



## **Chapter IX**

# **Cyberinfrastructure for Next Generation Scholarly Publishing**

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## **Abstract**

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*This chapter deals with the future of scholarly publications as a key element of the knowledge production process of science and research. Publications are both at the input and the output side of knowledge creation and an important means of communication among scientists. In the age of cyberscience, or e-science, the publishing system is changing rapidly and we expect more fundamental changes to come as soon as most scholarly publishing has gone online and researchers have started to explore the new opportunities. A new kind of infrastructure is emerging that will add new actors to the traditional ones and potentially adds new functions and mechanisms. The chapter outlines the status quo and new technological as well as organizational options for scholarly publishing and develops a scenario of the next generation academic publishing system. It concludes with practical recommendations for designing the scholarly e-publishing cyberinfrastructure of the future.*

## Introduction and Approach

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Scholarly publications are a key element of the knowledge production process of science and research. They are both at the input and the output side of knowledge creation and they are an important means of communication among scientists. Hence, science and technology studies (STS) were and are interested in how publishing functions and develops. In the age of cyberscience—a notion that rather stresses the “soft” communicative aspects of the changing working environment (Nentwich, 2003)<sup>1</sup>—or e-science—focusing on global collaboration via the so-called Grid technology in the “hard” sciences (e.g., Hey & Trefethen, 2002)—the publishing system is changing rapidly. We expect more fundamental changes to come as soon as most scholarly publishing has gone online and researchers have started to explore the new opportunities, such as multimedia. A new kind of infrastructure—independent of the Grid—is emerging that adds new actors, such as the individual researcher who “self-publishes,” to the traditional ones, such as commercial publishing houses, and will change their roles. Furthermore, this infrastructure potentially adds new functions, such as quality labelling, or new mechanisms, such as self-archiving or use-tracking.

This chapter is based on an encompassing technology assessment (TA) study (Nentwich, 2003) whose main research question was how, specifically, will technological developments change the ways research is done. To answer such a broad question is no easy task, as cyberscience is a moving target and an elusive subject since research done in the area is fragmented and often unsystematic. In particular, STS is often about either “S” that is science (e.g., how scientists arrive at results) or about “T” that is technology (e.g., how society reacts to a new technology or how the latter is shaped by the former). Only seldom it is about both at the same time: about technology (use) in science. TA is a special, practically-oriented branch of STS. Cyberscience has many characteristics of an ideal subject for technology assessment: It is about emerging technologies whose impacts are already partly visible in the present and which have the potential of widespread application. It calls for an encompassing study because the various aspects are strongly interrelated. The topic needs to be treated in an interdisciplinary manner, as the impacts are in the political, cultural, legal, economic and social sphere. Last, but not least, it is about an ongoing development reaching into the future, so it makes sense to look at it not only from an analyst’s perspective, but also with a view to eventually formulating policy recommendations. Furthermore, this study and hence this chapter is informed by diffusion research, which is interested in how technological (or other) innovations are implemented (or not) in a social system, including organizations (Rogers, 1995). At the heart of this type of analysis are the innovation-decision process and the conditions for a successful innovation process. Hence, this

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