

Designing Place

Topologies of Maker Labs

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I declare that the work presented in this thesis is my own.

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Abstract

This PhD thesis is working towards a techno-social ontology of 'place'. Place [*topos*] has been an underdeveloped concept in modern philosophical thought in 'the West', mainly subordinated to the more universal/ising terms time and space. Also media theory has often used conceptions of time as its primary category due to its foundation on notions of 'process'. Even though media theory and geography are increasingly converging, however predominantly through conceptions of space, considerable ontological treatments of medial place are still missing. In order to develop a notion of place/s that is more singular and pluralistic than Deleuze and Guattari's (spatial) rhizomes, which have now largely become the logics of post-Fordism, this thesis works with Peter Sloterdijk's topo-logy of *Spheres* – through, with, beyond and against Heidegger's ontology. *Spheres*, here systematically read as 'Being and Place', will however not just be explicated as universal/ising representation of Being/s, but as singularly de-constructing itself 'in the world' – via 'maker labs', i.e. meso-scale collaborative work-places where humans cohabit with/in technological systems to produce and share 'open designs' for local needs. Through a media-phenomenological approach close to the 'spherology', especially the third book, *Foams*, as well as the conception of 'organised networks' (Rossiter & Lovink), three of these labs will be explicated through their singular organisation/s of place: Vigyan Ashram, an experimental rural development college in Pabal (India) where school dropouts learn to design predominantly agricultural hardware and the 'natural' environment for local (survival) needs; the London Hackspace, a community-run hacker space where tinkerers make 'open designs' primarily in their spare time for experience value by sharing tools and knowledge; betahaus Berlin, a co-working space functioning as a mix of coffee house, home office, R&D lab, university, hacker space, carpentry

workshop and start-up incubator. The thesis concludes by pointing towards the limitations of *Spheres* as (philosophical) anthropology.

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Introduction

But where is time? Is it at all and does it have a place?¹

[...] I do not want to be so absolutely dogmatic and assert one could only understand Being out of time, perhaps tomorrow someone discovers a new possibility.²

This PhD thesis is working towards a techno-social ontology of 'place'. According to Edward S. Casey, throughout modern philosophical thought in 'the West', the concept of place [*topos*] has been "not only neglected but actively suppressed."³ Place has generally been conceived as a subcategory of the universal/ising terms time and space, by simply being seen as a point *in*, portion or modification of these.⁴ As Casey argues, it is only recently that philosophy has started to take a renewed interest in notions of place, citing thinkers such as Bachelard, Heidegger, Foucault, Derrida, Deleuze and Guattari as well as Irigaray. However, I would say that this philosophical concept has still hardly been developed as such.

I would furthermore add that also media theory has often used notions of time as its primary category, as one of *the* fields which have come out of the *acceleration* of technological development in modernity, hence being founded on notions of 'process'.⁵ The concept

¹ Heidegger, M. 'Zeit und Sein' in *Zur Sache des Denkens* in Gesamtausgabe Frankfurt a. M.: Vittorio Klostermann, 2007: 15 (my transl.): "Wo aber ist die Zeit? Ist sie überhaupt und hat sie einen Ort?"

² Heidegger, M. *Logik – Die Frage nach der Wahrheit* in Gesamtausgabe Frankfurt a. M.: Vittorio Klostermann, 1976: 267 (my transl.): "[...] ich will nicht so absolut dogmatisch sein und behaupten, man könnte Sein nur aus der Zeit verstehen, vielleicht entdeckt morgen einer eine neue Möglichkeit."

³ Getting Back into Place – Toward a New Understanding of the Place-World Bloomington, IN: IUP, 2009: xiv

⁴ Getting Back into Place – Toward a New Understanding of the Place-World Bloomington, IN: IUP, 2009; The Fate of Place: A Philosophical History Berkeley, London, Los Angeles: UCP, 1997

⁵ See, for example: Lazzarato, M. [transl. by Geene, S. & Stein E.] Videophilosophie – Zeitwahrnehmung im Postfordismus Berlin: b_books, 2002; Stiegler, B. [transl. by Beardsworth, R. & Collins, G.] Technics and Time 1: The Fault of Epimetheus Stanford, CA: Stanford University Press, 1998; Stiegler, B. [transl. by Barker, S.] Technics and Time 2: Disorientation Stanford, CA: SUP, 2008; Stiegler, B. [transl. by Barker, S.] Technics and Time 3: Cinematic Time and the Question of Malaise Stanford, CA: SUP, 2011; Virilio, P. [transl. by Polizzotti, M.] Speed and Politics: An Essay on Dromology New York: Semiotext(e), 1986; Virilio, P. [transl. by Degener, M.] Desert Screen: War at the Speed of Light London: Continuum, 2005; Virilio, P. [transl. by Rose, J.] The Futurism of the Instant: Stop-Eject Cambridge: Polity, 2010.

of place seems to be, literally, out of place.⁶ Even though media theory and geography are increasingly starting to converge – however predominantly through conceptions of space – ⁷ considerable *ontological* treatments of *medial place* are still missing. Over the following pages, place will be explicated not as deriving *from* time or space, but indeed as time *and* space. Place is the *in between* of time and space: *a singular* – not particular – *space-time*.

The globalising-globalised 'world' of (post-)modernity, where hardly any point on the geometric axis has become unreachable, appears as homogenised exterior (or -interior, however one wants to see it) through which capital *circulates*: a meta-technological mono'sphere'. Its only limit is itself, or so it seems to be. In order to develop a *differentiated* theory of 'the world' at the beginning of the 21st century, a change of its formation [*Bildung*] needs to *take place*. 'The world' is not universal, but pluralities of singular places – neither too 'macro', nor too 'micro', but *meso-scale* organisations, existing in each other, connecting with each other, crossing through each other, repelling each other, transgressing into each other, provoking each other, living next to each other. Places can neither be seen as the smallest homogeneous elements, nor as the largest decentralising processes, but as multi-dimensional hybrids where immanence and transcendence converge – in between 'the local' and 'the global'.

Due to the deepening pervasiveness of technological processes *throughout* 'the globalised world', we can talk about being placed in the 'anthropocene' – i.e. an epoch in which human culture is

⁶ Which has led some more geographical thinkers to conceive of 'non-places' (Augé, M. *Non-Places – An Introduction to Supermodernity* London & New York: Verso, 2008), a 'placeless culture' (Meyrowitz, J. *No Sense of Place – The Impact of Electronic Media on Social Behaviour* New York & Oxford: OUP, 1985) and 'placelessness' (Relph, E. *Place and Placelessness* London: Pion, 1976).

⁷ See, for example: Castells, M. *The Informational City: Information Technology, Economic Restructuring, and the Urban-Regional Process* Oxford: Basil Blackwell, 1989; Castells, M. *The Rise of the Network Society: The Information Age: Economy, Society, and Culture* Chichester: Wiley-Blackwell, 2010; Ekman, U. (ed.) *Throughout: Art and Culture Emerging with Ubiquitous Computing* Cambridge, MA: MIT Press, 2013; Fariás, I. and Bender, T. (eds.) *Urban Assemblages: How Actor-Network Theory Changes Urban Studies* London: Routledge, 2010; Farman, J. *Mobile Interface Theory – Embodied Space and Locative Media* Abingdon & New York: Routledge, 2012; Kitchin, R. & Dodge, M. *Code/Space: Software and Everyday Life* Cambridge, MA: MIT Press, 2011; McQuire, S. *The Media City: Media, Architecture and Urban Space* London: Sage, 2008.

increasingly manipulating 'nature' on a global scale.⁸ A contemporary ontology of place thus has to complicate the metaphysical dualities between nature and culture, biology and technology – which should not mean that difference is erased, but differentiates itself in different ways and in more complex forms. Living in the anthropocene thus involves to increasingly acknowledge the (social) relations between human and non-human formations, hence the decentring of the human and in turn to grasp the influence of the (more and more human-created) non-human on the human. In an increasingly cultivated 'world', the importance of design/ing becomes clear. Places are, to higher and higher extents, anthropo-technically designed places. They are designed places in the deeply connected systems of 'the world' (and beyond) and continuously morph by relatively keeping their volumes. Due to their malleability, anthropocenic places are 'open' places, i.e. they are 'open designs'⁹ – not absolutely open designs, as this would precisely take away the possibility for *any* design, but open in ways that keep them flexible enough in 'a world' in which they re-design *themselves* with/in immanent-transcendent forms.

In order to develop an ontology of place/s for the techno-social condition, this thesis will however not just consider place 'from the outside', i.e. as universal/ising *representation* of Being/s, but as *material-semiotic* environment/s, which are singularly designed-designing 'in the world'. One example of these new types [Arten] of singular environments are 'maker labs', i.e. meso-scale collaborative work-

⁸ The anthropocene thesis was popularised by the following article: Crutzen, P. & Stoermer, E. F. *The 'Anthropocene'* in *Global Change Newsletter* No. 41, May 2000: 17-18, accessed on: www.igbp.net/download/18.316f183_21323470177580001401/NL41.pdf, 31/05/2014. The term has been subject to much (controversial and often moralist-apocalyptic) debate in recent years – in the sciences, the arts and humanities as well as beyond. In this work, I am specifically using Peter Sloterdijk's version of the anthropocene, i.e. broadly understood as the epoch in which humans construct (the) world/s with/in technological systems, and thus as a wider movement towards, what I would call, a formational [Bildungs-] logics of place/s – which will become clearer in a bit (Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004 and *Wie groß ist 'groß'?* in Crutzen, P.; Sloterdijk, P. et al. *Das Raumschiff Erde hat keinen Notausgang – Energie und Politik im Anthropozän* Berlin: Suhrkamp, 2011: 93-110).

⁹ For less ontological notions of 'open design', see most essays in: van Abel, B.; Evers, L.; Klaassen, R. & Troxler, P. (eds.) *Open Design Now – Why Design Cannot Remain Exclusive* Amsterdam: BIS, 2011; Seaman, G. *Free Hardware Design - Past, Present, Future* talk at *Oekonux* conference, Dortmund, Germany, 2001, accessed on: www.nettime.org/Lists-Archives/nettime-l-0106/msg00048.html, 16/08/2014; Söderberg, J. & Daoud, A. *Atoms Want to be Free Too! Expanding the Critique of Intellectual Property to Physical Goods in tripleC* 10 (1), 2012: 66-76, accessed on: www.triple-c.at/index.php/tripleC/article/view/288, 16/08/2014.

places where humans cohabit with/in technological systems to produce and share 'open designs' for local needs.¹⁰ They are workshops in which physicality and virtuality, atoms and bits, biology and technology, science and art converge into a uniquely differentiated place. Because of their experimental and transdisciplinary approaches, maker labs challenge divisions between traditional fields such as architecture, software development, carpentry, biology, art and engineering by blurring the (economic) boundaries between conception and development, manufacturing, distribution and consumption into a new notion of 'open design'. Historically placed in the anthropocene, where 'the world' is anthropo-technically *made*, maker labs are formations that continuously re-design themselves, including their 'background' conditions (to extents), with/in the ecologies of 'the world' (and beyond).

Depending on their unique situations, maker labs can take on different forms – they can be a relatively stand-alone organisation or a mobile truck, are part of a university, college or school, a community centre, a co-working space or are located within a science and technology park. Sometimes the labs focus more on professional architecture and design, sometimes on technology education for children, DIY biology, art, on urban regeneration, rural development, music or on hobby tinkering – they are hybrids in any way and converge a number of different spheres. Maker labs are often not-for-profit organisations and hence largely financed by membership fees and donations, research- and government grants, while many also generate capital, or (exchange) value of sorts, through their own products and services. They thus often blur the boundaries between the informal sector, the third- and private- as well as sometimes also the public

¹⁰ I am using 'maker labs' as a collective term for places such as 'fab labs' (fabrication laboratories), 'hacker spaces', 'media labs', 'maker spaces' and similar workshops, as long as these do not focus almost exclusively on software practices – in order to emphasise the materiality of place/s as well as technological pervasiveness. Apart from maker labs, there are of course other singular techno-social environments that I could have chosen for this thesis, such as urban gardens, housing co-operatives or 'Occupy' for example, however I felt that maker labs were suited best due to their highly technological 'nature', high degrees of 'openness' and self-organisation at the same time, hybrid processes and localised manufacturing techniques.

sector, by forming *singular* types [Arten] of economy – i.e. *platial* economies, which are ‘locally’ grounded, but connected and enabled via ‘global’ infrastructures (such as the ‘free’ market, transport-, energy- and communication networks, including the internet for example).

The organisational forms of the labs tend towards ‘auto’-productive and participatory structures, in which open designs (including ‘the whole’ organisation itself) are not just produced via ‘global’ (post-)Fordist logics, but are personal- or small-group artefacts (sometimes commodities), which are made, together and alongside each other, via *topical* knowledge-exchange processes, *shared* resources and ‘*platial* production technologies’ (such as small 3D printers for example).¹¹ Maker labs thus promote a new model of formation [Bildung]: one that is more inclusive, polycentric, morphological and integrates the ‘minor’ skills of the crafts with the ‘higher’ skills of the arts and sciences, which have been separated/hierarchised since the industrial revolution. Rather than just *using* open designs, ‘makers’ also learn how to *develop* them, and also create (to certain extents) the *conditions* under which they are being developed. Whereas in mass production/consumption, people are generally involved in only *one stage* of the economic process – in accord with capitalist labour division and -specialisation rules, the relative separation of designers/producers/distributors/consumers as well as outsourcing strategies – in a maker lab these distinctions become blurred. Makers participate not just in *one*, but, more transdisciplinarily, in *many* economic processes, i.e. various types [Arten] of designing, producing, distributing and consuming. Maker labs are techno-social *places* where organisational processes are *singularised*. As Vilém Flusser already wrote in *The Shape of Things – A Philosophy of Design* in 1993,

You can be certain that the factory of the future will be much more adaptable than those of today, and it will be sure to redefine the relationship between

¹¹ See more on 3D printing in ‘Topologies of Maker Labs’ below.

human being and tool in a totally new way. We can count on it being possible to overcome the crazy alienation of the human being from nature and culture such as it was at the height of the machine revolution. The factory of the future will cease to be a madhouse and will become a *place* in which the creative potential of *homo faber* will come into its own. [...] It is therefore a question of topology [...].¹²

Maker labs can be conceived as what Ned Rossiter, Geert Lovink et al. have termed 'organised networks', or 'orgnets', i.e. new institutional forms emerging through today's informational economies and the logics of socio-technical networks.¹³ Since many countries have been undergoing dramatic social change in recent decades due to informationalisation, economic globalisation and neoliberal governance, Lovink and Rossiter argue that modern institutional systems and structures (such as states, unions, factories, firms, political parties and universities), which tendentially function through the logics of vertical integration, representation and (intellectual) property, i.e. through the *control of space*, are not able to cope with contemporary realities anymore. Because of their fairly static, closed and homogenous organisational structures, which increasingly have an asymmetrical relation to both their in- and external elements, modern institutions today can at most be seen as 'networked organisations', which merely *instrumentalise* the logics of (digital) networks to enhance their traditional institutional models. Networked organisations are increasingly embracing the horizontal and distributed logics of 'sharing', 'feedback' and 'flexibility', however thereby very often maintain their hierarchical and centralising structures. After all, precarity, short-termism and the logics of the 'user' are also the operative modes of post-Fordism.

¹² In *The Factory in The Shape of Things – A Philosophy of Design* London: Reaktion, 1999: 46 (my emphasis)

¹³ See, for example: Lovink, G. *From Weak Ties to Organized Networks – Ideas, Reports, Critiques* Amsterdam: Institute for Network Cultures, 2009, accessed on: <http://networkcultures.org/blog/publication/from-weak-ties-to-organized-networks>, 03/07/2015; Lovink, G. *Organizing Networks in Culture and Politics in Networks Without a Cause: A Critique of Social Media* Cambridge & Malden, MA: Polity, 2011: 158-175; Lovink, G. & Rossiter, N. *Dawn of the Organised Networks in Fibreculture Journal* Issue 5, 2005: Precarious Labour, accessed on: <http://five.fibreculturejournal.org/fcj-029-dawn-of-the-organised-networks>, 28/06/2015; Rossiter, N. *Organized Networks – Media Theory, Creative Labour, New Institutions* Rotterdam: NAi, 2006; Rossiter, N. *Organized Networks and Non-Representative Democracy* in Anderson, J. W., Dean, J. & Lovink, G. (eds.) *Reformatting Politics: Information Technology and Global Civil Society* Milton Park & New York: Routledge, 2006: 19-34; Rossiter, N. *Autonomous Education, New Institutions and the Experimental Economy of Network Cultures* in O'Neill, P. & Doherty, C. (eds.) *Locating the Producers: Durational Approaches to Public Art* Amsterdam: Valiz, 2011: 327-337.

In contrast to networked organisations, Rossiter and Lovink propose 'organised networks' as new institutional forms, i.e. *new spaces of 'the political'*, which can deal with the contingent forces of informational systems while at the same time providing security, stability and freedom. Organised networks are characterised by transdisciplinarity,¹⁴ hybridity, (a high level of) self-organisation and collaboration, often advocate open-source culture and are based on the logics of post-representational politics by conceiving of conflict as a generative process. Orgnets are loose enough to continuously reinvent themselves, enable participants to come and go whenever they want and be involved in decision-making processes, however in this way also bear the potential for unexpected harm and even destruction, and often prevent themselves from being organised in the first place. This 'openness' of organised networks is thus their strength and weakness at the same time – it is a continuous negotiation process for orgnets to stay inclusive and heterarchical while ensuring sustainability. Hierarchical and centralising tendencies are hence not antithetical to organised networks, but to certain extents needed so that decisions can be made and the networks be *maintained*.

Maker labs can be seen as a type [Art] of organised network. However, whereas Rossiter and Lovink largely theorise orgnets as *political spaces* (sometimes also through temporal frameworks), I consider them as *ontological places*. I.e. I see the techno-social condition as a larger epochal evolution from the modern age of time and space towards one of place, which functions through singularisation/s – the situation in and through which organised networks are beginning to operate. Rossiter in contrast is reluctant to attribute ontological status to the socio-technical form of the network since this rendering into essentialist terms functions "to elide the complexities and contradictions that comprise the uneven spatio-temporal dimensions

¹⁴ Not 'interdisciplinarity', as this is the logics of private and public research centres (Rossiter, N. Organized Networks – Media Theory, Creative Labour, New Institutions Rotterdam: NAI, 2006: 19).

and material practices of networks,"¹⁵ hence he understands orgnets primarily as political strategies. What is needed, according to him, is a *political theory* of networks in order to invent new institutional forms. I would not deny the need for a political theory of networks, however this needs to be *grounded* in an *ontology* – of place, and not primarily space or time – in order *not* to ignore both larger and smaller historico-structural processes. An ontology does not need to be essentialist if it recognises its own hybridities and (material) complexities. It is in this way that Rossiter and Lovink sometimes fall back into making metaphysical idealisations, such as orgnets being "external to the corporate-state apparatus;"¹⁶ the need to create self-sustaining media ecologies "that are simply not on the map of established political and cultural institutions;"¹⁷ or there being "no possibility of representational democracy" in orgnets "due to the architectonic properties of immanent forms of social-political organisation" –¹⁸ which are not in line with their methodology of 'immanent critique'. Orgnets understood as 'places' will necessarily function *in, through, with* and *against* the corporate-state apparatus, established political and cultural institutions and representational democracy.

With Lovink and Rossiter, we furthermore do not get to know much about how exactly organised networks do or might look like and how they function as singularities. Acknowledges Rossiter, "There will be no universal model that applies to the dynamics of networks, which by definition are singular, albeit with patterns, tendencies, and resources that may overlap."¹⁹ And together with Lovink: "[...] There is no universal formula for how an organised network might invent its conditions of

¹⁵ Organized Networks – Media Theory, Creative Labour, New Institutions Rotterdam: NAI, 2006: 47

¹⁶ Rossiter, N. Organized Networks – Media Theory, Creative Labour, New Institutions Rotterdam: NAI, 2006: 54

¹⁷ Rossiter, N. Organized Networks – Media Theory, Creative Labour, New Institutions Rotterdam: NAI, 2006: 49

¹⁸ Rossiter, N. Organized Networks – Media Theory, Creative Labour, New Institutions Rotterdam: NAI, 2006: 54

¹⁹ Organized Networks – Media Theory, Creative Labour, New Institutions Rotterdam: NAI, 2006:15 (my emphasis)

existence. There will be no 'internationalism' for networks."²⁰ Even though the authors recognise the singularity of organised networks, this singularity is only partially realised in their writings since they largely concern themselves with the 'universal'/representational dimensions of these new institutional forms. Examples of orgnets such as the 'Sarai' programme in Delhi, the Institute of Network Culture's 'Winter Camp 09' (including its participant networks) and the 'self'-organisation of domestic workers in Hong Kong are mentioned for instance,²¹ however these cases are not really explicated much in their singular material dimensions.

Apart from organised networks, maker labs could also be considered 'communities of practice' (CoPs), a conception coined by cognitive anthropologists Jean Lave and Étienne Wenger.²² CoPs are broadly conceived as being "formed by people who engage in a process of collective learning in a shared domain of human endeavour,"²³ and are rooted in theories of social and situated learning practices, often used in approaches to knowledge management in organisations. The concept emerged through the perceptions that, in a changing and complex interconnected world, learning is: not an individual operation with a beginning and an end, but a social process; not the (abstract) result of teaching, but active engagement and production of knowledge; not separate from other activities and contexts, but essentially pervading lived experience and situated in the world.

²⁰ Dawn of the Organised Networks in *Fibreculture Journal* Issue 5, 2005: Precarious Labour, accessed on: <http://five.fibreculturejournal.org/fcj-029-dawn-of-the-organised-networks>, 28/06/2015

²¹ See Rossiter, N. *Autonomous Education, New Institutions and the Experimental Economy of Network Cultures* in O'Neill, P. & Doherty, C. (eds.) *Locating the Producers: Durational Approaches to Public Art* Amsterdam: Valiz, 2011: 327-337; Lovink, G. *Organizing Networks in Culture and Politics in Networks Without a Cause: A Critique of Social Media* Cambridge & Malden, MA: Polity, 2011: 158-175; Neilson, B. & Rossiter, N. *Precarity as a Political Concept, or, Fordism as Exception in Theory, Culture & Society* Vol. 25 (7-8), 2008: 51-72.

²² See, for example: Lave, J. & Wenger, É. *Situated Learning – Legitimate Peripheral Participation* New York: CUP, 1991; Wenger, É. *Communities of Practice – Learning, Meaning, and Identity* New York: CUP, 1998; Wenger-Trayner, É. & B. *Introduction to Communities of Practice*, accessed on: <http://wenger-trayner.com/introduction-to-communities-of-practice>, 25/01/2015.

²³ Wenger-Trayner, É. & B. *Introduction to Communities of Practice*, accessed on: <http://wenger-trayner.com/introduction-to-communities-of-practice>, 25/01/2015. For a more detailed understanding of when a CoP takes place, see Wenger, É. *Communities of Practice – Learning, Meaning, and Identity* New York: CUP, 1998: 125-6.

In many ways, one can conceive maker labs as places where social learning practices are situated and sustained (although the labs have, to my knowledge, not specifically been considered by the CoPs discourse yet). This PhD thesis will however only partially consider these socio-practical environments as places *for learning*, but more broadly as *ontological* ones. As explained, in an epoch where 'the world' is to high extents anthropo-technically designed, this thesis particularly considers the labs as *techno-social* places, i.e. as (ontological) *media*. It is hence only partly concerned with human *cognitive* (micro) processes and how these just take place *in* organisations such as maker labs, and how one could cultivate these for management purposes, but rather with how the more *material* organisational form/s as which the labs function operate singularly with/in anthropo-technical Being/s.

While considering maker labs generally as a type [Art] of organised network in the techno-social epoch, this PhD project will furthermore explicate the singular platial dynamics of three of these places. These are: Vigyan Ashram, an experimental rural development college including 'fab lab' in Pabal (India) where school dropouts learn to design predominantly agricultural hardware and the 'natural' environment for local (survival) needs; the London Hackspace, a community-run hacker space where tinkerers make 'open designs' primarily in their spare time for experience value by sharing tools and knowledge; betahaus Berlin, a co-working space including 'Open Design City' functioning as a mix of coffee house, home office, R&D lab, university campus, hacker space, carpentry workshop and start-up incubator.²⁴ A techno-social ontology of place cannot just be conceived as a (representative) 'universal', but always act-ualises itself through singular materialities.

Although considerable ontological treatments of techno-social place/s are still missing, an approximation can be found in the

²⁴ The labs were chosen on the basis of 'platial', i.e. geographic-functional, diversity as well as activity levels in order to gain sufficient material. Since the aim of this thesis is to start developing a techno-social ontology of (singular) place, any maker lab would have been suitable to research in principle due to the singular culture/s of each.

'rhizomatic' thought of Gilles Deleuze and Félix Guattari. In *A Thousand Plateaus*,²⁵ Deleuze and Guattari developed the rhizome as a spatial concept to think multiplicity, immanence, relationality and experience in techno-logical capitalism. In contrast to arborescent systems, rhizomes do not include individual beings, points or positions mainly hierarchically organised *in space*, but machinic multiplicities that connect with other multiplicities intensively, continuously and largely heterarchically *as space/s*. Multiplicities here must not be understood as collections of units, or as being 'overcoded' by unity, but as spanning across all of their dimensions (i.e. 'directions in motion'), which increase with the connections being made on them. Rhizomes do not have a beginning or an end, but always a middle [*milieu*] (which is neither an average nor a centre) from which they grow. They are always "between things, interbeing, *intermezzo*"²⁶ and are characterised by the (intensive) 'outside', i.e. by the 'abstract line', the 'line of flight' and deterritorialisation through which they continuously change in 'nature' and connect with others, i.e. *become*.

Rhizomes exist as complex differentiations between 'nomad space' and 'sedentary space'. Nomad space, or 'smooth space', is *tendentially* open, undetermined, intensive, deterritorialising, local and abstract; sedentary space, or 'striated space', is *tendentially* closed, delimited, metric, extensive, territorialising, global and figurative. Smooth space and striated space always exist in mixture and cannot be conceived as dualities. "Smooth space is constantly being translated, transversed into a striated space; striated space is constantly being reversed, returned to a smooth space."²⁷ Smooth space and striated space always intermingle, but never completely coincide. Thus, "it is possible to live striated on the deserts, steppes, or seas; it is possible

²⁵ *A Thousand Plateaus: Capitalism and Schizophrenia* London & New York: Continuum, 2004

²⁶ Deleuze, G. & Guattari, F. [transl. by Massumi B.] *A Thousand Plateaus: Capitalism and Schizophrenia* London & New York: Continuum, 2004: 25

²⁷ Deleuze, G. & Guattari, F. [transl. by Massumi B.] *A Thousand Plateaus: Capitalism and Schizophrenia* London & New York: Continuum, 2004: 474

to live smooth even in the cities, to be an urban nomad."²⁸ These two 'voyages' are neither distinguished by "a measurable quantity of movement, nor something that would be only in the mind, but [by] the mode of spatialisation, the manner of being in space, of being for space."²⁹

In some ways, the rhizome is a useful concept to think techno-social place/s, even though largely described as space/s. However, like Rossiter and Lovink, I am a bit suspicious of a 'naïve Deleuzomania' where 'everything connects with everything',³⁰ which has now largely become the logics of post-Fordism.³¹ The problem with a rhizomatic model for me is its relative flatness, tendency to hyper-differentiate and universalise. The overall emphasis for Deleuze and Guattari is on 'smoothing striated space', which, for all its r/evolutionary potential, unfortunately also smoothes singularity. When all hyper-differentiated multiplicities with short-term memory/history connect and 'become' with each other on an a-centred '*plane of immanence*', there is no real conception of alterity and plurality, and difference actually tends to dissolve. As Deleuze and Guattari wrote themselves, by following Toynbee: "Nomads [...] do not move."³² The rhizome becomes a universal with no outside (due to 'becoming' *absolutely* outside).

This has the following implications: In the globalising-globalised 'world' of the 21st century, it has become increasingly apparent that even though places are highly connected, one place can be very *different* from another. Places are singular and can thus also clash and repel each other, or at least keep a certain distantiality due to unique

²⁸ Deleuze, G. & Guattari, F. [transl. by Massumi B.] *A Thousand Plateaus: Capitalism and Schizophrenia* London & New York: Continuum, 2004: 484

²⁹ Deleuze, G. & Guattari, F. [transl. by Massumi B.] *A Thousand Plateaus: Capitalism and Schizophrenia* London & New York: Continuum, 2004: 484

³⁰ Lovink, G. & Rossiter, N. *Dawn of the Organised Networks* in *Fibreculture Journal* Issue 5, 2005: Precarious Labour, accessed on: <http://five.fibreculturejournal.org/fcj-029-dawn-of-the-organised-networks>, 28/06/2015

³¹ Which is why Rossiter's reading puts more emphasis on the Deleuzian notion of the 'constitutive outside' combined with Marxist/autonomist conceptions around limits and uneven development. Since my project is to develop a techno-social onto-logy of place however, I have chosen a slightly different approach and set of main theorists, as we will get to shortly.

³² Deleuze, G. & Guattari, F. [transl. by Massumi B.] *A Thousand Plateaus: Capitalism and Schizophrenia* London & New York: Continuum, 2004: 482

differentiations – problematics that are inadequate to think via a flat, spatial ontology. Furthermore, places are increasingly technologically *designed* places – which brings up the question through which (historical) conditions they are designed. Even though rhizomatic thought is what could be called ‘productive’ or ‘creative’, because of its focus on (rather ‘passive’) affective relations it is limited in conceiving of design/ing as well as the (‘self’-)organisation of this design/ing – in ‘a world’ in which very different designs are *co-existing*.

In order to develop a techno-social ontology of place [*topos*], which is more ‘voluminous’ and pluralistic than the rhizome, this PhD thesis works with the topo-logy of Peter Sloterdijk’s *Spheres* [*Sphären*] project – through, with, beyond and against Martin Heidegger’s ontology. As Casey has already ‘dis-covered’, Heidegger is one of the most important theorists of place in recent philosophical history. Even though notions of place appeared in his writings and lectures from the very beginning, only little attention has been paid to them, including by (especially the early) Heidegger himself. So far, he has primarily been read from a temporal point of view, particularly his early work, apart from some exceptions – ³³ partly due to the intention of *Sein und Zeit* at the time, which was to critique the ‘Western’ tradition of metaphysics in order to develop more *processual* notions of beings through Being. Thus, platiality (and even spatiality) was ‘secondary’ to temporality. In his later works after ‘the turn’, Heidegger then put more emphasis on the *places* of Being to close the phenomenological circle. In order to ground Sloterdijk’s topology, this thesis will explicate Heidegger’s ontology through a techno-platial framework across (a selection of) his

³³ See, for example: de Beistegui, M. *The Place of Architecture in Thinking with Heidegger – Displacements* Bloomington & Indianapolis, IN: Indiana University, 2003: 139-168; Casey, E. S. *Proceeding to Place by Indirection – Heidegger in The Fate of Place: A Philosophical History* Berkeley, London, Los Angeles: UCP, 1997: 243-284; parts of Elden, S. *Mapping the Present – Heidegger, Foucault and the Project of a Spatial History* London & New York: Continuum, 2001; Malpas, J. *Heidegger’s Topology: Being, Place, World* Cambridge, MA & London: MIT, 2008; Malpas, J. *Heidegger and the Thinking of Place – Explorations in the Topology of Being* Cambridge, MA & London: MIT, 2012. Even though these writers have paid attention to conceptions of place in Heidegger’s work, they have however not focused much on technicity and even less on notions of ‘design’ as well as are unclear at times about the difference between space/s and place/s.

works, by focusing on the notions of 'Being-in(-the-world)', 'Thingliness', 'Ge-Stell', 'Dwelling', 'Entwurf' ['Design'] and 'Being-With'.

Although the *Spheres* project is not to be read as simply a continuation of the work of Heidegger, he is one, if not *the*, most important inspiration for Sloterdijk – in my view, the 'spherology' can not be sufficiently grasped without informing it by, as well as setting it against, Heidegger's techno-platial conceptions. As Sloterdijk says himself, *Spheres* is to be read as 'Being and Space'.³⁴ For me, however, it is more precisely to be read as 'Being and *Place*'.³⁵ With the spherology, Sloterdijk has developed a historico-philosophical, anthropologically grounded 'media' theory after Heidegger that conceives of place as medium, as conductivity: in some'thing' through some'thing' into some'thing'. Being-in-spheres is the fundamental condition [*Grund-ver-fassung*].³⁶ By conceiving Heidegger's early work from a spatial point of view and building upon his later, more platial, thought, Sloterdijk 'substantialises' the existential analytic and develops 'world'/s in more physical (one might say 'ontic'), constructivist, pluralistic, medially complex and social forms.

The 'spherical phenomenology' is designed in three parts: *Bubbles* [*Blasen*] ('micro spherology'), *Globes* [*Globen*] ('macro spherology') and *Foams* [*Schäume*] ('plural spherology'). Each thereby explicates a different epoch of human civilisation, i.e. a different form of Being-in-the-world: the age of hunter-gatherers, the age of agro-empires and the technological age (i.e. the anthropocene). The first book, *Bubbles*, explicates the micro-spherical elements, i.e. 'nobjects', as formations [*Form-Bildungen*] of intimate, communal immanences: 'first places'. It aims to explain the 'underworld of the interior world' by describing the anthropogenesis. *Globes* then concerns itself with the

³⁴ See Sloterdijk, P. *Sphären I: Blasen* Frankfurt a. M.: Suhrkamp, 1998: 345; cf. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 59.

³⁵ It is not that Sloterdijk does not recognise the significance of place in his work – on the contrary. He however mostly uses the words 'space' and 'place' interchangeably, which I think leads *Spheres* to lose some of its conceptual power. Place is not (just) a universal/ising representation of 'the world', but singularly immanent-transcendent with/in it.

³⁶ '*Fassung*', i.e. 'composure' or 'frame', is related to '*fassen*', i.e. '(to) grasp'.

macro spheres and gives a historical account of metaphysics, which is also a history of socio-political worlds – i.e. a history of *globalisation*, in the very sense of the word. Globes are the ‘next’ dimension in the maturation process of the human who now increasingly becomes an ‘individual’, i.e. a subject, putting itself into an ever more constructive relation with ‘the world’ by representing it, or setting it before [*vorstellen*], as picture. The last book of the trilogy, *Foams*, is the plural spherology – the critique of the present [*Gegen-wart*] – and aims, at the same time, to be a most intimate and most general theory of our current age. It conceives of globalisation not as *the* globalisation, but of globalisation as an ‘enfoaming’. *Foams* is a theory of co-fragile, hybrid human environments, which increasingly ek-splicate, i.e. technologically design, *themselves*. ‘Societies’ are now magnitudes that form [*bilden*] *themselves*, contain *themselves*, ‘climatise’ *themselves* – *in* and *with others*. The anthropocene epoch is ‘Being-in-the-world 2’. It is in the third book where Sloterdijk’s topo-logy really comes together – which can in no way be grasped outside of the (multi-historical) dimensions of *Bubbles* and *Globes*. At the time of writing, only the first and second volumes of the trilogy, *Bubbles* and *Globes*, were available in English,³⁷ which is why there has not been extensive literature on *Spheres* in the English-speaking world/s so far.³⁸ The small amount that is available does however not so much explicate the trilogy as an ontological, or topological, model and thus misses the importance of understanding it in a systematic form as ‘a whole’.³⁹

³⁷ Sloterdijk, P. [transl. by Hoban, W.] *Bubbles – Spheres I* Los Angeles, CA: Semiotext(e), 2011; Sloterdijk, P. [transl. by Hoban, W.] *Globes – Spheres II* Los Angeles, CA: Semiotext(e), 2014.

³⁸ This literature includes parts of the following: Elden, S.; Mendieta E. & Thrift, N. (eds.) *Environment and Planning D: Society and Space – Special Issue: The Worlds of Peter Sloterdijk* Vol. 27: 1, 2009; Elden, S. (ed.) *Sloterdijk Now* Cambridge & Malden, MA: Polity, 2012; Schinkel, W. & Noordegraf-Eelens, L. (eds.) *In Medias Res – Peter Sloterdijk’s Spherological Poetics of Being* Amsterdam: AUP, 2011; *Cultural Politics Special Issue: Peter Sloterdijk*, Volume 3, Issue 3, November 2007, Oxford: Berg: 271-398; van Tuinen, S. & Hemelsoet, K. (eds.) *Measuring the Monstrous – Peter Sloterdijk’s Jovial Modernity* Brussels: KVAB, 2008.

³⁹ The closest attempt is probably Marie-Eve Morin’s essay *Cohabiting in the globalised world: Peter Sloterdijk’s global foams and Bruno Latour’s cosmopolitics* in Elden, S.; Mendieta E. & Thrift, N. (eds.) *Environment and Planning D: Society and Space – Special Issue: The Worlds of Peter Sloterdijk* Vol. 27: 1, 2009: 58-72. Morin’s argument however concentrates mainly on the second book of the trilogy, *Globes*, together with Sloterdijk’s *In the World Interior of Capital (Im Weltinnenraum des Kapitals* Frankfurt a. M.: Suhrkamp, 2006), i.e. the (unofficial) ‘second part’ of *Globes*, and not so much on *Bubbles* and *Foams*, which is why I think her essay is a bit limited in its conceptual understanding of the topo-logy.

In order to show how a platial logics of 'foams' functions 'in the world', this thesis will use Sloterdijk's spherical phenomenology after Heidegger to explicate the topologies of maker labs – a type [Art] of formation [Bildung] paradigmatic of the 'foamal' epoch. I.e. as organised networks, maker labs are considered (primarily) as foams, (primarily) *in* the epoch of foams. However, due to the multi-historical dimensionalities of 'the whole' spherology, maker labs also have to be situated with/in and against the epochs of 'bubbles' and 'globes' since, as media-anthropo-logical places in the process of history, different forms of Being-in-the-world condition and simultaneously co-exist with each other. I will thus not just 'universally' consider maker labs by setting them before as representational ob-jects, but also generate the topologies of three singular places – Vigyan Ashram, the London Hackspace and betahaus Berlin – via a 'media-phenomenological' approach, close to the spherology.

At the time of writing, there was not much (semi-)academic literature on maker labs available and the little that was published was often under-theorised and/or not very comprehensive and did not explore the labs much from an ontological, or topological, point of view (especially not through a 'spherological' framework) – thus falling short of grasping the phenomenon through its place/s within media-anthropo-logical evolution processes.⁴⁰ As explained above, even with Rossiter and Lovink we do not get to know much about how exactly organised networks do or might look like and how they function as singular materialities 'in the world' since, in their writings, they largely

⁴⁰ This literature includes (in parts or in full): Büching, C. & Walter-Herrmann, J. (eds.) *FabLab – Of Machines, Makers and Inventors* Bielefeld: Transcript, 2013; Charny, D. (ed.) *Power of Making – The importance of being skilled* London: V&A, 2011; Frost, C. *Media Lab Culture in the UK on Furtherfield*, 28/08/2012, accessed on: www.furtherfield.org/features/articles/media-lab-culture-uk, 06/01/2013; Gershenfeld, N. *Fab: The Coming Revolution on Your Desktop – From Personal Computers to Personal Fabrication* New York: Basic Books, 2005; Grenzfurthner, J. & Schneider, F. A. // *Hacking the Spaces* on *monochrom*, accessed on: www.monochrom.at/hacking-the-spaces, 07/01/2013; Kera, D. *Hackerspaces and DIYbio in Asia: Connecting Science and Community with Open Data Kits and Protocols* in *Journal of Peer-Production* Issue 2, July 2012, accessed on: <http://peerproduction.net/issues/issue-2/peer-reviewed-papers/diybio-in-asia>, 17/08/2014; maxigas *Hacklabs and Hackerspaces – Tracing Two Genealogies* in *Journal of Peer Production* Issue 2, July 2012, accessed on: http://peerproduction.net/issues/issue-2/peer-reviewed-papers/hacklabs-and-hackerspaces/?utm_source=rss&utm_medium=rss&utm_campaign=hacklabs-et-hackerspaces-deux-genealogies-journal-of-peer-production, 26/04/2014.

concern themselves with the 'universal'/representational dimensions of these new institutional forms.

If it was not about developing an onto-logy of place through a spherological framework, which is more 'voluminous' and pluralistic than the rhizome, and about showing in which ways a logics of place, understood as foam/s, functions singularly 'in the world' through maker labs, the most obvious choice of how to empirically study these techno-social systems would possibly be through Actor-Network Theory (ANT).⁴¹ Coming out of the convergence of sociology and science and technology studies, ANT includes a number of different viewpoints and has undergone transformation over the years, however one can broadly summarise the following: A 'network' comprises heterogenous non-/human material-semiotic 'actors' (or 'actants') that largely heterarchically assemble with each other. Rather than focusing on networks or actors *per se* however, ANT primarily studies the complex relations *between* actors, i.e. it follows them *through* 'society' (for example the networks around 'global' science laboratories or transport infrastructures) in order to avoid essentialist explanations of events or innovations. As Latour writes, "[...] Social is *not a place*, a thing, a domain, or a kind of stuff but a provisional movement of new associations."⁴² Hence, instead of analysing 'facts' that are already given, ANT describes their production (micro) processes. In this way, 'facts' cease to be facts and act-ually become *artefacts*.

In my view, ANT is problematic for explicating place/s in similar ways as rhizomatic thought (even if also quite different in approach). Due to its flatness and relativism, the methodology cannot adequately explain how or why particular relations come into being *in the first 'place'*, i.e. it can not explain their (historical) conditions and limitations,

⁴¹ See, for example: Latour, B. & Woolgar, S. Laboratory Life – The Construction of Scientific Facts Princeton, NJ & Chichester: PUP, 1986; Latour, B. [transl. by Porter, C.] Aramis or The Love of Technology Cambridge, MA: HUP, 1996; Law, J. & Hassard, J. (eds.) Actor Network Theory and After Malden, MA & Oxford: Blackwell, 1999; Latour, B. Reassembling the Social – An Introduction to Actor-Network-Theory New York & Oxford: OUP, 2005.

⁴² Reassembling the Social – An Introduction to Actor-Network-Theory New York & Oxford: OUP, 2005: 238 (my emphasis)

or only in restricted ways. Although ANT is very successful at showing how complex systems are in-the-making, it can only do so quite 'universally' and in the short term, while not much considering the larger and more continuous 'background/s' these (mainly 'foreground') processes are functioning in, through, with and against – or indeed how 'backgrounds' are *also* being made, as well as co-exist with *other* 'backgrounds' (and 'foregrounds'). By 'translating' all actors onto *one* decentralised network of equivalence, singularity, difference and alterity are again undermined. Due to ANT's focus on construction processes and relations while largely ignoring *what* is more *continuously* constructed, through which conditions as well as the co-existence with other constructions, by conceiving of the constructed simply as effect, ANT repeats the metaphysical duality between process and being. In order to overcome this duality, 'places' have to be explicated as neither primarily processes nor primarily beings, but as processes *and* beings in the same differentiated move. Explicating the topo-logies of maker labs, understood as *polycentralised* work-places in the epoch of foams, through a media-phenomenological approach includes *situating* them through, with/in and against their singular (historical) conditions and limitations – which have been anthropo-technically *made* (to extents) as well as co-exist with others.

The subsequent pages will develop in the following form: Chapter I explicates 'Heidegger's Techno-Platial Ontology'. By doing a *topical* reading whilst trying to think through and with as much as beyond and against Heidegger, I will not attempt to *determine* notions of place in his work, but take a more *constructive* approach by explicating the places *around* place, which will ground the second chapter on 'Sloterdijk's Spherology'. These places include: 'Being-in(-the-World)', 'Thingliness', 'Ge-Stell', 'Dwelling', 'Entwurf' ['Design'] and 'Being-With'. Through and against Heidegger's notions around place and technicity, chapter II will develop the *Spheres* trilogy as a *topo-logical* model – i.e. as a more systematic design than the original text, which is not just a (media-)

philosophical essay, but equally, if not more so, a work of literature. I will hence explicate the logics (and poetics) of the three books, i.e. three epochs, of the spherology – *Bubbles*, *Globes* and *Foams* – which are not just to be understood as a linear progression, but as multi-dimensional, cyclical formations [*Bildungen*] of (the) world/s. In chapter III, I will explicate the topologies of maker labs through the techno-social frameworks developed by Sloterdijk (via Heidegger) while *primarily* placing the labs in the epoch of foams, as foams, however nevertheless situating them with/in and against the epochs of bubbles and globes – since different forms of Being-in-the-world condition and simultaneously co-exist with each other in the process of history. I will specifically develop the singular topologies of Vigyan Ashram, the London Hackspace and betahaus Berlin via media-phenomenological approaches close to the spherology in order to show how the theory de-constructs itself ‘in the world’. In the conclusion, I will point out the limitation of the Sloterdijkian topology of *Spheres* as (philosophical) anthropology and lead towards further *topoi* of research for developing a techno-social ontology of place/s.

I Heidegger's Techno-Platial Ontology

This chapter explicates Heidegger's ontology through a techno-platial frame across some selected works in order to ground Sloterdijk's 'spherology' and thus to generate the topologies of maker labs. As explained above, even though notions of place appeared in Heidegger's writings and lectures from the very start, only minor attention has been paid to them, including by (especially the early) Heidegger himself, apart from some exceptions. The writers who have paid attention to conceptions of place however have not at the same time focused much on technicity and even less on notions of 'design' as well as are unclear at times about the difference between space/s and place/s. So far, Heidegger has primarily been read through a temporal prism, particularly his early work – partly due to the intention of his major work *Sein und Zeit* (SZ) at the time. As a critique of the 'Western' tradition of metaphysics, SZ tried to develop a processual notion of *Being* in order to go beyond the 'ontic', 'intellectualist' and rather static, i.e. 'present-at-hand' [*vor-handene*], understandings of *beings*, especially in their Aristotelian, Cartesian and Kantian versions. Platiality (and even spatiality) were thus 'secondary' to temporality. In his later works after 'the turn', Heidegger then put more emphasis on the *places* of *Being* in order to close the phenomenological circle. As he wrote in 1949,

This turn is not a change of standpoint from 'Being and Time', rather in it, the attempted thinking firstly arrives at the place [*Ortschaft*] of the dimension out of which 'Being and Time' is experienced and indeed experienced out of the fundamental experience of the oblivion of *Being*.⁴³

⁴³ Heidegger, M. *Über den Humanismus* Frankfurt a. M.: Vittorio Klostermann, 1968: 17 (my transl.): "Diese Kehre ist nicht eine Änderung des Standpunktes von 'Sein und Zeit', sondern in ihr gelangt das versuchte Denken erst in die der Dimension, aus der 'Sein und Zeit' erfahren ist und zwar erfahren aus der Grunderfahrung der Seinsvergessenheit."

In 1962, he even admitted that “the attempt in ‘Being and Time’ §70 to derive the spatiality of Dasein from temporality is untenable.”⁴⁴ In the *Seminar in Le Thor 1969*, Heidegger revealed the three steps of his way of thinking throughout life: Meaning – Truth – Place (*topos*).⁴⁵ Hence, in *Aus der Erfahrung des Denkens* [*Out of the Experience of Thinking*] he could say,

But thinking poetry is in truth
the topology of Being.⁴⁶

Since Heidegger’s conceptions of and around place (as well as their importance) have been inconsistent across his works and since this *topical* reading tries to think through and with as much as beyond and against Heidegger,⁴⁷ the chapter will ‘proceed to place by indirection’, in Casey’s words.⁴⁸ The following pages will not so much attempt to *determine* notions of place in Heidegger, but rather take a more *constructive* approach by explicating his most important conceptions (within the constraints of this PhD thesis) in the *places around place*, which will *inform* the next chapter on Sloterdijk’s topo-logy of *Spheres*. These conceptions include: ‘Being-in(-the-World)’, ‘Thingliness’, ‘Ge-Stell’, ‘Dwelling’, ‘Entwurf’ [‘Design’] and ‘Being-With’. Within each section, I have tried to work through Heidegger’s writings and lectures historically in order to show the evolution of his thought. The choice of texts explicitly dealt with was determined by what they could *add* to and how they could *develop* the above notions throughout the course

⁴⁴ Heidegger, M. ‘Zeit und Sein’ in *Zur Sache des Denkens* in *Gesamtausgabe* Frankfurt a. M.: Vittorio Klostermann, 2007: 29 (my transl.): “Der Versuch in ‘Sein und Zeit’ §70, die Räumlichkeit des Daseins auf die Zeitlichkeit zurückzuführen, läßt sich nicht halten.”

⁴⁵ ‘Seminar in Le Thor 1969’ in *Seminare* in *Gesamtausgabe* Frankfurt a. M.: Vittorio Klostermann, 1986: 344.

⁴⁶ Heidegger, M. ‘Aus der Erfahrung des Denkens’ in *Aus der Erfahrung des Denkens* in *Gesamtausgabe* Frankfurt a. M.: Vittorio Klostermann, 1983: 84 (my transl.): “Aber das denkende Dichten ist in der Wahrheit / die Topologie des Seyns.”

⁴⁷ The ‘topicality’ of this reading also includes my own topical translations of Heidegger’s work.

⁴⁸ *Proceeding to Place by Indirection – Heidegger* in *The Fate of Place: A Philosophical History* Berkeley, London, Los Angeles: UCP, 1997: 243-284

of this chapter.⁴⁹ I will proceed by firstly doing close readings of selected original texts through the *topoi* mentioned and conclude with a summary and discussion by further developing the conceptions explicated as well as pointing forward to the spherology.⁵⁰

Being-in(-the-World)

In *Sein und Zeit* from 1927, Heidegger started his explication of platiality (however largely described as spatiality or 'roomliness' [*Räumlichkeit*]) through the notion of being-in-the-world, the type [*Art*] of Being which is most *proximate* to (human) *Da-sein* [being-there]. Being-in-the-world always has to be seen as a structurally whole phenomenon and is grounded in, or oriented through, the primary dimensionality of Being-in:

What is meant by *Being-in*? We define this expression firstly as Being-in 'in the world' and are inclined to understand this Being-in as 'Being in ...'. This terminus designates the type of Being [*Seinsart*] of being which is 'in' something else, such as water 'in' the glass, the dress 'in' the wardrobe. By the 'in' we mean the relation of Being of two beings extended 'in' space towards each other in relation to their place [*Ort*] in this space. Water and glass, dress and wardrobe are both in the same way 'in' space and 'at' a place. This relation of Being can be expanded, e.g.: The bench in the lecture theatre, the lecture theatre in the university, the university in the city and so on, up to: The bench in 'space' [*Weltraum*]. These beings whose being-'in'-each-other can be defined in this way all have the same type of Being of being-present-at-hand as things which are there 'within' the world. [...] Being-in on the other hand means a condition of Being [*Seinsverfassung*] of *Dasein* and is an *existentiale*. With this, one cannot then think of the being-present-at-hand of a corporeal thing (human corps) 'in' a being that is present-at-hand. [...] 'In' is derived from *innan-*, dwelling [*wohnen*], *habitare*, to be located [*sich auf-halten*]; 'at' means, I am accustomed to [*ge-wohnt*], familiar with, I care for something; it has the meaning of *colo* in the sense of *habito* and *diligo*. [...] Being as infinitive of 'I am', i.e. understood as *existentiale*, means dwelling by [*wohnen bei*]... being familiar with... *Being-in is thus the formal existential expression for the Being of Dasein, which has the essential condition of being-in-the-world.*⁵¹

⁴⁹ Hence, some important writings have not been included, such as *Die Kunst und der Raum* [Art and Space] for example, since it did not develop my reading further.

⁵⁰ As part of this PhD project, I do not deem it useful to go into any discussions on potential links between Heidegger's notions around place and his temporary involvement with Nazism – Jeff Malpas gives an overview of these debates in the *Introduction to Heidegger's Topology: Being, Place, World* Cambridge, MA & London: MIT, 2008: 1-37.

⁵¹ Heidegger, M. *Sein und Zeit* Tübingen: Max Niemeyer Verlag, 2006: 53/4 (my transl.): "Was besagt *In-Sein*? Den Ausdruck ergänzen wir zunächst zu *In-Sein* 'in der Welt' und sind geneigt, dieses *In-Sein* zu verstehen als 'Sein in ...'. Mit diesem Terminus wird die *Seinsart* des Seienden genannt, das 'in' einem anderen ist wie Wasser 'im' Glas, das Kleid 'im' Schrank. Wir meinen mit dem 'in' das *Seinsverhältnis* zweier 'im' Raum ausgedehnter Seienden zueinander in bezug auf ihren Ort in diesem Raum. Wasser und Glas, Kleid und Schrank sind beide in gleicher Weise 'im' Raum und 'an' einem Ort. Dieses *Seinsverhältnis* läßt sich erweitern,

Being-in as condition [*Ver-fassung*]⁵² of *Dasein* thus must not be understood as a relation between beings in a place contained in space, but as *existential openness*. Hence, *Da-sein*, which locates itself [*sich auf-hält*]⁵³ there [*da*], has a relation *with* the world *in* which it dwells.

Dasein is in the world through different ways of *Be-sorgen* [concern],⁵⁴ by having to do with something, producing something, using something etc. The most proximate world for *Dasein* is its *Um-welt* [environment]⁵⁵ *in* which intra-worldly beings encounter. The process through which *Dasein* deals with intra-environmental beings, Heidegger called the *Um-gang*.⁵⁶ Via the *besorgende Umgang*, *Dasein* handles and uses beings that are ready-to-hand [*zu-handen*] and *not* yet 'theoretically looks' at objects [*Gegen-stände*]⁵⁷ that are present-at-hand. In this way, *Dasein* understands [*ver-steht*] the world constantly. Only through the *besorgende Umgang* in the world, which is grounded in Being-in, objects can actually be grasped *in the first place*. *Dasein* is thus not a 'subject' separate from the world, i.e. simply reflecting on it from the outside, but is *ek-sistentially in* and engaged *with* it.⁵⁸

z.B.: Die Bank im Hörsaal, der Hörsaal in der Universität, die Universität in der Stadt usw. bis zu: Die Bank 'im Weltraum'. Diese Seienden, deren 'In'-einandersein so bestimmt werden kann, haben alle dieselbe Seinsart des Vorhandenseins als 'innerhalb' der Welt vorkommende Dinge. [...] In-Sein dagegen meint eine Seinsverfassung des Daseins und ist ein *Existential*. Dann kann damit aber nicht gedacht werden an das Vorhandensein eines Körperdinges (Menschenleib) 'in' einem vorhandenen Seienden. [...] 'In' stammt von innan-, wohnen, habitare, sich aufhalten; 'an' bedeutet, ich bin gewohnt, vertraut mit, ich pflege etwas; es hat die Bedeutung von colo im Sinne von habito und diligo [...] Sein als Infinity des 'ich bin' d.h. als Existenzial verstanden, bedeutet wohnen bei ..., vertraut sein mit ... *In-Sein ist demnach der formale existenziale Ausdruck des Seins des Daseins, das die wesenhafte Verfassung des In-der-Welt-seins hat.*"

⁵² Related to 'fassen', i.e. '(to) grasp' (see above).

⁵³ '*Sich auf-halten*' literally means '(to) hold oneself open'.

⁵⁴ Also meaning 'obtaining' or 'getting'; '*Sorge*' can be translated with 'care' or 'anxiety'.

⁵⁵ Can be translated with 'around-world' or 'surrounding world'.

⁵⁶ Difficult to translate, maybe 'going around', 'dealings' or 'intercourse'.

⁵⁷ Literally 'against-standings'.

⁵⁸ In the second division of *SZ*, Heidegger's explication of *Dasein*'s (being-in-the-)world then becomes more complex due to historicalisation, however is now essentially grounded in (horizontal) temporality and not in (dimensional) Being-in anymore, which grounds all phenomena in the first division – or rather: the latter becomes subsumed by the former. It is hence difficult to do a close reading of the second division of *SZ* through the conception of place, especially within the constraints of this PhD project.

Thingliness

By aiming to de-struct [*de-struieren*] the metaphysical tradition of (present-at-hand) 'ob-jects' and 'things', Heidegger broadly distinguished between three types [*Arten*] of being throughout his works, which are characterised by different degrees of ek-splicitness [*Aus-drücklichkeit*] – 'equipment' [*Zeug*],⁵⁹ 'work' [*Werk*] and 'thing' [*Ding*]. In *Sein und Zeit*, Heidegger focused on ready-to-hand equipment and work. Through the *besorgende Umgang*, sewing-, working-, transportation-, measuring equipment etc. (such as hammers, needles and cars, for instance) can be encountered in the world. However, equipment is never just equipment 'in itself', but always part of an equipment wholeness. Equipment is always *in* the world, lying *in* a region [*Gegend*], which is *in* the circumference [*Um-kreis*] of so and so. Equipment is always 'some'thing' in-order-to ...'. In this structure of 'in-order-to' [*Um-zu*], there is a reference [*Ver-weisung*]⁶⁰ of some'thing' to some'thing'. Equipment 'is' always *out* of the belonging to other equipment. The different ways of the *Um-zu*, such as serviceability, conduciveness, usefulness and handleability, create the equipment wholeness. By referring to some'thing', as a relating [*Be-ziehen*],⁶¹ equipment is dis-covered [*ent-deckt*], in the sense that it has a *Bewenden* ['involving']⁶² *with* it and 'by' [*bei*] it. The where-by [*Wo-bei*] equipment has its *Bewenden* is the towards-where [*Wo-zu*]⁶³ of serviceability, the where-for [*Wo-für*] of usefulness. The involvement [*Bewandtnis*] wholeness, i.e. the character of Being of the ready-to-hand, is always *earlier* than an item of equipment and is grounded in a primary towards-where that is the for-the-sake-of-where [*Wo-rum-*

⁵⁹ 'Stuff' or 'tools' also possible.

⁶⁰ Can also be translated with 'assignment'; broadly speaking even as 'relevance' or 'meaning'.

⁶¹ '-ziehen' meaning '(to) drag' or '(to) pull'.

⁶² Impossible to translate. Can be understood in the sense of 'being interested in', 'caring about' or 'referring to'.

⁶³ Generally translated as 'towards-which'.

willen] ⁶⁴ of *Dasein*. The *Je-schon-haben-bewenden-lassen* ['always-being-involved-already'] is the *a priori* perfect tense that characterises *Dasein* – it is the way through which *Dasein* understands Being, which is its possibility. The understanding [*Ver-stehen*] can itself be referenced in and of the 'with... by...' relations [*Be-ziehungen*]. The relational character of these reference relations Heidegger conceived as *be-deuten* [signifying/meaning].

Through the *besorgende Umgang* with equipment in the world, *Dasein* does not grasp the 'thing' yet, neither thematically/theoretically nor in its equipment structure since equipment lacks self-sufficiency. The less equipment is simply being 'looked at', but actually and immediately used and handled, the more original the relation is to it and the more revealing is *its* truth, i.e. the equipment's specific handleability. The Being of equipment is readiness-to-hand [*Zuhandenheit*], i.e. the ontologico-categorical determination of being as it is 'in itself'. Thus, the ready-to-hand essentially withdraws itself in order to 'be' ready-to-hand. However, readiness-to-hand (the Being of being *proximately* encountered) always relates to the presence-at-hand [*Vorhandenheit*] (the Being of being). Only *through* the ready-to-hand, the present-at-hand can be determined: "With the discovered 'environment', 'nature' discovered in this way is encountered."⁶⁵

Equipment as the everyday ready-to-hand is the being which *Dasein* encounters proximately – it is 'close by'. This proximity is not determined by measured distances, but comes about through the circum-spection [*Um-sicht*] of *Besorgen* in the world, which 'fixates' the item of equipment directionally. Every item of equipment either has its place [*Platz*] or it 'lies around', which is different to having a position [*Stelle*] somewhere in three-dimensional space. The place of an item of equipment is always determined as 'the place of this equipment to...' out of a wholeness of places of equipment which are directed towards

⁶⁴ Literally 'where-round-will'.

⁶⁵ Heidegger, M. *Sein und Zeit* Tübingen: Max Niemeyer Verlag, 2006: 70 (my transl.): "Mit der entdeckten 'Umwelt' begegnet die so entdeckte 'Natur'."

each other. The place is not to be understood as a 'where' of a present-at-hand of a thing, but as a specific yonder [*Dort*] and there [*Da*] of the belonging-to of an item of equipment. The possibility of a placeable item of equipment that belongs somewhere is the (slightly more encompassing) region, the where-to [*Wo-hin*], which it is oriented towards. Regions are not firstly formed through things that are present-at-hand, but are always *already* ready-to-hand *in* places. The places themselves either get assigned to the ready-to-hand in the circumspection of *Besorgen* or they are found as such. Each 'where' is thereby dis-covered by *Dasein* through the everyday (technical) *Umgang* in the world and circumspectly laid out [*aus-gelegt*],⁶⁶ not solidly installed 'in space'.

Ready-to-hand equipment is generally 'inconspicuously familiar' and only becomes visible through deficient modes of *Besorgen*. Equipment can be unusable – for example it can be broken or unsuitable for a particular use. This is dis-covered through circumspection. The equipment thus stands out [*fällt auf*]. This standing-out makes the equipment somehow un-ready-to-hand, i.e. more present-at-hand. However, the equipment as ready-to-hand that in its being unusable becomes more present-at-hand immediately withdraws itself again into readiness-to-hand. If the equipment needed is lacking, i.e. simply is not at hand, it is in the mode of ob-trusiveness [*Aufdringlichkeit*]. The more ek-sigently the lacking equipment is needed, the more it encounters in its un-readiness-to-hand so that it seems to lose its readiness-to-hand and thus shows itself as presence-at-hand. The equipment can also show itself in the mode of ob-stinacy [*Aufsässigkeit*], if it just 'lies in the way', i.e. when it is not lacking and is not unusable. These three modes – *Auffälligkeit*, *Aufdringlichkeit* and *Aufsässigkeit* – all have the function of showing the *character* of the present-at-hand of the ready-to-hand. By disturbing the reference *within* the equipment wholeness (the *Um-zu* [in-order-to] not referring to

⁶⁶ 'Auslegen' can also mean '(to) interpret'.

a *Da-zu* [towards-there]), the reference merely becomes explicit – not yet as ontological structure, but ontically. In this way, the world announces itself. However, for the ready-to-hand to *not* stand out and therefore 'be' ready-to-hand 'in itself', the world needs to *not* announce itself, which is the (positive) condition for readiness-to-hand.

One type [*Art*] of equipment are signs [*Zeichen*]. Signs can themselves be formalised into a 'universal' type [*Art*] of relation and thus have a specific equipment character that consists in indicating [*Zeigen*], which is a type [*Art*] of reference. However, although signs as indication equipment have the character of the *Um-zu*, it is not their specific ontological structure. Signs are rather the ontic concretisation of the *Um-zu* as serviceability and are used proximately in the *besorgende Umgang*, as *Dasein* is always somehow directed [*ausgerichtet*] and underway – standing and staying are merely limiting cases. The *Ver-halten* [behaving], or Being, towards the sign can be an *Aus-weichen* [avoiding] or a *Stehen-bleiben* [standing-remaining]. Avoiding, as taking [*ein-schlagen*]⁶⁷ a direction, is thereby also essential to being-in-the-world.

The sign is not grasped if it is merely 'stared at' as an indicator thing. Only circumspection [*Um-sicht*] can bring the sign into an explicit *Über-sicht* [sur-vey], which achieves an orientation in the environment. A sign is not a thing, but "an item of equipment which explicitly raises an equipment unity into circumspection so that together with it the worldly character of the ready-to-hand announces itself."⁶⁸ Signs proximately indicate where-in one lives and 'by' which the *Besorgen* locates itself [*sich auf-hält*]. They are the standing-out of equipment which one hitherto could not make use of.

The everyday *Umgang* however proximately locates itself not really by equipment, but by the 'work' [*Werk*] that is *be-ing* set forth

⁶⁷ '-schlagen' meaning '(to) strike', '(to) hit' or '(to) break'.

⁶⁸ Heidegger, M. *Sein und Zeit* Tübingen: Max Niemeyer Verlag, 2006: 80 (my transl.): "[...] ein Zeug, das ein Zeuganzes ausdrücklich in die Umsicht hebt, so daß sich in eins damit die Weltmäßigkeit des Zuhandenen meldet."

[*her-ge-stellt*],⁶⁹ i.e. produced, through equipment – it is the towards-where of equipment, i.e. the equipment's usefulness. The work, such as a shoe *be-ing* produced (to be worn), is also of the type of Being [*Seinsart*] of equipment and carries the reference wholeness *in* which equipment encounters. The work, which situates itself through its working [*sich in Arbeit befindene*], is essentially usefulness and at the same time lets the towards-where of *its* usefulness encounter with it as well. The work to be set forth is not just useful for ..., but is itself a using of some'thing' for some'thing' and thus refers to a 'where-out' [*Wo-r-aus*], i.e. 'materials' used. The work can hence not at all be understood as a present-at-hand. The work furthermore refers to the product user who is already part of the labour process, for example in the sense of later wearing a shoe or a watch that is *specifically* made for him or her (even in mass production). Therefore *with* the work, not just the ready-to-hand encounters, but also the user and thus 'the world'.

In his lecture *Der Ursprung des Kunstwerkes (UdK)* [*The Origin of the Work of Art*] from 1935, Heidegger continued his critique of thingliness by explicating the 'work' as specifically a work of art and thus *places* his ontology a bit more. The work is here however quite different from the work of *Sein und Zeit* – it is not just a ready-to-hand process anymore, but some'thing' more self-sufficient, i.e. singular. Since the work is a 'thing' in some ways, Heidegger started his explication of the work of art by criticising three habitual [*ge-wöhnliche*] notions of thingliness in 'Western' thought: 1) the thing as substance and bearer of certain characteristics, 2) the thing as mental unity perceptible through sensations and 3) the thing as formed matter. Since the work of art is not a 'mere thing' (such as a stone or a piece of wood), but is brought forth [*her-vor-gebracht*] through the human hand, it has more of a relation to a 'thing' of use. When considering a 'thing' of use that is made by the human, the former two conceptions are not very suitable, Heidegger argued, and one also cannot talk about form being the effect of a

⁶⁹ Note the importance of '*stellen*', i.e. 'setting', and its relation to '*Stelle*', i.e. 'position', 'location' or 'site'.

distribution of matter. On the contrary, form always *determines* the arrangement of matter, and even influences the type [*Artung*] and choice of it. Form and matter are thus interwoven. This interweaving, according to Heidegger, is however *before-hand* determined by the serviceability towards where the 'thing' is to be serviceable. Such serviceability is neither assigned nor added to the 'thing' later on nor is it the end or effect of it. Serviceability is rather the fundamental tendency [*Grund-zug*] through which the 'thing' of use is. I.e. both the formative act and the choice of material are grounded in serviceability and as such also the form/matter structure. The useful 'thing' is always the product [*Er-zeug-nis*] of a pro-duction [*An-fertigung*]⁷⁰ – it is equipment [*Zeug*] – hence form and matter are 'at home' in the essence of equipment, which Heidegger here did not call readiness-to-hand anymore as the in-order-to [*Um-zu*] referential structure in SZ, but reliability [*Ver-läß-lichkeit*].⁷¹

The work is however also not mere equipment since it is more self-sufficient and thus has more of a relation with the 'self-growthness' [*Eigen-wüchsigen*] of the thing in certain ways. In order to better work out the thingly character of the work of art, Heidegger thought the thingly character of the work *out* of the workly character of the work (not vice versa) since the work is not *just* a thing. He thus considered a work of art in its essential space [*Wesensraum*] (better: essential *place*), rather than seeing it as an ob-ject of the art business: a van Gogh painting which re-presents [*dar-stellt*]⁷² some equipment, i.e. a pair of peasant shoes. Although we can only *look* at the peasant shoes and not act-ually wear them, the picture nevertheless speaks to us by *immediately* revealing [*ent-bergen*] the truth about the shoes as equipment, i.e. their reliability; it tells us what they *are*. In the work of art, truth [*alétheia*] has set itself into the work, in the sense of bringing itself to a stand. For Heidegger, what is decisive in the work of art is thus not

⁷⁰ Includes '-fertig' meaning 'finished'. 'Anfertigen' could loosely be translated as 'towards finishing'.

⁷¹ Includes '-lassen', meaning '(to) let'.

⁷² Literally: 'sets there'.

'beauty' or 'aesthetics', but the revealing of truth – the opening-up, i.e. clearing [*Lichten*], of the Being of being.

Heidegger furthermore considered a built work – a Greek temple – in order to better grasp the working [*Wirken*]⁷³ of truth in the work of art. The temple encloses the figure [*Gestalt*] of God and lets it, in this concealing [*Ver-bergen*], stand forth into the holy domain [*Bezirk*]. I.e. through the temple, God essences [*west*] in the temple. The temple-work gathers and joins the wholeness of relations [*Be-züge*] around itself, which is 'the world' of the historical people. The temple at the same time rests on solid rock, with-stands the storm around it and shines through the sun, all of which it brings into appearance *in the first place*. This coming-forth [*Her-aus-kommen*] and arising [*Auf-gehen*] in itself and in the whole is what the Greeks used to call *physis*, which Heidegger terms 'earth' – not to be understood as a present-at-hand however.

The earth is that towards where the arising brings back all that arises and indeed as such. In the arising, earth essences as the concealing [*das Bergende*].⁷⁴

Earth is the ground – the essentially self-closing. *Upon* the earth and *in* it, the historical human being grounds its dwelling in the world. The earthy character is a thingly character. Earth can only come forth however through a 'world' which opens up. The world 'worlds' and *is more* [*ist seiender*] than the graspable and conceivable [*Ver-nehm-bare*].⁷⁵ World is never an object – it is the ever non-objective to which we are subject.

The temple-work thus sets up a world and at the same sets it back unto the earth so that the world is held in its essential remains. In contrast to equipment, which takes matter into its service that hence disappears in serviceability, the work lets matter come *forth* and into the

⁷³ Related to 'Wirklichkeit', i.e. 'reality'. 'Wirken' also means '(to) effect'.

⁷⁴ Heidegger, M. *Der Ursprung des Kunstwerkes* Stuttgart: Philipp Reclam jun., 1970: 42 (my transl.): "Die Erde ist das, wohin das Aufgehen alles Aufgehende und zwar als ein solches zurückbringt. Im Aufgehenden west die Erde als das Bergende."

⁷⁵ Includes 'nehmen', i.e. '(to) take'.

openness of the world of the work. By setting up a world, the work sets forth the earth into which it sets back. Setting-up and setting-forth are two essential tendencies [Wesens-züge] in the work-being of the work, however belong together as a unity through which the work stands in itself, in the sense of a resting. The relation between world and earth Heidegger called 'strife' [*Streit*],⁷⁶ or '*Spielraum*' [room to play],⁷⁷ in which each tries to carry the other beyond itself. This strife as *Spielraum* is the *happening* of truth (i.e. what Heidegger called Being-in in SZ) that the work carries and preserves [*be-wahrt*].⁷⁸ It is the motion that is gathered and thus rests in the work. Truth [*alétheia*], i.e. unconcealedness [*Un-verborgenheit*], which *happens* in the work, is thus ambiguous as the against-each-other of the strife. It is hence 'un-truth' in its essence. By standing *in* being, truth, as the open middle, appears in the world, however always in *another* way than it 'is' since it *is more* than being.

After having thought through the *workly* character of the work, Heidegger could thus further explicate the *thingly* and *equipmental* characters of the work, which is self-sufficient, nevertheless created through the human artist. The creating of a work is a bringing-forth, which is also how equipment is produced [*an-ge-fertigt*]. As Heidegger wrote, the Greeks had the same name for craft and art – *techné* – which is a way of knowledge [*Wissen*]. The essence of knowledge is *alétheia*, i.e. revealing, thus *techné* is the bringing-forth of the concealed into the unconcealed and is not the (artist's) activity of a making. The becoming-work of the work is an opening up, i.e. (the happening of) truth. Truth happens by installing itself [*sich einrichten*]⁷⁹ through the *Spielraum*. One way in which truth installs itself is setting-itself-into-the-work (other ways are, for Heidegger, the state-founding act or the essential questioning of the thinker). By installing the truth

⁷⁶ Can also be translated as 'dispute', 'argument', 'conflict', 'fight' or 'counterplay'.

⁷⁷ Literally 'playroom' or 'playspace'. 'Leeway', 'space to move' or 'scope' are also possible translations.

⁷⁸ Related to '*Wahrheit*', i.e. 'truth'.

⁷⁹ '(To) furnish' also possible. '*Einrichten*' is furthermore related to '*Richtung*', i.e. 'direction'.

(through the truth), the work *includes* the essential tendencies of the strife of world and earth, which can then be decided upon by the historical people at strife. Truth as strife/*Spielraum* that is solidly set [*fest-ge-stellt*] into the work is the figure [*Gestalt*], thus the being-created of the work is truth being solidly set in the figure. Heidegger here also called truth the 'creating Design' [*der schaffende Ent-wurf*],⁸⁰ which brings the strife into the open [*das Offene*] through the work. In contrast to the creating of a work, the pro-duction of equipment is never immediately the happening of truth. The being-finished [*Fertigsein*] of equipment merely means that it is let to 'arise' beyond itself in serviceability. The being-finished of equipment and the being-created of the work are both brought forth, however the being-created of the work is authentically [*eigens*]⁸¹ created *into* the created so that it authentically pro-trudes [*her-vor-ragt*] from it. The work, in which its being-created happens, is the non-habitual [*Un-gewöhnliche*] through which the work works [*wirkt*]. In its uniqueness, it lets truth originate [*ent-springen*]⁸², which is a thrust into history, a beginning – which transforms the habitual relations [*Be-züge*] of the historical people towards the world and earth. Truth setting-itself-into-the-work is Poetry for Heidegger – the clearing Design [*Ent-wurf*]. In this way, truth in the work is thrown towards [*zu-geworfen*] the historical people and opens up that into which *Dasein* is always already thrown.

In his later lecture *Das Ding* from 1949, Heidegger focused on the even more platial 'thing', while formulating a theory of (the essence of) proximity that goes beyond present-at-hand ob-jectivity. "Proximate to us are what we care to call things. [...] The human has so far given no more thought to the thing as a thing than to proximity."⁸³ He argued

⁸⁰ *Ent-wurf* is literally translated as 'de-throw', hence related to *Dasein*'s 'Ge-worfen-heit'. Heidegger in this lecture did not say much about the concept of *Entwurf* (or *Geworfenheit*), thus see more below.

⁸¹ 'Singularly' also possible. '*Eigen*' meaning 'own'.

⁸² '*Springen*' meaning '(to) spring' or '(to) jump'.

⁸³ Heidegger, M. *Das Ding* in *Vorträge und Aufsätze* Pfullingen: Günther Neske, 1954: 164 (my transl.): "In der Nähe ist uns solches, was wir Dinge zu nennen pflegen. [...] Der Mensch hat bisher das Ding als Ding so wenig bedacht wie die Nähe."

that contemporary uniform and 'unhomely' [*unheimlich*]⁸⁴ non-distance [*Abstandlose*] – he also called it the 'de-setting' [*Ent-setzende*]⁸⁵ – does not bring proximity,

for proximity does not consist in the small measure of distance. What stands in the smallest distance to us route-wise, through the image in film, through the sound in radio, can remain remote to us. What is unsurveyably far route-wise can be proximate to us. Short distance is not yet proximity. Great distance is not yet remoteness.⁸⁶

In order to think the essence of proximity, Heidegger gave the example of a jug, i.e. a thing that is proximate to us. A jug is a vessel which stands in itself – it is self-standing [*selbständig*], i.e. independent. A thing is different to an object, however can become an object if we set it before ourselves. Object and thing can not be determined in the same way, as the jug remains a vessel, whether we set it before ourselves or not. However, the vessel's standing-in-itself alone does not determine it as a thing. The jug has come to a stand due to a process of setting-forth [*Her-stellen*]. Thereby, the potter uses earth, which is specifically chosen and prepared for the jug through a 'towards-sight' [*Hin-sicht*]⁸⁷ to the thing standing-in-itself. Earth is however through which the jug consists [*be-steht*], thus standing-in-itself is not just that which setting-forth aims at, but that which persists [*be-steht*] throughout. The jug is not a vessel because it was set forth, but it had to be set forth because it is this vessel which stands in itself. The authenticity [*das Eigene*] of the essence of the jug as thing is not produced [*ver-fertigt*] by setting-forth. Released from its production, the self-supporting jug gathers, or appropriates in the

⁸⁴ i.e. 'uncanny'.

⁸⁵ From 'Entsetzen', i.e. 'horror'.

⁸⁶ Heidegger, M. *Das Ding in Vorträge und Aufsätze* Pfullingen: Günther Neske, 1954: 163 (my transl.): "[...] denn Nähe besteht nicht im geringen Maß der Entfernung. Was streckenmäßig in der geringsten Entfernung zu uns steht, durch das Bild im Film, durch den Ton im Funk, kann uns fern bleiben. Was streckenmäßig unübersehbar weit entfernt ist, kann uns nahe sein. Kleine Entfernung ist nicht schon Nähe. Große Entfernung ist noch nicht Ferne."

⁸⁷ 'Regard', 'point of view' or 'angle' also possible. See more in 'Entwurf' below.

sense of happening [*er-eignet*], 'earth', 'sky', 'mortals' and 'divinities',⁸⁸ in its own way into a onefold. The thing gathers the while [*Weile*] of the fourfold into *this* thing that 'whiles'. The fourfold gathered by the thing is a mirror-play, in which each of the four is set free towards the others, but also essentially bound with them. This mirror-play *happening* in the thing, Heidegger here also called 'the world'. For mortals, which are part of this mirror-play of the world, the thing is a contested matter, which is why the thing [*res*] publicly [*öffen-tlich*] approaches [*an-geht*]⁸⁹ them. The thing that 'things' in this way thus approximates the world.

The unity of the fourfold Heidegger called the 'fouring' [*Vierung*], which essences as the mirror-play and is the 'worlding' of world (i.e. what he used to call Being-in in *SZ*). The fouring Heidegger also called the ring [*Gering*], which 'rings' by playing as mirroring. This ring is the authentic [*eigentliche*] dimension of the mirror-play of the world – it is approximating proximity, i.e. the essence of proximity. In order to think the thing as thing among the sovereignty of non-distance, Heidegger wants us to take a step *back*, from the thought that simply sets *before* to the thought that thinks *towards* [*an-denkt*].⁹⁰

Ge-Stell ⁹¹

In *Die Frage nach der Technik* [*The Question Concerning Technology*] (1954), first given as the lecture *Das Ge-Stell* (1949), Heidegger further explicated *techné* as a revealing, as he had already done, to some extent, in *UdK*. Technicity is here not just *in* the world anymore, through *Dasein*'s use of ready-to-hand beings in *SZ*, but becomes 'world' itself. In order to work out the essence of (modern) technology, Heidegger

⁸⁸ It is difficult to know what Heidegger exactly meant by this 'fourfold' [*Geviert*], a concept he derived from the poet Friedrich Hölderlin. It can be read as a de-struction of 'the world' – the 'one' that in his later work becomes differentiated into the 'four' through which the thing places, or orients, itself.

⁸⁹ In the sense of 'concerning'.

⁹⁰ 'Andenken' also in the sense of 'remembering' (Being).

⁹¹ *Ge-Stell* is widely translated as 'enframing', however this translation neglects the importance of 'stellen' [(to) set] and also of 'Stelle' [position/site/location] in Heidegger's work, hence it will here be translated as 'set'. Cf. *das Ent-setzende* [de-setting] in *Das Ding*.

aimed to go beyond the anthropological and instrumental conceptions that had used to explain technology as a human activity and a means for an end since the Greeks. Since the 'correct' (ontic) is not yet the 'true' (ontological), he revisited Aristotle's four causes [*Ur-sachen*]⁹²: *causa materialis*, *causa formalis*, *causa finalis* and *causa efficiens*. Although these four causes are different from each other, they nevertheless work together. Thus, Heidegger asked: Why are there *four* causes? What *unites* them *a priori* and *how* can they work together? Traditionally, the *causa efficiens* – the human agent, i.e. the craftsman or the artist – had been conceived as the most important since s/he is that which effects, that which brings something about. S/he is the *that* and the *how* of coming into appearance. This coming into appearance is a *Ver-an-lassen* [occasioning]⁹³ in the sense of a bringing-forth [*Her-vor-bringen*] – *poiésis*. For the ancient Greeks, the word *poiésis* was not just used with regard to handicraft manufacture or artistic and poetic bringing into appearance and concrete imagery. *Physis* was also a bringing-forth – indeed in the highest sense since *physis* has the arising out of itself, belonging to bringing-forth, *in itself*. In contrast, what is brought forth by the artist or craftsman does *not* have *poiésis* in itself, but rather needs a human agent. Bringing-forth, i.e. causality as *Veranlassen*, brings the concealed into the unconcealed and is grounded in a revealing, i.e. *alétheia* [truth].

'Technology' stems from the Greek word '*technikon*', meaning that which belongs to *techné*. It was the name for the skills and activities of the craftsman as *well as* for the arts of the mind and the fine arts. *Techné* thus belongs to bringing-forth, i.e. to *poiésis*. Until the beginnings of 'Western' metaphysics, *techné* was linked with *epistémé* – both terms for knowing [*Erkennen*] in the widest sense. They mean a being-acquainted with [*Sich-aus-kennen in*] something and be 'skilled',

⁹² 'Sache' meaning 'matter', 'object' or 'concern'.

⁹³ '-lassen' meaning '(to) let' (see above).

and enable an opening-up [*Auf-schluss*].⁹⁴ Aristotle in his *Nicomachean Ethics* then distinguished between the two: *Techné* is a mode of *alétheuein* ('getting to the truth') – it reveals whatever does *not* reveal itself through itself. *Techné* is a type [*Art*] of revealing through the four ways of *Veranlassen*. These ways of *Veranlassen* (variable) always have their objective in the (invariable) *telos* – the end determines the means. *Techné* is thus grounded in *epistémé* – a disposition for making something by way of 'true knowledge'. For Heidegger, on the other hand, what is decisive in *techné* is *not* making and handling, *not* the using of means, but the aforementioned revealing as *poiésis*. Revealing is the essence of technology – *alétheia*. *Techné* hence does not *have* a *telos*, but rather '*is*' the *telos* – it is a granting that endures. *Techné* is thus both a means and end in itself and hence does not need a human agent.

The essence of *modern* technology (grounded by the 'exact' modern sciences) does however *not* reveal as a granting in the sense of *poiésis*, i.e. bringing-forth, but rather as a challenging-forth [*Her-ausfordern*] in the sense of setting [*stellen*]. Challenging-forth sets Nature in the way that it furthers [*fördern*] by un-locking [*er-schließen*] and setting out [*her-aus-stellen*] through regulating and securing. Modern technology is not limited by Nature anymore, instead Nature has become a fundamental stand-by part [*Grund-be-stand-stück*]⁹⁵ of challenging-forth. Challenging-forth is a furthering that is always, 'secretly and in advance', directed towards furthering something else. Revealing never comes to an end – it is a continuous un-concealment. This continuous un-concealment of the stand-by [*Be-stand*] is a circular motion [*Kreis-gang*] of *Be-stellen* [ordering].⁹⁶ The way of revealing the real as the stand-by is the *Ge-Stell* [set] – *in* and *as* which *Be-stellen* circulates. This is the essence of modern technology. The set gathers the

⁹⁴ '-schluss' meaning 'end' or 'closing'.

⁹⁵ '*Be-stand*' is mostly translated as 'standing reserve', however 'stand-by' is the most literal translation as well as points out the continuous readiness, and restlessness, of *Bestand*.

⁹⁶ Literally: 'by-setting'

setting that sets the human (and other beings). Revealing in terms of *poiésis* and revealing in terms of *Ge-Stell* are both ways of *alétheia* since they both set forth [*her-stellen*] and re-present [*dar-stellen*], however in fundamentally different ways. In the *Ge-Stell*, what is set forth is not in the domain [*Bezirk*] of what approaches the human anymore. The set sets the single whole [*das Eine Ganze*] of what is present into stand-by. In the *Ge-Stell*, the thing does not 'thing' anymore. At most, the *Ge-Stell* brings forth the object, although even that eventually decays [*zer-fällt*]⁹⁷ into the Same, which is always 'on the spot' [*auf der Stelle zur Stelle*],⁹⁸ without difference.

The essence of technology sends the human upon a way of revealing. This sending that gathers (historially) is a destining [*Ge-schick*]⁹⁹ – which is always *the danger* – if it reigns as the *Ge-Stell*, it is the *supreme danger*. In the age of modern technology, this danger appears in two ways: On one hand, in this total objectlessness the human becomes merely the *Be-steller* [orderer] of the stand-by and thus is in danger of becoming stand-by as well. At the same time, the human is in danger of seeing itself as 'master of the earth' and in this way can think that it only encounters itself. But in *truth*, says Heidegger, nowhere does the human encounter only itself, i.e. its essence, anymore. The human stands so decisively in the follow [*Ge-folge*] of the challenging-forth of the *Ge-Stell* that it does not grasp it as a claim anymore – which thus leads to a loss of ek-sistence, i.e. 'homelessness'. The *Ge-Stell* conceals revealing as *poiésis* – it is no bringing-forth of truth.

But where danger is, grows
the saving power also.¹⁰⁰

⁹⁷ '-fallen' meaning 'falling'. See more in 'Being-with' below.

⁹⁸ Literally 'on the position/site towards the position/site', but can also be understood as 'immediately ready'.

⁹⁹ 'Schicken' meaning '(to) send'.

¹⁰⁰ Hölderlin, F. in Heidegger, M. *Die Frage nach der Technik in Vorträge und Aufsätze* Pfullingen: Günther Neske, 1954: 36 (my transl.): "Wo aber Gefahr ist, wächst Das Rettende auch."

Technology is not 'bad', but its essence is 'mysterious'. In order to experience revealing as a granting in the sense of *poiésis*, Heidegger wants us to *question* the essence of technology in the sense of grappling [*sich aus-ein-ander-setzen*]¹⁰¹ with it. He wants us to ask *how* the instrumental is essentially a way of causality. Since the essence of technology is nothing technological, this grappling has to happen in the realm of art (not 'mere' aesthetics) through which the poetic essences [west].

Dwelling

In *Bauen Wohnen Denken [Building Dwelling Thinking] (BWD)* from 1951, Heidegger further developed the 'saving power' in the essence of technology. In this lecture, he thought the relation between technicity and place/s through dwelling as the fundamental tendency (i.e. Being/-in in SZ). 'Things' here explicitly *are* places, not just *have* or *are in* places, like equipment in SZ.¹⁰² By trying to overcome the metaphysical tradition which had explained dwelling simply as the *aim* of building, Heidegger in this text criticised the lack of dwelling/s in the industrialised world:

Bridge and hangar, stadium and power station are buildings, but not dwellings; [...] The truck driver is at home on the motorway, but he does not have his lodgings there.¹⁰³

The human inhabits buildings, but does not dwell in them – we work 'here', but dwell 'yonder'. Even though buildings are in the realm of dwelling, dwelling in modernity is not *experienced* as the Being of the human anymore; it is not thought as the fundamental tendency and thus has fallen into oblivion. The modern human is 'homeless'.

¹⁰¹ Literally: '(to) set oneself out with one another'.

¹⁰² Whereby the difference between places and spaces is not entirely clear, other than the latter being a bit more encompassing.

¹⁰³ Heidegger, M. *Bauen Wohnen Denken* in Heidegger, M. *Vorträge und Aufsätze* Pfullingen: Günther Neske, 1954: 145 (my transl.): "Brücke und Flughalle, Stadion und Kraftwerk sind Bauten, aber keine Wohnungen; [...] Der Lastzufahrer ist auf der Autobahn zu Hause, aber er hat dort nicht seine Unterkunft."

Out of Language – the ‘mistress of the human’ – Heidegger explicated ‘building’ in three ways: a) Building is authentically [*eigentlich*] dwelling b) dwelling is the way in which mortals are on earth and c) building as dwelling un-folds itself into a building that cultivates growth and into the kind of building that erects buildings. Building, from the Old High German ‘*buan*’, i.e. dwelling, is understood in the sense of a remaining and a locating-oneself [*Sich-Auf-halten*]. This is a conserving [*Schonen*], in the sense of leaving something in, as well as freeing something into, its essence. This dwelling-conserving as fundamental tendency is the play of the fourfold (see above), which is essentially a locating-oneself *with* things. Dwelling as conserving safeguards the fourfold in things. Things however reveal the fourfold only when they themselves as things are left in their essence.

Regarding the question ‘What is a built thing?’, Heidegger considered a bridge. Rather than the bridge connecting banks that are already present-at-hand, the banks only emerge as banks in the crossover of the bridge. The bridge lets the banks lie across from each other. It brings stream, banks and land into a reciprocal neighbourhood, which are each in turn also part of different neighbourhoods. Thus, the bridge as thing gathers, in its own (singular) way, the fourfold (of ‘earth’, ‘sky’, ‘divinities’ and ‘mortals’), in the sense that it allows a site [*verstattet eine Stätte*] for it. But only something that is a place [*Ort*] itself can make room for [*ein-räumen*] a site. The place was thus not present-at-hand before the bridge, but *from the bridge itself* a place comes to a stand [*ent-steht*]. Through the thing that allows a site for the fourfold, places and paths are determined through which a space is then made room for. Things that as places allow a site are called ‘buildings’ as they are brought forth through building. The relation [*Be-zug*] of place towards the human who locates itself [*sich auf-hält*] ‘by’ it lies in the essence of these things as places. This essence is dwelling.

Things as places *in the first place* allow sites for spaces. A space is always released into a boundary. A boundary is *not* that at which

something *ends*, but from *where* its essence *begins* – it is an origin, not a terminus. That which is made room for is gathered through a place, i.e. a thing. Hence, “spaces receive their essence from places and not from ‘space’.”¹⁰⁴ Space is thus not something that faces the human – it is neither an external object nor an internal experience. Spaces are made room for in the location [*Auf-ent-halt*] of mortals. By going *through* spaces, mortals stand in them. We always go through spaces in such a way that we are already sustaining them by locating ourselves by things as places that are near as well as remote. Someone ‘far away’ can be closer to a thing than somebody who stands right ‘next to’ it. A place makes room for the fourfold in two senses: It admits [*lässt zu*] the fourfold and installs it. Making-room-for as admitting and making-room-for as installing belong together. A place, as twofold making-room-for, is a ‘house’. Things of this type [*Art*] of place shelter the location of the human. Building, in the sense of *techné* as bringing-forth and letting-appear (of places), is thus closer to the essence of space than geometry and mathematics.

Thinking, as building, belongs to dwelling. According to Heidegger, if the relation between building and dwelling is considered by thought, and thus the homelessness of the industrialised world becomes *the* question, dwelling will be brought into the fullness of its essence. As he had already said in *Über den Humanismus* [*On Humanism*] a few years before:

Language is the House of Being. In its dwelling, the human dwells. Those that think and poeticise are the guardians of this dwelling [...]. Thinking does not become action only when an effect emanates from it or when it is applied. Thinking acts insofar as it thinks. This thinking is presumably the simplest and highest because it approaches the relation [*Be-zug*] of Being towards the human.¹⁰⁵

¹⁰⁴ Heidegger, M. *Bauen Wohnen Denken* in Heidegger, M. *Vorträge und Aufsätze* Pfullingen: Günther Neske, 1954: 155 (my transl.): “Demnach empfangen die Räume ihr Wesen aus Orten und nicht aus ‘dem’ Raum.”

¹⁰⁵ Heidegger, M. *Über den Humanismus* Frankfurt a. M.: Vittorio Klostermann, 1968: 5 (my transl.): “Die Sprache ist das Haus des Seins. In ihrer Behausung wohnt der Mensch. Die Denkenden und Dichtenden sind die Wächter dieser Behausung [...] Das Denken wird nicht erst dadurch zur Aktion, daß von ihm eine Wirkung ausgeht oder daß es angewendet wird. Das Denken handelt, indem es denkt. Dieses Denken ist vermutlich das Einfachste und Höchste, weil es den Bezug des Seins zum Menschen angeht.”

Entwurf

Heidegger mainly developed the concept of *Entwurf* in *SZ*, with some 'thoughts' in his unpublished writings (collected in *Beiträge zur Philosophie [Contributions to Philosophy]*), which advanced the conception a little. *Ent-wurf* is literally translated as 'de-throw' and thus related to the notion of *Dasein*'s *Ge-worfen-heit* [thrown-ness], i.e. its 'that-it-is-there'. *Entwurf* can however also be understood as 'design', 'model', 'experiment', 'project(ion)', 'plan', 'draft', 'out-line', 'lay-out', 'preliminary drawing', 'conception', '(re)presentation' and 'proposition'. The verb '*ent-werfen*' is even synonymous with the design/making process itself. For the sake of the argument, *Entwurf* is translated here as 'Design' in most places. Before the notion of *Entwurf* can be explicated however, one needs to go back to the concept of the *besorgende Umgang* in the world and through this further point out the spatiality (or, as I would say, *platiality*) of *Dasein* as being-in-the-world, through which it under-stands and situates itself [*sich befindet*]:¹⁰⁶

Encountering the ready-to-hand in the *Umwelt* is only possible because of the primary dimensionality of Being-in *wo-rum-willen* [for the sake of where] *Dasein* is. In its dimensionality, *Da-sein* is never firstly 'here', but 'yonder' – through the 'yonder' it comes back to its 'here' and hence situates itself in the openness of the 'there' [*da*]: "In *Dasein* there lies an essential tendency towards proximity"¹⁰⁷ – i.e. by being *by*, in the sense of being 'close to', ready-to-hand beings in the world, *Dasein* can *be*. Being-in-the-world, grounded in Being-in, lets intra-worldly beings encounter to *Dasein* – this letting-encounter Heidegger also called a 'giving-space' [*Raum-geben*] or, as already mentioned, a making-room [*Ein-räumen*], which is a releasing of the ready-to-hand towards its spatiality (or *platiality*).

¹⁰⁶ Also in the sense of *Dasein*'s affectivity and 'state of mind'.

¹⁰⁷ Heidegger, M. *Sein und Zeit* Tübingen: Max Niemeyer Verlag, 2006: 105 (my transl.): "Im *Dasein* liegt eine wesenhafte Tendenz auf Nähe."

By being *in* the world *by* ready-to-hand beings, *Dasein* is spatial (i.e. platial) through de-distance [*Ent-fernung*] and directionality [*Aus-richtung*], to be understood in an active and transitive sense, i.e. as existential categories. *Dasein* is ek-sistentially de-distancing and lets other beings encounter into proximity through ways of *Besorgen*. De-distance dis-covers de-distantiality [*Entferntheit*]. De-distancing is proximately circum-spective approximation, i.e. bringing close in the sense of obtaining, pre-positioning, having to hand. The beings that give directions in the world are ready-to-hand signs (see above), which hold regions ek-splicitly open as a specific where-to of belonging-to [*Hin-gehören*], going-to [*Hin-gehen*], bringing-to [*Hin-bringen*], fetching-from [*Her-holen*] etc. Through de-distance and directionality, the 'solid' directions of left and right spring forth. Like the de-directions, *Dasein* also always takes these solid directions *with* it in the sense that it is within them and thus orients itself in the world.

Da-sein brings its 'there' [*da*] with it *von Hause aus* ['out from home'] and situates itself [*befindet sich*] through it by ek-sisting. In this way, *Dasein* is dis-closed and under-stands. The understand-ing [*Verstehen*] is not an understanding [*Verständnis*] of something, but Being as existence and always concerns the whole fundamental condition of being-in-the-world. The existential structure of the understand-ing Heidegger calls the *Entwurf* – the *Spielraum* (see above) of *Dasein*'s possibility-for-Being. In its thrown-ness [*Ge-worfen-heit*], *Dasein* is thrown into the type [*Art*] of Being of *Ent-wurf*: "[The *Entwurf*] designs the Being of *Dasein* towards its for-the-sake-of-where as originally towards the significance as the worldliness of its each-while [*je-weiligen*] world."¹⁰⁸ *Dasein* is essentially designed-designing [*entworfen-entwerfend*]:

As the thrower de-throws, thoughtfully says 'of the event', it is being uncovered that he himself, the more he becomes de-throwing, the more thrown the

¹⁰⁸ Heidegger, M. *Sein und Zeit* Tübingen: Max Niemeyer Verlag, 2006: 145 (my transl.): "[Der Entwurf] entwirft das Sein des Daseins auf sein Worumwillen ebenso ursprünglich wie auf die Bedeutsamkeit als die Weltlichkeit seiner jeweiligen Welt."

thrown is. In the opening-up of the essencing of Being, it becomes apparent [*offen-bar*] that *Da-sein* does not achieve anything, be it to absorb the counter swing of the event that appropriates, i.e. to arrange oneself into it and so become itself in the first place: the conserver [*Wahrer*] of the thrown de-throw, the grounded grounder [*Gründer*] of the ground.¹⁰⁹

In its designed-designing-ness, *Dasein* does not exactly grasp where-to it designs, as this would precisely take away the possibility of design. By un-folding itself, the *Entwurf* sets itself back into that which it opened up and thus loses every appearance of authority, however never becomes passive and surrendering. Being is hence under-stood in the *Entwurf*, however not onto-logically grasped.

The understand-ing, as existential structure of *Entwurf*, Heidegger also called the sight [*Sicht*] of *Da-sein*, to be understood as the clearedness [*Gelichtetheit*], i.e. the dis-closedness, or openness, of the 'there' [*da*]. Sight is always transparency [*Durch-sicht-igkeit*], as *Dasein* understands its being-in-the-world *through* its constitutive moments. Thereby, *Dasein* 'sees itself' only if it becomes transparent towards its Being *by* the world and through being *with* other beings. In turn, *Dasein*'s opaqueness [*Un-durch-sicht-igkeit*] is grounded in its non-acquaintance [*Unkenntnis*] with the world.

Dasein designs, as essentially understand-ing, its Being towards possibilities, which in turn designs the understand-ing. This designing of the understand-ing has the possibility to form itself [*sich aus-zu-bilden*]. The formation [*Aus-bildung*] of the understand-ing Heidegger called 'laying-out' [*Aus-legung*]. Through laying-out, the understand-ing 'understandingly' [*verstehend*] appropriates the understood [*Verstandenes*], whereby its own possibilities are worked out. That which is explicitly understood has the structure of 'some' thing' as some' thing'' that 'is to...'. The towards-where as the 'as' has the structure of explicitness when it is laid out. However, this is only possible since the as-

¹⁰⁹ Heidegger, M. *Beiträge zur Philosophie* in *Gesamtausgabe* Frankfurt a. M.: Vittorio Klostermann, 1989: 239 (my transl.): "Indem der Werfer entwirft, 'vom Ereignis' denkerisch sagt, enthüllt sich, daß er selbst, je entwerfender er wird, um so geworfener schon der Geworfene ist. In der Eröffnung der Wesung des Seyns wird offenbar, daß das *Da-sein* nichts leistet, es sei denn den Gegenschwung der Er-eignung aufzufangen, d.h. in diesen einzurücken und so erst selbst es selbst zu werden: der Wahrer des geworfenen Entwurfs, der gegründete Gründer des Grundes."

structure in the sense of in-order-to is a *priori*. The circumspecting laying-out of everyday *Dasein* is grounded in a *Vor-habe* [fore-having],¹¹⁰ which *moves towards* an involvement [*Bewandtnis*] unity. This involvement unity that is always already under-stood, however still concealed, becomes unconcealed through the guidance of a towards-sight [*Hin-sicht*], which 'fixates' that where-to the understood shall be laid out. Laying-out is also grounded in a fore-sight [*Vor-sicht*],¹¹¹ which moves the 'fore-had' [*Vor-ge-habene*] towards a certain possibility-for-laying-out [*Aus-leg-barkeit*]. That which is 'held' in fore-having and is fore-sightedly envisaged [*anvisiert*]¹¹² becomes graspable through laying-out. However, before-hand, laying-out has already decided upon a specific graspability [*Be-griff-lichkeit*],¹¹³ which is grounded in a fore-grasp [*Vor-begriff*].¹¹⁴ The laying-out of some'thing' as some'thing' is hence essentially grounded in *Vorhabe*, *Vorsicht* and *Vorgriff*. The existential fore-structure of *Dasein* enables the (hermeneutic) circle [*Zirkel*] as ek-spression of the understand-ing. Thus, through the fore-structure of the understand-ing as *Entwurf*, *Dasein* has the existential possibility to form itself, i.e. to appropriate itself in the sense of determining *its own place*. However, "what and who the designer 'is' only becomes graspable out of the truth of Design, but at the same time also concealed."¹¹⁵

Being-With

Although Heidegger, overall, did not say very much about being-with-others across his works, in *Sein und Zeit* he explicated *Dasein* as not just in the world with/through ready-to-hand equipment and work, but also

¹¹⁰ 'Intention', 'fore-planning' or 'pro-ject' also possible.

¹¹¹ Also meaning 'caution'.

¹¹² Also possible: '(to) aim at' or '(to) sight'.

¹¹³ Or 'conceptuality'.

¹¹⁴ 'Fore-concept' also possible.

¹¹⁵ Heidegger, M. *Beiträge zur Philosophie* in *Gesamtausgabe* Frankfurt a. M.: Vittorio Klostermann, 1989: 56 (my transl.): "Was und wer der Entwerfer 'ist', das wird erst aus der Wahrheit des Entwurfs faßbar, aber zugleich auch verborgen."

with other *Dasein*. *Dasein* as being-in-the-world is co-existential with being-with [*Mitsein*]. In its everydayness, *Dasein* proximately and mostly [*zu-nächst und zu-meist*]¹¹⁶ 'holds' itself in the *Man* ['one'] of 'the others' – the averageness [*Durch-schnitt-lichkeit*]¹¹⁷ into which *Dasein* is thrown. This inauthenticity [*Un-eigen-tlichkeit*], or 'vulgarity', Heidegger refers to as a 'falling' [*Ver-fallen*]¹¹⁸ – a type [*Art*] of Being through which *Dasein* flees itself into untruth, while however still staying in the *realm* of truth. The being-with-each-other in the *Man*, according to Heidegger, is a being-with-any-other.

These others are thereby not *specific* others. On the contrary, any other can substitute them. Decisive is only the inconspicuous sovereignty of the others, which has already unawares taken over *Dasein* as being-with. One belongs to the others oneself and solidifies their power.¹¹⁹

Being 'one'-self is really being 'no one' [*Niemand*] – the neutrum. This does not mean that being *Niemand* is being nothing. The *Niemand* is simply a modality of *Dasein* – a difference that is qualitative or structural, rather than quantitative – i.e. it is positive in any way. Falling *Dasein* is simply in the way of a 'groundless floating' in which it is everywhere and nowhere – it is without location [*auf-ent-halts-los*]: 'one' does not dwell; it is 'unhomely'. By proximately and mostly being 'scattered' in the publicness [*Öffen-tlichkeit*] of the *Man* – for example through 'chitchat' [*Gerede*] or 'hack writing' [*Geschreibe*], the types [*Arten*] of Being of being-with-each-other – *Dasein* has a tendency towards levelling its possibilities-for-Being.

The sovereignty of public laid-out-ness [*Aus-gelegtheit*] decides the possibilities of *Dasein*'s attunement [*Gestimmtheit*] – i.e. 'one' fore-sketches [*vor-zeichnen*] *Dasein*'s situatedness [*Befindlichkeit*] in the

¹¹⁶ 'Zu-' meaning 'towards'.

¹¹⁷ '*Durchschnittlichkeit*' can be literally translated as 'cut-through-ness'.

¹¹⁸ Also in the sense of 'falling for' as well as 'decay'.

¹¹⁹ Heidegger, M. *Sein und Zeit* Tübingen: Max Niemeyer Verlag, 2006: 126 (my transl.): "Diese Anderen sind dabei nicht *bestimmte* andere. Im Gegenteil, jeder Andere kann sie vertreten. Entscheidend ist nur die unauffällige, vom *Dasein* als *Mitsein* unversehens schon übernommene Herrschaft der Anderen. Man selbst gehört zu den Anderen und verfestigt ihre Macht."

world; 'one' determines what and how 'one' perceives, how 'one' understands. Average understanding is characterised by ambiguity towards the world and towards being-with-each-other.

The being-with-each-other in the *Man* is not at all a closed, indifferent side-by-side, but a tense, ambiguous watching-each-other [*Auf-einander-auf-passen*], a clandestine monitoring-of-each-other [*Sich-gegen-seitig-abhören*]. Under the mask of the for-each-other, an against-each-other is played out.¹²⁰

Dasein which 'holds' itself in the *Man* is, according to Heidegger, cut off from authentic [*eigen-tliche*] relations of Being towards the world. It is in constant temptation to fall into 'business' [*Betrieb*] – out of itself into itself; into the groundlessness of inauthentic everydayness; into alienation. The *Man* constantly [*ständig*] 'tears away' *Dasein* as understanding from designing [*entwerfen*] authentic possibilities (understood as a 'modified grasping' of falling everydayness). I.e. the 'one' prevents *Dasein* from being 'at home' and thus from developing its own *place*.

¹²⁰ Heidegger, M. *Sein und Zeit* Tübingen: Max Niemeyer Verlag, 2006: 175 (my transl.): "Das Miteinandersein im *Man* ist ganz und gar nicht ein abgeschlossenes, gleichgültiges Nebeneinander, sondern ein gespanntes, zweideutiges Aufeinander-auffassen, ein heimliches Sich-gegenseitig-abhören. Unter der Maske des Füreinander spielt ein Gegeneinander."

Transition

This chapter has closely read Heidegger's ontology through a technological framework via selected texts across his works, explicated around the conceptions of 'Being-in(-the-World)', 'Thingliness', 'Ge-Stell', 'Dwelling', 'Entwurf' and 'Being-With'. In order to ground the spherology – which develops 'places' in more physical, constructivist, pluralistic, medially complex and social forms – I will sum up and develop further:

In the first section, being-in-the-world in *Sein und Zeit* was explicated as the type [Art] of Being most proximate to (human) *Dasein* and always has to be conceived as a structurally *whole* phenomenon. Being-in-the-world is grounded in, or oriented through, (universal) Being-in, which cannot be understood as a relation between beings in a place *contained* in space, but as primary dimensionality, i.e. existential openness, *through* which *Dasein* dwells. *Da-sein* locates itself 'there' [da], i.e. it is *placed*, via the *besorgende Umgang* with intra-worldly beings, a *process* through which it understands *the* world constantly and which enables the grasping of objects *in the first place*.

In 'Thingliness', it was shown how Heidegger attempted to deconstruct the metaphysical tradition of objects and things through three types [Arten] of being across his works – equipment, work and thing – which become ever more singular and 'patial' throughout the evolution of his thought. In *SZ*, he dealt with equipment and work that are ready-to-hand in *the* world and not self-sufficient since they withdraw themselves into usefulness and serviceability (unless they become explicit through deficient modes of *Besorgen*). Equipment in *SZ* only *has* and is *in* a place [Platz] – as specific yonder [Dort] and there [Da] of its *belonging-to* – not *is* a place itself. The work however 'situates itself through working' [*befindet sich in Arbeit*]. Equipment is always out of an equipment *wholeness* and lies in a place which is out of a *whole* of places of equipment that are directed, i.e. related, towards each other. *Dasein*, as understanding in *the* world, is proximately through

equipment and work in the sense that it technically orients itself through them. The possibility of a placeable item of equipment that belongs somewhere is the (slightly more encompassing) region *in*, i.e. *through*, which places are situated. In *Der Ursprung des Kunstwerkes*, we saw how Heidegger explicated the work of art not as an 'inconspicuous' ready-to-hand process, but as some 'thing' more self-sufficient, i.e. singular. The work is somehow a thing, since it 'grows' from itself, however is also somehow equipment, since it is technically *brought forth* through the human hand. The work is however not really equipment since it authentically reveals truth [*alétheia*] poetically by *opening up* 'the' *Spielraum* between 'world' and 'earth'. In this way, the work of art is 'thrown' towards, and decided upon by, *the* historical people at strife. This is enabled through *the* truth as (universal) clearing *Entwurf* [de-throw], i.e. 'Design', which always shows itself in *another* way than it 'is' since it is *more* than being/s. The creating of a work stands in contrast to the production of equipment since the latter is never *immediately* the happening of truth; the being-finished of equipment merely lets it 'arise' in serviceability. The being-created of the work is created *into* the created so that it authentically [*eigens*] pro-trudes from it. Later in *Das Ding*, we saw how Heidegger developed a notion of the even more platial 'thing' through the essence of proximity, in order to go beyond notions of present-at-hand objectivity. The thing here is not equipment and also not a 'mere thing', but *something* that is *made*. However, unlike equipment that is also made, the thing is self-supporting and gathers in its own way, in the sense of an appropriating as event. Equipment in *SZ*, and also in *UdK*, just disappeared in usefulness and serviceability. Through the concept of the fourfold in this lecture, Heidegger problematised the *wholeness* of 'the world' from *SZ* a bit more, in the sense of hybridising it through the relationality of the four/fold, i.e. 'earth', 'sky', 'mortals' and 'divinities'. Through the thing, the world appears to 'mortals', which are *in* it – the thing [*res*] is a publicly [*öffen-tlich*] contested matter which *approaches* them. The

fourfold in the thing only *happens* due to the fou/ring (which used to be the primary dimensionality/openness of Being-in in SZ), i.e. approximating proximity.

In the section on the 'Ge-Stell', we saw how the in-order-to [*Um-zu*] referential structure from SZ, which became reliability in *UdK*, was further developed into *techné* as a 'revealing' in *Die Frage nach der Technik/Das Ge-Stell*. Technicity is now not just in 'the world' anymore through ready-to-hand beings, but becomes 'world' *itself*. Heidegger here attempted to revise instrumental and anthropological notions of technology, as thought in 'the Western' metaphysical tradition, through developing the essence of technology – i.e. *techné* as poetic revealing of truth [*alétheia*], which *pervades* humans as well as technology. Heidegger argued that the essence of *modern* technology thereby does *not* reveal as *poiésis* anymore, but as the (universal) *Ge-Stell* [set] (already familiar as the de-setting [*Ent-setzende*] from *Das Ding*) that turns 'Nature' into a fundamental stand-by part. The essence of technology sends the human upon a way of revealing. This sending that gathers (historially) is a destining, which is always *the* danger and if it reigns as the *Ge-Stell* it is the 'supreme danger'. In the age of modern technology, this danger appears in two ways: On the one hand, in the state of total objectlessness of the modern age the human becomes merely the *Be-steller* [orderer] of the stand-by and thus is in danger of becoming stand-by as well. At the same time, the human is in danger of seeing itself as 'master of the earth', i.e. as having power or agency over being/s, and in this way can think that it only encounters itself. But in *truth*, says Heidegger, nowhere does the human encounter only itself, i.e. its essence, anymore. The human stands so decisively in the follow of the challenging-forth of the *Ge-Stell* that it does not grasp it as a claim anymore – which thus leads to a loss of ek-sistence, i.e. 'homelessness'. Although the *Ge-Stell* also reveals in a 'truthful' way, truth does here not *approach* the human anymore, hence difference decays into 'the Same'. Nevertheless, the 'supreme danger' can also grow a 'saving

power'. This saving power is, according to Heidegger, grown by *questioning* the essence of technology and (just) *thinking* of technics as a poetic revealing of truth within the realm of art, not 'mere' aesthetics.

In 'Dwelling', which mainly explicated *Bauen Wohnen Denken*, we saw how Heidegger further developed this 'saving power'. In *BWD*, he explicitly thought the relation between technicity and place through dwelling(-conserving) as the fundamental tendency. 'Things' in this lecture are places, not just *have* or are *in* places, like equipment in *SZ*. Heidegger here explicitly distinguished between (singular) places and (universal) space, while however not being entirely clear about the difference between space-s and places (other than the former being a bit more encompassing). The thing, as place, here gathers in its own way the (dimensionality of the) fourfold into a reciprocal neighbourhood. Things as places Heidegger here also called buildings since they are brought forth through building, i.e. *techné*, which is authentically dwelling. Things as places, i.e. buildings, *in the first place* allow sites for spaces by forming their boundary (which is an origin, not a terminus). Spaces thus receive their essence from singular places and not from universal space. The thing as place Heidegger considered a twofold making-room-for, in the sense of an admitting and installing of the fourfold, and thus also called it a 'house', which is 'open' by self-sufficiently sheltering the location [*Auf-ent-halt*] of the human. If the relation between building and dwelling is considered by *thought*, according to Heidegger, dwelling will be brought into the fullness of its essence, i.e. experienced as the Being of the human, who will thus be 'at home'. This dwelling is ultimately Language for Heidegger, i.e. the 'mistress of the human' or, as he had already said in *Über den Humanismus*, the 'House of Being'. Humans are thereby the (rather passive) guardians of this (rather passive) dwelling-conserving tendency of Language through thinking, which however "acts insofar as it thinks."

In the section on '*Entwurf*', i.e. 'Design', a conception Heidegger largely developed in *SZ*, the spatiality (or, for me, platiality) of *Dasein* as

understand-ing was further pointed out. Through the *besorgende Umgang*, (relatively individual human) *Dasein* is in the (universal) world, in the first place being enabled via *the* primary dimensionality of Being-in, for the sake of where *Dasein* is. By being in the (universal) world 'by' ready-to-hand beings, *Dasein* is spatial (i.e. platial) via de-distance and directionality through which it approximates and thus orients itself in *the* world. *Da-sein* situates itself [*befindet sich*] through the openness of the 'da' [there] via which it is dis-closed. The existential structure of disclosing is thereby the *Entwurf* – the *Spielraum* for *Dasein*'s own possibility-for-Being. *Dasein* is thrown [*ge-worfen*] into *its* Being of *Entwurf*, i.e. it is essentially designed-designing, whereby it never thematically grasps exactly where-to it designs. As essentially understand-ing, *Dasein* designs towards *its* possibilities, which in turn designs the understand-ing. This designing of the understand-ing has the possibility to form itself [*sich aus-zu-bilden*]. The formation of the understand-ing Heidegger called laying-out [*Aus-legung*], whereby the ready-to-hand becomes ek-splicit and *Dasein* as understand-ing appropriates, i.e. becomes, itself in the sense of determining its own (open) place. *Dasein* can however only form itself through the existential fore-structure of the understand-ing as *Entwurf*, which is the possibility for the (phenomenological/hermeneutic) circle as ek-spression of the understand-ing. Nevertheless, what and who the designer 'is' only becomes graspable out of *the* truth of Design, but at the same time also concealed. Heidegger's conception of *Entwurf* can thus be conceived as the existential structure of 'design/ing', however largely of the *individual human itself* who does essentially not "achieve anything" through it.

In 'Being-With', we saw how in *SZ* (and hardly anywhere else) Heidegger explicated *Dasein*, as being-in-*the*-world, as co-existential with being-with. *Dasein* 'holds' itself proximately and mostly in the (universal) *Man*, i.e. the 'one' – the averageness or 'vulgarity' – into which *Dasein* is thrown. This inauthenticity [*Un-eigen-tlichkeit*] Heidegger

conceived as a 'falling' through which *Dasein* flees itself into untruth (which is still an existentially positive condition). The being-with-each-other in the *Man* is a being-with-any-other, i.e. being 'one'self is being 'no one' – being without location [*Auf-ent-halt*] and thus being 'unhomely'. 'One' fore-sketches *Dasein*'s situatedness [*Befindlichkeit*] in the world through public [*öffen-tliche*] laid-out-ness, i.e. 'one' determines *what* and *how* 'one' perceives and understands. This average understanding is ambiguous – “under the mask of a for-each-other, an against-each-other is played out”. *Dasein* is in constant temptation to fall into the 'business' of the inauthentic *Man*, which constantly 'tears away', or 'cuts off', *Dasein* from designing *its* authentic possibilities, which it thus levels – i.e. it prevents *Dasein* from being 'at home' and developing its singular *place*. Heidegger thus had a relatively negative and universal conception of being-with-each-other as the 'one' and we do not really get to know much about what an authentic being-with-each-other is or could be. In this way, *Dasein* only designs authentic [*eigen-tlich*] possibilities for *itself*, i.e. relatively *without* others, via a 'modified grasping' of falling everydayness.

This chapter shall serve as the ground for the spherology and we will now see how Sloterdijk develops 'place/s' in more physical, constructivist, pluralistic, medially complex and social forms – in order to thus generate the topo-logies of maker labs.

II Sloterdijk's Spherology

Following on from Heidegger's techno-platial ontology, this chapter aims to read Sloterdijk's *Spheres* trilogy systematically in order to generate the topologies of maker labs. Although *Spheres* – certainly Sloterdijk's most extensive, arguably his most important work to date – is not simply to be read as a continuation of Heidegger's work, he is one of his, if not *the*, most important inspiration. Sloterdijk is influenced by a vast number of sources¹²¹ and his (largely implicit) 'reading' of Heidegger in *Spheres* goes far beyond the existentialist's own conceptions. In my view, the spherology cannot be sufficiently grasped without grounding it in, as well as setting it against, Heidegger's techno-platial concepts. As mentioned above, Sloterdijk writes himself that *Spheres* is to be read as 'Being and Space' – in order to give it more conceptual power however, by emphasising the theory's notion of singularity, I conceive it as 'Being and *Place*'.

As explained, the way in which I re-present *Spheres* here is a much more systematic design than the original text, which is not just a ('media'-)philosophical essay, but equally, if not more so, a work of literature (and not without its contradictions). Since I am starting to develop an onto-*logy* of place, my focus is here slightly more on the *logics* of the *Spheres* trilogy rather than the *poetics* of the text, although the *poetics* are part of the *logics* and will, hopefully, not be neglected. Since only the first book of the trilogy, *Bubbles*, was available in English for most of the time of writing, translations are more or less entirely mine. As mentioned earlier, it is also one of the reasons why there has not been extensive literature on *Spheres* in the English-speaking world/s so far, with the small amount available not so much explicating the trilogy

¹²¹ Influences include Nietzsche, *Titanic*, Deleuze and Guattari, Luhmann, Hegel, R. Buckminster Fuller, London's Crystal Palace, the Bible, Husserl, Freud, Christopher Columbus' signature, Indian group therapies and Bachelard, among many others.

as an ontological, or topological, model and thus missing the importance of understanding it in a systematic form.

As just explained, I see *Spheres* not so much as a spatial, but as a *patial* theory – since Sloterdijk does not really distinguish between spaces and places in *Spheres*, similarly to Heidegger, the following pages will explicate the spherology largely without any place/space distinctions, however in the summary and critical review at the end of this chapter, I will be sensitive towards the difference and further point out the *patial* dimensions of the trilogy. As regards the sheer volume of this explication of *Spheres*, the reader might wonder why certain topics have been included since they do not seem so relevant for the development of this thesis – as implied, the development of ‘the whole’ spherology is necessary for the sake of understanding it as an ontological model, which will be used in the next chapter to develop the topologies of maker labs. Especially since *Spheres* has not been widely read in the English-speaking world so far, certainly not volume III, the reader might be interested in following the spherological explication process.

As mentioned earlier, Sloterdijk wrote his ‘spherical phenomenology’ in three books – *Bubbles*, *Globes* and *Foams*. The design of this trilogy thereby corresponds to three epochs of human civilisation, i.e. three forms of Being-in-the-world: The age of hunter-gatherers, the age of agro-empires and the technological age (i.e. the anthropocene). The first book, *Bubbles*, explicates the micro-spherical elements – ‘nobjects’ – as formations [*Form-Bildungen*] of intimate, communal immanences: ‘first places’. It aims to explain the ‘underworld of the interior world’ by describing the anthropogenesis. *Globes* then concerns itself with the macro spheres and gives a historical account of metaphysics, which is also a history of socio-political worlds – i.e. a history of *globalisation*, in the very sense of the word. *Globes* are the ‘next’ dimension in the maturation process of the human who now increasingly becomes an individual, i.e. a subject, setting itself into an

ever more constructive relation with 'the world', by representing it as 'picture'. The last book of the trilogy, *Foams*, is the plural spherology – the critique of the present [*Gegen-wart*] – and aims, at the same time, to be the most intimate and most general theory of our current age. It conceives of globalisation not as *the* globalisation, but of globalisation as an 'enfoaming'. *Foams* is a theory of co-fragile hybrid human environments, which increasingly ek-splicate, i.e. technologically design, *themselves*. 'Societies' are now magnitudes that form [*bilden*] *themselves*, contain *themselves*, 'climatise' *themselves* – *in* and *with others*. The anthropocene epoch is 'Being-in-the-world 2'. The third book is the site in which Sloterdijk's topo-logy, i.e. his logics of place, really comes together, and cannot be grasped outside of the multi-historical dimensions of *Bubbles* and *Globes*.

With *Spheres*, Sloterdijk has developed a (post-)anthropological 'media' theory after Heidegger that conceives of place as medium, as conductivity: in some'thing' through some'thing' into some'thing'. Being-in-spheres is the fundamental condition [*Grund-ver-fassung*]. By conceiving Heidegger's early work from a spatial point of view and building upon his later, more platial, thought, Sloterdijk 'substantialises' the existential analytic: Rather than comprehending *the* world as a horizontal, primarily determined by temporality,¹²² Sloterdijk develops world/s in more pluralistic, constructivist, physical, medially complex and social forms. While Heidegger understood the 'House of Being' ultimately as Language, Sloterdijk understands it as, indeed, a *house*: Being-in(-the-world) means Being-in-houses – or better: *building* houses. *Spheres* hence describes a morphological transformation of 'the world', i.e. a new *organisation* of density: a being-with-each-other-in-each-other-against-each-other – immanance and transcendence converge.

¹²² As was the intention of *Sein und Zeit* at the time, see above.

Bubbles

All history is the history of animation relations. Its nucleus [...] is the biune bond of radical inspiration communities.¹²³

In the first book of the trilogy, Sloterdijk explains his 'micro spherology', to be understood as a psychology of spheres, or psychology of intimacy. Via the foetal situation [*Befindlichkeit*], i.e. the mother/child relation in the womb, Sloterdijk develops this primal history as the anthropogenesis. The birth of the human grounds, i.e. is the possibility for, the 'macro spherology' – the socio-political history of spheres. The primal dimensionality of 'interior' space is prior to 'exterior' space: Being-in is prior to Being-in-the-world – as Heidegger already pointed out. This 'sequence' is however not linear, but relative and necessary for the sake of explication. However, whereas Heidegger described primary dimensionality, i.e. originary openness, as fairly *universal* Being-in, Sloterdijk describes it as a *singular (social) milieu*, which is situated in a 'bubble'.

As fundamental molecules of the 'phenomenology of intimate spheres', bubbles are the 'origin', i.e. the pre-geometric. They are always a unity of (at least) two poles that form a resonance. These two (or more) poles in the bubble do not constitute an object yet, but a pre-object, primal object, or 'nobject'. They are a synthesis *a priori*; an 'aspirated commune'; an originary being-with. Nobjects are small interior 'comings-towards-the-world', which cannot conceive of themselves as objects since they have no other/s to oppose to yet. The proximity to the other pole/s is only real if the 'relation' to it/them is negated. Nobjects are 'in-ek-sistent'. The milieu in the bubble is merely an atmospheric (non-)relation; a con-subjective, inter-intelligent identification. The archaic Being-in(-the-milieu) – the first 'where' – is

¹²³ Sloterdijk, P. *Sphären I: Blasen* Frankfurt a. M.: Suhrkamp, 1998: 53 (my transl.): "Alle Geschichte ist die Geschichte von Beseelungsverhältnissen. Deren Nukleus ist [...] das zwei-einige Band radikaler Inspirationsgemeinschaften."

without any outline [*Um-riß*]¹²⁴ of structure and content yet; it has no walls; no present-at-hand is 'here' yet. Nobjects simply float in a type [*Art*] of non-duality; they merely sense a space. Referencing Salomo Friedländer, Sloterdijk sees the foetal situation as a 'medial indifference'.¹²⁵

Aiming to take 'depth psychology even deeper', Sloterdijk develops his theory of pre-objective psychosomatic mediality with the help of Thomas Macho's 'negative gynaecology', to be understood as a critique of Freud. In a pre-objective universe, no mirroring, narcissism or libidinal desires can occur as yet.

A gynaecology is negative or philosophical if it maintains a double renunciation: of the proximate possibility of looking at the vulva from the outside and conceiving it as an object (gynaecological and pornographic vulvo programmes); and of the temptation, never entirely out of date, to initiatively pass through the vulva again as gate to the interior world (para-metaphysics and mystical holism). [...] [The female non-opening] is the non-thing experienced by every naturally born individual in a single sequence of events; it is the narrow primal something that only 'is' once in an unrepeatable, dramatically extended scene. [...] From the conception of the nobject, the organ, taken objectively, seemingly familiar, overlookable, sympathetic and elastic, is a tunnel of decision in which the foetus is motivated to brace itself and become a breakthrough *par excellence*, a here-I-come projectile. Thought as a medium, the birth canal or vulva convey the present experience that an impenetrable wall exists which must at once also be an opening; the opening is a function of running against the wall. For the new arrival, the hopelessness of standing-before-the-wall turns directly into the compulsion to break through the wall. As nobject, the vulva is the mother of granite. At the moment of struggle, it is evidently impossible to penetrate the wall, but as it is nonetheless passed through somehow *in extremis*, the initiate who exits experiences itself as the harder stone, the stone that breaks stone. For most of the born, being born means to triumph over a wall.¹²⁶

¹²⁴ '-riß' meaning 'rip', 'riff' or 'split'.

¹²⁵ *Sphären I: Blasen* Frankfurt a. M.: Suhrkamp, 1998: 323

¹²⁶ Sloterdijk, P. *Sphären I: Blasen* Frankfurt a. M.: Suhrkamp, 1998: 307/8 (my transl.): "Negativ oder philosophisch ist eine Gynäkologie dann, wenn sie einen doppelten Verzicht durchhält: auf die naheliegende Möglichkeit, die Vulva in äußerer Draufsicht als Gegenstand zu konzipieren (gynäkologische und pornographische Vulvoprogramme); und auf die nie ganz inaktuelle Versuchung, die Vulva wieder initiatisch als Tor zur Innenwelt zu passieren (Para-Metaphysik und mystischer Holismus). [...] [Die weibliche Nicht-Öffnung] ist das Nicht-Ding, das von jedem auf natürlichem Wege geborenen Individuum in einer einzigen Ereignissequenz in Erfahrung gebracht wird; sie ist das enge Ur-Etwas, das es nur einmal und in einer unwiederholbaren, dramatisch gedehnten Szene 'gibt'. [...] In der Nobjekt-Auffassung ist das objekthaft genommen scheinbar bekannte, überschaubare, sympathische und nachgiebige Organ ein Entscheidungstunnel, in dem der Fötus motiviert wird, sich zusammenzuraffen, um ein schlechthin Durchbrechendes, ein Ich- komme-Projektil zu werden. Als Medium gedacht, vermitteln Geburtskanal oder Vulva dem Subjekt im Kommen die präsente Erfahrung, daß eine undurchdringliche Wand existiert, die zugleich auch eine Öffnung sein muß; die Öffnung ist eine Funktion des Anrennens gegen die Wand. Die Aussichtslosigkeit des Vor-der-Wand-Stehens geht für den Ankömmling direkt in die Nötigung über, durch die Wand zu brechen. Als Nobjekt ist die Vulva die Mutter des Granits. Es ist im Augenblick des Kampfes evident unmöglich, die Wand zu durchdringen, aber indem sie irgendwie doch, *in extremis*, durchquert wird, erlebt

Macho insists that before the so-called primary 'oral stage', at least three pre-oral stages must have passed in the development of the child:¹²⁷ a) The stage of foetal co-habitation b) the psycho-acoustic stage and c) the respiratory stage. In the stage of foetal co-habitation, the foetus experiences the sensory presences of placental blood, amniotic fluid, the placenta, umbilical cord, amniotic sac as well as spatial boundaries through the resistance of, for example, the abdominal wall. The psycho-acoustic stage then concerns the sonosphere. Due to the early development of the foetal ear (certainly in the second half of pregnancy, but probably already at the embryonic stage),¹²⁸ as well as through amniotic fluid and bones transmitting sound waves, the physiology of acoustic oscillations – the 'acoustic umbilical cord' – already prepares the unborn child for the later psycho-social soundscape, which includes linguistic competence, for instance. According to various studies, the foetus is not just passively taking sounds in (from inside the womb as well as from outside), but already selecting them in order to (pre-)actively *orient* itself – which is one of the child's first techniques.

As Tomatis untiringly emphasises, the child's location in the womb would be unbearable without the ability to specifically not listen and to mute large areas of noise, as the heartbeats and the digestive sounds of the mother, perceived in close proximity, equal the noise of a building site operated day and night or the acoustic level of a lively pub conversation. If the ear did not learn to not listen from early on, the life-in-becoming would be ravaged by a permanent noise torture.¹²⁹

According to Sloterdijk, the difference between 'the significant' and 'the insignificant' comes out of this primal differentiation. Thus, in

sich der Initiand, der hinausgeht, als den härteren, den steinbrechenden Stein. Geboren werden heißt für die meisten Geborenen über eine Wand triumphieren."

¹²⁷ In Sloterdijk, P. *Sphären I: Blasen* Frankfurt a. M.: Suhrkamp, 1998: 299-305

¹²⁸ Sloterdijk, P. *Sphären I: Blasen* Frankfurt a. M.: Suhrkamp, 1998: 511

¹²⁹ Sloterdijk, P. *Sphären I: Blasen* Frankfurt a. M.: Suhrkamp, 1998: 512 (my transl.): "Wie Tomatis zu betonen nicht müde wird, wäre der Aufenthalt des Kindes im Mutterleib ohne die Fähigkeit zum spezifischen Weghören und zum Abdunkeln großer Geräuschbereiche unerträglich, weil die Herztöne und die Verdauungsgeräusche der Mutter, aus nächster Nähe wahrgenommen, dem Lärm einer bei Tag und Nacht betriebenen Baustelle entsprechen oder dem Geräuschpegel einer prallen Wirtshausunterhaltung gleichkommen. Würde das Ohr nicht von früh auf lernen wegzuhören, so würde das werdende Leben durch eine permanente Lärmfolter verwüstet."

contrast to widely held views of semiotics, he argues that 'the subject' does not select the significant *out* of the insignificant that it overlooks [*über-sieht*], or 'hears over' [*über-hört*], rather the field of the insignificant is only being *posited* as non-informative or indifferent through the ear's *prior* turning away from unbearable sound presences. In the same way, the ear turns *towards* sounds that it senses to be welcoming and thus opens up 'the subject' to a certain attunement [*Stimmung*], which will affect the child's liveliness in the future. At the same time, by hearing its own voice, the child is developing a pre-oral medial ego-core through which it starts its history with itself. In the respiratory phase, air becomes the successive element of amniotic fluid, even before the child gets in contact with the surface of the mother's skin. By being-in-the-air, the child *necessarily* participates in the world.

Thus, in contrast to 'Western' metaphysical conceptions, 'mother' and 'child' for Sloterdijk are not objects, but *poles* of a dynamic in-between that is increasingly gaining complexity with the child's growing into a cultural system. The triadic character of this bipolar milieu can be explained as such:¹³⁰ 1 foetus – 2 (placental blood/mother's blood) – 3 mother; 1 newborn – 2 (own voice/mother's voice/mother's milk) – 3 mother; 1 child – 2 (language/father/mother's partner) – 3 mother. Coming-towards-the-world, i.e. the formation [*Bildung*] of the human, is thus not a movement from the ego to the 'we', but the decomposition of the archaic biune 'we' into the ego and its second element by simultaneously crystallising out the third. Due to its medial character, biunity is always already triadic – a dyadic triad that is constantly reset, concretised and expanded in the course of history. I.e. the 'revolution' of being born is continuously repeated throughout the 'theatre of life': it is a continuum of continuum and non-continuum; a transition into the total other that follows on from the past.

This dynamic in-between, which increasingly gains complexity with the child's growing up, Sloterdijk calls the 'with' – the primal

¹³⁰ Sloterdijk, P. *Sphären I: Blasen* Frankfurt a. M.: Suhrkamp, 1998: 326

companion; the living id; the virtual; the 'yonder-in-proximity'. The 'yonder' leads back to the 'here' where the 'also' sprouts. This primal organ, the 'genius', is the most silent some'thing' that, as soon as I want to locate it, withdraws itself. It enables infinite reconnaissance of proximity, i.e. of the first *place*, which is *only* mine. The genius is the 'with-me'. In this sense, devotion – i.e. going-outside-of-oneself – is *the* subject-forming act, i.e. the first gesture of the subject. In modernity, Sloterdijk argues, the 'with' has been lost due to the large disappearance of cultural relations replacing it, i.e. remembering it, after birth (for example the abandonment of afterbirth rituals or the belief in God), leading to melancholia, individualism and totalitarianism. Without one's genius, one cannot go outside of oneself anymore, one cannot *become*. In this sense, the "limits of my ability to transmit are the limits of my world."¹³¹ Sloterdijk argues that in modernity, without their second element, all individuals immediately become 'mothers'. We are living in an age of false alternatives in which the only choice individuals seem to have is to either dwell solitarily or "to embark on potentially lethal power adventures in collective fusions with their peoples."¹³² The solitary modern subject is the fission product of the formless separation of birth and afterbirth (rather than the product of its own choice): it is the ego without double. The separating cut is the de-distancing [*Entfernung*] of the anonymous twin. Modern individualism is placental nihilism.¹³³

Micro spheres are thus constituted by five structural moments: 1) the self (the 'here') 2) the with-self (the latent 'yonder') 3) the 'container' form in which the 'here'-'yonder'-field is embedded 4) the *a priori* resonance between the two poles; the ecstasy in the interior of the bubble; the Being-with-the-other; the sheltered Being-outside-of-oneself and 5) the membrane functions:

¹³¹ Sloterdijk, P. *Sphären I: Blasen* Frankfurt a. M.: Suhrkamp, 1998: 14

¹³² Sloterdijk, P. *Sphären I: Blasen* Frankfurt a. M.: Suhrkamp, 1998: 388/9

¹³³ Sloterdijk, P. *Sphären I: Blasen* Frankfurt a. M.: Suhrkamp, 1998: 391

As original complement, [the companion] ensures both the formation and opening of the space as well as its care and closure. [...] The degree of [the membrane's] opening decides over dehydration or flooding. If the companion's membrane is not porous enough to let through increasing volumes of world, it can develop into a prison of the subject; it closes it off from the so-called outside world, one would better say: from the outer-symbiotic spheres. If the companion is lost prematurely through a traumatic accident or remains indifferent or absent for a long time, the subject will suffer from an openness shock, it tumbles 'out' into the bad ecstasy of the fear of destruction; it becomes acquainted with an exospheric outside in which it cannot bear itself.¹³⁴

One cannot talk about bubbles without at the same time mentioning how they burst and in which ways new, bigger ones are being formed: bubbles live *towards* their bursting. When individuals leave their biune milieus and step 'out' into the extended psycho-social sphere, they become residents of multi-polar adult worlds. The birth of the outside is the transition from micro to macro. The departure [*Aufbruch*] into history – the process of exteriorisation – Sloterdijk calls the 'world poeticisation process' [*Weltdichtungsprozess*],¹³⁵ which increasingly turns 'the outside', the other, into an extended interior. I.e. the process of exteriorisation is at the same time a process of interiorisation. The world poeticisation process bears the question of death – it is a pathological process.

What Heidegger called Being-towards-death means not so much the individual's long march into a final solitude foreclosed with panic-stricken resolve, but rather the circumstance that all individuals will one day leave the space in which they were allied with others in a current, strong relationship. That is why death ultimately concerns the survivors more than the deceased. Human death thus always has two faces: one that leaves behind a rigid body and one that shows sphere residues – those that are sublated into higher spaces and are re-animated and those that, as thingly waste, fall out of former spaces of animation, remain on the ground. [...] Human and historical experience at least shows that spheres can continue to exist also beyond

¹³⁴ Sloterdijk, P. *Sphären I: Blasen* Frankfurt a. M.: Suhrkamp, 1998: 447 (my transl.): "Als ursprünglicher Ergänzer sorgt dieser ebenso für die Bildung und Öffnung des Raums wie für seine Hegung und Schließung [...] Der Grad ihrer Öffnung entscheidet über Austrocknung oder Überflutung. Ist die Begleiter-Membrane nicht porös genug, um wachsende Weltvolumina durchzulassen, so kann sie sich zum Gefängnis des Subjekts entwickeln; sie sperrt es von der sogenannten Außenwelt, man würde besser sagen: von den außer-symbiotischen Sphären, ab. Geht der Begleiter hingegen durch einen traumatischen Zwischenfall zu früh verloren oder bleibt lange gleichgültig oder abwesend, dann erleidet das Subjekt einen Offenheitsschock, es stürzt in die schlechte Ekstase der Vernichtungsangst 'hinaus'; es macht Bekanntschaft mit einem exosphärischem Außen, in dem es sich selber nicht erträgt."

¹³⁵ 'Weltdichtungsprozess' could also be translated with 'world densification process'.

mortal separation and that things lost can remain present in memories, as memorial, as spectre, as mission or as knowledge.¹³⁶

¹³⁶ Sloterdijk, P. Sphären I: Blasen Frankfurt a. M.: Suhrkamp, 1998: 48 (my transl.): "Was Heidegger das Sein-zum-Tode genannt hat, bedeutet nicht so sehr den langen Marsch der Einzelnen in eine letzte, mit panischer Resolution vorweggenommene Einsamkeit, sondern den Umstand, daß alle Einzelnen irgendwann den Raum verlassen werden, in dem sie mit anderen in aktueller starker Beziehung alliiert waren. Darum geht der Tod letztlich mehr die Überlebenden als die Abgeschiedenen an. Der Menschentod hat somit immer zwei Gesichter: eines, das einen starren Körper zurücklässt, und eines, das Sphären-Reste zeigt – solche, die in höhere Räume aufgehoben und neu belebt werden, und solche, die als dinglicher Müll, aus ehemaligen Beseelungsräumen herausfallen, liegenbleiben. [...] Die menschliche und historische Erfahrung bezeugt immerhin, dass Sphären auch über die mortale Trennung hinweg bestehen können und daß Verlorenes in Gedächtnissen gegenwärtig zu bleiben vermag, als Mahnmal, als Spukbild, als Mission, als Wissen."

Globes

[...] All history is the history of sphere expansion fights. [...] Expansions implement themselves only if the previously exterior can be absorbed from the smaller sphere and be reinterpreted in it into a factor of its elasticity and super-elevated bulge.¹³⁷

In the second book of *Spheres*, Sloterdijk explicates his 'macro spherology', which raises [*auf-hebt*]¹³⁸ the theory of intimate spheres onto a theory of large, 'theometric' immune structures (cities, states, empires, religions, 'worlds'): it is a theory of the inclusive globe. In the transition from micro to macro, the primal resonances of the bubble are becoming an individual, which grows into the psycho-social milieu. Sloterdijk here considers human ensembles as utero-technical, increasingly self-revealing pro-jects, which create their own atmospheres, their own 'climates' – 'fragments that signify the world.'¹³⁹ Sloterdijk here deals with theology, the political ontologies of (pre-/ post-)modern empires and urbanisation as well as describes a changing affect ecology and onto-semiology. Whereas the exclusivity of the bubble is a lyric motif ('an-archive'), the inclusivity of the globe is an epic one ('discursive archive'): *Globes* is mainly a *history* of globalisation, i.e. a history of building houses – from the cosmic globalisation of ancient physics and the philosophical globalisation of classic ontology to terrestrial globalisation to cybernetic globalisation.

In this second book of the trilogy, Sloterdijk describes macro spheres as thanatological spaces – the 'next' dimension in the maturation process of the human, which is a 'serious' process. As the individual is growing up, it has to learn to master death, i.e. deal with loss and open oneself up to the other. Strictly speaking, it has to 'die' into the other, into its neighbours, to which it gives its volume. The

¹³⁷ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 159/160 (my transl.): "[...] Alle Geschichte [ist] die Geschichte von Sphärenerweiterungskämpfen. [...] Erweiterungen vollziehen sich nur, wenn vormals Äußerliches von der kleineren Sphäre aufgenommen werden kann und in ihr sich umdeuten läßt zu einem Faktor ihrer Spannkraft und ihrer überhöhten Wölbung."

¹³⁸ Also in the sense of 'voiding' – cf. Hegel.

¹³⁹ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 207

process of dying is however at the same time a process of being born, by which the individual *remembers*, and in this way *repeats*, its first place, i.e. the primary 'solidarity' in the bubble. This life-and-death process bears a certain 'repair intelligence' – if humans were not able to overcome the death of their neighbours, no individual could ever die alone, as the death of one would at the same time be the death of everyone. Human spaces are inherently created through the 'vaccination' with death: Only through death, i.e. finitisation (of the infinite), a space can emerge and thus an individual be formed. By more or less opposing oneself against externals, the individual is increasingly taking a *position*.

As monstrous employer of mourning 'work', death is the first sphere stressor and shaper of cultures. [...] Only a co-existent system of the dead and living has world character ontologically – and owns the force ontographically to draw a world picture border around itself."¹⁴⁰

Death creates tense proximity; it is a process of de-distance [*Ent-Fernung*] – which isolates and unifies at the same time. As already explicated in 'Bubbles' above, the ego is not formed via (ob-jective) mirroring, but by it *firstly* becoming a self-referential figure through *anticipation* of death. Through the 'yonder' – the 'genius' – the ego has *already* posited itself as abandoning and abandoned, i.e. the human is always already *outside of itself*.

In *Globes*, the 'mausoleum of all-unitary thought', Sloterdijk considers monospherism as *the* project of metaphysics – the geometricisation, or 'theometricisation', of the immeasurable. The globe [*Kugel*] is the Parmenidean universe whose limit has been drawn with a spring bow. When in Platonic times, mere surroundings started to become represented by the geometric globe ('world' started to become graspable 'idea'), Being started to become the making-room

¹⁴⁰ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 171 (my transl.): "Als monströser Trauer'arbeit'geber ist der Tod der erste Sphärenstressor und Kulturbildner. [...] Allein ein Koexistenzsystem von Toten und Lebenden hat ontologisch Weltcharakter – und besitzt ontographisch die Kraft, einen eigenen Weltbildrand um sich zu zeichnen."

[*ein-räumen*] of space and knowledge became separated from 'society'. Being is increasingly becoming the time it takes to understand space – the world poeticisation process is underway.

True heaven wants to be held in encompassing reflections. Its bearer or its 'Gestell' is thought itself. The *logos* has become accomplice, yes authentic *fundamentum*, since it grasps what encompasses us. The *periechon** is the spirit whose lightness sets the gravity universe into suspension.¹⁴¹

From Sloterdijk's point of view, what many people today call 'globalisation' is a process that has been developing for a very long time. It is the history of the transition from a meditative speculation of the globe from 'the outside' to the practice of actually, immediately grasping it. I.e. the world is increasingly becoming 'ready-to-hand'.

Technology is going to be exactly what will be predominant when the bearer of the world puts down its image burden and conquers the world which is set before [*vor-ge-stellt*] and set down [*ab-ge-stellt*] through work [*Bearbeitung*] (Heidegger would formulate: when the what-lies-aground [*Zugrunde-Liegende*] is laid out as subject and the subject as what-dominates-over-it [*Darüber-Herrschendes*]).¹⁴²

For Sloterdijk, in classic ontology Being and fullness are the same: the complete, the enclosing, the overflowing, the non-castrated, the unsevered. This universal *über-object* – nothing else than God, the origin, the primal form of all things which contains them, cause for itself and its contents – is the oldest, the most beautiful, the greatest, the wisest, the fastest, the heaviest, the most powerful, the optimum. It is the coherent that contains everything and is contained by nothing but itself so that no other could be imagined outside. In this 'hermeneutic of fullness', not the 'not enough', but the 'too much' explains human Being-in-the-whole. In traditional metaphysics, it is time primarily

¹⁴¹ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 69 (my transl.): "Der wahre Himmel will in umfassenden Reflexionen gehalten werden. Sein Träger oder sein 'Gestell' ist das Denken selbst. Der Logos ist zum Komplizen, ja zum eigentlichen *fundamentum* geworden, seit er begreift, was uns umgreift. Das *periechon* ist der Geist, dessen Leichtigkeit das Schwere-All in Schweben versetzt."

* Plato uses the term for 'that which encompasses'.

¹⁴² Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 85 (my transl.): "[...] Technik wird genau das sein, was vorherrschend wird, wenn der Weltträger seine Bild-Last absetzt und die vorgestellte und abgestellte Welt durch Bearbeitung erobert (Heidegger würde formulieren: wenn das Zugrunde-Liegende als Subjekt und das Subjekt als Darüber-Herrschendes ausgelegt werden)."

understood as space that comprises recollection, anticipation and presence of mind: the centre is omnipresent. This means that the centre of power has the ability to emanate into the (infinite) distance – it has to be *immediately* present everywhere. In order to ‘telecommunicate’ its power, the sovereign generates media out of itself that represent it as if they were the sovereign themselves – the logics of apostolicism and emperorism, for example, and the reason why one encounters ‘the second’ before ‘the first’. The medium is the message: “Especially where [power] is absent, it has to be as if it was there in full.”¹⁴³ For the centre to be omnipresent, the media representing it have to be pure and neutral, i.e. without ego, so that they can be immediately replaced by the subjectivity of the master. If the representatives were self-referential, the power transmission would be disturbed. In traditional metaphysics, the *signs* of Being participate in Being itself – they are representative and presentative at the same time. Only in this way, the centre of power can effectively form a macro sphere.

Where Being and sign form a common quantity, the power of the whole to be imposingly *there* in signs is at stake. Signs of Being are signs of power because they not only mean what they represent, but are what they represent; A *real sign must not mean but be*. But how can something that represents at the same time be what it stands for? Is the real present of the denoted possible at all?¹⁴⁴

For Sloterdijk, classic philosophy’s epicentrism means that even though humans are seen as being contained in the epicentre, they are not the epicentre themselves – they are merely an opaque fragment of it. ‘Episubjects’ are the local function of the global optimum. They thus already establish some kind of relation with God/Nature and hence slowly start to become subject.

¹⁴³ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 669 (my transl.): “Gerade wo [die Macht] nicht ist, muß sie sein können, als wäre sie in Fülle da.”

¹⁴⁴ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 673 (my transl.): “Wo Sein und Zeichen ein gemeinsame Menge bilden, dort geht es um die Macht des Ganzen, in Zeichen imposant *da* zu sein. Seinszeichen sind Machtzeichen, weil sie nicht nur meinen, was sie vertreten, sondern sind, was sie darstellen; A *real sign must not mean but be*. Aber wie kann etwas, was vertritt, zugleich das sein, wofür es steht? Ist die reale Gegenwart des Bezeichneten überhaupt möglich?”

Not only is [the image of the *sphaira*] commensurable to the original in the highest sense, it furthermore drags the observer into the represented. The globe [Kugel] proves to be the dynamic true icon of being: for by informing and encompassing the observer, it starts to *live* in it as active idea. It brings the human eye into the excentric position, which could seemingly only be a detached God's own; followingly it deifies the human intellect, which has grasped the rule of globe creation. In this way, the *sphaira* can be described as the metaphysical thought image *par excellence*, as it initiates and completes, according to its internal dynamic, the transition from sensual viewing towards intellectual setting-before.¹⁴⁵

In the age of pre-modern empires (such as China, India and Greece, considered to be the birth places of philosophy), globes tried to expand themselves to the limit in order to widen their internal security and form themselves superior to the smaller ones. Thereby, the will to power has to correspond to the will to animate the entire sphere. The topological difference between interior and exterior has a moral reason: it creates the separation of 'good' (interior/pure) and 'evil' (exterior/impure). The socio-ecological processes of pre-modern cultures were based on removing all evil from the interior and separate it from everything that was not themselves – homogenisation is the concept of xenophobia. The main function of the empire is thus to explicitly make its walls visible and sensible in order to demonstrate its power – the dialectic of the border sets in: 'stop or transgress'.

The development of empires was simultaneously the development of macro architectures, in a literal sense: the city is a type [Art] of God. According to Sloterdijk, early urbanisation was the first instantiation of what was going to become the transcendental subject who acts in a grasped, self-reigned world – the building of cities becomes 'a way of revealing', in Heidegger's language. Sloterdijk here references examples such as Uruk ('the first metropole of world history'), Babylon, Jerusalem, Nineveh (capital of the ancient Assyrian empire),

¹⁴⁵ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 81 (my transl.): "Nicht nur ist [das Bild der *sphaira*] dem Original im höchsten Sinne angemessen, es zieht zudem den Betrachter in das Dargestellte hinein. Die Kugel erweist sich als die dynamische wahre Ikone des Seienden: denn indem sie den Betrachter informiert und umgreift, beginnt sie als wirkende Idee in ihm zu *leben*. Sie bringt das menschliche Auge in die exzentrische Position, die scheinbar nur einem abgetrennten Gott eigen sein könnte; folglich vorgöttlicht sie den menschlichen Intellekt, der die Regel der Kugelerzeugung erfaßt hat. So läßt sich die *sphaira* als das metaphysische Denk-Bild *par excellence* bezeichnen, da es seiner inneren Dynamik nach den Übergang von der sinnlichen Anschauung zum intellektualen Vorstellen einleitet und vollendet."

Rome (including the Pantheon, Colosseum and St. Peter's Basilica) and, later, Wyld's Great Globe and the Russian Kinopanorama.

In the same way, Sloterdijk explicates the development of empires in an 'aroma-architectural' way – i.e. the modernisation process understood on the basis that different peoples 'proximately' experience themselves as different odorates. The transition from the micro climates of living environments to the active political and juridical making of macro atmospheres has created the fundamental attunement [*Stimmung*] of a modern human ensemble, i.e. its (cultural) identity. Old local aromas were increasingly neutralised by the 'hygiene revolution' of the 18th century and have later been substituted by the mass media, functioning as "transporters for symbolically coded secondary odours".¹⁴⁶ Playing on the relation between odour [*Geruch*] and rumour [*Gerücht*] – "rumour is the spoken odour"¹⁴⁷ – Sloterdijk characterises the mass media as influential co-creators of the modern social synthesis. I.e. they co-install a "national informatic air conditioner that has to look after the affective, thematic, toxic and in that sense inner-political self-ventilation of the large society."¹⁴⁸

As Sloterdijk agrees with Heidegger, even though the 'conquest of the world as picture [*Bild*]'¹⁴⁹ already started with the beginnings of 'Western' metaphysics, the fundamental project of the modern age is characterised as 'the figure [*Ge-bild*] of the setting-forth [*Her-stellen*] that sets before [*vor-stellt*]' – the mechanisation of maternity. In modernity, by further conceptualising the figure of the globe, humans have started to put themselves into an ever more constructive relation with 'the world' and occupy an increasingly specific place within it. As people now act-ually travel and dis-cover [*ent-decken*] the globe (horizontally), 'the world' is becoming more and more set forth, i.e. pro-

¹⁴⁶ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 349

¹⁴⁷ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 349

¹⁴⁸ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 350 (my transl.): "Die verblässende geruchsauratische Lokalstimmung wird ersetzt durch die Errichtung einer nationalen informatischen Klimaanlage, die für die affektive, thematische, toxische und in diesem Sinne innenpolitische Selbstventilation der Großgesellschaft zu sorgen hat."

¹⁴⁹ See *Die Zeit des Weltbildes* [*The Time of the World Picture*].

duced, through the *making* of its *image* (main motif of terrestrial globalisation for Sloterdijk: the atlas/map). The globe is now not so much a geometric figure standing *before* the observer anymore (symmetrical, 'beautiful' aesthetics), but is becoming a *strong* relation between them, therefore increasingly breaking down the metaphysical divide – the globe is now a human *pro-ject* (asymmetrical, 'ugly'/'interesting' aesthetics). The earth without heaven is becoming the 'erring star', as Heidegger already said.¹⁵⁰

The sentence 'God is dead' signifies in the first place a morphological tragedy – the annihilation of the imaginarily satisfying, depictive immunity globe through inexorable infinitisation. Now God is wholly becoming the non-depictive, dissimilar, formless – a monstrosity for the human ability to visualise, a non-container, an absolute hole and non-ground. Suddenly one cannot recognise anymore what should be the benefit of being *in* this eternal God because the barrier between interior and exterior has fallen.¹⁵¹

In the complex world structures of cybernetic globalisation, where the animation of the interior is not possible anymore since space has been stretched into the unsensible and un-re-presentable [*un-vor-stellbar*], 'the whole' is becoming an alien outside without a shell. 'The globe' is now a sphere without a centre, as it repeats itself into the infinite out of protruding points *everywhere*. "What shall the globe become in a time without kings – or: What shall the kings become in a time without globe?"¹⁵² For Sloterdijk, the 'post-histoire' or 'synchronic world' is the egotism of points for which everything is environment that is not the monad itself, i.e. a self-referential system (such as individuals, states, families, companies etc.), if a monad is formed at all. Every point in neutralised space either decides to make itself the centre of all relations or falls into a decentralised play of event streams. Points have become

¹⁵⁰ In *Überwindung der Metaphysik* [Overcoming of Metaphysics].

¹⁵¹ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 131/2 (my transl.): "Der Satz 'Gott ist tot' bezeichnet an erster Stelle eine morphologische Tragödie – die Vernichtung der imaginär genugtuenden, anschaulichen Immunitätskugel durch unerbittliche Infinitisierung. Nun wird der Gott ganz der Unanschauliche, Unähnliche, Formlose – ein Monstrum für das menschliche Anschauungsvermögen, ein Un-Behälter, ein absolutes Loch und Ungrund. Mit einem Mal läßt sich nicht mehr erkennen, worin der Vorteil bestehen sollte, *in* diesem Unendlichkeitsgott zu sein, weil zwischen Innen und Außen die Schranke gefallen ist."

¹⁵² Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 45 (my transl.): "Was soll aus der Kugel werden in einer Zeit ohne Könige – oder: Was soll aus den Königen werden in einer Zeit ohne Kugel?"

positions [*Standorte*] through which capital *circulates* – no point can really make itself unreachable for the others anymore.

What does not lead anywhere is not recognised as a path, neither as the outward one nor the return one. Where there is no path, and no method, to walk it, nothing is purposed, learned, achieved, clarified. The horizon does not unfold itself, the distant points do not charge themselves with attractions.¹⁵³

In order to develop a critical theory of (post-)modernity and thus clarify a 'deceiving homogeneity' in which people have lost a sense of Being-in in the infinite, Sloterdijk suggests not to critique centrism as such, but instead to *differentiate* between centres and peripheries – a differentiation which in turn differentiates the endosphere from the exosphere. For Sloterdijk, the entire 'Western' metaphysical tradition rests on a confusion between two different models of totalities: immanent and transcendent spaces. For him, there is not *one Ge-Stell* in which everything is neutrally available – as he thinks, a concept of Being too removed from the biological – but a *plurality* of them, larger and smaller, crossing over each other, interpenetrating and transgressing, provoking themselves from the outside, reinstating and augmenting each other. Interiority is always multidimensional.

Wherever humans exist, their own place always already refers to other places and situations [*Lagen*]. Through every here-inside, an inside shines that was valid somewhere else. Every wall replaces a wall, every interior means another interior, every egressing out of an interior situation calls forth other egressions.¹⁵⁴

'The world interior of capital' is the last globe.¹⁵⁵

¹⁵³ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 614 (my transl.): "Was nirgendwohin führt, ist nicht als Weg zu erkennen, weder als der hin noch der zurück. Wo kein Weg ist, und keine Methode, ihn zu gehen, da wird nichts bezweckt, nichts gelernt, nichts erreicht, nichts geklärt. Der Horizont entfaltet sich nicht, die fernen Punkte laden sich nicht mit Attraktionen."

¹⁵⁴ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 208 (my transl.): "Wo auch immer Menschen existieren, verweist ihr eigener Ort immer schon auf andere Orte und Lagen. Durch jedes Hier-Innen scheint ein Innen, das anderswo galt, hindurch. Jede Wand ersetzt eine Wand, jedes Interieur meint ein anderes Interieur, jedes Herausgehen aus einer Innenlage ruft andere Herausgänge hervor."

¹⁵⁵ This thesis is further developed in Sloterdijk P. *Im Weltinnenraum des Kapitals* Frankfurt a. M.: Suhrkamp, 2006, which is not included in this PhD project – partly due to platial constraints, partly due to consistency of the argument. In the 'World Interior of Capital', Sloterdijk further explicates the history of *globalisation* with a focus on maritime exploration, colonisation and economics through the figure of London's Crystal Palace (a bit more on the latter in 'Foams' below).

Foams

Almost nothing, and yet not nothing. A something, albeit only a web [Gespinst]* of hollow spaces and subtle walls. A real condition, yet a touch-shy formation which, with the quietest grasp, gives itself up and bursts.¹⁵⁶

In the third volume *Schäume*, Sloterdijk is trying to deal with the modern 'catastrophe': i.e. the loss of *the* centre. Due to terrestrial- and cybernetic globalisation, in which the human *subject* has been increasingly setting forth 'the world' and hence eventually blown up globes to pieces, today's foams are 'un-round' formations in which centres are *everywhere*: The ground has become the 'un-ground'. In the age of foams, 'the whole' can in no way be set before [*vor-gestellt*] as a globe anymore – it has become nothing more than a "labile moment synthesis of an aswarming agglomeration."¹⁵⁷ Foams are the merging of oppositional substances – the soft elements are penetrating the hard ones, the instable the stable, the hollow the dense: 'Aphrology' (from the Greek 'áphros', i.e. 'foam') is the theory of co-fragile, amorphous systems. It is Sloterdijk's 'hybrid spherology': a pluralistic philosophy of culture/s.

Foams concern words and things at the same time and thus change cognitive and material environments in the same stroke. By borrowing a term from Günther Gamm, Sloterdijk describes foams as the 'not-nothing': they are form processes in which the most fragile (see 'Bubbles' above) is at the core. Foams are closely neighboured, semi-transparent multiplicities whose fragility is not a deficiency, but a strength – the strength of being able to create spaces in (a) world/s that is/are continuously re-forming. In this way, foam cells only keep a *relative* unity, a relative *eigenvolume*. Co-existence has to be co-

¹⁵⁶ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 27 (my transl.): "Fast nichts, und doch nicht nichts. Ein Etwas, wenn auch nur ein Gespinst aus Hohlräumen und subtilen Wänden. Eine reale Gegebenheit, jedoch ein berührungsscheues Gebilde, das sich beim leisesten Zugriff aufgibt und zerplatzt."

* Also in the sense of 'ghost'.

¹⁵⁷ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 303

insistence – ‘Connected Isolation,’ as Sloterdijk calls it, by referencing American architecture group *Morphosis*.¹⁵⁸

With *Foams*, Sloterdijk tries to do what the sociological tradition (according to Gabriel Tarde, for example) called ‘social synthesis’, however by going beyond the question of how a ‘society’ is a collection of ‘individuals’, or a collection of a collection of ‘individuals’. Instead, it aims to explicate ‘societies’ primarily as collections of (at least) dyadic bubbles whose elements are also not individuals, but poles, which form strong relations with their other/s. Foams are based on an *a priori* being-with as enabler of foams – the pre-spaces in the bubbles ground the multiple spaces of foams. The ‘societies of thin walls’ constitute a new organisation of density: a being-with-each-other-in-each-other-against-each-other. “[...] ‘Societies’ are space-demanding magnitudes and can only be described by an appropriate expansion analysis, a topology, a dimension theory and a ‘network’-analysis (if one prefers the net metaphor over the foam one).”¹⁵⁹

Schäume is a technological theory of ‘greenhouses’, which human collectives are contained in as well as design. In the epoch of foams, enlightenment becomes ‘atmotechnology’: “As soon as air supply ceases to be an unproblematic premise of life processes and transitions into the technical stadium [...], air compounds and atmospheres become objects of explicit productions.”¹⁶⁰ In this way, “society is its room temperature, it is the quality of its atmosphere; it is its depression, it is its clearing-up; it is its splitting-up into innumerable local micro climates.”¹⁶¹ Foams are the matrices for the (‘auto’-)production of

¹⁵⁸ See *Morphosis Architectural Monographs No 23: Morphosis – Connected Isolation* London: Academy Editions, 1993.

¹⁵⁹ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 298 (my transl.): “‘Gesellschaften’ sind [...] raumfordernde Größen und können nur durch eine angemessene Ausdehnungsanalyse, eine Topologie, eine Dimensionentheorie und eine ‘Netzwerk’-analyse (falls man die Netzmetapher der des Schaums vorzieht) beschrieben werden.”

¹⁶⁰ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 1008-10 (my transl.): “Sobald Luftzufuhr aufhört, eine unproblematische Prämisse von Lebensprozessen zu sein und ins technische Stadium übergeht, [...] werden Luftgemische und Atmosphären zu Gegenständen expliziter Produktionen.”

¹⁶¹ Sloterdijk, P. *Sphären II: Globen* Frankfurt a. M.: Suhrkamp, 1999: 1011 (my transl.): “Die Gesellschaft ist ihre Raumtemperatur, sie ist die Qualität ihrer Atmosphäre; sie ist ihre Depression, sie ist ihr Aufklaren; sie ist ihre Aufsplitterung in zahllose lokale Mikroklimata.”

foams. What seemed to be independent and homogenous is now transformed into loose structures, i.e. floating hybrids, composed of cores and peripheries. In enfoamed environments, creativity equals elasticity since it opens up spheres, closes one off from the other/s as well as keeps 'local improvisations in form'. Creativity thus functions as a performative excess, or *Spielraum*, through which foam cells are able to become foam cells, i.e. to emancipate themselves into a singular. Thus, cultural studies for Sloterdijk has now become not just a technology studies [*Technikwissenschaft*], but also a "curatorial practicum for the labour in cultural greenhouses":¹⁶² an 'interior design'. Knowledge is now the ability to *explicate*, i.e. the ability to ek-shibit. A 'spherical phenomenology' (phenomenology understood as the theory of the emergence of 'objects') thus aims to make the implicit explicit; to explicate the *background*, which Sloterdijk sees as the main function of (post-)modernity.

He cites three operational characteristics that have sped up the explication process throughout the last century: the praxis of terrorism, the concept of product design and environmental awareness. All three were born simultaneously in the 'primal scene' of 22nd April 1915: the first large-scale (chlorine) gas attack, i.e. the 'atmospheric war' fought by the Germans against French-Canadian emplacements in Ypres. Since then, military operations started to liquidate life not by targeting the human body directly anymore, but by targeting its environment. Human existence was here made impossible due to the creation of unliveable milieus through 'air conditioning', i.e. the bio-cultural manipulation of the atmosphere. The gas wars of WWI were later replaced by the air wars of WWII (however continued in concentration camps) and then found their culmination in the drop of the atom bomb. 'Terrorism' thus cannot refer to an 'enemy', but is the current *modus operandi* of warfare (whereby collateral damage often becomes the main effect). For Sloterdijk, hints towards 'environmental terror' to come are, for

¹⁶² Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 68

example, the US Department of Defense's publication of the June 1996 project paper 'Weather as a Force Multiplier: Owning the Weather in 2025' as well as the High-Frequency Active Auroral Research Programme (HAARP) based in Gakona, Alaska, whose main tool is able to create high-energy electromagnetic fields in the ionosphere – for researching things such as repairing the ozone layer and preventing hurricanes, according to its supporters; according to its critics, to develop the latest US military tactics. In the age of foams, even the background is produced for sensibilisations – it becomes a *product* itself. The 'Ge-Stell', i.e. technical Being, thus becomes 'revealed'. In contrast to Heidegger, Sloterdijk hence does not see 'ways of revealing' so much as a *dwelling-conserving*, but as a *making-ek-splicit* – of backgrounds which are influenced by "formal design, technical setting-forth, juridical care and political shaping."¹⁶³ Being/s are not just set [*gestellter*] stand-by [*Bestand*], but *events*.

Humans thus make their own climates, however not through their 'free will', according to Sloterdijk, but through the circum-stances they find themselves in. The self-determination of spheres is more than what used to be considered politics:

Spheres [...] are shared spaces which are set up through common inhabitation in them. They are the *first* product of human co-operations; they form the insubstantial and yet most real result of a primal labour which only occurs through resonances. Not the division of labour has advanced the process of civilisation, but the division of spheres; it is the *primal* vote of the community in itself and over itself. That is why political parties, politics generally as focus of public interest, could exist *in the first place* [...].¹⁶⁴

For Sloterdijk, "like every shared life, politics is the art of the atmospherically possible."¹⁶⁵

¹⁶³ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 147

¹⁶⁴ Sloterdijk, P. *Sphären II – Globen* Frankfurt a. M.: Suhrkamp, 1999: 1011/12 (my transl. & emphasis): "Sphären [...] sind geteilte Räume, die durch gemeinsames Einwohnen in ihnen aufgespannt werden. Sie sind das erste Produkt menschlicher Kooperationen; sie bilden das unstoffliche und doch allerrealste Resultat einer Ur-Arbeit, die nur in Resonanzen vor sich geht. Nicht die Arbeitsteilung hat den Prozess der Zivilisation vorangetrieben, sondern die Sphärenteilung; sie ist die Urabstimmung der Gemeinschaft in sich selbst und über sich selbst. Darum konnte es politische Parteien, ja Politik überhaupt als Fokus öffentlichen Interesses erst geben [...]."

¹⁶⁵ Sloterdijk, P. *Sphären II – Globen* Frankfurt a. M.: Suhrkamp, 1999: 1013 (my transl.)

In order to develop a theory of 'atmo-topic greenhouses', Sloterdijk revisits *Robinson Crusoe* as well as Deleuze's conception of the 'island'. He argues that 'mainland' and 'island' are generally considered to have an asymmetric relation towards each other – 'norm' versus 'exception' – however the exception is increasingly becoming the norm. By trying to overcome any spatial dialectic of 'world' as thesis and 'island' as antithesis, Sloterdijk wants to raise them up [*auf-heben*] to a synthesis and thus develop a spherological theory of islands. This theory aims to show the possibility of forming animated indoor spaces in the 'monstrous' [*ungeheuren*]¹⁶⁶ exterior and show how multiplicities of worlds actively agglomerate into "rhizomes of the sea".¹⁶⁷

There are three technical designs of island formation: a) Absolute islands – such as airplanes, space stations and even the earth itself. Here, the sea as isolator is replaced by other milieus, for example air or the vacuum. b) Atmospheric islands – where natural islands are replaced through technical imitation. c) Anthropogenic (natural) islands – insulated forms in which the being-together of equipped humans triggers a retroactive incubation effect.

Who wants to understand the island has to build island prostheses, which repeat all essential traits of the nature island through point-by-point equivalences in technical replica. From the *Ersatz*-form, one eventually grasps what the first form is about.¹⁶⁸

Absolute islands: This type [*Art*] of island is the radicalisation of the enclave-formation principle. In contrast to natural islands, which are isolated only to a very low degree since they are framed by the sea, and atmospheric islands, which are isolated only relatively and two-dimensionally, absolute islands presuppose a three-dimensional

¹⁶⁶ 'Ungeheuer' can also mean 'strange', 'distrustful' or 'uncanny'.

¹⁶⁷ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 310

¹⁶⁸ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 316/7 (my transl.): "Wer die Insel verstehen will, muß Inselprothesen bauen, die alle wesentlichen Züge der Naturinsel durch Punkt-für-Punkt-Entsprechungen in der technischen Replik wiederholen. Von der Ersatzform her begreift man schließlich, was man an der ersten Form hat."

isolation, i.e. they have to become a capsule – without vertical isolation, nothing can be completely enclosed. Absolute islands do not stay fixed in their environment, but navigate freely and flexibly therein to a large extent: they are 'mobile in motion'. Absolute insulation is only achieved when the environment is replaced, i.e. when the surrounding element of the relative island becomes the interior space of the absolute island. The building of absolute islands is hence the inversion of dwelling: It is not about building a dwelling into an environment anymore, but about installing an environment into a dwelling: 'Being-in-the-world 2'.

Isolation can only become three-dimensional if the island is not framed through the encountering of land and sea at the shoreline anymore. Absolute islands do not have a shore, but external walls on all sides, which have to be perfectly impermeable as they navigate within an unliveable milieu for the beings that live on them. On absolute islands, the creation of space does not happen through suppression anymore, but through the implantation of an expanding body that has to carry itself alone – expansion and suppression here become one: "In the vacuum, the bodies freed from all competition are exactly as big as their own will to expansion lasts – and this is identical with the building plan."¹⁶⁹ The absolute island is an immanence machine without a region.

In the vacuum, only what is understood down to the last detail can succeed – including the technology with whose help one elevates oneself into airless space. Space travel is the product of the multiplication of precision and levity.¹⁷⁰

The loose and spontaneous atmotopic 'situation of exception' of natural islands now has to be replicated as a severe situation of exception of the artificially enclosed atmotope – breathing within

¹⁶⁹ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 319 (my transl.): "Im Vakuum sind die von jeder Konkurrenz befreiten Körper genauso groß, wie ihr eigener Wille zur Ausdehnung reicht – und dieser ist mit dem Bauplan identisch."

¹⁷⁰ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 325/6 (my transl.): "Im Vakuum gelingt nur, was bis ins letzte Detail verstanden wird – einschließlich der Technik, mit deren Hilfe man sich in den luftleeren Raum erhebt. Raumfahrt ist das Produkt aus der Multiplikation von Präzision und Leichtsinn."

absolute islands is completely dependent upon technical 'air supply systems', i.e. life supports (which are increasingly explicated through the permanent 'revolution' of R&D initiatives). Since the psycho-semantic condition of the astronauts is almost 100% dependent on externalities, i.e. the input of the ground control stations on earth, space stations represent the concept of 'connected isolation' in its purest form: opening and closing of the system here coincide. Whereas in the natural situation, the environment is surrounding and humans the surrounded, on absolute islands humans have to build their own surroundings – "this really means: surrounding that which surrounds, encompassing that which encompasses, carrying that which carries"¹⁷¹ – for which there is no instruction manual. According to Sloterdijk, space travel is "from the philosophical point of view, by far the most important undertaking of modernity because it represents, like a generally relevant experiment on immanence, that which signifies the being-together of someone with someone and something in a commons [*Gemeinsamen*]."¹⁷² Absolute islands show in the most formal way how the co-habitation of humans with thing systems functions.

Atmospheric islands: These are relative islands and not positioned in the air or vacuum, but on the surface of the earth or water. Artificially floating islands suppress the surrounding seawater through implantation of a mass. This suppression is achieved through semi-permeable walls by which 'the interior world' is relatively separated from its surrounding element. In contrast to floating islands, earth-based islands mainly suppress air and, to a minor extent, also the root medium, i.e. flora and fauna. Earth-based islands form an enclave out of the surrounding air and stabilise a permanent atmospheric difference between interior and exterior. For Sloterdijk, this type [*Art*] of island is a rough definition of a 'house', as houses – apart from functioning as sheltering spaces, working spaces, sleeping spaces, meeting spaces etc. – are also

¹⁷¹ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 331 (my transl.): "Das heißt geradezu: die Umgebung umgeben, das Umgreifende umgreifen, das Tragende tragen."

¹⁷² Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 333

climate regulators. Examples of atmospheric islands are, for instance, glass-, green- and polyhouses. The greenhouse was the most important architectural innovation since antiquity for Sloterdijk, as the building of houses has since then become an explicit climate construction – a bio-cultural ‘revolution’. Atmospheric islands have become the new ‘reality principle’ since they have started to surround nature, i.e. surround the surrounding. As early visitors of London’s Crystal Palace¹⁷³ recalled,

This giant room had something liberating. One felt secure and yet without restraint in it. One lost consciousness of gravity, of one’s own bodily confinement.¹⁷⁴

As Walter Benjamin already knew, ‘greenhouses’ (i.e. modern arcades) are the historical projection of the primal interior – a paradoxical synthesis of intimacy and the public world of consumer goods.¹⁷⁵

Anthropogenic islands: This situation Sloterdijk considers the place of human *becoming*. It aims to show how humans become islanders, i.e. explain how living beings on islands become humans through the isolation effect. Since the hominisation of monkeys was located in the African savannah, according to current paleontological research, Sloterdijk describes this area as the suppressed surrounding element of the anthropogenic islands nomadising on it. The grassy steppe is the sea out of which the human emerged: “[...] The place of the act has to explain the act, the scene of the event provides the key to that which

¹⁷³ Crystal Palace was designed by greenhouse architect Joseph Paxton and built in Hyde Park between 30th July 1850 and 1st May 1851. It was 563m long, 124m wide and, in its central transept, 33m high – at its time, by far the biggest artificially contained place in the world. During the world fair in 1851, it inhabited 17,000 exhibitors, six million visitors and a couple of elm trees. After *The Great Exhibition*, it was disassembled and then rebuilt, with better proportions, in Sydenham between 1853 and 1854 as a botanical and ornithological indoor park. As *The Crystal Palace Compagnie* referred to it in a prospectus at the time: “Universal temple” for the “education of the people’s large masses and the refinement of their recreational pleasures” (in Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 344/5, my transl.). In 1936, Crystal Palace was destroyed by a fire, however it might get rebuilt as a ‘culture-led exhibition space’, including hotel, conference facilities, studios, galleries and other commercial units (www.theguardian.com/artanddesign/2013/oct/03/crystal-palace-rebuilt-chinese-developer, 16/12/2013). For more on the figure of Crystal Palace, see Sloterdijk P. *Im Weltinnenraum des Kapitals* Frankfurt a. M.: Suhrkamp, 2006.

¹⁷⁴ In Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 345 (my transl.): “Dieser Riesenraum hatte etwas Befreiendes. Man fühlte sich in ihm geborgen und doch ungehemmt. Man verlor das Bewußtsein der Schwere, der eigenen körperlichen Gebundenheit.”

¹⁷⁵ In Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 541 & 628

happened at it."¹⁷⁶ Insulation on anthropogenic islands not just occurs through emergence out of an environment, but at the same time through group inclusion, i.e. de-distancing [*ent-fernendes*] self-enclosing. For Sloterdijk, the human actuality [*Tatsache*] is derived from a *spontaneous* being-together of hominides with themselves and other beings, which creates this self-isolation effect. This in turn functions as the 'background' of human becoming. I.e. through their specific ways of dwelling, humans create their spaces themselves, which results in an ever-increasing greenhouse effect. Primary anthropic greenhouses – 'ontological islands' or 'islands of Being' – do not have physical walls and roofs yet, but only 'walls of distance' and 'roofs of solidarity', which become more and more concretised, i.e. poeticised, throughout history. Anthropogenic islands are 'workshops' of complex creations of space.

The insulation movements that make-room-for and install cross into each other by means of manifold feedback loops so that the human group sphere forms a cybernetic space from the beginning. Here, cyberspace is however not set next to the space of the so-called primary and real; rather the real and virtual are merged into the proprietary reality 'horizon' of the human world. The human island is a space station which surrounds us as our first 'lifeworld'.¹⁷⁷

Sloterdijk understands the anthroposphere as a nine-dimensional space – a minimum complexity without which the place of the human cannot be adequately grasped. Human 'society' is hence a field of places, each with a different tension of explication. These places include the following:

1) Chirotope: This is the zone of the Heideggerian ready-to-hand, in a more biological sense. The chirotope is the site where paws metamorphose into human hands, i.e. where hominides become 'chiropractors'. When humans are able to form relations with 'things'

¹⁷⁶ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 357

¹⁷⁷ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 361 (my transl.): "Die einräumenden und die einrichtenden Insulationsbewegungen gehen mittels vielfältiger Rückkoppelungen ineinander über, so daß die Menschengruppen-Sphäre von Anfang an einen kybernetischen Raum bildet. Hier ist jedoch der Cyberspace nicht neben dem Raum des sogenannten Primären und Realen angesiedelt; vielmehr sind das Reale und das Virtuelle zu dem eigentümlichen Realitäts-'Horizont' der Menschenwelt zusammengefügt. Die Menscheninsel ist eine Raumstation, die uns als unsere erste 'Lebenswelt' umfängt."

around them, that which just 'lies around' is transformed into something useful, which in turn enables self-inclusion – it is a world-creating reflex. In the chirotope, humans arise from the surrounding element through the de-distancing effects of throwing equipment, beat instruments and the discovery of sharp stone- and bone edges, with which the cultural history of cutting and material analysis begins.

For Sloterdijk, the ability to throw was the first emancipation technique of the human, as it created an alternative to avoiding contact with enemies by simply running away. Through their hands, humans attained the most important ontological competence: the ability to act at a distance. Through distance, throws could be planned and carried out.¹⁷⁸ Handy stones were the first materials used to erect 'walls'. The chirotope really is a 'video chirotope', for Sloterdijk, as it is a sphere surveilled by the gaze. It is the original field of action – a space of uncertainty – in which humans inspect whether their throws are successful or not. Hits ('true') and misses ('false') are practical truth functions, whereby the middle represents an unclear third value. Agreeing with palaeontologist Paul Alsberg, Sloterdijk sees the distance principle as the break with natural history. I.e. through distance-creating tools, humans were able to break out from the prison of bodily adaptation by forming a middle sphere in between themselves and their environment – for which Alsberg uses the term 'body switch-off' [*Körperausschaltung*]. Because of their ability to 'switch off' their bodies, humans have the evolutionary tendency to stay biologically pluripotent and juvenile throughout life, i.e. they stay neotenic, since adaptation to environmental pressures has been displaced from the body to tools. According to Alsberg, the only two human organs which do not switch off, or only paradoxically, are the brain and the hand. The brain because it develops, somatically as well as functionally, in specific ways. It enhances itself by being able to perform in more and more complex ways and, especially since the invention of writing, is

¹⁷⁸ One could say it was the birth of the 'de-throw' [*Ent-wurf*], i.e. *Design* – as in: *possibility* for design/ing.

increasingly maturing and specialising. So is the hand which, as closest ally to the brain, grows up when adequately educated and thus is, according to Sloterdijk, the first and authentic subject of 'formation' [*Bildung*]. All other organs are merely 'luxuriating', lingering in a biological 'dream time'.

In the same way as throwing equipment, the anthropogenic effect of beat instruments refers to the ability to predict things with one's hands, in order to reveal something which was not at hand before. Equipment announces that there is an ek-spectational space behind the environmental horizon that can be made available, i.e. useful.

The discovery of stone- and bone edges is significant since it developed reason as a separating, portioning and dissecting violence [*Gewalt*]. Arnold Gehlen already referred to early knives as 'chronic actualisers', which make the things in the world appear as divisibilities. With the help of knives, humans were for the first time able to look into the interiors of bodies.

Their world picture is co-formed by the experience of autopsy, of taking a look into the normally concealed interior of dense bodies with their own eyes. The knives of the early chirotopians make death explicit – they dissect its relict, the animal corpse, into parts and refute in this way the appearance of the inseparable wholeness of the limbs. [...] Cutting incites the correlation between quantity and violence [*Gewalt*] [...].¹⁷⁹

Cutting is the first manifestation of 'ek-splication': the disclosure of the background, i.e. the setting-bare [*Bloß-stellen*] of what is absent and concealed. Cutting correlates to language: "Every word serves a portion of the world."¹⁸⁰

The chirotopic effect furthermore comprises the socialisation of hands – poly-surgically as well as multi-cerebrally. The readiness-to-hand of the first 'lifeworld' is complemented by co-operators who give each

¹⁷⁹ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 375 (my transl.): "Ihr Weltbild wird mitgeformt von der Erfahrung der Autopsie, des Einblicknehmens mit eigenen Augen in das normalerweise verhüllte Innere dichter Körper. Die Messer der frühen Chirotopier machen den Tod explizit – sie zerlegen sein Relikt, die tierische Leiche, in Stücke und widerlegen so den Schein der unzertrennbaren Ganzheit der Glieder. [...] Das Schneiden stiftet den Zusammenhang zwischen Quantität und Gewalt [...]."

¹⁸⁰ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 376 (my transl.): "Jedes Wort serviert eine Weltportion."

other a hand in order to achieve collective work projects – ‘heterotechnical co-operation’, as Peter C. Reynolds calls it.¹⁸¹ Through ‘symmetrical co-operations’, everyone can take on the role of the other; in heterotechnical co-operations, everyone does what s/he can do better than the others – by anticipating the actions of others, one performs the adequate complementary function. The chirotope thus becomes a matrix for a social intelligence, which includes various separations and recombinations of discrete operations. According to Reynolds, a number of explicit conditions have to be fulfilled in order to make heterotechnical co-operation possible: task specialisation, symbolic co-ordination, role complementarity, the collective setting of targets, the logical sequencing of work steps and the assembly of separately produced parts.¹⁸² The being-together of humans with each other and other beings manifests itself in the chirotope as the original (social) synthesis of at least four hands and as primitive (material) synthesis of objects made out of at least three parts: polyoliths, such as a stone hammer or -axe, which are made of a stone, a stick and a binding element. According to this theory, the polyolith is the first material set – the primitive syntax or first logical synthesis – in which a subject (the grasp) is linked with an object (the stone) through a copula (the join). Later on in history, the chirotope is becoming more and more abstract, as hands do not have to physically touch anymore, to an extent. ‘Culture’ becomes a meta-equipment with incubating effect – the ‘hands’ become the ‘invisible’ functions of the market.

2) Phonotope: This *topos* refers to psycho-acoustic immune systems. Enabled through the medium of air, islands create their own specific soundscapes – they are full of traffic noise, the rattling of tools, crying children, shouting men and women, singing birds, fighting animals. In order to under-stand [*ver-stehen*] this early island, one has to be located in it for a while in order to take in its own attunement, i.e. the

¹⁸¹ In Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 373

¹⁸² Wilson, F. R. in Reynolds, P. C. in Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 373

sonic unconscious. The human group lives in an implicit sound installation, which functions as medium of belonging and “uses its entire energy for the repetition of the phrases through which it keeps itself in form and flow.”¹⁸³ Only in the phonotope, Sloterdijk argues, McLuhan’s thesis that ‘the medium is the message’ is completely true – the factual communication with each other in a given medium is already the entire content of the communication. In contrast to pre-modern collectives, which had been characterised by permanent public acoustics, the invention of the private individual was possible through the silent practices enabled by writing and reading: “The interior human does not exist before the books, the monastic cells, the deserts and solitudes have segregated it; only after the human has become a cell or *camera silens* itself, reason can dwell in it with its quiet voice.”¹⁸⁴

3) Uterotope: This dimension – the ‘we-cave’ or ‘world incubator’ – refers to ‘woman’/‘mother’ in site-theoretical terms. In contrast to the nest as external environment, argues Sloterdijk, the abdominal space of the female human is the milieu for the interiorisation of eggs, which creates offspring “with a higher commitment value and a harsher separation risk.”¹⁸⁵ The mother is literally the *situation* of the child – in biological as well as meta-biological terms. As explained in *Bubbles*, this situation is repeated throughout life and thus continuously changes meaning, i.e. is constantly reterritorialised. For interior situations to be transferred, a ‘real’ site in the exterior has to be created first of all so that the environment can potentially become world. This new site then functions as the repetition of interiority from the previous site. The older scene is repeated in the younger one; the social precedes the individual. For Sloterdijk, the uterotope for example explains the ‘kinship phantasm’ that the members of the same nation were at the same time

¹⁸³ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 378

¹⁸⁴ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 383/4 (my transl.): “Den inneren Menschen gibt es nicht, bevor die Bücher, die Klosterzellen, die Wüsten und Solitüden ihn ausgegrenzt haben; erst nach dem der Mensch selber zur Zelle oder *camera silens* geworden ist, kann die Vernunft in ihrer leisen Stimme in ihm wohnen.”

¹⁸⁵ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 387

the children of the same mother – ¹⁸⁶ uterotopia and utopia mirror each other like tradition-elitism and future-elitism.¹⁸⁷

4) Thermotope: Sloterdijk describes this place as the primal 'comfort sphere' or 'pampering space'. It refers to the fact that humans derive the 'home effect' from the sense of wellbeing of their own situation. One of the motives for group-insulating life is that a successful collective works out a 'pampering advantage' towards others, which is hence distributed internally – equally or not. The advantage of the group is thereby not so much the effect of the site, but the effect of the distribution makes one value the site (or not). In order to explain how much 'home' is linked to wellbeing, Sloterdijk cites the fireplace as one of the oldest symbols of humanity. As the thermal advantage of fire implies, the thermotope and chirotope are closely linked – magic and labour are synergetic. This 'difference' is shifted throughout the history of civilisation in favour of labour, without ever losing the magical pole. Whereas labour generally makes little out of much, magic makes much out of little – it is a causal surplus. Sloterdijk here references the Greek mythological figure of Prometheus, the thief of fire:

[...] Patron of kitchens, stimulator of alchemy, enabler of ceramics and metallurgy, comfort dispenser and lawyer of the redistribution of light and comfort – in one word, the authentic cultural titan, and by virtue of all of these characteristics, noblest saint in the calendar of enlightenment. As life facilitator and first accreditor, as philanthropist and agitator of the revolt against the idiocy of resignedness into conditioning [*das Zuständliche*], he is the mythical patron of the thermotope.¹⁸⁸

The exclusive thermotope is, in stratified societies, translated into an attraction of property advantages: what in small formats can create inclusive solidarities is desolidarising in large ones. And once a comfort

¹⁸⁶ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 392/3

¹⁸⁷ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 395

¹⁸⁸ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 399 (my transl.): "[...] Patron der Küchen, Anreger der Alchemie, Ermöglicher der Keramik und der Metallurgie, Komfortspender und Anwalt der Umverteilung von Licht und Bequemlichkeit – mit einem Wort der eigentliche Kulturtitan, und kraft all dieser Eigenschaften vornehmster Heiliger im Kalender der Aufklärung. Als Lebenserleichterer und erster Ermächtiger, als Philanthrop und Anstifter zum Aufstand gegen die Idiotie der Ergebenheit ins Zuständliche ist er der mythische Schutzherr des Thermotops."

zone naturalises, no one asks where it comes from anymore. He thus sees the modern welfare state as an 'allo-mother', i.e. a meta-prosthesis, which incubates the 'affluent society'. However, who wanted to transfer the national welfare state onto 'world society' would beforehand have to

dissolve the thermotopic paradox and show how one privileges everyone towards everyone. In the absence of a convincing thermal socialism, one will have to content oneself with a thermal aesthetics for the time being.¹⁸⁹

From a thermotopic point of view, he can hence say that all history is the history of wars not just between chosen groups, but also between pampered groups.

5) Erototope: This *topos* refers to the organisation of desire and aims to explain how the affective competition in groups stimulates as well as controls the life of the community. Through sub-acute self-irritation, which creates a permanent climate of attraction, human groups produce attention towards the differences between their members. Sloterdijk here sees the Eros not as a dual-libidinal tension between ego and alter, but as a triangular provocation: "I love you, your beautiful figure excites me, as soon as I can suppose that someone else loves you and your beautiful figure excites him enough to want to take possession of you."¹⁹⁰ Erotic processes are generated by the imitative observation of others' aspirations towards the acquisition of advantages. Inhabitants of the erototope thus differentiate themselves between what someone *is* more, what someone *has* more and what someone *represents* more. As Sloterdijk sees it, in order to keep the 'tone' of society liveable, the collective needs sufficient discretions for the differences of Being, the differences of property and the differences

¹⁸⁹ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 404/5 (my transl.): "Der Sozialstaat ist die regionale Generalisierung des Thermotops mit versicherungstechnischen Mitteln. [...] Wer diese Verhältnisse auf die Weltgesellschaft übertragen wollte, müßte zuvor die thermotopische Paradoxie aufgelöst haben und zeigen, wie man alle allen bevorzugt. In Abwesenheit eines überzeugenden thermischen Sozialismus wird man sich vorläufig mit einer thermischen Ästhetik begnügen müssen."

¹⁹⁰ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 406 (my transl.): "Ich liebe dich, mich reizt deine schöne Gestalt, sobald ich annehmen darf, daß ein anderer dich liebt und deine schöne Gestalt ihn genügend reizt, um dich in Besitz nehmen zu wollen."

of status: "Discreet is the one who knows what he should not have noticed."¹⁹¹ The justification of democratic societies thus consists in jealousy management, i.e. in having transformed free-floating group jealousy into the binding agent of civic spirit and the willingness to cooperate – "those episodes excluded in which, as if to ease tension, it allows oneself a chevy once in a while."¹⁹²

The simplest answer to control desire, for Sloterdijk, is to create taboos. Through taboos, people realise the presence of the third who is already between the two before one even meets. Taboos are supposed to prohibit the naïve desire for the advantages of the other as well as the exhibition of one's own advantages. But in fact, as taboos rather focus one's attention towards the deprived object, cultures have to make their people actively disinterested in their objects of jealousy – which only works if higher values are put in their place whose ideal nature allows unlimited division and no provoking private property. For Sloterdijk, the alleviation of desire has always been related to the spiritual – which is why a culture without God is a culture of envy, hence wars of jealousy are universalised today. Intellectuals smile at 'the good' with irony: "'superstructure' – you understand!"¹⁹³ Modernity, in which the privatisation of the love object forms the basis of competition, has led to an almost complete deregulation of the erototope. As Sloterdijk thinks, in no previous social formation the systematic provocation of desire for everything that others own has been so explicitly generated for the motivation of behaviour. In consumer society, jealousies are interconnected through power-station-analogous energy circuits that create a democracy in which everyone mistrusts everyone. As Thomas Jefferson already said in 1798: "Free government is founded in jealousy and not in confidence."¹⁹⁴ Thus, from the position of the erototope, the

¹⁹¹ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 407 (my transl.): "Diskret ist, wer weiß, was er nicht bemerkt haben soll."

¹⁹² Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 406

¹⁹³ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 409

¹⁹⁴ In Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 411

question of the 21st-century is how to control the globalisation of jealousy.

6) Ergotope: This world Sloterdijk explicates as labour collectives. Groups here become communes through social responsibilities, i.e. duties and obligations, in order to fight against the 'external enemy' as threshold of co-operation. The creation of collective works initially happens in the family sphere, informally totalitarian, through situational evidence and the dictate of tradition; later through rites of initiation, job requirements, bonds of status; even later through compulsory labour, edicts, offices for entry into the ergotope; finally the involvement in mission statements and the daily orders of public opinion.¹⁹⁵ Sometimes, ergotopic situations are radicalised and inhabitants are literally forced to hold the beat (on war ships, in fighter jets or labour camps); sometimes, people co-operate more voluntarily through enthusiastic consensus for a common thing (crusaders, finalists, freedom fighters). Through synchronised movements of the muscles, the ergotope functions as some sort of rhythmic socialism. As US historicist William H. McNeill described in his study *Keeping Together in Time: Dance and Drill in Human History*, techniques of muscular bonding generate group euphoria and delay the point of exhaustion.¹⁹⁶ In the military-based political systems of the (pre-)modern age, drill is the formation of the nation (for Sloterdijk, a contemporary example includes the '*imperium americanum*', the successor to the Roman empire). In (post-)modernity, when labour is dissociated from the group and more concentrated on the individual, 'athletes' develop who perform highly specialised types [*Arten*] of labour. In 'athleticism', performers compete against each other not so much for a common work (such as a war, harvest or the building of a wall), but for their abilities to represent their performances and outdo each other – whereby individual achievements are often interpreted as collective ones. Athleticism transfers the principle of

¹⁹⁵ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 412

¹⁹⁶ In Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 413/4

theatre onto physical exercise and thus is a civilising alternative to militant forms of stress management – “athletes are the first simulants of an emergency.”¹⁹⁷ Sports in arenas and elsewhere have often been practiced so determinedly as if they were the emergency themselves. In his *Natur der Kulturen* [*Nature of Cultures*], Heiner Mühlmann describes the social bond as a ‘maximal-stress-co-operation’ (MSC), i.e. what makes a group survive is the ability to synchronise its efforts in all-or-nothing situations.¹⁹⁸ Cultures function as self-activators of the maximal stress reaction – in order to control these mechanics, the ‘nature of culture’ needs to be made explicit. As Sloterdijk thinks, the developing ‘world culture’ of the 21st century needs a fundamental critique of heroism, as the previously serious emergencies have become way more serious today. Only a newly defined civilisation beyond victory and defeat would be able to virtualise maximal stress reactions and hence tame athletic almost-emergencies.

7) Alethotope: This *topos* refers to ‘republics of knowledge’ – the ‘horizon/s’ of truth [*alétheia*]. For Sloterdijk, there are two moments which open up this question: that novelties from the surrounding unknown enter the known (explication) and, vice versa, that the known can fall back into oblivion [*léthe*] (implication). Thus, truth cannot be a simple fact. The *sensibility* for truth develops from the *intuition* that there is a threshold range in between light and dark, which can not be easily grasped. Truth is always a dynamic light-dark that comes and goes in timely ways. The alethotope *sensitises* the human towards the difference between right and wrong through the experience that, in chirotopic terms, throws can be successful or not: humans are literally ‘struck’ by values of truth, already on a biological level – the alethotope is literally a question of life and death.

In this way, the manifest world is given in two different ways from the beginning, once as a nexus of actions which we commit, and once as

¹⁹⁷ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 417

¹⁹⁸ In Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 417/8

correlation of events which approach us. The double sense of truth as becoming-clear [*Offen-kundigwerden*] in the event or result [...] and as becoming-stated [*Aus-gesagt-werden*] in the apophantic sentence is as old as the human island itself.¹⁹⁹

Sloterdijk sees the alethotope in two ways: as storehouse and as site of judgement or repository. Whereas the storehouse collects what stands the test of time ('the true'), on the site of judgement or repository things are deposited which cannot and do not want to be kept by the group ('the false'). Traditionally, the alethotope has been more or less strictly divided – even Heidegger still made a difference between authentic [*eigentlich*] and inauthentic [*uneigentlich*] modes of *Dasein*.²⁰⁰ Thus, Sloterdijk describes metaphysics as a bicameral system of the 'House of Common Knowledge' and the 'House of Cognitive Lords':

It belongs to the most general characteristics of human islands that their inhabitants split themselves early into those who become intensely struck by tensions of truth, and those who rather avoid cognitive stress situations. Out of that, the almost universal differentiation of groups into experts develops, who personally put themselves in relation to hard-to-reach truths by which they, partly at their own risk, partly covered through the figure of the magician or the scholar, accumulate knowledge of the concealed, the what-has-been, the upcoming, and laypersons, who achieve to be content with first-order evidences, the collectively stored experiences and opinions, i.e. idols of the tribe.²⁰¹

Who lives on the anthropogenic island is, voluntarily or not, involved in the permanent struggle between true and false, the right and the wrong prophets. In this sense, Sloterdijk sees the problem of globalisation as the problem of the division of knowledge/s – the tensions of 'a

¹⁹⁹ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 429 (my transl.): "So ist die manifeste Welt von Anfang an auf zwei verschiedene Weisen gegeben, einmal als Nexus von Handlungen, die wir begehen, und einmal als Zusammenhang von Ereignissen, die uns angehen. Der Doppelsinn von Wahrheit als Offenkundigwerden im Ereignis oder Ergebnis [...] und als Ausgesagtwerden im apophantischen Satz ist so alt wie die Menscheninsel selbst."

²⁰⁰ See especially the section on 'Being-With' above.

²⁰¹ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 431 (my transl.): "Es gehört zu den allgemeinsten Merkmalen der Humaninseln, daß ihre Bewohner sich früh aufspalten in solche, die von Wahrheitsspannungen stark ergriffen werden, und solche, die kognitiven Stress-Situationen eher aus dem Weg gehen. Daraus entwickelt sich die fast universale Differenzierung der Gruppen in Experten, die sich zu schwerzugänglichen Wahrheiten persönlich ins Verhältnis setzten, indem sie, teils auf eigenes Risiko, teils gedeckt durch die Figur des Magiers oder des Gelehrten, Wissen vom Verhüllten, Gewesenen, Kommenden ansammeln, und Laien, denen es gelingt, sich mit den Evidenzen erster Ordnung, den kollektiv gespeicherten Erfahrungen und Meinungen, sprich den Idolen des Stammes, zufrieden zu geben."

world'-in-becoming. In coherent groups, knowledge is distributed in normal-symmetrical ways – it is a knowledge which is at the same time the joint knowledge of what others know and do not know. Hence, the alethotopian field is able to largely balance its internal differences so that there is no splitting into exclusive cognitive parties. In heterogenous groups, there is no joint knowledge between members who often have to deal with each other in a situation of extreme density. It is to be seen in which ways new relations between explication and implication will become possible.

8) Thanatotope: This is the zone of the search for the origin ('home') through lived life. According to Sloterdijk, there are two reasons, two transcendences, which explain why humans are affected by the absent: firstly, because of the ontological, or aletheiological, transcendence which, as just explained, is the fact that new truths, which come out of the concealed that lies 'behind' the cleared horizon, 'strike' the known – thus attesting that life continues into the infinite exterior. Secondly, through the fact that humans are mortal – they have death before as well as *behind* them. In all cultures, the living memories of the dead are formed into a world of 'internal' and 'external' images, later expanded into a psycho-social institution in order to regulate the traffic between the dead and the living. The 'lifeworld' thus corresponds to a world of ghosts, death and gods, which it "impregnates, penetrates and keeps under stress."²⁰²

According to Sloterdijk, the stress of 'deadly invasion' is usually embodied in three categories: in the ancestors and revenants who regularly return into the psyche of the group; in the natural aggressions and catastrophes which intrude into the *physis* of the group and the new truths which come forth out of the discoveries and inventions of the group's innovators. Today, people more and more chronically expect these invasions, i.e. they have developed a 'medial predisposition'

²⁰² Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 445

towards them, as intrusions increasingly emerge from within the cultural group itself, rather than from 'outside'.

For Sloterdijk, philosophy according to Plato thereby represented an incisive modification in human behaviour: it raised the neighbourhood between 'lifeworld' and 'ghostworld' onto the 'heaven of ideas', by reducing obsessions into convictions. And it was not until modernity that the academy started to become disenchanted. Today, he argues, the world of the living and the world of the dead do not have much to do with each other anymore – the thanatotope is fading. For the acquisition of knowledge, the long way via transcendence has become superfluous.

In this way, the twilight of the gods entails a twilight of the dead. [...] One looks back on them like dead persons without testament, ancestors from whom, for better or worse, not much is to be inherited [...]. The use value of the great dead, who one carries with oneself as classics in collective memory, is confined to the role of securing a common past for a group of civilised people. The past now serves as base camp from which the futurised civilisation sets off towards its projects.²⁰³

For Sloterdijk, the thanatotope has at most become a xenotope where humans are now challenged and determined by the foreign 'parasite'. Sooner or later, thinks Sloterdijk, people will necessarily come up against the walls of spherological facts and realise that the 'lifeworld' is always at the same time a 'deathworld'.

The booming *life sciences* represent the youngest frame of this management of absurdity. By wanting to know everything about life in order to side [*Partei zu ergreifen*] even more energetically with life, or what they call so, they dim the issue that biology, according to the nature of its object [*Gegen-stand*], is only possible as bio-thanatology, *life sciences* only as *life-and-death-sciences*.²⁰⁴

²⁰³ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 460 (my transl.): "So zieht die Götterdämmerung eine Totendämmerung nach sich. [...] Man blickt auf sie zurück wie auf Tote ohne Testament, auf Vorfahren, von denen im Guten wie im Bösen nicht viel zu erben ist [...]. Der Gebrauchswert der großen Toten, die man als die Klassiker im kollektiven Gedächtnis mitführt, beschränkt sich auf die Rolle, für eine Gruppe von Zivilisierten eine gemeinsame Vergangenheit zu sichern. Vergangenheit dient jetzt als Basislager, von dem aus die futurisierte Zivilisation zu ihren Projekten aufbricht."

²⁰⁴ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 466 (my transl.): "Die boomenden *life sciences* stellen die jüngste Fassung dieses Absurditätsmanagements dar. Indem sie alles vom Leben wissen wollen, um noch energischer für das Leben, oder was sie so nennen, Partei zu ergreifen, verdunkeln sie den Sachverhalt, daß Biologie, der Natur ihres Gegenstands gemäß, nur als Bio-Thanatologie, daß *life sciences* nur als *life-and-death-sciences* möglich sind."

9) Nomotope: The nomotope is the province of the self-insulation of cultures through their normative constitutions – i.e. the architectures of customs, rights, laws, rules, relations of production, language games, forms of life, institutions etc. Writes Sloterdijk, from the nomotopic point of view it seems as if Being and Being-in-order were the same, like the stoics thought.

That the normative climate of a group positively correlates with its stability, i.e. its survivability, is an early intuition of the wise and oldest among all peoples – none of the initial survival communities was ever able to afford to take their customs, their forms, their dogmas lightly. Only contemporary, systemically and deconstructivistically inspired social theory has learned to admit that every regulator is at once powered by a dragnet of tolerable exceptions.²⁰⁵

The relative rest of the authoritative social syntax 'in the background' enables humans to experience the movement of the figures 'at the front' – what Talcott Parsons, precursor to Niklas Luhmann, called 'pattern maintenance'.²⁰⁶ Human islands stiffen through normative internal tensions: the *ordo* is at the same time the form of life and the regulatory system that lies 'beneath' it – "systematists could go even further and claim that also the 'violations of the rule in the service of the cause' make up a constitutive part of the *ordo*-life," as Sloterdijk refers to Günther Ortman's *Regel und Ausnahme. Paradoxien sozialer Ordnung [Rule and Exception. Paradoxes of the Social Order]*.²⁰⁷ This double-sense of 'culture as text' and 'culture as syntax', Sloterdijk reformulates to 'culture as building' and 'culture following a rule of space creation'. Wherever human islands start to form themselves, a 'house rule' comes into force which, in order to keep the group integrated, has to be repeated to some extent. Following R. Buckminster

²⁰⁵ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 470 (my transl.): "Daß das normative Klima einer Gruppe mit ihrer Stabilität, also ihrer Überlebensfähigkeit, positiv korreliert, ist eine frühe Intuition der Weisen und Ältesten in allen Völkern – keine der anfänglichen Überlebensgemeinschaften hat es sich jemals leisten können, ihre Sitten, ihre Formen, ihre Dogmen leicht zu nehmen. Daß jedes Regelwerk zugleich von einem Fangnetz aus tolerablen Ausnahmen unterspannt wird, hat erst die zeitgenössische, systemisch und dekonstruktivistisch inspirierte Gesellschaftstheorie zuzugeben gelernt."

²⁰⁶ In Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 471

²⁰⁷ In *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 475 (my transl.): "[...] Systemiker könnten noch weiter gehen und behaupten, daß auch die 'Regelverletzungen im Dienste der Sache' einen konstituierenden Teil des *ordo*-Lebens ausmachen."

Fuller, Sloterdijk sees 'societies' as 'tensegrities'²⁰⁸ of expectation – i.e. multiplicities of regulatory actions and housing conditions that are stiffened by injunctions and threats. Cultures keep themselves permanently under stress through their rights and customs, which Sloterdijk compares to the endogenously stabilised body temperature of a warm-blooded organism. People constantly agitate themselves by turning over and over the thematic material that they use in order to communicate with each other about their immune situation – the group literally self-measures its fever. By charging themselves, cultures discharge – in today's complex nomotopic fields more than ever. Consider for example contemporary divisions of labour: the 'global' market can only exist due to maintaining chronic tensions from afar, making sure that others are, to a sufficient extent, complementing one's own work. It is thus an integrated construction of interlaced expectations – the 'system of needs' functions through the complementarity of its individual productions. Where the transition from the concrete to the abstract, from the in-existence in small groups to the imperial format, is underway, the interest in the interest of others

²⁰⁸ i.e. 'tensional integrity': Fuller – systems theorist, architect, engineer and designer – developed this principle of continuous tension and discontinuous compression through experiments with sculptor Kenneth Snelson at Black Mountain College in the late 1940s. Cell biologist and bio-engineer Donald E. Ingber then further refined the concept from the mid-1970s onwards, starting to experiment with tensegrity structures during his undergraduate degree at Yale in which he conducted studies of cell biology as well as sculpture. He developed tensegrity as a universal building rule guiding the self-assembly of both organic and inorganic structures at many different scales – from carbon atoms, water molecules and proteins to bacteria and viruses to cells, tissues and organs to crystals and minerals to humans and other beings. He discovered that organisms develop through highly complex interactions that involve a large number of different components. These components, or sub-systems, are themselves made up of smaller components which exhibit independent dynamic behaviours. However, when they are combined into a larger functioning unit, new and unpredictable properties emerge, such as the ability to move, transform and grow. Tensegrity structures are stable not because of the strength of individual members, but because of the way the entire structure distributes and balances mechanical stresses. They include two categories: The first one comprises structural members that can each bear tension or compression, such as Fuller's geodesic domes (see more below), i.e. a framework of struts that each constrain a joint to a fixed position, thereby assuring the stability of the whole structure. This is in contrast to most other buildings, which derive their stability from continuous compression because of the force of gravity. The second category comprises those structures that stabilise through 'pre-stress' and was developed by Snelson. In his sculptures, structural members that can bear only tension differ from those that bear compression. Before the members are subjected to an external force, they are already in tension or compression, i.e. are pre-stressed. The two types of structural members thus incorporate counteracting forces that equilibrate throughout the structure and thus enable it to stabilise itself. Both types of tensegrity structures exhibit continuous tension transmitted across all structural members. Hence, an increase in tension in one of the members results in increased tension in members throughout the whole structure. This global increase in tension is balanced by an increase in local compression within certain members placed throughout the structure. The tension-bearing members in the structures map out the shortest paths between adjacent participants, so they can best withstand stress. For this reason, tensegrity structures offer a maximum amount of strength for a given amount of building material (Ingber, D. E. *The Architecture of Life in Scientific American*, January 1998 issue, accessed on: http://time.arts.ucla.edu/Talks/Barcelona/Arch_Life.htm, 11/03/2014).

generates consideration for others from afar. The stiffening of the ensemble of stabilised tensions is what is called the 'status quo'. "Conclusion of the systematist: Without the tensegrity effects of 'communicating needs' and parasitised parasitisms, no differentiation of sub-systems."²⁰⁹

To conclude the theory of islands: With the emergence of anthropospheres in the savannah, i.e. the birth of the species, human greenhouses develop as self-framing units. For Sloterdijk, the suppressed surrounding element is thereby not just the African steppe, but the human itself and its ways of Being-in in the natural milieu.

[...] Drowsiness as the surrounding element is suppressed through the emergence of the alertness- and truth island [...]. The attention of its inhabitants is infinitely more provoked by differences and incidences in its own realm than by events in the external environment. While the surrounding animal and plant life consists of bound intelligence, on the ontological island a type of intelligence originates that can be characterised as free or ecstatic.²¹⁰

Which is why human islands are 'worlds' – they are places in which the open [*das Offene*] suppresses the bound.²¹¹ Humans reside on the island of the 'idea' which, due to the power of its infinity, puts the finiteness of its empirical surroundings into the background. This is why "infinity is an enclave in finite circumstances."²¹²

The three types of human islands (absolute, atmospheric and anthropogenic) correlate to three epochs,²¹³ whereby absolute and atmospheric islands are mere self-representations of the last, i.e. the first, in simplified modes. The anthropogenic climate is the base from which

²⁰⁹ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 490 (my transl.): "Fazit des Systemikers: Ohne die Tensegritätseffekte der 'kommunizierenden Bedürfnisse' und der parasitierten Parasitismen keine Ausdifferenzierung der Subsysteme."

²¹⁰ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 494 (my transl.): "[...] das Umgebungselement Benommenheit durch das Auftauchen der Wachheits- und Wahrheitsinsel verdrängt wird [...]. Die Aufmerksamkeit ihrer Bewohner wird unendlich viel mehr durch Unterscheidungen und Zwischenfälle in ihrem eigenen Bereich provoziert als durch Ereignisse in der äusseren Umwelt. Während das umgebende animalische und pflanzliche Leben aus gebundener Intelligenz besteht, entspringt auf der ontologischen Insel ein Typus von Intelligenz, der sich als frei oder ekstatisch charakterisieren läßt."

²¹¹ For apparent reasons, I do not want to go into any discussions around the 'animal question' as part of this PhD project.

²¹² Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 495

²¹³ Cf. *Foams, Globes, Bubbles*.

the human appears as superstructure. Base and superstructure thus cannot be absolutely separated, but, in a circular-causal way, the epiphenomenon of one dimension has to be seen as the basis of the other, and vice versa. The biological and the artificial, the organic and the inorganic, correlate. For Sloterdijk, the place of the human thus has to be thought as an implant of a 'lifeworld' into a non-lifeworld; as a biotope in which human and non-human symbionts co-exist as greenhouse comrades.²¹⁴ Only the practical simplification of the effect can explain the ground. For Sloterdijk, a philosophy of culture/s thus has to produce atmospheres by making their operating conditions explicit. The effects are more grounding than the ground – the relation between explicit and implicit can only be grasped through explication. Referring to Luhmann's theory of system-internal latency:

From there on, the implicit appears under a double aspect: as something that on one side is capable of explication, on the other side it embodies an eigenvalue which cannot be measured only by the norm of explication. Even where explication could happen, it only stays a *regional possibility*; neither can it, nor should it be executed everywhere.²¹⁵

In order to reformulate social theory into a theory of foams, Sloterdijk considers every cell of the anthropogenic island as a micro insulation which carries the complete (at least) nine-dimensional pattern in itself. According to him, this 'multi-dimensional cellular sociology' repeats Gabriel Tarde's thesis that '*chaque chose est une société*', however without simply seeing *chaque chose* and *société* as a collection of smaller entities, but in the way that every single formation spans into multi-dimensionality – every cell in the foam is a miniature version of the entire anthropotope.²¹⁶ Thus, neither any collection of cells (i.e. 'culture'), nor any single cell can ever be a

²¹⁴ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 493

²¹⁵ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 497 (my transl. & emphasis): "Das Implizite erscheint von da an unter einem doppelten Aspekt: als etwas, das einerseits der Explikation fähig ist, andererseits einen Eigenwert verkörpert, der nicht allein an der Norm der Explizitmachung zu messen ist. Selbst wo die Explikation geschehen könnte, bleibt sie nur eine regionale Möglichkeit; weder kann sie, noch soll sie allenthalben vollzogen werden."

²¹⁶ I will comment on this point in the review at the end of the chapter and especially get back to it in the conclusion.

homogenous figure, but only be a *hybrid*. Since foam inhabitants perceive the inner tensions and blurring of multi-dimensionality all at once, the value of implicit knowledge becomes clear. Humans initially take their fundamental situation for granted, as its implications are folded into flawless density. Sloterdijk thus thinks that all humans are sociologists latently, however usually cannot see the point of manifestly becoming one.²¹⁷ The transition into the manifest is normally pointless, as being located on the anthropogenic island *necessarily* includes a more or less developed ability to navigate the world through mere participation, “like most children inconspicuously grow into the complexities of the syntax of their mother tongue [...]. Dasein means to understand [*ver-stehen*] the entire syntax of the anthropotope – to understand this understanding is another matter.”²¹⁸ Most people content themselves with taking on conventional points of view, however, for Sloterdijk, this shortfall of attaining the *sapiens* niveau calls for a theory of self-underdoing.²¹⁹

The anthropo-topology of islands grounds the architectures of foams. According to Sloterdijk, if one was to explain, in the shortest form, how human Being-in-the-world changed throughout the 20th century, the answer would be that it has made dwelling explicit – Being(-in-the-world) becomes its own re-presentation. The modern art of building has deconstructed the ‘House of Nature’ and transformed it into a multiplicity of foam explications, or ‘art-iculations’, as Sloterdijk speaks with Bruno Latour: “Where there was nature, there shall be infrastructure.”²²⁰ The ‘analytic revolution’ of modernity is now grasping the architectures of the human sphere and turning it into a new type [*Art*] of synthesis, i.e. a new type of existing in surreal milieus. What Heidegger described as the ‘homelessness’ of the industrialised world,

²¹⁷ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 498

²¹⁸ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 499 (my transl.): “So wie die meisten Kinder unauffällig in die Komplexitäten der Syntax ihrer Muttersprache hineinwachsen [...]. Dasein heißt die gesamte Syntax des Anthropotops verstehen – dieses Verstehen zu verstehen ist eine andere Sache.”

²¹⁹ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 500

²²⁰ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 554

Sloterdijk explicates as the move from the natural milieu into designed spaces. In order to explain the location [*Auf-enthalt*] of humans in dwelling places, the relation between the foreground and background has to be reversed. In Heidegger's language: Being-in had to come apart before it could be explicitly raised onto the theme of dwelling in the world. From now on, dwellings have to be explicitly formulated as if they were relatives of the space station – as transitions from atmospheric towards absolute islands. An island, i.e. a *place*, is now

a quantum of enclosed and conditioned air, a locale of a traditioned and updated atmosphere, a node of sheltering relations, an intersection in a network of data flows, an address for entrepreneurial initiatives, a niche for self-relations, a base camp for expeditions into the work- and adventure environment, a position for business, a regenerative zone, a guarantor of subjective night.²²¹

The more the explication (i.e. poeticisation) process develops, the more the building of dwelling places becomes the installation of space stations. As Flusser, being a Jewish migrant, already stated in his *Wohnung beziehen in der Heimatlosigkeit* [*Procuring Dwellings in Homelessness*], part of *Von der Freiheit des Migranten* [*Of the Freedom of the Migrant*]:

One considers home [*Heimat*] as the relatively permanent, the dwelling [*Wohnung*] as the replaceable, relocatable location. The opposite is true: One can replace home or not have one, but always has to dwell, no matter where.²²²

For Sloterdijk, the most important architectural innovations of the 20th century are the apartment, on the one hand, and the sports stadium, on the other (including their psycho-active 'designer airs'). The

²²¹ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 504/5 (my transl.): "[...] ein Quantum umbauter und konditionierter Luft, ein Lokal tradierter und aktualisierter Atmosphäre, ein Knotenpunkt beherbergter Beziehungen, eine Kreuzung in einem Netzwerk von Datenflüssen, eine Adresse für unternehmerische Initiativen, eine Nische für Selbstverständnisse, ein Basislager für Expeditionen in die Arbeits- und Erlebnisumwelt, ein Standort für Geschäfte, eine regenerative Zone, ein Garant der subjektiven Nacht."

²²² In Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 519 (my transl.): "Man hält die Heimat für den relativ permanenten, die Wohnung für den auswechselbaren, übersiedelbaren Standort. Das Gegenteil ist richtig: Man kann die Heimat auswechseln oder keine haben, aber muß immer, gleichgültig wo, wohnen."

apartment he considers the architectonic/topological analogon of the 'individual'. It is the atomatic or elementary egospherical form: "the studio flat with the single inhabitant as cell core of its private world bubble."²²³ The single inhabitant must however not be understood as having 'no partner/s' – the 'non-symbiosis' practiced in the studio is actually an auto-symbiosis, whereby the form of the couple is fulfilled through the individual itself who self-differentially refers to its other/s, i.e. to its various sub-egos. This self-coupling is enabled via contemporary media which function as ego techniques. Only if telecommunicative mechanisms are practiced as routines, writes Sloterdijk, individualisation [*Vereinzelung*] is not experienced as isolation [*Vereinsamung*] – it enables the single soul to communicate with distant others.

The sports stadium, on the other hand, is a (post-)modern macro interior. As an ensemble, it explicates the symbiotic situation of the masses with a relative density of co-isolating 'life conglomerates' or 'life alliances' – a density which will always be higher than the one of the 'archipel', a metaphor for insulated multiplicities, and a lower density than the one of 'the mass', i.e. the collective unity. Comparing the situation of the sports stadium to 'The Festival of the Federation' of 14th July 1790 in Paris (one year after the storming of the Bastille), Sloterdijk explicates modern 'mass' culture as an event-staging, which describes the relation between audience, spectacle and assembly container. With around 400,000 people congregating, the festival was the largest 'mass' event of European history since the Roman *Circus Maximus*. For Sloterdijk, the modernity of this cult spectacle consisted in its explicit formation of a 'mass' as architectonic, organisational and ritual-technical (later also assembly-judicial) task. The 'mass'/'nation'/'people' as 'collective subject' can only exist to the extent that it becomes a physical object of artificial staging. Modern totalitarianism (see Olympic Games, Russian Revolution, fascism, concert halls, airports,

²²³ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 573

stations, ²²⁴ museums etc.) has been spawned by the 'mass' performance – whereby the receptiveness of the mobilised 'people' is economised through staged illusions of a centre. The macro collector thus functions as a psycho-political machine whose central sacrament is to produce winners (the first) and not-winners (the rest) while making the audience into witnesses of this division – with a "certain consideration for the seeded, to the extent to which the process of civilisation obliges (in this sense, it can be claimed that the invention of the silver and bronze medals attests for the civilising function of sports)." ²²⁵ However, for the 'mass' spectacle to really become a 'mass' spectacle, it is necessary for the collector to be synthesised with a connector: the media – "be it as coalition of bureaucracy and post, be it as print- or radio mass medium, so that the fiction of the integral social synthesis through staged events becomes operative." ²²⁶

In order to develop a culture of *differentiated* [*ausdifferenzierten*] collectors, writes Sloterdijk, one would have to avoid the over-interpretation of 'the mass', which religious communities and nationalistic collectives, including their assembly ideologies, tend to subscribe to. 'Society as a whole', whether it is thought in the singular as world society or in the plural as the population of nation states, is, in any case, a non-homogenous magnitude and can only be totalised medially and imaginarily. As the organisation of political parties, clubs, associations, unions and so on shows, assembly is only possible periodically in order to *represent* unity: Everything is able to congregate, apart from the whole. ²²⁷ Differentiated collectors can thus be understood as *congress* architectures. Hence, 'foam cities' can only be understood as meta-collectors, which assemble places of assembly and non-assembly. For Sloterdijk, the function of the metropole is to make centres and non-centres co-existent – not as a super centre, but as an

²²⁴ Airports and stations thereby to be understood as 'transit collectors'.

²²⁵ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 635

²²⁶ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 644

²²⁷ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 652

agglomeration of discrete spatial potencies. Meta-collectors do not collect 'individuals' who are either assembled or isolated, but include *places*, understood as installations, through which people realise possibilities to assemble, co-operate and communicate – or not. Places are not to be understood as 'wholes', but merely as *small segments* of 'the whole'. By reformulating McLuhan's thesis, Sloterdijk writes, "The format is the message, the section of the real is the real."²²⁸

²²⁸ Sloterdijk, P. *Sphären III: Schäume* Frankfurt a. M.: Suhrkamp, 2004: 742 (my transl. & emphasis): "Das Format ist die Botschaft, der Ausschnitt aus dem Realen ist das Reale."

Transition

This chapter has explicated Sloterdijk's *Spheres* trilogy in a systematic form, which will be used to generate the topologies of maker labs. As mentioned in the introduction, in the following summary and critical review, I will further explicate the *patial* dimensions of *Spheres* and also further point out how the spherology can be understood as an evolution from Heidegger's techno-patial framework/s:

In the first section 'Bubbles', Sloterdijk's micro spherology was explicated, which is to be understood as a theory of the anthropogenesis, i.e. the formation [*Bildung*], or coming-towards-the-world, of the human. This theory was developed via the foetal situation [*Befindlichkeit*], i.e. the 'first place' of the human, to be conceived as the primary dimensionality, i.e. originary openness, of Being-in, which Heidegger conceived as fairly universal and not thematised as the situated 'birth' milieu of the human. For Sloterdijk, *Dasein* is not just 'thrown' into *the* world, but, in the *first place*, 'born' into (a) world/s. Being-in is always already *placed* in a bubble and is thus singular. The milieu in the bubble – the first 'where' – for Sloterdijk includes (at least) two poles that form an intimate, pre-geometric resonance and is thus a 'nobject', i.e. a primal commune. Whereas Heidegger was more concerned with relatively individual *Dasein*, Sloterdijk understands *Dasein* as essentially being-with [*Mitsein*] – i.e. *through* the social, the 'individual' is born. While Heidegger developed being-with in largely negative, inauthentic [*un-eigen-tlichen*] ways, i.e. as *the* (universal) 'one' [*Man*] in *Sein und Zeit*, which 'tears away' or 'cuts off' *Dasein* from designing authentic possibilities that it thus 'levels', Sloterdijk conceives being-with as the in/authentic and situated possibility for Being-in-the-world. In this way, Sloterdijk 'de-structs' *Dasein* even more than Heidegger already did – i.e. *Dasein*, as originally *Mitsein*, is the constantly *evolving social product* of a (pre-)technical (at least) dyadic triad in (and 'later' also outside of) (a) bubble/s. One can say that the

human is a *techno-social place* itself. The micro spherology forms the ground for the macro spherology – i.e. from the first place in the bubble, the human departs [*bricht auf*] – is born – into *history* through which the ‘world poeticisation process’ begins and repeats itself.

In ‘Globes’, Sloterdijk’s macro spherology was explicated, which raises [*auf-hebt*] the micro spherology onto a theory of large, theometric ‘worlds’. The primal resonances in the bubbles, i.e. the first places, here grow into *individuals* in social milieus. Macro spheres are the ‘next’ dimension in the maturation process of the human, who now learns how to ‘die’ into the other, through which it increasingly expands its volume and thus *becomes* an individual. This death process is at the same time a birth process, with the ‘first place’ being remembered and repeated *throughout* life. In *Globes*, the “mausoleum of all-unitary thought”, Sloterdijk describes monospherism as *the* project of metaphysics – the (‘universal’) space of Euclidean geometry; the logics of *the* empire; God. *Globes* is a *history* of globalisation, which is a history of building houses – from the cosmic globalisation of ancient physics and the philosophical globalisation of classic ontology to terrestrial globalisation to cybernetic globalisation. Throughout the globalisation process, ‘the world’ increasingly becomes ‘ready-to-hand’ so that in modernity ‘proper’ (i.e. terrestrial globalisation) humans actually travel and dis-cover [*ent-decken*] ‘the globe’ – ‘the world’ is becoming *Ge-Stell*, which sets forth ‘Nature’. Humans are now becoming transcendental subjects by increasingly self-revealing their own *places* with/in it. Through this individualisation process, i.e. ek-splication process, *the* ‘world’, i.e. *the* ‘whole’, eventually falls apart, with ‘universal’ space differentiating itself into the unsensible and un-re-pre-sentable [*un-vor-stell-bar*]. ‘The world’ is becoming an alien outside without a shell – it is now ‘a sphere’ without a centre, as it repeats itself into the infinite out of protruding points *everywhere*. In order to develop a *differentiated* theory of the (‘universal’) *Ge-Stell*, Sloterdijk suggests not to critique centrism as such, but instead to differentiate between centres and

peripheries to in turn form the endosphere out of the exosphere. In this way, Sloterdijk's theory of *globalisation*, particularly of cybernetic globalisation (as the end of the epoch of globes/beginning of foams), is a departure [*Auf-bruch*] from Heidegger's notion of *the Ge-Stell* and the notion of being-in-the-world in *Sein und Zeit*. Even though Sloterdijk also considers Being-in-the-world as a *whole* in *Globes*, with monospherism being *the* project of metaphysics, he points out that these 'wholes' have always already been *plural*, i.e. been *singular places*. Although Heidegger already conceived of plurality (for example through the 'fourfold' in *Das Ding* and *BWD* or the relations of places [*Plätze*] towards each other in *SZ*), he did not take these notions quite far enough and did not much consider 'the world' as itself part of a plurality of worlds, which might actually be *incompatible* with each other (the same goes for Being-in, as mentioned above). In the same way, the Heideggerian *Ge-Stell* is for Sloterdijk not (just) universal – or better: critiqued of being conceived as universal in cybernetic globalisation – and indeed understood as 'the last globe'. Thus, Sloterdijk makes full use of the word '*Stelle*' [position/site/location] in '*Ge-Stell*'. In contrast to Heidegger, as explained, this Being-in-the-globe is in/authentically [*un-/eigen-tlich*] social for Sloterdijk, with the mass media being seen as co-creators of the modern social synthesis, and not necessarily 'level' the possibilities of 'individual' *Dasein*. The *Ge-Stell*, or better: *Ge-Stelle*, are hence not seen as largely negative, but simply as (of course not unproblematic) forms of Being-in-the-world-with-others.

In the third section, we saw how in the epoch of foams (i.e. the anthropocene) 'the whole' cannot be set before [*vor-gestellt*] as globe anymore. The human *subject* is increasingly constructing (the) world/s so that globes are falling apart. *Foams* is to be understood as Sloterdijk's hybrid spherology, i.e. his pluralistic philosophy of culture/s. In enfoamed environments, 'not-nothings' are the elementary spheres of closely neighboured, semi-transparent multiplicities, whose fragility is the

strength to be able to create places in (a) world/s that is/are continuously re-forming. Thus, 'societies' are here not explicated as a collection of 'individuals', or a collection of a collection of 'individuals', but as a collection of (at least) dyadic bubbles whose elements are in turn also not individuals, but *poles* that form strong relations with their other/s. Foams are based on an *a priori* being-with as *enabler* of foams, i.e. the pre-places in the bubbles ground the multiple places of foams – bubbles make foams *move*. The 'foamal' epoch hence constitutes a new formation of density: a being-with-each-other-in-each-other-against-each-other.

Foams is a technological theory of 'greenhouses', which humans are contained in as well as design. Enlightenment now becomes 'atmotechnology', i.e. atmospheres become ek-splicit productions. Hence, cultural studies for Sloterdijk is not just a technology studies anymore, but an 'interior design' – i.e. knowledge becomes the ability to ek-splicate, to ek-shibit. Since even the 'background' is becoming a product itself, the task of cultural studies is to explicate the 'background' conditions, i.e. to reveal the *Ge-Stell/e* – which have been "formally designed, technically set-forth, juridically cared for and politically shaped". Sloterdijk thus does not conceive of anthropocenic being/s as the Heideggerian stand-by [*Be-stand*], but as (open) *design/s* – i.e. as creations and events – and indeed also of *Being(-in)* as (open) *design/s*. However, humans do not make these designs through their 'free will', but through the immediate circum-stances they find themselves in. Having a certain power or agency over *Being/s* is hence not seen as necessarily negative, like for Heidegger to certain extents, but as the *essential* human situation in the epoch of foams (and, to lower extents, also of globes and bubbles). As Heidegger said in *SZ*, *Dasein* is 'thrown' into the Being of *Entwurf* [Design], hence it is essentially designed-designing. However, whereas for Heidegger *Dasein's* designing is *essentially* a 'non-achievement' and a mere 'absorbing' of the (universal) "counter swing of the event that

appropriates", for Sloterdijk it is a more *active* setting-forth of Being(-in/-the-world), with/in *multiple* forms of Being(-in/-the-world) – by creativity forming the *Spielraum* for the elasticity and emancipation of singular foam cells.

Part of Sloterdijk's theory of foams is his theory of atmotopic islands. There are three technical designs of island formation: a) absolute- b) atmospheric- and c) anthropogenic islands. These three types [*Arten*] of islands correlate to the three epochs of *Spheres* (however are not exclusive to any), whereby absolute- and atmospheric islands are simplified self-representations of the anthropogenic island, i.e. the last as in the first. In a circular-causal way, the epiphenomenon of one island is the basis for the others and vice versa. For Sloterdijk, a philosophy of culture/s thus has to make the operating conditions of the current island explicit – the first place, i.e. the last, can only be grasped through explication. a) Absolute islands are a type [*Art*] of island formation [*Bildung*] through which the enclave-formation principle is radicalised. As capsules – such as space stations – they are three-dimensionally isolated and navigate freely in unliveable environments. Absolute isolation is only achieved when relative environments are replaced and thus become the interior of absolute islands. Absolute islands are hence the inversion of dwellings – they are not built into an environment anymore, but, as environments, they are installed into a dwelling – 'Being-in-the-world 2'. Life on absolute islands is dependent on both their interior as well as 'distant' externalities, thus opening and closing of the system coincide. Sloterdijk considers them 'immanent machines'; an experiment of someone being together with someone and something in a commons [*Gemeinsamen*]. b) In contrast, atmospheric islands are relative islands which float on the surface of their surrounding element by suppressing it through implantation of a mass – i.e. they already start to, bio-culturally, surround the surrounding. Hence, their walls are only semi-permeable and their 'interior' is only relatively separated from the 'exterior'. For

Sloterdijk, the atmospheric island is the proper definition of a 'greenhouse', incorporated in the figure of Crystal Palace. c) The last type [Art] of island, i.e. the first, is the anthropogenic- or natural island, which refers to the place/s of human *becoming*, i.e. it explains how humans evolve through the incubation effect. Humans thereby do not just emerge out of their surrounding environment, but at the same time through group inclusion, which is a de-distancing [ent-fernendes] self-enclosing by *spontaneously* being together with others. This incubation process constitutes an ever-increasing greenhouse effect, whereby the previous places function as background for the next place of human becoming. The anthropogenic island is the human's first 'space station'.

It was explained how Sloterdijk understands the anthroposphere as a (at least) nine-dimensional place: the chirotope (the zone of the ready-to-hand), the phonotope (psycho-acoustic immune systems), the uterotope ('woman'/'mother' in site-theoretical terms), the thermotope (comfort sphere or pampering place), the erototope (the organisation of desire), the ergotope (labour collectives), the alethotope ('republics of knowledge'/horizon of truth), the thanatotope (zone for the search of the origin, i.e. 'home') and the nomotope (province of the self-insulation of cultures through their normative constitutions). Human 'societies' are fields of places that comprise different tensions of explication. Sloterdijk's (social) theory of foams can be conceived in the way that every cell in the anthroposphere carries the (at least) nine-dimensional pattern in itself, whereby every single one spans into multi-dimensionality, i.e. every place in the foam is a miniature version of 'the whole' anthropotope. Thus neither any single- nor any collection of cells (i.e. cultures) can ever be a homogenous figure, but only be a *hybrid*. Foam inhabitants hence understand [ver-stehen] this multi-dimensionality all at once, which points out the importance of implicit knowledge.

The immediate question that comes up here is the one of 'the whole' anthropotope – if 'the whole' is an impossible format, the

anthropotope is 'impossible' as well. Of course, *Spheres* does this to an extent already – for example by considering the *birth* of the human and its dwelling with/in *others* – however this hybridity could be much more developed, in the light of my project to construct a techno-social ontology of place. In order to also see the anthropotope as a 'foam cell', one would have to furthermore explicate the *topoi* of other beings the human is *with*, *in* and *against* – a point I will get back to in the conclusion.

Through his anthropo-topology, we saw how Sloterdijk developed the architectures of foams. As explained especially via the figure of the absolute island (and in part also of the atmospheric one), Being-in-the-world has changed in the way that it has made dwelling ek-splicit, i.e. Being has become its own re-presentation. Even the *Entwurf*, i.e. the 'background' condition of design, is now designed. The modern art of building has deconstructed the 'House of Nature' and is transforming it into a multiplicity of foam ek-splications. What Heidegger called the 'homelessness' of the industrialised world in *Bauen Wohnen Denken*, Sloterdijk conceives as the move from the 'natural' milieu to artificially designed places. As he says, dwelling places from now on have to be explicated as relatives of the 'space station', i.e. as transitions from atmospheric- to absolute islands. Sloterdijk considers the most important architectural innovations of the 20th century as the apartment, on one hand, and the sports stadium on the other. The apartment is the topological analogon of the 'individual', whereby the single inhabitant must not be understood as having no partner/s, but as practicing an auto-symbiosis by self-differentially referring to its various sub-egos, as well as communicating with distant others, which is enabled by the contemporary mass media. The sports stadium as macro interior, on the other hand, Sloterdijk considers an ensemble, which functions as container for the explicit stagings of a (illusory) centre. In order to develop a culture of *differentiated* collectors, the density of a sports stadium has to be considered higher than the one of the archipel (i.e.

insulated multiplicities) and lower than the one of the 'mass' (i.e. collective unity). It has to be seen as a non-homogenous magnitude that can only be totalised medially and imaginarily since 'the whole' can only ever be *represented*. 'Foam cities' can thus only be understood as *meta*-collectors that assemble places of assembly and non-assembly. The function of the metropole is to make centres and non-centres co-existent – not as a super-centre, but as an agglomeration of discrete platial potencies. A meta-collector, i.e. congress architecture, hence includes *places* (not 'individuals' or the 'mass') understood as *designed installations* through which people realise possibilities to assemble – *or not*. Places are just *small segments* of 'the whole' – they are their own worlds with/in (a) world/s.

Maker labs are precisely one type [*Art*] of those designed social places in the 'foamal' epoch, however not necessarily in foam *cities* – and not theorised by Sloterdijk himself. I will explicate their topo-logies through the spherological framework/s in the following chapter.

III Topologies of Maker Labs

Following on from Sloterdijk's spherology, grounded by my technoplatial reading of Heidegger, this chapter aims to show how a logic of 'foams' functions 'in the world' by explicating the topologies of one type [Art] of techno-social place paradigmatic for the anthropocene epoch: maker labs, i.e. meso-scale collaborative work-places where humans cohabit with/in technological systems to produce and share 'open designs' for local needs. Situated with/in ecologies of labs and supporting infrastructures as well as the wider contexts of 'the world' and beyond, maker labs are workshops where physicality and virtuality, atoms and bits, biology and technology, science and art converge into a singularly differentiated place. Because of their transdisciplinary approaches, the labs challenge divisions between traditional fields such as architecture, software development, carpentry, biology, art and engineering by blurring the (economic) boundaries between conception and development, manufacturing, distribution and consumption into a new notion of 'open design'. Historically placed at the dawn of the epoch of foams – in which 'the world' is increasingly becoming 'ready-to-hand' through its *making*, i.e. its anthropo-technical designing – maker labs are topological formations [*Bildungen*] which continuously re-design themselves, including their 'background' conditions, within the limits of their circum-stances. They are heterogenous 'societies', which do not include 'individuals', but an agglomeration of 'bubbles' understood as *poles*, which form communal resonances with each other (or not) and are constantly mutating. They are neither (micro) 'studio apartments' nor (macro) 'sports stadiums', but *meso-scale* designed-designing places, and not necessarily in 'foam cities'.

Maker labs have been proliferating within the last ten years or so, with the earliest examples including, for example, Vigyan Ashram in

Pabal, India (set up in 1983, with 'fab lab' since 2002),²²⁹ HONF ('House of Natural Fiber') in Yogyakarta (1999, with fab lab since 2011), Metalab in Vienna (2006) and the NYC Resistor (2008). Predecessors to these places are, for instance, L0pht in Boston (1992-2000) and the c-base 'space station' in Berlin (1995) – which (initially) concentrated more on software- and not so much on hardware practices.²³⁰ Maker labs, including their predecessors, have evolved through a number of different contexts: one was the development from mainframes to personal computers, the accompanying birth of the software industry, the mainstreamification of the internet, the development of the World Wide Web, the emergence of cybercafés and computer clubs, the subsequent rise of Web 2.0 ('social media'), FLOSS²³¹ as well as increasingly physical computing²³² and open/'free' hardware/design.²³³ As part of these phenomena, the growing digitisation of manufacturing technologies, including their decreasing in size and increasing affordability, has been decentralising, and progressively polycentralising, economic relations to extents, and more and more converging the physical world/s with the virtual ones. At the same time, the development of educational models such as constructivism²³⁴ and

²²⁹ See more in 'Vigyan Ashram' below.

²³⁰ For genealogies of 'hacklabs' and 'hacker spaces', see maxigas *Hacklabs and Hackerspaces – Tracing Two Genealogies* in *Journal of Peer Production* Issue 2, July 2012, accessed on: http://peerproduction.net/issues/issue-2/peer-reviewed-papers/hacklabs-and-hackerspaces/?utm_source=rss&utm_medium=rss&utm_campaign=hacklabs-et-hackerspaces-deux-genealogies-journal-of-peer-production, 26/04/2014.

²³¹ 'Free, Libre and Open-Source Software'. See, for example: Coleman, E. G. *Coding Freedom – The Ethics and Aesthetics of Hacking* Oxford & Princeton: PUP, 2013; Kelty, C. *Two Bits – The Cultural Significance of Free Software* Durham & London: DUP, 2008; Raymond, E. *The Cathedral & the Bazaar – Musings on Linux and Open Source by an Accidental Revolutionary* Sebastopol, CA: O'Reilly, 2001; Söderberg, J. *Hacking Capitalism – The Free and Open Source Software Movement* London & New York: Taylor Francis, 2008; Also see the 'Free Software Foundation' on www.fsf.org (12/12/2014).

²³² See, for example: Gershenfeld, N. *When Things Start to Think* London: Hodder & Stoughton, 1999; O'Sullivan, D. & Igoe, T. *Physical Computing: Sensing and Controlling the Physical World with Computers* Boston: Course Technology, 2004.

²³³ See main introduction above.

²³⁴ Broadly understood, constructivism in education aims to describe both *what* knowledge is as well as *how* it is constructed, i.e. it also tries to consider the *conditions* for knowledge. Knowledge is here seen as a transformational 'building' process (i.e. as always 'under construction'), as self-organised, socio-culturally mediated and as part of a larger structural system. Knowledge is not seen as an objective representation independent of reality, but as being 'in the world'. In constructivism, knowledge develops through actions and the agent's reflective abstractions of them, which are always in dialogue with others and social conventions, which in turn creates larger patterns and deeper understandings in the individual. Constructivism thus encourages personal discovery, invention and empowerment through experimental-

constructionism,²³⁵ for example, critical pedagogy²³⁶ as well as theories around lateral thinking and creativity have contributed to the pedagogical agendas and knowledge infrastructures of maker labs.

and problem-based learning via concrete and contextually meaningful experiences, creative works and procedures. Constructivism sets itself against instructionism and other top-down models of education and is thus more a theory of *learning* (i.e. active meaning-making) rather than teaching. Constructivists include Jean Piaget and Lev Vygotsky, for example, whereby the latter placed more emphasis on the socio-cultural dimensions of the theory, thus often referred to as 'social constructivism'. The learning theory is one of the 'background' conditions for the fab lab network (see more below) and has influenced maker (lab) culture more generally, in direct and indirect forms, with the labs often explicitly describing themselves, in one way or another, as experimental social learning places. In maker labs, knowledge is not (just) 'intellectually' transferred from a teacher/master 'down' to a student/apprentice/amateur, but also more 'manually' constructed, shared and exchanged across the maker community, and beyond (Ackermann, E. Piaget's Constructivism, Papert's Constructionism: What's the difference?, accessed on: http://learning.media.mit.edu/content/publications/EA.Piaget%20_%20Papert.pdf, 08/02/2014; Twomey Fusnot, C. (ed.) *Preface and Part I – Theory in Constructivism – Theory, Perspectives, and Practice* London & New York: Teachers College (Columbia University), 1996: ix-52; [http://en.wikipedia.org/wiki/Constructivism_\(philosophy_of_education\)](http://en.wikipedia.org/wiki/Constructivism_(philosophy_of_education)), 08/02/2014; http://en.wikipedia.org/wiki/Jean_Piaget, 08/02/2014; http://en.wikipedia.org/wiki/Lev_Vygotsky, 08/02/2014).

²³⁵ Constructionism is based on educational constructivism and was primarily developed by Seymour Papert around the 1980s through his earlier work with Piaget. Papert set up the Epistemology and Learning Research Group at Massachusetts Institute of Technology (MIT), which later became part of the Media Lab and contributed to the formation [*Bildung*] of the fab lab programme (see more in 'Vigyan Ashram' below). Constructionism extends constructivism by asserting that people learn with particular effectiveness when making *public* artefacts that are personally meaningful (whether that be a sand castle or a theory of quantum mechanics). Constructionism gives greater insights into how ideas get (trans)formed when expressed in particular environments. This localised approach to learning questions that abstract or formal thinking is necessarily the highest form of intellectual development. Constructionism recognises that there are multiple types and styles of thinking and knowing and therefore embraces epistemological pluralism. Some people prefer ways of thinking that keep them close to physical things, others use abstract and formal means to distance themselves a bit more from concrete materials. Some people prefer the bricolage process of learning (i.e. developing work as it proceeds), others the planning method (i.e. staying with a pre-established plan). All ways are equally relevant to constructionism – the point is not to oppose one method to the other, but to re-evaluate them mid-way, i.e. acknowledging that different methods (or a mix of them) are required in different situations for different people. Papert's constructionist work particularly focuses on child education through computer-based technologies – part of this research was his collaboration with LEGO on their 'mindstorms' series of kits, which contain hard- and software to create customisable, programmable robots (Ackermann, E. Piaget's Constructivism, Papert's Constructionism: What's the difference?, accessed on: http://learning.media.mit.edu/content/publications/EA.Piaget%20_%20Papert.pdf, 08/02/2014; Harel, I. & Papert, S. (eds.) *Constructionism* Norwood, NJ: Ablex, 1991; Mikhak, B. *Interview* 13/09/2011, 14.00-15.00, Cambridge, MA; [http://en.wikipedia.org/wiki/Constructionism_\(learning_theory\)](http://en.wikipedia.org/wiki/Constructionism_(learning_theory)), 08/02/2014; http://en.wikipedia.org/wiki/Lego_Mindstorms, 20/12/2011; http://en.wikipedia.org/wiki/Seymour_Papert, 08/02/2014).

²³⁶ Critical pedagogy, at large, considers education primarily as a socio-political practice. By recognising that education always takes place in a world of dynamic power relations in which (often latent) hegemonic forces and modes of exclusion are naturalised, critical pedagogy particularly aims to address issues such as race, ethnicity, class, gender, religion and sexual orientation in order to expose these relations, act on them and thus empower people to achieve socio-political transformation towards a more equal society. Aiming at a deep reconceptualisation of education, critical pedagogy sets out to develop criticality not just towards *what* is being learned and taught, but also *how* by considering the *conditions* through which learning and teaching *take place*. Critical pedagogy understands knowledge not as transcending history (universalism/positivism), but as being immanent to it and hence as *processual*. It regards knowing, learning and teaching not simply as intellectual and scholarly activities, but also as practical and sensuous ones. Although critical pedagogy embraces notions of difference and heterogeneity, it aims not to dismiss the authoritative power of the teacher, but instead to recognise it, however by considering her or him as 'simply' a facilitator of student inquiry and problem-posing, and as a learner her- or himself. Some maker labs see themselves more as critical pedagogical projects than others (such as Vigyan Ashram for example), however in line with hacker-maker ethics, most include fairly egalitarian world views, which they try to construct through their experimental formational [*Bildungs*-] practices, including the ones taking place on their 'background' conditions, often difficult to establish and maintain in and against 'a world' of hierarchical power relations (Kincheloe, J. L. *Introduction and The Foundations of Critical Pedagogy in Critical Pedagogy* New York: Peter Lang, 2008: 1-105; McLaren, P. *Introduction: Education as a Political Issue in Critical Pedagogy and Predatory Culture – Oppositional Politics in a Postmodern Era* London & New York: Routledge, 1995: 1-25; McLaren, P. *Introduction* in Castells, M.; Flecha, R.; Freire, P.; Giroux, H. A.; Macedo, D. & Willis, P. *Critical Education in the New Information Age* Boulder, Lanham, New York & Oxford: Rowman & Littlefield, 1999: 1-36; http://en.wikipedia.org/wiki/Critical_pedagogy, 14/02/2014).

Furthermore, the autonomist and alter-globalisation movements of the last century, including 'Autonomia Operaia'²³⁷ and 'Occupy'²³⁸ for example, have created counter cultures dissatisfied with the capitalist status quo, demanding more participatory and localised forms of politics. Through all of these contexts, 'hacker' cultures started to form,²³⁹ which realised the potential of the internet, digital technologies and increasingly their convergence with the physical world/s, hence now often also referred to as 'maker' cultures.²⁴⁰ Maker cultures of course intersect with various spheres of DIY (or 'DIWO'/'DIT'),²⁴¹ which can be traced back to the Arts and Crafts movement²⁴² and the

²³⁷ See, for instance: Katsiaficas, G. N. *The Subversion of Politics: European Autonomous Social Movements and the Decolonization of Everyday Life* Oakland, CA: AK Press, 2006; Lotringer, S. & Marazzi, Ch. (eds.) *Autonomia: Post-Political Politics* Cambridge, MA & London: Semiotext(e), 2007.

²³⁸ See, for example: Chomsky, N. *Occupy* London & New York: Penguin, 2012; Mitchell, W.J.T.; Harcourt, B. E. & Taussig, M. *Occupy: Three Inquiries in Disobedience* Chicago & London: UOC, 2013.

²³⁹ For more on hackers/hacking/hacker culture, see for instance: Coleman, E. G. *Coding Freedom – The Ethics and Aesthetics of Hacking* Oxford & Princeton: PUP, 2013; Kelty, C. *Two Bits – The Cultural Significance of Free Software* Durham & London: DUP, 2008; Levy, S. *Hackers – Heroes of the Computer Revolution* London: Penguin, 2001; Raymond, E. *The Cathedral & the Bazaar – Musings on Linux and Open Source by an Accidental Revolutionary* Sebastopol, CA: O'Reilly, 2001; Söderberg, J. *Hacking Capitalism – The Free and Open Source Software Movement* London & New York: Taylor Francis, 2008; Turkle, S. *Hackers: Loving the Machine for Itself* in *The Second Self: Computers and the Human Spirit* Cambridge, MA: MIT Press, 2005: 183-218. Also see Wark, McK. *A Hacker Manifesto* Cambridge, MA: HUP, 2004.

²⁴⁰ For more on makers/making/maker culture, see for example: Anderson, C. *Makers – The New Industrial Revolution* London & New York: Random House, 2012; Büching, C. & Walter-Hermann, J. (eds.) *FabLab – Of Machines, Makers and Inventors* Bielefeld: Transcript, 2013; Charny, D. (ed.) *Power of Making – The Importance of Being Skilled* London: V&A, 2011; Doctorow, C. *Makers* London: Harper Voyager, 2010.

²⁴¹ 'Do It With Others'/'Do It Together'

²⁴² The Arts and Crafts movement has its roots in Victorian Britain and developed in the late 19th and early 20th centuries – not just in Britain, but also in continental Europe, North America and the British colonies. It largely emerged as a reaction against industrialism (including machine production, the division of labour and hence devaluation of the crafts), the associated 'impoverishment' of the applied arts, as shown at the Great Exhibition in 1851 for example, as well as the elitist fine art academies of the time. The movement advocated not just artistic, but also economic and social reform. It promoted, for example, the unification and interdisciplinarity of all creative processes, i.e. of both the fine- and the applied arts; the appreciation of 'nature' through the use of organic patterns, traditional skills and techniques; pleasure and fulfilment during the production process; creativity and uniqueness; manual labour and material intimacy; community awareness and the poeticisation of life more generally. Especially in the early stages of the movement, industrial production methods were largely rejected, however later on became increasingly integrated and machinery was then seen as a craft tool itself, when mastered. Many Arts and Crafts practitioners were socialists, some moved to the countryside and set up independent workshops in order to escape modern life. Maker labs, as contemporary (digital) craft workshops, can in this way be seen not just as a reaction against industrialism, but also against post-industrialism, i.e. as a reaction against the alienating tendencies of the knowledge economy (see for instance: Berardi, F. [transl. by Cadel, F. & Mecchia, G.] *The Soul at Work: From Alienation to Autonomy* Los Angeles: Semiotext(e), 2009). In contrast to the early Arts & Crafts movement, maker labs of course embrace machine production, which is indeed at the core of their 'platial' practices, differing from the 'user'-centred interface logics of post-industrial 'empires', such as Google, Amazon and Apple for example (Cumming, E. *Preface and Sources and Early Ideals* in Cumming, E. & Kaplan, W. *The Arts and Crafts Movement* London & New York: Thames and Hudson, 1995: 6-30; Greensted, M. *Introduction* in *An Anthology of the Arts and Crafts – Writings by Ashbee, Lethaby, Gimson and their Contemporaries* Aldershot & Burlington, VT: Lund Humphries, 2005: 1-7; http://en.wikipedia.org/wiki/Arts_and_Crafts_movement, 10/02/2014).

Bauhaus,²⁴³ for example, as well as coincide with developments in synthetic biology in the form of 'biohacking'.²⁴⁴

There are hundreds, possibly thousands, of maker labs across the world already, in (sub-)urban as well as in rural areas.²⁴⁵ They can be a relatively stand-alone organisation, a mobile truck, attached to a university, college or school, a community centre, a co-working space or be part of a science and technology park, for example. Some labs focus more on professional architecture and design, some more on technology education for children, on DIY biology, on art or music, some more on urban regeneration, rural development or on hobby tinkering – they are hybrids in any way and converge a number of different spheres.

²⁴³ The Bauhaus was one of the first design schools in the world and operated from 1919 to 1933 in Germany – first in Weimar, then Dessau and eventually Berlin. Throughout its lifetime, it was directed by three different architects: Walter Gropius who founded it, Hannes Meyer and Ludwig Mies van der Rohe. 'Bauhaus' is literally translated as 'build(ing) house' and references the '*Bauhütte*', i.e. a pre-modern guild for various crafts, as well as relates to the German word '*anbauen*', i.e. to grow and cultivate crops. Similar to the Arts and Crafts movement, the Bauhaus proclaimed that the fine- and applied arts should be united, however in the overall context of a new notion of 'architecture'. It was more progressive in the sense that it confronted the new industrial realities at the time, which it increasingly embraced. By more and more shifting its focus from the crafts towards industrial design, the school eventually aimed not just to unite all arts, but also the arts and technology; form and function. In the Bauhaus manifesto from April 1919, Gropius stated that "the ultimate aim of all visual arts is the complete building" and that artists of all sorts should "learn to grasp the composite character of a building both as an entity and in its separate parts." Thereby, the eventual, if distant, aim would be the *Gesamtkunstwerk* – the total work of art in which there is no distinction between monumental and decorative art. With the Bauhaus, Gropius wanted to create a new 'guild', a new community of leading and future artists-craftspersons without class distinctions. The basis of that guild would be its *workshops*, not art studios – in fact, the school would be a servant of the workshop and "one day be absorbed in it". Teachers and students at the Bauhaus would be 'masters', 'journeymen' and 'apprentices' who collaborate on various building projects in a relaxed atmosphere and in touch with public life and industry. The Bauhaus also set up a new type of curriculum, which has since influenced art and design education worldwide: Students had to take a preliminary course in their first year, which included non-specialist training in all branches of the arts, theory and practice, and encouraged experimentation, creativity, interdisciplinarity, pragmatism and applicability. In 1933, the Bauhaus was finally closed by its own leadership due to pressures from the Nazi regime who saw it as a centre of communist intellectualism. In this light, maker labs can be seen as (polycentralised) '*Bauhäuser*' themselves, in the sense that they 'build houses' – not just technological arts and crafts products, but indeed entire formational [*Bildungs-*] architectures in which these products are being designed (in experimental and transdisciplinary ways). They can hence be understood as realisations of the *Gesamtkunstwerk* in some ways. In contrast to the Bauhaus as fairly hierarchical educational institution, or 'guild', however, maker labs generally operate more through peer-to-peer learning and organisation (Gropius, W. *Bauhaus Manifesto and Program*, April 1919, accessed on: www.thelearninglab.nl/resources/Bauhaus-manifesto.pdf, 12/02/2014; James-Chakraborty, K. *Introduction* in James-Chakraborty, K. (ed.) *Bauhaus Culture – From Weimar to the Cold War* London & Minneapolis: UMP, 2006: xi-xix; Whitford, F. *Bauhaus* London: Thames and Hudson, 1984; <http://en.wikipedia.org/wiki/Bauhaus>, 10/02/2014).

²⁴⁴ See Delfanti, A. *Biohackers: The Politics of Open Science* London: Pluto, 2013.

²⁴⁵ It is difficult to give even an approximate number. In 2013, there were ca. 150 workshops worldwide as part of MIT's 'fab lab' initiative (Lassiter, S. *Fablabs: Thoughts and Remembrances* in Büching, C. & Walter-Herrmann, J. (eds.) *FabLab – Of Machines, Makers and Inventors* Bielefeld: Transcript, 2013: 256). In addition, Hackerspaces.org lists 1,227 active 'hacker spaces' worldwide as of 26/01/2016, which however also include a number of places that mainly focus on software production and thus, as explained, do not so much fall under my definition of 'maker labs'. Apart from these, there are many other 'maker spaces', 'creative spaces', 'media labs' and similar organisations.

The architectures of the labs are unique and depend on their singular situation. By experimenting what designs would be most useful on site, maker labs are generally set up before anyone really knows how to do it. They start off as embryonic organisations, and stay like this to a certain extent, which evolve within and beyond their neighbourhoods; they are living places that are continuously transforming. Hence, their set-ups are quite loose, flexible and ready-made – their architectures are always in the process of being (re-)built. A lot of the labs look like a mixture between a carpenter's workshop, art and design studio, electronics store, squat and co-working office. While the smaller labs are often just one single room, the larger ones are usually a mixture of predominantly open- and a few enclosed areas, enabling collaborative and flexible working.

According to the focus of each lab, the workshops attract 'makers' from different ages, backgrounds, skills and with different motivations, largely participating on a voluntary basis: some might be working adults from fields as diverse as architecture, (software) engineering, community work, carpentry, medicine, education, music or law who use the labs as R&D incubators or for hobby projects; some might be children or teenagers who are introduced to advanced technology for the first time and use the labs to make essential survival products; some might be unemployed and experiment with different types of work or start their own business; some might be students who make prototypes for their studies or use the labs for activist projects; some might be pensioners who repair their household items or want to socially learn a skill they have never learned before. Although the people attending the labs are generally fairly diverse (of course depending on the singularity of each place), male technologists predominate.²⁴⁶

²⁴⁶ For a critique, see Carstensen, T. *Gendered Fablabs?* in Büching, C. & Walter-Herrmann, J. (eds.) *FabLab – Of Machines, Makers and Inventors* Bielefeld: Transcript, 2013: 53-64.

The organisational designs of maker labs tend towards 'auto'-productive and participatory structures – some (groups of) labs more so, some less so, again depending on their unique situation. They are usually embedded in some sort of supporting infrastructure – i.e. they might already be integrated into a larger organisation, are affiliated with a resource institute (such as a university nearby) or/and are part of a maker lab ecology, which by and large lets the labs go wherever they want to go and do whatever they want to do. There are also organisations which set out not to raise their own lab, but instead administer a group of them and support communities in founding them as well as providing resources (personnel, funding, equipment, educational programmes, communication infrastructures etc.). The idea is that by having a loosely connected group of labs, they will benefit from being affiliated more closely with each other through a mediating body, rather than being 'individual' structures that are just 'out there', trying to figure out what to do.²⁴⁷

A lot of maker labs are not-for-profit organisations and hence largely financed by membership fees and donations, research- and government grants. Some of the labs also generate capital, or (exchange) value of sorts, through their own products and services. Some makers end up establishing small businesses out of their projects; sometimes the labs function as start-up incubators. Maker labs thus often blur the boundaries between the informal sector, the third- and private- as well as sometimes also the public sector, by forming *singular* types [*Arten*] of economy – i.e. *patial* eco-nomies,²⁴⁸ which are 'locally' grounded, but connected and enabled via 'global' infrastructures (such as the 'free' market, transport-, energy- and communication networks, including the internet).

²⁴⁷ Such as 'FABLabs For America Inc.', for example (formerly 'Technology, Innovation and Entrepreneurship Project Inc.') – a social enterprise which aims to facilitate the development of a cohesive network of community, education and innovation 'fab labs' in the US (www.fablabs4america.org, 12/05/2014). Or Hackerspaces.org, an online platform which tries to connect and support the global 'hacker space' community. Also see the 'UK Hackspace Foundation' (www.hackspace.org.uk, 08/05/2014, more in 'London Hackspace' below).

²⁴⁸ 'Eco-' of course coming from the Greek 'oikos', i.e. 'house(-hold)'; '-nomic' from 'nomos', i.e. 'law'.

Depending on their situation/s, maker labs can include hard- and software such as: hammers, screwdrivers, bench grinders, lathes, small CNC (Computer Numerical Control) tools, for instance milling machines, vinyl-, laser-, foam-, plasma- and water jet cutters; 2D- and 3D printers;²⁴⁹ blow- and injection moulding machines; vacuum-forming technologies and different types of machine presses; soldering equipment; oscilloscopes; microcontrollers;²⁵⁰ 2D/3D scanners; knitting-/

²⁴⁹ 3D printers have been around for ca. 30 years, however are only becoming widely available now. There are about as many different 3D-printing processes as there are manufacturers, with numbers rising. Some of the most important processes are: 'Stereolithography' (SLA), by which a beam of UV light is shot into a bath of liquid resin that solidifies where the beam hits the surface. The object is thus built up in layers by using the beam to plot successive cross-sectional slices as the emerging part lowers into the bath; 'Selective Laser Sintering' (SLS) uses a CO₂ laser which fuses powder particles into a mass that has the desired three-dimensional shape. Again, the powder bed is lowered by one layer thickness each time so that new coats of material can be applied until the object is completed; 'Fused Deposition Modelling' (FDM) or 'Fused Filament Fabrication' (FFF) uses a hot glue gun that drops material into a chamber or onto a moving table. An object is built up as the material cools down layer by layer; 'Laminated Object Manufacturing' (LOM) employs a CO₂ laser or knives to create an object from layers of adhesive-coated plastics or paper. A heated roller presses the layers together and the laser or knives cut each layer of material into shape. Again, the object-in-process is lowered with each layer, whereby the remaining material stays in place in order to support the object during build-up; another process uses an inkjet printer head to squirt a liquid binder onto a fine powder, therefore building up the object through repetitive layering. Currently, most 3D printers print with plastics, however the range of materials is expanding and now also includes metals, ceramics, glass, concrete, sand, wood, nylon, carbon nanotubes, food, drugs, lunar soil and 'electronics' (i.e. inks with electrical properties). Even organs can be printed – a process by which a fluid with suspended cells is squirted onto a support matrix which then grows into the desired organ. Costs for 3D printers vary – from hundreds of thousands of pounds for big industrial ones to smaller desktop versions for between £2,000 and £10,000 (prices falling), with the cheapest ones already starting at around \$100, including one that prints through water (www.peachypainter.com, 09/01/2014) and a 3D-printing pen (www.the3doodler.com, 09/01/2014). Some 3D printers can 'replicate themselves', such as the 'RepRap' developed at the University of Bath (www.reprap.org/wiki/Main_Page, 21/02/2013), and some can recycle plastic waste into 3D-printing filament, such as the 'Filabot' (www.filabot.com, 28/09/2014) – if 3D-printing technologies can contain the information to *construct* an object – i.e. objects being made from a fixed set of (digital/physical) parts – they should also be able to *deconstruct* it, so the logic goes. Although 3D printing, also referred to as 'additive manufacturing' or 'drop-on-demand', will eventually become very important (to maker labs as well as everyone else) since it has a lot of potentials and benefits – such as the elimination of waste and ability to print complex structures, low volumes and prototypes cheaply, quickly and flexibly – it is not that important yet. Confirms Sherry Lassiter, Program Manager of MIT's Center for Bits and Atoms, which set up the 'fab lab' initiative, "3D printing is becoming very fashionable right now. There are a lot of people saying, '3D is the future, 3D is everything', but the technology really isn't there yet!" (Interview, 14/09/2011, 2-3pm, Cambridge, MA). 3D printers are still slow, the resolution is not particularly good, the better ones are very expensive, the range of printable materials is limited (at least for the average person), file management/-preparation/-exchange is complex, the machines often mess up, i.e. one has to go back and do things all over again and waste a lot of material, and the filament is still expensive (unless one can 'upcycle' it). At the moment, 3D printing is still widely used for making small simple things, such as doorknobs, ice cube trays, little toys or replacement parts. However, the technology is already established in various professional domains – including (product) design, architecture, medicine, agriculture, the aircraft-, aerospace- and automobile industries as well as the military – but so far mostly to make prototypes and models, printed one at a time (which is why 3D printing is sometimes still called 'rapid prototyping'). Nevertheless, as the technology is developing, 3D printing is increasingly used to make finished (parts of) products and even entire systems, sometimes printed in small batches and through a continuous process. Some people have already developed hybrid printing systems in which various digital processes and different materials are combined in one machine. And at some point, 3D printers will be superfluous – when digital processes will be built into the design of materials themselves. I.e. through positional awareness following the architect's coding, 'digital materials' will be able to morph and connect in order to form new shapes themselves.

²⁵⁰ Microcontrollers are small computers on a single integrated circuit. They are designed for embedded applications, i.e. for controlling specific tasks in a device, and can be found in automobile engine-control systems, implantable medical devices, remote controls, digital cameras, mobile phones, office devices, power tools and toys, for example. Instead of having a separate microprocessor, memory and input/output devices such as in PCs for instance, microcontrollers include all of these and make it easy to digitally control various devices and processes.

weaving-/sewing machines; desktop computers and laptops; CAD/CAM (Computer-Aided Design and -Manufacturing) software; graphics-/publishing-/video-editing programmes; digital cameras and video game consoles. Technological tools and systems in maker labs are often open-source/'free' and can thus get easily transformed and (re-) designed, attached to others or completely merged with them – otherwise they might get 'hacked'. Working materials can include anything from different types of paint to fabrics, wood and recycled bike parts, to liquid nitrogen and DNA samples, to electronic components and basic hardware such as nails and screws. Equipment and materials in maker labs are generally shared and often donated by the makers themselves, bought through the collective funds of the organisation (or of a sub-organisation within the organisation) and are sometimes directly made on-site.

With these 'partial production tools and technologies', makers collaboratively build open designs which are not available on the 'global' market – such as a 'local' rural wireless network, a prototype for a one-off 3D printer, a personal robot, a CAD graphic of a tailor-made suit jacket, a media art project, a home-brewed beer and of course the maker lab as 'a whole', including its interiors (sometimes entire building/s) and organisational processes. These designs are not just produced via (post-)Fordist logics, but are personal- or small-group artefacts (sometimes commodities), which are made, together and alongside each other, via *shared* resources and *topical* knowledge-exchange processes – in the lab as part of a workshop or simply through peer-to-peer interaction; online via wikis, blogs, tutorials, mailing lists, IRC (Internet Relay Chat) channels, video-conferencing or emails; more externally through the ecologies of international maker fairs and meetings, for example, the local community and other maker labs – by leaving *Spielraum* for flexibility and experimentation. Maker labs thus promote a new model of formation [*Bildung*]: one that is more inclusive, polycentric, morphological and integrates the 'minor' skills of the crafts

with the 'higher' skills of the arts and sciences, which have been separated/hierarchised since the industrial revolution. Rather than just *using* open designs, makers also learn how to *develop* them, i.e. *explicitate* them, and also create (to certain extents) the *conditions* under which they are being developed. Whereas in mass production/consumption (i.e. the largely 'global' logics of the manufacturing economy on the one hand, and the knowledge economy on the other), people are generally involved in only *one stage* of the economic process – in accord with capitalist labour division and -specialisation rules, the relative separation of designers/producers/distributers/consumers as well as outsourcing strategies – in a maker lab these distinctions become blurred. Makers participate not just in *one*, but, more transdisciplinarily, in *many* economic processes, i.e. various types [*Arten*] of designing, producing, distributing and consuming. Maker labs are *techno-social places* where organisational processes are *singularised* – in a move towards *creative economies*.

As mentioned in the main introduction, maker labs can be conceived as what Ned Rossiter, Geert Lovink et al. have termed 'organised networks' (or 'orgnets'): new institutional forms emerging through informational economies and the logics of socio-technical networks. They do not function much like modern institutions, i.e. tendentially through the logics of vertical integration, representation and (intellectual) property; neither so much like 'networked organisations', which merely *instrumentalise* the logics of (digital) networks to enhance their traditional institutional models. Rather, maker labs as organised networks tendentially work through contingency, transdisciplinarity, hybridity, (a high level of) self-organisation and collaboration, often advocate open-source culture and are based on the logics of post-representational politics by conceiving of conflict as a generative process. Orgnets are loose enough to continuously reinvent themselves, enable participants to come and go whenever they want

and be involved in decision-making processes, however in this way also bear the potential for unexpected harm or even destruction and often prevent themselves from being organised in the first place. The 'openness' of organised networks is thus their strength and weakness at the same time – it is a continuous negotiation process for orgnets to stay inclusive and heterarchical while ensuring sustainability. Hierarchical and centralising tendencies are hence not antithetical to organised networks, but to certain extents needed so that decisions can be made and the networks be *maintained*. In contrast to Rossiter and Lovink however, I am not theorising maker labs so much as *political spaces*, but as *ontological places*. I.e. I see the techno-social condition as a larger epochal evolution from the modern age of time and space towards one of *place*, which functions through *singularisation/s* – the '*background*' condition in and through which organised networks are beginning to operate. While Rossiter is reluctant to attribute ontological status to the socio-technical form of the network since this rendering into essentialist terms functions "to elide the complexities and contradictions that comprise the uneven spatio-temporal dimensions and material practices of networks,"²⁵¹ I would argue however that a political theory of networks needs to be *grounded* in an *ontology* – of place, and not primarily of space (or time) – in order *not* to ignore larger as well as smaller historico-structural processes. An ontology does not have to be essentialist if it recognises its own hybridities and (material) complexities. As explained earlier, it is in this way that Rossiter and Lovink sometimes fall back into making (metaphysical) idealisations, which are not in line with their methodology of 'immanent critique'. Orgnets understood as 'places' will necessarily function *through, with* and *against* the corporate-state apparatus, established political and cultural institutions and representational democracy.

Similar to Lovink and Rossiter, I am a bit reluctant to just use Deleuze and Guattari's spatial framework of the rhizome to theorise

²⁵¹ See above.

organised networks since this has now largely become the logics of post-Fordism. As explained, the problem with a rhizomatic model for me is its relative flatness, tendency to hyper-differentiate and universalise. The overall emphasis for Deleuze and Guattari was on 'smoothing striated space', which, for all its r/evolutionary potential, also smoothes singularity. When all hyper-differentiated multiplicities with short-term memory/history connect and 'become' with each other on an a-centred 'plane of immanence', there is no real conception of alterity and plurality, and thus difference tends to dissolve. In the globalising-globalised 'world' of the 21st century, a flat, spatial ontology is inadequate to think the singularities of *very different* places that are co-existing. It is also inadequate to think (anthropo-technically) *designed* places, including through which (historical) *conditions* this design is *taking place*. Even though rhizomatic thought could be called 'productive' or 'creative', since its focus is on (rather 'passive') affective relations it is limited in conceiving of design/ing as well as the ('self'-) organisation of this design/ing.

Whereas Rossiter in his reading of the rhizome puts more emphasis on the Deleuzian notion of the 'constitutive outside', combined with Marxist/autonomist conceptions around limits and uneven development, I am using Sloterdijk's 'voluminous' spherology (after Heidegger) to explicate maker labs as a type [Art] of organised network – as part of a larger project to develop a techno-social ontology of place. I.e. in this chapter, I am theorising maker labs through a spherological framework with a main emphasis on the epoch of 'foams' – as organised networks, maker labs are considered (primarily) as foams, (primarily) *in* the epoch of foams. Due to the multi-historical dimensionalities of 'the whole' spherology however, maker labs also have to be situated with/in and against the epochs of 'bubbles' and 'globes' since different forms of Being-in-the-world *condition* and *simultaneously co-exist* with each other *in the process of history*. I.e. on the one hand, the epoch of bubbles, understood as (micro) sphere of

the anthropogenesis, has to be seen as *possibility* for globes and foams; on the other hand, foams is the contemporary *ek-splication* of globes and bubbles as *ground/s*. Maker labs as foams are hence the *repetition* and *poeticisation* of the *originary place*, i.e. the coming-towards-the-world, of the human – on a more ‘individual’ dimension as foetal situation [*Befindlichkeit*] in the mother’s womb; on a more ‘collective’ one as epoch of hunter-gatherers. Maker labs are historically *conditioned* through the *a priori* and (*pre-*)*technical sociality* of (and in) the *singular* bubble of human *becoming*. They are not so much globes anymore, i.e. largely *individual, static, homogenous* and *hierarchical* (macro) spheres, which try to *represent* ‘the world’ as *picture*, but (meso-scale) *hybrid* foams, which *continuously (re-) construct themselves* through *technological systems*, with/in and against *others*.

By working with and through the spherology, whilst deconstructing it in order to show how it actualises itself ‘in the world’, maker labs will be explicated through the nine-dimensional complexity of the anthroposphere. I.e. via the ‘chirotope’, ‘phonotope’, ‘uterotope’, ‘thermotope’, ‘erototope’, ‘ergotope’, ‘alethotope’, ‘thanatotope’ and the ‘nomotope’, I will explain how maker labs are *becoming in different forms* through (non-)human incubation effects:

From the point of view of the chirotope, i.e. the zone of the ‘ready-to-hand’, maker labs have to be grounded by the formation [*Bildung*] of human hands, including its ‘world’-creating reflexes. The de-distancing [*Ent-fernungs*] effects of throwing equipment, beat instruments and the discovery of sharp stone- and bone edges are here the *possibility*, i.e. the *condition*, for maker labs, in the sense that humans have been able to emancipate themselves from ‘Nature’ through tools and thus gained a strong ability to erect ‘walls’ throughout the evolution process. By acting at a distance, humans have been able to plan and carry out ‘throws’ in order to reveal, i.e. *ek-splicate*, things which were not at hand before – which is the *becoming* of the ‘de-throw’ [*Ent-wurf*], i.e. ‘Design’. As explained via Sloterdijk and

Reynolds above, the chirotopic sphere comprises the 'socialisation of hands': from relatively symmetrical co-operations, where everyone can take on the role of the other, the human sphere has evolved towards heterotechnical co-operations, where everyone does what s/he can do better than the others – i.e. through anticipating the actions of others, one performs the adequate complementary function. The chirotope is becoming increasingly abstract since hands do not have to physically touch anymore, to an extent, thus 'Culture' has evolved into a meta-equipment with incubating effect – the hands become the 'invisible' functions of the market. Maker labs, where virtuality and physicality, bits and atoms, biology and technology converge, can be conceived as such a meta-equipment. In the epoch of foams, the (non-)human *Entwurf* is not just operating through simple tools anymore, but through technological systems – to a level of ek-splicational complexity that sub-systems are forming, i.e. *singularising*. As anthropo-technically designed *media*, maker labs are one type [Art] of these singular (sub-)systems. Through their transdisciplinary-, topical-, processual- and collaborative approaches to formation [*Bildung*], they are *places* where symmetrical- and heterotechnical co-operations *coincide* to produce 'open designs' – with/in and against *other* open designs.

Through the sphere of the phonotope, one can understand maker labs as psycho-acoustic immune systems – i.e. they are places that create their own soundscapes, or attunements [*Stimmungen*]. Their implicit 'sound installations' thereby function as medium of (non-) belonging and enable their formation *in the first 'place'*. I.e. through the repetition of sounds and phrases singular to each lab, and close to hacker/maker culture more generally, the labs keep themselves 'in form'. As explained above, the *condition* for these sound installations can be traced back to the development of the human ear in the sonosphere of the womb, where the foetus is already able to (pre-) technically select and distinguish between sounds in order to *orient* itself: i.e. the ear turns *towards* sounds that it senses to be welcoming

and thus opens up the 'subject' to a certain attunement; in turn, it turns away from unbearable sound presences, such as the mother's heartbeats and noise of the digestive system. These selections get repeated throughout life and become ever more technical, thus making the 'individual' increasingly 'attune' itself to (the) world/s and develop itself as a singularity. In contrast to pre-modern collectives, which had been characterised by permanent public acoustics, the invention of the private individual was possible through silent and solitary writing/reading practices, which in turn enabled the development of 'reason'. Maker labs, due to their mix of open and closed architectures, enabling collaborative working as well as 'individual' expression and creativity, can here be said to converge public acoustics with silent practices and in this way produce a more social model of formation [*Bildung*], indeed of 'reason'. In contrast to the (monotonous) high-noise levels of factories and the (monotonous) low-noise levels of individual- or small group offices (and even open-plan ones), maker labs *combine* the acoustics of manufacturing work with the ones of the knowledge economy. In the labs, makers do not *just* manufacture products or *just* design (or distribute and promote) them, but both – i.e. the design is the production. Thus, in their attempt to converge these two production spheres, maker labs can be explicated through the forms in which they create and negotiate their different acoustic environments – with/in and against others.

Through the framework of the uterotope, maker labs can be conceived as motherly 'world' incubators. They refer back to the milieu for the 'interiorisation of eggs' in the female human, which creates offspring with a "higher commitment value and a harsher separation risk."²⁵² For interior situations to be transferred, a 'real' site in the exterior has to firstly be created in order for the environment to potentially become 'world'; this new site then functions as repetition of interiority from the previous site. Maker labs can here be understood as dwelling

²⁵² See Sloterdijk in 'Foams' above.

places which aim to provide humans with a sense of belonging and security. As orgnets in the epoch of foams, hence functioning through contingency, hybridity and inclusivity – i.e. ‘openness’ – the provision of such senses can be problematic. It is a continuous negotiation process for the labs to stay inclusive and heterarchical whilst ensuring sustainability (for the organisation as ‘a whole’ as well as for its various sub-groups and ‘individual’ participants).

The thermotope, i.e. ‘comfort sphere’ or ‘pampering place’, refers to humans deriving the ‘home effect’ from the sense of wellbeing and ‘warmth’ of their own situation. As explained, one of the motives for group-insulating life is that a successful collective works out a ‘pampering advantage’ towards others, which is hence distributed internally – equally or not. For Sloterdijk, the advantage of the group is thereby not so much the effect of the site, but the effect of the distribution makes one value the site (or not). The exclusive thermotope is, in stratified societies, translated into an attraction of property advantages: what in ‘local’ formats can create inclusive solidarities is often desolidarising in ‘global’ ones, and once a comfort zone naturalises, no one asks where it comes from anymore. Through a thermotopic lens, maker labs can be conceived as media for the creation and distribution of comfort spheres and pampering advantages – i.e. as fragile foams with/in and against (the) capitalist world/s, how do the labs (sustainably) produce and disseminate ‘comfort’ according to their singular logics?

In the erototope, i.e. the organisation of desire, maker labs can be explicated from the point of view of how affective relations stimulate as well as control their communities. As explained above, through sub-acute ‘self’-irritation, which creates a permanent climate of attraction, human groups produce attention towards the differences between their members, for example in gender, property and status. Cultures thus have to practice a form of ‘jealousy management’ in order for deregulated group jealousy to be transformed into the willingness to co-

operate, i.e. they have to make their people actively disinterested in their objects of jealousy, to an extent at least, so that their culture/s can be formed first of all and be maintained. In contrast to the 'jealousy wars' of the 'free' market, in which the privatisation of the love object forms the basis of competition, maker labs' open designs function through an organisation of desire that is more *singular* and *collaborative* (due to the labs' male centrality, generally, the organisation of gender can however not be so singular and collaborative). Because of their relatively small size, high degrees of openness and autopoiesis, jealousy wars here become quickly apparent and the labs (or sub-group/s within the labs or even entire ecologies), including the artefacts produced in them, can fall apart easily and are not even created to begin with if desire is not targeted towards the *subsistence of the group in the first 'place'*, i.e. towards the maintenance of their 'background' conditions. Since the techno-social situation operates via singularisation, there can furthermore be a certain *compulsion* for makers as well as for entire labs to be singular, which stimulates them to compete with each other (in largely 'friendly' ways). Maker labs in this sphere can thus be conceived through their organisation/s of desire, which are, within limits, controlled by the groups *themselves*.

Through the framework of the ergotope, maker labs can be explicated as labour collectives. As described above, in this *topos* groups become communes through social responsibilities by setting themselves against the 'external enemy' as threshold of co-operation. Sometimes, the ergotope is radicalised when inhabitants are forced to 'hold the beat' (such as on war ships, in fighter jets or labour camps); sometimes, people co-operate more voluntarily through enthusiastic consensus for a common thing (such as crusaders, finalists and freedom fighters). Through synchronised movements and bonding of the muscles, the ergotope functions as some sort of 'rhythmic socialism', which keeps a culture together and creates it in the first place. According to Sloterdijk, in the military-based political systems of the

(pre-)modern age, drill is the formation of the nation; in (post-) modernity, where labour is dissociated from the group and more concentrated on the individual, 'athletes' develop who perform highly specialised types of labour. In 'athleticism', performers compete against each other not so much for a common work, but for their abilities to represent their performances and outdo each other. Athleticism transfers the principle of theatre onto physical exercise and hence is a civilising alternative to militant forms of stress management. The social bond can thus be seen as, what Mühlmann calls, a 'maximal-stress-cooperation',²⁵³ i.e. what makes a group survive is the ability to synchronise its efforts in all-or-nothing situations. Cultures hence function as 'self'-activators of the maximal stress reaction – in order to control these mechanics, the 'nature of culture' needs to be made explicit and a fundamental critique of heroism has to *take place*. In the world of the ergotope, maker labs can thus be explicated as spheres for the performance of collective labours (especially on their 'background' conditions) and as places where makers are 'forced' to abide by the singular rules and regulations of the lab in order to keep it alive and set it up first of all (otherwise participants might get excluded). Since the labs function according to the contingent and collaborative logics of the techno-social condition, 'external' thresholds are generally fairly low and exist in order to precisely enable the formation of *singularities*, in *co-existence* and *collaboration* with *other* singularities. The worst 'enemies' which maker labs set themselves against are often 'global empires', i.e. (post-) modern institutions that are fairly static, closed and homogenous – which the labs nevertheless function *through*. In this way, they also generally do not mobilise and synchronise their collective labour powers to 'invade' and 'take over' *other* environments, with the aim of becoming 'empires' themselves, but rather just take up *some place/s* to create and maintain themselves. Since the labs are formed through hybrid social spheres, their ergotopes do not *just* work through

²⁵³ See 'Foams' above.

synchronisation of the muscles or *just* through individualised 'athleticism', but a *mixture* of both – depending on the types [Arten] of work being performed, the products made and their production stages, which in any way tend towards *transdisciplinary* and *collaborative* principles.

In the alethotope, maker labs can be conceived through the 'horizon/s' of truth [alétheia]. As mentioned above, two tendencies open up this world: that novelties from the surrounding unknown enter the known (explication), and that the known can fall back into oblivion [léthe] (implication). Truth thus cannot be a simple fact, but the *sensibility* for truth develops from the *intuition* that there is a threshold range in between light and dark, which can not be easily grasped. Truth is a dynamic light-dark, which evolves throughout history. Traditionally, the world of truth has been more or less strictly divided – as Sloterdijk would say, into the bicameral system of the 'House of Common Knowledge' and the 'House of Cognitive Lords'.²⁵⁴ Even Heidegger still made a difference between authentic [eigentlich] and inauthentic [uneigentlich] modes of *Dasein*. The problem of globalisation, and indeed of globality, is thus the problem of the division of knowledge/s – i.e. the tensions of (a) world/s-in-becoming. In relatively coherent groups, knowledge is distributed in fairly symmetrical forms, i.e. it is a knowledge which is at the same time the joint knowledge of what others know and do not know; in heterogenous groups, joint knowledge is minimal between members who often have to deal with each other in situations of extreme density. As hybrid communities, maker labs thus can be explicated in this sphere as work-places for the revelation, and in turn concealment, i.e. *negotiation*, of truth-s. Since they are places in which open designs are *continuously* being (re-)made, i.e. newly poeticised, truth *experimentation processes* are constantly *taking place*. Due to their *transdisciplinary* approaches and production of *cognitive-material* artefacts, maker labs challenge

²⁵⁴ See 'Foams' above.

the metaphysical hierarchisation of 'common' and 'truthful' knowledge, including the bias on the 'higher' knowledges of the arts and sciences and the 'lower' ones of the crafts since the industrial revolution. In maker labs, knowledges are *hybridised* and *singularised*. However, how can participants design 'one' organisation through multiple forms of truth, which densely co-exist and depend on each other in the fragile foam/s of the labs?

From the point of view of the thanatotope, maker labs have to be conceived as the zone/s for the search for the origin, i.e. 'home'. As mentioned above, two transcendences explain this sphere: Firstly, the ontological, or 'aletheiological', transcendence as the fact that new truths, which come out of the concealed that lies 'behind' the cleared horizon, 'strike' the known; secondly, the fact that humans are mortal, i.e. they have death before as well as *behind* them. The 'lifeworld' thus corresponds to a world of ghosts, death and gods, which it *pervades*. For Sloterdijk, 'deadly invasion' is embodied in three forms: in the ancestors and revenants who regularly return into the psyche of the group; in the environmental aggressions and catastrophes which intrude into the *physis* of the group and the new truths which emerge from the discoveries and inventions of the group's innovators. Today, people more and more chronically expect these invasions, i.e. they have developed a 'medial predisposition' towards them, as intrusions increasingly emerge from *within* the cultural group itself, rather than from 'outside'. For Sloterdijk, philosophy according to Plato thereby represented an incisive modification in human behaviour: it raised the neighbourhood between 'lifeworld' and 'ghostworld' onto the 'heaven of ideas', by reducing obsessions into convictions. And it was not until modernity that the academy started to become disenchanted. Today, he argues, the world of the living and the world of the dead do not have much to do with each other anymore – the thanatotope is fading. For futurised civilisations, which set off towards their projects, the acquisition of knowledge via the long way of transcendence has

become superfluous. The thanatotope has at most become a xenotope, in which humans are now challenged and determined by the foreign 'parasite'. For Sloterdijk however, the 'lifeworld', according to the nature of its object, is only possible as a 'deathworld'. Maker labs can in this *topos* be understood as being essentially pervaded by death. As fragile foams, they are already medially predisposed towards 'deadly invasions', which are mostly coming from 'inside' the labs themselves, and less so from 'outside' environments – for instance financial problems, fast evolution, pollution or participants misusing the place. The lives of the labs are a constant struggle to 'manage death', i.e. surviving in (a) world/s of constant change, pervaded by the 'ghostly' invisible hand. As collaborative places for learning and invention, maker labs facilitate continuous exchange of the knowledge/s of their participants and (re-) development of products, which are mediated through various channels – in order to create *sustainable* open designs however (including the maker lab as 'a whole'), the *deep, historically* experienced knowledge/s of the 'deathworld' (such as of different craft techniques, administrative processes and educational formats, for example) are needed.

Through the lens of the nomotope, maker labs have to be explicated as 'self'-insulations of (a) culture/s through normative constitutions, i.e. architectures of customs, laws, rules, relations of production etc. Thereby, the normative climate of a group correlates with its stability, to certain extents, i.e. the relative rest of the authoritative social syntax 'in the background' enables humans to experience the movement of the figures 'at the front' – 'pattern maintenance', as Parsons called it.²⁵⁵ As explained above, human islands stiffen through normative internal tensions, i.e. the *ordo* is at the same time the form of life and the regulatory system that lies 'beneath' it, whereby violations of the rule also form a constitutive part. Thus, for Sloterdijk, culture is 'building' and at the same time the '*rule* of building'.

²⁵⁵ See in 'Foams' above.

Following R. Buckminster Fuller, Sloterdijk sees cultures as 'tensegrities' of expectation – i.e. multiplicities of regulatory actions and 'housing conditions' that are stiffened by injunctions and threats. Cultures keep themselves permanently under stress through their rights and customs and constantly turn over the thematic material that they use in order to communicate with each other about their immune situation – the group literally 'self'-measures its fever. By charging themselves, cultures discharge – in today's complex nomotopic fields more than ever: i.e. the 'global' market can only exist through maintaining chronic tensions from afar, making sure that others are, to sufficient extents, complementing one's own work. It is thus an integrated construction of interlaced expectations and functions through the complementarity of its 'individual' productions. Where the transition from the concrete to the abstract, i.e. from the in-existence in small groups to the imperial format, is underway, the interest in the interest of others generates consideration for others from afar. The stiffening of the ensemble of stabilised tensions is thus the 'status quo' – whereby sub-systems necessarily differentiate themselves in order to push rules *forward*, i.e. both *maintain* and *challenge* them, as well as '*locally*' install them. Maker labs can thus be explicated in this world through their (place/s within and outside of) architectures of customs, laws, rules and relations of production, which stabilise the organisations to certain extents and enable them to be formed in the first place, however can also destabilise them. Especially in the highly complex world/s of foams, *hybridities* of rules and customs might actually *clash* with each other and can thus lead to the disintegration of the labs or to them not forming at all. As orgnets, maker labs (including their various sub-systems) hence have to continuously *negotiate* their relative unities, i.e. tensegrities, by making sure that the 'authoritative' social syntax 'in the background' is not overdetermining the figures 'at the front' too much, in order for the places to stay inclusive, heterarchical and experimental.

Through the nine-dimensional complexity of the anthroposphere, I will, as explained earlier, not just ‘universally’ theorise maker labs as representational objects, relatively ‘from the outside’, but also explicate the singular spatial dynamics of three of these labs – Vigyan Ashram, the London Hackspace and betahaus Berlin – by *immersing* myself with/in their material-semiotic ‘worlds’. A techno-social ontology of place cannot just be conceived as a (representative) ‘universal’, but always actualises itself through singular material complexities. In this way, I have chosen a phenomenological approach, or rather: a ‘media’-phenomenological approach, close to Sloterdijk’s spherology, in order to show *how*, i.e. in which *form/s*, maker labs function singularly ‘in the world’ – (primarily) as foams, (primarily) *in* the epoch of foams. This method included *not* devising an exactly pre-defined fieldwork *strategy* and theoretical *frame* to be applied *onto* the empirical materials gathered, which would have *overdetermined* ‘the world’ through a simplified *idealisation*, but more *processual approaches* in order to *approximate* the labs and thus to ‘*ek-shibit*’ their singular topologies – *with/in* them and *through* the spherology. This means that I did not *not* have any apprehension at all of how to design my empirical research and to which ‘ends’. Rather, my research was grounded in more *intuitive* ‘fore-grasps’ [Vor-begriffe] ‘*towards where*’ I would design [ent-werfen] it, while *in the process* (of being-in-a-lab as well as writing up) revising these fore-grasps according to (changing) socio-material circumstances, and thus to increasingly concretise, i.e. ‘poeticise’, them. Thus, with the (nine-dimensional complexity of the) spherology ‘in the background’, I let myself be guided by the singular design processes of the labs revealing themselves ‘at the front’, and through this convergence decided which *topoi* to focus on in my explication of the labs.²⁵⁶ In this way, my methodology was an ‘open design’.

²⁵⁶ Not all nine dimensions have been considered for each singular lab since some spheres revealed themselves better in one place than in the others (by transgressing and hybridising in any way).

As mentioned, at the time of writing there was not much (semi-) academic literature on maker labs available and the little that was published was often under-theorised and/or not very comprehensive and did not explore the labs much from an ontological, or topological, point of view (especially not through a 'spherological' framework), thus falling short of grasping the phenomenon through its place/s with/in and against media-anthropo-logical evolution processes. With Rossiter and Lovink, we also do not get to know much about how exactly organised networks do or might look like and how they function as singular materialities 'in the world' since, in their writings, they largely concern themselves with the 'universal'/representational dimensions of these new institutional forms. As they acknowledge themselves, even though patterns and tendencies can be partially universalised, "there will be no 'internationalism' for networks".²⁵⁷

As also explained, in order to develop a 'voluminous' techno-social ontology of place via the materialities of maker labs, Actor-Network Theory is not quite suitable to empirically research and explicate these places due to the 'theory's' relative flatness as well as hyper-relationality, and thus inadequacy to sufficiently explain how or why particular relations come into being in the first *place*, i.e. to explain their (historical) conditions and limitations. Although ANT is very successful at showing how complex systems are in-the-making, it can only do so quite 'universally' and in the short term while not much considering the larger and more continuous 'background/s' these (mainly 'foreground') processes are functioning in, through, with and against, or indeed how 'backgrounds' are also being made, as well as co-exist with other 'backgrounds' (and 'foregrounds'). By 'translating' all actors onto *one* decentralised network of equivalence, singularity, difference and alterity are undermined. In order to explicate the topologies of maker labs, understood as *polycentralised* work-places in the 'foamal' epoch, a media-phenomenological approach close to the

²⁵⁷ See main introduction.

spherology includes *situating* the labs through, with/in and against their *singular* (historical) conditions and limitations – which have been anthropo-technically *made* as well as *co-exist* with *others*.

I have chosen three maker labs to visit as part of this thesis in order to explicate each lab's *singular* topologies – which can only be pointed out *with* and *against other* singularities.²⁵⁸ As explained earlier, Vigyan Ashram (an experimental rural development college including fab lab in Pabal, India, where school dropouts learn to design predominantly agricultural hardware and the 'natural' environment for local needs), the London Hackspace (a community-run hacker space where tinkerers make open designs primarily in their spare time for experience value by sharing tools and knowledge) and betahaus Berlin (a co-working space functioning as a mix of coffee house, home office, R&D lab, university campus, hacker space, carpentry workshop and start-up incubator) were selected in order to achieve 'patial', i.e. geographic-functional, diversity.²⁵⁹ Research was mainly conducted through participant observations in the labs, field notes, via online mailing lists and IRC channels, review of informational material and media coverage of the labs (including about some of their 'background' conditions), semi-structured interviews and informal conversations with current and former lab participants as well as initiators of the MIT fab lab programme. Apart from gaining better insights into the singular world/s of each maker lab, including their operating conditions, the interviews were also conducted to gain further *historical* accounts of the phenomena. The interviewees (18 in total – seven women, 11 men) were thus mainly chosen on the basis of their (sustained) active participation in the labs and hence their ability to provide experienced information. Since these interviewees were however generally the ones who directed/managed the labs (formally

²⁵⁸ Three thereby forms a minimum plurality – due to the time and resource constraints of this PhD project, I have not been able to visit more than three labs.

²⁵⁹ As mentioned above, the labs were furthermore chosen on the basis of activity levels in order to gain sufficient material. Since the aim of this thesis is to start developing a techno-social ontology of (singular) place, any maker lab would have been suitable to visit in principle due to the singular culture/s of each.

or informally), I also tried to gain information from some former participants, less active members or students (in the case of Vigyan Ashram) for more balanced accounts. The more factual information gained through the interviews was double-checked via desk research as much as possible – with regards to the supposed impact or ‘success’ of Vigyan Ashram as an NGO, some information could not be confirmed since this would have meant visiting hundreds of workshops and schools in person.²⁶⁰ Interviews were mainly conducted physically face-to-face – only two were Skype interviews for follow-up questions after my visits and two were done via email due to a small number of more targeted questions. In Vigyan Ashram, my research was a bit constrained by most students not being able to speak English and teaching being done in Marathi, thus I had to rely on translations from staff. I have no Indian roots or other connections to the country and had not undertaken any scholarship on India before my visit, which was my first, so my knowledge of its singular place/s was limited. The sustained informal conversations I had with Amitraj Deshmukh, Vigyan Ashram’s Director of Research, throughout my visit however, helped me to better understand the culture/s the lab was operating in, which I followed up with further desk research.

I will now firstly ek-shibit each of the labs as they ‘revealed’ themselves to me through the research (open) design process, and will conclude by closing the media-phenomenological circle/s by further placing the workshops within the multi-historical *topoi* of the spherology in order to show in which form/s the theory singularly de-constructs itself ‘in the world’:

²⁶⁰ Claims of impact/success of the organisation made by its staff are clearly marked as such. Since the purpose of this PhD project is not to assess how ‘successful’ a maker lab is or how ‘well’ it works, but simply in which *form/s* it functions, these questions are peripheral anyway.

III.I Vigyan Ashram²⁶¹

Vigyan Ashram (VA) is a rural development college and one of the centres of the Indian Institute of Education (IIE) in Pune.²⁶² It is located in Pabal, an agricultural community based in the Shirur *taluka* of Pune district, Maharashtra.²⁶³ Most of its population of around 10,000 however does not live in the core of the market village itself, but spreads across several hamlets. The college was established as an educational laboratory in 1983 by scientist-turned-educationalist Dr. Shrinath S. Kalbag²⁶⁴ in order to 'locally' experiment with solutions to the 'global'

²⁶¹ I visited Vigyan Ashram between 22nd March and 4th April 2012.

²⁶² The IIE was first set up in Bombay in 1948 in order to develop education in independent India. It was founded by educationalist J. P. Naik who held various positions in the Indian government's education division throughout his lifetime. In 1976, the institute moved to Pune and currently comprises seven centres. It believes that "education, if properly planned and organised, can serve as an effective stimulus for evolving an egalitarian social order based on the principle of social justice and freedom and dignity of the individual." From this point of view, it focuses on evolving non-formal modes of education, which intervene with the formal system in order to reconstruct it and make it more responsive to the needs of disadvantaged sections of society. While searching for alternative strategies and models for various levels and types of learning, the IIE aims to explore non-professional teaching resources, non-traditional techniques and materials by trying to emphasise 'learning' more than 'teaching'. The institute sees education as an interdisciplinary and multidisciplinary area and currently focuses on the history of Indian education; comparative education; development education; science and technology education; rural education; non-formal basic- and continuing education; teacher education; policy, planning, finance and management of education; the education of rural women. It is a charitable public trust (www.iiepune.org, 18/02/2014).

²⁶³ Pabal is a '*panchayat*' village, i.e. it is locally self-governed, to some extent, by an elected village council. The *panchayat* village is the cornerstone of the *panchayati raj*, a polycentrised form of government, which has its roots in the self-sufficient villages of ancient India. The system has had its ups and downs over the centuries and especially suffered from the centralisation of British rule. After independence, the system was revitalised, partly due to Gandhi's influence, in order to strengthen the idea of a grassroots nation-building up from the village level and became part of the country's Community Development Programme in 1952. The reconstruction however did not achieve great results – local commitment and motivation were missing and some *panchayats* were taken over by rural elites. Many public inquiries into this model followed and various attempts have been undertaken to make the *panchayati raj* more democratic and participatory. In 1992, the system was given constitutional status, which has encouraged most Indian states/territories to take it on, however structures and legislation differ between them. The most populous states, including Maharashtra, now function via a three-tier local government system with councils at village-, *taluka*- [sub-district] and district level. Some states have a two, some only a single-tier system. Although the *panchayati raj* still has its problems, it is proclaimed a tool for socio-economic transformation in rural India and forms the context for various grassroots development initiatives (Ghosh, R. & Pramanik, A. K. (eds.) *Panchayat System in India – Historical, Constitutional and Financial Analysis* New Delhi: Kanishka, 2007; http://en.wikipedia.org/wiki/Gram_panchayat, 24/02/2014; http://en.wikipedia.org/wiki/Local_self-government_in_India, 24/02/2014; http://en.wikipedia.org/wiki/Panchayati_raj, 24/02/2014).

²⁶⁴ Kalbag was born in the outskirts of Bombay in 1928 into a family that did not have access to basic services – such as water, electricity, sewers etc. As they had to provide everything for themselves, he got to know the importance of hands-on learning, self-reliance and invention from an early age. He later went to university to study for a BSc at the Royal Institute of Science in Bombay, gained an MSc from the University Department of Chemical Technology (now Institute of Chemical Technology) at the University of Bombay and his PhD in Food Technology from the University of Illinois in Chicago. During his two-year stay in the States, he often spent weekends at ranches in rural areas nearby to study the life of farmers who used science and technology not just in agricultural ways, but also in general living. After completion of his PhD, Kalbag returned to India and started working for the Central Food Technological Research Institute in Mysore and then became head of the Engineering Sciences Department of the Hindustan Lever Research Centre in Mumbai where he worked until 1982, the year during which he decided to go into voluntary retirement and set up an ashram-style, non-formal education institute for the rural youth. His educational

problems of Indian education. Over the years, VA has been developing a 'Rural Development Education System' for training the (predominantly) rural youth – most of them school dropouts, failed by the standard education system – in creating and commercialising innovative technologies for 'local' purposes. VA believes in the philosophy of 'learning while doing', understood as the 'natural system of learning' in contrast to the 'teaching-learning process'; that activity to hand is the quickest way to train the intellect; that multiple experiences help to develop a child's personality; that rural development can be integrated into school education ('education through development and development through education'); that science should be demystified and is in fact relevant to all areas of society.²⁶⁵ In 2002, the college set up the first 'fab lab' in collaboration with the Center for Bits and Atoms (CBA)²⁶⁶ at Massachusetts Institute of Technology, which is increasingly becoming an integral part of the college.²⁶⁷

philosophy was strongly influenced by Piaget's constructivism (see above), John Dewey's pragmatism, Edward de Bono's theories around lateral thinking and Gandhi's '*Nai Talim*' (see below). Kalbag died in July 2003.

²⁶⁵ www.vigyanashram.com, 11/04/2012

²⁶⁶ The CBA was launched by a National Science Foundation (NSF) award in 2001 worth \$15m over five years to support the creation of an interdisciplinary facility in order to make and measure structures from atoms to (smart) buildings and has been used by researchers from across MIT (physicists, chemists, biologists, mathematicians, mechanical and electrical engineers) in both individual projects and collaborative programmes. CBA's students come from various academic departments throughout the university, including Media Arts & Sciences, Electrical Engineering & Computer Science, Physics, Mechanical Engineering and Architecture. The main purpose of the centre is to investigate how physics can be a fundamental language for understanding information science, i.e. to grasp the overlap between hardware and software, form and function, body and mind, which have been traditionally separated. One of CBA's major aims has been to create the '*Star Trek replicator*' – i.e. a machine that can create/recycle physical matter. Since this is becoming reality (see 3D printing above), the centre is now increasingly researching 'digital matter'.

²⁶⁷ The 'fab(rication) lab(oratory)' programme was initiated in the MIT Media Lab as a collaboration between the Grassroots Invention Group (GIG)* and the CBA, intending to explore how the content of information relates to physical representation and how individuals and communities can be empowered by technology at grassroots level. The project started as the MIT class 'How to make (almost) anything' (first taught in 1998 and still running) led by physicist Neil Gershenfeld, Director of the CBA, in which students – from backgrounds as diverse as architecture, engineering, industrial design and community work – produce unique devices, such as an alarm clock that needs to be wrestled into turning off, a web browser for parrots (*Interpet Explorer*), a portable personal space for screaming (*ScreamBody*) and a *Defensible Dress*, inspired by the porcupine and blowfish, that lets its wires spring out as soon as someone invades one's individual sphere. As Gershenfeld describes in his book *Fab: The Coming Revolution on Your Desktop – From Personal Computers to Personal Fabrication*, the educational model of the class is just-in-time-peer-to-peer rather than just-in-case-top-down, i.e. students learn new techniques according to what they want to know at a specific point in time and primarily via their *classmates*, rather than what the *teacher* wants them to know, just in case it might be useful at some point. In order to fulfil the requirements of the NSF grant through which the CBA was set up, the centre also had to have some sort of educational outreach component. Instead of simply making a website or just sending computers out into the world and then train people how to use them, the CBA decided to set up some 'fab labs' as an extension of the class. When Gershenfeld started to look for possible sites in India and elsewhere, he came across Vigyan Ashram, which he deemed suitable

Vigyan Ashram has been a public charitable trust since its inception and been supported by various governmental and private organisations over the years, such as the Department of Science and Technology through its Core Support Programme (ca. 25% of VA's annual income), the Council for Advancement of People's Action and Rural Technology,²⁶⁸ the Sir Dorabji Tata Trust,²⁶⁹ Hindustan Unilever,²⁷⁰ Lend-a-Hand India,²⁷¹ the Association for India's Development,²⁷² Asha for Education²⁷³ and the Ministry of Human Resource Development as

due to its educational philosophy as well as inventive capabilities. In turn, Kalbag saw great potential in MIT's 'advanced' technologies and the collaboration with MIT. Thus, Gershenfeld and Kalbag started to experiment with how to install the lab and in which ways to use it. MIT's financial contribution at the time was a donation of equipment worth around \$34,000 and included tools such as a laser cutter, plasma cutter, milling machine and vinyl cutters. Since then, the lab has largely been financed by VA itself, however MIT now still acts as a resource institute and the college gets occasional visits from current and former CBA students. Having experimented with setting up the first fab lab at Vigyan Ashram, the programme has grown exponentially. Further labs immediately followed in Costa Rica, Northern Norway, inner-city Boston and Ghana – as mentioned above, in 2013 there were ca. 150 fab labs worldwide. Although the initial set-up of labs was in the first place instigated by the CBA/GIG, the labs are now largely built in a grassroots way: if someone wants to launch a lab, s/he approaches CBA's 'Fab Foundation' in order to get advice, support and financial help with equipment. The lab then gradually becomes more independent and largely finances itself after a while. By affiliating oneself with the fab lab movement – the name 'fab lab' is deliberately not being trademarked by MIT – one automatically becomes part of the network's support structure which, for example, includes international meetings and boot camps, the 'Fab Academy' (an online school for fab labs led by Gershenfeld, using a multipoint video conferencing system) and the international 'Fab Lab Association' (a largely virtual organisation which aims to connect people involved or interested in fab labs). As the programme is evolving, fab labs are now increasingly being adopted by US schools and community centres as part of a national agenda to stimulate innovation, science/technology/engineering/mathematics (STEM) education and workforce development to ensure the US' global competitiveness (see National Fab Lab Network Act of 2013, accessed on: www.gpo.gov/fdsys/pkg/BILLS-113hr1289ih/pdf/BILLS-113hr1289ih.pdf, 13/05/2014). Most fab lab equipment is currently still shipped around the world from MIT to the local labs, however it is anticipated that within the next few years, fab labs will be able to reproduce themselves completely, i.e. fab lab design files will be 'shipped' over the internet and technologies will then be used to replicate and adjust the designs locally and regionally for a fraction of the cost and in more sustainable ways (Lassiter, S. *Fablabs: Thoughts and Remembrances* in Büching, C. & Walter-Herrmann, J. (eds.) *FabLab – Of Machines, Makers and Inventors* Bielefeld: Transcript, 2013: 253).

* GIG operated from 2000 to 2004 and came out of the Epistemology and Learning Research Group founded by Seymour Papert who developed constructionism as an educational theory out of his early work with Piaget (see above).

²⁶⁸ CAPART was formed in 1986 as a convergence of the Council for Advancement of Rural Technology and People's Action for Development India in order to formally recognise, catalyse and co-ordinate partnerships between voluntary organisations and the Indian government for sustainable development of rural areas. It is a registered society as part of the Ministry of Rural Development (www.capart.nic.in/orgn, 21/03/2014).

²⁶⁹ The Sir Dorabji Tata Trust is a philanthropic initiative and financed by capital generated through the 100+ companies of the global TATA empire with headquarters in Mumbai.

²⁷⁰ Hindustan Unilever Ltd. is the Indian division of global consumer goods company Unilever.

²⁷¹ Lend-a-Hand India (LAHI) is a non-profit organisation based in New York City, with further offices in the US, India and London. LAHI collaborates with grassroots initiatives in India in order to develop projects around vocational education, rural youth employment and 'self-help'. It aims to assist organisations to replicate their programmes and to encourage them to diversify and grow beyond themselves by sharing expertise and providing financial assistance (www.lend-a-hand-india.org, 10/03/2014).

²⁷² AID is a US-based volunteer organisation, with further offices in Australia and India, which promotes sustainable, holistic and equitable development in India. It supports grassroots organisations and initiates efforts in a number of interconnected areas, such as agriculture, energy, education, health, natural resources, women's empowerment and social justice (www.aidindia.org, 24/03/2014).

²⁷³ Asha is a non-profit organisation with the belief that basic education is a critical requisite and catalyst for socio-economic change in India. It was set up by three students of Indian origin at the University of

well as individuals. It also finances itself to some extent through tuition fees, community projects and contracting. VA has been directed by Dr. Yogesh R. Kulkarni²⁷⁴ since 2003 and includes ca. 25 core staff²⁷⁵ and is furthermore managed by trustees of the IIE.

The college was set up in Pabal due to its remote location, poor farming population, dry climate and water shortages, daily power cuts, scarce means of communication, increasing problems with waste and sewage and other socio-economic contexts, such as the sustainment of the caste system and gender bias for example – which makes Pabal a condensed version of a typical Indian village, where the vast majority of the population lives.²⁷⁶ The college spreads across Pabal hill²⁷⁷ and thus slightly sets itself apart from the rest of the village. At the time of my visit, the place incorporated around 20 different buildings – workshops, dormitories, guest houses, classrooms, stables, polyhouses, science labs, storage rooms, toilets and a kitchen/dining room – as well as a pond, a number of trees, gardens and small fields, which have largely been constructed through the collective efforts of the students and staff. The dwelling places of this commune thus look a bit raw and crude and most of them are small and off-the-grid.²⁷⁸

California, Berkeley, in 1991. With headquarters in New York City, Asha comprises chapters in the US, Canada, India and Europe and acts as a network for grassroots workers, volunteers and NGOs (www.ashanet.org, 24/03/2014).

²⁷⁴ Kulkarni holds a Bachelor in Mechanical Engineering, a Post-Graduate Diploma in Business Administration, an MA in Distance Education and a PhD in Educational Communication. He has been involved in various educational initiatives, such as the literacy movement, including educating slum children and nomadic tribes, as well as promoting the use of technology in education.

²⁷⁵ Farmers, engineers and other manual workers, who often run or work in a business while teaching. Some are in the process of setting up their own company; some are former VA students.

²⁷⁶ According to provisional results of the 2011 census, there are over 640,000 rural units in India, which accommodate almost 69% of the total population (http://censusindia.gov.in/2011-prov-results/paper2/data_files/india/Executive%20summary%20final.pdf, 18/02/2014).

²⁷⁷ The land has been given on free lease by the government of Maharashtra.

²⁷⁸ The only large building on the site is the 'finishing school', which opened in November 2011 and was set up with money won through a competition run by UK-based global engineering group GKN. It was however actually built up by VA's students and staff themselves and now includes a number of different fabrication workshops, such as the fab lab. The building was set up much to the disappointment of some staff who wanted to keep VA as independent and decentralised as possible. However many acknowledged the benefits of the building's better security (equipment used to go missing regularly) and air circulation, for example.



Fig. 1: Geodesic domes with vegetable garden accommodating female students



Fig. 2: Guest houses

Socio-Economic Trans-Formations

Vigyan Ashram believes that India's education system is the root cause for many of the country's problems – including poverty, corruption, the rural/urban divide and environmental pollution. Although there are many different positions and approaches within the college towards this issue, one can broadly summarise the following problematics: a) Since independence, India has made considerable progress in the science and technology (S&T) sector and development of industry, however the industrialised world has been moving faster and more efficiently, therefore widening the gap between rich and poor. The rural/urban divide within India itself contributes to this. b) Due to the current, what VA calls, 'artificial' method widely practiced in Indian education – including passive learning, memorising single 'correct' answers, gaining knowledge from books and verbal communication only, learning removed from first-hand experience and *relevant* problems of the individual and the local community – a lot of students feel demotivated, dispirited and lack self-confidence. As Kulkarni explained in a TEDx talk,

50% of students [...] in India drop out before 10th class. They drop out not because they're not interested in education, but they drop out because

they're frustrated with this rote-learning method. They do not find value in what they're reading in the school.²⁷⁹

These young people either become unemployed or, if they do get work, are lowly paid. c) Education is not distributed equally across India while the vast majority of the population is working in the agricultural sector or performing other types of manual labour, often in very repetitive ways, thus a lot of people do not have the intellectual skills to actually assimilate the knowledge which could be gained from these labour processes that are in any way looked down upon as inferior to intellectual labour (the latter partly due to British rule) – resulting in a loss of dignity, self-confidence and motivation. d) People who do get a school and college education have to face up to increasing contents of syllabi and performance pressures – the government, many schools and educationalists not having understood that a mere quantitative difference of information does not increase intellectual skills, but, on the contrary, makes it even more difficult for a lot of students to take in any kind of knowledge, which thus puts young people off education. e) A lot of students growing up in villages are told from an early age that agriculture is a 'non-profitable', 'lowly' occupation and 'drudgery' – the only way to make money and to escape the 'fate' of one's parents is to migrate to the city, which many young people end up doing out of sheer helplessness. This in turn further increases the rural/urban divide and leads to rural unemployment.

In order to 'locally' transform the country 'globally', VA has been developing a Rural Development Education System (RDES) in collaboration with the Pabal community,²⁸⁰ which aims to work on the basis of 'head and hand' co-ordination – i.e. the ability to think and act together – in order to industrialise agriculture and the traditional crafts

²⁷⁹ As part of *TEDxWiserU* Beijing, China, 28/08/2010, accessed on: www.tudou.com/programs/view/D9euSitPjcY/, 07/05/2012.

²⁸⁰ In 1983, Kalbag tried to ensure that the curriculum was relevant to the community through conversations with villagers, observations of them working as well as of their environments. Over the years, the college has been trying to maintain this dialogue with the community.

as a way to achieve socio-economic change.²⁸¹ As Kalbag wrote in one of his early manifestos: If the majority of our population lives by the hand alone,

then it is better for us to reach the head through the hand. [...] It is also my belief that working with hand stimulates thinking. That concrete aids the abstract is the basis of this belief.²⁸²

The co-ordination of 'head and hand' is reflected in the meaning of 'Vigyan Ashram': 'Vigyan' is an old Sanskrit word referring to the natural sciences in the widest sense. An 'ashram' is a residential school ('spontaneous community')²⁸³ in which not only strictly educational subjects are part of the curriculum, but also physical and spiritual exercises. Ashram life has been traditionally characterised by simplicity and asceticism, discipline and devotion, experimentation, personality development and common goods. In the ancient ashrams – also referred to as '*gurukuls*' ('*guru-*' meaning 'teacher', 'master', 'heavy' or 'the weighty one'; '*-kul*' coming from '*kula*' meaning 'extended family' or 'house') – students lived in proximity to a guru, residing together irrespective of their socio-economic standing, learned from the guru (various sciences and religious philosophy) and helped the guru in day-to-day life.²⁸⁴ Although students had to learn a vocational skill and

²⁸¹ Although agriculture only accounts for 14.1% of India's GDP, with percentages falling, the sector still provides employment to 58.2% of the country's workforce and thus can be considered essential to its development (Government of India *Economic Survey 2012-13*, accessed on: <http://indiabudget.nic.in/survey.asp>, 24/02/2014).

²⁸² www.vigyanashram.com, 11/04/2012

²⁸³ Ralston, H. *Christian Ashrams – A New Religious Movement in Contemporary India* Lampeter, Wales, Lewiston, NY & Queenston, ON: Edwin Mellen, 1987: 3

²⁸⁴ Even though based on an egalitarian ethos in many ways, VA also manifests hierarchical tendencies similar to a *gurukul* by, for example, conferring some sort of guru status to Shrinath Kalbag and his wife Mira, who is still alive and responsible for the spiritual formation of the students, and is thus seen as the 'spiritual head' of the college. The fact that VA is an educational institution for rural teenagers also constrains heterarchical relations to a large extent. Its educational philosophy also sometimes comes across as quite dualistic, with a strong bias on the 'natural' system of learning (i.e. constructing knowledge manually) versus the 'artificial' system (i.e. constructing knowledge intellectually). The college furthermore upholds a fairly strong gender division/bias, despite subscribing itself to promoting gender equality. Although I felt boys and girls were working together more or less as equals on group projects, gender division/bias was apparent for instance through split seating arrangements for boys and girls during theory classes, meditation and eating, a very low number of female students (on average only one fourth or fifth per year) and female instructors (only one or two out of over 20), the fact that only girls are prohibited from being outside after 2am as well as gender discrimination by some male staff and students (Pooja, Bali, Sumitra, Vandna *Interview* 02/04/2012, 16.45-17.15, Pabal). As Amitraj Deshmukh, Director of Research at VA, told me in various conversations, it is still very difficult to change the deeply ingrained gender bias in India, hence VA has to slowly introduce new behaviours (24/03-03/04/2012, Pune/Pabal).

specialise according to their 'varna' [caste], education was nevertheless wide and not narrowly defined according to the utilitarian ideal – 'culture' was more important than 'literacy'. The Sanskrit term 'āśrama' is derived from the root 'śram', meaning 'stage of intense exertion in the duties of life'; it also refers to a hermitage or dwelling place where austerities are performed. The college can hence be described as a dwelling place for the contemplation and practice of the sciences.

Vigyan Ashram's formational [*Bildungs-*] philosophy is furthermore inspired by Gandhi's concept of '*Nai Talim*': the idea that knowledge and work are not separate. The principle promotes the interaction between body, mind and 'soul' as well as 'basic education for all' through which Gandhi spearheaded the 'silent social revolution' towards a united, independent India. He developed the concept as a revolt against the British education system and colonialism in general, which he saw as alienating Indians through career-based and competitive thinking, the disdain for manual work, the commodification of education, the new development of an elite class and increasing problems with industrialisation and urbanisation generally. *Nai Talim* was thus a response to one of the main problems of modernity, as Gandhi saw it: the dialectic between the human and technology. To him, technology/machines represented the industrialised 'West', which is why he placed central emphasis on the role of handicrafts in his pedagogy, symbolising self-sufficiency, independence as well as solidarity with the lower castes. In contrast to the 'Western' model, Gandhi's alternative social order was based on the *panchayat* system, i.e. on small, self-reliant, nevertheless co-operative communities supposed to foster devoted and generous singular citizens. *Nai Talim* also envisaged a different role for the teacher, who was not simply seen as a professional constrained by abstract and 'mechanical' knowledge, but rather as a person directly and 'naturally' relating to the student through dialogue and mutual learning. Although Gandhi's

educational model became increasingly prominent throughout India, especially after independence, due to improper implementation – and maybe because of its antipathy towards technology – it was not able to drastically change the education system as ‘a whole’ and therefore ended up churning out not much more than a few initiatives. Explains Kulkarni,

[... In Gandhi's] philosophy, ‘work’ was only considered in a traditional sense. In Vigyan Ashram, Dr. Kalbag introduced science and technology. Gandhi never visualised that much about science and technology and couldn't realise that this kind of technological development would happen which will change the community and will be affordable. He was just looking at the signposts of 19th century industrialisation.²⁸⁵

Within these contexts, Vigyan Ashram has been developing a formational methodology grounded in the following main principles:

Multi-skill training: VA believes that a multi-disciplinary approach broadens the experience of the growing child. Through a variety of concrete activities, the child forms sets of abstract rules from which s/he can later choose the most suitable method for solving a particular problem. This new experience in turn will influence the abstract model. According to Kalbag, this is the ‘rational thinking process’, which is ‘natural’ to all human beings. Especially in an age of rapidly changing technology, a multiple skill set is useful in order to be able to adapt to different situations, he thinks.

The intention is not mainly to teach crafts but primarily to develop physical, manipulative and mental faculties. The selected crafts will serve as carriers for these skills. A skilled carpenter with a steady hand, an ability to visualize, a good judgement, could easily be trained as a welder or a plumber or a mason. Given the intellectual capacity, he would be perhaps a better experimental scientist than if he had not developed his craft skills.²⁸⁶

Through a multi-disciplinary approach, a student can furthermore gain the ability to assess one's own potential, find out about one's likes and

²⁸⁵ Interview 31/03/2012, 14.45-15.30, Pune

²⁸⁶ Kalbag, S. S. *Science Education – General Philosophy*, accessed on: www.vigyanashram.com, 11/04/2012

dislikes and thus develop a singular personality. As work is generally done through projects at VA, the method can also enable students to cultivate a particular skill over time, which creates a sense of pride and confidence, and thus can get the student to make sustainable plans for the future.

Learning-by-doing: This method enables the child to learn intimately through all five senses by trial and error, which is thought to deepen the learning experience and ensure that knowledge gets properly assimilated – in the sense of,

No body can explain what is sweet if you had never tasted any sweet. Words and lectures, which are other peoples experience given to you, can only amplify your own experience. It multiplies your experience. But if your experience is zero, multiplication gives again only zero. Your doing alone gives experience [...].²⁸⁷

VA believes that this also fosters a person's capability to act, take initiative and thus increases self-confidence, which facilitates invention and entrepreneurship. Learning at VA hence starts with a topical activity, a work problem or question, which then takes the students to more universal concepts and principles. This usually happens in small groups that gather around the site that requires problem-solving. Even in the more theoretical classes, teachers use a lot of examples, narrative and graphic description in order to connect abstract theories to concrete problems and not 'just' teach the theory on its own, supposed to supplement the students' practical work. Problem-solving, including the ability to ask questions and see these as potentials, is thus at the centre of VA's vocational methodology, says Kulkarni.

[...] When India became independent [...], the government said, 'Ok, our first priority is to remove poverty and to supply drinking water and electricity to all villages.' So, after 60 years of independence, why is the Prime Minister still talking about the same thing? So who should ask these questions? The people should ask the questions! If the people should ask the questions, then we need to train them how to ask the questions. We're just asking them to think about this table – what is the length, which materials are you using, why this and not

²⁸⁷ Vigyan Ashram NIOS Brochure 2012: 12

another? We're asking them through simple examples. We're encouraging them to ask questions and find a solution for their own problems. But we're also expecting them to ask these questions to policy makers and so on. Why are these things not happening? Where are we going wrong?²⁸⁸

Introducing modern science and technology: VA thinks that modern S&T often carries an aura which can be a bit frightening to Indians, especially to those coming from poor socio-economic backgrounds – because it is seen as 'elitist', 'difficult' and 'irrelevant'. The college thus wants to demystify and slowly introduce their students to S&T in order to make them literate in this field and connect the 'local' environment with the 'global' information network. Students are supposed to learn where and how best to get information from as well as how best to create and transmit it – information/knowledge seen in terms of (technical) 'skill'. At VA, they gain the knowledge not just to use, but also to *make* technical systems, i.e. (mainly) hardware relevant to agricultural needs as well as the 'natural' environment. The college thereby works in line with the scientific method: observation, measurement, making experiments, organisation and classification as well as the formulation, testing and modification of hypotheses. All of these skills are seen as expressions of creativity.

Community services: VA believes that, for the student, working with the community establishes relevance, increases motivation and confidence as well as makes the student value the local environment. It also makes him or her interact with people and understand their problems and needs. It furthermore enables the student to 'earn while s/he learns' and get work experience as well as encourages them to become an entrepreneur oneself later on. It can furthermore reduce environmental impact as well as costs to the college, as materials and

²⁸⁸ Interview 31/03/2012, 14.45-15.30, Pune. Having participated in some classes and reviewing various information and teaching material, I could not exactly determine how students are being led to make direct connections between the active making and questioning of small products and the active making and questioning of large socio-political structures, although these are of course linked. Even though VA's curriculum includes some more theoretical classes, such as the history of construction for example, it does not include any political or social studies. I think it is hence quite a big leap for students to connect these micro and macro systems sufficiently, which could be achieved by integrating some more explicitly socio-political elements into the curriculum of predominantly manual fabrication techniques.

equipment can be sourced directly on-site or from the local neighbourhood.²⁸⁹ The community benefits in that it can get low-cost services from a place that is close by and knows its specific requirements.²⁹⁰ As it has a certain stake in the college, the community, to an extent, is part of the formational [*Bildungs*-] ecosystem of the school, which can result in the development of the 'entire' place.²⁹¹ Since a lot of VA's students initially came from Pabal itself or surrounding villages and mostly ended up establishing workshops locally after graduation,²⁹² the community can in this sense not just be seen as a beneficiary, but as actively participating in the design of its own place, including the knowledge, i.e. skills, generated. Socio-economic transaction between college and community also enables direct and sustainable quality control and can create job opportunities. Says Kulkarni, for VA the medium of education is socially useful productive work.²⁹³ The college can hence be considered semi-commercial.

Through these formational conceptions, Vigyan Ashram has been designing educational programmes in both non-formal and formal modes – the Diploma in Basic Rural Technology (DBRT, non-formal) and Introduction to Basic Technology (IBT, formal) – with the aim to 'locally' change India's 'global' architecture from *within*. As an educational R&D lab, the college can be fairly autonomous, flexible and topically experiment with different methodologies, which can then be (singularly) replicated at different scales and locations. The college does not want every school to become a Vigyan Ashram, but trans-form the country through working *with* the formal system (i.e. the government and policy-

²⁸⁹ Often however, buying finished products on the 'global' market is cheaper, of course. This is for example the case with solar panels, which are far too expensive to build on-site from locally- or regionally-sourced materials in India. VA thus gets the panels, which are furthermore subsidised by the government, from a national manufacturer (Deshmukh, A. *Informal conversations* 24/03-03/04/2012, Pune/Pabal).

²⁹⁰ The services might be low-cost, however since they are performed by students, they might also be of a lower quality.

²⁹¹ In his own evaluation from 1994, Kalbag stated that, "[The RDES] has influenced the community in general in thinking about new ways of doing things and to that extent reduced superstition" (Kalbag, S. S. *Rural Development Through Education* as part of Open University System and Development conference, Nashik, India, 16/02-19/02/1994, accessed on: www.vigyanashram.com, 11/04/2012).

²⁹² According to Kulkarni, Y. *Interview* 31/03/2012, 14.45-15.30, Pune.

²⁹³ As part of *TEDxWiserU* Beijing, China, 28/08/2010, accessed on: www.tudou.com/programs/view/D9euSitPjcY/, 07/05/2012.

makers), which in turn has the potential capacities to reach out to the more local communities – under the term ‘work-centred education’.²⁹⁴

The DBRT is a one-year residential programme, which is recognised as a vocational course by the National Institute of Open Schooling.²⁹⁵ Its curriculum trains students interdisciplinarily in the four areas of ‘Nature’ – ‘Engineering’, ‘Energy & Environment’, ‘Agriculture & Animal Husbandry’ and ‘Home & Health’ – ²⁹⁶ in which students (regardless of gender) spend three months each by working on various projects at the same time. In the Engineering section, students learn a number of fabrication, construction and carpentry skills, such as the ferrocement sheet technique, welding, soldering, drilling and sawing; they get to know about the properties of different materials, measurements and units, IT, scalars and vectors as well as the history of construction, for example. In Energy & Environment, students learn about electrical circuits, surveying and how to handle energy

²⁹⁴ For more information, see the position paper published by the National Focus Group on Work and Education (as part of the National Council of Educational Research and Training, NCERT) in January 2007, which Kulkarni was a member of: www.ncert.nic.in/new_ncert/ncert/rightside/links/pdf/focus_group/work_education.pdf, 01/04/2014.

²⁹⁵ The National Institute of Open Schooling (NIOS), formerly known as the National Open School (NOS), is an examination board for vocational-, ‘life enrichment-’ and community-oriented courses primarily at secondary and senior-secondary level in the field of open- and distance-learning. It was established by the Ministry of Human Resource Development in 1989 as a response to the National Policy on Education (1986), which suggested to strengthen the open school system by extending open-learning facilities at secondary level across the country as an alternative to the formal system. The NIOS aims to provide relevant and holistic education up to pre-degree level, contribute to the universalisation of school education in India as well as cater to the educational needs of prioritised target groups for equity and social justice. The institute operates through a network of its various departments and units, a number of regional offices, its local study centres in India (e.g. Vigyan Ashram) as well as its centres abroad for Indian expatriates – in Nepal, the Middle East, Canada and the US – and international collaborations with the Commonwealth of Learning, an intergovernmental organisation encouraging the development of open learning and distance education, as well as UNESCO. The NIOS has a current enrolment of about 2.59 million students, which makes it the largest open-schooling system in the world (www.nios.ac.in, 03/03/2014).

²⁹⁶ At the time of my visit, the fab lab was some sort of fifth section and used across VA for various projects. However, since the college has been (technologically) evolving and increasingly acknowledging its status as a large ‘fab lab’ itself, it has been trying to incorporate the place more into its structure as a whole. The set-up of the lab has not been without problems: Initially, the software operating the machinery was not fully developed and updates had to be downloaded frequently. Since the data transfer rate at VA is limited however, getting the technologies to work smoothly proved to be an issue. The software has however become better and more user-friendly over the years. In addition, a lot of the machinery was initially not working properly – even got damaged and had to be replaced – due to voltage fluctuations. In India, 230V AC supply is used, however most of the (US) equipment runs only on 110V. In order to get around these problems, VA has used, for example, different switchboards and colour codes to moderate the issues as well as replaced some of the tools with Indian equivalents. Another problem is that the fab lab equipment is mainly suitable for ‘high’-tech products, whereas VA largely needs ‘basic’ agricultural tools and machines, while staff are often not experienced and comfortable enough to work with ‘advanced’ technological equipment. Yet another issue is English – the ‘computer and software language’. As mentioned above, most students at VA cannot speak English, thus a polyglot fab lab teacher is required who can introduce students to the equipment as well as maintain it – such a person is very hard to find (Kulkarni, Y. *Small Ideas, Big Opportunities – FabLab at Vigyan Ashram Pabal, India* in Büching, C. & Walter-Herrmann, J. (eds.) *FabLab – Of Machines, Makers and Inventors* Bielefeld: Transcript, 2013: 236).

equipment, how to measure current consumption and connecting different appliances, the workings of internal combustion engines as well as mapping and costing, for instance. In Agriculture & Animal Husbandry, students acquire skills such as how to prepare the land, process and sow seeds and pesticides, measure the body temperature of animals, maintain records and analyse these (generally not part of Indian work culture), give vaccinations, milking, marketing and accounting; they learn about evolution, genes and heredity, water supplies, animal food and diseases. In Home & Health, they gain skills in stitching, knitting, cooking and food preservation, for example, as well as learn how to test blood, water and soil; they get to know about sanitation, human vaccines, dietary and nutrition as well as water pollution. Apart from going through these four sections, students furthermore gain presentation skills, do physical exercise every morning as well as meditation²⁹⁷ and also have a story-telling session every Sunday, which discusses an important scientist or inventor, entrepreneur or other business-related issue. They are also encouraged to do an internship (usually paid, but not much) either during or after the programme, preferably in VA's or the student's local community or in alumni's businesses. In order to pass the course, students have to earn at least Rs. 1,000 via work contracts throughout the year by making products, either alone or in small groups, for a member of staff, the local community or a student's family member – as part of an assignment or on the market. Capital thus, to quite an extent, circulates internally within the college and the regional sphere, which hence creates a local economy.

²⁹⁷ Meditation sessions are held every evening after dinner and are inspired by *vipassanā* – one of India's most ancient techniques in the field. In the Buddhist tradition, '*vipassanā*' means 'insight into the true nature of reality' and promotes self-transformation through self-exploration by eradicating mental 'impurities' (often accompanied by physical ones). Some of its characteristics are: the transitoriness of Nature, the belief that true learning comes only from experience, through practice and effort, the deep interconnection of body and 'soul' as well as essential equality (Kalbag, M. *Informal conversation* 18/03/2012, 14.30-15.00, Pabal); <http://en.wikipedia.org/wiki/Vipassan%C4%81>, 09/06/2012; www.dhamma.org, 09/06/2012). The meditation sessions furthermore include a story-telling element by which a 'word of the day' is chosen in order to initiate a discussion among the students and staff who collectively share their experiences with it.

Fees for the DBRT are at Rs. 18,000 per year (roughly £230), which includes tuition, accommodation as well as food and is quite low-cost, even for Indian standards.²⁹⁸ Students taking the DBRT are educated to at least 8th grade and, at the time of my visit, primarily came from rural areas within Maharashtra, but also elsewhere in India, and usually go back to their villages in order to start their own business in one or more of the above areas and sometimes end up working in a family member's or alumni's workshop. Ca. 40 students take the DBRT each year – in 2011/12, it was 44 students (37 boys and seven girls).²⁹⁹ It is estimated that since VA's inception, around 80% of the students have started their own enterprises³⁰⁰ and some even become DBRT or IBT teachers themselves at VA or another school.³⁰¹ Some former-students-turned-teachers even use the college as an incubator to start their own business while teaching and then hand over their position to the next former student ('Trainee Entrepreneur Scheme'). A lot of VA's students grew up in very poor conditions and are often encouraged by local NGOs to study at the college, such as most of the girls in the year 2011/12 from Bhopal, already having worked with these organisations since they were born. A very small number of students comes from urban areas – either because they want to adopt a different lifestyle, because of financial reasons or, due to failure in the standard education system, are encouraged by relatives, friends or NGOs to try an alternative formational model. Depending on each student's situation, fees are usually paid by an NGO or similar organisations (in full or in part), sometimes by relatives or through loans.³⁰² A small number of

²⁹⁸ Figures relate to the academic year 2011/12.

²⁹⁹ *Vigyan Ashram Status Report*, Volume 30, Issue 6, June 2012, accessed on: www.vigyanashram.com/uploadedfiles/Reports/8.pdf, 23/03/2012.

³⁰⁰ According to Deshmukh, A. *Informal conversations* 24/03-03/04/2012, Pune/Pabal.

³⁰¹ Which, in that way, contributes to the 'self'-organisation of the college. The problem however with this model is that due to the short qualification time and non-existent teacher training, the student-quickly-turned-teacher might not be qualified and experienced enough yet – something a former student pointed out to me in a conversation. He said he realised this while studying/teaching at VA himself as well as later on when current VA students did work experience in his agricultural tools business (Gaikwad, S. B. *Interview* 02/04/2012, 17.45-18.15, Chakan).

³⁰² Sometimes, students pay back their tuition fees to relatives by working in their businesses during or after the programme.

loan scholarships is available from VA itself, not given out on merit, but financial need.³⁰³ In very rare cases, some of the college's staff help out students to pay their fees, such as one of the kitchen ladies who noticed a student's potential during a conversation with him.³⁰⁴

The IBT course is formally recognised by the education board of Maharashtra and is a collaboration between Vigyan Ashram and a number of secondary schools across the state and elsewhere in the country. The programme is offered to students of 8th, 9th and 10th grade who take the course on one day per week alongside other subjects at each of their particular schools, thus completing the DBRT curriculum in three years. In order to implement the programme, each school has to raise at least 20% of the total budget from local resources, therefore promoting local participation and entrenching a sense of community ownership. The school together with VA then select suitable IBT teachers who are resident in the local area, have a close relationship with the community, are working in a business and will continue to do so alongside teaching, and want to eventually set up their own enterprise in the area. They have generally not been educated via the formal education system, but will be tested for their skills. They should not be looking for a lifelong career in education, but be using their experience of IBT teaching to eventually resign and set up their own business, thus handing over their place to the next person. In this way, the IBT programme functions as an ecosystem meant to ensure steady evolution and integration of the formal- and informal educational spheres. There will usually be four IBT instructors at each school who, between them, teach the four areas of the DBRT curriculum. As with the DBRT, community services are an essential part of the IBT programme and the school is furthermore encouraged to build its own facilities. In

³⁰³ When VA was initially set up, it used to work on a scholarship-only basis. However, staff quickly realised that a lot of students just signed up in order to get the scholarship (and hence accommodation, food etc.), not in order to learn, so the model was abandoned. As Deshmukh thinks, a scholarship-only system would be financially non-sustainable for the college in the long run anyway (Informal conversations 24/03-03/04/2012, Pune/Pabal).

³⁰⁴ According to Deshmukh, A. Informal conversations 24/03-03/04/2012, Pune/Pabal.

this process, VA acts as a resource institute giving training, advice and supervision to IBT teachers and the school management teams who in turn pass on their knowledge to the students. Upon completion of the DBRT programme, the students are assisted in getting employment in a local workshop, in starting their own small businesses, in pursuing further training in a particular trade or even become IBT teachers themselves.³⁰⁵ Since the school year 2005/6, VA has been co-operating with Lend-a-Hand India³⁰⁶ on the 'Plan 100 – A Silent Revolution' project, implementing the IBT programme across 100 schools across India in order to reach ca. 20,000 students. The project's ultimate aim is to develop an ecosystem of parents, schools, the community, policy-makers and the government in order to make the programme 'self'-sustainable. Although Plan 100's aim of getting 100 schools involved since 2005/6 was not achieved yet at the time of my visit, VA had been co-operating with an overall 122 schools across three states in India, involving over 8,000 students every year, since the IBT programme was launched in 1987.³⁰⁷ Many of the partner schools have (supposedly) become 'self'-reliant since and now sustain their own educational ecosystems.

Open Design Ecologies

Vigyan Ashram's formational model is the context for the production of its 'open designs'. Over the years, the college has acquired, built and transformed a number of fabrication tools and machines through which it collaboratively makes its artefacts. At the time of my visit, the college included for example screwdrivers, hammers, spanners, chisels and axes; thermometers, a haemoglobinometer, oscilloscopes and measuring cylinders; bench grinders, drills, welding- and soldering equipment; knitting- and sewing needles; desktop computers with

³⁰⁵ As mentioned above, this can entail certain problems.

³⁰⁶ See above.

³⁰⁷ According to Kulkarni, Y. *Skype interview*, 19/11/2012, 11.00-12.00, London-Pune.

open-source CAD/CAM software and MS Office,³⁰⁸ a laser cutter, milling machines, vinyl cutters and a digital camera. At the time of my visit, VA was also planning to buy a 3D printer and a 3D woodcutter, possibly with financial help from the CBA. Working materials in the college comprised, for instance, iron, steel (mesh), wood and cement; screws and hinges; wool, yarn and threads; recycled engines; VA's own animal products (including eggs, milk and fertilisers); various foods, seeds, crops and plants grown on-site and the surrounding land.

With these 'platial' production tools and materials, VA's students and staff make their open designs based around the core ideas of (environmental) sustainability, local relevance/global applicability, invention through experimental hands-on learning, social self-organisation and entrepreneurship via an integrated approach. These material-semiotic designs can be drawings, construction plans, data sets, prototypes and of course more 'finished' products, which are part of the knowledge infrastructures of their stakeholders. In their various forms, the designs, including their conception, production and consumption processes, are shared internally amongst students and staff (as well as VA's visitors, including myself at the time) and more externally with the local community, the staff and students of the secondary schools as part of the IBT programme, more virtually through VA's website and blog as well as the college's wider ecosystem, including the fab lab network through MIT and the Indian central- and state governments, for instance.³⁰⁹ Some past and current projects at the time of my visit included:

a) A solar cooker that, ideally positioned, heats up to between 250°C and 300°C. This is used by the kitchen ladies on a daily basis for cooking rice served during VA's collective lunches and dinners. Apart

³⁰⁸ Working with FLOSS is not one of VA's main priorities since the (re-)creation of software is not (yet) part of the educational curriculum of this rural development college. Software is nevertheless increasingly becoming an important tool through which the college makes and shares its hardware as well as designs the 'natural' environment.

³⁰⁹ Although VA does make some of its design files and documents available online, a lot more work could be done in this area, which Kulkarni is aware of (*Small Ideas, Big Opportunities – FabLab at Vigyan Ashram Pabal, India* in Büching, C. & Walter-Herrmann, J. (eds.) *FabLab – Of Machines, Makers and Inventors* Bielefeld: Transcript, 2013: 237).

from being environmentally friendly, solar cookers prevent death from indoor air pollution, which is one of India's major causes of death.



Fig. 3: Kitchen lady using solar cooker

b) Various types of fruit and flower dryers. The fruit can be dried and then eaten as such or further prepared, preserved, packaged and sold (for instance at the weekly food market down in the village or to VA's visitors). Dried flowers can be transformed into organic colours, currently used mainly by VA's students themselves for drawings and paintings, but there are plans to work on the quality of the colours and hence to commercialise them. c) A biogas container that produces gas out of (VA's own) cow/poultry/goat dung. The gas is in turn used for cooking. The remaining dung goes into a vermicompost that is furthermore organically fertilised by washing-up water from the kitchen that everyone carefully puts into a bucket when cleaning their dishes after finishing their meals. The compost is then used as an organic fertiliser itself – by VA for its own purposes as well as sold to villagers. Some of the composting worms are also sold to the local community or other visitors who can then start to compost themselves. d) VA's own dwellings. The

college is particularly known for its geodesic domes,³¹⁰ which it also sells commercially in kit-form via contractors. The domes are made firstly out of a bamboo- or, preferably, steel mesh structure divided into triangular shapes, then covered by a net and finally concrete. They are easily built in two to three days, last around 20 to 25 years and, due to their tensegrity structure, are low-cost and storm- as well as earthquake-proof, which is why they are often sent to endangered areas within the country. In 1992 for example, 117 of these domes were constructed in the village of Gubal, Maharashtra, after a major earthquake had



Fig. 4: Geodesic dome structures on Pabal hill

destroyed many people's homes (which are normally made of stone and mud and work through the principle of continuous compression,³¹¹ i.e. if some stones fall out, the roof will collapse). In 2001, some of the domes were sent to a college in earthquake-hit Gujarat where they initially housed survivors and are now used as class- and meeting rooms

³¹⁰ The domes were for the first time named 'geodesic' by R. Buckminster Fuller during field experiments with sculptor Kenneth Snelson at Black Mountain College in 1948/9 where the two developed the tensegrity principle (see 'Foams' above). Although Fuller was not the original inventor, he established the mathematics of the dome and thus popularised the idea for which he received a US patent in 1954. The domes appealed to Fuller due to their low weight and the fact that the sphere encloses the greatest volume and strength for the least amount of building material. Apart from their more practical use value, the design also appeals to VA more symbolically since the geodesic structure occurs in 'Nature' very often, in various organic as well as inorganic beings, hence embodying the college's philosophy. (Ingber, D. E. *The Architecture of Life* in *Scientific American*, January 1998 issue, accessed on: http://time.arts.ucla.edu/Talks/Barcelona/Arch_Life.htm, 11/03/2014; http://en.wikipedia.org/wiki/Geodesic_dome, 09/06/2012).

³¹¹ See 'Foams' above.

for students. VA also regularly runs geodesic dome training programmes around the country. Apart from the domes, other dwellings at VA, as mentioned earlier, are also usually self-built by students and staff. At the time of my visit, students were working on a nursery, a new toilet building as well as new staff quarters. e) A solar egg incubator, i.e. a



Fig. 5: Toilet-building process

Scheffler reflector including solar panel, which stores the energy of the sun in a battery that in turn powers an egg incubator as well as enables the reflector to adjust itself to the sunlight. Due to the small size of the incubator, the success rate is at about 98%, in contrast to the 78% standard across the market.³¹² The eggs are used for cooking, sold to VA's visitors or on the village market. f) The 'Mechbull': Due to the large amount of small farms across India, normal-sized tractors are too big and too expensive for most farmers. Hence in 1996/7, a research project was initiated by two students that ran over 10 years during which different versions of small low-cost tractors were made out of recycled materials – such as a jeep engine and tires from an old tractor. These two former students are now making and selling the Mechbull to farmers across India. g) The 'Pedal Power': Cycling on a Pedal Power charges a battery which can in turn be used for various purposes, such

³¹² According to Deshmukh, A. Informal conversations 24/03-03/04/2012, Pune/Pabal.

as powering LED lights – highly useful in India as most parts of the country have no electricity for at least 10 to 12 hours a day. In 2007, the design won the World Bank’s Development Marketplace competition award and was subsequently supplied to 42 boarding schools for tribal students situated in remote areas around the country. The project was also taken up by an entrepreneur in Pune who further developed a commercial version, by forming the company M/S Bottom, part of Inteb Energy and Environmental Solutions Pvt. Ltd., during the process.³¹³ At the time of my visit, the company had sold about 10 or 12 to Indian farmers at Rs. 7,000 to Rs. 10,000, which is quite little, however still too much for a lot of people. It was hence struggling and trying to figure out



Fig. 6: Pedal Power prototype

ways to reduce the price by maintaining financial viability.³¹⁴ h) An artificial pond that captures rainwater during the monsoon season, which is in turn used for various on-site purposes apart from drinking water. i) Aquaponics: These are sustainable food production systems whereby a fish tank is linked to a plant-growing structure. The plants (for example coriander, chilli and tomatoes) filter out the nutrients of the

³¹³ Kulkarni, Y. R. *Small Ideas, Big Opportunities – FabLab at Vigyan Ashram Pabal, India* in Büching, C. & Walter-Herrmann, J. (eds.) *FabLab – Of Machines, Makers and Inventors* Bielefeld: Transcript, 2013: 234

³¹⁴ According to Deshmukh, A. *Informal conversations* 24/03-03/04/2012, Pune/Pabal.

dirty fish tank, then the cleansed water flows back into the tank. Ranjeet Shanbag, VA's Project Manager, also built an aquaponic on top of his own house, testing the financial feasibility of the project. Although a structure like this is cheap to produce and generally grows plants quicker than usual, it has to be maintained a lot, while fruit and



Fig. 7: Aquaponic out of use

vegetable in India are very cheap to buy on the regional market anyway. He was writing a report at the time. j) VA has been collaborating with the Developmental Informatics Lab at Indian Institute of Technology in Mumbai to develop the aAQUA eAgriService, an online agricultural Q&A forum.³¹⁵ Through local internet kiosks in Pabal and surrounding areas, farmers can post questions onto the website which are answered by experts (employees of aAQUA's partner organisations) free of charge as well as by the virtual agricultural community. The site is available in English, Hindi and Marathi – since farmers are often illiterate, the kiosk owner sometimes acts as an

³¹⁵ <http://aaqua.persistent.co.in/aaqua/forum/index>, 21/05/2012

operator, interpreter and scribe. k) The kitchen's food schedule: The daily updated table lists all people's names (including students', staff's and visitors') with a tick for every meal (breakfast/lunch/dinner) that they are attending, including how many chapatis [flatbreads] they want to eat. If someone leaves out a meal for whatever reason, they have to call in and tell the kitchen ladies – otherwise they get punished. This is in order to exactly measure how much food is needed during a day so as to keep waste low: small-scale precision agriculture. l) A low-cost moisture-level sensor to form part of an agricultural watering

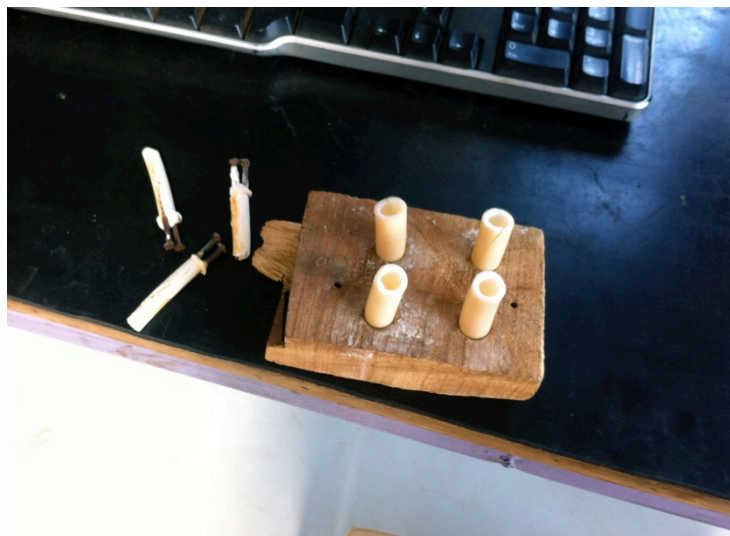


Fig. 8: Moisture-level sensor

system, made out of a piece of wood, nails and plastic tubes. m) Mobile toilets (in progress): A few years ago, a group of VA students experimented with making papercrete bricks (out of recycled paper) to build houses. Yet it turned out that the bricks were not strong enough, so the project was abandoned. Some time later during a *yatra* [religious pilgrimage], some students got the idea to revive the project and to use the bricks as 'mobile toilets' since there are a lot of hygiene issues during these kinds of public events. The bricks are very good at soaking up liquids and would not disintegrate even when taking in fluids at their own weight. n) The manual production of a USB-COM converter (in progress) to function as a tool through which the non-functioning milling

machine would be repaired – which in turn would be able to produce a USB-COM converter much easier and quicker. o) The installation of electrical wiring- and appliance systems of a villager's house (in progress). p) The re-installation of FabFi³¹⁶ (in progress) – an open-source wireless network for the region of Pabal and surrounding villages (25km reach) set up through a few extra antenna amplifiers installed on existing cell towers. FabFi was working until 2007, but had since been non-functional because of maintenance issues.

Platial Evolution

In the early 1980s, Shrinath Kalbag travelled around Maharashtra in order to find the right environment for setting up an ashram-style, non-formal education institute for rural school dropouts. As mentioned above, in collaboration with the IIE, Pabal was selected because it converged all the main problems of most Indian villages, which thus made it a suitable laboratory site. Kalbag and his wife hence relocated from Mumbai to Pabal in 1983 and slowly began to build up the college on Pabal hill, which at the time included nothing but a dry grass landscape. They firstly constructed a large shed made out of bricks and galvanised steel sheets, which then functioned as a combined office-workshop; another similar structure was built to work as a kitchen and a few smaller buildings were set up for residential purposes. When the college was launched, Pabal was an extremely remote place with hardly any transportation infrastructures and modern technology. VA thus started off as a small educational experiment in order to understand and develop the community of Pabal and its rural youth,

³¹⁶ FabFi has been an international collaboration of fab labs by using common building materials and cheap off-the-shelf electronics for communities to build their own high-speed infrastructure. The project started with a fab lab in Greece developing the first antenna, then one in Norway refined the design, a workshop in South Africa tested point-to-point communication abilities, VA was working on distance capabilities, the CBA developed the parabolic antenna design for the repeaters, corporate partners in Boston adapted routers and network protocols to support the system. The first fully functioning FabFi network was set up in Jalalabad, Afghanistan, in 2009 (Lassiter, S. *Fablabs: Thoughts and Remembrances* in Büching, C. & Walter-Herrmann, J. (eds.) *FabLab – Of Machines, Makers and Inventors* Bielefeld: Transcript, 2013: 252).

which could potentially be replicated in other localities around India.

The question at the time was:

How can we use the absence of infrastructure and development needs of the community as an advantage? [...] Once we'll take part in the development activities, the community will benefit and get services such as water, electrical wiring, maybe also sanitation. So the community will get these services from the students and in turn the students will take part in the activity.³¹⁷

Since 1983, the place has changed. The college has been growing and cultivating itself and now incorporates a number of different structures – geodesic domes, a large pond, trees, polyhouses, the fab lab etc. In the same way, Pabal has become much more urbanised and developed better communication- and transportation infrastructures. This has of course resulted in new problems, such as issues around sewage and garbage, to which the community and VA have had to adjust and respond. Whether the main reason for this evolution has been Vigyan Ashram or other factors, the college has certainly participated in the development of the place – by training some of Pabal's youth, who in turn set up local workshops, and offering (consulting) services to villagers. According to Kulkarni, most small businesses in Pabal and surrounding areas have been established by former VA students – such as construction and fabrication workshops, tailors and poultries.³¹⁸ The aim of 1983 thus seems to have been achieved, to some extent.

If you come to Vigyan Ashram via Pabal hill, there is a computer centre. He was a student of Vigyan Ashram. In the past, we were conducting computer courses at Vigyan Ashram. When the student decided to start a computer centre, I said, 'We will stop these courses.' And we started diverting all enquiries to that computer centre. Our job is to train students to become entrepreneurs, to provide solutions to the community. There is no point in competing with our own alumni. Then Vigyan Ashram should go to the next level. We have to leave the lower level to the other entrepreneurs.³¹⁹

³¹⁷ Kulkarni, Y. Interview 31/03/2012, 14.45-15.30, Pune

³¹⁸ Interview 31/03/2012, 14.45-15.30, Pune

³¹⁹ Kulkarni, Y. Interview 31/03/2012, 14.45-15.30pm, Pune

After a while, the local secondary school started to run the (national) IBT programme in collaboration with VA, thus there was no point for the college to take on students from Pabal anymore. VA's students are now increasingly coming from other parts of Maharashtra and even from other states in India – who then mostly go back to their own villages and make use of their new skills locally. Pabal is thus more and more becoming just a village to the college, which it happens to be physically based in.³²⁰ Today, VA is a place that people from *any* Indian village can come to – the 'local' is increasingly reaching a 'global' (or better: 'foamal') dimension.

Then we found out that our educational model is not only suitable to rural areas and that we cannot limit it to only rural development. We can basically generalise it and take it to all schools. And then we realised, 'Ok, this is not what we're doing.' Development is one thing, but then we need to make it far wider. [...] The real development is the development of the intellect. If we want to develop his intellect, then you need to give him various kinds of activities. And from these activities, we are trying to take him to scientific principles, concepts, theories. We started with a limited problem, like, 'Ok, I need to solve my place.' [...] But slowly, as our own understanding started to increase, we got to know more about the community, education, how creativity develops, how innovation takes place, how students come up with new ideas, how can we train him to find out the problem and the opportunity. So, as our understanding about all of these things started increasing, we started putting it into different frameworks. Then in 2005, the National Council of Educational Research and Training prepared syllabus guidelines for all schools in India, i.e. a national curriculum framework. I was a member of the discussion. There, we said we need to have a different terminology for whatever we are talking about. There, the term 'work-centred education' was coined.³²¹

VA's 'world/s' have been expanding and multiplying, and more environments have become part of its increasingly complex ecosystem/s. For example, due to the collaboration with MIT since 2002, the college has become part of the fab lab ecology through which it gains financial, technical and organisational support as well as the opportunity to interact with other labs that might have similar problems. Explains Kulkarni,

³²⁰ Thus, VA now has to make sure that it does not alienate its local community.

³²¹ Kulkarni, Y. Interview 31/03/2012, 14.45-15.30, Pune. See the position paper mentioned above.

This guy, Tom, from Kenya sent me an email saying he has some problem with the toilets and I got the designs. So I sent him the toilet designs. And he found them useful. So Tom becomes part of my community. The fab lab in Kenya and the fab lab in Pabal can share the same thing.³²²

VA is also increasingly attracting various sorts of (international) visitors – in 2010/11 for example, the college had more than 5,000 guests:³²³ farmers (clubs), schools, colleges, potential students, various researchers (including from the CBA) and initiatives. Due to the Sunday market in Pabal, a lot of farmers come to the village on a weekly basis and then often visit the college in order to get something repaired, buy products, get a vaccination or just ask for advice. Due to VA, Pabal itself has also attracted a number of researchers and programmes, such as the engINdia project, for example.³²⁴ engINdia was a partnership between six students from the University of Cambridge, MIT and IIT in Mumbai who lived in Pabal during the summer of 2005. In collaboration with VA, they worked with the local community in order to understand its singular development problems and work out engineering solutions to these. After the visit, the project continued by linking up international sustainable development students and professionals with the Pabal community. This has in turn also influenced the development of the place.

For Kulkarni, the biggest potential for VA lies in the fab lab, including its 'advanced' technologies. Through these, he believes, the divide between the 'developed' and 'underdeveloped' world could be bridged quickly.³²⁵ Currently, VA is largely working with manual and electrical tools – as mentioned, partly due to limited relevance in agriculture, conversion problems as well as staff not being experienced and comfortable enough to use the 'high'-tech equipment. However, as these problems are being dealt with, development needs are

³²² [Interview](#) 31/03/2012, 14.45-15.30, Pune

³²³ *Vigyan Ashram Annual Report 2010-2011*, accessed on: www.vigyanashram.com/uploadedfiles/Reports/12.pdf, 11/04/2012

³²⁴ www.engindia.net, 23/03/2014

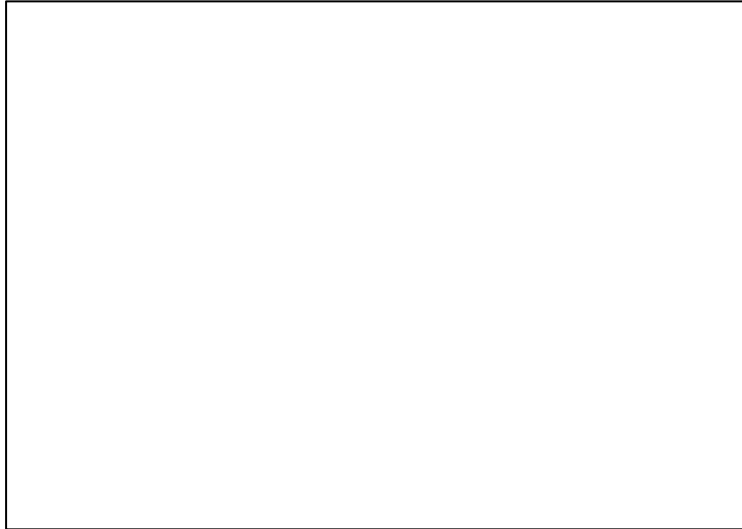
³²⁵ [Interview](#) 31/03/2012, 14.45-15.30, Pune

changing, people becoming more comfortable with digital fabrication tools, which are also getting cheaper and have the potential to make machines that make machines themselves,³²⁶ Kulkarni thinks that the college's tools will soon be mostly 'high'-end. The decreasing price and readier availability of the equipment would also make it easier to roll out VA's educational model in schools across the country, including integrating fab lab environments into each institution. Then, there is the next step, he explains,

Let's be optimistic and imagine that tomorrow there will be no development problems anymore in the community – we have a good infrastructure, we have good roads, we have good housing, we have good electricity, drinking water [...]. Today, we're finding out whatever the missing development links in the community are and use them as a source for educating our children. So today, we need to say, 'We need the IBT programme, we need to repair electrical equipment, we need to have our toilets working, agriculture, our nursery.' That problem might not be there in the future. Whenever there is a repetitive kind of manual work, then the tendency is to give it to the machine – whenever you require a lot of strength and effort. So today, we definitely know that automation will come and slowly we will start giving all of these tasks to the machines. Then, the question arises: Then what will we do? What kind of education do we want to give to our children? Vigyan Ashram doesn't have the answer to this today. But maybe in 10 years, 15 years, 20 years, we can say that as human beings we're good at thinking, innovation, creativity, which machines cannot do. So we need to spend our time on the innovation part – in art, music, theatre etc. Maybe Vigyan Ashram has to go into that kind of direction and human development can go to the next level. But still the work is half done. The real development is the development of one's intellect, one's full potential. So this pyramid [Maslow's] – when you have the basic needs fulfilled, you go to the next needs until you come to the realisation what you are. That's why we're an ashram. [...] I'm not sure what we need to do because we cannot imagine what kind of technology will come tomorrow. But what we can say is that we're taking that path and that this is the metre by which we invented the wheel, fire; this is the way in which all major development has happened in human history.³²⁷

³²⁶ For example through 3D printing (see above).

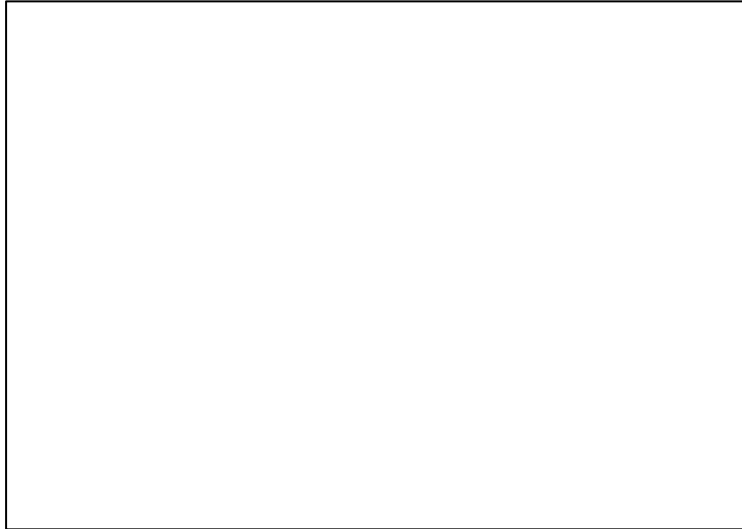
³²⁷ Interview 31/03/2012, 14.45-15.30, Pune



*Fig. 9: Vigyan Ashram's formation in 2007
(Google Earth image © 2014 DigitalGlobe)*



*Fig. 10: ... in 2009
(Google Earth image © 2014 DigitalGlobe)*



*Fig. 11: ... in 2012
(Google Earth image © 2014 DigitalGlobe)*

III.II London Hackspace³²⁸

The London Hackspace Ltd. (LHS) is a non-profit, community-run organisation in East London “where people who make things can come to share tools and knowledge.”³²⁹ When it launched in 2009, it was the first ‘hacker space’ in the UK and, with its ca. 950 members at the time of writing,³³⁰ it is one of the largest ones in the world. As set out in its constitution, the LHS’ objectives are “to promote and encourage technical, scientific, and artistic skills through social collaboration and education” and “to provide and maintain shared community workspace and equipment in Greater London.”³³¹ It can be described as, what has been termed, a ‘third place’, i.e. a place that facilitates creativity and a sense of community, being located outside of the ‘first place’ of the home sphere and the ‘second place’ of the work domain.³³²

The LHS was set up in February 2009 by software developers Russ Garrett and Jonty Wareing – then-colleagues at online music network Last.fm – because they were frustrated with not having access to a suitable place for pursuing their hobbies, i.e. making hardware such as tinkering with electronics and metalwork. Already inspired by existing hacker spaces in the US and Germany, Garrett and Wareing set up a mailing list with the idea of creating a communal workshop where people could make things with shared equipment that no one is able to keep at home (due to noise and hygiene issues as well as cost, for example). Since there was no other ‘hacker space’ in the UK at the time,³³³ the response was positive and the place formed quickly. For the

³²⁸ Research was carried out at various points between July 2013 and May 2014, although I had been familiar with the place before.

³²⁹ <https://london.hackspace.org.uk>, 07/07/2013

³³⁰ As of 11/05/2014 (<https://london.hackspace.org.uk/members/members.php>).

³³¹ <https://london.hackspace.org.uk/organisation/docs/articles.pdf>, 07/07/2013

³³² See Oldenburg, R. *The Great Good Place: Cafés, Coffee Shops, Bookstores, Bars, Hair Salons, and other Hangouts at the Heart of a Community* New York: Marlowe, 1999

³³³ Although a small number of similar places.

first ca. six months, it was run as a pub meet-up, then it had enough money to rent a small room in an archery in Islington, North East London. Since it kept growing, the LHS moved into 'Laboratory 24' (later also 23) of Cremer Business Centre in Hoxton, East London, in 2010 and in April 2013 located to a close-by warehouse on Hackney Road.



Fig. 12: The London Hackspace on 447 Hackney Road

In its Hackney location, the LHS includes ca. 6,500sqft spread across two floors as well as a 6,000sqft yard with loading bay, a cabin and a hydroponic garden.³³⁴ The ground floor of the building is the 'clean' (and more quiet) part of the Hackspace and consists of an open-plan electronics area and desk space, a small library³³⁵ and lounge, a semi-open classroom and a separate quiet room as well as a kitchen. The basement is the 'dirty' (and louder) section and at the time of writing hosted the main open workshop area, semi-open metal- and wood workshops, member storage space as well as a separate wet lab.

³³⁴ Like an aquaponic, however the water simply contains nutrients and no aquaculture.

³³⁵ Including books, magazines and journals on subjects ranging from physics and mathematics to cognitive- and computer science to electronics to graphic design, photography and popular culture. The LHS also hosts a small virtual library on its wiki.

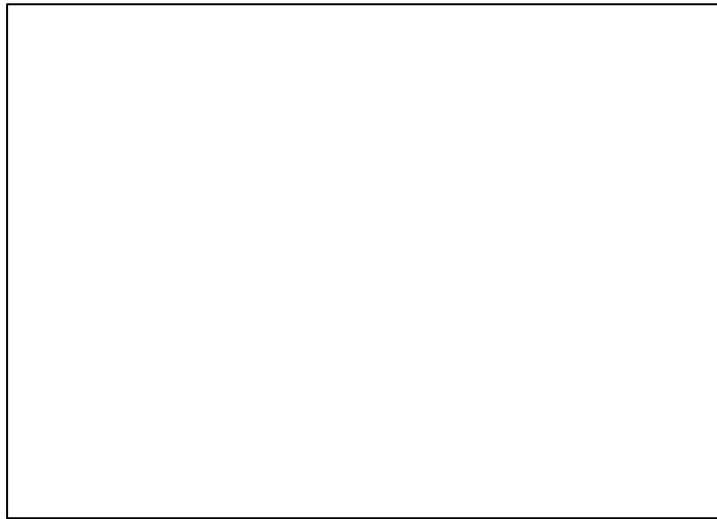


Fig. 13: Basement workshop

People participating in the LHS come from fairly diverse economic backgrounds, are mainly in their 20s to 50s, comprise predominantly local technologists from Hackney and London more generally, however also increasingly other creatives and scientists, and are largely 'white' male. Although some members run their own companies or are freelancing, and thus sometimes use the LHS for prototyping or for working on small projects, most people come in for social spare-time tinkering, making 'open designs' primarily for



Fig. 14: Spaceship environment in the LHS Bikeshed

experience value and entertainment, without major commercial ambitions.³³⁶ The designs are generally personal- or small-group projects, often made specifically for the LHS, and are usually shared in one way or another on the LHS wiki or associated blogs. They include artefacts such as: a Turing machine made out of scrap metal and 3D-printed parts, the 'Net-o-Meter' (an LHS network bandwidth meter), a real-life laser tag game and the 'LHS Bikeshed' (a caravan-turned-spaceship-simulator).

Organisational Design

The London Hackspace is a registered non-profit corporation in England and Wales and is limited by guarantee – in order to prevent one individual being financially liable in case of bankruptcy, since there are no shareholders to pay profit to as well as eligibility for certain tax benefits. It did not register as an 'unincorporated association' since it would not have been a legal entity and thus not been able to sign any contracts, such as tenancy- or bank loan agreements. It did not register as a (tax-exempt) 'charity' since the organisation would have had to prove its 'public benefit', for which the rules are fairly complex, and since it falls in between traditional institutional categories. The LHS also would have had to deal with much more accounting and auditing work, which is difficult, time-consuming and expensive. Explains Martin Dittus, long-term LHS member and one of the current 'trustees' (i.e. directors), "We were stuck in a situation where we could have risked it, but we could not have expected that it would have actually worked."³³⁷ There would have furthermore been severe limitations with what the organisation could have done with its money. Having observed hacker spaces in other parts of the world, Wareing (also a current trustee) explains,

³³⁶ These are my subjective impressions, however confirmed by long-term LHS member and current 'trustee' Martin Dittus ([Interview](#) 03/03/2014, 15.30-16.30, London).

³³⁷ [Interview](#) 03/03/2014, 15.30-16.30, London

In the US, everyone's a charity, they've all got 501(c) status. But in the UK, absolutely nobody does. Part of that is because we didn't do that and other [hacker spaces] looked to us for advice. We may have caused problems there, but I hope not... . [...] In Germany, it's very common for spaces to be in squats, [...] in Australia they have real problems with company formation. What works in one place doesn't work in another and you figure it out as it goes around.³³⁸

Since UK corporate and charity laws are constantly changing, the LHS has been reconsidering its status at various times and might take on a different legal design at some point.³³⁹

UK corporations are required to have a board of directors, thus ultimate governance of the LHS lies with its nine 'trustees'³⁴⁰ who are elected annually by the membership, with the longest-serving third required to stand for re-election every year.³⁴¹ Trustees' duties include, for example, ensuring that the LHS operates within legal frameworks (and according to objectives set out); handling basic finances; updating the constitution and rules if need be, in consultation with members; dealing with grievance procedures, including issuing warnings and banning people when necessary.³⁴² They generally do not get involved with the day-to-day running of the organisation, at least not in their trustee function, since this should be done by the members themselves.

In July 2011, the LHS became the 'world's first virtualised non-profit corporation' through the 'One Click Orgs' system, a legal software for democratic UK organisations.³⁴³ The virtualisation removed board

³³⁸ [Interview](#) 10/04/2014, 19.30-20.15, London

³³⁹ *Charitable Status Update* on <https://groups.google.com/forum/#!forum/london-hack-space>, 08/02-09/02/2012, 11/05/2014.

³⁴⁰ The LHS initially had only two trustees, but as the place grew and evolved, it started having three, then five, then eight and now nine. It went from eight to nine because there were some decisions that split the board exactly and no one was able to have the final say (Wareing, J. [Interview](#) 20/08/2013, 20.15-20.45, London). At the time of writing, the LHS had seven male and two female trustees.

³⁴¹ Any LHS member can put her- or himself forward as a candidate if at least one other member seconds that person. Final voting is done electronically via the Meek STV (Single Transferable Vote) method, designed to achieve proportional representation through the ranking of candidates in order of preference. At least one third of the LHS membership has to vote for the election to be valid.

³⁴² Bans and warnings are made public on the LHS wiki. So far, only two members had to be temporarily banned over the years (https://wiki.london.hackspace.org.uk/view/Grievance_Procedure/Bans_Issued, 10/05/2014).

³⁴³ The One Click Orgs Association (which itself runs through One Click Orgs) is a social enterprise based in London that develops virtual legal frameworks for democratic organisations (associations, companies

meetings from the LHS' formal procedures, which were replaced by online proposals and -votes among the trustees that are legally binding as well as allowed virtual modifications of the constitution.

In order to grow an organisation that would co-ordinate and mediate between (future) hacker spaces across the UK, Garrett and Wareing also set up the Hackspace Foundation (HF) as the parent (non-profit, limited) corporation of the LHS. Tells Wareing,

When we were naïve and idiotic, [...] we thought one of the things we could do is handle money and handle finances and handle legal problems, organisation and everything for all hackspaces in the UK – which at the time was just us, and Leeds was interested, Nottingham and Birmingham, I think. [...] And then we did it for about two or three months and then we realised that the accounting and legal problems were really significant. We handled the money for Leeds for a little while [...] and eventually we were like, 'We can't do this, this is just catastrophic.' It means that the people who run the Hackspace Foundation are legally responsible for everyone. And we tried to jump through all sorts of legal hoops to get away with it, but it wasn't gonna happen.³⁴⁴

Since then, the HF took on an advisory function mainly, by providing guidance to new UK hacker spaces and generally being the first point of contact for them.³⁴⁵ Occasionally, the HF gets monetary donations, which are then given to workshops that are financially unstable or are in the process of launching. Wareing explains that the HF will be legally separated from the LHS and probably actually become a charity later on in 2014 – the idea is to get one or two people from every hacker space in the UK, elected by their membership, to be on the board or a member of the organisation so that it becomes a unified representation of all the different places. As he says, it would be much easier to get funding in this way and distribute the money to where it needs to go.³⁴⁶

limited by guarantee and co-operatives) in partnership with Co-operatives UK, the Open Knowledge Foundation and Nesta. The One Click Orgs project was launched by the CIRCUS foundation in October 2008 and the association was founded in December of the same year at the Chaos Communications Congress in Berlin (www.oneclickorgs.com, 11/07/2013).

³⁴⁴ Interview 10/04/2014, 19.30-20.15, London

³⁴⁵ Most recently, the HF has been helping to set up the 'South London Makerspace', a community workshop located in Herne Hill, at the time of writing.

³⁴⁶ Interview 10/04/2014, 19.30-20.15, London

The London Hackspace Ltd. is entirely financed by its members as well as donations. Anyone (individuals as well as organisations, at least in theory) can become a member for a monthly fee,³⁴⁷ which is paid on a voluntary basis, however set at a minimum of £5.³⁴⁸ Members can access the LHS 24/7 via two doorbots – ‘Wilkes’ at the front door and ‘Perlman’ at the rear³⁴⁹ – through an RFID (Radio Frequency Identification) card or tag (most people take their Oyster cards). Members can use the shared equipment, are able to participate in workshops and sub-groups, are entitled to annually elect directors and contribute to decision-making, attend the AGM³⁵⁰ and get a personal storage box, but are at the same time expected to maintain and contribute to the organisation – for example by organising workshops or sub-groups, cleaning up after themselves, helping out on a ‘Hack the Space’ session to paint and redesign the building or by donating items. Through eight webcams³⁵¹ installed across the site and the ‘spacensus’ – a (LHS-made) sensor that counts how many people are in the building – members can see what is going on in the house at any time and are able to analyse user dynamics.³⁵²

³⁴⁷ Says Wareing, the LHS has never actually registered an organisation, but this would in principle be possible. However, it would need to be discussed with the trustees first of all and be a bit problematic, for example because one would have to register every single organisation member purely for access control purposes (Interview 20/08/2013, 20.15-20.45, London).

³⁴⁸ A minimum of £15 is encouraged though since maintaining the new place costs almost £11,000/month, most of which is rent (<https://london.hackspace.org.uk/cost-of-hacking>, 08/04/2014). In the run-up to the LHS' Annual General Meeting (AGM) 2013, a proposal to raise the minimum fee from £5 to £10 was discussed, however it was voted against by the vast majority. Arguments made in various conversations on the LHS main mailing list around the time suggest that this was due to the membership staying affordable for people on low incomes, occasional users and monthly donors who might otherwise drop out (<https://groups.google.com/forum/#!forum/london-hack-space>, 04/05/2014).

³⁴⁹ In the LHS, technological systems are named after famous people in computing: ‘Wilkes’ is named after British computer scientist Maurice Wilkes and ‘Perlman’ after American software designer and network engineer Radia Perlman. There is also a ‘Lovelace’ (the MakerBot workstation), ‘Babbage’ (the server) and ‘Shannon’ (the IRC station).

³⁵⁰ At the time of writing, the LHS was trying to abolish the AGM since it is of no use to an organisation which is largely virtually organised. This has proven to be legally complicated however (Wareing, J. Interview 10/04/2014, 19.30-20.15, London).

³⁵¹ Images can only be viewed via the LHS membership page, cameras do not zoom in and archived data is only accessible to trustees.

³⁵² This data was useful, for example, in establishing that only ca. 30% of LHS members are actually accessing the building on a regular basis – which is important for planning the needs of the organisation, including predicting membership numbers in relation to financial forecasts. According to Wareing, this 30%-rule generally holds true for all hacker spaces, except for the very small ones with less than ca. 50 members (Interview 10/04/2014, 19.30-20.15, London).

The LHS' political design aims to operate as a 'do-ocracy',³⁵³ i.e. a model through which people *actively* choose roles and tasks that they do *themselves*, rather than having *transferred* these responsibilities to s/elected officials who then *indirectly* perform them.³⁵⁴ In this way, the organisation tries to be as transparent, non-hierarchical, flexible and informal as possible since "as hackers we hate making rules almost as much as we hate following them."³⁵⁵ Although the LHS would ideally like to just have one rule – 'be excellent to each other'³⁵⁶ – it quickly realised, through its own experiences and those from other (failed) hacker spaces, that certain conditions need to be created in order to make the place function. Explains Dittus,

People don't really think about this aspect of hacker spaces, which is sort of the boring administrative bit. But after having seen quite a few attempts in London and in other places of creating hacker spaces and seeing under which circumstances they fail, I now believe that it's actually this which makes these places happen: To have a person on your team who has the time and the patience for these aspects, has the patience to understand, for example, zoning laws and insurance concerns and all these things because it's only those which actually then allow you to create the space where you can invite others to take over. It's so hidden, people don't generally see that.³⁵⁷

Apart from some members having put themselves forward for dealing with administrative issues (often the trustees), the LHS decided to set up a few basic guidelines and measures for health and safety³⁵⁸ as well as rules to ensure that everyone can participate in the organisation in the same way – ranging from "Rule Zero: Do not be on fire" over tidiness,

³⁵³ Sometimes also called 'do-it-ocracy' or 'do-opoly'. See the entry on Community Wiki: www.communitywiki.org/cw/DoOcracy, 09/04/2014.

³⁵⁴ As mentioned above, since UK law requires companies to have a board of directors who *represent* the organisation, this model can only be realised with some limitations in the LHS.

³⁵⁵ <http://wiki.london.hackspace.org.uk/view/Rules>, 07/07/2013

³⁵⁶ This 'politics' is coming out of 1989 US sci-fi slacker film *Bill & Ted's Excellent Adventure* and gets often adopted by the hacker community.

³⁵⁷ [Interview](#) 03/03/2014, 15.30-16.30, London

³⁵⁸ One of these measures includes the listing of training requirements and induction schedules on the LHS wiki for larger, more complex and expensive equipment as well as the nomination of members who maintain these items and offer training sessions. Some of these tools are fitted with an 'ACnode' which associates a member's RFID card with a database of who has received training and disables the equipment if either no card is produced or if that person was not trained to use it. This design also prevents equipment from being left unattended whilst in use and improves usage logging, however has to be more thoroughly rolled out across the organisation.

donating/loaning/borrowing issues to general etiquette.³⁵⁹ In addition, the LHS recently established a 'Code of Conduct' applicable to all communications channels of the organisation in order to prevent discrimination, harassment and public trolling.³⁶⁰ Also currently under discussion are 'Conditions of Entry' signs to be put up by all main doors so that newcomers and non-members are aware of the basic rules.³⁶¹

Most of the day-to-day organisation is not done in the building of the LHS itself, but negotiated and logged on the wiki as well as the main mailing list and IRC channel. The wiki lists, for example, events, proposed and desired workshops, specialised suppliers, room schedules, LHS equipment and infrastructure projects, the LHS history and press cuttings, the rules and policies of the organisation. It hosts a 'Wishlist' and a 'Pledges' page (for tools, consumables and library additions),³⁶² a 'SkillSwap' and a 'SwapShop' site. The main mailing list and IRC channel are used, for instance, to organise and announce events and pledges, for (largely informal) decision-making and discussions including complaints, requesting temporary large-item storage or filming, job postings, general knowledge exchange and by non-members to approach the organisation in the first instance.

In a do-ocratic organisation where 'everyone governs', there are usually a few people who do much more than most others. A hacker space is usually not even set up in the first place, explains Wareing, "unless there are one or two people who are really driven, who'll do anything to make it work and sacrifice themselves and everything they know [...]."³⁶³ For Dittus, the question is:

³⁵⁹ <http://wiki.london.hackspace.org.uk/view/Rules>, 07/07/2013

³⁶⁰ https://wiki.london.hackspace.org.uk/view/Code_of_Conduct, 09/04/2014

³⁶¹ *Conditions of Entry?* on <https://groups.google.com/forum/#!forum/london-hack-space>, 01/05-03/05/2014, 04/05/2014

³⁶² The LHS buys basic items and consumables out of its collective funds, however more specialised equipment needs to be pro-actively organised and financed by individual members through 'pledges', with the LHS sometimes adding some money if the item is desired by many people. The pledging members have a say on the product selection, however the item is finally owned by the LHS as 'a whole'. If a piece of equipment breaks because of wear and tear, the LHS will make a collective effort to replace it, however if it breaks because of wrong handling or neglect, the last user is expected to buy a new one.

³⁶³ *Interview* 10/04/2014, 19.30-20.15, London

How much effort are you willing to spend on making it happen and what kind of effort are you willing to spend? And generally when it's about co-ordinating others, organising others, people stop being interested. Maybe it's because you don't get paid for it, maybe it's also about the particular community that we have, where it's often people who might be quite introverted, who are interested in things for their own sake and playing with things and building things, because they enjoy it and they enjoy meeting others for those shared interests, but they don't necessarily want to be hosts. So it's almost a self-reinforcing horizontal organisation, where if you don't introduce an artificial effort to organise, [things are not going to happen]. We keep seeing people who enter the space and organise things for everybody else – and generally it works amazingly well – but these are quite rare ones.³⁶⁴

The LHS has been evolving at a very fast rate, by moving to larger locations and a community growing and complexifying with it, which has created different and larger, growingly complex problems. Relates Wareing,

The next nearest hacker space in terms of size is, I think, 300 members and we're now up to 920 and when we got to around 120-ish, that's when we really started noticing [problems]. There were fundamental breakdowns in communications, things became a lot more awkward and it's mainly due to people not talking, not communicating, not thinking about the larger whole. [...] And we haven't quite figured out the right ways of communicating between everyone to make it work, so some bits just don't work really well, some bits work really well and it's tricky and it's gonna be an ongoing experiment as it continues to grow. [...] We're slowly learning – like the security stuff we had to do now where we have to be more careful with who we let in, rather than just the door actually physically being open all the time, because we had burglaries. There's been several fundamental change points and they're generally when the space moves and it grows so rapidly that we lose a little bit of a handle on it.³⁶⁵

There are many issues with how socio-political mechanisms do not work anymore. For example, a lot of people feel that it has become very difficult to make decisions, which are mainly done via the main mailing list, leading to, as one member describes it, “strained arguments [...], as people try to drown out comments that they don't agree with.”³⁶⁶ By trying to “both encourage [sic] more participation in decision making and to reduce drama on the main list,” one option would be to keep

³⁶⁴ [Interview](#) 03/03/2014, 15.30-16.30, London

³⁶⁵ [Interview](#) 10/04/2014, 19.30-20.15, London

³⁶⁶ *How should we make decisions?* on <https://groups.google.com/forum/#!forum/london-hack-space,06/08-07/08/2013,04/05/2014>

the main list for discussions, but have another web-based consensus system for people to make proposals for things that concern the entire place. Another member finds that the main problems are the 'silent majority' and the fact that many people won't comment publicly against an inner circle by feeling obliged to support it out of fear that they will be alienated. Any new system would thus have to ensure that it does not simply validate a biased view. Separate lists/systems did apparently not work in the past due to low membership numbers, however as there is now enough traffic on the site, they might work in the future. The next step would then be to work out how such a new system would function. For example: What counts as 'general agreement' or as 'consensus'? Should the new system be more 'push' or 'pull'? Should it be for members only or more public? And should it be anonymised or not? If there were status icons indicating whether someone was a 'member', 'non-member', 'ex-member', 'trustee' etc., someone immediately objects that this "will only further encourage the myth that trustees [sic] opinion matters more than other members [sic]." Another person thinks that trustees' opinions should ultimately rule. Another's idea is to set up a separate decision council. In a discussion a few months later,³⁶⁷ 'Loomio' – a free software for decision-making –³⁶⁸ is put forth, which could potentially be used for more informal decisions in the LHS and could be redesigned to integrate the membership database. Someone immediately questions whether 'core power users', 'occasional visitors' and 'sleepers' should all have equal voting rights in this new system, which is met with a lot of objections. One person wonders whether a new decision-making system is necessary at all since, in a do-ocracy, minor decisions should really be made by the one who actually *does* a certain job, such as expanding the kitchen into the store room, then repainting it by deciding which colour it should be in.

³⁶⁷ *Loomio: group decision-making (by consensus)* on <https://groups.google.com/forum/#forum/london-hack-space>, 18/03-28/03/2014, 04/05/2014

³⁶⁸ Loomio was launched as a collaboration between some Occupy activists and social enterprise network Enspiral in Wellington, New Zealand, and is now part of Loomio Co-operative Ltd. (www.loomio.org, 26/04/2014).

Although the LHS is still using the One Click Orgs system for making decisions once in a while, the software is currently not designed for informal voting amongst the membership, only for formal votes between the trustees, and is not programmed for the singular needs of the LHS. Says Wareing,

One Click Orgs works well, but because it's a software platform that we don't write, it doesn't entirely work with what we need it to do. [...] We'd like to use it for votes amongst the members more often – things like, 'We want to move to a new space,' or how we spend money on things. But you run the risk of flooding people with votes all the time and it becoming a bit awkward. It would be a great platform, it's just not quite ready yet.³⁶⁹

Other problems the LHS is currently facing include, for instance, members sleeping in the building and misusing it as a storage facility without permission, identifying 'bad eggs' in the first place as well as people taking advantage of the LHS as cheap desk space. Explains Dittus,

It's something we're quite bad at, but it's also something about which we feel a bit exploited. Desk space in Shoreditch and Hackney is quite expensive, whereas the LHS membership can be quite cheap. Needing access to our desks isn't that much, however we cannot possibly function as shared workspace if many people would use that – our system would break down. And it's also not the kind of activity that we necessarily want to encourage. We want to put a strong emphasis on not just arriving there with your laptop and working there by yourself, but also being social, making things and using our tools.³⁷⁰

Hybridisation

When the London Hackspace was launched in 2009, the organisation mostly included people from the software sphere due to the ecosystems Garrett and Wareing participated in at the time. However, since the place has been expanding quickly, this "one swarming mass has become split into sections", in Wareing's words, and sub-groups have been crystallising organically.

³⁶⁹ [Interview](#) 10/04/2014, 19.30-20.15, London

³⁷⁰ [Interview](#) 03/03/2014, 15.30-16.30, London

It took maybe eight months before we saw a real change. We started getting people from other disciplines coming in and then we saw wild swings – we got one person who happened to be interested in software, but did something else, and then it all got mixed up. Now, it's almost anything goes. [...] When we first set up, we were actually fairly biased in what we wanted and we were not in the right space for wanting random people to show up all the time [...]. And then it started happening: 'Oh, this is a bit weird, are we okay with this? Actually, this is quite lovely.' And I'm slightly embarrassed that that even happened at the start because it wasn't obvious what the space could become.³⁷¹

With the evolution of the LHS, people increasingly started to form meet-ups around particular interests, which then allowed them to identify as being part of a local group within the larger organisation. Sub-groups in the Hackspace generally start by an individual or a small group logging their interest on the 'Workshops' page of the wiki, announcing it on the IRC channel or the main mailing list and if there is enough interest and some people willing to organise, the group slowly starts to take shape. Currently, the LHS includes the following sub-groups, which usually meet on a weekly basis, are mostly free and open to the public, some even have their own room or area within the LHS and more or less developed singular structures: 'London 3D', which focuses on (building and using)



Fig. 15: Hybrid LHS/Mindhackers logo

³⁷¹ [Interview](#) 10/04/2014, 19.30-20.15, London

open-source 3D printers; 'Not Just Arduino', a group working with microcontrollers and physical computing; a 'Robotics' meet-up; the 'Mindhackers', who are interested in hypnosis, optical illusions and lucid dreaming; 'Pl(a)ywood', a club for woodworking and carpentry; an 'Amateur Radio' workshop; the 'Lockpicking Sports Sessions'; an 'Art Workshop', where people experiment with different mediums and techniques as well as learn art theories; a 'Homebrewing' collective; 'London Aerospace', a UAV meet-up. Two of the oldest and most developed sub-groups of the LHS are the 'London BioHackspace' and the 'Music Hackspace':

The London BioHackspace (LBH) is part of a growing worldwide community of DIY biologists and includes a small group of both amateur- and professional biologists interested in molecular and synthetic biology as well as the democratisation of scientific knowledge. They meet on a weekly basis and work on becoming competent in basic techniques of synbio through cheap equipment and materials – which they often buy on eBay, in supermarkets or just make themselves. So far, they have mainly been working on plant species-, sex- and blood typing (through their own DNA, for example extracted from cheek cells) as well as growing and transforming bacteria. Sometimes, the biohackers also make food, such as their own soylent³⁷² as well as strawberry DNA daiquiris and liquid-nitrogen-cooled ice cream, which were served at the last 'Spacewarming Party'. At the time of writing, they were thinking about developing an algal biodiesel and building a photobioreactor, an artificial environment for the cultivation of microorganisms through light energy. In August/September 2012, the LBH participated in a 'citizen science' project in collaboration with the University College London (UCL) iGEM³⁷³ team. As part of the 'Plastic

³⁷² A food substitute which tastes like liquid oatmeal and supposedly supplies all the body's daily nutritional needs.

³⁷³ The iGEM (International Genetically Engineered Machine) Foundation came out of MIT in 2012 and turned into an independent non-profit organisation located in Cambridge, MA. It is "dedicated to education and competition, the advancement of synthetic biology and the development of open community and collaboration" between students and practitioners in schools, laboratories, research

Republic' project, the biohackers co-developed a 'public BioBrick' that could one day be used for cleaning plastics from the ocean. A BioBrick is a piece of DNA – in this case from marine bacteria – genetically modified to perform a specific function. The BioBrick was 'public' because biological parts are usually just developed inside the walls of academia and traditional science labs. In 2014, iGEM is running a competition specifically for community labs and DIY bio groups, thus the LBH is currently working on a proposal: the 'Juicy Print', a bio-printer that would work through light-sensitive bacteria. The project is financially supported by the UCL Engineering department and will be carried out in one of their labs.

The BioHackspace was set up in early 2011 after two LHS members – a molecular biologist and a sociology of science researcher with a background in biology – gave an 'Intro to Biohacking' talk in the Hoxton lab. Fairly early on, people from other backgrounds started to join and the biohackers currently also include computer scientists, web developers and artists, for example. In November 2012, the LBH became an independent limited corporation – London Biological Laboratories Ltd. – within the LHS since it was easier to handle finances and get supplies. As it is a sub-group of the LHS, the LBH is largely working within the organisational structures of the former and is basically financed by it, however has at the same time formed its own frameworks. The LBH has three directors and a treasurer, none of which have special decision-making powers within the group in real terms. The organisation has its own area, i.e. wet lab,³⁷⁴ in the basement of the LHS, which includes equipment such as a centrifuge, an incubator, UV machine, thermocycler (for amplifying DNA segments), an electrophoresis box (for particle dispersion), a microscope and an autoclave (sterilisation device). It has its own 'hacked' LHS logo,

institutes and industry as well as the public. The foundation mainly runs the iGEM student competition as well as operates the Registry of Standard Biological Parts, a virtual collection of biological components (<http://igem.org>, 30/04/2014).

³⁷⁴ In the Hoxton location, the biohackers worked in a combined wet lab/darkroom shared with LHS members interested in photography.



Fig. 16: LHS/LBH logo

website, LHS/LBH wiki page (including Wish List and Pledge Page), IRC channel and mailing list and is also working on a special 'Biohacking Code of Conduct'. Since biohacking is a bit more expensive than the average LHS activity, the LBH has its own membership scheme, with a suggested minimum donation of £2 for buying reagents, equipment and consumables. The biohackers are currently working towards becoming a 'Containment Level 1 Lab' to make more complex genetic modifications in the future (GM activities of 'no or negligible risk to human health'), which entails a fairly complex application process including risk assessments, health and safety checks, developing a lab policy as well as getting consent from the rest of the LHS.

The Music Hackspace (MHS) is "a place to share thoughts, knowledge, technologies, processes and aesthetics on music and audio."³⁷⁵ It has about 20 active core members and around 150 participants in total, mainly from the music scene, but also artists, soft- and hardware developers, entrepreneurs, researchers and lawyers. According to its website, the MHS is the largest self-organised community dedicated to music in the UK.³⁷⁶ The group was set up by Jean-Baptiste Thiébaud, a digital music researcher and composer, and

³⁷⁵ <http://musichackspace.org/about-us>, 03/05/2014

³⁷⁶ <http://musichackspace.org>, 03/05/2014

musical hard- and software developer Martin Klang in October 2011. Like the BioHackspace, the MHS is a registered company, however it is not trading since there has been no need for it (yet), with the incorporation mainly serving symbolic purposes. It also has its own hybrid logo, mailing list, website and LHS/MHS wiki. The organisation holds meetings every other week, which take place in various locations, however mostly in the basement of Troyganic, a café around the corner from the LHS' previous Hoxton location. The MHS does not meet in the Hackspace since it outgrew the capacity of the old building, the new one on Hackney Road is still no better in terms of noise insulation and the café makes for a more informal atmosphere.³⁷⁷ In the MHS meetings, a speaker presents what s/he has been working on – whether that is a final product, work in progress, ongoing ideas, prototypes or

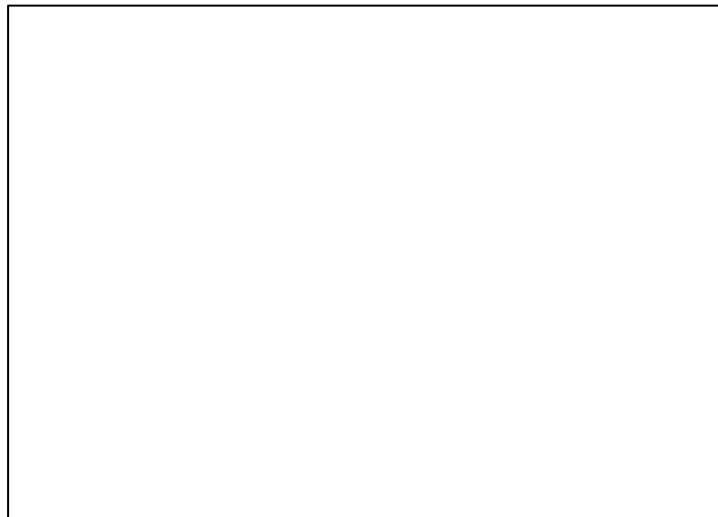


Fig. 17: LHS/MHS logo

technological problems – followed by a discussion and sometimes a live performance. The MHS also hosts ad-hoc workshops, which have included topics such as toy hacking, hi-tech kitchenware and micro noise as well as a 'Build your own Synth Module' session in collaboration with Befaco, a Spanish non-profit association focusing on developing

³⁷⁷ According to Thiébaud, J.-B. Email Interview 15/05/2014

open musical hardware. In April 2013, the MHS worked with Drake Music, a music-making hub for people with disabilities, as well as non-profit arts and technology association Furtherfield to run an assistive music technology hackday. Two prizes were given out for the most innovative works: a breath-powered instrument and a browser-based motion-sensing musical device. At the time of writing, a team of MHS members together with other makers from the LHS was working on the Hoxton 'OWL' – a re-programmable guitar effects pedal. OWL stands for 'Open Ware Laboratory' and refers to the fact that the project is 'open' in both hard- and software. The OWL team ran a Kickstarter³⁷⁸ campaign between May and July 2013 and is now within the production phase. The community is increasingly forming its own place around the project, having moved to an independent location in Finsbury Park, North London, and growing a community of developers. The MHS furthermore hosted a residency as part of Sound and Music's 'Embedded' composer programme.³⁷⁹ London-based sound artist and coder Tim Murray-Browne was a composer in residence at the MHS for ten months, from November 2012 to September 2013. His main project was the 'Hackspace Ensemble', a collective musical hacking session between MHS members for creating musical interfaces. The project resulted in an interactive sound installation – the 'Cave of Sounds' – showcased as part of the 'Hack the Barbican' event in August 2013. The Cave of Sounds consists of eight musical instruments that face each other in a circle: three of them include a hacked 'Kinect' box³⁸⁰ that tracks the body's movements (one is played by walking in a circle, one by imitating a bird, one by raising an arm), two of them are based on light (one responds to the shine of light, the other one to shadows), one

³⁷⁸ A crowdfunding site (www.kickstarter.com, 03/05/2014).

³⁷⁹ Sound and Music is a charity funded by the Arts Council England whose work includes "composer and artist support and development, partnerships with a range of organisations, live events and audience development, touring, information and advice, network building, and education." Its Embedded programme funds an early-stage composer to work with a creative organisation in the UK (www.soundandmusic.org, 03/05/2014).

³⁸⁰ Kinect is a motion-sensing input device by Microsoft originally designed to work with its Xbox video game consoles and Windows PCs.

is based on a theremin, one is a ball with an accelerometer and gyroscope inside and one is made of a hat and gloves which is played by tapping one's fingers against the hat. The instruments are connected to an interactive system which identifies spheres to converge and recognises when musicians try to communicate with each other through the instruments. The idea behind the installation was to explore the pre-historic origins of collective music-making and how this relates to contemporary music-hacking. It came out of "a concern that whilst musical hackers jam together, a lot of musical creativity happens during the hacking itself which is often done in solo."³⁸¹ At the time of writing, the MHS was looking into relocating and actually having its own building – in order to gather the community, provide shared access to its organisation-specific tools and audio equipment, to have more regular workshops, seminars and concerts and generally facilitate organisation. It also wants to become more commercially oriented than the LHS, for example by fostering professional relationships within the music industry, selling members' products via its website and offering a range of music services. This redesign of the MHS will probably also include a new membership system.

One LHS sub-group in-the-making is the 'Hackney Space Centre' (HSC) – a workshop formed around the LHS' 'HackSat One', a small lightweight spacecraft, i.e. 'Sprite', launched as part of the 'KickSat' project:³⁸² KickSat is a mini satellite which houses a number of Sprites, which are low-cost, as small as a few postage stamps and powered by their own solar panels. The KickSat launch was part of a NASA mission to resupply the International Space Station (ISS), which took off on 18th April 2014. With the satellite being in low earth orbit, a radio signal

³⁸¹ <http://musichackspace.org/residency/hackspace-ensemble/>, 03/05/2014

³⁸² KickSat was initiated in 2009 by aerospace engineering graduate student Zac Manchester from Cornell University that eventually got funded by a Kickstarter campaign running between October and December 2011. Manchester's idea behind the programme was to "kickstart the personal space age" by bringing down the high costs of spaceflight and thus allowing people to explore a little what is generally the exclusive realm of governments and large companies. All soft- and hardware of the project are under open-source licences (<http://kicksat.wordpress.com>, 07/08/2013).

transmitted from a ground station was planned to command the satellite to open and thus release the Sprites, after which they would be tracked by a worldwide network of amateur ground stations to gather data, however due to delays and malfunctioning, this never happened. The HSC was planned to become HackSat One's mission control, however since there have also been delays in getting the LHS radio mast ready to receive the signals, the project was put on hold. If it gets set up at some point, the HSC might potentially give rise to further LHS sub-groups, such as an astronomy club for example.

Apart from the more formalised groups, the LHS furthermore hosts irregular one-off- or short sessions organised around particular topics, which are also mostly run by members, sometimes by external individuals or organisations. Recent events have included, for example: a brain-computer interface workshop, 'Lightning Talks on Language' (with topics such as conlangs, etymology, speech synthesis and processing as well as language forensics and the International Phonetic Alphabet), a 'Free Hair Cuts' session, the 'Bees 101' (an introduction to beekeeping), knitting machine classes and a crash course in cancer biology. Members also organise various training sessions on demand, such as laser- and vinyl cutter inductions. There is furthermore a monthly 'Games Night', a weekly 'Bad TV Night' and a weekly social evening on Tuesdays, open to the public, where people can come to have a look around the house.

In the past, the LHS also ran an initiative called the 'Young Hackspace' (YH). The idea for the event came up while Dittus was giving a tour of the Hoxton location to some people who asked whether they could bring their six-year-old children: "I always felt like there was a lot of stuff happening for engineering and crafts, but it was generally grown-ups doing it for themselves and there was so much potential to do stuff for kids and also so much enthusiasm."³⁸³ Dittus, the parents and some other LHS members then organised a first meeting where they

³⁸³ Interview 03/03/2014, 15.30-16.30, London

experimented with some possible formats. The YH subsequently took place a few times on Sunday afternoons in the Hackspace where various installations were set up for children to play with, such as a ripple tank demonstrating the relation between sound and motion as well as a laser show, and workshops that taught them how to build things, for example a laser-cutting session. Explains Dittus,

It was a lot of fun, but it was also a lot of work to support. And it essentially stopped because I realised I was getting more busy with other things, with life. I think it was just the moment when I had quit my job and started a Master's or something and all kinds of other things happened. So my situation changed, I wasn't as available anymore. And I couldn't really find anybody who could take it on instead. There was a lot of enthusiasm in principle, but nobody wanted to sort of take ownership. And that's how it evaporated. [...] To me, the whole process was incredibly interesting, also as a means for understanding how a hackspace works as a social space and as a space where people dedicate time to certain things. It really made me appreciate that, at its core, the hacker space as a self-governed space works because it gives people a space where they can follow their own interests. To the extent that there is a frame in which they can operate, which relates to their interests, people are often very enthusiastic. So if you tell them, 'We have ten kids coming over and you have cool stuff to show, you don't need to prepare anything' – for a hacker, that's a brilliant channel. [...] However, if you tell them, 'We have these contacts to local schools or to these 50 parents and using these you could organise your own workshop sessions and then finding a time that fits others, making sure that the space is safe before everybody arrives and so on' – so all that administrative shit – then people stop being interested.³⁸⁴

With the LHS increasingly hybridising – according to Wareing, a new community is now forming about every two months – ³⁸⁵ sub-groups are becoming a bit more structured and actively organising themselves. He says that the trustees are currently looking at ways to further formalise this re-design – for example by getting the sub-groups to actually acknowledge their status in the first place, to nominate a point of contact and to set up a mailing list so that it becomes easier for non-members to find groups and get in touch with them. They also want to ensure that people know how to actually run a sub-group because they might not have done it before – without being prescriptive and allowing people to do what they want. The trustees then also want to allocate

³⁸⁴ [Interview](#) 03/03/2014, 15.30-16.30, London

³⁸⁵ [Interview](#) 10/04/2014, 19.30-20.15, London

(basic infrastructure) money to the different places, so they can self-organise rather than the entire Hackspace having to co-ordinate, which is increasingly becoming “an absolute nightmare”. As Dittus explains further,

We started realising that we can also use these groups as means of governance, where we give [them] access to particular resources, but then also make them responsible for maintaining those resources. [...] I think it's partially a reflection of, let's call it, social reality that people tend to organise around particular interests, but then we also use it as an organisational pattern to create little pockets where certain people feel responsible as opposed to everything belonging to 850 people, meaning it belongs to nobody. And that can work really well. The most recent example for that was the woodworking group. It was started by three or four people, two or three months ago. [...] They were all new to the organisation, but then very quickly realised that they were not alone in their interest around woodworking out of personal curiosity, to have something to do on the side with not a lot of professional ambition, just because they enjoy it. But then they also saw that most of the woodworking tools at the Hackspace actually were of quite poor quality because they were just out of the open and generally people were not trained in the use of the tools. So they proposed a pledge to buy equipment and I think they collected a few hundred pounds by interested members, put it in a locker and then you can get access to that locker, but are asked to introduce yourself to the group first and briefly show that you're capable to use the tools. And that's essentially all the induction you need. It seems like a very simple step, but it's putting a group in charge and then using it as a very simple filter for access. And I think it radically changes how people approach the space, how people approach their expectations of the tools and also of their responsibility of maintaining tools and so on. So having these kinds of interest groups I think is for certain things incredibly important. It also makes it much more easy for new people to approach the organisation; it makes it much more tangible if you can say, 'Oh, you're interested in woodworking, just show up on a Wednesday evening, Pl(a)ywood meets then and you'll meet interesting people and they can show you around.'³⁸⁶

Even though sub-groups are vital for governance of such a large place, one big problem is the (non-)communication *between* those groups. There are already some mechanisms in place, such as the LHS mailing lists, 'Do not Hack' stickers and the three-week bin system, for example.³⁸⁷ However, there are no formal designs yet which facilitate communication between sub-groups and people usually just informally talk to other groups' members they know or email each other's mailing lists. Explains Wareing, there are issues for example with semi-shared

³⁸⁶ Interview 03/03/2014, 15.30-16.30, London

³⁸⁷ If an item is found lying around the LHS without a label or 'Do not Hack' sticker, it progressively goes through the three bins of the system, week by week, until it ends up being thrown away.

areas, such as a large part of the basement with its metalworking room, woodworking area and open workshop. He says that very few people look after them and they get messy quickly, without anyone feeling responsible. He hopes that through a more (loosely) formalised approach, these problems can be tackled soon.³⁸⁸

Since the LHS is growing so fast and increasingly sub-dividing while physical size is limited – they have to stay in the current location for another year and a half at least – another worry is that it will soon split into individual, specialised organisations, which the MHS already seems to be doing. Tells Wareing,

We're either gonna have to cut members or actively help other spaces to absorb some of them. We don't want it to be sub-divisions where people go, 'Oh, we are the biohackers, we'll go and get our own space,' because you lose all of the cross-discipline stuff and that's often the joy of the place. [...] My absolute favourite one was: We had a fairly regular knitting group that was meeting here for a while – I think they now meet in a pub down the road somewhere because they needed more space and they grew quite large. So they were here and then somebody was doing some welding downstairs and they ended up coming for a knitting group and having welding lessons by the end of the day. That's brilliant, that's how it should be! I want ridiculous things like this to happen. I ended up learning so much weird shit and some of the people were like, 'What are you doing?!' 'I'm doing this amazing thing I've never even [heard of] – you can do that?!' I don't wanna lose that and I really, really worry that's what's gonna happen. And I think it will be very sad. [...] I would rather see slightly smaller spaces that try and do everything to the best they can. Maybe with some specialisations in some areas – they're better at one thing than another – but you still end up with people doing all of the things because [the hacker spaces] are near your home – especially in London, where no one wants to travel that far. Coming here for me is easy, but coming here from West London is a pain in the arse. I'd like to see more of the same replicated elsewhere, but at a smaller scale.³⁸⁹

Local Ecologies

Hackney, where the London Hackspace is based, is one of the city's 'creative hubs' and fastest gentrifying boroughs. Due to its East London location, the LHS often gets cited as belonging to 'Tech City'/'Silicon

³⁸⁸ [Interview](#) 10/04/2014, 19.30-20.15, London

³⁸⁹ [Interview](#) 10/04/2014, 19.30-20.15, London

Roundabout',³⁹⁰ however it does not associate itself as being part of "that scene what's been branded by the government horribly," according to Wareing.³⁹¹ Nevertheless, the proximity certainly has had an influence on the evolution of the LHS and in fact was one of the reasons it came into being in the first place. Says Dittus,

It's a self-reinforcing relationship. First of all, the two founders and many of the early members came out of the London internet start-up scene, meaning they already had social circles that they interacted with, which they then also used to promote the effort and invite people. But this also means that there was this corner in North East London where there was knowledge of these hacker-maker cultures – because that's where people who were familiar with these cultures tended to live, because that's where their companies were. And then once you had the organisation and the first spaces, of course people who came from the same start-up scene found out early because, again, it was right next to where they worked or even lived. And I think the effect that we're seeing now is that [...] we still benefit socially from the proximity.³⁹²

Although the LHS collaborates with its local environments – with the East London tech scene as well as with other spheres – it generally does not do so formally as a 'whole' organisation, but in a more decentralised, or even *polycentralised*, way through its individual members as well as sub-groups. Explains Wareing,

That's one of the things that people always say, 'Are there any formal group projects?' We've never done that and we will never do that because [...] then you're typecasting yourself, whereas if you just have members who do that and form groups on their own and they do their own thing, then it just naturally grows. There are loads of people who work with spaces all around here. There are groups that work with universities, there are groups that work with local shops [...]. There are artists upstairs who are members of the space, we get all sorts of people coming from the nearby area who work in here. And all sorts of small companies who have members here and offices nearby.³⁹³

³⁹⁰ Tech City refers to the concentration of technology companies in East/Central London, including the area around Old Street Roundabout ('Silicon Roundabout') and, soon, also the Olympic Park in Stratford. Development of the cluster has been supported by local and national government since 2010 with the aim of creating a place comparable to, and competitive with, Silicon Valley in the San Francisco Bay Area and to make "East London one of the world's great technology centres," in UK Prime Minister David Cameron's words. The initiative is also backed by a number of private companies as well as universities. In 2008, the area included small digital start-ups, however has meanwhile expanded to comprise technology empires such as Google (Campus), Amazon and Intel, for example (http://en.wikipedia.org/wiki/East_London_Tech_City, 07/05/ 2014; Prime Minister's Office *PM announces East London 'tech city'*, 04/11/2010, accessed on: www.gov.uk/government/news/pm-announces-east-london-tech-city, 07/05/2014).

³⁹¹ Interview 10/04/2014, 19.30-20.15, London

³⁹² Interview 03/03/2014, 15.30-16.30, London

³⁹³ Interview 10/04/2014, 19.30-20.15, London

Adds Dittus,

As an organisation, we're actually quite introverted. [...] We're not a hierarchical organisation with clear ambitions where you might need focus and funding to pursue a particular goal. We don't have a goal that we want to pursue – our aim is to create a social space and then allow people to do whatever it is that they wanna do, according to their own motivations. Which means we don't have management structures or reporting structures that would be necessary for a certain degree of organisation. [Establishing formal collaborations as a heterarchical organisation] would be a nightmare for everybody. Who would be the person of contact?! It would either have to be a single person, but without any sort of official title or official request by the organisation. They would have to put it on themselves to be the mediator between organisations. And that's *de facto* how it happens. Or it would be a situation where the other party has to deal with the fact that the organisation is an indeterminate number of people, each of them who might give them different answers. It's a nightmare for a hierarchical organisation to deal with a horizontal organisation because none of the conventional processes work. Because suddenly, there's no fixed contact person or, if you have a fixed contact person, they're generally not in power to make decisions on behalf of the organisation. Their default response would be, 'That sounds great, I can't make a decision now, I need to discuss this with others.' And then it takes at least days, more likely weeks, until that discussion has happened.³⁹⁴

Due to the culture of the LHS, members are most likely to collaborate with members of other non-hierarchical organisations, such as the 'London 2600 Meetup' for example,³⁹⁵ the 'Elephant & Castle Maker Faire', Occupy London or Troyganic café and of course people from other maker labs in the city, the UK and even internationally due to shared, one can say 'local', interests. Again, there are no formal links between the LHS and other labs, however members are often participating in, or at least are in contact with, a number of them – because they have personal relationships there, because they live or work between different cities or because they want to exchange advice and see how other workshops operate. As mentioned above, one organisation that actually is starting to formalise collaborations between hacker spaces is the UK Hackspace Foundation. However, as a mediating body, it is simply trying to create conditions for these workshops to exist in the first place and mainly within its own remit,

³⁹⁴ Interview 03/03/2014, 15.30-16.30, London

³⁹⁵ The 'local' version of a 'global' hacker meet-up named after 2600Hz, the audio frequency through which 'phreakers', i.e. 'phone freaks', hacked telecommunications networks mainly in the 1960s and 70s.

rather than actively directing collaborations with other organisations in order to expand.

On Hackney Road, the LHS is surrounded by 455 Vehicle Services and an off-licence shop. It sits before the Bethnal Green Royal Mail Delivery Office, opposite Boris Bags (Wholesale & Export) and The RE, a four-star hotel, is just on the next corner. The rest of the street is a mix of hipster bars and cafés, betting shops, second-hand furniture stores, Ye Olde Axe (a strip-club-slash-rockabilly-venue), fashion wholesalers, supermarket chain locals, Mecca Bingo and increasingly expensive



Fig. 18: Hackney Road outside of the LHS

residential properties. The four-storey warehouse in which the LHS is housed accommodates The Decorators (an architecture and design office), A4e (a public service provider), as well as some art studios. Says Wareing,

The thing that worries me most is that in three and a half years' time, the whole area is gentrified. You can just see it progressing down Hackney Road and the rent is gonna go sky-high and I don't know what we'll do then because we're not able to afford it. And moving somewhere else means we'll move further out, we'll lose members, we're not gonna have enough money in the bank account, the projections just don't put us in the safe range. We still have maybe 50% of the space to build out – the space we're sat in [the 'quiet' room which hosts the network server] is a disaster zone, it hasn't even been touched. Downstairs is only partially finished, at least a third of upstairs is not even touched yet – we need to knock through walls, we need to rerun wiring, piping, everything and I don't know how we're gonna have the money to

keep going, given the rents in London. [...] And we don't wanna just go, 'Google, come and give us loads of money and sponsor us,' or something – a) because they don't understand us and b) what would we be giving them in return. It's difficult to keep going, I just don't know...³⁹⁶

³⁹⁶ Interview 10/04/2014, 19.30-20.15, London

III. III betahaus Berlin³⁹⁷

betahaus is an urban co-working space for independent 'creatives', functioning as a mix of coffee house, home office, R&D lab, university campus, hacker space, carpentry workshop and start-up incubator. Together with the international co-working network/s, it shares the basic values of 'collaboration', 'accessibility', 'community', 'openness' and 'sustainability'.³⁹⁸ betahaus was founded upon the idea of a new form of economy in which people do not work in classic offices from nine to five anymore, but in which "the creation of value happens in different places, at different times, in changing team constellations and without permanent employment".³⁹⁹ For the co-working space, it is an economy in which entrepreneurial praxis cannot be understood solely in economic terms anymore, but as a converging of the traditional spheres of economics, culture, technology, politics and 'the social' into a "topology of co-working"⁴⁰⁰ – it is an economy in which "almost everyone is an entrepreneur."

betahaus was initiated in the summer of 2008, when the six co-founders sat around a table – media studies/political science/business graduate Christoph Fahle, history/German graduate Madeleine Gummer von Mohl,⁴⁰¹ product designer Tonia Welter, lawyer Maximilian von der Ahé, business graduate Stephan Bielefeldt and political science graduate Gregor Scheppan –⁴⁰² while being frustrated with not finding jobs in places in which they wanted to work. Their first experiences with the existing world of work in Germany, typical for their generation, were "strict working hours, missing collaborative processes and

³⁹⁷ I visited betahaus Berlin between 5th October and 2nd November 2013.

³⁹⁸ See <http://coworking.com>, 23/06/2014.

³⁹⁹ <http://betahaus.de/about-2>, 07/10/2013 (my transl.)

⁴⁰⁰ Fahle, Ch. et al. *Das Beta Prinzip*, accessed on: www.booki.cc/betahaus-ein-coworking-handbuch, 09/10/2013 (my transl.)

⁴⁰¹ Gummer von Mohl had previously interned for the European Parliament and worked for the German Bundestag.

⁴⁰² Gummer von Mohl, Fahle and Scheppan were all involved in the Politikfabrik ['Politics Factory'], a political communications agency for students (www.politikfabrik.de, 23/06/2014).

communication in hierarchical systems on the one hand; isolation, individual competition and self-exploitation on the other”, as well as the illusion that ‘the physical’ and ‘the virtual’ were separate spheres.⁴⁰³ They thus set out to actually build their workplace themselves, i.e. one that is open and collaborative, with a flexible infrastructure between physical and digital, life and work; a place in which “networks can become stabilised, i.e. become visible and graspable,”⁴⁰⁴ a context where web 2.0 materialises. They aimed to create a ‘laboratory’ in which humans are not merely tools in the techno-logical system, but in which technology is instrumentalised to produce and experiment with new forms of organisation that make work enjoyable or at least less tedious.⁴⁰⁵ Although the co-founders do not see betahaus primarily as a political project, they nevertheless consider it a place where precarious freelancers are brought together in a supportive environment through which they can in turn lobby for more support and social security of the independent ‘creative class’,⁴⁰⁶ in Germany and beyond.⁴⁰⁷

The first betahaus was opened in Berlin’s Kreuzberg, one of the city’s ‘creative hubs’, in April 2009. It was one of the first co-working spaces in the city and is now one of the largest worldwide. Since April 2010, betahaus Berlin also hosts the Open Design City (ODC)

⁴⁰³ Fahle, Ch. et al. Das Beta Prinzip, accessed on: www.booki.cc/betahaus-ein-coworking-handbuch, 09/10/2013 (my transl.)

⁴⁰⁴ <http://betahaus.de/faq>, 07/10/2013 (my transl.)

⁴⁰⁵ Partly in the sense of Bernard Stiegler’s concept of an ‘economy of contribution’, which is based on more sustainable forms, or ‘circuits’, of industrial (knowledge) production, rather than consumption. See, for example: *Ars Industrialis Manifesto 2010*, accessed on: <http://arsindustrialis.org/manifesto-2010>, 26/06/2014; Stiegler, B. *For a New Critique of Political Economy* Cambridge & Malden, MA: Polity, 2010.

⁴⁰⁶ See Florida, R. *The Rise of the Creative Class* New York: Basic Books, 2012.

⁴⁰⁷ According to a study by the Institut für Mittelstandsforschung (IfM) [Institute for Research of the Middle Class] in Bonn, the number of self-employed workers in Germany has risen from 7.3% in 1991 to 10.6% in 2012, i.e. from 2.6m to 4.2m, excluding the agricultural sector, forestry and fishery (www.ifm-bonn.org/statistiken/selbststaendige-freie-berufe/#accordion=0&tab=0, 26/06/2014). Freelancers in Germany face many disadvantages compared to the permanently employed, for example with regard to health- and unemployment insurance as well as pension schemes, and of course generally need more flexibility and less bureaucracy in institutional and financial matters. Direct political involvement of the betahaus co-founders has included, for example, the participation in a delegation of 100 leaders from Germany’s digital economy to Silicon Valley in 2013, led by Philipp Rösler, chairman of the liberal Free Democratic Party (FDP) and Minister of Economics and Technology at the time, which was supported by Chancellor Angela Merkel. The delegation was a move to try to turn Germany from a risk-averse nation into an investment culture and to show that the country has a viable technology start-up sector (Wick, A. *Germany’s New Digital Economy Drops Glass-Half-Empty Mentality* on *NPR Berlin Blog*, 21/06/2013, accessed on: www.nprberlin.de/post/germany-s-new-digital-economy-drops-glass-half-empty-mentality, 07/10/2013; *Germany.info Economics Minister Rösler and German Startups Tackle Silicon Valley*, 22/05/2013, accessed on: www.germany.info/Vertretung/usa/en/_pr/P__Wash/2013/05/22-Roesler-California.html, 26/06/2014).

workshop⁴⁰⁸ and further betahouses have been set up in Hamburg (since July 2010), Cologne (since May 2011, closed in April 2013), Sofia (since June 2012) and Barcelona (since October 2012).⁴⁰⁹

The name 'betahaus' comes out of the software development terms 'beta version' and 'beta phase', which describe the way in which the place wants to function, i.e. as an open process. In 'perpetual beta', the house never aims to be complete, but always be further tested and developed together with its members. No one can say yet how a betahaus is supposed to look like and how it can function in a sustainable way, especially since places like this have only developed since fairly recently. According to Fahle et al., the 'beta principle' follows the "non-ideology of 'dogmatic pragmatism': no basic principle, no rule is set up that won't be turned on its head again later."⁴¹⁰ While thinking about a name, the founders also came across the history of the Greek letter 'betha': its predecessor originates in the Aramaic and describes a symbol of a square yard or house with an open door.

At the time of my visit, around 250 people⁴¹¹ worked in betahaus in some way every day – full-time, part-time, on-and-off or/and just for a short period – from areas such as design, photography, education, architecture, journalism, law, software development, translation, art and

⁴⁰⁸ See more below.

⁴⁰⁹ betahaus Hamburg was redesigned in summer 2013 due to bankruptcy. According to Lars Brücher, old stakeholder and new director of the company, the old space was too small and inflexible. And after eight long-term co-workers had left, the house was not able to fill the desks again quickly, partly because a lot of freelancers in Hamburg are able to work in the offices of their temporary employers anyway (Maier, J. *Betahaus Berlin – "Wir sind fast ausgebucht"* in *Berliner Zeitung*, 09/09/2013, accessed on: www.berliner-zeitung.de/wirtschaft/betahaus-berlin--wir-sind-fast-ausgebucht-,10808230,24257926.html, 07/10/2013). The functioning parts of the old corporation were bought by a new one formed out of two old stakeholders and a new investor with the help of sponsoring from various companies in Hamburg as well as advance bookings by future co-workers. A larger, more flexible location was found and a new pricing model introduced. betahaus Cologne was not able to find a different solution and thus had to close permanently. According to the team, the main problems were missing well-paid events and co-operations with companies, an ill-designed building as well as burnt-out staff (<http://koeln.betahaus.de>, 22/10/2013).

⁴¹⁰ *Das Beta Prinzip*, accessed on: www.booki.cc/betahaus-ein-coworking-handbuch, 09/10/2013 (my transl.)

⁴¹¹ Middle-class, predominantly 'white' professionals. It seemed to me that the (slight) majority of people in the house were German, however English was probably spoken the most. According to a betahaus-internal study around social security from April 2010, in which 37 people participated, only one third of betahaus co-workers were female, however the ratio felt slightly more balanced when I visited. The median age was 31.6 years, according to the findings, 40% had a gross income of less than €1,800/month, 31% between €2,500 and €3,500 and 11% over €5,000 (Bühr, P. & Fahle, C. *Kurzstudie: Soziale Absicherung im Betahaus Berlin*, Mai 2010, accessed on: http://betahaus.de/files/2010/05/Betahaus_Kurzstudie_Soziale_Absicherung.pdf, 08/10/2013).

the third sector. Most co-workers are freelancers or start-up entrepreneurs, however the house also accommodates some external corporate teams who use betahaus as an innovation lab – for specific projects or/and to experiment with new forms of work organisation (which they aim to integrate into their more traditionally designed businesses). Start-up companies at the time of my visit included, for example, 'somewhere' (a work-related social network based on 'cultural fit' rather than formal qualifications and skills), 'knowable' (a virtual maker lab) and the 'Lunch Network' (a website/app to organise lunches among co-workers, including at betahaus). Some start-ups won external competitions that have gained them a temporary place in the house.⁴¹²



Fig. 19: betahaus Berlin at 19-20 Prinzessinnenstraße

⁴¹² For example through the Axel Springer (publisher) 'Plug and Play Accelerator' for digital entrepreneurs who participated in an acceleration programme in Silicon Valley before moving into betahaus.

Corporate Design

Before betahaus could be set up as a primarily commercial organisation, it had to develop a business plan in order to get financial support through banks, investors and competitions as well as to comply with the regulations of various state institutions. Since it was always supposed to function 'in beta', by converging a number of different disciplines, its co-founders had problems with gaining financial support, especially through business plan competitions. According to Fahle et al., the reason for being dismissed in the early stages was always along the lines of, "Your business model is not comprehensible enough. Reduce your fields of activity, otherwise your corporation has only little chances of success."⁴¹³ Although market research had been done and a certain 'strategy' been established, betahaus' business 'plan' functioned more like a 'business guess', i.e. it tried to stay open and adjust itself to constantly changing circumstances. Thus, the corporation was finally financed by the co-founders' own capital and help from friends and family in addition to some bank loans.

Although co-working spaces in Germany can generally be founded as a 'corporation', an 'association' or simply as a 'club', the betahaus co-founders decided for a *GmbH & Co. KG*, a '*Gesellschaft mit beschränkter Haftung & Compagnie Kommanditgesellschaft*' – i.e. a corporation in which the liable shareholder is not a person, but the corporation. betahaus was not founded as a 'club' since it would have been a non-legal entity, and not as an 'association' because it could not have been profit-oriented and thus not been a commercial construct per se.⁴¹⁴ It also would have been possible to do it as an *Unternehmergeellschaft (UG)*, a fairly new form of corporation in

⁴¹³ [Das Beta Prinzip](http://www.booki.cc/betahaus-ein-coworking-handbuch), accessed on: www.booki.cc/betahaus-ein-coworking-handbuch, 09/10/2013 (my transl.)

⁴¹⁴ I have not been able to speak to the co-founders directly and thus do not know exactly their motivations behind this. I presume that, apart from the fact that they want to make profit out of betahaus at some point, an 'association' might have been unsuitable since this organisational form is largely heterarchically and informally structured, which slows down organisational processes and makes work more complicated for the co-workers, including start-ups, trying to earn their daily subsistence in the house.

Germany, whose main advantage is the very low seed capital of only €1. However, a *UG* is still not taken very seriously by a lot of business people and it is very difficult to start renting out space as well as get loans and investors since the low seed money entails a lot of risks. It would have furthermore been possible to design *betahaus* simply as a *GmbH*, which would not require the extra administrative work due to the *GmbH & Co. KG* technically being two corporations, but the latter entails certain tax advantages.⁴¹⁵

At the time of my visit, *betahaus* was run by eleven core staff including three directors – Gummer von Mohl, Fahle and von der Ahé – as well as eight support staff plus regular (unpaid) interns. The house is open for co-working Monday to Friday from 8am to 8pm as well as on Saturdays from 9am to 6pm. In order to work in *betahaus*, one first of all has to pay a basic membership fee of €10/month, which enables one to attend all internal events and advice/feedback sessions, to get discounts on workshops and to co-work three days each month in one of the other *betahaus*es in Europe. In addition to the basic membership, one can book either: a 'Flex Desk', which is shared between other Flex Desk 'users'; a 'Fix Desk', which is reserved for just one member; a 'Team Desk', i.e. a large group table permanently reserved for a group of three; a 'Team Room', which has space for five to ten people and is primarily given to start-up companies who need to apply for it. A Flex Desk costs €149/month full-time or, part-time, either €12 per day, €49 for five days or €79 for twelve days; a Fix Desk comes at €229/month; a 'Team Desk' (for three) is €500/month, whereby each additional member needs to add another Flex Desk; a Team Room is €800-€1,500/month. Apart from that, one can add certain 'Extras' on a modular basis, such as a post box, VOIP, a locker, 24/7 *betahaus* access or a 'Black Coffee Flat' for €25 each. Members can also book meeting rooms for up to eight people on an ad-hoc basis for €10/hour. Childcare

⁴¹⁵ Fahle, Ch. et al. Das Beta Prinzip, accessed on: www.booki.cc/betahaus-ein-coworking-handbuch, 09/10/2013

facilities were not available yet at the time of my visit, however were being considered for the future. Apart from the co-working leases, betahaus furthermore finances itself by renting out office space to external organisations, through events, workshops and sponsorships.⁴¹⁶

The betahaus in Berlin is invested to a third each in the other houses in Hamburg, Sofia and Barcelona. As they want to establish and preserve a betahaus 'global' brand, the different places include common characteristics in, for example, their web- and interior designs, core (event/workshop) programmes and flexible pricing models, however all have adjusted their architectures to their 'local' environments (so that betahaus Barcelona has a rooftop event space, for example, or that betahaus Sofia is not located in a 'creative hub' since creative hubs as such do not exist in Sofia yet). Once a year, all betahaus teams, as well as some other co-working spaces (such as La Mutinerie in Paris or Cowo360 in Rome), get together into one of the houses for the 'betahaus summit', where the different groups exchange their knowledges and try to better connect the (primarily European) co-working community. In September 2013, betahaus furthermore became part of the Startup Federation, a network of eight incubators around the (largely 'Western') world – including 1871 in Chicago, for example, Digital October in Moscow and Capital Factory in Austin – instigated by 1776 in Washington DC, with the aim of creating a better global ecosystem of the industry. In its first stage, the programme enables start-ups from one place to use all the other incubators while travelling, with further collaborations planned.

Morpho-Logical Place/s

To the co-founders, their birthplace Berlin seemed to be the right environment to set up a place like betahaus in 2009. 20 years after the fall of the Wall, the city had become one of Europe's main cultural

⁴¹⁶ See more below.

capitals with a thriving technology start-up scene. Berlin is today chosen by many international creative workers of sorts as their (often temporary) home, thus providing betahaus with a 'global' flux of potential inhabitants. Due to the city's cheap rents (as a consequence of its post-WWII history), it was easy for the co-founders to find a building for little money quickly. After some research, they found a location on 19-20 Prinzessinnenstraße, just off Moritzplatz in Kreuzberg, one of Berlin's creative centres, where advertising agencies live next to bars, restaurants and fashion stores, therefore also being well connected to the city's public transport networks. Even though right in Kreuzberg, Moritzplatz at the time of research was not really part of this ecosystem, but a location shaped by patches of asphalt wasteland with hardly any creative industry immediately around.⁴¹⁷ betahaus' home – a six-storey office building largely empty at the time and formerly housing cloth- and print factories, whose façade is now slightly subverted through pink panels with circus lamps and a 'cool' betahaus logo – was to a large extent chosen due to its spacious, bright rooms that are necessary for collaborative working and flexibility as well as due to very low rents for the first six months set by Orco-GSG,⁴¹⁸ who had already commissioned a study on the 'creative economy' in Berlin at the time.⁴¹⁹ According to the 'beta principle', only very little was invested in the design of the building at the beginning and the set-up was minimal – only so much structure that the functional frame was given in order to achieve maximum openness and development potential. Thus, before the official opening of the house, 'betalab' was introduced: After high amounts of social media marketing, the co-founders selected 20 test

⁴¹⁷ The square was severely damaged by bombings in WWII, and the 'radical regeneration' [Kahlschlagsanierungs] politics of Willy Brandt in the 60s and 70s, during which many old buildings were demolished, did not help. The development of the area was furthermore blocked by a planned motorway tangent to be connected to the square's roundabout, which was never realised in the end ([http://de.wikipedia.org/wiki/Moritzplatz_\(Berlin\)](http://de.wikipedia.org/wiki/Moritzplatz_(Berlin)), 26/06/2014; Schmid, E. D. *Blumenbar im Schwimmbecken* in *Berliner Zeitung*, 13/05/2011, accessed on: www.berliner-zeitung.de/archiv/mit-dem-aufbau-haus-wird-der-moritzplatz-neu-belebt--immer-mehr-kreative-siedeln-sich-dort-an-blumenbar-im-schwimmbecken,10810590,10786788.html, 26/06/2014).

⁴¹⁸ A provider of office- and commercial spaces in Berlin.

⁴¹⁹ Fahle, Ch. in Denk, F. *Wie viele Kreative verträgt die Stadt?* in *zitty Berlin*, 04/01/2011, accessed on: www.zitty.de/wie-viele-kreative-vertraegt-die-stadt.html, 26/06/2014

'users' via Facebook who could rent a workplace in the house for €100/month for three months, on the condition of having to bring their own furniture as well as help with the design process. Only a very basic infrastructure was given – such as the building itself including rooms and toilets, a small kitchen, some technological systems such as electrical wiring and broadband.⁴²⁰ Everything else was being developed bit by bit in collaboration with the initial betahaus co-workers. After one month, the 250sqm office space rented out in the building was almost filled so that another 300sqm was leased on another floor.



Fig. 20: betalab

Starting from the ca. 550sqm at the time of opening, betahaus has since been renting out further floors in the building and at the time of my visit included around 2500sqm spread across five storeys – ground floor, the first-, third- and fourth floors as well as the basement:⁴²¹ Ground floor first of all includes a public café, which functions as a reception. Since everyone has to pass through when entering or exiting the house, it is supposed to work as a transition between private- and public

⁴²⁰ Since the building formerly accommodated manufacturing businesses whereas betahaus primarily belongs to the service industry, the house had to be redesigned for example in terms of toilet numbers and emergency exits.

⁴²¹ The second- and fifth floors as well as the other wing of the building housed a number of companies in the creative sector, such as the 'Journalistenetage' ['Journalists' Floor'], i.e. an office community for freelancing journalists, and 'jovoto', a 'crowdstorming' (i.e. brainstorming on a large scale) initiative in the field of product design and -innovation.

sphere, thus trying to set the atmosphere of this ('open') place.⁴²² Apart from selling food and drinks⁴²³ as well as playing background music, the café also hosts exhibitions, concerts, parties, large dinners and various other events, mostly free and open to the public, according to which it

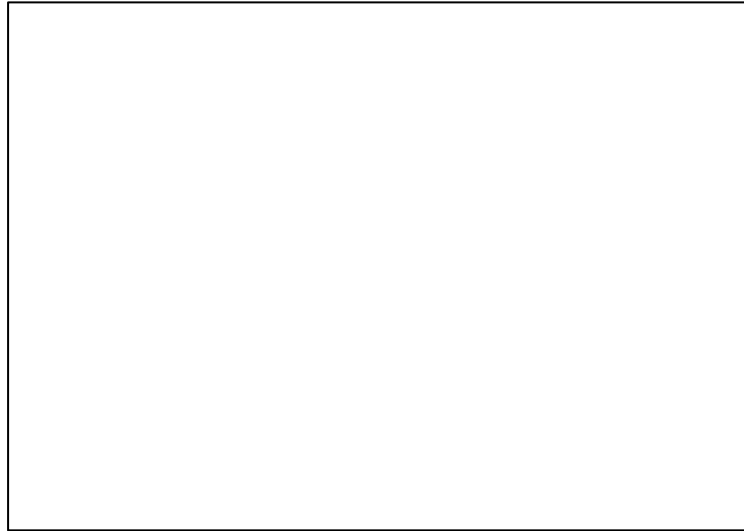


Fig. 21: Multi-functional café with 'tree house'

gets redesigned. Around the time of my visit, events included, for example, a presentation on black holes by 'Pop Science Café', the 'Urban Knights' programme of talks around urban change, the 'ReciproCity' exhibition on graphic design influences between Berlin and Barcelona as well as the annual 'People in Beta' festival, a one-day event around co-working-, start-up- and DIY culture. Due to its multi-functional design, the café comprises a 'stage' (including a 'tree house' with a small library) and an 'arena' of benches which, during normal opening hours, are integrated into the café set-up. The large, high walls are painted white, so that they can easily function as

⁴²² Although the café functions in this way to some extent, the location and design of the building are a bit problematic, as it is, firstly, not directly on Moritzplatz, but on a nearby side street and not that easy to see from the square or main road. The house is also slightly set back from the street due to car parking space right in front, i.e. it is not immediately accessible, certainly not recognisable as a café and thus not that inviting to people who do not know about it. During my time working in the café, I felt that most people in there were part of betahaus anyway and that not a lot of 'outsiders' were actually using the building.

⁴²³ When betahaus launched, the 'café' (then simply a 'canteen' due to less complicated registration processes) just sold some basic drinks, sandwiches and soup prepared by the co-founders themselves. The staff were betahaus co-workers who financed their desks in this way. At the time of my visit, the café included a full team of cooks and baristas, a professional kitchen and a wide range of food and drinks, thus accommodating the increasingly demanding betahaus clientele.

background for artworks or projections. Throughout the workday, the café is often used by co-workers to welcome their clients and to have a quick meeting with colleagues or other co-workers. It also functions as a slightly more relaxed, informal and 'public' workplace, in contrast to the co-working areas upstairs, which one might prefer according to one's 'attunement'. Ground floor furthermore includes the Open Design City, comprising three rooms out of which one is the main workshop area, the other a meeting-/classroom and a reception, which has been changing quite substantially over the years.⁴²⁴ There was also a 'Machine Room' outside of the ODC which used to host CNC routing company formcut, however was empty for most of my visit and then one day transformed into a kitchen/lounge and a few days later into an electronics workshop for the weekly 'DIY BaustelMontag'.⁴²⁵

The first floor comprises the betahaus reception, which opens a large lounge. It is used by co-workers to collaborate on projects or to work more individually in a slightly more public environment, without the distractions of the café downstairs. The lounge is also location for the weekly 'betabreakfast' event, a collective breakfast on Thursday mornings where two or three start-ups give five-minute presentations, followed by a discussion and networking. When I visited, pitches were made by Diagsum (an online diagnostic service for retinal diseases), get2play (a virtual music school) and PoDojo (a learning incubator for product developers).⁴²⁶ The event is free for members, otherwise costs a small fee and includes a betahaus trial day, thus the breakfast often functions as an introductory social environment for new co-workers. The lounge furthermore hosts 'betabeer', a free social beer night for members ca. once a month on Friday evenings. The first floor also accommodates the first set of open, loft-style co-working areas, a few meeting- and team rooms as well as a silent room, thus integrating

⁴²⁴ More in the next section.

⁴²⁵ Also see below.

⁴²⁶ 'Product Owner Dojo'. 'Dojo', Japanese, meaning 'place of the way'.

different types [Arten] of workplaces. Explain Fahle et al. in their open-design co-working handbook,

Co-working means to be able to move in space freely. It should be possible to be able to change one's work position and environment at any time. WiFi, internet and laptops have detached 'working' from [geographical] 'place' on a technical level. When one can work whenever, wherever, however and with whomever one wants to, the place in turn has to adapt to the different requirements of the user. If the place doesn't accomplish this, the user will look for another one. [...] The degree of interaction, communication and concentration changes according to the work phase – brainstorming, research or realisation. Concentrated individual work alternates with communication-intensive team meetings. A skype conference demands a different set-up than the presentation of an architectural model.⁴²⁷

In this way, betahaus' furniture (generally sourced from the 'global' market) is largely mobile and modular and plugs are accessible from every location (often hanging from the ceiling) so that environments can be changed around quickly – for example when a new co-working team moves in that requires a larger desk space which is then assembled through a few smaller tables. In order to keep a certain turnover of co-workers in the house, only one third of all desks are Fix Desks (Flex Desks are generally more expensive due to shorter leases and the flux of workers is needed to maintain 'global' knowledge- and capital circulation). Furniture materials and designs are usually light and simple, such as lamp shades made out of paper (or none at all), plywood tables and shelves – for mobility, but also for financial reasons in order to keep co-working affordable to the (largely lower- to middle-) middle-class clientele. Larger furniture, such as shelving units, often function as 'walls'/room separators in order to create "a balanced relation between proximity and distance as well as communication and concentration. [...] If a user desires more intimacy, he can close the bits of the shelf around him with drawers, doors etc. and in this way reduce

⁴²⁷ Das Beta Prinzip, accessed on: www.booki.cc/betahaus-ein-coworking-handbuch, 09/10/2013 (my transl.)

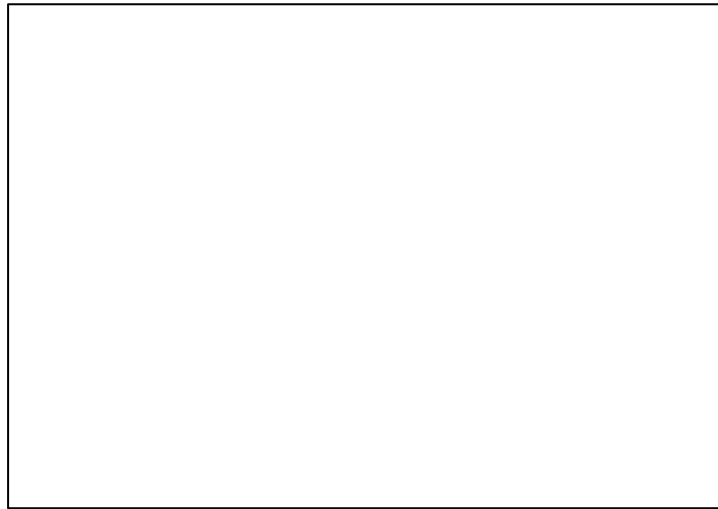


Fig. 22: Open co-working environment

permeability/transparency."⁴²⁸ In order to tone down the acoustics of such a large open room as well as to create a warmer, more comfortable atmosphere, some carpets have been laid out, felt drawers put into shelves, mostly upholstered chairs have been used, sofa corners created, coat racks set up to absorb noise as well as plants scattered around the rooms. Tables are not set up in rows, but placed into larger and smaller off-the-grid clusters, which change frequently and are slightly separated with shelves, plants and coat racks or just set apart from each other. There are not too many tables in each room so that it does not feel overcrowded and dense. The colour scheme is rather warm and slightly subdued, however broken up with some bright shades, such as yellow and pink, in order to make the office feel more like (a 'cool' middle-class) home. As Fahle et al. formulate it, "[...] When designing a co-working space, the biggest enemies are regulations and work standards such as DIN 16555 (requirements for the design of an office workplace)."⁴²⁹ The first floor furthermore hosts some 'Dialog' meeting rooms that can be booked by betahaus members or external organisations, which have included O2 and eBay, for instance. Some of the rooms have moveable doors and can thus be merged into a larger

⁴²⁸ Das Beta Prinzip, accessed on: www.booki.cc/betahaus-ein-coworking-handbuch, 09/10/2013 (my transl.)

⁴²⁹ Das Beta Prinzip, accessed on: www.booki.cc/betahaus-ein-coworking-handbuch, 09/10/2013 (my transl.)

space. The rooms are also used for the 'Office Hours', where betahaus members can drop in and get free advice/feedback sessions on most weekdays. These are often given by betahaus co-workers and staff themselves (including the co-founders) and comprise changing topics such as personal coaching, gamification, creativity, tax for freelancers, crowdfunding, graphic design, mathematical modelling, CV-writing as well as a 'How to Make the Best Out of Co-Working' session with Fahle. The first floor also includes the 'Back Office', slightly hidden behind the lounge, from where betahaus is 'globally' managed. As Fahle and co. write,

Viewed through the administrative lens of the founder, betahaus divides itself into two areas: There is the space, lively playing field and stage, as face of the corporation on the one hand and the firm, acting in the invisible hinterland on the other. The user in betahaus only perceives the 'user interface', i.e. the space and will never see that behind this, entire worlds full of mountains of data, commodity motorways and cleaning choreographies are concealed. It is the same with ballet dancers, pop stars or chess world champions. Shining and winning always looks easy and playful, but really is the fruit of discipline and hard work. Just that no one is allowed to perceive it.⁴³⁰

The third floor of betahaus includes predominantly open co-working environments, but also some more Dialog rooms, the 'Event Office', a 'Rest & Relax' room and a kitchen where co-workers can prepare their own food and drinks. One area of the third-floor co-working area also has some mobile sofa 'pods' in which one can relax or talk on the phone slightly more privately. The pods can be moved around so that one can, for example, combine two or move them towards the wall in order to 'cut oneself off'. There is also an old German telephone box where one can make confidential phone- and Skype calls.

The fourth floor houses the 'Arena', which is used for smaller events – by betahaus members, but also rented out to external organisations (mostly from Berlin, but also elsewhere in Germany, Europe

⁴³⁰ Das Beta Prinzip, accessed on: www.booki.cc/betahaus-ein-coworking-handbuch, 09/10/2013 (my transl.)

and beyond), which have included the Universität der Künste Berlin for instance, in the framework of a project presentation for a design module, or 14km, an NPO with the aim of fostering innovative collaborations between Europe, North Africa and the Middle East, which occupied the room for their launch. The (Roman-style) Arena can be used on its own or together with the 'Barcamp Area',⁴³¹ which it directly connects to. The Barcamp Area is a 120sqm environment with a central 'square' and large roundtable surrounded by six semi-separated rooms for six to ten people each. The area is designed a bit like a ('cozy') Scandinavian cottage in which the rooms are separated via wood panels, -doors and -shelves that reach up to the ceiling and thus cut the rooms off from the central area to an extent, but still keep them 'permeable', depending on how much one fills up the shelves and whether one leaves the doors open or not. The environment is a location for more practical workshops (usually rented out to larger external teams) where people split up into groups and work on different projects after listening to a presentation, or while a presentation is happening in the Arena, at the same time as being able to communicate with each other, and then congregate again to present results. The location sometimes also accommodates the semi-permanent start-up teams of betahaus, thus creating a more intimate environment between the different companies, potentially fostering collaborations. The fourth floor furthermore includes the ca. 200sqm 'Innospace' for larger events including up to 150 people. The room can be used as one large area or broken up into three sections that can be separated with curtains as well as moveable doors, whereby projection screens can be rolled down at various points. The Innospace is, betahaus-internally, used as location for big events such as 'betapitch',

⁴³¹ BarCamp is an international network of software developers, hackers, designers, activists etc. who hold 'unconferences', i.e. participatory workshop-events, in various locations around the world, usually over a few days. Initially, the camps revolved around the technology sector only, however are now increasingly transdisciplinary.

a competition for start-ups,⁴³² however very often hosts externally organised events, such as 'Assembled Capital: A Founder's Guide to Fundraising' by General Assembly, a global tech/design/business campus aiming to "transform thinkers into creators".⁴³³ The fourth floor moreover includes another Dialog room as well as betahaus' 'Law Office', where von der Ahé is based and members can drop in once a week for Office Hours around legal issues. The basement of the house is generally used as storage space, however sometimes gets redesigned for parties.

The building is connected via fast wireless internet infrastructures as well as a cloud-based printing service (ezeep, a start-up founded within betahaus) so one can print from anywhere within the house. Through its virtual architecture, betahaus co-workers are, for example, furthermore networked via internal mailing lists, the 'Open-Design-City' Google group⁴³⁴ as well as the betahaus website. The internal email newsletters (largely designed in a modular way, so they can be changed over quickly) are sent out every other day and include information on upcoming betahaus events and workshops, updates about the organisation as well as start-up competitions. They also include interviews with betahaus co-workers and start-up companies so that people can better connect in the house and possibly form new collaborations. The website, apart from including information on events and workshops and the organisation in general, hosts a virtual pin board with profiles of the more permanent betahaus co-workers – again, to make it easier to find people in the house and form partnerships with them. The internal mailer and website are not contributory, but are managed by 'the host', i.e. betahaus' core staff, and in turn by the directors. As Fahle et al. write,

⁴³² betapitch is held once a year in each betahaus, whereby the winners of the local competitions then participate in the 'betapitch global' event.

⁴³³ See <https://generalassemb.ly>, 23/06/2014.

⁴³⁴ Which was hardly used at the time of my visit. Reasons for this can be found in the next section.

[The host's] daily work has the growth and prosperity of a real social as well as professional network as its aim. He mediates the vision and values of betahaus and makes the added value and synergy effects of the community visible and graspable. Only through the key position of the host, the possibility of interacting with betahaus and so to enable the dialogue between corporation and user is opened up to the user. In the face of abstract processes, which are created in a continuously growing and changing corporation, it is a real challenge to always put the human in the foreground. It's like the innkeeper and his regulars: It strongly depends on him whether the users feel comfortable and an atmosphere is created which, on the one hand, radiates hospitality and, on the other hand, enables effective working.⁴³⁵

Since betahaus moved to the Moritzplatz area in 2009 – because it was in turn attracted by the place that was close enough to the ‘creative Kreuzberg’ at the time, but cheaper and more “edgy” and “unfinished” – ⁴³⁶ the area has been generating a number of new organisations (and in turn driving up its own rents): such as Prinzessinnengärten [‘Princesses’ Gardens’], a social urban garden project grown on one of the asphalt islands of the area,⁴³⁷ and the Aufbau Haus [‘Buildup House’], a cultural centre accommodating, for example, Aufbau publishing and planet modular, a department store for makers, which transformed the (empty) Bechsteinhaus (where the Bechstein family used to produce pianos and Visolux manufactured electronics). The Moritzplatz area now also houses the European headquarters of Etsy, an online marketplace for handmade goods, lasern, a laser-cutting company, as well as numerous other businesses in the creative sector, thus becoming part of the Kreuzberg ecology. In order to celebrate the emergence of a local maker culture around Moritzplatz, the place was transformed into ‘Makerplatz’ for two days in autumn 2011 – a festival which coincided with three events: ‘People in

⁴³⁵ [Das Beta Prinzip](http://www.booki.cc/betahaus-ein-coworking-handbuch), accessed on: www.booki.cc/betahaus-ein-coworking-handbuch, 09/10/2013 (my transl.)

⁴³⁶ Gummer von Mohl in Griffin, M. & Jürgens, B. *Conversations: Madeleine von Mohl on Locally Grown City*, 06/06/2012, accessed on: www.locallygrowncity.net/index.php?option=com_content&view=article&id=32: vonmohl&catid=7&Itemid=101&lang=en, 23/06/2014

⁴³⁷ The land of Prinzessinnengärten is rented out by the city of Berlin and managed by the ‘Liegenschaftsfonds’ [‘Landed Property Fund’], which has been planning to sell the land in this ‘regenerating’ area to the highest bidder. The garden has thus been on precarious one-year contracts between 2009 and 2013, however due to a local campaign and petition, which has generated over 30,000 signatures in the summer of 2012, the sell-off has been stopped for the time being (<http://prinzessinnengarten.net>, 26/06/2014; Szyndzielorz, J. *Brötchen und Späti - das braucht der Moritzplatz* on [Zoom Berlin](http://zoom-berlin.com/morgen/bruetchen-und-spaeti-das-braucht-der-moritzplatz/static,morgen,moritzplatz_de.htm), accessed on: http://zoom-berlin.com/morgen/bruetchen-und-spaeti-das-braucht-der-moritzplatz/static,morgen,moritzplatz_de.htm, 26/06/2014).

Beta' by betahaus, the opening of the Aufbau Haus as well as the 'Potato Fest' by Prinzessinnengärten. As part of the festival, many local

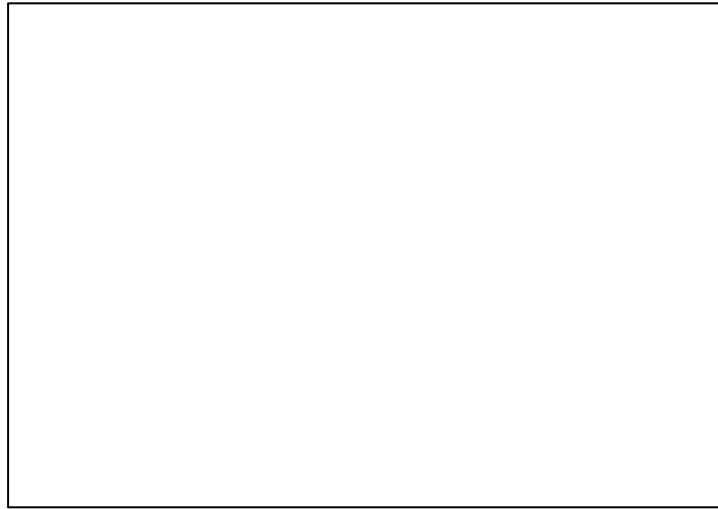


Fig. 23: Moritzplatz becomes 'Makerplatz'

organisations put on events, such as a clothes-making session with Etsy Labs, a cargo bike workshop in the Open Design City, a picnic on the square sponsored by planet modulor and M1 café at Aufbau Haus and a digital manufacturing session for school children by Weltgestalten,⁴³⁸ an initiative which sets up collaborative design projects with local schools. This 'transformation' of Moritzplatz within recent years has however not prevented the area from staying at the bottom of the 'Social Index I' as part of the Berlin 'Sozialstrukturatlas 2013' ['Social Structure Atlas'], indicating unemployment and the receipt of social benefits.⁴³⁹

Open Design City

The ODC was set up in betahaus Berlin in April 2010 and was instigated by designer/consultant Christopher Doering, computer and

⁴³⁸ 'Weltgestalten' can be translated with 'world figures' or '-designs' as well as 'designing (a) world'.

⁴³⁹ Senatsverwaltung für Gesundheit und Soziales *Handlungsorientierter Sozialstrukturatlas Berlin 2013*, November 2013, accessed on: www.berlin.de/imperia/md/content/sen-statistik-gessoz/gesundheitspezialberichte/gbe_spezial_2014_1_ssa2013.pdf?start&ts=1393515352&file=gbe_spezial_2014_1_ssa2013.pdf, 26/06/2014

communications scientist Philip Steffan and designer/'social hacker' Jay Cousins who collaborated in the temporary MakerLab at 'DMY International Design Festival' at Berlin Tempelhof airport. Since betahaus was planning to set up some sort of maker lab anyway, Fahle offered them a room of ca. 150sqm after a short meeting at the festival and is now located on the ground floor towards the back of the house. Inspired by other 'hacker spaces' and 'fab labs' at the time, the ODC was set up around the principles of sharing resources and knowledge in order to create 'open designs' collaboratively, i.e. beta products that people are free to make, share, adapt, modify and build upon. It aims to function as a workplace in which its 'citizens' design for the commons by experimenting with new methods of monetisation and reward.⁴⁴⁰ In order to keep the ODC open to possibilities and change, the founders tried to only loosely define the place, keep access barriers to a minimum and just let interested makers from all sorts of backgrounds come in and shape it themselves. Tells Sebastian Burkhart, software developer and long-term ODC participant,

[The ODC] was totally open for various types of ideas and workshops. One could almost say it was some kind of 'house share' of all types of people. Everything was very disorganised – deliberately disorganised – and very grassroots. That's why a lot of different stuff was created in there all the time – i.e. not just things got built in there, but people also cooked or did material research. Plastic was produced from starch, for example, and such things, which one could actually eat – really crazy stuff! [...] It was all very casual, there were always people coming in spontaneously saying, 'Hey, can we do this thing in here now?,' and then someone said 'yes' and then it was just done. There was nothing like having to ask anyone for permission, one always just did stuff in there.⁴⁴¹

In its embryonic phase, the ODC was a relatively separate sphere within betahaus, freely accessible to anyone 24/7. Says Burkhart, "Technically, one could go in whenever – whenever one had a key. Quite a lot of people had a key. Sometimes, one went in and someone had just slept

⁴⁴⁰ <http://opendesigncity.de/mission-statement>, 14/10/2013

⁴⁴¹ [Skype Interview](#) 06/11/2013, 18.30-19.30, London-Berlin (my transl.)

there.”⁴⁴² The ODC included woodworking equipment sponsored by Bosch, such as a jig saw, glue guns, different types of screwdrivers, hammers and drills etc., however a lot of tools were donated by the ‘citizens’ themselves.

We also had a 3D printer that Philip [Steffan] put in there, which also belonged to him. Then I also put in an oscilloscope and my entire electronics equipment. And then there was also Axel Stab, one of the engineers, [...] who put in a large drill press and a CNC router and everything. [...] There was no real concept of property in there, i.e. everything belonged to everyone, that's why everyone used everything for anything – which led to a lot of spontaneous new ideas, however therefore it was also gone sometimes.⁴⁴³

Although Doering, Steffan and Cousins were the main people responsible for the ODC, it was generally heterarchically organised. It was however financed almost entirely by ‘donations’ from betahaus and functioned as some sort of marketing initiative for the co-working space. Explains Burkhart,

For many people, it was a reason to think of betahaus as a ‘cool’ place and to be there and not somewhere else. Even the people who didn't even work in the ODC nevertheless told their friends, ‘There's this really cool room where I work,’ and then they always came in and showed it to their friends, walked around once and then out again. [...] It was some kind of curiosity. Actually, even for tourists.⁴⁴⁴

In its initial design, the ODC attracted everyone from hobby tinkerers, engineers and architects to entrepreneurs, to biologists, activists, philosophers and anthropologists – mostly local individuals who came in for spare-time tinkering, but also a few companies (from inside betahaus or elsewhere) making prototypes and using the workshop as an innovation lab. Most people were not actual betahaus members, but came from outside and paid a voluntary fee to work in there – or not.

⁴⁴² [Skype Interview 06/11/2013, 18.30-19.30, London-Berlin](#) (my transl.)

⁴⁴³ Burkhart, S. [Skype Interview 06/11/2013, 18.30-19.30, London-Berlin](#) (my transl.)

⁴⁴⁴ [Skype Interview 06/11/2013, 18.30-19.30, London-Berlin](#) (my transl.)

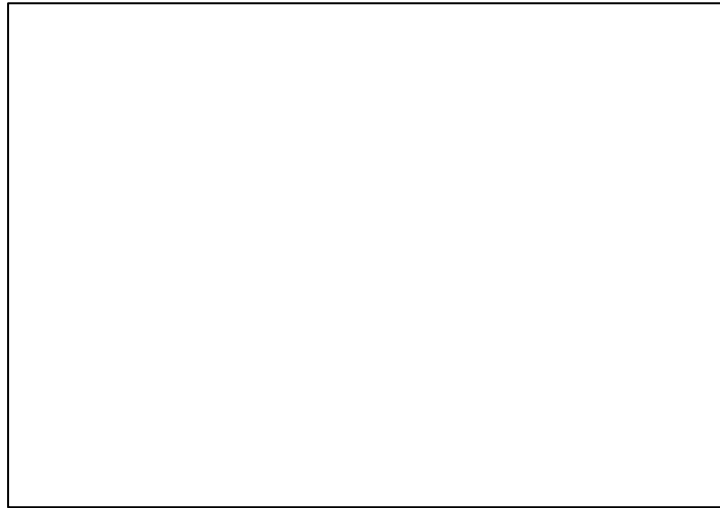


Fig. 24: Open Design City in 2010

The ODC has been hosting various projects, workshops, seminars and events – some early ones included, for example: a) Lamp shades made out of trash and tea bags as part of an ‘upcycling’ workshop. b) A plastic brain that three-dimensionally lights up different parts according to specific stimuli. c) The ‘Display 2000’, a ca. 10m x 2m display including over 170 neon tubes through which one can run different texts – Burkhart says it was exhibited at the Transmediale art and technology festival in Berlin.⁴⁴⁵ d) ‘Foam cutting for human rights’, a project in which a group of activists donated a foam cutter to the ODC in exchange for the hackers to show them how to use it. After a training session, the activists were able to work the machine and returned to build a four-metre styrofoam ‘20’ to articulate the prison sentences given to Iranians because of their religious beliefs. e) A CNC foam cutter – after the donation of the foam cutter, one ODC hacker had the idea to turn it into a CNC machine, but the project was abandoned quickly due to complexity and cost. However, one day engineer Axel Stab donated a CNC router which got hacked, was newly built up again and has since been transformed many times. The idea of a CNC foam cutter could finally be realised by merging the foam cutter and CNC

⁴⁴⁵ [Skype Interview 06/11/2013, 18.30-19.30, London-Berlin](#)

router into a completely new machine. f) Enable, an open-design consultancy project that aims to find creative solutions to social and commercial problems. g) Prototypes by einFach,⁴⁴⁶ a betahaus start-up in the process of developing a physical 'Dropbox' for things and services. h) An open-source graffiti 'spray can' developed by the Graffiti Research Lab.⁴⁴⁷ With the can, i.e. a converted Playstation controller and sensor connected to a laptop and beamer, one can 'draw' light graffiti on the surfaces of buildings. The digital graffiti 'light bombed' Lausanne as part of its city festival in 2013.

In summer 2012 however, the Open Design City fundamentally changed and betahaus as a corporation started to take more control of the place – since it was financially unsustainable, became too disorganised, a lot of things went missing, many planned projects were never realised and got abandoned, hence increasingly cluttering up the room. As Elizaveta Barsegova, who thus became employed as ODC's Programme Manager, relates,

[ODC in its initial concept] was both great and with its drawbacks. On one hand, there were some really inspiring projects coming out of the space and there was a very strong community [...] who got together and tried to make something together. But on the other hand, it was an unrealisable challenge to make it financially sustainable. It was really hard to actually operate the space and trying to keep the tools intact and materials accessible and prevent it from turning into a storage space. Then at some stage, it actually got a little bit too messy and people who were originally in the project got close to a burn-out, trying to be there 24/7.⁴⁴⁸

Explains Burkhart,

This room is relatively expensive [...], so after a while betahaus wasn't willing to pay for it anymore without money also coming back in again. Then everything reorganised gradually, a bit more into a commercial direction. And with this, actually, that what we'd always said was realised – kind of, 'If this room exists, someone also needs to make sure that there are workshops in there the whole time in order to finance it.' Now, the whole thing is of course not as chaotic, creative anymore as before – which really bothers some people – but I like it, in

⁴⁴⁶ Meaning 'a box' or 'one box' as well as 'easy'.

⁴⁴⁷ The Graffiti Research Lab was an organisation dedicated to create open-source graffiti technologies for urban communication (www.graffitiresearchlab.com/blog, 26/06/2014)

⁴⁴⁸ Interview 15/10/2013, 11.30-12.30, Berlin

the sense that the existence of the room is secured. I.e. the rent can just be paid and no one has to donate it somehow every month – this is something between €1,500 and €2,000 [...]. In the framework of this restructuring, a lot has changed, i.e. the room has been divided into three parts, so one can actually do many things at the same time and especially [...] one can do loud and quiet things at the same time. When, previously, someone wanted to saw in there, then he just went in, took out his saw and just sawed somehow – other people who maybe tried to talk just had to go somewhere else. Because of this, there were always conflicts around resources – people weren't able to use the place [...] because, spontaneously, there was something else in there which didn't fit. Or such things like the entire equipment was suddenly taken to a fair and presented there and then one got back and the stuff wasn't tidied for two/three weeks – and that was then spontaneously done by the people who were just in there. So it could've been the case that one wanted to go in there to work, but then had to tidy up for one/two hours in order to actually be able to use the place. It all had its positive and negative sides. [...] One had a great atmosphere in there if one likes it messy, which I personally do, but many people don't. And now everything's very tidy and therefore one can also count on things happening and not happening in there.⁴⁴⁹

According to Walter Mason, Director of CNC routing company formcut, which was located in the Machine Room next to the ODC for almost two years,⁴⁵⁰ the 'Open' Design City was, even in its initial phase, not that open after all.

When the [ODC] was completely 'open', it was more or less all the same kind of geeks who knew their way around. If someone came in, then usually all they would see was the back of some geek working on programming, whatever, and it was quite forbidding – it wasn't welcoming and quite unfriendly. [...] It was kind of a black hole – always the same people working there who weren't paying any money anyways. [...] So it's costing [betahaus] a lot of money and it wasn't really serving anyone or any real purpose.⁴⁵¹

As part of the redesign, the ODC's one large room was transformed into three: a main workshop, a meeting-/classroom (Dialog Open Design City) and a reception. The main room now has clear storage space and includes an extended set of woodworking tools as well as sewing machines, two MakerBot Replicator 2 3D printers and screen- printing

⁴⁴⁹ [Skype Interview](#) 06/11/2013, 18.30-19.30, London-Berlin (my transl.)

⁴⁵⁰ Mason told me that he was forced out of the room a few weeks before our interview since betahaus wanted to transform it into a kitchen/lounge (see above). He now has a small workshop around the corner at planet modulator in the Aufbau Haus.

⁴⁵¹ [Interview](#) 23/10/2013, 14.00-15.00, Berlin

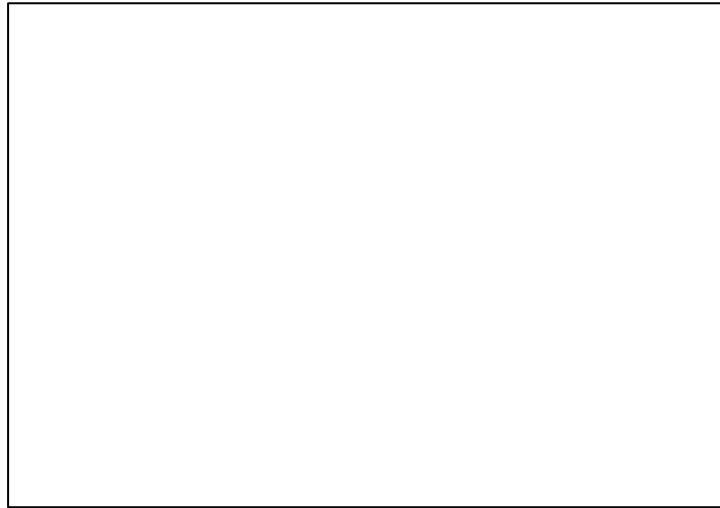


Fig. 25: Redesigned ODC workshop

equipment – at the time of my visit, betahaus was also planning to get a laser cutter. The meeting room is mainly used for work on software and electronics, which people largely bring themselves. Most of the new equipment in the workshop has been sponsored by companies such as Festool and MakerBot, which see a lot of potential in the polycentralised production techniques of the ODC since it is

raising a new generation of makers, of people who are working more professionally than just through the DIY approach and thereby could use their tools for more serious projects. So it's interesting for them to have access to this professional community and to see in which ways these people could be their future devoted customers – if they learn on these tools and if they understand the benefits of using the best equipment.⁴⁵²

When I visited the ODC workshop, it was generally empty and locked during the day and sometimes used as a meeting and conference room rented out to external organisations. Says Burkhart, “It's not like everyone can always access everything anymore, instead one can access that which belongs to a specific workshop on the specific workshop night.”⁴⁵³ Apparently, one can also get into the ODC during the day if one asks Elizaveta or Tom Laterveer, the Workshop Manager, however for this one has to be a betahaus member.

⁴⁵² Barsegova, E. [Interview](#) 15/10/2013, 11.30-12.30, Berlin

⁴⁵³ [Skype Interview](#) 06/11/2013, 18.30-19.30, London-Berlin (my transl.)

The restructuring of the ODC has mainly resulted in its transformation into a betahaus-directed educational environment. Since summer 2013, it has been introducing a workshop programme, not only for people who are already familiar with 'making', but also for those who are not and would like to get into it. Explains Barsegova,

[...] We set up courses to teach people how to get the very best out of the tools and how to use them in a way that they don't break. We also set up special sessions where people can work on their projects. [...] There's a person in all sessions to help people out if they don't know which exact tool they should use, how exactly they should use it and also pays attention that all makers go through a five-hour introduction, so they for sure know all the machines and tools which are in the space. [...] We made access to things a little bit more structured, so people don't get into the situation when they're really curious, they really want to use the equipment, but they don't know how, so they just try – which is a nice process of learning, but it's also way more efficient and way more comfortable if there's someone around who can actually help you out to do it the right way from the very beginning.⁴⁵⁴

At the time of my visit, ODC workshops included for instance: '3D Printing', 'Build Your Own Berliner Hocker', 'Learn to Make Your Own Clothes', 'Introduction to InDesign', 'How to Build Your Own Website' and 'Arduino'.⁴⁵⁵ Some of these are one-day sessions which last for a few hours and cost under €50; the longer workshops run over a couple of weeks for two or three hours each and can cost up to about €250. They usually run on weekdays after 7pm or on weekend afternoons and are mostly led by betahaus part-time staff or co-workers, however sometimes also by external experts. People attending these workshops are generally middle-class professionals from Berlin, who want to make their own products and learn new skills out of personal interest or, according to Barsegova, look for new tools and processes to integrate into their existing jobs. Sometimes, she says, they get funding through their companies or freelance projects to gain skills that they can then bring back. "For instance, we have a few people who are working for agencies or NGOs and think that 3D printing or woodworking would be

⁴⁵⁴ Interview 15/10/2013, 11.30-12.30, Berlin

⁴⁵⁵ An open-hardware microcontroller.

really useful for their current project."⁴⁵⁶ A lot of people are co-workers in betahaus and they often tell their friends and business networks about these workshops. With the new education programme betahaus/ODC is launching, they want to experiment with different approaches to hands-on learning by integrating various skill sets into one place. Explains Barsegova (quite dualistically),

What if it's taught by professionals in the field who actually have a lot of work experience and gone through a lot of failures and whatever else you come across when you're working with real projects and don't just study the subject for years – how much quicker could they involve people in the actual process of making. So you don't need to learn theory for two years and then you will have access to one machine – you just learn the machine and then work with it. I think it's really needed nowadays because knowledge is very accessible. If you want to learn the theory, you can just go online and listen to lectures. There are lectures from Harvard University, whatever – the best you can get. But the practical knowledge is actually what has to be given from hands into hands by professionals and this is the part which is very hard to accomplish just by yourself – if you don't have a community behind it, if you don't have good advice and a tutor along the way. [...] Normally, the whole structure of education is super focused, which is good, but thereby it becomes a little bit narrow-minded. If you are a fashion- or a product designer, how come you don't need to know anything about Arduino, when you can build up something really amazing by integrating this technology into the process?⁴⁵⁷

Thinks Mason (also quite dualistically), a construction worker before getting into CNC routing at betahaus by chance,

I think hands-on is being taught less and less, which is a shame. It's really hard to explain... I think anyone who's played a sport like football would understand if you say you're actually thinking with your body. As a striker, [...] there are certain situations where the ball would come and I would shoot the ball and I can't look back and say, 'Oh yeah, when the ball came over I thought I could do this or I could do that.' I didn't think – I kicked it. And it's the same with working with your hands. You can't get experience from the book, you have to get experience from working with material, from physical work. Industry, mostly, is dying out and moving to China. Everything is done by machines nowadays. So there are less people who can teach it, let alone people who actually learn the trade. So I think it would be good to teach it. And the reason it would be good to teach it is not necessarily because we need more carpenters – we don't – but because it's not something that can be replaced. You can't get the same experience from making something with your hands as you can from working on a computer or reading a book. It's completely different. I think there's a different kind of satisfaction that comes from working with your hands. Which is also why these courses do sell, although they're expensive. People don't have this experience anymore, so they're

⁴⁵⁶ [Interview](#) 15/10/2013, 11.30-12.30, Berlin

⁴⁵⁷ [Interview](#) 15/10/2013, 11.30-12.30, Berlin

willing to pay money to do the 'menial' labour that used to be done by the underclass. [...] I mean, one of the main problems with modern society, I find, is everybody has their own opinion about everything – they think they understand it. But you know, like, woodworking: If you really, really wanna do carpentry, you have to do it for two or three years before you can even call yourself a carpenter – full-time. And to become a really good carpenter, I'd say five to ten years. ⁴⁵⁸

Apart from the workshops, the ODC also runs some free open maker sessions, including the 'Woodworking Evenings' on Tuesdays, for everyone who has gone through an introductory session, as well as the 'DIY BaustelMontag'⁴⁵⁹ on Monday evenings and 'Make Afternoons' on Saturdays, where people do everything from repairing their Nintendo 64 game controllers or keyboards to experimenting with their new Arduino kits to building robots or digital guitar pedals, as well as do screen



Fig. 26: DIY BaustelMontag

printing on Saturdays, in a very informal atmosphere. The DIY BaustelMontag, which survived the ODC redesign and has existed for years, is now hosted by Burkhart and was actually the place where he taught himself electronics because this fell a bit short in his computer science degree – skills he now uses to develop a smart wardrobe that

⁴⁵⁸ Interview 23/10/2013, 14.00-15.00, Berlin

⁴⁵⁹ 'Baustel-' is a play on 'Baustelle' ['construction site'] and 'basteln' ['(to) design/tinker/do handicraft work'].

he is planning to commercialise in the future.⁴⁶⁰ He explains that the BaustelMontag, at the time of my visit taking place in the converted Machine Room, has put on quite a few 'Repair Nights' recently, where people can bring their electronic devices – TVs, stereos, headphones etc. – with him and co-organisers showing and helping people how to repair them. He tells me that he sees the evening as a political event since

we want that every citizen can access [...] advanced technologies. So we want that what the average citizen generally considers advanced technology is not seen as that anymore, but instead as something that one can understand, open up and which hence isn't a magical black box anymore. And we want that through [our event], people just become more knowledgeable consumers, so they understand how such an electronic device looks from the inside and are put into the position where they can repair it themselves. [...] We make them a bit more independent from the big corporations. We also enable them, when they're buying a product, to make a more factual decision.⁴⁶¹

One of the first attempts to transform the ODC into an educational project and introduce 'non-makers' to the workshop was the 'Build or Buy' store, hosted on the betahaus website. Build or Buy gave people the option to either 'buy' designs online – such as furniture, jewellery, bags, beauty products or home accessories – or to 'build' them themselves in one of the ODC sessions. For example, a balloon designer lamp cost €120 to buy, but only €28 to build in the 'Papier-mâché Lamps' workshop; or the '1m² House', part of the 'Hartz IV Möbel' project,⁴⁶² cost €590 to buy, but only €90 plus materials to make; or a designer feather necklace which was €129 could be self-made for €38 in the 'Jewellery Creation' session. Says Barsegova,

I felt that the idea of giving the choice of either 'build or buy' was the most clear and easy way to present [our concept]. We started it in August last year and actually it worked out not so well for the selling part – I think throughout a

⁴⁶⁰ Skype Interview 06/11/2013, 18.30-19.30, London-Berlin

⁴⁶¹ Skype Interview 06/11/2013, 18.30-19.30, London-Berlin (my transl.)

⁴⁶² 'Hartz IV' is the German version of unemployment benefits. The design project with the tag line 'Build More Buy Less – Constructing not Consuming' by Berlin architect Van Bo Le-Mentzel comprises an entire furniture collection including the '€24 Chair' as well as the 21sqm 'Hartz IV Flat' (www.hartzivmoebel.de, 11/06/2014).

few months, we sold maybe two items – but the making part really worked out. So at some point, we realised that we were holding about, I don't know, 50 workshops a month. And then we started forming festivals out of it – which is how the concept of the Maker Weekend was born.⁴⁶³

Barsegova explains that the products featured were chosen on the basis of being interesting to make, not just simple to assemble, as well as having an attractive design, generally not associated with 'low-tech' DIY.

[DIY] has a little bit of this image of 'ugly things which are glued together'. [What we're doing is] obviously also DIY and there are a lot of projects like, 'Look, I cut out the bottom of this garbage bin and now I have an awesome lamp.' But there's way more to it and we're really trying to show that with simple skills you can also get really beautiful designs.⁴⁶⁴

As part of the ODC's restructuring, betahaus also launched the 'Berlin Hardware Accelerator',⁴⁶⁵ a programme assisting start-ups to develop their hardware commodities by providing mentorship, office space and strategic networks, which has increased the number of companies making prototypes in the ODC. For example, Solarbrush developed a wireless robot that cleans solar panels and deMiFi created a pocket-sized wireless router. The ODC is thus becoming a more integral sphere of betahaus as 'a whole'. Says Barsegova,

It brings a lot of fresh maker energy into the community of start-ups. It's very Berlin that those things happen hand in hand and are quite complementary. If you have them in one house, there's the possibility for start-ups to 3D-print their prototypes or for designers to see if they can do something together. Once you have both in one house, it's really a totally new structure which hasn't existed so far. Normally, it's either a co-working space or a fab lab. People [...] normally speak different languages. They cannot really work together because they are focused on different things and have a different approach to work. So to [...] make them part of a single community creates a totally new way of integrating people.⁴⁶⁶

⁴⁶³ [Interview](#) 15/10/2013, 11.30-12.30, Berlin

⁴⁶⁴ [Interview](#) 15/10/2013, 11.30-12.30, Berlin

⁴⁶⁵ In collaboration with 'hy!', a network that aims to foster the 'digital transformation' in Europe (<http://hy.co>, 26/06/2014), and 'Hardware Berlin', a hacker/maker meet-up (www.meetup.com/hardwareberlin, 26/06/2014).

⁴⁶⁶ [Interview](#) 15/10/2013, 11.30-12.30, Berlin

Due to its more commercial direction, the ODC now also collaborates more formally, i.e. as 'a whole' organisation, with different places, however generally not so much with other maker labs – apart from 'republikken', a co-working/maker lab in Copenhagen, which often co-operates with betahaus as a co-working space anyway. According to Barsegova, this is due to the ODC/betahaus not wanting to just replicate existing maker lab models, but instead experiment with other 'less expected' places within the creative sector ecology – such as Platoon Kunsthalle in Berlin, for example, as part of the 'Remake Festival' and the 'Maker Weekend', with 'Codemotion', a conference for hard- and software developers, or with the local OpenTechSchool⁴⁶⁷ for the Berlin 'Science Hack Day'⁴⁶⁸ 2013, hosted at the ODC. Relates Burkhart,

We just started to [collaborate with other maker labs] a bit, to get out of ourselves and contact people, and are now, for example, doing a cycling jacket workshop where we collaborate with ['co-sewing' space] Nadelwald* in Kreuzberg. So there are indeed attempts into that direction, but they're not where they could be yet. We also want that [the ODC] is seen as an exchange project where people from different places work together. So it's not that the ODC is supposed to be competition to the Fab Lab or to the other hacker spaces [in Berlin], rather it should simply be an extension to the range of choices that one has in the city.⁴⁶⁹

He says that in the framework of the Repair Nights, the BaustelMontag group also co-launched a Repair Café in Utrecht, which was filmed by Spiegel TV. There are also plans to open ODCs in other betahouses – according to Barsegova, the houses are very keen to set up a maker lab themselves, however are still a bit hesitant and waiting for ODC Berlin to come up with a 'master' building plan, which can then be replicated and adjusted in their local places.

⁴⁶⁷ The OTS was set up in Berlin in 2012 and organises, as well as encourages people to organise, polycentralised, inclusive tech meet-ups in more physical places around the world (www.opentechschooll.org, 14/06/2014).

⁴⁶⁸ Science Hack Day is an international initiative encouraging individuals and organisations to host a 48-hour event in their cities where amateurs and professionals come together in one place to make prototypes with science (<http://sciencehackday.org>, 13/06/2014).

⁴⁶⁹ Skype Interview 06/11/2013, 18.30-19.30, London-Berlin (my transl.)

* 'Nadelwald' is literally translated as 'needle forest', in the sense of a 'coniferous forest'.

[...] We're only on the way to make [the ODC] fully sustainable, to make it really perfectly operatable. I think [the other houses are] a little bit waiting for the moment when we say, 'Ok, we've found the perfect solution, here it is.' And I think we're not so far away from this point, but it's not there yet. [...] We have to first figure out all the do's and don'ts – at least to the extent where it's possible. I mean, it's always an ongoing experimentation, an ongoing trial and error, but we need to figure out the set-up more or less, which we can then replicate in other betahouses.⁴⁷⁰

Due to the transformation of the ODC, a lot of people who were originally involved left since, or shortly before, the redesign of the place.
Explains Burkhart,

I think that they just missed the atmosphere. It's just a completely different project now. If one wants to have something like the old ODC, then one can find this probably at the Fab Lab in Mitte or at D.Collective in Neukölln or maybe still at the Raumfahrtagentur ['Space Travel Agency'] in Wedding. And actually there are, for example, some people at D.Collective now that used to be in the ODC before, and also in the Fab Lab. So they've found their place there, where they can realise themselves better. I also assume that [a lot of people left] because the room was so expensive. I.e. if the ODC had been a bit cheaper, it wouldn't have been a problem to finance it through membership fees or something. The problem was however that most of the people in there weren't willing to pay a membership fee so high as to pay the rent. We were thinking back and forth a lot about different business models and made Excel sheets where we listed all income and expenses and how one could solve [the problem]. However, we didn't find a real solution without betahaus then starting to take on the workshop organisation [...]. And exactly this rebuilding phase was a bit chaotic and scared off a lot of people – when they came in there after a couple of months [...] and then it wasn't what they'd expected. I.e. the audience is of course a different one now. The audience is now rather the audience with money who can afford these workshops. [...] Because of [the restructuring], probably a bit of proximity to citizens has been lost. I can imagine very well that there are many people who aren't confident anymore to go in there because there are so many start-up people running around now. We really had people in there from very poor social milieus, for example one homeless person, and I don't think that these people dare to go in there anymore because they probably feel a bit out of place. [...] There was also this sub-group – the 'Trial and Error' people. They now have a house in Grünau where they're raising an alternative housing- and living project. So the ODC was for them some kind of alternative housing- and living project where they organised all of these trash workshops, for example, and now they just do that in their Funkhaus ['Broadcasting House'] Grünau. [...] I like both [ODC] concepts very much and I would've been really happy if we could've kept the old one, locally – now one has to go to two places if one wants to have both. At the end of the day, the old concept was more fun and the new one is more sustainable. And I think it's a shame that the old one is gone, but I'm glad that one can also have that in places such as D.Collective or the Raumfahrtagentur. So it's not that one can't find such a place anymore in Berlin, it's just that one has to go somewhere else. [...]⁴⁷¹

⁴⁷⁰ Interview 15/10/2013, 11.30-12.30, Berlin

⁴⁷¹ Skype Interview 06/11/2013, 18.30-19.30, London-Berlin (my transl.)

He thinks that projects such as the ODC function a bit like school magazines:

One has a fluctuation of people who want to realise their ideas and these just differ from each other – are sometimes actually compatible, sometimes aren't. Such a project always gets rebuilt anew. I.e. some people take something on and do what they consider to be right and good, and at some point these people just do something else – because they've had enough, because they've seen enough – and then a new group of people comes in and also does what it wants, what it considers right, what might be completely different. So apart from this fluctuation of people, there's then also a fluctuation of what this whole thing is. This [project] is just not designed for people participating in it for years, instead one can take part as long as one wants to and, at the end of the day, this is usually a few months per person – because one often goes in there with a specific project. And then this project is maybe finished at some point or one did it as a final degree assignment or so and then one has a different life and devotes oneself to other things again. And so this whole thing develops.⁴⁷²

⁴⁷² Skype Interview 06/11/2013, 18.30-19.30, London-Berlin (my transl.)

De-Constructions of Place

Having explicated three maker labs through a media-phenomenological approach, I will now further locate the places within the multi-historical *topoi* of Sloterdijk's spherology (after Heidegger) in order to show in which form/s the theory singularly de-constructs itself 'in the world'. As organised networks, the labs are considered (primarily) as foams, (primarily) *in* the epoch of foams. However, due to the multi-historical dimensionalities of 'the whole' spherology, maker labs also have to be situated with/in and against the epochs of bubbles and globes since different forms of Being-in-the-world *condition* and *simultaneously co-exist* with each other *in the process of history*. I will thus develop the labs' singular topo-logies via the (nine-dimensional) complexity of the anthroposphere in order to show how these work-places are *becoming* in different forms through (non-)human incubation effects:⁴⁷³

Vigyan Ashram is a foam cell not in the 'foam city', like the London Hackspace and betahaus Berlin, but in the rural ecology of Pabal, India. From the point of view of the chirotope, i.e. the zone of the 'ready-to-hand', VA can be conceived through the becoming of the 'de-throw' [*Ent-wurf*], i.e. 'Design', which has enabled humans to emancipate themselves from 'Nature' throughout the evolution process. Due to India's, more specifically due to Pabal's, place in evolutionary history during which terrestrial- and cybernetic globalisation have only taken place tangentially and in non-linear forms, VA functions via largely 'basic' agricultural- and manufacturing tool sets and machines. Through these, students and staff (as well as the local community and visitors, to extents) collaboratively produce, and

⁴⁷³ As mentioned earlier, not all of the nine dimensions are considered in each singular lab since some spheres revealed themselves better in 'one' place than in the others (while in any way transgressing and hybridising). Thereby, my aim was not to do in-depth studies of each dimension – which would have been impossible to achieve as part of this PhD project and would have required more specialist knowledge/s of each of the different fields, such as of sound theories/practices in the phonotope and expertise in gender and affect studies in the erototope, for example – but simply to show how each lab operates as a foam and in which ways the spherology needs to be conceived as not just setting 'the world' before as picture, but as being embodied with/in it.

not just use (like in places of the late 'global' epoch) mostly agricultural ('open') hardware and the 'natural' environment for local (often sheer survival) needs – ⁴⁷⁴ including buildings loosely configured according to late bubbles/early globes logics, when India's ancient ashrams first emerged. At the same time, VA however manifests itself in fairly 'foamal' ways (especially since recently) due to its situatedness [*Befindlichkeit*] in, and thus the 'tensegrity effects' of, the 'global' transition from the epoch of globes to foams, for instance embodied through VA's *involvement with* the fab lab network's chirotope/s (including laser- and plasma cutters as well as the online Fab Academy with its multipoint video conferencing system) and the development of transport-, energy- and communication infrastructures in and around Pabal. As explained, this can entail certain problems around 'advanced' technology integration and use (such as different voltages, computer language issues and complications with software updates due to an unstable/slow internet connection at VA), but has enabled the college to move into different developmental dimensions, including the ability to source future VA students from other parts of India beyond Pabal as well as to regionally and internationally produce/share designs with relevant networks (both more virtually and physically) – not just to replicate the exact same designs everywhere, but to exchange processes and then locally produce them through the singular circumstances of each place (as is the case with the IBT secondary schools, for example).

The chirotopic sphere comprises the 'socialisation of hands' and VA as an educational medium can here be seen as topically and experimentally converging symmetrical- and heterotechnical co-operations, largely within the sphere/s of 'manual labour' (in contrast to the LHS and betahaus), functioning in many ways against the 'empire' of the modern Indian education system: on the one hand, students

⁴⁷⁴ As explained, sometimes however it is much cheaper (or only possible) for the college to just buy and then simply use products from the 'global' market.

(regardless of gender) are trained across disciplines, such as carpentry, electronics and cooking for example, thus everyone can essentially take on the role of the other;⁴⁷⁵ at the same time, they also gradually specialise in a specific field, according to each person's singular *Entwurf* and circumstances – due to the college's expertise in building geodesic domes, it also 'heterotechnically' runs construction programmes across India, sells the domes in kit-form via contractors and often sends these to earthquake-endangered places in the country. This local convergence of symmetrical- and heterotechnical co-operations in the college is then replicated 'foamally' throughout India: in the case of the IBT programme, *with* the country's global education system, and by students (together with their relatives, communities etc.) who auto-produce (to extents) their businesses and living conditions in their respective villages.

Through the framework of the uterotope, Vigyan Ashram can be explicated as world incubator which repeats the milieu for the interiorisation of eggs in the female human, creating offspring with a "higher commitment value and a harsher separation risk" – ⁴⁷⁶ i.e. it is a dwelling place that aims to provide its inhabitants with a sense of security and belonging. Due to VA's highly social formational [*Bildungs-*] logics, partly because of its situatedness [*Befindlichkeit*] in (rural) India's evolutionary place, functioning in many ways as late bubbles/early globes, the college's ability to create a sense of belonging is relatively strong (especially in contrast to betahaus, which operates in more individualistic forms): for example, students share their accommodation on-site and largely work/learn collaboratively, collective eating-, storytelling-, physical exercise- and meditation sessions take place on a daily basis, and the college is relatively 'open' to visitors as well as is embedded within the local community. This is further supported by most students (largely from similar poor socio-

⁴⁷⁵ Teachers are perhaps a bit more heterotechnically educated in organisations functioning according to more 'global' logics.

⁴⁷⁶ See Sloterdijk in 'Foams' above.

economic conditions) as well as teachers coming from the local area or the state of Maharashtra, hence making the place fairly homogenous and coherent in this sense. Moreover, since new student intake is only once per year, the turnover of people inhabiting the place is relatively low – unlike in the LHS and especially in betahaus, where participants come and go on a continuous basis.

As an educational institution, largely 'globally' managed/organised by Kulkarni, his staff and Mira Kalbag, in collaboration with the IIE trustees, VA can provide a lot of security to its teenage students since these cannot perceive, and do not have to deal with, the college's operating conditions (from their position in a 'bubble', for which they mostly have to pay, but only very little).⁴⁷⁷ In the LHS, the provision of security is more foammally negotiated amongst the 'entire' membership; at betahaus, security is also more 'globally' provided by the co-directors and their staff (for which co-workers generally have to pay via the modular fee structure), however only to low extents since co-workers need to largely individually secure themselves through their labour done in/from the house. As VA is a public charitable trust in an industrialising country, the provision of security by Kulkarni and his staff is not that difficult since the college gets a lot of global financial support – from the Indian government, its 'mother' institution the IIE as well as numerous international organisations and individuals, including the CBA/MIT – often on a permanent basis. This money is undistributable as profit amongst the 'managers', which secures the maintenance of the place to certain extents. In this way, VA works more like a 'modern institution', in contrast to the highly self-financed LHS and also to betahaus as a co-working business. The relatively high level of security VA can locally provide to its students (and partly also to staff through wages as well as part-time accommodation on-site and meals) however only enables fairly 'basic' living standards, in line with Indian

⁴⁷⁷ As explained, when VA operated on a scholarship-only basis, some students simply signed up to enjoy the provision of security by the college, and not in order to learn (subsequently the model was abandoned).

norms, which have developed via unequal global distributions throughout human history. Since the college sets out to experiment locally with solutions to the global problems of Indian education and the country's development needs more widely, by trying to prevent rural teenagers from having to migrate to the city to earn money, if they do not want to, one can also say that VA is attempting to create and distribute ('self'-replicating) security and modes of belonging by foamally rolling out its education programmes – via the IBT schools as well as through its individual students.

In the world of the erototope, i.e. the organisation of desire, Vigyan Ashram needs to be explicated from the point of view of how affective relations stimulate as well as control the community. According to its place with/in India's 'global' patriarchy, the college operates in many ways through high degrees of gender division/bias – as explained, there are split seating arrangements during theory classes, meditation sessions and eating, girls only are prohibited from going outside after 2am, and gender discrimination by some male staff and students is taking place. Moreover, both female students and staff are highly outnumbered by their male counterparts, which can lead to a lack of confidence and feelings of misplacement on the female side as well as to increased erotic tensions and 'jealousy wars' within the group as 'a whole'. However, the college also functions against this deeply ingrained 'global' system due to its more foamal gender equality agenda, including gender-neutral curriculum, which it is increasingly trying to implement.

In a more economic sense, in contrast to the global market where the privatisation of the love object forms the basis of competition, VA's 'open designs' function through an organisation of desire that is more singular and collaborative, partly due to (rural) India's highly social type [*Art*] of formation [*Bildung*]. Since the college is relatively small and autopoietic in its making of locally, and to extents also globally, shared (often essential survival) products – sometimes for

free, sometimes for monetary or non-monetary (exchange) value – individualistic behaviour and -appropriation here become quickly apparent and the place would fall apart, or people would at least be disadvantaged, if they did not work towards the subsistence of the group as ‘a whole’ – for example, food would not be grown or get extracted from animals, and accommodation, workshops, tools and machines would not be built in the first place (or slower). Furthermore, since the college, as an educational institution for teenagers, is ‘globally’ directed by Kulkarni et al., students would fail the education programme or at least get punished if they only acted according to their individual desires – in this sense, Kulkarni et al. are the ones who organise desire in the college, to a degree, and thus practice a form of (enforced) ‘jealousy management’. Nevertheless, students are also competing with each other in more deregulated forms, in fact are encouraged to compete to certain extents, through their (hopefully) ‘innovative’ products created, via which they attain a certain individual status – within VA, the local community as well as the global market sometimes.

Through the sphere of the phonotope, VA needs to be explicated through the way it creates its own soundscapes, or attunements [*Stimmungen*], which function as medium of belonging and integration, but can also lead to conflicts. These sound installations are historically conditioned by the development of the human ear in the sonosphere of the womb, where the foetus is already able to pre-technically select and distinguish between sounds in order to orient itself. Due to the college’s ‘head and hand’ philosophy, it can here be said to combine the acoustics of agricultural- and manufacturing work with, in part, the ones of the knowledge economy, while strong emphasis is placed on the sonic dimensions of ‘handy’ labour (due to rural India’s developmental place and needs). Different soundscapes are thereby created in fairly separating forms however, in the sense that each building includes its relatively individual acoustic sphere, which are

nevertheless converged in 'one' (literally open, mostly) place at large – for example, the 'finishing school' accommodates mostly construction workshops (although the fab lab also has desktop computers for more silent IT practices), the science lab is separate, the classrooms are more individual spheres, the kitchen as well as the stables. In this way, VA is rather an inter- or multi-disciplinary-, rather than transdisciplinary, maker lab (unlike the LHS and also betahaus to extents), by enabling students to better orient and attune themselves through choosing specialisms after a while and thus to develop more singular personalities. These multi-disciplinary acoustics form a stark contrast to the monotonous and alienating 'global' labour sounds created in the large numbers of factories in India, on the one hand, and call centres, on the other. The missing transdisciplinary dimension of VA thereby might block some creative potential, however at the same time can prevent conflicts between different sonic spheres in 'one' place (as described earlier, this was a problem for the Music Hackspace as well as for the Open Design City at some point).

In the alethotope, Vigyan Ashram can be conceived as workplace which 'reveals', and in turn 'conceals', forms of truth that are transforming throughout the evolution process. Due to its convergence of 'head and hand' via creative, multi-disciplinary and singular approaches to 'global' science and technology (accompanied by meditation and physical exercise), the college can be said to challenge and hybridise the metaphysical division and hierarchisation of 'higher intellectual-' and 'lower manual/embodied' formations [*Bildungen*-] of truth – an especially pertinent issue for VA since India was, at the time of writing, going through the industrial r/evolution process (accelerated in part by British rule in the 19th and 20th centuries). In this way, the college criticises the truth of India's modern institutionalised education system, which in many ways holds up this hierarchy, and is deemed responsible by the college for many of the country's problems, including poverty, corruption, the rural/urban divide

and environmental pollution. Nevertheless, VA also functions *through* this 'global' system to some extents since it was precisely set up *in* it in order to work *against* it: more *independently* as an experimental education lab, and *with* the formal system through its IBT programme as well as involvement with the country's 'work-centred education' framework and open-schooling system. Thus, as a foam, VA does not want to become an 'empire' of truth at the end of the day, but just wants to take up *some* singular truth in order to stay relatively independent and locally experiment with solutions to India's global problems, which it wants to distribute in foamal ways. With/in (and against) this hybrid system of truth/s VA is trying to create, it however often sets up dualisms between the 'artificial (i.e. inauthentic) head' and the 'natural (i.e. authentic) hand', in part due to the developmental place and needs of (rural) India, where truth which reveals itself through 'manual labour' predominates.⁴⁷⁸

As explained just above, since the college is a relatively homogenous and coherent place due to students (and partly also teachers) mostly coming from fairly similar backgrounds, including geographic location, socio-economic situation, educational stage and affinity towards 'the hand', truths are here distributed in relatively symmetrical forms, at least between students on one side, and teachers on the other (in contrast to the more heterogenous LHS and betahaus).⁴⁷⁹ Since Kulkarni et al. direct and represent this rural development college for teenagers, truths are here not very foamally negotiated amongst the participants, but to certain extents 'enforced' or at least 'globally' facilitated.

Throughout its evolution process, the college has been experimenting with, and emplaced, various forms of truth, which it has been re-designing according to changing (developmental) circumstances. For example, when it was set up in 1983, its immediate

⁴⁷⁸ As mentioned above, some important educational/developmental dimensions and opportunities might be missed through this opposition.

⁴⁷⁹ Gender truths here being an exception.

aim was to understand and develop the community of Pabal and its rural youth, which could potentially be replicated in other places around India. Over the years, the college has been 'incubating' itself as well as supported the urbanisation and global connectedness of its local surroundings, thus changing its dimension/s of truth according to a different, more foamal, developmental stage – for instance by increasingly taking on students from outside Maharashtra, further rolling out its IBT programme and implementing the work-centred education system across the country, experimenting with more 'advanced' technological systems and globally connecting itself to other maker labs and similar organisations. In the future, the college wants to put more emphasis on the arts, i.e. tending more towards the truth/s of 'the head', as soon as it reaches a new developmental stage, when it would make sense to let the dimensions of 'the hand' fall into implication a bit more (since they will increasingly be handed over to machines).

From the point of view of the thanatotope, Vigyan Ashram can be conceived through the zones of death that it is pervaded by. Since the college is located with/in a number of (long-term) traditions, such as the ancient ashram culture, *panchayati raj* and Gandhi's *Nai Talim* (in contrast to the LHS and betahaus, which are more confined to the short-termist 'lifeworld/s'), it can be seen as being penetrated by these 'dead' formational [*Bildungs-*] logics (largely operating as late bubbles/early globes), through re-poeticising an egalitarian ethos, simplicity, 'holistic' educational methodology based on 'learning' (rather than teaching), environmental awareness, meditation techniques and implementation of guru status (in the forms of Shrinath and Mira Kalbag, for example), which contribute to the social cohesion and stability of the place. However, especially via the integration of contemporary S&T, VA also partly works against these 'dead' logics through becoming more foamal, i.e. through global connectedness with others as well as constant R&D, for example, thus adding to, and

partly obsolescing, old forms of Being, which 'die' into implication. For instance, *Nai Talim's* antipathy towards modern technology has been overcome in this way, and due to the college's student intake realms increasingly widening, together with larger amounts of visitors coming to VA every year, the potential for social incohesion, i.e. social 'death', of the college and its local community in Pabal has opened up. Since an alumnus had started to offer his own computer courses in the village, VA stopped these courses and hence 'died into' the next developmental sphere, one can say. Moreover, as Pabal is becoming more urbanised, partly due to VA's influence, it has now more problems with sewage and garbage, hence this evolution has 'murdered' the environmental balance of the place.

As explained above, since VA as an NGO in an industrialising country is relatively financially secure, partly through long-term global funding, struggle with everyday death is less of an issue for this place – in contrast to the precariously 'self'-financed LHS and the betahaus business. However, one of the problems of the college, which is at the same time one of its strengths, is its rather short-termist circulatory student-teacher system (including business incubation service), on the one hand enabling (often inexpensive and efficient) 'self'-organisation and local embeddedness, however on the other can lead to the student-quickly-turned-teacher(-and-start-up-entrepreneur) not being experienced enough yet in the historically developed 'deathworlds' of her or his trade specialism.

In contrast to Vigyan Ashram, the London Hackspace is a cell in the meta-artificial foam city. From the point of view of the nomotope, the LHS can be explicated as 'self'-insulation of (a) culture/s through normative constitutions, i.e. its (place with/in and against) architectures of customs, laws, rules and relations of production, which stabilise the LHS to an extent, but also destabilise it in some ways. Since it is a community-run organisation mainly for adults, who participate in the lab

primarily in their spare time and for experience value, it is in some ways much more foamally produced and managed (including financed)⁴⁸⁰ than VA as an educational institution for teenagers and also betahaus as a commercially-oriented business. However, since it is at the same time a private limited corporation⁴⁸¹ as well as a non-profit, it also has to operate with/in the more 'global' spheres of modern institutions and 'networked organisations' – for instance, since UK corporations must by law have a board of directors who represent the organisation, the LHS can not function in completely heterarchical forms and 'trustees' have major decision-making powers (who are nevertheless elected by the membership via a system of proportional representation and largely let participants organise the LHS themselves) and because an AGM is required, which is tedious and unnecessary for an organisation that is in many ways virtually managed (more foamally from anywhere by the membership). As a relatively self-financed organisation located in London's Hackney borough, the LHS is furthermore highly affected by the (in some ways 'global', in some ways foamal) gentrification processes taking place in the area, which drive up rents and might push the place out further into the suburbs in the near future, which would in turn decrease membership numbers and thus income, and could hence lead to the place not being able to produce some of its basic infrastructure needs (such as wiring, piping and layout of the rooms) due to shortage of finances. However, at the same time these gentrification laws have helped the organisation to form in the first place since many of its members live/d and work/ed in North East London, thus participating in the LHS due to proximity in this 'bubble'.

When the LHS was set up, the co-founders Wareing and Garrett at the same time established the UK Hackspace Foundation as mother

⁴⁸⁰ Participants can however only 'self'-finance the organisation (via membership fees and donations of money or equipment and materials) due to their incomes generated through jobs mostly operating in more 'global' spheres, such as digital 'empires' or start-ups in and around (the government-supported) Tech City.

⁴⁸¹ Due to the constraints and complications that other organisational forms would have imposed on the LHS. Since UK company law is continuously changing, the LHS might however take on a different organisational design at some point.

organisation, which was supposed to mediate the (future) 'hacker space' ecology in the UK, however they quickly realised that the extra dimensions of nomotopic complexity were unmanageable at a time when the LHS was itself only in its embryonic phase, inexperienced with the worlds it was operating in (and against). It hence took on mainly an advisory function for the time being and might at some point become legally separated and turned into a charity, when the LHS and the UK hacker space network have matured a bit, hence being able to organise themselves better on a more 'global' scale (needed in order to more effectively secure their operating conditions).

In line with hacker-maker customs, there are relatively few rules within the LHS and its nomotope functions in fairly 'open' forms – for example due to low and flexible access thresholds, i.e. anyone can become a member for a minimum fee of £5/month,⁴⁸² a lot of its activities and events are open to the public (and take place in the evening and on weekends), most online channels are easy to find and navigate, and participants are generally helpful, approachable and open to suggestions from others. Due to its 'openness', the LHS also collaborates a lot with other nomotopes 'outside' of itself in order to create conditions that facilitate the production of its experimental and transdisciplinary 'open designs'. These collaborations however generally do not take place in formal ways, i.e. through 'global' agendas and directives of the organisation as 'a whole', but through its 'individual' participants and sub-groups, in line with the LHS' foamal logics. In this way, the organisation at large is quite "introverted", in Dittus' words,⁴⁸³ and simply has the 'aim' to produce and maintain itself as a shared work-place, where participants can mostly make what they want and in their own forms. The co-operations that individual members and sub-groups of the LHS get involved with also mainly happen with other individuals or more foamal organisations (who might already be

⁴⁸² Even organisations, however due the LHS' largely de- or even polycentralised nomotope, this could be difficult.

⁴⁸³ See above.

members of the LHS) – such as the London 2600 Meetup, artists from the studios upstairs, Occupy London or other maker labs from around the world – since collaborations with more ‘globally’ organised nomotopes (such as Google’s, for example) can easily lead to clashes (for instance around different administrative processes, see above) or would not make sense to instigate in the first place (due to differences in aims).

Even though the LHS’ nomotope operates in fairly ‘open’ forms, members have realised through experience over time that some basic ‘global’ house rules and guidelines need to be made in order to maintain the foamal organisation of the place, especially since it has been growing and evolving quickly. For example, the main door used to be open all the time until burglaries happened in the place in which participants did not know everyone anymore, thus it had to be closed more permanently and members now generally have to access the building via their authorised RFID cards/tags (non-members have to knock on the door and make themselves visible, i.e. ‘controllable’, in this way). The LHS also introduced some health and safety rules (such as an RFID-controlled equipment training database, which enables or prevents members from using certain tools), a code of conduct for all of its online channels to prevent discrimination, harassment and trolling, and ‘Conditions of Entry’ signs are to be put up by all doors for newcomers, for example.

In an organisation which operates to extents through a ‘do-ocratic’ (post-representational) model of politics, where ‘everyone governs’, and participants have a lot of freedom to do what they want and how, one problems is that due to the absence of strict rules and roles, and thus reliance on individual motivations and actions, a lot of members do not feel responsible for contributing to the LHS,⁴⁸⁴ partly since a few others (often the elected trustees) do what needs to be

⁴⁸⁴ Or are not able to because of their highly contingent lives in London and elsewhere.

done.⁴⁸⁵ The members who do contribute to the organisation in turn often have to deal with high levels of conflict when there are other people who want to contribute to the same thing, but have very different ideas about it,⁴⁸⁶ and there is no one to 'globally' moderate the discussion and make the final decision – such as in the online discussion on decision-making in the LHS, which at the time of writing lacked a decision about which system should be adopted, how it would work and in which ways it would be used (see above). Should a new software system be adopted, which is currently produced according to more 'global' rules, the problem would be how to integrate it into the singular *nómoi* of the LHS.

A form in which the LHS is trying to facilitate its fairly autopoietic governance is via its various sub-groups, which it is increasingly attempting to formalise and make 'self'-responsible through processes of experimentation (mainly 'globally' driven by the trustees however) – for example by getting them to acknowledge their status in the first place, to nominate a point of contact, set up a mailing list so that it becomes easier for non-members to approach the places and also the LHS as 'a whole', by training people how to effectively run a sub-group and allocating basic infrastructure money to them, so they can 'self'-organise rather than the entire LHS having to co-ordinate, which is increasingly becoming "an absolute nightmare", according to Wareing⁴⁸⁷ – without being prescriptive and giving members a lot of freedom. Some of the different sub-groups have established their own 'local' laws and structures within the LHS already, nevertheless they also function according to the logics of the organisation as 'a whole' to extents, for instance in terms of 'openness' as well as 'auto'poietic modes of production and governance – i.e. they each have their

⁴⁸⁵ If these few others do not do what needs to be done, the lab could easily fall apart, which is often the case (see Dittus and Wareing above).

⁴⁸⁶ Especially since the membership of the LHS is a fairly hybridic mix of people (mostly 'white' male technologists however) of various ages coming from quite different backgrounds, in contrast to VA for example, which is a more coherent community.

⁴⁸⁷ See above.

unique (physical and virtual) chirotopes within the LHS,⁴⁸⁸ their own codes of conduct, some have their own room or area (sometimes outside of the LHS building), some have an additional membership scheme and get funding from other sources than the collective assets of the organisation (such as the BioHackspace through its more 'global' collaboration with UCL Engineering as part of the iGEM competition, for instance), the larger and more formalised sub-groups represent themselves via their own (hybrid LHS) symbols, and some have even incorporated themselves within the larger organisation, thus have their own 'directors' and administrative processes (such as the LBH since it is cheaper to handle finances and get supplies in this form, and the Music Hackspace, initially mainly for symbolic purposes). At the time of research, the MHS was already developing its individual nomotope to a point at which it was about to separate from the LHS as a larger organisation since it wanted to function through more commercial logics (hence planning to move to its own building and set up a new membership system). The group already met up outside of the LHS on a regular basis and its sub-group around the Hoxton OWL already had a separate location by creating its own more homogenous community around the project.

Although sub-groups are to some extents a way to facilitate the LHS' organisation, there are at the same time problems with the (non-) communication *between* those groups, for example around semi-shared work areas – at the time of my visit, there were only a few informal mechanisms in place, which the LHS was in the process of (re-) designing and formalising. The increasing hybridisation of the organisation furthermore increases the potential for room shortage – it still had to stay in its Hackney location for at least another year and half at the time of research and some sub-groups already individually met

⁴⁸⁸ Which they often produce 'locally' themselves, such as the biohackers who make their own soylent and extract DNA from cheek cells in their 'self'-created wet lab in the LHS basement. Sometimes, participants swap tools and materials amongst themselves (via the wiki/s) and sometimes equipment is bought on the 'global' market (such as via eBay) because it is cheaper or/and the makers do not have the knowledge and resources to produce the items themselves.

up outside of the building on a permanent basis (such as the knitting group or the MHS, as just mentioned), thus endangering the transdisciplinarity of the place.

In the alethotope, the London Hackspace can be conceived as work-place/s for the negotiation of ('open') truths. As described above, this social formational [*Bildungs-*] place initially operated largely within the confines of the software sphere (wanting to work with hardware) due to the ecologies the co-founders Garrett and Wareing were situated in [*sich befanden*], with the first members being quite intolerant towards people approaching the organisation from other disciplines, i.e. other forms of truth. After a while however, members started to form meet-ups around different interests and opened themselves up more since they realised the potential for 'revelation' from 'outside', hence the organisation increasingly hybridised. At the time of research, the LHS broadly defined itself as being located with/in the "technical, scientific and artistic" spheres, and included a number of different areas in its 'one' (largely open-plan) building, such as a hydroponic garden in the yard, an electronics area, desk space, a small library, classroom, kitchen, metal- and wood workshops and a wet lab, for example, which each facilitate (a) different alethotope/s (that sometimes clash with each other, as just mentioned above). It furthermore included sub-groups, meet-ups and ad-hoc events (often open to non-members as well), such as Pl(a)ywood, the Lockpicking Sports Sessions, a brain-computer interface workshop, the Bees 101, Not Just Arduino, the Homebrewing collective and a knitting group for example, which mostly also have their own virtual environments, such as websites and mailing lists as well as sub-wikis within the 'global' wiki of the LHS, through which they produce and exchange their different types [*Arten*] of truth, even across 'the whole' organisation and beyond. The workshops and sessions are generally 'self'-organised by members (often on demand) and are open to makers from multiple (non-) professional backgrounds, with various interests and different life

experiences (however are mostly attended by male technologists). In these hybrid places, the LHS makers (re-)design singular (and fairly 'open') cognitive-material artefacts, collectively and alongside each other, such as liquid-nitrogen-cooled ice cream, the LHS Bikeshed spaceship simulator, the Cave of Sounds installation and the Hoxton OWL, hence making the organisation in many ways transdisciplinary, by challenging the traditional divide between knowledge gained from 'intellectual labour' on the one hand, and through 'manual labour' on the other. The LHS' alethotopic field is relatively 'open' (more so than VA's) due to very low and flexible entry thresholds,⁴⁸⁹ collaborative 'auto'poietic logics and continuous change – for example through the relatively quickly transforming membership from London and outside, with makers taking their singular truths into, and out of, the organisation on a fairly permanent basis, the new formation [*Bildung*] of sub-groups (about every two months, at the time of research)⁴⁹⁰ and the experimental re-production of its open designs

In the world of the thermotope, the LHS can be explicated through the forms in which it creates and distributes comfort. As an organisation for (mainly) technophile tinkerers in a foam city, who produce open designs mostly in their spare time and for experience value, the LHS can be described as a 'pampering (third) place', enabling its members to create and participate in comfort spheres where they can follow and realise their interests outside of the more 'global' (often alienating) work domains of their daily jobs and homes. Much in contrast to VA, but similar to the Open Design City, the LHS' artefacts are mostly 'luxury' products, in the sense that they are created mostly out of personal interest in the relatively 'warm' environments of 'the post-industrialised world' that is able to tendentially focus more on

⁴⁸⁹ As mentioned above, anyone can become a member of the LHS, the minimum membership fee was only £5/month at the time of research, a lot of activities were open to the public anyway and makers were generally helpful and enjoyed sharing their 'truth/s' with others. The BioHackspace particularly has a mission to democratise scientific truths, which are usually confined to 'global' science labs.

⁴⁹⁰ According to Wareing, see above.

the dimensions of the 'comfortable' arts, rather than manufacturing and the crafts.⁴⁹¹

Since the LHS is fairly foamally produced and organised, comfort is here distributed in relatively equal forms – i.e. everyone has equal access to the collectively owned tools, equipment and materials (although members do also bring their own private property, which they can keep in individual storage boxes in the basement), to the basic infrastructures of the organisation (such as all rooms of the building, accessible 24/7, and internet access, for example) as well as to decision-making (although there can be problems with informal discussions for instance, when an established individual or circle of members tries to drown out comments from less established ones, as explained above). These relatively equally distributed comfort spheres can, due to their 'openness', easily get exploited, for example when some members misuse the LHS as cheap desk space in Hackney, thus potentially preventing other members from using the place in some ways, or through paying a low membership fee while frequently participating, which could (literally) prevent the LHS from 'heating' itself. Similar to VA, the standard of fairly equally distributed comfort/s in the LHS is fairly 'basic' (for its location in a relatively 'pampered' country however) due to the precarious (financial) situation of this foamal organisation in the highly contingent city of London. An organisation which is trying to increase the levels of comfort of the LHS in the future as well as other hacker spaces in the UK is the Hackspace Foundation, which, as explained, might soon function as mediator to facilitate the generation and distribution of resources – as a charity and 'mother' organisation of all the UK hacker spaces, it would be able to generate funding more easily and distribute it to where it most urgently needs to go (however, the extra administrative work would also lead to more discomfort for the members involved).

⁴⁹¹ The LHS' focus on the crafts/manufacturing thereby operates within the larger 'background' sphere/s of the arts. Of course, the arts are not always comfortable to work in, for example due to precarious conditions in 'the post-industrialised world'; neither are the spheres of manufacturing/the crafts necessarily.

Via the prism of the phonotope, the London Hackspace can be conceived through the forms in which it creates its own soundscapes that function as media of (non-)belonging. Due to its place with/in hacker-maker culture, the LHS (re-)creates its sonic spheres which are part of the technology and DIY worlds – for example, its technological infrastructures are named after famous people in computing (such as ‘Lovelace’, ‘Perlman’ and ‘Shannon’), which are said repeatedly throughout the place in order to keep it ‘in form’. As most maker labs, the LHS is a fairly transdisciplinary sphere and thus needs to *negotiate* its different sound production worlds – in this way, it decided to make the ground floor the more quiet area for electronics, desk-based work, cooking as well as conversations and eating in the lounge area,⁴⁹² while the basement is the louder place for mainly carpentry and metalwork. This division separates the LHS a bit into ‘loud manual-’ and ‘quiet intellectual’ labour, according to ‘globes’ logics, however is necessary for members to be able to perform their different types [*Arten*] of labour (sounds) without conflicts between them. Since these two sonic places are however in close proximity within ‘one’ building (mostly open-plan and including makers with largely collaborative and transdisciplinary attunements [*Stimmungen*]), with people having to pass through the ground floor in order to get to the basement, and having to go to the basement in order to get to their storage boxes as well as the wet lab, a level of sonic hybridity in the LHS is given. As mentioned, there are still problems with the Music Hackspace, which is not able to make its own sound production spheres fit into the ones of the LHS as ‘a whole’ (due to room shortage and insulation issues), thus it had to find another more suitable location in Troyganic café and its Hoxton OWL place in Finsbury Park, while even planning to get its own individual building somewhere else where it can better realise its sound installations.

⁴⁹² Whereby the ‘quiet’ room is not quiet yet since the network server has still not been dealt with due to financial issues, thus preventing the LHS from managing its sonic spheres.

Like the London Hackspace, betahaus Berlin is an urban foam cell in the meta-artificial metropolis. Through the world of the ergotope, the co-working space can be conceived as labour collective mainly for independent 'creatives', functioning as a mix of coffee house, home office, R&D lab, university campus, hacker space, carpentry workshop and start-up incubator. In contrast to Vigyan Ashram as well as the LHS, it is more of a 'global' business construct functioning in a lot of ways like a post-Fordist networked organisation rather than an organised network – by being fairly hierarchically organised and managed by the co-directors and their staff who generally try to hide the 'background' operations of the place from its 'users' (who, as paying customers, the directors have to cater for and respond to however). As described above, betahaus was founded upon the idea of a new form of economy in which people do not work in classic offices from nine to five anymore, like in modern institutions, but where "the creation of value happens in different places, at different times, in changing team constellations and without permanent employment", and an economy in which entrepreneurial praxis can not be understood solely in economic terms anymore, but as a converging of the traditional spheres of economics, culture, technology, politics and 'the social' into a "topology of co-working" – i.e. an economy where "almost everyone is an entrepreneur."⁴⁹³ In between 'the physical' and 'the digital', betahaus tries to be a laboratory where humans are not merely tools in the techno-logical system, but in which technology is instrumentalised in order to experiment with new forms of labour organisation.⁴⁹⁴ In this way, the house is partly a political project, on the one hand promoting (and lobbying for) more economic flexibility, but at the same time also more security of the precarious 'creative class/es' in Germany and beyond (not always successfully, as their unpaid internship scheme shows for example and it is questionable whether one had to set up

⁴⁹³ See Fahle et al. above.

⁴⁹⁴ As explained above, in some ways in the sense of Stiegler's 'economy of contribution'.

betahaus as a fairly hierarchically organised *GmbH & Co. KG* with set modular fees for 'users' to achieve this).⁴⁹⁵

Due to its fairly hybrid logics, betahaus inhabits a diverse range of workers from different disciplines (almost equally male and female, however largely 'white' and middle-class), mainly freelancers and start-up entrepreneurs from the knowledge economies in Europe – such as designers, artists, journalists and software developers – and some external corporations (sometimes post-Fordist 'empires', such as eBay and O2, sometimes more 'globally' organised ones that use betahaus as an innovation lab). These diverse knowledge-economy workers 'rhythmically bond' by mainly performing their labours via typing on their computer keyboards and presenting slides during networking events, however also disassociate themselves from the group through 'athleticist' principles, i.e. their highly specialised forms of (largely 'intellectual') labour and commodities (performed in singularised office settings), which need to be as 'individual' as possible in order to compete on the highly fragmented global market/s with other 'individual' commodities (in largely friendly ways). This is much in contrast to VA with its students and teaching staff largely bonding through agricultural- and manufacturing work, producing mainly agricultural hardware (not always commodities) and the 'natural' environment often for themselves or the local/regional, much-less-fragmented market/s around Pabal. In line with the 'beta principle', participants inhabit the house largely on a temporary basis due to their highly contingent lives, thus providing the place with a continuous circulation of knowledge, capital and networking opportunities, i.e. potential for business 'innovation' – in the LHS, although the membership does circulate and grow, makers are largely from the local tech scene in (North East) London, who generally stay on for a while; at VA, the majority of participants change only once per year due to

⁴⁹⁵ As mentioned above, I have not been able to talk with the co-founders about this. The decision might have been made due to profit motivations or/and to provide co-workers with a quite hassle-free environment where they can earn their daily subsistence.

student intake, which is making these places a bit more stable and homogenous in this way.

Together with the worldwide co-working network/s, betahaus shares the basic values of 'collaboration', 'accessibility', 'community', 'openness' and 'sustainability', hence it works in fairly formal ways, with thresholds against more external ergotopes being relatively low, similar to VA and the LHS. However, the place is only really accessible/open to individual workers and organisations in fairly basic forms – one can sit in the café for example, attend a free exhibition or take part in the open maker sessions; if one wants to participate in the Open Design City workshops for instance, one has to pay a relatively high participation fee, the co-working desks, offices and meeting rooms are not very open either to individuals/organisations with low incomes (although are not very expensive as office spaces in general), and childcare facilities were not available yet at the time of research (however being considered).

Like in the LHS and VA, 'collaboration' and 'community' are highly valued and facilitated in this ergotope, however in more commercial formats – for example through social (networking) events, sponsorships and knowledge exchange with other co-working spaces or post-Fordist 'empires'. Thereby, co-operations and community-building initiatives are often 'globally' directed by staff, in addition to participants forming their own collaborations through their individual work, but these then often take place more externally to the house. Hence, the social responsibilities through which betahaus forms itself as a 'commune' are mostly not enforced, like in (pre-)modern 'empires' (including at VA as an educational institution, to extents), but are in fact not even so much responsibilities but (innovation) services, which 'users' can take up (if they pay, mostly) or not. Thus, even though a 'social' place, betahaus functions in fairly individualistic forms, with most co-workers either working alone or individually in small corporate teams, only interacting with other co-workers once in a while, by paying for the

services that each one needs, or can afford, in modular forms. In the LHS and VA, interactions are generally a bit more continuous amongst participants due to the more (homogenously) social set-ups of these places, including more static memberships and casual, off-work relationships.

In order to foster collaboration amongst its continuously circulating creative-class workers with different needs, betahaus' architectural configuration is morphological and interactive, functioning against the 'global' logics of the DIN 16555 office set-up: The layouts of (the mostly open-plan) rooms of its subverted office building can be changed according to singular circumstances, with interiors being diverse, largely lightweight and re-arrangeable, moving between more private- and public spheres.⁴⁹⁶ When the house was in its 'betalab' phase, the set-up of the place was minimal in order to become more foamally created by its test participants (which were however more 'globally' crowdsourced by the co-directors via Facebook). Test 'users' initially brought their own furniture, sometimes even made food and drinks in the ready-made 'canteen' to finance their desks in this way, and were involved in the design development processes of the house. At the time of research, betahaus was not that foamally designed anymore, but largely through the co-directors who mainly bought interiors via the 'global' market. More virtually, the house is morphologically configured and connected through fast wireless internet infrastructures, a cloud-based printing service (a start-up founded internally) as well as mailing lists, Google groups (however hardly used), the betahaus website and email newsletters, which are largely designed in modular formats for quick changeover of content and include information about betahaus co-workers, events, competitions and relevant partners, in order to facilitate networking. Internal mailers and the website are not contributory, but organised and

⁴⁹⁶ As mentioned above, the betahouses in Hamburg and Cologne who have not been able to create such morphological places have gone bankrupt, according to their staff.

managed fairly 'globally' by betahaus' staff and partners, i.e. ultimately the co-directors.

The Open Design City is a betahaus-internal ergotope, initially fairly separate from its mother organisation and functioning in its own forms, however later taken over by betahaus as 'a whole' in order to operate more according to the logics of the latter. In contrast to the co-working space at large, which operates mainly in the spheres of 'intellectual labour', the ODC's ergotope tends more towards 'manual labour' and was set up to collaboratively produce 'open designs', including (re-)creating and sharing knowledge and resources as well as experimenting with new forms of value. In its embryonic phase, the ODC comprised only one room and was almost completely financed by betahaus at large, which used it as a branding tool to attract co-workers and 'cool' companies to boost its innovation potential. During that time, its access barriers were extremely low, i.e. basically anyone was able to go in at any time and even sleep in there (also homeless people),⁴⁹⁷ and it was very informally and heterarchically (dis)organised, like a house share, with hardly any conceptions of private property – which, according to Burkhart and Barsegova, led to a lot of creative potential, however also to the occasional loss of some 'open' designs, or, on the opposite, to too many (often unfinished junk) designs cluttering up the workshop, which no one felt responsible for.⁴⁹⁸ Makers participating in the ODC used to be mainly local creatives from various disciplines (architects, engineers, philosophers, biologists etc.) and only few companies, with most projects realised being transdisciplinarily arts-and-crafts-based and made largely for experience value, similar to the LHS.

After a while, when the betahaus co-directors realised that the ODC was (financially) unsustainable and not serving them much of a purpose anymore, they started to take control of the place, more in line

⁴⁹⁷ Whereby Mason pointed out however that the 'geek nature' of the place made it in some ways inaccessible to 'outsiders' (see above).

⁴⁹⁸ See above.

with the co-working space's 'global' logics, which has led to it being less open and transdisciplinary. It thus started to get financed mainly through (relatively expensive) educational maker workshops, directed largely by betahaus staff and external experts, and its layout was re-designed in order to make room for a more organised atmosphere, where (mainly) paying customers can now create their projects in dedicated sessions with professional tools largely sponsored by corporate partners (which had already realised the marketing potential of 'making') and are owned by betahaus as a company. Workshop tutors now more 'globally' guide customers' learning processes as well as ensure that tools do not break. The place is hence, literally, not open all the time anymore, only for planned workshop sessions, in order to protect betahaus' property – if one wants to have access to the place outside of these times, one has to ask the Workshop Manager and needs to be a (paying) betahaus member. As part of the re-design, the one ODC room became separated into three, which, according to Burkhart, led to fewer conflicts around resources – for example, quiet work in the Dialog room can now be performed at the same time as loud work in the main workshop – however also led to less creative potential. People attending the ODC in its revised version are now largely local middle-class professionals generally with a slightly higher income than the makers who used to attend the place before, producing their own artefacts out of personal interest or in order to integrate innovation processes back into their existing jobs in various disciplines (often in more 'globally' organised companies) as well as some start-ups from upstairs who make prototypes of their commodities-in-development.

From the point of view of the thermotope, betahaus can be explicated as highly aestheticised 'comfort sphere' or 'pampering place', located in the relatively 'warm' consumer culture/s of Kreuzberg in Berlin, one of Europe's main creative capitals. Initially rather on the edges of the Kreuzberg hub, due to the post-WWII history of Moritzplatz

and its surroundings, the place was chosen due to still cheap rents at the time and, according to Gummer von Mohl, because of its more “edgy” and “unfinished” atmosphere,⁴⁹⁹ predestined to soon become part of the larger creative ecology of the area. The set-up of betahaus has since then contributed to the (not unproblematic) ‘regeneration’ processes of the Moritzplatz environment, which have not been able to prevent it from ‘uncomfortable’ high rates of unemployment and receipt of social benefits.

Upon renting out the building at 19-20 Prinzessinnenstraße from Orco-GSG, which gave betahaus a very cheap deal due to its potential to drive up rents in this gentrifying area, it was transformed from a former cloth- and print factory into a ‘cool’ office building, in order to become part of the comfort sphere/s of the knowledge/creative economy and to accommodate its needs. Its interiors were thus turned into rather ‘warm’ environments, attempting to converge ‘life’ and ‘work’ for the mainly ‘Western’ creative-class ‘users’ of the place, who are trying to earn their daily subsistence in/from there (however might have to operate in highly precarious, i.e. discomforting, conditions and are often on incomes rather on the lower end of the spectrum). For example, the ground floor café’s atmosphere is ‘air conditioned’ with ‘trendy’ (and not-too-loud and -excessive) music to accompany informal business meetings and relaxed working; social events and parties take place in between working hours; walls and furniture can be changed according to the changing attunements [*Stimmungen*] of co-workers; interiors of the place are colourful, but subdued, and wood and fabrics are set against concrete, making the place feel more like ‘home’ – in contrast to VA and also to the LHS since it does not have the means to create such highly aestheticised pampering spheres due to its lower financial access barriers and perhaps also less product-design-centric membership.

⁴⁹⁹ See above.

The distribution of comfort in betahaus thereby generally works according to how much one individually pays for it via the modular fee structure – capital which is used to maintain betahaus as well as generate profit for the co-directors,⁵⁰⁰ who decide what to do with all income generated (as mentioned, in a lot of ways determined in turn by the needs of betahaus' customers ⁵⁰¹). Apart from this 'self'-generated comfort of the organisation, which is then in a lot of ways unequally owned and distributed (in contrast to the LHS and in some ways also to VA),⁵⁰² betahaus furthermore ensures the maintenance of its comfort sphere/s through more 'globally' renting out office space to external organisations, through events, workshops and sponsorships.

As implied above, due to betahaus' fairly foamal logics, the organisation mostly tries to work out a 'pampering advantage' towards others in order to form and maintain its singularity, i.e. be one option out of many by collaborating with other relevant organisations and competing in largely friendly ways, rather than trying to aggressively 'invade' other spheres in order to become an 'empire'. However, in contrast to the LHS, but somehow similar to VA, it does have some more 'global' ambitions by promoting and lobbying for more comfort of the creative class/es as well as by trying to expand its betahaus brand via its sister houses in Europe, which have each created their own forms of generating and distributing comfort, however in many ways function according to betahaus' more 'global' logics, getting provided with some 'comforting' capital by the main house in Berlin in order to set up and maintain themselves.

Similar to the LHS, the ODC especially can be seen as a pampering (third) place, where people interested in 'making' can, collaboratively and alongside each other, produce artefacts mainly in

⁵⁰⁰ One can assume however that these are not very high (yet) due to the fairly precarious form of organisation that betahaus is, being relatively cheap as an office space (which is not very big) and still reasonably new at the time of research, experimenting with sustainability models. Moreover, the co-directors almost certainly still have to pay back loans.

⁵⁰¹ Who can informally approach staff and directors since these work and socialise in the same place/s, or more formally in one of the feedback sessions, for example.

⁵⁰² As explained above, equally shared comfort can also lead to its occasional exploitation.

their spare time and for experience value. It enables participants (since the re-design mostly rather well-off individuals) to create and participate in comfort spheres where they can follow and realise their interests largely outside of the often more 'global' (and alienating) work domains of their daily jobs. The artefacts created there can thus be described as 'luxury' products, in the sense that they are often made for personal enjoyment only and within the dimensions of the arts, rather than the tendentially more uncomfortable 'manual labour' sphere/s and the crafts.⁵⁰³

Before the re-design of the ODC, participants were able to quite comfortably enjoy the place that was almost completely financially sustained by its mother organisation, while at the same time hardly being controlled by it. The ODC was thus able to function in very heterarchical forms, where almost everyone had equal access to the collectively owned equipment and materials as well as basic infrastructures of the place, by being able to very transdisciplinarily produce their 'open designs' (as mentioned, these 'open' designs were gone sometimes, hence creating discomfort for the members who were not able to use them anymore). After the 'global takeover', when betahaus was not willing to pay anymore for the place that was threatening its (financial) comfort, and the ODC participants were either not willing, or able to, pay membership fees discomfotingly high enough to sustain it themselves, the dimensions of comfort in the ODC changed – on the one hand, it became more comfortable to work there due to being more organised and professional (for which one now largely has to pay however); on the other hand, this organisation felt more uncomfortable to some makers who liked the place more disorganised (and cheaper) and hence left the ODC in order to go to other places where they could realise themselves more comfortably (such as the Funkhaus Grünau or Raumfahrtagentur).

⁵⁰³ Similar to the LHS, the focus on 'manual labour' and the crafts in the ODC operates within the larger 'background' sphere/s of the arts.

Through the frame of the alethotope, betahaus can be seen as work-place/s for the becoming of truths [*alétheia*]. Since the co-working space as 'a whole' largely operates with/in the knowledge economies, i.e. through 'intellectual' forms of labour, while (particularly) through the ODC also transgressing into the manufacturing sphere/s, i.e. more 'manual' forms of labour, it can be understood as challenging the traditional opposition between 'higher' and 'lower' formations [*Bildungen*] of truth. Through this hybridisation, by foamally converging the areas of economics, culture, technology, politics and 'the social' into 'one' experimental place, betahaus sets itself against the truth of the modern institutionalised (office) labour system – including strict working hours, missing collaborative processes, hierarchical organisations, self-exploitation as well as the division between 'physical' and 'virtual' spheres – ⁵⁰⁴ while promoting both more flexibility and security of the creative class/es. In its attempt to operate against a more 'global' truth of economic organisation, betahaus initially had problems with gaining financial support through its 'business guess', thus it had to more foamally finance itself through the co-directors' own capital as well as help from friends and family, in addition to some bank loans.

Through its relatively foamal set-up, betahaus' alethotope is fairly 'open' (however largely in the realms of the mostly 'white' and middle-class knowledge/creative economies in Europe): for example by being quite accessible (for an office space) to a diverse range of workers (fairly equally male and female) from different disciplines and backgrounds who mostly inhabit the house on a short-term basis, through facilitating collaborations amongst these and with various other (not necessarily co-working) places. It thus enables – and in fact actively encourages – different types [*Arten*] of truth to co-exist and to continuously evolve in order to generate 'innovative' cognitive-material products (largely post-Fordist, slightly more 'closed' commodities

⁵⁰⁴ See Fahle et al. above.

however) that are in friendly competition with each other on the 'global' market. These different forms of truth are fairly foamally *generated* in betahaus, i.e. through its individual co-workers and small corporate teams in connection with others (largely outside of betahaus), however not so much foamally *negotiated* amongst the participants since this negotiation is mainly 'globally' done by the co-directors and their staff – services which 'users' mostly pay for modularly. This is in contrast to the LHS with its more do-ocratic logics of truth, and also to VA where truth/s are fairly hierarchically organised, in a lot of ways due to being an educational institution (for teenagers).

In order to evolve its alethotope, which is increasingly operating with/in the creative- (and not just knowledge) economies, the co-working space set up the ODC and in this way started to let truth/s also reveal themselves via more 'manual labour' processes (however in this way also setting up an internal dualism between the alethotope of the co-working office space and the one of ODC). In its early epoch in many ways a branding tool, perhaps mainly to generate interest among co-workers and organisations still largely operating in the spheres of the knowledge economy, the ODC functioned in highly 'open',⁵⁰⁵ transdisciplinary and experimental formats, where truths were very casually and heterarchically (non-)negotiated, without much 'global' direction – which sometimes led to highly creative formations of truth, however often also to truths not (sufficiently) forming at all. After the re-design, due to non-sustainability and missed business/innovation opportunities, while being relatively separate from the co-working space at large, the ODC's dimension/s of truth changed towards the more commercial and professional model of its mother organisation – as Barsegova explained above, other existing places generally used to be either (more 'global') co-working spaces or (more foamal) fab labs or similar, but not both at the same time. The decision to turn the ODC

⁵⁰⁵ Although, as mentioned above, Mason thought it was not so open to people with truths outside of the technology geek culture/s.

partly into a betahaus-directed educational environment, including paid workshop sessions in order to financially sustain the place, worked well as part of the larger formational landscape/s – as Barsegova described, 'intellectual' forms of truth can be quite accessible these days, partly through virtual learning environments that one can individually connect to easily from various places, whereas more 'manual' forms of truth are very difficult to reveal themselves through the individual and computer screens only, requiring more guidance and participation in a social sphere, which also includes the tools and technological systems needed. Furthermore, as Mason pointed out, the people taking these workshops (i.e. middle-class professionals with relatively high disposable incomes) might be alienated a bit from more physical materials and 'manual' formations of truth in their knowledge economy jobs, which makes them pay quite a bit of money for experiencing truths which used to be/are generally confined to the working classes. Possibly, environmental truths might be involved in this alethotopic development as well (see Repair Nights) and maybe some people want to invest in skills that could be financially beneficial in the long-term (see Build or Buy store, including *Hartz IV Möbel* project).

Since the re-design, the ODC's alethotopes have become less open (literally) and transdisciplinary,⁵⁰⁶ with most sessions being more 'globally' organised and directed by betahaus staff and dedicated to only one alethotope at a time (which can be used in hybrid forms however) – such as fashion design or woodworking or jewellery creation – located in either the main workshop area or the Dialog room. This changed alethotopic sphere now generally includes people with slightly higher disposable incomes than the makers having worked in there before, however they are also from various disciplines and create personalised artefacts (generally less 'shared' though) mainly in their spare time. As mentioned, sometimes they integrate these 'innovative'

⁵⁰⁶ Again, following Mason, in some ways the ODC is more open now due to higher responsiveness to people not so familiar with 'making' yet, however one has to pay for this 'openness' (see above).

truth formation [*Bildungs-*] processes learned back into their existing jobs, often in more 'globally' organised companies, and sometimes start-ups from the co-working offices upstairs make prototypes of their commodities-in-process.

Even though the ODC started to function according to more 'global' logics, some more open and informal maker sessions still take place, including the DIY BaustelMontag for example, where people can bring their electronic devices and the co-organisers show them how to repair these. As Burkhart explained above, he sees the workshop as a political event since they want to make people more independent from 'global' corporations through opening up technological 'black boxes' (i.e. closed truths) and thus turn them into more knowledgeable consumers, even enabling them to 'reveal' technological systems themselves, to extents, by being able to repair these on their own in the future.

Since the ODC was redesigned and has taken on more commercial forms of truth, it also started to more formally, i.e. 'globally' as an organisation, collaborate with other places within the creative sector (both more 'global' and foamal ones, and mostly not maker labs) in order to ensure circulation of truths for innovation purposes. There is furthermore a 'global' agenda to set up ODCs in the other betahouses, but only when a sustainable truth of the place has been achieved, at least as a rough sketch, which could thus be locally re-created. Thus, in the same way as betahaus as 'a whole', even though the ODC now functions according to more 'global' logics, it does not want to become an empire of truth, but simply create some form/s in order to produce and maintain itself as a singularity, in connection and (largely) friendly competition with others. This new singularity of the ODC's alethotope is in many ways incompatible with the old one, which has led to many makers leaving to participate in other places where they can better realise their own truths. As Burkhart explained, he thus understands the ODC as functioning somehow like a school

magazine – i.e. as a fluctuation of people with different truths, which sometimes fit and sometimes do not fit with each other, and then these people just do something else at some point – “because they’ve had enough, because they’ve seen enough” – and a new group comes in with another set of truths. “Such a project always gets rebuilt anew.”⁵⁰⁷

⁵⁰⁷ See ‘Open Design City’ above.

Conclusion

This PhD thesis has started to develop a techno-social ontology of place. As argued above, place has been a neglected concept in modern philosophical thought in 'the West', generally conceived as a mere subcategory of the more universal/ising notions of time and space. Even though philosophers have recently started to take a renewed interest in notions of place, the concept has, in my view, hardly been developed as such. Also media theory has often used notions of time as its primary category due to the acceleration of technological development in modernity, thus being founded on notions of 'process'. Although media theory and geography are increasingly converging, however predominantly through conceptions of space, considerable ontological treatments of medial place are still missing. This thesis has hence set out to explicate place not as deriving *from* time or space, but indeed as time *and* space, i.e. as the in-between of time and space: as singular space-time. The globalising-globalised 'world' of (post-)modernity needs a differentiated theory to take place in order not to conceive it as homogenous universal, but as pluralities of singular places – neither too 'macro', nor too 'micro', but meso-scale hybrid organisations where immanence and transcendence multi-dimensionally converge in between 'the local' and 'the global'.

Due to the deepening pervasiveness of technological processes throughout 'the globalised world', a techno-social ontology of place needs to be placed in the anthropocene, i.e. an epoch in which human culture is increasingly influencing 'nature' on a global scale.⁵⁰⁸ A contemporary ontology of place/s thus needs to complexify the metaphysical dualities between nature and culture, biology and technology, and hence acknowledge the relations between human

⁵⁰⁸ As explained above, I, partly with Sloterdijk, understand this epoch as one in which humans construct (the) world/s with/in technological systems and thus as a wider movement towards a formational logics of place/s.

and non-human formations, consequently the decentring of the human and in turn grasp the influence of the (more and more human-created) non-human on the human. In this cultivated 'world', places are, to higher and higher extents, anthropo-technically *designed* places. They are designed places in deeply connected ecologies, which continuously morph by relatively keeping their volumes. One can thus consider them 'open designs' – i.e. open in ways that keep them flexible enough in 'a world' in which they are re-designing *themselves* in singular immanent-transcendent forms.

Although considerable ontological treatments of techno-social place/s are still missing, an approximation can be found in Deleuze and Guattari's rhizomatic thought (however primarily explicated through notions of space). As argued, due to the theory's relative flatness, tendency to hyper-differentiate and universalise, with an overall focus on rather 'passive' affective relations, it is not able to sufficiently think singularities, including their design/s and organisation/s. In (the) late capitalist world/s, the rhizome has now largely become the logics of post-Fordism. In order to design a techno-social ontology of place [*topos*] that is more 'voluminous' and pluralistic than the rhizome, this thesis has worked with Peter Sloterdijk's *Spheres* trilogy – through, with, beyond and against Martin Heidegger's thought. In order to ground the former, this PhD project has firstly constructed Heidegger's ontology in techno-platial forms through some selected texts, against the primary focus on temporal notions in his early work (by himself as well as most of his readers). Secondly, Sloterdijk's 'spherology' has been explicated, which (largely implicitly) conceives Heidegger's early work from a spatial point of view and builds upon his later, more platial, thought. In *Spheres*, Sloterdijk has developed a historico-philosophical, anthropologically grounded media theory after Heidegger, which understands 'world'/s in more physical, constructivist, pluralistic, complex and social forms. As explained, in contrast to Sloterdijk's own understanding of his trilogy as 'Being and Space', I would more

precisely read it as 'Being and Place', i.e. as a topo-logy, in order to give it more conceptual power in its creation of place as not (just) a universal/ising and flat representation of 'the world', but as being singularly immanent-transcendent with/in it. As a theory of globalisation, the *Spheres* trilogy – including *Bubbles* (micro spherology), *Globes* (macro spherology) and *Foams* (plural spherology) – has been read here as a topo-logical model, i.e. in a more systematic form than the original text, which is not just a (media-)philosophical essay, but equally, if not more so, a work of literature.⁵⁰⁹ The logics (and poetics) of the three books, i.e. epochs, have thus been explicated, with an emphasis on foams where Sloterdijk's topology comes together – which however cannot be understood outside of the dimensions of bubbles and globes due to *Spheres*' multi-historical systematics in which different forms of Being-in-the-world condition and simultaneously co-exist with each other.

In order to develop a techno-social ontology of place in the epoch of foams, this thesis has not just considered place 'from the outside', i.e. as universal/ising and idealised representation of Being/s, but as material-semiotic environment/s, which are singularly designed-designing 'in the world'. One type [Art] of these new environments, chosen for this thesis, are maker labs, i.e. meso-scale collaborative workplaces where humans cohabit with/in technological systems to produce and share 'open designs' for local needs. They are workshops in which physicality and virtuality, atoms and bits, biology and technology, science and art converge into a uniquely differentiated place. Because of their transdisciplinary approaches, maker labs challenge divisions between traditional fields such as architecture, software development, carpentry, biology and engineering by blurring the (economic) boundaries between conception and development, manufacturing, distribution and consumption into a new notion of

⁵⁰⁹ As explained, in my view this has not sufficiently been done yet in the relatively sparse (but expanding) literature on *Spheres* in the English-speaking world/s, in many ways due to the last book, *Foams*, still not having been translated at the time of writing.

'open design'. Historically placed in the anthropocene, where 'the world' is to high degrees anthropo-technically *made*, maker labs are formations that continuously re-design themselves, including their conditions (to extents), with/in the environments of 'the world' (and beyond). The labs have also not just been 'universally' considered in this thesis, but the platial dynamics of three of these have been explicated in order to show how a techno-social ontology of place act-ualises, i.e. de-constructs, itself through singular materialities. These places have been: Vigyan Ashram, an experimental rural development college including fab lab in Pabal (India), where school dropouts learn to design predominantly agricultural hardware and the 'natural' environment for local (survival) needs; the London Hackspace, a community-run hacker space where tinkers make open designs primarily in their spare time for experience value by sharing tools and knowledge; betahaus Berlin, a co-working space including Open Design City functioning as a mix of coffee house, home office, R&D lab, university campus, hacker space, carpentry workshop and start-up incubator.

Maker labs have partly been conceived as what Rossiter, Lovink et al. have termed 'organised networks', i.e. new institutional forms emerging through today's informational economies and the logics of socio-technical networks. Orgnets do not function much like modern institutions, i.e. tendentially through the logics of vertical integration, representation and (intellectual) property; neither so much like 'networked organisations', which merely instrumentalise the logics of (digital) networks to enhance their traditional institutional models. Orgnets tendentially operate through contingency, transdisciplinarity, hybridity, (a high level of) self-organisation, collaboration, often advocate open-source culture and are based on the logics of post-representational politics by conceiving of conflict as a generative process. In contrast to Rossiter and Lovink however, I have not theorised maker labs, as organised networks, so much as political spaces, but as

ontological places – in the sense that I see the techno-social condition as a larger epochal evolution from the modern age of time and space towards one of place, which functions through complex singularisation/s, i.e. the 'background' condition in and through which orgnets are beginning to operate. While Rossiter is reluctant to attribute ontological status to the socio-technical form of the network since this rendering into essentialist terms functions "to elide the complexities and contradictions that comprise the uneven spatio-temporal dimensions and material practices of networks,"⁵¹⁰ I have argued that an ontology does not have to be essentialist if it recognises its own hybridities and (material) complexities. Thus, even though I would not deny the need for a political theory of networks, this theory needs to be grounded in an *ontology of place* (and not primarily of space or time) in order *not* to ignore both larger and smaller historico-structural processes. As explained, it is in this way that Rossiter and Lovink sometimes fall back into making metaphysical idealisations, which are not in line with their immanent critique methodology. Orgnets understood as places necessarily function through, with/in and against the corporate-state apparatus, established political and cultural institutions and representational democracy.

With Lovink and Rossiter, we also do not get to know much about how exactly organised networks do or might look like and how they function as complex singularities 'in the world' since, in their writings, they largely concern themselves with the 'universal'/representational dimensions of these new institutional forms. As they acknowledge themselves, even though patterns and tendencies can be partially universalised, "there will be no 'internationalism' for networks".⁵¹¹ As also explained, there was not much (semi-)academic literature on maker labs available at the time of writing and the little that was published was often under-theorised and/or not very comprehensive and did not

⁵¹⁰ See main introduction above.

⁵¹¹ See main introduction.

explore the labs much from an ontological, or topological, point of view, especially not through a 'spherological' framework, hence falling short of grasping the phenomenon through its place/s with/in (and against) anthropo-technical evolution processes.

In order to develop a 'voluminous' techno-social ontology of place via the materialities of maker labs, I have furthermore argued that Actor-Network Theory is not quite suitable to empirically research and explicate these work-places due to the model's relative flatness as well as hyper-relationality, and thus inadequacy to sufficiently explain how or why particular relations come into being *in the first place*, i.e. to explain their (historical) conditions and limitations. Although ANT is very successful at showing how complex systems are in-the-making, it can only do so quite 'universally' and in the short term while not much considering the larger and more continuous 'background/s' these (mainly 'foreground') processes are functioning in, through, with and against, or indeed how 'backgrounds' are also being made and co-exist with other 'backgrounds' (and 'foregrounds'). By 'translating' all actors onto *one* decentralised network of equivalence, singularity, difference and alterity are again undermined.

In order to develop the topologies of maker labs, understood as polycentralised work-places in the epoch of complex singularisation/s, I have used a 'media'-phenomenological approach close to the spherology, which has situated Vigyan Ashram, the London Hackspace and betahaus Berlin through, with, in and against their singular (historical) places. As part of this approach, I have immersed myself with/in their material-semiotic 'worlds' via open research design processes and shown in which forms they function (primarily) as foams, (primarily) *in* the epoch of foams. Due to the multi-historical dimensionalities of the logics of *Spheres* however, the labs have also been situated with/in and against the epochs of bubbles and globes since different forms of Being-in-the-world condition and simultaneously co-exist with each other in the process of history. By working with and

through the spherology, whilst de-constructing it in order to demonstrate its embodiment 'in the world', the labs have been explicated through the (nine-dimensional) complexity of the anthroposphere. I.e. via the chirotope, phonotope, uterotope, thermotope, erototope, ergotope, alethotope, thanatotope and the nomotope, I have ek-shibited how the labs are singularly becoming in different forms through (non-)human incubation effects.

Which finally brings me back to Sloterdijk's conception of the *whole* anthropotope and thus to the limitation, in my view, of the *Spheres* project as (philosophical) anthropology. As Sloterdijk explained in the last book of the trilogy, every foam cell is a (at least) nine-dimensional pattern, which spans into the complexities of the whole anthropotope, while emphasising that 'the whole' is an impossible format and can only be understood as a hybrid. The anthropotope must thus necessarily also be an 'impossible' format, i.e. a hybrid, and needs to be seen as part of other *topoi* of Being/s it is placed through, with, in and against. Since my project is to develop a *techno-social* ontology of place, this would specifically entail seeing the anthropotope as being placed in relation with *technological* Being/s. Of course, and this is one of the main arguments of *Spheres*, especially of *Foams*, Sloterdijk already does this to extents, however the singular ontology of the 'technotope' has not been considered. Bringing an anthropo-logy together with a 'techno-logy'⁵¹² through the framework/s of place⁵¹³ would enable one to further grasp the (historical) mediations between human and technological systems as well as how these mutually de-construct themselves in singular forms – with/in and against others.⁵¹⁴

Developing an ontology of place in an epoch where 'worlds' are anthropo-technically designed would also include further considering

⁵¹² See Gilbert Simondon's and Bernard Stiegler's works, for example.

⁵¹³ And not of time, as Stiegler largely does (see main introduction above).

⁵¹⁴ This approach in turn would have allowed me to explicate better how technological systems mediate relations through maker labs.

the emerging economic forms tending towards local production (and not so much consumption) techniques and 'auto'poietic organisations of work, which are enabled through global infrastructures (such as the 'free' market, transport-, energy- and communication networks). This economic evolution includes the hybridisation and de-hierarchisation of manual- and intellectual forms of labour and thus the convergence of the more manufacturing-based- with the knowledge-based economies into *creative* economies. In turn, these new economic types [*Arten*] need to be considered through the transactional forms between human and technological systems, including how the emerging 'patial production technologies', such as 3D printing for instance, as well as the 'open designs' produced through them, mediate these transactional forms by increasingly blurring physical and digital worlds.

As touched upon earlier, in order to further evolve a techno-social ontology of place when 'the world' cannot just be conceived as 'external' idealisation anymore, its design needs to make room for [*einräumen*] its own hybridities, material complexities, continuous evolution as well as recognition of *others*. The 'theory' could achieve this, for example, through a malleable composition, which does not try to rather simply and passively (over-)determine 'the world', but to actively *produce* it *with/in* it; through nuance; by de-constructing itself via proximity to materialities; through transdisciplinary experimental approaches and collaborations, as well as by placing itself with/in and against *other* material-semiotic environments through recognising its own complex (historical) conditions and limitations. I.e. it should be constructed as an 'open design'.

Bibliography

Books

van Abel, B.; Evers, L.; Klaassen, R. & Troxler, P. (eds.) Open Design Now – Why Design Cannot Remain Exclusive Amsterdam: BIS, 2011

Anderson, C. Makers – The New Industrial Revolution London & New York: Random House, 2012

Augé, M. Non-Places – An Introduction to Supermodernity London & New York: Verso, 2008

de Beistegui, M. Thinking with Heidegger – Displacements Bloomington & Indianapolis, IN: Indiana University, 2003

Berardi, F. [transl. by Cadel, F. & Mecchia, G.] The Soul at Work: From Alienation to Autonomy Los Angeles: Semiotext(e), 2009

Büching, C. & Walter-Herrmann, J. (eds.) FabLab – Of Machines, Makers and Inventors Bielefeld: Transcript, 2013

Casey, E. S. The Fate of Place: A Philosophical History Berkeley, London, Los Angeles: UCP, 1997

Casey, E. S. Getting Back into Place – Toward a New Understanding of the Place-World Bloomington, IN: IUP, 2009

Castells, M. The Informational City: Information Technology, Economic Restructuring, and the Urban-Regional Process Oxford: Basil Blackwell, 1989

Castells, M. The Rise of the Network Society – The Information Age: Economy, Society, and Culture | Chichester, Malden, MA & Oxford: Wiley-Blackwell, 2010

Charny, D. (ed.) Power of Making – The importance of being skilled London: V&A, 2011

Chomsky, N. Occupy London & New York: Penguin, 2012

Coleman, E. G. Coding Freedom – The Ethics and Aesthetics of Hacking Oxford & Princeton: PUP, 2013

Cumming, E. *Preface and Sources and Early Ideals* in Cumming, E. & Kaplan, W. The Arts and Crafts Movement London & New York: Thames and Hudson, 1995: 6-30

Deleuze, G. & Guattari, F. [transl. by Masumi B.] A Thousand Plateaus: Capitalism and Schizophrenia London: Continuum, 2004

Delfanti, A. Biohackers: The Politics of Open Science London: Pluto, 2013

von Dobeneck, H. F. Das Sloterdijk-Alphabet – Kritisch-lexikalische Einführung in seinen Ideenkosmos Würzburg: Königshausen & Neumann, 2006

Doctorow, C. Makers London: Harper Voyager, 2010

Ekman, U. (ed.) Throughout: Art and Culture Emerging with Ubiquitous Computing Cambridge, MA: MIT Press, 2013

Elden, S. Mapping the Present – Heidegger, Foucault and the Project of a Spatial History London & New York: Continuum, 2001

Elden, S. (ed.) Sloterdijk Now Cambridge & Malden, MA: Polity, 2012

Fahle, Ch. et al. Das Beta Prinzip, accessed on: www.booki.cc/betahaus-ein-coworking-handbuch, 09/10/2013

Farías, I. and Bender, T. (eds.) Urban Assemblages: How Actor-Network Theory Changes Urban Studies London: Routledge, 2010

Farman, J. Mobile Interface Theory – Embodied Space and Locative Media Abingdon & New York: Routledge, 2012

Figal, G. (ed.) [transl. by Veith, J.] The Heidegger Reader Bloomington & Indianapolis: IUP, 2009

Florida, R. The Rise of the Creative Class New York: Basic Books, 2012

Flusser, V. The Factory in The Shape of Things – A Philosophy of Design London: Reaktion 1999: 43-50

Gershenfeld, N. When Things Start to Think London: Hodder & Stoughton, 1999

Gershenfeld, N. Fab: The Coming Revolution on Your Desktop – From Personal Computers to Personal Fabrication New York: Basic Books, 2005

Ghosh, R. & Pramanik, A. K. (eds.) Panchayat System in India – Historical, Constitutional and Financial Analysis New Delhi: Kanishka, 2007

Greensted, M. Introduction in An Anthology of the Arts and Crafts – Writings by Ashbee, Lethaby, Gimson and their Contemporaries Aldershot & Burlington, VT: Lund Humphries, 2005: 1-7

Harel, I. & Papert, S. (eds.) Constructionism Norwood, NJ: Ablex, 1991

Heidegger, M. Vorträge und Aufsätze Pfullingen: Günther Neske, 1954

Heidegger, M. Identität und Differenz Pfullingen: Günther Neske, 1957

Heidegger, M. Über den Humanismus Frankfurt a. M.: Vittorio Klostermann, 1968

Heidegger, M. Der Ursprung des Kunstwerkes Stuttgart: Philipp Reclam jun., 1970

Heidegger, M. 'Vom Wesen und Begriff der *φύσις* – Aristoteles, Physik B, 1' in *Wegmarken* in Gesamtausgabe Frankfurt a. M.: Vittorio Klostermann, 1976: 239-301

Heidegger, M. 'Zur Seinsfrage' in *Wegmarken* in Gesamtausgabe Frankfurt a. M.: Vittorio Klostermann, 1976: 385-426

Heidegger, M. 'Aus der Erfahrung des Denkens' in *Aus der Erfahrung des Denkens* in Gesamtausgabe Frankfurt a. M.: Vittorio Klostermann, 1983: 75-86

Heidegger, M. 'Seminar in Le Thor 1969' in *Seminare* in Gesamtausgabe Frankfurt a. M.: Vittorio Klostermann, 1986: 326-371

Heidegger, M. *Beiträge zur Philosophie* in Gesamtausgabe Frankfurt a. M.: Vittorio Klostermann, 1989

Heidegger, M. [transl. by McNeill, W.] The Concept of Time Oxford: Blackwell, 1992

Heidegger, M. *Bremer und Freiburger Vorträge* in Gesamtausgabe Frankfurt a. M.: Vittorio Klostermann, 1994

Heidegger, M. [transl. by Hofstadter, A.] Poetry, Language, Thought
New York: Harper Perennial, 2001

Heidegger, M. [transl. by Wilde, J. T. & Kluback, W.] What is Philosophy?
Boulder, Lanham, Oxford & New York: Rowman & Littlefield, 2003

Heidegger, M. Sein und Zeit Tübingen: Max Niemeyer, 2006

Heidegger, M. 'Zeit und Sein' in *Zur Sache des Denkens* in
Gesamtausgabe Frankfurt a. M.: Vittorio Klostermann, 2007: 3-30

Heidegger, M. [ed. by Ferrell Krell, D.] Heidegger – Basic Writings London
& New York: Routledge, 2010

Ingwood, M. Heidegger – A Very Short Introduction New York & Oxford:
OUP, 1997

James-Chakraborty, K. *Introduction* in James-Chakraborty, K. (ed.)
Bauhaus Culture – From Weimar to the Cold War London & Minneapolis:
UMP, 2006: xi-xix

Katsiaficas, G. N. The Subversion of Politics: European Autonomous
Social Movements and the Decolonization of Everyday Life Oakland,
CA: AK Press, 2006

Kelty, C. Two Bits – The Cultural Significance of Free Software Durham &
London: DUP, 2008

Kincheloe, J. L. *Introduction and The Foundations of Critical Pedagogy*
in Critical Pedagogy New York: Peter Lang, 2008: 1-105

Kitchin, R. & Dodge, M. Code/Space: Software and Everyday Life
Cambridge, MA: MIT Press, 2011

Latour, B. & Woolgar, S. Laboratory Life – The Construction of Scientific Facts Princeton, NJ & Chichester: PUP, 1986

Latour, B. [transl. by Porter, C.] Aramis or The Love of Technology
Cambridge, MA: HUP, 1996

Latour, B. Reassembling the Social – An Introduction to Actor-Network-Theory Oxford & New York: OUP, 2005

Lave, J. & Wenger, É. Situated Learning – Legitimate Peripheral Participation New York: CUP, 1991

Law, J. & Hassard, J. (eds.) Actor Network Theory and After Malden, MA & Oxford: Blackwell, 1999

Lazzarato, M. [transl. by Geene, S. & Stein E.] Videophilosophie – Zeitwahrnehmung im Postfordismus Berlin: b_books, 2002

Levy, S. Hackers – Heroes of the Computer Revolution London: Penguin, 2001

Lotringer, S. & Marazzi, Ch. (eds.) Autonomia: Post-Political Politics
Cambridge, MA & London: Semiotext(e), 2007

Lovink, G. *Organizing Networks in Culture and Politics* in Networks Without a Cause: A Critique of Social Media Cambridge & Malden, MA: Polity, 2011: 158-175

Malpas, J. E. Heidegger's Topology: Being, Place, World Cambridge, MA & London: MIT, 2008

Malpas, J. E. Heidegger and the Thinking of Place – Explorations in the Topology of Being Cambridge, MA & London: MIT, 2012

McLaren, P. Introduction: Education as a Political Issue in Critical Pedagogy and Predatory Culture – Oppositional Politics in a Postmodern Era London & New York: Routledge, 1995: 1-25

McLaren, P. Introduction in Castells, M.; Flecha, R.; Freire, P.; Giroux, H. A.; Macedo, D. & Willis, P. Critical Education in the New Information Age Boulder, Lanham, New York & Oxford: Rowman & Littlefield, 1999: 1-36

McQuire, S. The Media City: Media, Architecture and Urban Space London: Sage, 2008

Meyrowitz, J. No Sense of Place – The Impact of Electronic Media on Social Behaviour New York & Oxford: OUP, 1985

Mitchell, W.J.T.; Harcourt, B. E. & Taussig, M. Occupy: Three Inquiries in Disobedience Chicago & London: UOC, 2013

Morphosis Architectural Monographs No 23: Morphosis – Connected Isolation London: Academy Editions, 1993

Nagi, B. S. Educating Tribals in India – A Study of Ashram Schools New Delhi: Kanishka, 2000

Oldenburg, R. The Great Good Place: Cafés, Coffee Shops, Bookstores, Bars, Hair Salons, and Other Hangouts at the Heart of a Community New York: Marlowe, 1999

O'Sullivan, D. & Igoe, T. Physical Computing: Sensing and Controlling the Physical World with Computers Boston: Course Technology, 2004

Pattathu, P. Ashram Spirituality Indore: Satprakashan, 1997

Polt, R. Heidegger: An Introduction London & New York: Routledge, 1999

Ralston, H. Christian Ashrams – A New Religious Movement in Contemporary India Lampeter, Wales, Lewiston, NY & Queenston, ON: Edwin Mellen, 1987

Raymond, E. The Cathedral & the Bazaar – Musings on Linux and Open Source by an Accidental Revolutionary Sebastopol, CA: O'Reilly, 2001

Relph, E. Place and Placelessness London: Pion, 1976

Rossiter, N. Organized Networks – Media Theory, Creative Labour, New Institutions Rotterdam: NAI, 2006

Rossiter, N. *Organized Networks and Non-Representative Democracy* in Anderson, J. W., Dean, J. & Lovink, G. (eds.) Reformatting Politics: Information Technology and Global Civil Society Milton Park & New York: Routledge, 2006: 19-34

Rossiter, N. *Autonomous Education, New Institutions and the Experimental Economy of Network Cultures* in O'Neill, P. & Doherty, C. (eds.) Locating the Producers: Durational Approaches to Public Art Amsterdam: Valiz, 2011: 327-337

Schinkel, W. & Noordegraf-Eelens, L. (eds.) In Medias Res – Peter Sloterdijk's Spherological Poetics of Being Amsterdam: AUP, 2011

Sennett, R. The Craftsman London: Penguin, 2009

Sloterdijk, P. Regeln für den Menschenpark – Ein Antwortschreiben zu Heideggers Brief über den Humanismus Frankfurt a. M.: Suhrkamp, 1999

Sloterdijk, P. Nicht Gerettet – Versuche nach Heidegger Frankfurt a. M.: Suhrkamp, 2001

Sloterdijk P. Im Weltinnenraum des Kapitals Frankfurt a. M.: Suhrkamp, 2006

Sloterdijk, P. Sphären I: Blasen Frankfurt a. M.: Suhrkamp, 1998

Sloterdijk, P. Sphären II: Globen Frankfurt a. M.: Suhrkamp, 1999

Sloterdijk, P. Sphären III: Schäume Frankfurt a. M.: Suhrkamp, 2004

Sloterdijk, P. Die Verachtung der Massen: Versuch über Kulturkämpfe inder modernen Gesellschaft Frankfurt a. M.: 2009

Sloterdijk, P. Wissenschaft als Übung Frankfurt, a. M.: Suhrkamp, 2010

Sloterdijk, P. Scheintod im Denken: Von Philosophie und Wissenschaft als Übung Frankfurt a. M.: Suhrkamp, 2010

Sloterdijk, P. & Voelker, S. (eds.) Der Welt über die Straße helfen: Designstudien im Anschluss an eine philosophische Überlegung Munich: Fink, 2010

Sloterdijk, P. *Wie groß ist 'groß'?* in Crutzen, P.; Sloterdijk, P. et al. Das Raumschiff Erde hat keinen Notausgang – Energie und Politik im Anthropozän Berlin: Suhrkamp, 2011: 93-110

Sloterdijk, P. [transl. by Hoban, W.] Bubbles – Spheres I Los Angeles, CA: Semiotext(e), 2011

Sloterdijk, P. [transl. by Hoban, W.] Globes – Spheres II Los Angeles, CA: Semiotext(e), 2014

Söderberg, J. Hacking Capitalism – The Free and Open Source Software Movement London & New York: Taylor Francis, 2008

Stiegler, B. [transl. by Beardsworth, R. & Collins, G.] Technics and Time 1: The Fault of Epimetheus Stanford, CA: Stanford University Press, 1998

Stiegler, B. [transl. by Barker, S.] Technics and Time 2: Disorientation Stanford, CA: SUP, 2008

Stiegler, B. [transl. by Barker, S.] Technics and Time 3: Cinematic Time and the Question of Malaise Stanford, CA: SUP, 2011

Stiegler, B. For a New Critique of Political Economy Cambridge & Malden, MA: Polity, 2010

van Tuinen, S. & Hemelsoet, K. (eds.) Measuring the Monstrous – Peter Sloterdijk's Jovial Modernity Brussels: KVAB, 2008

Turkle, S. *Hackers: Loving the Machine for Itself* in The Second Self: Computers and the Human Spirit Cambridge, MA: MIT Press, 2005: 183-218

Twomey Fusnot, C. (ed.) *Preface and Part I – Theory in Constructivism – Theory, Perspectives, and Practice* London & New York: Teachers College (Columbia University), 1996: ix-52

Virilio, P. [transl. by Polizzotti, M.] Speed and Politics: An Essay on Dromology New York: Semiotext(e), 1986

Virilio, P. [transl. by Degener, M.] Desert Screen: War at the Speed of Light London: Continuum, 2005

Virilio, P. [transl. by Rose, J.] The Futurism of the Instant: Stop-Eject Cambridge: Polity, 2010

Wark, McK. A Hacker Manifesto Cambridge, MA: HUP, 2004

Wenger, É. Communities of Practice – Learning, Meaning, and Identity New York: CUP, 1998

Whitford, F. Bauhaus London: Thames and Hudson, 1984

Articles & Papers

Ackermann, E. Piaget's Constructivism, Papert's Constructionism: What's the difference?, accessed on: http://learning.media.mit.edu/content/publications/EA.Piaget%20_%20Papert.pdf, 08/02/2014

Backhouse, J. & Steyn, J. *Teaching Rural Technology: Would the Vigyan Ashram Model Work in South Africa?* as part of 1st All Africa Technology Diffusion Conference, Benoni, South Africa, 12-14/06/2006, accessed on: www.judybackhouse.com/pdfs/backhouse_teaching_rural_technology.pdf, 30/03/2014

Bousted, G. *The Biohacking Hobbyist: Why does all biology happen in academic or industrial labs?* Mac Cowell, co-founder of DIYBio, seeks to change that on Seed, 08/12/2008, accessed on: http://seedmagazine.com/content/article/the_biohacking_hobbyist, 29/04/2014

Chandler, D. L. *Printing off the paper* on MITnews, 13/09/2011, accessed on: <http://web.mit.edu/newsoffice/2011/3d-printing-0914.html#.TnDYmf5Le4s.email>, 25/01/2014

Crutzen, P. & Stoermer, E. F. *The 'Anthropocene'* in Global Change Newsletter No. 41, May 2000: 17-18, accessed on: www.igbp.net/download/18.316f18321323470177580001401/NL41.pdf, 31/05/2014

DeNisco, A. *Fab Labs: Using Technology to Make (Almost) Anything!* in District Administration, accessed on: www.districtadministration.com/article/fab-labs-using-technology-make-almost-anything, 22/01/2014

Denk, F. *Wie viele Kreative verträgt die Stadt?* in zitty Berlin, 04/01/2011, accessed on: www.zitty.de/wie-viele-kreative-vertragt-die-stadt.html, 26/06/2014

The Economist *Print me a Stradivarius – How a new manufacturing technology will change the world*, from 10 Feb 2011, accessed on: www.economist.com/node/18114327?story_id=18114327, 05/03/2011

The Economist *The printed world – Three-dimensional printing from digital designs will transform manufacturing and allow more people to start making things*, from 10 Feb 2011, accessed on: www.economist.com/node/18114221, 05/03/2011

The Economist *Print me a phone* in The Economist Jul 28th – Aug 3rd 2012: 67

Escobales, R. *Crystal Palace to be rebuilt by Chinese developer* on The Guardian, 03/10/2013, accessed on: www.theguardian.com/artanddesign/2013/oct/03/crystal-palace-rebuilt-chinese-developer, 16/12/2013

Farr, N. *Respect the Past, Examine the Present, Build the Future* on hackerspaces | flux, 25/08/2009, accessed on: <http://blog.hackerspaces.org/2009/08/25/respect-the-past-examine-the-present-build-the-future>, 26/04/2014

Frase, P. *The 3-D Printed Future and its Enemies* on Jacobin, 10/09/2012, accessed on: <http://jacobinmag.com/2012/10/the-3-d-printed-future-and-its-enemies>, 31/03/2013

Frearson, A. *Foster+Partners to 3D print Buildings on the Moon* on Dezeen, 31/01/2013, accessed on: www.dezeen.com/2013/01/31/foster-partners-to-3d-print-buildings-on-the-moon, 10/02/2013

Frost, C. *Media Lab Culture in the UK* on Furtherfield, 28/08/2012, accessed on: www.furtherfield.org/features/articles/media-lab-culture-uk, 06/01/2013

Garrett, R. *Starting a Non-Profit in the UK*, 25/10/2009, accessed on: <http://russ.garrett.co.uk/2009/10/25/starting-a-non-profit-in-the-uk>, 07/04/2014

Germany.info *Economics Minister Rösler and German Startups Tackle Silicon Valley*, 22/05/2013, accessed on: www.germany.info/Vertretung/usa/en/__pr/P__Wash/2013/05/22-Roesler-California.html, 26/06/2014

Grenzfurthner, J. & Schneider, F. A. // *Hacking the Spaces* on monochrom, accessed on: www.monochrom.at/hacking-the-spaces, 07/01/2013

Griffin, M. & Jürgens, B. *Conversations: Madeleine von Mohl* on Locally Grown City, 06/06/2012, accessed on: www.locallygrowncity.net/

index.php?option=com_content&view=article&id=32:vonmohl&catid=7
&Itemid=101&lang=en, 23/06/2014

Heidegger, M. [transl. by Capuzzi, A.] Letter on Humanism, accessed on:
www.archive.org/stream/HeideggerLetterOnhumanism1949/Heidegger-LetterOnhumanism1949#page/n0/mode/2up, 15/10/2012

Holmes, K. *In the Future, your Drug Dealer will be a Printer* on Vice
online, accessed on: www.vice.com/en_uk/read/in-the-future-your-drug-dealer-will-be-a-printer, 01/03/2013

Ingber, D. E. *The Architecture of Life* in Scientific American January 1998
issue, accessed on: http://time.arts.ucla.edu/Talks/Barcelona/Arch_Life.htm, 11/03/2014

Kera, D. *Hackerspaces and DIYbio in Asia: Connecting Science and
Community with Open Data Kits and Protocols* in Journal of Peer-
Production Issue 2, July 2012, accessed on: [http://peerproduction.net/
issues/issue-2/peer-reviewed-papers/diybio-in-asia](http://peerproduction.net/issues/issue-2/peer-reviewed-papers/diybio-in-asia), 17/08/2014

Kröger, M. *Gentrifizierung ist in vollem Gange* in neues deutschland,
01/03/2014, accessed on: [www.neues-deutschland.de/artikel/925662.
gentrifizierung-ist-in-vollem-gange.html](http://www.neues-deutschland.de/artikel/925662.gentrifizierung-ist-in-vollem-gange.html), 26/06/2014

Lovink, G. & Rossiter, N. *Dawn of the Organised Networks* in Fibreculture
Journal Issue 5, 2005: Precarious Labour, accessed on: [http://five.
fibreculturejournal.org/fcj-029-dawn-of-the-organised-networks](http://five.fibreculturejournal.org/fcj-029-dawn-of-the-organised-networks),
28/06/2015

Lovink, G. From Weak Ties to Organized Networks – Ideas, Reports,
Critiques Amsterdam: Institute for Network Cultures, 2009, accessed on:

<http://networkcultures.org/blog/publication/from-weak-ties-to-organized-networks>, 03/07/2015

Maier, J. *Betahaus Berlin – “Wir sind fast ausgebucht”* in Berliner Zeitung, 09/09/2013, accessed on: www.berliner-zeitung.de/wirtschaft/betahaus-berlin--wir-sind-fast-ausgebucht-,10808230,24257926.html, 07/10/2013

maxigas *Hacklabs and Hackerspaces – Tracing Two Genealogies* in Journal of Peer Production Issue 2, July 2012, accessed on: http://peerproduction.net/issues/issue-2/peer-reviewed-papers/hacklabs-and-hackerspaces/?utm_source=rss&utm_medium=rss&utm_campaign=hacklabs-et-hackerspaces-deux-genealogies-journal-of-peer-production, 26/04/2014

Mitchell, B. *1776 Launches Startup Federation* on In the Capital, accessed on: <http://inthecapital.streetwise.co/2013/09/06/1776-launches-startup-federation>, 26/06/2014

Neilson, B. & Rossiter, N. *Precarity as a Political Concept, or, Fordism as Exception* in Theory, Culture & Society Vol. 25 (7-8), 2008: 51-72

Phelan, B. *The Hacktory* on LEO Weekly, 19/01/2011, accessed on: <http://leoweekly.com/news/hacktory>, 18/04/2014

Schmid, E. D. *Blumenbar im Schwimmbecken* in Berliner Zeitung, 13/05/2011, accessed on: www.berliner-zeitung.de/archiv/mit-dem-aufbau-haus-wird-der-moritzplatz-neu-belebt--immer-mehr-kreative-sie-deln-sich-dort-an-blumenbar-im-schwimmbecken,10810590,10786788.html, 26/06/2014

Simonite, T. *Rise of the replicators* in New Scientist, 02/06/2010, Issue 2762, accessed on: www.newscientist.com/article/mg20627621.200-rise-of-the-replicators.html, 13/02/2013

Seaman, G. *Free Hardware Design – Past, Present, Future* talk at Oekonux conference, Dortmund, Germany, 2001, accessed on: www.nettime.org/Lists-Archives/nettime-l-0106/msg00048.html, 16/08/2014

Sloterdijk, P. *Nearness and Da-sein: The Spatiality of Being and Time* in Theory, Culture & Society, Vol. 29, Jul-Sep 2012: 36-42

Söderberg, J. & Daoud, A. *Atoms Want to be Free Too! Expanding the Critique of Intellectual Property to Physical Goods* in tripleC 10 (1), 2012: 66-76, accessed on: www.triple-c.at/index.php/tripleC/article/view/288, 16/08/2014

Szyndzielorz, J. *Brötchen und Späti - das braucht der Moritzplatz* on Zoom Berlin, accessed on: http://zoom-berlin.com/morgen/broetchen-und-spaeti-das-braucht-der-moritzplatz/static,morgen,moritzplatz_de.htm, 26/06/2014

Wagh, P. *An Exchange of ideas in Pabal: Defining Development* in MIT International Review, Spring 2007: 42-47, accessed on: <http://web.mit.edu/mitir/2007/spring/india.html>, 23/03/2014

Wainwright, O. *The Filabot will revolutionise the home 3D-printing market*, accessed on: www.guardian.co.uk/artanddesign/architecture-design-blog/2013/jan/15/filabot-home-3d-printing-recycle, 15/01/2013

Wenger-Trayner, É. & B. Introduction to Communities of Practice, accessed on: <http://wenger-trayner.com/introduction-to-communities-of-practice>, 25/01/2015

Wick, A. *Germany's New Digital Economy Drops Glass-Half-Empty Mentality* on NPR Berlin Blog, 21/06/2013, accessed on: www.nprberlin.de/post/germany-s-new-digital-economy-drops-glass-half-empty-mentality, 07/10/2013

Websites

<http://aaqua.persistent.co.in/aaqua/forum/index>, 21/05/2012

<http://betahaus.de>, 07/10/2013

<http://biohackspace.org>, 01/05/2014

http://censusindia.gov.in/2011-prov-results/paper2/data_files/india/Executive%20summary%20final.pdf, 18/02/2014

<http://coworking.com>, 23/06/2014

<http://en.wikipedia.org/wiki/Anthropocene>, 08/09/2014

http://en.wikipedia.org/wiki/Arts_and_Crafts_movement, 10/02/2014

<http://en.wikipedia.org/wiki/Ashram>, 11/04/2012

<http://en.wikipedia.org/wiki/Bauhaus>, 10/02/2014

<http://en.wikipedia.org/wiki/BioBrick>, 02/08/2013

https://en.wikipedia.org/wiki/Community_of_practice, 24/01/2016

[http://en.wikipedia.org/wiki/Constructionism_\(learning_theory\)](http://en.wikipedia.org/wiki/Constructionism_(learning_theory)), 08/02/2014

[http://en.wikipedia.org/wiki/Constructivism_\(philosophy_of_education\)](http://en.wikipedia.org/wiki/Constructivism_(philosophy_of_education)), 08/02/2014

<http://en.wikipedia.org/wiki/Copyleft>, 17/01/2014

http://en.wikipedia.org/wiki/Critical_pedagogy, 14/02/2014

http://en.wikipedia.org/wiki/East_London_Tech_City, 07/05/2014

http://en.wikipedia.org/wiki/Fab_lab, 28/02/2010

http://en.wikipedia.org/wiki/Free_Software_Foundation, 04/08/2013

http://en.wikipedia.org/wiki/Geodesic_dome, 09/06/2012

http://en.wikipedia.org/wiki/GNU_General_Public_License, 04/08/2013

http://en.wikipedia.org/wiki/Gram_panchayat, 24/02/2014

<http://en.wikipedia.org/wiki/Gurukul>, 11/04/2012

<http://en.wikipedia.org/wiki/Hackerspace>, 07/01/2013

http://en.wikipedia.org/wiki/Internet_of_Things, 27/03/2014

http://en.wikipedia.org/wiki/Jean_Piaget, 08/02/2014

http://en.wikipedia.org/wiki/Lego_Mindstorms, 20/12/2011

http://en.wikipedia.org/wiki/Lev_Vygotsky, 08/02/2014

http://en.wikipedia.org/wiki/Local_self-government_in_India, 24/02/2014

http://en.wikipedia.org/wiki/London_Hackspace, 28/07/2013

<http://en.wikipedia.org/wiki/Microcontroller>, 20/12/2011

[http://de.wikipedia.org/wiki/Moritzplatz_\(Berlin\)](http://de.wikipedia.org/wiki/Moritzplatz_(Berlin)), 26/06/2014

http://en.wikipedia.org/wiki/Nai_Talim, 05/06/12

http://en.wikipedia.org/wiki/Pabal,_Pune, 24/02/2014

http://en.wikipedia.org/wiki/Panchayati_raj, 24/02/2014

http://en.wikipedia.org/wiki/Putting-out_system, 12/12/2011

http://en.wikipedia.org/wiki/Seymour_Papert, 08/02/2014

<http://en.wikipedia.org/wiki/Taluka>, 21/02/2014

<http://de.wikipedia.org/wiki/Verein>, 27/06/2014

<http://en.wikipedia.org/wiki/Vipassan%C4%81>, 09/06/2012

<http://fab.cba.mit.edu/about/charter>, 28/02/2010

<http://fabfiblog.fabfolk.com>, 13/11/2011

<http://fabfoundation.org>, 27/02/2010

<http://freenode.net>, 29/04/2014

<https://generalassemb.ly>, 23/06/2014

<http://hy.co>, 26/06/2014

<http://igem.org>, 30/04/2014

<http://kicksat.wordpress.com>, 07/08/2013

<http://koeln.betahaus.de>, 22/10/2013

<https://london.hackspace.org.uk>, 07/07/2013

<http://musichackspace.org>, 03/05/2014

<http://opendesigncity.de>, 14/10/2013

<http://prinzessinnengarten.net>, 26/06/2014

<http://sciencehackday.org>, 13/06/2014

<http://techcitynews.com/2013/05/13/europes-biggest-hackspace-opens-new-headquarters-in-hackney>, 31/07/2013

<http://weltgestalten.wordpress.com/dokumentation>, 27/06/2014

http://wiki.fablab.af/index.php/FabLab_Summary, 27/02/2010

http://wiki.fablab.af/index.php/Main_Page, 28/02/2010

<https://wiki.hackerspaces.org/Hackerspaces>, 26/01/2016

<http://wiki.london.hackspace.org.uk>, 07/07/2013

www.aidindia.org, 24/03/2014

www.befaco.org, 03/05/2014

www.cupart.nic.in/orgn, 21/03/2014

www.communitywiki.org/cw/DoOcracy, 09/04/2014

www.dhamma.org, 09/06/2012

www.engindia.net, 23/03/2014

www.fablabs4america.org, 12/05/2014

www.filabot.com, 28/09/2014

www.fsf.org, 12/12/2014

www.graffitiresearchlab.com/blog, 26/06/2014

www.hackspace.org.uk, 08/05/2014

www.hartzivmoebel.de, 11/06/2014

www.honfablab.org, 22/01/2014

www.ifm-bonn.org/statistiken/selbststaendigefreie-berufe/#accordion=0&tab=0, 26/06/2014

www.iiepune.org, 18/02/2014

www.kickstarter.com, 03/05/2014

www.lend-a-hand-india.org, 10/03/2014

www.loomio.org, 26/04/2014

www.meetup.com/hardwareberlin, 26/06/2014

www.nios.ac.in, 03/03/2014

www.oneclickorgs.com, 11/07/2013

www.opendesigns.org, 14/11/2011

www.opentechschoool.org, 14/06/2014

www.peachyprinter.com, 09/01/2014

www.politikfabrik.de, 23/06/2014

www.reprap.org/wiki/Main_Page, 21/02/2013

www.socialnet.de, 27/06/2014

www.somewhere.com/betahaus, 07/10/2013

www.soundandmusic.org, 03/05/2014

www.the3doodler.com, 09/01/2014

www.vigyanashram.com, 11/04/2012

Videos & Audios

BBC Radio – World Service 'The 3D printing revolution' on *Business Daily*, 02/01/2013, 23:32, accessed on: www.bbc.co.uk/programmes/p012jcx7, 09/02/2013

Furby, G. *London 'bio-hackers' catching the eye of professionals* on BBC London News, 16/10/2012, accessed on: www.bbc.co.uk/news/uk-england-london-19964886, 01/05/2014

Gershenfeld, N. *Unleash your creativity in a Fab Lab* on TED, 02/2006, accessed on: www.ted.com/talks/neil_gershenfeld_on_fab_labs, 04/04/2011

Kulkarni, Y. talking as part of *TEDxWiserU*, Beijing, China, 28/08/2010, accessed on: www.tudou.com/programs/view/D9euSitPjcY, 07/05/2012

Nirmitee, A. Vigyan Ashram... Development through Education documentary, accessed on: <http://video.google.com/videoplay?docid=-7244987184341990763>, 30/04/2012

Röbke, S. *Süperzukunft: 3D-Drucker* on Funkhaus Europa Süpermercado, 13/05/10, accessed on <http://hci.rwth-aachen.de/fablab>, 17/03/2011

Schmieding, B. & Weber, B. 'Wenn Arbeiten überall möglich ist – Hat das klassische Büro ausgedient?' in *Lebenszeit* on Deutschlandfunk, 21/06/2013, 10.10am, accessed on: www.dradio.de/dlf/programmtipp/lebenszeit/2147656/, 07/10/2013

Talks/Tutorials

Bowyer, A. RepRap – Manufacturing for the Masses at Bath Innovation Centre, 01/11/2011

Fab Academy Online Tutorial on Input Devices, 28/03/2012, 9.00-12.00 EST

London Hackspace Ltd. AGM 2013, 27/11/2013, 20.00-21.00, London

Interviews

Barsegova, E. (Programme Manager, Open Design City, betahaus Berlin) 15/10/2013, 11.30-12.30, Berlin

Beaufoy, W. (member of London BioHackspace) 02/05/2014, Email

Burkhart, S. (host of DIY BaustelMontag, betahaus Berlin) 06/11/2013, 18.30-19.30, skype call London-Berlin

Deshmukh, A. (Director of Research, Vigyan Ashram) 24/03/2012-03/04/2012, Pune/Pabal, India

Dittus, M. (trustee of the London Hackspace) 03/03/2014, 15.30-16.30, London

Female students at Vigyan Ashram (Pooja, Bali, Sumitra, Vandna) 02/04/2012, 16.45-17.15, Pabal, India

Gaikwad, S. B. (former Vigyan Ashram student & fabrication workshop owner) 02/04/2012, 17.45-18.15, Chakan, India

Kalbag, M. (wife of Vigyan Ashram founder Kalbag, S.) 18/03/2012,
14.30-15.00, Pabal, India

Kulkarni, Y. R. (Executive Director, Vigyan Ashram), 31/03/2012, 14.45-
15.30, Pune, India & 19/11/2012, 11.00-12.00, Skype call, London-Pune

Lassiter, S. (Program Manager of the Center for Bits and Atoms, MIT
Media Lab) 14/09/2011, 14.00-15.00, Cambridge, MA

Mason, W. (Director of formcut & former Open Design City participant)
23/10/2013, 14.00-15.00, Berlin

Mikhak, B. (former Director of the Grassroots Invention Group at MIT
Media Lab) 13/09/2011, 14.00-15.00, Cambridge, MA

Thiébaud, J.-B. (Music Hackspace co-founder) 15/05/2014, Email

de Vries, B. (Director of Vela 3 & former host of FabCafé at betahaus
Berlin) 17/10/2013, 10.00-11.00, Berlin

Wareing, J. (co-founder & trustee of the London Hackspace)
20/08/2013, 20.15-20.45, London & 10/04/2014, 19.30-20.15, London

Other

Ars Industrialis Manifesto 2010, accessed on: <http://arsindustrialis.org/manifesto-2010>, 26/06/2014

Bihl, P. & Fahle, C. *Kurzstudie: Soziale Absicherung im Betahaus Berlin*,
Mai 2010, accessed on: http://betahaus.de/files/2010/05/Betahaus_Kurzstudie_Soziale_Absicherung.pdf, 08/10/2013

Cultural Politics Special Issue: Peter Sloterdijk, Volume 3, Issue 3,
November 2007, Oxford: Berg: 271-398

Elden, S.; Mendieta, E. & Thrift, N. (eds.) Environment and Planning D: Society and Space – Special Issue: The Worlds of Peter Sloterdijk Vol. 27: 1, 2009

Fabulous Sankt Pauli brochure, Hamburg: Fabulous St. Pauli & Multi Press, 2010

Government of India *Economic Survey 2012-13*, accessed on:
<http://indiabudget.nic.in/survey.asp>, 24/02/2014

Gropius, W. *Bauhaus Manifesto and Program*, April 1919, accessed on:
www.thelearninglab.nl/resources/Bauhaus-manifesto.pdf, 12/02/2014

London Hackspace Ltd. Annual Report 2012, accessed on:
<https://github.com/londonhackspace/hackspace-foundation-sites/blob/master/london.hackspace.org.uk/organisation/docs/annual-report-2012.pdf>, 14/07/2013

LHS Biohacking mailing list on: <https://lists.kentgeek.org/mailman/listinfo/lhs-biohacking>

London Hackspace mailing list on: <https://groups.google.com/forum/#!forum/london-hack-space>

London Hackspace IRC channel on: <http://webchat.freenode.net/?channels=london-hack-space>

London Hackspace Brewing mailing list on: <https://groups.google.com/forum/#!forum/london-hackspace-brewing>

London Music Hack Space mailing list on: <https://groups.google.com/forum/#!forum/london-music-hack-space>

National Fab Lab Network Act of 2013, accessed on: www.gpo.gov/fdsys/pkg/BILLS-113hr1289ih/pdf/BILLS-113hr1289ih.pdf, 13/05/2014

Not Just Arduino mailing list on: <https://groups.google.com/forum/#!forum/not-just-arduino>

Position Paper by the National Focus Group on Work and Education, January 2007, National Council of Educational Research and Training, accessed on: www.ncert.nic.in/new_ncert/ncert/rightside/links/pdf/focus_group/workeducation.pdf, 01/04/2014

Prime Minister's Office *PM announces East London 'tech city'*, 04/11/2010, accessed on: www.gov.uk/government/news/pm-announces-east-london-tech-city, 07/05/2014

Senatsverwaltung für Gesundheit und Soziales *Handlungsorientierter Sozialstrukturatlas Berlin 2013*, November 2013, accessed on: www.berlin.de/imperia/md/content/sen-statistik-gessoz/gesundheit/spezialberichte/gbe_spezial_2014_1_ssa2013.pdf?start&ts=1393515352&file=gbe_spezial_2014_1_ssa2013.pdf, 26/06/2014

Vigyan Ashram NIOS Brochure 2012

Vigyan Ashram Status Report, Volume 30, Issue 6, June 2012, accessed on: www.vigyanashram.com/uploadedfiles/Reports/8.pdf, 23/03/2012

Zeitschrift für Medien- und Kulturforschung, *Schwerpunkt Entwerfen*, 1/12, Hamburg: Felix Meiner

Images

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Fig. 13: Taken by Sullivan, H., accessed on: <https://wiki.london.hackspace.org.uk/view/File:Lhs-workshopFeb14.JPG>, 29/09/2014

Fig. 14: Taken by Garrett, R., accessed on: www.flickr.com/photos/russss/9085985859/in/pool-londonhackspace, 29/09/2014 (under

Creative Commons licence: <https://creativecommons.org/licenses/by-nc-sa/2.0/legalcode>)

Fig. 15: Created by Ingram, D., accessed on: <https://wiki.london.hackspace.org.uk/view/File:Mind-hack-space-logo.svg>, 29/09/2014

Fig. 16: Created by Levantis, I., accessed on: https://wiki.london.hackspace.org.uk/view/File:Biohack_logo.png, 29/09/2014

Fig. 17: Accessed on: <http://musichackspace.org/wp-content/uploads/2012/11/hackspacelogo2012sm.jpg>, 29/09/2014

Fig. 18: Own image

Fig. 19: Own image

Fig. 20: Accessed on: http://d2tjgupm4m2jnv.cloudfront.net/wp/assets/sites/2/3198557853_347fc032b6.jpg, 29/09/2014

Fig. 21: Accessed on: www.flickr.com/photos/betahaus/9452090596/, 29/09/2104 (under Creative Commons licence: <https://creativecommons.org/licenses/by-nc-sa/2.0/legalcode>)

Fig. 22: Taken by de la Blanca, A. G., accessed on: www.exberliner.com/survival/the-og, 29/09/2014

Fig. 23: Taken by Werner, M., accessed on: www.findingberlin.com/tag/gallery/page/3, 29/09/2014

Fig. 24: Taken by Bressner, J., accessed on: <http://jeninebressner.blogspot.co.uk/2010/08/onward-to-berlin.html>, 29/09/2014

Fig. 25: Accessed on: <http://es.twtrland.com/profile/opendesigncity>,
29/09/2014

Fig. 26: Own image