



ELSEVIER  
MASSON



Disponible en ligne sur

**ScienceDirect**  
www.sciencedirect.com

Elsevier Masson France

**EM|consulte**  
www.em-consulte.com

IRBM 37 (2016) 232–239

---

---

**IRBM**

---

---

# A methodology to assess social technological alignment in the health domain

C. Thuemmler<sup>a,b</sup>, A.K. Lim<sup>c</sup>, I. Holanec<sup>d</sup>, S. Fricker<sup>e,f</sup>

<sup>a</sup> Technical University Munich, Klinikum rechts der Isar, Germany

<sup>b</sup> Edinburgh Napier University, UK

<sup>c</sup> Celestor Ltd, UK

<sup>d</sup> Institute and Faculty of Actuaries, Edinburgh, UK

<sup>e</sup> FHNW, i4Ds, Centre for Requirements Engineering, Switzerland

<sup>f</sup> Blekinge Institute of Technology, Software Engineering Research Laboratory, Sweden

Received 4 May 2015; received in revised form 4 August 2015; accepted 20 October 2015

Available online 8 January 2016

---

## Abstract

There have been longstanding discussions whether social or technological factors eventually determine the speed of innovation, in particular when it comes to implementation. In order to identify and quantify potential resistance and implementation risks in the health domain we propose a set of key parameters, which are measurable in both – the social and the technological dimensions. Following a meta-analysis we identified the following parameters to be of relevance: readiness, shared values, motivation, elasticity, control and time. All these parameters are scalable and measurable in both dimensions with existing tools. Mapping and comparison of the social and technological dimensions of these parameters might allow conclusions on how far the social and technological dimensions of these parameters are aligned and where potential difficulties during the implementation have to be expected. (This paper refers to the technical term “implementation” as the process of integrating a new technology into established workflows.)

© 2015 Published by Elsevier Masson SAS on behalf of AGBM.

*Keywords:* Social determinism; Technological determinism; Risk assessment; Innovation characteristics; Social-technological alignment matrix

---

## 1. Introduction

Over recent decades there has been an ongoing discussion about the notion of innovation. While the term Innovation is relatively well explained and defined there are many open questions regarding its dynamics: What are its preconditions? How is innovation coming about? What are its determining factors? What are the triggers? [1,2] Some researchers seem convinced that innovation is triggered mainly by technological progress and the exposure of society to new technologies, widely referred to as technological determinism [3,4]. The notion of technological determinism has been deeply rooted in the social-political ideologies of the 20th century and references to this topic appear repeatedly in the writings of Karl Marx [5]. On the other hand there is plenty of evidence supporting the view

that innovation is triggered by societal processes and a selection of society immanent factors have already been proposed [6]. This social determinism is based on the assumption that innovation requires a certain “readiness” to embrace technology inside individuals and groups and possibly in society as a whole [7,8]. Since the early 1980s there is evidence that a dichotomy of deterministic factors is more and more accepted. In their meta-analysis on innovation characteristics Tornatzky and Klein concluded that “Innovation characteristics research should focus on both adoption and implementation as the dependent variables and not simply dichotomous yes/no adoption decision” [9]. They also demanded, that “More than one innovation characteristics must be studied at the same time in order to adequately evaluate the relative predictive power of innovation characteristics and to consider their relationships. However, although there has been a longstanding exchange of arguments and innovation characteristics have been discussed

---

E-mail address: [c.thuemmler@napier.ac.uk](mailto:c.thuemmler@napier.ac.uk) (C. Thuemmler).

for quite some time now so far there is no coherent strategy or analytical tool considering both, implementation and adoption at the same time. One of the technological areas with great relevance due to significant growth predictions is the health care domain.

This paper is driven by the assumption that neither technological nor social determinism on its own can be considered an explicit model to describe innovation and predict its dynamics. In this paper we will undertake the attempt to merge social and technological determinism into a more comprehensive theory and propose a methodology to predict social technological alignment.

Our research is motivated by the current situation in the health care industry where there is clear evidence for unexplainable delay in the uptake of e-health technology [10]. Although the technological offerings and proposals seem sound the phenomenon is unexplained. However, technological and social deterministic forces have never been assessed at the same time. The Social-Technological Alignment Matrix is an attempt to create a tool, which is capable to do exactly this in a standardized way and make social technological alignment predictable. Algorithms to operationalize the model might be a fuzzy logic, a well described mathematical algorithm that is capable to deal with uncertainty typically associated with linguistic and non-heterogeneous parameters [11].

### 1.1. Development and implementation models

The waterfall model has long been the choice for developers for product and process design [12]. Strict sequential development implies that development steps are not reversible and once a product design was completed changes could not be applied. However, the plan-driven nature of the waterfall model offers a structured way to create results and is still a desirable approach where teams are experienced in the kind of system they develop and coordination is critical. The iterative approach offers the opportunity to get users involved throughout the whole development process and allows for continuous feedback and as the system is being developed [13,14]. The rationale behind this approach is the risk reduction although this might require more time for the development process all-together. In recent years iterative approaches have become more and more fashionable where user input and innovation may be added at any point in time and iterative cycles are not necessarily completed if it is clear that a change in process may be beneficial. This speeded up the development process, made progress more transparent and manageable, and resulted in better alignment of the technical solution with the social context where the solution would be deployed.

### 1.2. Design strategies

In order to involve users from a very early stage in the design process and reduce the risk of an end product being rejected several strategies have emerged. Requirements Engineering is an emerging specialty of Engineering which is using a structured approach to explore processes at the very beginning of

development cycles in order to operate as closely as possible to the real word requirements thus optimizing the “Specification” phase [15]. Scenarios are explored in sessions with users and are plotted into diagrams using Unified Modelling Language (UML) and other techniques to achieve a shared understanding between stakeholders and the development team [16]. Co-designing and user interaction design aiming at involvement of users in order to maximize the level of ownership and acceptance all along the product development.

## 2. Methodology

This paper refers to the technical term “implementation” as the process of integrating a new technology into established workflows. Building on previous work on the dichotomy of social-technological determinism, but also on conceptual references from similar work on food ethics we conducted a literature review on the interdependencies of social and technological innovation [6,19,20,23,44]. Starting from the assumption that similar, corresponding parameters should be of relevance for the social as for the technological domain we were looking for validated methodologies to conduct parallel assessments of identical parameters for each of the two domains initially following a hermeneutic approach but with a clear intention to extend to an empiric approach in the future. We interrogated standard databases including Google scholar and IEEE Xplore in order to identify suitable strategies and eventually conducted a more comprehensive literature review. The main focus was placed on a qualitative match. We did not conduct a full-scale meta-analysis in order to investigate the quantitative aspects of the methodologies. After careful qualitative analysis we could identify validated methodologies to assess matched pairs of the following parameters: *Readiness Levels* (Increase the success rate of technology transition and likelihood of people’s adoption of the new technology), *Shared Values* (This includes standards and aspects of appeal and design. Having shared goals and purpose will ensure new technology is fully interoperable and compatible with other technology and meet the highest standards of ethical compliance), *Motivation* (Social acceptance of new technology is the primary success factor of the new technology), *Elasticity* (Elasticity is a key priority in new technology acceptance), *Control* (Improved control will ensure effective software acceptance) and *Time* (relevant to the trajectory of new technologies and crucial for the acceptance process).

## 3. Social-technological alignment

There are major examples for last mile failures of technologies especially in the health care industry, which are well known for their large-scale losses. On the one hand there is Google Health, which was withdrawn from the markets in 2013 [17] and there is the UK National Project for IT, which did not make it through the implementation stage with a loss of hundreds of millions of British Pound [18]. Both multi million Euro failures would have been avoidable if tools had been available to

Download English Version:

<https://daneshyari.com/en/article/870715>

Download Persian Version:

<https://daneshyari.com/article/870715>

[Daneshyari.com](https://daneshyari.com)