The National Grid Service

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Policy for re-use

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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
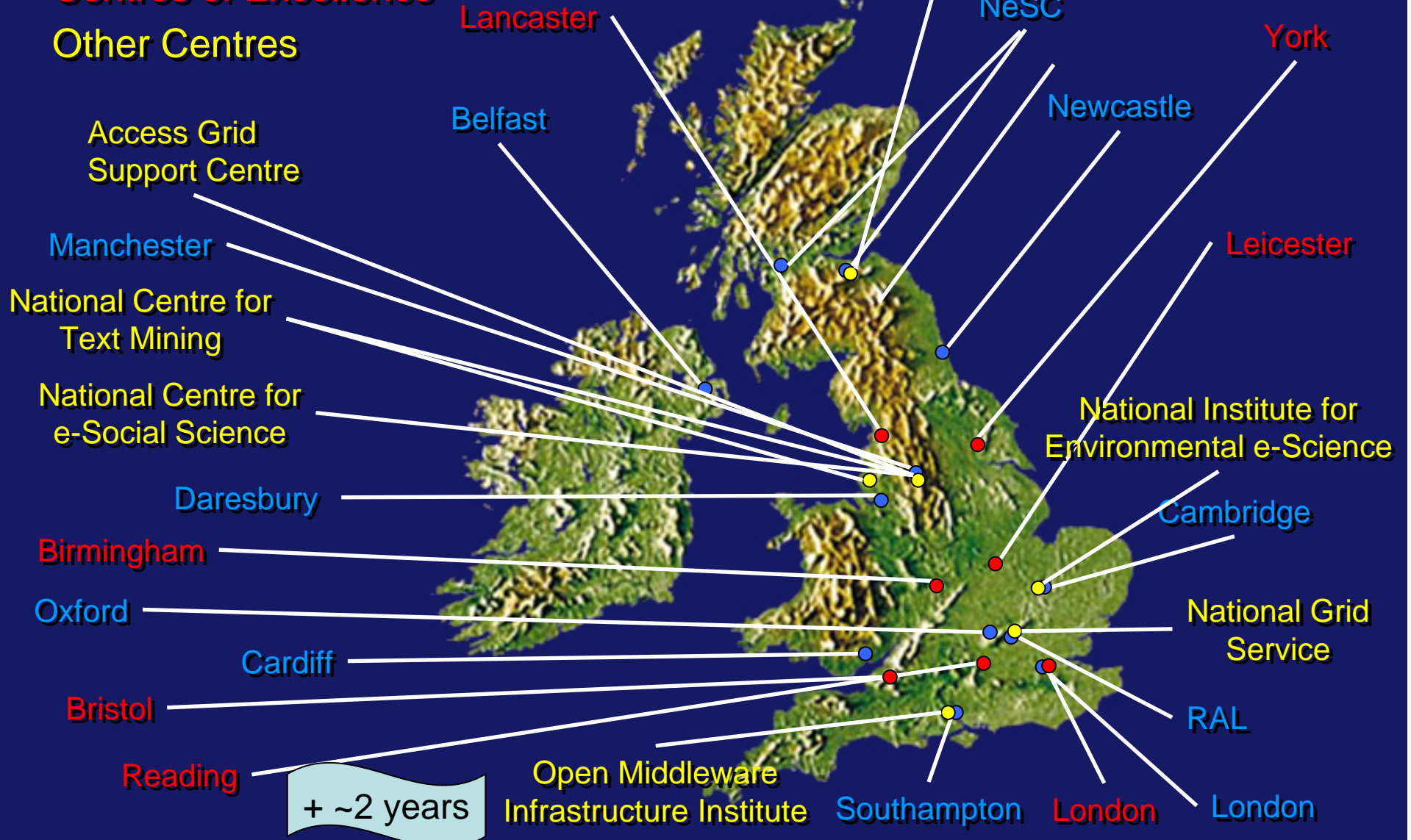
- The National Grid Service

e-Science Centres in the UK

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

e-Science Centres
Centres of Excellence
Other Centres

Access Grid
Support Centre

Digital Curation Centre

NeSC

Lancaster

York

Belfast

Newcastle

Manchester

Leicester

National Centre for
Text Mining

National Centre for
e-Social Science

National Institute for
Environmental e-Science

Daresbury

Cambridge

Birmingham

Oxford

National Grid
Service

Cardiff

Bristol

RAL

Reading

+ ~2 years

Open Middleware
Infrastructure Institute

Southampton

London

London

e-Science Institute

Edinburgh

+5 years

OMII-UK nodes

EPCC & National e-Science Centre

School of Computer Science
University of Manchester

School of Electronics and
Computer Science
University of Southampton

Edinburgh

Manchester

Southampton

open middleware
infrastructure institute uk
www.omii.ac.uk

+3 years

UK e-Infrastructure

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

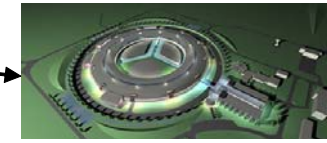ScotGRID
ULGrid

HRCx + **HECtoR**

Regional and Campus grids
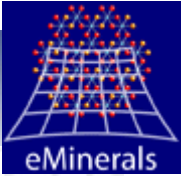
GridPP
UK Computing for Particle Physics
eMinerals

BRIDGES

Community Grids

GOSC

NGS

UKERNA

Integrated internationally

EMBL-EBI
European Bioinfo

JISC

VRE, VLE, IE

EDINA
MIMAS
BRITISH LIBRARY

DCC

open middleware infrastructure institute

VISTA
ALMA

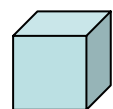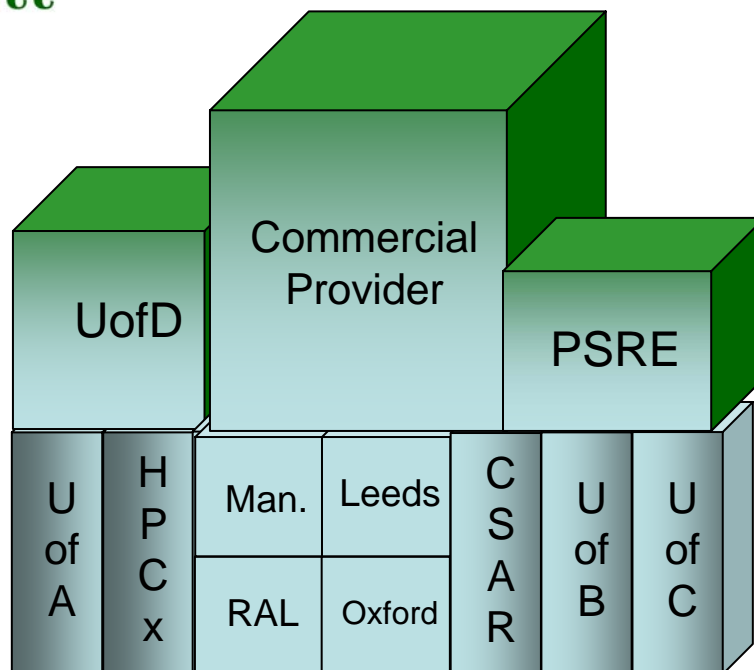diamond

LHC

ISIS TS2

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
  - Entering 2nd phase of funding

National
Grid
Service

Commercial Provider

UofD

PSRE

| U of A | H P C x | Man. | Leeds | C S A R | U of B | U of C |
| | | RAL | Oxford | | | |

NGS Core Nodes: Host core services, coordinate integration, deployment and support
+free to access resources for all VOs. Monitored interfaces + services
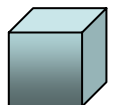
NGS Partner Sites: Integrated with NGS, some services/resources available for all VOs
Monitored interfaces + services

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

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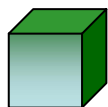# National Grid Service and partners

HPCx CAPABILITY COMPUTING

National e-Science Centre

LANCASTER UNIVERSITY

MANCHESTER 1824
The University of Manchester

NGS
National Grid Service

CCLRC Rutherford Appleton Laboratory

White Rose university consortium

Edinburgh

Lancaster
Manchester · York

Cardiff

Bristol

Didcot
Westminster

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

+2.5 years

University of BRISTOL

University of Westminster

NGS Use

Files stored

~400 users

CPU time by user

Users by institution
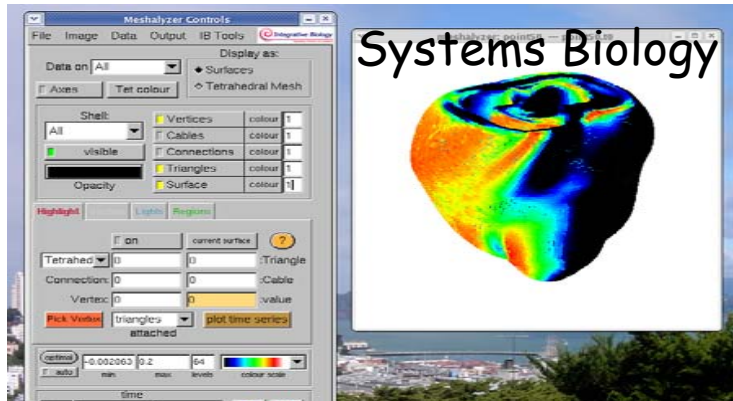
Users by discipline
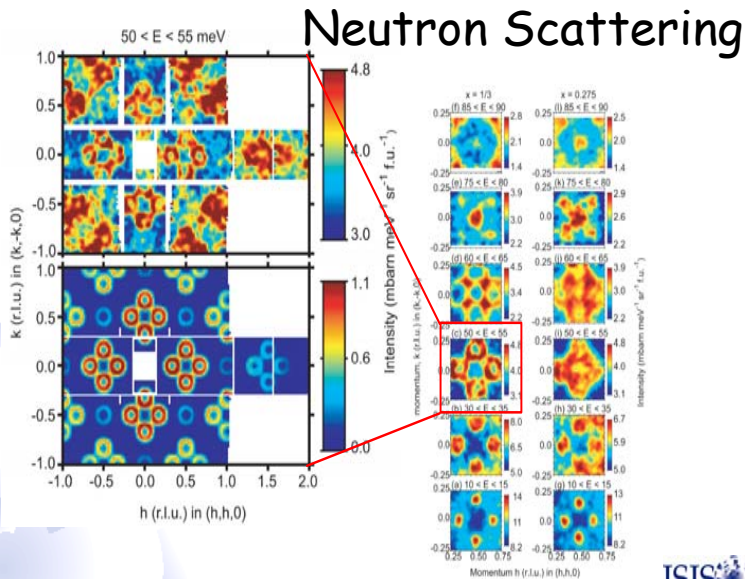
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Supporting Services

- 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
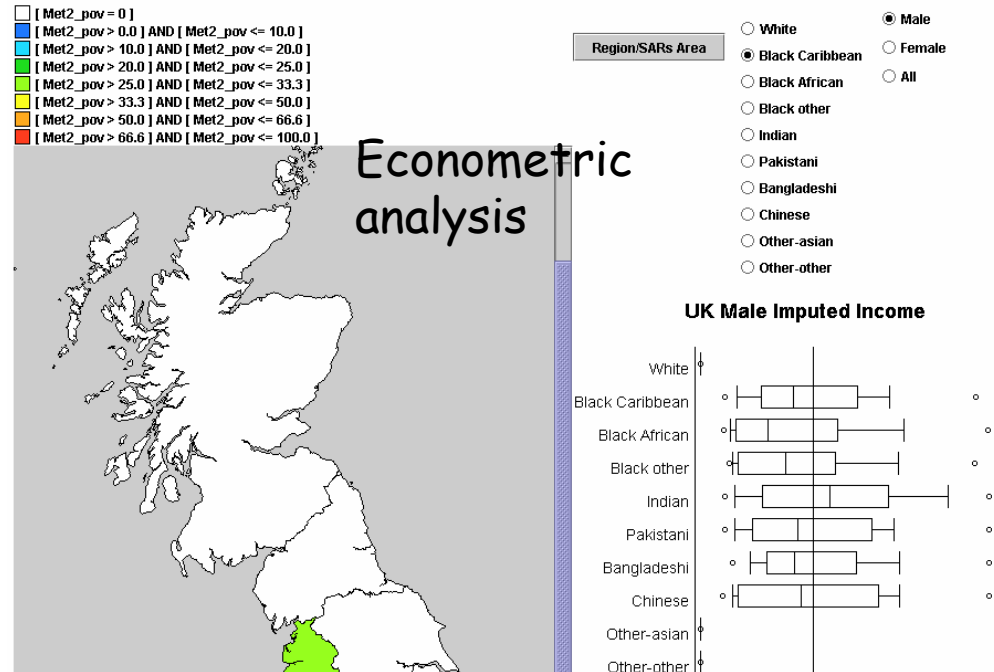 - Operational Security

![NGS National Grid Service logo]

Systems Biology

Example: La$_{2-x}$Sr$_x$NiO$_4$

Neutron Scattering

50 < E < 55 meV

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

Econometric analysis

- [Met2_pov = 0]
- [Met2_pov > 0.0] AND [Met2_pov <= 10.0]
- [Met2_pov > 10.0] AND [Met2_pov <= 20.0]
- [Met2_pov > 20.0] AND [Met2_pov <= 25.0]
- [Met2_pov > 25.0] AND [Met2_pov <= 33.3]
- [Met2_pov > 33.3] AND [Met2_pov <= 50.0]
- [Met2_pov > 50.0] AND [Met2_pov <= 66.6]
- [Met2_pov > 66.6] AND [Met2_pov <= 100.0]

Region/SARs Area

- ○ White
- ● Black Caribbean
- ○ Black African
- ○ Black other
- ○ Indian
- ○ Pakistani
- ○ Bangladeshi
- ○ Chinese
- ○ Other-asian
- ○ Other-other

- ● Male
- ○ Female
- ○ All

UK Male Imputed Income

Climate modelling

NGS Membership options
National Grid Service

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

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.

- 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**
  - …

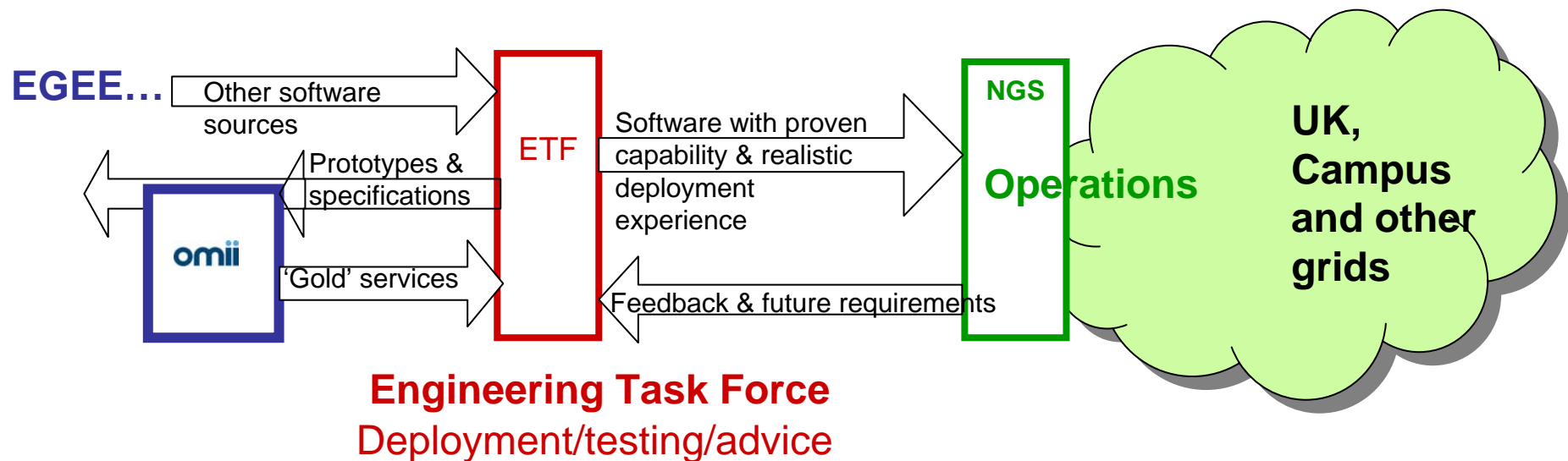For more details: http://www.ngs.ac.uk/resources.html

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NGS software

- **Computation services** based on GT2
  - 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
    - Primarily for grid-enabling databases (relational, XML)
  - 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.

EGEE…

Other software sources

Prototypes & specifications

omii

'Gold' services

ETF

Software with proven capability & realistic deployment experience

Feedback & future requirements

NGS

Operations

UK, Campus and other grids

Engineering Task Force
Deployment/testing/advice

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

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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

- 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