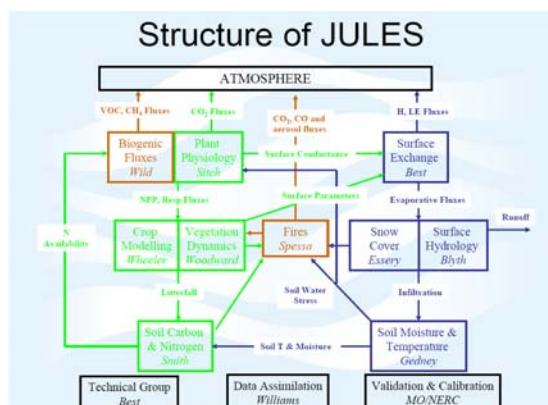




eResearch: Working together on the big issues

Climate:

- We have unleashed questions and concerns that are beyond current capability to answer properly
- No individual group has the capability or capacity to tackle the challenges



JULES is the Joint UK land surface model: a part of a climate model

Computational demand

- More parts of the earth system
- Longer integrations
- Finer spatial resolution
- Ensemble based probabilistic prediction

Accessible storage

- Bigger data sets
- Integrated with processing

The web and web interfaces

- Use of new science tools

Collaboration across institutions

- Infrastructure interoperation
- Policy interoperation

eResearch: doing research otherwise impossible



QuickTime™ and a
decompressor
are needed to see this picture.

Overall NCRIS Investment Pattern

\$540M over the five years: 2007-2011

- | | |
|--|--|
| <ul style="list-style-type: none"> • Evolving bio-molecular platforms and informatics • Integrated biological systems • Characterisation • Fabrication • Biotechnology products • Optical and radio astronomy • Integrated marine capability • Structure and evolution of the Australian continent | <ul style="list-style-type: none"> • Networked biosecurity framework • Population health and clinical data linkage • Terrestrial ecosystem research network |
|--|--|

Platforms for Collaboration (\$82M)

- | | |
|---|---|
| <ul style="list-style-type: none"> • Data access and discovery, storage and management • Grid enabled technologies and infrastructures • Technical expertise • High performance computing • High capacity communication networks | <ul style="list-style-type: none"> • Controlled sharing of researcher identities • Researchers and resource owners should control who can do what to their resources • Expanding the e-Research community to "non builder" users • Engaging the broader NCRIS community |
|---|---|

Building on a decade of investment

1997: High Performance Computing Committee

- Established the Australian Partnership for Advanced Computing to provide access to high performance computing capability

2000: Advanced Networks Programme

- Established advanced demonstrator networks

2002: Higher Education Bandwidth Advisory Committee

- Established the Australian Research and Education Network Advisory Committee, and the Australian Research and Education Network

2004: Research Infrastructure Taskforce Report

- Established the National Collaborative Research Infrastructure Strategy Committee to implement a program of strategic investment in research infrastructure

2006: eResearch Coordinating Committee Report

- Outlined an integrated program of skills development and of middleware and computer science research

2007: NCRIS Platforms for Collaboration

- Commitment to an infrastructure program covering computing, data and inter-operation components, and supporting the development of the Australian Access Federation

2008: NCRIS Roadmap Review, National Innovation System Review

- Recognition of Platforms for Collaboration and eResearch as fundamental infrastructure
- Tentative recognition of data as infrastructure

eResearch Strategy (circa 2006)

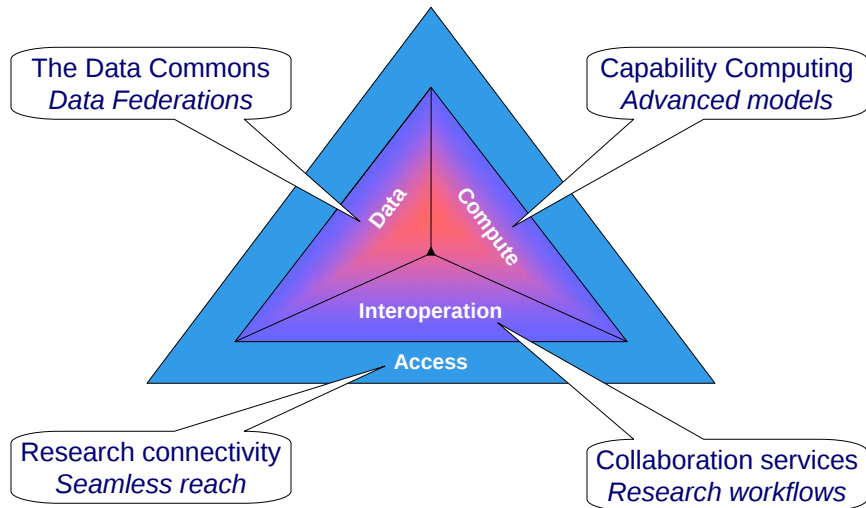
Service Clusters

- Data
 - outreach, curation, data management
 - meta-services, location, access, movement
 - practice, providers and users
- Computing
 - capability computing facilities
 - national computing environment
- Interoperation
 - discipline services (tools ((software)))
 - user and operations support
 - collaboration services support
- Access
 - the Australian access federation
 - the Australian research and education network

Thematic Issues

- Continuing Need for a Focus
 - through national coordination
- Human Capabilities
 - People, skills and understanding
- Linkage of eResearch Resources
 - seamless access to resources
- Access to Data
 - Most data is outside the research system
- Structural and Cultural Change
 - evolution of organisational structures and cultures
- Awareness and Support
 - develop researchers' ability to adopt eResearch

Platforms for Collaboration (circa 2007)



Current Investments

Australia National Data Service Data Federations (\$24M)

- Develop user and owner frameworks for a data commons
- Develop and operate national registries and data sharing services
- Help Institutions connect repositories to the data commons
- Help researchers publish, share and access data through the commons

National Computational Infrastructure Advanced Models (\$26M)

- Develop and operate a shared national computational facility
- Develop domain oriented advanced modelling capabilities

Australian Research Collaboration Service Research Workflows (\$20M)

- Develop and operate services linking systems and resources nation wide
- Develop and operate collaboration and workflow tools for researchers

AREN and AAF Seamless Reach(\$5M)

- Connect researchers and research resources at required bandwidth
- Develop a shared authorisation framework for access to research resources

Additional spends (ASSDA \$3M, Authorisation Services \$2M)

Extract from Revised Roadmap...

- In the main, the capabilities identified in the 2006 Roadmap are supported as an appropriate set and continue to be priorities.
- A number of additional needs identified across key areas result in a reshaping, and in the most part a supplementing, of elements in individual capabilities.
- The Humanities, Arts and the Social Sciences (HASS) are specifically recognised as an important capability area, in view of this research area's significant contributions to national outcomes.
- The significance of information and communication technologies (ICT) as an underpinning and pervasive capability is strongly acknowledged.
- The inclusion of data itself as collaborative research infrastructure is emphasised.
- The need to further enable and recognise the linkages between specific capabilities has resulted in the grouping of related areas

The proposed investments...

- eResearch Infrastructure
- Environmentally Sustainable Australia
 - Terrestrial Ecosystems
 - Built Environments
 - Marine Environment
 - Australian Continent
- Transforming Humanities, Arts and Social Science Research
- Biological Discovery and Health
 - Integrated Biological Discovery
 - Translating Health Discovery Into Clinical Application
 - Population and Biological Health Data Network
- Frontier Science and Technology
 - Characterisation
 - Fabrication
 - Optical and Radio Astronomy
 - A Sustainable Energy Future
 - Heavy Ion Accelerators
- Safeguarding Australia
 - Networked Biosecurity
 - Disaster and Hazard Test-bed

So, what is eResearch infrastructure about?

Goals

- To enable researchers to accomplish studies of national significance which are beyond the scope of individuals and to tackle problems otherwise impossible
- To build a foundation eResearch capability that provides an innovative, sustainable approach to ICT enhanced research

Outcomes

- A globalised, information-rich, collaborative research environment that accelerates and enhances national research priorities
- The benefits from NCRIS are maximised by eResearch infrastructure building bridges to and across other NCRIS Capabilities

The human dilemma

- A step change in population and its urbanisation provides a step change in the amount of research in progress
- An avalanche of information results from an explosion in connectivity
 - to each other and to computing and data systems
- Vast amounts of information arise from sensor development
 - but no person can peruse it
- What if we suppose there will be no corresponding substantive change in a person's ability to learn and understand
 - the information space understood by any researcher will shrink as a fraction of the total aggregate information and as a fraction of the information visible to them
- So how do we conduct research in an increasing state of relative ignorance?
 - From research by experts working in a knowledge poor environment
 - To research by teams in a knowledge rich environment

...so eResearch is vital to us

Everything doesn't explode at once...

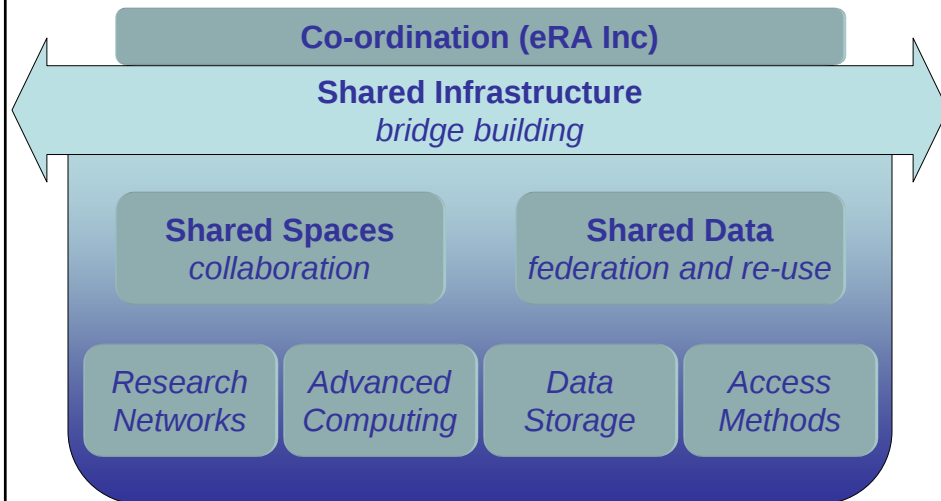
Capacity	Explosive growth started 50-60 years ago
Connectivity	Explosive growth started 15-20 years ago
Content	Explosive growth started 3-5 years ago
Interface	The soft visual, smart speech, sensed interface maybe around in 10 years time
Products	Smart autonomous devices maybe 25-100 years
Complexity	Major problem, complexity still exploding, maybe a forever challenge

The underlying drivers for eResearch...

eResearch is about the capacity to apply ICT to knowledge in three ways:

- **Enhance comprehension** - the higher human bandwidth agenda
 - We need the means to easily find and use information where ever it is
 - We need the means to assimilate more information
- **Enable collaboration** - the interoperation agenda
 - We need the means to work easily and naturally in a variety of teams
 - We need the means to 'join' together each others tools and laboratories
- **Encode Knowledge** - the smart tools agenda
 - We need the means to use knowledge without knowing it
 - We need systems to process semantics as well as information

Our proposed investment structure....



Forward path for Research Networks

We think key governance issues include:

- A national co-ordination and investment process that takes account of research sector, State and Territory government, and provider interests
- A strategic design activity that aligns investments in backbone, regional and institutional network capabilities to deliver end-to-end research services
- An enhancement strategy to improve network performance ahead of needs

Our focus is on additional services including:

- Provision of ad-hoc and dedicated circuits configured as required and potentially on demand for advanced experiments, computing grids and machine-to-machine interactions
- Extension of reach to government researchers and for research access to resources that governments hold and agree to make available to research
- Enhanced network capacity to international research organisations

There is a need to more fully develop the demand model for advanced research network services in preparation for significant additional investment.

Thank you

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eResearch
Australasia

melbourne, australia
Sept 29 - Oct 3, 2008

Melbourne 29 September 3 October 2008	Showcase for innovative science and research Catalyst for innovation and collaboration Forum for eResearch infrastructures & services www.eresearch.edu.au
Highlights	AeRIC eResearch Forum Town-hall meeting hosted by Rhys Francis Cloud Infrastructure Services discussion Featuring Tony Hey, Microsoft Research Many other International speakers
Workshops	Authorisation, Australian National Data Service, ARCS Tools, ARCS Data Fabric, ARCS National Grid, National Computational Infrastructure, SEE Grid, Geo-informatics, Arts and humanities, Simple SAMLphp, Web 2.0, GPU/Stream Computing

 An Australian Government Initiative
National Collaborative Research
Infrastructure Strategy

18