

SENSES & SENSIBILITY IN LISBON

DESIGN,
MARKETING,
AND VISUAL
CULTURE
IN THE RIGHT
PLACE



SENSES
and SENSIBILITY
in LISBON

2011

6TH INTERNATIONAL CONFERENCE

6TH UNIDCOM/IADE INTERNATIONAL CONFERENCE

6TH TO 8TH OCTOBER

+ DRAWING RESEARCH NETWORK CONFERENCE

5 OCTOBER

PROCEEDINGS

DRAWINGS

BOOK

DRAWING
RESEARCH
NETWORK
CONFERENCE
5TH OCTOBER
2011

LOCATION:

EXPERIMENTA
LOUNGING SPACE
ANTIGO TRIBUNAL DA BOA HORA,
LARGO DA BOA HORA,
AT RUA NOVA DO ALMADA,
CHIADO/LISBOA

PRO- GRAM

08h30

Registration starts

09h00

Welcome :: Eduardo Corte-Real

09h30

Parallel WORKSHOPS starts

WORKSHOP #1

"Knowledge to Practice; Can new knowledge from cognitive psychology inform drawing pedagogy?"

Coordination: Michelle Fava

WORKSHOP #2

"Take a line on the wild side", a guided tour through the heart of Lisbon.

Coordination: Ana Iglésias

WORKSHOP #3

"The Fast Picture Show", drawing experiences with the eye-tracker.

Coordination: Vítor Simões

WORKSHOP #4

"Live is Life", drawing nude-models from observation.

Coordination: Rita Maia Moura

Carali McCall and Jane Grisewoond, Artists, London, UK

The Sense of Drawing: An Approach to Drawing, Marking and Experiencing

13h00

Lunch

14h00

Visioning and discussing the film:

"Pelas Sombras" by Catarina Mourão

16h30

Coffee Break

16h45

Plenary session DRN

Deborah J. Harty, Simon Downs and Steve Garner

17h45

Break

18h00

Visual Documents about the Workshops and final discussion

18h30

Closing Cocktail

6TH UNIDCOM/IADE
INTERNATIONAL
CONFERENCE
6TH TO 8TH OCTOBER

2011

PRO- GRAM

DAY
01

LOCATION:

EXPERIMENTA
LOUNGING SPACE
ANTIGO TRIBUNAL DA BOA HORA,
LARGO DA BOA HORA,
AT RUA NOVA DO ALMADA,
CHIADO/LISBOA

⌘afternoon⌘

14h00 :: Paralell Sessions

DRAWING 1 - ROOM A

Amanda Roberts & Howard Riley, Swansea Metropolitan University, UK

➤ Drawing, Gesture and Semiotics: an exploration of the semiotic potential of gesture drawing

⑧ Jac Saorsa, IADE, Portugal,
An ontological exploration of fine art drawing practice and its relevance to design education

Ian McInnes, Heriot Watt University, UK
Drawing as a precursor for innovation in knitted textile design and production in the manufacturing industry

⑧ Emily Strange, Manchester Metropolitan University, UK
The diagram

SENSITIVE DESIGN 2 - ROOM B

Theresa De Lobo, UNIDCOM/IADE, Portugal
Way finding systems for users with visual disabilities

Ana Correia de Barros, Carlos Duarte, José Bulas Cruz, UTAD - UNIDCOM/IADE, Portugal
Complexity in inclusive design: needs for opportunities?

Denis A. Coelho, Ana S. Cunha e Silva, Carla S. M. Simão, Human Technology Group, Dept. of Electromechanical Engineering, UBI, Portugal
Design for cultural inclusion and identification: a transition of portuguese and lusophone cultural aspects to furniture design, based on product personalities

SOCIAL CHANGE 2 - ROOM C

Maria-João Félix, Paula Taveres e Pedro Mota Teixeira, Depart. of design / School of Technology / IPCA
The Semantic and Cultural Aspects Related to Products

Carlos Barbosa, IADE/FA.UTL
Avieiro Boat: its recovery as an anthropological reference and as a sustainable development factor.

Ana Grácio, FA.UTL
From Crafts to Design: transpositions and cooperations for the contemporaneity

Cátia Rijo, IADE/FA.UTL
The site of Alcântara: identity and image

16h00 :: Coffee Break

16h15 :: Paralell Sessions

DRAWING 2 - ROOM A

Carali McCall and Jane Grisewood, Artists, London, UK
The Sense of Drawing: making sense through sensibility (knowing through drawing) - as part of performance drawing collective

Rachel Cohen, Artist, UK
The chinese whispers generative drawing project
Julia Midgley, Liverpool School Art & Design, L.J.M.U., UK
Reportage: from atrocities of war to a skateboarding cockpit

SOCIAL CHANGE 3 - ROOM C

Marco Neves, FA.UTL
The printed object, but digital

Miguel Sanches, IPT/FA.UTL
Colour translation

Rita Maia Moura, IADE/FA.UTL
The graphic work of José Maria Lima de Freitas (1927/1998)

Theresa de Lobo, IADE
Way finding Systems for users with visual disabilities

18h15 :: End of day one

⌘morning⌘

08h30 :: Registration Sarts

09h30 :: Plenary - ROOM A

Welcome

Carlos Sá; Carlos Duarte; Eduardo Côte-Real

10h00 :: Plenary - ROOM A

KEYNOTE SPEAKER

⑧ CLIVE DILNOT

Parsons New School for Design, New School University, NY, US
On becoming a human being (in part through design)

10h40 :: Coffee Break

11h00 :: Paralell Sessions

PRINCIPIA - ROOM A

Galina Lota, St-Petersburg State University, Russia

➤ The <Narrative Cocoon> as a model of design product

Beth Mosher, Rhode Island School of Design, US
Exploring ethical issues of mass-production in industrial design through time-based medium

➤ Helena Barbosa, Universidade de Aveiro, Portugal
Around design principia: a study of 400 years of portuguese poster

➤ Sara Velez, Universidade da Beira Interior, Portugal
Design and the aestheticization of scientific knowledge

SENSITIVE DESIGN 1 - ROOM B

Alison Burrows, Val Mitchell and Colette Nicolle,

Loughborough Design School, UK

All together now: factors that foster older adults' feelings of independence

Dina Riccò, Elena Caratti, Cibele Bustamante, Politecnico di Milano, INDACO Department School of Design, Milan, Italy
Synaesthetic access to visual contents: audio description of films for visually impaired people

SOCIAL CHANGE 1 - ROOM C

Brooke Chornyak, Virginia Commonwealth University/USA,
Tools & Templates: the application of umberto eco's open work in design practice

Salvatori Di Mauro, Queensland College of Art Griffithh University Community Ownership

André Alves Campos, ESAD/IM
Design and utopianism: a strategy of evolution against a future between brackets

Fernando Martins, IADE/Escola das Artes/UCP
The limit of the deterritorialization of the arts

13h00 :: Lunch

PRE-CONFERENCE

OCTOBER 5TH 19H00

WELCOME COCKTAIL

EXPERIMENTA
LOUNGING SPACE

8TH UNIDCOM/IADE
INTERNATIONAL
CONFERENCE
6TH TO 8TH OCTOBER

2011

PROGRAM

DAY 02

☾morning☽

08h30 :: Registration continues

09h30 :: Plenary - ROOM A
Welcome day 2

10h00 :: Plenary - ROOM A
KEYNOTE SPEAKER

MÁRIO J. MIRANDA, School of Economics and Finance,
Victoria University, Melbourne, AU
The artist and scientist in marketing - The dyad
that creates opportunities to experience

10h40 :: Coffee Break

11h00 :: Paralell Sessions

DRAWING 3 - ROOM A

Christine Turner, Liverpool John Moores University, School
of Art and Design, UK
Realising higher creative knowledge through
drawing practice

Robin Schaeferbeke, Sint-Lucas School of Architecture,
Belgium

Re-Thinking the way we draw in a digital reality
Izmer Ahmad & Caroline Bew, Universiti Sains, Malaysia
& Kingston University, UK

Gesture, mark making, drawing: the role of
gesture in conditioning the meaning of drawing

MARKETING 1 - ROOM 2

11h00 - 11,30h ::

António Pimenta da Gama, IADE- Portugal

Marketing audits in the turn of the century:
perspectives and insights

11,30h - 12,00h ::

Alicia Izquierdo -Yusta, University of Burgos, Spain
María Pilar Martínez Ruiz, University of Castilla-la-
Mancha, Spain; Ana Isabel Jiménez Zarco, Open University
of Catalunya, Spain; Laura Merino Uzquiza, University of
Burgos, Spain

Assessing Changes in consumer behaviour
patterns in response to the crisis: the case of the
fast-moving consumer goods (FMCG) industry

12,00h-12,30h ::

Luis Manuel Cerdá Suarez, University Carlos III - Madrid
and ETEA - Cordoba University, Spain

The location of new shopping centres using
geodemographics: a strategic approach

SOCIAL CHANGE 4 - ROOM C

Santa Klavina, IADE/FAUTL
Sustainable makeover in lisbon downtown:
redesign vacant building into design hotel

Eduardo Gonçalves, IADE/FAUTL

Lighting Design - New paradigms of urban space
and user

Lorenzo Secco, Università IUAV di Venezia

Designing medical devices: sensibility beyond
Science

Demétrio Matos, Esc. Sup.Tecn./IPCA
Contribution of design in the development
process for medical devices

13h00 :: Lunch

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LARGO DA BOM NOVA
PT RUA NOVA DO ALVARA
CHIADO/LISBOA

☾afternoon☽

14h00 :: Paralell Sessions

DRAWING 4 - ROOM A

Annelies De Smet, Sint-Lucas School of Architecture,
Belgium
Le Lit du Hasard

Maria João Félix, IPCA, Department of Design, Portugal
The drawing tools for game design and animation

Armando Vilas Boas, IADE
Has design lost its aura?

MARKETING 2 - ROOM B

João Pedro de Lucena, IADE
Measuring television content value from an
advertising perspective

Narissara Parkvithee & Mário J. Miranda, Victoria
University-Australia

The interaction effects of country-of-origin,
brand and purchase involvement in motivating
consumer preference of clothing labels

María Pilar Martínez Ruiz, University of Castilla-la-
Mancha-Spain; Alicia Izquierdo-Yusta, University of
Burgos-Spain, Agustín Alvarez-Herranz, University of
Castilla-la-Mancha-Spain; Pablo Ruiz-Palomino, University
of Castilla-la-Mancha-Spain

Factors underlying grocery store attributes:
assessing differences between store brand-
prone consumers and manufacturer brand-prone
consumers

SOCIAL CHANGE 5 - ROOM B

Américo Mateus, Carlos Alves Rosa, IDIMCOM/IADE
Creative intelligence methodology Ideas
(R)evolution: a proposal for two new stages of
the design thinking process

Miguel Câmara, IADE
In the heart of change: social responsibility and
co-creation

João Flecha, IADE/FAUTL
Dynamical crosscultural design approach:
designing new project interactions

16h00 :: Coffee Break

16h15 :: Paralell Sessions

DRAWING 5 - ROOM A

Mario Minichiello, Birmingham City University, UK
Drawing as Visual Communication

Toni Hildebrandt, University of Basel, Switzerland
Le plaisir du geste

Graça Magalhães, Universidade de Aveiro, Portugal
Drawing as a metaphor for design: drawing as
image, project as representation

ERGONOMICS 1- ROOM B

Álvaro M. Sampaio, António J. Pontes & Ricardo
Simões, Institute of Polymers and Composites IPC/IZN,
University of Minho; Polytechnic Institute of Cavado and Ave,
Campus do IPCA

Ergonomic evaluation in product design for
surgical instruments traceability

Luís Teixeira, Emília Duarte, Elisângela Vilar,
Francisco Rebelo, Ergonomics Laboratory. FMH/Technical
University of Lisbon, Portugal; UNIDCOM/IADE, Lisbon, Portugal
The use of virtual reality for design studies

Lara Reis, Emília Duarte & Francisco Rebelo,
UNIDCOM/IADE, Lisbon, Portugal; Ergonomics Laboratory,
FMH/Technical University of Lisbon, Portugal
Designing inclusive technology-based warnings
using a Virtual Reality-based methodology

Paulo Noriega, Elisângela Vilar, Emília Duarte &
Francisco Rebelo, Ergonomics Laboratory. FMH/Technical
University of Lisbon, Portugal; UNIDCOM/IADE, Lisbon, Portugal
Affordances in the design of road environments:
for better road safety

TEACHING MARKETING - ROOM C

Luis Manuel Cerdá Suárez & Casimiro Francisco
Ramos, ETEA-University of Cordoba, Spain & IADE-Lisbon,
Portugal

Leadership in the classroom: an empirical
analysis in two countries

Isabel Farinha, IADE-Lisbon, Portugal
In-school marketing: between social
responsibility and commercialism

José Ferro Camacho, IADE-Lisbon, Portugal
Current and promising research themes in
marketing: empirical approach

18h15 :: End of day two

20h00 :: CONFERENCE DINNER
CHIADO HOTEL (to be confirmed)

DAY 03

☾morning☽

08h30 :: Registration continues

09h30 :: Plenary - ROOM B
Welcome day 3

10h00 :: Paralell Sessions

ERGONOMICS 2 - ROOM B

Leman Figen Gül, Department of Architecture. TOBB
University of Economy and Technology, Söğütözü, Ankara,
Turkey

Studying affordances of digital design modes
Elisângela Vilar, Francisco Rebelo, Paulo Noriega,
Luís Teixeira, Emília Duarte & Júlia Teles, Ergonomics
Laboratory. FMH/Technical University of Lisbon, Portugal;
UNIDCOM/IADE, Lisbon, Portugal

The Role of path selection in the design of
videogame worlds: a pilot study using Virtual
Reality

Leong Yap, Faculty of Design & Creative Technologies, AUT
University. Auckland, New Zealand.

Ergodesign: harmonising art and science
methods & tools in evidence-based human-
centered system research, design and
development

SOCIAL CHANGE 6 - ROOM C

Magali Oihats, UFSC/Parsons Paris
Branding Favela Fashion

Helder Cardoso, UFSC/LOGO

Brand Land: branding as a factor in recovery and
differentiation of territories

Patricia Cecatto, UFSC
Brand in times of cross-media: a glimpse of
graphic design

Fernando Oliveira, IADE/FAUTL
Diagrams & Brands: contributions and reflections
on the use of diagrams in the analysis and
construction of the visual language of brands

10h40 :: Coffee Break

11h00 :: CLOSING - ROOM A ::

KEYNOTE SPEAKER

GILLO DORFLES & ALDO COLONETTI

13h00 :: End of day three

ERGODESIGN: HARMONISING ART AND SCIENCE METHODS & TOOLS IN EVIDENCE-BASED HUMAN-CENTERED SYSTEM RESEARCH, DESIGN AND DEVELOPMENT

LEONG YAP

FACULTY OF DESIGN & CREATIVE TECHNOLOGIES

AUT UNIVERSITY

AUCKLAND, NEW ZEALAND

keywords:

ergodesign,

methods

& tools,

disciplines,

hybrid

paradigms

Abstract:

This paper argues that current methods and tools for product, service and system designs are becoming increasingly ineffective for solving complex design problems or for justifying opportunities in human-centred design. Advanced technologies are changing the landscape of design. Because design has concentrated as a practice-based profession, aimed at industrial processes and mass production, since its inception from the Bauhaus in 1938, the discipline is lacking behind other disciplines such as the natural and applied sciences. The Kyoto Design Declaration (2008) has proclaimed that a paradigm shift from technology driven development to human centred development is in progress to seeking better methods to design new values, new ways of thinking and adaptation to change. Design as a subject for creating materialistic values has no robust methods or tools for developing a grounded theory to build a body of new knowledge. The development of science and technology is advancing at an alarming rate. Design methodologies, methods and tools have not shifted to address these changes. Ergodesign – a hybrid of ergonomics and design – is discussed in this paper as a mixed research-design paradigm to address the growing disciplinary complexity in which design has to mediate to enable innovation to take place in the future. The sense and sensibility of Ergodesign, as a hybrid research method and design approach is argued along with an intensive-care patient monitoring research project to demonstrate its potency. The case study will highlight the symbiotic capability of Ergodesign as a knowledge generating research tool, as well as a constructive design method for information synthesis, product design and development process, and system evaluation approach in evidence-based research and evidence-based design.

1. Sense and sensibility of ergonomics and design

By 3 methods we may learn wisdom:

First, by reflection, which is the noblest;

Second, by imitation, which is the easiest; and

Third, by experience, which is the bitterest.

Confucius.

Ergonomics, or Human Factors is defined by the International Ergonomics Association as “the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theoretical principles, data and methods to the design in order to optimize human well-being and overall system performance. Ergonomists contribute to the design and evaluation of tasks, jobs, products, environments and system in order to make them compatible with the needs, abilities and limitation of people” (Karwowski, K. 2000).

This definition implies that ergonomics consists of two significant components:

- a) A Research Science that seeks to understand the behavioural and performance responses of human beings in a system, and
- b) An Applied Art that uses behaviour principles and data to the design and development of a system (Meister, D. 2000).

The main aim of this paper is focused on delineating and questioning the effectiveness of ergonomics methods and tools as a research science for the generation of data and understanding of the human operator or user, and the application of this information in the design of functional, usable and desirable human-equipment-environment systems in evidence-based system design. This often calls for the Synergetic Insights of Pragmatism, Creativity, Empathy and the Sense and Sensibility of Ergonomics in Design research and practices.

The paper argues, with evidence from a practice-based design research case studies – a patient monitoring system for critical care – that contemporary ergonomics methods and tools are incongruous in the design process for the creation of complex products,

services and systems. This incompatibility of “ergonomics in design” will be discussed in detail to illuminate the fact that in equipment and system design, our understanding of the creative process has developed to a point that it is now too vast for the “theory and application” of ergonomics to be subsumed in its existing form. It is increasingly impossible and confounding to delineate the human factors and design elements separately. Nor it is necessary to do so. It is becoming impossible to decide when ergonomics ends and when design begins during system inquiry, ideation, design and development.

There are still considerable difficulties within Ergonomics and Human Factors Engineering in transforming much of its theory into sound design practices. One of the main reasons is that most ergonomists are not “interdisciplinary oriented”. As scientists, we are not trained to participate in design or able to organise our findings in a format that is useful in the design process or for the designer to use.

The Ergonomic Approach – even under its expanded form – Macroergonomics – still presents problems in terms of its creativity, or accessibility to designers. Disciplinary and application barriers remain: Ergonomist solve problems by analysis; designers solve problems by synthesis. The two activities are at the opposite ends of the research-design continuum. This is the reason why ergonomics has established itself remarkably well as a science. As a technology (applied science), however the contribution of ergonomics has been much less successful. Only a mere 25% of ergonomics research has some potential of ever being applied to the design and improvement of the human-machine system (Van Cott, 1971).

2. *Ergodesign*

A paradigm shift in the way we do research and practice design is long overdue. The answer lies in the creative harmonising and fusion of Ergonomics and Design to coerce a more compatible, and integrated approach for ergonomics theory and design application to coexist iteratively and seamlessly. This is the concept of Ergodesign.

Ergodesign – a new hybrid interdisciplinary design paradigm will be discussed in detail along with its application in the research, design and evaluate of one of the most critical hospital patient care systems. I will highlight that the use of ergonomics and design as separate disciplines militates cohesive design thinking and the creative processes. Besides, the symbiotic aspects of Ergodesign, the truly interdisciplinary attributes become an effective

and synergistic design tool, that is significantly more powerful and effective than conventional approaches of applying ergonomics and design as separate disciplines.

The Ergodesigner as a scientist, a designer, as well as a change-agent plays a vital role in problem solving, designing and ensuring that the function, usability and safety of intricate human-equipment-environmental systems are well researched and well developed. The patient monitoring system for intensive care constitutes the main theme of the discussion to demonstrate the application and efficacy of Ergodesign.

2. 1. *Ergonomics In Evidence-Based Design*

Effective research methods and tools that enable poetic design solutions to take place are not only rare, but they usually exist in disciplinary narrowness that shackles the synthesis process during analysis and insight construction. Kolko (2011) maintains that it is common for designers to go through the design synthesis in conjunction with problem solving. The process is seldom expressed separately from the process of form giving. The creativity that this involves in the synthesis process usually takes place heuristically in the designers thought processes. “Regardless of the specific synthesis action the designer takes, synthesis and insight-forming are always generative. It is an iterative process, that besides merely forming ideals and insights, it always produces more data, information and knowledge before the process started”. The synthesis or insight-building process therefore is different to the scientific or empirical study that seeks to understand a phenomenon. In design, “synthesis seeks to understand the facets of things that do not yet exist by bringing them into existence, and the process of synthesis helps to guess what people will do, feel, or think once the thing that does not exist, exists” (Kolko, 2010).

Design synthesis, insight forming and affective sense making are abductive processes that infer from meanings that have been captured by more factual scientific or empirical studies – such as in Ergonomics. Abduction is an important mental process in Ergodesign. It is an evidence-based design process that produces pragmatic insights via the iterative heuristics process to producing new realities. While the deductive and inductive processes are fundamentally for the production of new knowledge, abduction is primarily the process of creative reflections to designing new things that are informed by data, information and knowledge generated by deduction and induction – generally speaking.

The Design Council of Great Britain described design as an activity that translate idea into blueprint for something useful, whether it is a product, a posters service or a process. “Scientists can invent technologies, manufacturers can make products, engi-

neers can make them function and marketers can sell them, the Council says. But only designers can combine insight into all these things and turn a concept into something that's desirable, viable, commercially successful and adds value to people's lives. This statement indicates the importance of a rigorous synthesis process to ensure that valid data are used reliably to inform design viabilities.

It would seem strange to an Ergonomist that this paper considers it important to discuss the need of evidence in research and design in our own discipline. However, as art and design have conventionally been considered to use the heuristic process and intuition, it is pertinent that a brief discussion of evidence-based design is included here. Typically Evidence-based design is considered as an approach to say, healthcare design that give importance to design features that impact patient health, well-being, mood, and safety, as well as staff stress and safety. (en.wikipedia.org/wiki/Evidence-based_design)

Evidence-based design is the natural parallel and analogue to evidence-based medicine. An evidence-based designer – such as an Ergodesigner – together with an informed client, makes decisions based on the best information available from research and project evaluations. Critical thinking is required to develop an appropriate solution to the design problem; as in most design problems the pool of information will rarely offer a precise fit with a client's unique situation. In the last analysis, though, an evidence-based design should result in demonstrated improvements in the organization's clinical outcomes, economic performance, productivity, customer satisfaction, and cultural measures (Webster Online Dictionary). The description of the goals and methods is obvious to any scientists or ergonomists who are experienced with the scientific methodology.

3. Ergodesign As A Hybrid Paradigm

Ergodesign is conceived here as a Mixed Method or a Hybrid Paradigm. It embraces a mixed quantitative and qualitative research method, for the production of new knowledge and tangible design. This disciplinary merging is necessary for addressing increasing complex societal and technological issues. Friedman (2003) posits that technology and design affects us profoundly. Our daily live is surrounded by, and influence by a vast range of technology that mediate most of how we work, live and play. As the man-made world is increasingly replacing the natural world by the progressive introduction of artefacts that alters our environment, "Design now plays a role in the general evolution of the environment, and the design process takes on new meaning" (Friedman, 2003). Consequently, new technologies, and their successful imple-

mentation through design and innovation have evolutionalised the way we view design, from simple craft tradition to increasingly more complex products, infrastructures and systems, and other commercially, industrially and environmentally-altering artefacts. The complex design problems that we have to solve have led to the evolution and development of blended or mixed modes of research inquiries and design practices. Hybrid technology – that is increasing being harnessed for designing say, mechanical and electronic hybrid cars, for example – has necessitated the needs for hybrid, pluralistic and synergistic design methodology such as Ergodesign. The challenges that are facing designers to solve problems in the complex world can no longer be subsumed in the current model of design practice that is supported by a heuristic paradigm for craft production. Current design problems and opportunities has necessitated researchers and designers to shift current design thinking and conceptualizing in product, system and service designs, not only to a preferred one, but one that would change the cultural perception of how designers harness, use and transform advanced technologies in the future.

In this complex environment, the designer has to have explicit and tacit knowledge to enable her to prioritize critical problems and opportunities to judiciously propose solutions. She has to capture data, analyses, synthesize, ideate and evaluate system complexity via story telling, visualization and prototyping. “Because a designer is a thinker whose job it is to move from thought to action, the designer uses capacities of mind to solve problems for clients in an appropriate and emphatic way” (Friedman, 2003). These activities involve both analytical and intuitive actions. Within contemporary industry and business designs, explicit research information to support design propositions is increasingly being demanded to align left brain rationality with right creativity. This requirement and expectation of the designer has led to the merging of human factors, brand strategy, business model and product envisioning in “Design Thinking” approaches in design consultancies. Creativity in the design processes must be deliberated within the confines of rationality of the design transformation: the mental function that connects both the rational and the creative minds, in a hybrid, symbiosis, and reflective and iterative manner – such as the Hybrid Paradigm embraced in Ergodesign would provide.

In both the natural and the social sciences, research is often categorized in to 3 forms: basic research, applied research and clinical research. Friedman (2003) states that clinical research applies the findings of basic and applied research to specific design situations, and most design practice is restricted to clinical research. Constrained by time the designer “increasingly needs a sense of

research issues with the background and experience to distinguish among classed and kinds of problems”. This model of design is exactly what Ergodesign has been conceptualized to address. Ergodesign positioned design as a hybrid research and practice not only to address complex problems, but also to position it as a mixed Paradigm capable for knowledge and theory production. The positioning of Ergodesign as a new empirical-constructivist paradigm, instead of perpetuating it as a craft subject would enable Ergodesigners to develop new knowledge on the one hand, and practicing design on the other.

4. Research Paradigms

A Paradigm is the theoretical framework of a discipline, which influences the way knowledge is studied and interpreted. The choice of a paradigm sets down the intent, motivation and expectation for the research. Hence, Ergodesign can be described as a design approach targeted towards studying the human user or operator, to design and develop usable, functional, safe and desirable systems by the application of evidence-based research and design processes.

Mackenzie (2006) maintains that without choosing a paradigm, as the first step in research, there is no basis for subsequent choices regarding methodology, methods, literature or research design. Interestingly, she claims that mixed method, such as Ergodesign, “could be used with any paradigm”. She classes the four paradigms as: Positivist, Constructive/interpretive, Transformative and Pragmatic. The Pragmatic Paradigm places the research problem as the central frame of reference for research, and data collection and analysis are chosen “to provide insights into the question with no philosophical loyalty to any alternative paradigm” (Mackenzie 2006).

In view of the above statement, Ergodesign, as a Hybrid Paradigm may be placed in this Pragmatic Paradigm grouping. “The pragmatic paradigm provides an opportunity for multiple methods, different worldview, and different assumption as well as different forms of data collected and analysis in the mixed methods” that is most useful and suitable for the Ergodesigner. As an interpretive/constructivist researcher the Ergodesigner tends to focus the research on the human participants perspective of the situation being studied. Designers as constructivist researchers do not normally begin to construct an idea with theory. They generate or inductively and abductively develop a theory/model or pattern of meanings throughout the iterative design process often impacting the research with their own culture, background and experience. (Creswell, 2003, p12, cited in Mackenzie, 2003). Both research and design processes adopt iterative and cyclical approaches rather than linear ones.

5. Duality, Pluralism and Synergy of Disciplines

Ergodesign, Bioengineering, Mechatronics, Sociotechnical Systems and so on are comparatively current notions of the need for integration and interlinkages between disciplines to enable us to study, understand and construct new knowledge in a society that is changing both in speed and complexity. This is to enable a discipline or field to form smart clusters to produce new knowledge, to solve problems, improve efficiency, and to ensure that innovation could be harnessed more reliably, viably and creatively. The aim is to capture new insights via the integration and application of the duality and synergistic perspectives of disciplinary knowledge.

As mentioned above, Ergodesign has been conceptualized to fill an unmet need for a pluralistic/transdisciplinary mixed methodology to drive evidence-based research, practice and design for the capture of knowledge about the behavioural, capability and limitation of the human operator in the system, to generate new knowledge, and actionable and transformable insights to inform the design of the system, and as an iterative, heuristic, constructive or transformational process for storytelling, visualization and prototyping – that will result in the creation of a product, system or service that is not only functional and usable, but most importantly, also emotionally desirable.

6. The needs for Connectivity, Pluralism in Integrative Research

A decade or two ago it was comparatively easy to explain the function of a telephone to a human factor engineer, even though the mechanism and voice transfer were complex. In recent times, it is getting significantly more difficult, if not impossible to do so as the design of the telephone such as the Apple iPhone not only involves mechanics and optics, but also electronics and software. The convergence of functions of such produces and processes has necessitated a synergistic integration technical know-how such as mechanical engineering, electronics, computer science, human factor engineering, material and processes on the one hand, and soft-factors such as design creativity, culture and insights on customer including culture, psychology and behavioural sciences, concept ideation, visualization, prototyping, to design and develop meaningful produce, services and experience to the users, operators or consumers. The design and development of successful and innovative product is becoming increasingly more complex and pluralistic – often requiring more than the knowledge and know-how of a single discipline.

Miller et al (2008) maintain that despite the progress of interdisciplinary research – such as Ergodesign – much difficulty still exist, and caution scholars, educators, and practitioners to be vigi-

lant of the ways in which interdisciplinary research are conducted. Epistemological pluralism as an integrated approach for conducting collaborative research and practice recognizes valuable ways of knowing that are specific in different disciplines. For example, in terms of Ergodesign, “ergonomics” may be considered as an empirical discipline for generating new knowledge on the capabilities and limitation of the human operator via positivism, whereas “design” is an interpretive or heuristic discipline for the design of products, services or systems using ideation, visualization, prototyping creative skills via artistic interpretation and construction of meaning and experience innovation.

While the benefits of making intimate connection across disciplines – such as in ergonomics and design that are enshrined in Ergodesign – many joint efforts are hindered by disciplinary problems, including a tendency to privilege a single epistemology and disciplinary perspective of the researcher (Rescher 2003), instead of cultivating an open mindset to take advantage of the different epistemologies, or theory of knowledge that each discipline brings to bear in knowledge creation, articulation and application. These are exactly the reasons, as we will see later, why Ergodesign has been proposed to create new knowledge and practice design more efficiently and seamlessly.

6.1. Disciplines and their Levels of Connectedness

The need for disciplinary connection or integrated research is usually motivated by the realization that the complexity of modern problems in the rapidly changing technological world is difficult to be resolved in any single way or by any single discipline. Epistemological connections or pluralism such as in multidisciplinary, interdisciplinary, and transdisciplinary research and application contribute four important elements to research enquiries, according to Miller et al (2008).

1. It acknowledges the validity and value of multiple ways of knowing.
2. It asserts that integrating these epistemologies results in a more complete understand of complex issues, such as the management of childbirth.
3. It accepts that the inclusion of different disciplines would require cross fertilization that would benefit research and design outcomes, and
4. It requires that disciplinary researchers work together to find ways to benefit from each other’s approaches rather than compromise them.

The appeal and advantage for epistemological pluralism is obvious. It recognizes the inadequacy of the existing of knowledge base of the various individual disciplines, and the needs for coher-

ence between the knowledge produced by different disciplinary integration (Pett et al, 2008, 596, reported by Cronin, 2008).

6.2. *Summary Definition of Integrated Research Concepts*

“Disciplines are constituted by defined academic research methods and objects of study. They include frames of references, methodology approaches, topics, theoretical canons and technologies. Disciplines can also be seen as “sub cultures with their own language, concepts, tools and credentialed practitioners” (Petts et al, 2008, 596, reported by Cronin, 2008).

A summary of the various approaches is provided by Tress et al (2008):

Disciplinary Studies: projects that take place within the bounds of a single, currently recognized academic discipline.

Multidisciplinary Study: several different academic disciplines researching one theme or problem, but with multiple disciplinary goals. Participants exchange knowledge, but do not aim to cross boundaries to create new knowledge or theory. The research process progresses as parallel disciplinary efforts without integration, but usually with the aim to compile results.

Participatory Studies: academic researcher and non-academic participants working together to solve a problem. The participants exchange knowledge, but the focus is not on the integration of the different knowledge cultures to create new knowledge.

Interdisciplinary Study: several unrelated or contrasting paradigms - e.g. between quantitative and qualitative approaches, or between analytical and interpretive approaches that bring together disciplines from the humanities and the natural sciences - in a way that forces them to cross subject boundaries to create new knowledge and theory and solve a common research goal.

Transdisciplinary Studies: projects that both integrate academic researchers from different unrelated disciplines and non-academic participants, such as ergonomists, designers, obstetricians and the public (mothers), to research a common goal, create new knowledge and theory, and to design a new system or service. Transdisciplinary combines interdisciplinary with a participatory approach.

All good ergonomic design requires effective and agile research methods and tools, combine with iterative creative design processes to promote sense and sensibility that enable functional and usable product, service and system innovation to take place are rare, if not non-existence. Besides, user experience is much more complicated to design than functionality and usability. Yet, designing for desirable, loyalty and devotion for a product or service are of significant consumer and commercial importance in current product design and development. This is a significant requirement because

the desirability and meaningful experience convey by a product, service or system can be a source of competitive advantage, safety, efficiency and business value.

For Ergodesign to be useful it is important that we are cognizant with the above Data-Wisdom Continuum. It is an important visualization to understand the nature of scientific Knowledge (that Ergonomists seek to produce), and the design transformation that designers create via the process of design realisation from insight. The Ergodesigner works across the continuum, iteratively to capture new knowledge, solves problems, construct actionable insights for product and system ideation, visualization and prototyping – using deductive, inductive and abduction to weight up logic, conceptual thinking and designing. Ergonomists as scientists apply deductive and inductive thinking to understand and to produce new knowledge for the discipline. Designers apply abductive know-how to create artefacts for the tangible world. But, the Ergodesigner applies all the three deductive, inductive and abductive mental process to develop insights to ideate, design and develop products, services and other human-machine and human environmental systems.

Chong (2006) citing the “philosophical notions” of the Peircean (Charles Sanders Peirce (1839-1914) logical system, states that the logic of abduction and deduction contribute to our conceptual understanding of a phenomenon, while the logic of induction adds quantitative details to the conceptual knowledge. Although Peirce justified the validity of induction as a self-corrective process, he asserts that neither induction nor deduction could help us to unveil the internal structure of meaning and sensemaking. As exploratory data analysis performs the function of a model builder for confirmatory data analysis, abduction plays the role of explorer of viable paths to further inquiry. Thus, the logic of abduction fits well into exploratory data analysis. At the stage of abduction, as in design, the goal is to explore the data, find out a pattern, and suggest a plausible hypothesis; deduction is to refine the hypothesis based upon other plausible premises; and induction is the empirical substantiation. These deliberations and actions, he adds, are mediated within the data-wisdom continuum. Given the above, we can deduce that the concept of Ergodesign can play a significant role to ensure that the different modes of explicit and tacit mental comprehension and application, in the problem solving, analysis and design processes, expected of the Ergodesigner are tenable and plausible. Currently, the process for designing products and systems that convey human emotion and experience through empathic design, an ergonomist normally starts by capturing users/customers unmet physical and behavioural requirements during primary research; along with human-beings broad context of interaction with a product or system is an interdisciplinary process involving scien-

tific, empirical, interpretive and heuristic knowledge and skills of a team of scientists and designers – working as individual under the different disciplines. However, it is argued in this paper that a single knowledgeable individual such as an Ergodesigner – could be trained with the capability, knowledge and know-how to capturing rigorous data through both true and quasi-experiments on one hand; and conducting phenomenological and ethnographic studies, on the other. Akin to the above assertion, Hadorn et al (2008) posits that, “In a world characterized by rapid change, uncertainty and increasing interconnectedness, there is a growing need for science to contribute to the solution of persistent, complex problems”. Ergodesign is an attempt to delineate this complexity and to devise a mixed method/paradigm that would be effective for solving complex design problems.

7. Case Study: Applying Ergodesign in Intensive Care.

In order to fully understand the true nature of Ergodesign as a useful form for knowledge and innovation production, I have briefly reviewed the various disciplinary approaches in the field that a discipline employs to capture new knowledge, and to transform knowledge into design realities. The case study – presented as an illustrated research, synthesis, creating actionable insights to inform the ideation, visualization, design, prototyping and system evaluation – of a patient monitoring system for intensive care, at Pinderfields Hospital, Wakefield, England - will be discussed to demonstrate how Ergodesign is a transferable, knowable and adaptable hybrid paradigm for creating new knowledge and solving complex human-artefact-environment problems.

In conclusion, this paper has discussed that an increasingly complex technological and sociocultural environment, the designer has to have both explicit and tacit knowledge to enable her to prioritise critical problems and opportunities to judiciously propose solutions. She has to capture data, analyses, synthesise, ideate and evaluate system complexity not only to answer materialistic and technical questions, but also masters human behavioural sciences to transform technology into emotional and experiential meanings that would make work safer, functional, usable and even pleasure. It is claimed that Ergodesigner, who is knowledgeable and armed with a hybrid methodology, as a scientist, a designer, as well as a change-agent plays a vital role in problem solving, designing and ensuring that the function, usability and safety of intricate human-equipment-environmental systems are well researched and well developed. The patient monitoring system for intensive care constitutes the main theme of the discussion, at the Conference, to demonstrate the application and efficacy of Ergodesign.

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