Research Paper Computer Science

An Effective Use of ICT For Education on Worldwide Knowledge, Research & Experience

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KEYWORDS

1. Advancing ICT in Futures Research

Since its emergence as a discipline in the 1960s, futures research - the systematic examination of the future while following established quality criteria in research -has made significant strides in penetrating different aspects of our lives. Especially the increasing pace of change has created demand for techniques that make our future-oriented decisions more robust. Our research underlines that foresight activities are increasingly being implemented and supported by a diverse range of tools based on Information and Communication Technology (ICT), for example trend databases, prediction markets, and scenario-building software. Nowadays, lectures and workshops can be held online and data mining is beginning to revolutionise quantitative forecasts. Advanced software is learning to code qualitative arguments and to connect this data to related content on the web. Recently, the term "Foresight Support Systems" (FSS) evolved to describe the systematic study of computer-aided methodology of forecasting as an emerging separate field of research [1-3]. Such integrated, multi-method systems allow experts and stakeholders to collaborate throughout the entire foresight process. In addition, more powerful computers are being employed to calculate models of complex systems, such as the global climate. The study at hand reveals that we can expect significant advancements in technology to professionalise ICT-based futures research in organisations by 2020.

2. Consolidating a global Perspective of ICT-based Futures Research

This report is the result of an online real-time Delphi study [4, 5]. We invited approximately 1,000 experts from all fields of futures research: pioneers of the discipline, academics from universities worldwide, developers of software tools, practitioners from consultancies and industrial companies, as well as implementers from government and business associations. Members of the Global Business Network and the Club of Rome were also invited. In total, 177 experts from 38 countries took part in the survey, providing more than 2,000 written comments and arguments for future developments.

3. Keeping Futures Research a People's Business

According to our Delphi expert panel, futures research will remain a people's business even in 2020. Although ICT-based tools will tend to take on a more prominent role in strategic foresight activities, they will continue to rely on people's input and creativity. Ultimately, actions will be taken by human decision makers, but ICT tools will help to make processes more efficient and provide valuable decision support. Over the next decades, the quality of these tools will improve significantly, thus the diversity of foresight methods will increase. Notably, crowd sourcing should contribute significantly to forecasting and the focus will shift from databases and communicative tools to interpretative software. Due to the diversity of instruments available, the challenge for future-oriented consultants will be to match the right tool to the right issue. This situation will also have an effect on consultants in the field. Being an expert in one method will no longer be sufficient. Therefore, practitioners will have to become proficient in multiple methods in order to tailor the foresight process according to the clients' needs.

4. Bringing Futures Research to Society

Our study demonstrates that interest in futures studies is increasing independently from ICT development. Confronted with a growing amount of global long-term challenges - such as global warming or food security - societal discourse will embrace futures research on a much greater scale than today. However, ICT can generate added value by creating public awareness of futures research. Accessibility will be driven by the ubiquity of ICT technologies and the implicitness of using ICT devices for the increasingly digital society.

ICT-based foresight tools will be particularly helpful in tackling complex challenges. Growing computational power will not only enable use of more complex algorithms, but also provide tools to make teams more diverse and interdisciplinary. Due to their nature, ICT tools facilitate interaction, even in geographically remote areas. As a consequence, inter-departmental and inter-organisational projects will become increasingly common. Hence, scenarios will be adjusted to multiple stakeholders' views und more realistic images of the future will become possible. Remote interaction also poses communicative challenges. Thus, there will be a need to design tools and projects in the simplest ways possible. Information provided by ICT tools should be comprehensible as well as non-ambiguous and creativity should be encouraged. Any ICT tool should merely be a supportive instrument for a people-oriented communicative process in which the user remains in control. With multimethodological support, it should be possible to tackle issues by triangulation: using different methods to work on the same challenge - thereby cross-checking results [cf. e.g. 6, 7]. In this way, users will be able to analyse the results instead of simply letting the machine perform the work. In order to achieve good quality results from ICT tools, good quality data needs to be compiled and applied.

6. Choosing the right Experts

Since professional expertise is a prerequisite for participants in traditional foresight exercises, a reliable selection process is necessary. In addition, it is important that participants understand the goals of the process. In order to attain the right information, it is important to consider the subject matter - is the question at hand confined to a certain area of expertise or does it require unorthodox thinking? It might be more appropriate to involve highly specialised experts for a short-term to mid-term technological scenario, whereas visionaries with a broader scope of imagination might be better suited for unanchored events.

7. Linking the Practices of Futures Research and academic Research

Parallel to these developments, it is important that the field of futures research continues to develop as an academic discipline. The methods used in ICT-based foresight tools will have to be based on scientific research and internationally developed quality standards. Only if these prerequisites are fulfilled methodological rigour and data quality can be guaranteed. Our study demonstrates a high desirability among experts for such standards. However, except for peer review control, scientific research methods and international quality standards have not yet been established. Therefore, there is widespread scepticism that this will be achieved by 2020.

8. Involving Employees and Stakeholders

Our study reveals that considerable potential lies in ICT-based foresight tools, especially in their capability to foster participation and engagement. These tools should facilitate involvement and communication among stakeholders and employees, thereby benefiting policy makers and stakeholders in formulating and achieving future-oriented, sustainable policy goals. ICT development will support corporate foresight activities. These practices will be more professional and better transferable into implementation measures. Most importantly, ICT-based foresight tools will render corporate foresight affordable to small and medium-sized enterprises (SMEs).