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**From the Editor in Chief**

# MICROINNOVATIONS IN HUMAN–TECHNOLOGY INTERACTION

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Human–technology interaction is a central consideration of our time: Many aspects of our social development depend on it. Therefore, it is essential to consider how best we can coordinate the innovation process, since innovation establishes the technological preconditions for future life. Issues such as inventing, creating, designing, manufacturing, marketing, and using new technologies are all steps in the complex innovation cycle.

Inventions or creations are the first step in a long line of processes that eventually result in something useful for improving the quality of people's everyday lives. However, only when hundreds, if not thousands, of small, at times independent, pieces are connected to each other into a sense-making whole, do we have an innovation. The idea is the beginning, but only ideas that improve on practice and are adopted by users become innovations (Schumpeter, 1939).

Sometimes the ideas may be relatively tiny and invisible, yet still their ultimate justification is always expressed in terms of human life. For example, it makes sense to apply nanotechnology in paper machines because it improves the process of making paper, something we can readily see when we read the newspaper at our breakfast tables. Thus, the value of small technological ideas and the improvements they bring have value when they raise the quality of life. This is why we should attend to the process that integrates the many ideas into a working whole.

The innovation process begins with a set of ideas. At this point, the ideas are simply that—an output of someone's thinking and imagining. Design solutions and marketing inventions are always products of human thinking. This means that thinking forms the very enigma of innovation processes. It makes them work, and for this reason we can investigate innovations as human thought processes.

The perspective on innovations opened by human thinking is intriguing. Much has been written about large innovations processes, such as governmental innovation processes, networks, and systems of innovations. We also know a considerable bit about organizational innovation processes and the diffusion or sustainability of innovations. But we know very little about innovative thinking in the scientific sense. Innovation processes can be very extensive, and so it is logical to call them macroinnovations. Alternatively, then, innovation as thinking can be considered a microinnovation process. Of course, innovation as thinking does not replace macroinnovation research. Indeed, microinnovation research opens up complementary


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perspectives toward the innovations, thus enabling us to understand in a new way many macroinnovation phenomena.

Moreover, human–technology interaction design also has its microinnovation processes. Throughout history, these processes have had their success stories and failures. By analyzing the stories—particularly the failures—we can learn much about the typical microinnovation processes. As an example, we can analyze the WAP (wireless application protocol) fiasco from about a decade ago. Although many engineers saw technical problems as an explanation for the WAP's failure, it is clear that the users did not accept this technology. The fundamental misjudgment on the part of WAP's developers is that they did not recognize that users did not want to learn how to use its symbolic interface. In fact, the problem was that users could not learn to use it (Ramsay & Nielsen, 2000). So although members of the overly enthusiastic mobile industry recognized the usability factors in play on this important new technology, it took them time to realize there was little they could do to get audience to accept the product.

Thus, WAP serves as an instructional mistake. Had its usability assessments been undertaken before the development process of its final form of service was completed, much trouble would have been avoided. Yet, this innovation traveled a wrong path because a portion of its developers' thought processes arrived at wrong conclusions, or, perhaps more accurately, disregarded evidence in a key innovation task in reaching conclusions. The primary mistake was an underestimation of the users and the value of user testing in the early stages of technology development. Information and understanding about users' cognitive capacity were not included in the management decisions leading to product launch decisions. So, what can we learn from analyzing the WAP events?

WAP would not be important case unless it kept developers from repeating similar mistakes in contemporary industry. Today, large numbers of programs never reach their audiences, even though the ideas behind them are good. Freeware and the difficulties in marketing program products illustrate the challenges of getting products—even good products—accepted in the marketplace. Therefore, reflecting on the ―logic” behind the failure in microinnovation processes of the WAP project offers lessons to be learned.

As noted above, innovation processes involve huge streams of ideas. Sometimes it happens that the failure of a single component can have disastrous consequences. For example, a number of supertankers exploded in the 1960s, the result of a small gas pocket in their tanks (Perrow, 1999). The space shuttle Challenger explosion was a similar case of a small component producing a catastrophic outcome (Presidential Commission, 1986). In fact, WAP shared the same characteristic: One uncontrolled phenomenon destroyed the big technological idea.

Microinnovation research is a huge field because thinking plays a role in all innovation processes. The WAP failure teaches us an essential lesson: the importance of task-necessary information. Users are an essential element in technology, and if information about and from users is not included within each step of the innovation processes, innovators are likely to err. Company managerial boards take unnecessary risks when they do not have on-staff personnel with user expertise or do not seek input from those so skilled. Negative outcomes can result from either ignorance of or false information regarding the human–technology innovation processes.

Another risk in human technology interaction development thinking was illustrated by Steve Jobs and Apple. The mobile industry had met with difficulties when introducing WAP. Human–technology interaction experts had demonstrated already in the year 2000 that text-based WEB services would not work (Ramsay & Nielsen, 2000). Experience with the Web in the pc world had clearly shown that text-based interfaces were too complicated for ordinary users to apply in accessing the Internet, and yet the industry continued its work on WAP for a couple of years more, before accepting the facts. However, everyone knew that graphic interfaces worked fine in supporting Internet use. In other words, the solution to the WAP deficits actually existed under the noses of developers during this period. Nevertheless, it took nearly a decade before Apple was able to bring this realization to fruition in the mobile world. Of course, many of the factors explaining the slow emergence of the graphic mobile culture were technical, such as bandwidth and battery capacity. Nevertheless, it was necessary to restructure the human–technology interaction thinking associated with WAP in order to create a new application- and service-based culture. Changing the thinking allowed for this positive step.

Human thinking opens the potential for people to reach their goals in life when such solutions are not currently available (Newell & Simon, 1972). The failure of WAP illustrates the problems that can arise, and Apple's approach demonstrates how re-thinking can solve such challenges. The definition of goals, the identification of obstacles, and creative problem solving form the core of the innovation processes in human–technology interaction, as they do in other human endeavors. Problems and challenges can be solved only when innovative thinkers have sufficient expertise and the required information. Thus, the importance of defining human knowledge and understanding the users' behaviors, preferences, and attitudes is an essential component of expertise within the engineering community. This is not true only inside the walls of design offices, but also inside executive boardrooms.

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