The National Grid Service

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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

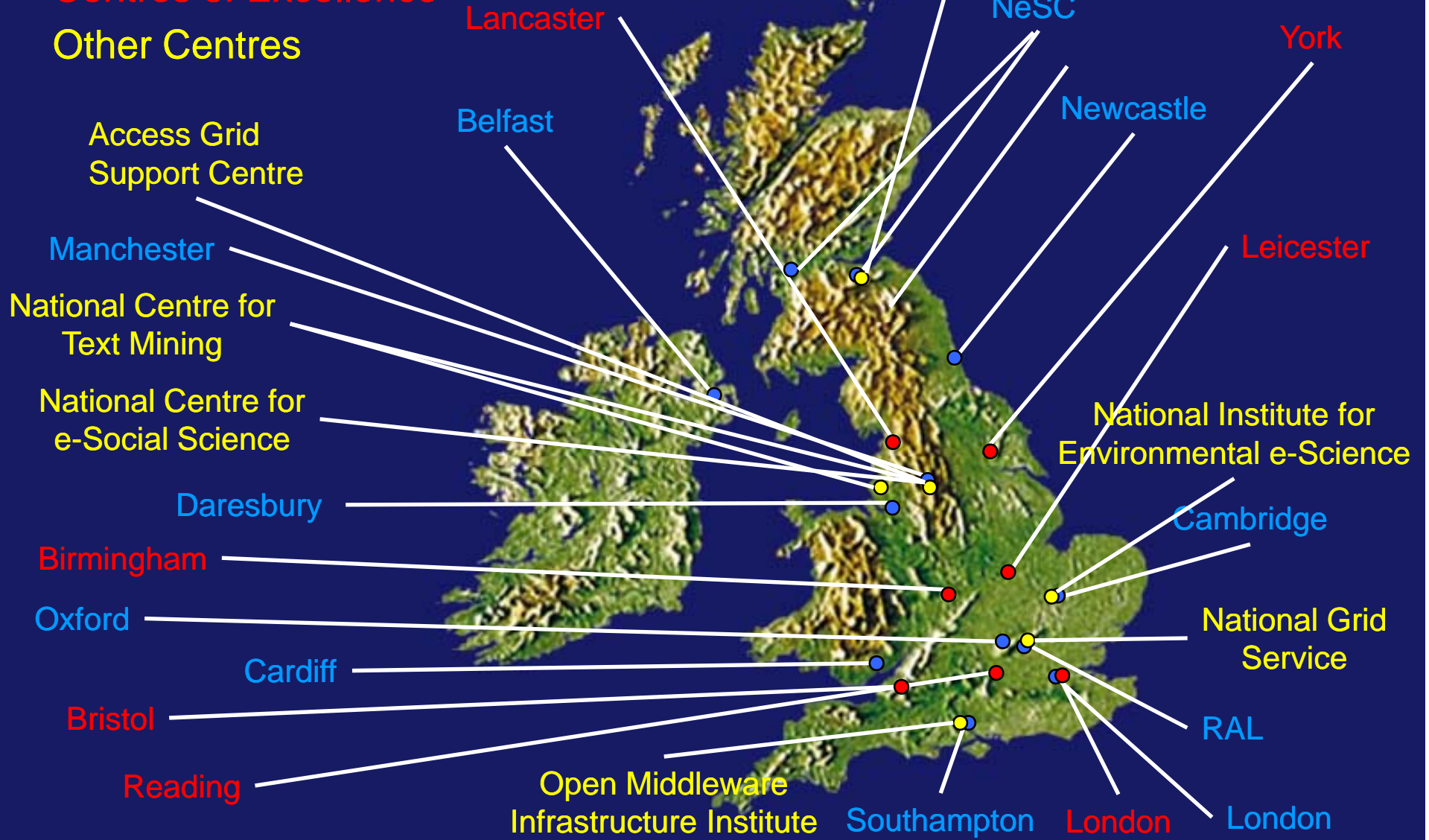- e-Infrastructure in the UK

- 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

National Centre for Text Mining

National Centre for e-Social Science

Digital Curation Centre

NeSC

Newcastle

York

Lancaster

Belfast

Manchester

Leicester

National Institute for Environmental e-Science

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

HRCx + **HECToR**

Regional and
Campus grids

GridPP
UK Computing for Particle Physics

eMinerals

BRIDGES

Community Grids

EMBL-EBI
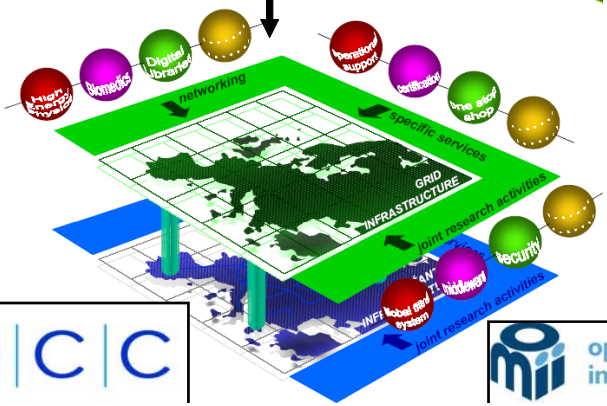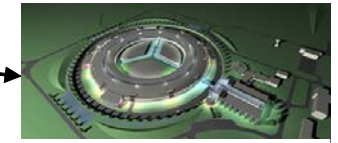European Bioinfo

JISC
VRE, VLE, IE

EDINA
MIMAS

BRITISH LIBRARY
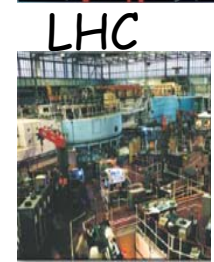
NGS

UKERNA

Integrated
internationally

D|C|C

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
  - 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

NGS Vision
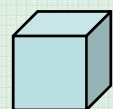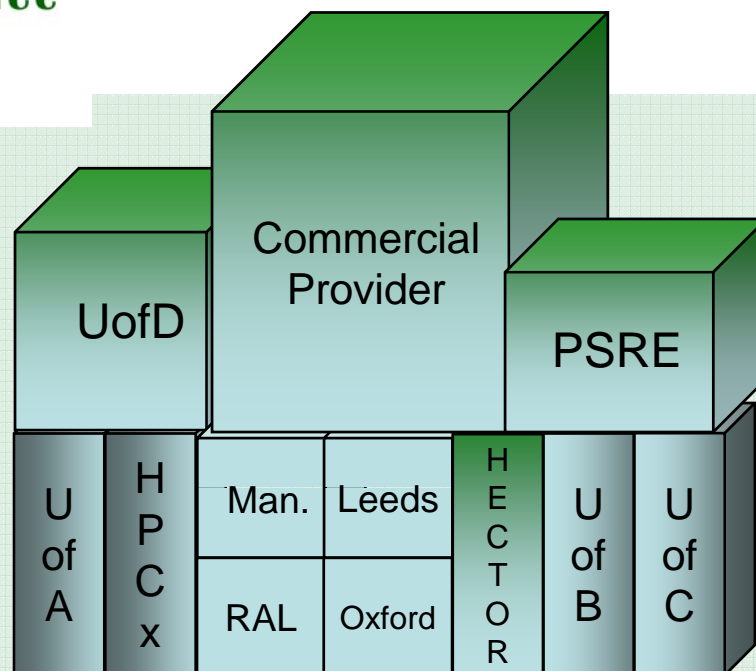
NGS Core Nodes: Host core services, coordinate integration, deployment and support +free to access resources for all VOs. Monitored interfaces + services
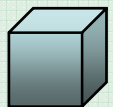
NGS Partner Sites: Integrated with NGS, some services/resources available for all VOs Monitored interfaces + services
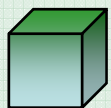
NGS Affiliated Sites: Integrated with NGS, support for some VO's Monitored interfaces (+security etc.)

General principle here: establish core and grow it: 9
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

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National Grid Service and partners

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
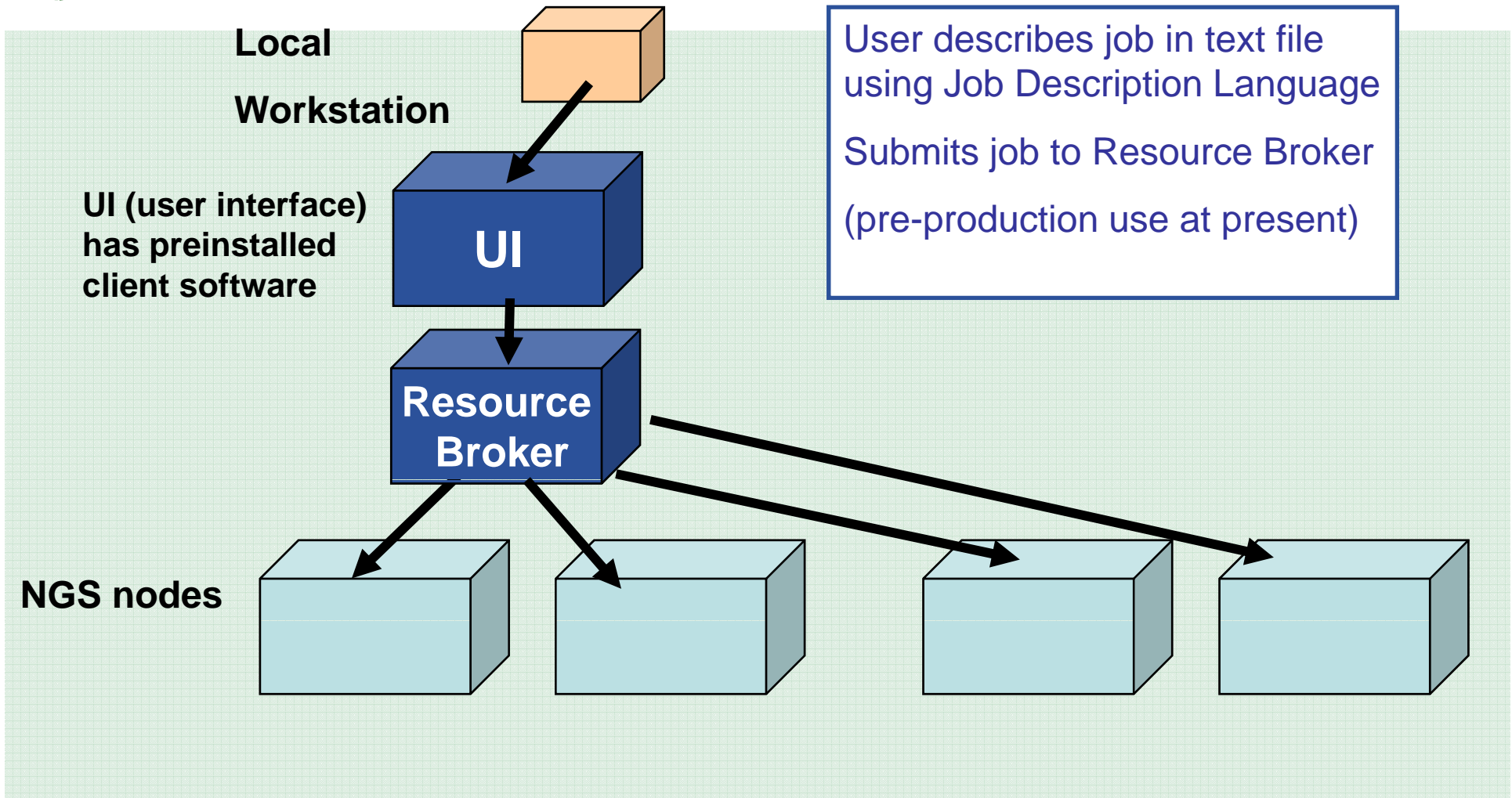
2. Partners also
   - make "significant resources" available to NGS users
   - enforce NGS acceptable use policies
   - provide accounting information
   - define commitments through formal Service Level Descriptions
   - influence NGS direction through representation on NGS Technical Board

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
  - NGS Oracle service
  - "OGSA-DAI": Data Access and Integration
    - Primarily for grid-enabling data *not* on the SRB or Oracle (files, relational, XML)
- Authorisation, Authentication
  - Built on GSI, VOMS – details later

- Middleware recently deployed
    - Resource Broker
    - Applications Repository ("NGS Portal")
    - GridSAM – alternative for job submission and monitoring
    - GRIMOIRES – registry of services (e,g,GridSAM instances)
- Developed by partners:
    - Application Hosting Environment: AHE
    - P-GRADE portal and GEMLCA
- Being deployed
    - VOMS support
    - WS-GRAM: GT4 job submission
- Under development
    - Shibboleth integration

Resource Broker

Local

Workstation

UI (user interface)
has preinstalled
client software

UI

Resource Broker

NGS nodes

User describes job in text file
using Job Description Language

Submits job to Resource Broker

(pre-production use at present)

GridSAM

Local

Workstation

UI (user interface) has preinstalled client software

User describes job in XML using Job Submission Description Language

Web services interfaces to chosen GridSAM instance (SAM: Submission and Monitoriing)

GridSAM

GridSAM

GridSAM

GridSAM

NGS nodes

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

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*

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Web Sites

- NGS
  - http://www.ngs.ac.uk
  - 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
  - New sites and resources being added
  - Growing support for VOs (as well as individual users)
  - New software deployed recently – later in course