Predicting or Inventing the Future?

Common Grounds in Architecture and Strategic Marketing

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In this paper we discuss the parallels between architectural design and strategic marketing in industry to advance the theme of predicting the future in architecture. Just like companies face the challenge to organize their R&D activities, architects develop different strategies for their designs. Looking at the architectural design process as well as at strategic planning done in companies we recognize that they have much in common. To advance the theme of predicting the future in architecture we draw parallels to strategic marketing in industry. Both activities require a clear vision regarding customer requirements, available technologies, and areas of operation and emerging markets. We report on a successfully implemented method Pictures of the Future at Siemens and relate it to architecture and show possibilities to expand the role of architectural design in the future. We opine that it is now time to expand the architectural curriculum towards Knowledge Architecture.

Keywords: Information architecture; knowledge architecture; strategic planning and marketing.

Introduction

This year’s eCAADe’s conference theme is Predicting the Future. In former times, Pythia, presiding over the Oracle of Delphi, or later Nostradamus, formulated their prophecies cryptic and vaguely so that all kinds of interpretations were possible. Today, these obscure omens are not useful for reliable forecasts for clearly structured paths to the needs of tomorrow. Even enterprises which are marked leaders in their business area are systematically looking for novel approaches to ensure their market position as well as their economic growth and their profitability. Competitive costs and economies of scale are no longer sufficient enough to meet the more and more rapidly changing product requirements and performances. In highly developed countries 50 percent of the economic growth takes place by technology and innovation. For that reason companies are facing the challenge to transform new ideas into marketable products and services rapidly. Therefore, technology and innovation management is becoming a central role in leading companies. As a result these companies are able to develop concepts that help them to develop innovative marketable products out of their ideas.
Architecture is a long-term venture and has a long development time. Within the design the architect develops different strategies. She considers different solutions and deliberates how to create the final solution. In doing so she is not only interested in the methods themselves but rather in how to apply these technologies to realize her ideas. She combines different and the latest technological developments and explores them with the goal to realize novel designs. The main focus of the architects’ profession has changed over the years. In former times, the architect saw herself as an autonomous designer who promotes through her works. Today, the architect is not only designer but also a communicating and promoting building manager. The central focus is no longer the theoretical design. Instead the realization has gained in importance. The architect brings together questions of aesthetics, technology and economics. Dealing with project planning, building management, economics, technology, new media, etc the architect is more and more turning into a service provider. More over, by the nature of the architectural discipline which bridges basic science and engineering, many architects have the ability to merge rational and quantifiable parameters as well as more intermediate and uncertain variables. For proper building design and execution architects take knowledge of other disciplines into account, have close cooperation with a diversity of specialists, and need a high degree of organizational competence.

To become a trendsetter in as much as possible business fields a company has to have a systematical procedure to identify technologies with a high incremental potential, to recognize technological breakthroughs, and to detect future customer needs and new business possibilities. Therefore, creative people who have the ability to understand, to combine knowledge and experience from different areas so that novel ideas or problem solving approaches emerge. Creative thinking people like architects apply knowingly or unknowingly certain methods to gain new ideas. These heuristic principles make it easier to overcome fixed attached thinking patterns. These principles include the association, the abstraction as well as the transfer of methods and elements from areas not directly related to the problem.

**History of futurism**

Already in the 8th century BC the Oracle of Delphi is established. Being consulted before all major undertakings like wars, the founding of colonies and so forth Pythia, the priestess of the oracle, invents the power of prediction, political coaching and social change. Later, in the 1st century AD the church dominates the future. In these times the future is associated with guilt, transcendence, superstition, and redemption. In the following years, predictions are no longer vaguely formulated prophecies. In 1290, the monk and philosopher Roger Bacon predicts steamships, flying machines, and cars which are able to move rapidly without being moved by animals. In the Renaissance, also called the Age of Vision, Leonardo da Vinci who is primarily known as painter creates the future as humanity. Regarding his studies in science and engineering he is also observer and inventor. In his sketches he describes ideas for inventions like his helicopter, machine gun, tank etc. which are years ahead of their time. They never were built and tested during da Vinci’s life. In the Age of Alchemy, Thomas More publishes *Utopia* in 1516. Utopia describes an ideal, imaginary island nation where the population has no private property and where almost complete religious toleration is practiced. On the one hand, this book is seen as a forerunner for the utopian literature which describes the idea of the ideal society and the perfect city. On the other hand, some historians draw parallels to Karl Marx’s later vision of the ideal state. In 1555, Nostradamus brings out the first edition of *Les Propheties* including his cryptic predictions. In the Age of Enlightenment, Thomas Malthus develops his principle of population which indicates that the population will increase excessively. In
Innovation management

In the age of globalization economic growth, economic wealth, and international competitiveness are close connected to technological innovation ability. Therefore, global players like Siemens, Henkel, IBM, Microsoft, Philips, and BMW are facing the challenge how to organize research and development activities. They can not rely on merely forecasting trends. Instead they need a clear vision regarding new technologies, customer requirements, and market trends emerging in the next years to come. First of all, these global corporations have to identify promising ideas and new approaches. Secondly, they need to lay down a course of action which allows them to emerge as a trendsetter. Just as the products of theses corporations vary, there approaches to become a trendsetter in their business field differ (Albers, 2005): Henkel, as a leading company in the chemical industry uses the customer as engine for innovation. In innovation and technology management the automotive industry is often regarded as trendsetter. As well as Henkel BMW includes his customers into the innovation process. The core task of BMW’s innovation management is to provide the customer a product which he wants to have but did not know that he was looking for it and says about it that he always wanted to have it once he got it. This Emphatic Design aims at hidden, latent existing desire of their customers. Whereas the pharmaceutical industry indeed is ranged within a growing and attractive market but their innovation area is low and their research and development cost increase. Merck Kga and Daiichi Medical research use portfolio techniques and focus on the added value which is described via Net Present Value considerations. Siemens as one of the leading electronic corporate developed the method Pictures of the Future. This scenario based technique helps them to identify attractive solutions as well as the requirements needed for realization.

To advance the theme of predicting the future in architecture we draw parallels to strategic marketing
Pictures of the future

In order to find out which technologies will shape our lives in the near future (in 10 to 20 years from now on), Siemens invented a new method for strategic planning: Pictures of the Future, a scenario technique to identify attractive solutions and requirements to their realization (Stuckenschneider, 2004). This method which is applied to develop innovative products and services aims at achieving three goals: (1) increase impact on mainstream businesses (2) identify and prioritize key technologies (3) communicate topics of general interest. This company wide applied model supports the company to choose the very best ways into the future focused and with a high consensus. By designing and creating detailed image based scenarios of tomorrow’s living and working situations, Siemens is able to identify promising technologies and future consumer needs which are in a next step translated into business possibilities.

In this process two opposite perceptions which complement one another are employed: on the one hand, the extrapolation of today’s world and on the other hand, the retropolation of tomorrow’s world. Extrapolation with foresight corresponds to road mapping. Current technologies and products are projected into the future with the aim to anticipate as precisely as possible at what time necessary components become available and when their need will be arise. Despite the advantage of an objective starting point, discontinuity and great leaps forward in the development process can not be forecasted. Therefore, a complementary approach, known as scenario technique is used to improve the judgment of these matters. This retropolation which can be seen also as strategic visioning involves placing oneself 10, 20 or 30 years into the future depending on which area of activity is under investigation. Once the time frame is chosen a comprehensive scenario is designed. This scenario considers preferably all relevant influencing factors like the future development of social and political structures, environmental impact, sustainability and globalization as well as technological trends and customer needs. Backtrack these future scenarios to the present makes it possible to identify challenges and tasks which today need to be overcome in order to realize the scenarios in the world of tomorrow.

Figure 1
Bringing these two approaches – extrapolation and retropolation – together allows Siemens to draw consistent pictures of the future for different business areas. These Pictures of the Future do not merely show visions of the future they also greatly provide the basis to depict a systematic, ongoing process, to detect discontinuities, to quantify future markets, to anticipate forthcoming customer needs, and to identify new technologies with large growth potential and mass appeal. Out of these new insights for future core business shifts and new business opportunities arise as well as a unified vision of the technological future for Siemens. Therefore, using Pictures of the Future consensus oriented future scenarios are devised. Furthermore, technologies which have been identified as forward-looking are recommended to build-up know-how and competence.

Siemens takes the term literally: for every business area the over-all and the partial scenarios are depicted using detailed illustrations (see figure 1). These image-based illustrations focus on the fundamental aspects and allow for individually interpretations. They can be discussed and reviewed from different positions. Therefore, they serve as excellent communication tool and provide the basis for discussions between different interlocutors (see figure 2).

Bringing together the methodical principles from innovation strategies and technology life time cycles, and the assumptions based on the method Picture of the Future with regard to the content enables to describe themes precisely, to discuss them in detail and to gain a first estimation regarding their attractiveness. As a result, already in early phases funds are applied focused and directed on goals like trendsetting and product leadership.

From architectural design to knowledge architecture

Normally, technologies like computing and digital tools in architecture are used for being productive, for increasing efficiency in design and construction, for solving problems, and for affording temporal, economic and manufacturing efficiencies. The advent of CAAD influenced architectonic representations which are getting more and more realistic, precise and detailed. Virtual Reality in architecture leaded to the simulation and presentation of physical architecture as well as non-physical artifacts. The obvious next step after CAAD to continue the digital chain is to extract information and put it into knowledge. This leads from the emerging field of Information Architecture which is for example taught at the ETH Zurich by Professor Gerhard Schmitt (http://ia.arch.ethz.ch) to Knowledge Architecture and Design Science. Information Architecture is among others concerned with visualizing information systems in architecture, science, and business as well as communicating complex contents by using visualization techniques (Schmitt, 1999). This area is twofold: On the one hand it integrates available simulation methods for light, energy, structure, behavior or systems knowledge into direct modeling in order to design sustainable architecture. On the other hand Information Architecture helps to bridge the gap between natural sciences and life sciences. In doing so design methods and principles have to be imported and exported between different disciplines. This allows formalizing interdisciplinary accepted design principles which can be applied to science and business. These challenges are investigated at the
Competence Center for Digital Design & Modeling at ETH Zurich (http://ddm.ethz.ch). The central goal is to understand the principles of design and modeling across disciplines and investigate novel principles of design (Lang, 2006).

The change from the information society to the knowledge society involves an immense increase in value and relevance of the resource/material knowledge. Knowledge Architecture aims at organizing knowledge rich environments through strategic planning and the integration of knowledge. The challenge is to investigate, to understand, and to harness the principles of the emergence and diffusion of knowledge. Architects face the task not only designing spaces and buildings but also designing process. The methods to choose are communication and visualization. This task requires working in highly transdisciplinary teams. Design decisions are made through the social system. Architecture as one of the effective descriptions for complex structures and form of organizations lends itself to be applied to knowledge, communication, and information systems. Thereby it is also crucial to have business economist in the team. It is time to bring the architectural knowledge about how to structure buildings on a small scale and cities on a large scale into other disciplines and apply them for example to structure data or find new interaction methods.

**Predicting or inventing?**

“It’s very difficult to predict – especially about the future.” Nils Bohr

Both R&D in companies and architecture are not an end in itself. They have to be goal oriented in order to strengthen their business. Feasibility, economic attractiveness and fit into the company’s portfolio are crucial criteria. In order to achieve these emerging technologies and their potentials are evaluated as well as existing technologies and their novel fields of applications. At the university level, for example at ETH Zurich, the strategic planning process is already done with the support of selected design and communication processes from architecture (see figure 3 and figure 4). They are especially applied in the fields of collaborative strategy design, strategy visualization for structuring and communicating contents, visualizations for the assessment of relevant contents by experts from different backgrounds, images, and visual metaphors for the illustration of strategic projects (Schmitt, 2006).
By identifying new ideas and approaches at an early stage we are defining and identifying the future. Is not what we really want inventing the future instead of merely trying to predict it? In strategic marketing this is called strategic visioning and used as a powerful instrument for optimizing R&D strategies in industry. But in fact, this is exactly what architects always have been doing in their profession. The architect by his nature thinks out of the box, is often skeptical of traditional methods and defies rules and established paradigms. His ideals are competence, teamwork, and a problem-solving perspective based on aesthetics. Solving their design tasks they figure out how to do things differently from traditional approaches. All these characteristics are the human catalysts that make ideas burn bright.

Considering that the nature of the profession of an architect is more communicative and consulting than other professions and taking into account that the architect is a creative process oriented designer, the architect is in fact an inventor. The inventor creates and discovers new methods, means or devices for performing task and is characterized as an avowed entrepreneur who is the best salesman of her own ideas. Apparently, although only two-third of the population are able to read plans anyone seems to understand architecture slightly and be able to interpret atmospheric images. Using complementary forms of visualization architects present their ideas and intentions and in doing so spark dreams, wishes, emotions, and describe the future. Therefore, it suggests itself to use architecture as metaphor to turn complex coherences into something explainable and understandable. Architects are on the one hand shaping the future through their visualizations since the visual power prepares the decision. On the other hand visualization supports to obtain a common understanding regarding difficult and complex subjects of matter.

Hence what we really want is not predicting the future, we want to make a contribution in inventing the future and shape the way we live.

**Summary and conclusions**

In the last years innovation and technology management emerged as a strong own discipline. Today this interdisciplinary discipline is an established, independent area in general management. This discipline is not only positioned within business economies but also within engineering, natural sciences, psychology and social sciences. In the future innovation and technology management will experience further specializations. Global players are increasingly looking for executive employees who understand the increasing complex world of technology. The management of technology and innovation is gaining in importance in many industries based on technology. It is not enough to just understand the technologies but also their exposure and the evaluation of premature technologies regarding their future potentials are gaining in importance. Therefore, not only design and visualization principles from architecture can be applied to strategic planning, also the architect can expand her role not only in academia but also as a valuable consultant for strategic planning, especially in trendsetter companies such as IBM, Intel, Microsoft, Siemens, and BMW. For this reason we claim that it is time to expand the architectural curriculum and education towards Knowledge Architecture and Design Science. Architecture is more than a discipline limited to building tasks. In fact, architectural design is a particular way to solve problems, a self-containing technique to perform knowledge. The benefit using architectural metaphors as an effective way of thinking and procedural method for better structuring understanding and communicating information is more impact, both in teaching, research, and business.

To exploit the power of transdisciplinary work we have to find visualization and communication forms which work across disciplines and allow transferring facts, insights, experiences, attitudes, values, expectations, perspectives, opinions, and predictions. A common language of universal transparency between the disciplines is required. In successful
transdisciplinary research we can not recourse to disciplinary jargon. To present expert concepts and assertions more simple and understandable, which are approved by both experts and laymen is a crucial task which should not be underestimated. The evolving field of knowledge and information visualization (Burkhard, 2004) and their methods support to bridge the communication gap between different disciplines. Being able to work in multidisciplinary teams is not only important for those students who are aspiring an academic career but also for those going to industry.

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