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# The National Grid Service

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- 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



# Overview

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

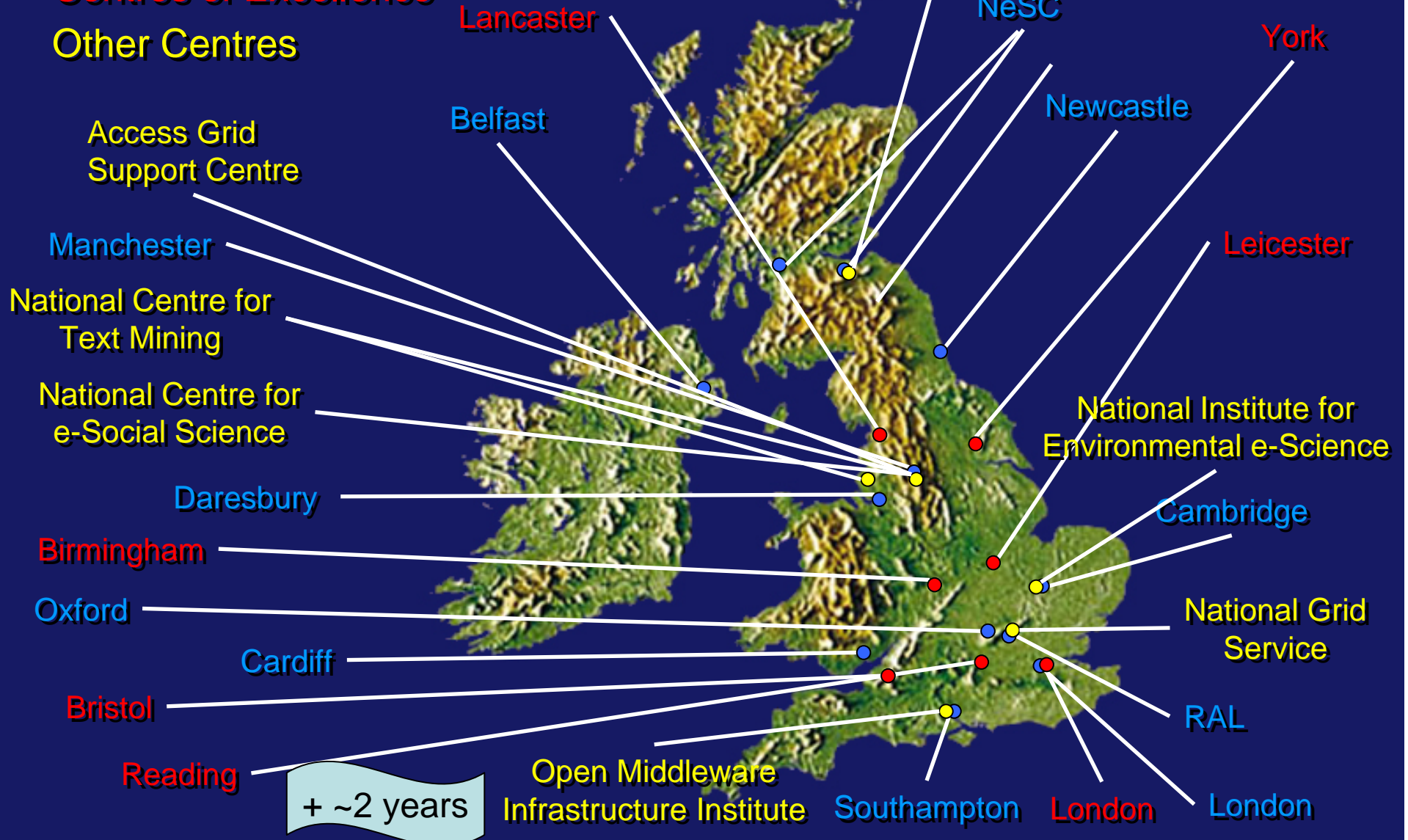
# e-Science Centres in the UK

e-Science Centres

Centres of Excellence

Other Centres

Coordination & Leadership:  
NeSC & e-Science  
Directors' Forum





Edinburgh

+5 years

# OMII-UK nodes

EPCC & National e-Science Centre

School of Computer Science  
University of Manchester



Edinburgh

School of Electronics and  
Computer Science  
University of Southampton

Manchester

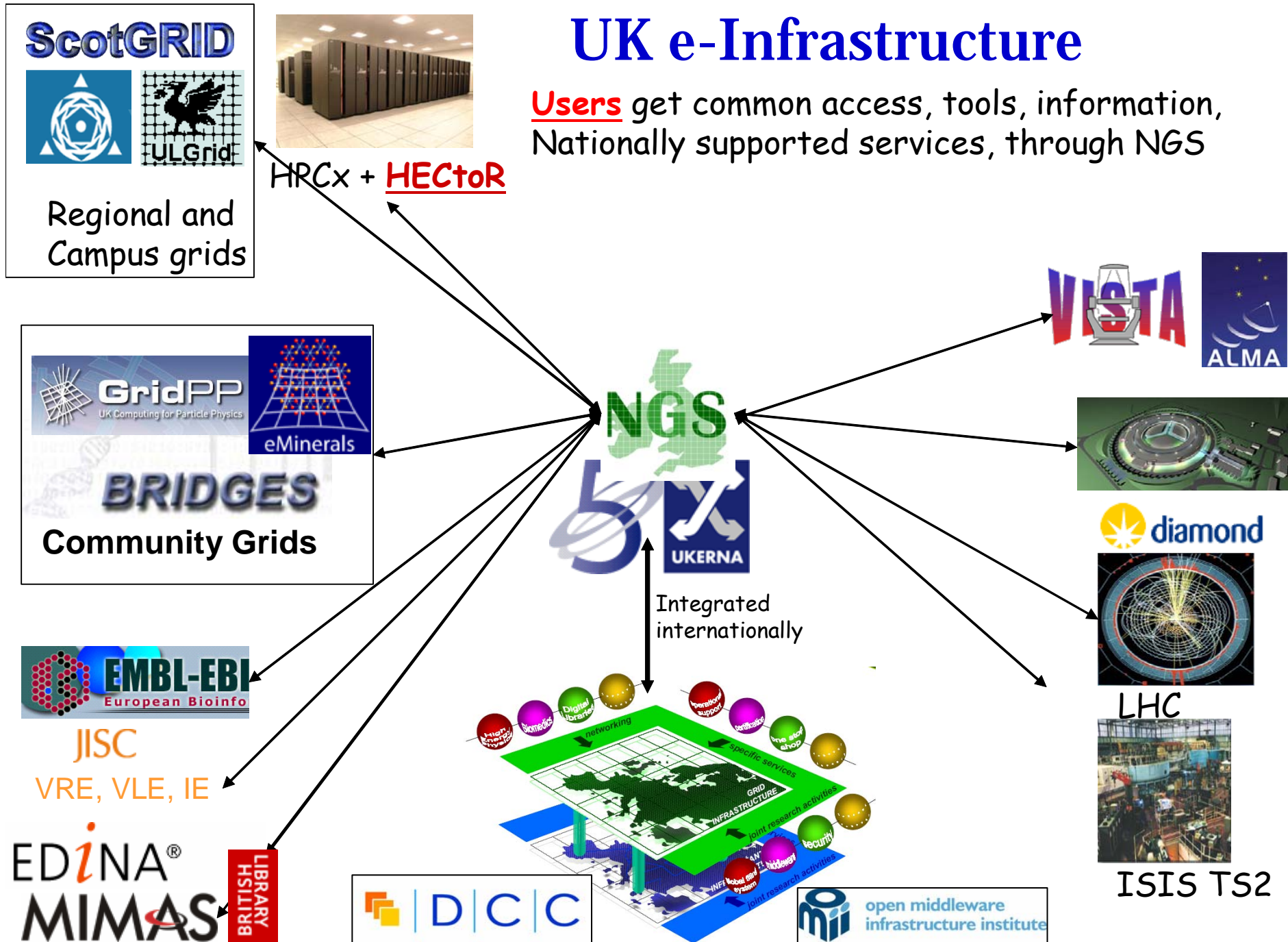


Southampton

+3 years

# UK e-Infrastructure

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







# **The National Grid Service**

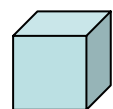
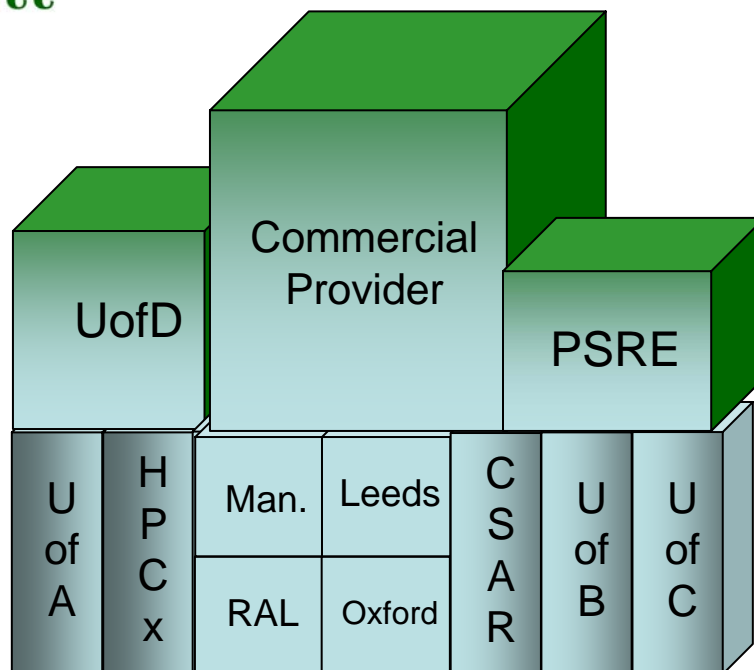


# The National Grid Service

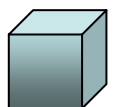
- The core UK grid, resulting from the UK's e-Science programme.
  - Grid: virtual computing across admin domains
- Production use of computational and data grid resources.
- Supported by JISC
  - October 2006: entered 2<sup>nd</sup> phase of funding, 2 years



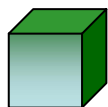
**National  
Grid  
Service**



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.)

# National Grid Service and partners



CCLRC Rutherford  
Appleton Laboratory

Edinburgh  
Lancaster  
Manchester  
York

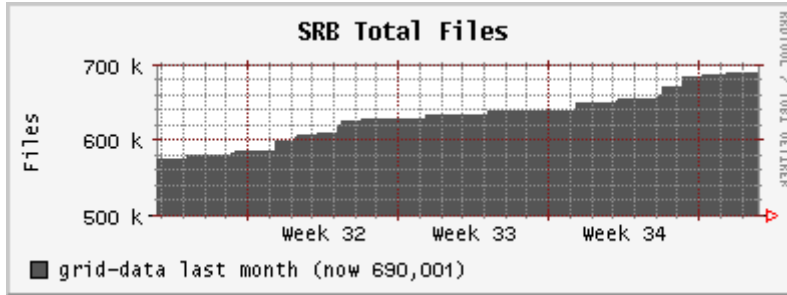


Didcot  
Westminster  
Cardiff  
Bristol



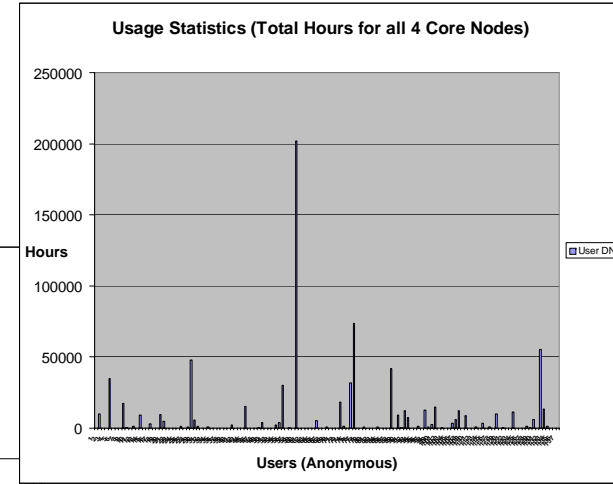
+2.5 years

# NGS Use

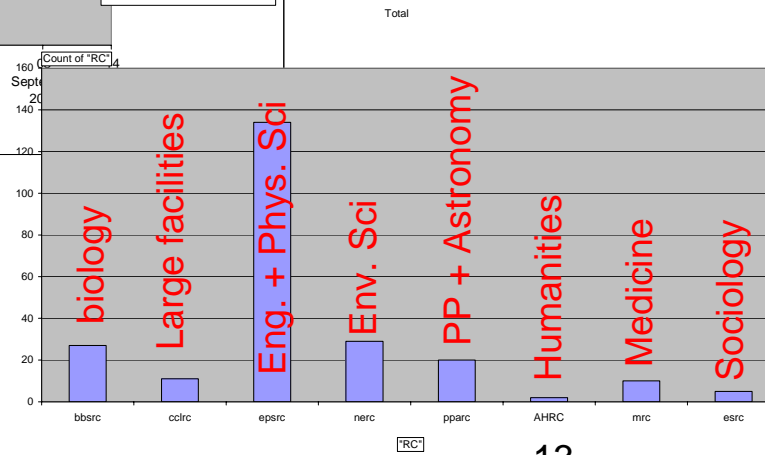
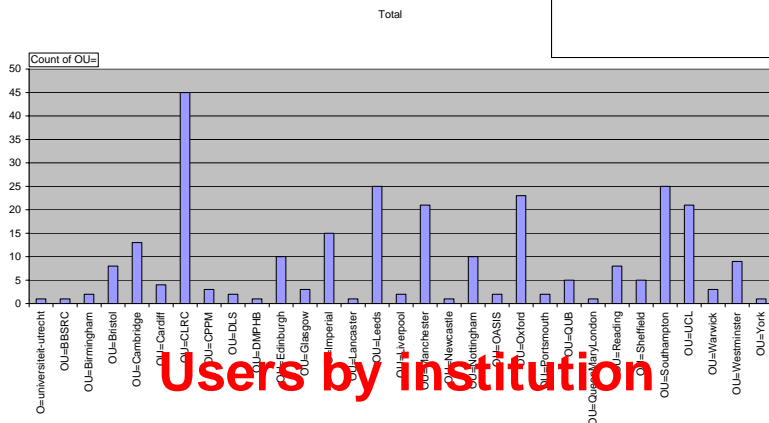
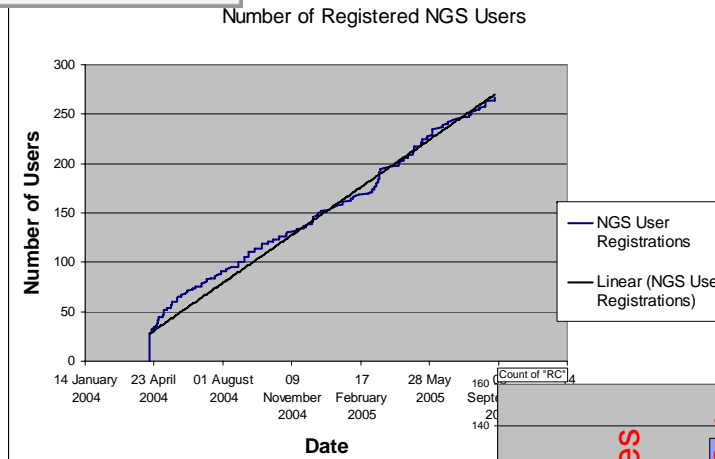


**Files stored**

**~400 users**



**CPU time by user**



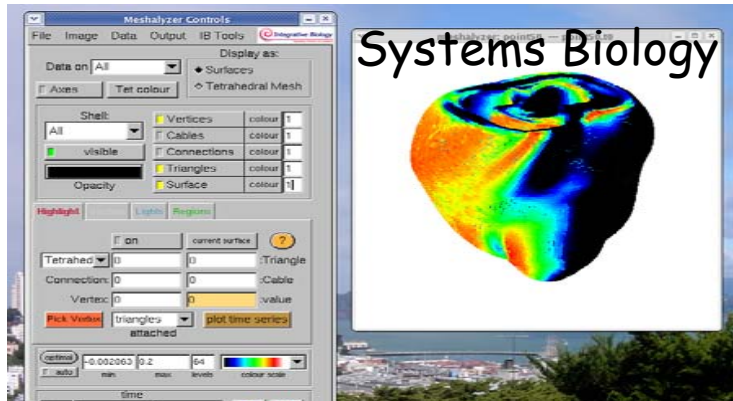
**Users by discipline**



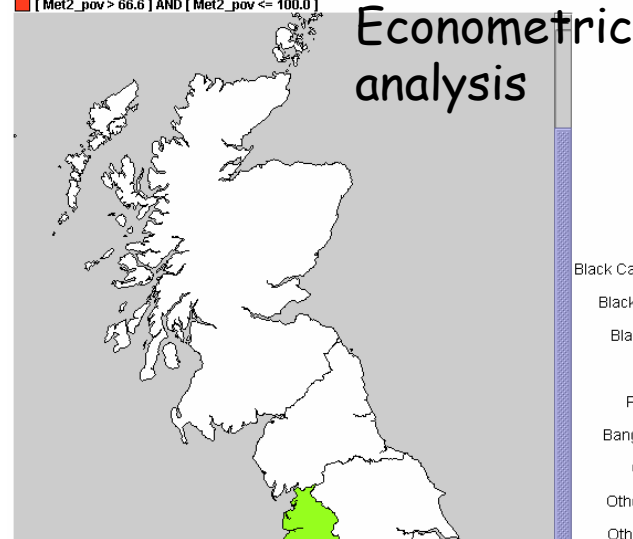
# Supporting Services

- 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

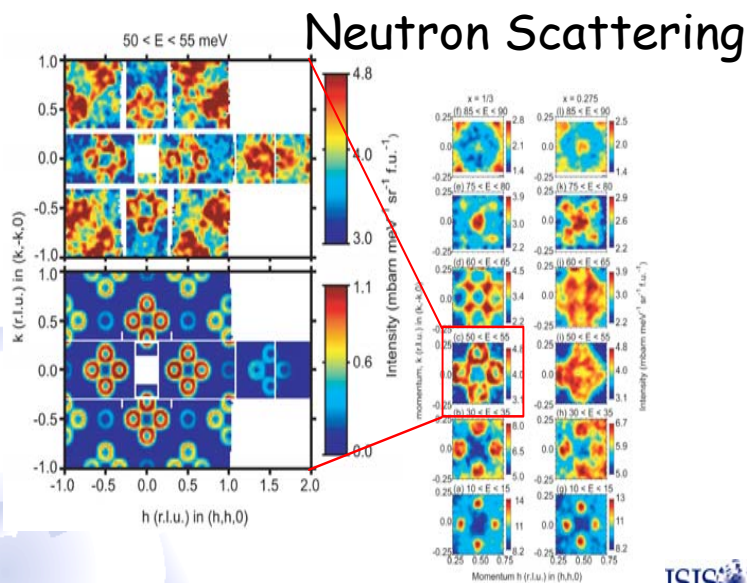
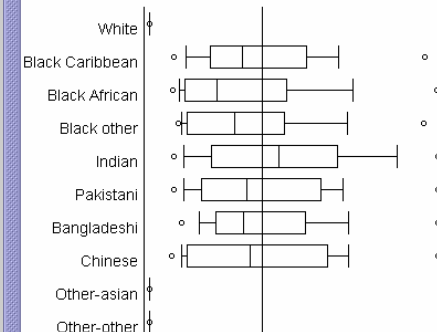


- [ Met2\_pov = 0 ]
- [ Met2\_pov > 0.0 ] AND [ Met2\_pov <= 10.0 ]
- [ Met2\_pov > 10.0 ] AND [ Met2\_pov <= 20.0 ]
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- [ Met2\_pov > 33.3 ] AND [ Met2\_pov <= 50.0 ]
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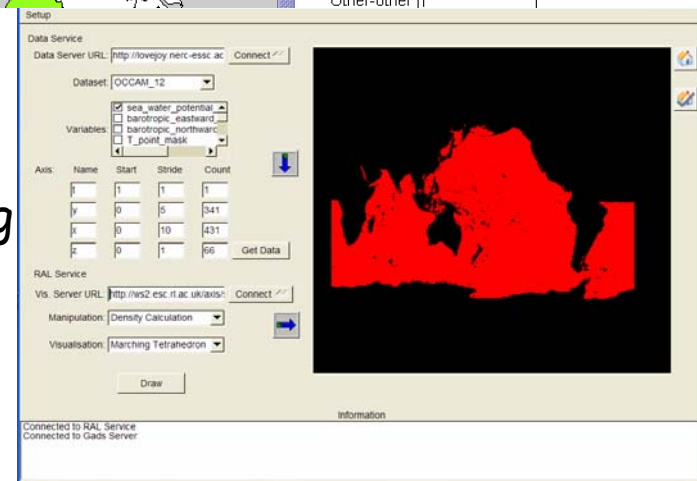
- Region/SARs Area
- White
  - Black Caribbean
  - Black African
  - Black other
  - Indian
  - Pakistani
  - Bangladeshi
  - Chinese
  - Other-asian
  - Other-other

UK Male Imputed Income



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

Climate modelling





# Membership options

Two levels of membership (for sharing resources):

## 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





# Membership pipeline

September 2006 (not a complete list)

- Partners
  - GridPP sites, initially Imperial, Glasgow
  - Condor/Windows at Cardiff
  - Belfast e-Science Centre (service hosting, GridSAM,...)
- Affiliates
  - NW-Grid/Manchester SGI Prism
  - SunGrid
- Data partners (early discussions)
  - MIMAS and EDINA
- Others in discussion



# New partners

Over the last year, several new full partners have joined the NGS:

- Bristol, Cardiff, Lancaster and Westminster
  - Further details of resources can be found on the NGS web site: [www.ngs.ac.uk](http://www.ngs.ac.uk).
- 
- Resources committed to the NGS for a period of at least 12 months.
  - Heterogeneity introduced by these new services

# NGS 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.
- **Westminster**
  - 32 Sun V60 compute nodes
- **HPCx**
  - ...

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

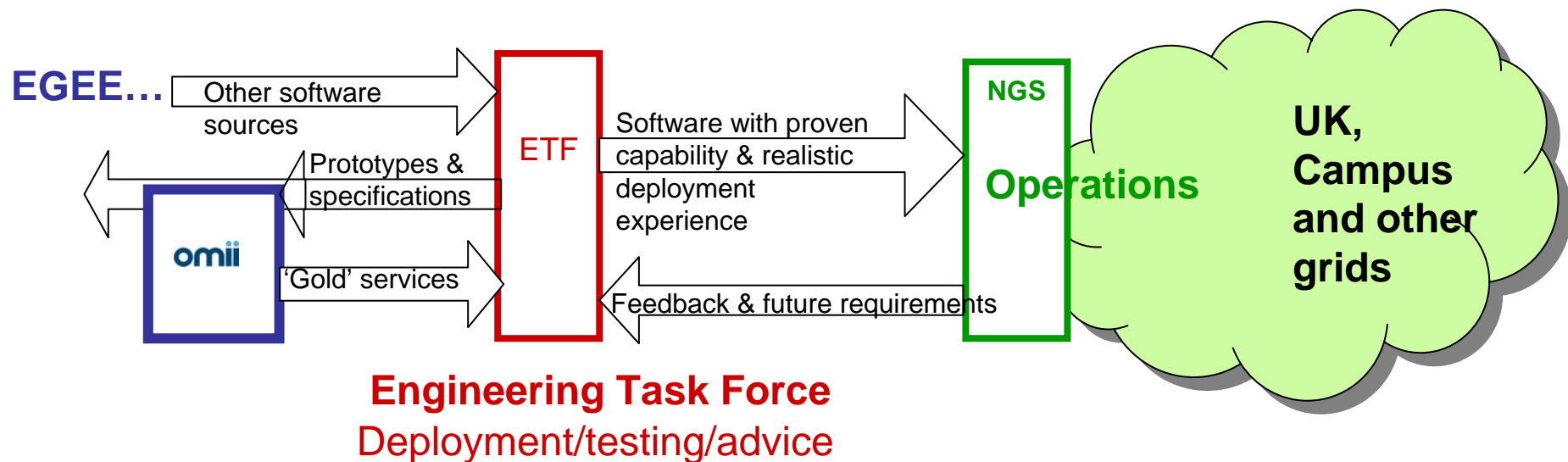


# NGS software

- **Computation services** based on **Globus Toolkit 2**
  - Use compute nodes for sequential or parallel jobs, primarily from batch queues
  - Can run multiple jobs concurrently (be reasonable!)
- **Data services:**
  - **Storage Resource Broker:**
    - Primarily for file storage and access
    - Virtual filesystem with replicated files
  - **“OGSA-DAI”: Data Access and Integration**
    - grid-enabling data (relational, XML; files)
  - **NGS Oracle service**

# Managing middleware evolution

- Important to coordinate and integrate this with deployment and operations work in EGEE, LCG and similar projects.
- Focus on deployment and operations, NOT development.





# 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 The HPCx logo consists of the letters 'HPCx' in a bold, blue font. The 'x' is stylized with a red, jagged, flame-like shape. Below the letters is a red horizontal line, and underneath that, the words 'CAPABILITY COMPUTING' are written in a smaller, blue, sans-serif font.  
CAPABILITY COMPUTING
- Must apply separately to research councils
- Digital certificate and conventional (username/password) access supported



# Key facts

- **Production:** deploying middleware after selection and testing
- **Evolving:**
  - Middleware
  - Number of sites
  - Organisation:
    - VO management – for collaborative projects
    - Policy negotiation: sites, VOs
- **International commitment**
- **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/>
  - New wiki service: <http://wiki.ngs.ac.uk>
  - Training events: <http://www.nesc.ac.uk/training>
  
- HPCx
  - <http://www.hpcx.ac.uk>



# 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
  - OMII, EGEE, Globus Alliance all have m/w under assessment for the NGS
    - Selected, deployed middleware currently provides “low-level” tools
  - New deployments will follow
  - New sites and resources being added