Achieving Excellence in Design Research: A Case Study of Research and Education Framework at Northumbria University

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Abstract: This paper discusses the case study of the new research and education framework applied at the school of design at Northumbria University that aims at building an integrated sustainable design research community. This community concerns itself with developing design value propositions (new methods, new knowledge and new design IDEAS or applications) by combining the three broad domains of the discipline (forms of practice); practice through collaboration (new methods), discovery through research (new knowledge), and new solutions through engagement (new products, services). In both academic and commercial context this also culminates into a purposeful learning for all stakeholders.

The authors explain that the methodological gap between design 'doers' and design scholars in an academic context makes the process of design leadership very difficult. The paper discusses the paradox that design in the academia needs to respond to the conflict between learning through doing (design) and learning through research of design. Additionally, the paper highlights the challenges that School of design at Northumbria came across while establishing this research community and also discusses everyday challenges of maintaining this community.

Keywords: design research, design education, multidisciplinary design, design leadership, change by design.

1. Introduction: The problem space – Conflict between Learning through Doing (Design) and learning through Studying (Design)

"…the reason for this failure to achieve anything of substance is that designers have been looking in the wrong direction…" [11]. Peter Lloyd Jones made this statement while unraveling the future role of design; where designers are not merely making aesthetically beautiful products but are leading change in the major societal, political, economical problems of the world. Where design education is not merely teaching skills but is playing a much larger role of creating new people, new ideas and new roles of design for the changing world. The world calls this design for change - design leadership.

In section one, the paper highlights the constant creative conflict, in both academic and commercial context alike, the conflict between the act of creation through practice and the act of scholarship through studying and researching the theory. The paper also discusses the challenges of combining the analytical and synthetic approaches to design research. The paper aims at proposing new methods and tools to achieve a better integration of the three domains of the discipline into the DNA of the core of design leadership.

The reason for the conflict between design research theory and practice lies in the disintegrated, ambiguous, and inexplicit knowledge within the design discipline [1] and the solution lies within design itself. Krippendorff [12] believes that design is a research activity in itself where work is done to transform the future worlds [18]. There has been much discussion about the relationship of theory and practice within design. This has been a recurrent topic within the PhD-Design Jiscmail as well, under the thread; 'four orders of design' [6]. In order to help identify the relations between design practice and theory, Frayling, C. [cited in 15] provides three forms of design and art research namely, research *into,* research *through,* and research *for* art and design.

The authors recognise the different scopes of research when it stems from theory or practice; where, theoretical research deals with an analytical approach and practice research deals with a synthetic approach [13]. The relationship between theory and practice has been described mostly through the study of design processes [9] [23] have not considered the influence of the fact that the designer is learning about himself while he is in the process, the context, or the changing role of the designer. Dorst, K. [8] agrees and states, "*Within design research, the emphasis on the process of design is still overwhelming. This is hardly surprising, because the models of design processes that have been developed over the*

years have been a great success. They have proven to be a very powerful tool in the development of design practice and design education." Further he adds the importance of context in design education and states "…*to train them in design we have design studios, where we give them multiple design projects in which they learn to grapple with different kinds of design problems, with different design contexts, and with themselves as designing human beings. The art of design is to deal with these other aspects of the design activity, the ones that a process model so conveniently ignores…*"

Attempt has been made to conceptually model and visualize design, using the approach taken during [1] recent case study, where she mapped the work conducted by Researchers and practitioners of the Research, Development and Innovation team within organizations. The outcomes of capturing design practice relied on design's ability to transform tacit understanding into explicit knowledge, on the other hand the value of research relied on providing the process a scientific theoretical underpinning. Additionally, [14] in collaboration with McKenzie elaborated on the different types of design practice models that exist within the corporate practice at Philips Design.

Figure 1 illustrates a theoretical framework with three levels of practices, incremental innovation practices, adjacent innovation practices and breakthrough innovation practices. It was these three levels of practices that build a strong research base for Philips design and translated design activities into innovative proposals for the future.

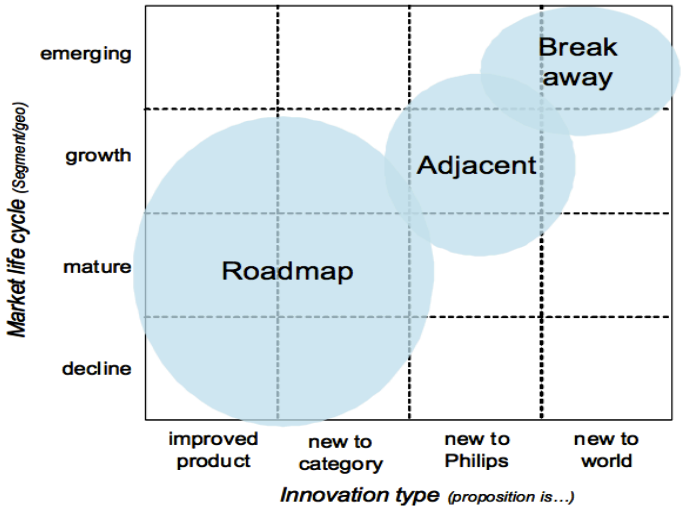

Figure 1: Design practices within corporations (Source: [14])

Designers have shown the ability to learn through doing [7]. Additionally, designers use action research to self-reflect and improve their understanding of their own practice by research through design [5].

These two ways of researching and doing has been providing design researchers and design educationalist a common platform. It is not only transforming the new ideas but also the way we conceive it, therefore transforming the new result. This connection could transform the world of communications, media, objects, system solutions and social innovations.

Manzini, E. [17] agree that the challenge now is to integrate these creative research of study, thinking and doing. The authors suggest that this should be done through projects that incorporate an entirely different group of academic and commercial stakeholders. Figure 2 illustrates the new stakeholders to be the industrial partners, students and researchers, public and third sector partners, industrial partners and users. As a result of this new academic and commercial stakeholder interaction, new knowledge will be proposed, new methods of creative practices will be developed and new ideas of living (visions) will be developed for the future.

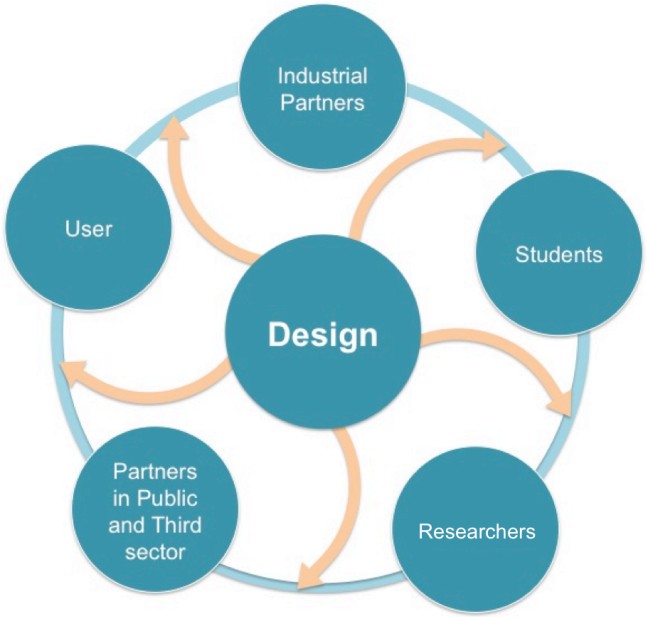

Figure 2: Creative consortia and collaborative integration (Source: [16])

Once the sustainable community has been formed, the next best challenge will be to maintain this community. This has to be done by embedding the community with the ability to have and express ideas, drive new forms of business, and therefore lead innovations. This in itself is a big challenge, nevertheless, building and maintaining a community that integrates research and education while ensuring independent growth of each student and researcher participating in the process is vital.

2. Integrated Sustainable Design Research Community: A Case Study of the Department of Design at Northumbria University

In section two, this paper discusses the reasons for design research as an activity to lead in aspects of providing deeper understanding of social, cultural, technological, and esthetical trends and turning them into opportunities, to improve teaching, and researching. In addition, also inform the new forms and products and in doing so contribute to a better world by highlighting new exemplars of design practice and research. The paper will set this debate within the context of our experiences in the Department of Design Northumbria University where this knowledge is provided and shared in an open innovation platform to all its partners and stakeholders as a result deepening the academy's research.

Weil, D. (1993, cited in [10]) provided a strong argument when he stated that it is for universities to explore and experiment in order to provide research, data, and approaches (methodologies), which will enable practitioners (the profession) to respond to the opportunities offered by the new technologies, ideas, and global alignments. He further iterates the importance of integration and establishment of a common platform by stating, *"...it is vital that the university should re-establish its place as a testing ground and as a laboratory for the trial of new perspectives and approaches that the day-to-day pressures prevent practitioners from attempting."*

The design academics at the Faculty of Arts Design and Social Sciences are focused on designing the future of research and education through an integrated framework of researching and teaching. Figure 3 articulates the path Northumbria University took to achieve this level of stakeholder integration. All research endeavors have to start small; and so did Northumbria University as a Government school of Design, where they developed an integrated strategy for new ideas and knowledge for the

future. Followed by inclusion of a taught program that focuses on developing practice/know-how for today. By 1969 Northumbria was transformed into a polytechnic and then into a University in 1992. Since then Northumbria University concentrated its educational activities on developing and integrating professional practice/know-how for today and new ideas and knowledge for future.

The final shift in the research and educational strategy was seen in 2010 when the University started to focus on innovation and research. Since then and until now the faculty's agenda has been to integrate research and development into new disciplinary roles, professional practice/trades for future; new ideas and knowledge for future, embedded within education of professional practice/know-how for today; and new ideas and knowledge for future.

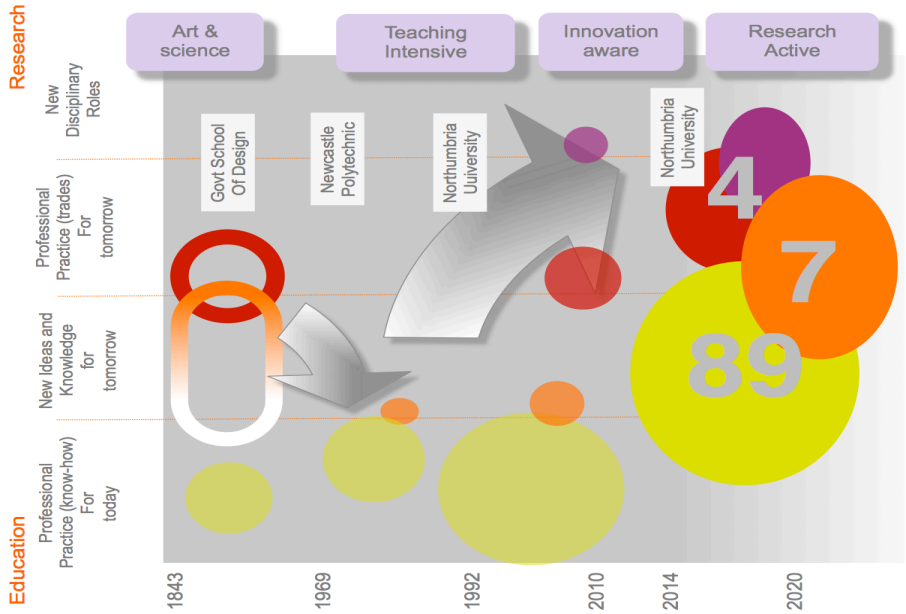

Figure 3: Research and Education Framework (Source: [16])

Additionally, the school of Design undertook several initiatives to facilitate this integration.

2.1 Design Led Enterprise Program: Establishing Intellectual leadership

The initial integration between research and education within the Faculty of Arts Design and Social Science have generated fleet of research projects, which have provided greater research impact and simultaneously valuable education. In order to facilitate the integration of design research and design education the Faculty started a Design led Enterprise Program which was a contract research program funded by local companies. This research and innovation program focused on our innovation culture within Northumbria University and establishes the university as an engine for growth and development for an enterprise culture and creates a similar pathway in Northumberland region and beyond. This Design led Enterprise Program brought wider collaboration opportunities through establishment of an innovation in the county and developed new methods, models for new ways of supporting innovation, enterprise and graduate retention.

The design research activities have presented intellectual (disciplinary) leadership as capability and positions as a point of view through propositions of new ideas, products, systems and solutions, and in turn strengthening the knowledge within the discipline itself. The faculty collaborated with general practitioners, doctors and hospitals to propose product solutions for type II diabetic patients. Design was used to communicate how a small change in behavior can have a huge impact on health. The outcomes for this research were educational tools for GP's to be used with patients, and the development of a GP training tool to help define 'physical movement' in relation to Type II diabetes (Figure 4).

Figure 4: Design Research collaboration with NHS and Diabetes UK

In another example design brought together the banks and the third sector. They collaboratively identified needs and barriers of the stakeholders (Figure 5). Over 5 months we co-designed new banking services and prototypes, including an electronic chequebook and mobile banking service for the elderly [4].

Figure 5: Design Research collaboration with Age UK for co-designing banking service

2.2 Knowledge Transfer Partnerships: Creating a Future for Design

Additionally, through new practices, new roles, ways of working, intellectual property, design research has provided new context for the future of life and future of design. The best impact can be seen in Northumbria University and Age Concern Newcastle's partnership to design services, which were set to improve the lives of older people. The Faculty established a Knowledge Transfer Partnership (KTP) with the UK's leading advocates for older people and one of Britain's most influential charities together with a wider strategic partnership called Quality of Life Partnership [2]. This project aimed at integrating the research and academic platforms was the Age-UK partnership. This project provided the discipline of design a new way of working through the methods and processes of service design [19] [3]; the project provided the client with valuable business inputs manage organisational change [20]; the project gave the research staff confidence to engage in co-creation of new business opportunities with the third sector [21]; and, the student achieved a studentship to pursue a PhD study.

Figure 6: Knowledge Transfer Partnership with age concern Newcastle

On the other hand, design education is not just delivering knowledge and content but is also creating future practitioners, consultants, in-house makers, future entrepreneurs, future researchers, future strategic leaders, future academics and thinkers and new knowledge about context of life. The Faculty initiated a program that partnered with regional SME's on projects ranging from materials, which dramatically cut global industrial electricity usage, through to a device to alleviate infant colic. This project created new jobs, new intellectual property and increased economic activity in the region.

Figure 7: The nurture program

2.3 Research Incentive Initiatives: Developing a Research Culture and Encouraging Doctoral Research

In delivering valuable education the faculty has also come up with a support system for graduate exit profiles. The research and education programs are supporting students through four pathways;

-Pathway of becoming an academic leader through their journey from a PhD to Professorship;
-Pathway of a creator by establishing a designer involved in making into a recognised SME;
-Pathway of a consulting practitioner by providing tools where staff designers with external practice can become internal leaders; and
-Pathway of a creative thinker who have shown strategic leadership in management, marketing, innovation and product management globally.

The university has had a number of examples where graduates have returned to do a PhD and have been absorbed as permanent research staff within the department of design.

2.4 Learning from others: TU/e Success Story

Another establishment that has successfully integrated academia, research and practice is Tu/e Eindhoven. Figure 8 demonstrates the way Technical University integrates Academy research into their creating an understanding of the new age industrial design. TU/e [13] have described this new age design as "*A design driven notion of innovation charged with the capacity and strategic understanding in order to envisage personal Creative Transformation & enrichment of every personal, inter-personal and transcultural Experiences around the spectrum of Human Activity; from the Personal to the Public…"* Their definition of design established an understanding that design is also about business, politics, technology and people. Therefore, design research requires a combined effort from all these spectrums in order to make an impact on the society and its future.

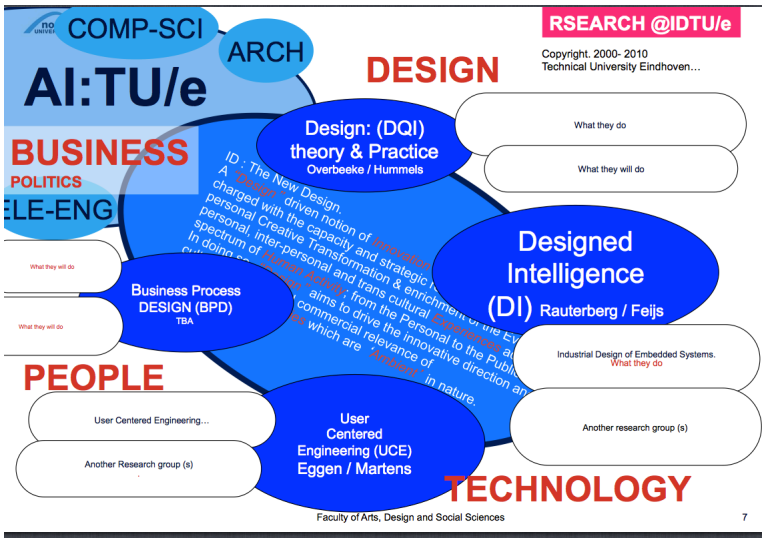

Figure 8: Technical University Eindhoven, Academy research (Source: [13]).

3. Impact of the New Framework

In section three, the paper explores the ways in which design research as an activity enables leadership position to be gained by each of the stakeholders. The design department at Northumbria University is seen to create ways in which new design subjects are proposed as content for taught programs; new domain contexts are proposed for new designers to work through; new contextual knowledge are proposed in which design can speak; proposals are created for new creative roles for the discipline of design; and new ideas/solutions are proposed for future living. All this is achieved through experimenting with new knowledge for the future and through partnership with all.

Today, the world is responding to wicked problems[1] that require new approaches for envisaging their solutions. These solutions can be achieved by leveraging collaboration beyond traditional disciplines including that of hard sciences, humanities and social sciences. According to Manzini, E. [17], "*To adopt this perspective means designers should be*

[1] A social or a cultural problem that is difficult to solve because of incomplete or contradictory knowledge, number of people and opinions involved, they are large economic burden, and they are interconnected with other problems. Source: Kolko, J. (2012) *Wicked Problems: Problems Worth Solving.* [Online] Available at: https://www.wickedproblems.com/read.php (Accessed: 14th January 2014).

aware of ecological problem of a general kind, to understand their reflection on the most diverse and small projectual choices, as well as – and this may be their specific task – to propose possible and attractive ecological settings." In order to enable such a collaborative environment, department of Design at Northumbria University has combined academic value from different disciplines in an integrated, multi-disciplinary way (Figure 9).

Figure 9: Integrated, Multi-disciplinary and interconnected Faculty at Northumbria (Source: [16])

3.1 Masters Program in Multidisciplinary Innovation

The department of design set up a Master program named multidisciplinary design for innovation in order to leverage students' learning by teaching the methods that have been learnt through academic integration. Projects undertaken by MDI aim to create a four-way value, and have ensured higher impact on delivery of design leadership in academia. In doing so students and staff were hired from different disciplines. The program was set up between the Newcastle business school, Northumbria school of design and departments of mechanical, electrical engineering and digital engineering.

The main purpose was to generate graduates who had the experience of working across disciplines and finding solutions to wicked problems. In a bid to identify how best to equip tomorrow's corporate leaders with the skills to innovate, a debate has ensued pitting 'B' Schools

against 'D' Schools and engineering know-how against design intuition. Our view on this debate is quite simple; no one discipline owns innovation. As West, H. [22]*,"...innovation often happens not in the centre of a discipline but in the space between disciplines..."* The department developed Multidisciplinary Innovation MA/MSc precisely to help overcome these 'innovation barriers'. The whole objective of this course is to allow students to develop their core skills while increasing their understanding of the other two disciplines and enhancing their self-awareness and team working skills. This is done through a combination of working on real world projects with leading companies such as Unilever and Mars, and reflecting on their own role and performance within each project. The end result is a graduate who has creative confidence, commercial acumen, knows how to humanize technology and can work with other disciplines to get the job done.

4. Challenges in Establishing and Maintaining the New Framework

Section four highlights the challenges that were faced during the transformation of the academy, in order for it to impart learning for all stakeholders at all time. Additionally, it also highlights the day-to-day challenges faced by the department to maintain the framework. A learning that is delivered through a common approach of working across all stakeholder groupings, enabling creative partnerships with industrial consortia and inducing a greater academic impact. There are two sets of challenges involved in realizing this four-way value creation framework.

The first set of challenges arises out of establishing the framework and is concerned with the infrastructure of the framework and the people involved and their professional development as academics.

Recognising academic practitioners - First challenge includes the recognition of experienced practitioners who are also academic in their nature. Academics, who can analyse and study the practice, educate and research at the same time is essential. The selection of the right academics is important to work in both spaces of practice and research. In order to help in the selection process of academics, the department established a graduate tutor scheme. This scheme aimed at aligning PhD research with local design companies, or corporate design teams so that their own professional practice can be developed.

Professional development from a commercial practitioner to an academic practitioner - Second challenge is the professional development of an individual from a commercial practitioner to academic practitioner to define an academic framework. The question here is if the department should enable current and new colleagues to take PhD's alongside their research and teaching activities? And, how should the academy support this professional transformation from commercial practitioner to academic practitioner?

Enabling a two way knowledge transfer - Third challenge is making academics work with different discipline and partners. In order to facilitate this the university aligned the contract research activities with PhD proposals to enable a two-way knowledge transfer.

Encouraging independent and integrated research and practice - Fourth challenge is to establish an infrastructural platform where independent and integrated practice can flourish and that give opportunities to test new theory/methods through practice, and also experiment through practice to form new theory.

Research inclusive teaching activities - The fifth challenge is to align research and teaching and provide a platform for inclusion of student-learning activity as part of academic's research.

Promoting sharing of data between stakeholders - The final challenge is establishment of a channel, which allows sharing and transfer of data between the stakeholders. This could be established when communities of practice within the department recognize that research and testing 'new design territories and forms of practice' is part of academic knowledge.

The second set of challenges is recurrent and arises out of maintaining the framework where balancing the quality of independent research and provision for integrated research and education is critical. The biggest challenge is to embed a project into the framework for at least five years until it is ready to be made commercial. The other challenges are:

-Maintaining graduate placement and employments networks that provide a sustainable route to employment and sources of future talent.

-Hiring professional practitioners as tutors and providing them key enablers in order to transforming their outputs into 'research rich'

outputs. Professional developers should not see the academy as a competition.
-Providing a continuous professional development programs to the industry through creation of new know how, and post doc research projects.
-Involving a wider consortium of stakeholders, user groups and including more public and industrial partners (Figure 1).
-Extending the contract research activities into public and third sector agencies.

The above challenges exist due to the history of research within the academia that has influenced design research. The Northumbria School of design is pushing for changes and these changes in research culture take time and are difficult. We believe that designers have to understand that techniques of high quality practice and production of creative ideas beautifully executed is not research in itself. However, these activities and processes can be used to create – new ideas, new methods, new knowledge. In order to have significance impact and contribution on the notion of design leadership and creation of know-how, practicing designers from the professional context do need to learn their own academic profession sharing their ideas in work in form of PhD or through continuous publication.

5. Conclusion

The final section of the paper intends to spark a trend within the Academic Art and Design community to create new ways of thinking and doing; establish a common approach to transform design research in order to enable partnerships and industrial consortia. The authors' ambition is that through laying this foundation a new way of academic design research would arise, creating new design principles, integration of research spectrums and international networks of Learning through Research and Educational practice.

The problem is to bridge the gap between education, research and practice within academia. The challenge to establish and maintain this connection lies in the lack know-how in the academic or professional context. The authors believe that now is the time to move forward and instead of merely teaching skills, create new people, new ideas and new roles of design through high level collaborative projects Where the former

is a responsibility of a design school, the later is where the competency of a design academy lies.

The department of design is now in the position to develop creative consortia based on a collaborative future thinking platform. The platform is a combination of strategy, people and market research, technological development, and design. First, strategy that focuses on growth and creates research on future business models, industry trends, and economic trends. Second, people and market research that focuses on socio and cultural mind-sets, market trends, competitor trends and social change drivers. Third, cutting edge technological development through continuous technology landscaping. Fourth, design, which focuses on design qualities, emerging lifestyles, weak signals and design language for the future of education and design leadership in academia.

The choice of this domain is steered by both the commercial research agenda and the national research agenda. Universities now need to align themselves to both these and deliver successfully. The university is looking into establishing integrated program that respond to the European and National agenda's for the new and better future; such agendas are driven through collaboration and high standard research. A combination ensures leadership in the two prominent culture of design leadership and they are research 'changing the world' and research 'understanding it'.

Design research at Northumbria has grown into a broad professional academic partnership working on areas of research, teaching, and consultancy with industry, commercial and public sector clients. The research has led to the creation of new leaders through growth of future profession, creation of new subjects through growth of future disciplines and creation of new ideas and new experimental laboratory through growth of future industry.

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