

Chapter 17

An Empirical Evaluation of the Assimilation of Industry- Specific Data Standards Using Firm-Level and Community-Level Constructs

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ABSTRACT

Vertical standards focus on industry-specific product and service descriptions, and are generally implemented using the eXtensible Markup Language (XML). Vertical standards are complex technologies with an organizational adoption locus but subject to inter-organizational dependence and network effects. Understanding the assimilation process for vertical standards requires that both firm and industry-level effects be considered simultaneously. In this paper, the authors develop and evaluate a two-level model of organizational assimilation that includes both firm and industry-level effects. The study was conducted in collaboration with OASIS, a leading cross-industry standards-development organization (SDO), and with ACORD, the principal SDO for the insurance and financial services industries. Results confirm the usefulness of incorporating firm-level and community-level constructs in the study of complex networked technologies. Specifically, the authors' re-conceptualization of the classical DoI concepts of relative advantage and complexity are shown to be appropriate and significant in predicting vertical standards assimilation. Additionally, community-level constructs such as orphaning risk and standard legitimation are also shown to be important predictors of assimilation.

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INTRODUCTION

Vertical standards are specifications that focus on industry-specific product and service descriptions, data structures, definitions, and formats, and that formalize and codify business processes for participating organizations (Markus et al., 2003). Researchers have begun to acknowledge their uniqueness and to integrate various applicable research streams to the study of their development, adoption, diffusion, assimilation, and value across industries. Vertical standards are often implemented via the eXtensible Markup Language (XML), play a critical role in inter-organizational data-sharing (Hills, 2000; Lim & Wen, 2002), and are expected to yield more influence than any previous inter-organizational system (Wareham et al. 2005). The emerging body of literature focusing on vertical standards uses concepts of classical diffusion of innovations theory (DoI; Rogers, 1983), augmented with ideas from various other theoretical streams. DoI theory focuses on relatively simple technologies subject to voluntary binary adoption by individual users. However, vertical standards are complex technologies with an organizational adoption locus and subject to inter-organizational dependence (Fichman, 1992; Lyytinen & Damsgaard, 2001). Understanding the nature of the assimilation process for vertical standards requires the consideration of industry-level effects, along with factors shown to predict organizational adoption and diffusion of technology-based innovations.

Our research adds to our understanding of the vertical standards assimilation phenomenon by proposing and evaluating a two-level model of organizational assimilation based on both firm- and community-level effects. The model uses the three firm-level DoI concepts most consistently found to be significant in predicting technological adoption and diffusion (Premkumar et al., 1997; Tornatzky & Klein, 1982). At the community level, assimilation of complex networked technologies has been shown to be subject to network externali-

ties (Wigand et al., 2005), which help technologies achieve the point of critical mass (Markus, 1987) at which a dominant platform emerges in a market. Network externalities have been shown to affect technology assimilation in various industries (Au & Kauffman, 2001; Kauffman et al., 2000). Thus, our model uses the concept of network externalities to develop the two community-level constructs labeled *orphaning risk* and *standard legitimation*.

To our knowledge, this is the first large-scale empirical study of organizational assimilation of vertical standards. The study was conducted with the ongoing collaboration of OASIS, a leading cross-industry standards-development organization (SDO), and of ACORD, the principal SDO for the insurance and financial services industries. Additionally, it is the first attempt to operationalize and measure the concepts of technology orphaning risk and standard legitimation as they relate to information technology (IT) assimilation. As previous research suggests, the changes with greatest longevity and impact will not be those inherent to the technology itself, but the behavioral changes the technology enables on a mass scale (Evans & Wurster, 1997). Understanding the factors that motivate the adoption and diffusion of vertical standards is critical to the understanding of any likely structural changes across industries.

LITERATURE REVIEW

In contrast to horizontal standards, which define basic connectivity specifications for use in multiple industries, vertical standards formally specify unique data structures, semantic definitions, document formats, and business processes for specific industries (Markus et al., 2003; Steinfield et al., 2004, 2005; Wigand et al., 2005). They are organizational-level technologies whose assimilation is complicated by community effects external to the organization's environment. The assimilation of vertical standards is still in its early stages (Wareham et al., 2005), which provides

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