

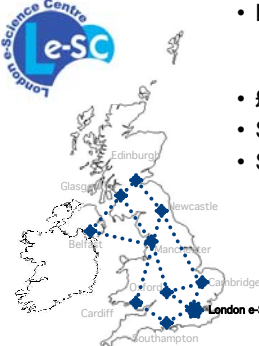
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## Challenges in building OGSA based Grids

Dr Steven Newhouse  
Sun Lecturer in e-Science  
Technical Director, London e-Science Centre  
Department of Computing, Imperial College London

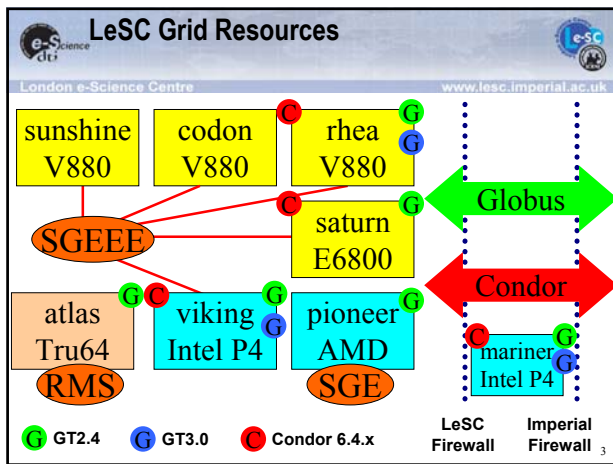
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## UK e-Science Programme



- Multi-disciplinary projects
  - Applied Scientists
  - Computer Scientists
- £120M over three years
- Started 2001
- Supporting infrastructure:
  - National e-Science Centre
  - Regional Centres
  - Grid Support Centre
  - Centres of Excellence (not Sun)


Regional Centre & Sun CoE 2



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### ICENI

*The Icenii, under Queen Boudicca, united the tribes of South-East England in a revolt against the occupying Roman forces in AD60.*



- IC e-Science Networked Infrastructure
- Developed by LeSC Grid Middleware Group
- Collect and provide relevant Grid meta-data
- Use to define and develop higher-level services
- Interaction with other frameworks: OGSI, Jxta etc.
- Released under SISSL like Open Source license

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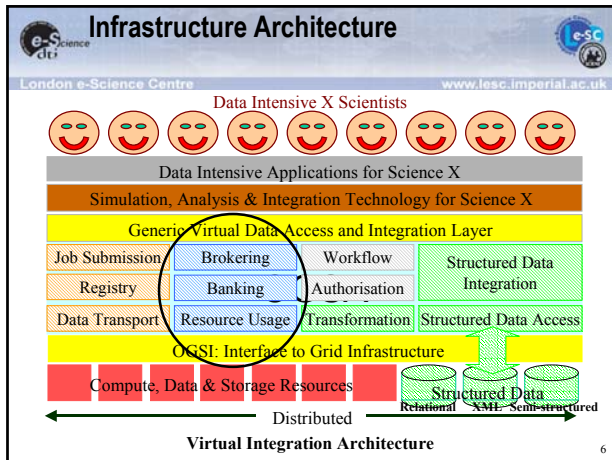
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### Open Grid Services Architecture (OGSA)

- Utilises 'standard' Web services infrastructures
  - Enables resource virtualisation
- Building on capability within Globus Toolkit 2 (GT2):
  - **Grid Service**: semantics for service interactions
  - Management of transient instances (& state)
  - **Factory, Registry, Discovery**, other services
  - Reliable and secure transport
- Multiple hosting targets: J2EE, Perl, Python, .NET, ...
- Reference implementation Globus Toolkit 3 (GT3)

'Architect's view of the completed building'

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## Market for Computational Services

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- UK Core e-Science Programme project
- Interfaces & protocols to trade Grid Services
- Funded by Department of Trade & Industry
- Collaborators
  - London e-Science Centre (LeSC)
  - e-Science North West (ESNW)
  - Southampton e-Science Centre (SeSC)
  - UK Grid Support Centre









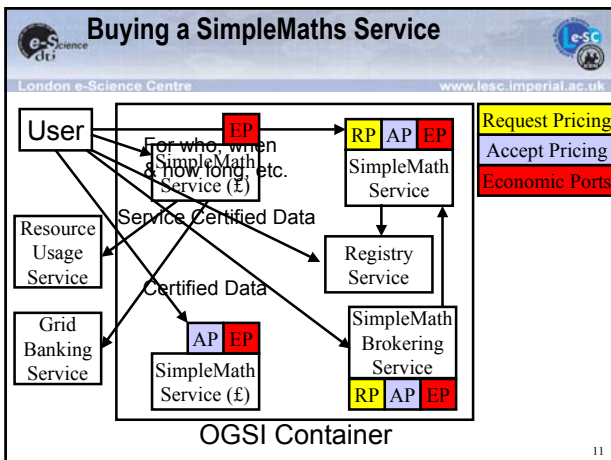
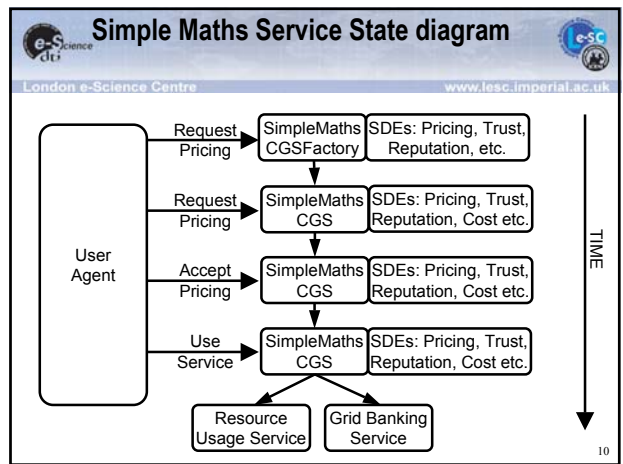
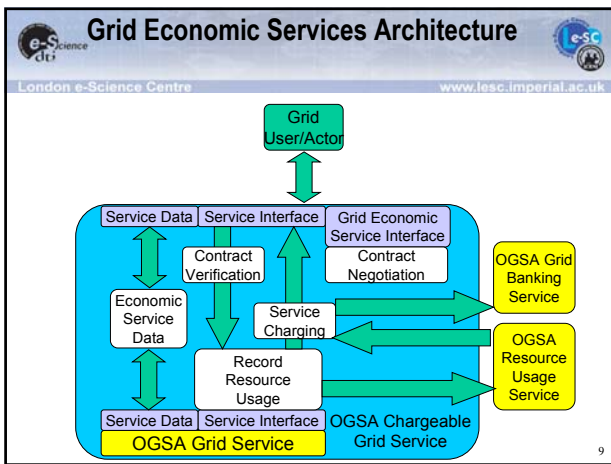
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## Extensions: New Economic SDEs & Services

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- Trust, Reputation & Reliability (0+)
  - Can I rely on this service? Will it deliver?
  - Has this service been audited for performance & integrity?
  - Allow SDE to updated by signed statements?
- Compensation & Liability (0+)
  - Who can I complain to and can I prosecute?
  - How could the contract be broken?
- Grid Banking Services (1+)
  - Declare which GBS are acceptable
- Resource Usage Service (1)
  - Declare which RUS is used by the service

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## Economically enabled Grid Service

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Select a factory service to generate a service instance with which to initiate negotiations

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## Examine Pricing Options

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Timeout(seconds):  Set Get Destroy

Chargeable Grid Service

SCE Name	SCE Value
Pricing Mechanism: FixedPrice	
Duration: default	100
max	200
min	50
amount	124
Pricing Mechanism: Auction	
Duration: default	100

Pricing Mechanism: Allowed Users:  Currency Name:  Product Name:

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## Examine Offer

London e-Science Centre www.lesc.imperial.ac.uk

Timeout(seconds):  Set Get Destroy

Chargeable Grid Service Pricing

SCE Name	SCE Value
Price	
Currency	GBP
name	newhouse
email	cash@ley.ac.uk
Amount	124
Product	
identity	simplemath
name	Linux
platform	Windows
duration	100
location	

Accept Pricing

Examine the offer ('terms & conditions') and accept or decline.

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## Use the SimpleMath Service

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Timeout(seconds):  Set Get Destroy

Math Service Panel

Value:  Add Subtract

Chargeable Grid Service Contract

Timeout(seconds):  Set Get Destroy

Math Service Panel

Value:  Add Subtract

Chargeable Grid Service Contract

SCE Name	SCE Value
Price	
Currency	GBP
name	newhouse
email	cash@ley.ac.uk
Amount	124
Product	
identity	simplemath
name	Linux
platform	Windows
duration	100
location	

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## ... on service destruction, cost calculated & money transferred...

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### Grid Bank

New A/C View All Logout

DN	First Name	Last Name	Company	Department	Balance	Status
stevannewhouse	Steven	Newhouse	Imperial College London	London e-Science Centre	10000.0	Active
williamlee	William	Lee	Imperial College London	London e-Science Centre	10000.0	Active

### Grid Bank

New A/C View All Logout

DN	First Name	Last Name	Company	Department	Balance	Status
stevannewhouse	Steven	Newhouse	Imperial College London	London e-Science Centre	9878.0	Active
williamlee	William	Lee	Imperial College London	London e-Science Centre	10124.0	Active

## Conclusions & Acknowledgements

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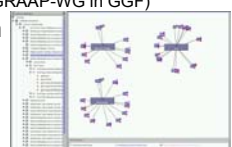
- Exploratory implementation of GESA
  - Extend basic Grid Service with economic capability
  - Development of CGS, RUS, & GBS services
- Demonstrated use of GT3
  - Many problems expected from a new infrastructure
    - Documentation, documentation, documentation
- Development Teams
  - LeSC: Miqdad Asaria, William Lee, Anthony Mayer
  - ESNW: Jon MacLaren
  - SeSC: Kushan Nammuni
- Management Teams
  - LeSC: John Darlington, Steven Newhouse, Oliver Jevons
  - ESNW: John Brooke
  - SeSC: Simon Cox, Trevor Cooper-Chadwick
- <http://www.lesc.ic.ac.uk/markets>

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## Further Work (Sun Funded)

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- GT3 Deployment
  - Containers: Standalone, Tomcat Servlet, SunONE Servlet
  - Examine performance & scalability
- Expose SGE as a Grid Service
  - Standard integration with GT3
    - Expose full capability & reservations
      - Job Description Markup Language (JSDL-WG in GGF)
      - Development of WS-Agreement (GRAAP-WG in GGF)
- Continue OGSA tooling within Netbeans framework



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- P2P (Jxta) based service discovery
- Grid Service Orchestration
  - extended BPEL4WS
- Computation Economics
  - Economically enable SGE Grid Service
  - WS Agreement for cost & resource reservation



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- Support Staff:
  - Systems: Keith Sephton, David McBride
  - Operations: Oliver Jevons, Sue Brookes
- Contact:
  - <http://www.lesc.ic.ac.uk/>
  - e-mail: [lesc@ic.ac.uk](mailto:lesc@ic.ac.uk)