Chapter 6
E-Infrastructures for International Cooperation

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ABSTRACT

E-infrastructures are becoming in Europe and in other regions of the world standard platforms to support e-Science and foster virtual research communities. This chapter provides the reader with a comprehensive view of the developments of e-Infrastructures in China, India, Asia-Pacific, Mediterranean, Middle-East, Sub-Saharan Africa, South-East Europe and Latin America and with an outlook on the very important issue of their long term sustainability.

INTRODUCTION: SOME OF THE WORLD "DIVIDES"

Almost 250 years after the publication of the illuministic and equalitarian theories of J. Rousseau, today's world still suffers from a very uneven distribution of opportunities. Figures 1, 2 and 3 show, respectively, the world maps of growth competitiveness, education attainment, and digital inclusion (Maplecroft, 2008).

Looking at the maps above, two considerations can be highlighted:

First, there is a considerably strong correlation among the three quantities reported: thus several factors contribute in parallel to keep increasing the gap between more advanced and less advanced countries, inducing endemic problems like large-scale immigration, under-development, alienation, and poverty. Along the same reasoning, fighting against more than one problem simultaneously could then help to alleviate the others. As reported by the Education and Training Task Force (ETTF) of the e-Infrastructure Reflection Group (e-IRG ETTF, 2008), country studies carried out both by the Organisation for Economic Co-operation and Development (OECD) and the World Bank have confirmed an obvious correlation between investment in education and quality of life and GDP.

Second, there are several centres of excellence and "hot-spots" in many of the countries suffering from the above mentioned "divides" and there is a need for cooperation actions aiming at improving their scientific competitiveness.

In this chapter we will demonstrate how the adoption of e-Infrastructures can effectively foster scientific cooperation between several more-developed and less-developed regions of the world, thus reducing endemic problems such as the "digital divide" and the "brain drain".

THE EUROPEAN AND THE GLOBAL RESEARCH AREAS

At the onset of the 21st century, the way scientific research is carried out in many parts of the world is rapidly evolving to what is nowadays referred to as e-Science, i.e. a scientific method which foresees the adoption of cutting-edge digital platforms known as e-Infrastructures throughout the process from the idea to the production of the scientific result. The e-Science vision is depicted in Figure 4.

Scientific instruments are becoming increasingly complex and produce huge amounts of data which are in the order of a large fraction of the whole quantity of information produced by all human beings by all means. These data are often relative to inter/multi-disciplinary analyses and have to be analyzed by ever-increasing communities of scientists and researchers, called Virtual Organisations (VOs), whose members are distributed all over the world and belong to different geographical, administrative, scientific, and cultural domains. The emerging computing model which is being developed since a decade or so is what is called "The Grid", i.e. a large number of computing and storage devices, linked among them by high-bandwidth networks, on which a special software called middleware (intermediate between the hardware and the operating system and the codes of the applications) is installed,