Future user-product arrangements: Combining product impact and scenarios in design for multi age success

Steven Dorrestijn [a,*], Mascha van der Voort [a], Peter-Paul Verbeek [b]

[a] Laboratory of Design, Production and Management, University of Twente, P.O. Box 217, 7500 AE Enschede, The Netherlands
[b] Department of Philosophy, University of Twente, P.O. Box 217, 7500 AE Enschede, The Netherlands

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ABSTRACT

The presence of four generations in business and organisations and the prevalence of ever-evolving technology, pose questions for technology design; a much wider range of user-product arrangements needs to be forecast and designed for. To provide a theoretical framework that accommodates the need to forecast product appeal for various age groups and contexts this paper compares and combines the dual use of scenarios from scenario based design and scenario planning with the approach of technical mediation in the philosophy of technology. It introduces 'scenario based design' and 'scenario planning' as well as 'mediation theory' and specifically the 'product impact model'. In scenario based design direct product impact can be used for drawing and evaluating scenarios with a focus how ways of doing are directed and changed by products. In scenario planning indirect product impacts are helpful. Utopian/dystopian conceptions of technology help to draw extreme scenarios, while historical patterns in sociotechnical evolution guide the evaluation and definition of realistic forecasts. Our examples suggest that these effects may just as well go in the direction of augmenting the divide between generations, and full attention is called for to prevent or solve this.

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1. Introduction: anticipating user-product arrangements

How to forecast the future use of technologies? When organisations want to provide their multi-age employees a work environment that enables them to work most effectively and efficiently, they are in fact facing a complicated forecasting problem. Not only does the technology they introduce in their organisations have to match a great variety of human characteristics and work activities. More importantly, research shows that technology transforms behaviours (Ihde, 1990; Latour, 1999, Dorrestijn, 2012a; Verbeek, 2005). Technologies do not merely support the work of employees in an instrumental way, but they also have an impact on the character of people's work and on the way in which it is conducted.

Personal computers, for instance, not only have supported the work of secretaries that was traditionally done on typewriters, but also have radically changed office work, including the work of secretaries — typing text has become one of the least central elements of their work. Developing and introducing technologies for work environments, therefore, require a complicated form of forecasting of the interactions between products and users. Is it possible to predict what could be satisfying arrangements of products and users in the future? And can this be done for a workforce that spans a wide range of ages?

In order to answer this question, this paper explores and combines approaches in design research, philosophy of technology, and forecasting studies. As a theoretical research paper, it aims to contribute to methods of forecasting in general, with a special focus on workplace technology in the context of generational differences, ageing, and work organisation. Hence

* Corresponding author.
E-mail address: s.dorrestijn@utwente.nl (S. Dorrestijn).

this paper presents a framework to expand forecasting approaches with theories about the interaction between users and technologies.

The central thesis of this paper is that adequate technological forecasting requires that we explicitly and systematically take into account the interactions between users and technologies. In order to realize this, we make two theoretical steps. First we combine two uses of scenarios in design: scenario based design and scenario planning. *Scenario based design* is a methodology developed in design research in which scenarios are applied to improve user-product interaction. In this context, scenarios function as explicit descriptions of the hypothetical future use of products or services (Van der Bijl-Brouwer and Van der Voort, 2013). These 'use scenarios' need to be distinguished from the 'future scenarios' used in *scenario planning*. While scenario-based design focuses on micro-level use situations, scenario planning is a forecasting technique to for drawing scenarios with a larger scope of place and time.

Secondly we integrate these uses of scenarios in design with the approach of 'technical mediation', which has its roots in philosophy of technology. In this way the impact of technology on people is acknowledged and used to inform the use scenarios and future scenarios. Combining these approaches results in a systematic heuristic tool to anticipate future 'interaction scenarios' between users and products, making it possible to design these products in a more effective and responsible way.

As a guiding example for illustrating our theoretical exploration of dual use of scenarios and product impact for anticipating and optimising future user-product arrangements we will refer to the interaction between ways of working and workplace facilities. Whereas in a basic functionalistic view of technology technical facilities merely instrumentally facilitate what people do, our approach attempts to focus attention on how technology shapes and transforms human practices. This has clear implications with respect to the theme of workplace facilities and a multi-generational population. Technical innovation in the workplace and especially in ICT facilities may seem good means for supporting, e.g. older people in remaining active and productive. However, the adoption of new technology also may be a factor in producing a divide between generations.

Many people in the generation now just retired have during the past decade faced the challenge of either learning to work with the computer, or, equally challengingly, keeping doing their work as long as possible without the computer. In the meantime computerization has permeated all domains of work. Moreover, connection to the Internet has also become widespread and portable devices are becoming more and more common. This brings changes in working behaviours. A new phenomenon is that employees increasingly use their own or self-selected smartphone, tablet and laptop for company and work purposes — known as 'Bring Your Own Device' (BYOD). BYOD has become a recurring notion over the last couple of years and has benefits as well as possible dangers (cf. Thomson, 2012; Singh, 2012). Forecasting the impact of such changes in different generations requires an approach that integrates use scenarios with more general future scenarios.

2. Scenario based product design

High-quality products cannot be designed without addressing the quality of the interaction of the product with its user.

The extent to which a product meets the expectations of users, after all, is not only a characteristic of the product, but is fully dependent on the interaction between the product, its user and the environment within which it is used. For this reason, the concept of usability has been coined as a quality-measure for user-product interaction. Usability can be defined as the extent to which a specified user can achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use (ISO 9241-11; cf. e.g. Jordan, 1998, 5).

Designing usable products requires designers to explicitly research and address the variety amongst users, their goals, the intended product interactions and the use environments. The use of scenarios can be helpful here. Scenarios consist of several elements (Rosson and Carroll, 2002). They include a 'starting state', consisting of a *user* (or other stakeholder) with a certain *goal* in relation to a certain *product* in a *setting*. The setting consists of all contextual aspects that can potentially influence the user–product interaction, such as the physical environment, and the objects and individuals within that environment. The plot of the scenario unfolds when an actor starts to perform activities aimed at achieving his or her goal, when the product responds to these actions, and/or when changes in the setting affect the interaction between the actor and the product. Fig. 1 illustrates the relationship among the elements.

A scenario can describe what happens in a particular situation without committing to details of precisely how things happen (Rosson and Carroll, 2002). It is typically expressed in a written or spoken narrative. Alternatively or additionally, it may be expressed in the form of storyboards, movies, role-playing and (virtual) simulations (Nielsen, 1990). The power of scenarios is to represent alternative solutions or use situations, and to explore boundary conditions and enable comparisons, helping to avoid premature decisions or commitment (Carroll, 2000). Such 'use scenarios' enable product designers to anticipate more systematically how users will interact with the future products, in order to take this into account in the design process.

3. Scenario planning

Scenarios are also used in the related yet different field of *scenario planning*. When organisations need to make decisions about strategies for an uncertain future, they can benefit from
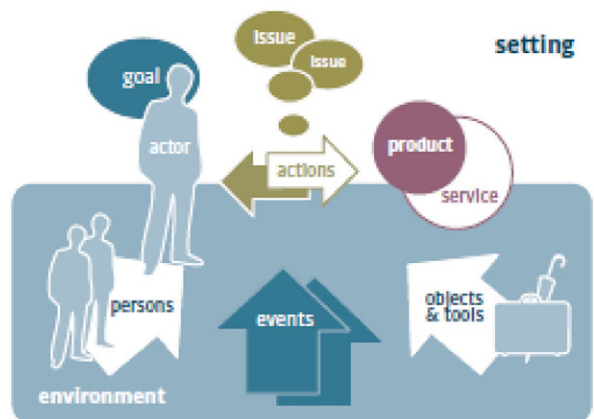

Fig. 1. Overview of scenario elements (Van der Bijl-Brouwer and Van der Voort, 2013).