

## Chapter 2

### The design studio as a centre of synthesis

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**Studio one:** a meeting in a studio located in a London University Design Department. The ‘Interaction Design Studio’ (IDS) undertakes enquiries into human-computer interaction (HCI) and is recognised as a leading centre of ‘practice-based’ research. The meeting has been convened to resolve the specification of a five-core shielded cable, resembling a common telephone coil, that connects a microphone handset to the main enclosure of a sound-based and interactive research device called the ‘Babble’. The role of the handset is to allow users to contribute spoken messages to the sound output of the device — a talk-radio like internet appliance that vocalizes energy and environmental related online content drawn from a variety of sources, notably Twitter©. The intended users of the appliance are members of UK-based energy communities who are expected to assimilate the device into their everyday lives in the deployment phase of the research project. The aim of the deployment is to explore the issues at stake in energy demand reduction and how local communities enact low-carbon living and how these enactments can be communicated and potentially reconfigured.

At the centre of the discussion, on a meeting table, sits a prototype. This is frequently invoked — verbally and tangibly — as members of the design team present and materially demonstrate their views on the cable. At the time of the meeting, the cable fitted to the prototype was grey, wound in a coil like a telephone cable and, due to its length, the cable rested partially on the enclosure of the device and partly off. The team compared different coil samples whilst speculating on the precise aesthetics of the final design. It became apparent that the central issue was the length and colour of the cable: some team members viewed the hang of a shorter cable as aesthetically key, whereas others believed the length was primarily a matter of ergonomics rather than aesthetics (a shorter cable would result in the device being yanked out of place). Neither faction could agree. Key to the discussion was the notion of ‘aesthetics’ and how this was deployed to prioritize certain visual and material aspects of the design. Here was a shared concern with a modelling of the ‘aesthetic-user’, even if this differed in its details over the course of the discussion. Wrangling over the cable colour concerned the question of whether to use grey, or a yellow cable that would match certain 3D printed components. Here, the lead ‘product’ designer had selected a yellow (RAL 1016 Sulfur Yellow) from a pre-specified list. Selection was made possible by visually approximating the stated colour with a pantone colour chart, and ensuring this approached the yellow colour of the 3D printed ABS components produced by a high resolution FDM printer installed in a separate studio workshop, alongside a laser-cutter, a MakerBot, circuit board fabrication equipment, a water bath, various dedicated computing terminals and all manner of hand-tools for metal, plastic and woodwork. Amidst all this lay an orderly mess of components, fixings, materials, off-cuts, glues, solvents and polishes etc.

A solution emerged during the meeting, when a designer proposed specifying a coil with a far larger diameter, thereby downplaying ergonomic concerns by producing a longer cable that would pleasantly dangle within the geometry of the enclosure boundary whilst simultaneously achieving an aesthetic of scale. In short, the coil would become a noticeable and idiosyncratic feature of the design rather than a mere functional and ergonomic component.

**Studio two:** an interaction designer is sitting at a cubicle in a low-rise facility of a multinational microprocessor manufacturer in the Pacific Northwest of the US. The designer is a member of a ‘user-centered’ design group that is responsible for designing computing enclosures as well as providing design expertise on strategic projects, often in collaboration with other workgroups, such as research scientists engaged in the fields of computer science and HCI, also working at company facilities around the world. The cubicle is one amongst thousands in the building and butts up against motherboard, graphic processing and BIOS engineering teams and is encircled by various testing laboratories and engineering workshops. To demarcate their space within the facility and to embody a ‘design studio’, members of the design team have, quite noticeably, reconfigured their space by removing cubicle dividers and bringing in beanbags and various other domestic furnishings.

The designer is working at his computer on a graphical user-interface (GUI) for the second stage prototype of a wearable healthcare technology that incorporates a novel body-worn ‘multi-modal’ sensor (pedometer, barometric pressure, accelerometer, humidity, infra-red and visible light, temperature and sound) with a graphical user-interface to enable the user to monitor, manage and reflect on their daily activities. The design team explicitly envisioned the prototype as a computational solution to the pandemic threat of obesity where individuals use the activity-monitoring device to avoid the onset of, or to manage, the disease. To that end, the brief for the design stipulated that the GUI must: run on the Windows Mobile OS; provide glanceable data on fitness activities; act as the home screen; translate the data into an abstracted visualisation so as to ensure the privacy of the user; and visually depict daily and weekly activity and progress. After various design proposals, such as correlating the wearer’s activities with real-world mountain treks, the design team chose to employ a garden metaphor where different activities (walking, running, cycling etc.) would be symbolised by flowers, the growth of which would plot the users accumulated activity and progress.

To get to a functioning piece of software from the proposal, the work on the GUI included the visual design by the interaction designer and its implementation by software engineers. For the designer, this included the wireframe definition of the application and the visual detailing of discrete screens, including backgrounds, sprites, typography and transitions. Having realised and obtained approval for the wireframe the designer sets about the detailing work using a combination of Adobe Illustrator and Photoshop, ubiquitous graphic editing software. The designer is fluent

with both applications and editing is a two handed activity: the left hand swiftly invokes keyboard shortcut operations such as changing the precise behaviour of the cursor's editing capabilities, constantly saving the document, switching between adding or deleting vector anchor points and the right hand to constantly position and reposition the cursor, drag and transform sprites, drag the artboard and zoom so as to focus on and amend a particular graphical object. All these operations are done frequently, perhaps ten or twenty in a given minute and in combination with constant visual judgments about line weight, length and form. Once the artworks are completed — the sprites and individual page illustrations — the files are emailed (as PDFs) for review to the project manager on the other side of the studio and to other team members located in a research laboratory in another city in the Pacific Northwest.

**Studio three:** at the central London offices of sanitary ware manufacturer two designers, employees of a small 'service design' studio (SDS), are presenting to senior executives the results of a short piece of market research conducted on behalf of the manufacturer. Three months previously, the SDS had been reappointed by the manufacturer to envision domestic bathroom uses. The brief, agreed by client and contractor, prescribed a study to identify and describe emerging and future domestic sanitary trends with a description of the deliverables and schedule of work. In this case, as in many other contracts undertaken by the SDS, the product of the studio's work consisted of a presentation to the client's senior management alongside an illustrated report in which recommendations are made as to how the organisation can improve its various 'touchpoints' with consumers e.g. how a healthcare company can enter into the childcare market; setting up a 'social innovation lab' with a UK council as a site for local policy experimentation; or optimising customer relationships with various organisations including, but not limited to, energy suppliers, broadcasting and media organisations, car manufacturers; financial and insurance companies; and government. As such, the 'designs' produced by the SDS were varied, but typically included the detailed and visual orchestration of a 'customer journey' including evocative propositions, such as the portrayal customer facing elements of a service (architectural, branding, print, employee uniforms and behaviour, in-store experiences, management processes, web presence etc.) or the rationalisation of an organisational process.

In the months leading up to the presentation, work on the design had taken place at the studio of the SDS. Their space was a small one-room office rented from and located in the building of a larger architectural practice. The expectations of the studio and the manufacturer had been set by the apparent success of the previous project — a set of playing card like visual and narrative descriptions of sanitary prospects. The SDS set about the project by devising an in-house brief re-describing the tasks and project schedule according to studio resources and estimated task durations. The design work, as with other engagements undertaken by the studio, was conducted under principles and practices explicitly but loosely modelled around user-centered design where 'customer-centric' and 'co-design' approaches resulted in emphasis being placed on the imagined service user. Thus, the designers speculated on and

represented the imagined identity, capacity and competencies of people carrying out domestic hygiene within novel sanitary settings. Services, so the thinking goes, should be modelled around the (service) designer's understanding of the 'needs' and 'requirements' of customers. With the deadline approaching, however, and the need to finalise plans for the completion of the deliverable to the client, including the presentation, it was decided that the work would be presented in a format similar to the first project.

Given the timing and resources, the project proceeded by way of desk-based research — thus avoiding the practical complexities of involving research subjects in the design process. Here, the designer began to work up various propositions, describing bathroom practices and fittings, including: material technologies, engineering installations and interventions, providing, for instance, the infrastructure to allow small bathrooms to accommodate multiple practices, such as the ad-hoc conversion of the toilet cistern and pan into table and bench surfaces, or fittings that could easily be installed by tenants and thus moved into new rentals; bathroom designs that supported self-monitoring and self-care as well as environments to support recreation. What emerged through this was the definition of a set of categories, ordering a series of substantive propositions concretising the theme through visual and narrative representation and communicated by succinct titles much like 'Care of the Self', 'Relaxation', 'Adaptability' etc.

The ensuing work consisted of preparing a PowerPoint presentation of propositions, including brief narrative descriptions for each as well as accompanying visuals. The narrative descriptions encompassed the context of use, the relevance to the business, the likely market demographic as well the identity, interests, and behaviours of the putative user. To visually communicate a proposition images were sourced from the Internet or made where appropriate. Photographs were selected on their ability to quickly express multiple aspects of the proposition, for instance the visual tonality and hue of a category's aesthetic, the presence, or lack of, technology, the presence, or lack of, fittings and fixtures, the representation of a sanitary, healthcare, grooming or other.

### **Centres of synthesis and diverging events**

Above, we have narrated three vignettes drawn from experience in three distinct design workplace settings. In addressing — and comparing — each of these we wish to explore the design studio in terms of processes of synthesis. Echoing Rheinberger (1997), we suggest that design studios can be productively understood as centres characterised by the compounding of entities, expertise and practices that are ordered and integrated through a multiplicity of processes. More specifically, we suggest that design studios entail processes wherein a heterogeneous variety of elements are brought together and combine to generate knowledge (and its accoutrements) of some sort or another.<sup>1</sup> On this score the design studio sits alongside other sites — business, engineering, law, medicine, science to state but the most obvious. What is relatively distinctive about the design studio is the *breadth* of the heterogeneity that comprises

it: in the mix we can find all at once aesthetic/material/visual, engineering, healthcare, historical, marketing, programming, psychological, and sociological elements. Of course heterogeneity marks many sites, notably the scientific laboratory as Latour (1988) famously insists. Further, this heterogeneity seems to be on the increase, not least as ‘interdisciplinary’ initiatives between science and art, for instance, take root (Barry et al., 2008). Nevertheless, we detect a qualitative, if not quantitative difference between the design studio and other ‘sites of synthesis’.

In focusing on synthesis we also seek to move away from the ‘studio as container’ or ‘site’ — as a bounded vessel for practices (e.g. Century 1999) — and attend to the processuality and relationality of design practices. The products of design studios, as the vignettes above signal, are multiple. They bring into being any number of user figurations (Wilkie 2010), models and buildings (Yaneva 2005), prototypes (Wilkie 2013), technical inventions (e.g. Bijker 1995), intellectual property and copyrights (Raustiala and Sprigman 2006), methods and techniques (e.g. Asaro 2000), as well as linguistic practices (Fleming 1998). However, their synthesizing practices can also bring into being more interesting, or inventive, questions and developing better and more relevant problems. Here, studio practices can be understood, following Schön (1985), as ‘problem setting’ procedures where problem definition and parameters are constructed.

At this point we present another qualification. Drawing on Whitehead, Deleuze and Latour, Fraser (2010) differentiates two models of the event. On the one hand, the heterogeneous elements that combine in an event — ‘synthesis’ in our terminology — retain their identity, their being. They *inter-act* to produce something that is new, but this newness falls within the existing problem definitions (which in the case of a design event might be a client’s brief). Against this, let us call it ‘being event’, she contrasts, what we call, a ‘becoming event’ where the constituent elements can be said to *intra-act* (Barad 2007), and in the process of intra-action, they can be said to mutually change, to co-become. If the constituents change, so does the (design) event itself: the parameters that define it become ‘unhinged’ and markedly ‘inventive problems’ that rework the issues at stake — the very ‘meaning’ of the event — can begin to emerge (see also Stengers 2005, Michael 2012). However, against Fraser’s ontological, qualitatively dichotomous version of the event, we would like to propose an empirical, quantitatively differentiated version of the event. That is to say, as our vignettes above suggest, and as we shall detail below, new inventive problems, intra-action, and mutual co-becoming, *more or less*, emerge. That is to say, in the events of design synthesis with which we have engaged, we notice that they vary in the ‘*proportion*’ (to put it rather too crudely) of their ‘being’ and ‘becoming’.

In what follows, we trace this ‘eventful’ variation across the three design studios. In this respect, we trace how the synthetic processes that characterize studio events are embroiled in divergent patterns of relationalities, which we tentatively and heuristically call: Organization/Distribution, Time/Temporalization, User/Modelling, and ‘Invention’/‘Innovation’.

## **Studio processes**

### *Organization/distribution*

First, we consider the range, configuration and disposition of competencies within the three studios, which becomes apparent through the distribution of labour (DoL). As mentioned previously, distinctive to design is the breadth of the heterogeneity of expertise that is called upon to realise its products. Thus, the synthesis of studio outputs necessarily entail differing interchanges of practices and knowledge arranged in specific ways.

The DoL within the IDS is subtly hierarchical but easily and routinely breached. The studio has a director who is responsible for agenda setting, gaining and directing funding awarded on the basis of his research expertise, interests and biography. Supporting the director is a senior research fellow who, amongst other responsibilities, acts as a studio manager by leading project planning and finances, project teams as well as playing a leading role in determining and supervising the visual and material aesthetics of the design work, akin to a 'creative director'. The senior researcher and research assistants carry out the day-to-day design work, ensuring the progress of project trajectories. All members, however, are responsible for and have a say in 'specifying' the idea or ideas of a project. The competencies of the IDS lie mainly in 3-dimensional design since final designs take the form of interactive and computational appliances. Software and hardware engineering will be instigated in-house with advance competency brought in on a freelance basis where appropriate. A recurring difficulty of the IDS is to employ and retain 'creative technologists' — engineers with formal training in the arts. However, like laboratories, the IDS operates much like an inscription device (Latour and Woolgar 1979) where designs, methods and deployments are regularly transformed into scholarly publications, codifying studio practices.

At the MDS the DoL is more rigid. Teams are convened as projects arise. Initial meetings typically involve the organization of team and sub-team structures where competencies (e.g. interface and interaction design, ethnography, mechanical and software engineering) are arranged below management figures. Members with domain expertise, such as healthcare or domestic technologies, with device design (industrial and interactive) expertise, such as handheld or wearable technology, and/or engineering expertise, such as personal-area networking technology are designated areas of responsibilities and clear lines of management are determined, which will routinely appear as visual diagrams as part of presentations in meetings and project documentation. The MDS typically works on a variety of projects simultaneously, and members often work two or more projects simultaneously. The composition of competencies at the MDS is tied to the 'core' business of the corporation — the development and production of microprocessors — and, as such, various forms of advanced engineering expertise are prevalent. More so than the IDS, the MDS is able to conceive, design and realise fully working prototypes as the corporation holds much of the necessary technical expertise and apparatus, in numerous labs and

workshops around the world. Ideas are also implicitly and explicitly pre-given in the light of broader corporate priorities that are fixed upon maintaining and prospecting computation markets (areas of socio-cultural life that are supported or made possible by microprocessing).

The DoL at the SDS was very rigid, perhaps the most rigid of the three studios discussed here. The two company owners micro-managed each project whilst undertaking other company duties, notably the acquisition of new business. The studio was in its infancy and regular contract income — reputation, size and human resources were in the process of being established — a necessity. The hierarchy of the studio was therefore overt and tied to individual project briefs, which as well as a company owner, would include one or two designers as well as freelancers where necessary. The SDS had recently refashioned itself as a service design consultancy, a genre that emerged in the early 2000s. This transformation included explicit efforts within the studio to formulate a client-facing vocabulary and to codify its design practices as billable ‘ideation methods’.

So, under the motif of ‘organisation’ we can detect a DoL that varied more or less systematically across the three studios. The IDS exhibits considerable flexibility in what individual designers could take on and such work was often collectively determined, although publications are, by and large, the preserve of the studio director. By comparison, the DoL within the MDS was very much organised by the corporation’s priorities, management hierarchy and the division of expertise though within these there was room for some creative exchanges across different design and engineering specialisms, not least insofar as the precise shape of the products were more open. For the SDS, proximal market conditions and opportune developments meant that ‘invention’ was jettisoned in favour of ‘service design’ with the result that DoL was enforced by as a necessary means of micro-resource management, meeting client briefs and enacting a normative studio model compatible with client expectations. In sum, we see how the synthetic events varied in the proportion of ‘becoming’ and ‘being’ as we moved across the three studios: IDS having the greatest relative levels of ‘becoming’, SDS the least.

#### *Time/temporalization*

Next, we contrast how different temporal processes configure, and are configured by, the studios: how are the design studios enacted through different temporal patternings that reflect and mediate organisational demands, funding models, resources, material pliancy, and expertise relating to (often emerging) technological components and processes. Distinctive to design practices, and studios, are how futures are rendered and made manageable in the present, often invoking prior experience and assumptions, which then work to engender certain futures.

The IDS operates along temporal arcs that are influenced by the time frames of research grants, usually between one and five years. Such durations are typically determined by Research Councils and projects and practices are organised within the limits of these durations. Projects proceed from grant application to initial

engagement with a putative research volunteers (user group), the design and deployment of ‘cultural probes’ amongst the volunteers, analysis of probe returns, the design and production of workbooks documenting existing and prospective socio-cultural-technical practices and technologies as well as propositions for designs that are often unusual, sometimes comical and occasionally absurd. The focus of the design process then turns to the specification and design of individual or batches of devices, which are then deployed amongst the research volunteers for an extended period of time (usually more than 2 months). Site visits and observational work is then conducted whilst the devices are in-situ with the volunteers. Members of the IDS are involved in all aspects of a project. The extended temporalization allowed for innovation, for example during the development phases of the ‘Babble’, the project team developed and conducted a ‘probe workshop’ for the first time. The extended time-frame also mediated and reflected the particular temporalizations of sociomaterial processes such as those of 3-D printing, the duration of Kalestead’s manufacture of the cable, the hiccups in the making of material and electronic components, the exigencies faced by volunteer user communities. While the studio operating within, and managed, cross-cutting temporalities pertinent to each individual project, it was nevertheless embedded within the institutional temporalizations: cycles of teaching, conference going and publication, research assessment and grant application.

Projects undertaken by the MDS were driven by three interrelated temporalities: 1) the logistics of microprocessor development, production and global distribution; 2) the continuity of existing (e.g. desktop and server chips) and the emergence of new silicon markets (e.g. health and transportation), and; 3) organisational accounting cycles. The MDS served both corporate preoccupations by designing conventional hardware enclosures and by undertaking more speculative projects, often in collaboration, as described above. That said, the nature of prospective projects, which raises the question of what can be done with ‘computation’, brought with each a novel and speculative temporality, such as the emergence of digital body-monitoring, or the capacities/performance, scheduling or availability of new hardware, such as the sensor unit on which the garden GUI relied or the battery performance of the unit, adversely affected by the PAN power consumption. Thus, the MDS accommodated multiple temporalities rigid and emergent — shifted by new innovations — and its work routinely involved the interweaving of both.

The SDS, by contrast, worked to the timeframes delimited by contracts and briefs. Most were relatively short — between three and twelve months — and there was no guarantee of further work from a particular client. The upshot of the SDS’s reliance on contractual work meant that its timings were largely dependent on a client’s agenda. That more than one project was operating simultaneously meant that the SDS was contending with multiple, sometimes, conflicting schedules and had to manage resources accordingly. The project with the sanitary ware manufacturer is therefore indicative of the nature of the work conducted by the SDS. As such, the tempo of the SDS was not overly hindered by the obduracy of materials or the struggles associated



with the underdetermination of new technologies or technical practices. Visualisation, PowerPoint and outsourced printing processes, for example, were largely known and controllable. The sanitary project, however, demonstrates how the question of innovation preoccupied the SDS. Here, the attempt at innovation concerned both the novelty of bathroom propositions (successful) and novelty of presentational techniques by which the propositions were communicated to the client (unsuccessful). As the vignette illustrates, the practical contingencies of project work shaped the temporalization of studio practice such that where innovation could be enacted, it was with regard to sanitary propositions rather than the means of expression.

To summarize, we can say that IDS is characterized by a synthetic process in which there is temporally both looseness and openness such that it could absorb and creatively respond to the temporal ‘hiccups’ of the design process. At the same time, there were outer limits of temporal constraint that reflected research funding and teaching rhythms. By contrast, SFS entails a tight temporal coupling with the client’s brief (as well a strictly drawn division of labour within the studio itself). Here, even where attempts are made to find some room for inventiveness, these are only partially successful in light of the temporal rigidity of these relations. MDS, again, falls somewhere in between, entailing at once fluid and rigid relations with the other elements of the corporation that mediated and reflected at once flexible and inflexible temporalizations. Put another way, these differences in temporalization across the studios also inflect the balance of ‘becoming’ and ‘being’ in the events of synthesis. Here, the actuality of ‘slowing down’ is crucial, according to Stengers (2005): to slow down is to become sensitive to the *possibilities* that are present in synthetic events and to question our existing sense of “ourselves (as) authorized to believe we possess the meaning of what we know”.

### *User/modelling*

A key figure in design studios is the user (Wilkie 2010). Users mediate and are shaped by multiple relations including, but not limited to: the body and the device; the social and technological; existing practices and future use; individual preferences/requirements and collective demands, and; the accountability of design work. Users are pivotal in all manner of ‘design’ practices and, alongside realised designs, are notable synthetic outcomes of studios.

The IDS has developed a distinctive approach to engaging with users, involving home-grown research techniques. Users are depicted as ‘research volunteers’, underscoring the obligations and requirements (unpaid, able to withdraw without penalty and nondirective) of their role. Users are involved and represented by way of some combination of techniques including ‘ethnographic’ engagement during initial contact as well as deployment, cultural probes (Gaver et al. 1999), workshops and the use of ‘cultural commentators’ (Gaver 2007), where scriptwriters and documentary filmmakers are employed to elicit alternative (non-scholarly) depictions of research volunteers and the deployment of research devices. As such, the user is emergent through extended engagements and some combination of method assemblage (Law

2004) and is assumed to be a complex and variable socio-cultural actor that can be accessed and understood through interpretivist, material and non-linguistic techniques.

In contradistinction to the IDS, the MDS conducted user involvement by way of off-the-shelf techniques including, but not limited to, personas, ‘ethnography’ and ‘ethnographic’ in-home interviews, focus groups, field trials with sample groups, implicit ‘I-methodology’ (cf. Akrich 1995) techniques, as well as more quantitative experimental set-ups. More often than not, users, even empirical users (e.g. mediated through ethnography) are subordinated to the emergent capacities of technological propositions and prototypes, where, for example, the previously mentioned multi-modal sensor pre-determines how health and fitness are introduced into everyday practices (Wilkie 2013). As an upshot, and echoing the IDS, users were mediated by some combination of research techniques, typically however, the MDS unproblematically mixed different epistemological and ontological assumptions by way of various research techniques (quantitative and qualitative) in modelling the user. Thus, whilst the ‘ethnographic user’ was provoking an ontological shift in the imagination of the corporation towards the view of its products as “socio-cultural-technical” assemblages (Barry et al. 2008) other user figurations (e.g. cognitive, task-oriented, ergonomic, demographic) and their attendant ontological assumptions persisted unproblematically.

Consumer (user) research is an essential aspect of the commercial services provided by the SDS and is haphazardly derived from various sources. Like the MDS, off-the-shelf techniques are used including ‘ethnography’ and interviews, but, unlike the MDS, the SDS re-present the techniques, arguably as part of efforts to legitimate their expertise. Here, interviews become ‘in-home’ or ‘stakeholder’ interviews and observation becomes ‘shadowing’. Like the IDS, the SDS also coins its own techniques such as ‘expert panels’, ‘stakeholder interviews’: minor modifications to existing techniques. The SDS also has few qualms in combining quantitative and qualitative research since the ‘user’ is a reified and pre-given human-centred actor about whom ‘insights’ can be gleaned and whose behaviour can be changed without the complications of epistemological and ontological considerations. Thus, user research and involvement can take numerous forms, and in the case of the vignette above, can be undertaken from a studio workstation without any recourse to empirical engagement with people. As in the MDS, I-methodology makes possible the doing of ‘involvement’ without involvement i.e. where the ‘user’ is other to the designer. Arguably, the means by which the consumer-user is modelled and represented by the SDS has emerged out of dialogue with wider industry norms and client expectations as well as the emergent discourse and practices associated with service design. A technique favoured by the SDS for involving ‘stakeholders’ in design is to facilitate workshops (typically half or one-day) in which user representatives and clients engage with one another, addressing the client’s requirements and problem area. Such engagements are part of a broader strategy to involve clients in various aspects of the design process that ensure ‘buy-in’ to the techniques for involving users. In sum, the

underlying model (status and capacity) of users in the SDS is static and is as much about ensuring commercial relations as informing design.

In sum, common to each studio is some explicit form(s) of engagement with people-as-users. In practice, however, users are variably enacted: as persons whose emergent complexity is to be explored through design; as persons whose characteristics are derived through a combination of methods but nevertheless subordinated to the capacities of the emergent device; as persons who are haphazardly configured through various techniques and yet remain largely static and reified. In each case, we again are witness to the changing proportion of ‘becoming’/‘being’ in the synthetic design event. For IDS, the relations of the user are dialogic where the user is expected to generate surprise for the designer: the user is a mediator of speculation about what makes up the ‘issue at stake’ (around energy demand reduction in the case of the Babble). By contrast, MDS’s user is emergent in the context of the corporation’s core business. But this malleability is hard coded to the development of the device; that is to say different capacities of the user can be prioritised depending on the shifting features of the device. Lastly, for the SDS, the rigidity of the user reflects the rigidity of the client-designer relation in the context of service design in which a known and reified element can be literally and unproblematically implanted into service visualisations. Here, we see the predominance of ‘being’ in the synthetic design event, which incorporates the overarching demands of the client.

#### *‘Invention’/‘innovation’*

As should now be clear, each studio addresses analogous but distinctive aspects of design processes and each enacts inventiveness and innovation in divergent ways, ways that synthesise differing patterns of expertise and labour, spatialization, and temporalization, as well as techniques and rationales for enacting users. In this section, we draw out how each studio accomplishes ‘novelty’ whilst at the same time effecting stabilisation and continuity by way of ‘non-invention’. Here, each studio enacts a particular arrangement of novelty and preservation where certain practices, processes and becomings reproduce certain designerly repertoires whilst others enact newness.

For the IDS, practice-based research into HCI is the primary activity. At core, as the design of the coil illustrates, the concern is with the meticulous design and ‘sympathetic’ deployment of inventive and exotic research devices where aesthetics and functionality are foregrounded as the means to elicit knowledge concerning the socio-cultural possibilities of computational technology. IDS’s practices involve what might be understood as ‘radical’ innovation, where research devices — which operate on tensions between exoticism/accessibility, playfulness/seriousness — resist the assumptions of research volunteers. Here, ‘design’ becomes an operator for the ways in which formal aesthetic artefacts can be incorporated into epistemic practices. The coil vignette shows how inventiveness is distributed across the various practices and human/nonhuman engagements of the studio, including the materiality and aesthetics of artefacts, the techniques for engaging and understanding volunteers-as-users as

well as the inventive capacities of the milieus in which the devices are deployed i.e. what is done *with* devices during deployment. Despite the distributed multiplicity of extreme inventiveness, and the IDS's repute for producing methodological novelty, the studio repeats a now well-worn project arc beginning with initial contact with volunteers, design and deployment of probes, the collation of propositions into workbooks, electronic artefact design, deployment and write-up.

Unlike the IDS, the aim of the MDS is to define, specify and give form to functional products and appliances that align with or seek to establish, rather than question, market and end-user expectations. Here, design practices are attuned to optimising the ease of use of, in this case a user-interface for a wearable health technology, as well as responding to user 'needs', such as continual health monitoring, management and privacy, however such needs are shaped. Arguably, the MDS enacts a 'standardised innovation' process, in tune with corporate business and strategy, the studios sole audience and patron. So, where is innovation and inventiveness located within the distribution of design processes and practices at the MDS? Arguably, the studio enacts a limited and intermediate form of innovation, where (often new) markets, products and personas are introduced as or into 'situated' socio-cultural settings, thus intervening in the industrial practices and ontological imagination of the corporation (Barry et al. 2008). Thus, whilst the 'products' of the MDS appear typical of IT research and development, the way such products are conceived by the corporation is inventive.

As our case of sanitation design demonstrates, the SDS aligns aesthetics and functionality with client expectations. As such, the familiarity and immediacy of the aesthetics is adaptable to the manufacturers brand identity. In so doing, the SDS focuses on the immediacy of communicating how a 'customer experience' mediates the relationship between organisation/institutions and the user-as-customer. Thus, in aiming to attune the service propositions to the client's expectations, the SDS enacts a form of non-invention in that it operates to preserve — through outsourcing — the innovation practices of the clients and support and maintain normative domestic sanitary practices. The enactment of non-invention in relation to the putative product and user, as well as the deployment of normative aesthetics, can be viewed against the enactment of novelty in how design, or 'design thinking', is insinuated into the efforts of SDS to develop novel understanding of the customer-as-service-user.

In this section, we have attempted to crystallize the differing proportions of 'being'/'becoming' in the synthetic events of the design studios by focusing on invention. Again, we see how this proportion varies in a fairly systematic way across our case studies. However, we have also considered how, even within the more 'becoming' synthetic events of IDS, there is 'being' not least as it is manifested in the routinization of invention, of 'becoming', and how, conversely, even within the 'being' of SDS's synthetic events, there is 'becoming' in the form of inventiveness around the customer-client.

## **Concluding remarks: the synthetic registers of design studios**

This chapter has explored three cases studies of design studios. These have been chosen because they illustrate aspects of the institutional variety that pertains to design practice. We suggest that design studios are peculiar in the breadth of the heterogeneity of elements that feed into the design process. However, we also argue that this breadth varies. In particular we propose that the work of design studios entails synthesis that can be more or less ‘creative’ or ‘inventive’. This was theorised through the lens of ‘event’, which can be proportionately more or less oriented toward ‘becoming’ or ‘being’. We then explored this proportionality through four heuristic parameters applied to the cases.

Needless to say, this is but one way of articulating the differences amongst design studios and design practice. It is certainly not exhaustive. In previous drafts we attempted to think this difference with the aid of Deleuze’s (e.g. 1999) notion of the diagram to highlight the studio as an arrangement embroiled in different ‘economies’: epistemic economies (IDS), market economies (MDS), or service economies (SDS). The notion of the diagram also points to how studios operate to construct realities that are yet to come: each studio, then, can be said to carry its own means of diagramming design, of operating to bring into being new socio-cultural realities. As the preceding section on invention/innovation suggests, each studio exhibits a different patterning of invention/non-invention.

Be that as it may, we can return to what is distinctive about the design studio *per se*. We began this chapter by highlighting the synthetic character of such epistemic practices as science, law, medicine etc. — each having its own ‘centres of synthesis’. We suggested that design can certainly be placed on a continuum of synthesis — though situated at an extreme because the elements that enter into its synthetic processes are particularly heterogeneous. The design studio is thus a particularly ‘expansive’ version of a centre of synthesis. Inevitably we must situate the idea of a centre of synthesis in relation to Latour’s (1988) notion of the scientific laboratory as a centre of calculation. Our view is that calculation is part and parcel of synthesis — in the case of the design studios calculations were made about all manner of elements: circuit boards, users, ergonomics, materials, coils, populations, health and so on. As such we might end with two bold proposals: centres of calculation may actually be a subset of centres of synthesis; and centres of synthesis find their apotheosis in the design studio.

## **Acknowledgements**

The authors would like to thank Ignacio Farías and Michael Guggenheim for providing insightful comments and feedback on drafts and members of the IDS for their patience. This chapter also draws on research conducted under the grant ‘Sustainability Invention and Energy-demand reduction: Co-designing Communities and Practices’ funded by RCUK and led by the EPSRC (project code ES/1007318/1).

## Notes

- <sup>1</sup> From an epistemic perspective, the scant literature on design studios can be seen to fall into two broad camps: 1) the pedagogic studio (e.g. Schön 1985), or; 2) the studio as ‘laboratory’ or ‘studio-lab’ hybrid (see Century 1999).

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