Scenarios - A tool for starting a research process

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ABSTRACT

Scenarios can be used as a tool for starting a research process within a group. When putting together a research group of people with different backgrounds, different competencies and different preconceived ideas, special attention has to be put on the problem of integration. Many different "tools" can be used to help merging the different approaches of the individuals constituting the group. One such tool is scenario work. Trends are created by analyzing and structuring the environment around the project. Combining and extrapolating the trends gives a basis for creating the scenarios. The scenarios are then used to help refining research issues. Both the process and the result are hence of importance. The process aims at revealing the different approaches and possible conflicts due to the different scientific and research traditions among the members of the group. The result forms a basis for refining and limit the research question.

The work within the 4th Generation Wireless Infrastructure project group of the PCC-project aims at finding important design issues for the infrastructure of a future wireless communication system. Using the scenarios as a starting point the research questions originally put, have been successfully challenged and refined.

INTRODUCTION

Every year huge amounts of money is spent on strategic research in many different fields all over the world. Seldom the question on what makes a research project strategic arises. Strategic for the country? Strategic for a company? Strategic for an existing research community? Strategic for an individual scientist? The question on what is meant by "strategic" and for whom needs a thorough treatment. Still, defining key research issues for a large project is difficult without a strategic perspective.

How could one form a strategic perspective? There exists many tools for helping management in companies and other organizations to create an understanding of the strategic perspective. In all research and development there exists assumptions about the future. This is envisioned in assumptions about the situation where the future product or system will be in use. Many of these assumptions are inherent and not outspoken since they are natural parts of the field of research in question.

There are many ways of handling the problem of assumptions about the future. A large variety of tools have been developed. There is a dividing line between statistical methods and investigating methods. One basic assumption in the statistical methods is that it is possible to find something quantifiable to measure i.e. GNP, Number of buyers on a market or number of cars or similar measures. By measuring and extrapolate one can project a development and hereby interpret the result into strategic considerations in the present. Methods of this kind are: Delphi, Mathematical models of economic development, trend extrapolation etc.

A different approach is also in use. Instead of finding a single or perhaps a few variables to use as indicators of something else, more effort is put into investigating, analyzing and understanding the context of a situation. Extrapolation of trends made visible through the understanding of the situation is crucial.

One of the most wide-spread methods of this latter character is scenario development. There are many different kinds of scenarios but the kind originally developed by Peter Schwartz and his team at Royal Dutch Shell during the seventies is probably the most used. Today the same people are working in Global

Business Network, GBN, which is a "Think-tank" and consulting firm working with scenarios. [1,2,3]

Many different companies and organizations are using scenarios today for many purposes. One example is Ericsson which involve most of its middle and top management to develop scenarios both as a common basis for discussions on where Ericsson is today and where to position for tomorrow. In their first round during 1996, over 500 people where interviewed, both internally and externally. The work resulted in three scenarios partly presented in the annular report. [4]

Another example is Siemens-Nixdorf which have a special scenario unit that produces scenarios that shall "challenge executive management's view of conventional business strategy development and implementation, identify long-term social, business, economic & technological trends and discontinuities…" [5]

Yet another example is the project "Teknisk framsyn" (Technological foresight) by the Swedish academy for engineering science (IVA) and the Swedish national board for industrial and technical development , (NUTEK). "The purpose is to assist public agencies, institutions of higher learning and business organizations to formulate appropriate decisions." The project started in late 1997 and will be finished during 1999. [6]
The PCC Vision: "Mobile multimedia services to all at the same price level as fixed telephony today." which is interpreted for the 4th Generation wireless project as: "…studying key problems in the architecture and deployment of future wireless access infrastructures required …."

Within the 4th GW the aim is to identify key research issues for the PCC-project. This aim resembles the aim of the "Teknisk Framsyn" of IVA-NUTEK but on a technological level. The scenarios of Ericsson give interesting input since they are focusing on the same object, telecommunication. Apart from that, Ericsson is a company and thus have a different perspective to start with than the 4th GW group. Therefore it is necessary to develop scenarios that better fill the needs of the project. Defining key research issues using a strategic perspective with the help of scenarios will improve the whole of the research within the PCC-project.

METHOD

The project process model is illustrated in the fig 1. The project work is focused around the working assumptions (WA:s) that provide the common platform for interrelating, comparing and selecting research problems in the different WP:s. The task of the WP is to derive and analyze key (bottleneck) problems in the current set of WA:s. The focus is on studying the feasibility of solving these problems as well as determining

performance limits set due to these bottleneck problems. The result will be used to modify the WA:s by changing the trade-offs between various bottleneck areas. The WA have to be consistent with a set of background
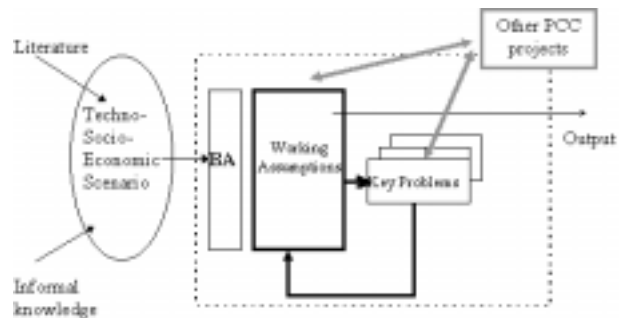
Figur 1. The working process of the 4th GW project.

assumptions (BA:s) describing relevant parts of a techno-/socio-/economical scenario for telecommunications in the time period 2010-2020.

Scenario process

Initially the surroundings to the project is under study. The participants all have exams in electro- or computer engineering from different universities in Europe. The different backgrounds and languages serve as a broad basis for different perspectives on the matter.

The surroundings of the project is interpreted as current trends and evolvements in the telecom business, business in general and at a more political level.

Brainstorm

To initiate the discussion a brainstorming session is performed. During the session each participant is encouraged to think freely on the matter and write down observations, statements or questions on a small yellow Post-it note. Every string of text on these notes represented an area of thought that is of interest. If the text is a question, the combined question -answer is interesting. If it is a statement, the questions and reasons for the statement is of interest. Thereby everything represented a fragment of an interesting area that can be further examined.

During the session one rule is forced. It is forbidden to put forward any form of critique of the others notes. It is even forbidden to place critique on one's own notes. The idea is to, as free as possible, generate interesting thoughts that can be further examined.

Approximately 90 little yellow notes in 8 areas (Business and industry, Infrastructure, Market issues, Politics, Regulation, Social life, Technology and Usage) is the result. The 8 areas evolves by collecting and

clustering the notes trying to find reasons behind the facts or questions scribbled on the notes.

Formulate fragments

The different areas that appears to be interesting are further examined and eventually developments in these areas can be seen. These developments later form the basis for the trends that are created to comprehend the development.

To cover more aspects that seem important, but not present in the brainstorming, some additional research is performed. These areas are: Who might the actors be in telecom and related areas in 2010?, What will peoples life be like in 2010? And neighboring technologies that might affect our area of interest.

Trends

Bringing the fragments and the ideas from the additional research together, trends behind the development form. Many fundamental trends together change the society. The core directions of development in different areas may be visible only via the influence on more visible developments. However these underlying trends must be identified to understand the development.

Rather than providing an exact definition for the trends, a more pragmatic approach is used.. Start with an observable change and ask "Why?" repeatedly. Where to stop asking "why?" is also a pragmatic matter to be decided by common sense.

For example:
1. Brandnames will be more important! More precisely: The brand name of the content, e.g. CNN, Bonniers
2. Why? It is necessary to identify the sender of the information.
3. Why? The brand name will provide a guarantee of a certain quality.
4. Why? There will be many senders of information. It is necessary to quickly identify the information that is correct, and has relevance for the receiver.
5. Basic trend: The amount of information available will increase dramatically.

Fragments into larger parts.

Combining trends into Megatrends is the final step of abstraction. These are the clear and roughly understandable output that can describe possible futures. The Megatrends work as basic parts in creating the scenarios. By changing the importance of the developments within the different Megatrends several different scenarios appear.

An exact definition of a megatrend is difficult to give. Identifying megatrends is therefore an interactive process. Some megatrends are already observable today. Uncovering and analyzing them is the basis for identifying new megatrends. Identifying such new megatrends early on or even prior to their emergence is of course of greatest value.

The megatrends serve several purposes. First, by relating megatrends to observable changes, they help to gauge the relevance of them. Second, they can be used more readily in communicating our work Each Megatrend will be described using a number of attributes as What is the megatrend, why is it a megatrend, what enables the megatrend etc. The idea to structure the attributes came from the FutureScape. [5]

- What? A short description of the Megatrend.
- Why? Reasons for changes or movement in the Megatrend.
- Enablers? Factors which strengthen this Megatrend
- Inhibitors? Factors which weaken this Megatrend.
- Paradigms? Changes in ways of thinking about the world due to the Megatrend.
- Predictability? Degree to which development can be foreseen for this Megatrend.
- Influence? Ways for companies to affect the Megatrend.
- Experts? Sources for additional information about this Megatrend.
- Timing? Dates for key milestones in the development of the Megatrend.

These are the clear and roughly understandable output that can describe possible futures. *The final Megatrends identified are:*

- *Globalization of products, services and companies*
- *Communicating appliances*
- *Services become more independent of infrastructure*
- *Information trading (Information overflow)*
- *Education increasingly important*
- *Standards, Licensing and post-harmonization*

Synthesize and create scenarios.

The different Megatrends are ranked according to importance and uncertainty relative to the 4th GW project. This is a rather difficult matter since some of the megatrends seem to be both more important and more certain because of their nature. The trends that are more certain becomes the skeleton of all the scenarios while the ones more uncertain are used to create the variety of the scenarios. The uncertain megatrends can be said to serve as axis to span a space of possible futures with the same basis.

One example is the combination of a strong "Communicating appliances" and weak "Standardization" gives input to the "Anything goes" scenario.

Many possible outcomes are defined and some of the more interesting points in this space are chosen to be the Scenarios and the final outcome of the analysis.

To go from the Megatrend into a scenario, more "life" have to be added to the megatrend. This is done by extrapolating the megatrend and presenting the results in the form of newspaper headlines explaining important steps in the development. Some of the headlines for the megatrend "Communicating appliances" are shown below:

- 1999 Microsoft releases "windows for appliances".
- 2001 Sony, Matsushita and Phillips defines standard for inter-appliance communication over the power lines. (Standard mainly intended for home audio-video equipment).
- 2001 50 MHz released for unlicensed wireless LAN operation.
- 2002 More than 50% of the VCRs sold in Sweden are configurable via a web interface.
- 2004 95% of computers sold have built-in Wireless LAN connection.
- 2007 A Vattenfall study shows substantial savings in power consumption in houses with smart appliances boosting sales.
- 2010 Largest white goods manufacturer drops production of all non-web-enabled products.

After that several different lines of thoughts presented in the headlines are collected and discussed, three different scenarios are decided upon. They are given the names "Anything goes", "Integrity-Big brother protects you from little brother" and "Pocket computing". [7,9]

The scenarios are written in three different parts each. The three perspectives are: A general description of the society in the scenario, a scene from inside the telecom business and a day in a normal persons life. This gives a threefold perspective on each scenario. [7,9]

Interpret the scenarios in the light of the needs of the project.

Each student has to challenge his workpackage against the scenarios to see what changes that might be the result. This part is not finished yet. Probably it never will be finished. Both the scenarios and the workpackages will be subject to change for a long time. Hopefully the scenarios can be revised and enhanced so that they can fill the role of giving a challenge to the established assumptions.

ANALYSIS OF THE PROCESS

Before analyzing the process the fact that there are many processes involved has to be considered. Three important processes are, the knowledge forming process, the practical process of creating the scenarios and the overall PCC-project process.

The knowledge forming process

A perspective is a metaphor for all the preconceived ideas, thoughts and understanding that comes with an education. Clarifying and changing the perspectives one normally applies to a problem is often beneficial to when formulating and defining the problem. [8] To be able to clarify the perspective one has to adapt another perspective and then compare and see the differences. Scenarios, and the process behind, are of a different perspective than most people normally would consider. Therefore it is a support when changing perspectives.

The practical process

An afterthought on the more practical details of the work give some ideas on how to perform such work in a better manner.

A more closely related project team should be able to make the scenarios much faster. Almost a year has been spent on the work until today. On the other hand, when the project started the team was just newly recruited and the scenario process hence became a way of developing a more closely related team.

Instead of spending almost a year with meetings on average every second week, a shorter but more intense working period can be fruitful. However, the long time used have given time for reflection along the way which might not have been the case if the more concentrated form had been used.

A third practical detail relates to the fact that two of the participants are located far away from the rest. To enable participation in meetings a phone conference equipment is used. Participating over the phone is not the same as real participation. It is best used for shorter meetings. Long discussions are difficult to follow over the phone since it is difficult to hear who says what. Another problem is when participants in the room starts using whiteboard or pictures to describe. This can be solved by using internet video equipment.

The PCC-project process

The scenarios gives new input and ideas that can be measured against the basic assumptions of the PCC-project. Such comparison is necessary to update and develop the project on a higher level, for instance initiate new projects or research areas.

On a lower level the scenarios might lead to slight adaptations and justifications of the individual work

packages. The process of evaluating and changing the workpackages is not finished yet.

There might also be use for the scenarios within other parts of PCC. Examples of usage can be to discuss consequences of the scenarios for the projects and workpackages, enhancements and additional scenarios, questioning the chosen perspective within a project, etc.

CONCLUSIONS

Taking a deep breath and diving into the future and all the work done to get there of course leaves an impact on the people participating. The immediate consequence is the challenging of the research issues of the workpackages within the 4th GW. Eventually the scenarios will be used for similar purposes within the other research groups of PCC. Even challenging the overall goal of "Mobile multimedia to everyone at the same price as fixed telephony today." And thereby refining the key research issues of the whole of PCC.

Engineers performing technical research and development within industry or university have to consider factors far outside of the main interest of their research. Different technical solutions must always be adapted to their context. Scenarios and similar tools designed for improving the understanding of the context have a place within the PCC-project and probably within similar research initiatives.

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