



# ICENI: An integrated Grid middleware to support e-science

Dr Steven Newhouse, Technical Director  
London e-Science Centre

Department of Computing, Imperial College London

## *Enabling the e-Scientist'*

- Established applied multi-disciplinary research
- Industrial Collaborations:
  - Sun Centre of Excellence in e-Science
  - Intel Virtual European Centre of Grid Computing
- Cross-campus collaborations:
  - Bioinformatics
  - High Energy Physics
  - Computational Engineering
- Specialisation: Next Generation Grid Middleware
- <http://www.lesc.imperial.ac.uk/>



*The Iceni, 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: OGSA, Jxta etc.

# Development Infrastructure



London e-Science Centre

[www.lesc.imperial.ac.uk](http://www.lesc.imperial.ac.uk)

## Project Website & mailing lists

### Daily build

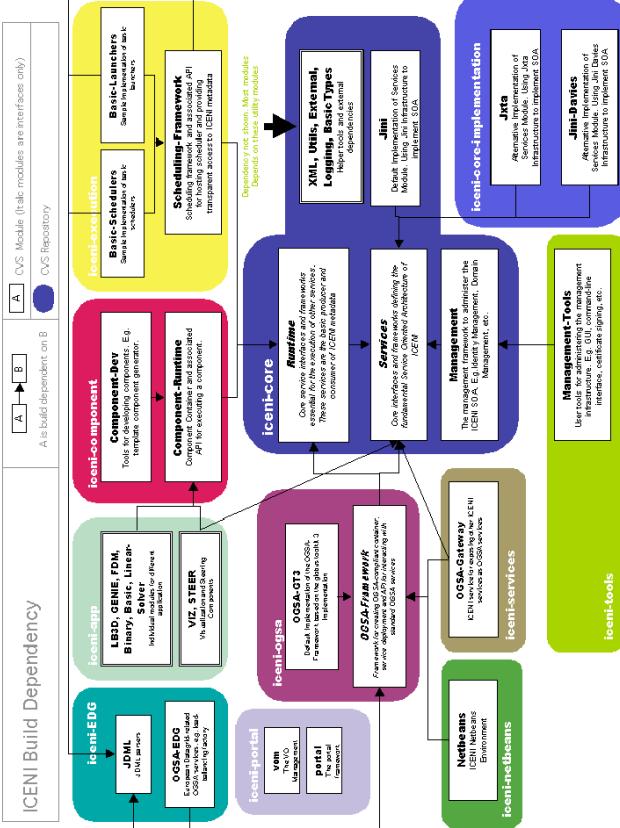
- Regression tests
- On success binaries updated
- Regenerated JavaDoc
- Deployment tests

### CVS

- Code split across multiple repositories & modules

## Documentation, manuals & user guides

## ICENI Open Source License (Extended SISSL)



# Focussing on usability & deployability

Name	Value
binary.root	http://www.lesc.ic.ac.uk/iceni/downloads
gateway.cacert.dir	\${user.home}/.globus/ca
gateway.cert.file	\${user.home}/.globus/host/hostcert.pem
gateway.handler.threads	60
gateway.http.port	8081
gateway.key.file	\${user.home}/.globus/host/hostkey.pem
global	
iceni.console.debug	INFO
iceni.domain.http.port	true
iceni.home	9086
iceni.jini.home	/Volumes/wwhl/work/iceni-binary
iceni.jini.lib	\${iceni.home}/iceni-services-jini/lib/jini1_2
iceni.jini.policy	\${iceni.jini.home}/lib
iceni.private.domain.jini.http.port	\${iceni.jini.home}/policy/policy.all
iceni.private.domain.jini.log	8090
iceni.private.domain.jini.log	\${iceni.temp}/jini
iceni.private.domain.jini.port	\${iceni.private.domain.jini.log}/mahalo
iceni.private.domain.jini.port	8091

Property Value - iceni.jini.home  
  
\${iceni.home}/iceni-services-jini/lib/jini1\_2

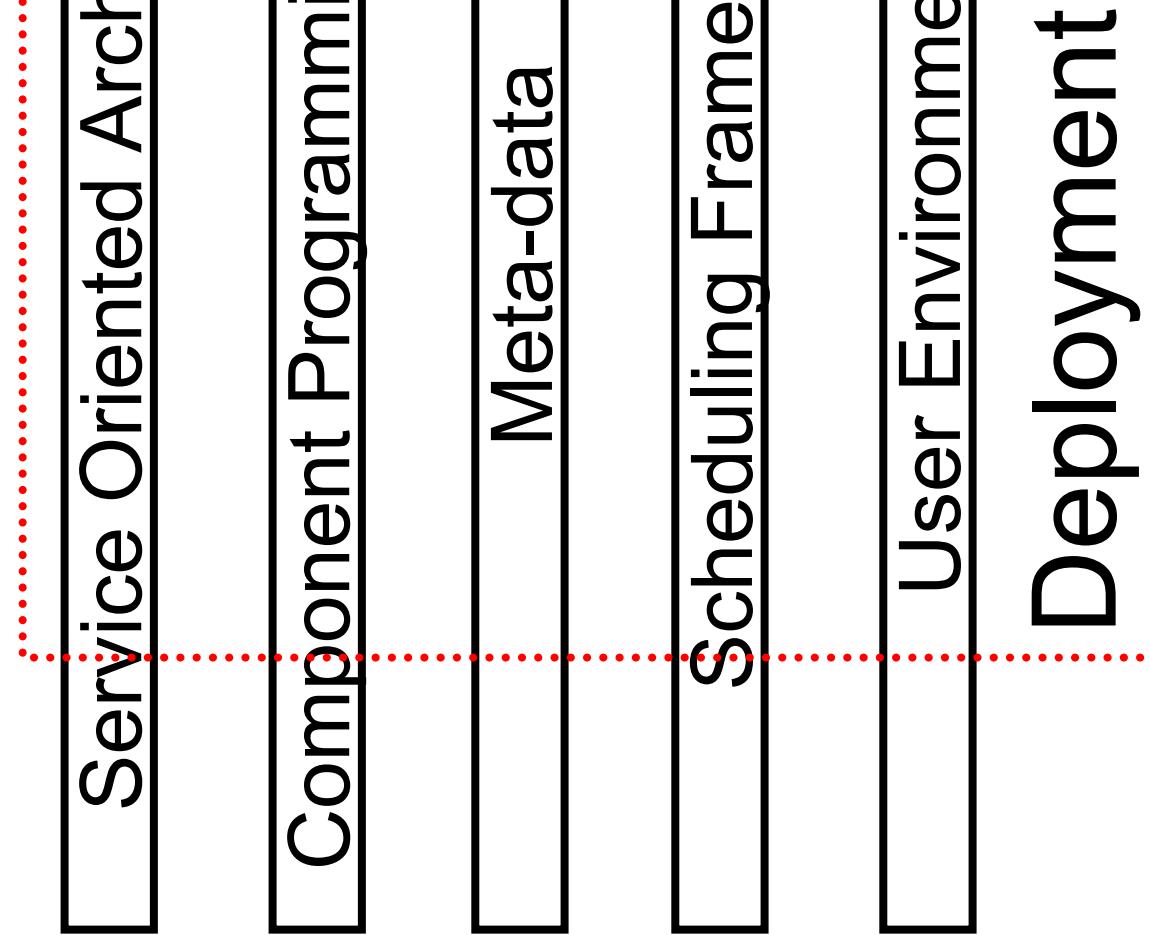
# Centralised configuration and service execution

# ICENI Strands



London e-Science Centre

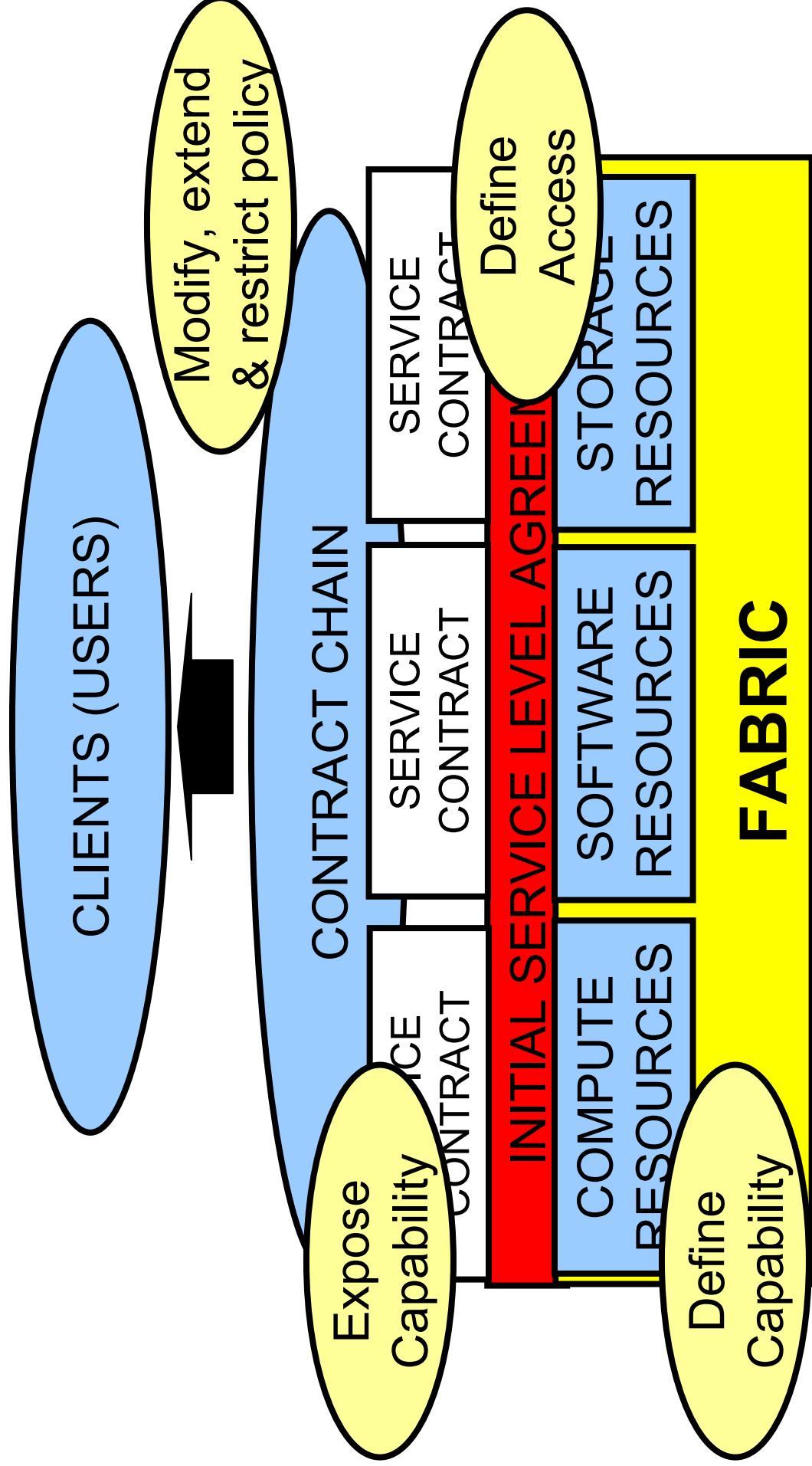
[www.lesc.imperial.ac.uk](http://www.lesc.imperial.ac.uk)



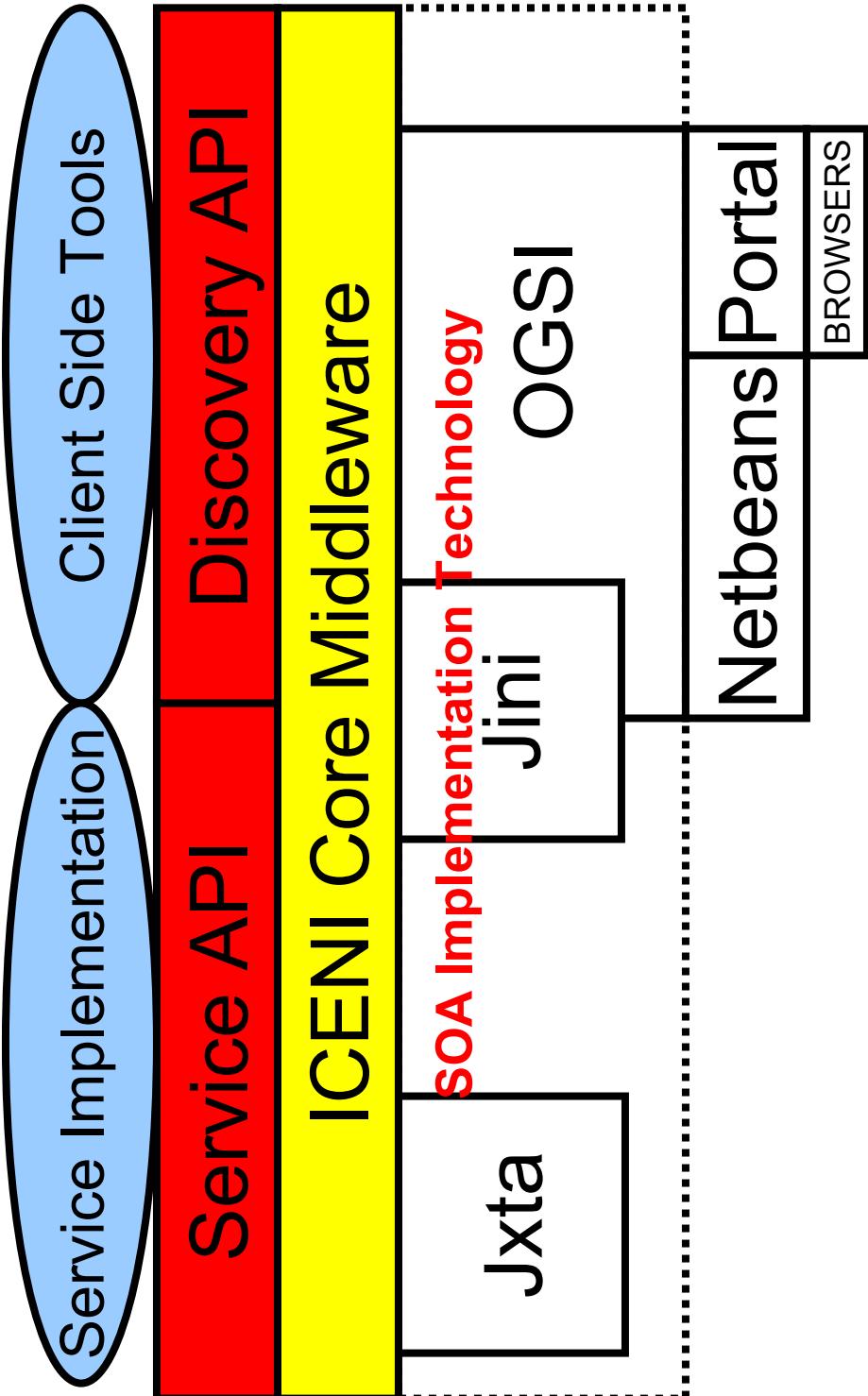
# e-Science dti

## Contract (SLA) Specified Services within ICEN

## Contract (SLA) Specified Services



# Different Service Implementations



# ICENI OGSA Service Browser

## London e-Science Centre

[www.lesc.imperial.ac.uk](http://localhost:8080/ogsaservicebrowser/)

ICENI Browser [ICENI Explorer]

Group By Community  
Group by Port Types

Services

- Group by Community
- Group by Port Types
- ICENI GridService
- NotificationFactory
- NotificationServiceGroup
- NotificationSource
- PublicResourcePortType
- Scheduler
- SchedulerPortType
- SecureContextEstablishmentPortType
- ServiceGroup
- TestService
- Group by Host
- rheal.esc.dtc.ic.ac.uk
- Authentication Service
- Basic Counter Factory
- Container Registry Service
- Generic Persistent Grid Service
- Handle Resolver
- ICENI OGSA Service
- Notification Subscription Service
- saturn.esc.dtc.ic.ac.uk
- Group by ICENI Component Types
- Applications
- Compositions
- LB3D
- Running Applications

Group By

Port Types

Factory

Scheduler

FactoryPortType

NotificationSource

NotificationServiceGroup

SecureContextEstablishmentPortType...

TestService

NotificationFactory

GridService

PublicResourcePortType

SchedulerPortType

SecureContextEstablishmentPortType

ServiceGroup

TestService

org.ingenierid.ogsagateway.test.Test

Group by Host

rheal.esc.dtc.ic.ac.uk

Authentication Service

Basic Counter Factory

Container Registry Service

Generic Persistent Grid Service

Handle Resolver

ICENI OGSA Service

Notification Subscription Service

saturn.esc.dtc.ic.ac.uk

Group by ICENI Component Types

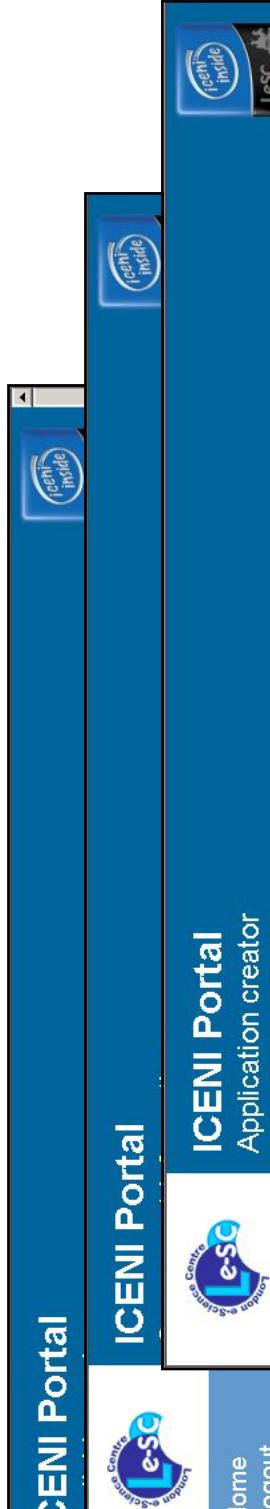
Applications

Compositions

LB3D

Running Applications

# ICENI Portal Integration of OGSI services





The screenshot shows the ICENI Portal Application creator component. At the top, it displays the LeSC logo and the text "ICENI Portal Application creator". Below this, there is a message: "Certificate: CN=mirazza.gulamali, L=LeSC, OU=eScience, C=UK" followed by the URL "http://giotto.doc.ic.ac.uk:8082/". A note says "Please connect the ports of this component to the associated ports of the other components in your application." The main area is titled "org.geniagrid.GENIE.demo.Coupler". It contains two sections: "In ports" and "Out ports".

In ports	Out ports
AtmosIn (genieType)	AtmosOut
OceanIn (genieType)	OceanOut
SeaiiceIn (genieType)	SeaiiceOut
SetupIn (genie Type)	SetupOut

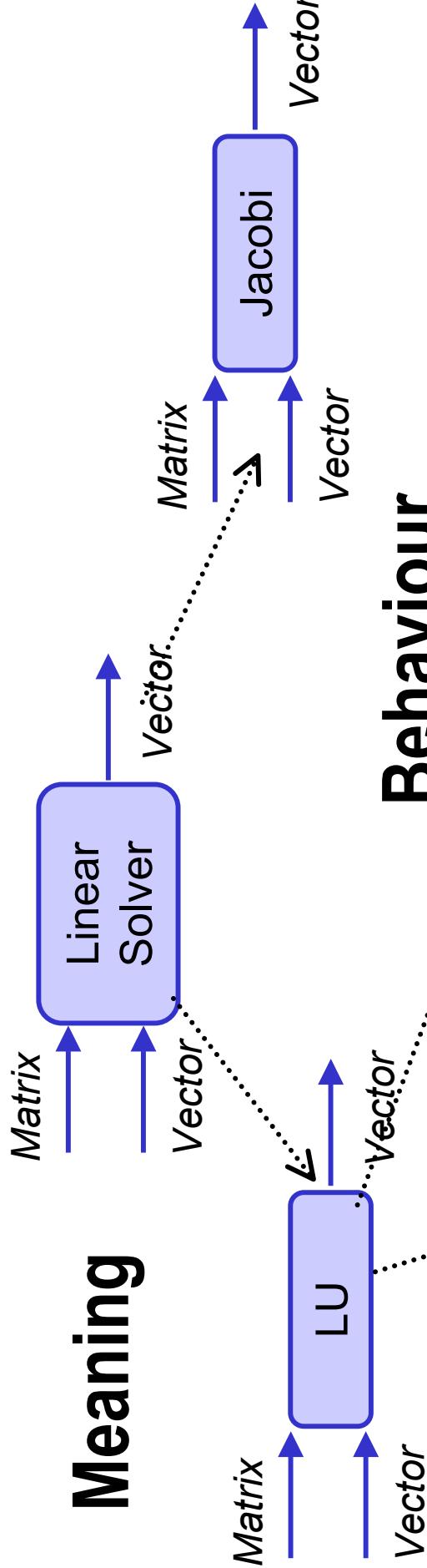
Below the port tables, there are "Application Menu" and "Create" buttons.

[Refresh](#) | [Migrate](#) | [<< Previous](#) | [Next >>](#)

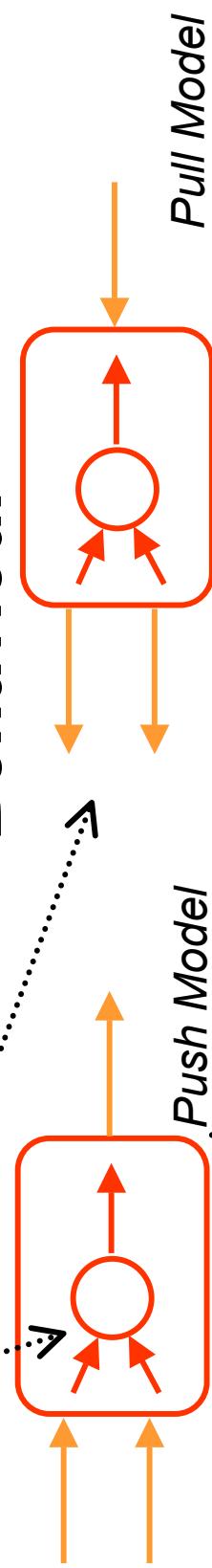
[About ICENI](#) | [About LeSC](#) | [Policy](#) | [Documentation](#) | [Help](#) | [Contact](#)

# Augmented Component Programming Model

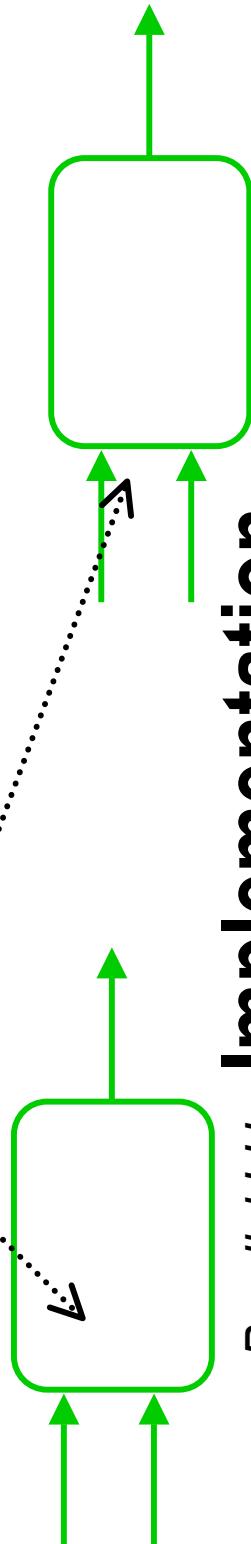
## Meaning



## Behaviour



*Push Model*



**Implementation**

Sequential LU

# Component Application Builder

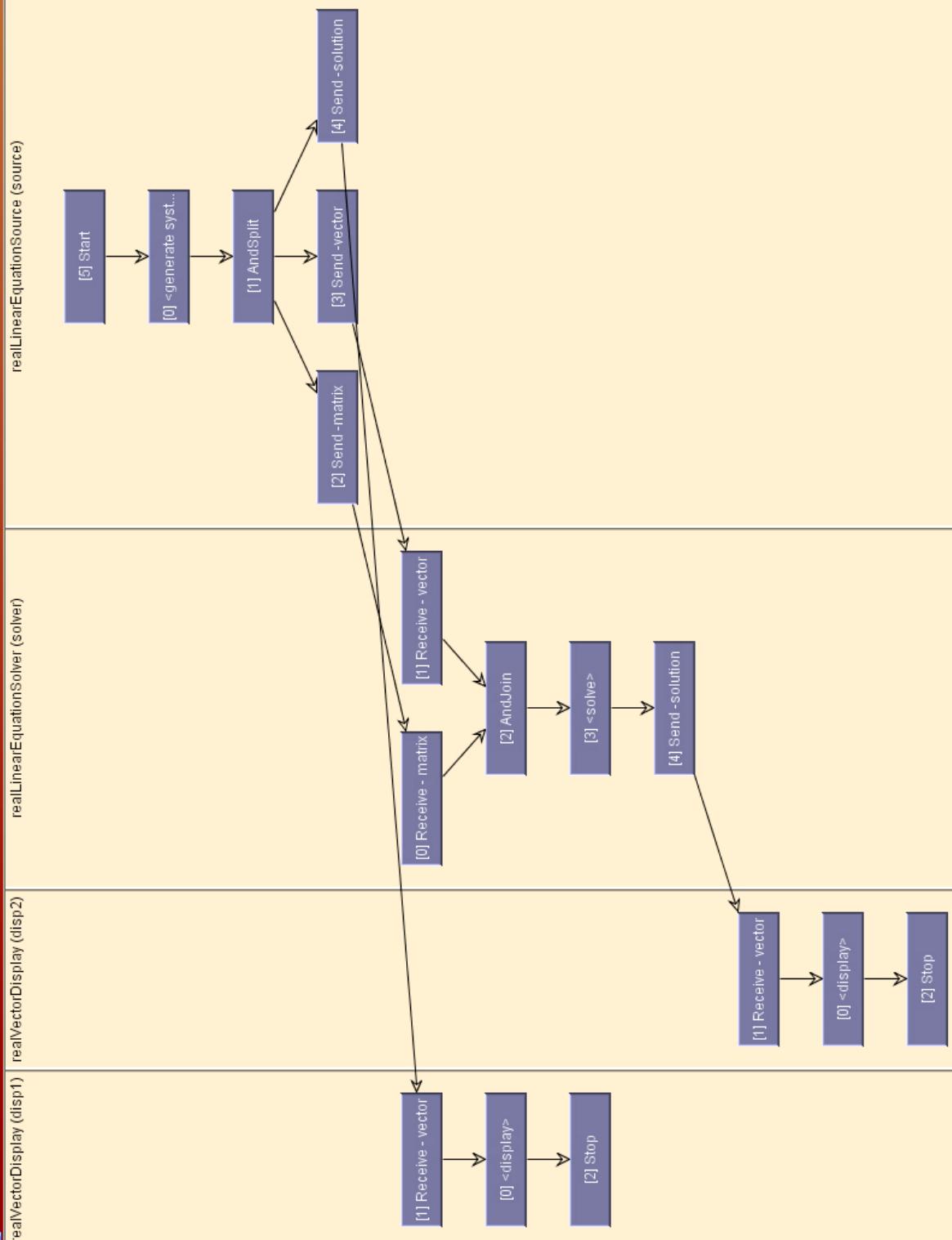


London e-Science Centre

[www.lesc.imperial.ac.uk](http://www.lesc.imperial.ac.uk)



# Inferring Workflow from Dataflow



# Scheduling within ICENI



- Exploit common meta-data within SOA
  - Service description
  - Inter and intra component workflow
  - Access & control at service & method level
- Extensible Scheduling framework & simulator
  - Random
  - Round Robin
  - Game Theory
  - Simulated Annealing

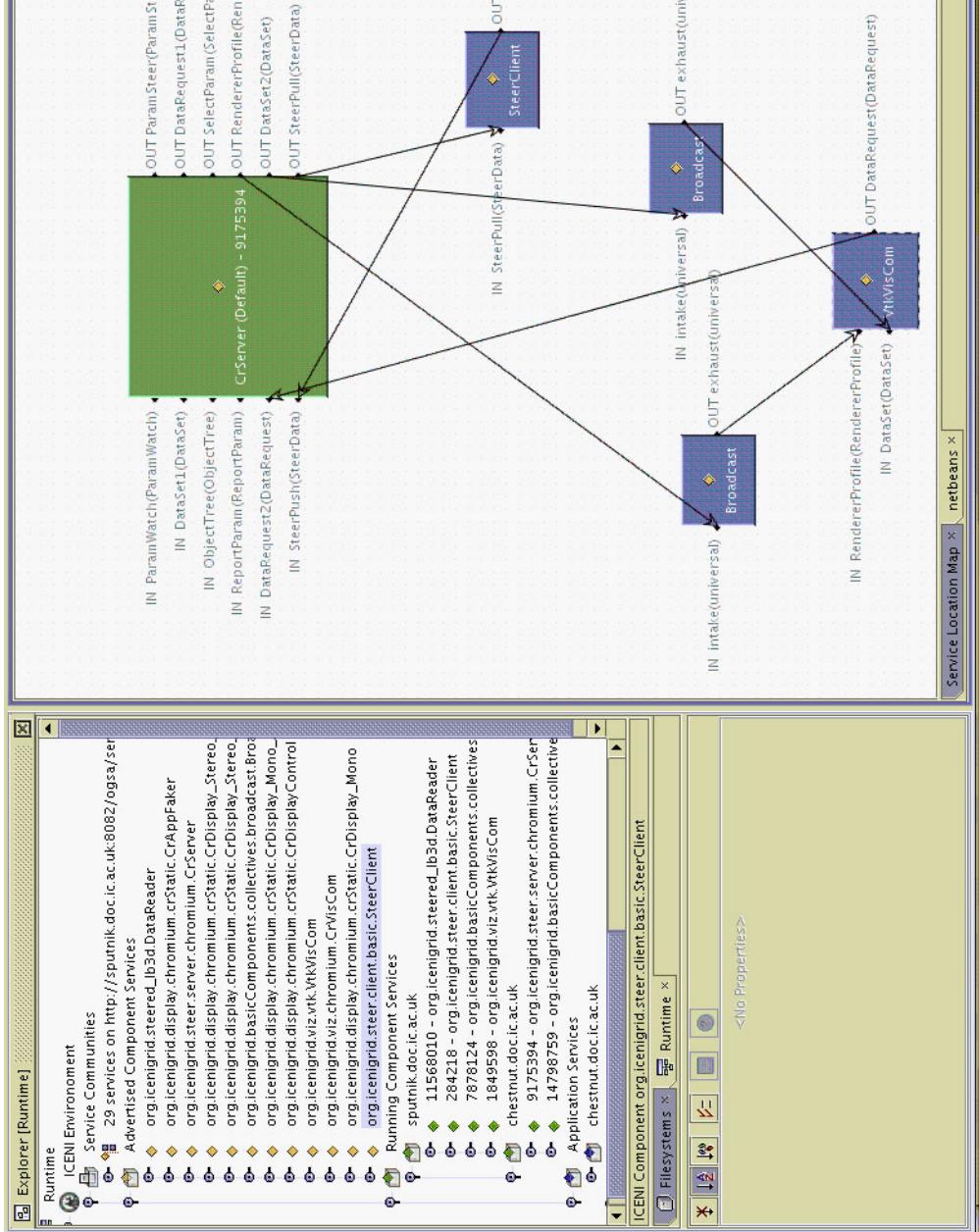
- Discover running applications

- Compose with visualisation workflow

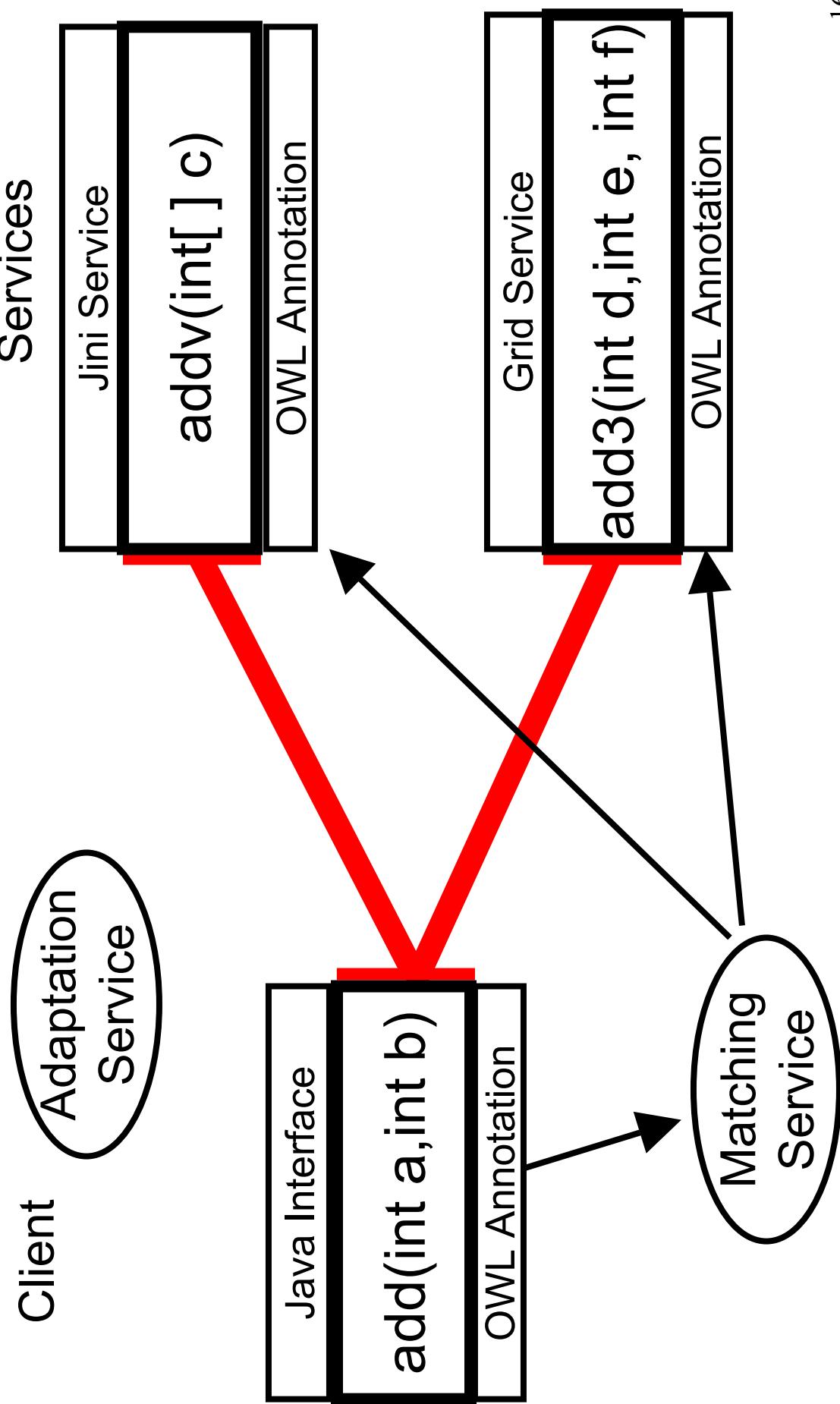
- Dynamic scheduling of new

## components

- Integration with AG



# Future Service Architectures



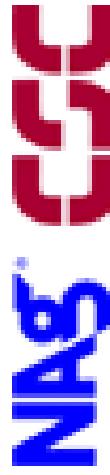
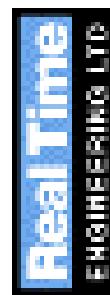
# Market for Computational Services



London e-Science Centre

[www.lesc.imperial.ac.uk](http://www.lesc.imperial.ac.uk)

- 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



# Acknowledgements



- Director: Professor John Darlington
- Technical Director: Dr Steven Newhouse
- Research Staff:
  - Anthony Mayer, **Nathalie Furmento**, Stephen McGough
  - William Lee, Jeremy Cohen, Ali Afzal
  - Marko Krznaric, Murtaza Gulamali, Asif Saleem
  - Laurie Young, Gary Kong, Jeffrey Hau, Angela O'Brien
- Support Staff:
  - Systems: Keith Sephton, David McBride
  - Operations: Oliver Jevons, Sue Brookes
- Contact:
  - [e-mail: lesc@ic.ac.uk](mailto:lesc@ic.ac.uk)
  - <http://www.lesc.imperial.ac.uk/>