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Real-Time Delphi in practice — A comparative analysis of existing software-based tools

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ABSTRACT

The success of Real-Time Delphi studies largely depends on the capabilities of the chosen software-based tool. First, there are currently a number of different tools at the community's disposal. Second, these tools vary widely in terms of their respective capabilities. Consensus as to what qualifies such tools for their academic purpose has not yet been established, even though Real-Time Delphi studies have become increasingly popular in recent years. The social science literature has hitherto offered relatively few analyses about the applicability of Real-Time Delphi software. This paper seeks to address this research gap by developing a methodology to compare and categorize tools that are available on the market, thus making a first step towards the establishment of academic standards for Real-Time Delphi studies. The basis of this paper is the testing of four selected Real-Time Delphi tools and their application. Through reviewing the existing literature the authors developed a system of categories and sub-categories according to which the tools were assessed and compared. The findings presented in this paper highlight the need for further development of the existing tools in order to iron out their shortcomings. Furthermore, this paper is merely considered to be the groundwork for research based on more exhaustive empirical evidence in the future, and for upcoming Real-Time Delphi studies.

1. Introduction

The Delphi Method is undisputedly a commonly used method in futures research (Popper, 2008, p. 69). In line with upcoming new internet technologies, the usage of Delphi surveys changes from classic paper and pencil to online, platform-based and especially to Real-Time applications. Today, Real-Time Delphis are used in heterogeneous fields of research, such as information and communication technologies (e.g. Keller and von der Gracht, 2014), security (e.g. Gordon et al., 2015), education (e.g. Gary and von der Gracht, 2015), logistics (e.g. Markmann et al., 2013) and others. Studies focusing on the comparison between classic paper and pencil and Real-Time approaches emphasize the cost effectiveness and the direct interaction between the participants (e.g. Geist, 2010; Gnatzy et al., 2011).

But futures research based on Real-Time Delphis also relies on the technological potential to design and conduct the survey in the best suitable way to generate answers to the specific research question of a study. Interestingly, in current papers the techniques and tools that were used for conducting the Delphi surveys were not discussed in detail. Some authors used their own tool, which they programmed for that specific study (especially Gary and von der Gracht, 2015; Keller and von der Gracht, 2014; Markmann et al., 2013) so that it is not easy to comprehend how the tool worked in detail. Others use more or less openly accessible tools like Risk Assessment and Horizon Scanning, Global Futures Intelligence System, eDelfoi or Surveylet. Conducting a foresight study using Real-Time Delphi highly depends on whether you are familiar with available tools or have the possibility to program your own.

However, how can researchers decide whether a tool is suitable for their research? This paper addresses researchers and practitioners in futures research who are aiming at realizing a Real-Time Delphi. Therefore, the aim of this paper is to discuss the characteristics and requirements that should be met by Real-Time Delphi tools. It is not about generating content or the Delphi statements in general – a separate process is necessary for this – it is about the assessment part of the survey in the field. In this paper we compare four existing tools and reflect how strong practitioners and scientists are influenced in performing their surveys by the limitations or possibilities of the tools. Researchers and practitioners in companies as well as in universities will gain a substantial overview and will be able to decide whether to

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use a tool that is available on the market or not. They will get insights into the usability and administration of the most popular tools. Students in master's programs will learn about the possibilities and limitations of tools in with regards to answering their research questions[1].

What we know mainly concerns the characteristics of Real-Time Delphis. Basically, Real-Time Delphi surveys are based on the fundamental assumptions of 'the general Delphi method'. Three functions distinguish a Delphi from a standard survey: 1. Touching upon future topics in the form of statements, 2. Having a type of assessment or questions concerning these future topics and 3. Feedback of previously given answers by other respondents be it in rounds or roundless. In other words: The same future statements are assessed two or more times with feedback from previous rounds so that the same people judge the same statement more than just once. The results that are fed back can be understood as psychological anchors that have influence on the judgement people made in previous rounds (see Bardecki, 1984; Tversky and Kahneman, 1981). In addition, anonymity is an important factor (exception: Group Delphi, see Schulz and Renn, 2009) of a Delphi survey to avoid dominance of alpha individuals and to provide the possibility to change opinion without losing face (see e.g. Cuhls, 1998).

The real-time variation of a Delphi does not have explicit "rounds" but gives feedback directly when a participant is assessing. This means, when participants assess a statement they are immediately confronted with the aggregated results of all other experts' estimations who have participated thus far. Furthermore, this means that asynchronous answering procedures are possible so that one person can take part several times and change his or her answers until the end of a given time frame (e.g. three weeks) is reached. Generally, a more or less determinable participant sample size has to be reached before feedback is given in order to keep anonymity. A Real-Time Delphi can only be performed online. Although there were early online Delphi surveys (e.g. Brockhoff, 1979) and a lot of plans to perform online surveys, the first Real-Time Delphi surveys were performed after 2000 and reported in 2006 (Gordon and Pease). They were rather practical approaches and after some time, more experimental and better visualized studies were performed, e.g. in Germany Zipfinger (2007), Cuhls et al. (2007), or Friedewald et al. (2007) on the European level.

Already in 1975, Linstone and Turoff (1975) elaborated on the advantages of computer-based Delphi surveys. At the same time, they acknowledged the shortcomings of such surveys due to the status of technological development in (cf. Price, 1975). Nearly thirty years later, Häder (2002, p. 163) argued that nowadays such drawbacks of insufficient technological means are widely overcome and computer-based (Delphi-)surveys are becoming increasingly important. Current technological means do indeed provide the standards necessary to conduct a comprehensive Delphi study. However, Häder raises the question whether existing software tools are suitable. This paper seeks to investigate exactly this issue. Therefore, this paper focuses on what we do not know: Do current software solutions to operate Delphi surveys meet the necessary requirements such as those defined by Häder, 2009, Gnatzy et al., 2011 or Gordon and Pease, 2006 and the academic criteria in general?[2]

As stated above, most Real-Time Delphi tools were programmed for each single project. However, the advancement in internet platform technologies and survey experiences online motivated some practitioners to develop commercialized or standardized tools for different Delphi surveys and Real-Time Delphi. Experimenting with different tools and through first trials, it was noticed that it is crucial to define a framework that allows one to evaluate the different tools, which includes the following questions: When can these tools be applied? What are the criteria for a good tool? Which kind of visualization is fruitful? And the first question to ask is: under what conditions can you rate a Delphi study a "good" one in general?

Therefore, firstly we ask what a Real-Time Delphi tool needs and what characterizes the quality of a 'good' Delphi study. Secondly, for the assessment, we set out to build a framework in order to provide a basis for the comparison of Real-Time Delphi tools. The developed system is based on the four categories "features", "data output", "user-friendliness" and "administration". In the third step, a comparative analysis focuses on four different Real-Time Delphi tools that are available online (Risk Assessment and Horizon Scanning, E-Delfoi, Global Futures Intelligence System, Surveylet). Finally, we discuss our findings regarding the questions if a) the available tools meet the previously defined needs and b) if not, to what extent the given possibilities and limitations might have an influence on research questions and the quality of a foresight study in general. Within the Appendix A we share our experiences working with the named tools in different contexts of futures research. Thus, we provide practical insights into the application of the tools.

2. Characteristics of Real-Time Delphi

In the following paragraphs we elaborate on the characteristics of Delphi studies. In terms of certain features Delphi studies must provide the option to ask for the following types of questions (Häder, 2009, p. 125 ff)

- o Individual competence/expertise[3]
- o Estimating time intervals
- o Estimating numerical data
- o Evaluating tendencies, developments, scenarios
- o Evaluating the same issue through different questions
- o Personal data
- o (Open questions and comments)
- o (Complex questions)

We argue that a good Real-Time Delphi tool needs to support all of these types. While Häder does not go into the detail of visualization, symbolic design and layout of the questionnaire, we consider these important aspects of conducting Delphi studies, as well. In their paper to deliver a software-based Real-Time Delphi tool Gordon and Pease present screenshots of their Real-Time Delphi tool. Text and layout appear very basic in this case. No colors are used to emphasize certain aspects of the text (cf. Gordon and Pease, 2006). Gnatzy et al. further elaborate on this in their response to Gordon and Pease (cf. Gnatzy et al., 2011). For feedback reasons in particular they use a color system to indicate how close or far a respondent's answer is in comparison to the group average. Moreover, the general visual appearance is much further developed in Gnatzy et al. Consequently, we take such visual aspects in our comparison of the Real-Time Delphi tools into account.[4]

Furthermore, neither Häder, nor Gnatzy et al. nor Gordon and Pease discuss in their contributions the aspect of how they launched their surveys in detail and what impact the way of feeding back information in the form of an Real-Time Delphi had[5]. Although Gnatzy (2011, p. 1683) mentions that "hyperlinks are randomly sent in order to access the Delphi portal" he does not further elaborate on details. We want to look into such options and how the invitations are sent out to lead the experts to the survey and, thus, how anonymity can be assured.

[1] This comparison is based on the course "Real-Time Delphi in practice", held by one of the authors, that is part of the Master's Program for Futures Research at Freie Universität Berlin.

[2] A list of criteria for what is "good science" in the academic realm of futures research can be reviewed in Gerhold et al. (2015).

[3] Delphi surveys are defined as expert surveys – but in most cases, the term "expert" is defined very broadly (for clarification see Cuhls, 2000, 2003; Meuser and Nagel, 2005).

[4] An impact analysis could not be performed for this paper. Therefore, the direct impact of visualization on the performance and estimations of the experts who are influenced by it cannot be evaluated.

[5] Only the tool Gordon and Pease used is available but developed much further and is discussed in this paper (Global Futures Intelligence System, see above). Gnatzy et al. did the programming especially for their surveys and do not share the tool.