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Enlightened Trial and Error.

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Abstract. Human-computer interaction as a rationalistic, engineering discipline has been taught successfully for more than 25 years. The established narrative is one of designing usable systems for users, some of whom have been described as "naïve", safely installed behind their desktop personal computers. But the world is changed. All aspects of society use interactive technology, it is frequently carried about with us, we talk to it, gesture at it, caress it and check it compulsively. The original emphasis on designing for usability has given way to creating an optimal "user experience". So we are faced with two distinct but related issues: firstly, how do we characterise this new technology and our relationship with it and secondly, how do we teach to design for it. We have developed an approach, which might formally be described as being based on a "convergent-divergent dialectic" but is, at its heart, recognisably playful.

Keywords: ...

1 The world is changed …

Since its inception Human Computer Interaction (HCI) has been primarily concerned with designing interactive artefacts, usable by specialist and non-specialist alike. It was quickly recognised that the best way to design usable, appropriate, effective and acceptable technology was to understand and involve people in the design process. This involvement has taken two forms. The first of these was to understand and model aspects of our psychology. For example, Card and his colleagues proposed a model of human cognition which could be used to guide the design of technology and to make predictions about its use [11]. This was the first of many attempts to capture, model, represent and employ accounts of human cognition [12, 22, 50]. However probably the greatest achievements in designing for relevant aspects of our cognition have been the creation of the graphical user interface (GUI); the desktop metaphor and the use of direct manipulation [5, 55, 56]. At approximately the same time as these psychological initiatives, efforts to involve end-users directly in the design process began. HCI adopted and developed user-centred design (UCD) approaches drawing upon English, Scandinavian and US practice [6, 9, 19, 41, 47]. The focus of UCD was to create interactive technology to automate aspects of peoples' work. The rationale underpinning UCD is that the intended end-users are best placed to contribute their

expertise on how they did their jobs (with a focus on the tasks they perform and the context in which they perform them) Involving people also has the advantage of increasing the likelihood of "user acceptance" of the resultant technology. Given this impetus, HCI rapidly emerged as a design discipline in its own right and with its growing maturity came both diversification and formalisation with the appearance of an ISO standard for human-centred development [31].

And then there was the Apple iPod™ (the iPhone™ and the iPad™). In many ways the iPod is emblematic of the latest generation of "must have" interactive artefacts. The defining characteristic of the iPod (and so forth) is not its usability *per se* but its desirability and its design *chic* and is typical of the new generation of interactive artefacts which are not (and as it will be argued, cannot be) the product of traditional HCI but of the recently established discipline of *interaction design*.

Interaction design, at first sight, appears as a "designer-centric" approach to the creation of interactive artefacts having included a range of design attributes which HCI would not traditionally have consider, for example, aesthetics, pleasure, style and elegance (though this point is revisited below) The design goals of interaction design appear broader than those of HCI as Crampton Smith writes, "*If I were to sum up interaction design in a sentence, I would say that it's about shaping our everyday life through digital artefacts – for work, for play and for entertainment*" (cited in [40]: xi – *our italics*). So, this is not just the instrumental use of technology for work or to entertain but technology which changes the very ways in which we work or enjoy our leisure. However, for some, this distinction is not clear-cut. Many regard this change in the design of interactive artefacts to be only one of emphasis, for example, the current title of the most widely selling HCI textbook is "Interaction Design: Beyond Human-Computer Interaction" [53] though it is not quite clear what is intended by being "beyond human-computer interaction". Löwgren and Stolterman also continue to describe interaction design as "*the process that is arranged within resource constraints to create, shape, and decide all use-oriented qualities (structural, functional , ethical and aesthetic) of a digital artifact for one or many clients*" ([38], p. 5). The picture being further confused by practitioners and researchers who have broadened HCI's scope to include a number of non-work perspectives (e.g. pleasure – [34]; fun - [8]; aesthetics - [51]; affect - [45]) Specifically, Blythe and his colleagues note that their work reflects "… *the move in human-computer interaction studies from standard usability concerns towards a wider set of problems to do with fun, enjoyment, aesthetics and the experience of use*" [8]. Indeed there is evidence for Norman's [44] assertion that "attractive things work better" in that, in some instances, pleasing aesthetics can indeed compensate for poor usability [26] In contrast, interaction designers themselves believe that they have more in common with product or industrial design and consequently see interaction design as a (design) discipline in its own right (e.g. [54, 40, 10]). Figure 1 is an illustration of how Moggridge [40]

"locates" interaction design in this context. To date these two different views have largely been a matter of (well informed) opinion.

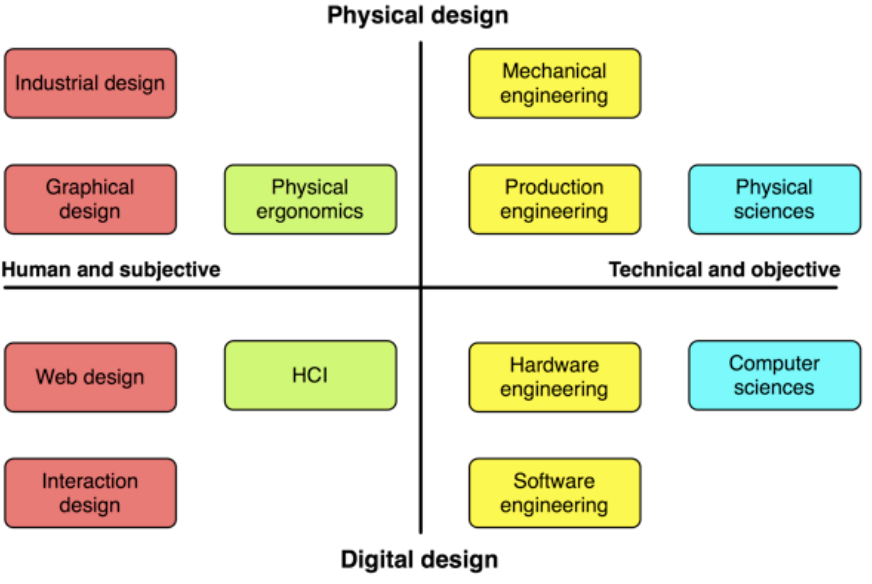

Fig. 1. "Locating" interaction design (redrawn after [40], p.658)

2 Designing Digital technology

2.1 From the perspective of Human-Computer Interaction

As we have already noted, design in HCI has been traditionally user-centred, task-based and rationalistic. Its aim is to create usable and useful interactive technology matched to the people who will use it and to the demands of their jobs. Figure 2 (below) is a representation of the HCI lifecycle as defined by international standard [31]. The un-shaded boxes identify the steps in the process: the shaded boxes list some of the appropriate and available methods and tools.

HCI's approach to designing interactive technology for people has always been two-fold. Firstly, considerable importance has been attached to understanding the role of cognition when designing for and using interactive technology. Recalling the early days of HCI, Carroll ([14], p.3) observes that, "*the initial vision of HCI as an applied science was to bring cognitive-science methods and theories to bear on software development*". HCI has successfully developed numerous cognitive models and

psychologically-plausible engineering models of human behaviour (e.g. [22. 50] among many others) which, to a greater or lesser extent, have been used to model aspects of the behaviour of people using interactive systems and devices. Cognitively-inspired tools such as GOMS (Goals-Operators-Methods-Selection) have been used in the design and evaluation of user interfaces (e.g. [11, 33]). There have also been a whole raft of model-based approaches (e.g. [18]) through to the use of formal methods in designing interactive artefacts (e.g. [49]) Winograd and Flores [63] describe these attempts as modelling people as "cognitive machines", whose psychology and behaviour can be built on or reproduced by computers. Winograd [62] also notes that the clearest expression of this view is Newell and Simon's physical symbol system hypothesis [43] which in turn was a major influence in the first great HCI text - *The Psychology of Human Computer Interaction* [11] So it is not without good reason that design in HCI has been characterised as "rationalistic".

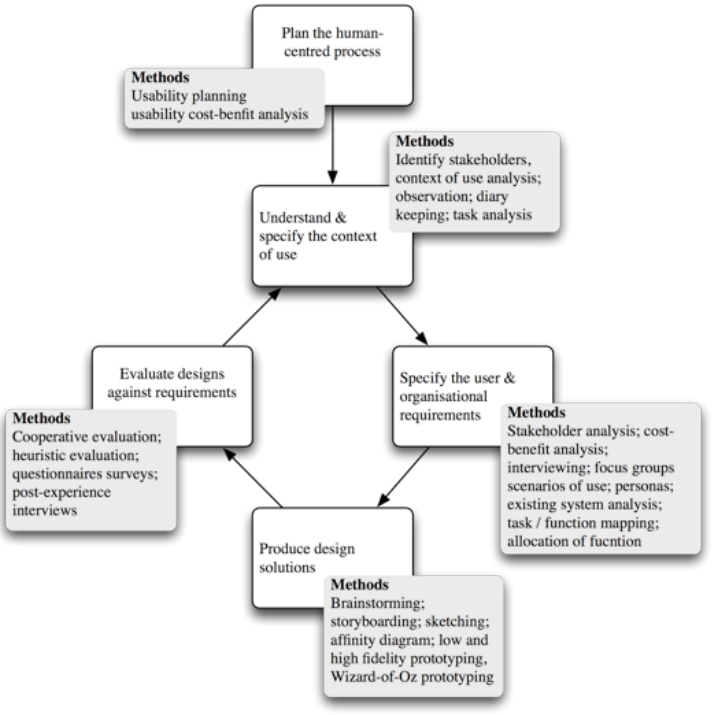

Fig. 2. The HCI lifecycle [31]

The other principal means by which people have been designed for has been to involve them directly in the design process resulting in the creation of user-centred design or UCD (e.g. [16]). The classic text on UCD is Norman and Draper's edited volume *User Centered System Design* [47], in the introduction of which they describe

the book as having originated from the editors' common interests of psychology and artificial intelligence. It is made clear that UCD (to adopt the more modern usage) necessarily involves many disciplines including "computer science, psychology, artificial intelligence, linguistics, anthropology, and sociology – the cognitive sciences" (page 2) and that UCD is "*about the design of computers, […] from the user's point of view*" (ibid) Other influences include the practice of "workplace democracy" in Scandinavian wherein workers have a voice in the design and implementation of new systems [24] and the English tradition of socio-technical development as pioneered by Mumford, Eason and the Tavistock; finally, major US corporations such as Digital and IBM have been responsible for the creation of user-centred methodologies, which in their final forms, appear as Contextual Design and Joint Application Development ([6] and [64] respectively) UCD is also pervaded by a sense of "fitting the machine to the man" which is a (now dated) expression derived from ergonomics (e.g. [42]) UCD is a mainstream practice espoused by the majority of the software and consumer electronics vendors.

UCD involves understanding how people do what they do, how it is organised and the range of tools, methods and artefacts they employ. These investigations can range from interviews, questionnaire surveys, focus groups to design ethnographies lasting extended periods of time. Models and other forms of representation of the users, their purposive activity and the broader context are often created by the designer to help situate and inform their design effort. Good practice in UCD will involve the validation of these models by mutual understanding. This done, a prototype system will be created which will be iteratively evaluated with the users until the completed technical system has been agreed and ultimately installed. A full UCD episode will typically conclude with user training and acceptance testing. UCD is very clearly a form of engineering.

2.2 Interaction Design

Interaction design is concerned with creating interactive technology for work and play, or for aesthetic reasons alone (in the form of installations) - *cf.* Crampton-Smith's definition, all with the express intention of creating for each of us a "a good user experience". These design goals mark a departure from those of traditional HCI but whether this is evolutionary or revolutionary remains to be seen. Evidence of these changes includes the appearance of a number of new academic conferences and symposia sponsored by the Association of Computer Machinery (ACM) These include *Designing Interactive Systems* (1995), *Designing User Experiences* and *Designing Pleasurable Products and Interfaces* (both in 2003), which now appear alongside the older computer-human interaction conference dating from the 1970s.

Interaction design may also reflect changes in our relationship with technology (e.g. [15, 48]) In this 'post-modern' era we appear to be moving from using technology to co-existing with it; interaction being replaced by something more closely reassembling a kind of *symbiosis*. It is, for example, reported that peoples' mobile phones are their most important possession so much so that Moggridge notes that less affluent teenagers own a mobile phone despite being unable to pay for the network charges. Elsewhere we have argued that these changes resemble the ways in which the motor car has changed from the utilitarian transportation device to one which shapes our cities and homes and which "we could not live without" [57].

In parallel with this has come the recognition of the importance of user experience to designers and has come to include everything from the experience of unpacking the box (the interactive artefact was delivered in) through to designing for pleasure, aesthetics, style and so forth. Philosophical frameworks have been adopted to help the designer reason about user experience recalling, in many ways, the inventiveness and "cherry-picking" of the early days of HCI. Finally, the practice of interaction design involves what David Kelley, leader of Stanford's *Institute for Design* calls "*enlightened trial and error*" which he claims "outperforms the planning of flawless intellect" and this is the inspiration for the work we report here. Commenting on Kelley, Winograd observes that this is "*not a statement against intellect, but rather an acknowledgment of the limitations of knowing and modelling the complexities of the real human world*".

2.3 Designing For "User Experience"

As we have already seen, interaction design has come to be closely associated with the term "user experience" (UX) An early definition of user experience comes from Alben [1] who describes it as "*the way a [a device / system] feels in the hands, how well they understand how it works, how they feel about it while they are using it, how well it serves its purpose and how well it fits the entire context in which they are using it*". In an attempt to create a means of reasoning about experience McCarthy and Wright [39] have drawn on Deweyan pragmatism. McCarthy and Wright identify a matrix comprising four 'threads' of experience - the sensual, emotional, spatio-temporal and the configurational. The *sensual* thread of experience is concerned with our sensory engagement with a situation, "which orients us to the concrete, palpable and visceral character of experience". Emotions are seen as qualities which colour particular experiences rather than being independent of them which is how we typically think of joy, anger or fear. While the *compositional* thread is concerned with relationships between the parts and the whole of the experience, it also refers to "the narrative structure, action possibility, plausibility, consequences, and explanations of actions". Finally, all experience is said to have a *spatio-temporal* component. These threads are, in turn, 'woven' together by a number of sense-making processes

resulting in an experience. This is potentially a rich descriptive, experiential framework but is not rationalistic. Finally, co-experience is user experience in a social context. Finally, and to underline the volatile nature of this design goal, Hassenzahl and Tractinsky [28] have offered a wide ranging definition of user experience, "UX is about technology that fulfils more than just instrumental needs in a way that acknowledges its use as a subjective, situated, complex and dynamic encounter. UX is a consequence of a user's internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organisational/social setting, meaningfulness of the activity, voluntariness of use, etc.)". Since this was proposed, a more formal definition has been created, namely, "A person's perceptions and responses that result from the use and/or anticipated use of a product, system or service" – which forms part of ISO 9241- 210 [32].

So we are faced with an "indiscipline" of aims, design constraints, and competing imperatives in trying to equip adequately the next generation of interaction designers with the "know-how" to meet the demands of creating a "*good user experience*". The academic discussion aside, a recent recruitment advertisement from the UK interactive design consultancy AllofUs encapsulates the qualities we must aim to instil in our novice designers. " *[a] multi-skilled, enthusiastic, design obsessed individual… driving the creative thinking around how the interface should behave; by providing insightful research, generating concepts, and building prototypes … champion concepts from early ideas to exciting and lasting experience … In short we are looking for someone who can create solutions that are innovative and intuitive, surprising and delightful, playful and responsive, clever and appropriate*." (www.krop.com/#!/jobs/v8zj8/)

3 Responding to this change

Just as HCI has evolved into interaction design/ user experience, we would expect a corresponding change of emphasis in the teaching and learning of our discipline. Rather surprisingly, such a shift in pedagogy has attracted little discussion to date in published academic discourse. There is however, evidence of growing support for the argument that new forms of interactive artefact demand different forms of "evaluation", whether in real-world practice or academia. Bardzell *et al*. [3], for example, argue for the adoption of design criticism, whether as "expert readings" or the more informal "*design crit*" in interaction design teaching. Faiola *et al*. [20] address the nature of the wider curriculum and propose a framework integrating the domains of (broadly defined) ethnography, design and media. This framework serves as the basis for the design of new media curricula that include interaction design and

consideration of socio-cultural contexts as core elements. However, despite an acknowledgement that design is an inherently exploratory activity, their approach remains predominantly a convergent process of problem definition, design conceptualisation and evaluation.

3.1 The context of this work: Interactive Media Design

What follows is a description of the "interactive" thread of the IMD programme. IMD first recruited in 2006, with the initial cohort graduating in 2009. The degree was established as a sibling programme to the established BSc Digital Media programme, IMD is a four-year degree offering a mixture of interaction, visual effects, animation and sound design, combining technical competence with media creation. The degree is taught in a modular system with the majority of modules providing 20 credits; successful students gain 120 credits per year.

3.1 Three key modules

Teaching and learning in IMD recognises that the world of interaction design is indeed changed. We have moved from a traditional HCI curriculum; from rationalistic approaches to "enlightened trial and error"; from UCD to "designer-ly" design and from usability to UX. And we have accomplished this in a school of computing (not an atelier); with large classes of students and despite the very real constraints of the modular system. These approaches are taught throughout the curriculum but at their heart are three key modules which we describe below and which form the "backbone" of the interaction thread in the programme.

- Practical interaction design is primarily about *prototyping* (Kelley's "trial and error")
- Playful interaction focuses on the divergent aspects of the design process (*cf.* [10])
- User experience is about understanding and capturing the experiences people have of technology.

This foreground of "enlightened trial and error", is against a background of traditional HCI, and modules on social media and physical interaction. Each module runs over a single trimester and students gain 20 credits from their study. The first and second authors teach all three modules, the third author being responsible for the structure of the course.

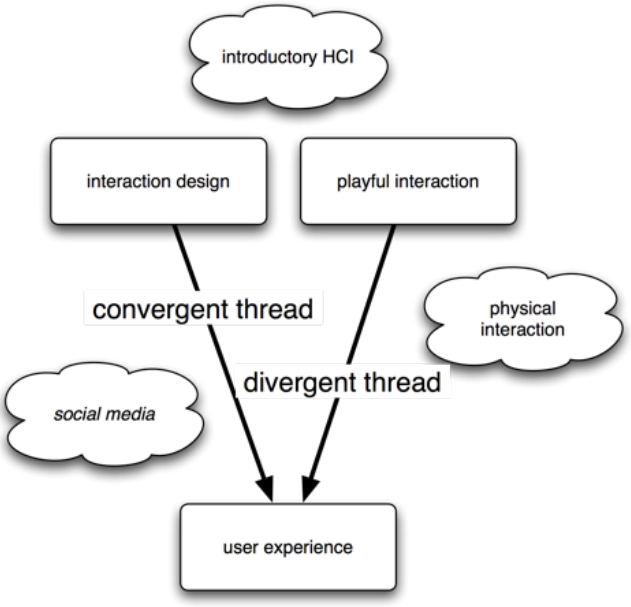

Fig. 3. Our treatment of interaction design

3.3 Practical Interaction Design

Practical Interaction Design, as the name suggests, presents students with a realistic challenge that is addressed through early, iterative prototyping. The starting point is ideation, rather than personae or scenarios or requirements elicitation. Personae and scenarios are used as means of communicating designs rather than for designing *per se*.

Students are introduced to the concept of ideation – "idea generation" by way of Rich Gold's exposition in his *The Plenitude*. From there we move to sketching (following Buxton's distinction between sketching and prototyping) and to prototyping thereafter - early, rapid, and abundant prototyping which has witnessed, most recently, the adaptation of the Axure prototyping environment. The work encourages students to think beyond the constraints of current technologies, something which the adoption of a prototyping approach readily affords.

By way of illustration we describe a current coursework, which was to design a novel, low-cost tablet device together with an app that promoted 'green' behaviour – an intentionally wide brief. Activities start with ideation exercises leading to the identification of initial concepts. It is only now that potential technology users enter

the process, as students undertake an informal ethnography of people using existing devices and apps. In practice, this generally comprises fairly short periods of observation coupled with interviews. As the design matures through the prototyping process, potential users again become involved as participants in the evaluation of the design.

The experience prompts refinement of initial concepts, but may also provoke a more radical re-thinking. One novice designer observed that tablet users frequently struggled to find a comfortable, yet secure, position for holding the device, particularly while entering text. This prompted a re-envisioning of his hitherto solid and rectilinear device to embody an integrated handle, taking his inspiration (but not the product dimensions) from the form of the familiar IKEA™ kitchen chopping board.

Fig. 4. Four views of a (prototype) folding tablet computer

Others recognised a degree of awkwardness in carrying tablets in the hand or stowing them in a bag, producing concept devices which folded to the size of a wallet and – in one case – supported an interactive screen on the outside of the folded 'tablet'. We should stress that what is happening here is not predominantly user testing of ideas but rather an exploration of a more broadly defined design space.

Students then develop their concepts further in sketches and low-fidelity prototypes, typically utilising cardboard, paper and acetate sheets. It is at this point that issues such as usability (revisited from the introductory HCI module taken by all computing students) and the pleasurable and aesthetic qualities of use are (re)introduced as "design conversations" with the emergent ideas. While it would be desirable to require a further iteration of the design, time is limited and the prototypes, together with a simplified evaluation report are now submitted. This also affords a more ambitious approach unconstrained by the realities of production. These deliverables are completed by the conventional tools of storyboards, scenarios and personae – but in this case serving to document a near-complete interaction design rather than as a means of supporting an inherently user-centred approach from the start.

Practical work in the module is supported by material which *inter alia*: emphasises the distinction between the "trial and error" approach practised here and traditional, user centred HCI methods; it discusses prototyping techniques and their application in a range of contexts from the moon landings to the first computer mouse and the digital book; and illustrates the role of inventive forms of storyboard in communicating novel product ideas. Overall, students undertake a design process with an emphasis on the use of interactive technologies in everyday life that moves from ideation, through progressive design refinement, to a prototype solution.

While Practical Interaction Design essentially conveys an essentially convergent goal-oriented process, the role of Playful Interaction is to unsettle, subvert and inform design thinking, thereby provoking fresh approaches to interaction design.

3.4 Playful Interaction

Anthropologists flatter us a little by describing our species as *homo sapiens sapiens* – the wise, wise man. In contrast, Johan Huizinga prefers the term *homo ludens* – playful man. Huizinga arguing that playfulness is a more accurate, defining characteristic than wisdom. He defines play (in this rather long quotation) as, "*we might call it a free activity standing quite consciously outside 'ordinary' life as being 'not serious' but at the same time absorbing the player intensely and utterly. It is an activity connected with no material interest, and no profit can be gained by it. It proceeds within its own proper boundaries of time and space according to fixed rules and in an orderly manner. It promotes the formation of social groupings that tend to surround themselves with secrecy and to stress the difference from the common world by disguise or other means*." This quotation has strongly informed the structure of this module and highlights how it stands in contra-distinction with practical interaction design.

The teaching structure of the Playful Interaction module consists of one two-hour lecture session and one two-hour practical session. The module has recently been

adopted as a compulsory module on the BSc Product Design Engineering delivered in the School of Engineering. The topics discussed in this module include: the ontological primacy of play, genetic epistemology and the *Singing Neanderthals* (after the book of the same name), which have not only been chosen for their relevance but their titles are unexpected and provocative in a School of Computing setting. We also consider the nature of surprise (and repetition), whether products have personalities, social robotics, a Heideggerian account of engagement, art from an evolutionary psychological perspective (cf. Dutton's *Art Instinct*) and conclude with a discussion of hyper-reality and the Situationist's critique of what they call the "Spectacle". This formal lecturing is regularly interspersed with playful exercises to promote divergent / design thinking and example of which is to sketch a bicycle reflecting the student's experiences of using MS Word™ - an idea borrowed from Lundgren (n.d.).

Students are currently required to design and implement a prototype artefact which surprises and delights the person interacting with it, past variants of this assignment having posed the challenges of designing for disquiet and designing interfaces which adopt the characteristics of public personalities. After producing a low-fidelity prototype in PowerPoint™ , HTML or paper, the students are then required to create a physical instantiation in Processing / Arduino.

Fig. 5. "The Most Useless Machine Ever"

By way of example (figures 5 & 6), we demonstrate a coursework submitted on the Playful Interaction module. This is a box that turns itself off when switched on and taunts the user on the futility of their actions. Switching the machine on with the switch on the top of the box triggers a tongue (see detail) to emerge and flick the switch back to the off position.

This is a successful amalgamation of ideas from "The Most Useless Machine Ever" (Frivolous Engineering 2008) and "Do Not Press The Red Button" (Author unknown) and demonstrates an ability to fuse ideas from the physical and digital domain and incorporate them in a novel real world artefact.

Fig. 6. "The Most Useless Machine Ever" (detail)

3.5 User Experience

The User Experience module completes the core material for interaction design teaching and learning. Here, the focus is to not to design user experiences, but to elicit and understand them. Students encounter theoretical material which underpins such understanding: Dewey's and Wright and McCarthy's work on the threads of experience [17, 39]; Benford *et al.*'s [4] insights on user trajectories; theories of embodied interaction; current arguments around the nature of aesthetics in interaction design and phenomenologist treatments originating in the work of Heidegger. Alongside this, questions of the construction of identity through interactive and social media and the experience of the self rendered present 'elsewhere' through technology are considered.

Practical work has varied with successive deliveries, but always comprises a combination of techniques which are qualitative and exploratory in nature and those which capture quantitative data. Practicals and assessed projects have entailed, for example, the application of repertory grid techniques [55], the use of content analysis to make sense of interview data and the design, construction and application of properly structured questionnaires (rather than simple lists of unreliable and invalid questions).

Alongside this, students gain familiarity with ready-made tools such as Biocca's 'Networked Minds' questionnaire for measuring social presence [7], the AttrakDiff

instrument based on Hassenzahl's work [29] and a "first impressions" questionnaire which is under development.

Much of this work has produced insights not only for the students themselves but also publishable results. The first and second authors, for example reported data from a class project using repertory grids to investigate the nature of attachment to cherished digital and non-digital possessions [58, 59]: findings suggested that, contrary to the conclusions of earlier work, some aspects of feelings about digital and non-digital domestic paraphernalia appear very comparable. Figure 7 is a composite a grid produced by one of the user experience groups using RepGrid tools [52] which shows this graphically.

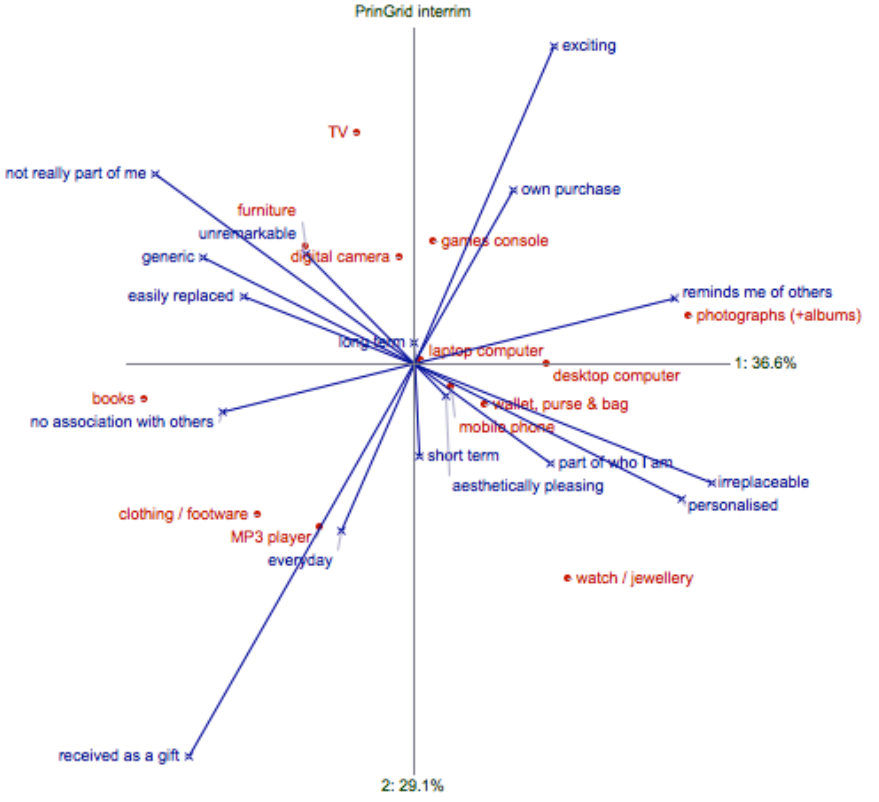

Fig. 7. Repertory grid output showing patterns of attachment to digital and non-digital artefacts

Figure 8 is an example of the use of the FIQ – first impressions questionnaire – which is being developed with and alongside the students in this module. In this instance it is illustrating the first impression people have of the style of a concept mobile phone. The image of the flexiphone was obtained is available from http://www.shortlist.com/cool-stuff/gadgets/the-flexi-phone.

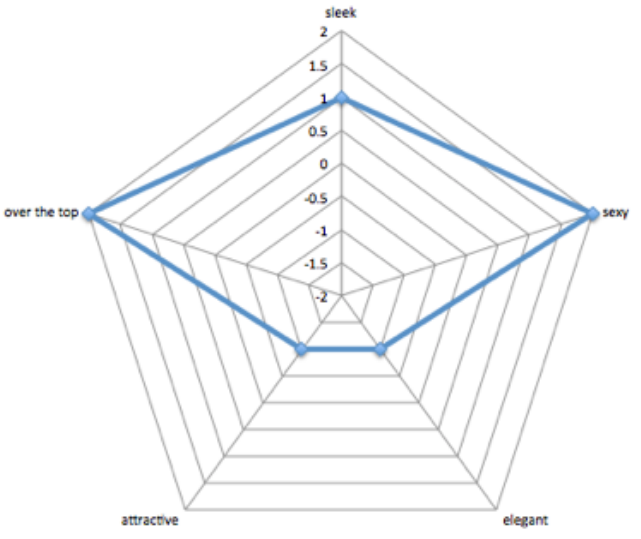

Fig. 8. First impressions of the styling of a flexiphone

The phone is perceived to be "sexy" and "sleek" but neither attractive nor elegant. Perhaps the key to this is the phone being perceived to be "over the top".

Finally in this section, we should add that these three *core* interaction design modules are complemented by related material elsewhere in the IMD curriculum which discuss, among other topics, state-of-the art interaction paradigms and environments, the appropriation of space and artefacts in relation to interaction design, physical interaction design and principles of on-screen graphics design, not forgetting a substantial amount of content concerning the development of audio, visual and time-based media. Critique from peers and tutors is an integral part of learning.

4 Discussion

We have sought to bring "enlightenment" and synthesis to trial and error. Trial and error is a familiar, everyday heuristic and is the basis of the convergent problem solving strategy, which is embodied in early, rapid prototyping. We have formally and deliberately introduced and integrated divergent thinking – *playful* thinking as the means of enlightening this focussed convergent thinking. One of the main challenges to curriculum design was ensuring that students had an appropriate technical skill level at each stage of the degree. This technical competence combined with an understanding of interaction design manifests itself in the final year and there is

abundant evidence that these students are using what they have learned in their final year honours projects.

While our approach is primarily principled, that is, based on our own published research and the available best design practice as evidenced by key thinkers and practitioners in the field (cf. Lawson, Buxton, Kelley, Hassenzahl and Moggridge) there is also ample evidence from students' independent projects of the success of the approach in fostering creative interaction design. Examples of these include:

- A physical musical interface including developed synthesiser software and files for 3D printing a case. The aim of the project is to produce instructions and assets that can be freely downloaded and built by members of the public allowing the procurement of low cost entry-level electronic music equipment.
- An investigation of the user experience of eye tracking equipment. The approach here is to build DIY ("do-it-yourself") eye tracking equipment and an attempt assess the experience of interfacing with an interactive comic compared with standard mouse input.
- The construction of wearable electronics to enable dancers to gain direct feedback between their movement and a designed sound piece.
- An investigation into the "singularisation" of urban spaces. This project will collect Twitter posts relating to specific spaces. These posts will then be repurposed and physically projected onto the spaces themselves.

All modules within IMD are also subject to formal evaluation by the students. The questionnaire is anonymous and asks such questions as "What did you like most/least about this module?" The written feedback is uniformly very positive (averaging better than 4.5 on a 5 point scale) and demonstrates that students appreciate not only the subject and teaching methods but also the feedback they receive on their work. The external examiners are similarly complimentary.

A further indication of success is the adoption of two modules, Playful Interaction and Responsive Environments as core modules onto the BSc[1] Engineering Design programme delivered in the School of Engineering. The programmes BA[2] Design and Digital Arts from the School of Creative Industries and BA Marketing Management from the Edinburgh Napier Business School have also adopted modules (primarily Interaction Design) from the programme, indicating that teaching has relevance across multiple disciplines.

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[1] Bachelor of Science

[2] Bachelor of Arts

IMD has acquitted an enviable reputation within Scotland and across Europe being regularly and significantly over-subscribed.

Graduates from the programme are actively sought by web design and interactive application development companies. These graduates have also been recruited into advertising agencies and film production companies. The strong entrepreneurial flavour present within the course (which space has prevented us from discussing) regularly bears fruit and many of IMD graduates start their own companies and work as freelancers.

The interaction thread has been running for five years now and we are confident that we are hitting our target of producing enlightened interaction designers able to meet the demands of the "iPod generation".

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