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Pieter Devolder
Ghent University Hospital, pieter.devolder@uzgent.be

Bram Pynoo
Ghent University Hospital, bram.pynoo@uzgent.be

Phillippe Duyck
Ghent University Hospital, philippe.duyck@uzgent.be

Bart Sijnave
Ghent University Hospital, bart.sijnave@uzgent.be

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PERSONALITY, TECHNOLOGY BELIEF CONTEXTS AND ACCEPTANCE: FRAMEWORK AND EMPIRICAL TESTING

Personnalité, acceptation et contextes de croyance envers la technologie : cadre et tests empiriques

Research-in-Progress

Pieter Devolder
Ghent University Hospital
De Pintelaan 185, 9000, Ghent, Belgium
Pieter.Devolder@uzgent.be

Bram Pynoo
Ghent University Hospital
De Pintelaan 185, 9000, Ghent, Belgium
Bram.Pynoo@uzgent.be

Phillippe Duyck
Ghent University Hospital
De Pintelaan 185, 9000, Ghent, Belgium
Philippe.Duyck@uzgent.be

Bart Sijnave
Ghent University Hospital
De Pintelaan 185, 9000, Ghent, Belgium
Bart.Sijnave@uzgent.be

Abstract

This paper describes a new framework for technology acceptance research. Next to an information-system specific belief context, an individual's personality context and an overall technology-related context are introduced. It is primarily introduced to explore antecedents of technology acceptance's independent constructs. The framework is proposed so that each of its tiers can host a model best describing the population under examination. The three tiered framework is then operationalized whereby personality is measured through the Five Factor Model, overall technology beliefs are reflected by the Technology Readiness Index and information system –specific beliefs are covered by the Unified Theory of Acceptance and Use of Technology. This research model is tested in a large university hospital setting, where the technology under scrutiny is an Electronic Patient Record.

Keywords: technology acceptance, UTAUT, TRI, Big Five, personality

Résumé

Cet article décrit un cadre pour la recherche sur l'acceptation de la technologie. Trois niveaux sont distingués : la personnalité, les croyances relatives à la technologie en général et les croyances envers une technologie spécifique. Le nouveau cadre est testé en utilisant les modèles Five Factor, TRI et UTAUT.

Abstract in Native language

Dit artikel beschrijft een nieuwe kader voor onderzoek naar acceptatie van technologie. Drie niveaus worden beschouwd; persoonlijkheid, overtuigingen over technologie in het algemeen en overtuigingen aangaande een specifieke technologie. Het nieuwe kader word getest gebruik makend van respectievelijk het Five Factor-model, TRI en UTAUT.

Introduction

Lately, scholars in the field of technology acceptance are beckoning for a revamping of the field. Its models are validated, its methods have become ubiquitous yet results in terms of really grasping the concept of users' acceptance have been slightly disappointing.

This paper describes the development of a new framework for technology acceptance research. It consists of a three-tiered model of individual acceptance of a specific information system. We posit that IS acceptance is influenced by:

- Personality traits
- General beliefs of the individual regarding technology
- Specific beliefs of the individual regarding a specific technology/information system

The project described in this paper aims to alleviate some of the problems associated with conventional information systems models while adding to the sound theoretical basis these models were built upon.

This study will target acceptance of technology in a healthcare setting. We will assess technology acceptance of an EPR by all medical staff (both nurses and doctors) of a large university hospital. This report is a part of a nation-wide study of information technology acceptance and will later be used to benchmark the healthcare setting with overall findings.

Theory

Rationale

Within the technology acceptance research domain, the quest for higher R^2-levels is still ongoing. Not going as far as describing this quest as noble, it certainly has its merits in the attempt to validate an implementation process or to be able to optimize an implementation strategy towards higher user acceptance according to their results. Variance-explained levels typically fluctuate around 0.4, e.g. Chau and Hu (2002), and higher numbers can be reached when pooling data (Venkatesh et al. 2003). While some researchers attempt to augment the variance-explained level by adding extra constructs (Dishaw and Strong 1999; Venkatesh and Morris 2000; Taylor and Todd 1995), the general remark is that acceptance research stays within the boundary of beliefs that are linked to the information system researched (with the possible exception of the diffusion of innovations theory and related models).

Furthermore it should be noted that acceptance as a concept is not really grasped. The independent variables or constructs both theoretically and empirically fit the model and up to a certain point predict the dependent variables, however the mechanisms behind their formation remain unclear. Together with the observation that confusion remains on a valid dependent variable (Pynoo et al. 2007), the above problems lead information system researchers to question the foundations of technology acceptance research and to beckon for a revamping of the field (Benbasat and Barki 2007).

One possible way to achieve this is to look at the antecedents of technology acceptance. Or to be more precise, there is a need to look at the antecedents of the constructs that make up the different technology acceptance models. Where does a certain acceptance pattern originate? What makes people use a certain technology? Again, Benbasat and Barki (2007) make a strong point for investigating the belief that make up constructs of

different technology adoption models, however their view focuses on what usefulness comprises, what properties of the IS define usefulness. In remarking this, we find that all universal acceptance models exclude the users' non-IS-specific personal beliefs and character traits. This was recently acknowledged by the definition of the TRAM model (Lin et al. 2007) in which TAM is combined with TRI (Technology Readiness Index). In the prediction of job performance, IS research (Sykes et al. 2007) integrates the Big Five personality scales as antecedents of job performance. It is a logical assumption that when personality affects job performance, this is also likely to be the case with technology acceptance (especially in a work environment). We posit that the incorporation of personal traits and beliefs of individual users can be utilized in augmenting the low variance-explained figures typically obtained from an acceptance study.

Theoretical framework

This paper intends to position technology acceptance research within a broader framework (Figure 1). We propose a structure in which not only the individual's perceptions of the IS system under scrutiny (i.e. the IS-specific belief context) are involved. Two other belief contexts are added to this IS-specific view. The context of overall beliefs regarding technology and the context of the individual's personality are proposed.

Personality traits are hypothesized to influence both the IS-specific context (into which a number of technology acceptance model are situated, like TAM, UTAUT,…) and the overall technology context whereas both are also thought to be interrelated. A possible explanation for this can be found in Lin et al. (2007), where the authors discuss how overall technology beliefs can affect the IS-specific context. The preceding influence of the personality context on the overall technology context can be conjectured as the resulting sum of all previous experiences with technology as a whole. This implicitly shows that personality affects the IS-specific context, first in forming a belief set on the IS and ultimately resulting in the adaptation of the overall technology belief context. Technology acceptance can be seen at the center of these three belief contexts.

The framework remains an open framework. Several possibilities are available to deploy it, of which the chosen research model discussed below is one option. Each of the three belief contexts can be filled in with a theory of the researcher's choice so that models that better explain certain populations can be used interchangeably.

The occurrence of confounding effects between the trinity of contexts is likely, however the investigation of the chain of causality between the different models can provide valuable insights into how acceptance of an IS is formed. This can be seen as one of the main motivations behind the study. It may show how different populations can be approached to optimize IS-implementation efforts for maximum result.

IS acceptance models

The dissertation of Davis (1985) initially described the TAM (Technology Acceptance Model) whereas the resulting article (Davis 1989) remains to this day one of the most influential articles in use within the IS field. With its sound theoretical basis, TAM became the number one technology acceptance model. However, several scholars decided that the limited number of constructs on which the model was based did not cover the whole spectrum of issues involved in grasping the concept of technology acceptance. This idea was the underlying idea of a number of papers were the TAM model was expanded with other constructs in order to heighten the variance-explained by the new model (Venkatesh and Davis 2000). This ultimately led to the UTAUT model, which aims to amalgamate the different acceptance models by identifying which constructs overlap between models and which stay salient in a large test group. The UTAUT model has as an advantage that it covers more ground than the original TAM model while keeping the number of scale questions limited. Even though UTAUT can be seen as an umbrella theory of acceptance, the variance-explained level does not dramatically rise above the values of its forbearers unless pooled across three periods.

Figure 1. Three-tiered framework of technology acceptance
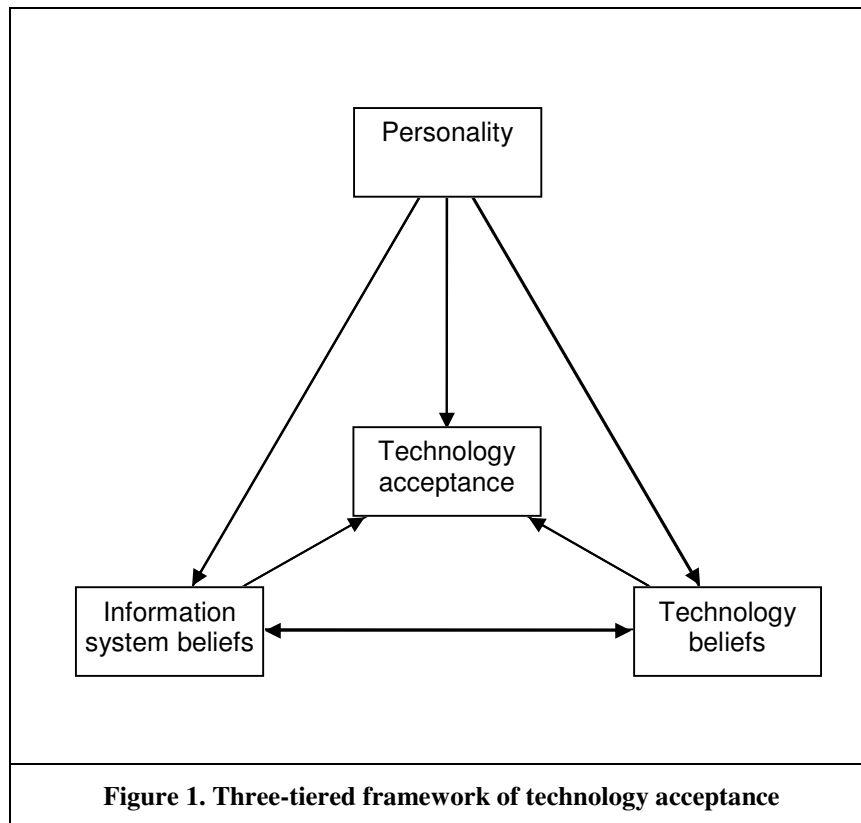
Attitude towards technology models

Since the 1980's scales measuring attitudes towards computer technology have been used. Overall attitudes towards computer technology have been measured, especially in the educational context, where several scale sets were developed (Robertson et al. 1995). Recent research shows that some highly used scales might have become outdated (Garland and Noyes 2008).

More recent models exist, such as the concept of technology readiness, which was introduced by Parasuraman (2000) when he devised the Technology Readiness Index. Parasuraman defines technology readiness as "people's propensity to embrace and use new technologies for accomplishing goals at home and at work."

This idea to integrate technology acceptance research and technology readiness was first put forth in the recent integration of TRI and TAM, the TRAM model by Lin et al. (2007)

The computer self-efficacy model (CSE) (Compeau and Higgins 1995) can also be seen as a valid alternative to assessing the individual users' beliefs regarding overall technology. The hypothetical scenario used for responses can however introduce problems. E.g. if administered post-implementation the scale could be interpreted as pertaining to the implemented information system thus invalidating the measure.

Personality models

Personality has been under scrutiny for a long time. Ever since the Greeks used the four humors for assessing human personality a number of theories regarding the subject were devised. Throughout history, the four humors theory was changed repeatedly and linked to physical problems.

Aided by several scholars Cattell (1943) devised scales measuring the 16 primary factors underlying human personality. The initial questionnaire made by Cattell (1943) used 170 questions and is known under the name 16PF-questionnaire.

Pioneered by Cattell (1943) in using large samples, Tupes and Christal (1961,1992), and Norman (1963) found that when refactoring Cattell's 16 traits, five underlying traits could be distinguished. Although this research remained unknown until the eighties a revival of personality research showed that five factor models held most promise. By introducing the NEO-PI-R scale in 1985 a foundation was built for personality researchers to build

upon (Costa and McCrae 1985). The resulting factors are now known as the Big Five. These traits are normally named Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism.

Drawback of assessing personality traits is the number of questions used in the different questionnaires. Several scholars have tried to resolve this issue by issuing questionnaires in which the scale has risen to be a reliable ten item questionnaire.

This allows a personality assessment in the eventuality where administering the complete NEO-PI-R (Costa and McCrae 1992) scale would take too much time.Recent developments in the IS field acknowledge the problems related with the lack of individual traits. Very recently, Sykes et al. (2007) proposed the integration of a job performance model with personality traits.

Project outline

This article aims to convey an integrated methodology for assessing user acceptance of technology based on a three-tiered technology acceptance framework, with the three tiers being general technology beliefs, IS-specific beliefs and personality factors. The IS-specific belief context is posited to have two antecedent contexts: general technology beliefs and personality factors.

The framework will be filled out with relevant models describing each of the three belief contexts. This operationalization of the framework will be tested according to the different questionnaires related to the employed models.

The aim remains twofold; to better explain the antecedents of the technology adoption model and to obtain a better model fit for the gathered data.

Methods

Research model

As a first implementation of the technology acceptance framework we will employ the following models as descriptions of the three belief contexts:

- The Five Factor model for describing the personality context
- The UTAUT model for describing IS-specific beliefs
- The TRI-model for describing overall technology beliefs

The research model is displayed in Figure 2.

Dependent variables

There is still a certain amount of discordance in the field regarding the most useful dependent variable which effectively describes technology acceptance for a certain information system. In order to be able to fully analyze this issue scales measuring three different dependent variables were included in the questionnaires. So acceptance of the IS will be operationalized in three ways. Scales regarding "attitude towards using the information system" – ATT, "behavioral intention" – BI, "Self-reported use" – USE.

Used scales

Scales of the three models discussed above are administered. This includes:

- The ten item TIPI scale measuring the big five personality traits
- The 30 item UTAUT scale measuring IS-specific technology beliefs
- The 36-item TRI scale

Next to these questions a number of demographic questions were included. A limited number of other non-related questions were included. Scales for computer self-efficacy are incorporated.

All scales were translated from English to Dutch and subsequently back-translated to English. Slight modifications to the literal translation of the English questionnaires were carried out where literal translation introduced ambiguity of sentence meaning in the Dutch sentence.

Figure 2. Research model (single lines imply interconnections between all constructs)
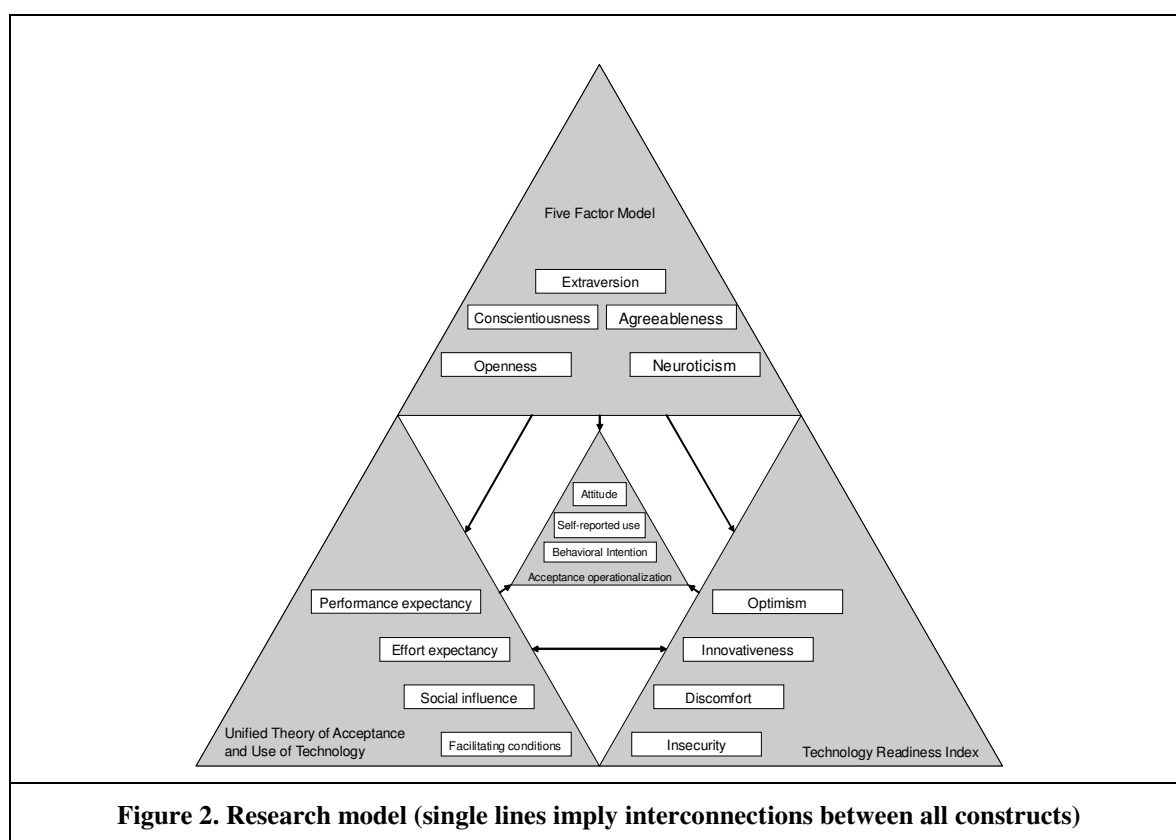
Continuous scales

All questions were scored on a continuous Likert scale. These scales, where a mark has to be put on a line varying from "completely disagree" to "completely agree" were chosen to allow more variation in answering than with traditional 7-point Likert scales.

Pretest

As the questionnaires were translated to Dutch, translation validity was pre-tested on a number of members of the IT department's and radiology service's staff. All volunteers were employees of the hospital and were not included in the actual administration of the questionnaire.

Administration

Questionnaires were administered on paper. Every medical employee received a questionnaire with a cover letter explaining the project. Return envelopes were included with the initial mailing. Questionnaires were sent and returned through the internal post system of the hospital.

Setting & target groups

The Ghent University Hospital is a 1169-bed hospital employing 4800 people in total. The electronic patient record has been installed for about a decade, but until the recent change of ITs management its use was not promoted sufficiently. The project now receives the attention it deserves and both top management and IT management consider its widespread adoption a priority. The number of people having access to the system was significantly raised so interplay between long-time users and people new to the system emerges.

Every member of the nursing staff, i.e. a main user-group of the EPR, was sent a questionnaire. Physicians will be incorporated in the study at a later time. The hospital employs around 1700 nurses and 300 physicians.

Time frame

Questionnaire translation has been finalized and questionnaires are ready to be sent out, pre-tests are being conducted at the moment of submitting the paper. All questionnaires will be distributed during the month of May 2008.

Hypothesis

The main hypotheses of this study concern the impact of TRI scales on the dependent variables albeit mediated through the UTAUT constructs. Personality constructs are hypothesized to have a mediating effect on the dependent variables although direct effects of certain personality traits are not to be excluded.

Analysis

The analysis will comprehend a decomposed model where the individual constructs of each incorporated model will be assessed for influence on the dependent variables and mediating effects. PLS (SPSS 16) will be used.

Results

The questionnaire will be collected during May 2008. Analysis results will be presented at ICIS 2008.

Discussion

Findings regarding the results will be presented at ICIS 2008.

Conclusion

A theoretical framework for technology acceptance research embedded within a personality context and an overall attitude to technology context was developed.

Empirical validation of the framework utilizing UTAUT, TRI and the Five Factor model will be presented during ICIS 2008.

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