MANCHESTER 1824
The University of Manchester

Semantic Accountable Matchmaking for E-Science Resource Sharing

Zeqian Meng
Rizos Sakellariou
School of Computer Science, The University of Manchester
John Brooke
JMB Associates Ltd. Manchester

MANCHESTER 1824
The University of Manchester

Introduction | Motivation

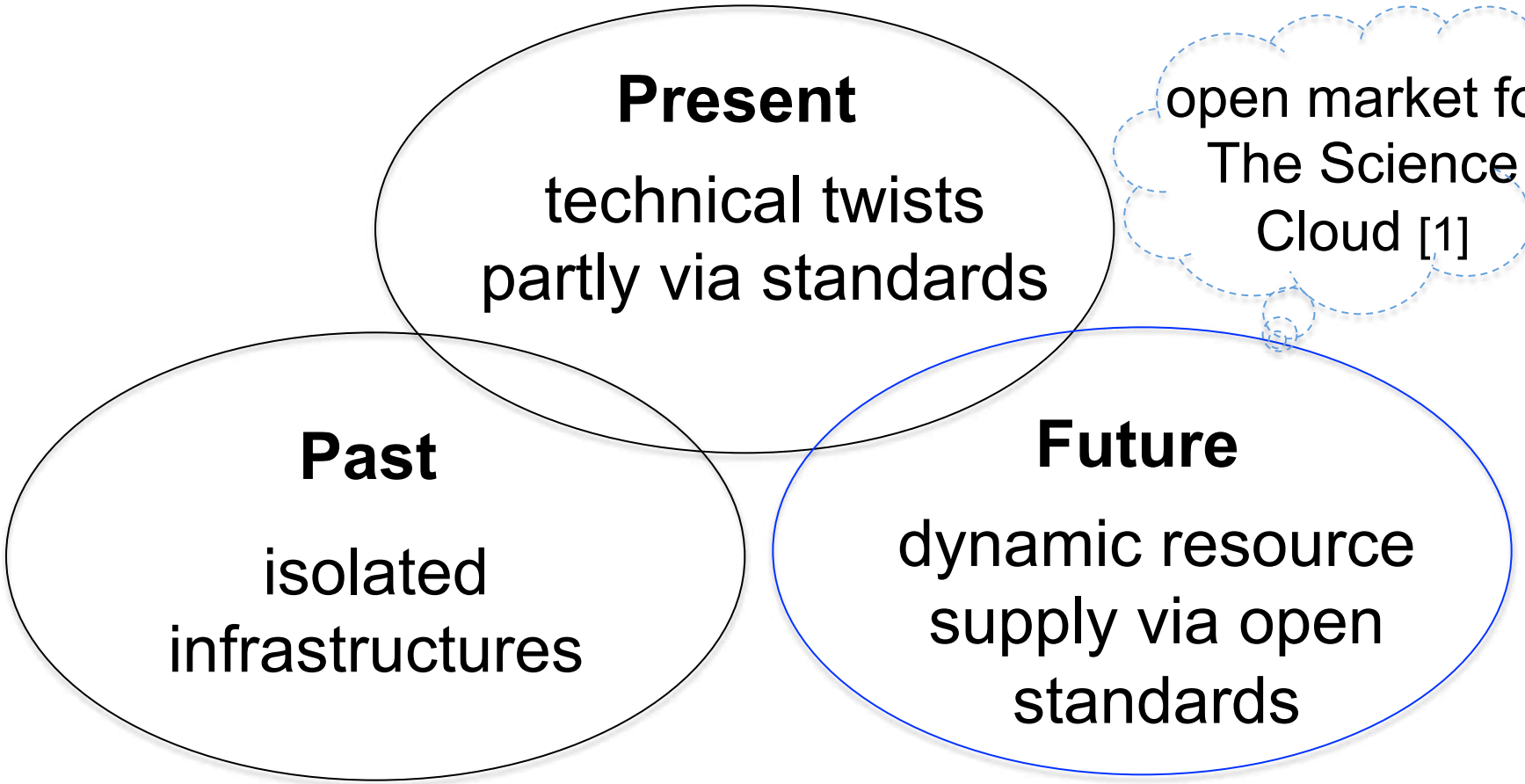
resource sharing management for e-Scientists' collaboration

e-Scientists

resource supplying infrastructures

MANCHESTER 1824
The University of Manchester

Introduction | Motivation

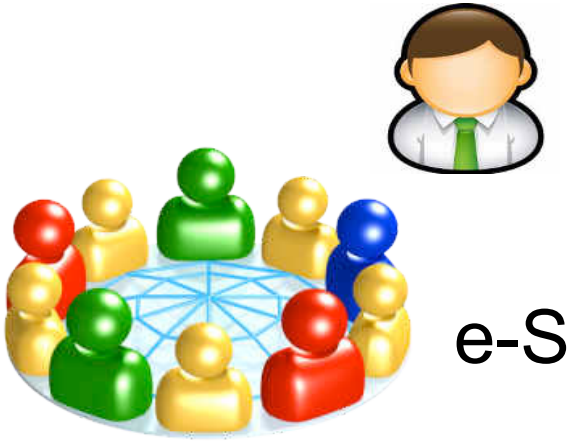


[1]: Amsaghrou, Rachida. Report On The Open Market Consultation And The Results. Geneva: CERN, 2016. Web. 29 June 2016.

MANCHESTER 1824
The University of Manchester

Introduction | Motivation

resource sharing management for e-Scientists' collaboration



e-Scientists

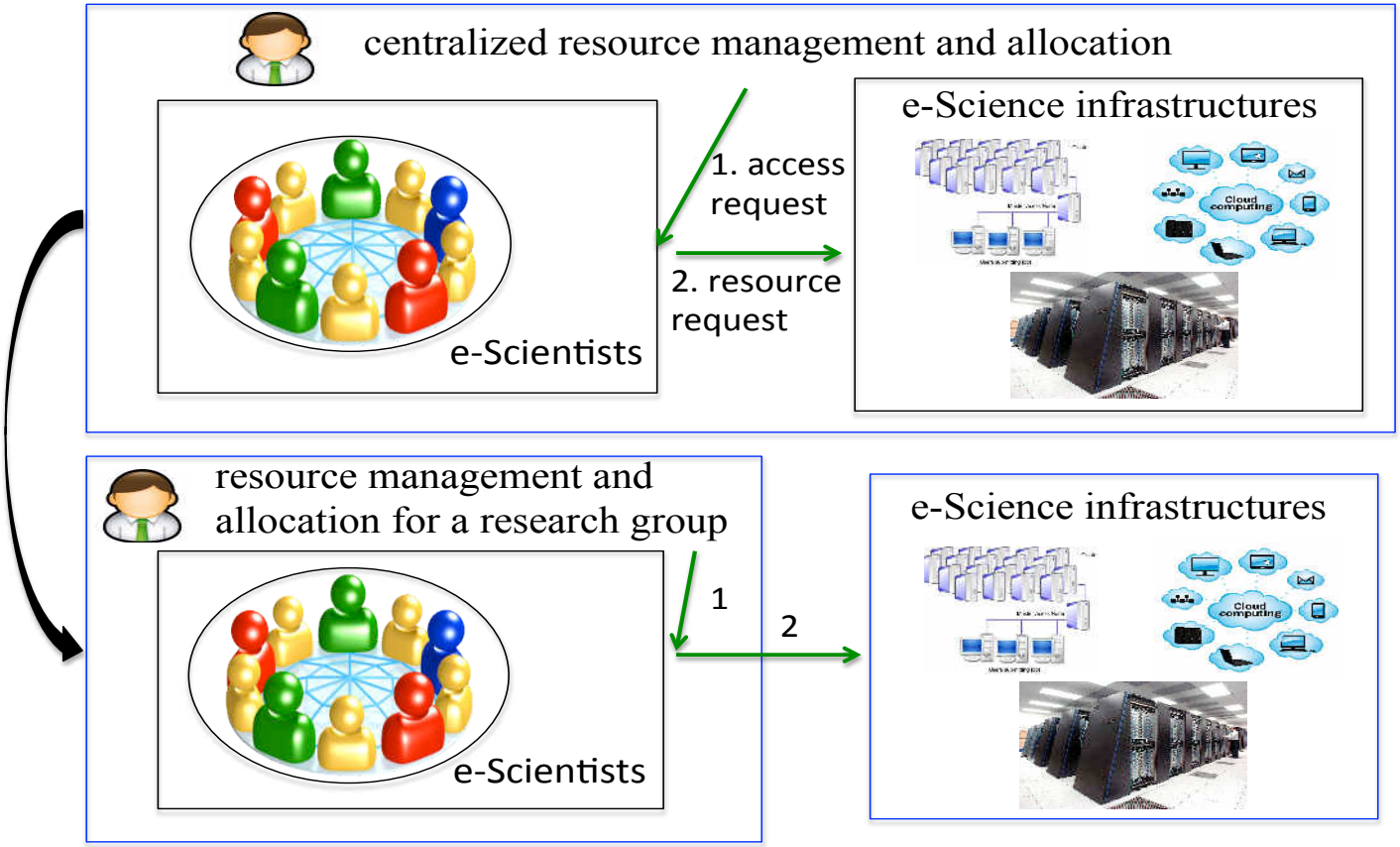
resource requesting organisation

resource supplying organisation

resource supplying infrastructures

MANCHESTER 1824
The University of Manchester

Introduction | Motivation



[2]

[2]: Solagna, Peter. "AAI In EGI Current Status". 2015. Presentation.

MANCHESTER 1824
The University of Manchester

Introduction | Motivation

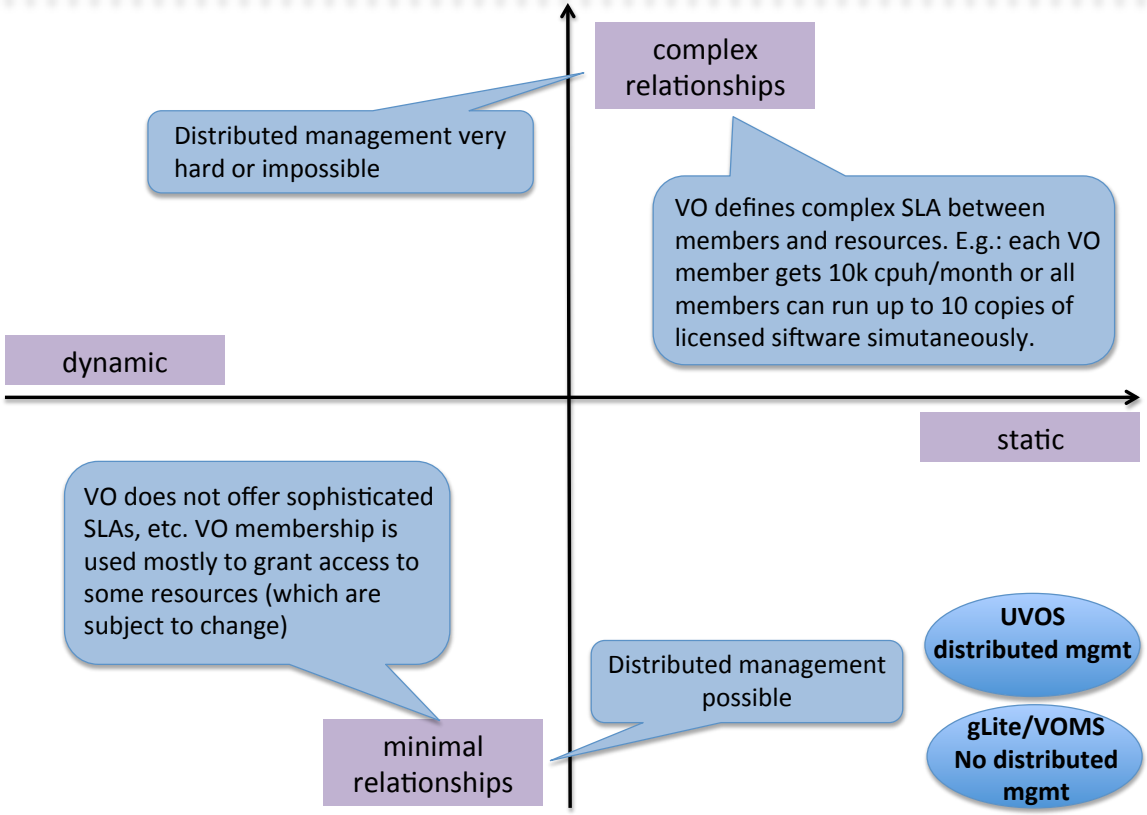
dynamic & customised resource supply

fine-grained accountable resource sharing (per job)

coarse-grained resource management

MANCHESTER 1824
The University of Manchester

Introduction | Motivation



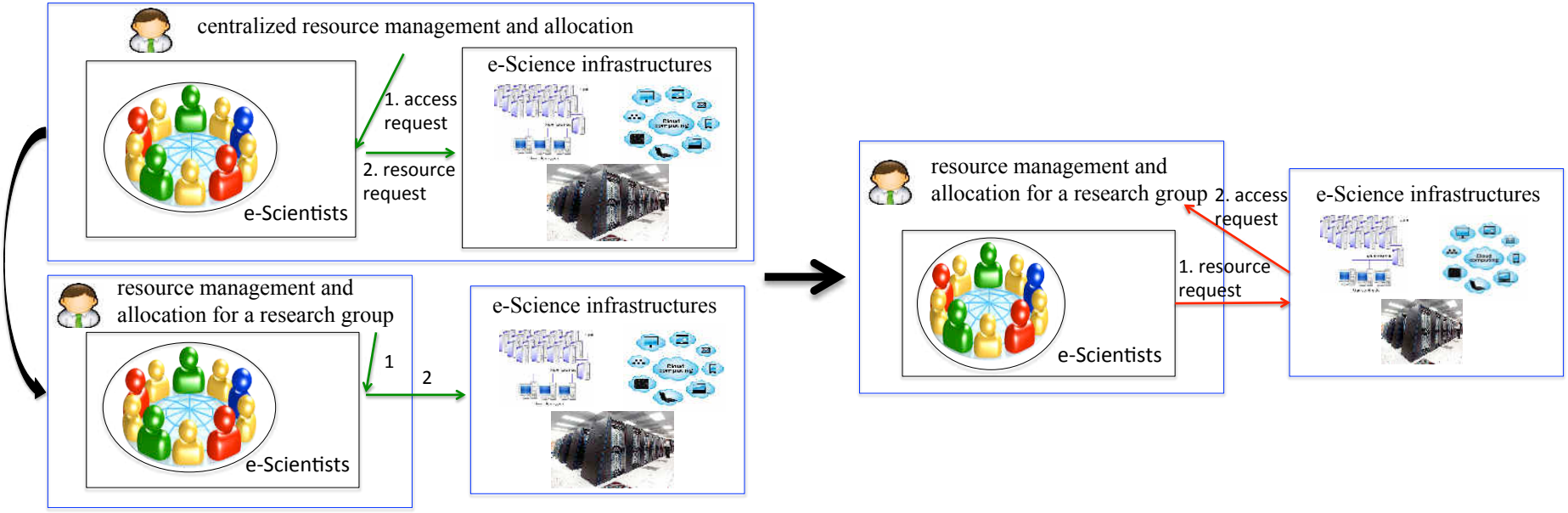
Classification of Virtual Organizations [3]

[3]: Benedyczak, K. and Bała, P., 2012. The next generation of Virtual Organisations in UNICORE. *Unicore Summit*.

MANCHESTER 1824
The University of Manchester

Introduction | Main question

How to realise fine-grained accountable resource sharing?



MANCHESTER 1824
The University of Manchester

Contributions

- A standard-based information model for fine-grained resource management
- An implementation of the information model (**independent organizations, new lifecycle**)

MANCHESTER 1824
The University of Manchester

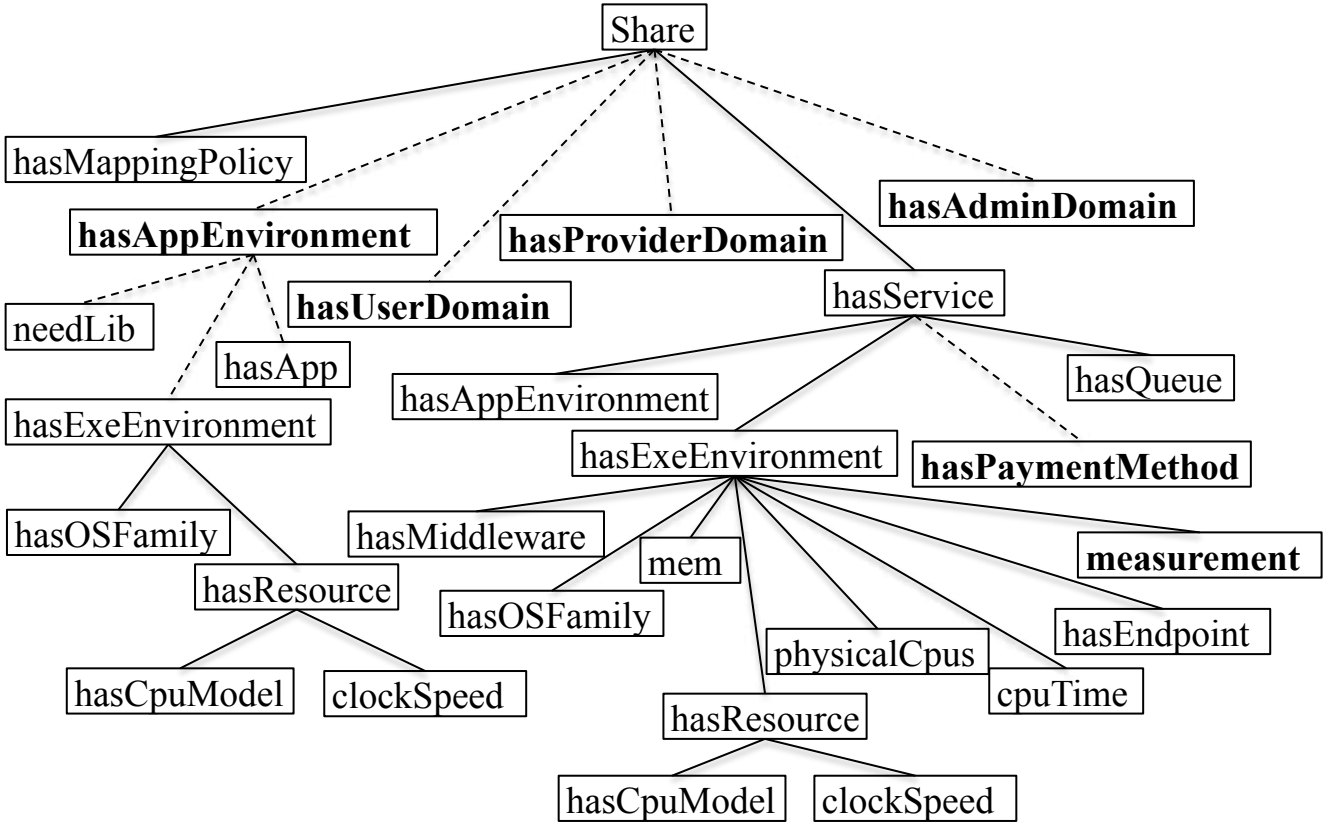
Methodology

- Extension upon GLUE 2.0
  (Glue Laboratory Uniform Environment 2.0)
- Semantic modeling & reasoning
- Implementation upon Amazon Web Sevices

MANCHESTER 1824
The University of Manchester

Results | Semantic model

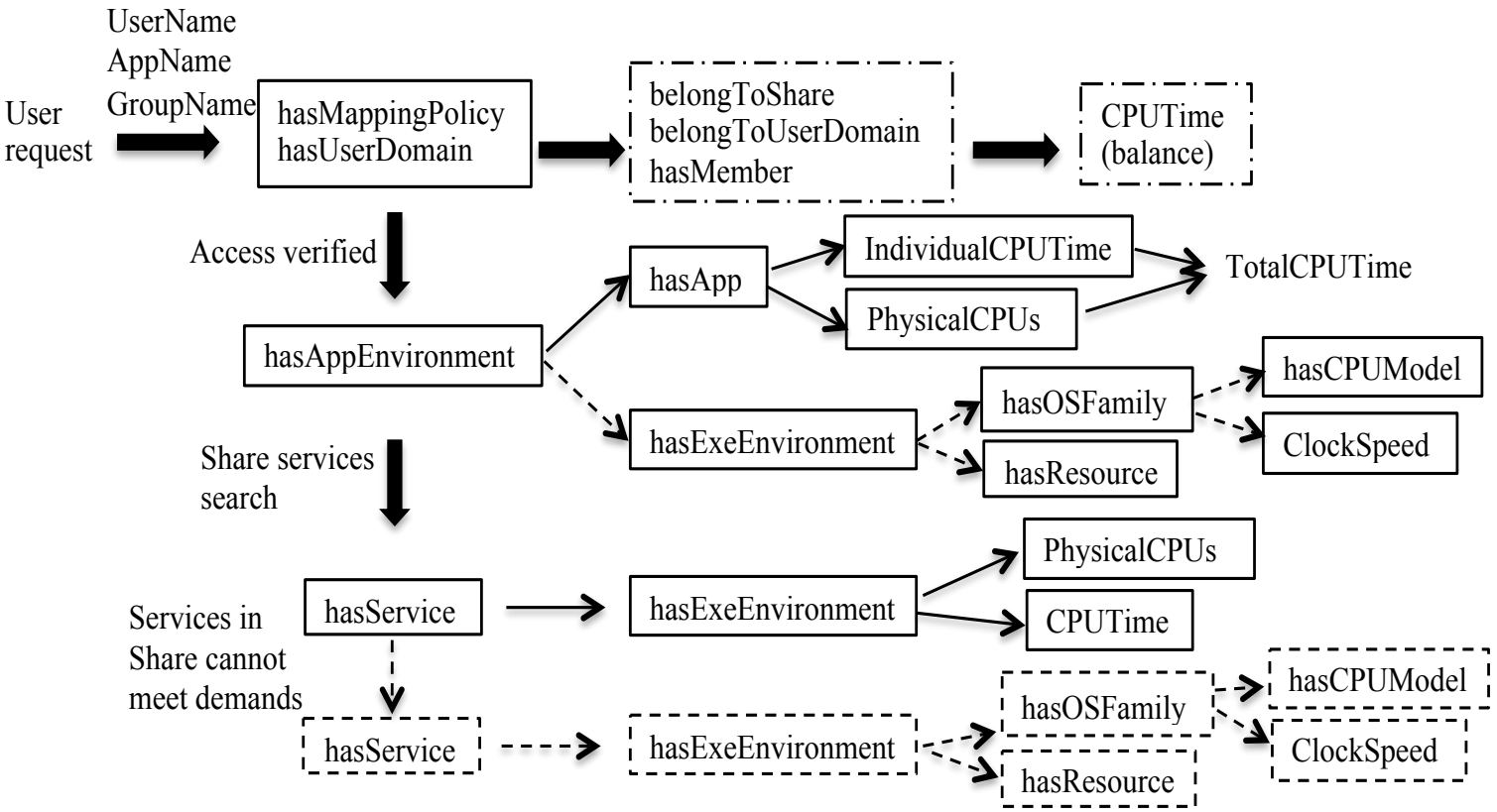
OWL 2 (Web Ontology Language 2)



MANCHESTER 1824
The University of Manchester

Results | Semantic reasoning

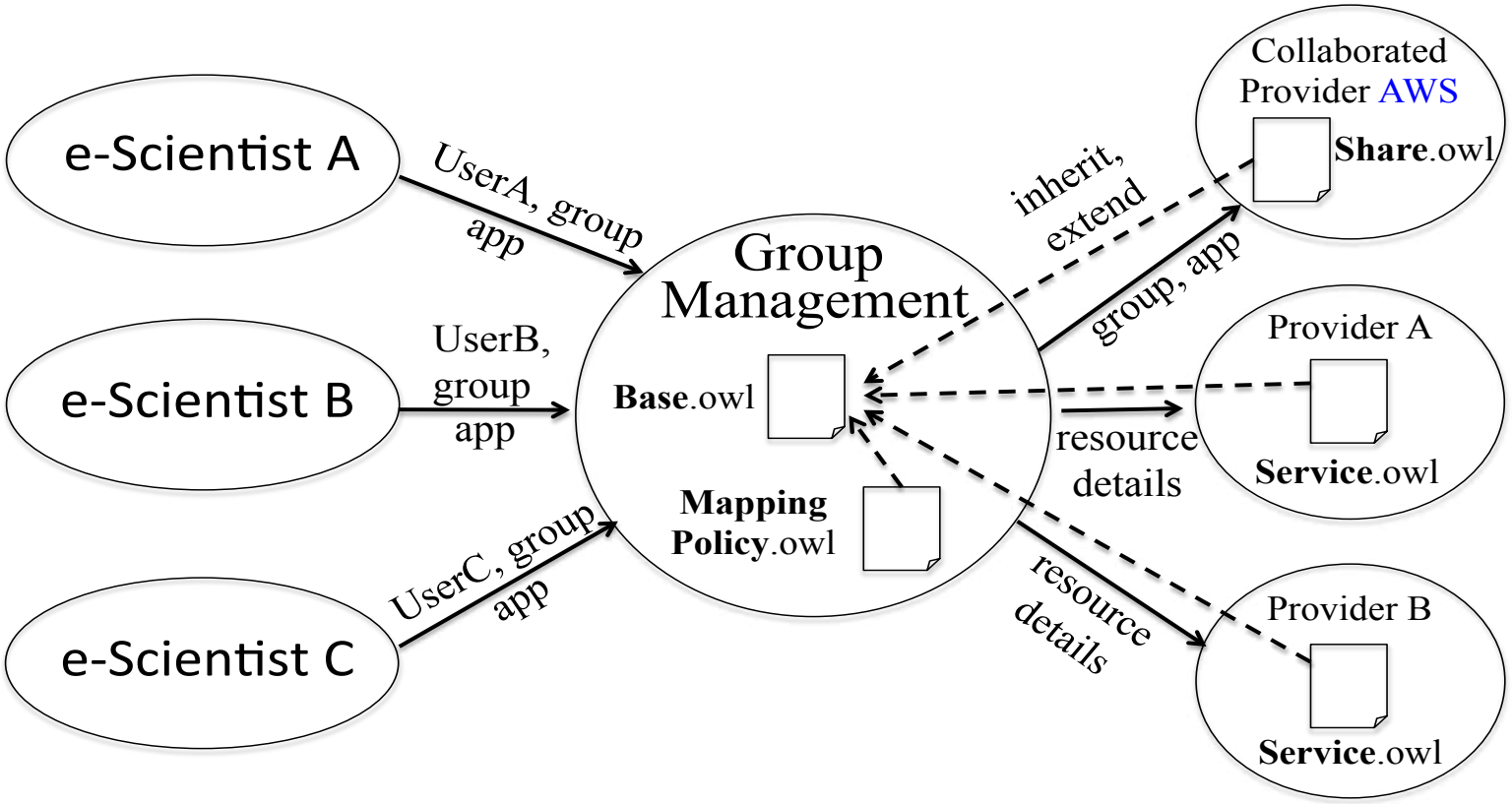
Pellet: open source, Java-based



MANCHESTER 1824
The University of Manchester

Results | Implementation

Implementation design



MANCHESTER 1824
The University of Manchester

Results | Evaluation

✔ Functionalities:

-- application- & resource-oriented matchmaking

-- balance updates

-- no resources returned with un-sufficient balance

-- members' privileges for matchmaking

MANCHESTER 1824
The University of Manchester

Results | Evaluation

✔ Performance: pure reasoning duration

-- a group with 15 members
-- 2 instances for application-oriented matchmaking
-- 4 instances for resource-oriented matchmaking

MANCHESTER 1824
The University of Manchester

Results | Evaluation

✔ Performance: pure reasoning duration

-- application- & resource-oriented matchmaking (S1&S2)

-- balance updates (S1)

-- no resources returned with un-sufficient balance (S3)

-- members' privileges for matchmaking (S5)

Scenario	1	2	3	5
Mean (ms)	267.10	279.33	272.93	280.83
Deveation (ms)	74.45	74.37	72.54	59.11

MANCHESTER 1824
The University of Manchester

Conclusion

- A semantic model extended from GLUE 2.0
- Reasoning programs upon the model
- Evaluation over Amazon Web Sevices
- Testbed: negotiable and accountable resource sharing

MANCHESTER 1824
The University of Manchester

Hypotheses

- To form and dissolve resource supply in a dynamic & independent manner
- Fine-grained accountable resource sharing
- To allow analysis of algorithms for performance

MANCHESTER 1824
The University of Manchester

References

[1] Amsaghrou, Rachida. Report On The Open Market Consultation And The Results. Geneva: CERN, 2016. Web. 29 June 2016.

[2] Solagna, Peter. "AAI In EGI Current Status". 2015. Presentation.

[3] Benedyczak, K. and Bała, P., 2012. The next generation of Virtual Organisations in UNICORE. *Unicore Summit*.


Thank you

Contact:

Zeqian Meng

zeqian.meng@manchester.ac.uk