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December 1997

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### Recommended Citation

Allen, Jonathan, "The Evolution of Handheld Computers: Problem Framing and Network Building" (1997). *ICIS 1997 Proceedings*. 41.  
<http://aisel.aisnet.org/icis1997/41>

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# **THE EVOLUTION OF HANDHELD COMPUTERS: PROBLEM FRAMING AND NETWORK BUILDING**

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The objective of this study is to better explain how technology companies, and their supporting networks of suppliers, investors, partners, and leading-edge adopters, make commitments to new information technologies when there is still substantial uncertainty about how a technology will be used. Through a series of case studies, this research will trace the commitments made to specific product visions in the chaotic handheld computer industry during the 1990s. Theories of technological innovation tell us that technologies can move between periods of widespread agreement over what form a technology should take (the “dominant designs” described in Utterback 1994) and periods of deep uncertainty about the course of future technology development (the “eras of ferment” described in Tushman and Rosenkopf 1992). These theories tell us much less, however, about the processes through which specific technological visions become dominant.

The theoretical basis for this study comes from the social shaping of technology literature (e.g., Bijker and Law 1992). This body of work is useful for this project, and important for IS research more generally, because it assumes that a technology as flexible as IT can ultimately take many different forms. The form a technology ultimately takes needs to be explained, often through attention to specific processes of development. This study focuses on two processes identified in the social shaping of technology literature: problem framing and network building.

A problem framing is a set of assumptions held by a community about the problem that a technological project is trying to solve. For the handheld computer industry, the question to be answered is through what process do companies, industry experts, funders, and leading-edge customers define the problem to be solved by these technologies (Bijker et al. 1987), and how do these framings lead to specific technological decisions? The process of actually developing these technologies can be seen as a network building process, where a variety of institutions, technologies, and people must be “enrolled” into sociotechnical networks through strategies such as negotiation (e.g., Latour 1996) in order to bring a technology into existence.

By focusing on specific cases of problem framing and network building, the study hopes to explain some of the more puzzling aspects of the handheld industry. Why, for example, were multimillion dollar commitments made to some visions, such as “pen-based computing” and “personal digital assistants” and not others? Why do individual companies in the handheld industry rarely change their basic assumptions about new information technologies, even as industry analysts change their assessments and end consumers accept or reject products?

The presentation will report on the first phase of data analysis, which includes information from trade press articles, press releases, and market research reports. The problem framing process will be discussed in five cases: Apple, Hewlett Packard, Microsoft, Psion, and Sharp. The changing problem framings in the handheld industry, including pen-based computing, the horizontal versus vertical market debate, the communications problem, and the synchronization problem, will also be discussed. The grounded theory approach used in the first phase of the study will continue in phase two, where approximately 60 interviews with product managers, technologists, and industry experts will examine problem framing and network building processes in more detail.

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