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Chapter II

Computerization Movements and Scientific Disciplines: The Reflexive Potential of New Technologies

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Abstract

This chapter examines some of the factors which help to create a momentum for developing new infrastructures for scientific research. Specifically it discusses the usefulness of the "computerization movement" perspective for understanding how innovations in scientific practice catch on and to what effect, arguing that we need to understand the role that wider cultural perceptions about the potential of new technologies play in shaping high level policy and day-to-day practice in science. A case study to develop this point is drawn from one scientific discipline, biological systematics. Examination of a recent policy document suggests that a computerization movement is in progress in this discipline, accompanied by a variety of strategic responses. It can be seen that a computerization movement in

science can not only stimulate particular forms of technical activity, but also provide the occasion for focused discussions on the directions, goals and audiences for a discipline.

Introduction

It is axiomatic within science and technology studies that winning technological solutions are often not the ones which are "best" on purely technical grounds. Rather, technologies succeed through a complex set of social and economic considerations. One well-known example is the gas refrigerator, which lost out to electrical refrigeration. Gas-powered designs would have been quiet and reliable, but failed to win a strong market position thanks to the resources that General Electric was able to deploy to develop and promote their machines. Ruth Schwartz Cowan's (1985) account of the course of innovations in refrigeration is a classic in science and technology studies, demonstrating that we should not look to technical rationales alone to work out why a particular innovation succeeds.

In this chapter I will take this axiom of science and technology studies and explore its application to e-science. Specifically, I will use the momentum from Schwartz Cowan to justify looking at the dynamics which surround new technological infrastructures for research without assuming that technological superiority guarantees anything. I will be expecting, rather, that new technologies will need champions to introduce them to research communities and to demonstrate what they might be good for. I also expect that the technologies which are developed will be those which are credible within the community, desirable for individual researchers and institutions to invest themselves in and which are attractive to funding bodies. Whilst in the current volume we spend much of our time discussing the development of new, ideal and self-consciously innovative infrastructures for computing and data sharing, in this chapter I will be looking at factors which shape the landscape of existing projects within one discipline and the ways in which they are publicly promoted. This means that the technologies that I will be examining may not fit some of the more precise definitions of e-science and Grid computing. Indeed, one implication of my argument is that the precise definitions which emanate from high-level discussions are often subject to creative responses on the level of concrete initiatives, and at ground level it becomes harder to make sharp distinctions about the nature of the technologies involved.

I will be arguing that pronouncements about the role of information and communication technologies in science may be understood using frameworks