

# Design Management in an Era of Disruption



## Proceedings of the 19th DMI: Academic Design Management Conference

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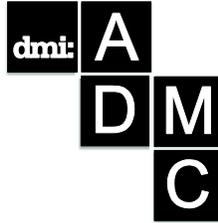
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## Design Capabilities for Value Creation

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*Design is undergoing a moment of disruptive change/transformation: skills, education, and its link with innovation are evolving as fast as is the context of the socio-economical crisis. One of the fundamental issues to discuss and reflect upon to meaningfully direct the transformation at hand is the connection and role of design within the future of innovation. Reflecting on this, the paper looks at the capabilities of design to explore the role of design innovation in business and society (for example, production, distribution, public services, etc.). It proposes a discussion that could potentially contribute to provide wider evidences on the impact of design for growth and prosperity, arguing for a design thinking mindset, and design leadership stronger sector. Moreover, the paper proposes a model based on business narratives emerged through qualitative research that could help orienteer a wiser and wider development of design policies. The main question that the paper addresses is: which capabilities matter to give design the chance to contribute meaningfully to the innovation path, and to reinforce the key players in the socio-economical system (e.g. governments, intermediaries, businesses, universities, policymakers, and people)? Finally, the paper proposes a narrative on how design capabilities are manifested, evaluated, and supported for addressing innovation effectively.*

**Keywords:** *Design capabilities; design value; measuring design; design policy.*

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## **Introduction**

In the last few years, the importance of design as a lever for growth and prosperity has been accompanied by the acknowledgement that innovation goes beyond technology to include concerns on quality of life and social wellbeing. Europe is investing in shaping a larger idea of competitiveness that encompasses design as strategic asset for SMEs, the public sector and citizens to tackle problems in a more efficient way. Recent budget cuts in public spending have influenced governments and decision makers in redefining an idea of development and investment. Design can contribute to promote the idea of a 'radical efficiency' (Nesta, 2010) according to which organizations should look at challenges through: new insights, which means looking for a distributed knowledge exchange approach; new customers which means understanding people as community rather than customers; new suppliers which include users and 'mini-tribes' as co-producers; new resources aiming at reusing, recycling and reducing consumption.

The European Design Leadership Board has also recognised design as a top capability that differentiates the European socio-economical system from other competitor countries. However, only few sectors are leveraging on design values, and much of design culture still needs to be developed for the 21<sup>st</sup> century. In particular, this means to invest for development of design capabilities both in companies and for a new educational system, as well as to reinforce the public sector, governments, and citizens' participation in civic life.

In the design management literature, we are currently undergoing the third paradigm, which considers design as a general capability and human undertaking (Cooper, et. al., 2011). In this context, the impact of design on business performance is recognised as widespread at all levels and functions. However, in a time of disruptive transformation and heavily reduced budgets it is considered extremely important to pinpoint and identify clearly the value that this general capability brings to companies and the society. Accordingly, the interest around measuring design value is growing into more official channels. For example, the recent European Action Plan for Design-Driven Innovation reinforces the importance to promote understanding of design's impact on innovation by '... measuring the economic impact of design and its role alongside other intangible assets in value creation' (EC, 2013, p. 7). The accent is on the absence of statistical evidence to demonstrate the economic value of design.

Therefore, the main challenges concerning design management and the measurement of design value can be listed as follows:

- To identify a framework to read and measure design capabilities in companies;
- To define appropriate metrics to demonstrate the impact of design on business performance;
- To translate these metrics into tools for measuring design as knowledge capital.

This paper discusses the concept of design capabilities in relation to the third paradigm of design management. It seeks to define a framework to read the existing literature and tools to map design within businesses. Furthermore, it describes one of the results of a two-years European co-funded research [[DeEP Design in European Policy – www.designpolicy.eu](http://www.designpolicy.eu)] to suggest a narrative to measure design capabilities in companies.

It concludes by proposing a discussion around limits and constraints of the topic in design management research.

## **An overview on design capabilities**

The paper builds a framework to define the field of design capabilities by tracing the drivers and authors who influenced the development of this topic. Scholars and references have been selected because of the explicit reference to design capabilities, and the attempt to identify them in a business context. Therefore, authors mentioning design capabilities without a dedicated description are not included, as the objective is to attempt to acknowledge a common definition.

Moreover, the use of design capabilities as a concept to identify design in a business context is often present in surveys and reports built through on-field investigation. These refer both to strategic recommendations for economic development (e.g. the reinforcement of design capabilities is considered crucial to improve a sector), and to analysis of data to read the effects/value of design (e.g. a specific investment has increased design mature companies of a certain percentage).

Few tools exist that try to audit design in enterprises in terms of capabilities. These are also mapped and described when the concept of design capabilities is made explicit.

In the following paragraphs design capabilities are explored both in the design management literature and in the projects and publish reports that apply this idea to real contexts.

### *Design capabilities in theory*

The concept of capability is a multi-disciplinary and multi-faceted one. It is used in diverse fields of the literature, to recognise innovation capabilities (Tschirky & Koruna, 1998; Meier, Fadel et al., 2004; Pleschak, 1996 cited in Buergin, 2006, p. 456), dynamic capabilities (Henderson & Cockburn, 1994; Verona & Ravasi, 2003; Teece et al., 1997; Zahra & George, 2002), firm capabilities (Teece, et al., 1997; Leonard-Barton, 1992), organisational capabilities (Acklin, 2013a, 2013b), and design capabilities with different and intertwined meanings (Leonard-Barton, 1992; Jevkaner, 1998; Swan, et al., 2005).

In general, capability can be intended as an integration of knowledge, skills, personal qualities and understanding used appropriately and effectively (Stephenson, 1998).

The term was initially conceived in the 1980s as an approach to welfare economics. Here, Amartya Sen connected a range of ideas that were excluded from traditional approaches to the economics of welfare. The author proposed an idea of capability described by what individuals are able to do that means what they are capable of. 'The capability approach is an intellectual discipline that gives a central role to the evaluation of a person's achievements and freedoms in terms of his or her actual ability to do the different things a person has reason to value doing or being' (Sen 2009, p. 16).

After Sen, other scholars have developed the approach. In particular, Nussbaum has described it as an achievement that is central to people both in quantity and quality, as they cannot be considered merely as numerical scales (Nussbaum, 2011). Further, the idea of capabilities has been applied to wider entities, such as departments, organizations, and systems, to describe the way in which these achieve their objectives in relation to their overall mission.

In the design management literature, the term capability is often associated to firms rather than individuals, and is used as synonymous with skills, capacity, and resources. Acklin (2013a, 2013b) proposes an interesting analysis on how firm capabilities are treated in design management recognizing the difference between the notions of core competencies, resources, capabilities, capacities and skills resources. Core competences are essential assets for the survival of the firm in the long term and are a mix of skills, resources and processes (Tampoe, 1994). Firm resources are all assets, capabilities, processes, attributes, knowledge that enable the company to implement its strategy (Barney, 1991). Building on this definition, Amit and

Schoenmaker's (1993) distinguish resources from capabilities. The last are the ability of the company to use resources effectively for their ends. Unlike resources, capabilities are the result of knowledge exchange processes through the firm's human capital. Capacities are '... the ability to perform a task in at least a minimally acceptable manner' (Helfat et al., 2007 cited in Acklin, 2013a, p. 13). Even if capacity and capabilities are often used as synonymous, capacities need to be well-structured and recurring behaviours to classify as capabilities. This implies reacting purposefully to new inputs and situations also involving a certain degree of strategic decision-making.

In terms of performance, the same concept is described as dynamic capability (Helfat et al. 2007; Teece, et al., 1997) or the ability to build and integrate resources in order to innovative and anticipate changes in the market. Dynamic capabilities are tangible and intangible assets, in terms of knowledge and processes needed for recognizing new business opportunities and orchestrating resources (Teece et al., 1997; Zahra and George, 2002).

When related to design, the majority of authors have enquired capabilities in terms of design management skills indicating the inclusion of design management from basic skills (e.g. managing the design process), to specialised and strategic skills (e.g. managing specific parts of the design process more in depth). Diverse sets of design capabilities are listed by different scholars that mainly change according to the context in which they are investigated (e.g. small company vs big company, design-driven enterprise vs other types of companies).

Borja de Mozota (2002) proposes a literature review to identify the diverse ways in which design creates value within the organisation. In particular, she mentions the following characteristics and authors:

- Sensemaking and aesthetic features of products (Schmidt, 1999; Floch, 1994; Lebahar, 1994 cited in Mozota, 2002, p. 92);
- User analysis and understanding (Bitner, 1992; Damak, 1996; Dano, 1996; Swift, 1997 cited in in Mozota, 2002, p. 92).

Design is described as a valuable management asset in terms of: facilitator, integrator of knowledge, differentiator of products, communicator, coordinating function for innovation.

Jevnaker (1998) articulates design management in six component capabilities:

- Resourcing capability, the ability to acquire and manage effective design resources;

- Combinative capability, consisting of: the ability to configure design resources in the appropriate business departments, the ability to identify the best design resources for the company, the ability to create relationships between design resources;
- Organizational learning capability, the ability to diffuse a design culture in the organization;
- Innovation capability, the ability to stimulate creative activities;
- Design strategic capability, the ability to connect design strategy and business strategy;
- Protecting capability, the ability to protect commercial results of a product.

As emerged from the brief excursus proposed, the field of design capabilities is still under explored. Partly, this is due to the multi-faceted nature of the concept of capability, and the difficulty to define clearly the subject and context of the investigation. For example, design capabilities could and should be studied at many different levels: designers working in organisations, organisations as complex systems, wider eco-systems as the interaction between organisations and the environment. The basic unit of investigation used throughout this paper to propose a set of design capabilities is the enterprise, as one of the main subjects where both designers and managers connect. Capabilities are thus referred to the way design creates value and transforms a business context when integrated in its culture.

### *Design capabilities in practice*

In 2012 the idea of design capabilities has been included explicitly in the strategic agenda of the European Commission to support design innovation. As a first action to raise awareness of non-technological innovation a European Design Leadership Board (EDLB) has been created to deliver a set of recommendations to policy makers to include design as a lever for European growth. The report *Design for Growth and Prosperity* (Thomson & Koskinen, 2012) lists six distinctive European design innovation capabilities to direct the future investments for developing ‘... attractive, desirable and sustainable products and services that can compete on the global stage’ (Thomson & Koskinen, 2012, p.19).

In particular, the design capabilities identified are: European Design on the global stage; Design in Europe’s innovation system; Design in Europe’s enterprises, Design in Europe’s public sector; Design in Europe’s research system; Design in Europe’s education system. These are recognised as main

assets to support design driven innovation in Europe. Nevertheless, when looking at the reality of different Member States, the awareness about the role of design in innovation is not homogeneous. Nations and regions, companies, organizations and institutions differ in adopting design and planning for its support. The fragmentation in the practical development of design policies across Europe is due to few main limitations: the lack of consistent and comprehensive data to prove the value of design, the absence of tools to analyse these evidences, and the difficulty to clearly pinpoint the contribution of design to business performance (AA.VV, 2014). One of the European leaders that has developed a best practice to begin solving these issues is Denmark. The Danish Design Centre (DDC) has developed the idea of a Design Ladder (Ramlau & Melander, 2004) as a framework to measure the level of design maturity in national businesses. This is based on four hierarchical stages: no design, design as styling, design as a process, and design as strategy. The first two steps describe a basic contribution of design in new product and service development mainly as an aesthetic attribute. The second two levels measure design as a process able to produce solutions starting from user needs and adopting multidisciplinary approaches. The highest level of maturity refers to the integration of design in the top level management and company's functions.

Recently, this model has been further validated through a survey conducted by Statistics Denmark on 5000 enterprises (Valle, 2014). This has collected data on a two-years period 2010-2012 showing that, of the companies interviewed, one out of four includes design as an innovation activity: for solving problems, to develop new products and services, as a strategic policy within the company, to establish multidisciplinary collaborations, to create new concepts and business models. The Design Ladder plays a crucial role in Europe as the most widely adopted tool to justify the recognition of design capabilities for improving innovation performance. This is supported by studies conducted by different design centres in Europe. The British Design Council is particularly active in this area and has recently published two reports looking at design capabilities in the private and public sectors.

The first report is 'Leading Business by Design' (Micheli, 2014) developed by Warwick Business School. This is based on a research aimed at analysing how leaders in design create value. The report describes three main findings emerging from the observation of organizational processes and strategic actions: design is customer-centred; design is most powerful when culturally embedded; design can add value to any organisation independently of size

or sector. Further, the report outlines that design can be used in different ways: as a internal function when designers play a technical role, as a key perspective for innovation when designers are fully involved in the innovation process, as a strategic perspective when design plays a key role in defining the business strategy. Finally, the research stresses the idea that design is a capability to solve users' problems, and a pervasive way of thinking.

Another report is 'Design for Public Good' (AA.VV., 2013) co-authored by Design Council, Danish Design Centre, Aalto University and Design Wales and looking at the public sector. This describes a series of case studies and tools to discuss the role of design in public sector innovation. Specifically, a Public Sector Design Ladder is proposed to recognise the adoption and the diffusion of design thinking in public services. The model uses three levels of maturity: design for discrete problems, design as capability, design for policy. As for the Design Ladder, the model refers the lowest level to a sporadic use of design in specific situations; the second level to the ability to not only work with designers, but to actively include design thinking methods in all functions; the highest level to a structured collaboration between policymakers and designers to deliver policies and initiatives.

Besides reports and studies two tools are worth noting that have been proposed by design associations to recognize and analyse the presence of design capabilities on the field. One such reference is the Design Management Staircase (Kootstra, 2009) that describes the different roles that design management can have in firms. The tool is structured into four levels called design management capabilities and connected to five factors (awareness, planning, resources, expertise, process). Following the Design Ladder model, the four levels are: *no design management* in which design has no role in the business objectives; *design management as a project* in which the role of design is limited to adding value to existing products through aesthetics; *design management as a function* in which design is a lever for innovation and multidisciplinary collaborations; *design management as a culture* in which design is an important asset to differentiate the business strategy and is considered an integral part of the innovation process.

Also in this case, the model proposes a hierarchical position of design management capabilities from a technical function to a strategic asset of the business strategy.

The other reference is the Design Atlas, developed by the Design Council. This provides a systematic review of key drivers for design implementation

within businesses. The tool describes a model to conduct design audit and analyse design capabilities in the organisation. In particular, a framework is described through five areas: *planning for design* investigates the presence of strategic plans for design; *process for design* aims at understanding the awareness management and tools used for design; *resources for design* investigates the presence of a budget for design; *people for design* describes how design skills are organized and the related networks of competences; *culture for design* refers to the general widespread of a design culture in the company. The Design Atlas does not describe a ladder, but allows companies to conduct a systematic review of key design resources, and to identify the more relevant areas for future improvement of design capabilities.

## **A narrative to measure design capabilities in companies**

The issue of design capabilities has been one of the crucial points researched and developed by the authors in a European co-funded research lasted for two years (DeEP Design in European Policy). This has investigated and promoted design and an evaluation culture into European innovation policies by reinforcing: the link between design and innovation; the awareness of design innovation policies; and the promotion of a policy evaluation culture. The research has prototyped a scenario for tools and strategies with which to orientate policy makers in the implementation of design policy. In this framework, it has considered design capabilities the central concept to measure the effects of design in innovation processes directly on beneficiaries, and in particular SMEs. The approach proposed is an original one, as policies are generally measured at the level of larger systems (nations). The starting hypothesis has defined design as a set of capabilities that enable people-centred innovation. Further it has proposed a capability approach to measure the transformation of the use/skills for design in companies. Design capabilities in SMEs have thus been investigated through analysing design policy beneficiaries after their participation in the program. Companies have been interviewed considering 5 design policies in 4 European countries.

In particular, the design policy considered have been:

- Un Designer per le Imprese (*A designer for enterprises*, Italy – Lombardy Region), aimed at promoting a stronger perception of the relevance of design to beneficiary SMEs, and at increasing the use of

innovative materials in medium-sized firms based in the Lombardy Region;

- DEA | Design e Artigianato per il Trentino (*Design for Craft*, Italy – Trentino Alto Adige Region), aimed at promoting a closer connection between design and craft in the local area of the Trentino Region as a potential source of new growth;
- Designing Demand (UK), seeking to build design capabilities in British SMEs by helping them to understand how to use design strategically and effectively and how to embed design tools, techniques and management to build new skills and capabilities;
- Design som Utvecklingskraft (*Design as a Development Force*, Sweden), aimed at increasing the number of ‘design-mature’ companies in Sweden, thus reinforcing their understanding of design and their link with design professionals;
- Design your Profit (Poland), aimed at creating a professional business environment to support the cooperation between Polish entrepreneurs and designers.

Considering each of these policies, a total of 16 companies have been contacted and analysed as part of the research through semi-structured interviews. In particular, the format used has enquired:

- The type of support received, the level of satisfaction, and the results achieved;
- The effects of the policy and the design activities integrated in the innovation process of the beneficiary;
- The level of awareness and integration of design in the business after the policy.

The enterprises interviewed have not been selected following precise criteria, as the intent was to select more strictly the policies and understand what type of beneficiaries and benefits these had received. The landscape emerged after the investigation has revealed a quite homogeneous picture:

- The totality of the sample is made of SMEs;
- The majority of the businesses have low awareness of design, its tools and processes;
- The sample is quite variegated in terms of sector, as the policies analysed were not directed at specific industrial areas.

Table 1 List of companies interviewed

Company	Country and Policy	Main activities
1. Sonnomedica	Italy   Un designer per le imprese	It is a private Sleep Medicine Center in Milan. It offers treatments tailored to every single patient thanks to the cooperation between physicians and psychologists using the most advanced diagnostic and therapeutic equipment.
2. A4A Design	Italy   Un designer per le imprese	It produces design objects and furniture in honeycomb recycled and reusable cardboard, including stage settings, installations for exhibitions and commercial areas, and for refreshment and recreational areas for adults and children.
3. Leone 1947	Italy   Un designer per le imprese	It is a sporting goods company, leader in the production of box-related articles since 1947.
4. Merlini Marmi	Italy   Un designer per le imprese	It is a small company operating in the sector of marble objects.
5. Tucano Urbano	Italy   Un designer per le imprese	It is specialized in clothing and accessories for urban motor bikers, including jackets, vests, gloves and hats.
6. Lizard	Italy, DeA   Design and Craft	It is the Italian leader in this sector, specifically of sportive sandals. Its collections are mainly dedicated to marine, outdoor, and travel, and include boots, moccasins, technical and sportive sandals.
7. Rustiklegno	Italy, DeA   Design and Craft	It produces home furniture in wood, from interiors to self-supporting architectures.
8. Sartori Ambiente	Italy, DeA   Design and Craft	It deals with logistics and transport of goods, while also including in its core business the import and distribution of products for home composting.

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9. Arcoma	Sweden, Design som Utvecklingskraft   <i>Design as a development force</i>	It produces and develops X-ray stands for the international market. Arcoma has positioned themselves as a company that works on ergonomics, technology and flexibility.
10. Camp Scandinavia	Sweden, Design som Utvecklingskraft   <i>Design as a development force</i>	It is a family-owned corporate group that develops, produces and sells products for orthopaedic rehabilitation in 50-60 countries. It also acts as a distributor for many major companies in orthotics and prosthetics.
11. Perimed	Sweden, Design som Utvecklingskraft   <i>Design as a development force</i>	It provides instruments, software and expertise for precise and convenient measurement of vascular function and diseases. It develops, manufactures and markets state-of-the-art equipment for micro vascular diagnosis
12. Permobil	Sweden, Design som Utvecklingskraft   <i>Design as a development force</i>	It is one of the world leading distributors of electric wheelchairs.
13. Asimpex	Poland, Design your Profit	It is a furniture manufacturer. It supplies a wide range of pharmacy, office and hotel furniture and offers complex interior design and consulting services.
14. Marmorin	Poland, Design your Profit	It produces bathroom sinks, kitchen sinks and shower trays mainly for export, putting the customers' needs at the centre of their offer.
15. Mode:lina Architekci	Poland, Design your Profit	It is an architectural firm that creates interiors starting from a close investigation of people's needs.
16. Soul&Mind	Poland, Design your Profit	It is a brand consultancy that helps other businesses improve their coordinated image on the

### *Results of the analysis: Design Capabilities described*

The analysis conducted has shown that design activities have impacted on the overall innovation processes and culture of the companies. All enterprises interviewed have demonstrated a renovated understanding of the value of design, and of the impact of design processes on business performance. Moreover, companies affirmed that their renewed perception of design has fostered an enhancement in their mind-set and future vision. These responses, and the analysis in the literature previously conducted have been the main basis to define three main design capabilities.

#### **Design leadership**

This capability has been evident only in few of the companies interviewed, as it implies the presence of a design driven innovation strategy that is embedded in all enterprise functions. This means that the company uses processes and resources to ensure the adoption of consistent design strategies, tools and procedures to promote design driven innovation. Design Leadership relates to the presence of a multi-faceted understanding of design inside the organisation and a clear focus on the user to define the offer system as well as the production and distribution process. This capability can be perceived when design participates in determining the strategic choices available to a firm or organisation.

Referring to the classification of the 21 variables of design management identified by Borja de Mozota (2013), design leadership can be further articulated as:

- The creation of a competitive advantage through design;
- The absorption of design as a core competence of the whole company, and as one of the main ingredients of the enterprise culture;
- The development of a unique selling proposition through design values that is more difficult to imitate by competitors because of its intangible characteristics.

#### **Design management**

This capability describes the effective management of all the firm's assets, including processes for organizational learning, design resources, offering system, the collaborations and business relationships, from both internal and external perspectives. Design management includes the idea of:

resourcing design expertise and embedding them at all levels of the firm; managing the overall firm portfolio (products/services); accessing design collaborations (in terms of people, money, facilities) for the success of the firm. It is the ability to manage design resources – in terms of human resources; design processes and creativity; and economic resources.

Following the previously mentioned variables (Borja de Mozota, 2011), the capability of design management can be further described as:

- The improvement of the coordination of the diverse functions of the company, and in particular research, production, and marketing;
- The inclusion of the user perspective and the improvement of customer relationships throughout all innovation processes;
- The development of more strategic and efficient external relationships with suppliers and other professionals, as part of the innovation strategy.

### **Design execution**

This capability describes few technical skills that design contributes to companies: enabling product/service innovation, introducing a people centred approach in the innovation process, adopting new technologies, using visualisation and prototyping as fundamental tools to reduce risks and start the creative process. This type of advantage refers in particular to small and incremental innovations that can improve the company portfolio by design, and help enter new markets.

Design Execution involves the presence of human resources with technical skills, design technologies and infrastructures, investments in the new product development process. In Borja de Mozota (2011) words:

- The improvement of the ability to reach new international markets;
- The change of the value of the offer system, in particular for the perception of users;
- The introduction of new technologies to strengthen and regenerate the innovation process and increase the aesthetic and functional value of products;
- The reduction of the time to market and costs of production for new concepts.

## The narrative in practice

The design capabilities described can be applied to companies more concretely by defining narratives and models of best practice that can show the practical value of design for business innovation. This is useful to underpin to companies the reasons why investment in design is a strategic lever for development. The task is a crucial one for designers and design associations, as companies need to understand in practical ways and through real stories how design tools and methods can apply to their daily practice. For example, the Design Council uses this approach to advocate design both by publishing reports, and sharing stories at peer-to-peer and knowledge exchange events. The above mentioned report 'Leading Business by Design' identifies 12 stories of companies that use design strategically in very diverse sectors (banks, manufacturing companies of several types of goods, consultancies of brands, companies producing food and drinks, fashion and accessories, and service companies). This collection is useful to showcase the impact of design on world-renowned leaders that have used it to differentiate product development strategies, to define new niche markets, to regenerate services and brand portfolio, to create new user needs.

The authors propose narratives with a two-fold purpose:

- To describe design capabilities in practice, the extent of transformation that design can generate, and how it can create socio-economical value in SMEs;
- To support the understanding of wide audiences through interpretive narratives describing real profiles.

Narratives are archetypical scenarios emerged through analysing the case studies and data gathered through the research ([DeEP Design in European Policy](#)). They were developed on the basis of the policy cases described above. Data collected were interpreted qualitatively to identify the relevant combination of one or more capability in a business profile. For example, companies that show a capability only in design execution have a different profile compared to companies that show capabilities in design execution and management. Therefore the presence of design capabilities has been matched to the profile of firms interviewed to read their awareness of design. The result is described in the table below, as a list of *firm outlines* or profiles. These last are described in general terms, and are exemplified using the previously listed case studies.

Our findings show 6 narratives that describe 6 different ways to use and integrate design capabilities in business innovation processes. These are:

- Design Beginner, where design capabilities are only used implicitly;
- Design Adopter, where design capabilities are mainly connected to technical aspects of product/service development (main presence of design execution);
- Design Expert, that uses design capabilities explicitly for managing processes and developing new products and services (presence of design execution and design management);
- Design Explorer, that despite the absence of a strong management component uses design as the main tool to explore and develop new ideas as well as to give the company a strategic direction (presence of design leadership and design execution);
- Design Enabler, that embeds design explicitly in all processes and functions, while investing highly in brand reputation and in training all employees on the companies' values (presence of design leadership and design management);
- Design Advocate, that identifies the recognised leaders of design innovation. These use design widely throughout business processes, making it the main differentiator of their offer, production, distribution, and communication systems.

Table 2 Description of firm outlines

Firms outlines description	Examples *All examples of firms used have been interviewed directly in the context of the case studies developed in the research.
Design Beginner Firms with little or no design capabilities, but nevertheless interested in acquiring and experiencing design capability (in terms of tools and approaches) throughout the product/service development process.	<b>Perimed:</b> Participant in Design som Utvecklingskraft, Sweden. <b>Perimed</b> emerged as a design beginner, a champion in its own field but still unclear how design could benefit its activities. As a result of participation Perimed were able to integrate design in the <i>softer</i> side of product development, e.g. user interfaces, software, web development, and aesthetics.

<p>Design Adopter Firms with a core concentration of design capabilities at execution level. Design is used as a technical skill supporting the processes of ideation, production, and distribution of products and services.</p>	<p><b>White Logistics*</b>: Participant in Designing Demand (Design Leadership), UK. Participation transformed <b>White Logistic</b> into a exemplar for best practice for the use of design within their organisation, where design has contributed to their business growth through focussing long term strategies; and to developing a more consistent brand, from company uniform to drivers' attitudes. *This company was not interview directly, but the data are available online as part of a best practice in Designing Demand, one of the design policies studied in the project</p>
<p>Design Expert Firms with a structured approach to design at all levels and functions, including planning, managing, and organising design resources. Capabilities in product development, customer experience and communication are strong, including prototyping and the involvement of external designers.</p>	<p><b>Tucano Urbano</b>: Participant in Un designer per le imprese, Italy. <b>Tucano Urbano</b> have strengthened collaboration with external designers including transforming previously functional products into 'cool urban wear', and projecting brand recognition in Italy and abroad. They are also exploring possible collaborations with research centres and universities specialising in design.</p>
<p>Design Explorer Firms using design capabilities to strategically orientate innovation processes. Developing new and emerging business scenarios, this approach to innovation comes from a consistent drive to experiment with new materials and technologies, extending capabilities to the implicit aspects of</p>	<p><b>Lizard Footwear</b>: Participant in DeA – Design for Arts and Crafts, Italy. Participation has reinforced <b>Lizard Footwear's</b> cooperation with external designers through designing new products, and contributed to the effectiveness of its in-house design function through the acquisition of additional management and new product development skills.</p>

<p>design e.g. co-design processes.</p>	
<p><b>Design Enabler</b> Firms concentrate design capabilities e.g. in communicating a product or service and engaging the user in brand value. This includes a high capacity of managing external resources and relationships for design and production. These firms use design throughout the organisation with standard and clear procedures for all, with high investments in training for design.</p>	<p><b>Marmorin:</b> Participant in Design Your Profit, Poland Participation provided support for know-how building and skills for brief preparation. However <b>Marmorin</b> already used design a driver of innovation as a constant push to experiment with new materials and technologies. They employ design both as internal and external functions and invest in promoting design activities also at international level.</p>
<p><b>Design Advocate</b> Firms with a design-driven approach to innovation. These firms are acknowledged leaders and exemplars for the use of design. They promote a design-driven vision and culture that can engage and stimulate communities, firms, regions, even nations.</p>	<p>Generally, these companies are successful and well acknowledged by users. As an example of Design advocates, internationally known organisations such as <b>Alessi, Freitag, Ittala and Brompton</b> employ best practices showing design as a cultural asset that integrates functional, emotional, and socio-economical utilities. Design Advocates are champions in co-creative processes with users, as their products are part of a wider value constellation of product-service systems.</p>

## Discussion: limits and constraints on measuring design capabilities

Firm outlines provide a conceptual narrative of firm profiles. However, this model includes further challenges for validation that are important to be stressed as they could foster debate and advancement in the design management research community.

The main purpose of the model is to propose a simple and straightforward storytelling to sustain companies understanding and justifying their investments in design, thus learning to involve it more steadily into their strategies and innovation processes. This model helps on the one side designers, managers and policy makers to justify investments in design, on the other it can be used by researchers to interpret research results and as a tool to explain practically how design management is a value for companies.

Few main limits and constraints are thus proposed in this paragraph hoping to advance the debate on the topic. In particular, three main areas of limits can be recognised:

- Limits linked to the research conducted and the sample of enterprises used:
- The profiles proposed have been created out of a limited number of business cases (especially those studied in the examples of design policies developed in the research). This represents an important limitation, as a wider sample of cases should be included to fully justify the model, which would also help refine descriptions and justify them with richer details.
- Limits linked to the model proposed and to its application in concrete terms;
- The profiles proposed are not totally separable from one another. There is overlap as the methods and metrics to differentiate the use of design within businesses is quite rich and complex.
- The profiles do not represent a hierarchy. Currently, they express and justify different ways of including design within business operations and strategies. Each of these could be translated in a very good use of design for the firms' purposes and sector. For example, a small firm focused on manufacturing excellence might not want to be a design advocate, but might make the best use of design for its characteristics just being a design expert.
- Another important limitation is linked to the necessity of simplifying extremely a very rich and nuanced picture, linked to the use of design in firms. In order to engage peer learning, for example, firms would need to find valid samples in terms of similarities. These would span from the sector and size of the firm, the characteristics of the contexts in which it operates, the life and history of the firm, and even the main traits of the entrepreneur, thus making the interpretative model much more complex.

- The main challenge is to transform this model in a tool to support firms, designers and design associations in general to learn and advocate for design-driven innovation as a crucial lever in innovation for future growth.
- Limits connected to the existing literature, and the need for further debate and empirical inquiry to agree widely on a definition of design capabilities.
- Despite the increasing interest on the topic of design capabilities, the definitions, descriptions, and research provided by scholars are still limited. These hardly define the concept through practical evidences, and are often centred on analysing the role of design and designers when/if embedded in organisations. Further, design management literature often concentrates on how managers use or could use design for the benefits of the enterprise, leaving design at the margins of the picture. The authors believe that more research is needed from a design perspective, to integrate more comprehensively the management perspective that is already well acknowledged in the reference literature. This could be crucial to begin answering to some of the latest principal concerns linking design to innovation and policy more in general, where the European Commission is investing greatly on advocating design capabilities in the policy system, the enterprise system, and the public sector.

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