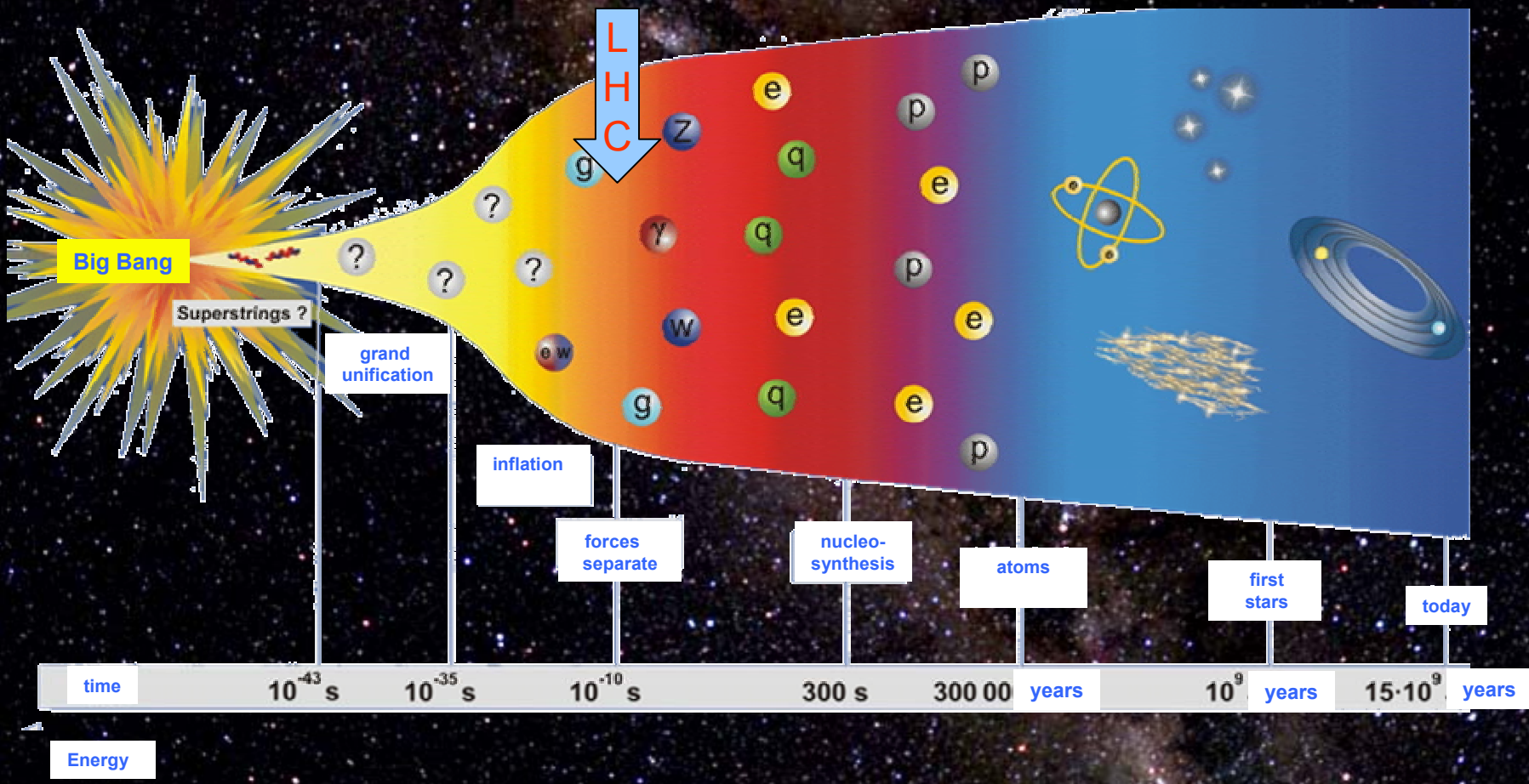
Grids and LHC, towards a first global Grid Prototype

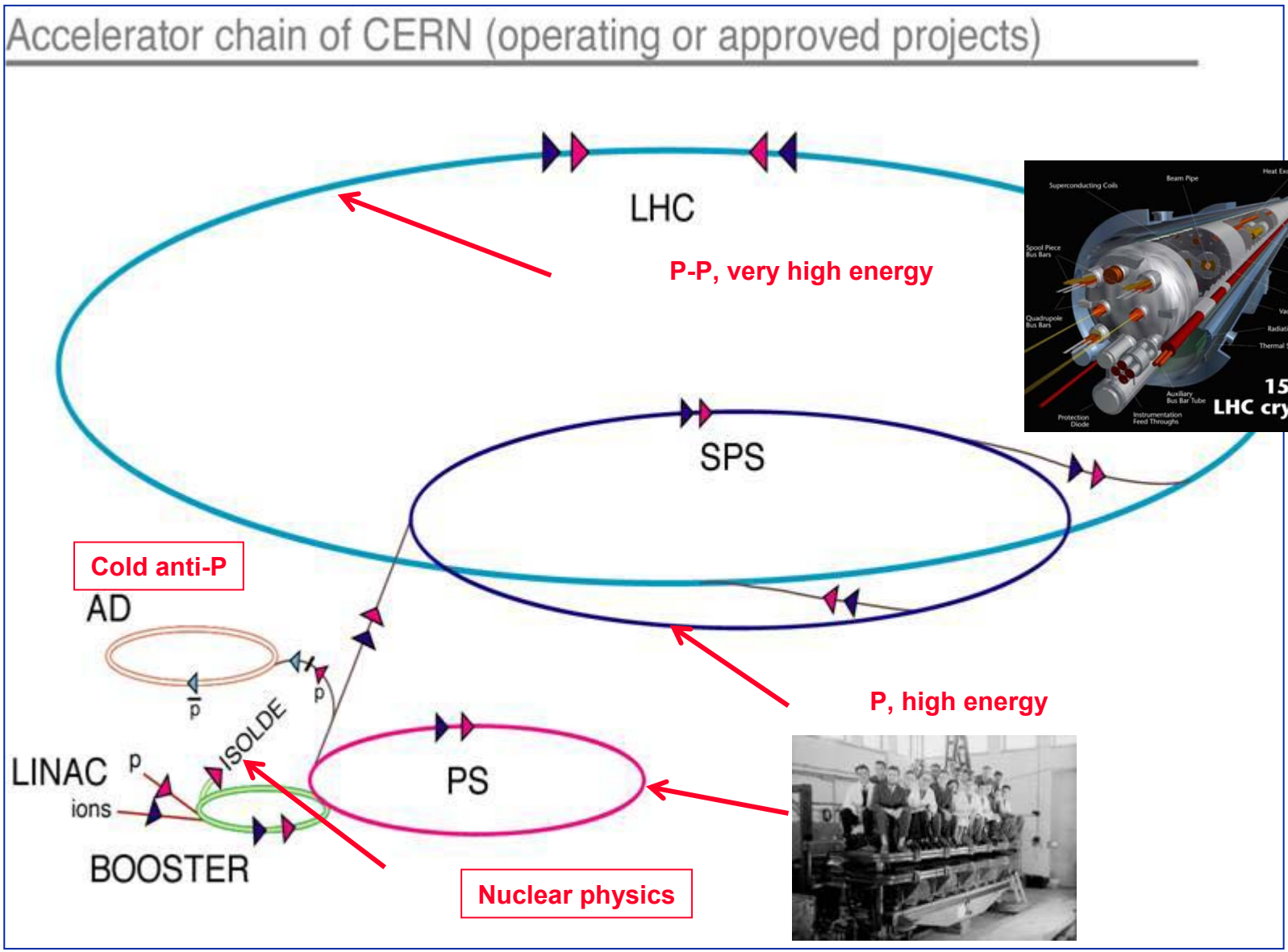
International Collaboration – "e- Inclusion"

Hans F Hoffmann/CERN

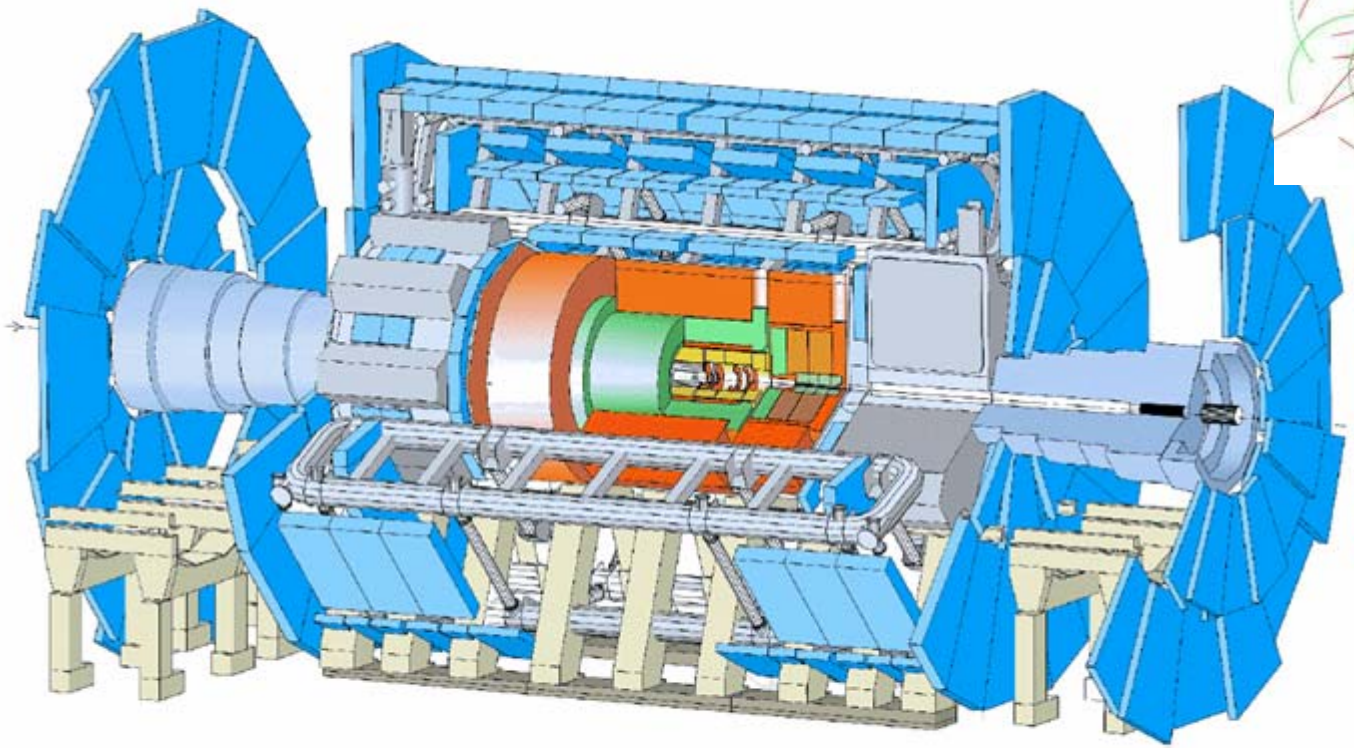
http://cern.ch/Hans.Hoffmann/EU-EDG-LCG-RSIS.ppt

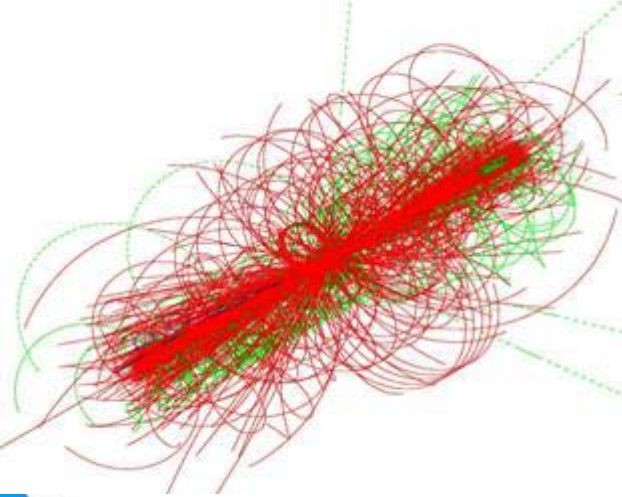


Scientific Instruments



Grids





„Eventually, users will be unaware they are using any computer but the one on their desk, because it will have the capabilities to reach out across the internet and obtain whatever computational resources are necessary”
(Larry Smarr and Charles Catlett, 1992)

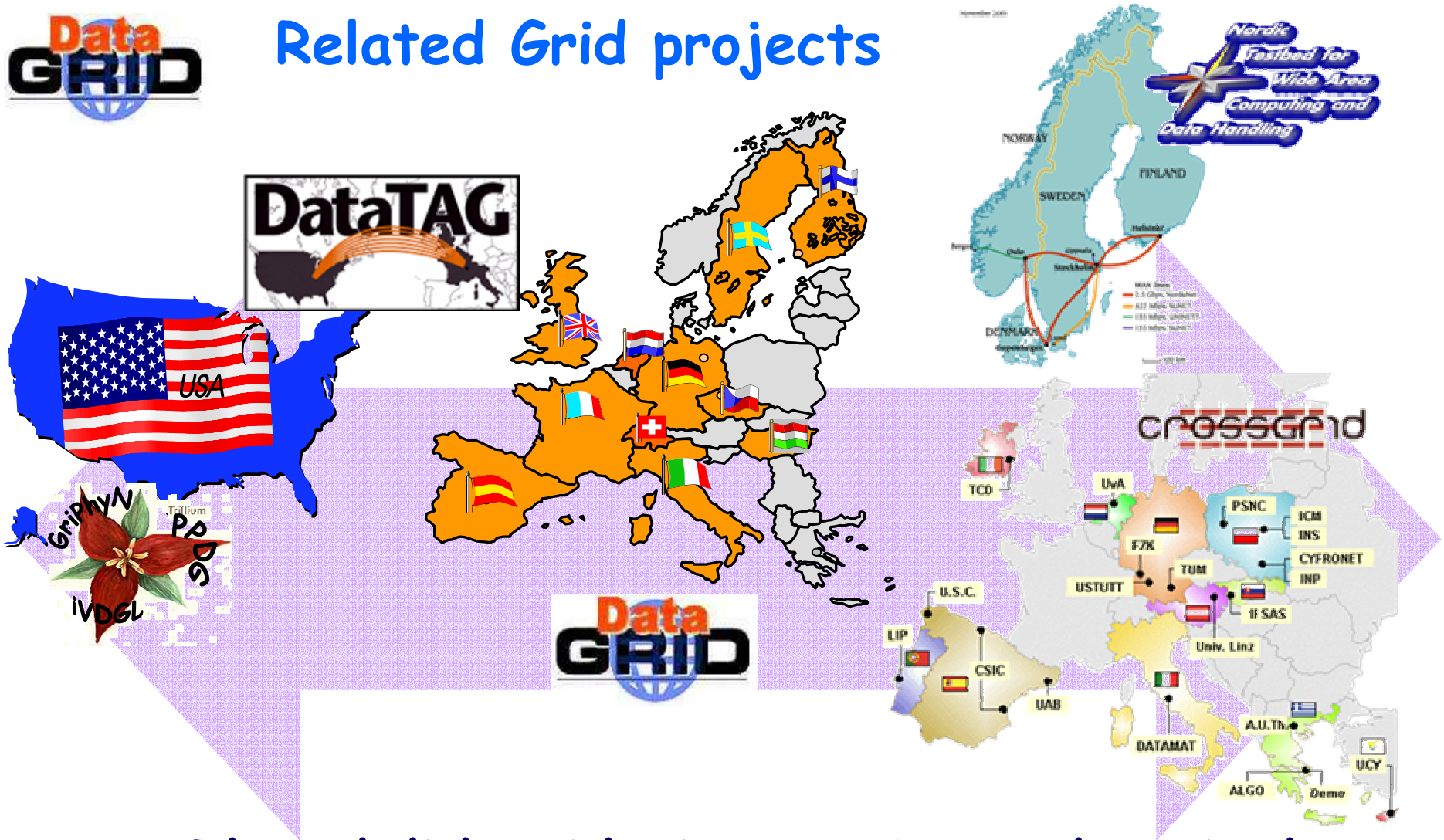
CERN's Network in the World

270 institutes in Europe, 4600 scientists
210 institutes elsewhere, 1650 scientists
1 LHC experiment: ~1/3 of this

Create a Grid infrastructure

In the CERN WWW tradition: useful also for other sciences, industry and the people

Related Grid projects



Through links with sister projects, there is the potential for a truely global scientific applications grid

Goal of the LHC Computing Grid Project - LCG

To prepare and deploy the LHC computing environment to help the experiments' analyse the data coming from the detectors

Phase 1 – 2002-05
development of common applications, libraries, frameworks, prototyping of the environment, operation of a pilot (grid-)computing service

Phase 2 – 2006-08
acquire, build and operate the LHC computing service

Initial set of Middleware for 1st prototype, LCG1, July 2003 24*7 service

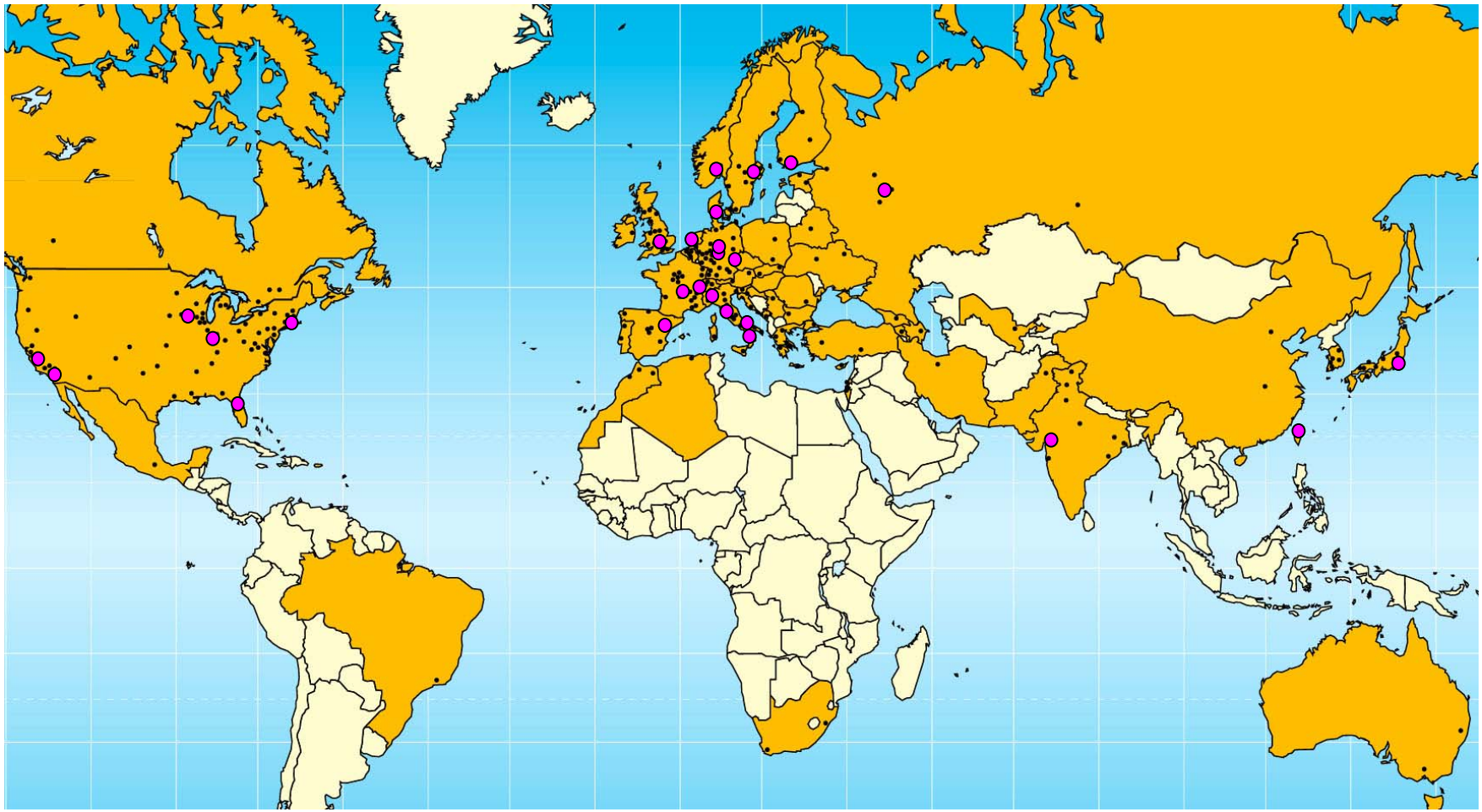
Components from:

European DataGrid – EDG – includes replica catalogue, resource broker, replica management tools, gatekeeper, testbed experience

VDT - includes components from several different US projects, including Globus and Condor

Lower functionality than was expected to be available at this time, additional components will be added as they become available and demonstrate sufficient reliability

Centres taking part in the LCG prototype service (2003-05)



around the world → around the clock

last update: 19/06/2003 12:10

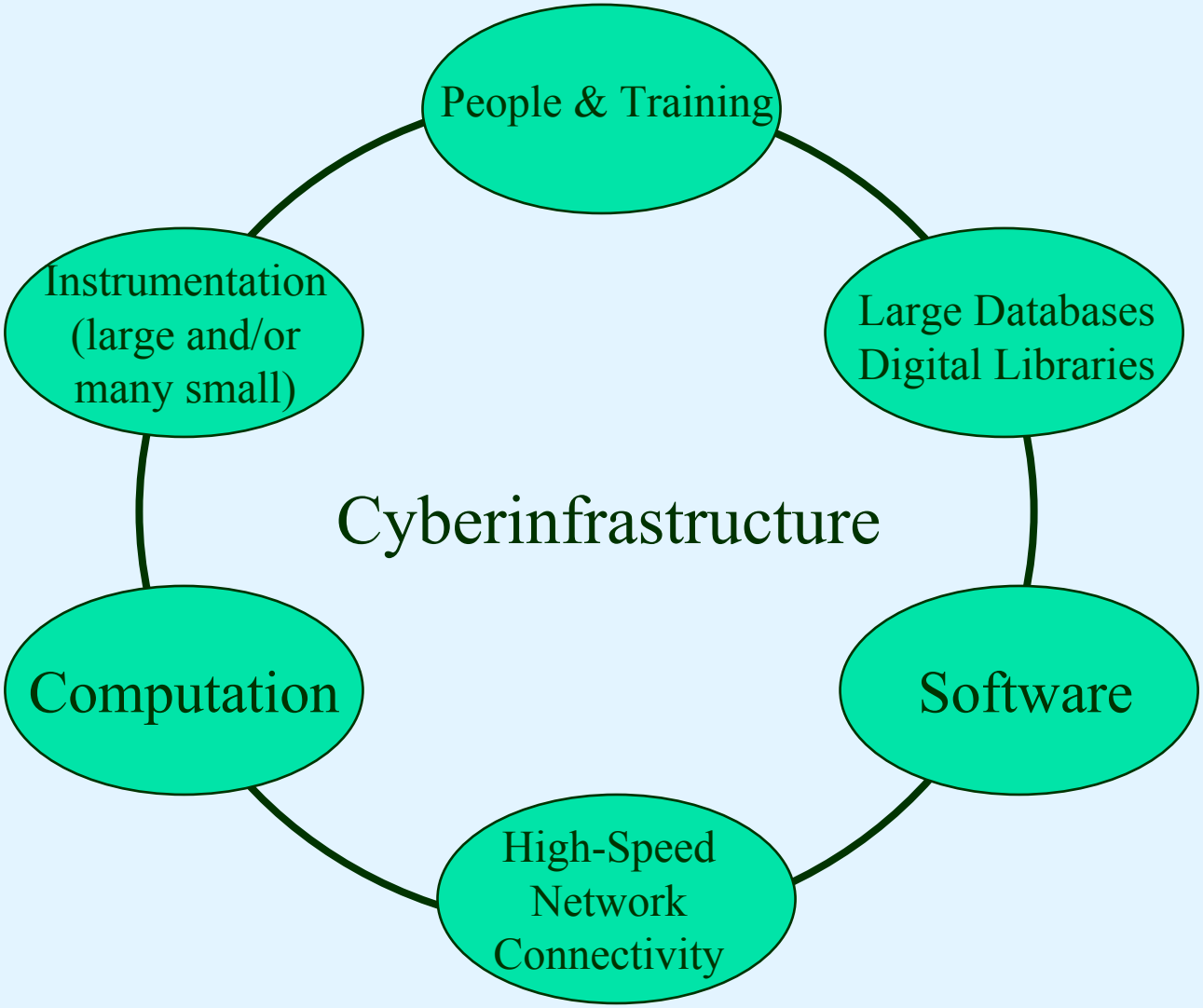
International Context

- EU: Grid Research and Deployment (FP6)
- UK: e-Science

  'e-Science is about global collaboration in key areas of science, and the next generation of infrastructure that will enable it.' John Taylor

- Other European national initiatives: NorduGrid, I, F, DE, Central Europe, S-E Europe (GR)
- US: Cyber – Infrastructre (NSF) – Global Science Infrastructure (DOE)

Cyberinfrastructure



Five Principles

[0] The cost and complexity of 21st Century Science requires the creation of advanced and coherent global Infostructure (information infrastructure).	**(global cost sharing)**
[1] The construction of a coherent Global Infostructure for Science require definition and drivers from Global Applications (that will also communicate with each other)	**(applications give benefits that justify expense)**
[2] Further, forefront Information Technology must be incorporated into this Global Infostructure for the Applications to reach their full potential for changing the way science is done..	**(Frontiers & Global for real changes)**
[3] LHC is a near term Global Application requiring advanced and un-invented Infostructure and is ahead in planning compared to many others.	**(LHC is a frontier)**
[4] U.S. agencies must work together for effective U.S. participation on Global scale infostructure and the successful execution of the LHC program in a 4 way agency partnership, with international cooperation in view.	**(national then global)**

Global Infrastructure for Science

Supercomputing and Large-Scale Storage

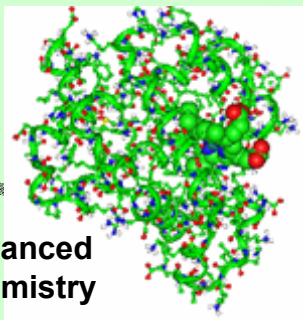
experiment

theory

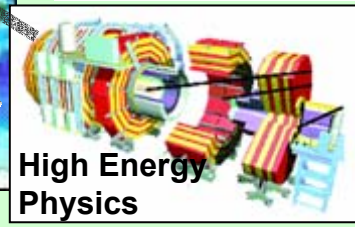
simulation

High Speed Networks

Computing and Storage of Scientific Groups



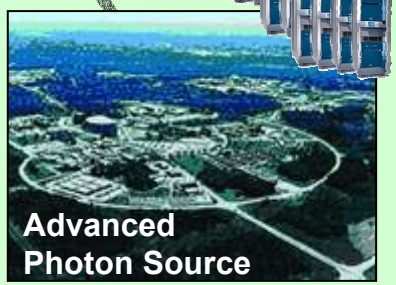
Advanced Chemistry



High Energy Physics

Advanced Engine Design

Macromolecular Crystallography



Advanced Photon Source

Spallation Neutron Source

Global Grid Middleware Institute
(Paul Messina)

- **What would GMI be?**

  International organization (an ***Institute***) sponsored by the EU, European Countries and several US Federal agencies (and Asia Pacific, Industry?)

- **Mission**

  Produce, maintain standard conforming and interoperable grid middleware.

- **Goal**

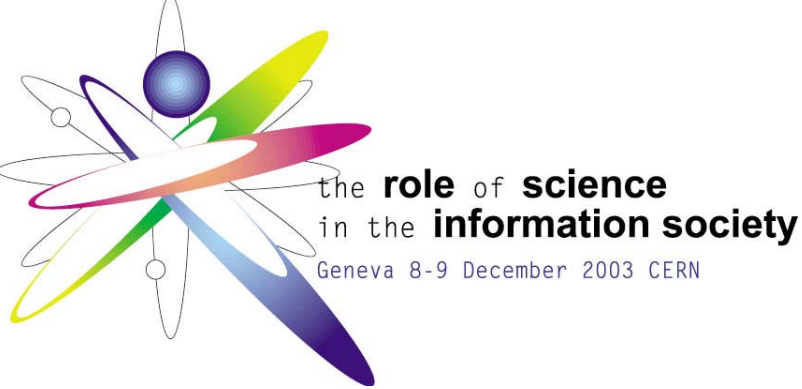
  ensure that Grid middleware becomes production-quality and acquires sufficient functionality quickly enough to meet the expectations of the emerging grid user communities

- **Implementation of the institute would be in a distributed/virtual organization**

An ambitious strategic goal for EU in the next decade

"...to become the most competitive and dynamic knowledge-based economy in the world..."

(Lisbon Summit 2000)



The Role of Science In the Information Society (RSIS)

An Event of the World Summit on the Information Society

1.5-day conference, on December 8 and 9, at CERN

- Governments, scientific policy agencies
- Scientists, heads of institutes

world summit
on the information society
Geneva 2003 - Tunis 2005

sommet mondial sur
la société de l'information
Genève 2003 - Tunis 2005

cumbre mundial sobre
la sociedad de la información
Ginebra 2003 - Túnez 2005

信息社会世界高峰会议
2003年 日内瓦 - 2005年 突尼斯

Всемирная встреча на высшем уровне по вопросам информационного общества
Женева, 2003 г. – Тунис, 2005 г.

القمة العالمية لمجتمع المعلومات
جنيف 2003 – تونس 2005

the role of science in the information society
Geneva 8-9 December 2003 CERN

Why is it important?

Science is a key public good that underpins the information society. The fundamental scientific and technological components of the Information Society have been driven by the search for fundamental knowledge and solutions to specific problems. The Information Society tools, from electricity and radio waves to the World Wide Web and browsers, were all discovered or invented in scientific and academic laboratories.

Scientific research and technology drive today's economies and serve as twin pillars of progress for advances in knowledge for all humankind. Scientific knowledge often has international applicability. Information and communication technologies have the capacity to increase accessibility to scientific knowledge worldwide.

Science brings the peoples of the world together, contributes to education, health, economic development in a sustained environment and can help to overcome the digital divide