

Designing (added) value : social innovation in flexible networks

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Inaugural lecture
prof.dr.ir. Elke den Ouden
23 October 2009



/ Department of Industrial Design

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Technische Universiteit
Eindhoven
University of Technology

Designing (added) value

Where innovation starts

Inaugural lecture prof.dr.ir. Elke den Ouden

Designing (added) value

Social innovation in flexible networks

Presented on 23 October 2009
at the Eindhoven University of Technology

Introduction

This is a great moment. The Dutch Design Week is in full swing. There are plenty of attractive things to see: products and processes, industrial products and applied art. The whole city is infused with creativity. But it is also rather strange to be talking about a great moment right now. Because we are in the middle of not just one crisis, but several at the same time: the economy is in a downturn, the environment is under pressure, there is an energy crisis, a food crisis, and medical costs are likely to overtake us because of the graying population. There seem to be hardly any reasons for optimism. Or perhaps there are?

In history, crises have often proved to be a source of breakthroughs in innovation. As well as that, we now have more technical capabilities than ever before. Technology makes possible intelligent systems, which can also be marketed for very acceptable prices. Companies are becoming more and more aware of the opportunities that open innovation offers, and are prepared to work together on innovations and in applying new business models. If we can use the creativity of designers to not only design products but to create total solutions for larger societal problems, then we will be able to find a way out of the crisis. The industrial design discipline is outstandingly suited to playing an important role in this process. But it also poses a number of questions to designers: how do you deal with the complexity of issues like these? How do you integrate the social, business and end-user perspectives in solutions that deliver value for all the involved parties, and that will also retain their value in the longer term? Which practical approaches are available to support these complex processes and decisions, and which competences do the designers of such socially relevant innovations need?

These are central questions for my chair in the Business Process Design group of the Department of Industrial Design. Our ambition is to design intelligent systems, products and services that are useful because they provide solutions to socially relevant challenges, and that are valuable in the perception of the end-users. Because several parties are often required for the development and implementation of these systems, the solutions must also have added value – and offer more value – to each of the involved (business) parties.

This means that in designing these total solutions, we will have to look not only at the system, product or service itself, but also at the business model. In the coming years I intend to dedicate my work at TU/e to research in this field, with the aim of building a bridge between business methods and industrial design.

In this lecture I will first look more deeply at the social and business contexts of this research. After that I will talk about the significance of creating (added) value, and outline some of the opportunities for design in the future. Finally I will take a closer look at the research that I am planning to do in the coming years.

Intelligent systems and their context

Developments in electronics mean that components are now so small, cheap and efficient that they can be used almost invisibly to make products more intelligent. Increasing numbers of products are now equipped with sensors and software that add intelligence to the product, for example washing machines that measure how dirty the rinsing water is and adjust the number of rinse cycles accordingly. As well as the local intelligence which is built into products themselves, there is also a growing category of products that are 'connected'. Through – often wireless – links they gather relevant data to provide the user with a better service. Just one example of such a system is traffic congestion information for navigation systems, in which up-to-date information about traffic jams is acquired using a mobile phone link. Smart navigation systems use this data not only to show likely delays, but also to plot the fastest alternative route, taking into account the current delay data.

Now that miniaturization is making it possible to integrate functions, and relevant information is available virtually everywhere, many new applications that until recently were no more than fantasy have suddenly become possible. Just think of the 'Marauder's Map', which Harry Potter uses to see where everyone is when he is up to no good. Nowadays many people have a navigation system, or a GPS function integrated in their mobile phone, so of course it's easy to see where friends or colleagues are. There are already similar applications for your iPhone. These may look like trivial gadgets, but they can suddenly have a lot of added value if you have a family member who is suffering from Alzheimer's.

Systems will also increasingly become adaptive, and take into account the context, the situation in which they are used or the user. Smartphones, which are now often used as alarm clock, diary and navigation system, could also adjust the settings of the alarm clock by combining the information about the location of the first appointment, the current traffic jam information and historical data about the time that the user needs between waking up and driving away. As well as that, an increasing number of systems respond to the presence of people, and adjust to the personal preferences of those people and to the physical, social and cultural contexts in which the systems are used. The ambition of the Department of

Industrial Design is that these ambient intelligent systems will make interaction simpler, because they are aware of the context and can adapt to it without requiring any action by the user [1]. This means that on the one hand intelligent systems offer attractive opportunities, but on the other hand we all know the frustration of products that don't do what you want them to do. It turns out that good design of intelligent products isn't so simple in practice.

The social context

You don't have to be a visionary to see the opportunities that intelligent systems offer to address the larger problems that currently face our society. For example, energy can be saved in offices if they are equipped with sensors, so that the lights are automatically switched off when nobody is there. To keep the rising costs of the graying population under control, intelligent products will allow more patients to be treated at home, instead of in hospital. This will not only reduce costs, but it is also strongly preferred by patients themselves. At first glance these may appear to be product-driven solutions: enriching products with intelligence to provide functions that are useful to the end-users. But in fact, innovations like these have a deeper idea behind them: they not only solve a problem for the end-user, but they also make a contribution to society by reducing energy consumption or bringing down the total costs of providing healthcare for a graying population. Going one step further are the social innovations, in which finding a solution for a societal issue is the primary goal. Of course there too the perspective of the end-users is still relevant, because they are the ones who will accept or reject the ultimate implementation. If end-users do not adopt an innovation, it will not be a lasting success. The end-user perspective is therefore also crucial for social innovations, but it is not the only relevant perspective.

The business context

The intelligent systems I referred to above have in common that a number of parties are required to develop them. Not only, as in traditional companies, are a range of suppliers needed for the various components of the system, but a number of companies with different products and systems are necessary to jointly design and launch the system and to keep it operational.

One example is TomTom HD Traffic. As well as the TomTom navigation system (the 'box'), real-time information about travel times and delays is also necessary. Of course TomTom could collect this information itself. However Vodafone can use its

transmitters to monitor how quickly people with mobile phones are moving, and TomTom can translate that into accurate, real-time information about travel times on busy roads. Users of the TomTom HD Traffic take out a subscription to the traffic jam information, and this includes the service provided by Vodafone. This is a typical example of what we call open innovation.

Companies are finding more and more opportunities in open innovation, because collaboration with other parties makes things possible which they could not achieve by themselves, or which they could achieve only by making high investments. Creating such intelligent systems with a greater added value for the end-user demands integration of the knowledge and experience of different parties. One consequence of such collaboration is that not only the technical system itself has to be thought about, but so does the business model. Open innovation requires the designing of the business model to be an integrated part of the design process so that a good solution is generated, while at the same time all participants are clearly aware on the one hand of which efforts each of them has to make, and on the other hand of how this serves the interests of all of them.

The context of the end-user

Technology makes many things possible. Miniaturization has led to constantly increasing numbers of functions and features being integrated in products. More and more companies are putting the end-user at the center of the innovation process, not only to add new features, but also to find completely new solutions. In other words not 'technology push' but, based on the deeper needs of end-users, designing products and services, and applying advanced technology in them. One example from Philips is the Ambient Experience Lab for hospitals, see figure 1.

A big problem in making medical scans is that patients are often agitated, and do not lie still. This means that images are often not sharp, and the patient has to be scanned a second or a third time. Sometimes patients are so agitated that they have to be given a sedative to allow the scan to be made. One solution is to develop a technology that allows scans to be made more quickly, so that the patient's movements have less effect. Another solution is to try to find a way to counteract the agitation of patients. This has led to the development of the Ambient Experience Lab.

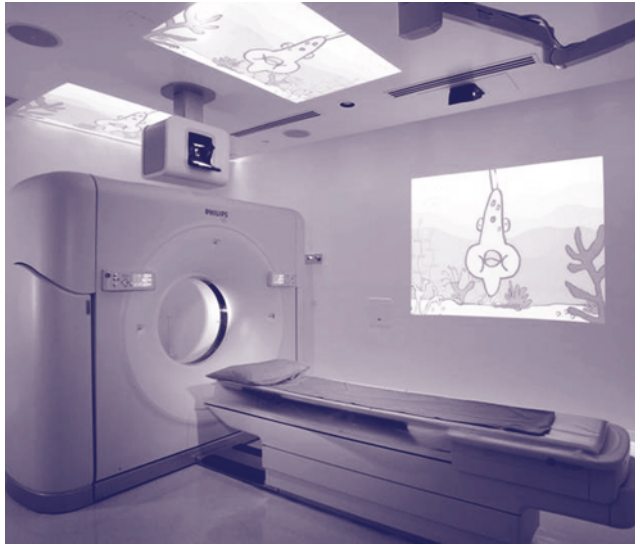


figure 1

The Philips Ambient Experience Lab

Patients can choose a theme, which by means of sound, film projection and lighting to transforms the lab into a space in which they feel at ease. The film projection and sound distract patients so that they lie quietly. Special films for children help them to hold their breath for twenty seconds at just the right moment. As this example shows, putting the end-user at the center of the process leads to different solutions that also offer added value for the hospital, because more scans can now be made in the same time.

Synergetic prosperity

Truly valuable innovations deliver lasting added value for all stakeholders. This is based on a layered model, of which the core is formed by the system that offers value to its users. This is surrounded by a shell in which the proposition generates value for the companies. And around this is another shell in which the total concept delivers added value for society at large. Designers are not in a position to redesign society, but of course what they can do is strive for innovations that offer synergies in value across the various layers or shells. Before I look at how this could possibly be implemented, I would first like to consider the concept of value in more detail.

The meaning of value

What is value? And how can you create added value? Value can have different meanings, depending on the perspective you choose. In the example of the Ambient Experience Lab, different parties look at the system from different viewpoints. Figure 2 shows a few examples of those different perspectives.

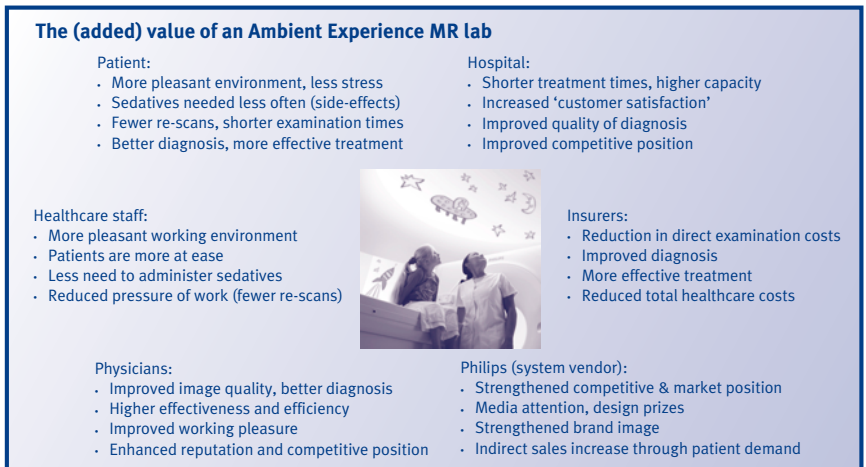


figure 2

Value from different perspectives

As this example shows, value not only differs in the eyes of the various stakeholders, but it can also take different forms. Value can sometimes be expressed directly in financial terms, but often this is not the case. Value also expresses itself in other ways, for example in 'feeling good', having a 'good experience', gaining increased knowledge, improving your reputation, getting personal attention or having time for the things that you find important. So value can by no means always be translated into figures or money. Creating (added) value is therefore not the same thing as simply earning (more) money.

The value of a design

The value of a design cannot simply be expressed in figures. A good design makes life more enjoyable, or increases the quality of life. Often a design also has a related esthetic value, which can sometimes be translated directly into economic value (an attractive chair is worth more and can be sold for a higher price than one that is less attractive). Esthetic value in itself is a difficult concept to define because it depends on the subjective aspect of taste: not everyone finds the same things equally attractive. In this sense value is not absolute, but is relative and depends on the context.

A valuable and valued design matches the context for which it is intended, and offers lasting added value from the perspectives of the stakeholders.

The Netherlands has a long history of designing and creating added value. In the Dutch Golden Age, painters like Vermeer and Rembrandt were able to create huge added value with a few oil paints and a piece of canvas. Today's Dutch Design has a firm place on the world map with Dutch designers like Marcel Wanders and Hella Jongerius, who add value to modern materials and industrial production methods. A chair designed by Marcel Wanders isn't just another chair. People who buy one of his chairs see a lot of added value in it. The design touches them, and they feel a strong bond with it. If it gets stained, that hurts them more than would be the case with an ordinary chair. A good design has lasting value.

For the Netherlands, the designing industry also creates increasing amounts of value in an economic sense. The creative industry comprises companies that are active in the areas of fashion, architecture, industrial and graphic design, gaming, media and advertising. With an estimated 240,000 to 300,000 jobs this sector provides a huge amount of employment, certainly compared with the high-tech automotive systems industry, for example, in which around 40,000 people work, or the maritime industry, with around 46,000 people [2]. That means designers make a valuable contribution to the Dutch economy.

Economic value

Especially now, at a time of economic crisis, it is interesting to see that the concept of the economy has recently been reduced to 'the art of money-making'. Some people regard this impoverishment as the primary cause of the present crisis. Aristotle defined Oikonomia as 'the art of living and living well' [3]. In this classical definition, economics is a means to increase welfare. Economics is there to serve people and their lives, and not the other way around. The specific way in which the fundamental need for a rich and meaningful life is met of course depends on the individual, and on the applicable culture and context, but also and

most of all on the extent to which that fundamental need is already met. Buying goods and services has a role to play in that, but there are also social and ecological aspects which are important to ensure continued human existence and welfare. A holistic view of the total system of needs is required to identify the fact that meeting a need at a lower level can have an unintended and destructive consequence at a higher level. For example the need for leisure can be met by air travel, which leads to pollution of the environment and as a result quite probably to lower overall welfare. And focusing only on money in innovation leads to other important aspects being lost.

The ambition of the Department of Industrial Design is to design intelligent systems that offer added value to all stakeholders, at both the societal and individual levels. We therefore have to apply the concept of economic value in a broad sense. For people that means both physical and spiritual welfare, and for the planet it means that both the Earth and society must offer a good environment in which to live. This ambition is also expressed in the Ambient Intelligence 2.0 vision [4]. This focuses on synergies in welfare for both people and planet, which is what we mean by synergetic prosperity. Implementing this ambition demands a holistic view of value creation in the design process. This has far-reaching consequences for the designers and the other involved parties.

Value creation

The societal challenges facing us today demand creative solutions: the graying population and the related increasing healthcare costs, the energy issue, the impact of climate change, the unhealthy lifestyle of many people, increasing criminality etc. The solutions to all these issues will only prove to be real solutions if they can structurally offer added value to all those involved. Only then will they be adopted and used for longer periods. A number of conditions must be met for this to happen, and I would like to talk about what these are and how this can be achieved.

Making the end-users central

The welfare of the end-users must be the point of departure for the design process. In the first phase the focus must be placed entirely on identifying the needs of the end-users, and this is initially quite separate from possible solutions, the available technology or the position of the current organizations in the overall picture. We can only create viable and useful innovations if we gain a profound insight into the world of the end-user and the needs arising out of it.

Really putting end-users at the center of the innovation process is quite a far-reaching step for many companies and institutes. A long-standing position as market leader in a specific technology or product category no longer has to be relevant. Many companies started with technology and continued, often successfully, on that basis. Space now needs to be created to think about innovative solutions whose added value to the company is not immediately clear. Creativity is an important factor in several phases of that process. First of all in finding the most valuable solutions for the end-users; solutions that will support them, either directly or indirectly, in leading rich and meaningful lives, and as a result also making a contribution at the societal level.

Collaboration in innovation

Fortunately more and more companies are including open innovation in their strategy.

Multiple parties can jointly find a better solution for the needs of the end-user, because by working together in this way they can combine their strengths. In many cases, the resulting solutions can also be brought to the market faster because another party possesses the required knowledge and experience. In the example of the TomTom HD Traffic which I referred to earlier, the contribution by Vodafone enabled a good product to be put onto the market sooner than if TomTom had had to gather the data about real-time traveling speeds by itself.

In the generation of breakthrough innovations through open innovation, it is important that each of the parties can add value, and that they can also get back from the system value that is relevant for themselves. The parties will have to let go of their own core business in the creative stage, and be open to finding the best solution in the perception of the end-user, regardless of their own role in realizing it. This means that the parties must have confidence in their own added value, without rigidity or prejudice about their own implementation of the solution. The process starts with 'giving' in the form of time and creativity, while opportunities for 'taking' in the form of attractive business propositions for the relevant parties will only emerge at a later stage. It may turn out that attractive business propositions are not available for all parties. So it is also important that there is an open and dynamic form of collaboration during the creation of the network. Parties that in the first instance believe they may gain a good position must be able to withdraw at a later stage if the returns for them turn out to be insufficient. Conversely, parties that in the first instance were not involved in the discussion must be able to join in later because they can make a relevant contribution to the solution. Current forms of collaboration often do not make enough allowance for these dynamics. As a result, existing networks are often too rigid, which means the available opportunities are not fully exploited and the outcome is often a suboptimal solution. Flexible networks are necessary for successful implementation of social innovations.

Today's (internal) product design processes are in many cases defined for closed systems. Many companies have made open innovation a part of their strategy, but in fact the actual level of openness is rather limited. For example a research department that is also authorized to sell its findings to third parties if the company does not wish to use them itself, or a business that sources technologies not only from its own research department but also externally. However concepts

that fall outside the direct scope of the present business, or which require a new business model, are in many cases not regarded as serious options. Really open, end-user-driven innovation also means that the existing scope of a business must be open to question in the search for new solutions and opportunities. This applies equally to new business models.

Another difficulty in innovation in flexible networks is the fact that there are no contracts or agreements laying down the rights of all the parties. The reality is that in the future – in the early phase of designing totally new solutions for societal problems – these will not exist either. This means that the participants will have to be able to trust each other completely. In many cases this will be based on intuition, because there will not be enough time or any other way to find out quickly what the parties really have to offer each other. Authenticity is therefore essential: all parties will have to put their cards on the table, and have no hidden agendas. Fortunately there are turning out to be more and more opportunities for partnerships of this kind. The new generation are used to taking part in online communities and know that if you do not behave authentically, and do not observe the often unwritten rules, or if you only want to ‘take’ without ‘giving’ anything, you will be excluded by the community. In other words, the system is self-cleansing.

From business model to value model

An important aspect of innovation in networks is the design of the business model. In fact the business model combines three elements [5], see also figure 3:

- The offer to customers: products and services, including the forms of relationship with these customers and the distribution channels;
- The infrastructure required to deliver the offer: activities and resources, including a network of partners;
- The financing: the balance between the cost structure and the revenues.

Business models for socially relevant innovations need to be more broadly defined. There are a number of interested parties on the playing field, and value means more than cash flows alone: it can also take other forms, such as time, knowledge and/or reputation. As well as that, models can be formed in reverse: the point of departure is not the company’s present competences and customers (inside-out), but the societal challenge and the resulting end-user needs (outside-in). This means that designing business models has to be brought up to the level of designing value models. It also means that a new language is required. The standard terminology used in business models is too limited.

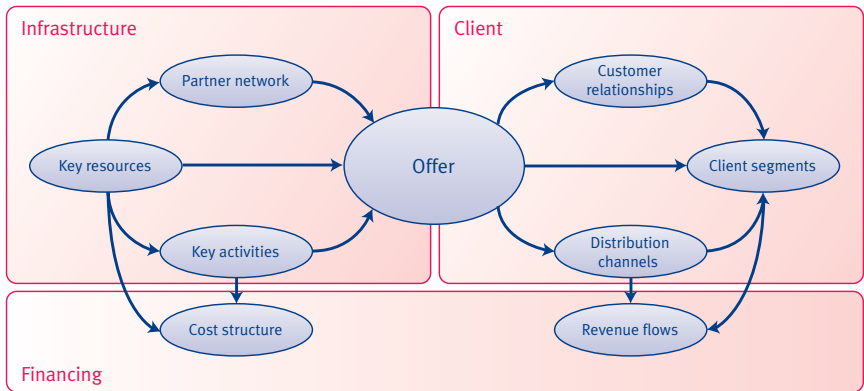


figure 3

Representation of a business model (Oosterwalder, 2004)

We have made a first approach to the design of value models and the corresponding language in the joint projects with the *Design Initiatief*[6], see figure 4. However this model is also still in development. For example the projects show that the linear model is not satisfactory: there is no clear boundary between the stakeholders on the ‘giving’ and ‘taking’ sides. In many cases the end-users are also suppliers: for example in a value proposition for healthy living, the end-users are the suppliers of the information about their eating habits and lifestyles. This information allows physicians to make statistical links between lifestyle and health, and thereby to build up knowledge that can be translated into an improved service to end-users. Intelligent systems will often be based on exchanges of this kind, because they are a fast and simple way of gathering large amounts of data. Future versions of value models will need to take links like this into account.

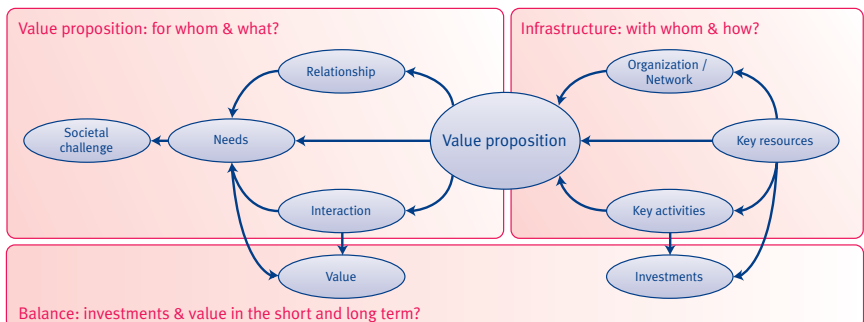


figure 4

Value model as applied in projects with the *Design Initiatief*.

The design of a value model will have to be done in parallel with that of the product solution. Just like the system architecture, this will be general in the early phases, and only indicated in outline, but as the project progresses it will be worked out increasingly at detail level. The value models for socially relevant innovations are relatively complex, because they consider not only classical cash flows, but also other values. Visualization will be an important tool not only to make the complex network transparent, but also to clarify to the various participants what the proposition can mean for them, and to help them decide whether or not to invest in it.

Value creation in practice

One example of value creation in practice is the Intelligent PlayGround. This project was executed in the Creative Conversion Factory – CCF¹. As part of their graduation, two TU/e students had developed a product concept for an intelligent game in which children are active in the real world, instead of just sitting passively at a computer, see figure 5.

CCF coached them and helped them to find a suitable business model and relevant partners. KOREIN (owner of 140 regional day care centers for children) proved to be a valuable partner, contributing knowledge about the learning capacities of young people and making available facilities for carrying out user tests. NYOYN (a regional company specializing in marketing interactive play concepts for children) was also approached, and has since launched the system on the market. The business model includes a licensing agreement with Philips and TU/e, who are joint owners of the intellectual property. The project not only developed the product solution, but also looked at an early stage for organizations that contributed knowledge of the end-users, and for organizations that would market the product. The development of the business model was an integrated part of designing the solution.

New demands on education

As I just said, creating value demands a more holistic view of the design process. The societal problems that we are facing today cannot be solved from any one, specific discipline. Setting up multidisciplinary teams of experts from different

¹ CCF (Creative Conversion Factory) is a collaboration between TU/e, the Design Academy, Philips Research, Philips Design, the Dutch Polymer Institute, the Holst Centre, NH Hoteles and Living Tomorrow, which aims to accelerate and support innovation through partnership in the areas of design and ICT.



figure 5

The Intelligent PlayGround from NYOYN

fields can do no more than provide the sum of all their respective visions [7]. An integrated synthesis will require integration of all the individual disciplines, so that a good solution can be selected both at detail level (for example a specific implementation of a product or service) and at the higher (societal) problem level. Without such an integrated synthesis we find that we are constantly choosing suboptimal solutions, which are destructive for the higher goal: the welfare of people and planet. The new generation of designers will have to be able to translate an understanding of the needs of end-users into creative solutions that offer value equally to the individual users, the organizations involved and society at large. As well as the design of the technical system, in other words the products and services, we will therefore also have to be able to design and visualize the value model. That means we are in fact calling for the ability to link user needs, technology and business understanding into good solutions, in terms of both the product and service on the one hand, and the value model on the other. The Industrial Design Master's program includes all these aspects – design, engineering and science – but some work still has to be done on the curriculum and the coaching of students to be able to produce designers with the required holistic approach at a sufficiently high level.

An interesting aspect in this context is the establishment of Aalto University in Helsinki, by the merging of three Finnish universities: Helsinki School of Economics, the University of Art and Design Helsinki, and Helsinki University of Technology. From January 2010 the university will open up a new world for multidisciplinary education and research. It hopes to break down the barriers between scientific research and art, and to find new and innovative solutions, thereby promoting the welfare of both people and the environment. The university is named after the famous architect and designer Alvar Aalto, and its mission is in line with his philosophy that interaction between different people supports the birth of new ideas, and that opposing viewpoints generate understanding and strength.

It will be interesting to set up a closer partnership with Aalto University, and to learn how they are putting their merger into practice and what its effect is on their education and research.

New research directions

The design of valuable intelligent systems offers ample opportunities for relevant scientific research. As the name suggests, the Business Process Design group of Industrial Design focuses on the business aspects of design. In this work, the result of a successful design project is regarded as an intelligent system that is able to offer lasting value to the relevant parties. This includes financial profit for the companies involved, but also the welfare of people and sustainability aspects for society. The research focuses on solving problems that are rooted in important societal issues, by combining two aspects:

- The design must be based on a sound insight into the needs of the end-user(s), and a profound understanding of what is important to them and what motivates them (the need);
- The design offers a creative, 'out of the box', intelligent solution based on a combination of products and services which together offer added value both for the end-users and for all the other involved parties (the solution).

Designing value, based on a good match between the need and the solution, is regarded as a crucial success factor: for the adoption of innovations, for the success of the business, and for the sustainability of the solution at the societal level.

In the Business Process Design group we see our research challenge as the analysis of current processes, together with the design of new innovation processes for intelligent systems. To do this, two main research lines have been defined:

- Adaptive systems and their users
- Innovation in flexible networks

I will now explain these in more detail.

Adaptive systems and their users

As I said at the beginning of this lecture, intelligent systems adapt to individual users, the context and the situation in which they are used. Users may also themselves adapt to the system.

One example of such a system is mobile phones, in which each individual user can, to a certain extent, make his or her own choices in terms of software applications and hardware options such as Bluetooth headphones and car kits, as well as personal settings. We can expect this adaptability to continue to increase in the future. This will lead to an explosive growth in different uses, usage situations and applications, which means the classical way of working will no longer be adequate. Formerly a specification of the product was drawn up early in the design process, then the design was made and worked out in further detail, all the while testing whether the design still met the specifications. Whole quality systems were based on this principle. The problem of adaptive systems is that such specifications cannot be made. Because the system adapts to the individual users and the usage context, there are far too many possibilities to be able to lay them all down meaningfully in a specification. Writing a comprehensive specification would take many years of work, and even then would have the risk that some scenarios had been missed. Testing all the possible scenarios would also be impossible to do in a reasonable timeframe. This means that the classical design process, with milestones at which products are released for the following phase, has become undermined. Development teams will have to learn to deal with uncertain and incomplete information.

A part of the Business Process Design group, led by my colleague prof. Brombacher, addresses this problem in its research. This work focuses on product development methods that help the designer and system integrator to design and test efficient intelligent systems, including the variety in users, usage situations and contexts. It involves the use of explorative strategies to allow the variations in product-user interactions to be identified and characterized in the early design

stage, when the needs of the end-users are still being investigated. In this approach, product concepts are developed in rapid iterations and presented to the target group of users, while the interaction and reaction are observed both rapidly and in great detail.

A great deal of research is being carried out worldwide into identifying consumer needs. The group's research does not focus on this aspect, but follows the new insights gained by researchers working elsewhere. Our own research is aimed at involving the end-users in the various stages of the development process. This creates an excellent link to the User Centered Engineering group. With concepts like Living Labs, we can work together on methods to find user perspectives and to evaluate and improve complex solutions in the real world. Prototypes also play an important role in this work, not only at product level but also for the whole system. Finding suitable methods to represent whole systems in various phases of the design process will form part of the research, which makes collaboration with the faculty of Industrial Design Engineering at Delft University of Technology, where this work is referred to as 'projectas', an attractive proposition.

Work is also being done on how designers can deal efficiently with the great variety of user scenarios during the development process. This involves the use of test strategies and other methods to ensure that both the technical product quality and the customer satisfaction of the systems launched onto the market are high. In addition, customer feedback on the systems which are already on the market is gathered to gain a better understanding of the real user interactions and usage scenarios. This is then used to make improvements and adjustments in the value propositions of new concepts. As well as developing new methods, there will also be a redesign of the product definition, development and commercial phases of the product development process.

Social innovation in flexible networks

The starting point of this research line is a societal issue for which a breakthrough innovation is required. Such problems (for example the increasing medical costs resulting from the graying population) can in many cases be solved only by looking creatively for an 'out of the box' solution, and a number of stakeholders will be needed to generate and implement a successful solution. The network of companies and organizations that is required to generate the ideas, to translate them into feasible solutions and to put them on the market is often set up on an *ad hoc* basis during the innovation process (and is not necessarily the result of a careful strategic evaluation and the building up of partner relationships). Such a network will probably change over time, particularly for intelligent products, as parties exit and enter it during the development process under the influence of the increasing level of understanding of the products, the users and the market potential. The solutions are based on combinations of ideas that are generated in an open setting, in which the participants openly share information and raw ideas, while a high level of uncertainty still remains about which scenario or proposition will ultimately be selected and what benefits the participants themselves will gain from it. In many cases, breakthrough innovations of this kind also demand new value models which have to be designed at the same time. The value model must ensure that there is an attractive business for the relevant parties, but the parties themselves will have to accept that they may sometimes have to reconsider their traditional business models.

Creativity at a higher level

Creativity is an important aspect in generating solutions for the larger societal challenges. New solutions have to be sought, outside the established boundaries. I am certain that only a part of this will be a rational process, and that many solutions will be found intuitively – quite simply because the complexity is too great to allow the whole process to be approached analytically and rationally.

My colleagues in the Designing Quality in Interaction group are working on interesting research into creativity and interactions. I can see opportunities here to work together further on the creative design process. We will have to seek answers to the question of how people can work together to generate new concepts. This is a dynamic process, which makes studying it a challenge. You can't just look at the outcome and then see how it was generated. Many aspects are involved, and we will have to identify these and how great their influence is. How does the first spark of an idea originate? And when does someone else become enthusiastic about it, and start thinking about it constructively?

The design of value models

Extending the design of business models to value models will form the core of the research. This will include the way in which different parties can innovate together in an open innovation context, and which values are relevant for the respective parties (including the end-user). We will also look at how the various perspectives can be captured in a single, simplified model of reality, so that its attractiveness for the various parties can be evaluated and possible investments can be considered. My vision is that after a few years we will have built up sufficient understanding of the essence of the value models to allow us to show exactly the relevant information in a simplified form of presentation. By which I hope that we will be able to make a visualization which is just as strong as that of the London Tube Map. This was first designed in 1931 by Harry Beck and is still used around the world today, because this visualization method from the perspective of the end-user conveys exactly the essential information. There is still a major challenge in visualizing the dynamics of the value models, and here too collaboration with the Designing Quality in Interaction group is attractive because they aim to visualize comparable dynamics in the interaction between intelligent systems and their users.

A significant part of the research into the design of value models will also be carried out in collaboration with the Industrial Engineering & Innovation Sciences (IE&IS) department. Their contribution will focus on the business-related aspects, as well as the more strategic considerations of collaboration between organizations, which forms a good complement to our design-related research.

This explanation of the research areas which I would like to develop further in the coming years together with my colleagues in the BPD group, the ID and IE&IS departments and a network of companies and institutes marks the end of my inaugural lecture. I hope that I have been able to shed some light on the challenges that designing (added) value brings with it. As well as the challenges relating to the subject itself, there are also challenges in multidisciplinary collaboration, in advancing to the level of value creation, and in the new language that we will have to find for this purpose. Achieving our ambition will still take years, but fortunately we can work step-by-step and the first results are within reach.

Word of thanks

I would like to conclude my lecture by thanking the people who have helped to make it possible for me to hold my inaugural lecture here today, as visiting professor in the Industrial Design department of TU/e.

First I would like to thank the Executive Board and the Industrial Design department board for establishing this chair and for the trust they have placed in me.

I would like especially to thank prof. Aarnout Brombacher. Aarnout, it is now more than ten years ago that our collaboration started with the heroic victory over a tropical hairy spider of mythical proportions in my living room in Singapore. Since then we have worked together on a range of other matters. Your enthusiasm and drive are highly infectious, and it is thanks to you that I am standing here today. I would also like to thank prof. Jeu Schouten. Thanks to you my links with Industrial Design started right from the establishment of the ID department in Eindhoven. I am extremely grateful to you for the efforts you made for my chair and appointment, and I am proud to be able to work on building 'something beautiful', as you yourself call it.

My colleagues at Philips still give me the inspiration every day to think that bit more deeply and to continue working to create the things I believe in. My direct managers have always encouraged me to aim for high goals, but at the same time to be true to myself and to make full use of my strengths. I am especially grateful to Ruud van Vessem and Iason Onassis for the fact that next to my work at Philips I have the freedom to devote two days a week to my work as professor.

Collaboration with others in this field produces tremendous insights. I know I am doing many other people an injustice by only naming Fred Langerak, Emile Aarts, Jan Buijs and Daan van Eijk. Discussions with all of you have given me a great deal of insight, and have also made me aware of the attractive side of scientific research. I would like specifically to thank Rianne Valkenburg: thanks to my collaboration with you we are making a lot of progress in understanding value models and how we can work with them in concrete terms. I hope to be able to do

a lot more work with you in the coming years. I would also like to mention my colleagues in the Business Process Design group. The relocation of our group from the Business Process Design Group in the IE&IS department to the Industrial Design department has been a huge challenge for you all, and one that you have tackled with a lot of passion. In only a short period of time you have set up a completely new educational program and defined new research directions. ID is a young department which possesses a tremendous element of self-reflection and a great adaptive capability, and it is great to be able to work together with all these people!

My parents deserve a special word of thanks. Pap, you have always encouraged me to aim higher than what I think I can achieve. Of course I've often protested strongly, but thanks to your confidence in me I have been able to achieve things that I would not have expected by myself. Mam, you helped me to understand the value of making my own decisions and independence. That provides me with a great deal of energy and it has brought me a lot, both in my private life and professionally. Dear sister, even though you're a few years younger, in many ways you are wiser than I am, and I greatly appreciate being able to drop by at any time; regardless of whether I have some good news to tell you or if I'm struggling with some problems. I also hope that there will be many more occasions on which I can call on your skills as a graphic designer.

Pauline, something extra always comes up through talking to you, and every time that shows the value of different perspectives. I appreciate the fact that you're always prepared to think things through with me!

Dear Allard, 20 December 2008 is a date that we will never forget. You have shown me the value of true love. I greatly appreciate your tremendous support for my work, and that you find it so natural to give me space and encouragement. I hope that we will continue to be happy together for a long time to come.

And finally, I would like to thank all of you for your support in the past, for the great things we have done together, for being here today and for your attention, and I am looking forward to creating more (added) value together in the future.

Ik heb gezegd.

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Curriculum Vitae

Prof.dr.ir. Elke den Ouden was appointed on 1 August 2008 as part-time professor of Industrial Aspects of the Design of Intelligent Systems, Products and Services in the Industrial Design department of Eindhoven University of Technology (TU/e).

Elke den Ouden (1967) studied industrial design at Delft University of Technology, where she graduated *cum laude* in 1990. She subsequently joined Philips, where she has held a number of positions as advisor and manager in the field of product innovation. From 1997 she spent four years in Singapore where she set up an advisory group for the Asia Pacific region. During this period she worked closely together with the Design Technology Institute, a partnership between the National University of Singapore and TU/e. On her return to the Netherlands she became manager of the product innovation group at Philips Applied Technologies, and was appointed part-time senior researcher in the TU/e Technology Management department (now Industrial Engineering & Innovation Sciences), where she gained her doctorate in 2006. She is currently senior consultant for innovation at Philips Applied Technologies, and she advises companies both inside and outside Philips on innovation and product development. Due partly to her experience and network in the industry, she has been appointed part-time professor in the Business Process Design group of the Industrial Design department.

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