

BOOK OF ABSTRACTS

EDITION AND DESIGN

École de design industriel, Faculté de l'aménagement, Université de Montréal
Montréal, Canada



DESIGN & COMPLEXITY
Design Research Society International Conference
Montréal — 7 to 9 July, 2010
Université de Montréal

INTRODUCTION

The DRS 2010 Montreal — Design and Complexity Conference is destined to become a landmark event in the annals of the School of Industrial Design of the Université de Montréal and, it is hoped, an important contribution to the progression of design research on an international level. The decision to entrust the School of Industrial Design with the organization of the first DRS Conference to be held in North America is an appropriate one in view of the School's attachment to one of Canada's largest research Universities as well as its declared intention of playing a leading role in the evolution of the design discipline, whether it be related to professional practice or to research. This duality of purpose has marked the School's history from its very inception over 40 years ago, the tension between these two poles providing an enduring source of energy that has fueled its development. Hosting the DRS 2010 Conference comes at a time in the evolution of the design discipline when attention must be cast on the relationship between practice and research and efforts applied to building durable bridges that span between the two. This very preoccupation is at the origin of one of the unique features of the DRS 2010 Conference, the Building Bridges event, destined to attract practicing professionals and offer a stage to foster discussion on ways to enhance the symbiosis between practice and research.

The Conference Guide and Book of Abstracts offers a summary at what will take place during the three days of intense intellectual communication, exchange and debate that comprise the Conference. The DRS 2010 Montreal Conference, totalling 140 research papers, three keynote conferences and a round table discussion led by a panel of eminent professionals and academics, promises to leave an indelible mark on the evolution of design and many lasting memories in the minds and hearts of all who attend.

I wish you a rewarding conference

Philippe Lalande
Conference Chair

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KEYNOTE 1

Improving Design Without Destroying It

ERIK STOLTERMAN

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The design process is today highly appreciated for the kind of results it can deliver. This appreciation can be found within academia as well as in the business world. At the same time there is in many communities a noticeable uneasiness of the ambiguous character and the apparent elusiveness of the methods of design. This unease has led to many attempts to transform or improve the design process, for instance with the purpose to make the process more efficient, rational, predictable, and safe. However, many of these attempts have lead to results that are detrimental to the design process, because they impose conditions, limitations, restrictions, procedures, and measures of success that are not grounded a deep understanding of design as a unique approach of inquiry and action. In my talk I will examine approaches to and examples of design process improvements that are destructive to design, but I will also explore and discuss some safe alternatives to improving design.

KEYNOTE 2

Can Complexity be Contained?

ANNE-MARIE WILLIS

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CO-DIRECTOR OF DESIGN CONSULTANCY TEAM D/E/S

To speak of “design AND complexity” suggests design can be held outside complexity. From an instrumental perspective, it implies the designer’s task is to overcome or manage complexity. However, from the point of view of enquiry, the binary relation has to be refused and complexity recognised as the inescapable condition of design. To cast complexity pragmatically is to reduce it and thus negate the complex, while to fully embrace it is to create an unbounded exploration leading to chaos and madness. The challenge then is to find an appropriate mode of thinking, practice and a language to engage complexity.

KEYNOTE 3

Somaesthetics, Design, and the Complex Sense of Atmosphere

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Researchers in certain areas of design have recently looked to philosophical pragmatism for useful concepts and theoretical directions. Somaesthetics – a discipline emerging from an embodied, experience-centered pragmatist aesthetics – may help address one of design’s most elusive and complex aspects: atmosphere. Atmosphere is complicated (both to design for and to analyze in user experience) because its perception is very much a product of wide-ranging transmodal sensory experience that works on the level of nonreflective, implicit somatic reactions and thus escapes critical analysis. This paper explores how somaesthetics might improve such analysis by articulating the complex role of the body in design and by heightening our awareness of somatic experience. It will focus on the design field of architecture.

ROUND TABLE

Building Bridges: Fostering Collaboration Between Practice and Research

ALEXANDRE JOYCE, moderator

INSTITUT DE DÉVELOPPEMENT DE PRODUITS (IDP), MONTRÉAL

JEAN LABBÉ, panelist

LABBÉ DESIGNERS, MONTRÉAL

NEVENKA PRIJIC, panelist

C&D ZODIAK, MONTRÉAL

ANNE-MARIE WILLIS, panelist

TEAM D/E/S, QUEENSLAND AUSTRALIA

WIM ZEILER, panelist

T/U DELFT, HOLLAND

Joining the scientific and professional communities involved in the design discipline, *Building Bridges* reflects on the intertwined roles of design practice and design research in an attempt to define ways to better our understanding of their complementary natures. Feeding on some outstanding examples of research into various design topics, experts in each field will discuss ways of strengthening links between design practice and research. Taking place within the confines of the DRS2010 International Conference – Design and Complexity, this exceptional practitioners’ section aims to explore the many ways research activities manifest themselves thus strengthening the theoretical framework that underlies design practice and conversely, the various channels through which professional practice can offer researchers relevant and appropriate research problematics.

Following the presentation of research focussed on a number of design issues, a panel comprised of researchers and seasoned design professionals hosted by Alexandre Joyce, sustainable design advisor at the *Institut de développement de produits (IDP)*, will discuss the relationship between design practice and design research and attempt to find ways to foster a better understanding of each for the mutual benefit of both.

This unique event, made possible through the support of the *Ministère du Développement économique, innovation et exportation (MDEIE)*, will be the occasion to reflect on designers’ practical preoccupations, their consideration by researchers and the re-introduction of research results into designers’ best practices. *Building Bridges* is about smoothing the junction between practice and research in order to contribute to creative solutions adapted to the evolving constraints of the design profession.

001

The Role of Interaction Design in Information and Communication Technologies Embedded Product Development Activity

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This paper describes the role of interaction design in information and communication technologies (ICT) embedded product design and development activity. Besides presenting the relationship between industrial design and interaction design in the same activity, it also re-defines this relationship in terms of roles in ICT embedded product development activity.

This research has been accomplished by having an extensive interdisciplinary literature review, a series of interviews and also a case study based on a specific product's development process. The series of interviews have been conducted face to face in USA with professionals from 5 different industrial design and interaction design based consulting firms such as IDEO, Cooper Interaction, Smart Design, Swim Interaction Design Studio and LUNAR Design. The next step of the field research has been a case study based on gathering information of a specific product through secondary sources and then conducting in-depth interviews with designers, who have worked in that product's development process, from different professions.

Major conclusions of the research include as follows: Being a younger discipline relative to industrial design, the role of interaction design in ICT embedded product development activity has the similarities to that of industrial design in the same activity. The most extensive collaboration between industrial design and interaction design is seen at *Planning* and *Concept Design* phases in ICT embedded product development activity. As the products become more complex in terms of interactions, interaction designers will gradually need to manage the design teams. There will be a need for a new sub-field of interaction design which is supposed to emerge as interaction design management. Comparing with industrial design, interaction design is foreseen to have a wider activity area in *Planning*, *Concept Development* and *System Level Design* phases of ICT embedded product development activity. As interactions with products become more and more immaterial, be a new actor from service design is supposed to have a role in ICT embedded product development activity.

002

A Survey of Definition and its Role in Strengthening Design Theory

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This paper argues that an essential task for managing complexity in design is clarification of key terms within the field, and most importantly the term that defines the field itself: Design. This position rests on the argument that theory—a key tool for managing complexity in design—is weakened by ambiguous terminology, and crucially, ambiguity of the word *design*. Although it has been well documented that design is a highly ambiguous term and that this is problematic for the field as a whole, many designers are resigned to this fact since it is unclear how one can resolve differences of opinion about what such a central and sensitive term means. This paper argues, though, that once designers have a better understanding of the process of definition—a process that has its own complexities—they might see the benefit of trying to define design and other key terms. To this end, this paper provides an overview of definition, borrowing largely from philosophy, which includes a survey of the types and methods of definition and issues related to each. It will also explore methods and criteria by which one can evaluate various competing definitions. From this survey, I propose that designers use a stipulative and pragmatic approach to definition outlined by Edward Schiappa (2003). Schiappa's approach is useful because of these two key underlying assumptions: first, defining design (and related terms) is not a search for the record of past usage but an act to persuade others of how to use the word in the future, therefore the person defining must provide a compelling argument for why others' usage should be modified; second, defining design is not a search for the 'true' or 'real' meaning of a word but instead a goal-oriented process and, therefore, dependent on the context and purpose of those defining the word.

003

Interaction Designers' Conceptions of Design Quality for Interactive Artifacts

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It is important to be aware of different ways of seeing design quality of interactive artifacts in order to appreciate the various aspects of a design, but how do professional interaction designers understand design quality? In theory, one way of approaching design quality of interactive artifacts has been the Vitruvian principles of commodity, firmness and delight, originally created for architecture. Such frameworks are, however, seldom directly employed in practice. This paper investigates what conceptions professional interaction designers have of design quality for interactive artifacts. Interviews were conducted with ten designers. The analysis disclosed four conceptions concerning: (a) Constraints & contexts, (b) motivations & purposes, (c) use-qualities of functions & content, and (d) experiential qualities of form & behaviour. An awareness of these conceptions may facilitate the appreciation for different aspects and opportunities in a design situation.

004

Émergences du design et complexité sémantique des sextoys

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MARC MONJOU

CeReS, LIMOGES, FRANCE

L'exposition « Love design », en 2009, et notamment le *8ème ciel* de Matali Crasset, manifeste l'intérêt du design pour l'érotisme et les sextoys. Nous traiterons ici des glissements sémantiques opérés ces dernières années dans le monde des objets à usage sexuel. Le phallus, devenu un artefact hypertechnologique ou bien un objet habillé d'une iconographie issue d'un bestiaire, évince le registre pornographique au profit d'une apparence ludique ou raffinée. Les sextoys mettent donc en lumière la complexité sémantique à l'œuvre dans la construction d'un nouveau champ de pratiques afin de faire accéder le produit à l'univers commun. A travers cet objet d'étude, le design est interrogé dans une démarche à double tranchant. L'élaboration d'une cohérence sémantique repositionne le discours des sextoys mais elle se limite souvent à l'iconographie et à la technique en quête d'efficacité. Dès lors, le design, vecteur de cohérence sémantique au sein de ce terrain hétérogène émergent, reste en deçà de ses capacités à construire des scénarii complexes des diverses pratiques sexuelles.

005

Sustainable Collaborative Services on the Digital Platform: Definition and Application

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Information communication technologies (ICT) have emerged as an enabling solution that facilitates grassroots social innovations. Among them are collaborative services in which the final users collaborate to provide solutions to their unmet social needs. These alternative solutions aggregate to result in radical innovations towards a sustainable society (Meroni ed., 2006). Examples of collaborative services on the digital platform include Hitchhikers, a service created by hitchhikers to connect people with empty seats in their cars and people in need of a ride, thus allowing them to meet new people and reducing carbon footprint; Vicini Vicini, a service that aims to strengthen social fabric in Rome by helping people to organize parties with neighbors; Peladeiros, a service in Brazil that helps people to organize soccer matches; GROFUN, a service organized by people in Bristol to promote urban gardening, share the produce and dine together.

We introduce the notion of collaborative service and showcase the examples of collaborative services supported by ICT, mainly web-based. The cases studies reveal that collaborative services have a common structural system and that they can be classified into seven categories based on their meta-function. Collaborative services produce two elements – a solution and a social network. Based on theories of social network analysis, we argue that the two elements influence the formation of each other, i.e., a solution generates a social network as a byproduct and the social network in turn become a medium to diffuse innovations and creates opportunities to start new collaborations and that this virtuous cycle is amplified by ICT.

006

A Competitive Game-based Method for Brainstorming and Evaluating Early Stage Design Ideas in Terms of their Likelihood of Success in the Marketplace

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This paper considers a game-based method for the early evaluation of design ideas in terms of the likelihood of success of the designs in the marketplace. The method was developed in the format of a multiplayer competitive team game for up to 120 participants. Known as the Marketplace Casino, it has been applied in both design education and industry. The paper reviews the evolution of the game with international play testing and refinement involving over 400 participants in Europe (UK), Asia-Pacific (Japan, Korea, China, Australia), and Africa (Ghana).

The research innovation discussed in this paper relates to the combination of game play and brainstorming with a real world simulation component for evaluation, aimed at improving both the quality and ranking of outputs. The research draws on game theory, game typologies, and game research and development methods using play testing and iteration that are comprehensively described in “Rules of Play” (Salen, 2004). Effective brainstorming principles are well practised and described (Osborn, 1963) as are case studies in design brainstorming (Kelley, 2001), along with pitfalls (Sutton, 1996).

Bringing a contemporary design to market can be complex and expensive. Techniques that improve the likelihood of success in the marketplace can potentially reduce the associated risk and cost. The aim of the Marketplace Casino is to link creative ideas generation to a marketplace evaluation through a simplified model (the “game”) of a complex situation (the “reality”). The format is based on play specifically to enable a non-threatening and exploratory environment for participants.

The development of the game-based Marketplace Casino has focussed on product design and service design outputs. The author also considers its possible application to other disciplines in which creative output has to compete in the marketplace.

The Impact of Modular Product Design on Innovation Compared with Design from First Principles

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The research looks at whether modular design methods can compromise innovation when compared with design from first principles. The questions that the authors investigated were: to what extent does modular product design restrict innovation in design? Is design from first principles a better starting point for innovation, and if this is the case, then what methods and environments facilitate design from first principles among design teams? The authors were also interested in the relationship between industry and academia when taking these differing approaches.

The authors consider design from first principles to be where there is a significant shift in a product or system which - while addressing similar societal wants, needs and desires - is not built upon nor based on previous technological modules, or on existing design paradigms. These shifts derive from “tabula rasa” design research and lateral thinking, often in combination with new technologies or innovative technological combinations. These innovations are radical as they force creative and/or technological discontinuity.

Informed by their projects with industry and academia, the researchers argue that modular-based physical products are generally more appropriate for evolutionary designs or mature products, and that a design from first principles approach is better suited to genuine innovation and step change design. However, in terms of the creative design process, a design from first principles approach can be accommodated in both modular and non-modular products or systems.

Beyond the Designers’ View: How People with Autism Experience Space

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Harnessing all different dimensions of space is an immense, if not hopeless task. Thus the design of space is challenged by a complexity of meanings. The meaning attributed to a certain physical environment depends to a large extent on the personal interpretation people attach to this environment, influenced by their personal interests, attention and perceptual possibilities, whatever the designer’s line of thought that generated this built environment.

Aware of the diverse ways in which a designed environment can be received, this paper attempts to understand the built environment from another perspective. It reports on a study that starts from different people with autism spectrum conditions, throwing light on their spatial interpretation and the way they deal with the physical environment. Insights from an analysis of autobiographies of people with autism, tinged with the experiences of engaging with people with autism in different contexts, give an idea of what understanding another view on the built environment could imply.

This paper presents fragments of a particular autistic world of experience as a challenge to open our eyes. It illustrates how some people with autism place an enforced confidence in the direct perception of the built environment, and it highlights the influence of extra connotations—exceeding the directly perceptible—which are inherently connected to space in our society. In an attempt to look at the built environment from this perspective, this stance enables us to be critical of the way we—architects and designers—think about designing space and it spurs us to be alive to the multiple complexity of space.

Modélisation sémiotique et systémique de l'objet design comme signe-action complexe

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Les approches sémiotiques et systémiques du design produit sont à la fois peu nombreuses et peu coordonnées. C'est ce que fait apparaître l'état de la recherche en ce domaine. Les quelques études sémiotiques disponibles ont par ailleurs tendance à isoler l'objet de ses usages, de ses utilisateurs et de la complexité du système d'objets qui constitue son environnement proche ou des modes et styles de vie qui constituent ses univers. En conséquence, l'objet analysé est le plus souvent réduit à une image figée de lui-même. Seules les études qui relèvent de la sémiotique pragmatique veillent à inscrire l'objet dans l'action, les interactions et différents contextes.

C'est dans cette lignée que la recherche ici présentée propose une modélisation sémiotique et systémique de l'objet. Celui-ci est considéré comme un signe-action complexe inscrit dans le temps, dans l'expérience d'interaction et de relation, dans les habitudes et les changements d'habitudes résultant des tensions adaptatives engendrées par les changements technologiques, culturels et socio économiques.

Une telle approche à la fois sémiotique et systémique impose de reformuler les questions de recherche. Les objets communiquent-ils dans l'action et comment ? Comment les traiter comme des signes complexes sans les séparer de leurs environnements de conception et d'usage et sans réduire la dynamique des usages aux seuls «bons usages» décrétés par l'analyste ? Comment penser la relation avec l'objet en action (l'expérience) à la fois de l'intérieur (approches internalistes) et de l'extérieur (approches externalistes) ? Comment penser l'objet complexe comme un système de relations et d'intelligences distribuées dans des représentations individuelles et collectives, mais aussi intégré dans des mémoires externes ? Comment distinguer les différentes phases de découverte, d'apprentissage, d'automatisation des usages et de leurs changements qui constituent la vie des humains avec les objets ? Enfin, comment modéliser cette complexité et tester les hypothèses interprétatives produites par la recherche ?

Dis/Ability Teaches Design!

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In our paper, we claim that general human and artificial communication systems might be enriched by acknowledging and adding specifics of different ways of communication, perception and locomotion that refer to bodily impairment (Bieling, 2009).

Schillmeier (2009, 79ff) sees disability less as an effect of bodily impairment, but more as a phenomenon of social construction. Oriented towards Science, Technology and Society Studies (STS) he conceptualizes disability as a "heterogenic, material event", which connects "social and non-social relations of human and non-human actors, of things, bodies, technologies, sensorial practices" and becomes able to be experienced in the sense of disabling as well as enabling (>dis/abling<) scenarios. (Waldschmidt/Schneider, 2009, 17) „With the multiple objects of >Disability<, the parliament of things becomes obvious: the assembly of bodies, technologies, and things, as an articulation of reality of natures and cultures“. (Schillmeier, 2009, 79ff) By exploring disability from an >out-of-center< position, we aim to use it as a "knowledge-constituting moment, for the analysis of the (majority of) society". (Waldschmidt/Schneider, 2009, 15)

In our investigation we consequently focus on integrative processes: An improvement of social integration, as well as an improvement of communication systems and devices through design (research), inspired by and learning from communication patterns of the bodily (and therefore socially) impaired. If we, as e.g. interface designers, understood more about communicative variations caused by bodily impairment, we might be able to create systems that enrich general human communication, by transferring and combining properties of such different variations.

We will discuss results and examples of the design research project Speechless, an interdisciplinary project run at the Design Research Lab of Deutsche Telekom Laboratories, Berlin. One main focus of Speechless lies primarily on deaf and blind communication and perception, as well as on the transferability of alternative forms of communication to general human (interpersonal) communication and human-computer-interaction (HCI).

011

Dynamique forme-lumière : Un processus de création et d'analyse de l'espace architectural par modèles maquettes/images

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La recherche propose un regard sur l'objet et la lumière à travers l'élaboration d'une méthode de design et d'analyse spatiale aidant architectes, designers et artistes dans leur exploration créative. Elle tente de réinitialiser le processus de création par des manipulations simples et directes avec la matière, et une expérimentation en maquettes et en images photographiques, deux médiums familiers des architectes et designers. Ces interventions minimales recèlent à la fois une grande richesse de relations spatiales et de nombreuses informations sur le phénomène lumière. Une collecte de plus de 200 compositions spatiales est soumise à l'analyse. Un lexique de paramètres est formulé à partir de notions théoriques relatives à l'espace, l'objet, la lumière et la perception, sous forme de grilles d'interprétation. Celles-ci servent de cadre d'analyse permettant d'identifier les éléments les plus actifs en interaction dans l'espace visuel. Elles orientent la lecture de la complexité spatiale et agissent comme balises dans le processus de décision/création. Le vocabulaire élaboré aide à préciser la nature des interventions et sert de plate-forme d'échange entre les collaborateurs. Ce processus vise également à stimuler l'imagination et la créativité en architecture et en design.

012

Complexity in Home Medical Equipment Design

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Home medical devices are developing into a major industry worldwide that covers monitoring, diagnostic, disease prevention, treatment, alleviation of disease and rehabilitation equipment. Services are being moved out to the community and into the home; self management is replacing hospitalization and visits to the doctor's clinic; and custom-tailored medicine is making inroads into normative treatment. These developments have great implications for the scope and design of home medical equipment.

The paper will discuss the unique and complex nature of home medical devices, from a human-environment-machine perspective focusing on the changeable unpredictable nature of users, the unknown, amorphous home environment and the level of intricacy of tasks performed by patients having various diseases and disabilities.

The design of home/personal medical equipment should be guided by the need to make it compatible with the needs of different users and diverse residences. The selection of medical equipment should not be determined by passing trends, technological fashions, or search for innovative and hi-tech applications and gadgets.

We call for increased awareness and active, ongoing research by multidisciplinary teams of healthcare personnel, end user patients, caregivers, psychologists, social workers, and especially, the architects and designers who will be involved from the first stages of concept development through to the final stages of medical device marketing. Design of home/personal medical equipment should follow principles of inclusive design (design for all, universal design) criteria, following user-centered design methodologies. It should accommodate the dynamic, uncertain and complex profile of the widest range of users and environments.

Barrier Analysis as a Design Tool in Complex Safety Critical Systems

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When constructing or improving large complex systems, design activities help establish the needs and goals of users, deepen the understanding of the system and facilitate ideation of new solutions. When service systems are large, dynamic and complex, the need for thorough design work is especially evident. However, design methods usually strive to describe and design best case scenarios and we argue they lack the perspective of safety needed when working in safety critical systems. In order to gain knowledge on how a perspective of risk and safety can benefit design in a safety critical domain, two different perspectives were adopted through the use of two different methods. The methods were service blueprinting and barrier analysis, adopted from service design and cognitive systems engineering respectively. The methods were implemented during the research phase of a service design project in a home healthcare system in Sweden. Service blueprinting is a method used by service designers to visualise services. Barrier analysis is aimed at identifying and categorizing artefacts and functions that prevent unwanted events from taking place, or that lessen the impact of their consequences. A comparative analysis of the two methods was performed, concluding that barrier analysis has the potential to benefit design work performed in complex and safety critical systems. The potential for barrier analysis to be more tightly integrated into current service design methods is discussed, but more research is needed in order to clarify this matter.

Complexities of Teaching and Learning Collaborations with International Partners: the Global Studio

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During the past four years, academics from the School of Design at Northumbria University have developed and implemented an innovative international collaborative teaching and research model named 'the Global Studio'. The Global Studio provides a response within Higher Education to shifting trends taking place in manufacturing and the related emergence of globally networked organisations. This paper examines the challenges of establishing and maintaining teaching and learning relationships with international partners.

During the past four years seven international collaborative research projects involving high profile overseas universities and multinational industry partners have been undertaken within the Global Studio. A focus of the Global Studio is developing a better understanding of product development processes that are conducted by globally distributed and cross-cultural design teams. The Global Studio is enabling staff and students at a university located in the UK to work in a cross-disciplinary and cross-institutional context with staff and students from the participating partners based in countries such as Australia, the USA, the Netherlands and Korea. The cross-institutional collaboration is enabling the intersection of various disciplinary approaches which are facilitating the development of innovative practices.

In this paper we explore some of the complexities associated with conducting the Global Studio. We also provide an example of one of the projects undertaken in 2008. This particular Global Studio was conducted in collaboration with a multinational mobile products manufacturer and two universities based in Korea and the UK. The paper draws attention to complexities of teaching and learning collaborations with international partners.

015

Intensive Studio Experience in a Non-studio Masters Program: Student Activities and Thinking Across Levels of Design

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In conjunction with an emerging view of instructional as a design field versus its traditional identification as a science, the authors have designed, established and studied from 2005–2009 a masters level course using studio-based pedagogy. This paper examines the design tensions involved in that effort from the perspective of the designer/instructors and the design activities and thinking of the students in the most recent iteration of the course. The research is based on analysis of field notes, student work, and syllabi across these five years, as well as on reflections of the designer/instructors. Design tensions center on the difficulties of adapting a pervasive pedagogy into an environment not conceived to support it and on the evolution of the course as it became more studio-oriented. Examination of the student's activities and design thinking was made through the lens of Lawson and Dorst's (2009) models of design, and include analysis of design activities as represented in our field notes together with discussion of sample work from students that illustrate their design thinking. The design models offered a useful vocabulary for discussing student's design behaviors, both with respect to their unique approaches to design and to the observations of the instructors regarding the effect of revisions in the course. We also discuss two categories of design activity used as extensions to the model (using external input and using tools) to describe activities in this class.

016

When Will Customers Claim Their Rights as Empowered And Creative Human Beings? A Rhetorical Perspective on Co-creation

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Designers as well as business leaders are strictly focusing on co-creation and co-creation activities as an effective method to innovation in business and product development. Paradoxically we seem to forget the perspective of the customers.

The intention of this paper is to bring a rhetorical approach to 'co-creation'. This approach emphasizes co-creation as a specific form of rhetorical design discourse directed at customers who are introduced to new creative ways of expressing themselves. The rhetorical perspective also emphasizes how this discourse is capable of constituting its audience in new roles, here as empowered, active and creative people. This co-creation discourse is considered an art 'constitutive rhetoric' (Charland, 1987). The crucial effect of the constitutive rhetoric is the audience claiming its right on behalf of this constitution. This raises the question: when will customers claim their rights on behalf of these new roles - as creative human beings - and how can we possibly develop co-creation and reply to this possible demand?

In co-creation sessions designers are appealing to the customers's creativity by presenting generative tools in order to make the customers express their creativity, their tacit knowledge, their dreams and needs. The paper agrees with Sanders that these generative tools entail the possibility of growing into a new language not restricted to co-creation sessions and organizational development (Sanders, 2002). Using the generative tools is a way of inviting design thinking and creativity into everyday peoples lives, offering them a way of reflecting and responding as creative human beings. Rhetorically this means offering the capacity to act also called 'rhetorical agency' (Hoff-Clausen et al., 2005) and as such a possible solution to customers claiming their rights as creative human beings.

The paper will outline different understandings of co-creation as well as bring experiences from co-creation activities conducted in a present research in a Danish bank. The paper will also bring an example of customers claiming their rights.

Reframing Business – and Design? A Critical Look at Co-creation

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The collaborative aspect has become a prominent focus in design discourse and words like *user-driven innovation*, *user studies*, *participatory design* and *co-creation* are frequently used in the design terminology of researchers, practitioners, not to mention business organizations. This reflects a shift in attention from product and manufacturing to users and experience.

Normann (2001) speaks of reframing business and arguably the changing landscape of design as described by Sanders and Stappers (2008) is making designers reframe their practice. (cf. Schön, 1991). Employing user studies, participatory design and co-creation looks like an easy and accessible way towards innovation, unlocking the creativity of the customers to develop future business. To no surprise these words are buzzing around the business and design offices.

However it seems, the buzz is failing to deliver, and it is important to question why. Using *co-creation* as an example, we claim that businesses and designers are stuck on the buzz. Borrowing a term from cognitive psychology, we argue that co-creation has created a *fixation* among businesses and designers, where the strong focus on the innovative potential of users as co-creators paradoxically has become an obstacle for both radical innovation and *real* co-creation.

The paper brings an overview of different and conflicting perspectives on co-creation, and explains how these perspectives stem from different paradigms. Furthermore, the paper suggests designers to consciously reflect upon the image of design and designers.

We want to highlight researchers from both design and business who claim design and design thinking to be a new way of bringing both insight and innovation, a new way of working with thought, human systems and *design-driven innovation* (Buchanan 2001; Verganti 2009). We think it is time to encourage designers to expand their current vision from user-driven innovation to design-driven innovation. It is time to reframe design from a designer's perspective – and why should designers not have the capabilities to reframe business as well?

Expanding Design Space: Design-In-Use Activities and Strategies

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This paper introduces an analytical framework for understanding the collaborative nature and distributed structure of what is often referred to as *design space*. We propose that the design space should be conceptualized as the space of possibilities for realizing a design, which extends beyond the concept design stage into the design-in-use activities of people. By locating different activities and mapping participants' possibilities in a continuum from consumption to active creation, we develop a framework for understanding and locating design research interventions and a tool for mapping design activities. We argue that: 1) a design space is always actively co-constructed and explored by multiple actors through their social interactions with and through technologies and 2) the participating actors, resources, conditions and supporting strategies frame the design space available. In doing this, we bring forth relationships between an expanded view of the design space, contemporary discussions on the nature of innovation and the imperative to support explicit collaborative and participatory design activities.

019

Food Orbits: A Novel Design Tool for Complex Systems

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Food and our relationship with it is important to our very survival. To understand the different natures of various food systems it is critical to understand some of their general characteristics. We must know the components of the system and how they work together. Currently, there are several conceptual models of food systems available to facilitate the understanding of such: the linear, radial and loop models, none of which seem suitable for a design application. Natural food systems are complex adaptive systems that operate in a closed loop, with all inputs emanating from and all residuals returning to the source. However, rather than resembling these closed-loop ecosystems, modern food systems have much more in common with 19th century factories designed around a strong input/output efficiency model. Food Orbits is a novel graphical tool for plotting the relative industrial intensity of a food as it moves through the system from soil to dinner plate. This paper will introduce the concept of food orbits through a brief discussion of their context in the modern food system, their composition and construction, and an overview of a brief study done to assess their graphical intuitiveness. The focus of the paper will be the application of food orbits as a design tool and a device for understanding complex adaptive systems.

020

Poetics as a Strategy of Inquiry: Productive Science in Design Practice and Research

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For many years practicing artists and designers, as well as design researchers, have struggled to find useful models for their creative work. To understand this struggle, we will use a model that gives intellectual strength and direction to research and creative projects, offering an alternative to other approaches such as *Design Science*, *Dialectic* and *Rhetoric*. The strategy is called *Productive Science* or *Poetics*, and it is a way of focusing and understanding the struggle of a practicing artist or designer as he or she seeks to develop creative work. There are three central features of the strategy: the identification of the essential functional elements of design; the exploration of those elements with an appropriate degree of precision; and the *integration of those functional elements* in design and artistic practice. The exploration of the elements is the process of designing: phases of analysis and synthesis in concrete production, with reflection on the implications and principles that emerge in the course of creative work. The goal of this paper is to explore the potential and significance of *Productive Science* as a strategy of inquiry in design practice and design research. I will illustrate the importance of this strategy with a concrete example drawn from my own practice-based design research. The deepest hypothesis of my work was that *perception, meaning, and emotional expression work together in creating a unity or wholeness in the products of design and in the experience of the people supported by such products*. Exploring this hypothesis in the different stages of the analysis and synthesis is what this research was about.

021

Visual Creativity and the Threshold of Uncertainty in Product and Automotive Design

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An investigation into the development of visual and spatial creative capabilities in industrial design students is described. It focuses on establishing whether or not spatial intelligence represents a threshold concept in studying industrial design and evaluating whether or not visuo-spatial intelligence can be a measure of a student's cognitive ability to design. A four year longitudinal study highlighted a number of threshold concepts the most significant of which was the toleration of design uncertainty. A separate range of tests and studies covered spatial comprehension, drawing exercises, and pattern-solutioning capability, and they demonstrated that spatial capability represents a baseline requirement and is not a key threshold concept. Further reflection on the uncertainty threshold located it within the concepts of the designerly way of knowing, as a key ingredient in a 'conversation' between two modes of thought in a dual processing model. This was seen as key to facilitating the development of visual creativity in a holistic approach to Coventry University's design curriculum. A range of teaching interventions can be mapped onto this approach. This has informed the basis for an enhanced industrial design study programme which is being introduced.

022

Joinedupdesign for Academies: Enhancing Design Learning Through Complexity

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This paper reports on research undertaken on the Sorrell Foundation's *Joinedupdesign* for Academies programme, a pilot scheme with four universities in the United Kingdom (UK) aiming to inform the transition of 'failing' secondary (11-18) schools into academies (involving substantial re-designs and re-building). From the authors' university, 12 undergraduate Design students participated in *Joinedupdesign* for Academies, in partnership with two secondary schools in the Midlands region of England. Like other universities in the UK, it has well-established links with local schools and programmes of community engagement, corresponding with reported US experiences (Lerner & Simon, 1998). The Sorrell Foundation model is an example of university design departments working in multiple partnerships in order to align with government initiatives (such as the Labour policy *Building Schools for the Future* to rebuild or renew nearly every secondary school in England over a 20 year period). By embedding the pedagogy of live projects, there is potential to impact significantly on local regeneration.

The aim of the study was to investigate *Joinedupdesign* for Academies as a new model of off-campus learning. In order to do this, we explored: the impact on student learning for employability; the effectiveness of undergraduate learning with pupils as clients, and the challenge of working with multiple partners in a complex environment. In terms of Design education, this provided a rare and timely exposure to the complex demands of the kind of regenerative, publicly-funded work on a large scale which will be providing opportunities for designers in the UK over the next decade.

023

Design History Education and the Use of the Design Brief as an Interpretative Framework for Sustainable Practice

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Over the last several years, designers, researchers and educators have been increasingly concerned with what effect design has had, and could have, on the current condition of unsustainability. If design has had a significant part in materializing unsustainability, then we must try to change its disciplinary parameters and relationships. How can we teach design history in order to engage students in this critical work?

This paper will document an ongoing experiment in the teaching of design history to undergraduate students in visual communication in two colleges of art and design. The course asks students to interpret images from the broad history of design through the lens of a common form of a “reverse design brief,” modified to engage the student in the task of pondering designs’ future effects. It is hoped that this pedagogical tool will not only allow the student to internalize this strategic tool of design practice, but as well allow them to understand the present-day consequential effects of designing. I will attempt to judge the success of the modified brief, from the standpoint of the qualitative insights of students into the ongoing designing effects of historical design objects.

This pedagogy raises questions regarding the uses of design history, the relationship between historical study and practice, the understanding of contemporary and historical frameworks and the engagement of an historical and ecological imagination. Can the design history classroom become a locus for a critically engaged, experimentalist pedagogy that can be experienced by the future designer as an essential tool in developing a sustainable practice?

024

Everyday People: Enabling User Expertise in Socially Responsible Design

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This paper examines the contemporary relevance of interdisciplinary research practice specifically within the field of design for social need. Examining the complexity of current social problems using the concepts of Rittel & Webber’s *wicked problems*, this paper looks at the potential for the application of co-design methods within an interdisciplinary framework. By proposing the use of a social model of design, it is argued that it is through co-design methods and the use of generative toolkits such as Liz Sanders’ *MakeTools* and IDEO’s *Human-Centered Design Toolkit* that the design process can be enhanced in the early stages. This paper argues for interdisciplinary practice by enabling user expertise so that the user can equally contribute to the design process. This paper also explores the changing role of the designer from researcher to facilitator, and how this can benefit communities dealing with complex problems. Finally, this paper looks at the benefits of active user involvement in socially responsible design through discussions on empathy, user empowerment and benefits to communities within design education.

From Ontologies to Folksonomies. A Design-driven Approach from Complex Information to Bottom-up Knowledge

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This paper explores the social challenge posed by the complex environments in relation to know-ledge management in which contemporary society and all its activities are immersed. The main question addressed is how information design can contribute to the construction of hybrid, bottom-up and collective ontologies-in-progress and dialogue with the complexity of the practices around the construction of digital knowledge.

We argue that it is necessary for information design strategies to deepen its understanding of the semantic web and the new forms of creation of ontologies. This research seeks to broaden the an-alysis of the role of information design in this moment of change so that design can find a concrete space of agency in such a scenario.

Information design can develop an essential role in developing more suitable prostheses, more versatile instruments and simpler technologies. That is a great responsibility and a great oppor-tunity. A new design approach is required to dialog with the strategies of a web-based culture, as an example of a complex phaenomenon (Lewin, 1992), among which we can find hybrid, bottom-up and collective ontologies, built *in itinere* with the contribution of users that trace definitions, as-sociations and variations, in a kind of defective semantics, founded on co-tagging, mash-up and syndication.

Design has the possibility to establish a rhetorical of project in order to create a dialogue between the social and the technical tissues. This means not only to produce a toolkit to support new scen-arios with sustainable models, but also to suggest a vision of a different cultural apparatus, to offer a new way to online interaction, and new points of access to the knowledge.

Dynamique des ambiances lumineuses par relevés vidéo d'espaces de transition

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Natural light characterizes architecture in a complex manner, especially when considering its fluctuations and variations whenever we experience a transition or passage from a space to another. It also influences the comfort and the well-being of its occupants. This visual adaptation appears in a process that is translated into a spatio-temporal dynamics implying body movement from space to space. The literature review recognizes the lack of knowledge in the relation light-space-time. This research proposes to study this spatio-temporal relation existing between light and architectural space, to qualify an architectural *promenade*. It proposes to reconsider the design of transitional spaces by the spatio-temporal analysis of light, through *in situ* experimentation including filmic segments. The studied variables of this research take into account the qualitative and quantitative aspects of light such as luminance, time, contrast and brightness. It combines the use of a luminance-meter, a camcorder and the analysis of numerical images as a starting point for the assessment of spatio-temporal qualities of light. The resulting analysis, as well as the visualization of the dynamic experience of visual ambiances, will allow a classification of luminous transitional experiences. The architectural *promenade* is analyzed according to the diversity and relative intensity of luminous ambiances in relation to time, which allows the development of a descriptive analysis of visual perceptions through spatial transitions. This method of analysis and dynamic representation offers a potential to favour the design of spaces while encouraging and applying principles of luminous diversity in architecture.

Consumption Experience in Running: How Design Influences this Phenomenon

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The studies on consumption experience have gained force not only in the Marketing field but also in relation to the impact that design can have in the construction of those experiences. This paper discusses the role that Design can play in the construction of experiences perceived in road running activities. In order to do so, an exploratory study was conducted through the use of multiple techniques of data collection (in-depth interviews, desk research, and ethnographic essay). The results indicate that the experience generated by the running activity is strongly dependent on external agents, like sport consultancy services and competitions, being Design as an important factor to the promotion of sports practice and the constitution of consumption experience.

SCENARIO: The User Profiles Methods Applied to Product Design

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This paper presents SCENARIO (System of Speculative Conception of New Environments related to the Individual and the Object), developed in the Ph.D. thesis called "Design future-oriented, focused on the individual and trend analysis", (2005). SCENARIO is a project instrument created with the objective to help the designer to comprehend both the profile and the user necessities, so that the former is capable of designing more adequate objects to the contemporary context. The objective is also to create conditions that allow the verification and validation of the designer's project proposal through the use of metaphors built on trend analysis. The project is composed of three phases: Phase 1 - Identity; Phase 2 - Projections and simulations; Phase 3 - a possible history. Considering theory references from psychology and anthropology, it discusses methods of data collecting and treatment using phenomenological reduction techniques and participative living. The result can be applied to the conceiving of objects more adequate to the necessities of contemporary users.

This research is based on the assumption that the complexity presents today, after so many changes in all segments of society in recent years. Nowadays the user-individual must be considered the centre of the whole projetual process and Design must consider its vocation for innovation and for the future. The approach utilized in this paper considers the object in its scenario and the individual as a character in this story, to be told using multidisciplinary elements which have their origin in psychology, design, marketing, anthropology and sociology. The second assumption is that it will happen starting from the analysis of the social tendencies and the comprehension of the user/consumer's necessities. We believe that only from the understanding of the object's role in society and its participation in the construction of the individual's everyday life is possible to project new objects that will suit both necessities and expectations.

The theoretical framework is established from the summary tables, establishing relationships between areas of knowledge, the authors used and tool projetual proposal.

029

The Challenges of Information Transfer Between the Client Organization and the Temporary Multi-Organization (TMO)

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The mechanisms required for the transfer of both implicit and explicit information between the client organization and the temporary multi-organization are crucial in the programming process of construction projects. However, the identification and transfer of needs within the conception phase from the client (and eventually the users) towards the project team are rarely direct and easy. (Nadler et al., 1992) The evaluation of the project outcome (“as built”) against the initial project proposal, allows for a better understanding of both the project process and the influence of informal communications in translating client/user needs.

This research project, comprised of three phases, focuses on the specificities of the formal and informal channels of authority developed by project actors, particularly organizational units, internal teams, pressures groups, and project facilitators. It also studies their influence on the organizational structure and project performance (Baiden, Price, & Dainty, 2006), notably in relation with the transfer of design intentions and requirements through the project process. More precisely, we compare the intentions proposed – program specifics – in the early phase of the project – planning and design – against the final project outcome – the results.

Finally, the ensuing transformations made to the project, seen through their evolution in time, provides the basis for a model that identifies both the planned and structured linear process of decision making and the informal – and unanticipated – decisions made in response to unexpected changes on the project and/or its environment. Construction project organizational structures have been modeled and represented by a new set of typologies. These also represent the informal inter-organizational communication channels. Preliminary mapping of intra-organizational communications as well as representation of the dynamic internal structure behavior further provides and insight into the transfer processes of needs and knowledge between organizational units and project teams. It also relates their effects on the organization.

030

The Success of Designer-producers in Québec

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The author identified more than 120 designer owned manufacturing companies in Québec. He interviewed 50 designers who owned such companies, and obtained detailed information on more than 75 companies. He examined these companies for: area of activity, size, longevity and economic impact. The companies are highly concentrated in the area of lifestyle products and are of comparable size to other manufacturing companies, show similar revenue per employee and have similar economic impact. They are also much more successful than other Québec manufacturers as far as longevity is concerned. These designer-owned companies create more direct employment than do industrial design consulting firms in Québec. The author proposes several hypotheses for the business success of designer-producers.

031

Design, Democracy and Agonistic Pluralism

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In this paper, the author presents an alternative approach to 'design for democracy,' drawing on the notion of agonistic pluralism. Specifically, the author highlights the differences between politics and the political within agonistic pluralism, and employing examples of contemporary design projects, discusses how these differences can be seen in the objects and practices of design. Through this critical examination, the author contributes a new perspective to the discourses of 'design for democracy' and expands the possibilities for democratic action and critique available to both practicing designers and design scholars.

032

An Exploratory Study of Scientists' Perceptions of Design and Designers

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As part of a wider empirical study in to the potential role of industrial design in scientific research, a series of semi-structured interviews were conducted with scientists to understand how their perceptions of design and designers might influence collaboration.

This paper reports that scientists without prior experience of working with designers may be unclear as to their skills and areas of expertise, and may subsequently be missing out on collaborative opportunities.

Scientists perceive a greater possible impact on applied research through engagement of professional design skills. It was revealed that design interventions could be suitable for many scientists as their range of research activities is likely to include both basic and applied research. Opportunities were identified for designers to play a role in scientific research, especially with issues relating to communication.

033

Developing a Framework for Mapping Sustainable Design Activities

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The notion of sustainable design has become increasingly prominent within the design community. As a result, numerous design theories, strategies and tools are available to designers. Yet, limited attempts in the field evaluate these activities by placing them in relation to each other or within the broader context of sustainable development. Based on a literature review this study develops an integrated framework which connects the areas of sustainable development and sustainable design. This framework may be utilised in two ways: firstly, to visualise the interdependencies of sustainable design and sustainable development; secondly, as an assessment tool to measure and compare the potential of sustainable design activities.

034

Understanding the Practical Challenges of Moving from Closed to Open Source Collaborative Design

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This inquiry examines how effective collaborative user experiences can be shaped in open source communities. It focuses on the changing design and development conditions of the prototype computer software application LabanAssist (Ebenreuter, 2008). By changing the project's environment and activity of development, it is envisaged that a range of experts will have the potential to participate in the ongoing advancement of LabanAssist. The challenge, here, rests in designing a way in which an integrated view of the design situation and the associated activities required to continue the open development of the LabanAssist project, can be shared and communicated effectively across different design domains.

In this paper, literature concerning the nature of collaborative activities in open online communities is examined. This is done to better understand the challenges of communicating interdisciplinary ways of working and thinking that contribute to the holistic development of open design projects. To address these challenges, a number of interaction design guidelines for facilitating collaborative action are offered as a means to maintain the purpose and activity of open design projects.

The proposed guidelines offer a way of thinking about the manner in which interactive tools can be designed to assist with the identification of design elements in open design projects and to be able to visualise the relationships between various collaborators from different areas of expertise. An open design environment that has the potential to support collaborative action is shown through various interface designs of a conceptual tool that illustrates how a shared view of the form and significance of evolving ideas may be communicated over time.

Taylorisme, Fordisme et Toyotisme: comment le design management a construit les principaux modèles productifs de la théorie des organisations

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Ancrée dans les sciences du management et la théorie des organisations, cette recherche établit un lien entre la recherche en design et les sciences du management. Elle vise à définir, en une perspective inscrite dans la complexité, les fondamentaux de la construction du territoire du design en théorie des organisations. Il s'avère de ce fait que le design est loin de ne constituer qu'un « outil négligé » sous forme d'appendice au service du marketing. Plus que cela, le design structure le champ de la théorie des organisations en étant présent au cœur des trois principaux modèles organisationnels, à l'origine du puissant impact transformationnel de l'économie et que sont le taylorisme, le fordisme et le toyotisme. Une exploration du design située au cœur des principaux modèles productifs montre à travers le récit de F.W. Taylor, de H. Ford et de T. Ohno que le design occupe un rôle stratégique majeur dans le développement, l'essor de ces modèles et l'impact transformationnel qu'ils ont eu sur l'économie. Et que loin d'être circonscrit au produit, le design s'inscrit dans une démarche totale qui va de l'atelier de production à l'outil de travail en passant par le service. A partir de là, il faut considérer différemment le design en management et en théorie des organisations.

Ultra Low Carbon Vehicles: New Parameters for Automotive Design

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As the influence of vehicle emissions on our environment has become better understood, the UK government has recently placed urgent emphasis on the implementation of low carbon technologies in the automotive industry through: the UK Low Carbon Industrial Strategy. The overall objective is to offer big incentives to consumers and support for the development of infrastructure and engineering solutions. This scheme however does not consider how the development of functional and experiential user value might drive consumer demand, contributing to the adoption of low carbon vehicles (LCVs) in the mass market.

With the emergence of the North East of England as the UK's first specialised region for the development of ultra-low carbon vehicles (ULCVs), ONE North East, as a development agency for the region's economic and business development, and Northumbria University Ideas-lab have supported a project to facilitate innovation through the collaboration of technology, research and business. The High Value Low Carbon (HVLC) project aims to envisage new user value made possible by the integration of low carbon vehicle platforms with new process and network technologies. The HVLC consortium represents vehicle manufacturers and their suppliers as well as technology based companies and through an ongoing process of design concept generation the project offers a hub for innovation led enterprise.

Whilst new technological developments in areas such as power generation, nano materials, hydrogen fuel cells, printed electronics and networked communications will all impact on future automotive design, the mass adoption of low carbon technologies represents a paradigm shift for the motorist. This paper aims to describe how the mapping of new parameters will lead to new transport scenarios that will create the space for new collaborative research on user experiences supported by innovative technologies and related services.

Value Innovation Modelling: Design Thinking as a Tool for Business Analysis and Strategy

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This paper explores the use of multiple perspective problem framing (English 2008) as a tool to reveal hidden value and commercial opportunity for business.

Creative thinking involves the interrelationship of parameters held open and fluid within the cognitive span of the creative mind. The recognition of new associations can create new value that can lead to innovation in designed products, intellectual property and business strategy.

The 'Ideas-lab' process is based on the proposition that a company's capacity for innovation is dependent on the way the business is able to see its problems and opportunities. In this process the attributes of a company and the experience of the researchers are considered as the parameters of a design problem. It is therefore important to acknowledge the commercial experience of the project researchers, all of whom have a proven track record in helping businesses develop, exploit and protect their know how.

Semi structured interviews were carried out with key individuals in 34 companies. The resulting data was assessed on a company-by-company basis through a process of multiple perspective problem framing, enabling key nodes, patterns and relationships to be identified and explored. A 'Cornerstones of Innovation' report was prepared to inform each company of the observations made by the researchers.

The paper describes the methods adopted and summarises the feedback from participating companies. Case studies are highlighted to demonstrate ways in which the process influenced the actions of particular businesses, and the commercial outcomes that resulted. Finally the researchers reflect on the structure of the Ideas-lab process.

Looking to the Future; A Response to the Challenges of Design Education in the 21st Century Using C&IT

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In response to increasing student numbers in practice based subjects, an ongoing project to develop online learning support materials for a BA (Hons) Fashion Design programme is exploring ways in which video based resources, in conjunction with virtual learning environments, can support practical demonstrations. Intended as complimentary learning support materials, rather than replacing face to face demonstrations in taught sessions, this project investigates the ways in which students respond to the learning materials, and preferences they show for the different methods of learning used within a practice based setting.

039

Influential Elements of Creativity in Art, Architecture, and Design Creative Processes: A Grounded Theory Analysis

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Creativity in art, architecture, and design was investigated in this analytical study through the qualitative research methodology of grounded theory. A data set comprising published interviews with eighteen eminent creative artists, architects, designers, and leaders of creative organizations was analyzed to generate an initial grounded theory model for the creative process phenomenon of generating creative insights. Five influential elements to the creative process were identified from the analysis: sources of creativity that yield creative insights; strategies that instigate creativity; influential factors that drive creativity; individual and collaborative modes of working; and characteristic qualities of creative results. The analysis presented is part of doctoral research in progress in its early phase.

040

Epistemological Positions Informing Theories of Design Research: Implications for the Design Discipline and Design Practice

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Design research is not simply concerned with speculations regarding the relationship of theory and practice. Design research also brings out significant questions regarding the nature of research and the position of the doctorate in university education. This paper presents analyses of examples of objectivist, constructionist, and subjectivist theories of design research. The assumptions that underpin their perspectives are outlined, their powers of generalisation considered. The implications for the position of the design discipline in relation to the greater academic community, and the characterisations of design practice that they contain, are drawn out. The paper concludes by considering the pedagogical implications of the role of disciplines in the knowledge building cycle between research and professional practice.

041

Innovation Methods in Story-Driven Games: Genre Variation

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The paper proposes a method for game design innovation in story-driven games, as exemplified by the development of the adventure game prototype *Rosemary*. This method selects a game model in which a specific variation is introduced. Developing a game where the interface, interaction design, rules, goals, and themes are all new can be overwhelming for the user as well as the developers, so using a pre-existing model can ground the development and help evaluate the success of the innovation introduced.

The design method proposed is called Genre Variation. This methodology relies on a particular story-driven game model as the foundation to introduce new mechanics. After selecting the model, the next step is identifying a design problem that has not been tackled before. Then the variation is implemented as a game prototype and evaluated, following the principles of iterative design. In this case study, the problem was designing the mechanics of memory, and how to turn remembering into a core mechanic of the game. This method is intended at facilitating game development within the limited resources of academia.

042

Reading the Tea Leaves: Patterns of Theorisation about Design Research

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Heterogeneity is regarded as an inherent and significant feature of the emergent and complex field of Design. This pluralism is recognised as an important factor underpinning design's increasingly significant role and position as an 'inter'discipline which is both integrative and an interface and has the potential to bridge traditional divisions such as the 'natural' orientation of sciences and the 'social' orientation of the humanities through a 'third culture' concerned with the 'artificial' (Jonas, 2000). It is also recognised as contributing to the increasing articulation and vibrancy of design discourse. However there is a critical need for greater relational understanding between different theoretical positions and research practices. This paper discusses ongoing research into the development of relational models based on an analysis and interpretation of different design research theories and reflections on how such hermeneutical models might inform the design of information resources about design research methodology.

There is a recognition in the approach taken to this analysis and modelling, that the pre-understandings of an author, of an analyst, reader or researcher, will affect the construction and the understanding of theories. A person using an information resource will approach it through his or her existing knowledge frameworks and historical understandings. This perspective, informed by information hermeneutics, recognises limitations in traditional computational approaches towards the construction of formal information structures as well as the need for greater relational understanding across the diverse concerns of the field.

043

The Complex Field of Research: for Design, through Design, and about Design

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The concept of design research is evolving through the literature, on-line discussions, and conferences. They revolve around defining what research is and where it belongs in design education and practice. This paper provides a framework for understanding the approaches to design research that builds upon existing overviews of the field provided by Bruce Archer, Richard Buchanan, Nigel Cross, Christopher Frayling, and Ken Friedman, among others. It begins with a brief history of design research to provide a foundation for understanding that research has been an integral part of the field of design since the early twentieth century. It then discusses the difference between clinical, applied, and basic research, providing an overview of the variety of approaches in each area. It is intended to serve as a guide to the discussion and provide a map of the literature. It is not intended as a detailed description or evaluation of the approaches or to serve as a vehicle for learning the methods, techniques, or theories of design research.

044

Caractérisation des activités collectives réunissant designers et chercheurs

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En février 2008 s'est tenue au MoMA de New York l'exposition *Design and the Elastic Mind*. Par la présentation d'un peu plus de 200 projets, l'événement culturel voulait mettre en avant "un des rôles les plus fondamentaux du design : la traduction des révolutions scientifiques et technologiques au travers d'objets accessibles changeant la vie des gens".

Bien que les activités respectives du designer et du scientifique (chercheur et ingénieur) soient différentes, l'exposition montrait la plus grande proximité qu'entretiennent désormais les milieux du design et de la science. Que ce soit par la portée des propositions, des connaissances mobilisées ou des connaissances nouvelles que les projets en question ont apportées, le design investi par les dernières avancées scientifiques semble apporter des perspectives nouvelles aux deux disciplines concernées. Mais quand est-il des pratiques respectives, celles du designer et du chercheur ? Dans cet article, nous proposons d'explorer cette question par l'analyse d'une série d'entretiens semi directifs. Ces rencontres se sont étalées entre juillet et septembre 2009 et ont concerné 7 designers et 7 chercheurs ayant travaillé ensemble.

045

Converting the Participants' Verbal Expressions into Design Factors

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The designers usually apply various qualitative and quantitative techniques in investigating users' desires. Once such techniques are applied, they deal with the difficulties of making the outcome data comprehensible enough to be used in the subsequent steps.

This paper presents some encountered complexities of a pilot survey titled "Designing and Implementing an Artificial Design Tool Based on Improved Kansei Engineering", in an effort to describe the borderline between quantitative and qualitative methods and their transformation point, and a practical solution suggested as co-qual-quant model.

Through conducted case study, we have used qualitative methods on the human side (e.g. PPP and Mood Board) and quantitative techniques (e.g. AHP) on the other side and inferred some co-qual-quant model-based parameters to be further injected to the design machine.

046

Synergizing Positivistic and Aesthetic Approaches to Improve the Development of Interactive, Visual Systems Design

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An extensive literature review undertaken at the outset of this endeavor revealed that the current status of interactive visual systems development, implementation and sustenance has evolved from theory and research that is neither especially pluralistic nor synergistic.

There exist two distinct systems design approaches: 1. the largely positivistic and functionally guided approaches derived from the realm of information technology (IT), and 2. the incorporation of the more qualitatively based, aesthetically and experientially guided approaches derived from the realm of dynamic interaction design.

The authors hypothesized that this paradigmatic schism required a new approach that could bridge fundamental gaps in knowledge and understanding between visual interaction designers and IT professionals. They further hypothesized that achieving this goal would enhance the usability and usefulness of many types of interactive visual systems.

The authors created a theoretical, pluralistic process model comprised of aesthetic and positivist design characteristics of interactive visual systems. The model consisted of a process framework and a typology of design characteristics that depicted how aesthetic and positivist design characteristics affect each other. They then tested the hypothesis that diverse individuals perceive design characteristics in interface construction across paradigms by conducting a small-scale visual experiment on 105 participants. This hypothesis was formed by combining an aesthetic visual design approach with a functional, systems-based approach.

This experiment strongly confirmed the hypothesis; it affirmed the efficacy of using this type of pluralistic research typology and framework to better inform designers and IT researchers and practitioners who are challenged to design dynamic, interactive visual systems.

047

Design Fiction: A Method Toolbox for Design Research in a Complex World

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Current debates on design research, and its relation to other research fields and scientific disciplines, refer back to a fundamental distinction introduced by Herb Simon (Simon, 1996 (1981)): Design and design research do not primarily focus on explaining the world as it is; they share with engineering a fundamental interest in focusing on the world as it could be. In parallel, we observe a growing interest in the science studies to interpret scientific research as a constructive and creative practice (Knorr Cetina, 1999; 2002), organized as experimental systems (Rheinberger, 2001). Design fiction is a new approach, which integrates these two perspectives, in order to develop a method toolbox for design research for a complex world (Blecker, 2009; Wiedmer & Caviezel, 2009; Grand 2010).

048

Visual Means for Collaboration Across Disciplines

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The complexity of today's design problems—the global economy, rate of change in new technologies, the challenges of sustainability development—requires diverse design teams, comprised of multiple disciplines as well as multiple cultures, to look at broader and different perspectives and larger scopes of investigation. Due to the multilayered and multifaceted interactions between team members, effective communication and collaboration among people in multidisciplinary design teams becomes critical to ensure a project's success, in particular, and for innovation, in general. Research shows that one of the most important aspects of collaboration is effective information sharing—shared knowledge and shared understanding among all team members (Citera, et. al., 1995). Design teams traditionally share information verbally as well as visually through representations such as drawings and sketches, three-dimensional models, project walls, or conceptual maps. Consequently, an important aspect of communication is the role that visual thinking and visual communication practices play in the success of the design team. The exploration and finding of a current frame of reference for creating and utilizing visual tools for communication, capable of serving as a common means of expression for multidisciplinary teams, is the purpose of this research paper. To that end, individual field focused interviews were performed with distinct groups of stakeholders from the business, design and engineering professions. The interview included visual participatory research methods that prompted visual responses and reflected the interviewee's own use of visual methods for communication. In every case, visual means proved to be valuable thinking and communication assets. Two specific dimensions of communication that allowed team members to define, generate, and communicate innovation opportunities—storytelling and representation—were identified. The research findings and interpretations also generated conclusions and future opportunities for the design manager, for the instructors of design, and for the design, engineering and business professionals.

Experiential, Embedded, Electronic - Integrating Academic Skills into The Art and Design Curriculum

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The objective of this paper is to reflect on the possibilities experiential learning offers to the fuller integration of study skills into the undergraduate design curriculum.

Undergraduate design courses are experiential at their core. Students are actively engaged in their own learning, constructing it for themselves (often literally). However, this practice needs to be complemented by the ability to critically reflect on these experiences, a knowledge and understanding of its context in the field, as well as the aptitude to communicate these insights. This is where contextual studies and study skills come in.

By taking the natural approach of practical design teaching, could a model be developed that allows students to experience the building up of academic study skills in a similar way to how they engage with practical design skills?

Two main hypotheses were made: firstly that the learning needed to be experiential and secondly that the study skills teaching needed to be embedded as much as possible into the rest of the curriculum. These were complemented by the aim to test whether at least some of this could be achieved by the integration of electronic means.

During a case study at Staffordshire University a module has been developed that takes the students step-by-step through some basic processes of researching, culminating in an essay that conforms to academic conventions. Links to the different awards the students are studying are made at every opportunity, embedding the academic research into, and thereby developing, their reflective practice. In order to allow further student interaction a private wiki has been set up, where students can not only practice and test their skills, but also share their research.

The testing of this model is very much a work in progress and while feedback has been positive, it also has identified a number of issues that need to be developed further.

Is Model-Making Sketching in Design?

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Considerable research has been done by various scholars to assess the significance of sketching in the early stages of the design process. However, sketching in design studies usually corresponds to drawing and the extensive research on the cognitive aspects of sketching does not always include three-dimensional sketching through physical and digital models produced in the early phases of design process. The aim of the presented research is to question whether model-making in the design process and design cognition is a form of sketching. Departing from key research on sketching which articulates its uncertain nature as a positive drive in early design phases, this paper looks at whether physical and digital models can also be counted among ambiguous design tools. The inquiry is conducted with three graduate students of architecture having similar degrees of professional experience and skills of making physical and digital models. The participants are given three architectural design tasks which are similar in terms of contextual, functional and programmatic complexity and scale and are asked to solve the given design problems by using three different mediums: free-hand sketches, physical models, and digital models. The design sessions are recorded using cam-corders and the participants are asked to think-aloud during the design protocols. The Linkography method is used for the analyses of the protocol studies and linkographs are developed for each design session. Departing from the assumption that ambiguity of a medium is positively related with the amount of lateral transformations realized during a design session, the outcomes of the linkographs are compared in terms of the transformations generated. We conclude that having too many lateral transformations is not always an indication of ambiguity.

Human Photographs on Trust in Bank Websites

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On the Internet, trustworthiness is an issue and becomes more important as financial transactions continue to grow. According to our analysis of the top 20 largest US banks, fifty-five percent of the banks' homepages used human photograph(s). The purpose of this study is to examine how image choices of a male, a female, a family, a small group of people in an office, or a diverse group of people in photographs on a bank homepage will have the most positive effect on customers' perceptions of trustworthiness with regard to the website. For the research method, five mock-ups of a bank homepage were created with carefully modified and selected photographs from each image group. Then a web-based survey was conducted. The result, as determined by this study, reveals distinctions among ethnic groups. Asian participants tended to trust homepages using photographs of families the most and Caucasian participants tended to trust homepages using photographs of a small group the most.

Seeding Social Technologies: Strategies for Embedding Design in Use

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This paper reflects on the changing nature of participation and design in the context of social technologies and, in particular, our evolving understanding of what it means to do design. When designing social technologies we are effectively creating containers or scaffolds; their shape is formed through participation and user driven contributions and that shape changes over time. In designing successful social platforms around which communities grow, evolve and share, our role as designers extends beyond researching, defining, creating and releasing a product. The facilitation of participation by the 'future community' also becomes a central concern.

In this paper we present, explore and reflect upon the notion of seeding as a useful concept for approaching the facilitation of participation in social technologies. Seeding is concerned with the process of embedding and connecting design within the real world. It draws our attention to the work that needs to be done for design to become part of people's everyday lives, and our role as designers in creating conditions under which this is likely to occur. The theoretical reflections and arguments presented in the paper are based on empirical research into the impact of social technologies on exploratory design research methods used in the early stages of a design project. We present potential strategies for seeding early in the design process that emerged from our research and reflect on the questions about participation, protocol and practice that they raise.

Understanding Senior Design Students' Product Conceptual Design Activities: A Comparison Between Industrial and Engineering Design Students

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This paper reports an experimental study with a purpose to investigate and compare the design thinking processes between final-year industrial design (ID) and mechanical engineering design (ME) students. Two types of conceptual design activities were observed and analyzed. One was to solve a realistic problem for the current market and the other was to generate “blue-sky” visionary concepts for the future. A qualitative method, derived from design protocol analysis, was proposed to explore the structure of observed design processes. The preliminary result demonstrated the disciplinary difference, between ID and ME students, on formulating and approaching design problems. In contrast with the previous perception that ID process is more solution-led while that of ME is more analysis-oriented, ID students were observed to spend much more time on systematically analyzing target-users and possible contexts of usage, in order to establish new design goals and requirements with regards to the above analyses. Whereas ME students were more dedicated in solving the problems identified from the given design brief and conducted little analytic work before concept development.

Design Education as a Practice of Affiliation: Facilitating Dialogue Between Developed and Developing Nations

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Exploring Design research and Design education that straddles developing and developed world contexts is the aim of this paper. It is a bold ambition to identify the key debates that inform these two significant aspects of Design – much too big to cover in the limited space here. Nevertheless we speculate on some of the issues that emerge from within Architecture, Urbanism, Philosophy, Sociology, Geography, Education and Design. We do this through the idea expressed by Lang that ‘affiliation’ is the need that links to all other human needs. We hypothesize that affiliation, and our need for belonging not only within our local communities, but also at a global scale, is a central concern that links research and education in developing and developed world contexts. Some design practitioners are shown to be tackling this problem, but too often these are single projects limited in scale. We maintain that these worthwhile and noble efforts must be scaled up to deal with problems of urban planning through first, second, third and fourth order design concerns, recognizing that whilst contemporary design is increasingly occupied with ‘interaction’ and ‘environment’, the established preoccupation with ‘symbols’ and ‘things’ remains out of reach for millions of urban poor. In fact, urban designers consider ‘symbols of affiliation’ as central to city dwelling. Design research and design education must therefore aspire to a material democracy that judges the appropriateness of each given situation on its merits, recognizing the need at times for basic material provision.

055

Embodiment, Immediacy and Thinghood in the Design of Human-Computer Interaction

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This paper is concerned with the design of Human-Computer Interaction (HCI). It criticizes the position that proposes 'Embodied Interaction' to be the underlying principle of the transition from textual, to graphical, to tangible interfaces.

Firstly, it is hypothesized that it is not the level of embodiment that has increased, but the level of immediacy. It is furthermore proposed that the concept of thinghood, as described in the works of Heidegger, is a fruitful starting point for the design of human-computer interfaces.

In the second part of this paper, the recent history of HCI practice is reviewed, with regard for its involvement of embodiment, immediacy and thinghood. It is then argued that embodiment has always been there unchangedly, while immediacy and thinghood have changed - not only in degree, but also in kind.

In the third part, three projects are reported. Each of the projects researches, through design, the physical display of digital entities. The projects do so by picking up Heidegger's characteristics of thinghood: extendedness, substantiality, and proximity.

It is concluded that making digital entities physically graspable can help us to make the immaterial accessible and, in doing so, ready-to-hand.

056

The Inclusive Incapability-Culture-Economy Cube: A Design Framework for Complex Barriers

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Inclusive design is an evolving and complex concept, the definition of which can be extended to address not only age and disability, but also race, income, education, and culture. As most of products are originally designed in developed countries, conventional elder-care products present serious difficulties and exclude users with different cultural customs and lower economic status. There is an urgent need for a design framework, based on an expansive understanding of not only age and disability, but also income, education and culturally related barriers, which will lead to a minimizing of the impact of these differences and thereby extend the effectiveness of "inclusive design". Through case studies of Thai elder care product development, this paper aims to explore the inclusive design approaches that are suitable for all ranges of users with different capability, culture and purchasing power. Techniques for this research, in the first phase, include contextual interview and observation as well as self-documentary of 50 pairs of Thai elderly and their caregivers. The subjects were selectively chosen based on age, gender, length of dependency, the relationship to each other, functional dependency in ADL, living conditions, and equipment used for elder care. These enable us to identify the details of inclusive design barriers and to develop population profiles based on three expanded design dimensions for greater inclusion: individual incapability, cultural specificity and economic limitation. In the second phase, the relationships between design approaches and included user groups were analyzed through 150 design case studies of Thai eldercare product development. The findings enable the development of the "Incapability-Cultural -Economic Cube" (I.C.E Cube), an active inclusive design framework for all ranges of users with different capability, culture and purchasing power. The model is illustrated in this paper by a range of product examples from Thai elder-care case studies.

Far Beyond Dualisms in Methodology - An Integrative Design Research Medium “MAPS”

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Design research is an academic issue and increasingly a success factor for industrial, organizational and social innovation. Efficient methodical support is crucial. The fierce rejection of 1st generation design methods in the early 1970s resulted in the postmodernist attitude of “no methods”, and subsequently in the strong adoption of scientific ways of thinking for design research. The situation regarding methodology has been characterized by unproductive dualisms such as scientific vs. designerly methods, normative vs. descriptive methods, research vs. design. The potential of the early (1st generation) methods is neglected and the practical usefulness of design research is impeded. The suggestion for 2nd generation methods, conceived as discursive instruments, as discussed by Rittel and others has hardly been taken up in design. The development of MAPS is aimed at the support of practice-oriented design, innovation and research processes. The long-term aim is the development of an *integrated knowledge and communication platform for research through design*. MAPS is based upon the idea of a productive reconciliation of the strong dualisms between “scientific” and “designerly” modes of inquiry and supports the emerging concept of *design thinking*. The paper reports on the ongoing research and development process from MAPS1.0 towards MAPS2.0 and beyond.

In Touch with Representation: Iconic, Indexical and Symbolic Signification in Tangible User Interfaces

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In this paper, we discuss the value of semiotics to inquire tangible user interfaces (TUI) in human- computer interaction (HCI). Drawing on Peirce’s three types of representation – icon, index, and symbol (Peirce, Houser, & Kloesel, 1998) – we analyze signification processes in the design of tangible UIs. As a case study, we draw on several prototypical interfaces and analyze their semiotic structure. We focus specifically on three different significations for a similar application on a mobile phone: Displaying a new event on a mobile phone (e.g. an unread text message or a missed incoming call). The aim is to establish a basis in semiotics for TUIs that can inform the mapping between physical and virtual parameters. Taking semiotics as basis can help to enhance interface design as the interface ‘specifies the optimal set of signs for the interaction between two entities’ (Nadin, 1988, p. 273).

Rethinking System Diagrams: from Arranging Components to Organizing Action, Thought, and Possibility

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The use of system diagrams has encouraged information designers to tacitly consider the holistic context. However, because the traditional understanding about the nature of systems has been highly focused on the arrangement of components within a static model, users' experience is considered little. The goal of this research is to provide a theoretical framework to broaden designers' conception of the system diagram and enable them to design system diagrams that would prove most effective for different situations, needs, and design problems. Therefore, the key of system diagrams is to understand the relationship of how the system is organized, according to the intent of the designer, the purpose of the user action, and the function of the group. In order to further investigate this notion of a system diagram, we present four kinds of system diagrams where relationships emerge, depending on the following organizing principles: 1) law that holds together individual components, 2) rule that guides decision making, 3) function that supports users' action possibility, 4) condition that facilitates participation in cultural ideals. In addition, we examine numerous system diagrams that have been created in the Domestic Mail Manual Transformation Project by the Carnegie Mellon School of Design and the United States Postal Service. This is a design case study that not only illustrates the role of system diagrams throughout the design process but also identifies four cases of system diagrams according to different goals: structure diagram, pathway diagram, affordance diagram, and vision diagram.

Conceptualizations of the Materiality of Digital Artifacts and their Implications for Sustainable Interaction Design

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In this essay, we report on our survey of the design and HCI literature and other sources we have conducted in order to create an inventory of notions of digital materials past, present and future. We provide some thoughtful speculations and implications for design of digital artifacts with focus on emerging materials based on this survey. Our inventory includes state-of-art technologies and art and design projects covering the topics of organic user interfaces, smart materials, transitive materials, and so forth, as well as theoretical perspectives on materials in interaction design (Bleviss, 2007; Löwgren and Stolterman, 2004). We construct design implications to include specific application scenarios of new material and interface technologies based on speculations for each theme of material perception that we uncover in our survey. These include (i) reducing the use of disposable materials—*how to reduce material consumption as personal lifestyles*, (ii) creating mechanisms of innovative, appropriate interaction—*how to reduce energy consumption by means of the use of digital artifacts constructed with new display technologies*, (iii) fostering ownership of sharable resources—*how to promote the feeling of ownership or security in sharing public resources*, (iv) updating things through the use of new materials—*how to renew old objects by adding new technologies instead of replacing them with new ones*, and (v) using materiality for engagement and expression—*how to promote peoples' attachment to artifacts by means of preserving sentiments and histories in the qualities of materials as a critical motivation for sustainable behaviour*. We provide specific examples that reflect on how such themes can foster sustainable design practice with new material and interface technologies by expanding the perception and understanding of the materiality of digital artifacts.

Motion Design for Nonverbal Communication with a Humanoid Robot

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In the near future, humanoid robots will act as the partners of human beings in daily life. Among numerous human-like competencies, motion of humanoid robots is critical for providing humans with richer interactions with such robots. Motion plays an essential role in complementing spoken communication. Moreover, the motions of humanoid robots generate nonverbal communication in various contexts. Through this nonverbal communication, humans can interact with robots not only directly but also indirectly or even unconsciously, as if the robot were simply part of the environment.

Before the developments of humanoid robots, embodied conversational agents (ECAs) were introduced as virtual embodied representations of humans that communicated multi-modally with humans and there has been a great deal of research on ECA behavior. ECAs and humanoid robots share many features in terms of how they communicate with humans. Nevertheless, simply adapting knowledge gathered from current ECA studies to a humanoid robot study is insufficient for the following reasons: 1. ECA studies lack knowledge focused on nonverbal communication, which has become more important in the physical world; 2. ECA studies have focused on developing agent-centered intelligence rather than a user-centered experience; 3. ECA studies have developed logics to generate motions automatically rather than to provide designers with the practical knowledge necessary to design desirable motions.

Motivated by these three arguments, we seek to pioneer a new field of motion design between robot engineering and design discipline. To bring this motion study into design discipline, we focused on human-centered experience through nonverbal communication with a humanoid robot. This paper aims to outline sharable user experience in order to help designer create desirable motions for humanoid robots in various speechless contexts.

Design Naturally, Dealing with Complexity of Forms in Nature & Applying it in Product Design

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The aesthetic NORMs have formed some presupposes in designers' **minds** which don't let their eyes see the reality of forms in NATURE before their abstracting mind see. They usually reduce complex forms to their basic geometries and proportions, in order to find orders in their complexity and to harmonize them with their design paradigms. We believe that this common vision to the nature, deprive us from perceiving its reality. This paper proposes a new vision to the nature and thereby present nature's approach to the form issue, and some of its manifestations. These findings which are presented under the title of DESIGN NATURALLY would guide designers, one step closer to the complex reality of forms in nature to get inspired by. Our point here is that this approach takes us far beyond the law-bound principles of the geometry and traditional design aesthetics and would create a new aesthetic language to the world of products based on the real complex world.

Catching Wasps and Baking Dinosaurs: Experiences from Co-designing with Children

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User-centred product development and design can be carried out with differing degrees of user participation: for users, with users, and by users. A project characterized by a co-design approach, i.e. design ‘with’ rather than ‘for’ or ‘by’ users, was carried out during the spring of 2009. The co-design teams consisted of children (a total of 45, between 10 and 11 years old) and 10 product developers/designers (teachers and students from an industrial design engineering university programme). The overall theme for the co-design exercise was food, eating and health, a theme which the children had researched as co-researchers during the autumn of 2008. The design project followed a structured design process, including problem identification, idea generation, concept development, etc., supported by typical methods and tools such as various brainstorming techniques, formulation of evaluation criteria and concept screening. Working in teams of 3-4 children and one developer/designer, various problems were identified and solutions proposed. The problems included for example “healthy sweets”, “keeping wasps away from the lemonade glass”, and “how to make washing up more fun”. The results from the process consisted of for example a healthy sweets advertising campaign, several “wasp traps”, and a new type of dishwasher based on the principle of a record player. However, the results also encompassed experiences from co-designing with users. Some of these experiences were considered the consequence of the fact that the children were indeed children, and are thus considered relevant only for other projects involving children as co-designers. Maintaining focus and concentration, for example, was a key issue. Other experiences are considered more generic, i.e. issues which would emerge as important topics in any co-design process. Communicating an understanding of the product development process and the time required for the solution to develop from idea to prototype were regarded as such generic topics.

Knowledge Transfer from Designers to Home Crafts Makers: Negotiating Methods to Study Actions in Context

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This paper discusses the methodological problems arising in a dissertation research project to investigate potentially productive relationships between professional designers and home based craft makers who have not received formal design training.

Informal observations by the researcher and other designers indicate that, when individuals from these two groups work together, in either professional or social settings, the craft makers’ practices may develop in productive ways. We have observed that this can occur and be beneficial in traditional home craft work in Turkey (the main field of the research), post-industrial craft practice in Britain and small-scale industry in both countries.

In this research, the designer-researcher is a participant observer dealing with non-verbal communication and the exchange of tacit knowledge stemmed from interpersonal relationships with the participants.

Since the knowledge transmitted or engendered in this research is tacit, it cannot be accessed purely by language-based methods although these can provide valuable triangulation. The elicitation of the tacit knowledge transmission was the most important methodological question that we faced. That is why we reviewed methods for reflecting on the actions to elicit tacit knowledge transfer by exploring the features of the methods that allow a managed programme of engagement between designers and home craft makers.

The questions we have explored include an evaluation of Action Research and Participant Observation, observational video for capturing spontaneous actions and the ways learning theories might help us to identify and characterise the ‘silent’ tacit knowledge that is exchanged.

065

Ontological Design Ways of Sustainable Intervention: A Conceptual Framework

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What is meant by the ontological way of sustainable intervention between technology and humans, and how can it be studied? This paper seeks to assist designers to structure their ontological reflection for sustainable intervention by discovering coherency in technological transformation. Grounded in the notion of ontological designing, this paper proposes a conceptual framework for sustainable interaction design. This framework imposes requirements on function, on behavior, and on meta-conjunction to reflect on and plan what a digital artifact is for; what the artifact performs; and what the artifact synthesizes. Four functional dimensions are highlighted: *Balancing* (B), *Prevention* (Pv), *Persuasion* (Ps), and *self-Motivation* (M). In each of the dimensions, the behaviors of digital artifacts are articulated as key design activities. Finally this paper attempts to justify the meta-conjunction process, which is established in each example of digital artifacts. Therefore, the results of these analyses show how ontological designs are shaped in a set of conceptual boundaries.

066

Speculative Visualization: A New Rhetoric for Communicating Public Concerns

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Speculative design is an emerging rhetorical strategy in design practices and research to raise public awareness in social agendas that have been little explored. As a stream of this type of research, we propose *speculative visualization* that aims to achieve speculative design by utilizing techniques from data visualization and graphic design. Specifically, speculative visualization represents socially and politically meaningful data in aesthetic ways to provoke viewers' interpretation and further elicit discussions. In this paper, we report the diverse approaches of speculative visualization by demonstrating three exemplary studies and identifying their visual rhetoric. Based on the argument, we discuss research opportunities that speculative visualization can broaden its design sphere: the aesthetic adaptation of data visualization techniques, the methodologies of assessment, and the public's engagement in design activities.

067

Sensemaking and Framing: A Theoretical Reflection on Perspective in Design Synthesis

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Sensemaking is a constant process of acquisition, reflection, and action. It is an action oriented cycle that people continually and fairly automatically go through in order to integrate experiences into their understanding of the world around them. A frame is an active perspective that both describes and perceptually changes a given situation. A frame is, simplistically, a point of view; often, and particularly in technical situations, this point of view is deemed “irrelevant” or “biasing” because it implicitly references a non-objective way of considering a situation or idea. But a frame – while certainly subjective and often biasing – is of critical use to the designer, as it is something that is shaped over the long-term aggregation of thoughts and experiences, through the above process of sensemaking, and is therefore a larger way of viewing the world and situations that occur in it. Like a point of view, a frame too will change, but will change over the long-term rather than the short term.

Designers make explicit the normally implicit processes of sensemaking and framing during design synthesis, as they attempt to make meaning out of data through interpretation and modeling.

This paper offers a theoretical reflection on the relationship between design synthesis, sensemaking and framing. This reflection, based on professional practice in a world-class design consultancy, attempts to tie research from various disciplines to what many designers feel is an implicit part of their process – the ability to apply their own “intuitive” ability to find meaning in complex situations and solve complex problems.

068

Interaction and Mediation in Preadmission Clinics: Implications for the Design of a Telehealth Stethoscope

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A telehealth stethoscope would make it possible for doctors to perform physical examinations on patients at great distances. In order to develop a useful and useable telehealth stethoscope we have conducted fieldwork observations of existing anaesthetic preadmission clinics to understand how stethoscopes are currently used. Both face-to-face consultations and videoconference consultations have been studied. Our results indicate that the stethoscope plays a minor role in the consultation and that consultations are mediated by the administrative work that is the reason for the consultation. We suggest that a stethoscope plays an infrastructural role in the consultation. The implications of considering stethoscopes as infrastructure are explored and considered in the context of a future telehealth stethoscope.

A Proposal for the Web 2.0 Revolution in Online Design Education: Opportunities for Virtual Design Learning Using Social Networking Technologies

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New Web 2.0 tools are enabling new avenues for online communication. Social networks that have sprung up from these tools are not only the basis of information dissemination but also a means of sustained learning. Educators are now able to investigate beyond traditional teaching pedagogies and student participation roles. By exploring learning theories and the philosophies of design education, this research proposes a framework for leveraging recent innovations in social networking technologies to facilitate these values in an online environment. Unlike many other subject areas, at the center of design learning is an underlying method of inquiry and dialogue that cannot be objectively transferred to students through typical learning management systems. The growth and popularity of social networking services has created a communications space that is distinct from the confines of the physical world. By taking advantage of the rich complement of applications that comprise this alternative communication space, educators can import the reflective learning approach essential to design education.

Identifying Familiarity in Older and Younger Adults

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This paper discusses empirical research into the familiarity of older and younger adults with contemporary electronic devices. Prior research into the field of intuitive interaction is examined, and the links between experience, familiarity and intuitive interaction are highlighted. An experiment is presented which investigated the differences in familiarity between older and younger adults. Overall the results suggest a negative relationship between age and familiarity, but exceptions to the rule are also demonstrated. This shows that age is not a determinant of familiarity, but it is often associated with a lower level of familiarity. This research also shows that older adults show verbal cues for familiarity far less frequently than younger adults, yet still display familiarity during task execution. The implications of these findings are discussed.

Complexité architecturale et assistance informatique

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Depuis plus de trente cinq ans en France, un champ de recherche visant à expliciter la conception architecturale dans sa complexité se développe sous le vocable d' «Architecturologie». Aujourd'hui construit sous forme d'une connaissance scientifique, ce champ présente un langage théorique systémique dont le concept majeur a pour terminologie « *espace de la conception* ». Construit et décrit en tant que «*système complexe*», l'«*espace de la conception*» est posé par l'architecturologie comme lieu mental abstrait et théorique d'intrication de diverses opérations cognitives de la conception.

En tant que méta-savoir fondamental, abstrait de toute réalité concrète, l'architecturologie procède d'une pensée complexe et vise à construire une connaissance complexe de la conception prise comme activité cognitive elle-même complexe. De nos jours, cette connaissance fait l'objet d'une réflexion sur ses possibles applications. Elle est ainsi prise comme modèle pour une approche «clinique» de cas physiques et/ou scientifiques, concernés par la conception, tels que la perception architecturale et la modélisation informatique de l'architecture en projet.

Cette approche « clinique » amène, au regard de la complexité constitutive d'un «*espace de la conception*», à poser une complexité constitutive d'un «*espace de la perception*» et une complexité constitutive d'un «*espace de la modélisation*». Tandis que l' «*espace de la conception*» est descriptible en termes d'*échelles architecturologiques*, l'« *espace de la perception* » l'est en termes de *qualités* et l'« *espace de la modélisation* » le sera en termes d'opérations de modélisation.

La question posée ici, est celle d'un nouvel outil qui vise à produire une nouvelle assistance logique à la complexité de la conception architecturale : ESQUAAS. Produit de deux niveaux de programmation, l'un procédant d'une pensée simplexe et l'autre d'une pensée complexe, ESQUAAS interroge les «*reliances*» indispensables à l'assistance des opérations de la conception architecturale.

Transformative Design: From Consultant to Clinician

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The paper will describe how digital information gathered in medical diagnostic practices has been utilized in an area traditionally reliant on manual medical sculpting techniques. Working in conjunction with iRSM (Institute for Reconstructive Sciences in Medicine), the authors have participated in the development of systems and processes that have resulted in: enhanced surgical planning, elimination of surgeries and improved accuracy of prosthetics. As iRSM is the only centre in Canada to provide these services, it has attracted many international medical facilities and practitioners to use these digital workflows in their own practice.

Industrial Designers were originally consulted by iRSM on a project-by-project basis, consistently demonstrating the value of design research strategies. This demonstration of value resulted in the demand for a full-time designer within iRSM's interdisciplinary team, opening new insights and opportunities within the clinical environment. The integration of design into this area of medicine resulted in the development of a new field of design interaction, education and research. The collection of numerous case studies over an eight-year period provided the background for the development of a graduate program of study dedicated to this new field. The result of this work has been presented exclusively within the medical arena both at conferences and workshops. This academic year, the first student to be enrolled in a Master of Science in Rehabilitation Medicine with a specialization in Surgical Design and Simulation came to fruition. The creation of this new field of study is a continuation of this relationship, as the first candidate has a degree in Industrial Design, but will gain the necessary skills to become a clinician and researcher within a clinical practice. This new "species" of designer is at the forefront of new opportunities for design education and research with a focus on patient-centered health care delivery.

A Comparison and Analysis of Usability Methods for Web Evaluation: The Relationship Between Typical Usability Test and Bio-Signals Characteristics (EEG, ECG)

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A usability assessment is now widely recognized as critical to the success of interactive interface design including web design. In this paper, our research team used a variety of different bio-signals such as Electroencephalogram (EEG), Electrocardiogram (ECG), and Electromyogram (EMG) to evaluate individuals' emotional reactions to different web interface designs. At the same time, we conducted typical usability testing of the same web interface design to compare the results of these two methods, and conclude whether usability testing using bio-signals is a good method to use for web evaluation.

Design Research and the Complexity Encountered in People's Critical Thoughts

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This study focuses on the concept of "Critical Design", which describes the development and use of design objects for the discussion of social and technological problem areas. "Critical Design" provokes or puzzles the consumer. Instead of offering people merely optimized and constraint action patterns, open situations and questions are created. The arising reactions provide valuable insights for innovative product development and basic design research. This paper assesses the potential of "Critical Design" approaches to be utilized as novel research tools for future challenges to design. The main contributions of this paper are threefold. Firstly, it reviews various ways of user engagement to design that reinterprets the conventional relationship of user and designer. Secondly, it selects and evaluates specific qualitative research methodologies that accept and support the active involvement of the researcher as well as the importance of letting theories "emerge" out of data, in order to develop a methodological research framework specific and original to design. Finally, the study offers an assessment of "Critical Design's" potential, to understand and deal with people in a novel and richer way and to test it as a research tool that supports complex approaches. "Critical Design" illustrates the need for design researcher to deal with complexity encountered in the general dynamic of actors and in people's critical thinking.

An Investigation into Features of Design Thinking in Fast Moving Consumer Goods Brand Development: Integration and Collaboration

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Most companies and researchers have no doubt now that design envisages a way toward future products, services, and systems. Recently, however researchers have started to highlight 'design thinking' to ensure that design becomes the next competitive advantage in companies. They acknowledge that design thinking enables companies to develop differentiated products, services and systems which consumers and users need. However, there is little research which reports how design thinking can be embedded and fostered in different business contexts, especially in FMCG (Fast Moving Consumer Goods) brand development. This paper investigates what features of design thinking are employed in FMCG brand development via stakeholder interviews in three domains: agencies, companies, and retailers. This paper concludes with suggestions of how design thinking can be embraced in FMCG brand development.

Resonance rather than Solo: Shaping a Regional Image with Soundscape

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As times change, industrialization and urbanization transform the structure of traditional rural society and result in imbalanced development between urban and rural areas. Then, as a result of population outflow and change in industries, rural distinctiveness gradually disappeared. Given that visual text was normally used to shape a regional image, this study further added audio text to enrich rural expression and also adopted the soundscape concept proposed by Murray Schafer (1973). Other than artificial sounds and natural sounds, soundscape also covers memory sounds, image sounds, cultural sounds and social sounds. The study incorporated the ecological triangle developed by Tilly (1974) - humans, space and activities, to analyze the urban and rural social structures; as well as the soundscape triangle developed by Schafer (1978) - soundmark, signal, keynote, to analyze the sounds in the environment.

This study utilized environmental marketing to transform sounds that are regarded as noises from negative exchange phenomenon to positive exchange of environmental resources. By using in-depth interviews, the study filtered out the scenic spots of Tongshiao Town, Miaoli County featuring mountainous or oceanic uniqueness and conducted a field survey to collect visual and audio text data. The text analysis method was used to analyze the data contents and meanings, and explored the derived interactive relation between humanistic emotions and the rural image. The study designed a soundscape shaping region prototype- Sonic Vison, which blended visual and audio test data into audio-visual interactive creation, in an attempt to help the study subject better promote the region's tourism industry and reinforce marketing applications. The results can also be used as a reference for future research on shaping a regional image in other rural regions.

Consultancy Designer Involvement in New product Development in Mature Product Categories: Who Leads, the Designer or the Marketer?

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This research sets out to uncover how design is contributing more intensively to new product development. More precisely, it aims to understand the growing involvement of designers, and in particular consultancy designers, in NPD in mature product categories. The study seeks to build on recent evidence of design taking a greater leadership and strategic role in new product development, particularly in embracing the theory and praxis of the discipline of marketing.

The research methodology involved a quasi-ethnographic case study within a medium-size, internationally focused design consultancy undergoing significant transition. Three key areas/themes mediating designer involvement in new product development emerged in the findings: (1) a broadened designer remit, (2) the importance of consultancy-client relationships, and (3) a performance-design tension. If design consultancies take greater leadership in NPD, new marketing-related competencies will have to be adopted by designers, designers will have to be more sensitised and knowledgeable about the types and intensities of consultancy-client relationships, and designers and managers will have to actively manage the sometimes contradictory tensions between design integrity and commercial hard sell.

When Artists and Designers Inspire Collective Intelligence Practices: Two Case Studies of Collaboration, Interdisciplinarity, and Innovation Projects

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Current mainstream collaborative processes and practices are not always fit to deal with the complexity of our society and the problems it generates. The lack of complexity-based practices for empowering collective intelligence conditions makes it difficult to address and solve intertwined multi stakeholders situations. As a disciplinary attitude can rarely succeed to solve complex and wicked problems, there is relevance and a need to question today's mainstream approaches to collaboration and innovation. We explore this issue by asking how design can be of help to lead this reflection and to translate collaboration into pragmatic activities. We propose that by focusing on a constructivist paradigm and an interdisciplinary approach, collective intelligence can be constructed. It will then generate new ways to address complex situations.

To support this, we draw from two interdisciplinary projects done in two organizations where collaborative design has translated into various social practices. In one case the creative process involves artists and managers, in the other, collaborative reflective practice within an HCI project brings stakeholders to focus on a human-centered approach to design and sustainability. We examine how design has in each case been of help, and finally, we conclude by presenting pragmatic ideas easily translatable into guidelines for fostering collective intelligence.

Perspectives on Critical Design: a Conversation with Ralph Ball and Maxine Naylor

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This paper features an edited conversation with designers Ralph Ball and Maxine Naylor. It explores their thinking in relation to critical design.

In 1985 Ralph Ball formed a design partnership with Maxine Naylor a reputable experimental designer maker. Together they began to challenge the borders between art, craft and design. They have exhibited work internationally and held teaching positions at colleges in the UK and USA. Over a decade from 1985 Ball taught on Furniture, Jewellery and Industrial Design at the Royal College of Art, where Naylor taught on Furniture Design, directing the course between 1995 and 1998. Today Ball is Professor of Design at Central Saint Martins University of the Arts London and Naylor Professor of Design and Director of the Design Research Institute University of Brighton.

Through practice and academic tenure they have refined their critical perspectives and developed a distinctive approach to practice based research. They describe themselves as critical designers using design as a critical, visual discourse to communicate ideas about design culture and society. Taking experimentation as a research method they subject their ideas to a critical process of refutation; questioning the work through an approach that challenges protocols of design method aiming to enhance the design profession.

In this conversation the designers' discuss their concepts of 'open-process' and 'design poetics'. They describe their role acting as critics of design from within design practice. They outline their thoughts on the increasingly un-ideological culture of Industrial Design describing how through playful experiment they question the value of repetition in design and mass production of products. They do this by taking modernist axioms to extremes and 'embedding narrative' into objects as commentary on the state of contemporary design.

Supplementing the conversation the author offers his reflections. Primarily this exposes a form of critical design that differs significantly from popular and often technologically orientated notions of critical design.

Design Research: Towards a History

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Various starting points might be selected for the origin of design research but this paper will begin with the design methods movement in Great Britain. Two of the leading figures in the movement were Bruce Archer and John Chris Jones. The original conference on design methods was held in London in 1962 and Jones published the first edition of *Design Methods: Seeds of Human Futures* in 1970. Archer was involved with the establishment of the Industrial Design Research Unit at the RCA in the early 1960s and was also a founder of the Design Research Society in 1976. The DRS journal *Design Studies* was founded three years later. Design methods in the United States continued to develop through the Design methods Group at the University of California, Berkeley in the late 1960s. Horst Rittel was a central figure in this group. In 1968 Herbert Simon gave the Compton Lectures at the Massachusetts Institute of Technology. These were published shortly thereafter as *The Sciences of the Artificial*, which became a seminal book in the field of design research. Another group on design methods, which included Donald Schön, also developed at MIT. In the fall of 1982, the academic design journal *Design Issues: History, Theory, Criticism* was founded at the University of Illinois, Chicago and the first issue was published in 1984. Among its activities, the editors organized the first conference on doctoral education in design, which was held at Ohio State University in 1968. During the 1990s, the international network of societies and associations involved with design research expanded to include organizations in Europe, Latin America, and Asia. The Design Research Society organized a series of international research conference and an organization that includes a number of research societies in Asia and Europe was formed. While there is much activity today, there is still a problem in connecting the various discourse communities into a more coherent field of activity.

Representation-phobia and the Complexity of Embodied Interaction

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In current interaction design research there is a widespread belief that situated action and embodied interaction should replace mental representations in the theoretical account of human cognition. This exclusion of representation is however diagnosed as a sign of representation-phobia by Anderson (2003) who claims that it is misguided. This paper aims to show why and how it can be overcome. Initially, a literature review will show how representation-phobia manifests itself through two different versions in HCI research. On the basis of this I argue that representation-phobia leads to a theoretical dead end. Then, by drawing on semiotics and recent findings from cognitive research, I argue that we cannot understand the rich complexity of embodied interaction unless we furnish our thinking with a dynamic notion of representation.

Lighting Design: Non-visual Impacts and its Influence on Employees' Health and Well-being

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In the last ten years, findings in medical science reveal that light plays important roles in maintaining optimum regulation of biological rhythms and hormones on a daily basis. Despite the decades of research, it was only in 2002 that David Berson discovered the connection between light and a third type of photoreceptor in the retina and this was the missing link in the description of the mechanism of biological effects controlled by the light and dark cycle. This discovery revolutionized the research on the spectrum, the intensity, the duration and the type of light that affects biological responses. This work addresses this issue of non-visual impacts of human exposure to light, in an attempt to relate the quality of lighting design to health, comfort, and well-being of female retail store employees. The sample for the cross-sectional study was randomly established with 30 female volunteers in street retail stores (possibility of outside visual contact) and shopping mall retail stores (no outside visual contact). Assessment of lighting considered the occurrence of glare, color appearance of light, flexibility, and possibility of lighting control by employees. The tools to assess well-being and health were psychometric scales internationally validated by the psychiatric field to measure depression, anxiety, and stress symptoms. Assessment of sleep conditions and analysis of the activity/rest rhythm was carried by a wrist monitor with attached luximeter and the analysis of the body temperature rhythm was made by a temperature sensor, to which each participant was submitted for five consecutive days. The lighting pattern's influence on the circadian system was verified by measuring saliva melatonin and cortisol levels. The degree of satisfaction of employees and their preferences regarding work environment lighting were surveyed by applying questionnaires. Data were analyzed using Pearson correlations, ANOVA, and stepwise regression.

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Interactive Tools and Online Communities that Support Media Literacy

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Discussions about online media often neglect the engagement and interpretation of these technologies. The Internet has become a primary resource for learning, but schools are often not prepared to train students to understand online content. Outside of the classroom teenagers are active online. Conversely, many schools rely solely on analog tools to teach this already digital generation. This disconnect may result in teenagers who are not prepared to be critical digital citizens.

According to research by the Massachusetts Institute of Technology and Stanford University, teenagers tend to rely on the look of online information to determine credibility. As design software and image manipulation tools have become more available, average users can create content that looks professional and therefore trustworthy. Online content facilitates public discourse, but positions amateurs and experts at the same level. This flattening of source credibility is problematic for teenagers with limited cognitive abilities and life experiences to make judgements.

As online participation is inevitable we must determine ways for students to practice communication and collaboration in activities that are facilitated by an educational framework. We cannot simply ignore participatory communities and reject interactive tools as learning strategies. Educators have an opportunity to encourage new media literacy by leveraging existing social participation into teachable moments.

Based on literature, field interviews, persona development and research, we have identified five main challenges that merit pedagogical shifts to address media literacy. We propose two speculative case studies to address these five challenges.

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The ASD Friendly Classroom – Design Complexity, Challenge and Characteristics.

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As architects and designers we have a responsibility to provide an inclusive built environment. For the Autistic Spectrum Disorder (ASD) sufferer however, the built environment can be a frightening and confusing place, difficult to negotiate and tolerate. The challenge of integrating more fully into society is denied by an alienating built environment. For ASD pupils in a poorly designed classroom, their environment can distance them from learning. Instead, if more at ease in their surroundings, in an ASD friendly environment, the ASD pupil stands a greater chance of doing better.

This paper sets out the triad of challenges faced by designers when considering the ASD friendly environment and then examines lessons to be learnt from 9 studied ASD friendly classrooms in a Northern Ireland context. The objective is straightforward. By increasing the awareness of the ASD friendly classroom it will hopefully facilitate greater inclusion of the ASD pupil into mainstream education and society at large.

Collaborative Design Pedagogy: An Examination of the Four Levels of Collaboration

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This paper reexamines research conducted with more than a dozen authorities in architectural education on collaborative methodologies over a three year period. The focus of initial study, a doctoral dissertation entitled: Collaborative Design Pedagogy: A Naturalistic Inquiry of Architectural Education (McPeek, 2009), examined the apparent disparity existent between the practicing profession of architecture and the academic preparation of its future members. In this paper, a condensed examination of specific findings from the previous data set point to four key levels of pedagogical collaboration (community, institution, faculty, and student) that are critical components to the implementation of collaborative architectural curriculum. These levels contain both inhibiting and facilitating elements that appear in all types of higher educational institutions (public, private, liberal arts schools, land grant universities, etc) and in varied curriculum settings. Thus, while the authors' main emphasis lies in enhancing the pedagogical scope of architectural education, this data may also be pivotal in facilitating and/or inhibiting collaborative endeavors in any major field of study, particularly those which incorporate collaborative methods in the context of situated learning.

The Construction of Complexity in Design and Public Policy Contexts

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This paper explores the nature of complexity and how it is manifest in the practice of design research and public policy given their unique contexts. This comparison is made by examining the tools and approaches that are used in understanding problems and creating outcomes in each field. This paper is based on a recently conducted action research study at a state legislature in the United States and is supported by foundational literature on modern problem theory, decision making, methods, and process in the two fields.

Complexity emerges from the many stakeholders that surround and define our issues, the enigmatic nature of our ill-structured problems, and the multiplicity of variables that confound progress towards one solution. An interdisciplinary opportunity is presented; the study suggests tools are a function of the complexity in any given context and provides examples of varying modes of managing complexity in design and policy environments. By juxtaposing the similarities and differences in how design practice and policy development construe and manage complexity, this paper frames the overlap between the two areas of practice and builds a mutual space for learning and collaboration.

Sustainable Alternatives to Industrial Printing Practices: A Case Study Analysis of Esquire Magazine and Electronic Paper Display

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In October 2008, *Esquire* magazine became the first commercial publisher to utilize electronic paper display technology (EPD) for mass production and distribution of printed ephemera. Initially developed at the MIT Media Lab in 1997, E Ink displays have been integrated into a variety of hardware devices, including the Amazon Kindle and Sony Reader. However, the *Esquire* cover represents a milestone achievement in the evolution of a more sustainable, paperless print solution due to the medium's flexible nature, low power consumption, and limited circuitry requirements. 100,000 copies were sold on newsstands for the regular cover price of \$5.99 USD, proving both the economic viability and flexible application of the technology, which is impervious to ambient lighting conditions and adaptable to multiple modalities. This paper outlines the key features and benefits of E Ink, as well as the critical challenges impeding widespread adoption of EPD.

Designing Design Learning: A Case Study

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As 'designerly' ways of thinking and knowing are increasingly understood to be relevant in fields outside the traditional design disciplines, there is need to conceive of and design appropriate pedagogy. The challenge is to successfully negotiate disciplinary crossings in ways that simultaneously respect the discipline of design and provide a space for exploration and innovation, while at the same time produce results that satisfy individual disciplinary standards as well as the institutional standards of the university. The paper presents a case study of a novel graduate course in design research in the University of Toronto's Knowledge Media Design Institute (KMDI) – a multidisciplinary community in which the design has been largely grounded in models from human-computer interaction (HCI). The model of pedagogy that emerged out of this experience and reflection is then situated in terms of prior work on interdisciplinary pedagogy. We propose that our model of pedagogy grounded in what we call *disciplined transdisciplinarity* has the potential to generalise to other settings.

Set in Concrete? Crafting Innovation

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This paper draws on the experience of practice-led research based in academia, which investigates the possibility of making hard surfaces soft.

So far the project, in its fifth year of development, has led to three patents being filed on technology allowing manufacturers to embed textile technologies onto the surface of precast concrete surfaces resulting in hybrid but integral finishes.

The work was initially understood as decorative but as the project has moved into testing and analysis phases a better understanding of the resultant altered characteristics of precast concrete surfaces has emerged - ie the resultant hybrid concrete surfaces overcome some of the negative characteristics of concrete to become colourful, warm, acoustically soft, thermally less variable and people friendly. In short, this design-led research process has extended the characteristics and hence potential of a global material.

Following on from a brief outline of the project and evidence of its innovation, the paper will be structured around two central sections examining some of the strategies that have evolved in this hybrid process and examining potential tactics that have led to innovative outcomes. The first section will examine how conceptual and theoretical thinking, generated out of a user-centred critique of the built environment and an understanding of the relationship between architecture and textiles, can demonstrably lead to pragmatic, innovative and marketable solutions. The second section will look at the interrelationships between creativity, innovation and collaboration and address some potentials and challenges.

The paper represents an early attempt to make sense of this design-led project. It aims to capture and contextualize some possible transferable tactics that might lead to more conscious and explicit processes for *crafting innovation*.

Sketching in Hardware and Building Interaction Design: Tools, Toolkits and an Attitude for Interaction Designers

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In this paper, we present a *Sketching in Hardware* perspective to Interaction Design (IxD) education and practice. We start our discussion by highlighting the differences between *Prototypes* and *Sketches*, and explaining why we believe the term *Sketching in Hardware* is suitable and appropriate to the IxD practice. We introduce a short history of the term and its origins before relating it to Experience Prototyping activities and other related design processes/methodologies.

Our main discourse consists of observations and a critical analysis of academic activities and professional work suggesting that *Sketching in Hardware* remains quite challenging despite the recent progress in the development of new tools and toolkits. The low barrier to entry and the explosion of tools and toolkits are very welcome, but this democratization can also be misleading. The learning curve is still steep in many ways. The current sketching tools seem to have leapfrogged our design skills and our ability to deal with that avalanche of technical capabilities. Designers regularly lose a critical perspective on their sketching and prototyping activities. We noted that students and designers alike spend a lot of time mastering intricate tools and debugging technical issues when they should be developing, evolving and fine-tuning interesting experiences or sketches informing their design process.

We close our discussion with a review of various toolkits and building blocks currently available to interaction designers for designing new technology and future concepts. We ultimately suggest five guiding principles to be taken into account in the design of new toolkits or upgrading of existing ones. These same principles and qualities not only can, but should also radiate in the experiential qualities, well beyond the built material artifacts. *Sketching in Hardware* is not just playing with electronics; it has serious implications and repercussions in the way we design stuff.

Designing for Cultural Diversity: Participatory Design, Immigrant Women and Shared Creativity

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Immigration and multiculturalism are realities of the globalized world that has given rise to subcultures, which possess specialized knowledge. This increasing interaction among people from diverse cultures has produced a complex ethno-cultural mosaic that presents formidable challenges for visual communication designers' as well as for other designers. Cultural diversity of designers and audience of messages in a design scenario brings complexity in the design research process.

This research study explores an effective visual communication language, through the medium of the poster, for culturally diverse audience of immigrant women in Edmonton, Canada. The decision was informed by triangulated results from a pre-workshop survey, interviews with staff and discussions with immigrant women associated with the Centre. While designing messages for a culturally diverse audience, participatory design exploration approach assisted in developing a framework for research methodology. A participatory design workshop was planned to investigate possible visual vocabulary for an ethnically diverse group. Workshop results were synthesized in the form of three poster prototypes, which represented the needs and realities of those immigrant women. Prototype poster designs were tested to examine the results of the mutually identified visual concepts. Based on the observations and synthesis of research findings, it is concluded that user-centered participatory approaches of design can work effectively for developing a visual vocabulary for an audience of culturally diverse women.

The research direction of this project is based on the concept of shared creativity of ethnically diverse immigrant women, through collaborative design exploration workshops. The concept of shared creativity is also harmonious with the spirit of multicultural pluralism, which forms the basis of the Canadian culture. This role of a designer to identify problem-oriented activity, and to develop participatory strategies to address those real issues provided a chance to contribute to the social process concerning cultural diversity in a constructive and sustainable manner.

Transitions Heuristics in the Pursuit of Well-being: Situating Interactive Products and Services in Transitions

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Transitions in people's lives take shape in the roles they enact, and the environments they inhabit. In these transitions, people encounter the paradox of changing and unchanging happenings, occurring simultaneously at multiple channels with differing magnitudes, and through immediate and long-term interactions. In this multiplicity of dimensions, transitions bring complexity while they emerge, throughout their occurrence, and while they resolve. Dealing with this complexity oftentimes results in stress, decline in emotional and social qualities of experiences. Interactive products and service systems play an important role in transitional experiences, by providing support for people to hold on to during the transitions. However, they are not explicitly designed with transitions and their complexity in mind. In this paper, I introduced transitions heuristics stemming from the modes of transitions framework, to understand and act on the complexity behind transitions. Transition heuristics leads the inquiry to discover principles at work in the existing interactive products and services and unveils the functioning principles that transforms these products into transitional experiences. The discovery unveils four threads of transitional products: routine, performance, ritual and narrative, which encompass a hierarchical and concentric relation with each other.

Involvement in the Design Student Approach

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This paper is about the methodology used in the first six months of the Design course at my university in Brazil. This was inspired by the so called Social Design methodology developed in another Design course where I previously worked as a lecture and researcher.

Educating designers is a complex subject because it is a matter which integrates techniques to help the students to develop their observational skills, creativity, social awareness and individual talents.

A student who arrives at the university has already skills, knowledge, and the capacity to project their life according to his/her education. Including this fact in the class's approach is the first step of this methodology.

The students are told to look for a group outside the university with an interlocutor, where they will develop a real design project. The purpose here is to guide the student, not to propose a problem or even resolve it, but he or she will be able to develop the capacity to identify fertile areas for action. Thus a constructive atmosphere will develop with the aim of bringing new benefit for the group, rather than the more negative mindset concerned with fixing a perceived problem. The student designs an object and tests it in order to get feedback from his adopted group. The student is encouraged to get as much feedback as possible in order to challenge his preconceived ideas and promote double-loop learning.

This paper shows the techniques used by the students related to data collection as an attempt to generate a "model 2" operating system as advocated by Schön and Argyris (Smith, 2001), and some of the projects developed during 10 years of the university design course.

Discovery and Creation: Explaining Collaboration between Designers and Scientists in Scientific Research

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This paper examines the role of product/industrial design in scientific research. It reports the results of three case studies in which designers and scientist collaborated. The paper presents the initial findings of these cases, and reflects on the designers' contribution to research, and on those aspects that can act as a barrier or as a facilitator in designers and scientists' collaborative endeavour.

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Cognitive Biases and Design Research: Using insights from behavioral economics and cognitive psychology to re-evaluate design research methods

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In light of well-established principles in behavioral economics and cognitive psychology, we consider how minor variants in the structure, framing, and phrasing of several common design research activities may unintentionally elicit more biased participant responses than currently recognized. To begin investigating the relationship between minor modifications to design research activities and changes in participant responses, we propose designs for three experiments, and then explore their weaknesses and limitations through a short-term pilot study.

In our discussion, we suggest that a better understanding of cognitive biases may be used to produce more accurate and salient participant responses - either by minimizing or by explicitly eliciting activity- and context-induced biases as appropriate to the research at hand. Additionally, we propose that recognition of context-dependent preferences could lead to more holistic models of user behavior.

This early research is a work in progress. The principle aim of this paper is to provide a conceptual foundation for additional research into how participants' cognitive biases might influence the outcome of design research activities, and related implications for research activity design.

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Designing for the Periphery of our Attention: A Study on Ambient Information Systems

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This article discusses a specific category of information systems known as Ambient Information Systems. These systems present information in a non-intrusive manner, acting mostly on the periphery of our attention, following Mark Weiser's concept of *calm technology*.

The major concern that drives the development of these systems can be summarized in two aspects: first, as pervasive computing increases, ordinary objects are becoming capable of processing and displaying data, thus the consumption of information will occur in many different contexts, which may contribute to an information overload, generating stress. The second aspect is that Design plays a major role in developing better ways to deal with this information overload. For a long time designers have been studying how to design communication systems that drive our attention, but little research has been done in exploring how to design communication systems that act upon the periphery of our attention.

In this article four Ambient Information Systems are discussed, highlighting their characteristics and limitations. As a conclusion, the author proposes an agenda of topics that should be tackled to advance future research on this subject.

Developing a Theoretical Framework for Understanding (Staged) Authentic Retail Settings in Relation to the Current Experience Economy.

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In the current experience economy, some retailers and retail designers aim at triggering customer experiences by associating the retail store's design with 'authenticity'. The notion of authenticity, however, is complex and layered and has been studied in several scientific disciplines. But within retail design, only limited research on authenticity is available. This paper aims to clarify the complex concept of authenticity in relation to retail design. Retail design as part of interior architecture is an emerging discipline. By establishing its theoretical basis, authors mostly rely on the knowledge of background disciplines; as in this paper, where we look at theories developed in marketing and philosophy to investigate how (staged) authentic retail settings be can situated in relation to the current experience economy.

The paper contains three large sections. The opening section presents a review of literature on retail design and the experience economy in relation to authenticity. The second section explores authenticity as defined through the theory on simulacrum by Plato, Baudrillard en Deleuze. In the third section, these theoretical insights are translated to the actual retail environment by surveying (staged) 'authentic' retail stores in three shopping cities in Flanders (Belgium). Based on this survey, seven different groups of authentic stores are defined, moving from 'real' to 'hyperreal'. This grouping should not be seen as a classification system but rather as a mental scheme to investigate and report on different approaches towards authenticity in retail store environments. The scheme can be applied in the field of consumer research as well as in retail (design) practice.

A New Atlas for Abstract Spaces. Visual Tools for the Exploration of Complex Contexts.

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In the tradition of research, text is the preferred solution for research and communication. The linear sequence of writing explains reality: it transforms synchronic scenes into a sequence of codes that describe it diachronically. Nonetheless, while textual representation still remains extremely useful in scientific communication, the linearity of writing is lately appearing as inadequate to the latest models of science and to the representation of current knowledge systems.

In this context the language of cartography in particular seems to be fit to work as a structural model for the representation of complex systems, and Design can find in the atlas a model for the communication of complex contexts. As a tool designed to describe and act upon complex context, the atlas provides a model to strategically describe highly heterogeneous knowledge spaces. As a communication device, the atlas sets up a strategic network of images in order to achieve a set of communicative goals: maps, illustrations, graphs, and texts work together to describe and act upon space.

In the first part of this paper, we examine the structure of the atlas in order to expose the mechanisms that allow actions of exploration of complex and heterogeneous contexts. In the second part of the paper, the format of the atlas is discussed in its transfer to the digital domain and in its application to knowledge contexts. The first experimental results of such an approach are displayed by presenting a software tool for the collaborative management of design knowledge resources.

Understanding Team Design Communication through the Designer's Eye: A Descriptive-Analytic Approach

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The present study is an example of an empirical design research project based on design teams. Our main goal is to describe, understand and analyze the communication processes which take place inside a design team working on a design project for a short period of time. This paper presents the main observations and results of two case studies based on two design fields: Architecture and Graphic design. The paper's contribution lies on the methodology used, combining qualitative and quantitative methods of analysis, and involving the designers' point of view at various steps of the research process. In this way, we consider the value of this study twofold: first, it served as a 'vehicle of communication' between the research team and the design team and second, the structured methodology followed taking into consideration recognized methods, such as Linkography, and adapting them to the communication focus of this study.

Seeing what they are Saying: Diagrams for Socio-technical Controversies

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The opening of enormous databases and the possibility offered by new tools to access the heterogeneous flows of data and information emerging from the Internet could be seen as an innovative mode also to observe and represent social complex systems. *The cartography of controversies*, the applied version of the Actor-Network Theory (ANT), is one of the examples of this new way of exploring and understanding these new information and knowledge domains. The cartography of controversies also aims at overcoming some of the limits of the traditional description of social issues by exploiting the potentialities of the *information visualization* and of the *information design*. In this framework visual models and diagrammatic devices are assumed as useful tools to describe the different position assumed by the actors of controversy. A distinctive feature of these, heterogeneous and non-isotopic, spaces is the absence of *unique metrics* to deal with them. The absence of reference points requires endowing with technical and conceptual tools for understanding and grasping the dynamics and the processes, which characterize them. Diagrams are here considered as operating devices able to describe and unveil the nested and latent connections of a system.

A real case has been chosen to develop and test the capability of diagrammatic models to observe and describe controversies and to show the point of view of the actors involved in it: the remote control of dangerous materials transportation in road.

The research is strongly related to the development of the *Turtle Project*: a series of visual tools and diagrammatic devices able to explore controversies. It could be defined as an observation environment of the discursive knowledge flowing through the Internet, offering the possibility to make profit both from quantitative and qualitative research methods.

Some results about the chosen controversy are discussed as well as the limit of the tools.

Empreintes lumineuses nocturnes : Codes et représentations simplifiées appliquées au design de l'éclairage architectural et urbain

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Cette recherche présente une méthode simple pour mesurer, analyser, représenter et comprendre la complexité des systèmes de lumière urbaine dans les grands espaces. Elle démontre les avantages d'un code simplifié de repérage et de représentation des ambiances lumineuses, appelé ici « empreinte lumineuse nocturne », pour l'intégrer dans l'analyse et la création des paysages, architectures et places publiques vécues la nuit. La recherche propose un outil d'analyse de la lumière urbaine à partir d'une technique photographique basée sur l'idée de mouvement afin de créer ces « empreintes lumineuses nocturnes ». Celles-ci permettent de vérifier les conditions critiques des éclairages existants et d'améliorer les propositions de design étudiées.

Analyzing the Appearance and Wording of Assessments: Understanding their Impact on Students' Perception and Understanding, and Instructors' Processes

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In the context of a design studio, the study presented in this paper investigates the effects that appearance and wording of assessment forms have on design students' perception and learning. The project is motivated by hypotheses formed by a prior study, which revealed visual and textual components of assessment forms as possible influences on students' perception and learning. Thus, the goal of this project is to investigate their impact on students and offer the study findings to educators to help them better understand and construct effective assessment tools.

This paper argues that the appearance and wording of assessments convey meaning and must align with the activities and discussions that are common in design courses. This argument is supported by research that emphasizes the seamless integration of all steps of the learning process (Biggs, 2003) and the importance of students' learning preferences in developing lesson plans (Gardner, 1993). The paper explains the construction of four assessment forms. It also describes the post-evaluation self-reflections that students wrote and the questionnaire they completed at the end of the course. These project components were conducted to learn what students retained and how they perceived the assessment forms. In addition, the instructors provided their perceptions and time allocated to using each tool.

The outcomes of the study revealed that the digital assessments were more efficient to complete than the handwritten form. Students noted little difference in their satisfaction between the digital and handwritten forms when the wording stayed consistent. However, they did prefer comments that were personal and related to each specific project. The students retained more information from assessments that included a clear visual hierarchy and eliminated ambiguous titles. These findings informed the proposal of visual and textual considerations that should be taken into account when creating assessment forms for use in design classrooms.

Capturing and Retaining Knowledge to Improve Design Group Performance

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This paper explores the management and organizational context for capturing and retaining knowledge transferred through the design process.

It is widely acknowledged that our ability to successfully organise and transfer design knowledge is dependant upon the context in which it is situated. Cross (1992) has also highlighted the normally unsystematic way designers work and the limited extent to which the knowledge contained within the products they create is made explicit.

Essentially design knowledge transforms as it transfers (Ashton, 2007) and the knowledge-based resources of a design group are socially complex. Successful exploitation of these knowledge assets can secure competitive advantage (Alavi and Leidner, 2001) yet, a systematic literature review of leading design and educational management journals found limited empirical evidence that shed light on the influence of knowledge management on design group development.

The paper addresses this weakness in the literature and suggests that design consultancies utilise cross-disciplinary knowledge to solve problems which could not be resolved by linear disciplinary frameworks (Gibbons et al, 1994). Based on two in-depth case studies with interior design companies implementing new digital asset management systems over a two year period, the paper explores the findings in relation to design practice and policy, alongside implications for the contribution of the Creative Industries to the knowledge economy.

Misfits, Balance, Requirements, and Systems: thoughts on Alexander's Notes on the Synthesis of Form

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The author examines the notion of misfit as presented by Christopher Alexander in his book *Notes on the Synthesis of Form*. We argue that from the point of view of our current understanding of design, the approach is flawed, but not flawed beyond use. In fact, the core concept of misfit, and how misfits can be addressed, remain as important to design today as when Alexander wrote about them. In this paper, a number of flaws are identified and explored. Subsequently, a new approach, which the author calls a *balanced systems approach*, is sketched. This approach preserves the intent and core of Alexander's work, while addressing the identified flaws. The main contribution of this paper is to indicate the shortcomings of Alexander's approach, but only for the sake of refining it and ensuring it remains relevant and useful.

Co-design in Public Spaces: an Interdisciplinary Approach to Street Furniture Development

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Cities are developing at a rapid pace. As a result of this growth, the importance of public spaces has increased. This paper intends to discuss the role that elements such as street furniture play in this context, whilst proposing a specific design approach to develop them. It attempts to analyze the distinct user-product relationship between people and the objects that occupy urban areas, and suggest ways to improve it. Co-design emerges as an alternative to involve all the stakeholders in the design discussion. The lay public, city planners, politicians and designers are invited to participate in the creation of pieces of street furniture. The interdisciplinary aspect of co-design becomes evident, once each actor contributes to the process with a different perspective on the urban spaces' needs. The association between co-design and street furniture development promises to be very beneficial to public spaces. Some of the positive outcomes of this association may be reduction of vandalism and urban alienation, and the enrichment of the community life. The co-design process affects, however, the roles that the referred actors play in the traditional context, and depends on the compromise of some power structures to be successful.

A Study on Design Careers and the Impact of Gender

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Many of those entering the design workforce will at one point in time be affected by life choices. Some of these choices are welcomed, however, others are of necessity and are not reflective of personal preference. Life choices such as childcare, career advancement decisions, marriage, leaving the workforce, making a lateral career move, or becoming an attendant caregiver for an incapacitated family member are only a few examples of situations that can dramatically impact the course of a career in design fields. In addition, women and men may be affected differently by these choices.

The purpose of this research is to identify the impact of gender on design careers. The methodology for this research is an online survey of university alumni. The respondents represented a variety of design disciplines. This research found a statistically significant difference in perceived impact of gender on design careers.

A Matter of Negotiation: Managing Uncertainties in an Open Design Process

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Designing is a highly collaborative and communicative process. To achieve good results effective teamwork is extremely important. Digital technology makes it possible for this process to be distributed across different spatial locations. Despite the potential of digital networks, commercial systems in the field of Computer Aided Architectural Design remain stuck in old patterns with strict role definitions and linear working processes. Open Architectural Design offers an alternative to this “sequential model” by providing an approach to distributed work oriented around “Open Strategies”. Open strategies facilitate an open exchange of ideas and artefacts with the aim of making better use of distributed resources and realising greater creative potential. The goal of our project is to apply open strategies to the architectural design process. The technical basis for our research is FREAC, a software framework developed in-house which provides a collaboration space for co-operation between different users and tools. This framework is designed not just for exchanging the outcome of the design process but also for opening up the design process itself and making it more transparent. Such highly open and distributed design processes, however, also present new problems and uncertainties which need to be taken into account in order to reach successful design outcomes. As a result proposals for the management of such processes need to be developed that facilitate collaborative work but do not unnecessarily constrain the inherent complexity of the design process. The focus therefore lies on the improvement of the negotiation process between users, tools and architectural design models. The actor-network theory, and other different management concepts, provides a theoretical underpinning for our approach. The project is a collaboration between the fields of computer science in architecture and media management.

A Case Study of an Andragogical Model in Design Education: Experiments in Interactive Teaching and Learning in Graphic Design Pedagogy

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The purpose of this study is to seek an interactive pedagogical model in teaching graphic design in higher education. Malcolm Shepherd Knowles, an American adult educator, adopted the theory of ‘Andragogy’ which focused on self-directed learning theories. This author applied the ‘Andragogical Model’ to upper division design studios and addresses effective instructions and tips through case studies. In terms of the digital academic environment favored by Generation Y, educators in graphic design fields have been faced with difficulties balancing practical and theoretical disciplines for successful academic achievement. The challenge for educators caused by the digital culture is convincing students that professional jobs mostly require students to achieve multiple creative abilities. This phenomenon demonstrates the problems of giving students precise direction for academic achievement. Thus, this paper brings up questions about how we should structure design education in a digital environment, and how we define boundaries between pedagogical and andragogical models.

Contradictions, Complexity and the ‘Conversational Self’ Design Research Methodology: “Australian Citizens’ Parliament” documentary

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This paper addresses the role of the designer as actor/agency working within and across flows of knowledge, perception and information for filtering, negotiating and mediating design decision-making. The research methodology uses auto-ethnographic writing to construct and explore a series of deliberative conversations as (I /You/ Me / We). Each of these personas offers a distinctive mediatory stance for the designer/self to engage with relations to *other-ness* across personal and public social contexts. As a second order cybernetic approach, the designer/self is thus constructed as being simultaneously participant and observer in ongoing collaborative design conversations as synthesis. These fictive and auto/biographical personae provide access to a range of viewpoints and perspectives, which can be used to actively reflect, mirror and respond to stakeholder interests and investments, whilst effectively being considered in light of the designer’s own reflections on, in, and through action (Schön).

Whilst the paper proposes this methodology as having general benefit for design research in any field, its application for a visual design narrative project is described. The case study is of the making of a video documentary about the ‘Australian Citizens’ Parliament’ (2009), as 150 randomly selected citizen participants take part in a deliberation about ways to improve Australian democratic governance systems. The designer’s process of decision-making and story telling is guided by using the personae methodology to engage with synthesis of multiple perspectives from the video capture process. Key stages of the script design process are described, where the designer uses the framing and mediating concepts of public/private; and individual/collective (I/ You/ Me/ We) to generate a revised form for the documentary as an essayistic work consisting of a series of ambient scenes. What emerges in this final video piece is an engaging narrative treatment and shared understanding about a uniquely Australian political context, titled ‘Deliberation Nation’.

Interpretation as a Design Method

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Interpretation as a method to be applied by the designer is based on the principle of building a new rationality: constructing material culture, holding as a reference the user, ultimate recipient for the projected product. Interpretation as a method further strengthens the specificity of ‘designerly ways of thinking and designerly ways of knowing’ (Nigel Cross). With this approach we aim to contribute towards the characterization of an innovative design: neither a singular problem solver nor solely solution-oriented devoid of dialogue with the question, but rather a semantic agent, a designium interpreter, a maker of meanings through the generated forms, a builder of new circumstances and contexts to contribute to human freedom. The methodological processes applied to an innovative design cannot be conceived as a sequential and linear process with no room for questioning or constraints. Interpretation as a method in design practice holds as a model the application of the hermeneutic cycle: a proposal of dynamic reasoning between an initial question (situation, problem) and a final solution. The development of the project takes place vis-à-vis with the context, culture, place, language, use, and these variables interfere with the initial proposal, reinstating and reformulating it. The choice of new and unexpected answers acknowledges the user as dynamic individual and key player in the interaction process between the proposed ‘product’ and its use. This research focuses specifically on the ‘skin of buildings’ as city’s constituent component. To support that ‘the skin of buildings’ has a function-meaning we perform a comparative study on the use of interpretation as a method by the designer Daciano da Costa and the architect Carlo Scarpa. One of the outcomes of this approach is that postulating interpretation as a design method characterizes the designer as an interpreter. In our research we intend to address the designer as a role player in the city, intervention scenario, as an analyst of the cultural value of the context, coming upon a sustainable and innovative answer. This approach seeks to justify the use of a method that instead of designing an object aims at construing the object’s meaning for the user, hence his relationship with the surrounding space..

Retail Design and Sensory Experience: Design Inquiry of Complex Reality

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Understanding sensory stimulation of people in human environments is vital to designing an interior space. The senses play critical roles in human experience and the memories and emotions tied to it. In retail design brands associated to sensory experience attract customers and stimulate strong, positive, and distinctive impression across all five senses. In this case multiple sensory cues are found in a store interior including store and display layout, lighting, interior fixtures and furnishings, music, and air quality such as fragrance and temperature. All contribute and complement each other in orchestrating the complexity of interiors.

Malnar and Vodvarka provide sensory schematics to analyze the built environment. They devised a *sensory slider* to tap the clarity for a particular sense (Malnar & Vodvarka, 2004). Analysis of resulting sensory levels in interior environments provides expanded understanding of the interior's physical condition in relation to sensory perception of users. For retail, the sensory slider was simplified and adapted to analyze visual, acoustical, olfactory and tactile information in store "S". Key factors are found: (1) visual cues are most evident in retail interiors supporting previous research; (2) non-visual stimulations are evident in design narratives revealing emotional domains; (3) multi sensory experience supports literature on branding practices in retail; (4) interior detailing appear to impact all senses.

Using the tool contributes to creating a conceptual framework when evaluating physical environments and emotional factors concerning customers satisfaction. Implication on the application of the method to the design practice is noted. Interior designers as collaborators with retailers will find it useful for the branding and for new store design and services. Insights and directives from this work suggest added research possibilities and application in interior design, graphic design, as well as store marketing and retailing.

On the Impact of Systemic Thinking in Sustainable Design

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The world faces significant problems of high complexity. The potential of knowledge, methods and tools used in design education and practice are useful for the development of sustainable solutions. Sustainable design is regarded in this paper as the integration of multiple competencies in order to generate and implement creative interventions that trigger positive changes in complex socio-technical systems. In this paper, a multidisciplinary case study is created for experimentation on the way in which different student groups approach complex problems, the type and level of thinking used, and the evaluation of the adequateness of their proposals by experts. The groups analysed encompass eighty subjects enrolled in four different undergraduate and graduate programs. In the experimental groups, the lecturers integrated a number of methods and tools that target purposeful change in complex adaptive systems. In the control courses, the lecturers applied the more traditional methods and tools that are customary of their disciplines, without explicit linkage to complexity and systemic change. Students participated voluntarily in a team activity dealing with the pervasive and complex problem of garbage disposal and transportation in large urban settlements. The resulting proposals provide valuable insights, for example regarding the way in which students analyse the situation, the type and level of change that their proposals imply, and the scope and depth of their causal analysis. This study demonstrates that the set of methods and tools currently used in some of our courses are valuable tools for promoting systemic thinking in our students. Evidence is also provided to suggest that regarding systemic reasoning, the distinctions between disciplinary and multidisciplinary teamwork may be weaker than what was expected. Furthermore, diagnosing systemic thinking in a team or a person would remain largely irrelevant if this type of reasoning failed to produce more creative and higher quality responses. Our study confirms the premise that teams with high-order systemic thinking consistently yield high-quality and original solutions.

The Value of Stimulated Dissatisfaction

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“I’m not saying it’s a good quality to have, but my observation is that good designers are never happy, they’re never satisfied, never content” (Adrian Stokes, quoted in Spencer, 2008, p. 145).

It seems self-evident that designers, whose *raison d’être* is to initiate change in man-made things (Jones, 1970), devising courses of action aimed at changing existing situations into preferred ones (Simon, 1969), will be dissatisfied, at some level, with the way they experience the material world. However, recent research (Spencer, 2008) suggests that expert designers deliberately enhance the pressure and stress of the design situation – stimulating dissatisfaction. By stimulating the experience of dissatisfaction their imaginative and investigative action is given urgency, focus and purpose as they pursue excellence and attempt to unfold from their own view of the world to empathise with a broad project community.

This discursive paper highlights the need for a developed understanding of the reflective practitioner model to inform the post-rationalist generation of design methods. This paper: reviews critical literature about the experience of designing; discusses the role of dissatisfaction within the practise of design; and presents a research project that aims to evaluate the value of stimulated dissatisfaction for the purpose of supporting practitioners’ empathic appreciation in early design direction generation. This paper argues that the reflective practitioner model of the designer must address the stimulation of dissatisfaction as a condition of creative and explorative design practice.

Understanding the Complexity of the Multicultural Design Work Team

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Designing digital artifacts for a culturally diverse market implies the thorough understanding of the psychological mechanisms derived from the social and environmental context. The next article introduces a research that investigates the relevance of cognitive and identity diversity (Page, 2007) in the working groups that have as a task the design of interactive services for digital environments. The argument of the article aims to understand how the diversity of the design group could help improve the nature of the interactive services designed for a multicultural market. Considering the craft of a virtual environment in terms of interaction metaphors that have to be understood by the end users, the step prior to the design of the above-mentioned environment is to be taken into consideration. Two pedagogical experiments placed in two different cultural contexts, Italy and China, will be presented in order to exemplify the prior findings of the research inquiry. First the common ground creation in the context of multicultural workgroups will be analyzed, and second the internal dynamic of the group reflected in the creation of the digital working model will be shown. Taking into account all the above, the question asked is: what methods and tools can be used to support an internal communication language of the working team and how the developed skills could then be applied to the process of designing digital interactive artifacts.

Implications of Spatial Abilities on Design Thinking

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The relationships between various cognitive characteristics and design creativity provide the necessity for consideration for design education. It can be argued that constructive perception ability that combines perception and conception and basic ability in visual reasoning composed of visual analysis, synthesis and representation in iterative nature are equally related with creative design ability. This paper reports findings of the application of a Spatial Ability measurement tool to first year design students and considers the results across three parameters, gender, University entrance Score and students' achievement in a first year Graphics course.

Engaging Complexity Through Collaborative Brand Design

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In this research we used inductive reasoning through design to understand how stakeholders in the Waterfall Way (New South Wales, Australia) perceive the relationships between themselves and the place they live in. This paper describes a collaborative design methodology used to release information about local identities, which guided the regional brand exercise. The methodology is explicit about the uncertainties and complexities of the design process and of its reception system. As such, it aims to engage with local stakeholders and experts in order to help elicit tacit knowledge and identify system patterns and trends that would possibly not be visible if a top-down expert-based process was used. Through collective design, local people were drawn together in search for a symbol to represent the meaning attached to their places/region in relation to sustainable tourism activity.

The Design and Development of Microcab

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The combination of the global economic crisis and the issues associated with reducing our carbon consumption has made the Microcab project both timely and relevant. The company is essentially a spin-out from Coventry University's design expertise. The project has been to design, develop and test a sequence of vehicles for urban transport using low carbon hydrogen fuel cell technology. The key process issue is whether a relatively straight forward and familiar design process can be followed up successfully by a design product evolution and testing programme which is complex. Its complexity is in its dependence on various funding sources, in its engagement with a changing array of development partners, and in its relationship to a number of public sector programmes.

Developing a Pedagogic Framework for Product and Automotive Design

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An approach to industrial design education based on 'transformative practice', which has the ambition of equipping students with a passport to enter the community of professional design practice, is described. This is mapped onto a version of the designerly way knowing which is illustrated as an analysis-synthesis model involving a conversation between the two cognitive modes, which are emphasised in various teaching activities. The uncertainty threshold, which is inherent in this, is both essential and routine, but can present problems for some students. The development of a re-designed course programme devised with a more flexible project delivery arrangement to accommodate these issues is briefly described. Its effectiveness is assessed through focus groups and feedback from early results is giving a broadly positive response to the new scheme.

Craft as a Form of Mindful Inquiry

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In this research project 'Communication of Craft Practice' is the subject and the problem is one of transparency of the intellectual act and accessibility to the embodied knowledge. Why? The skill of coherently expressing the intellectual and personal voice within the development of craft practice is usually missing. There is a gap in our knowledge.

The methodological framework is *Mindful Inquiry* which is a synthesis of critical social science, hermeneutics, phenomenology and Buddhism (Bentz and Shapiro, 1998). The research involves working directly with professional practitioners to embark on a series of creative journeys from which craft as an experience, process, product and service could be observed and evaluated. The practitioners included a 3-D metal designer, curator, interactive jeweller, product artist and woven textile designer.

The aim is to reassess the term craft practice as a means of understanding the impact of social, political and technological change by documenting the practitioner's thinking processes throughout a period of practice. It is to consider combining visual and written outputs as means of supporting the identification of the new knowledge gained through practice, and how this knowledge is used cumulatively to develop craft. The objective is to nurture a dialogue with practice and to document the process of thinking and making associated with craft.

This paper provides the context and framework for research as well as presenting the findings from it. It exposes the methods and the accompanying rationale for using them in relation to mindful inquiry, and it presents a new perspective from which to view and discuss craft practice. The argument is concerned with articulating the relevance of mindful inquiry as a methodology for critiquing and supporting the development of craft thereby supporting the contextual understanding and meaning of the research findings and procedures when they are presented. It is also to offer new craft knowledge in terms of the phrase 'practice'.

A Didactical Framework to Experiment the Potential of Visual Languages in Engaging Social Complexity.

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Development models often apply expert knowledge to social needs using a top-down approach, thus rendering these models insufficient in coping with the issues of a complex world. Effective changes in social systems arise from iterative and dialogic processes in which information and knowledge are exchanged between heterogeneous actors, building a common background that enables a shared hypothesis.

The design approach involves the ability to select results from various disciplinary fields, activating a trans-disciplinary circulation of concepts. Designers should use their skills to facilitate the emergence of a system, rather than concentrating on finding solutions to specific and well-identified problems. The focus should be on developing tools that can be self-adaptive, continuously modifiable and improvable by utilizing the ongoing process of wicked problem transformation. Social complexity requires new processes fundamentally attuned to the social and conversational nature of decision-making and design work; these processes should enable an increasingly valuable interaction level and dialogue among the actors of a social system.

And considering the Design discipline in respect to language, Communication Design could allow for the creation of visual and interactive languages relevant to the representations of Complex systems, thus creating shared visions within multi-actor contexts. In this sense, communication design can facilitate dialogues within participatory actions, and verify the potential of communication artifacts in supporting and externalizing sustainable and self-adaptive learning processes.

Therefore, the possibility of consciously facing social issues and orienting the behavior of complex social systems could benefit from the use of communicative tools and methodologies, thus supporting collective learning processes and building a common vision, shared by various stakeholders. Engaging complexity calls for visual languages.

Is systemic design the next big thing for the design profession?

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Design is increasingly used for tackling large and complex problems and this new systemic design thinking is often interlinked with large societal issues. This paper will give the historic background and context to this development; it will show how the overall economic situation affects the design profession as well as exemplify recent development of the design practice. In order to do this it will describe three case examples of recent design usage in large societal issues: the birth of a new university, the municipal commitment of using design to improve society and the national approach of Finland in pushing systemic changes through design.

Explaining and Relating Different Engineering Models of Functional Decomposition

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In this paper I analyze the use of different models of functional decomposition in engineering design. I consider models that refer to sets of desired behavior-functions, to sets of desired effect-functions, and ones that refer to sets of purpose-functions. It is argued that the choice for a particular model is affected by whether or not its construction will be based on known function-structure connections for the functions in the model or on known behavior-structure relations that implement the functions in the model. It is then argued that whether or not such knowledge is taken into account is affected by specific design objectives. Finally, I thus argue that the choice for and suitability of particular models of functional decomposition depends on the design objectives for which these models are employed. Based on this result, it is concluded that the co-existence of different functional decomposition-models has engineering value, defining the remaining task to relate them. To this end, a strategy is proposed for relating different models. The above analysis is focused on three approaches that advance particular models of functional decomposition: the Functional Basis approach in which models refer to sets of desired behavior-functions, the Functional Interpretation Language approach in which models refer to sets of desired effect-functions, and the Dual Stage approach in which models refer to sets of purpose-functions.

Approach for Designing Elderly Care Homes

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Most research has been unable to combine organisation, management and design studies. This seems a major shortcoming when looking at elderly care homes, because well-being in these institutions depends on all three approaches. Hence the aim of our research is to produce new knowledge on the interdependence of the three aspects. Special emphasis is put on planning processes. Numerous new buildings for the elderly will be planned in coming years and, at the same time, renovations of old buildings will be carried out. We will especially look at the design objectives for these undertakings.

This paper is about a work in progress by a team consisting of researchers and doctoral students in organisational and management studies at the University of Eastern Finland and design research at the Aalto University School of Art and Design. The four-year project started in 2009 and is funded by the Academy of Finland. Already in the early phase, the multidisciplinary team has produced inspiring new ideas.

One of the research methods has been to use photographic documentation of municipal and private elderly care homes. During visits to care homes in North Karelia, systematic documentation was created. Selected photographs were, then, discussed by six focus groups representing various stakeholders. This research material, experiences and documentation of visits and sessions, was used to describe and analyse conditions and concrete product environments, in order to lead to better understanding, planning and organisation in the future. In this paper, the concept of homeliness is examined from a design point of view and as a part of well-being, based on empirical data and literature.

L'utilisation du geste dans des réunions de conception architecturale

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L'importance de l'utilisation, dans l'interaction humaine, d'autres modalités d'expression et de représentation que l'audible (le "verbal") a été reconnue largement dans le domaine du *cognitive design research*. A quelques exceptions près, ce n'est toutefois que le graphique qui a fait l'objet d'études en tant que modalité d'expression et de représentation visibles (le "non verbal").

L'objectif à long terme de notre recherche est de déterminer la contribution relative de chacun des différents systèmes sémiotiques (verbal, graphique, gestuel et autres modalités d'expression et de représentation visibles) et leur articulation dans l'interaction entre des personnes dans des situations de collaboration. Dans ce texte, nous nous focalisons sur l'utilisation du geste dans la conception collaborative. Pour analyser celui-ci, nous avons conduit deux études empiriques basées sur des enregistrements vidéo de réunions de conception architecturale.

C'était sur la base de données verbales et, dans une moindre mesure, graphiques, que nous avons élaboré notre approche de la conception (, 2006). Nos analyses antérieures de la conception collaborative avaient conduit à y distinguer deux grandes familles d'activités, représentationnelles et organisationnelles.

Dans nos travaux sur l'utilisation de gestes dans des réunions de conception architecturale, nous avons retrouvé ces deux types de fonctions. En effet, les gestes y contribuent également à la construction de la représentation de l'artefact et à l'organisation des activités de conception et de l'interaction. L'analyse présentée ici montre en plus qu'ils le font d'au moins deux manières: dans une combinaison intégrée avec la parole ou de façon autonome, c'est-à-dire sans coexpression verbale.

Designing a design competition: the client perspective

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Design competitions are part of the design tradition since ages. Still structured empirical research about this topic is lacking. This paper describes the results of six months participatory observation as a member of a project team responsible for the organization of an international ideas competition. The data include observations, interviews and document analysis. The results for this paper focus on the design of the competition and stakeholder participation from a client perspective. The findings show four combinations of aspects that underlie several problems of design competitions as currently perceived by architectural practice: the dynamics of the brief, the balance between professionalism and ambition, the link between participation and competition aims, and the influence of expertise at client obligations. It is this constant search for a balance between ambitions, aims, opportunities and needs that make clients experience numerous difficulties during the design of a competition. It is however the same search that makes every competition unique and a wealth of information about clients and architectural design.

Findability of Commodities by Consumers: Distinguishing Different Packaging Designs

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What package design features can help consumers find commodities faster? This study assumes that the factors in distinguishing different packaging designs of commodities differ due to consumers' different personal experiences. Thus, this paper studies the findability of commodities by consumers through distinct packaging designs. It consists mainly of two stages: (a) the first stage reviews the existing literature to determine the application of different package designs; (b) the second stage is a focus group interview designed to investigate the factors influencing consumers in distinguishing different package designs. In the investigation process, (i) samples of package bottles for testing were collected through natural observation and convenience sampling; (ii) a focus group interview was conducted to determine how a consumer recognizes the differences among packages; (iii) a grounded analysis model was employed to transfer and encode the data collected from the focus group interviews to construct a conceptual frame for trade dress and the classifications of trade dress, which can interpret variations in the recognition of packaging design differences. The results of the focus group interview showed that consumers focused more on three kinds of "trade dress": property of commodity, label design, and bottle shape design when looking for differences in packaging designs. The "bottle shape design" was the most important factor that the focus group used in distinguishing different packaging designs. The distinction in the different package designs by consumers is not limited to design elements (image, language, color, shape, etc.) only; more importantly, the distinction lies in the relationship between "trade dress" and "classifications of trade dress," which can better reflect the differences in packaging designs.

Interdisciplinary Design: The Need for Collaboration to Foster Technological Innovation to Create Competitive and Sustainable Products.

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This paper explores an integral relationship between industrial design, advanced technologies, science, economy, and the environment to realize a logical trajectory for the future of product design. Through an investigation of current literature, key aspects and critical factors of interdisciplinary collaborative work are explored. By realizing the benefits and obstacles, this paper suggests a framework in which scientists, engineers, and designers can work together successfully to create innovative solutions for product design. The paper discusses the possibilities of material synthesis through the scientific field of biomimetics. It also suggests that the Industrial designer's role must evolve into a position of project facilitator and communicator. To conclude, this paper mentions technologies utilized currently in this fashion and ideas are proposed to further guide this framework.

Thinking about Design Experience: A Semantic Network Approach

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Social network analysis software has been used in this study to reveal individual and collective perceptions of space from different perspectives. The paper outlines how to analyse an 'environment-response' semantic network of a user group and that of the architect. The semantic network of the designer was found to be quite different from the users of their designs, a starting point from which to question how far designers of space are able to anticipate what impressions and reactions their designs elicit in users.

Determining what thematic clusters or topics emerge (called 'metatopics' in the study) from the networks is a primary aim. The networks usually contain 4-7 metatopics. A range of network analysis algorithms, calculating measures such as centrality and proportional strength of ties are applied to identify important constructs and help identify metatopics. These metatopics can also themselves be ranked and compared through network analysis indicators. Through these tools, new observations on the structure of collective mental representations of built environments are gathered.

Assessing Creativity in the Context of Architectural Design Education

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In a study on architectural education in Australasia, Oswald and Williams (2008a; 2008b) found that one of the most contentious issues facing architecture and design education is the assessment of creativity. The problem is not new, yet, despite ongoing criticism of the frameworks used to assess creativity in architecture and design, the assessment of students' creative work remains a vexed issue. Central to the problem of assessment is the lack of an unambiguous disciplinary definition of creativity. The concept of creativity has been understood in different and often conflicting ways, and across the design disciplines there is no shared understanding about creative processes and, in particular, how they apply to learning and teaching experiences. The paper briefly outlines the main problems related to assessing creativity before exploring the complexity embodied in the notion of "creativity" as it relates to design education. The research presented in this paper is derived from an extensive and critically framed literature review and forms part of an ongoing research project concerning the question of creativity within design education.

Insights into Insight – How do In-vitro Studies of Creative Insight Match the Real-world Complexity of In-vivo Design Processes?

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This paper presents approaches to study insight in the context of creative (design) processes. Evidence for the discrepancies between experimental and observational studies of insight moments is collected from the literature. Implications for conducting integrative research that addresses the complexity of real world design environments are discussed. Preliminary results from two case studies looking for insight moments of design teams working on real world design tasks at a medical appliance manufacturer and within an interior design project are reported. A multi-methodological framework inspired by in-vivo-in-vitro research together with ethnographic and practice based approaches is developed and applied.

Designing Contemporary China: National Design Identity at the Crossroads

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China is an ancient civilization rapidly developing in a globalized post-modern context. The country now finds itself at a crossroads, with outside ideologies and forces of “Americanization” and “Westernization” competing against its cultural heritage and communist economic system to form a national design identity for contemporary China. This paper uses the rise of modern design in China, design examples from Hong Kong and Taiwan, the 2008 Beijing Olympics opening ceremony, and Victoria & Albert Museum’s *China Design Now* exhibit to investigate questions of national identity as they pertain to design. It argues that, with the whole world watching China’s rise as a global economic power, the real challenge facing Chinese designers is how they can create a “new” image of China to present to the rest of the world, particularly the West, if they don’t wish to be stereotyped by images from the ancient past.

To discuss the potential impact of Western design and economic influences on the development of a contemporary national design identity, this paper first investigates the relationship between a designer’s ethnic background and creative work to search for a possible direction of development of a contemporary national design identity for China. It concludes that cultural factors do not play a key role in every design project undertaken by Chinese designers in the Greater China region, but rather that decision depends on the nature of the design job. However, the author recognizes the importance of studying the cultural artifacts of this great civilization, as well as the urgent need to establish design curricula with Chinese elements, in order to discover how to establish a modern international style with a contemporary Chinese touch – that is, its contemporary national design identity.

Creating an Electronic Patient Held Health Information Card

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In many areas of health care, professionals rely on patients to provide information about their medical history. However, patients may not be able to remember details or communicate essential information relating to, for example, current conditions, medication and allergies. Currently no central system exists which serves all the UK. Therefore, an electronic, patient held health record system has been proposed as a way of improving patient safety. This development has been driven by a user centred process, from requirements capture to iterative development, longitudinal trials and dissemination. Through this process the project has raised debate and awareness amongst the public and medical professionals about power relationships within the health service and the need for the public to take a greater responsibility in matters related to their own health.

Pupil Participation in School Design

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Over the last decade, UK policy interventions relating to the (re)design of schools have stressed the importance of pupil participation in programmes such as Building Schools for the Future, Academy Schools, and Primary Capital Funding. A two year project was conducted to explore the possibilities for, and present state of, pupil involvement in classroom (re)design and design decision-making. Through in-depth qualitative data drawn from pupils, school staff, Local Authority officers and other stakeholders, the relationships and tensions between the ideals of participatory design as expressed in national policy statements and the ways in which such participation is happening in practice was investigated.

Cultural Appropriation in Design and 'The Cipher'

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Dynamics of globalization redefine objects as agents of cultural exchange in various everyday contexts. Design activity constitutes a significant channel of cultural exchange because it presents objects to a system of social interactions that does not require geographical proximity of cultures. Design's conceiving a cultural element in a product, thus starting the process of commoditization involves practices of cultural appropriation. Appropriation of cultural elements from their local contexts to be designed or re-designed translates the element's cultural value into an exchange value that presents '*negotiated decodings*' (Rogers, 2006) of the 'different other'. Through design channels, '*the cipher*' (Ono and Buescher, 2001), '*a figure through which various commodities with multiple exchange values are marketed*', is produced as '*a social concept that circulates like a commodity*' (Ono and Buescher, 2001, p. 26). '*The cipher*' sets cultural stereotypes by encoding selected characteristics of a culture in a series of products and limits the (articulation) capabilities of design agency down to commodities floating in the market without any original cultural content.

Design's interpretation of culture needs a critical reflection on the processes of commoditization and practices of cultural appropriation. Through this critical reflection, design's capabilities to propose new grounds for cultural exchange as an ongoing process of growth can be explored. This paper discusses cultural appropriation as a key strategy in design's interpretation of culture in products and recognizes cultural appropriation as a practice for creating '*the cipher*' through cultural encoding and decoding. The research project named 'A Kaffiyah Project' presented in this paper focuses on the transformation of the *kaffiyeh* (the Middle Eastern headdress) from a traditional element of cultural identity to a fashion statement in different parts of the world. By using strategies of creating '*the cipher*', the research explores and documents ways of decoding cultural stereotypes through design processes.

Yo Soy Yo Y Mi Circunstancia: My Life as a Cleaner

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Initial research by the authors using an online survey of over six hundred participants analysing what (if any) activities lead to discomfort, particularly in the hand, showed that cleaning tasks and in particular, mopping, sweeping and hoovering led to higher levels of hand discomfort than other ADL's (Carre, 2009). Activities of Daily Living (ADL's) such as cleaning, hoovering, mopping, and so on have had little or no previous research undertaken on them. In 2005, Tresea et al., examined the prevalence of work related injury and explored barriers to, and experienced of, reporting them amongst workers. The results showed that over one year, three quarters of the workers studied experienced work-related pain. With reference to the above study, the authors defined two categories of cleaning activity, termed heavy work and light work. 'Heavy' work was characterized by neutral postures, walking, repetitive movements involving the articulations of the upper limb pushing a 1-6 kg (wet or dry) mop, with occasional more intense effort. 'Light' work was characterized by flexed postures, walking, rapid repetitive movements involving the articulations of the upper limb and the movement of light weights (dusting) or 1-3 kg weights (emptying wastebaskets), with more occasional intense effort (Teresa et al., 2005).

It was proposed to study the process of using cleaning equipment such as a mop, brush and hoover and ascertain what factors may lead to discomfort particularly in the hand. However to inform the design of the questionnaire's, tasks to be analysed and experimental set-up, one of the authors took a job as part of this cleaning team and has worked for over two years as a cleaner, logging their own experiences and activities in a diary and recording the experiences of their colleagues.

This paper details those experiences with comments and reflections from the diary work and demonstrates how the experiential approach led to improved design of experiments and data gathering.

Retail Design and the Visually Impaired: A Needs Assessment

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This study represents a first attempt to investigate the need for universal retail design in Canada. Specifically, the research objectives were to expand understanding of the unique challenge of visual impairment and the shopping experience of visually impaired consumers, and to identify gaps in retail design in order to better serve the visually impaired community.

The researchers conducted three focus group interviews with a total of 17 informants recruited by an independent consultant who was affiliated with a visually impaired advocacy organization in the Greater Toronto Area in Ontario, Canada. Data were transcribed and then analyzed using QSR NVivo 8.

Findings suggest that mobility is the biggest daily challenge facing visually impaired consumers. Retail shopping involves significant effort at every step of the process for visually impaired shoppers, including getting into the store; judging product quality; distinguishing colour; reading labels, store signage, and receipts; negotiating store layout and fitting rooms; dealing with store lighting; and interacting with sales associates. This paper identifies visually impaired shoppers' needs for universal retail design, discusses implications, and makes recommendations to policy makers and industry practitioners in the defined fields.

Approaching Product Subjective Sustainability: Comparative Study on Evolution of Users' Kansei during Lifetime of their Mobile Phones between Iran and Japan

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Most of the scholar works about Sustainable Design treat of the objective side of product sustainability, whereas its subjective side has not been observed adequately. A sustainable product should be able to last in its expected lifetime not only objectively but subjectively. The main focus of design researches concerning the subjective issues of sustainability is on 'lifetime optimization of products'. Focusing on the subjective side of product sustainability, here the concept of 'Product Subjective Sustainability' is proposed to specifically indicate 'the emotional, affective and/or aesthetical capability of a product for satisfyingly and pleasantly lasting during its expected long/short lifetime'. However, such a concept may generally encompass all possible subjective effects of the product on sustainability values. This research basically aims to clarify 'Product Subjective Sustainability' experientially. As *Kansei* embraces much wider subjective issues of product than emotion, this study is based on *Kansei* Engineering approach. Here, a comparative and analytical study is done on the evolution of users' *Kansei* toward their personal product during its entire lifecycle in two different contexts, Iran and Japan. The product lifecycle from user perspective is divided into three stages including purchasing or choosing, keeping or using and replacing or throwing away the product. The assigned personal product for this comparative analysis is mobile phone which is an approximately short-lived product. Thus, two groups of Iranian and Japanese subjects are investigated about their senses, feelings and/or emotions (ie *Kansei*) regarding their mobile phone during each of its lifecycle stages. After extracting the patterns of evolution of their *Kansei* and thence drawing the trends of subjective sustainability of mobile phone in Iran and Japan, the resulted patterns and trends would be compared.

Dealing with the Human-centered Approach within HCI Projects

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Our interactions with objects or/and systems through digital screens are constantly increasing. Industry and information technology have more and more ambition toward offering new functions and interactions through these computerized systems. At the same time as the complexity of these systems is escalating, the complexity in designing them also grows. While user-centered approaches and usability in the area of human-computer interfaces (HCI) have been thoroughly researched for more than a decade now, we still encounter regularly unsatisfying interfaces. It is generally recognized that the design of HCI within multidisciplinary teams brings better answers to users. However as design practitioners, we see the inadequacy when it comes to working with other disciplines, at the conceptual level, and in creating shared understanding and new knowledge regarding user-centeredness. The paper explains what factors contribute to user-centered design and how we can see the inadequacy within multidisciplinary teams. Aiming to create the conditions for knowledge sharing and emergence of innovative and sustainable solutions, we propose a model called environment for reflective collaboration that encourages interdisciplinary attitude and allows for achieving joint reflective practice. Both seem necessary for dealing with the complexity of HCI. In this model, design is used as a method to understand people. Applying this design process in the early stages of a project provides the needed structure for collaboration. We explain the model as used in a real project, and we explain how a project-grounded approach helped the team bridge theory and practice.

Inspiring from the Works of Other Architects in Reinforcing Students' Creativity

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The present article investigates “the role of influences of other architects’ works” as a learning tool in order to improve the creativity of the architecture students. Firstly, the definition of creativity is discussed and then the view points of creativity in the sphere of architecture follows. Secondly, a model is presented on the need of the presence of creativity in the deep layers of a creative architectural work. In the presented model, the need of the element of creativity, at least in three major phases in the deep layers of an architectural work, will be explained.

Afterwards, the concern of “influences of other architects’ works” is discussed by considering two main states of conscious and subconscious forms and then the article concludes that unlike the orthodox view point of some architecture teachers who believe that “influences of other architects’ works” blocks the innovative architectural ideas, it can play a major role in at least two stages of the presented model of creativity and increases the possibility of reaching creative solutions by the architecture students.

As a supplementary, and to clarify the point that the treatment of teachers for the so-called influences has to change as students’ cognitions of architectural works change, the concept of “cognition” itself will be discussed.

It must be mentioned that in some cases, the author has made use of polls containing the views of both the teacher and the student about the case study. These polls were answered by 10 architecture teachers of Tehran University and Shiraz University of Iran who had a broad experience in teaching the architecture material and also 40 students who were recently graduated from the colleges.

Integral Design Method in the Context of Conceptual Sustainable Building Design

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Global warming, shortage of fossil fuel and rising energy prices are endangering humanity. The built environment is responsible for a large part of the energy use and waste production. Traditional building design approaches essentially lead to redesign and optimization, whereas to meet the unique challenges for sustainability in the present day built environment, we need to go further and generate new concepts and knowledge that represent the necessary conditions to arrive at new sustainable design solutions.

This research set out to develop a method to create a more integral process that would create the opportunity to introduce a greater variety and amount of design knowledge from the outset of the conceptual design phase. The approach was tested by using series of workshops in which more than 100 experienced professionals participated. The Integral Design method [ID-method] developed here, given the right cultural environment, may in time lead to the generation of new building concepts that will allow us the opportunity to move beyond redesign and optimization. The necessity of concept creation is shown by C-K theory that defines design as the interplay between two interdependent spaces, knowledge space K and concept space C, which allows us to conceive of the possibility to transform the building design team’s knowledge into new concepts.

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