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e-Research @ Monash

briefing to IT Managers' Forum 2 March 2006

Motivation

- DVC-Research seeks to improve Monash's research performance. e-Research technologies are *one* way to contribute to this.
- DEST seeks to improve the *preservation* and *accessibility* of research data.
- It is an exciting time:
- Compute and storage costs are now so low that new classes of research problems become tractable across all disciplines. Still the exponential continues.

What is **e-Research@Monash Centre** ?

- A joint activity between DVC Research and ITS Division
- Director: Prof. Ah Chung Tsoi
AhChung.Tsoi@adm.monash.edu.au
- Manager: Mr Neil Clarke
Neil.Clarke@its.monash.edu.au
- Established pursuant to a Strategic Plan developed in 2005 ...



e-Research@Monash Centre Strategic Plan

**Prepared by
The e-Research@Monash Working Group
May 2005**

Professor John Crossley (Chair)
Professor Bill Applebe (VPAC)
Mr Jack Chorowicz (ITS)
Dr Asad Khan (Faculty of IT)
Mr Alan McMeekin (Director – ITS)
Ms Heidi Winnen (Secretary)

What is **e-Research@Monash Centre** ?

- Will rely on (not replicate) many aspects of ITS Division's established operations
- Will provide a new focussed face (conduit between researchers and ITS) and new specialized services

What is “e-Research” ?

- The use (& development) of ICT technologies and in particular “GRID” technologies:
 - to *facilitate* research and
 - in particular to foster research *collaboration*

3 planks to the Monash e-Research strategy:

- (a) Enable our own research staff so that they can use ICT infrastructure more efficiently and effectively
- (b) Engage with industry & government
- (c) Engage with national & international collaborators
 - These three planks should go hand in hand together rather than sequentially

What is “GRID” ?

- More than just “distributed super-computing” although it does include distributed super-computing and cluster computing
- **Collaborative use of ICT**
across organizational boundaries
- Requires the development of “middleware” software

What is “GRID” ?

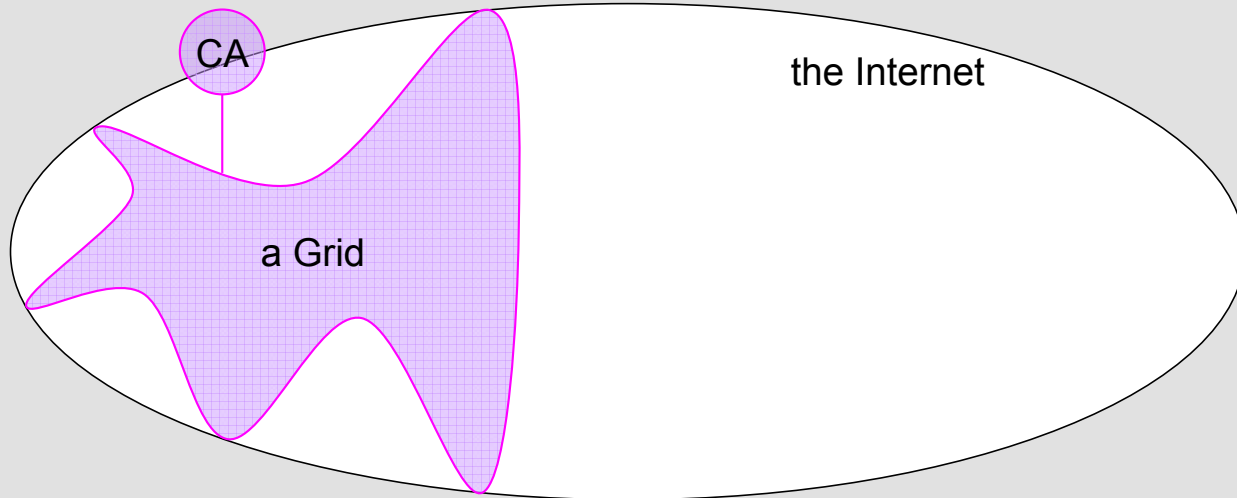
- GRID network (network capable of supporting GRID usage)
- storage GRID (distributed data-store/SAN)
- compute GRID (distributed compute power)
- distributed database
- distributed application
- work-flow GRID
- data visualization tools
- researcher GRID (distributed collaborative workgroup)
- tele-presence: tele-working, remote monitoring and/or control, “access GRID” (a form of video conferencing)
- sensor GRID and remote instruments (telescope; synchrotron)

What is “GRID” / “e-Research” ?

- Yes, it's all these things
- But it's more:
 - > It's distributed research & distributed researchers
- It's a paradigm shift
 - > a new way of doing research
- Move data into the middle-ground
 - > real collaborative research
- Analogy: the research paper and the quill

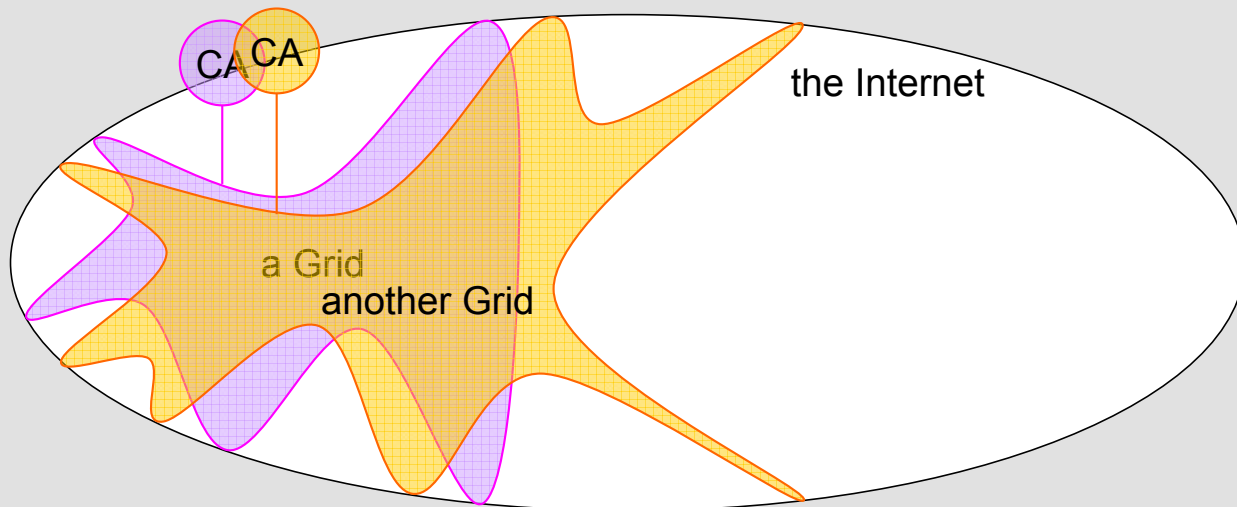
What is a GRID work-space ?

- A collaborative protected virtual working environment between consenting participants and consenting facilities



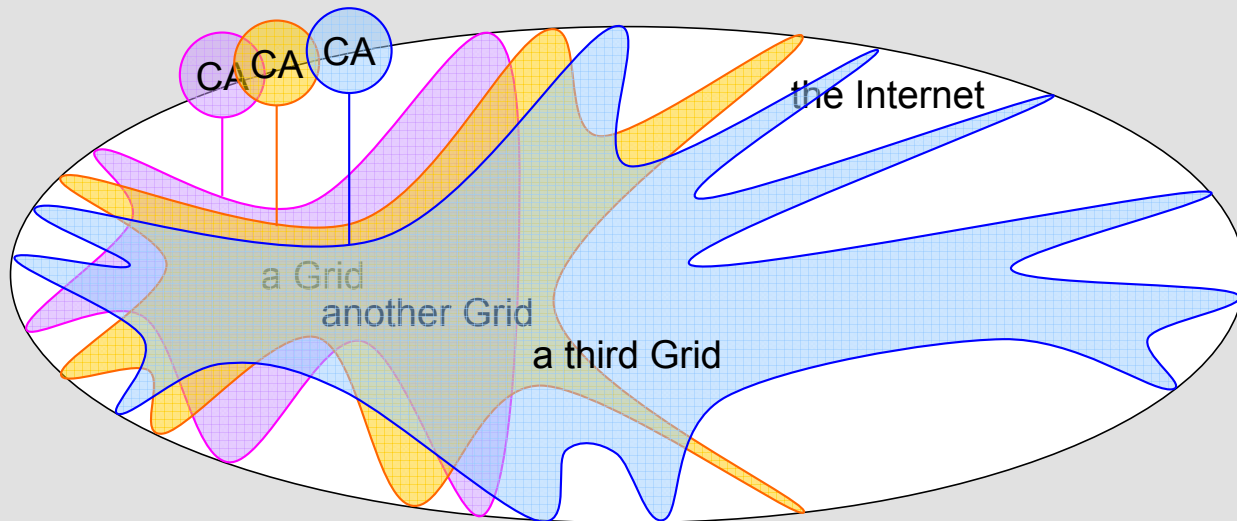
What is a GRID work-space ?

- There can be a multiplicity of GRIDs:



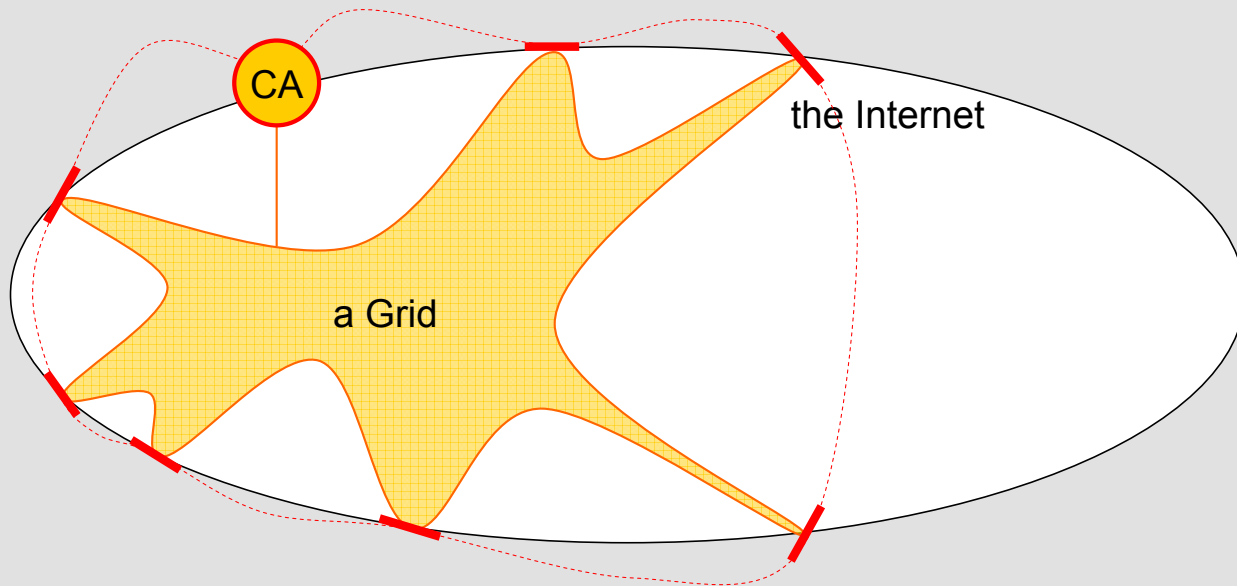
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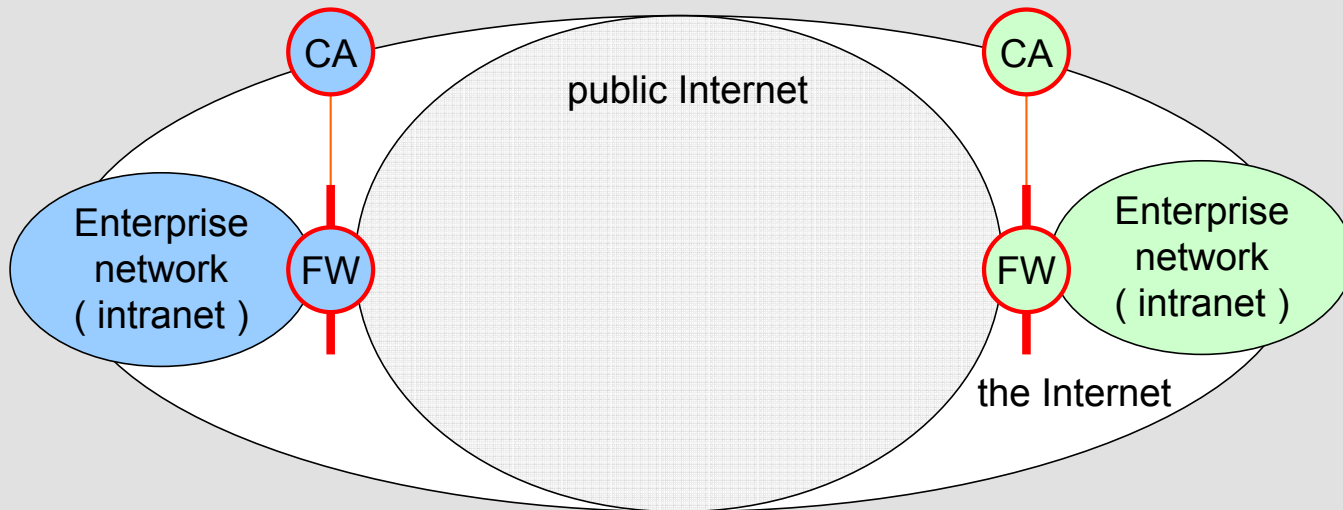
What is a GRID work-space ?

- The GRID security model is different:
Security at access point:



The GRID security model is different

- Compared with the Enterprise network model:
Security at organizational border (firewall):



What is “Middleware” ?

Machinery to create the collaborative environment:

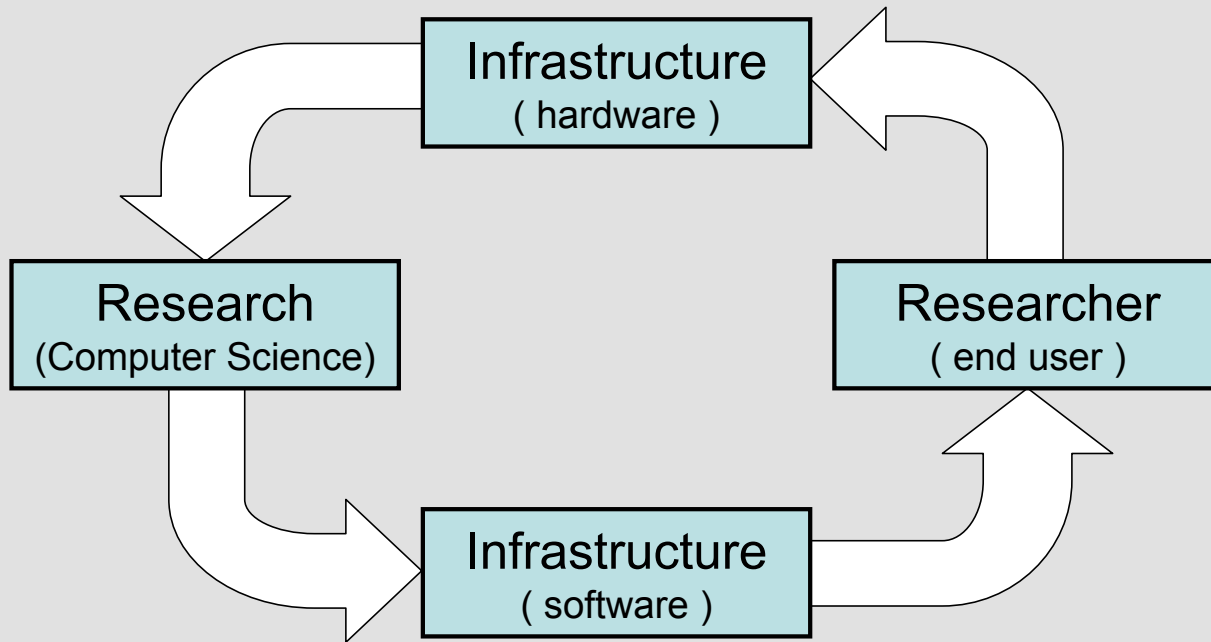
- Access (to data)
- Access rights & access controls
- Authorization
- Authentication (user identity)
- Authentication (data validity)
- Audit trail, provenance and time-stamping
- Archival
- Authoring, Annotation & Attribution
- Access grids (virtual reality)
- remote Access (remote control)

What is “Middleware” ? (longer list of “A” words)

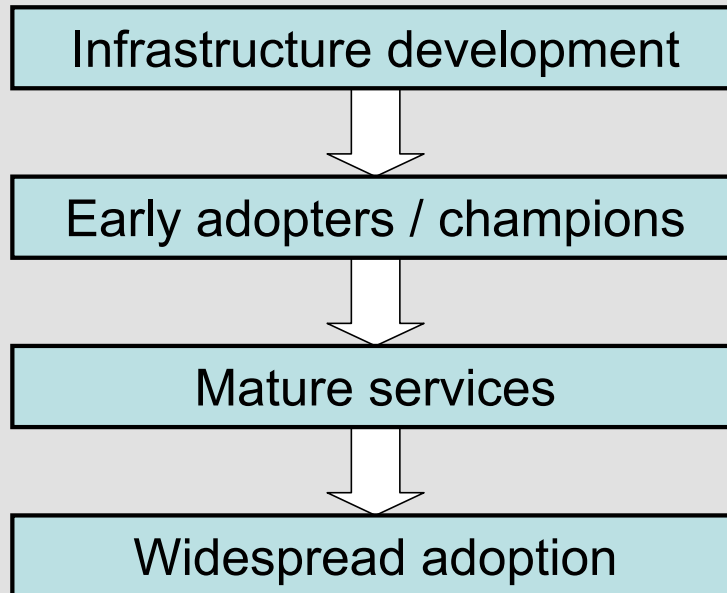
Machinery to create the collaborative environment:

- Abstraction layer (resource virtualization)
- Access controls
- Access rights
- Accessibility (to research data and resources)
- Accessibility (compatibility options)
- Acquisition (of data & information)
- Accounting and usage monitoring, quota Allocation and controls
- Adaptation layer (compatibility between disparate systems)
- Allocation and co-Allocation (of compute and other resources)
- Authorization
- Authentication – of user (user identity)
- Authentication – of device
- Authentication – of data (data validity, accuracy and integrity validation)
- Audit trail, provenance & time-stamping
- Archival, preservation & curation
- Authoring, Annotation & Attribution
- Access grids (virtual reality & tele-presence)
- remote Access (remote monitoring and/or control of devices/experiments)

The “spiral-up” model



Over several iterations ...



Progress to date (2005 to now)

- Importance of research support highlighted in 2005 update to Monash IT Strategic Plan
- e-Research Strategic Plan developed by e-Research@Monash Working Group – chair: Prof John Crossley
- e-Research@Monash Centre established
- Inaugural Director of e-Research Centre appointed – Prof Ah Chung Tsoi
- HDR-specific IT work environment developed (e-mail, accounts, etc.)
- Monash Sun GRID compute facility commissioned – currently being expanded (MSG project)
- Equipment purchased to provide a Large Research Data Store – currently being commissioned (LaRDS project)
- Trips to UK, US and Switzerland Nov 2005 and Feb 2006 by senior ITS and e-Research Centre staff to explore technologies and opportunities for collaboration

Questions & Answers ...

