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Chapter VIII

Coordination and Control of Research Practice across Scientific Fields:
Implications for a Differentiated E-Science

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Abstract

This chapter speaks to the heterogeneity of research practices in science. It explores how cultural differences within and across disciplines shape the appropriation of e-science tools and infrastructures. Becher's (2001) anthropological perspective on academic disciplines and Whitley's (2000) organizational theory of scientific fields are used as a theoretical framework. The argument focuses on how differentials in the degree of interdependence between scientists and the level of uncertainty around research problems, objects, techniques and results affect the integration and coordination of

work organization. The resulting cultural configuration has implications for mechanisms of control and consensus around the adoption of new technology. The chapter also highlights how appropriation can in turn shape the work organization and research practices of scientific communities.

Introduction

There are a number of problems with the current vision of a revolutionary science based upon technological promise. Evaluation of the uptake and use of e-science technologies is problematic due to the diversity of cultural identities across knowledge domains, which vary in terms of their social organization, intellectual goals, methods, techniques and tools and competence standards. There have been many failed projects and costly mistakes in the history of information and communication technology design, and while the successes are lauded, the possible reasons underpinning failures are inadequately evaluated. It is now obvious that given time all fields will not adopt e-science infrastructures into their work practices in the same way or to the same extent (Kling & McKim, 2000). We know that in some fields, such as genetics and biodiversity, there has been an increasing reliance on large-scale databases and information and communication technologies (ICTs) (Fujimura & Fortun, 1996; Lenoir, 1998; Bowker, 2000), which have become central to the research process, while in others digital tools and infrastructures are at best on the periphery of knowledge creation practices (Fry, 2004).

In the context of e-science, it has been pointed out that social science approaches often focus on the technically-driven hard sciences and consequently follow the flow of funding initiatives (Wouters, 2004). This means that outside of these fields we have a limited understanding of how research cultures shape the appropriation of e-science tools and infrastructures and how in turn the technology influences research practices and cultural identity. The development and use of e-science technology is emerging both inside and outside the boundaries of prestigious high-tech sciences such as genetics and high-energy physics. For example, in physical geography information scientists are working with practitioners to integrate multiple data sources into digital libraries to support higher education curricula (Borgman et al., 2005). In corpus-based linguistics, developments in designing and building mega corpora of language in use have burgeoned since the mid 1980s. Technical developments in corpus-based linguistics have generated new approaches in literary studies, amongst other fields, where efforts in the digitization of collections of texts and the development of text-

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