Funding Opportunities under the e-Science Programme

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‘New Labour’ Manifesto Pledge

‘[The Grid] intends to make access to computing power, scientific data repositories and experimental facilities as easy as the Web makes access to information.’

Tony Blair, 2002
RCUK e-Science Funding

First Phase: 2001 – 2004
- Application Projects
  - £74M
  - All areas of science and engineering
- Core Programme
  - £15M Research infrastructure
  - £20M Collaborative industrial projects

- Application Projects
  - £96M
  - All areas of science and engineering
- Core Programme
  - £16M Research Infrastructure
  - £20M DTI Technology Fund
Example e-Science Projects

- Particle Physics
  - global sharing of data and computation
- Astronomy
  - ‘Virtual Observatory’ for multi-wavelength astrophysics
- Chemistry
  - remote control of equipment and electronic logbooks
- Engineering
  - industrial healthcare and virtual organisations
- Bioinformatics
  - data integration, knowledge discovery and workflow
- Healthcare
  - sharing normalized mammograms
- Environment
  - Ocean, weather, climate modelling, sensor networks
## Computer Science for e-Science

- 18 projects, 16 departments,
- 85% CS for e-Science projects in RAE 5*/5 departments
- 59 academics

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<th>HyOntUse</th>
<th>Secure location independent autonomic storage architectures</th>
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<td>Grid-enabled numerical and symbolic services</td>
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<td>A Semantic Firewall</td>
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<td>Trusted Coordination in Dynamic Virtual Organisations</td>
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<td>PASOA: Provenance Aware Service Oriented Architecture</td>
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<td>AMUSE: Autonomic Management of Ubiquitous Systems for e-Health</td>
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<td>Dynamic Net Data: Theory and Experiment</td>
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<td>Describing the Quality of Curated E-Science Information Resources</td>
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<td>Open Overlays: Component-Based Communications Support for the Grid</td>
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<td>Virtual organisations</td>
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UK e-Science ‘Sisters’ Projects

First Call funded 4 proposals:
1. BIRN/myGrid
2. DiscoveryNet/US Sensors
3. AstroGrid/NVO
4. DS-Grid/Singapore

Second Call funded 6 proposals:
1. myGrid/Argonne
2. CombeChem/ReciprocalNet
3. CancerGrid/caBIG
4. IntBio/Tulane-UCLA-UCSD
5. OGSA-DAI/Datacutter
6. e-Star/NASA
DTI Innovation Strategy

Technology Strategy Board

ICT
- Technology Manager
- Computing and Communications networks
- Bio-informatics

BIO
- Technology Manager
- Genomics
- Structural Materials

Advanced Materials
- Technology Manager
- Nanotechnology

Advanced Manufacturing
- Technology Manager
- Product and process technology

Energy & Environment
- Technology Manager
- Fuel cells

Prior selection will be defined through a set of key criteria

Sectors
Research Councils
IGTs
Users
Other networks

NETWORKS

DELCIVERY
through working with...

EU Framework
RDAs
BR Sector teams

Eureka
Business Link
Research Councils
FCO
DTI Technology Programme

• £370m over six Competitions
• This call - £100m,
• Two stage - open and very competitive,
• Nine Technology Priority Areas
• Only - Collaborative R & D
Collaborative Research & Development

Grant-based products - from three categories each with two types:

- **Basic Research** - Far from market projects,
- **Applied Research** - Middle market projects,
- **Exploitation Development** - Nearer to market projects.

All involving 2+ collaborators:-

- Science to Business – S2B
- Business to Business – B2B
Funding for Collaborative R & D

- 75% for Basic Research projects
- 50% for Applied Research projects
- 25% for near market or Exploitation projects
- Business to Business projects (50%, 40%, 25%),

And:-

- Typical projects £2m - £5m but no minimums
- Attractive to have by-in from other Stakeholders
- Duration - 6 months to 5 years
- Can be used to fund EUREKA projects
- All with consideration to state aid rules
Collaborators who can Apply

**Beneficiaries**
- Sole Traders
- Partnerships
- Companies
- Cooperatives
- Charities

**Stakeholders**
- Research Councils
- Regional Development Agencies
- Devolved Authorities
- Government Agencies
- Other Government Departments

**Intermediaries**
- Higher Educational Institutions
- Trade Associations
- Professional Bodies
- National Training Organisations
- Research and Technology Organisations
- Learning and Skills Councils
- Further Educational Establishments
- Chambers of Commerce
- Public Sector Research Institutes
- Other National Bodies
e-Science Successes in Call 2 of the Technology Programme

- e-Science applications fell into IEC part of the programme.
- Very stiff competition – 63 proposals at outline but only 7 eventually funded
- Following centres are involved in the IEC successful projects
  - Belfast
  - Cambridge
  - Cardiff
  - Edinburgh
  - Newcastle
  - Oxford
  - Reading
  - Southampton
  - UCL
  - White Rose
DTI Technology Fund 3rd Call: November Competition Priority Areas

- Design, Modelling and Simulation
- Pervasive Computing & Networks and Sensors
- Nano-technology
- Imaging Technologies
- “Smart” Materials
- Waste Management and Minimisation
- Opto-electronics & Disruptive Electronics
- Bio-Industries
- Renewable Energy
Timetable - November 2004 Competition

- 29 Nov: Call Opens
- 31 Jan: Pre Reg
- 7 Feb: Call closes
- 7 March: End-assess
- 3 May: Close Full
- 27 June: End-assess

- 10 weeks Outline Open
- 4 weeks Assess
- 8 weeks Full Open
- 8 weeks Full Assess
UK Science & Innovation
Investment Framework 2004 - 2014

Three Major Components of the UK Vision:

1. Multidisciplinary Working
   – Creation of a multidisciplinary research environment
   – Links between Funding Councils and RCUK
   – Uses e-Science exemplars from Earth Systems Science and Systems Biology
2. National Information ‘e-Infrastructure’
   - Access to experimental data sets and publications
   - Collection and preservation of digital information
   - Importance of National e-Infrastructure
   - Tie into international efforts
3. Access to Capital Infrastructure/Large-Scale Facilities

- Diamond Synchrotron to open 2007
- Second Target Station for ISIS Neutron Source from 2008
- Large Hadron Collider operative from 2007
- Hector HPC Facility
- ITER Fusion Machine
Dual Support

Provides two streams of public funding for university research:

– Funding provided by the DfES and HEFCs for research infrastructure – salaries of permanent academic staff, premises, libraries and IT services

– Funding from the DTI and OST for specific projects – in response to proposals submitted & approved through peer review

➢ A national e-Infrastructure to support collaborative and multidisciplinary research and innovation is the joint responsibility of RCUK (OST) and JISC (HEFCs)
JISC Committee for Support of Research (JCSR)

• Ensure JISC addresses the needs of the HE research community
  – Members represent each of the Research Councils

• Annual Spend of ~ £10M
  – Supports development projects, best practice, training and services e.g. National Grid Service
  – Joint R&D projects with Research Councils and workshops, training and awareness
  – Major initiatives on Security (Shibboleth framework) and e-Research Environment
e-Science Phase 3: Building a Sustainable National e-Infrastructure

e-Infrastructure Funding for 2007-2008

• £14M (?) for e-Science Core Program
• £7M for UKLight ‘lambda’ network
• £70M for SuperJANET 5 Hybrid Network
• £6M for Authentication and Authorization Infrastructure
• £15M for e-Science Tools and Environment
• £5M (?) for CS Research for e-Science
• e-Science Application Programs
Key Elements of a UK e-Infrastructure (1)

1. Competitive Research Network
2. National AA Infrastructure
3. Open Middleware Infrastructure Institute and Repository
4. Digital Curation Centre
5. Access to National Data Sets and Publications
6. Portals and Discovery Services
Key Elements of a UK e-Infrastructure (2)

7. Remote Access to Large-Scale Facilities e.g. LHC, Diamond, ITER, ..
8. National Grid and HEC Services
9. Multidisciplinary National e-Science Institute
10. Support for International Standards
11. Tools and Services to support collaboration
12. Industrial Collaboration
SuperJANET4/5
£7M for UKLight
‘Lambda’ Network
RCUK Funding for Research using the UKLight network

Three major research projects funded:

• **ESLEA (EPSRC, e-Science, PPARC and MRC)**
  – Network protocols and Quality of Service research for four e-Science application areas - **£1M**

• **MASTS (EPSRC and e-Science)**
  – Probes and tools to record, analyse and control full, sampled and compressed network traffic - **£650k**

• **46PaQ (EPSRC)**
  – IPv4 and IPv6 Performance and Quality of Service - **£1.2M**
Authentication and Authorization Infrastructure

• £3M for Security Development Projects
  – Combine Shibboleth with PERMIS Authorization Services
  – Joint project with NSF Internet2 NMI project on Security Services for Virtual Organizations

• £3M for ‘National Middleware Services’
  – Deployment of National Authentication Framework based on Shibboleth
  – Support for both Digital Library and e-Science communities
Open Middleware Infrastructure Institute

• Set up Repository for WS-* generic Grid middleware for the UK e-Science community

• Capture generic middleware from UK e-Science Projects

• Commission middleware projects to fill specific ‘gaps’

➤ All supported by robust Software Engineering processes and standards
National Grid Service

GOSC Timeline

Q1 Q2 Q3 Q4
04 05 06

EGEE gLite alpha release
OMII release

NGS Production Service
NGS Expansion (Bristol, Cardiff...)
WS plan

OMII Release
EGEE gLite release

OMII Production Service
NGS Expansion
WS2 plan

NGS WS Service
NGS WS Service 2

Web Services based National Grid Infrastructure
Digital Curation Centre

• Actions needed to maintain and utilise digital data and research results over entire life-cycle
  – For current and future generations of users
• Digital Preservation
  – Long-run technological/legal accessibility and usability
• Data curation in science
  – Maintenance of body of trusted data to represent current state of knowledge in area of research
• Research in tools and technologies
  – Integration, annotation, provenance, metadata, security…..
Virtual Research Environment (VRE) Development Program

- Middleware/Software Library
- Access GRID
- Security Authorisation Authentication
- Text Mining/Data services
- Semantic GRID Services
- Portal Management
- UK GRID Services
- Awareness Raising Resources
- Workshops

VRE Portal

VLE Portal
‘e-Science for Schools’ Projects

Funded 4 demonstrator projects:

• e-Star
  - provides remote control of telescopes and access to astronomical databases

• e-Malaria
  - uses drug screening and remote use of crystallographic grid service

• e-Environment
  - with remote sensors and data collection and analysis

• ClimatePrediction.Net
  - SETI@Home style climate modelling
Demonstrations of the e-Infrastructure

US TeraGrid

Starlight (Chicago)

Netherlight (Amsterdam)

SDSC

NCSA

PSC

All sites connected by production network (not all shown)

UK NGS

Leeds

Manchester

Oxford

RAL

UK Light

UCL

AHM 2004

Local laptops and Manchester vncserver

Computation

Steering clients

Network PoP

Service Registry
New e-Science Calls

EPSRC ‘CS for e-Science’
• Usability £1M
  – Details on the EPSRC Web Site
• Security £1M
  – Will be on EPSRC Web Site

ESRC e-Social Science
• e-Social Science Demonstrator Projects
  – Details on the NCeSS Web Site
SR2004 Outcome

• EPSRC e-Science Core Programme
  – Final budget still under negotiation
  – Will issue new calls in near future
  – Competitive ‘e-Science Centres’ call?
  – Grid Services, Middleware, Data Curation?
  – Transition plan to persistent e-Infrastructure

• AHRC new ‘e-Science’ Programme
  – e-Science technologies applied to the Arts and Humanities
New JCSR Calls/Activities

• Visualization – £500K call, closing date 18 May
• Access Grid support - £200K in 05/06 + …
• e-Science for Schools - £100K in 05/06 + …
• Human Factors/HCI - £100K in 05/06 + …
• 2nd VRE Call - £100K in 05/06

• Open Access - Role of Institutional Repositories for data as well as publications
• e-Research component of National e-Infrastructure
• Brainstorming/Requirements gathering

➢ Need to educate academic research community about JCSR and JISC’s remit
EU R&D and Infrastructure Calls

• IST Call 5
  – Opens May 2005 – Closes Sep 2005
• Grid Technologies Unit priorities
  – Priorities
    • Grid foundations including architecture, design and development for building the invisible Grid
    • Grid enabled applications and services for business and society
    • Network-centric Grid operating systems
  – What does this mean?
    • Focus on TTN-like Grid pilots for industry and commerce
    • Projects to develop an EU Grid OS

• Research Infrastructures Unit
  – Priorities
    • Fostering interoperability of solutions across different scientific and industrial disciplines in an effort to achieve broader-scale up-take of Grid and other technologies
    • Development of roadmaps and guidance to support European e-Infrastructures through eg. Grid Technology Centres
  – What does this mean?
    • EGEE2
    • OMII-Europe
Work Programme 2005-2006
Advanced Grid Technologies and Services

IST Call 5
Open May 2005
Close Sept 2005
Budget: ~70M€

Grid-enabled Applications & Services
for business and society
Research, development, validation and take-up of
generic environments and tools

Grid Foundations
Architecture, design and development of technologies
and systems for building the invisible Grid

Network-centric Grid Operating Systems
Potential new fabric layer for future
distributed systems and services

Application Pull
Technology Push

e-bus, e-health, e-gov, e-learning Environment,...
Advanced Grid Technologies, Systems and Services
### eInfrastructure next calls for proposals in FP6

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| **eInfrastructure – Grid initiatives**
Continue building advanced Grid-empowered infrastructures
*New emphasis on:*
  - Production quality & ready-to-use SW-infrastructures
  - Address industry requirements
  - Environments dynamically adaptable to user needs

### Research Networking Test-beds
- Optical, Wireless, Security, Grids, other technologies.
- User involvement / technology validation
Conclusions

• Sustainability of a global e-Infrastructure requires long-term support
  – At Local, National and Global level

• e-Science and Grid projects worldwide are beginning to create prototype global Cyber/e-Infrastructure
  – Key role for GGF to develop architecture and standards for interoperable services

• Opportunities for e-Science funding from RCUK, JISC and the EU
  – Much work still to be done!
Acknowledgements

With special thanks to Jim Austin, Peter Burnhill, Simon Cox, Geoffrey Fox, Jeremy Frey, David Gavaghan, Carole Goble, Sharon Lloyd, Liz Lyon, Alan Rector, Hannah Tipney and Anne Trefethen