

## Abstract

Author: Prof. Dr. Roman Boutellier

Institution: ETH Zurich, D-MTEC, Chair of Technology and Innovation Management

### Title: Diffusion of wireless technologies and technological lock-in

Since decades, companies have deployed wireless communication technologies in their products and processes, leading to obvious and hidden dependencies on several kinds of wireless communication types. These path-dependent evolutions of products and processes may lead to technological lock-in situations for companies and whole industries. Technological lock-in lowers the ability to switch to alternative solution principles other than wireless communication (e.g. cable-based communication or thick-client applications).

The public perceived utility of technologies is dwindling with increased living standard (Kepplinger, 1989). The case of electric power grids (Economist, 2004) and other research suggest that this is also true for the perception of a technology by a company that applies this basic technology. Invisibility leads to misinterpretation of technological dependency and therefore, the company does not participate in the discourse about the acceptance of this technology. Wireless communication is applied by many companies (e.g. manufacturers of access control systems) as such a "black-box" technology. *The dependency from wireless communication technologies is likely to be underestimated by these companies.*

Lock-in of industries in a wireless communication technology can become critical in case of public rejection, since alternatives are not available, then. Industry and regulators would face a dilemma because the adverse effects can not be diminished without significant loss of functionality of products or services. Understanding mechanisms that lead to lock-in situations on a company levels helps the companies as well as the regulators to ensure the necessary flexibility to substitute a technology within reasonable time and without a loss of safety.

Technological lock-ins can manifest in the areas of R&D (products and processes) as well as investments in plants and equipment (Hoyt & Sherman, 2004). Only few empirical research in this area exists (Karakaya, 2000). Our research project therefore aims to contribute to the understanding of the diffusion of wireless technologies into a company's products and processes and of the relevant mechanisms inside the organization (e.g. management decisions and technology planning). In addition, the consequences of the lock-in effects on wireless technologies are examined (e.g. remaining options, possibilities to react towards new regulations).

The *case studies* are realized by interviews of experts within companies (e.g. senior management) and outside the enterprises (e.g. authorities, industrial unions). In addition, the relevant development in the environment is investigated by document analysis (e.g. scientific publications, legislation outcomes and newspapers). The targeted number of companies to be involved in developing the case studies is 25. The case studies will address several dimensions within the companies.

The *industrial congress* at the end of the research process aims to ensure the transfer of the research results into industry. A possible follow-up of this research project could be the development of technology management practices to sustain the necessary technological flexibility.

---

Economist (2004): Now you see it, now you don't. *The Economist*, 2004-11-30.

Hoyt, J. & Sherman, H. (2004): Strategic groups, exit barriers and strategy decision constraints in high-tech companies. *The Journal of High Technology Management Research*, Elsevier Inc., 15 (2): 237-247.

Karakaya, F. (2000): Market Exit and Barriers to Exit: Theory and Practice. *Psychology & Marketing*, John Wiley & Sons, Inc., 17 (8): 651-668.

Kepplinger, H. M. (1989): Künstliche Horizonte: Folgen, Darstellung und Akzeptanz von Technik in der Bundesrepublik. Frankfurt etc.: Campus Verlag.