Issues in e-Science

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Overview

- background to e-Science and Grids in UK:
  - history
  - applications and toolsets
  - e-science in the UK
- issues and challenges:
  - simplifying access for end users
- the future:
  - grids tomorrow
  - Scottish grid service

e-Science and the Grid

‘e-Science is about global collaboration in key areas of science, and the next generation of infrastructure that will enable it’

‘e-Science will change the dynamic of the way science is undertaken’

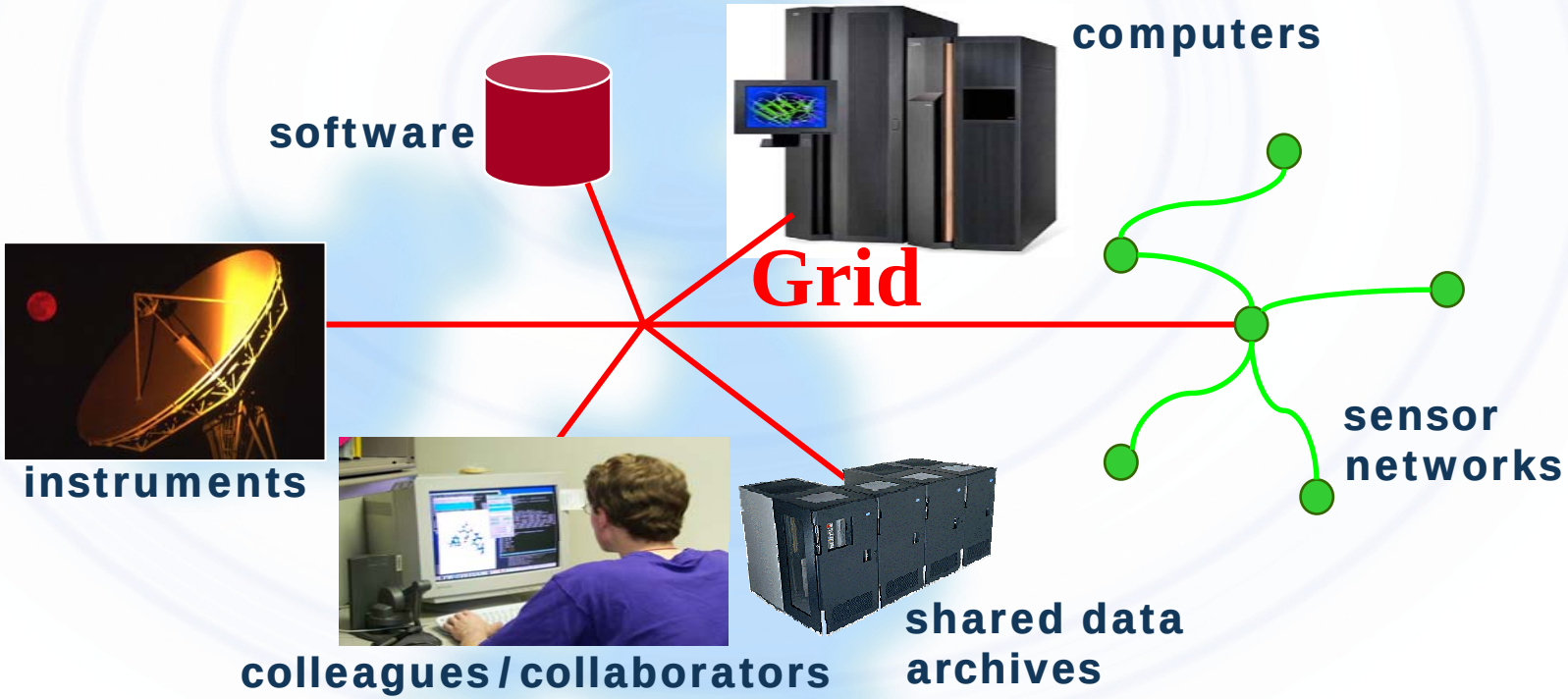
John Taylor
Director General of Research Councils
Office of Science and Technology

Grids are the infrastructure for e-Science:

- metaphor of Power Grid
- computation and data resources on demand

The e-Science Approach

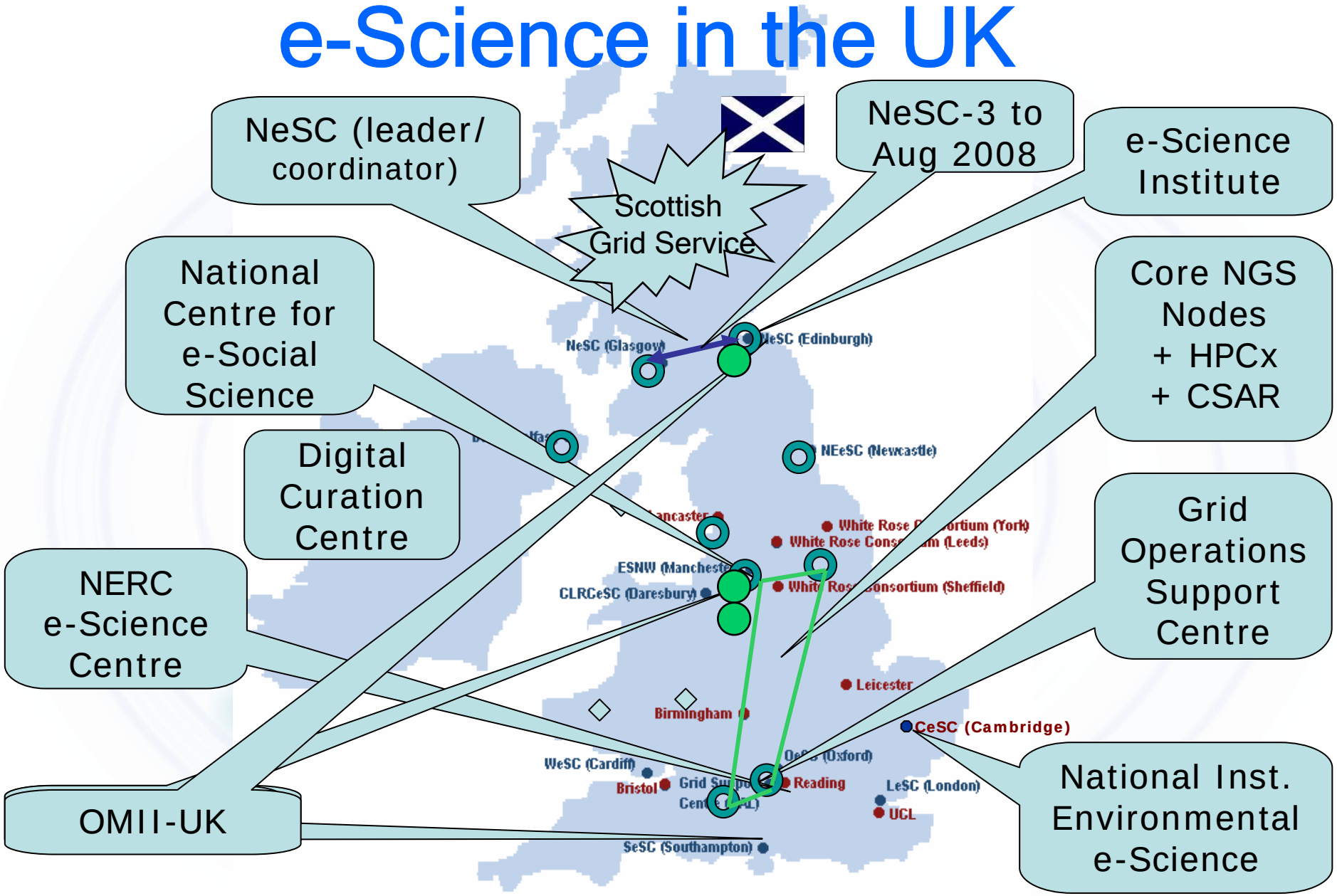
- transforming science, engineering, medicine and business:
  - driven by exponential growth in data and computing
  - enabling a whole-system approach



Grid Techniques

- application areas:
  - e-social science
  - e-health
  - life sciences
  - physics ...
- toolsets:
  - Globus Toolkit
  - OMII (Open Middleware Infrastructure Institute)
  - gLite (Grid lightweight middleware) ...

e-Science in the UK



Issues and Challenges

- not yet a push-button technology
- overall architecture for Grids still being defined (Open Grid Services Architecture):
  - has moved towards web services architecture
- architecture not prescriptive:
  - no hard notion of conformance, compliance or test suites
  - different solutions need proven to interwork

The Grid Today

- mostly users funded to use Grids:
  - 'me-Science' culture
  - good IT knowledge needed to use Grid middleware
  - focused more on technology than on supporting research
  - mostly oriented towards system developers
  - lack of real services and data sets
  - need to move towards service provision

Ease of Use

- for e-science to be truly successful:
  - must be as seamless and easy to use as the Internet
  - must be based on research pull and not middleware push
  - digital certificates for authentication are disliked
  - must be easy to get onto the Grid

Current Security Approach

- Public Key Infrastructure (X.509) is common:
  - Step 1.
    - get a certificate
  - Step 2.
    - register with places you expect to use
  - Step 3.
    - read the manuals for how to submit and run jobs

How Can we Improve Things?

- domains should follow a common approach
- best to exploit local authentication:
  - sites know if users still at institution
  - sites know what user privileges should be
- approach supported by Shibboleth:
  - based on trust between domains
  - home sites authenticate users
  - authorisation is role-based
  - will replace Athens across the UK

Grids Tomorrow

- resources accessed much as for the Internet:
  - log in once at home site
  - roam wherever credentials permit
- application sets for different communities:
  - research applications wrapped as Grid services
  - sites defines who can use what and when
- data sets hosted on/accessible through Grid:
  - occupational data sets
  - census databases ...

Scottish Grid Service

- case is currently being formulated:
  - outline proposal agreed by SFC as ‘strategically important for Scotland’
  - move towards service-based infrastructure
- application areas:
  - physics, life sciences
  - bioinformatics, electronics
  - arts and humanities, social science …
  - may need to pick the most suitable disciplines

Find out More

- NeSC are happy to provide training:
  - lectures, seminars
  - themed events, workshops
- NeSC web site (*www.nesc.ac.uk*):
  - primary source for UK e-Science
  - who is doing what on what projects
  - newsletter