iasdr 2021 [WITH DESIGN]

PolyU Design
School of Design
The Hong Kong Polytechnic University
5–9 December 2021

Impact of Design Management on Innovation

Das, Bharati*[a]; Xihui Liu, Sylvia*[b]

[a] The Hong Kong Polytechnic University, School of Design, Hong Kong
[b] The Hong Kong Polytechnic University, School of Design, Hong Kong
* dr-bharati.das@connect.polyu.hk; sylvia.liu@polyu.edu.hk

Design management is complementary to innovation- managing design processes as well as designing management processes. While innovation has been widely used in business and management, design management has been associated with product development and design process orientation. This paper questions the application, success rate, and calculation of the impact of design management on innovation, then deep-dives into their relationship. A meta-synthesis approach has been taken to identify relevant papers across six journals from business and design to conduct qualitative research from 1970-2021. As a result, four research gaps were identified for a pilot study in the future. An attempt to bridge innovation and design management in an organization with the help of a common framework is conducted. This paper would like to contribute to the fields of design and business, where the evaluation of their connection is sustainable and beneficial to the economy and society.

Keywords: innovation; design management; design business relationship; design innovation; value creation

1 Introduction

Design and innovation complement each other, with design being a primary influential element in creating value for a successful business (Walsh, 1992). Unlike the theories and core competencies developed for business functions like finance, marketing, and operations, design as a function or action has been taken into somewhat less consideration (Cooper & Press, 1995). Design Management (DM) arises as a leadership role clarifying, motivating, persuading, and determining how design can contribute positively to a company. The Royal Society of Arts was the pioneer to define 'design management' in 1965 in the United Kingdom (Best, 2006), referring to the use of progression of management in terms of innovation and design (Cooper & Press, 1995). In 2005, the British Government commissioned the Cox Review of Creativity in Business to explore creative capabilities in an organization (Cox, 2005). Exciting connections were raised for creativity-innovation-design where: (1) Creativity is perceived as the invention of new ideas by looking at prevailing problems differently or by discovering new opportunities; (2) Innovation is the process of exploitation of new ideas leading

to new products, services, or methods of functioning the business; (3) Design combines innovation and creativity to provide practical ideas which are attractive for users and customers. These insights determine that design is intrinsically linked to business, which can add and create value (Best, 2010), where designers and managers can play the dual roles of creatives and analysts, leading to dynamic outcomes.

Table 1 Result of keyword search across six databases.

Keywords searched	Field	Database	Articles with keywords combined	Total articles selected
Combination of: innovation; design management; design business relationship; design innovation; value creation	Business Management related	Web of Science	153	16
		Scopus	64	
		Google Scholar	72	
	Design Management related	Design Studies	32	
		Design Issues	103	
		CoDesign	75	
Total articles reviewed			499	16

Source: Authors.

However, several business cultures cannot comprehend the actual value or investment of money and time in the design process (Best, 2010), which devalues the design profession and hence the product or service (Press & Cooper, 2017). This paper aims to illustrate the connection between DM and innovation and identify the research gaps in the two fields for future research. The review process (Table 1) was done in four phases in June 2021, where (1) Individual keywords were identified; (2) The keywords were then combined to give a list of articles forming the database collection; (3) Duplicates were removed from this collection; (4) Articles were reviewed and summarized for the research. The document analysis application to a grounded theory study for the qualitative research method (Bowen, 2009) has reviewed the 499 papers.

2 Why we need to use Design Management in Innovation

Every innovation, from radical (a compelling impact on the market or economic activity of firms in the market) to incremental (enhancing existing products, services, or processes), requires design input (Walsh, 1992). According to the American architect and design-practitioner David Rockwell, design and innovation have the power to shape an entire brand or marketplace. He justifies that the design is not just focused on a new product or service but is also used to create experiences that consumers remember. DM has been maturing over the past fifty-six years and is still in a state of evolution (Vazquez & Bruce, 2002), with the managers of design needing to adapt to different situations (Lockwood, 2004). The significance of DM is growing in four principal ways (Powell, 1998) to explore and exploit design as a strategic asset: (1) With a more profound role of design in innovation, DM will help differentiate the business and establish sustainable competitive advantages; (2) With the growth in choices for the consumers in the marketplace, their demand for effective management of design in good design will increase; (3) The conversion in the attitude from DM to governing design will unlock new possibilities for design; (4) Design can be seen as the span between the cultural and vital economic facet of individual nations where the design will contribute to active, balanced societies

globally. Henceforth, there is an emergent appreciation of the potential benefits of DM in terms of the required attitude, skills, and knowledge.

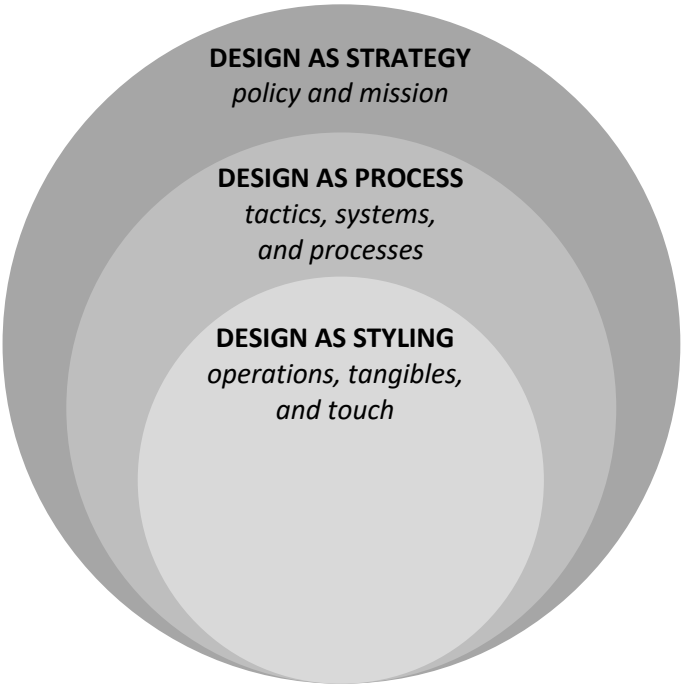

Figure 1. Design management is active at three levels in any organization (Source: Borja de Mozota (2006))

Competitive advantages can be developed with design as a coordinator or integrator (Figure 1). 'Design as Styling' represents the operational level where design comes in the form of physical and tangible products, services, experiences, denoting the application of projects and processes the customers can literally 'touch' (Young et al., 2001). 'Design as Process' represents the tactical level at which structures of specific business units or functions follow the design procedure. 'Design as Strategy' at the macro level engulfs the comprehensive policies, aims, and agendas specified and connected to design. The three levels are further explained using the insights from Design Value, an 18-month project (2016) in collaboration with Innovate UK that was directed to find the substantial contribution of design to innovation in an organization. Innovate the UK supported 158 companies who were acknowledged and surveyed, and 47% of them identified design as a process that helps in three definite aspects in the companies: (1) Commits to promoting innovative products, services, and markets; (2) Aids in expediting and de-risking innovation activities; and (3) Supports in the marketing of products and services, and the building of brands (Cooper et al., 2017). The companies that used design as a process or strategy introduced more radical innovations and noted that design contributes directly to entering new markets, differentiating a company from its competitors, and enhancing its image.

Very few books have been written about building DM, depicting distinct challenges and opportunities regarding its contribution (Blyth & Worthington, 2010; Emmitt & Ruikar, 2013; Eynon & Eynon, 2013). Quantitatively, measuring design quality is typically measurable (Cooper et al., 2005) due to the non-monetary considerations based on performance, reliability, appearance, safety and durability, ergonomics, and service (Walsh, 1992). This is magnified with incompetent management of the early design phases, which prove to be a significant source for document inadequacy and rework (El. Reifi

& Emmitt, 2013; Tilley, 2005) and can lead to increased costs or reduced productivity (Baldwin et al., 1999). Therefore, an advanced establishment of the progress of information across the project process is required to manage design across the three levels of an organization, where DM needs serious contemplation on its purpose and direction.

3 Design Management in the context of innovation

When looked into the pattern of innovation, it is rarely an individual undertaking and appears in fractals with minor decision cycles rooted in larger ones (Leonard & Sensiper, 1998). The primary development trail of identify-develop-plan-implement is the innovation process's governing principles, representing a spiral or circular progress of uninterrupted fast feed-forward and feedback loops (Assink, 2006). Figure 2 is contrary to linear accumulative innovation processes like the stage-gate process for driving new products to market (Cooper et al., 2002), restricting learning and leading to project inflexibility (Sethi & Iqbal, 2008). Assink (2006) innovation process has been selected for this paper because of the following reasons: (1) The process includes both external factors (economic, social, political, competition, and infrastructure) and internal factors (resources, corporate structure, and corporate culture), which affect the dynamic business environment (Teece et al., 1997); (2) The process denotes an interdependent system with learning as the fundamental characteristic, based on the conception of system thinking and dynamic strategic thinking (Brown & Eisenhardt, 1995; Senge, 1994); (3) The process follows the cycle of searching, selecting, exploring, and experimenting, signifying the importance of learning and unlearning, involving the concepts of convergent and divergent thinking (Assink, 2006).

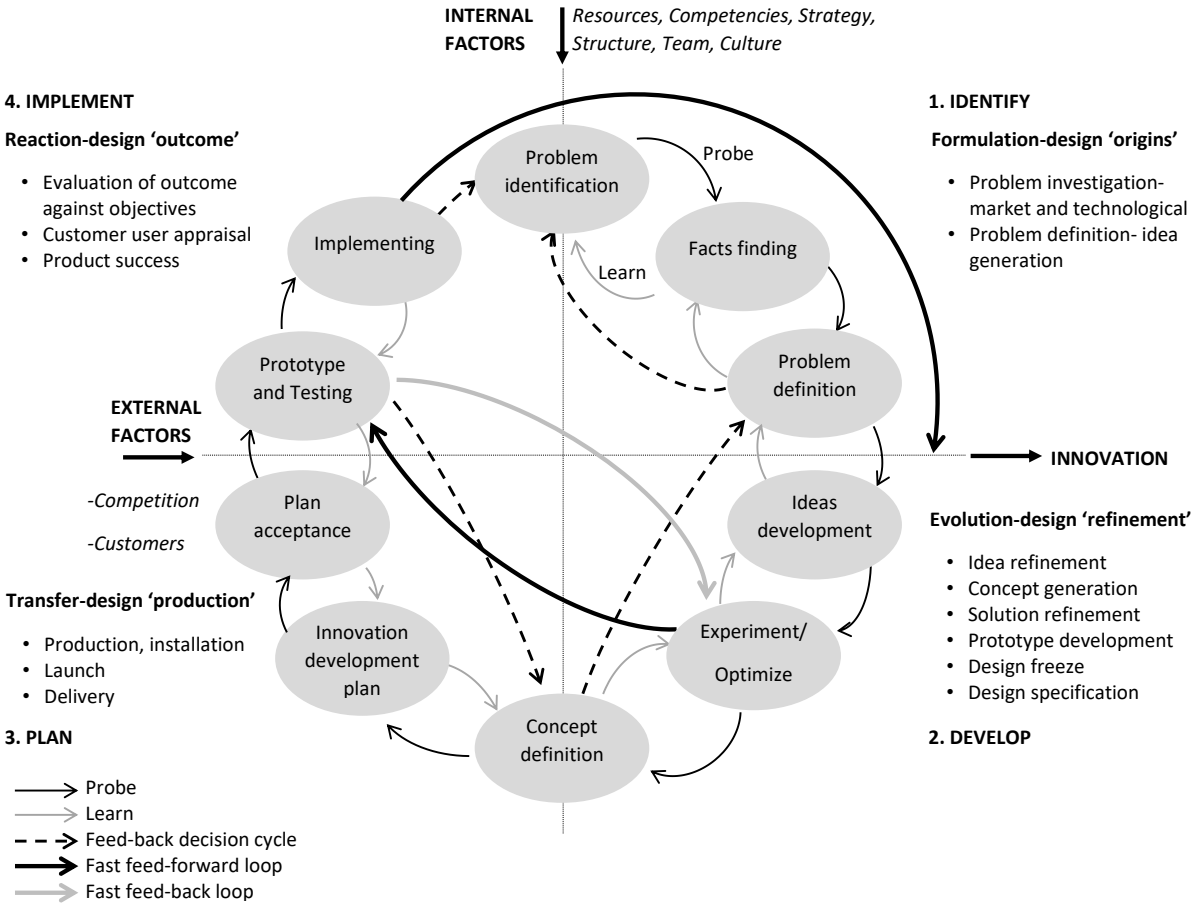

Figure 2. The connection between innovation and DM processes. Source: Summarized by the authors based on Dynamic Disruptive Innovation process from (Assink, 2006)*, Design research cycle from in* (Bruce & Cooper, 1997)

Traditionally used as a resource in marketing or product and service development, a design process can drive innovation at every step via adopting new technologies, materials, or methods (Best, 2006). The design research cycle (Figure 2) represents a continuous process of four categories denoting formulation-evolution-transfer-reaction (Bruce & Cooper, 1997). The formulation phase falls in the innovation process's identification phase, which includes planning and problem definition, leading to the next step of idea generation. The origin of the problem is identified, and customer segments based on similar needs and desires are acknowledged within the market, where the target market can be segmented as per the geographic, demographic, psychographic, and behavioural usage (Lin, 2002). Research on competitors, market, lifestyle, contextual, and trends, along with anthropology and ethnography, helps in the process. The evolution stage covers the idea, concept, and detailed design generation, which allows for refinement. During this phase, research-based on technology, participatory, and practice-centred approaches are conducted to develop solutions. The transfer stage deals with applying design into production, gaining knowledge and experience, which will help the innovation development plan and its acceptance. Understanding the production and delivery process will also be valuable for tackling future design problems. The *Reaction* stage addresses the result of the design after its implementation in prototyping and testing. User and stakeholder responses are evaluated, and the whole process is analyzed, contributing to innovation or learning (and unlearning).

4 Discussion

Innovation is considered one of the primary sources of firm growth and competitive advantage, attracting practitioners and scholars (Damanpour & Aravind, 2012; Hullova et al., 2016). The need to stand out in a saturated market has led the firms to act strategically and gain the audience's attention (Osterwalder & Pigneur, 2010) with consistent product and service updates involving customization (Prahalad & Ramaswamy, 2000). For instance, Honda and Kawasaki made motorcycles available for the ordinary people, Sony made televisions and radio accessible to the mass market, Toyota made cars affordable for students, Canon was the first to enter copiers and printing machines for offices and households. These innovative designs allowed people to own and use those previously impossible by making them more straightforward, more accessible, and affordable. The importance of design in innovation is strengthened further by Boston Consulting Group's survey (2021) on the 'Most Innovative Companies' that has identified innovation as one of the top-three strategic priorities for success. The leading companies such as Apple, Google, Amazon, and Adidas are prominent examples of influential design-oriented and design-educated companies, which play an essential role in attracting scholars and managers to study the value of design in innovation (Cooper et al., 2016). Thus, DM has a strategic and multidisciplinary function in the organizations, impacting research on innovation management studies (Erichsen & Christensen, 2013).

The current need for sustainability, adoption of new technologies, rebuilding societies and communities ecologically demands design thinking and design imagination (Press & Cooper, 2017), expanding the horizons of DM at both micro and macro levels. Four research gaps were identified in the processes of innovation and DM:

Research Gap 1: Do companies using design at three different levels get impacted differently?

Companies using DM at the top two levels (design as strategy and process) to construct relationships and communicate ideas usually locate design roles at the beginning of the process (Borja de Mozota, 2006). This gives them a significant head-start in analyzing the concepts over those that use design as styling and see its impact at the end of their innovation. How can these adverse effects of design be used in business to understand the implications?

Research Gap 2: How can we measure the return on investment in design?

For effective DM in any organization, it is necessary to develop both intangible and pragmatic measurements (Powell, 1998). It is not easy to put a monetary value on the impact created by design individually. Design is often used as a process compared to marketing or finance and can be difficult to measure given its integrated and multi-dimensional nature. Currently, companies rely on the feedback received from their clients and customers and the performance of their innovations in the market to measure and make necessary changes (Cooper et al., 2017). How can we explore the ex-post and ex-ante insights of design?

Research Gap 3: Does design guarantee innovation, or is it progress over perfection?

The role of design in innovation can enhance the value-added in a service, product, or method but does not guarantee a competitive outcome. This might be because innovation itself cannot be deemed successful even after the implementation phase due to unforeseen external forces such as competition, shifts in the market, or customer demands (Charitou & Markides, 2003). How can we locate anomalies to the connection between DM and innovation?

Research Gap 4: Should DM be only conducted by managers or designers in a company?
Innovation and DM are not linear processes that can be completed by managers or designers alone. A collaboration between the team is required to encourage creative concepts and a sustainable competitive advantage. However, given the budget limitation, staff members, and time, are there standard skillsets that anyone can learn to practice DM freely in a company, or does DM require a separate business unit?

Filling the four research gaps: The four research gaps will be bridged by employing a case-study method. This has been explained further under Section 5 of the paper.

Both innovation and DM are required to make the product, service, or method competitive by enhancing its functional performance, quality, and durability (Kotler & Alexander Rath, 1984). As design advances to process and strategic levels, companies increasingly view them as an integral part of their decision-making to create added value through creativity and customer satisfaction.

5 Conclusion and Recommendation

Michael Farr (the publisher of the first book on DM) rightly says that design should enable people to enhance their individualities instead of suppressing them (Farr, 1966). A more precise understanding of the emerging orders of design (Buchanan, 2001) from its focus on tangible to intangible concepts can help explore the opportunities of DM more proactively. The growth of DM has been comparatively slower in terms of quantitative measurement, with design mostly linked to management concepts of process, model, and space (Erichsen & Christensen, 2013). Thus, to reconnect and realign DM within innovation, shared knowledge (used by both designers and managers) and integrated frameworks (quantitative and qualitative) are required to free-flow communication and creativity across an organization.

The four research gaps act as a work-in-progress for the authors, where a pilot study with an in-depth case-study approach will be taken to measure the outcomes quantitatively and qualitatively. The pilot study will involve a hybrid mode of (1) Online evaluation of design elements used by 40 companies from Kickstarter (the largest crowdfunding platform); (2) Direct interviews with the designers and managers of 5 companies in Hong Kong. The analysis of design management will span over four months, starting from October 2021. The paper encourages future participation and research on principles and results that focus on the relationship between business and design instead of viewing them separately.

Acknowledgment: I would like to express my gratitude to my Mentor and Chief Supervisor, Dr. Sylvia Xihui Liu for her incredible contribution in shaping the foundation of my research career. Also, I would like to thank my family and friends for supporting me throughout.

References

Assink, M. (2006). Inhibitors of Disruptive Innovation Capability: A Conceptual Model. *European Journal of Innovation Management*, *9*, 215-233. https://doi.org/10.1108/14601060610663587

Baldwin, A. N., Austin, S. A., Hassan, T. M., & Thorpe, A. (1999). Modelling information flow during the conceptual and schematic stages of building design. *Construction Management and Economics*, *17*(2), 155-167. https://doi.org/10.1080/014461999371655
Best, K. (2006). *Design management : managing design strategy, process and implementation*. Lausanne : AVA Publishing.
Best, K. (2010). *The fundamentals of design management*. Lausanne : AVA Academia
La Vergne, TN : Distributed in the USA & Canada by Ingram Publisher Services.
Blyth, A., & Worthington, J. (2010). Managing the brief for better design. Hoboken. In: NJ: Taylor & Francis.
Borja de Mozota, B. (2006). The Four Powers of Design: A Value Model in Design Management. *Design Management Review*, *17*, 44-53. https://doi.org/10.1111/j.1948-7169.2006.tb00038.x
Bowen, G. (2009). Document Analysis as a Qualitative Research Method. *Qualitative Research Journal*, *9*, 27-40. https://doi.org/10.3316/QRJ0902027
Brown, S. L., & Eisenhardt, K. M. (1995). Product Development: Past Research, Present Findings, and Future Directions. *The Academy of Management Review*, *20*(2), 343-378. https://doi.org/10.2307/258850
Bruce, M., & Cooper, R. (1997). *Marketing and design management*. Intl Thomson Business Press.
Buchanan, R. (2001). Design research and the new learning. *Design Issues*, *17*(4), 3-23.
Charitou, C. D., & Markides, C. C. (2003). Responses to disruptive strategic innovation. *MIT Sloan Management Review*, *44*, 55-64.
Cooper, R., Bruce, M., Wootton, A., Hands, D., & Daly, L. (2005). Erratum: Managing design in the extended enterprise (Building Research & Information (2003) 31: 5 (367-378)). *Building Research and Information*, *33*(3), 316.
Cooper, R., Hernandez, R., Murphy, E., & Tether, B. (2017). *Design Value: the role of design in innovation*. https://doi.org/10.13140/RG.2.2.28595.43046
Cooper, R., & Press, M. (1995). *The design agenda: a guide to successful design management*. John Wiley and Sons.
Cooper, R. G., Edgett, S. J., & Kleinschmidt, E. J. (2002). Optimizing the Stage-Gate Process: What Best-Practice Companies Do—I. *Research-Technology Management*, *45*(5), 21-27. https://doi.org/10.1080/08956308.2002.11671518
Cox, G. (2005). *Cox review of creativity in business: building on the UK's strengths*. TSO.
Damanpour, F., & Aravind, D. (2012). Managerial innovation: Conceptions, processes and antecedents. *Management and organization review*, *8*(2), 423-454.
El. Reifi, M. H., & Emmitt, S. (2013). Perceptions of lean design management. *Architectural Engineering and Design Management*, *9*(3), 195-208. https://doi.org/10.1080/17452007.2013.802979
Emmitt, S., & Ruikar, K. (2013). *Collaborative Design Management* (Vol. 9780203819128). Florence: Routledge. https://doi.org/10.4324/9780203819128
Erichsen, P. G., & Christensen, P. R. (2013). The Evolution of the Design Management Field: A Journal Perspective. *Creativity and Innovation Management*, *22*(2), 107-120. https://doi.org/10.1111/caim.12025
Eynon, J., & Eynon, J. (2013). *Design Manager's Handbook* (1. Aufl. ed.). Somerset: Wiley-Blackwell. https://doi.org/10.1002/9781118486184
Farr, M. (1966). The Creative Human Factor in Design. *The American Scholar*, *35*(2), 313-320. http://www.jstor.org/stable/41209376
Hullova, D., Trott, P., & Simms, C. D. (2016). Uncovering the reciprocal complementarity between product and process innovation. *Research policy*, *45*(5), 929-940.
Kotler, P., & Alexander Rath, G. (1984). DESIGN: A POWERFUL BUT NEGLECTED STRATEGIC TOOL. *The Journal of business strategy*, *5*(2), 16-21. https://doi.org/10.1108/eb039054

Leonard, D., & Sensiper, S. (1998). The Role of Tacit Knowledge in Group Innovation. *California Management Review*, *40*(3), 112-132. https://doi.org/10.2307/41165946
Lin, C.-F. (2002). Segmenting customer brand preference: Demographic or psychographic. *Journal of Product & Brand Management*, *11*, 249-268. https://doi.org/10.1108/10610420210435443
Lockwood, T. (2004). Integrating design into organizational culture. *Design Management Review*, *15*, 32-39. https://doi.org/10.1111/j.1948-7169.2004.tb00159.x
Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers* (Vol. 1). John Wiley & Sons.
Powell, E. N. (1998). Developing a Framework for Design Management. *Design Management Journal (Former Series)*, *9*(3), 9-13. https://doi.org/10.1111/j.1948-7169.1998.tb00210.x
Prahalad, C. K., & Ramaswamy, V. (2000). Co-opting customer competence. *Harvard business review*, *78*(1), 79-90.
Press, M., & Cooper, R. (2017). *The design experience: the role of design and designers in the twenty-first century*. Routledge.
Senge, P. (1994). Building learning organizations. *The training and development sourcebook*, *379*.
Sethi, R., & Iqbal, Z. (2008). Stage-Gate Controls, Learning Failure, and Adverse Effect on Novel New Products. *Journal of marketing*, *72*(1), 118-134. https://doi.org/10.1509/jmkg.72.1.118
Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strat. Mgmt. J*, *18*(7), 509-533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO
2-Z
Tilley, P. (2005). Lean Design Management–A New Paradigm for Managing the Design and Documentation Process to Improve Quality. *13th International Group for Lean Construction Conference: Proceedings*.
Vazquez, D., & Bruce, M. (2002). Design Management-The Unexplored Retail Marketing Competence. https://doi.org/10.1108/09590550210423672
Walsh, V. (1992). *Winning by design : technology, product design, and international competitiveness*. Oxford : Blackwell Business.
Young, R., Blair, S., & Cooper, A. (2001). Redesigning design education: the next Bauhaus?