

All Hands Meeting 2008

Grids: A Knowledge Infrastructure requiring a Knowledge Infrastructure

The development of a Grid infrastructure within High Energy Physics is a highly collaborative, highly distributed and dynamic enterprise. The LCG (Large Hadron Collider Computing Grid) involves coordinating the actions of a huge range of people of different culture, education and skill, all working within different institutions around the globe. Vital in this enterprise are the ability to share knowledge about the project, and to support innovating new technology and new work practices. In part this is achieved by careful attention to developing a sense of community among participants, and through constructing a range of repositories of information about the project, the people, the grid itself and its performance.

Within this paper we explore the way in which the construction of LCG has required the development of such a knowledge infrastructure (Hanseth 2004) that, in many ways, parallels that of the Grid's more technical infrastructural elements. Indeed, we argue that the Grid is only made a sensible concept if we consider both elements.

We focus in particular on the work practices of GridPP, the UK contribution to LCG. Data collection for the paper was undertaken through over sixty interviews, participant observation, attendance at major GridPP meetings, site visits, and through three week long visits to CERN.

In this study we employ a range of theories from organization science with a specific focus on practice (Feldman 2000; Schatzki, Knorr-Cetina et al. 2001). Practice for us is the often taken for granted actions of people in their work; "a routinized way in which bodies are moved, objects are handled, subjects and treated, things are described and the world is understood" (Reckwitz 2002). Our analysis is presented from four interconnected and constitutive perspectives: community, history and culture, infrastructure and knowledge. These themes reflect the call for studies of knowledge management to consider the cultural, historical and technical context within which they reside (Venters and Wood 2007).

- 1) **Community:** Drawing on the notion of a Community of Practice (Brown and Duguid 1991; Wenger 1998) we discuss how the construction of the Grid creates a sense of community for GridPP and in doing constructs an identity for GridPP and for those involved in its construction.
- 2) **History and culture:** We discuss how the cultural context of particle physics and computer science impact the knowledge related practices of this community.
- 3) **Infrastructure:** GridPP rely upon a range of information infrastructure in creating and sharing their knowledge. These range from monitoring applications, websites, blogs, Wikis, video-conferencing and e-mail. We discuss how these technologies constitute GridPP as socio-materiality (Orlikowski 2007) and cannot be separated from the projects sense of identity or from its technical fabric.
- 4) **Knowledge:** Knowledge of the project is vital and flows around the rapidly changing GridPP community. Such knowledge has a tacit dimension (Polanyi 1967) shared by those participant in the community, but hidden from those not yet inducted. We discuss the relationship such knowledge has to the practices of those involved and to the learning of new members and users.

Through this interweaved analysis of GridPP we describe the complex knowledge infrastructure which accompanies Grid development. The paper draws upon recent literature in organization science and knowledge management to provide concrete recommendations to those involved in the development of Grids, and provides a checklist of necessary practices for those contemplating a distributed Grid development project.

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Short Abstract.

We argue that since the development of global Grids is collaborative, distributed and dynamic involving coordinating a range of people, so the ability to share knowledge about the project and to support innovation effectively is vital. We argue this is achieved in part by developing a sense of community among participants and through the construction of range of information repositories.

We explore the development of such a knowledge infrastructure within GridPP (UK's contribution to global LHC Computing Grid) from four interconnected perspectives: Community; History and Culture; Infrastructure (including online repositories); Knowledge. Through this interweaved analysis we aim to provide concrete recommendations to those involved in the development of distributed Grids, and provide a checklist for those contemplating such an enterprise.