

Collaborative foresight as a means to face future risks - An innovative platform conception

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ABSTRACT

Increasing market volatility and disruptions imply risks for companies and governments and have become therefore focus topics. Adequate tools to identify, assess and manage future developments are key to survive in a turbulent environment. In our paper, we present the systematic development process of an innovative, web-based foresight platform, which is a joint research project funded by the German Federal Government and aims to improve the robustness in decision making by collaborative foresight. Its four interlinked applications have the purpose to enable their users a collaborative generation, discussion, evaluation and development of future-oriented knowledge. Thereby, a special emphasis is on the relevance and the timeliness of the provided information. Within the multi-stage requirement analysis of the tool platform we analyzed existing concepts in order to identify strengths and weaknesses and conducted brainstorming sessions and interviews with professionals of 130 companies and organizations to account for different backgrounds, perspectives and intentions.

Keywords

Foresight, collaboration, trend database, foresight support system, prediction market

INTRODUCTION

The global economy is increasingly busy to deal with the consequences of political, economical and natural incidents and developments, which disturb the global flow of goods and information. Benefiting from different local advantages, the globalization and the leanness of the value creation chain has strongly contributed to the economical and financial dependency between companies and nations. The result is an increased vulnerability of the global economy to various kinds of disruptions. Strong market volatility, natural disasters (e.g. volcano outbreaks, floods or tsunamis), accidents (e.g. power breakdown or nuclear incidents) and man-made attacks (e.g. piracy, theft or terroristic attacks) have recently shown their serious impact on our economy. However, even if the potential consequences of future disruptions are similar for many countries and nations, the management of risks and the exploration of future developments are often carried out separately. An early interconnection and communication between researchers, practitioners and politicians dealing with similar issues and challenges instead could be supportive in reducing the reaction time in case of an emergency (Turoff et al., 2004). Koivisto et al. (2009) propose to investigate foresight methodology to be used for early risk analysis since both research areas have to deal with similar characteristics and challenges: probability and impact assessment, uncertainty, providence, subjectivity in assessment, etc. Companies employing techniques from the field of corporate foresight, such as the scenario or Delphi technique, are financially more successful than their peers, who do not pursue foresight-oriented endeavors (Amsteus, 2011; Phelps et al., 2001). Corporate foresight has become the prevalent term used by many companies for their strategic research activities on the future. It stands for the analysis of the long-term prospects of business environments, markets, and new technologies, and their implications for corporate strategies and innovation (Rohrbeck and Gmünden, 2011; Ruff, 2006). Foresight has to be considered a process that ensures feedback to and from relevant actors while being a learning experience for all involved (Martin 1995). The global character of disruptions requires the consideration of multiple perspectives in risk analysis (Acedo and Florin, 2007), which can be provided by foresight techniques. This increases the amount of information available and the accuracy of impact and probability assessment and therefore the quality of emergency and mitigation strategies (Knemeyer et al., 2009).

The authors' current research endeavor is to develop an innovative foresight platform, which addresses the following major topics: providing integrative and innovative foresight methodology, intelligent linkage of future knowledge, integration of multiple perspectives, and facilitation of collaboration. We therefore contribute to current research in the field of collaborative computer-based systems for foresight, so called Foresight Support Systems

(FSSs) (Banuls and Salmeron 2011). We aim to improve the information base for decision makers in highly uncertain and complex environments. The early communication and collaborative assessment of future developments will help to enhance the early risk identification for each stakeholder and thereby increases his/her emergency preparedness. Therefore, we present in this paper the systematic development of an innovative, web-based foresight platform, which supports strategic decision making and contingency planning as well as competitive and environmental intelligence.

INTEGRATIVE FORESIGHT PLATFORM

Under the term ‘Competitiveness Monitor’ (CoMo), the authors’ research idea became part of a superior research initiative by the German Federal Government in the area of logistics and supply chain management with the name ‘EfficiencyCluster LogisticsRuhr’¹. The initiative was launched in June 2010 and involves 130 companies and organizations, including 56 small and medium sized enterprises and 11 research institutes and universities, which cooperate in 28 joint research projects on emerging topics and challenges in the area of mobility. The major goal is to enable future transport and mobility with significantly less resources than today. The CoMo is, in the first instance, a joint research project aiming to create and convey future-oriented knowledge within the cluster. In total four diverse partners (a large manufacturing corporation, a supply chain management consultancy, an IT service provider, and a research institution) are working together in the CoMo project to ensure high levels of scientific rigor and industry relevance. CoMo comprises a future-oriented IT platform where science, business, and politics co-operate to ensure a sustainable competitive advantage for all stakeholders. This translates into four major challenges for CoMo:

- (1) Creating, linking, and processing information about future macro- and microeconomic developments in logistics and its environment;
- (2) Providing educative information on futures studies and teaching future skills;
- (3) Incentivizing stakeholders to systematically deal with their futures and to foster innovation;
- (4) Stimulating co-operation among cluster stakeholders.

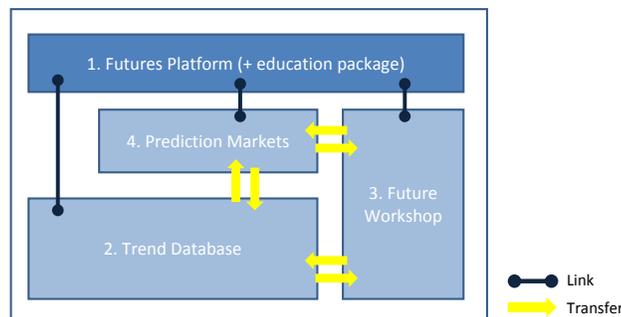


Figure 1. Conceptual framework of the Competitiveness Monitor

In order to address these challenges, we developed an IT-architecture that integrates three innovative and digital foresight tools as illustrated in Figure 1: (1) Trend Database (TDB), (2) Prediction Market and (3) Future Workshop (“Zukunftswerkstatt”) – which are integrated into a (4) web-based Foresight Platform. The single tools as well as their systematic development process are presented in the following section.

CONCEPTUAL DEVELOPMENT

Within the development process of the CoMo, each of the described tools is following the same steps of development: (1) analyzing of existing concepts in order to identify strengths and weaknesses of current trend databases and to elaborate possible unique selling points; (2) creative brainstorming sessions with professionals with different backgrounds and intentions in order to generate an extensive list of requirement specifications; (3)

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realization of the requirements in a first programmed prototype; (4) testing and reviewing of the prototype. Intense scientific desk research and analysis, requirement analyses, concept development as well as multiple participatory workshop sessions with external experts ensure a solution-oriented and straightforward development process. Roughly 1,000 ideas (i.e. requirements) for tool functionalities and interfaces were identified, classified and prioritized in a systematic requirement analysis process, supported by the ‘Volere Requirements Specification Template’ (Robertson and Robertson, 2006). The identified requirements were classified by the project partners according to its apps (Futures Platform, TDB, Future Workshop, Prediction Markets, or app-interlinkages), type (functional, non-functional, or constraint) and categorical purpose (e.g. user collaboration). A three dimensional framework consisting of (1) feasibility, (2) innovativeness and (3) importance was developed to narrow down and evaluate requirements. Thereby, it was important to acknowledge underlying assumptions and dependencies between the dimensions. In most cases there is a trade-off between feasibility and innovativeness. Furthermore, importance is characterized by ones’ perspective and depends on stakeholder needs. Dealing with this complexity in our evaluations, a stakeholder and use-case analysis proved useful in resolving the trade-offs and acknowledging the stakeholder environment of the leading-edge logistics cluster.

Futures Platform

The requirement analysis for our Futures Platform revealed an increasing demand for integrating social systems into company-specific and cross-company IT solutions. Our Futures Platform is intended to serve as the users’ personalized login portal. Important information about previously selected contents from the other three tools is displayed here. Users can interactively individualize their Futures Platform according to their interest by e.g. saving trend favorites, displaying related information or following a certain Prediction Market. This flexible and individualized structure offers an individual decision making environment which increases ease and incentivizes overall use. Furthermore, users communicate directly through the Futures Platform to elaborate on future-relevant topics. The cooperative nature of the platform shall increase transparency and access to knowledge for all stakeholders. Information asymmetries can be reduced and velocity of communication and innovative potential increase. Since the provided tools have an innovative character, the platform will include an educational self-learning package, structured in a curricula form. Here, training content is provided for self-studies, enabling the successful use of the tools that are vital in individual future planning. In that way, it can be assured that especially newcomers to strategic planning and foresight, e.g. small and medium sized enterprises (SME), can use the platform to build up foresight competencies and thereby reduce their vulnerability to future developments and risks.

Trend Database

Our TDB concept represents the quantitative and qualitative pool of future-relevant knowledge that is provided to and provided by its users. The TDB shall not only include trend related numbers, data and facts but also handle weak signals, wildcards and disruptive events. Query results are planned to be filtered through an intelligent algorithm that depends on a flexible combination of trend descriptives, e.g. geographical scope. Users will have the ability to export trend relevant information in standard formats or save trends in a personal space, which incorporates the individual decision making environment of CoMo. The possibility to acknowledge trends early and systematically creates significant advantages for users and ensures sustainable management and acting in the respective field. In the beginning of the TDB concept development process, we analyzed and evaluated existing TDB concepts in order to identify the state-of-the-art. In total, the concepts of eight providers were selected in order to support the requirement analysis process for the CoMo TDB. Similarly to the Futures Platform, co-operating elements of users are a fundamental part of the TDB. Users will be incentivized, for example, to evaluate existing trends in terms of impact or likelihood, participate in surveys, or create completely new future-relevant knowledge and thus collaborate productively (Kane and Fichman, 2009, Cuhls, 2002). While consumer co-creation can bring substantial benefits to a company’s innovation processes (Hoyer et al., 2010), the fundamental concept of co-creation is relevant for the TDB. Users of the CoMo platform itself are involved in sustaining actuality, validity, and relevancy of future-relevant knowledge in the database. In combination with a quality control system (e.g. obligatory text fields when creating content, etc.), this solves one of the core challenges that a TDB faces, which is decision quality of the data. By allowing and incentivizing users to share individual wisdom, overall wisdom increases (Surowiecki, 2004). An essential factor to success for our approach is getting users to participate. The CoMo will facilitate the concept of lead users to achieve this (Leimeister et al., 2009). Users can gain status and credits from active participation that can subsequently be used in e.g. the Prediction Market application or specific educative sessions. Another characterizing idea of the TDB and thus the CoMo relates to linkage. Data points by themselves cannot build a holistic picture of the future of logistics, if one does not know how they interact. The

TDB architecture shall be linked in three dimensions using a semantic structure. First, trends will be linked among each other, providing users with valuable additional information. Second, the TDB will be linked with the two other tools: Prediction Market and Future Workshop. While the Prediction Market app will provide an additional data source and contribute in the overall incentivizing issue, a digital Future Workshop will be based on data that is transferred from the TDB. Hence, the direct linkage between raw data (i.e. TDB) and analysis tool box (i.e. Future Workshop) provides users with the ability to generate direct individual value. Third, the TDB is expected to be linked with external data pools. Facilitating the idea of linked data, relevant external information has to be included increasing the basis for drawing future relevant decisions (Auer and Lehmann, 2010).

Future Workshop (“Zukunftswerkstatt”)

In our Future Workshop app users will be able to use the TDB as a discussion basis and digitally collaborate in global or private workshop environments. The Future Workshop app represents the element of CoMo where trends are systematically projected into individual futures and recommended options and actions can be derived. The fundamental idea of a Future Workshop has been developed by Robert Jungk, Ruediger Lutz and Norbert R. Muellert in the 1970s (Jungk and Muellert, 1988). This foresight technique is solution-oriented and comprises the four phases: (1) Preparation Phase, (2) Critique phase, (3) Fantasy Phase, (4) Implementation phase. Users are led through a process of problem identification, innovation, and creativity towards problem solving. Thereby, decision makers can actively shape their futures combining qualitative and quantitative information from the TDB and Prediction Market to build a robust decision space. The key innovation of the CoMo is that it will enable for a web-based Future Workshop as well as its inter-linkage with internal and external foresight tools and data pools. In our internal analysis as well as expert workshops we revealed that elements of scenario planning (von der Gracht and Darkow, 2010), roadmapping (De Laat, 2004), backcasting (Höjer et al., 2011, Quist and Vergragt, 2006) and Imagineering (Nijs, 2009) promise high procedural value for a Future Workshop.

Prediction Market

Our CoMo Prediction Market app will supplement Future Workshops and the TDB by providing an innovative foresight method that generates futures knowledge. Prediction markets originally evolved in psephology and proved to obtain significantly better forecasts than classical opinion polls – recently they have therefore been transferred into the business world (Coles et al., 2007, Ho and Chen, 2007). In the Prediction Market app CoMo users will be able to bet on the outcome of future events in a virtual environment. Future events are treated as stocks where prices represent likelihood of occurrence for example. Users lose and gain virtual credits according to their forecast accuracy, which incentivizes participation and accuracy. The theoretical foundation for the information efficiency of prediction markets bases on the combination of the wisdom of crowds (Surowiecki, 2004) and the Hayek-Hypothesis about market efficiency (Hayek, 1945). A single stock prize represents the aggregated wisdom/knowledge of all market players while competition in the market ensures efficiency in aggregating asymmetric distributed information. Similarly to the other described CoMo apps, Prediction Markets contribute to CoMo’s superior aim defined through its guiding topic, i.e. sharing complementary resources to generate overall future-relevant wisdom/knowledge in the leading edge-cluster. Hereby, Prediction Markets will represent an innovative, flexible, and robust forecasting method. Global and private Prediction Markets will offer the assessment of company specific as well as public topics and will, in combination with TDB, sustainably increase the overall future-oriented knowledge of the CoMo-user.

CONCLUSION

Market volatility, natural disasters and man-made attacks have a serious impact on the global economy. Even if in the consequences of possible disruptions are similar for most companies and governments, risk management and foresight exercises are often conducted separately, if at all. With the development of our foresight platform, we aim to provide a foresight toolbox, which can be used also by SME to collaboratively generate, discuss, evaluate and develop future knowledge. Thereby, a special emphasis is on the relevance and timeliness of the provided information. In order to achieve these objectives, users of the platform are involved in sustaining actuality, validity, and relevancy of future-relevant knowledge in the database. Furthermore, the quantitative and qualitative evaluation of future developments within the platform can also serve as basis for risk management decisions, due to the similar characteristics between risk management and foresight exercises.

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