Institution:	**Goldsmiths, University of London**
Unit of Assessment:	**34 – Art and Design: History, Practice and Theory**
Title of case study:	**Design: Interaction Research Studio**

1. Summary of the impact (indicative maximum 100 words)

Since its formation in 2005, the Interaction Research Studio (IRS or 'the Studio') has developed distinctive practice-based research into new interactional possibilities afforded by digital technologies. Over the course of eight externally-funded projects the Studio has worked on during this time, it has made *methodological* and *conceptual* contributions in the course of producing exemplary *research products*.

- *Research products* - the Studio develops highly-finished research products that serve as landmarks of new interaction paradigms, application domains, and product genres.
- *Methodological* - methods such as Cultural Probes have travelled widely to influence commercial research in Design, HCI, contextual research and related fields.
- *Conceptual* - the Studio's promotion of playful engagement, ambiguity and interpretive flexibility, both methodologically and in the products it develops, has helped influence high-tech industries to investigate non-utilitarian values and approaches.

2. Underpinning research (indicative maximum 500 words)

Bill Gaver has been at Goldsmiths since his appointment as Professor of Design in 2005. He leads the Interaction Research Studio [IRS], a design-led, interdisciplinary team with expertise in design, technology and social studies. The group has varied from about six to twelve contract researchers over the reporting period, several of whom have worked in the group for many years. Their practice-based research has developed as an alternative to traditional science and engineering's stance of dispassionate objectivity, respecting personal and situated engagement on the part of researchers and participants alike.

The Studio's core research is pursued via projects funded by the UK and EU research councils, most involving a trajectory of:

- design-led contextual studies including Cultural Probes (Boehner et al. 2012)
- ideation captured by design workbooks (Gaver, 2011)
- implementation of highly-finished working prototypes (e.g. Gaver et al. 2010)
- long-term field studies of the prototypes in everyday, situated use (e.g. Gaver et al. 2011)

In the course of realising a portfolio of fully realised 'research products', the Studio has developed a collection of robust methodological and conceptual contributions.

Research Products: The IRS has produced a portfolio of fifteen highly-finished 'research products'. All have been field trialled in participants' everyday environments, and many have been exhibited as well as reported in the research literature. For example:

- As part of Equator, an £11m EPSRC Interdisciplinary Research Collaboration (2000 - 2007), the IRS developed a total of six prototypes. These included the Drift Table and the Plane Tracker.
- In the Joint Council 'Landscapes of Cross-Generational Engagement' project (2008 - 2010), the Studio created two prototypes exploring innovative uses of technology for aging people. The Photostroller has been installed for several years in two care homes. The Prayer Companion was installed in a Catholic monastery for 3+ years for use by a group of cloistered nuns.
- As part of an ERC Advanced Investigator project (2009 - 2014), the Studio has deployed 60+ Indoor Weather Stations as part of an exploration of batch production and deployment as a research method (Gaver et al., 2013).
- The Material Beliefs project, funded by the EPSRC (2007 - 2008) partnered four biotechnology laboratories with designers, who created artefacts exploring how emerging technologies might manifest as commodities. Along with a range of exhibitions and public engagement events, this project investigated the potential for speculative design to play a central role in new 'upstream' modes of public engagement with science.

Methodology: The Studio has developed and disseminated a variety of methods to establish a dialogue with participants that can be intermittent, challenging and even provocative, maintaining the Studio's identity and point of view, and producing outcomes that are both relevant and surprising. This perspective has resulted in several landmark methods:

- *Cultural Probes* are collections of evocative tasks given to participants drawn from potential user communities to elicit revealing responses (Boehner et al. 2012).
- *Design Workbooks* are collections of indicative design proposals and treatments of issues used to create spaces of possibility for development (Gaver, 2011).
- *Cultural Commentators* are independent practitioners drawn from outside the research community to help assess research prototypes during field studies. Like the Probes, they are 'cultural' in addressing societal values and attitudes as well as those of small groups and individuals (see e.g. Gaver et al. 2005).

Orienting Concepts: The IRS has developed an approach to design-led research that extends across its varied projects. The conceptual underpinnings of this style, and of the Studio's methodology, have been elaborated in articles discussing concepts that help orient our practices, and that may help people orient to our designs:

- *Ludic Design* (e.g. Gaver 2009) emphasises the value of non-instrumental, exploratory and curiosity-driven engagement with everyday life, with implications both for methods such as the Probes and the products we develop.
- *Ambiguity* (e.g. Gaver et al. 2003) can be a positive value, opening products to users' interpretative appropriation and engendering engagement in the process.
- *Design for Interpretation* (e.g. Sengers & Gaver, 2006) more broadly provides a path for designers to address issues with their products without dictating peoples' orientations.

These concepts have been continually explored and extended during the Studio's tenure.

3. References to the research (indicative maximum of six references)

Evidence of the international quality of the research: The work was presented at prestigious international conferences and in some cases was awarded 'best paper' status (1,2)

1. Gaver W, Bowers J, et al (2013). Indoor weather stations: investigating a ludic approach to environmental HCI through batch prototyping. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '13). ACM, New York, 3451-3460. DOI=10.1145/2470654.2466474 *(Best paper honorable mention).*
2. Boehner K, Gaver W, Boucher A (2012) 'Cultural Probes' in *Inventive Methods: The Happening of the Social*, C. Lury and N. Wakefield (eds.), Routledge.
3. Gaver W, Boucher A et al (2011) The Photostroller: Supporting Diverse Care Home Residents in Engaging with the World. *Proceedings of the 2011 Conference on Human Factors in Computing Systems (CHI 2011*). ACM, New York, 1757-1767. DOI=10.1145/1978942.1979198
4. Gaver W (2011). Making spaces: how design workbooks work. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '11). ACM, New York, 1551-1560. DOI=10.1145/1978942.1979169 *(Best paper honorable mention)*
5. Gaver W, Blythe M et al (2010) The prayer companion: openness and specificity, materiality and spirituality. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '10). ACM, New York, 2055-2064. DOI=10.1145/1753326.1753640
6. Gaver W (2009). Designing for Homo Ludens, Still. In *(Re)searching the Digital Bauhaus*. Binder, Löwgren, and Malmborg (eds.). London: Springer, pp. 163-178.
7. Sengers P, Gaver W (2006). Staying open to interpretation: engaging multiple meanings in design and evaluation. In *Proceedings of the 6th conference on Designing Interactive systems* (DIS '06). ACM, New York, 99-108. DOI=10.1145/1142405.1142422
8. Gaver W, Beaver J, Benford S (2003). Ambiguity as a resource for design. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '03). ACM, New York, 233-240. DOI=10.1145/642611.642653

4. Details of the impact (indicative maximum 750 words)

The IRS's products, methodology and conceptual work have made impact across Human Computer Interaction (HCI) and Interaction Design, including large technology companies (Microsoft, Intel, IBM) concerned with how computing enters everyday life as well as cultural institutions that explore technological possibilities.

Methodological Impact: The Microsoft Research Laboratory (MRL) has taken up IRS methods:

- Microsoft researchers have used Cultural Probes, e.g. for a project on intelligent machines with researchers from MIT Media Lab and the Stockholm Mobile Life project, and for MRL work on technology heirlooms which "*built a range of interactive probes to explore concepts of the passing on and inheriting of digital data.*"[1] Thus the Deputy MD of MRL writes: *"the seminal notion of cultural probes as a means to elicit surprising designs has inspired us in our research into the digital aspects of home life, and in our more recent work on the meaning of big data to the local community."*
- The Studio's 'in-the-wild' research has resulted in the MRL adopting its methods: according to the Deputy Managing Director: *"the emphasis that the Studio have placed on building and deploying prototypes and evaluating them through lived interpretation has provided us with a valuable counterpoint to more quantitative techniques for studying ubiquitous computing systems."*
- The Co-Manager of Socio-Digital Systems at MRL[1] writes that *"the design-led methodologies that come from this group have expanded not just the repertoire of approaches we use in our work, but they have had a game-changing impact on the field of Human-Computer Interaction more broadly"* because they *"offer much needed alternatives to the tried and tested social science methodologies in the field and have led instead to a more eclectic and energising set of techniques which has helped to cement the central importance of design in this community."*

Conceptual Impact: The studio's conceptual work has influenced Intel's approach to products:[2]

- Intel financed a collaborative project called "Supporting Reflection on Well-being in the Digital Home" from 2004-2007 with the Studio and Cornell researchers. Two designs using ambiguity to promote engagement were produced and discussed during presentations at Intel in Portland.
- Conceptual work on ambiguity developed in part by this project was cited as a primary source in award-winning Intel research.[3]
- IRS and Intel staff have made regular visits to each other to share insights, with the Manager of the Cultural Transformations Lab, Intel Corporation[2] explaining: *"Intel labs is pursing a research and product agenda around new relationships, not interactions, with technology. Dr. Bill Gaver and The Studio's work around the importance of ambiguity in design is one of our organizing principles. Personal wellness data sensing devices that we wear or intelligent devices in our homes, can no longer stand out as 'technologies' but must blend with other objects in our lives. Further, Intel products have global reach: designing around ambiguity enables people with different social, cultural and economic backgrounds to interpret the technologies in meaningful ways to themselves. Over the years, we have continuously looked to Dr. Gaver and The Studio as a source of new insights and design methods - they continue to provide innovation that has value to the corporation."*

Impact of Products and Making:

Both the products made by the Studio and its practice-based processes have impact:

- IRS products have been chosen to represent new trends in interaction design. For instance, the Prayer Companion was exhibited at MOMA from July-Nov 2011 and again from March-Jan 2012, and has been acquired for their permanent design collection.[4] Other IRS designs have appeared in exhibitions in Spain, Sweden, the US and UK.
- Microsoft product research has reflected the Studio's products. *"The concepts and prototypes that come from the Studio are provocative and insightful, and many have influenced our own research themes over the years."* [1] The MRL Principal Design Manager has said: *"The studio's blend of nuanced social science and exemplary design craft have inspired our own work, both in the way we discuss the role of design in research, and on the types and qualities of artefacts we develop and deploy. Our work on digital heirlooms, for example, was heavily influenced by the objects*

developed by the studio." [5]

- The Studio's development of fully-finished prototypes impacted on the development of a rapid-prototyping platform commercialised by Microsoft. The system, called .Net Gadgeteer, is being used by increasing numbers of professional prototypers, educators, hobbyists and inventors to rapid-prototype computational products. In 2011-12, the computer scientist responsible for the original and sustained development of the system (a researcher from the Sensors and Devices Group) was seconded to the studio to help develop the Indoor Weatherstations, a set of sensor-based devices that used a hard- and software prototyping platform that he had been developing. He has noted:

  "The team's detailed feedback about what worked and what didn't was very useful in the drafting of the final Gadgeteer hardware specification, which is used today by the various commercial hardware manufacturers that make and sell Gadgeteer-compatible products [e.g. GHI Electronics, Sytech and Seeed Studio]*…. The success of the collaboration has directly contributed to the Microsoft Research Connections team (which coordinates engagements and funding programs for academia) reconsidering the importance of engaging with design schools to be on a par with computer science departments…. This was particularly evidenced by the inauguration of the 'Design Day' at this year's Microsoft Faculty Summit, where the work that the IRS team did with Gadgeteer was highlighted."*

Impact of the Studio's Overall Approach

The combination of methodologies, products and concepts that comprise the IRS approach has had a cumulative impact[6] on the technology and HCI sector. This has been felt beyond the technology industry to other players such as the BBC, who hired Gaver to give a keynote address to the UX&D Connected Studio event on 30 October, 2012*: "Bill Gaver and his group have been a strong force in keeping personal emotional narrative as a key care-about for design in a digital age. Teams like this, that champion the individual, the lyrical, the intuitive with rigour and demanding models of enquiry are rare and important."* [5]

Gaver has also been funded by IBM from 2000-2002, and kept in regular contact with researchers since that time. For instance, he has been commissioned to write a chapter on science and design for a book on 'ways of knowing in HCI' co-edited by the founder of the Social Computing Group at IBM's T. J. Watson Research Center.[7] She explains: *"Gaver and team's work has catalyzed a better understanding of design within the worldwide HCI community, from articulating entirely new perspectives on design (ambiguity as a resource, design proposals) to providing innovative and widely adopted tools for understanding users (cultural probes), to defining an emerging "third paradigm" of HCI that underscores the significance of users' experience of designed artifacts. Truly remarkable, transformational work."*

5. Sources to corroborate the impact (indicative maximum of 10 references)

The individuals listed below are willing to provide corroboration on request (details provided separately). Other sources are available in hard or electronic form on request from Goldsmiths Research Office.

1. Co-manager of Socio-Digital Systems, Microsoft Research Ltd
2. Principal Engineer and Manager of the Cultural Transformations Lab, Intel Corporation
3. Paul M. Aoki and Allison Woodruff (2005). Making space for stories: ambiguity in the design of personal communication systems. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '05). ACM, New York, 181-190. DOI=10.1145/1054972.1054998
4. Senior Curator in the Department of Architecture and Design at The Museum of Modern Art
5. Executive Creative Director, Future Media, BBC
6. Harrison, Steve, Phoebe Sengers, and Deborah Tatar. "Making epistemological trouble: Third-paradigm HCI as successor science." *Interacting with Computers* 23.5 (2011): 385-392.
7. Founder of the Social Computing Group at IBM's TJ Watson Research Center and member of the IBM Academy of Technology