Immediate and Remote Design of Complex Environments[1]

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The Complexity and Scope of Design

Changes in technologies, innovation, business strategies, and consumer behavior, together with the returning concerns about the social responsibility of design, are challenging the established role and conception of design. For instance, a sample of interesting contributions to describing the recent evolution and increasing complexity of design include Richard Buchanan's model of the changing objects of design; John Thackara's presentation of new design frames (i.e., approaches for designing increasingly complicated human-technology systems); Anna Valtonen's doctoral thesis about the evolvements in the industrial design profession in Finland; and Nicola Morelli's article about a new kind of socially responsible, empowering design agenda.[2]

Buchanan has classified design objects into four categories which are related to corresponding design practices. The first two categories are symbols and objects designed according to graphic and industrial design traditions. In the design of the third category (i.e., actions), people, contexts, and the social setting of applying technologies are in focus and encompassed in the extended concept of a product. Thus, the object of design includes functions, services, and experiences, and the corresponding practice is interaction design. The fourth category, environmental design, deals with human systems of applying information, physical objects, and environments in work, play, leisure, and learning. These systems and environments are not directly perceivable, but intangible ideas, thoughts, or concepts that set frames to our practices. John Thackara's frames recommend situated and democratizing design strategies such as genuinely recognizing the insider's point of view, enabling people to create meaningful solutions for themselves, respecting the importance of comprehending local contexts, and exposure to the rich variety of influences in design. According to him, complicated systems should not be designed and left for people to cope with, but they should be gradually developed in context and in a case-sensitive manner in collaboration with the users. This should be done by building on available knowledge and experience, instead of starting from scratch as designers often prefer. Anna Valtonen studied the recent history of the industrial design profession in Finland. Her results show a deepening integration of industrial

1 This article is a revised version of a paper presented at the International Association of Societies of Design Research IASDR07 Conference in Hong Kong in November, 2007.

2 Richard Buchanan, "Design Research and the New Learning," *Design Issues* 17:4 (2001): 3–40; John Thackara, *In the Bubble: Design in Complex World* (Cambridge, MA: MIT Press, 2005); Anna Valtonen, *Redefining Industrial Design: Changes in the Design Practice in Finland* (Helsinki: University of Art and Design Helsinki, 2007); and Nicola Morelli, "Social Innovations and New Industrial Context: Can Designers 'Industrialize' Socially Responsible Solutions?" *Design Issues* 23:4 (2007): 3–21.

design with industry and society, and the increasing versatility of designers' competencies. She recognized several new tasks that designers have taken up in addition to the traditional core task of product design. These include design management, user-centered design, and design for end-user experience, driving innovations, and contributing to corporate strategies. While new tasks have been taken up, none of the previous has been replaced. As the two main trends within the industrial design profession, Valtonen recognized a shift from operative concrete design to more abstract strategic work, and an increase in specialization. Nicola Morelli proposes[3] a socially responsible design agenda where designers use their skills directly for the benefit of local communities, instead of working for product manufacturing industry. Relevant skills in the new kind of frame of utilization include human-centered design approaches, scenario-based design, and the creation of platform-level solutions allowing local modifications.

Even the few examples cited above are indicative of the design discipline's responses to the changes in its environment. The responses include future visions and alternative design agendas, as well as the factual development that has taken place in design practices. The authors' shared message is that the established conception of design as a product[4] creating, professionally conducted, activity supporting manufacturing industries, is becoming obsolete, or at least just one of the alternative interpretations. After Herbert Simon's and Victor Papanek's works,[5] one can hardly say that understanding design as an extremely broad and socially relevant concept would be a novel idea. However, the above-mentioned authors have a new message beyond that: the expansion of design, its growing social and business responsibility, and increasingly collaborative nature is not just a theoretical possibility or design ethical challenge, but a fact and necessity having a strong influence on the design practice.

Seeing the shaping of mass-manufactured products becoming outdated as the only dominant model for design is, however, much easier to notice and accept than to understand how design should be reconceptualized. The reconceptualization problem is not only bothering scholars trying to redefine design, but can blur the practitioners' views as well. Design directors and design school faculty members need to make concrete decisions on the future strategies and the next practical steps to be taken to develop future-proof design competencies. Each of the authors above provide answers which illuminate development trends and visions, but if we look at the topical pressures on design trying to formulate a holistic idea, it becomes difficult to describe major developmental trends that would not be challenged by opposite or diverging issues taking place in parallel. On the contrary, it seems that when a change trajectory is found and described, an opposite or conflicting one immediately can be identified, and the traditional design practices remain between

3 In line with the work of Victor Margolin and Sylvia Margolin, "A 'Social Model' of Design: Issues of Practice and Research," *Design Issues* 18:4 (Autumn 2002): 24–30; and Victor Margolin and Sylvia Margolin, "A 'Social Model' of Design: Issues of Practice and Research" (paper presented at the Common Ground, London, September 5–7, 2002).

4 "Product" is used here to refer to different categories of design objects when regarded as artifacts isolated from the larger contexts of production and use (i.e., including, for example, stand-alone software applications or products of graphic design).

5 Herbert A. Simon, *The Sciences of the Artificial* (Cambridge, MA: MIT Press, 3rd edition, 1996, first published 1969); and Victor Papanek, *Design for the Real World: Human Ecology and Social Change* (Frogmore, NF: Paladin, 1974).

the distancing extremes. In this situation, the tensions which the opposite challenges set on design can be seen as more descriptive than the coherent trends themselves. And perhaps the tensions could be applied to construct a picture of the future of the profession. Following this logic, a set of five design tensions—technology, innovation, competence, readiness, and generality tensions—will be presented below. On the basis of the tensions, a model of design including two emerging practices in addition to the traditional product design, namely, "immediate and remote design," will be suggested. In the next five sections, I will describe each of these tensions, explaining how design practitioners face strengthening demands to respond to new and conflicting challenges. Even though the tensions illuminate different angles of design, I will claim in the section "Immediate and Remote Design" that they share a common core, which is based on the temporal, physical, causal, and hierarchical distance of design activity from the users and their acute needs. The idea of distance will enable us to frame the two emerging design practices. Finally, in the section "Tensions to Opportunities," I will discuss some of the possible expansions of design practice alluded to by the ideas of immediate and remote design.

The tensions have been identified within a project developing design approaches for the ubiquitous information society,[6] and in the following discussion, they are framed accordingly. However, the technology basis should not be seen as too definitive, and it is the author's opinion that the increasing complexity of human-technology relationships; and the ubiquitous presence of any kind of advanced technology; may have effects similar to information and communication technologies (ICT) with respect to this discussion.

Technology Tension

The ubiquitous information society[7] can be seen as a technology trajectory characterized by comprehensive and widespread utilization of communication technologies, advanced interaction methods between humans and technology, and algorithmic intelligence. Connectivity becomes an increasingly universal feature of artifacts and, consequently, a standard phenomenon in our environment. Human-machine interaction is seen to develop towards so-called "natural interaction" including speech and gestures, and it enables control at high levels of abstraction. Algorithmic intelligence refers to a technical systems' ability to learn, to anticipate, and to take initiative in adapting to changes.

One of the most fascinating opportunities with ubiquitous technologies is to be able to hide the technology, make it invisible, and just to provide the services, utility, and experience that is valuable for the users when needed, in the exact amount and quality that is needed.[8] Ironically, working on the meaning and values of technology, and hiding the machine, may make the technologies peripheral or even completely unnecessary. This is indicated by

6 The article is based on a cross-disciplinary project, Ecological Design of Intelligent Environments (ÄES), conducted in Finland 2005–2006. The purpose of the project was to address future demands that ubiquitous computing and the information society will place on user-centered design. For a comprehensive report in Finnish, see: *Älykkäiden ympäristöjen suunnittelu – Kohti ekologista systeemiajattelua (Design of Intelligent Environments – Towards Ecological System Approach)*, Eija Kaasinen and Leena Norros, eds. (Helsinki: Teknologiainfo Teknova, 2007).

7 See E. Aarts, J. Korst, and W. Verhaegh, "Computational Intelligence" in *The New Everyday: Views on Ambient Intelligence*, E. Aarts and S. Marzano, eds. (010 Publishers, 2003), 120–125; ISTAG, *Shaping Europe's Future through ICT: Report of Information Society Technologies Advisory Group* (Luxemburg: Office for Official Publications of the European Communities, 2006); and *Älykkäiden ympäristöjen suunnittelu*, Eija Kaasinen and Leena Norros, eds.

8 See, e.g., M. Weiser, "Ubiquitous Computing," *IEEE Computer* (October 1993); and Donald Norman, *The Invisible Computer: Why Good Products Can Fail, The Personal Computer Is so Complex, and Information Appliances Are the Solution* (Cambridge, MA: MIT Press, 1998).

the human-centered definitions of intelligent environments, which define the intelligence of the environment via its capability to enable the intelligent behavior of humans.[9] John Thackara's example[10] about the "walking school bus" demonstrates this clearly. "Walking school bus" is an imaginary bus by which school children walk to school together, escorted by "a driver" who is an adult walking along. "The bus" provides an intelligent combination of safety and exercise that traditional methods of taking a bus or walking alone cannot offer. When genuinely paying attention to needs, meanings, and utility, just redesigning practices and improving the utilization of existing means can create the desired improvements. All of the clumsiness of immature technologies is avoided, because there are no novel technologies to be introduced.

An indication of the strong focusing on meaning and human practices in design instead of technologies, at the same time with a strong ICT push, is the spreading interest in design tools that address behaviors rather than products. These include, for instance, scenarios, acting-based design approaches, and design games.[11] Many of these methods have been developed to make sense of the possibilities of modern technologies but, while doing that, they direct attention away from the technology. Consequently, we can notice the development of advanced technologies including, or even creating, another trend towards the vanishing of the machine in design practice and users' everyday lives.

Innovation Tension

Creating completely new solutions from scratch is an ideal challenge loved and appreciated by designers. The emergence of new technologies enables and attracts designers to present disruptive innovations, and these are what the technology visions have promised: new technology does not only provide us with better tools and toys, but enables completely new kinds of behaviors and experiences. Radical innovations changing our perception of products also are what the innovation literature regards as the key business objective making the old competition obsolete.[12] Thus, changing the world in big style and scale is something that we have seen happen, and expect to keep on happening. However, existing structures impose restrictions and create unavoidable connections to the present and the past, and the connections keep on getting increasingly tight as the complexity of technologies increases. The designers of the ubiquitous information society in particular need to acknowledge this, because ubiquitous technology is by definition networked and, thus, compatibility becomes a major issue. Compatibility with other new technologies is not enough, and matching the novelties with traditional technologies such as housing solutions and human capabilities also is necessary. As information society penetrates all areas of human life, the interface between technology and the human domain becomes as

9 *Älykkäiden ympäristöjen suunnittelu*, Eija Kaasinen and Leena Norros, eds.

10 John Thackara, *In the Bubble*.

11 See, e.g., Dave Randall, Richard Harper, and Mark Rouncefield, *Fieldwork for Design: Theory and Practice* (London: Springer, 2007); Rachel Cooper and Martyn Evans, "Breaking from Tradition: Market Research, Consumer Needs and Design Futures," *Design Management Review* 17:1 (2006): 68–78; *Empathic Design: User Experience in Product Design*, Ilpo Koskinen, Katja Battarbee, and Tuuli Mattelmäki, eds. (IT Press, 2003); Patrick Jordan, *Designing Pleasurable Products: An Introduction to the New Human Factors* (London: Taylor & Francis, 2002).

12 See, e.g., W. Chan Kim and Renée Mauborgne, *Blue Ocean Strategy: How to Create Uncontested Market Space and Make Competition Irrelevant* (HBS Press, 2005).

multidimensional as the environment we live in, and thus radical innovations need to be linked to the innumerable historical layers of prevalent technologies and human practices.

The ubiquitous omnipresent nature of the information society makes it obvious that the designers in any given project will have only partial, often very incremental, control over the system as a whole. All designs will be a part of existing systems, just like any single new building will be a relatively small part of a city. No single actor—however big and powerful—has enough competence, resources, or insight to implement a complete solution. Shared initiative and responsibility become necessary preconditions for development, and development initiative spreads from industry leaders and their laboratories to suppliers, customer organizations, universities, and user communities.[13] The shared contribution of a large number of developers and users adopting the role of developer is possible only if there are universal development platforms. These need to be stable and accessible for a wide range of contributors to learn and use to explore, to allow time for design evolution, and to guarantee that the development efforts do not suddenly become obsolete.

Consequently, while flexible ubiquitous technology in principle enables radical innovations creating completely new kinds of human-technology designs, the development platforms enabling the change need to be stabilized. Mechanisms for updating infrastructures and facilitating the dialogue between social change and technical development need to be created to ensure the integration of technical and social development. Designers' reality in a world of ubiquitous technology which, at the first glance, may look like an adventure and exploration of the unknown, may turn out to be routine work, ensuring the compatibility of solutions that often will be launched as rather mundane updates.[14]

Competence Tension

Ecological approach to design[15] suitable for conceptualizing the complexity in human-technology systems underscores the importance of focusing on practices that include the technology and users both understood in a broad manner. This requires designers to be able to understand and influence complicated, intertwined, socio-technical phenomena. They need to apply research-based approaches, although perhaps these may not follow exactly the established models of academic research and knowledge creation. Research in the design context requires transdisciplinary concepts, and the agile crossing of the boundaries between technical sciences and the humanities. It links knowledge with practice and context where it is created; acknowledges the versatility of the knowledge creation processes and the versatility of participants; and believes in the reflective creation of knowledge, and emphasizes its social relevance.[16] And indeed, the design community is actively working

13 See Harri Kiljander and Johanna Järnström, "User Interface Styles" in *Mobile Usability: How Nokia Changed the Face of Mobile Phone*, Christian Lindholm, Turkka Keinonen, and Harri Kiljander, eds. (McGraw-Hill, 2003) for a discussion about development stability; H. Chesbrough, *Open Innovation: The New Imperative for Creating and Profiting from Technology* (Boston: Harvard Business School Press, 2006) for a discussion about sharing innovation responsibilities between companies and universities; and Eric Von Hippel, *Democratizing Innovation* (Cambridge, MA: MIT Press, 2005) for lead users developing new solutions for themselves.

14 Minna Isomursu, "Älykkään ympäristön iteratiivinen rakentuminen" ("Iterative Emergence of Ubiquitous Environments") in *Älykkäiden ympäristöjen suunnittelu*, Eija Kaasinen and Leena Norros, eds., 248–251.

15 See, e.g., *An Ecological Approach To Human Machine Systems I: A Global Perspective*, J. Flach, P. Hancock, J. Caird, and K. Vicente, eds. (Hillsdale, NJ: Lawrence Erlbaum, 1995); U. Bronfenbrenner, *The Ecology of Human Development* (Cambridge, MA: Harvard University Press, 1979); James Gibson, *The Ecological Approach to Visual Perception* (Boston: Houghton Mifflin, 1979); and *Älykkäiden ympäristöjen suunnittelu*, Eija Kaasinen and Leena Norros, eds.

16 M. Gibbons, C. Limoges, H. Nowotny, S. Schwartzmann, P. Scott, and M. Trow, *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies* (London: Sage Publications, 1994); Kari Kuutti, Turkka Keinonen, Leena Norros, and Eija Kaasinen, "Älykäs ympäristö suunnittelun haasteena" ("Ubiquitous Environment as a Design Challenge") in Eija Kaasinen and Leena Norros, eds., *Älykkäiden ympäristöjen suunnittelu*, 32–51.

to develop a more research-driven culture with research conferences, journals, textbooks, academic centers, institutions, and especially with designers with more advanced research competences and qualifications than ever before.

However, even with advanced design research approaches, the complexity of human-technology systems cannot be understood independent of the insiders' views. The major technical revolution of ubiquitous ICT technologies also is a big social change, and that is why the solutions concerning the future technologies may not be formulated only on a technical or economical basis. The development needs to be guided by shared values and principles of righteous social development. On the level of design methods, this primarily means increased transparency. When we pay attention to the competences that are required from the participants in this kind of democratic design dialogue, we realize that we have to look in two opposite directions. On the one hand, we see very well-trained design researchers who approach the design challenges with scientific concepts and the sophisticated methods that go beyond traditional design exploration. On the other hand, there are laymen with no formal design education whatsoever whose expertise is grounded in the specific practices they are involved in and self-learned design skills.[17] So the valuation of design skills is getting increasingly polarized between the professional, conceptual, and methodological "school design"; and the situated and practical "street design" by the laypersons.

Readiness Tension

The ubiquitous technology vision includes an idea about self-sufficient technologies that are prepared to serve users by taking the initiative for proactive action.[18] Also, increasingly fine-tuned segmentation of design solutions supported by mass customization technologies share the goal of making technologies that exactly match users' needs and wishes, without the users having to adjust, set, modify, or configure. The ecological approach to design, on the contrary, emphasizes that technology becomes complete and meaningful only through complex processes of adaptation.[19] The meaning and role of technology will depend on users' ability to combine it with other means and their everyday practices. Taken further, the adaptable nature of technology can be seen as challenging the traditional division between design, implementation, and use. It emphasizes the open, incomplete nature of technologies providing users with options to design for themselves and it makes developers design for flexible and smooth handover between design, production, and use.[20]

A well-designed product is considered to be a ready-made solution capable of serving the users and fulfilling their needs without too much maintenance or adjustments. The vision about ubiquitous intelligent environment stretches the requirement for readiness to proactive anticipation, technology initiated action,

17 Recent, well-known advocates of trusting ordinary people as innovators include, for instance, John Thackara, *In the Bubble*; Eric von Hippel, *Democratizing Innovation*; and C. Leadbeater and P. Miller, *The Pro-Am Revolution: How Enthusiasts Are Changing Our Economy and Society* (Demos, 2004).

18 D. Tennenhouse, "Proactive Computing," *Communications of the ACM* 43:5 (2000): 43–50.

19 See footnote 15. Sometimes also called "domestication" as in Roger Silverstone, Erich Hirsch, and David Morley, "Information and Communication Technologies and the Moral Economy of the Household" in *Consuming Technologies: Media and information in Domestic Spaces*, Roger Silverstone and Erich Hirsch, eds. (London: Routledge, 1999), 15–31.

20 G. Fischer, E. Giaccardi, Y. Ye, A. G. Sutcliffe, and N. Mehandjiev, "Meta-Design: A Manifesto for End-user Development," *Communications of the ACM* 47:9 (2004): 33–37.

without waiting for the users' decision. However, completely finalized solutions exclude the options for adjustments by users, and are in open conflict with the view that ideal design is permanently unfinished, stimulates new interpretations, provides opportunities for adjustments, and trusts users being able to make them.

Generality Tension

Design solutions become understandable and relevant only in specific practices and contexts, and the quality of the solutions can only be assessed within these practices, and from the point of view of those who are involved with their values and attitudes. This forces designers in the field to the immediate proximity of the users and practices, and it forces designers to be situation-specific with their solutions. The design of a piece of equipment for a complex environment; for example, an operation theater, without comprehensive understanding about users' collaboration, competences, stress levels, and newly changed treatment practices, as well as the other devices used simultaneously complementing each other would be very unwise. Indeed, we have witnessed good examples of such practice-bound projects and methods that are based on ethnographic approaches and collaborative design.[21] At the same time, however, designers' work is getting more abstract and conceptual. To create preconditions for the design of advanced technology products, companies utilize design on more strategic levels where, instead of working on products directly, designers influence product portfolios, stakeholders' attitudes, competences, tools, and regulations.[22] And it seems like these strategic challenges of design are getting more and more attention. Increasingly numerous designers work on creating prerequisites for design through research, education, administration, and strategic planning. Consequently, designers are simultaneously getting closer to the users to solve their specific local problems; and increasingly distant from them in order to anticipate and enable activities dealing with more and more abstract design questions.

Figure 1 summarizes the trends discussed above in the design of complicated systems, and the tensions they bring to the design discipline. It is worth noting that much of what is presented above as challenges for the future already exists and has influenced design for a long time in some form and to some degree, and that the flexibility of the design discipline has digested the changes.

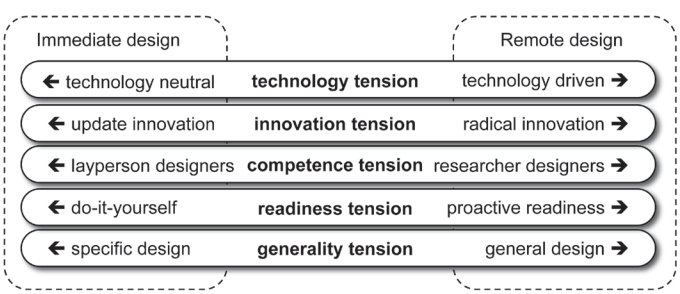

Figure 1
Technology, innovation, competence, readiness, and generality tensions stretching the design practices of complicated environments and systems between *immediate and remote design.*

21 See, e.g., D. Randall, R. Harper, and M. Rouncefield, *Fieldwork for Design.*

22 About the development in Finland, see Anna Valtonen, *Redefining Industrial Design.*

Immediate and Remote Design

A common feature of all of the tensions previously described is the existence of two, simultaneous main trends: one approaching users and specific local practices (the left side of Figure 1), and another distancing from them in order to shift to more generic questions about creating universal solutions or preconditions for design (the right side of Figure 1). The technology tension stretches design between immediately responding to human needs, and working on the possibilities of novel technologies often somewhat distant from laypersons' concerns. The innovation tension polarizes design between suggesting incremental innovations, which immediately create user value, to developing radical innovations having a potentially significant effect on more distant product generations. On the one hand, trusting and working with people to design or contribute to the design of their own near environments and, on the other hand, regarding design as an increasingly specialized and academic professional discipline; increases the competence tension of design. The readiness tension contrasts tendencies to design for flexible technologies to be adjusted locally, to technologies that are self-sufficient and ready to respond, in principle, to whatever is needed. Finally, the generality tension refers to the conflicting objectives of design to cater to case-specific needs and universal quality.

Even though, in some cases, achieving one pole of a tension requires going to the other (e.g., involving laypersons may require research on co-design methods); it is suggested that the opposite ends of the tensions are related to genuinely different design practices. Along with the recognition of the five tensions, it is suggested that two modes of design, "immediate" and "remote," could be conceptually separated from product design, or the equivalents such as information design, to describe the emerging fields of design activity. The concepts are proposed to give conceptual clarity in describing the future and presence of design competencies and practices, without completely diluting the meaning of product design.

Immediate design is suggested to refer to a mode of design characterized by responsiveness to users' current needs, intensive layperson participation, continuous incremental improvements, and the utilization of open do-it-yourself developmental platforms. It takes place where the activity and challenge are on the site, and aims at solving the problem directly without withdrawing to product development fortresses. In addition to being immediate time-and location-wise, it should be immediate when it comes to the causes of design and the interaction between the designers and the users: users' explicit and implicit needs are the immediate reasons to which the design responds, rather than a global trend, business strategy, or technical opportunity, which usually are the drivers of product design. In immediate design collaboration, the designer is one of the insiders fighting in the same trenches with the users, without hierarchical or value barriers separating design from use or maintenance.

Immediate design links the design activities directly to the practices, which makes it specific and context-dependent. Design to improve the environment, and normal work to complete tasks, can intertwine and merge in immediate design.

When design works in the immediate mode, it applies existing technologies and adjusts novel technical innovations to specific human-technology systems. Because it is based on available components, products, and platforms, it is relatively easy to experiment with, adjust, or reject options, and consequently design does not need to be seen as a series of projects, each ending when the product is ready for launch. Design can turn into a process of continuous flow of improvements and adjustments optimizing the human-technology match. An example of immediate design practices might be a project in which designers work for a central hospital, improving the personnel's working environments and the patients' experiences in an intensive collaboration with both constituencies.[23] This kind of immediate design combines the phenomena listed in the left column of Figure 1, including the technology-neutral pole of the technology tension; the incremental update innovation side of the innovation tension; the active layperson end of the competence tension; the do-it-yourself half of the readiness tension; and the context-specific end of the generality tension.

We can recognize several design practices that fall under the category of "immediate design." First, users (i.e., layperson designers) themselves are responsible for the majority of immediate designs. They decorate their homes and adjust their PCs, and sometimes continue to more demanding product development and innovation practices.[24] Second, innumerable activities at offices and factories, where experts in technical support and maintenance adjust tools and environments, represent another form of immediate design. Understanding the local requirements of work is so essential that these decisions cannot be made anywhere else but in the context. With the idea of design tensions, all these can be regarded as design activities, even though they remain outside of the prevailing conception of (product) design. Although laypersons have been able to cope with these domestic and occupational design challenges, the penetration of new complex technologies is complicating immediate design, and making professional contribution more relevant. Third, traditional design services falling close to immediate design include, for instance, interior design and tailored information systems because of their case-specific design objects. However, they do not necessarily incorporate many of the above-mentioned principles of good immediate design, such as respecting and building on insiders' point of view, and equal collaboration in the layman end of the competence tension. These kinds of context- and task-specific design services have been based on specialized skills such as the ability to code or develop insight in visual style typical for the professional end of competence tension. These skills have been applied in

23 Like the one IDEO completed with DePaul Health Center. See Tom Kelley and Jonathan Littman, *The Ten Faces of Innovation* (New York: Doubleday, 2005).

24 C. Leadbeater and P. Miller, *The Pro-Am Revolution*; and Eric von Hippel, *Democratizing Innovation*.

a generalized manner without necessarily being very sensitive to local practices.

Remote design is suggested to refer to design that aims at structural changes. Remote designers work for general solutions, principles, or understanding over individual contexts or implementations. They create conceptual, infrastructure, methodological, regulatory, competence, or resource-related foundations for others to develop products or local practices. When remote designers' conceptual work turns into more tangible design, the results are either concepts meant for decision-making, learning, or influencing; or they are models for generic design platforms that will be adjusted before becoming useful for end-users.[25] Remote designers' scope of interest in time and coverage is broader than that of immediate or product designers. Remote design is distant from users' immediate needs in terms of time, location, reason, and status because its impacts incarnate much later and in modified appearance. The designers work within industrial and administrative superstructures, which can be rather distant from the users' reality, and their actions are based on generic phenomena in society or business. Remote design practices can be positioned on the right-side ends of the five tensions in Figure 1; where design is driven by technical opportunities, radical innovations, specialized professionals and conceptually oriented designers, ideas about the self-sufficient readiness of design products, and the generality of solutions.

Strategic design is an expression sometimes used to refer to similar kinds of activities by remote design. These include design and innovation management, the design of development platforms and infrastructures, and design competence development in industry. Remote design, however, is proposed to be a broader category including design taking place in settings other than industrial organizations (i.e., within education, design research, design promotion and criticism in the media, design administration, and regulative activities related to products and environment).

Defining immediate and remote design as separate practices saves product design from fragmentation and some of the conflicting requirements that have been recognized. For product design, including the design of physical products, stand-alone software systems, and corresponding artifacts; it is enough to focus on its core processes, and specify the interfaces between immediate and remote design, to ensure adequate understanding about the practices, strategies, and platforms. On the five design tension continuums, product designers cannot reach for such extremes as immediate and remote designers. For instance, product designers working for mass-manufacturing industry can neither optimize their designs for a single context of use, nor create new, ubiquitous platforms. Instead, they need to adjust the generality of their contributions somewhere in between—into the middle of the scale—utilizing given platforms and aiming at serving relatively broad user segments.

25 For conceptual design supporting a range of corporate functions, see *Product Concept Design: A Review of the Conceptual Design of Products in Industry*, Turkka Keinonen and Roope Takala, eds. (London: Springer, 2006). Also Eija Kaasinen, "Teknisten perusrakenteiden ihmiskeskeinen suunnittely" ("Human-centered Design of Technical Infrastructure") in *Älykkäiden ympäristöjen suunnittelu*, Eija Kaasinen and Leena Norros, eds., 242–247.

If we focus on the organizational environments and practices to which the different modes of design belong, we can draw an image such as the one presented in Figure 2. While product design typically belongs in the contexts of product development and marketing in manufacturing organizations or their suppliers, immediate design can be seen as a function in these organizations that apply products and technologies. In these organizations, design is not driven by particular technologies, but by practical local needs. The compatibility of new solutions with legacy products and practices is more relevant than radical changes; practitioners' own contribution to design and their stakeholder views are more essential than generic design wisdom; and finalizing technologies to be ready for use through local adjustments is the core design, as characterized by the immediate design ends of the tension continuums. Positioning remote design into one particular kind of practice is more difficult because of the different roles it might take. But in all of these roles, it is linked to administration, enabling activities, and control on higher levels of abstraction than the two other modes.

Tensions to Opportunities

In addition to assisting in categorizing present design activities and development directions, the ideas of immediate and remote design can be deployed to continue conquering new ground for design. Design has traditionally worked in the context of production and marketing. The dominating business logic for designers' customers has been to sell design products for others to apply. The models of immediate and remote design enable designers to be prepared to also work in other organizational contexts. Engineers often are responsi-

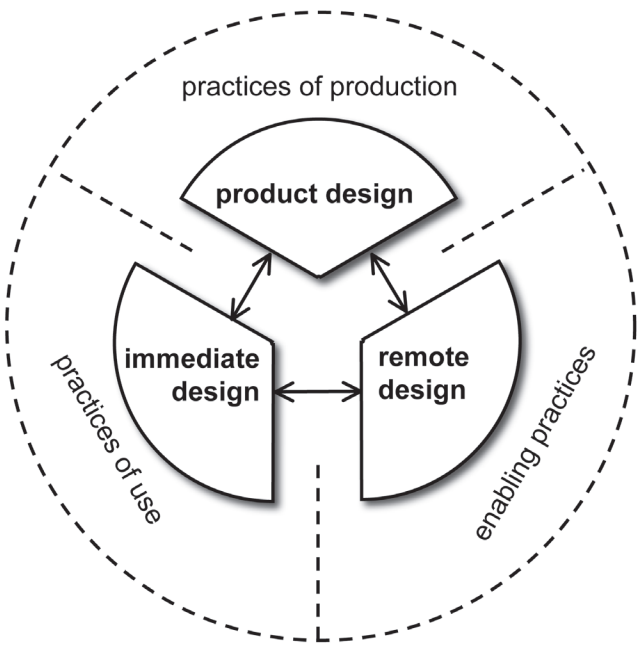

Figure 2
Immediate, product, and remote design within corresponding practices.

ble for running and developing factories, instead of just engineering production machines for sale to these organizations. Similarly, immediate designers' skills could be utilized in running and developing human-technology practices for and within organizations needing these themselves. Would an airport need continuous development of its technology and service practices? Would a police department have similar needs, or a day-care center or hospital, or the local communities of active people as discussed by Morelli? Immediate design in these kinds of contexts would not just be about changing the object of design from products to product-service systems, but the practices would shift towards the immediate poles of all the five tensions, and replace the usual "design for them" with "design for us." Remote design is close to business development, industry-level strategic planning, and society-level decision-making. In addition to manufacturing companies, remote designers could be affiliated with retail enterprises, business consulting, research institutions, civil administration, and the media. In these positions, designers would contribute to technology, industry, and society-level development of material culture on an essentially more abstract and generic level than in traditional design positions as characterized by (the right side of Figure 1) remote extremes of the tensions.

Examples of designers working in these kinds of organizations in immediate and remote design modes can be found, but such practices are not well-supported as long as design education is product-design dominated. Thus, adopting the idea of immediate and remote design would have several influences on designer education. User-centered design, collaborative design, and project and change management probably would be key issues for immediate designers to master. Because design solutions are created using ready-made objects and development platforms, as discussed under "technology tension" and "innovation tension" above, product design skills would not be needed to the same extent as traditionally, and thus omitting them would lighten the immediate design curriculum. To the contrary, deeper understanding about the domains of specialization and the technologies within would become new requirements for immediate designers. An immediate designer might, for instance, study industrial design and gerontology, and work for a nursing home developing care practices and environments without having to worry about being creative with radical novelties or solutions applicable beyond his or her particular organization. Or they might have expertise in paper manufacturing technology and interaction design, and work for a paper mill developing automation systems, interfaces, and working practices.

Remote designers approach design as a more conceptual issue. They need to understand about value creation through design, linking design with business management, innovation, and connections between culture and economy. Design, engineering, and business already have been recognized as related fields; and

cross-fertilization across faculties is a reality at several universities.[26] Also, other educational innovations to create competences for remote design can be imagined. Combining design and law studies would be an asset in working with standardization, product liability issues, and user-centered approach to legislation. Design, literature, and journalism studies would start raising the standard of design through public critical feedback.

We can assume that immediate designers could find collaborative partners through horizontal integration in several industries, applying design in complicated human-technology systems. Remote design orientation might integrate design activities vertically within traditional industries, but on higher levels of abstraction. In professional education, the integration could be facilitated by training designers specializing in other disciplines, or other professions including design in their curriculums. Design, especially immediate and remote, does not need to be done by designers, but design skills are necessary.

Technology, innovation, competence, readiness, and generality tensions appear to stretch design into an amorphous field the extremes of which pose incompatible competence development challenges. However, regarding the opposite poles of the tensions as emerging practices, immediate, and remote design, the competence development challenge becomes more manageable, and even suggests new opportunities.

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26 See, for instance, *Design Management Review* (Special Issue) 18:3 (Summer 2007).