A User-Centric Typology of Information System Requirements

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ABSTRACT
Keeping in view the increasing importance of users in shaping and acceptance of Information Systems (IS) products, there is a need for deeper understanding of IS user requirements. However, currently there is a gap in IS literature. Virtually no theory-based Typological Scheme (TS) exists for IS user requirements. And a typology is widely acknowledged as the first step towards understanding a phenomenon (Bailey, 1994). Using concepts from inter-disciplinary review of research in the areas of requirements engineering, product quality, and customer satisfaction this study explores the possibility of developing a TS suitable to the IS context. The proposed TS scheme, iteratively constructed, through literature review and experimentation demonstrates promise. The requirement types identified in the suggested TS are found to have both theoretical and empirical support and have useful implications for future research as well as practice.

KEYWORDS
Implied Requirements, Stated Requirements, Typology, Unstated Requirements, User Satisfaction

INTRODUCTION
IS (Information Systems) products are developed with the goal of satisfying user needs and requirements (Alves, 2003). Further, the set of user requirements implemented into the product is a primary determinant of end-user satisfaction (Karlsson and Ryan, 1996), and a measure of value provided by the IS product (Calisir and Calisir, 2004). Yet, currently there is a gap in IS research. Virtually no theory based typological scheme exists for user requirements. A well-constructed typology is widely acknowledged as the first step towards understanding a phenomenon. It is useful for bringing order out of chaos and forms the foundation for both theorizing and empirical research (Bailey, 1994). Typological theories also help connect archetypes to critical outcomes (George and Bennet, 2005).

But to develop a reliable user-centric typology of IS requirements the following questions have to be addressed: Are user requirements a homogenous category or are there multiple types each with their own distinctive characteristics? What are the widely used requirement types used in literature? Are these requirement types intuitive? Are they easily comprehensible to requirement gatherers and developers of IS products? Can these requirement types be easily identified? Are they relevant in the context of developing IS products aligned with user needs? Are they empirically supported? Are they based on a strong theoretical foundation? Do they meet the criteria for a good Typological Scheme (TS)? Do they have explanatory power to explain the hitherto unexplained phenomenon?

Getting answers to these questions was a long iterative process involving a multi-disciplinary review of literature and experimentation. The study began in 2009 with a search in IS literature for
a suitable theory based Typological Scheme (TS). Not finding substantial success in IS literature in identifying a typological theory the quest then led to a search in product quality and customer satisfaction literatures resulting in the discovery of a two factor and a three factor theory of product attributes. On further analysis, the three factor theory also known as Kano (Kano, Seraku, Takahashi and Tsuji, 1984) theory of attractive quality seemed most promising.

The acceptance of the theory of attractive quality has increased over the past 25 years (Lofgren and Witell, 2008). Empirical studies have shown its relevance to Information Systems (IS) products (Zhang and von Dran, 2002; Lehtola and Kauppinen, 2006). A pilot study was nevertheless conducted with users of Astrid, a task planning application, to explore the potential of the three factor theory in developing a suitable typology of IS requirements. The results of the pilot were encouraging and led to a search back in literature for theoretical underpinnings of the three factor theory to examine why it works.

It was found that although presented as a theory, and supporting empirical evidence found for its postulations in multiple studies, the theoretical bases for the archetypes in the three factor theory are not expounded. However, in a revisit of IS literature, the ISO 8402-1986 classification, which was earlier overlooked in favor of the three factor theory, and which has limitations compared to the three factor theory, provided valuable insight. Extending the ISO 8402-1986 classification of user requirements, and utilizing the widely accepted Expectancy-Disconfirmation paradigm, a TS was developed that not only had a firm theoretical foundation but demonstrated empirical support as well in a subsequent experimental study.

LITERATURE REVIEW

Requirements Classification from IS Literature

Among the many ISO standards, ISO 8402-86 is the first standard utilized in IS for classification of user requirements. The Quality Management and Quality Assurance Vocabulary, ISO 8402-86 (International Organization for Standardization, 1986), provides a formal definition of quality as “The totality of characteristics of an entity that bear on its ability to satisfy stated and implied needs”. The definition agrees with traditional references (Juran, 1989; Crosby, 1980) which describe quality as “fitness for use”, “fitness for purpose”, “customer satisfaction”, or “conformance to requirements” (Abate, Diegert and Allen, 1998) and gives us two types of IS user requirements: stated and implied. In line with this definition, we can consider an IS product to be of the required quality if it satisfies the user requirements stated in a particular specification and also meets the implied needs of the user.

The IEEE Standard 610.12-1990 which came later than ISO 8402-86, surprisingly, focused only on “stated” needs of the users and defines Quality as the degree to which a system, component, or process meets specified requirements and customer/user needs and expectations. Its Standard Glossary of Software Engineering Terminology defines software requirements as 1) a documented representation of a condition or capability needed by a user to solve a problem or achieve a condition and 2) a documented representation of a condition or capability that must be met or possessed by a system component to satisfy a contract, standard, specification or other formally imposed document.

Later, attempts were made to broaden the determinants of software quality. Software requirements were conceptualized as functional and non-functional. While the functional requirements describe what the software will do, the non-functional requirements described how the software will do it. However while there was a general agreement on what functional requirements are there was no consensus on non-functional requirements (Glinz, 2005). For example, Davis (1992) makes a similar distinction between software requirements but called them behavioral and non-behavioral requirements.
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