Edinburgh e-Science TOE

Training Outreach and Education

http://www.nesc.ac.uk/training

NGS National Grid Service

http://www.ngs.ac.uk

The National Grid Service

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egee

http://www.eu-egee.org/

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- This presentation can be re-used for academic purposes.

- However if you do so then please let training-support@nesc.ac.uk know. We need to gather statistics of re-use: no. of events, number of people trained. Thank you!!

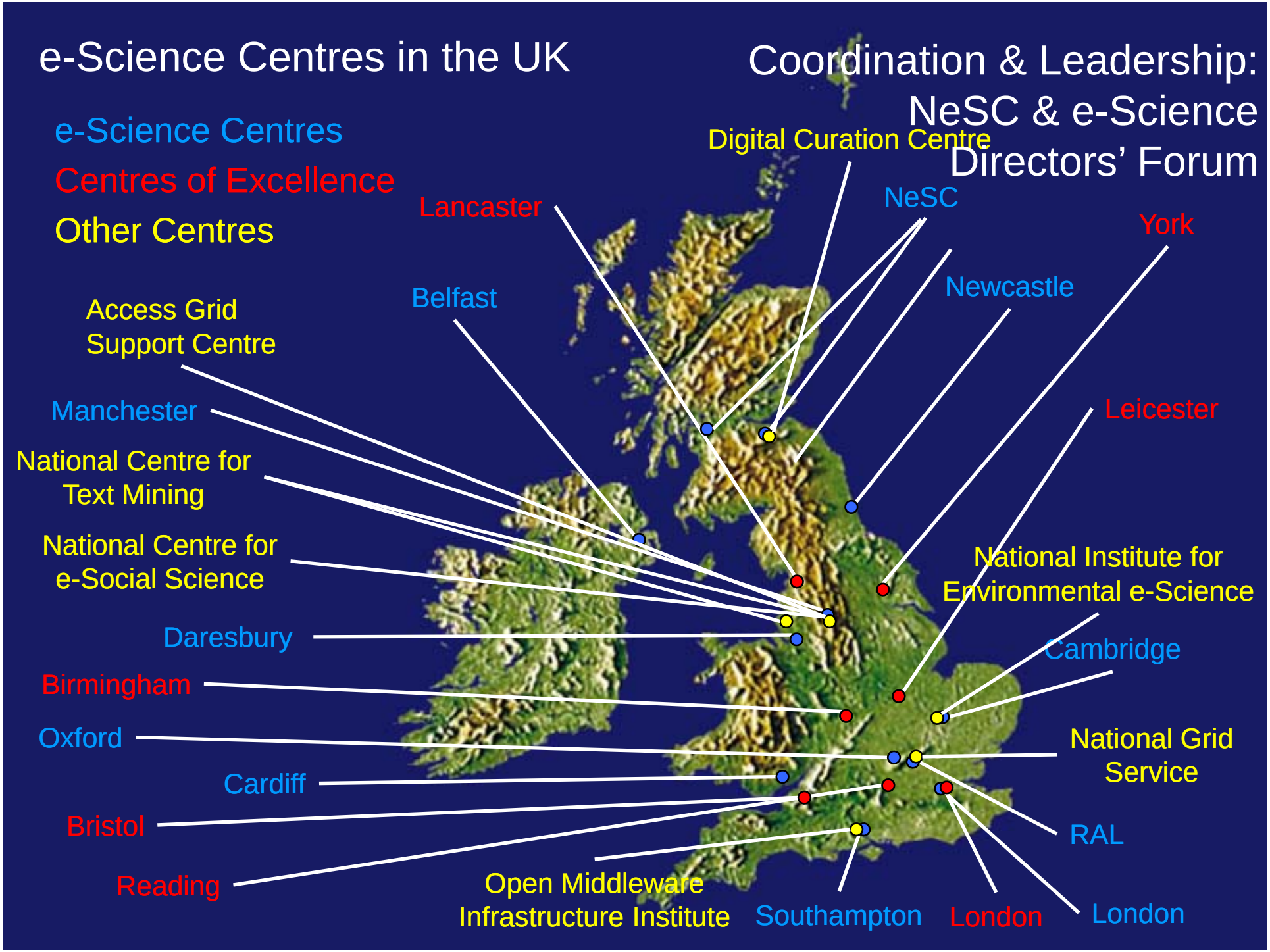
Acknowledgements

- Some NGS slides are taken from talks by Stephen Pickles and Andy Richards
- Also slides from Malcolm Atkinson on the UK e-Science programme

NGS
National Grid Service

Overview

- e-Infrastructure in the UK
- The National Grid Service


e-Science Centres in the UK
e-Science Centres
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Other Centres
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Digital Curation Centre
Lancaster
NeSC
York
Belfast
Newcastle
Access Grid
Support Centre
Manchester
Leicester
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Text Mining
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Daresbury
Cambridge
Birmingham
Oxford
National Grid
Service
Cardiff
Bristol
RAL
Reading
Open Middleware
Infrastructure Institute
Southampton
London
London

UK e-Infrastructure

Users get common access, tools, information,
Nationally supported services, through NGS

ScotGRID
ULGrid
Regional and Campus grids

HRCx + HECtoR

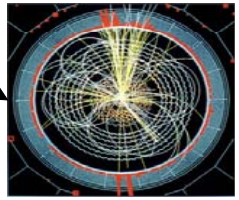
GridPP
UK Computing for Particle Physics
eMinerals
BRIDGES
Community Grids

NGS
UKERNA

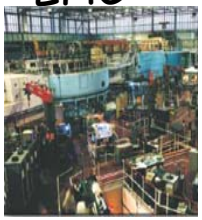
Integrated internationally

VISTA
ALMA

diamond



LHC



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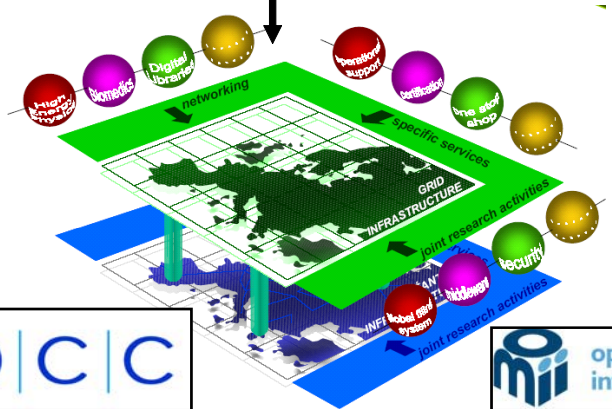


DCC

open middleware infrastructure institute

NGS
National Grid Service

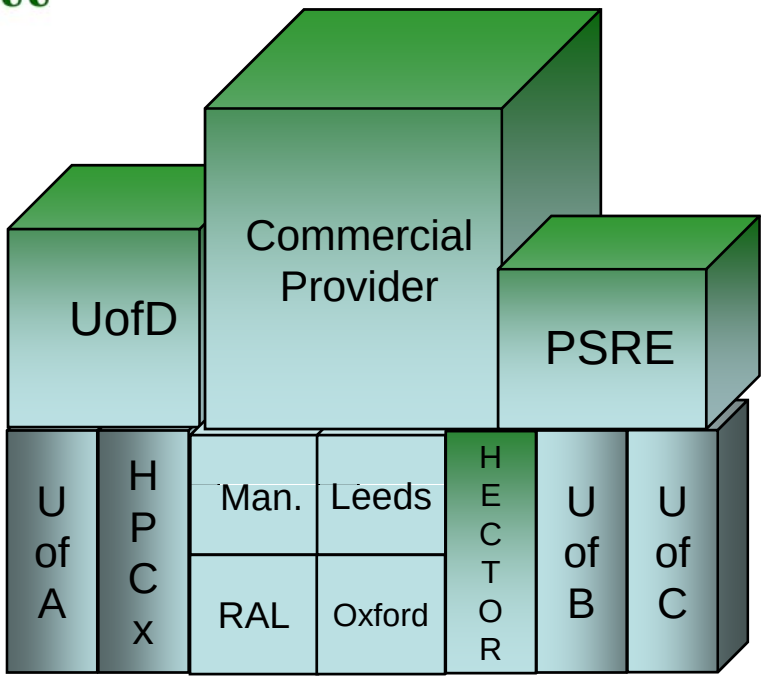
The National Grid Service

The National Grid Service

- The core UK grid, resulting from the UK's e-Science programme.
  - Grid: virtual computing across admin domains
- Production use of computational and data grid resources
  - For projects and individuals
  - Free at point of use to UK academics
  - Note: Scalability demands universities/VOs contribute resources
- Supported by JISC: “core sites”, operations, support
  - Entered 2nd phase of funding in October 2006: 2 ½ years
  - Longer terms plans being laid

National Grid Service

NGS Vision



NGS Core Nodes: Host core services, coordinate integration, deployment and support
+free to access resources for all VOs. Monitored interfaces + services

NGS Partner Sites: Integrated with NGS, some services/resources available for all VOs
Monitored interfaces + services

NGS Affiliated Sites: Integrated with NGS, support for some VO's
Monitored interfaces (+security etc.)

General principle here: establish core and grow it:
compute, data and operational services

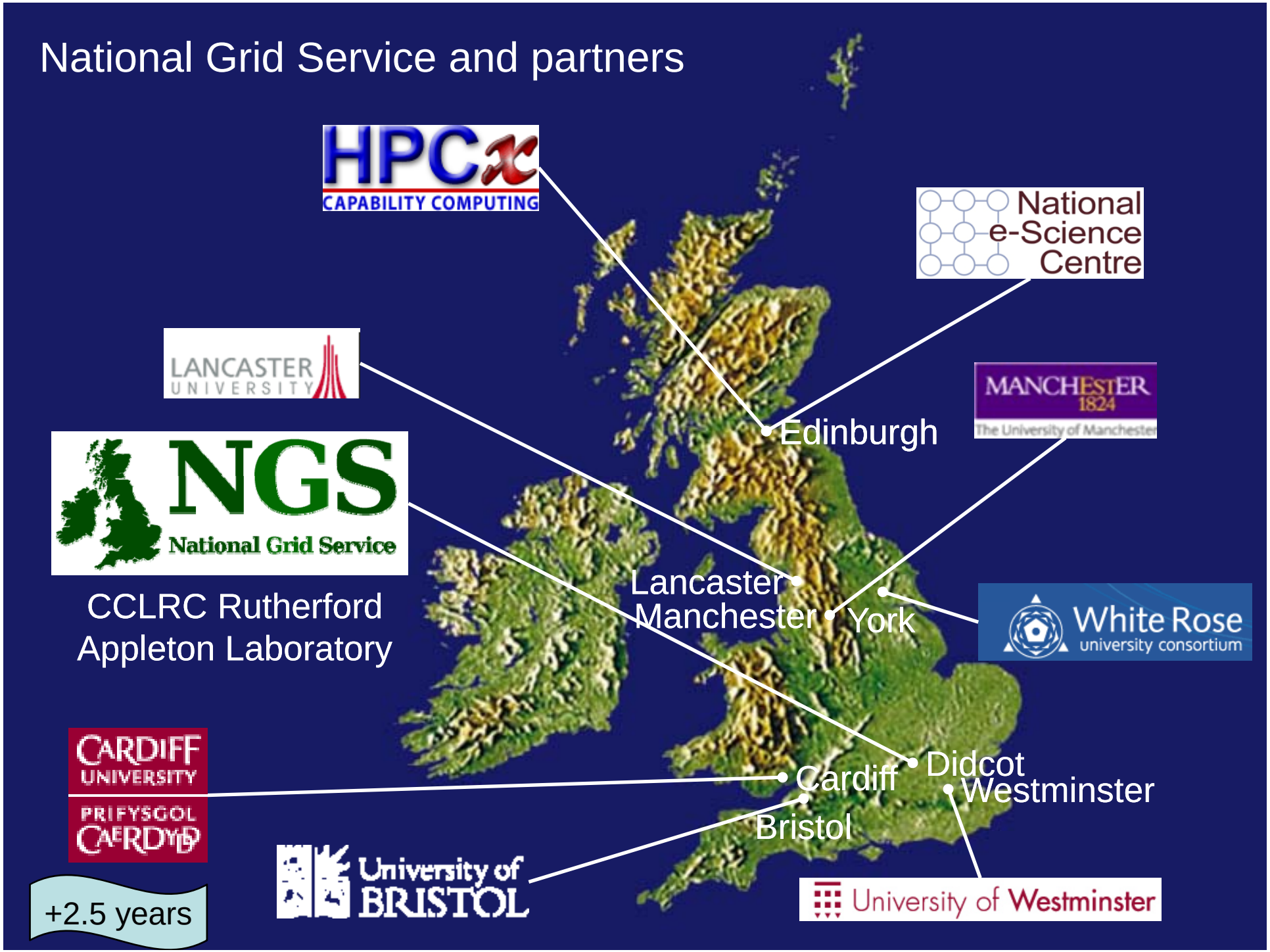
NGS Compute Facilities

- **Leeds** and **Oxford (core compute nodes)**
  - 64 dual CPU intel 3.06GHz (1MB cache). Each node: 2GB memory, 2x120GB disk, Redhat ES3.0. Gigabit Myrinet connection. 2TB data server.
- **Manchester** and **Rutherford Appleton Laboratory (core data nodes)**
  - 20 dual CPU (as above). 18TB SAN.
- **Bristol**
  - initially 20 2.3GHz Athlon processors in 10 dual CPU nodes.
- **Cardiff**
  - 1000 hrs/week on a SGI Origin system comprising 4 dual CPU Origin 300 servers with a Myrinet™ interconnect.
- **Lancaster**
  - 8 Sun Blade 1000 execution nodes, each with dual UltraSPARC IIICu processors connected via a Dell 1750 head node. ***UPGRADE IN NEAR FUTURE!***
- **Westminster**
  - 32 Sun V60 compute nodes
- **HPCx**
  - …

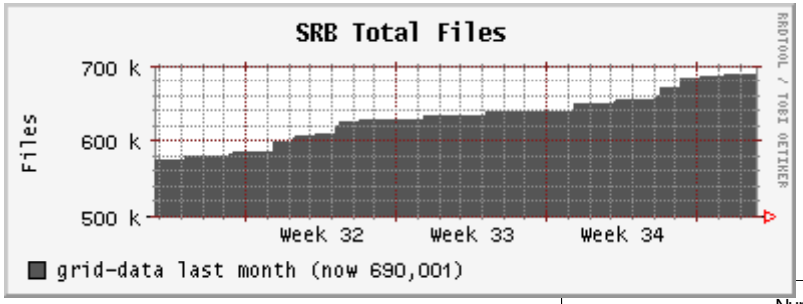
For more details: http://www.ngs.ac.uk/resources.html

Note: heterogeneity of compute nodes

National Grid Service and partners

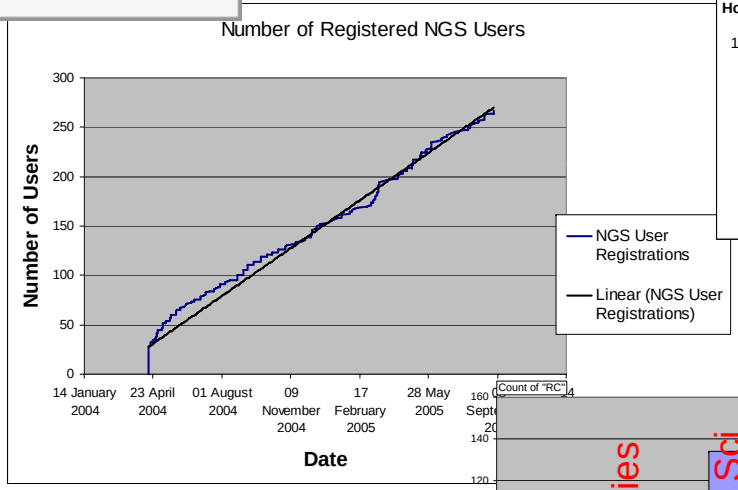


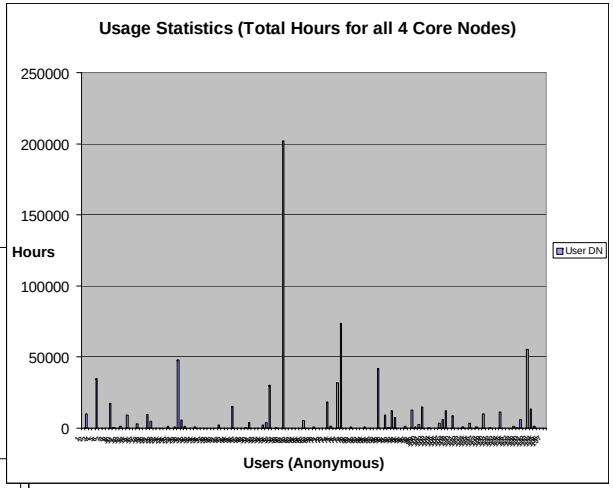
NGS Use



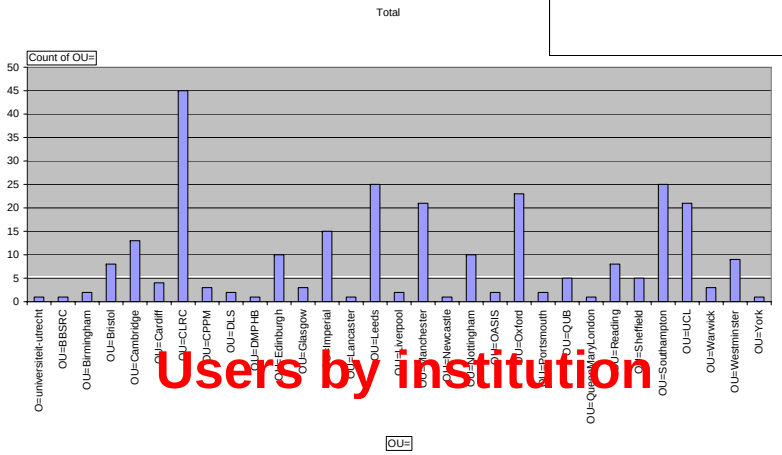
Files stored

~400 users

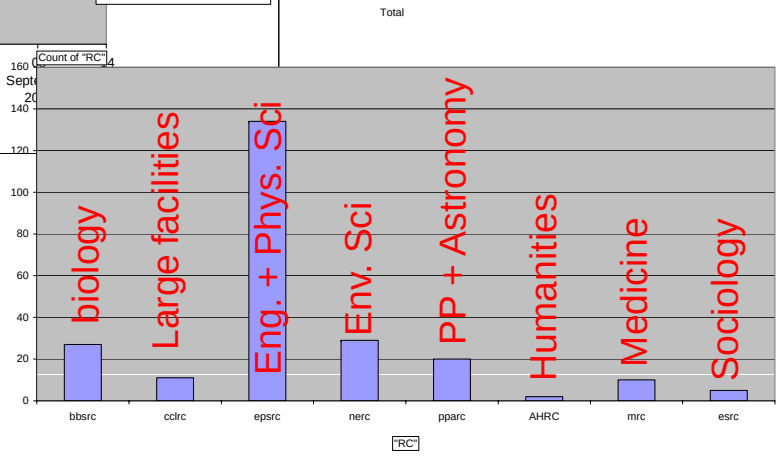




CPU time by user



Users by institution



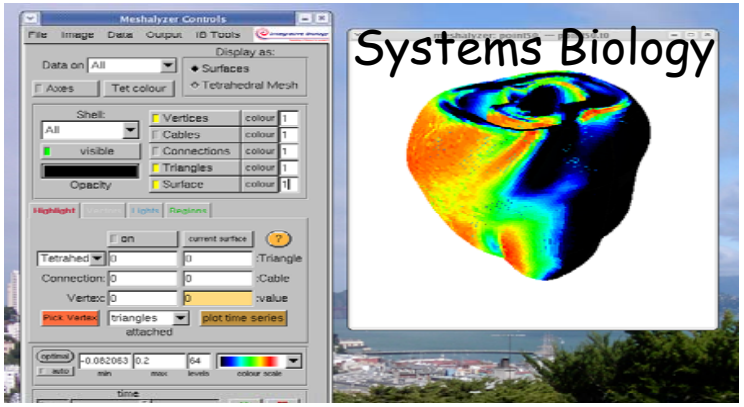
Users by discipline

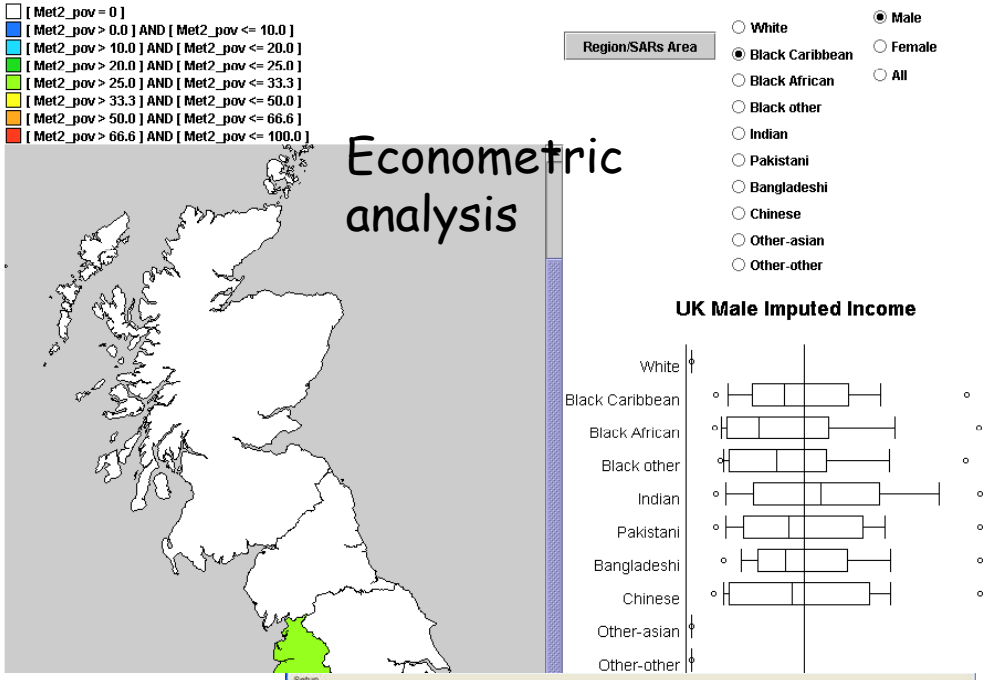
Supporting Services

- UK Grid Services
  - National Services
    - Authentication, authorisation, certificate management, VO registration, security, network monitoring, help desk + support centre.
  - NGS Services and interfaces
    - Job submission, simple registry, data transfer, data access and integration, resource brokering, monitoring and accounting, grid management services, workflow, notification, operations centre.
  - NGS core-node Services
    - CPU, (meta-) data storage, key software
  - Services coordinated with others (eg OMII, NeSC, EGEE, LCG):
    - Integration testing, compatibility & Validation Tests, User Management, training

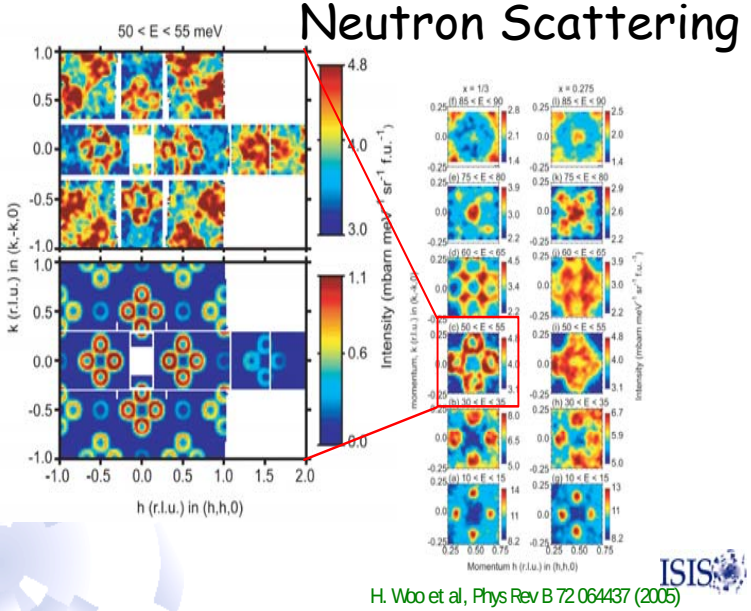
- Administration:
  - Policies and acceptable use
  - Service Level Agreements and Definitions
  - Coordinate deployment and Operations
  - Operational Security

Applications: 2

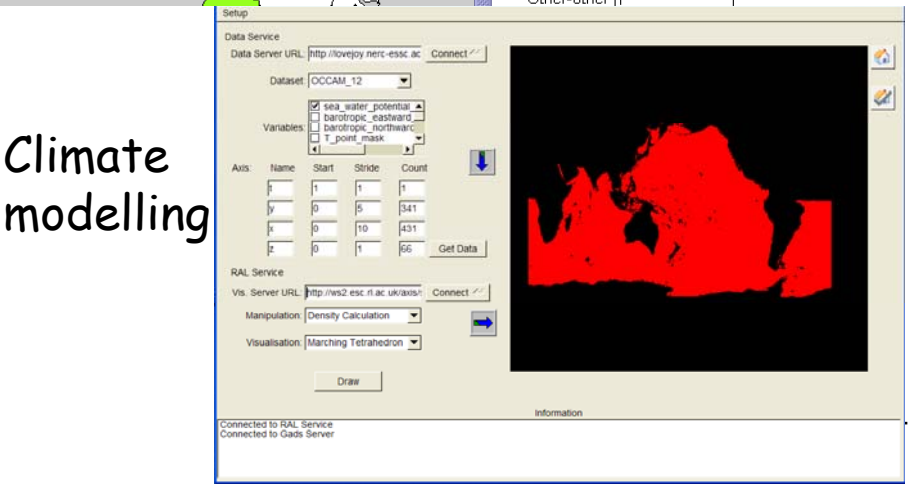




Example: $La_{2-x}Sr_xNiO_4$



H. Woo et al, Phys Rev B 72 064437 (2005)



Membership options

Two levels of membership (for sharing resouces):

1. Affiliates
   - run compatible stack, integrate support arrangements
   - adopt NGS security policies
   - all access to affiliate's resources is up to the affiliate
     - except allowing NGS to insert probes for monitoring purposes
2. Partners also
   - make "significant resources" available to NGS users
   - enforce NGS acceptable use policies
   - provide accounting information
   - define commitments through formal Service Level Descriptions
   - influence NGS direction through representation on NGS Technical Board

NGS software

- **Computation services** based on Globus Toolkit
  - Use compute nodes for sequential or parallel jobs, from batch queues
  - Can run multiple jobs concurrently
- **Data services**:
  - Storage Resource Broker:
    - Primarily for file storage and access
    - Virtual filesystem with replicated files
  - "OGSA-DAI": Data Access and Integration
    - Primarily for grid-enabling databases (files, relational, XML)
  - NGS Oracle service
- Authorisation, Authentication
  - Built on GSI, VOMS – details later

NGS Software - 2

- Middleware recently deployed
  - Portal v2
  - GridSAM – alternative job submission and monitoring
- Developed by partners:
  - Application Hosting Environment: AHE
  - P-GRADE portal and GEMLCA
- Being deployed
  - VOMS support
  - WS-GRAM: GT4 job submission
  - Resource Broker
- Under development
  - Shibboleth integration

Gaining Access

Free (at point of use) access to core and partner NGS nodes

1. Obtain digital X.509 certificate
   - from UK e-Science CA
   - or recognized peer
2. Apply for access to the NGS

National HPC services

- HPCx

- Must apply separately to research councils
- Digital certificate and conventional (username/ password) access supported

NGS
National Grid Service

Key facts

- Production: deploying middleware after selection and testing – major developments via Engineering Task Force.
- Evolving:
  - Middleware
  - Number of sites
  - Organisation:
    - VO management
    - Policy negotiation: sites, VOs
- International commitment
- Continually gathering users' requirements – National Grid *Service*

Web Sites

- NGS
  - http://www.ngs.ac.uk
  - To see what's happening: http://ganglia.ngs.rl.ac.uk/
  - Wiki service: http://wiki.ngs.ac.uk
  - Training events: http://www.nesc.ac.uk/training

- HPCx
  - http://www.hpcx.ac.uk

NGS
National Grid Service

Summary

- NGS is a production service
  - Therefore cannot include latest research prototypes!
  - Formalised commitments - service level agreements
- Core sites provide computation and data services
- NGS is evolving
  - New sites and resources being added
  - Groiwng support for VOs (as well as individual users)
  - New software deployed recently – later in course