

An Evaluation of Scenario Planning for Supply Chain design  
Executive Summary  
by

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When trying to envision what the future might look like, different methods of forecasting are often used. However, there is a growing consensus that discontinuity and abrupt change are inherent to the very nature of the future and should be incorporated into futurist studies. One such study is the MIT Center for Transportation and Logistics' Future of Supply Chain 2020 (SC2020). This paper reviews the future-studies method of Scenario Planning and evaluates its applicability to the SC2020 project. This paper describes and evaluates an approach to generating possible future scenarios.

The impetus for this work was my engagement in a new and exciting project at the MIT Center for Transportation and Logistics, which aims to look at the way leading supply chains might look in the year 2020. As scenarios are a major part of this project, how they are to be generated is a subject worth looking at. In addition, there are several publicly available scenarios, which were written by outside parties. However, these scenarios were not created with supply chain management issues in mind. This requires that we think specifically about the application of scenario planning within SCM context.

According to the Global Business Networks consulting firm, scenarios can be compared to stories. Stories are in a sense an old way of organizing knowledge. Scenarios resemble a set of such stories, written or spoken, built around carefully constructed plots. Stories can express multiple perspectives on complex events; scenarios give meaning to these events. Scenario planning is the art of storytelling applied to the future instead of the past or present. Although scenario planning involves extensive and thorough research which enables the generated scenarios to be coherent and plausible; scenarios are not predictions about the future. Scenarios present alternative images instead of extrapolation of trends from the present. The result of scenario planning is not a more accurate picture of tomorrow but better thinking and an ongoing strategic conversation about the future. While predictions are designed to try and tell us what the future will look like, scenarios are designed to tell us something about the true nature of the environment in which we are operating, through stories of different possible futures.

The scenario method is based on the understanding that the future is unpredictable. This unpredictability is not some by-product of a shortcoming in our forecasting methods. It is rather an inherent part of the nature of the future.

## **History**

Scenario planning in its modern form has been in military use since WWII and is still being extensively used by the military (the US Naval Academy is especially renowned for it). Unlike military scenario planning, scenario planning practices entered the business arena relatively recently. It is widely agreed upon that Royal Dutch/Shell were the ones to introduce and develop scenario planning. Several experimental studies were initiated by different business units at Royal Dutch/Shell during the early 1970's, with the common aim of looking ahead to the year 2000. It was mainly those two studies, as well as other studies that made Royal Dutch/Shell realize they needed to take a new look at the very way they planned. At the time, Pierre Wack was working for Shell France. He put together a team and started working on better understanding the business environment in which Shell was operating, through the use of scenarios. Wack produced the 1970 scenarios, which predicted the 1973 oil crisis, albeit without putting a definite

date on it. His predictive success has however driven scenario planning into the Royal Dutch/Shell planning methods mainstream, which was manifested by the creation of the Royal Dutch/Shell Scenario planning unit, later named Global Business Environments unit (GBE). Nowadays, scenarios are used by many companies, organizations, governments and individuals for strategic planning purposes.

Scenarios were and are being developed by many groups around the world, from futurist societies, to academia and business. Most of the scenarios are available on the World Wide Web. Some of these scenarios are worth looking into, and perhaps even being used as a baseline for the SC2020 project scenario generation effort. Other insights into scenario planning as well as into other futuristic disciplines can be gleaned through academic institutions which have future studies programs.

### **How-to Guide**

Scenario planning in its modern form is a well structured process. Scenarios should be internally consistent and rooted in reality. **Research** into the past helps us in avoiding inaccuracies in our assumptions, as well as errors in describing events which have already happened. New technologies and new ways of thought, as well as new scientific paradigms are often found on the edges of the main accepted body of scientific activity, if not outside of it altogether. Therefore a broad-view discussion about where to look for such thinkers should take place at the initial stages of the scenario planning project. Sometimes there might be a need to consider relevant trends and data which is outside what we are trying to describe. For example, when looking at a new emerging technology such as RFID (Radio Frequency Identification), political and sociological issues stemming from privacy issues should be considered as well, as these might cause a shift in consumer behavior.

By bringing into the scenario generation process **people from the outside**, we can better understand our own assumptions and better locate our blind spots. The next step is usually facilitating some sort of **strategic discussion**, which is aimed at **defining the questions** in which we are interested.

To reduce complexity, it is useful to **cluster the information** and ideas that come up during research and strategic conversations into smaller groups, with a common thematic denominator, or which relate to each other. During the formation and consideration of these clusters, we should think about the **driving forces** behind them, which are characteristic of the system we are dealing with. These **Driving Forces, Predetermined Elements and Critical Uncertainties** are our Scenario Building Blocks. Although it is recommended to generate only three or four scenarios, it is not necessarily the case with the SC2020 project. For the project, we might choose to look at more variables and just use a “Supply Chain Generating Function” to see which supply chains would fit which scenario, rather than use the scenarios to answer a specific question.

The **plot** is the logic that ties all elements of a scenario together in a coherent fashion. It is essential to consider the audience when constructing the plot of a scenario. There are some archetypes of stories, which are easy to understand and can be used for both best and worst case scenarios. Among these plot types are: Winners and Losers,

Challenge and Response, Evolution, Revolution, Cycles and several others. These kinds of plots rarely work alone. Often they are used to formulate and test the internal consistency or logic of a scenario, and actually interact with each other and merge from one plot into another. In addition, when designing a scenario, we should consider the ways different plots might react to the same forces. Scenario are usually constructed in groups of three scenarios, sometimes four. It is generally agreed that two scenarios is too few, with resulting Utopia/Catastrophe scenarios, while having more than four scenarios is generally too complex for the recipient to handle. The basic scheme for a scenario package is therefore two scenarios which describe two extreme (to a certain degree) cases of some element, with a third scenario which revolves around a totally different axis, as to avoid the obvious Utopia/Catastrophe/Average, with the Average scenario tending to describe the world as we know it today. A short, evocative **name** for the scenario is used to convey the key element of the scenario and it serves as an easy to remember reference.

### **Scenarios and SC2020**

An understanding of Supply Chains and their future can be gained through a disciplined look into the mechanisms behind supply chains and the way these chains interact with the environment in which they are operating. To do that, we first have to look at the present and try to understand the decisions and forces that helped position companies as leaders in their field. We should then try and figure out the policies these companies took in the past, as well as the way they perceived the future, which enabled them to emerge as leaders in the present.

Implementing these insights, we should try and figure out what do companies need to do today to become leaders in the future, or to at least be able to handle that future effectively. Although supply chain design is rooted in companies' drive to optimize whole supply channels, instead of just sub-optimizing parts of them, the way in which they do that is very much dependent on the environment in which these companies operate. Some of these factors change over time in a relatively trend-like fashion, while others tend to have shifting behavior, characterized by discontinuities. Although many of these outside factors can be quantified and turned into constraints that would shape an optimization model, some of them can not. Nevertheless, some those factors deserve to be strategically discussed to determine exactly how they should be quantified and what would be likely values for these factors in the future. Some important phases in the SC2020 scenario process are: looking at previous work, consulting with industry leaders and analyzing current supply chains: evaluating the correlation between the forces which we deem important in shaping supply chains and actual supply chain behavior.

After we have identified the variables affecting supply chain formation, we should try to classify those variables into driving forces, predetermined elements and critical uncertainties. One way of classifying these variables would be to conduct a Delphi leading to a consensus among all parties involved (after of course familiarizing all participants with the concept of variable classification). After determining which variables we think are important, these variables should be ranked by importance and uncertainty. This method of classification would allow us to establish the variables we should concentrate on when constructing the scenarios. After identifying the variables of interest, we should try to limit ourselves in the number of scenarios we will be

generating. We may find some combinations of variable behavior to be so unlikely or unreasonable that they can be eliminated. It is often easier at this stage to split the project group into several subgroups, each responsible for generating one scenario. However, we should not only look at the variables around which the scenario is woven, but rather try to incorporate other variables, whose behavior goes hand in hand with that of the core variables, or which might have some explanatory power that would enhance the scenario credibility.

We should be careful not to create scenario sets that would cause us to gravitate towards one scenario by design. Mechanisms that do that include (among others) having two extreme scenarios and one “middle” or “average” scenario. We should also avoid assigning probabilities to different scenarios. While probabilistic ranking is useful in deciding which elements to put in a scenario, having a more probable scenario causes us to focus on that specific scenario, neglecting the other scenarios.

It is likely that the future will look like a combination of elements from all the different scenarios. It would therefore serve us well to incorporate into the scenarios some sort of sensor, or a **signpost**. These signposts are events that are very likely to occur under a certain scenario and not under the other scenarios. Hence, observing these events happening would serve as a good indication of the future going in a certain direction, allowing companies to adapt their strategies as the future unfolds.

After generating the scenarios, we can devise supply chain strategies and behaviors that would fit each of the different scenarios, preferably making those strategies more robust by adapting them to more than one scenario.

## **Conclusion**

This thesis tried to accomplish several things. First, to provide the reader with an understanding of what scenarios are and how they evolved into their modern business strategy oriented form. The thesis then proceeded to describing the manner in which scenarios are generated. Finally, concluding with a suggested way to incorporate scenario planning into the Supply Chain 2020 project, a suggested implementation of the scenario planning method was given. Although proponents of scenario planning often cite the amazing success scenario planning had at Royal Dutch/Shell, I believe it is not necessarily inherent to the scenario planning method to be such a good future prediction and forecasting tool. This belief is based on the designated use for scenario planning given by Wack and Schwartz, which is mainly as a tool for facilitating strategic discussion as well as issue clarification. It is oftentimes hard to look beyond the disciplines ability to foresee, almost clairvoyantly, very dramatic shifts such as the 1973 oil crisis and the fall of communism. However, I tend to side with the claim, partly advocated by people who were involved with the Royal Dutch/Shell scenario planning efforts, that it is the nature of the future itself that renders conventional forecasting methods insufficient, not only in predicting what the future will turn out to be, but also in aiding in strategically understanding what our business environment is really made of and which factors in it are important. In that regard, I have come to believe that scenario planning would be extremely helpful in stimulating, facilitating and focusing an ongoing strategic discussion among the different parties involved in the Supply Chain 2020 project, as well as essential in pinpointing our blind spots and directing us towards overcoming them.

Scenario planning is but one discipline within the realm of future studies, which includes other practices like extrapolation, impact assessment, pattern identification, systemic analysis, visioning and many more. There is a large body of knowledge and available literature on the subject of the future and of different ways to approach its exploration.

As for scenario planning and the Supply Chain 2020 project, the thesis looked at how this method might fit different stages of the project and how it may complement other scientific methods of research that might be used in the project. That said, perhaps as important as an understanding of what scenarios are, is an understanding of what scenarios are not, as well as awareness of some common mistakes made by people who use scenarios as well as of some pitfalls that should be avoided as we go through the scenario planning process.