

Design Management Absorption Model: A Framework to Describe and Measure the Absorption Process of Design Knowledge by SMEs with Little or no Prior Design Experience

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The introduction of new design knowledge or design resources in companies with little or no design experience has been at the core of design support programmes in several countries. Scholars investigated the use of design and identified different design and design management capabilities to deploy design effectively in companies of all sizes. However, how design and design management capability is built in SMEs with little or no prior design experience is insufficiently investigated. Based on the absorptive capacity construct from the broader field of innovation studies, this paper proposes a comprehensive design management absorption model that includes design management capabilities enabling design absorption in SMEs with little or no prior design experience as well as indicators to measure the progress of absorption. The model allows for analysing and guiding the process companies go through when using design as a strategic resource for the first time.

Introduction

Using design management as a strategic resource to differentiate products, manage design projects more effectively, or build brand value has been common since the 1960s (Farr, 1965; Topalian, 1979; Kotler & Rath, 1984; Lorenz, 1987). Since then, scholars have been intent upon defining and positioning design management as a management function in its own right. Design management has been described from different perspectives such as definitions and goals (Farr, 1965; Gorb, 1990a; Blaich & Blaich, 1993), organizational place and level (Cooper & Press, 1995; Borja de Mozota, 2003), people deploying design (Gorb, 1990b), their management and leadership responsibilities (Turner & Topalian, 2002), or their tasks (Topalian, 1979). Design management has been viewed as a process from the analysis of customer needs all the way to the launch of new products or services (Topalian, 1979); it has also been conceptualized as a

co-ordinator between functions, departments and an integrator of stakeholders (Bruce & Bessant, 2002).

Other than marketing, which found its way into organizations in the 1950s and 1960s (Gorb, 1990b), design management failed to be widely adopted as a separate management function (Sun, Williams & Evans, 2011). Only lately, the debate on design thinking and the ensuing inclination of renowned companies such as P&G (Martin, 2009) to include design knowledge into their value-creating and innovation processes has sensitized more organizations to design. Although the notion of design thinking is ambiguous and has provoked mixed reactions in the community of design practitioners as well as design scholars (Hassi & Laakso, 2011), the 'hype' has mostly been restricted to larger organizations.

Many small and medium-sized enterprises (SMEs) are still unaware of design as a strategic resource; some because they are technology-driven and are making 'silent

design' decisions (Gorb & Dumas, 1987) or doing engineering design (Blaich & Blaich, 1993); some because of barriers such as limited human and financial resources, less formal or non-existent product development and innovation processes (Fueglistaller, 2004); some because of lack of access to design resources (Cox, 2005) or poor design understanding (Moultrie, Clarkson & Probert, 2007). From these few observations it can be concluded that starting to use design as a strategic resource involves a learning process on the part of SMEs on how to manage this new knowledge or strategic resource.

While, as stated before, much of the design management literature has focused on definitions, goals, responsibilities and tasks, little attention has been given to the question of how companies with little or no prior design experience build the capabilities to execute design management. Models such as the Danish Design Ladder (National Agency for Enterprise and Housing, 2003) or the Design Management Staircase (Kootstra, 2009) implicitly address organizational learning, proposing ascending levels of design and design management maturity, but they fall short of outlining how exactly SMEs 'mature' with respect to design management. A focus on capabilities and how they are built, however, needs to address the absorption of new knowledge and the configuration of resources.

To address this need, we introduce a model of *how* SMEs with little or no design experience acquire new design knowledge. Based on the *absorptive capacity construct* (Cohen & Levinthal, 1990; Zahra & George, 2002) from the broader field of innovation studies, we devised a model that conceptualizes the absorption of design knowledge as an organizational learning process of *acquisition, assimilation, transformation* and *exploitation*, including indicators to assess the success of the individual phases of the process. Design management and design leadership capabilities are viewed as organizational capabilities that have the potential, on the one hand to create competitive advantage and, on the other, to change the company to a dynamic and flexible organization. To understand 'how design fits' and, as a result, to adequately deploy design resources to drive innovation and generate added value can even be considered as a *dynamic capability*, a concept that has been described in strategic management studies (Teece, Pisano & Shuen, 1997; Helfat et al., 2007).

In prior applied research (Acklin, 2011), a prototype of a Design Management Absorption Model (DMAM) to evaluate the absorption processes and capability building of five Swiss SMEs was tested; the prototype was sub-

sequently revised based on first empirical data, which added validation to an otherwise purely prescriptive model. Insights into weaknesses of the prototype and a further literature review led to a second, more comprehensive DMAM. This article first reviews the theory that led to both models; secondly, it discusses the experiences with the prototype of the model and the changes it went through; and, finally, it presents the second model and concludes with a discussion of the improved model.

Literature and Definitions

The key concepts to understand design management as an organizational capability yielding competitive advantage and strategic flexibility can be traced back to Edith Penrose's *The Theory of the Growth of the Firm* (1959) and to ensuing concepts of strategic management such as the resource-based view (RBV) or the dynamic capability construct (DC).

Resources, Capabilities and Capacities

A company can be viewed as a bundle of productive *resources* with a management team deciding how to deploy them to make a profit (Penrose, 1959). These resources can be physical, such as plants or equipment, but they can also be intangible such as the human resources available to the firm. However, 'it is never resources themselves that are the "inputs" in the production process, but only the services that the resources can render' (p. 22). Services are seen as an 'activity' (p. 22) to put these resources at work, and 'as we shall see, it is largely in this distinction that we find the source of uniqueness of each individual firm' (Penrose, 1959, p. 22).

Some 40 years later these ideas were picked up by the resource-based view and by the dynamic capability construct (DC) to explain sustained competitive advantage. The resource-based view (RBV) defines resources as all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. It is resources that are valuable, rare, imperfectly imitable and non-substitutable that create a competitive advantage for a company (Barney, 1991). On top of that, the DC emphasizes the notion that companies need 'dynamic capabilities' to exploit existing internal and external firm-specific competences to address changing environments (Teece, Pisano & Shuen, 1997). Companies should *dynamically* adjust to the changing business environment of a 'Schumpeterian world', and strategic management should be capable of

appropriately adapting, integrating and reconfiguring internal and external organizational skills, resources and functional competences to match the requirements of a changing environment (Teece, Pisano & Shuen, 1997).

Design can also be viewed as a bundle of resources in organizations. Based on Barney's (1991) definition of company resources, design can be regarded as a resource in several ways: Design is a *process* and can be viewed as an organizational 'routine' (Nelson & Winter, 1982); design is a specific form of *knowledge* (Jonas, 2011); design can be an *asset*, e.g. in the form of an in-house design team or a design alliance (Bruce & Jevnaker, 1998); design resources can be conceptualized as the 'powers' of design as a differentiator, integrator, transformer, and of design as 'good business' (Borja de Mozota, 2006); and design is a set of *design management capabilities* to enable the deployment of design resources (Gorb, 1990b) in a way to harvest the benefits 'these services can render' (Penrose, 1959).

In past research, design management scholars (Kotler & Rath, 1984; Dumas & Whitfield, 1990; Bruce, Cooper & Vasquez, 1999; Perks, Cooper & Jones, 2005; Borja de Mozota, 2006; Chiva & Alegre, 2007, 2009) identified different design and design management capabilities in organizations. Some extract specific design capabilities from product development processes (Perks, Cooper & Jones, 2005) or from the design management use of design-oriented companies (Borja de Mozota, 2006), or detect a connection between an in-house design team and the design management skills of companies (Chiva & Alegre, 2007). These scholars mostly describe a specific design management function or person and his/her tasks and abilities.

The shift to viewing design management as an organizational capability is a relatively new one. Jevnaker (1998) lists the following component capabilities in organizing design and its management:

1. Resourcing capability, the ability to acquire and manage profitable design resources.
2. Combinative capability, the ability to configure design resources.
3. Organizational learning capability, which is an absorption capability.
4. Innovation capability.
5. Design-strategic capability, the ability to integrate design into business strategy.
6. Protecting capability of design-based advantages (p. 21).

As can be seen from this short summary, in design management theory the terms task, skills or capabilities are used ambiguously and

depending on the context of use. Here, we root these terms in the DC construct – meaning design management capabilities are the capacity to deploy design resources in an adequate (and dynamic) way. From strategic management studies, Amit and Schoenmaker (1993) clarify the distinction between *resources* and *capabilities*: capabilities are the capacity to deploy the resources. Like resources, these capabilities are firm-specific and are developed over a longer period of time through learning processes. They are information-based, tangible and intangible processes and they 'can abstractly be thought of as "intermediary goods" generated by the firm to provide productivity of its resources, as well as strategic flexibility and protection for its final product or service' (p. 35).

A *capacity* is the ability to perform a certain task in a minimally acceptable manner (Helfat et al., 2007). To qualify as a capability, the capacity to execute a specific task needs to have a *patterned element*, a company needs to be able to repeatedly perform a certain task in a minimally acceptable manner.

Absorptive Capacity and Design Complementarity

In the ACAP construct, organizational learning and capability building are a result of new knowledge absorption and critical to innovation or to the development of new offerings. According to Cohen and Levinthal (1990), absorptive capacity (ACAP) is 'the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends' (p. 128). Although the ACAP construct, in the beginning, has focused on the acquisition of technological and scientific knowledge through the R&D function of a firm, Cohen and Levinthal (1990) also name other business units such as manufacturing, design or marketing as the beneficiaries.

Referring to the resource-based view (Barney, 1991) and to the dynamic capability concept (Teece, Pisano & Shuen, 1997; Helfat et al., 2007), Zahra and George (2002) re-conceptualize ACAP as a set of organizational routines and processes, and connect it to the dynamic capability concept by viewing ACAP as a dynamic capability that impacts on the resource base of a company to provide it with multiple sources of competitive advantage. They suggest that there are four organizational capabilities: knowledge acquisition, assimilation, transformation and exploitation.

Drawing on insights from cognitive behavioural science, Cohen and Levinthal (1989, 1990) state that prior knowledge helps to value new information and to assimilate it. In spite of

an already existing memory (of knowledge), new knowledge might be acquired, but often not utilized well because individuals do not possess the appropriate knowledge to put the new knowledge into context. Zahra and George (2002) distinguish potential capacity (PACAP), the ability to acquire and assimilate knowledge, from realized capacity (RACAP), the ability to transform and exploit new knowledge. While PACAP makes a company susceptible to learning, RACAP enables the company to leverage PACAP.

It is a common experience of design practitioners and of past and ongoing applied research of the author of this article (Acklin and Hugentobler, 2008; Acklin, 2010, 2011) that SMEs will reject the idea of integrating design into their new product development projects or often abandon it early on. This is explained by time or money constraints by SMEs, but often points to a deeper chasm between engineering and design or management and design values and their ways of 'handling things'.

Some of the explanations encountered in the literature for the difficulty to acquire and manage new design knowledge by large as well as by small firms are as follows:

1. Design knowledge has rarely been part of management education and, thus, is an alien resource to many managers (Jevnaker, 1998; Boland & Collopy, 2004; Martin, 2009) as well as to engineers (Jahnke, 2009).
2. Design is an 'experience good' (Commission of the European Communities, 2009). Confidence in design as a resource grows, once there have been positive experiences with, and observable effects of, the use of design (Perks, Cooper & Jones, 2005).
3. A 'design attitude' (Boland & Collopy, 2004) has some irritating 'ingredients' for management teams such as an insistence on fluid and iterative processes of searching, experimenting and prototyping, zooming in and out of the problem while maintaining a holistic view (Conley, 2004), accepting high levels of uncertainty (Jevnaker, 1998), while evaluating multiple alternatives (Conley, 2004), and being led by a human-centred design ethos stressing empathy with user needs as a starting point for innovation (Brown, 2008).
4. Also the tacit dimension of design knowledge that is embodied in products as well as in people has been mentioned (Jevnaker, 1998).

An empirical study with French companies from the clothing and the construction business researched the difference between design

knowledge and engineering or marketing knowledge during the absorption process in new product development and came up with an enlightening list of typical attributes (Abecassis-Moedas & Mahmoud-Jouini, 2008):

1. Companies perceived design as related to an individual designer/architect rather than embedded to a collective as in their firms.
2. Design relies strongly on tacit rather than explicit knowledge, the latter being more present in, for example, manufacturers' or retailers' knowledge.
3. Designers are inclined to use divergent thinking rather than convergent. Designers rather strive on creative exploration, while, for example, engineers work on well-specified problems.
4. Designers keep to a peer orientation, giving more importance to their peer's opinions than to the people commissioning the project.

While the gap between design and engineering or management and the difficulty to relate design knowledge to prior organizational knowledge can be a problem, the complementarity between manufacturing and design or retail and design knowledge can be a critical aspect for the successful absorption process. Abecassis-Moedas and Mahmoud-Jouini (2008) come to the conclusion that, if the source knowledge as represented 'through the archetypical figure of the architect or the fashion designer' (p. 474) is at the same time related and diverse and if it is combined effectively with the recipient's knowledge (firm), positive effects can be observed on NPD performance such as process efficiency (cost) and product effectiveness (quality).

Prototype of the Model

In the prototype of the Design Management Absorption Model (see Figure 1), the four organizational capabilities of acquiring, assimilating, transforming and exploiting with respect to design management knowledge are listed. The acquisition phase consists of recognizing the potential of design as a resource and identifying specific design contributions to a company's bottom line. Once this has been done, specific design resources will have to be assimilated, transformed and exploited.

Assimilation entails a deeper understanding of the new design knowledge by connecting it to company goals, projects and processes. During the transformation phase, the new

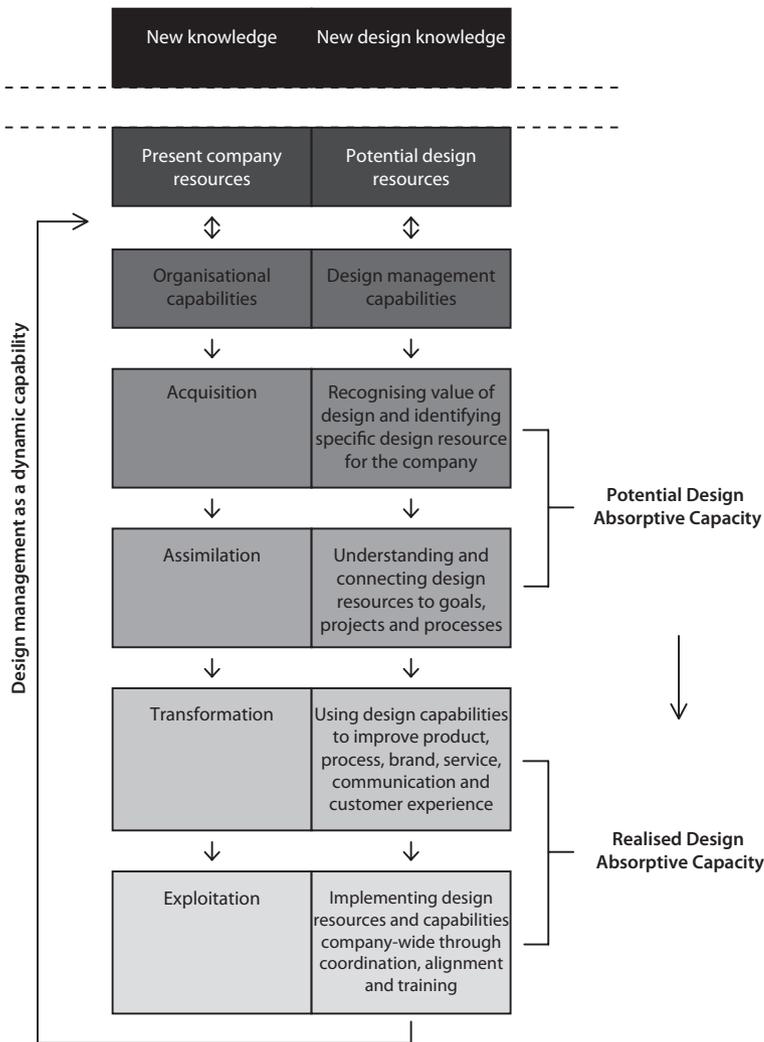


Figure 1. Prototype Design Management Absorption Model (Acklin, 2011, based on Zahra & George, 2002)

design knowledge has to be deployed effectively through building design management capabilities and using design tools to improve all customer touch points such as products, brands, services, communication or processes such as NPD or innovation processes. The exploitation will involve the company-wide implementation of the design resources through integrating design into processes, co-ordinating functions, aligning core values, training the staff, etc.

In our prototype model, we suggested the same distinction between potential design absorption capacity and realized design absorption capacity as Zahra and George (2002); much like them, we stated that the development of potential design management capabilities does not guarantee the successful transformation and exploitation of these capabilities. Potential resources will need to be

changed into specific design management capabilities that include a 'patterned element' (Helfat et al., 2007), a capacity to repeat certain actions.

Once design as a potential resource has been recognized, assimilated, transformed business routines and has been exploited successfully, design and design management capabilities can impact on existing company resources. Ultimately, design management can act as a dynamic capability, changing the company on a deeper level and improving its overall competitiveness and strategic flexibility.

Data and Methods

In 2009/2010, an action research project was conducted followed by an evaluation of results and company lessons (Acklin, 2011). At the

outset of that project, it was not intended to develop and validate a DMAM. However, the prototype, which was developed during the literature review for a later project, lent itself for a trial. The model was not introduced to companies during evaluation, but was used by researchers only to analyse company results from a knowledge absorption perspective. To understand the results concerning the model, nevertheless, a sketchy outline of the data is provided in Table 1.

The sample of companies (Table 1) was not representative of any trade or sector; only the following selection criteria were applied: the company had to be an SME and it had to be willing to explore design and design management as a driver of innovation. The company projects followed the cycle of action research as described by Susman and Evered (1978) of *diagnosing, action planning, action taking, evaluating* and *specify learning*. At the beginning, researchers and companies diagnosed the strengths and weaknesses of the present use of design (as evident in products, services, communication, brand and overall customer experience) and current threats and opportunities from the business environment. Based on the initial analysis, design strategies and (innovative) design projects for each company were identified (action planning). In addition, the sourcing and briefing of, and the communication with, external designers were facilitated where design work was needed (action taking). During a period of seven to seventeen months, depending on the needs of the individual company, researchers worked as 'facilitators who catalysed the process within the subject company' (Platts, 1993), introducing several design and design management approaches and tools such as customer journeys, experiential research methods to enable learning processes with respect to design management concepts.

Six to nine months after these workshops, an evaluation was conducted to understand whether or not the companies had carried out their projects, and what the 'tangible' results were (evaluating). Semi-structured interviews also aimed at finding out how they made use of design and design management since the action research phase, whether their perception of design had changed, and how the specific design projects had been implemented (specify learning). The progression of absorption through the stages of acquisition, assimilation, transformation and exploitation, and the success of the absorption process in regard to the impact on the overall resource base of the company were rated retrospectively (see Table 2) using the prototype of the DMAM and a scoring system

ranging from 0 to 100 per cent knowledge absorption.

Results from the Applied Research Project

Company 4 succeeded in realizing ACAP, Companies 1 and 3 were on the way to doing so, and Companies 2 and 5 failed. Company 4 succeeded completely in absorbing and integrating new design knowledge. At the beginning, the CEO doubted that design would prove relevant in his field at all. However, in co-operation with the industrial designer, the company simultaneously managed to cut production costs, to install a modular architecture, and to improve ergonomics and product semantics of their product. Furthermore, by exploiting design and design management, Company 4 moved from a mechanical engineering company, which had been constructing and selling machinery to a system provider, to one which now offers innovative services based on a well-designed piece of machinery as a core. These changes to the resource base indicate that design management has acted as a dynamic capability. The CEO also pointed out that the technological know-how the company possesses has been made more visible and tangible to customers and stakeholders with the help of design. One year later, the company is continuing its co-operation with the designer on a new project.

Company 1 was also able to absorb new design management knowledge in a way that impacted on the overall resource base of the company; a new customer experience strategy became part of the overall strategy of the company. The use of tools such as the customer journey and the brand persona resulted not only in a re-design of most communication media such as the logo, business documents and website, the company also reworked and refocused single services, all of the service portfolio and their overall customer experience strategy. As a result, the number of unsolicited enquiries from customers increased. The company still uses some of the design tools to check whether it keeps to its customer experience strategy. However, it was not completely clear as to whether the company would be using these tools in the future.

Company 3 made some progress on its absorption of new user-centred design knowledge. However, changes in the responsibility for the design project and internal pressure from the head office slowed down the absorption process, nearly bringing it to a stop. While customer orientation was part of the culture of

Table 1. Company Overview Including Company Information, Project Goals and Result

	Company 1 Service Company	Company 2 Manufacturer B2B	Company 3 Healthcare	Company 4 Manufacturer B2B	Company 5 Manufacturer B2B
Company information	Specialized in consulting and knowledge exchange services between for SMEs	Specialized in printing textiles for B2B market	Privately owned clinic	Start-up company developing a new pellet machine processing biomass and offering services connected to it	Specialized in contract manufacture of textile products
Project goal during action research project	Optimization of touch points and improvement of customer experience	Optimization of innovation process and organization; exploration of new business opportunities (e.g. development of a B2C product)	Optimization of way-finding system to and inside clinic (entrance hall)	Introduction of industrial design in NPD process, development of services and business model connected to new product	Development of corporate identity, corporate design, brand values and brand name

Table 2. Evaluation of Interviews with SMEs about Absorption Process and Design Management Capability Building

	Company 1 Service Company	Company 2 Manufacturer B2B (Textile Print)	Company 3 Healthcare	Company 4 Manufacturer B2B (Engineering)	Company 5 Manufacturer B2B (Textile Industry)
Acquisition	Recognition of value of design (some questions on nature of design mgmt.)	Recognition of nature of innovation process; design as a driver of new business opportunity	Recognition of human-centred design models for designing relationship with customers/patients	Recognition of value of design in all company areas	Recognition of design as something more complex than assumed
Progression bar*	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Assimilation	Understanding design and design mgmt. Contributions to company goals (customer experience) results in design project development	Understanding problems with then current innovation process, innovation organization and attributed human resources	Understanding of problems with way-finding system and understanding contribution of design results in design project	Understanding of contribution of industrial design to form giving, ergonomics and cost reduction of new machine; of system's and information design to business model generation and communication	Understanding of contribution of corporate identity building results in naming and corporate identity project
Progression bar*	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Transformation	Cooperation with external designer; use of design tools for analysis and synthesis for design project through company	Employment of design manager (successor to leaving CEO)	Formulation brief for concept development to optimize way-finding system, sourcing designer; revision of customer entry forms.	Formulation brief for design of engineering prototype, sourcing designer; use of design tools such as visualization, customer journey etc.	None (external obstacle to progression of project)
Progression bar*	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Exploitation	Use of design tools (e.g. customer journey as blueprint for sustained adaptation of services; brand persona to outline prospective CI)	None (internal obstacles due to change in leadership and human resources)	Partial adoption of user-centred perspective for management decisions; synergy between human-centred design view and change in cultural values and leadership	Following product was developed with industrial designer right from the start; use of visualization for internal communication	None
Progression bar*	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Impact on company resources	Inclusion of customer experience strategy in overall business strategy	None	Reinforcement of human-centred view	New organizational structure (with design); adaptation of corporate design	None
Progression bar*	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

* Incremental progression by 20 per cent, increasing from left to right.

the clinic before, certain design tools, such as the use of an ageing suit by some members of the board, made a strong impression on the perception of human-centred approaches. The clinic was planning to use this method again.

In Companies 2 and 5, the researchers observed no design absorption process in the company. In the case of Company 5 this was due to external obstacles. To increase visibility and market power, the manufacturer aimed to become independent from a governmental department. During the action research period, a corporate identity and branding project, a strategy to open up new market segments, and eventually to offer new proprietary products was developed. The manufacturer handed in the business plan to the local authorities and had to wait for its decision. At the end of the applied research project, we had little evidence that ACAP would be realized. In the case of Company 2, instead of developing new business opportunities and eventually a new product, questions on how the succession of one of the CEOs should be handled took centre stage. One team member displayed interest in the design and design management tools, but she was not able to implement them because of her position in the company. In this case, potential capacity was given, but a lack of power to transform and exploit the new knowledge inhibited the realization of the capacity.

Discussion of the Prototype Model

Evaluating company results with the first DMAM proved to be successful. To distinguish one company from the other in regard to design knowledge absorption was possible as well as broadly mapping absorption progression of the individual companies. In the case of Company 4, evidence of design management absorption acting as a dynamic capability could also be found. However, the measurement of the progression of design management absorption was too basic and sometimes arbitrary. What would justify an increase of the score by 25 per cent had not been defined. The prototype also had a self-contained quality not including triggers leading to knowledge absorption or outcomes, or people acting within absorption processes. In addition, the self-assessment through companies would have been a corrective to the possibly limited view of the researchers. For the model to be of use as an evaluation framework as well as a roadmap during the process of organizational learning, the DMAM needed to be more comprehensive, including indicators for successful knowledge absorption, a more refined defini-

tion of design management and design leadership capabilities, and a more dynamic view of the learning process, its triggers and outcomes.

Revised Model

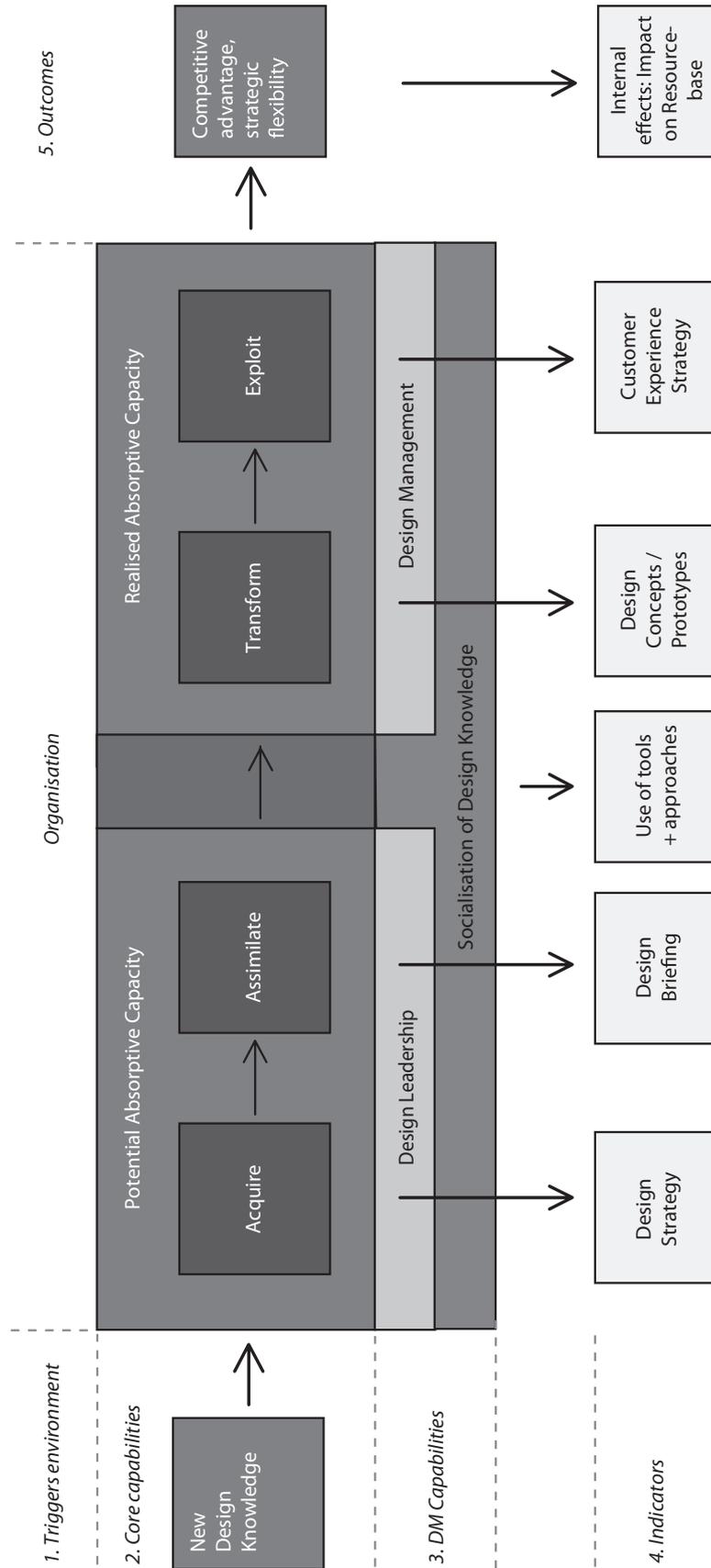
To improve the model – besides the insights mentioned above – a more in-depth study of the literature was conducted. The new version now offers five different dimensions to support the ‘navigation’ of the absorption process as well as its analysis. Just like the first version, the revised DMAM conceptualizes design management as an organizational capability that facilitates the absorption of new design resources and leverages design knowledge to achieve competitive advantage. The absorption process and design management capability building can be supported by the use of design approaches and tools as well as by the (sustained) collaboration with external designers. If the absorption of design management and design management capabilities move from potential to realized absorptive capacity through socialization and diffusion of design knowledge inside the company, design management can yield external outcomes as well as internal effects such as strategic flexibility and, ultimately, act as a dynamic capability (see Figure 2).

Triggers

One of the central questions is how new design knowledge finds its way into the company. According to Zahra and George (2002), internal or external triggers such as an organizational crisis, performance failure, technological shifts, or radical innovations that occur outside the company activate the absorption of new knowledge. In addition, the firm’s motivation or willingness to absorb new knowledge is key (Abecassis-Moedas and Mahmoud-Jouini, 2008).

Core Capabilities of Design Knowledge Absorption

Following Zahra and George (2002), design management absorption is divided into the four organizational capabilities of *acquiring*, *assimilating* (PACAP), and *transforming* and *exploiting* (RACAP) new design knowledge. *Acquisition* consists of identifying a specific design contribution to the company’s bottom line. *Assimilation* entails a deeper commitment to the new design knowledge by combining it to engineering or marketing processes and projects and by establishing it to work with complementary sources of design knowledge.



Design Management Absorption Model (Acklin, 2011)

Figure 2. Second Design Management Absorption Model (based on Zahra & George, 2002.)

Table 3. Design Leadership and Management Capabilities Connected to Design Management Absorption

Acquire	Assimilate	Transform	Exploit
Design Leadership Capabilities		Design Management Capabilities	
Defining hypothesis for new business opportunity; formulating a design strategy as part of company strategy (Jevnaker, 1998)	Sourcing design expertise and combining it with in-house team expertise (Jevnaker, 1998); briefing of external partner (Perks, Cooper & Jones, 2005); contracting and allocating resources	Facilitating project development (Topalian, 1979); managing different stakeholders out- and inside company	Aligning corporate values and project outcome; coordinating functions, processes etc. to achieve coherent customer experience

During *transformation*, the new design knowledge has to be deployed effectively to improve offerings such as products, brands, services, communication, or efficiently to manufacturing or innovation processes. *Exploitation* involves the company-wide implementation of design resources through integrating them into relevant processes, co-ordinating functions, aligning core values, training staff, etc., and through delivering a coherent customer experience at all touch points. Since absorption processes take place mainly during concrete work assignments and projects, the DMAM follows a prototypical development process.

Design Leadership and Design Management Capabilities

In this article a distinction between strategic or leadership and operational design management capabilities is made (Topalian, 1979; Cooper & Press, 1995; Turner & Topalian, 2002; Borja de Mozota, 2003). This distinction allows for connecting the DMAM to SMEs, which are strongly controlled by the owner/founder of the company (Mintzberg, 1979; Fueglistaller, 2004). He or she is the 'gatekeeper' as described by Cohen and Levinthal (1990), and determines whether design knowledge classifies as useful or not. In the model, acquisition and assimilation are related to design leadership capabilities and transformation and exploitation to design management capabilities, although the notions blur into each other (Turner & Topalian, 2002); this is also because owners of SMEs are involved in strategic as well as in operational work (Fueglistaller, 2004). The DMAM refers to design manage-

ment capabilities as described by different authors (Topalian, 1979; Jevnaker, 1998; Perks, Cooper & Jones, 2005), putting them into an order suitable for the absorption process and complementing or omitting elements to match the situation of SMEs (Table 3).

Socialization of Design Knowledge

Design knowledge entails design processes, approaches such as human-centeredness, visualization, experimentation, prototyping, etc., and tools as well as an attitude towards creation of innovative solutions. While co-operation with external designers will trigger a learning process, SMEs can absorb design knowledge themselves. Jonas (2011) re-conceptualizes the notion of design in the following way: 'Design is a *process*, which uses *knowledge* to generate new *forms* and new (*forms of*) *knowledge*' (p. 1). Design knowledge contains tacit dimensions (Rust, 2004) using tools such as future customer personas, user scenarios or customer journeys to convert tacit into explicit knowledge (Nonaka, 1994). As SMEs are close to their customers, they have a wealth of tacit knowledge to inform designers' solutions once it is made explicit. In addition, the use of these tools by company members is a vehicle to introduce how designers work, to socialize design knowledge throughout the company.²

Indicators

Indicators are evident outcomes to support the description and measurement of the progression of the design management absorption process. The first indicator is an often sketchy (nevertheless explicit) *design strategy* or *hypothesis*.

esis of where a process and the absorption of design knowledge connected to it should take the enterprise. It triggers search and knowledge creation activities to understand the envisioned business opportunity. A *design briefing*, the second indicator, constitutes the assembled knowledge at this point in time, the direction and the scope of the design work. The briefing can be in a written or oral form and represents the condensation of strategic intent communicated to and re-worked by designers. Indicators of a successful collaboration with a complementary design knowledge source are *concepts* and *prototypes* of a future product or service. Finally, an indicator for a holistic understanding of design management as a multi-layered activity to achieve touch point orchestration is a *customer experience strategy* that might initiate a long-term transformation and exploitation of design knowledge throughout the company.

Outcomes

Zahra and George (2002) described ACAP 'as a dynamic capability pertaining to knowledge creation and utilization that enhances a firm's ability to gain and sustain a competitive advantage' (p. 185). The same can result from absorbing design and design management knowledge if design resources are connected to value-creating process of SMEs. Consequently, an external outcome of absorbing new design knowledge can be a competitive advantage achieved through improved offerings and customer experiences. There can be an internal outcome as well, which might be even more important because it has the potential to change a firm into a dynamic and flexible entity. Although scholars mention that measuring dynamic capability is difficult (Helfat et al., 2007; Ambrosini & Bowman, 2009), the DMAM proposes that an indicator for design management as a dynamic capability is a change to the resource-base of a company, such as altered innovation processes or company structures that include designers or design managers. There also needs to be a 'patterned element' (Helfat et al., 2007) in the way a company handles strategic as well as operational routines.

Discussion of the Second Model

Overall, there exists little design management research about the use of design in SMEs with little or no design experience. Research agendas developed around design policies and design programmes supporting the case for more governmental initiatives in view of the large number of SMEs in Europe.³ While

maturity models (National Agency for Enterprise and Housing, 2003; Kootstra, 2009) take a snapshot at the status quo, the DMAM outlines how SMEs absorb design knowledge, how they actually mature and, finally, how they grow in the sense of Penrose (1959). By intertwining the ACAP and the DC constructs with various dimensions of design management into one comprehensive model, the DMAM also succeeds in conceptualizing design management as a dynamic capability to gain and sustain competitive advantage.

Chiva and Alegre (2007) found that companies from the Italian and Spanish ceramic tile industry are more able to harness design management skills if there exists an in-house design team. Not all SMEs will have the human and financial resources to create a design department but also a sustained relationship with external designers will support a more profound understanding of designerly ways of knowing and doing things. Once basic design management capabilities have been built into the SME, these will leverage design knowledge in a way appropriate to the company's specific context and challenges. In addition, the relationship between company and external design knowledge source becomes richer.

This is, to some extent, in contrast to debates that have promoted design thinking as a silver bullet without a complementary design management function. We conclude that design management capabilities are more readily absorbed than design capabilities because they connect to prior company knowledge and are managerial in nature. Design management capabilities bridge the gap between PACAP and RACAP and, over time, can shape resources and become a dynamic capability.

Conclusion

How companies absorb new knowledge is a complex phenomenon, since individuals as well as teams, internal as well as external stakeholders, etc., interact in companies during absorption processes. In the area of organizational learning, there exist two streams of literature (Tsang, 1997); one that is based on theory, that is *prescriptive* and aims at answering the question of how companies should be learning; and one that is *descriptive*, that is based on empirical research and focuses on how companies actually are learning. Since both approaches have their merits and limitations, Tsang (1997) opts for an integration of both ways of formulating models. This was done here as well: the test of the prototype of the DMAM, a prescriptive model emerging

from a literature review, informed the second model through empirical data. The second model will be validated in a follow-up project, which again will enrich the prescriptive model by new empirical results.

Nevertheless, certain limitations remain. Design management capabilities are built over time and longitudinal studies would be necessary to trace the success of design management absorption on the level of competitive advantage and even more so to see design management act as a dynamic capability. Keeping these limitations in mind, the DMAM is useful to evaluate and compare companies' absorption processes in a differentiated qualitative manner. It could also be used to guide co-operation between design consultants or practising designers and SMEs with little or no design experience. The main contribution of the DMAM – apart from the fact that the ACAP construct has been made accessible to the design management practice – is that it makes distinct steps of design management knowledge absorption traceable and controllable through indicators that act as 'check points' during the process.

Notes

1. In evolutionary theory, Nelson and Winter (1982) came up with the term 'routines', comparing routines to the role genes play in biological evolutionary theory.
2. See also the notion of 'design infusion', as described by Dumas and Mintzberg (1989).
3. For example, See Design, <http://www.seedesign.org> (accessed August 2012).

References

- Abecassis-Moedas, C. and Mahmoud-Jouini, S.B. (2008) Absorptive Capacity and Source-Recipient Complementarity in Designing New Products: An Empirically Derived Framework. *Journal of Product Innovation Management*, 25, 473–90.
- Acklin, C. (2010) Design-Driven Innovation Process Model. *Design Management Journal*, 5, 50–60.
- Acklin, C. (2011) The Absorption of Design Management Capabilities in SMEs with Little or No Prior Design Experience. *Nordes 2011: Making Design Matter*. Aalto University, Helsinki, Finland.
- Acklin, C. and Hugentobler, H. (2008) Design Management for Small and Medium-Sized Enterprises: Development of a Design Management Guide for the Use of Design and Design Management within Corporate R&D and Decision Making Processes. Swiss Design Network Symposium 'Focused', Bern.
- Ambrosini, V. and Bowman, C. (2009) What are Dynamic Capabilities and are they a Useful Construct in Strategic Management? *International Journal of Management Reviews*, 11, 29–49.
- Amit, R. and Schoenmaker, P. (1993) Strategic Assets and Organizational Rents. *Strategic Management Journal*, 14, 33–46.
- Barney, J. (1991) Firm Resources and Sustained Competitive Advantage. *Journal of Management*, 19, 99–120.
- Blaich, R. and Blaich, J. (1993) *Product Design and Corporate Strategy: Managing the Connection for Competitive Advantage*. McGraw-Hill, New York.
- Boland Jr., R.J. and Collopy, F. (2004) *Managing as Designing*. Stanford University Press, Stanford, CA.
- Borja de Mozota, B. (2003) *Design Management: Using Design to Build Brand Value and Corporate Innovation*. Allworth Press, New York.
- Borja de Mozota, B. (2006) The Four Powers of Design: A Value Model for Design Management. *Design Management Journal*, 17, 44–53.
- Brown, T. (2008) Design Thinking. *Harvard Business Review*, 86, 84–92.
- Bruce, M. and Bessant, J. (2002) *Design in Business: Strategic Innovation through Design*. Pearson Education, Edinburgh Gate.
- Bruce, M. and Jevnaker, B.H. (1998) *Management of Design Alliances: Sustaining Competitive Advantage*. John Wiley & Sons, Chichester.
- Bruce, M., Cooper, R. and Vasquez, D. (1999) Effective Design Management for Small Businesses. *Design Studies*, 20, 297–315.
- Chiva, R. and Alegre, J. (2007) Linking Design Management Skills and Design Function Organization: An Empirical Study of Spanish and Italian Ceramic Tile Producers. *Technovation*, 27, 616–27.
- Chiva, R. and Alegre, J. (2009) Investment in Design and Firm Performance: The Mediating Role of Design Management. *Journal of Product Innovation Management*, 26, 424–40.
- Cohen, W. and Levinthal, D. (1989) Innovation and Learning: The Two Faces of R&D. *The Economic Journal*, 99, 569–96.
- Cohen, W. and Levinthal, D. (1990) Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35, 128–52.
- Commission of the European Communities (2009) Design as a Driver of User-Centred Innovation. Commission Staff Working Document, SEC(2009)501 final, Brussels.
- Conley, C. (2004) Leveraging Design's Core Competencies. *Design Management Review*, 15, 45–51.
- Cooper, R. and Press, M. (1995) *The Design Agenda: A Guide to Successful Design Management*. John Wiley & Sons, Chichester.
- Cox, G. (2005) *Cox Review of Creativity in Business: Building on the UK's Strengths*. Design Council, London.
- Dumas, A. and Mintzberg, H. (1989) Managing Design. *Designing Management. Design Management Journal*, 1, 37–43.
- Dumas, A. and Whitfield, A. (1990) Why Design is Difficult to Manage. In Gorb, P. (ed.) *Design Management. Papers from the London Business School*. Architecture Design and Technology Press, London, pp. 24–37.
- Farr, M. (1965) Design Management. Why is it Needed Now? *Design Journal*, 200, 38–39.

- Fueglistaller, U. (2004) *Charakteristik und Entwicklung von Klein- und Mittelunternehmen (KMU)*. KMU Verlag HSG, St. Gallen.
- Gorb, P. (1990a) Introduction: What is Design Management. In Gorb, P. (ed.) *Design Management. Papers from the London Business School*. Architecture Design and Technology Press, London, pp. 1–9.
- Gorb, P. (1990b) Design as a Corporate Weapon. In Gorb, P. (ed.) *Design Management. Papers from the London Business School*. Architecture Design and Technology Press, London, pp. 67–80.
- Gorb, P. and Dumas, A. (1987) Silent Design. *Design Studies*, 8, 150–6.
- Hassi, L. and Laakso, M.S. (2011) Conceptions of Design Thinking in the Management Discourse. 9th European Design Academy Conference (EAD), Lisbon.
- Helfat, C.E., Finkelstein, S., Mitchell, W., Peteraf, M.A., Singh, H., Teece, D.J. and Winter, S.G. (2007) *Dynamic Capabilities. Understanding Strategic Change in Organizations*. Blackwell, Oxford.
- Jahnke, M. (2009) Design Thinking as Enabler of Innovation in Engineering Organisations. 8th European Academy of Design Conference, The Robert Gordon University, Aberdeen.
- Jevnaker, B.H. (1998) Building Up Organizational Capabilities in Design. In Bruce, M. and Jevnaker, B.H. (eds.) *Management of Design Alliances: Sustaining Competitive Advantage*. John Wiley & Sons, Chichester.
- Jonas, W. (2011) A Sense of Vertigo. Design Thinking as a General Problem Solver? 9th European Academy of Design Conference (EAD), Porto, pp. 1–11.
- Kootstra, G. (2009) *The Incorporation of Design Management in Today's Business Practices. An Analysis of Design Management Practices in Europe*. Design Management Europe (DME) Consortium, The Hague and Rotterdam.
- Kotler, P. and Rath, G.A. (1984) Design: A Powerful But Neglected Strategic Tool. *Journal of Business Strategy*, 5, 16–21.
- Lorenz, C. (1987) *The Design Dimension: The New Competitive Weapon for Business*. Blackwell Publisher, Oxford.
- Martin, R. (2009) *The Design of Business. Why Design Thinking Is the Next Competitive Advantage*. Harvard Business Press, Boston, MA.
- Mintzberg, H. (1979) *The Structuring of Organization*. Prentice-Hall, Englewoods Cliffs, NJ.
- Moultrie, J., Clarkson, P.J. and Probert, D. (2007) Development of a Design Audit Tool for SMEs. *Journal of Product Innovation Management*, 24, 335–68.
- National Agency for Enterprise and Housing (2003) *The Economic Effects of Design*. Copenhagen.
- Nelson, R.R. and Winter, S.G. (1982) *An Evolutionary Theory of Economic Change*. Harvard University Press, Cambridge, MA.
- Nonaka, I. (1994) A Dynamic Theory Knowledge of Organizational Creation. *Organization Science*, 5, 14–37.
- Penrose, E. (1959) *The Theory of the Growth of the Firm*. John Wiley & Sons, New York.
- Perks, H., Cooper, R. and Jones, C. (2005) Characterizing the Role of Design in the New Product Development: An Empirically Derived Taxonomy. *Journal of Product Innovation Management*, 22, 111–27.
- Platts, K.W. (1993) A Process Approach to Researching Manufacturing Strategy. *International Journal of Operations & Production Management*, 13, 4–17.
- Rust, C. (2004) Design Enquiry: Tacit Knowledge and Invention in Science. *Design Issues*, 20, 76–85.
- Sun, Q., Williams, A. and Evans, M. (2011) A Theoretical Design Management Framework. *The Design Journal*, 14, 112–32.
- Susman, G.I. and Evered, R.D. (1978) An Assessment of the Scientific Merits of Action Research. *Administrative Science Quarterly*, 23, 582–603.
- Teece, D.J., Pisano, G. and Shuen, A. (1997) Dynamic Capabilities and Strategic Management. *Strategic Management Journal*, 18, 509–33.
- Topalian, A. (1979) *The Management of Design Projects*. Associated Business Press, London.
- Tsang, E.W.K. (1997) Organizational Learning and the Learning Organization: A Dichotomy between Descriptive and Prescriptive Research. *Human Relations*, 50, 73–89.
- Turner, R. and Topalian, A. (2002) Core Responsibilities of Design Leaders in Commercially Demanding Environments. Design Leadership Forum Inaugural Session, London.
- Zahra, S.A. and George, G. (2002) Absorptive Capacity: A Review, Reconceptualization and Extension. *Academy of Management Review*, 27, 185–203.

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