

## **Do offerings meet expectations?**

### **Educating T-shaped professionals in strategic design management**

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#### **1. Introduction**

The demanding new product development (NPD) environment and high degree of competition in the marketplace call for professionals who possess wide strategic skills and profound experience in mastering multifaceted challenges. Strategic management of modern companies and brands is a complex endeavor that is seamlessly linked to NPD and innovation activities of the company and requires multitalented development teams. Effective product development teams and organizational structures are prerequisites for innovation and creativity that are increasingly sought after in many companies. The more innovative the product is, the more creativity is required and the greater the need for different kinds of expertise in the team (Madhavan & Grover 1998). Innovative teams are constructed of members who possess not only disciplinary expertise but also strong multidisciplinary knowledge and experience. For example, functioning product development teams need experts of design, technology, and business who can master their discipline-specific tasks and, in addition to this, are able to work effectively with the representatives of other disciplines.

Disciplinary knowledge is typically educated in universities, but multidisciplinary approaches are still in a minor role. The expectations of the industry, however, require for novel approaches that combine different disciplinary views and knowledge bases and, even more importantly, provide students with practical experience in working as part of multidisciplinary teams in a real-life industry contexts. This experience in working with other professions, the future NPD team mates, is strongly needed in the curricula of design management and NPD education.

## **2. IDBM Program**

International Design Business Management Program (IDBM) is tailored to meet these expectations. IDBM is a multidisciplinary effort in Finland to educate future professionals who are prepared to work in multidisciplinary teams and possess a strategic view into design management and, more precisely, management of international design-intensive businesses, operations, and NPD, as the name suggests. IDBM is a joint teaching and research program of three leading Finnish universities: the Helsinki School of Economics (HSE), University of Art and Design Helsinki (TAIK), and Helsinki University of Technology (TKK). Since its establishment in 1995, over 450 students have done the program, many of whom work today in high positions in the industry. IDBM also has established contacts with the industry, as around 150 company projects have been executed with some 70 Finnish and foreign companies.

The purpose of the Program is to bring together students, thus future experts, from the key disciplines within the concept of design business management. IDBM trains skilled professionals for key roles in international design business by underscoring the importance of design as a competitive factor in different industries. Arising particularly from the needs of companies, the program provides business, design and engineering students with an opportunity to practice interdisciplinary and interpersonal skills through shared projects and courses.

Multidisciplinary approach, international context, strategic view, and hands-on company collaboration are the cornerstones of the IDBM Program. In overall, industry collaboration and project-based learning are becoming increasingly important topics in education, particularly concerning design management and innovation in multidisciplinary and international context. To create well functioning structures and practices between universities and companies is, however, a tough challenge that is being continuously faced also within the IDBM Program. Eight months long industry projects namely form the core of the program and the multidisciplinary knowledge that students gain from theory courses is applied into practice particularly through these projects. A typical IDBM industry project is

completed in teams of 3 to 5 students, representing students and the different knowledge areas of HSE, TAIK and TKK. Moreover, 2-3 project tutors are selected for each team both from the participating universities and the industries to supervise the progress of the project. The projects have dealt with new product concepts (design and user interface issues), the definition of customer needs and the future environment of a product, the analysis of markets and customer feedback, and the examination of corporate identity, communications and design management, among other things. Through these projects, the Program is not only able to provide students with practical coaching in real-life corporate and NPD environment, but also gained a wide experience of the challenges and functioning forms of industry-university collaboration. The projects have been well-appreciated by companies who are able to come into contact with creative and innovative students and to obtain first-hand information on the most recent research and training in the field. During the course of the project, the company also has an opportunity to evaluate the students in view of possible future collaboration.

The IDBM has been a one-year program that forms a minor subject for the participating students of HSE, TAIK and TKK. However, there has appeared a strong need for a deeper and larger educational entity on the IDBM basis, as the Program has generated a convincing track record in terms of company collaboration and positive experiences of the participating students as well as developed a widely acclaimed image in the international context through project collaboration with a number of foreign universities such as Stanford University in US and Kyoto Institute of Technology in Japan. The IDBM program has also functioned as one of the forerunners of the Innovation University (working title) initiative that is taking place in the Helsinki Area. This initiative has been planned during a couple of recent years and now a decision has been made to merge HSE, TAIK and TKK together to form one high-quality university. The Finnish Government has promised an additional funding of 500 million Euros which will be combined with the 200 million coming from the Industry to establish a new foundation-based structure for the new university. Within the realization of the Innovation University, set to start operating in August 2009, the IDBM program has also set objectives for development activities to further foster multidisciplinary education and research in close

collaboration with companies, and more strongly on the global context. When writing this, a concrete plan is pending as one of the pilot activities of the new university to develop IDBM into a full-fledged multidisciplinary post-graduate program that would educate truly global class business developers and would function in full run in 2012.

There appear some fundamental issues that need to be addressed when developing the new educational approaches like the IDBM program. They are briefly discussed in the following chapters with an objective to enable fruitful discussions with our international colleagues during and after the DMI conference.

### **3. NPD and creation of multidisciplinary knowledge**

At their best, well-functioning teams not only get along in daily activities but can also create a shared body of knowledge that is more than the sum of individual members' own knowledge and skills. This concerns creation and sharing of explicit and tacit knowledge, but especially so-called "embedded knowledge" within the teams. Madhavan & Grover (1998) define embedded knowledge as a result of combination of team members' tacit knowledge that is potentially created as soon as team members get together. This is type of knowledge is inherent in well-functioning teams, collective knowledge that cannot be held efficiently by individual members.

We propose that the better the team members' recognize and acknowledge the roles, strengths and limitations of their team mates with different disciplinary backgrounds, as well as their practices and thinking models, the more purposeful embedded knowledge is created. This is also the fundamental ground of the IDBM Program. Sensitivity to generate embedded team-specific knowledge, or what we call multidisciplinary knowledge, can be improved through practical collaboration that should be started already during one's studies.

As Madhavan & Grover (1998) propose, embedded knowledge that a team possesses is transferred to “embodied knowledge” in the new product that the team develops. How successfully the embedded knowledge transfers to embodied knowledge, in other words, how well the product meets the intended goals, depends on a number of key variables. These include (1) “exogenous variables”: T-shaped skills, A-shaped skills, shared mental models, NPD routines, and inherent product innovativeness, as well as (2) “endogenous variables”: trust in team orientation, trust in team members’ technical competence, richness of personal interaction, and information redundancy. These variables are important to consider when creating NPD teams, while they affect the key indicators of effectiveness and efficiency within NPD.

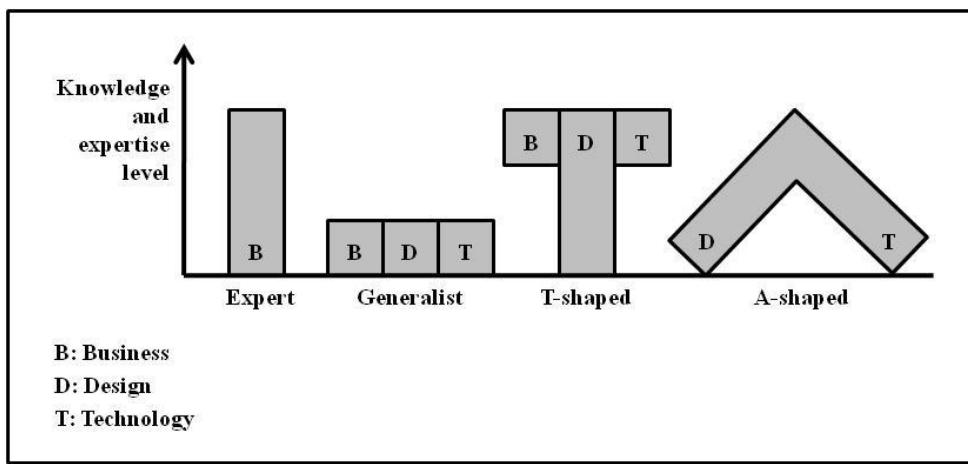
These key variables are also highlighting the objectives of IDBM. The program aims at creating trust between different disciplines, boosting hands-on interaction through project-based learning and, through this, enabling information redundancy, meaning that a minimal amount of (formal) information sharing would be required within teams. Through these exogenous aspects it is ensured that students’ T-shaped skills, the multidisciplinary knowledge base, is being created. The concept of persons with T-shaped skills was originally proposed by Iansiti (1993). According to him, T-shaped persons are experts in specific areas (T’s vertical stroke) and know how their discipline interacts with others (horizontal stroke). In addition to their specific disciplinary knowledge, they are thus exposed to experience and knowledge of other disciplines.

This approach generates shared mental models, prior knowledge of how things are supposed to be, as well as NPD routines, concretized in the form of regular and predictable patterns of organizational behavior, and inherent innovativeness within product teams. Even though the composition of teams and professional tasks that the students will face in their future careers differ from those constructed in the study phase, they will supposedly be better prepared and more sensitive to work effectively and efficiently in different teams and contexts.

#### 4. Educating T-shaped professionals

Hence, the starting point of the IDBM is to nurture a multidisciplinary view. It is, however, important to acknowledge the sufficient level of expertise that students have to gain from the university curriculum. There are different professional profiles that are required in the industry and to which different educational programs can prepare students. Some of them are summarized in Figure 1.

**Figure 1:** Examples of different professional profiles



Traditionally, the largest share of students has been educated to become experts in a specific discipline such as business that is illustrated in Figure 1. These disciplines of course are further divided into more specific areas of expertise, but we remain on a more general level in this presentation. Experts hold a high level of knowledge and expertise in their own area, but do not possess or even understand the substance of other disciplines such as design or technology. Generalists, in turn, are persons who possess a fair deal of knowledge and expertise in different disciplines but lack a deeper expertise in any of them.

T-shaped professionals, as noted, are the type of persons that the IDBM Program aims to educate. Before entering the Program, these students have been taught within their respective disciplines to receive the level of expertise and knowledge that suffices for performing their disciplinary tasks in a good manner. Then, IDBM develops their multidisciplinary skills, thus forms the horizontal stroke of

the T-shaped skill set, which enables team members to interact with one another. The T-shaped approach proposes that students' vertical skills are a prerequisite for creation of new embedded knowledge within the teams. Interaction of different knowledge sets can result in creativity and new ideas (Simon 1985, Madhavan & Grover 1998). It is assumed that higher the disciplinary knowledge level of individual members, the greater is the potential for creative ideas within the team.

Multidisciplinary interaction can create what Madhavan & Grover (1998) call "creative abrasion", a deliberate conflict of different ideas at a cognitive level that leads to increased effectiveness and efficiency, as well as innovativeness of NPD. This remark is important. Without T-shaped skills, teams may end up in a state of abrasion that is not creative but destructive.

Tim Brown, CEO and President of IDEO who has a profound experience in innovative processes and multidisciplinary team work, states that T-shaped people work, and need to work, in a highly experiential manner (Brown 2007). Innovative products are created through error and trial.

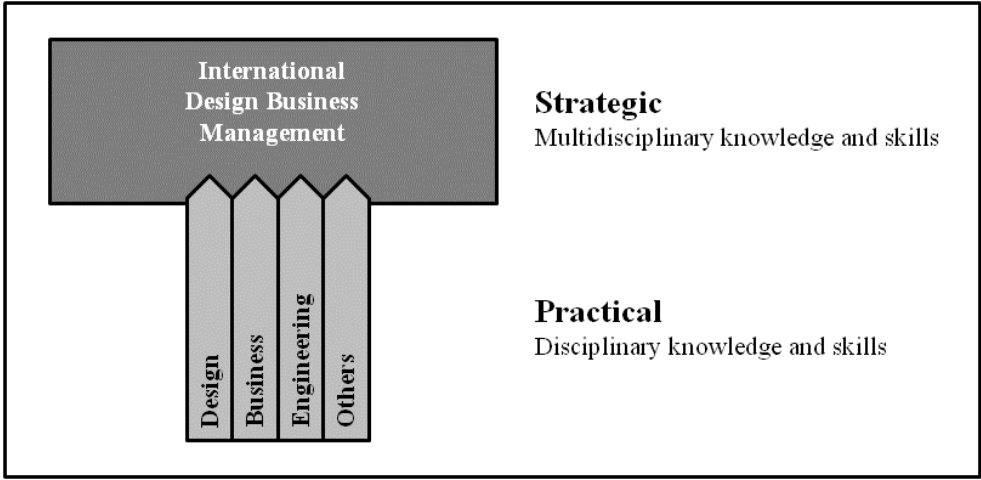
Multidisciplinary education also must take place through structures and practices that allow and develop the creative teamwork skills of students and also comprise challenges that are great enough and implied from the real-life context. This approach is embraced in the IDBM Program specifically through the industry projects that the students execute for the industry under the supervision of seniors both from the academia and companies.

The fourth professional profile that we touch upon in this presentation is the person with A-shaped skills. According to Madhavan & Grover (1998) these are persons who have the unique ability to integrate two different disciplines. They possess a high degree of expertise and knowledge in each of them. Typically, proposed by the authors, team leaders with A-shaped skills are more effective than persons without them. Such persons are valuable in the NPD organization as leaders and links between different disciplines.

**5. Promoting strategic design thinking**

T-shaped (and A-shaped) professionals possess knowledge both on the practical (or operational) level and on the strategic level. The focus of the IDBM Program is to improve the strategic knowledge base of the participants. In a multidisciplinary context, this knowledge is often tacit, embedded, and in order to be successfully employed in NPD requires that shared mental models, NPD routines, and inherent innovativeness are created within the team. It is also suggested that strong disciplinary knowledge and skills are prerequisites for a creative and innovative team work. Students have acquired the main body of their disciplinary knowledge and skills, that is, their practical abilities and expertise as professionals, in their own universities. The idea of IDBM is not to educate a business graduate to become a designer, or an engineer to learn an array of marketing tools, but to get them acknowledge the existence and profiles of the tools, practices, and mental models employed by other professions. Figure 2 illustrates this division between practical and strategic emphasis.

**Figure 2:** Conceptual division of approaches between disciplinary education and the IDBM Program



This conceptual presentation, however, escapes the fact that the multidisciplinary team work naturally involves a variety of practical and operational skills that the team members incorporate in interaction, whether explicitly or tacitly. Moreover, students have employed different professional profiles when entering the Program. Business and often also technology students are usually well educated to

strategic thinking, while design students master more practical skills with regard to design processes and NPD. In Finland, design education is fundamentally art-based and takes place in own universities such as TAIK. In this situation, the greatest outcome of the IDBM program for the design student is to get more accustomed to strategic thinking and planning processes, while the business students learn about product development practices.

The fundamental mission of the IDBM Program, in general, is to emphasize the role of design as a strategic asset in companies. The Program tries to promote the increasingly important role of design in modern companies. There is evidence that design contributes to the commercial success of companies (Gemser & Leenders 2001, Goodrich 1994, Whyte et al. 2003). In many companies, however, design is still regarded as an instrumental tool that is only subject to the corporate, product portfolio, and brand strategies. In such situations the actual decisions made by designers mainly concern the tactics of executing strategic decisions made by company executives and therefore are therefore not strategic in its own right (Harkins, 1999). As also noted by Johnson (2005):

“Few companies understand and use design as a strategic asset. In part, that's because design is often thought to be primarily a creative and finite endeavor: Identify the project, execute the art, toss it out into the marketplace. Developing a design strategy, on the other hand, is not an event. It's a business process. It should not be confused with the art or creative process. In fact, it's not a creative endeavor at all; it's much more comprehensive, involving extensive audits, analysis of competitors and measurement. It touches every aspect of a company.”

Such a holistic view requires a multidisciplinary approach. Strategic design requires a goal-oriented, high-level, and long-term view that must be aligned with and applied to different disciplinary views, operations, and organizational units of the company. As suggested by Ravasi and Lojacono (2005), it is important that design is acknowledged as a driving force in itself, contributing to strategic renewal of the brand and corporation, driving brand repositioning and inspiring strategy formulation.

Moreover, design can act as a “catalyst” for innovation and creativity in the entire company, as formulated by Tim Brown of IDEO (Brown 2007):

“Organizations need to take design thinking seriously. We need to spend more time making people conscious of design thinking – not because design is wondrous or magical, but simply because by focusing on it, we’ll make it better. And that’s an imperative for any business, because design thinking is indisputably a catalyst for innovation productivity. That is, it can increase the rate at which you generate good ideas and bring them to market. Where you innovate, how you innovate, and what you innovate are design problems. When you bring design thinking into that strategic discussion, you join a powerful tool with the purpose of the entire endeavor, which is to grow.”

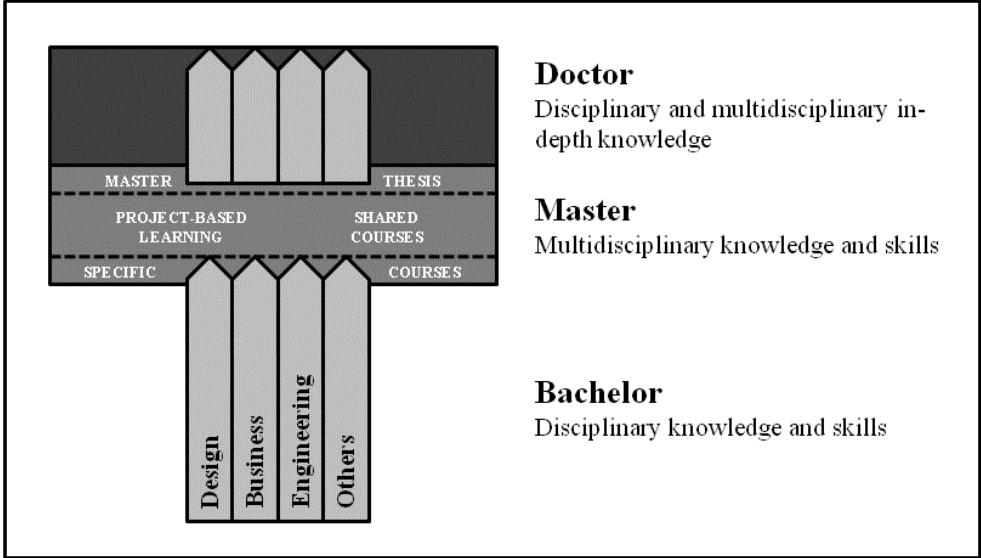
## **6. IDBM development plan**

As mentioned in Chapter 2, the future of the IDBM Program involves a plan to develop it to a full-fledged multidisciplinary post-graduate program that would be in full run in 2012. The new IDBM would incorporate a stronger global content through education and research collaboration with a number of partner universities in all continents. Close collaboration with industry will also be continued and further strengthened. In practice, the plan is to build a 2-year master program that would start in August 2009. The master program would take in 50 graduates per annum and educate them to obtain a professional T-shape knowledge and skill profile. In addition, the plan includes a 4-year doctoral program that would start in 2011, would take in, in full run, five doctoral candidates per annum. To support the education and research activities, a global research alliance will be formed that includes a number of international partner universities. Collaboration will be sought after to create a research portfolio that supports the programs and generates high-quality knowledge with regard to strategic management of design and innovations in global context. The idea is that the IDBM Program would function both as an independent unit with its own staff and resources and as a horizontal service that supports and combines the existing resources and expertise of HSE, TAIK and TKK.

Within the framework of generating T-shaped knowledge and skills, the primary focus of the IDBM Program would still be on the multidisciplinary and strategic domain. As proposed in Figure 3, disciplinary knowledge and skills would be created on the bachelor level, whereas the master program would emphasize the multidisciplinary dimension. However, the program would possibly provide some specific courses that, for instance, would prepare the strategic or practical skills of students within specific disciplinary boundaries.

The main body of the master program would consist of shared courses and practical industry projects, conducted for Finnish and foreign companies and some of them in collaboration with foreign partner universities. On top of this, students would conduct master theses within the IDBM context, individually or in multidisciplinary teams. They would get degrees from their home universities. The doctoral program would then offer possibilities for a smaller number of students to deepen their disciplinary and multidisciplinary knowledge.

**Figure 3:** T-shaped profile of the new IDBM Program.



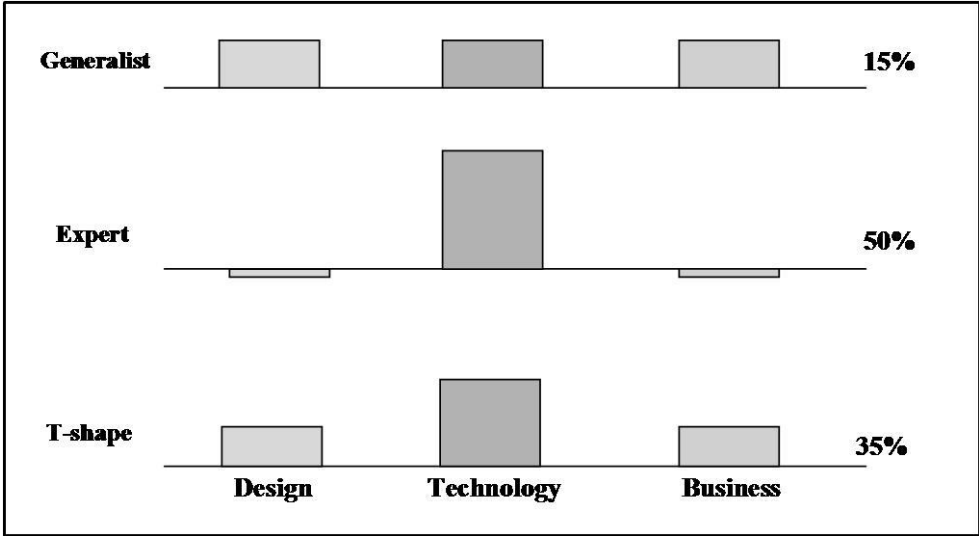
## 7. Conclusion

In the development of the new IDBM Program and similar educational approaches, there exist a number of practical challenges and fundamental decisions to be made. Communication between the people from different disciplinary backgrounds is perhaps a greatest individual challenge that is being constantly faced in the IDBM industry projects, most often resulting from poor understanding of the “language”, tools, practices and thinking models of the other professions (Leiviskä 2001).

Communication is a challenge, and sometimes a severe obstacle, for effective team work, even between designers with different knowledge (Busby 2001), but especially in multidisciplinary groups (Peeters et. al 2007). Different disciplinary languages and practices have even been a greater challenge than cultural differences that some IDBM students are exposed to when, for instance, working in distributed teams together with students from the US (Karjalainen & Repokari 2007). In addition to disciplinary and cultural differences, company collaboration has often been considered a central challenge in many projects. To prepare students for these challenges, and to overcome such obstacles in their professional careers, the IDBM Program offers a simple remedy. Communication and collaboration is learned in practice, through the daily interaction and real-life company projects.

In terms of the main conceptual topics of this paper, there are two fundamental dimensions concerning the requirements for high level design management education and the future format of the IDBM Program. The first one concerns the balance between disciplinary expertise and multidisciplinary knowledge, and the second one the balance between strategic and operational contents that is pursued in education. With regard to the former dimension, an interesting question is how many graduates representing each of different profiles (T-shaped, experts, and generalists) are really needed in the industry. According to our experience and estimation, the need for experts is clearly highest and there is relatively low need for pure generalists. The need for T-shaped professionals falls presumably somewhere between these two (see Figure 4). Of course, the distribution of different profiles varies from industry to industry, and from company to company, but estimation of appropriate quantities is required when planning the educational structures on the national and university levels.

**Figure 4:** Estimation of the need for different graduate profiles in the industry.



Another relevant question concerns the balance between strategic and practical/operative contents in education. As stated, studies at business schools tend to give better basis for theoretical and strategic thinking when design studies stress more the craftsmanship and professional skills, although strategic content is increasing also in many design curricula. Technology studies may fall in between these two. Different emphases in basic education mean that students entering the IDBM Program possess different levels of strategic knowledge and practical expertise. Designing the curriculum to serve the needs and profiles of the different disciplines therefore requires much attention.

In assessing the need for educational profile and contents, a survey study among the IDBM alumni is being planned. Moreover, an idea is to map the relevant topics and approaches for education and research within the field of strategic design management through a survey and discussions with the international partner universities and collaboration companies of the IDBM Program. Through such investigations and the development of the new IDBM Program, the aim is to develop new educational offerings that pay specific attention on meeting the challenging expectations of the industry and academia.

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### **Resumé / Toni-Matti Karjalainen**

Dr. Toni-Matti Karjalainen holds the degrees of Doctor of Arts (Art and Design) from the University of Art and Design Helsinki (TAIK) and M.Sc. (Econ.) from the Helsinki School of Economics (HSE). He works as Research Director of the IDBM (International Design Business Management) Program at HSE and has also several years experience as Project Manager at the BIT (Business Innovation Technology) Research Centre at Helsinki University of Technology (TKK). His research on product design, design semantics, brand management, and new product development is conducted in close collaboration with international companies and published in academic journals and international companies. Karjalainen also acts as a visiting lecturer in a number of foreign universities and co-manages the Nordcode research network in Nordic countries.

### **Resumé / Markku Salimäki**

Markku Salimäki, Dr.Sc. (Econ.), M.Sc. (Eng.), is Director of the IDBM Program at HSE. After graduation from Helsinki University of Technology (Industrial Management) in 1973 he worked in different managerial positions in the Finnish Ceramic and Glass Industry. Salimäki left the industry in 1992 to start his doctoral studies at HSE and received his Licentiate Degree in 1996. The IDBM Program was started in the beginning of 1995 and Salimäki became the first Coordinator and Director of the Program. Dr. Salimäki defended his doctoral thesis and received the degree of Doctor of Science in 2003 at Helsinki School of Economics. The topic of his thesis was “The Competitive Strategy and the Internationalisation Process of the Finnish Design Companies. Salimäki was nominated as Visiting Professor at Kyoto Institute of Technology, Japan, in 2007.