

ABSTRACT

Multiple information technologies are converging. Crucial to organizations' relentless struggle to remain competitive, IT innovation processes must now increasingly take into consideration a multitude of stationary, mobile, and even embedded information technologies and their associated use contexts. In assembling such ubiquitous computing environments, multiple organizations with diverging interests and capabilities are involved. Indeed, heterogeneous component technologies are frequently associated with independent markets lacking a dominant actor knowledgeable about more than fragments of the combined capabilities present. A resulting lack of architectural knowledge poses a challenge to organizations attempting to assemble innovative computing environments spanning these boundaries. In this thesis, heterogeneous IT innovation processes are conceptualized as dependent on dispersed component technologies and associated competencies bound together by boundary-spanning architectural knowledge. This perspective is formalized as a research model assessed over a five-year action research project in the Swedish transport industry. The research project involved an industry network of independent technology vendors and user organizations experiencing a mobile-stationary divide in attempts to assemble ubiquitous computing environments. Seeking to understand the role and nature of architectural knowledge in heterogeneous IT innovation processes this thesis contributes implications for both research and strategy.

First, architectural knowledge in heterogeneous IT innovation is found to rely on technology capability awareness, use context sensitivity, and business model understanding. However, in order to be successfully enacted in practice, the emergence of boundary-spanning competence is crucial. It is imperative to collectively define mutual boundaries between components of an architecture with respect to technology capabilities, use contexts, and business models. Through this process, architectural knowledge emerges as actors gain an increased capability to appreciate the conditions present in other components. This creates a crucial foundation for boundary spanning innovation. However, such boundary definitions must reflect a viable common denominator. Any resulting formalized architecture should not pose an immediate threat to perceived core markets of any involved component IT base. The need for open boundary-spanning component capabilities and requirements of innovation leeway for individual firms within their core IT base pose a balancing challenge. This can be achieved by black-boxing disputed technology capabilities of the component IT bases, acknowledging the innovation prerogative of organizations within that particular component market.

Keywords: action research, architectural knowledge, heterogeneous IT innovation, ubiquitous computing environments

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