Chapter 1
Infrastructural Innovation and Generative Information Infrastructures

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ABSTRACT
This chapter addresses issues related to how to enable the broadest possible innovative activities by infrastructural technology design. The authors focus on the development of high-level services based on mobile telecommunication technologies that for matters of simplicity are termed the development of a Mobile Internet. The focus of the analysis is how features of the technology itself enable or constrain innovations. The authors do this by looking on a few embryos of the Mobile Internet (primarily the Norwegian CPA platform, but also two pre-CPA platforms in Norway and Japan’s i-mode) through the concepts of end-to-end architecture, programmability of terminals, and generativity. This analysis illustrates that the change from closed infrastructures like MobilInfo and SMSinfo to more open ones like CPA and i-mode increased the speed and range of innovation substantially. At the same time, the differences between CPA and i-mode regarding programmability of terminals and the billing service provided by the CPA network enabling the billing of individual transactions also contributed to basically the same speed and range of innovations around CPA as i-mode in spite of the huge differences in investments into the networks made by the owners. However, the analysis also points out important differences between the Internet and the existing Mobile Internet regarding technological constraints on innovations. It points out important ways in which powerful actors’ strategies inhibit innovations, and how they embed their strategies into the technology and, accordingly, create technological barriers for innovation.

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1. INTRODUCTION

The Internet as we know it is a standard and infrastructure spurring innovation and fuelling entrepreneurship in an unprecedented fashion. Its counterpart for mobile phones – the Mobile Internet – has however only modestly, at its best, become such an arena for entrepreneurship. The success of the Internet has been explained in different ways, but a central factor has been the flexibility and openness of its design. With an outset in the concept of loose coupling from software engineering and the argument for locating intelligence in the fringes (the so-called end-to-end argument) in network architecture design, Jonathan Zittrain (2006) have ventured more deeply into these matters and coined the key success factor of Internet as its generative capacity. More particularly, Zittrain define generativity as a technology’s capacity for leverage across a range of tasks, adaptability to a range of different tasks, ease of mastery, and accessibility. This conceptual framework illuminate that the essential flexibility of Internet as an infrastructure is not limited to its modularity and decentralized network architecture, but also the way in which it enable and leverage innovation performed by third-party contributors.

In this article, we discuss two early ‘instances’ of the Mobile Internet, namely the Japanese i-mode and the Norwegian CPA platform. By applying the concept of generativity, our aim is to disclose and to better understand the success and failure of attempts to create the Mobile Internet. By comparing with the Internet, we discern what generative capacities the i-mode and CPA platforms offer, how the capacities have developed and the motivations behind their development. Our contribution thus lies in a deeper insight in the successfulness of different approaches to the Mobile Internet in the way in which they support innovation.

Standardization is, of course, a critical issue in the development of all kinds of information infrastructures, and so also the Mobile Internet. Our primary focus is not explicitly on standards, but rather on issues and concepts, like architecture and the concept of generativity, that have huge influence on actors’ strategies for developing infrastructures, including strategies for developing standards and what kind of standards that are needed. Accordingly, we also contribute to the literature on standardisation with an extended perspective on flexibility, namely generativity.

The rest of this paper is designed like this. In section 2, we frame the concept of standardisation in the broader literature on standards and flexibility. In section 3, we describe our research methodology and approach. In section 4, we introduce the CPA and i-mode in brief, before we in section 5 compare and discuss their generative capacities. In the last section 6, we draw implications related to the further developments of the Mobile Internet as well as reflect on the applicability of the concept of generativity.

2. A CHANGING ‘WORLD OF STANDARDS’ AND THE NEW NEEDS FOR FLEXIBILITY

The research presented in this paper is part of a growing interest in research on infrastructure standardisation in general and on the tension between standardisation and flexibility within ICT in particular. This increasing interest is a result the transformation of the ‘world of standards’ (Brunsson & Jacobsson, 2002). This transformation is a result of the growth in the number and importance of standards due to the so-called convergence of telecommunications and information technologies. This convergence leads to the development of a whole range of new standards, and new kinds of standards, in particular domain specific ones like standards for Electronic Patient Records (see for instance Hanseth et al., 2006).

The necessity of flexibility, as well as the contradiction between standards and flexibility has been a central topic in the literature on standardisation. In this section, we describe how changes in information and telecommunication technologies