Så integrerar man design

I detta nummer publicerar vi två vetenskapliga artiklar. Båda handlar om integration av design i organisationer – först konceptuellt och sedan ur ett mer praktiskt perspektiv i sammanhanget av högre utbildning.

Designmanagement som kunskapsintegration

Den första artikeln, **"Knowledge Integration of and by Design"**, är författad av Per Åman och Hans Andersson och berör integration av management och design. Dessa discipliner kommer från olika traditioner och bygger delvis på olika logiker. Förenklat finns det inom managementområdet en tradition av teknisk och ekonomisk rationalitet, men också försök att förstå och hantera sociokulturella fenomen i organisationer. Designtänkande har i stället en konstnärlig koppling där praktisk och handfast erfarenhet betonas och där det ofta anses vara en moralisk plikt att förbättra människors livsvillkor, men där till exempel industridesign ingår i ett tekniskt, ekonomiskt och organisatoriskt sammanhang. Managementperspektivet och designperspektivet behöver samspela.

Författarna använder sig av kunskapsintegration som ramverk för att förstå management, designtänkande och hur dessa kan integreras. En organisation definieras här som en kunskapsbärare där kunskap kodifieras och handling koordineras. Management och design ses som två olika men komplementära kunskapsbaser. Kunskapsintegration handlar om vilken kunskap som ska integreras, hur detta sker effektivt, och om flexibilitet i integrationsprocessen.

Två typer av integration formuleras; att se design som en resurs att integrera i övriga organisationen, respektive att se design som förmågan att integrera olika typer av kunskap. Det vill säga integration av design eller integration genom design.

Design i det högre utbildningsväsendet

Universiteten tillhör en av de äldsta institutionerna i samhället. Jag som undervisar på universitetet vet att universitetets strukturer ofta är rigida. Heather Madden och Andrew T. Walters beskriver i sin artikel **"Using an Action Research Approach to Embed Service Design in a Higher Education Institution"** ett projekt där aktionsforskning och tjänstedesign kombinerats för att åstadkomma förändring mot ett mer studentfokuserat lärande.

Specifikt studeras hur tjänstedesign kan påverka kulturen inom organisationen, på vilka sätt tjänstedesign kan hjälpa universitetet att bli mer innovativt och kollaborativt, och vilket ledarskap som krävs för detta. Idag saknas ofta systematiskt och löpande utvecklingsarbete på universitetet. Användningen av designmetodiker är inte något som har fått fotfäste på universiteten. Därför är Madden och Walters bidrag högst välkommet.

Studien visar på svårigheten i att åstadkomma förändring i stora och komplexa organisationer. I ett läge där utrymme i tid och plats saknas för utveckling och där organisationen är uppbyggd enligt funktioner i "silos" är det möjligt att åstadkomma mindre förbättringar men svårt att nå större förändring och kulturförändring. Men studien visar att genom att börja arbeta enligt designmetoder kan "intraprenörer" få utrymme att visa sig och hitta varandra. Ett nätverk av utvecklingsorienterade individer som är grund för mer långsiktig förändring kan bildas.

Nu finns en portal för journalens vetenskapliga bidrag: **www.svid.se/sdrj**. Där skickar författare in artiklar, där sker review-processen och publicering av artiklar som fristående artiklar. Detta för att öka tillgängligheten för forskare som läsare och skribenter. Det är mitt mål att vi gradvis kommer att öka antalet publicerade artiklar per år. För att förkorta ledtider kommer artiklar första att publiceras digitalt och sedan i pappersform i journalen.

Jag vill tacka reviewerna för deras viktiga arbete och hoppas att läsarna ska finna artiklarna värdefulla! ■

Jon Engström Tekn. dr. Redaktör

FORSKNING/

Knowledge integration of and by design

Management and Design need to interplay in organizations. But how? This paper points out two distinct strategies for integration.

ABSTRACT

The purpose of this paper is to explore the possible uses, benefits, limitations and future directions of a formal knowledge integration perspective on design management. The paper develops the concepts of management thinking and design(erly) thinking, and questions the implied contention. With a knowledge perspective, design management may be seen as including the capability to integrate specialized, distributed and heterogeneous knowledge bases. Consequences regarding the characteristics of scope, flexibility and efficiency of knowledge integration indicate both greater difficulties and greater possibilities.

Regarding the architecture of knowledge, integration of design indicates a functional orientation and a limited role for design, while integration by design may indicate a strategic role.

Design (management) as knowledge integration

The integration of the design function for the benefit of the overall performance of the organization is a crucial issue that has been awarded a considerable amount of attention (*e.g. Cooper et al., 2011; Svengren, 1995; Buchanan, 1992; Johansson and Woodilla, 2008*). Design is an integrative discipline and designers 'explore concrete integrations of knowledge' (*Buchanan, 1992, p. 6*). More recently Hobday et al. stated that design ought to be viewed as a 'knowledge creating, generation and integration activity' (*2012, p. 18*), not just as problem solving.

On a domain-independent level, design is the general human ability to improve existing conditions by creating the artificial (*Simon, 1996*). Design is a generative process (*Hatchuel et al., 2010*), the result of human interest, purpose and activity, and generally applicable. However, different domains may lead

to different contents, which may in turn influence the design processes and the processes of integration. For our purposes here, the perspective is inspired by John Heskett:

The deliberate and reasoned shaping and making of our environment in ways that satisfy our needs and give meaning to our lives. (Heskett, 2002, p. 16)

This definition gives prominence to the human actor and the human capacity to create a 'betterment of the human condition' through making tools of increasing complexity and abstraction. The crucial words being 'needs' and 'meaning' where the human being is seen not only as a (boundedly) rational seeker of utilities and satisfaction of material needs, but also as an aesthetic and social being seeking experiences of beauty and sublimity as well as symbolic values in a social context.

This duality is found in many works on design, albeit in different conceptual clothing, for example in Norman and Verganti's (2014) discussions on design and innovation in two dimensions: technology and meaning.

Through capturing, recombining and integrating knowledge about socio-cultural models and product semantics in several different social and industry settings, designers help in creating breakthrough product meanings. (Verganti, 2003, p. 35)

Design may consequently be seen as integrating across 'needs' and 'meanings', while design management may be seen as the managerial capability to make use of design as a strategic and integrative resource. In an often quoted generalized definition:

Design management is the effective deployment by line managers of the design resources available to an organisation in the pursuance of its corporate objectives. It is therefore directly concerned with the organisational place of design, with the

identification with specific design disciplines which are relevant to the resolution of key management issues, and with the training of managers to use design effectively. (Gorb, 1990, from Cooper et al., 2011 p. 14)

From a strategic management perspective, then, design management is about the effective employment of design as resource and the capabilities for that employment. A first issue is that design management contains the organizational need for and capability to integrate 'design' and 'management'. Second, as design is inherently integrative, design management is effectively integrating the integrative.

In this paper, issues pertaining to integration will be addressed with a knowledge perspective, as integration of knowledge bases.

The study of organizations as knowledge-based entities has become a significant stream in organizational and strategy research. A general position is that

A firm is a repository of knowledge that consists of how information is coded and action coordinated. (Kogut and Zander, 1993, p. 626)

One example of a subfield is that of knowledge management (KM), which from a design perspective has been argued to be a rather rationalistic, instrumental set of pragmatic methodologies (*Rylander, 2009*), opposed to a design process characterized by intuitive and holistic thinking.

Given our interest in the integration of design (and management), we will turn our attention to the structured treatment of integration from a knowledge perspective found in the field of knowledge integration (KI). From the formative contributions of developing a knowledge based perspective on organizations, such as *Kogut and Zander (1992; 1996)* and *Nonaka and Takeuchi's (1995)* work on types, locations and transfer (or conversions) of knowledge, the field

of knowledge integration (*Grant 1996a, 1996b; Kogut and Zander, 1993*) has found its own contours. The list of publications has been increasing (*Tell, 2011*), boundary conditions have been set, and communities formed (*Berggren et al., 2011*). KI is in principle neutral in terms of domain, with the advantage of a structured set of propositions on types and characteristics of integration. The defining premise of KI is that knowledge has become increasingly specialized, leading to dispersed and heterogeneous knowledge fields, which, in turn, lead to a need for integration. The objective is not learning in the form that levels differences and lets us all become privy to the other's knowledge, but integration of dispersed, heterogeneous and complementary knowledge bases into a greater whole that employs and leverages the diversity.

The purpose of this paper is to explore possible uses, benefits, limitations and possible future directions of a knowledge integration perspective on design management.

We approach the issues with a strategic management perspective. The present work is about the use of the particular design knowledge in an organized context, for the greater goal of the performance of that organization. The ultimate interest is how the knowledge integration of design contributes to the performance of the organization. With a resource based view (*Penrose, 1959; Wernerfelt, 1984; Barney, 1991*) to understand design as a strategic resource for the firm, and design integration as strategic capability. Our issue becomes the integration of 'management thinking' and 'design(erly) thinking' (*Johansson-Sköldberg et al., 2013*), as specialized, heterogeneous but complementary knowledge bases.

Structure of the paper
We posit a straight-forward formulation of our possibly wicked problem: there is the two knowledge bases of 'management thinking' and 'design(erly) thinking', a difference between the two,

Leadership is a matter of **poetry and plumbing**' (March and Weil, 2005)"

a possibly positive effect of combining them, and consequently an issue of integrating the two. Our knowledge integration perspective will eventually, for the purpose of clarity, be rather 'Grantian', with a starting point in the seminal contributions by Robert Grant (*1996a; 1996b*).

We will address the issues in the following manner. Our first set of issues concern the two knowledge bases. First, we will address the idea of management thinking, and second, design(erly) thinking, ending with a discussion outlining some consequences for the contention of the two concepts. Then, the field of knowledge integration (KI) will be introduced as a structured framework for integration, and our particular approach formulated. In order to make sense of the consequences of design management as knowledge integration we will first examine the integration of design in terms of the characteristics of knowledge integration – the scope, efficiency and flexibility of knowledge integration processes (*Grant, 1996a*), and second, we will examine the location of design in the hierarchy of capabilities (*Grant, 1996a*). We will end with general observations and implications.

Two knowledge bases
Management thinking

Management thinking has often been perceived and modelled as a purposeful, shareholder value based, instrumental problem solving activity, based on rationalistic argumentation with resource efficiency as guiding principle (*e.g. Rylander, 2009*). Taylor's (*1911*) scientific management has been identified as a possible core of management thinking (*Johansson and Woodilla, 2008*). The organization,

its employees and activities are means for achieving ends, which are formulated in capital yield terms. It becomes a Tayloristic and Friedmanish stereotype of management thinking, possibly with a detached systems engineering-like perspective to the approach of organizing work, where subsequently hierarchy is a leading principle (*Johansson and Woodilla, 2008*). A teleological and instrumental view of activities finds all decisions an investment of financial capital and subject to being judged for their contribution to the organization's overall objective function, through techniques of investment analysis by net present value (NPV) and internal rate of return (IRR). Such an economic rationality is perfectly neutral in domain; whether production systems investments, marketing decision, recruitment decision or design expenses, the decision to go ahead is subject to the same format of calculation.

Like Peter Gorb (*2001*) observes, the management language remains in the numbers of the profit and loss statements and impact to the balance sheets. The management language treats decisions as investments and if there is a sense of functional beauty (*Parsons and Carlson, 2008*), it lies in the level of the compound annual growth rate (CAGR), return on capital, and the ability to consistently increase shareholder value.
On the other hand, organization theory, and the part of strategic management that is not wholly formulated within (neo-classical) economics, has evolved considerably from the rationalistic and uni-dimensional perspective somewhat caricatured above. Already the Hawthorne studies introduced management action as symbolic, rationality in decision making became bounded (*Simon, 1973*), the influential study on 'excellence' of

Peters and Waterman (*1982*) and later post-modern organization theory (*e.g. Hassard and Parker, 1993*) helped spurn an interest in organization culture studies and narratives. A series of works argue for an aesthetic organization theory (*Gagliardi, 1996; Strati, 1999; Ramirez, 1991*).

Indeed, a limitation observed about strategic management research is that focus has been on the material and the supply side, at the expense of the immaterial and the demand side:

(a) extant research has focused on producer activities and on the cost side of the value-creation equation ... to the neglect of the role of consumer perceptions and practices;and (b) extant research has focused on the importance of technology in value creation to the neglect of cultural and symbolic resources (Dalpiaz et al., 2010, p.176).

In other words, management thinking does have a pragmatic base in the language of numbers and a logic that is derived from a shareholder's perspective and represents a technical/economic rationality. But strong contemporary voices develop and elucidate a socio/cultural perspective on management work and theory.

Perhaps more intriguing yet are formulations of the two as a duality of technical/economic and socio/cultural perspectives arguing for a paradoxical conceptualization. Most provocative and elegant is perhaps James March's statement that 'leadership is a matter of poetry and plumbing' (*March and Weil, 2005*). The plumbing being the technical, economic and pragmatic workings of the organization while the poetry contains the aesthetics of work and workplace and the social symbolic values of products, work and ideas.

Summing up; to pinpoint management thinking as an instrumental resource-efficiency discourse is possible and in some ways pragmatically correct, but overly simplistic in the light of advances in the field. Managerial knowledge and practice does contain the

interlinked characteristics: a holistic view, an ability to zoom between holistic to detail, and a capacity to structure and dissolve structures This leads to a formulation of design practice rather antithetical to hierarchy and functional boundaries (*Johansson and Woodilla, 2008*).

As developed earlier, design is a field that inherently incorporates a cross-speciality integrative aspect, stretching across the divide between the rational and the 'irrational' of the aesthetic and symbolic. The consequence here being that design(erly) thinking rests in a similar paradoxical state of affairs as do management thinking; technical/economic and socio/cultural. And indeed, the sometimes troublesome relationship of 'management' to 'design' has been addressed in design research (*e.g. Heskett, 2008*).

Still, the idealistic legacy of certain waves of design is revered. Already William Morris for instance

believed that beautiful design enriched the quality of life and that the designer had a moral responsibility in his or her work towards the greater good (McDermott, 1992).

Echoes of this ideological, humanistic position have a long reverbation and examples highlight the balancing of a technological and economical logic with an ideological orientation. Design from this perspective is not just an instrumental, industrial activity for the betterment of the industrial process and its economic performance, but an instrument for the betterment of the human condition, processed through industry as the mass production methods democratizes quality. Low cost and industrial processes are not only seen as means to create margins and capital turnover, but means to make good designs available for a greater number of people. Industrial techniques are means, not ends. The ideological stance is not necessarily outspoken or very marked in industrial design, which is, again, a professional and embedded deployment of design knowledge, but

paradoxical nature of a duality of a technical/economic rationality and a socio/cultural one.

Design(erly) thinking

Whereas mainstream management thinking has been argued to be repressive of creative thinking (*Johansson and Woodilla, 2008*), design is denoted as part of the creative industries in a EU commission report (*KEA, 2006*), and creativity is one characteristic often recurring in discussing design(erly) thinking. The intuitive aspect of design work is another recurring characteristic. Designers are also empathic (*Kelley and Littman, 2005; Brown, 2008*), drawing their inspiration from a deep respect and understanding of the human condition. Designers are idealistic, foregoing the instrumental shareholder perspective for an all-embracing stakeholder view, and artsy, bringing a disinterested aesthetic judgment to the work, thereby delivering

experience and meaning to the beholder. All in all, designers are artsy, creative, empathic, inclusive, intuitive and even fun; in short, most of the qualities that management thinking is not. But then again, design in a managed context, e.g. as industrial design, is more complex.

Is design art? In a certainly entertaining but rather poignant remark, design has been seen as 'useful', and art as 'useless' (*Sudjic, 2009*). Professional industrial design is not arts in the disinterested, detached way of the romantics (*Kant, 1790/2000*), but guided by the objective function of the firm (*Lovas and Ghoshal, 2002*).

Designerly thinking is what designers do and design thinking is that knowledge transferred to other, and most often managerial, contexts (*Johansson et al., 2013*), and what may then be the core of that way of thinking? Design competence has been identified as the result of three

the questioning of rational, technological knowledge as panacea remains.

Placing industrial design within art or technique, however, is an almost impossible task. Industrial design is a combination of both, and it is this combination that is the core of the profession. An industrial designer always takes the beauty of forms into consideration. But he or she never does so regardless of function and the production process, thereby distinguishing themselves clearly from "pure art" and artists. (Johansson et al, 2003, p, 2)

From a knowledge perspective, designerly thinking is arguably more tacit than management thinking. From a practitioners perspective, Chris Bangle argues that 'artists really only learn to create winning designs by trying over and over again; their professional growth occurs almost invisibly' (*Bangle, 2001, p. 51*), indicating the importance of experience based, tacit knowledge.

Summing up, design(erly) thinking is not an obvious counterpoint to management thinking, but may represent a complementary knowledge base, specialized and perhaps dispersed.

The contention
Wherein lies the contention between management thinking and designerly thinking? Wherein lies the contention between management knowledge and designerly knowledge? Is it real, perceived or an illusion? With undeniable experiential legitimacy, Chris Bangle, earlier design manager of BMW, calls it the "inevitable conflict between corporate pragmatism and artistic passion" (*Bangle, 2001, p, 47*). Given the discussion above we should approach the contention with some caution.

A view of a duality permits us to capture the complexity in the earlier debate and propositions for the difficulty of integration of design. If management thinking and design(erly) thinking can be approached through similar paradoxes, they may be approached as specialized fields of knowledge, but complementary

rather than excluding. Depending on how big – or paradigmatic -the difference, the contention has been seen as a small ditch, a significant stream,
... there's a huge river of misunderstanding between the design and the business world. (Peter Gorb, 2001, p. 2)

or a wide chasm:
The modern split between engineers and industrial designers or between art and business, therefore, appears not to be a small ditch simply to jump over. Rather, it seems to be of such a magnitude that it is doubtful whether it is even worth trying to overcome it." (Johansson, Sköldberg and Svengren, 2003, p. 10)

The potential and difficulties of design integration have been perceived in various ways. In some contributions the integration issues have been addressed as an organization structure issue, as an issue of roles, as issues pertaining to external or internal location of the design function; there is a difference in degree. Or, the contention is seen as an issue of paradigmatic difference between the rationality of business and the wicked problems of the arts and design; as a difference in kind.

Knowledge integration – an integrative framework

The contemporary need for depth of knowledge leads to increasing specialization and subsequently organizations need increasingly sophisticated means for integration. As knowledge is dispersed across individuals and collectives within (and outside) the firm, "the primary role of the firm is integration of knowledge" (*Grant, 1996a, p. 377*). Thus, knowledge integration has been defined as the combination of specialized but complementary knowledge bases in a goal-directed process aiming to achieve a significant outcome for the concerned organization(s) (*Berggren et al., 2011b*). Knowledge integration is concerned with understanding and explaining processes of knowledge integration,

and implications for the design of such processes. Tell (*2011*) identifies several streams of research, and more particularly one that seems of particular interest to us, concerned with the combination of specialized, dispersed but complementary knowledge. A generative perspective on knowledge creation link to innovation, and indicate that in innovative settings knowledge integration takes place despite knowledge-base dissimilarities (*Lindkvist, 2005*). On the other hand there are indications that integration of specialized knowledge may not be easy (*Dougherty, 1992; Hoopes and Postrel, 1999*) or even possible if the common knowledge that may bridge between areas is lacking (*Grant, 1996a; Postrel, 2002*), or there may be a trade-off between exploiting familiar knowledge and exploring unchartered territory.

Task, knowledge, and relational characteristics have an influence on KI (*Tell, 2011*). The knowledge characteristics identified are of a rather general character, i.e. internal vs. external, tacit vs. explicit, etc. This, just as the general definition by Berggren et al., does not discriminate between different knowledge bases relevant to the task at hand. KI is in that sense domain-independent. The defining categorization of knowledge that Grant (*1996a*) employs is that of tacit and explicit, and focuses on the specialization needed on an individual level in order to acquire more – deeper – knowledge. On an individual basis he argues for a necessary trade-off between breadth and depth of knowledge. Hence, in order for the organization to create means for integration between individuals with specialized knowledge, Grant argues that explicit knowledge poses little problems because of its ease of communicability. The coded, stored and retrievable explicit knowledge may easily be accessed by other individuals, given that the language of the code is common to others. On the other hand, tacit knowledge presents more substantial issues, as tacit knowledge not necessarily can be converted to explicit without knowledge loss.

It is reasonable to extend this discussion into the realm of social contexts. Groups of individuals form social communities where common experiential background, e.g. education and project collaboration, comes to form socially bound norms and expectations. Social norms of instrumentality, idealism, and 'artistry' concerns the content of work, while norms of efficiency, linearity, goal-orientation, and rationality influences the expectations on work process. Social communities define identities and peer-recognition.

In the following, we will use Robert Grant's models (*1996a; 1996b*) of knowledge integration to explore some consequences of using KI as a vehicle to understand the integration of management thinking and design(erly) thinking. Specifically, Grant identifies three characteristics of knowledge integration of importance for competitive advantage.

First, the **efficiency** of knowledge integration is judged by 'the extent to which the capability accesses and utilizes the specialist knowledge held by individual organizational members' (*Grant, 1996a, p. 380*) i.e., the efficiency is determined by the level of common knowledge and the frequency and variability of task performance. Second, the **scope** of knowledge integration is constituted by '..the breadth of specialized knowledge...' (*Grant, 1996a, p. 380*), i.e., the scope is affected by complementarities and substitutability as well as causal ambiguity. Third, the **flexibility** of knowledge integration is '...the extent to which a capability can access additional knowledge and reconfigure existing knowledge' (*Grant, 1996a, p. 380*), where flexibility lies in the ability to encompass new knowledge or reconfigure existing repositories of knowledge.

Grant (*1996a*) introduces a perspective of knowledge as a 'hierarchy of integration', from the specialized knowledge held by individual members of the organization, successively broadening the scope of fields of knowledge to be integrated until we reach the top of 'wide-ranging functional integration'.

To sum up, KI contains a developed discourse on how the integration of specialized, dispersed and heterogeneous fields of knowledge may be structured, conceptualized and approached, eventually evaluating the contribution to the competitive advantage of the organization.

Integrating the resources and capabilities of design(erly) thinking

We will here first discuss some implications for integrating the resource of design. Second, we will discuss some implications for the capability of design management in order to integrate design. Finally two short empirical illustrations are presented.

Integrating design in terms of scope, efficiency and flexibility

Scope
Design knowledge broadens the scope of what to integrate, in relation to integrating different traditionally technological and managerial knowledge bases. With design as incorporating a humanities dimension, and concerned with human interaction with artefacts in an aesthetic and symbolic way, one aspect of design is to integrate the material with the immaterial.

In the extreme, this scope may represented by the paradigmatic and classic divide between technology and the humanities (*e.g. Snow 1959*). Communication may be difficult across such divides. Individuals have been educated and trained in different traditions. In the polytechniques rationality prevails, and an undertext of rationality, progress and materiality emerges – in short a Newtonian based universe of modernity.

Design schools are located either within the polytechniques, or within beaux arts, which has spawned a considerable debate concerning the effects in terms of attitudes, values, work processes.

On the other hand, in the minimum of scope, design is added to fix the appeal of an item, perhaps as 'styling'. Perhaps

with planned obsolescence built-in. At the least, design scope introduces a humanities element in how we perceive the properties of the artefact or process to be designed. The artefact or process is not just about material utility and problem solving, but also and including aesthetic experience and symbolic meaning creation.

Grant (*1996a*) argues that increasing the span of knowledge to be integrated actually has the potential to be beneficial for the firm, on two accounts. First, up to a point of 'diminishing relevance', different types of knowledge may be seen as complementarities rather than as substitutes. Second, a greater scope of knowledge increases the possibilities of a greater causal ambiguity and thus increases the sustainability through sheltering the firm from imitation. Design increases the scope of knowledge to be integrated and thus carries a promise or potential for increasing sustainability of competitive advantage – given that the two conditions can be met. If the aesthetic and symbolic considerations of design are seen as a poor complement it may stretch beyond the point of diminishing relevance in the eyes of other organizational actors. Given the tacit nature of much of design, it may certainly contribute to causal ambiguity and thus shelter competitive advantage from imitation, but the extreme of causal ambiguity is simply fuzziness and lack of causality.

Efficiency
The efficiency of knowledge integration depends in part on the ability to communicate across functional borderlines, regardless of whether the knowledge is explicit or tacit and thus if the integration mechanisms may be based on direction (explicit) or routine (tacit) (*Grant, 1996a*). Shared behavioural norms are fundamental and "the wider the scope of knowledge being integrated...the lower is the level of common knowledge" (*Grant, 1996a, p. 380*)

A prerequisite for communication across knowledge areas has been the level and quality of common knowledge,

> In a dynamic market setting, sources of **competitive advantage have a best-before date**, and the capability for continual renewal may maintain performance"

which rest on common language, commonality of vocabulary and conceptual knowledge. Can we expect the design professionals to speak the same language as technology or management specialists?

Design, in its introduction of aesthetics and symbolic value, risk being problematic on most of these accounts. It widens the scope of knowledge to be integrated; the intra-field languages, concepts and structures are likely to be different; behavioural norms risk being different and intra-field cultural values are likely to be different.

Further, the frequency and variability of task performance influences the efficiency of knowledge integration (*Grant, 1996a*). This would point to industrial design being successfully integrated in situations where design is part of the routines of a firm, rather than an exception.

Lastly, organizational structuring may facilitate the efficiency of KI. Interestingly, Grant (*1996a*) uses the automobile industry, from Clark and Fujimoto (*1991*), to illustrate the possible benefits from sequencing, functional differentiation and product segmentation to overcome knowledge integration barriers, although without paying any special attention to design.

Flexibility

In a dynamic market setting, sources of competitive advantage have a best-before date, and the capability for continual renewal may maintain performance (*Eisenhardt, 2002; Teece, 2007*). First, a firm's ability to encompass additional fields of knowledge depends greatly on the ability to communicate (*Grant, 1996*). The more tacit and historically and culturally embedded, the more difficult the

communication process and the more difficult knowledge will be to transfer and to integrate. Socio-cultural patterns of meaning creation (*Verganti, 2008*) are certainly both path dependent and culturally embedded. Second, an ability to reconfigure existing knowledge through new patterns of integration is a potential capability for renewal.

All of the three characteristics of knowledge integration indicate some difficulties when we introduce the broader set knowledge of design. We posed question marks around the efficiency of integration, partially because of communication issues; the scope of what to integrate may move beyond the point of diminishing relevance; and flexibility of integration may be slow partially because of the tacit nature of design knowledge and practice. However, following the argumentation regarding scope by Grant (*1996a*), the broader scope of industrial design also carries the potential for creating and sustaining competitive advantage. Great potential coupled with great difficulties.

## Design management capability: integration of and by design

A specific issue of knowledge integration that is highlighted from a design perspective is whether design is being integrated as a function, or itself an agent of integration; in other words whether knowledge integration takes place of or by design.

First, part of design management is the idea of **design as integrated** into the activities of the organization; integration of design. From a mainstream conception of the firm as a technical/economic optimization problem, design then needs to be added to the existing set of

activities. Design is one activity along other activities, one department along other departments. How to structure, organize, place and integrate design with such a perspective is a recurring theme in design research, for example in Lisbeth Svengren's discussion of functional integration (*Svengren, 1995*). With integration of design, at its most fundamental we are adding a field of knowledge to be integrated. The problem possibly being that we hereby attempt to achieve flexibility through encompassing new knowledge (*Grant, 1996*), something Grant sees as unlikely to be successful unless the new knowledge is explicit and communication can be found through direction. The integrating mechanism of flexibility would most likely occur through reconfiguration (*Grant 1996*). Hence we have a paradoxical situation that may be difficult to resolve, and possibly a line of explaining the many reported difficulties in finding success through incorporating industrial design. The design function is placed along other functions and activities and becomes one knowledge area among other knowledge areas. It would represent an 'independent subsystem' (*Simon, 1973; Grant, 1996*), and design would have a 'horizontal' role. The focus would most likely be to employ and apply known knowledge. In principle, design(erly) thinking in this situation does not alter or has any effect on management thinking. The design resource is added to the existing resources of the firm. If so we may arrive at an asymmetrical communication pattern (*Johansson et al., 2003*) where design need to legitimize itself vis-à-vis a possibly mainstream technical and economic interest and logic, leading to issues of relative importance of design compared

to other functions such as technical development of supply chain management. An investment in design needs to be evaluated in the same manner as any investment. The role of design is functional rather than strategic.

Second, a further step is to see design as an integrating activity, where design is the agent of change; integration by design. Design is the activity that links, or creates links between the activities of the firm. This perspective moves design more clearly into the realm of business strategy, as an overarching process logic that binds value creating and appropriating activities together. This seems to be a growing interest in design research, such as Svengren's (*1995*) conceptual integration, to the blurred lines between design and management with 'managing as designing' (*Boland and Collopy, 2004*). Design may, thus, be a higher order capability with a 'vertical' role and responsibility. As such design is a facilitator of knowledge integration processes, with responsibility for creating meaning and order throughout the process.
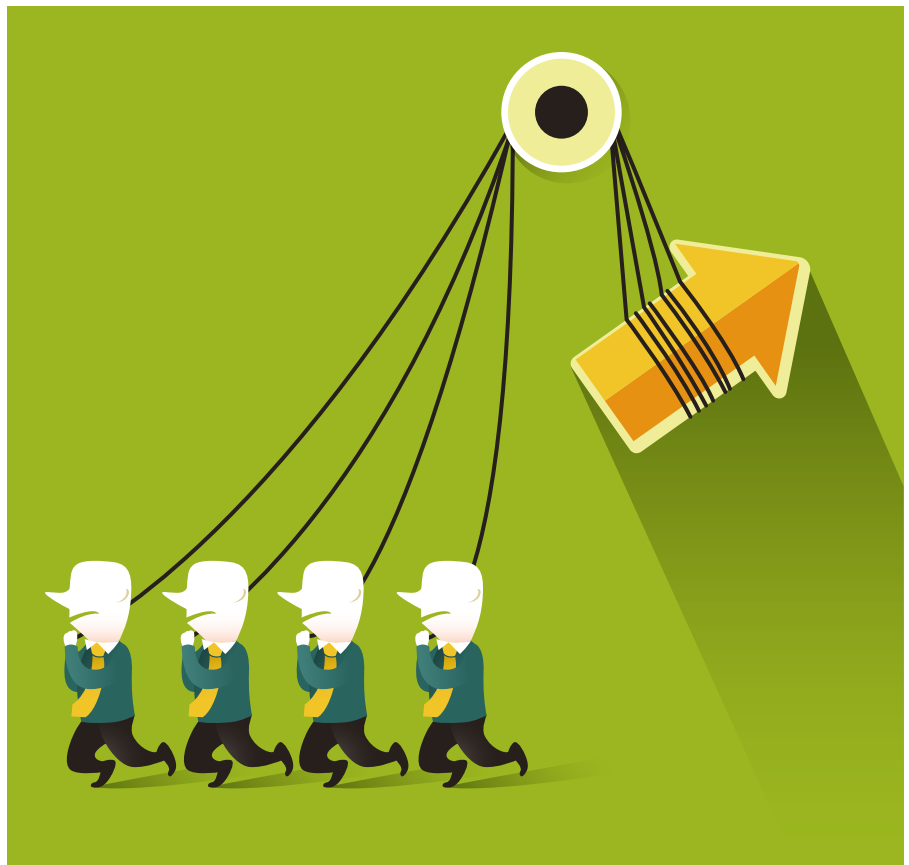
The technical envelope

An empirical illustration of integration of or by design may concern the attitude towards a technical level or envelope. While integration of design would most likely work within a set boundary of technology, apply that level of knowledge, and work within that envelope, it is easier to see integration by design as stretching that boundary, in order to meet the vision of the design, thus not accepting the given. Design here would be the leading activity, and any specific field of technological knowledge would represent a resource, or a subordinate capability, in the hierarchy (*Grant, 1996a*). Design would have a 'vertical' field of authority.

Throughout the history of Apple products there are numerous stories of when Steve Jobs refused to accept boundaries of existing technological fields of knowledge. When the iPhone was being developed, the front with one single glass surface was an integral part of the design

vision. The problem being that there was no glass material hard enough for the intended use, which risked stalling or stopping the entire project. True to his style, Steve Jobs phoned the CEO of Corning, flew over and convinced Corning to spend research time inventing the impossible. Within a month Corning had found an unused technology and the glass surface issue was solved. (*Isaacson, 2011*)

Another approach is illustrated in the example from the Swedish glass works Orrefors (*Andersson, 2002*). Orrefors recruited its first designer (or artist as they were called back then) in 1916 and has ever since been a company which has relied heavily on its designers for the development of new products with commercial potential, combining an artistic content with cost-efficiency consideration (whether manufacturing is completely manual or mechanical or combinations thereof). An often referred

to expression in the glass works when designers presented their sketches, sometimes drawing with chalk on the floor of the glassworks, was "it can't be done" ("de' gaur inte" in the local Swedish dialect) which was another way of saying "we have never done that". More or less everything in the company centred around the company's eight designers, recruited in order to be different from each other, expressing their individuality in their products, while working under the umbrella of the brand and its tradition. Combining commercial potential by pushing (technological) limits and stretching, but not breaking the tradition of the brand, was thus the essence of integrative design(ers) at Orrefors. The organizational level of where to find 'integration agents' may, as the Apple and the Orrefors examples show, vary.

This is consistent with Grant's (*1996a*) notion that the hierarchy of integration

is not to be confused with the administrative one of authority and control, and that the two hierarchies, in most organizations, do not correspond closely with each other.

Discussion

By exploring design management with a perspective of knowledge integration, we have elaborated on the scope of what knowledge to be integrated. We have identified a managerial issue that formally encompasses both the material and the immaterial (*Hodder, 1991*), the rational and the 'irrational', use value and user value, functional and symbolic value (*Ravasi and Rindova, 2008*); encompassing the poetry and plumbing of management (*March and Weil, 2005*). Some of the world's most highly valued companies, such as Apple or BMW, are undoubtedly 'design-intensive' firms (*Verganti, 2008*), building their success on a combination of rational problem-solving and meaning creation, of technology and meaning creation into product epiphanies (*Norman and Verganti, 2014*). Whether this combinative capability (*Kogut and Zander, 1992*) is called industrial design, design thinking or design management or something else is in a way secondary. We have here sought to explore some consequences of introducing knowledge integration into the design management discourse, specifically what the consequences may be of knowledge integration of or by design.

Design knowledge represents at its most basic a distinct set of resources. The employment of these resources requires distinct operational capabilities, and the integration of which may require higher order capabilities. The 'designer' uses the input of the resources of knowledge content through the capability of process knowledge to 'design' things and processes as output.

With this perspective, design is inherently integrative, bridging the needs, desires and self-perceptions of the user, and the resources and capabilities of the firm. Design, in content and process, represents an identifiable and distinct resource and/ or capability for the firm. The placement of industrial design in a hierarchy of capabilities (*Grant, 1996a*) is in fact a critical managerial issue, indicative of whether the integration is seen as integration **of** or **by** industrial design.

Conclusions

First, from a knowledge perspective, design management may be reformulated: design management includes the capability to integrate specialized, distributed and heterogeneous knowledge bases.

Second, when studying integration of design through the lens of knowledge integration what stands out is the increased scope of what to integrate. In order for the design process to provide improvement of the existing situation the process needs to bridge needs as well as meaning.

Third, all of the three characteristics of knowledge integration – scope, efficiency and flexibility – indicate some difficulties; regarding the efficiency of integration, partially because of communication issues; the scope of what to integrate may move beyond the point of diminishing relevance; and flexibility of integration may be slow partially because of the tacit nature of design knowledge and practice. However, following the argumentation regarding scope by Grant, the broader scope of industrial design also carries the potential for creating and sustaining competitive advantage. Great potential coupled with great difficulties.

Fourth, the location of design in Grant's hierarchy of capabilities may help identify critical managerial issues, indicative of whether the integration is seen as integration OF or BY industrial design. Integration OF design indicates that design (with its distinct capabilities) is placed alongside other functions of the firm, and thus could be described as extending the horizontal dimension of organizational capabilities. This calls for efficient integrative capabilities at a higher level; integration is not intrinsic to the design field itself. Integration BY design, on the other hand, refers to the vertical dimension in a hierarchy of capabilities. Design (thinking) – spanning the economic/technological and the socio-cultural – permeates the organization and thus becomes, or constitutes, an integrative capability in itself, wherever its agent(s) reside. If knowledge integration takes place BY design, then design is an integrative agent and design becomes part of strategic management.

Managerial implications

To outline some managerial implications, we would first emphasize the knowledge integration aspects of design management. Design management taken seriously means bridging between fields of expertise that might at a glance seem difficult to reconcile.

This bridging will depend on our ability to overcome self-perceptions and identities. If we allow identities of 'rational efficiency 'and 'creative artistry' to be left separated or in non-productive conflict, the emergence of a base for communication, the common language, may be impaired. While maintaining experts' specialization, the creation of common language becomes a critical management intervention.

We have suggested two principle approaches to the integration issue: integration OF design and integration BY design. The more the firm is balancing the 'rationality' vs the 'artistry', the more integration will likely be BY design. Design becomes management and as overarching principle becomes strategic management.

And thereby we have gone full circle and have returned to Simon's original thoughts on design: management is design. To design a productive as well as meaningful common ground for integrating knowledge and expertise.

Design is a capability, not a function. ■

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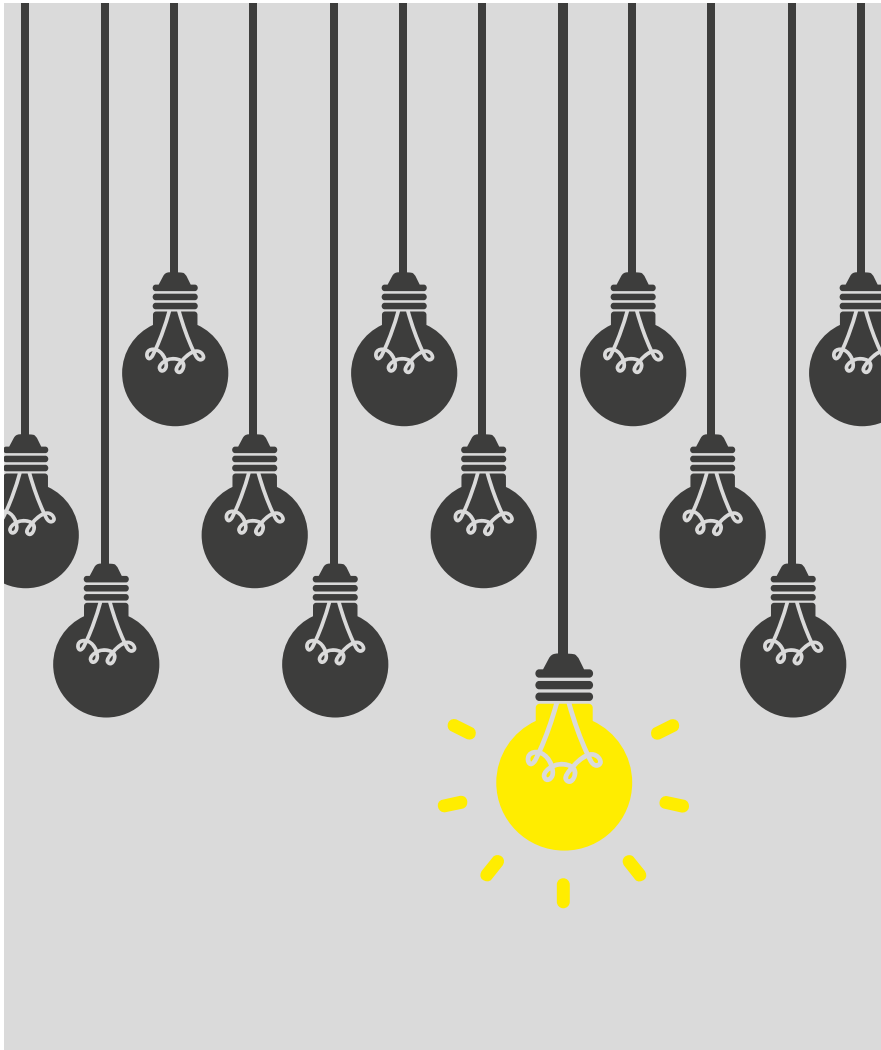
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