



# Collaborative Orthopaedic Research Environment

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# [ Background ]

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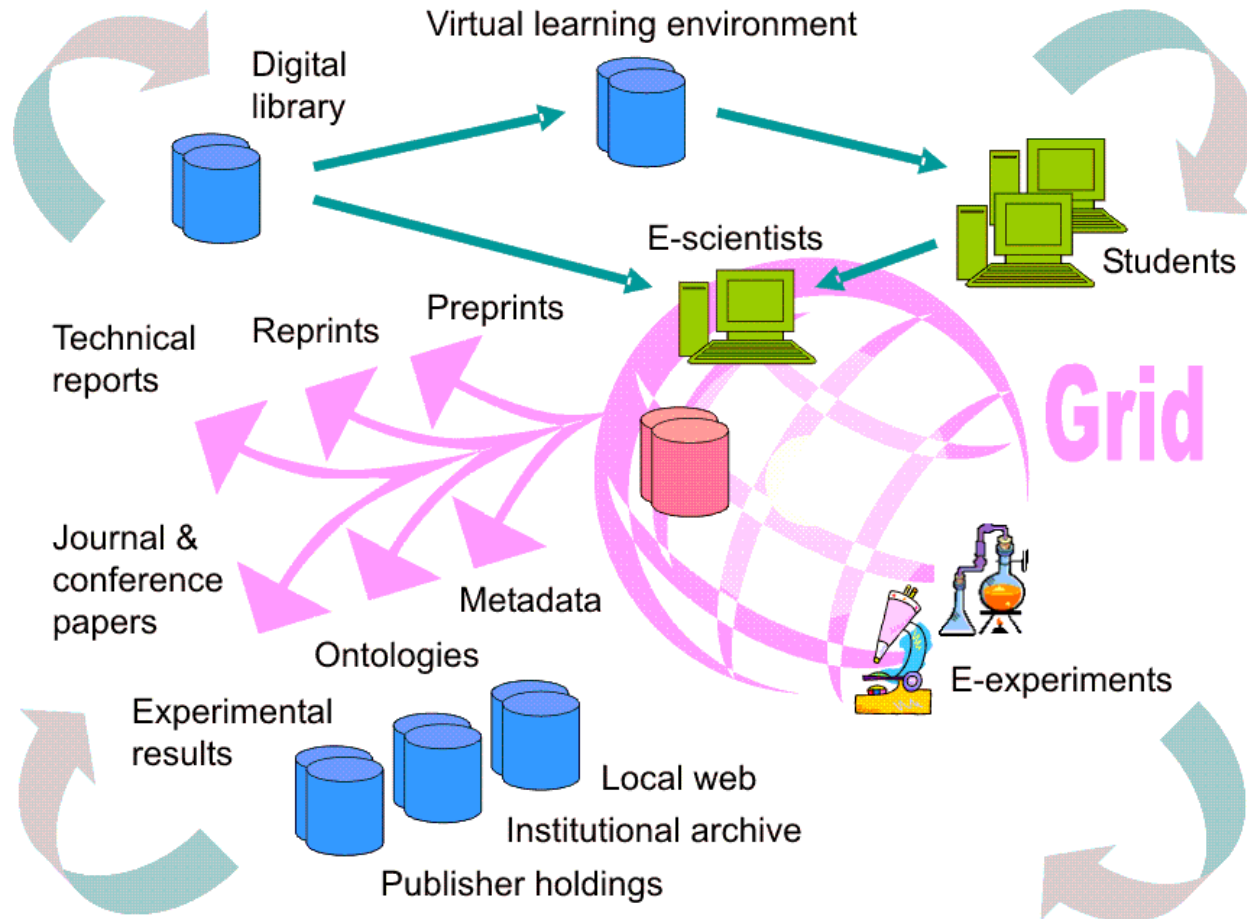
- Need for collaborative research in biomedicine
  - Develop a Virtual Research Environment which enables orthopaedic surgeons to collaborate remotely
  - Support orthopaedic surgeons in the design, analysis, review, and dissemination of experiments and trials

# [ Background ]

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- Re-engineer previous VRE (Virtual Orthopaedic European University, VOEU)
  - As a loosely coupled system
  - Use a web/grid services-based approach to an e-science VRE

# [ E-science cycle ]



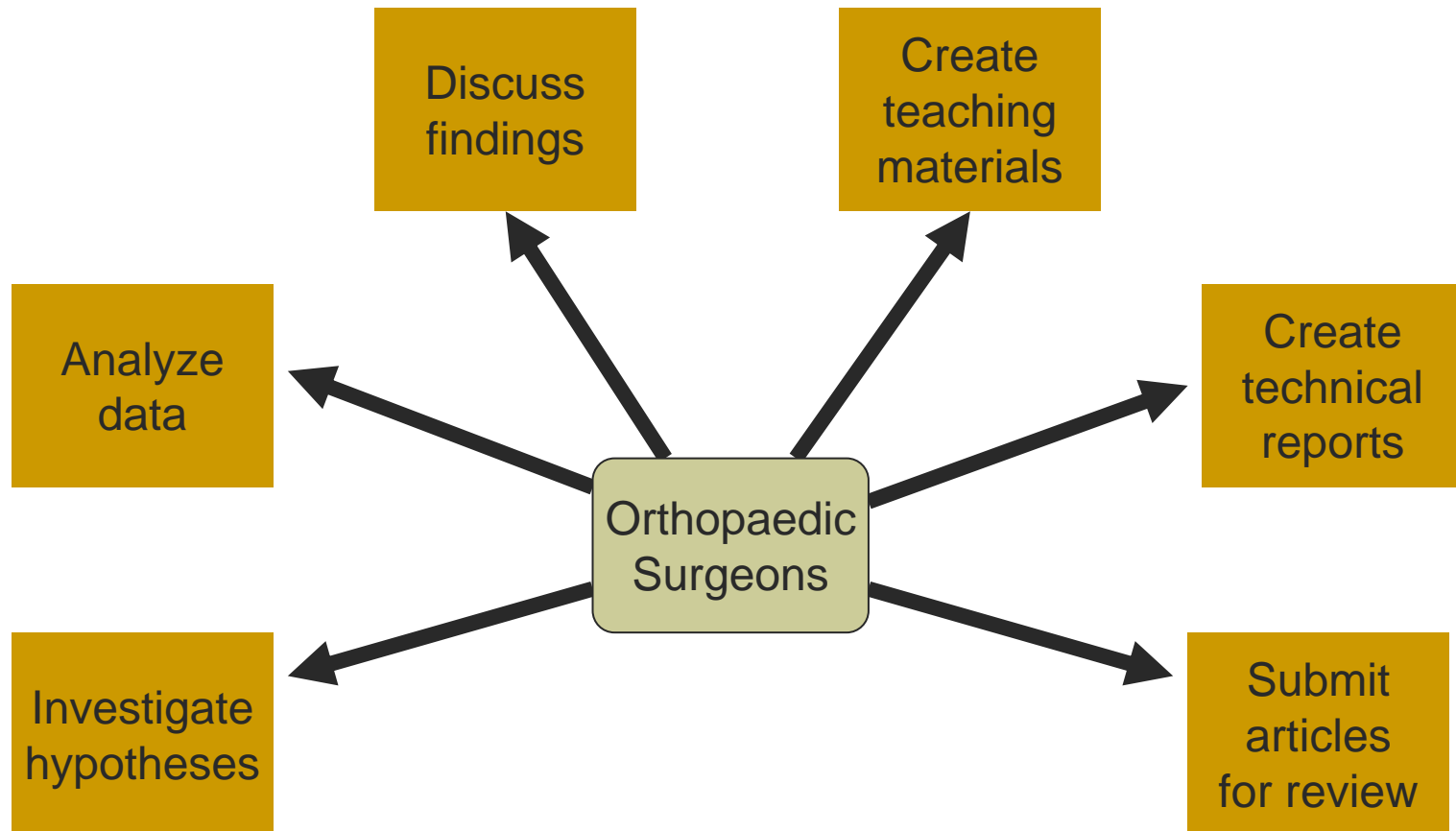
# [ Aim ]

- Develop a Grid/Web service-based VRE for supporting a critical subset of the e-science cycle for orthopaedic surgeons:
  - Collate and analyse trial results
  - Organise internal project discussions and reviews
  - Produce technical reports and papers
  - Produce teaching and training materials

# Required CORE support

- Creation of technical material (non-research material for education)
- Data analysis (from own trials or data entered from journals)
- Investigation and development of hypotheses (from own work or as meta or thematic reviews)
- Discussion and review of findings from own or others work
- Preparation of papers and reports, and submission for review

# Required CORE support



# [ User requirements ]

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- Virtual Research Environment should be easy to use (consultant surgeons are apparently low in patience)
- Contextualise resources and data presentation (adaptive user profile)
- Run simulations with large scale data
- Provide secure access

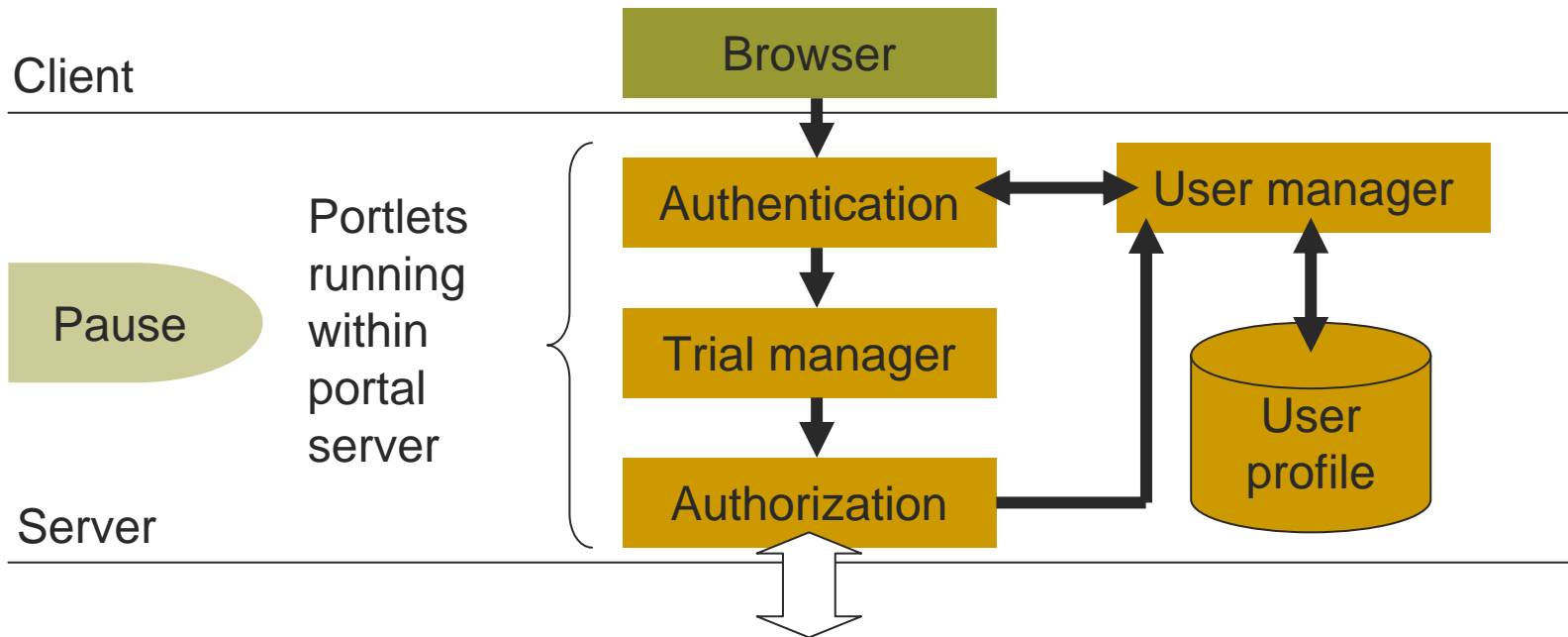


# [ CORE approach ]

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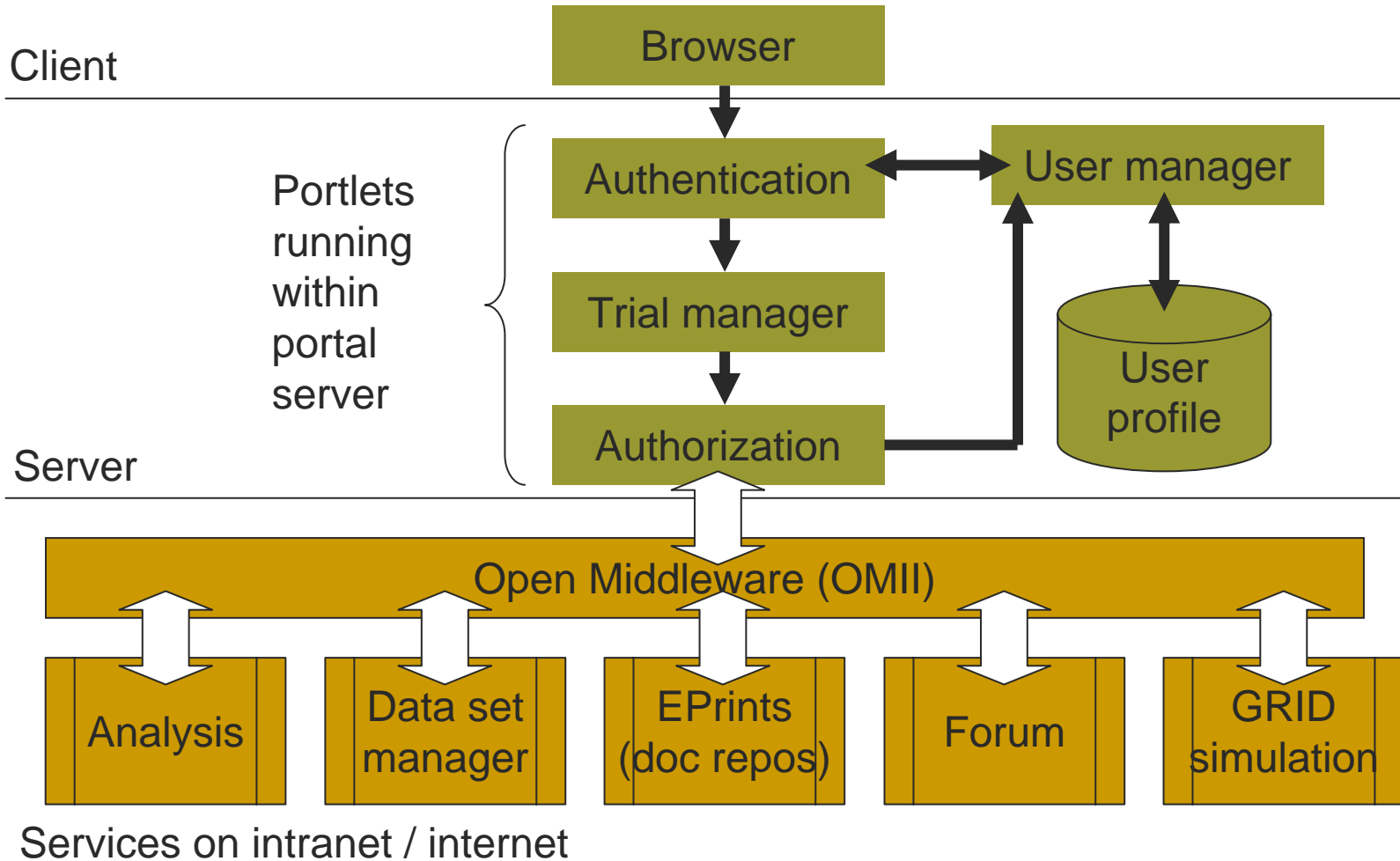
- Re-engineer the VOEU tightly coupled system to a web service-based VRE
- Implement the VRE using Grid/Web services technology and Service-Oriented Architecture concept
- Use a portal as a presentation layer which aggregates, integrates, personalises and presents information, transactions and applications to user

# [ CORE architecture ]



Services on intranet / internet

# CORE architecture



# [ CORE architecture ]

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- Server level

- Portal -- act as a gateway between clients and a range of services/components

- Middleware

- OMII -- end users can access Grid resources and applications in a trusted and secure environment

- Services

- A set of web / grid services on intranet / internet

# [ Portal and portlet ]

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- The components within a portal are “portlets”: Trial Manager, User Manager, Authentication, Authorisation, ...
- Trial Manager controls the work flows for setting up experiments and submitting papers

# [ Web/Grid services ]

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- Analysis

- A web service to perform analysis on dataset using statistical method

- Eprints

- A web service to help submit and disseminate articles for reviewing between researchers

- Forum

- A web service to support discussions between researchers

# [ Web/Grid services ]

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- Data Set Manager
  - A web service to handle trial related data
- Grid Simulation
  - A grid service to provide users with functionality for running simulations

# [ Conclusion ]

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- CORE is engineered as a loosely coupled system using SOA and Grid services
- The loosely-coupled architecture allows the system to evolve in accordance with the changing needs of its users
- Uses Grid services for the simulation, modelling and visualisation of bone and soft tissue biology, analysis of large scale experiments and the modelling of nanometric tissue units



# [Thanks!]

- Questions, comments... ?

