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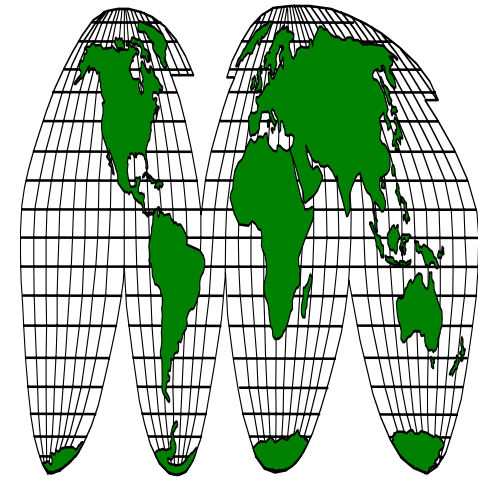
# Welcome and e-Science Overview

Prof. Paul Jeffreys

Director Oxford e-Science Centre

<http://e-science.ox.ac.uk/>

paul.jeffreys@oucs.ox.ac.uk



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# Welcome



## ...to Oxford

## ...to the LCG2 Administrator's Course

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# Introduction



- *There is an activity.., of which Oxford is a part.., which:-*
  - *Tony Blair has enthused about*
  - *The Office of Science and Technology has invested £0.25b*
  - *Has resulted in world-leading new research*
  - *Addresses issues in the Lambert Review of Business-University Collaboration*
    - *([http://www.hm-treasury.gov.uk/consultations\\_and\\_legislation/lambert/consult\\_lambert\\_index.cfm](http://www.hm-treasury.gov.uk/consultations_and_legislation/lambert/consult_lambert_index.cfm))*
  - *Offers an excellent spring board to respond to the Government's Innovation Report - "Competing in the Global Economy: the Innovation Challenge"*
    - *(<http://www.dti.gov.uk/innovationreport/>)*
  - *and .. if you believe the previous Director General of the Research Councils..*
    - *"will change the dynamic of the way science is undertaken"*





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# Global Developments



Mark Ward - BBC News Online technology correspondent  
<http://news.bbc.co.uk>



**“The Wimbledon tennis tournament will be relying on Linux and Grid computing to keep everything running smoothly during the two weeks of the championship. ”**





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# Talk Outline



- Describe and define e-Science
- The “wall”: -behind, -in-front, and -through
- UK e-Science Programme
- e-Science in Oxford





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# Blair's speech on British Science



- <http://politics.guardian.co.uk/speeches/story/0,11126,721029,00.html>

“It's significant that the UK is the first country to develop a national e-Science grid, which intends to make access to computing power, scientific data repositories and experimental facilities as easy as the web makes access to information. One of the pilot e-science projects is to develop a digital mammographic archive, together with an intelligent medical decision support system for breast cancer diagnosis and treatment. An individual hospital will not have supercomputing facilities, but through the grid it could buy the time it needs.”

PM Tony Blair, July 2002



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# The Grid – different ‘definitions’



- First stages of the “information utility” – successor to client-server Internet/WWW architectures
- Solution to the data-intensive problems and compute- intensive needs of many scientific communities and industry over the next decade (e.g. LHC, astronomy, protein folding, earth sciences...)
- **Middleware**, software and hardware to share, access, process, communicate and store huge quantities of data in a secure manner

*Grid is the infrastructure enabler for e-Science*  
*e-Science is the driver for the Grid*



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# e-Science



- *John Taylor, previous Director General of the Research Councils, OST*
  - is about research increasingly done through distributed global collaborations enabled by the Internet (e.g. human genome program, LHC/CERN)
  - uses very large data collections, terascale computing resources, high performance visualisation
  - and col-laboratories – support for *trusting teams*

***e-Science will change the dynamics of how research is done***





# “Behind the Wall”, “In Front of the Wall”, “Through the Wall”



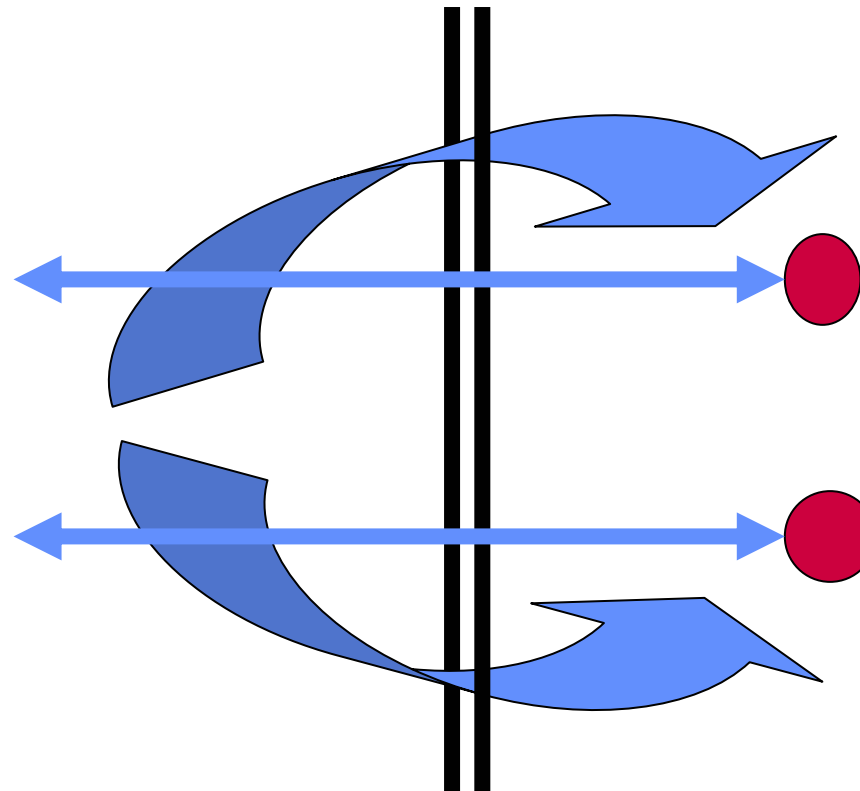
“Behind the wall”

“In front of the wall”

Information

Utility

- resources
- compute
- data
- comms



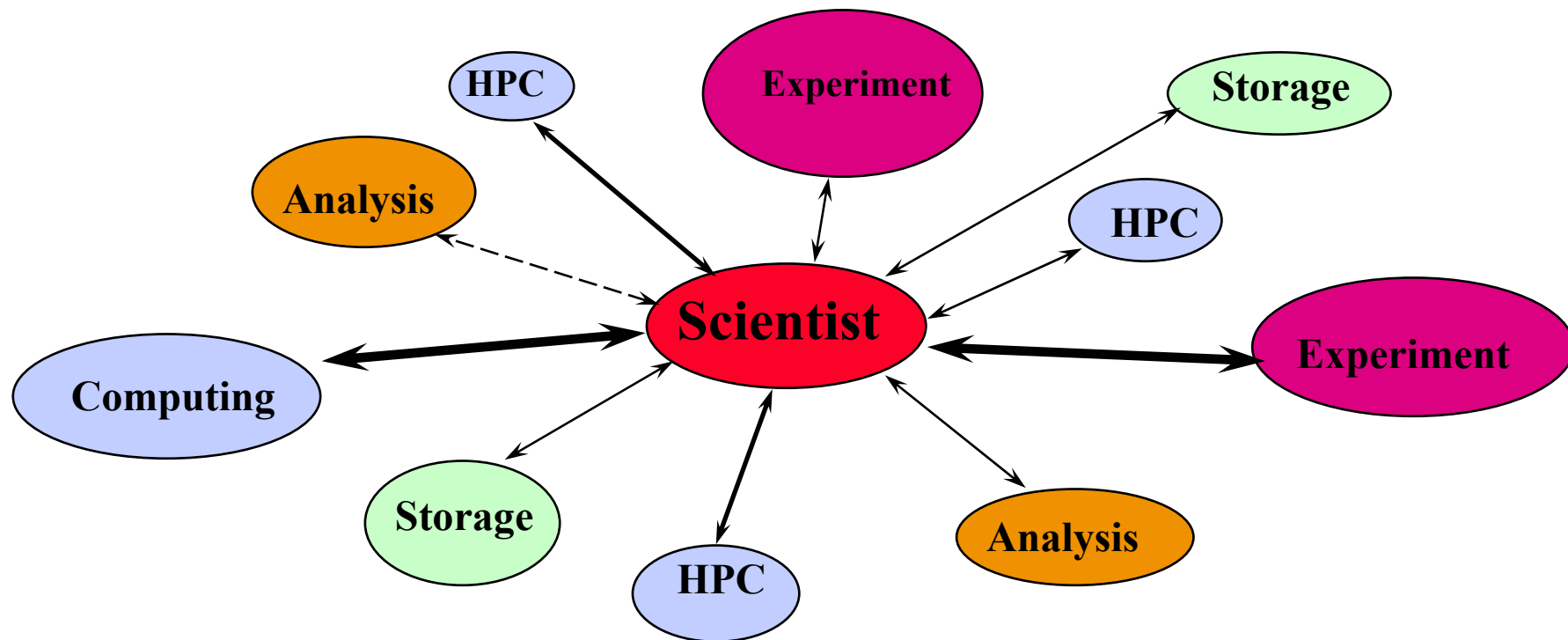
Users

- people
- devices

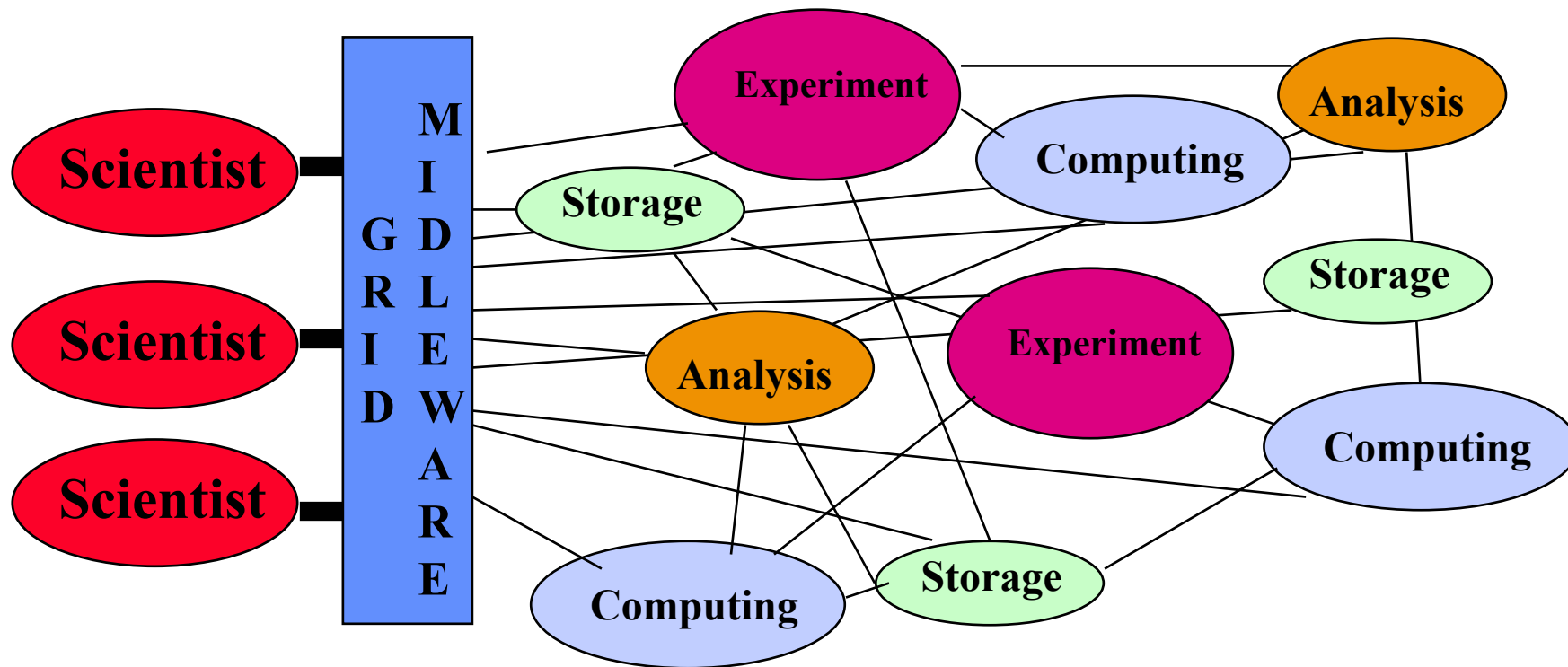
“Through the Wall” Col-laboration & interaction between people

# “Behind The Wall”: today

- many “bits of walls”, ad hoc Client-Server

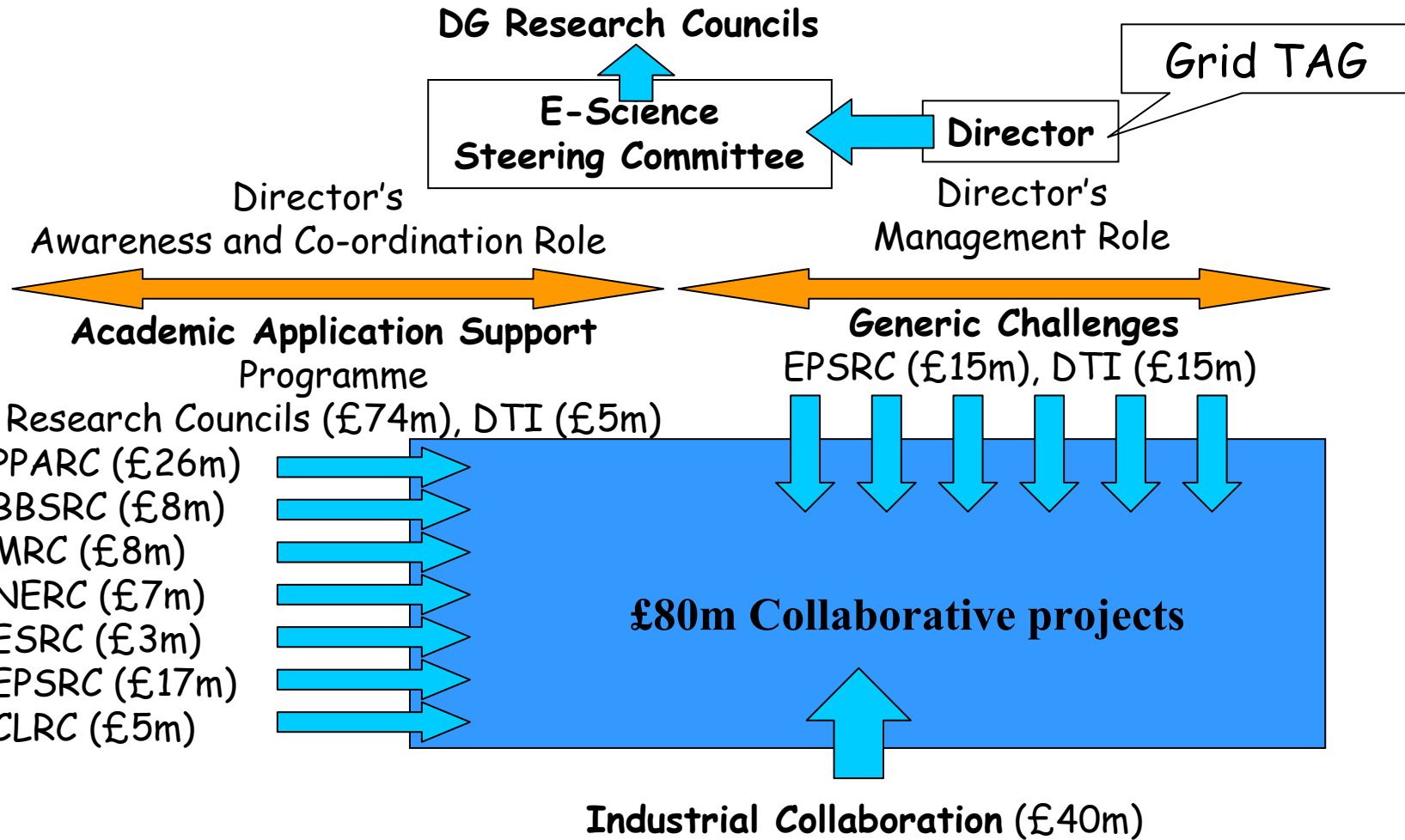


# “Behind The Wall”: next generation -Information Utilities and col-laboratories





# SR2000 e-Science Allocation





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# Core Funding Breakdown

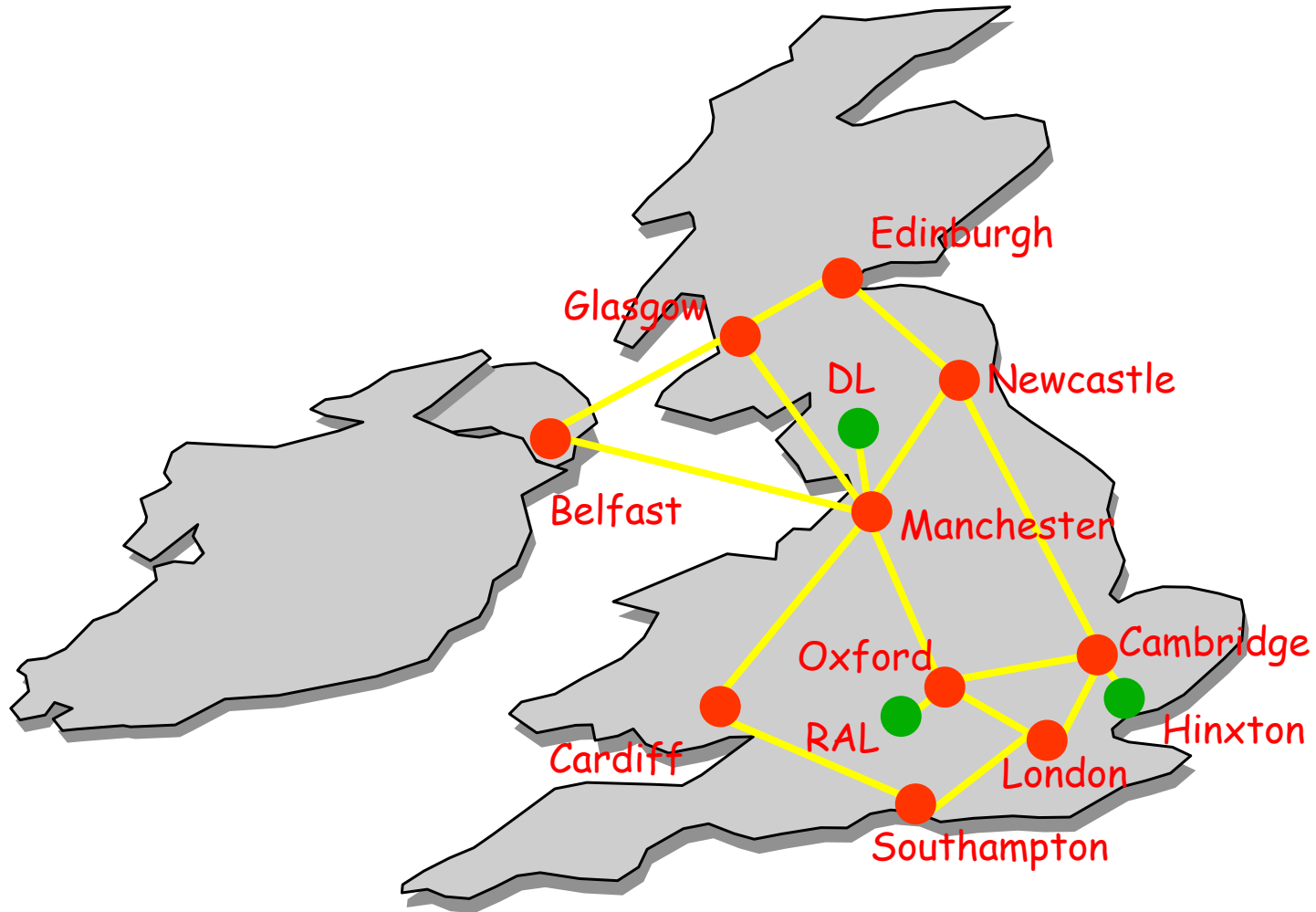


Grid Centres	£7.0M	£11.5M	£11.0M
Grid Middleware	£2.5M	£2.5M	£2.5M
Grid IRC Projects	£3.0M	£1.0M	£4.0M
Grid Support		£2.0M	
International	£1.0M		
GNT	£1.5M	£1.5M	£1.5M
Demonstrators		£0.5M	
Pilots		£1.0M	£8.0M
	_____	_____	_____
	£15M	£20M	£27M
	OST	DTI	Industry



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# UK e-Science Grid – phase 1





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# e-Science Centres of Excellence



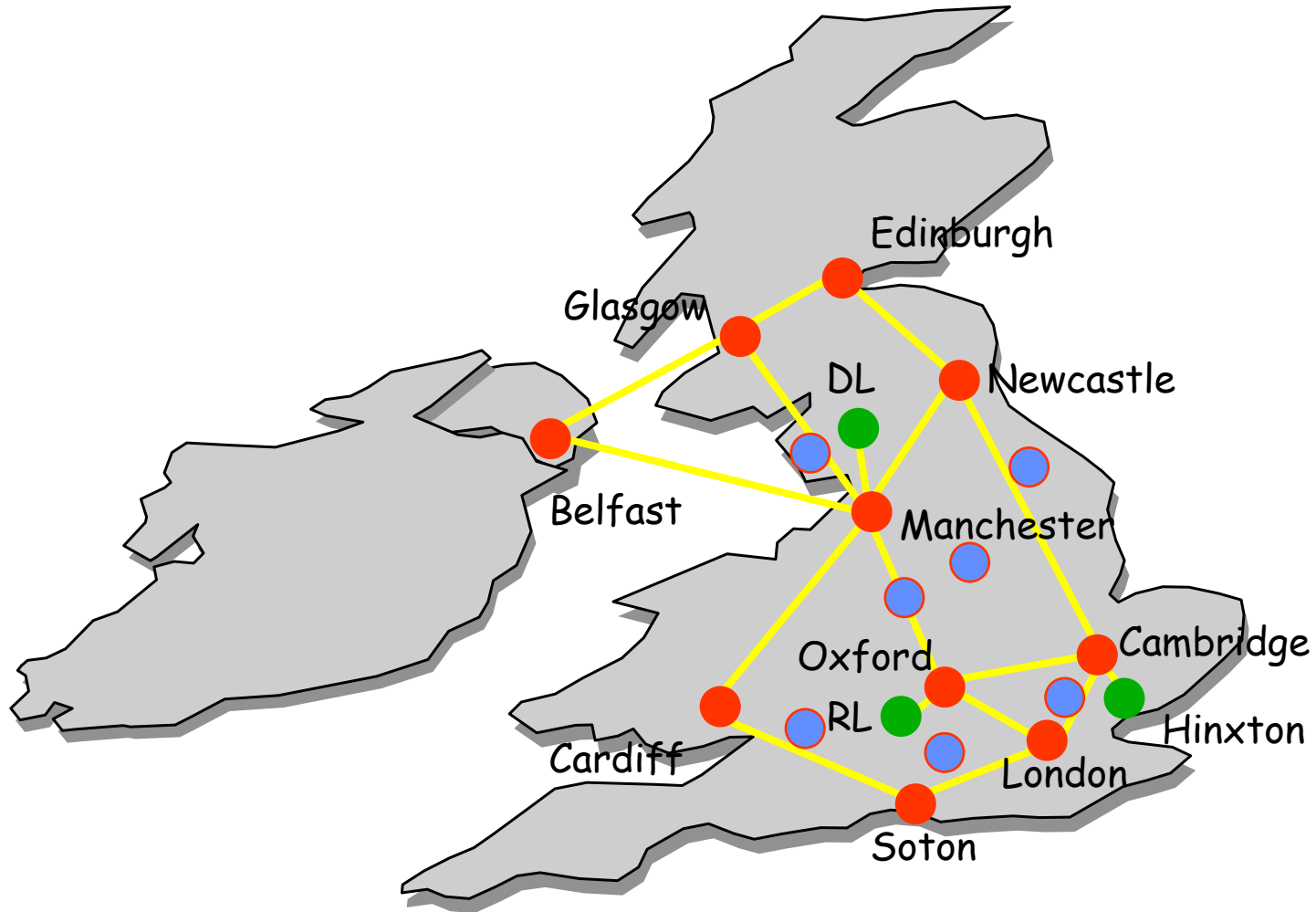
- Birmingham/Warwick – Modelling
- Bristol – Media
- UCL – Networking
- White Rose Grid – Leeds, York, Sheffield
- Lancaster – Social Science
- Leicester – Astronomy
- Reading - Environment





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# UK e-Science Grid – phase 2







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# SR2000+SR2002 e-Science Funding



Total for e-Science from Spending Review

£M	2001/2	2002/3	2003/4	2004/5	2005/6	TOTAL
MRC	1.0	2.0	5.0	6.9	6.2	21.1
BBSRC	1.0	2.0	5.0	5.0	5.0	18.0
NERC	1.0	2.0	4.0	4.0	4.0	15.0
EPSRC	6.0	13.0	22.0	17.2	19.5	77.7
<b>Of which:-</b>						
<i>HPC</i>	<i>0.0</i>	<i>3.0</i>	<i>6.0</i>	<i>0.0</i>	<i>2.5</i>	<i>11.5</i>
<i>Core Prog</i>	<i>3.0</i>	<i>6.0</i>	<i>6.0</i>	<i>8.2</i>	<i>8.0</i>	<i>31.2</i>
PPARC	3.0	8.0	15.0	16.4	15.2	57.6
ESRC	0.0	1.0	2.0	5.5	5.1	13.6
CLRC	1.0	1.5	2.5	2.5	2.5	10.0
<b>TOT</b>	<b>13.0</b>	<b>29.5</b>	<b>55.5</b>	<b><u>57.5</u></b>	<b><u>57.5</u></b>	<b>213.0</b>





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# SR2004 – e-Science Infrastructure



- Persistent UK e-Science Research Grid
- Grid Operations Centre
- UK Open Middleware Infrastructure Institute
- National e-Science Institute
- UK Digital Curation Centre
- AccessGrid Support Service
- e-Science/Grid collaboratories Legal Service
- International Standards Activity





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# OeSC 'Objectives'



- Establish Oxford as regional centre on national Grid
  - Thereby establish Grid connections for our researchers
  - Make our resources available on the Grid
- Support groups throughout University undertaking national and international e-Science projects (and other Grid activities), and link with companies
  - Provide support infrastructure:- registration, certificate authorisation, training, documentation, security, services
  - Share development, coordinate and optimise across projects
  - Disseminate
- Commission 'intranet Grid'
  - Share resources across university
  - 5000 cpus !





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# National Grid Testbed



- JISC has agreed to fund:-
  - 4 nodes to be operated as grid infrastructure testbed facility
  - Will become UK “e-Science Production Grid”; converge with PP Grid
  - One of the two cpu cluster nodes installed at Oxford
    - ClusterVision supplied: 64 dual CPU nodes (Intel Xeon); Myrinet interconnect
  - In the process, learn how to manage and operate a Grid resource
- Connected with TeraGrid





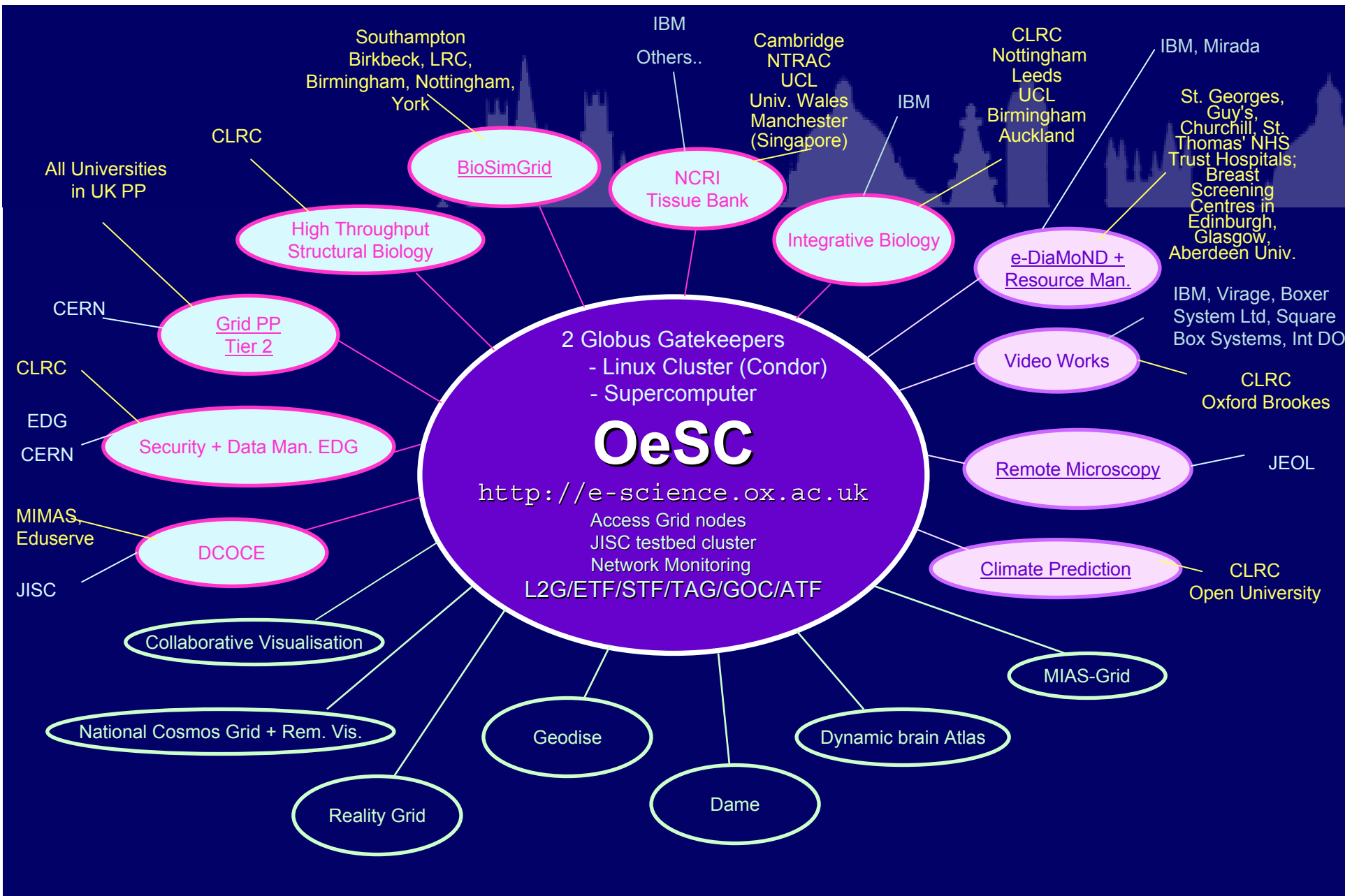
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# Collaborating OU Departments



- Biochemistry
- Atmospheric, Oceanic and Planetary Physics
- Engineering
- Materials
- Wellcome Trust Centre for Human Genetics
- Zoology
- **Physics**
- Oxford Internet Institute
- Said Business School
- Begbroke Business Park
- University Library Services
- Clinical Trials Unit
- Pharmacology and NTRAC
- UK Energy Research Centre bid (Oxford)







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# Links with GridPP



- Growing links with the Particle Physics Group in Oxford
  - Hosted GridPP7
  - Integral part of ‘Southern Tier 2’
  - Shared management and resources in new Centre
    - New PP Grid resources being made available through University
  - Expanding relationship with CCLRC in process
- Vital in development towards national ‘persistent Grid’
- Helps to ensure international compatibility





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# Reality Check...



- *‘We should not underestimate the difficulties involved. It really is very difficult to make the [Grid] infrastructure work routinely and I cannot promise instant success. This is a long haul.’*

Tony Hey (All Hands Meeting, Sept 2002)

- Reiterated at the Strachey Lecture – 21 January 2003
- Have we ever built applications and a new infrastructure in parallel?!
  - Do we have any application using a persistent Grid yet?







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# Future e-Science in Oxford



- New Interdisciplinary e-Science Centre, providing:-
  - Physical location for emerging partnerships and a point of contact for national and international activities
  - Centre for research training across disciplines, providing advice and guidance to researchers throughout the University
- Continue to focus on application-led e-Science
  - World-leading research projects
  - Deployment and exploitation
- Continue to support and expand knowledge and use of e-Science/Grid
  - Make the technology as transparent as possible
  - Aiming to closely couple e-Science and Oxford Super Computing
    - Create University-wide local Grid





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# Conclusions



- e-Science/Cyberinfrastructure:
  - Exciting new activities
- UK e-Science Programme
  - Substantial investment
  - Significant contribution to CERN
- e-Science in Oxford
  - Well established
  - Changing research
  - Keen to work closely with GridPP and LCG





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- End of Talk