

Chapter 6

E–Infrastructures for International Cooperation

Giuseppe Andronico

Italian National Institute of Nuclear Physics, Italy

Antun Balaž

Institute of Physics of Belgrade, Serbia

Tiwonge Msulira Banda

Ubuntunet Alliance, Malawi

Roberto Barbera

Italian National Institute of Nuclear Physics, Italy

Bruce Becker

Meraka Institute, South Africa

Subrata Chattopadhyay

Centre for Development of Advanced Computing, India

Gang Chen

Institute of High Energy Physics, China

Leandro N. Ciuffo

Italian National Institute of Nuclear Physics, Italy & RNP, Brazil

P. S. Dhekne

Bhabha Atomic Research Centre, India

Philippe Gavillet

CETA-CIEMAT, Spain & CERN, Switzerland

Salma Jalife

CUDI, Mexico & CLARA, Uruguay

John Wajanga Aron Kondoro

Dar Es Salam Institute of Technology, Tanzania

Simon C. Lin

ASGC, Taiwan

Bernard Marie Marechal

CETA-CIEMAT, Spain & Universidade Federal de Rio de Janeiro, Brazil

Alberto Masoni

Italian National Institute of Nuclear Physics, Italy

Ludek Matyska

CESNET, Czech Republic

Redouane Merrouch

CNRST, Morocco

Yannis Mitsos

Greek Research and Technology Network, Greece

Kai Nan

Chinese Academy of Sciences, China

Suhaimi Napis

Universiti Putra Malaysia, Malaysia

Salwa Nassar

ERI, Egypt & NARSS, Egypt

Marco Paganoni

University of Milano Bicocca, Italy

Ognjen Prnjat

Greek Research and Technology Network, Greece

Depei Qian

Beihang University, China

Sijin Qian

Peking University, China

Mario Reale

GARR, Italy

Federico Ruggieri

Italian National Institute of Nuclear Physics, Italy

Cevat Şener

Middle Eastern Technical University, Turkey

Dipak Singh

ERNET, India

Yousef Torman

JUNET, Jordan

Alex Voss

University of St. Andrews, UK

David West

DANTE, UK

Colin Wright

Meraka Institute, South Africa

DOI: 10.4018/978-1-61350-113-9.ch006

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,

51 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/infrastructures-international-cooperation/58744

Related Content

Panel: Current State and Future of Event-Based Systems

Annika Hinze, Jean Bacon, Alejandro Buchmann, Sharma Chakravarthy, Mani Chandi, Avigdor Gal, Dieter Gawlick and Richard Tibbetts (2010). *Principles and Applications of Distributed Event-Based Systems* (pp. 432-454).

www.irma-international.org/chapter/panel-current-state-future-event/44411

Abstractions and Middleware for Petascale Computing and Beyond

Ivo F. Sbalzarini (2012). *Technology Integration Advancements in Distributed Systems and Computing* (pp. 161-178).

www.irma-international.org/chapter/abstractions-middleware-petascale-computing-beyond/64447

Using Inter-Block Synchronization to Improve the Knapsack Problem on GPUs

Xue Sun, Chao-Chin Wu, Liang-Rui Chen and Jian-You Lin (2018). *International Journal of Grid and High Performance Computing* (pp. 83-98).

www.irma-international.org/article/using-inter-block-synchronization-to-improve-the-knapsack-problem-on-gpus/210176

Parallel Applications Mapping onto Network on Chip Based on Heterogeneous MPSoCs Using Hybrid Algorithms

Dihia Belkacemi, Mehammed Daoui, Samia Bouzeffrane and Youcef Bouchebaba (2019). *International Journal of Distributed Systems and Technologies* (pp. 37-63).

www.irma-international.org/article/parallel-applications-mapping-onto-network-on-chip-based-on-heterogeneous-mpsocs-using-hybrid-algorithms/226961

Model-Driven Engineering, Services and Interactive Real-Time Applications

Luis Costa, Neil Loughran and Roy Grønmo (2012). *Achieving Real-Time in Distributed Computing: From Grids to Clouds* (pp. 16-40).

www.irma-international.org/chapter/model-driven-engineering-services-interactive/55240