

# CSIRO



The Commonwealth Scientific and Industrial Research Organisation is Australia's largest scientific institution.

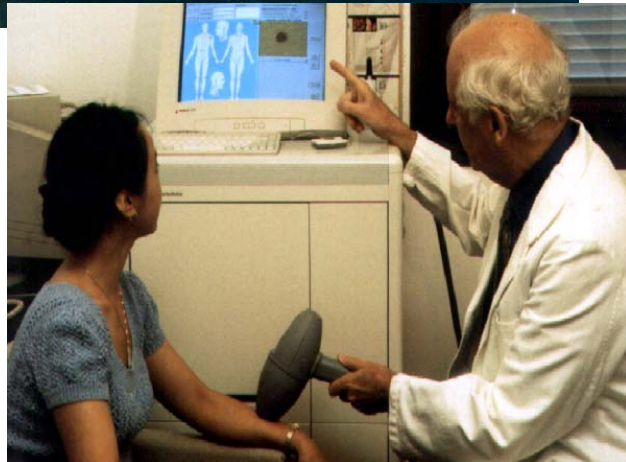
Dr Dean Economou  
Networking Technologies Laboratory- CSIRO ICT Centre



# Diverse

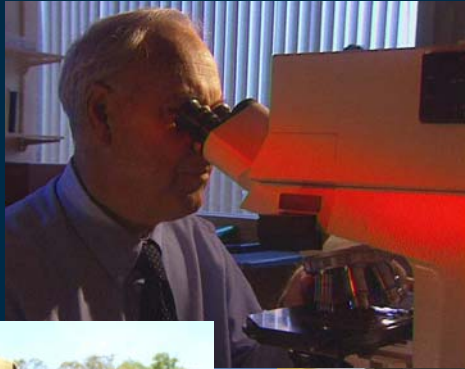


CSIRO's research spans agriculture, environment, manufacturing, minerals and energy, information technology, infrastructure and services.



- *CSIRO collaborates with universities, Cooperative Research Centres, industry and other research institutions.*

# People



Over 6000 scientific, technical and support staff at 68 sites around Australia.

# CSIRO ICT Centre

Delivering Today, Creating Tomorrow

## Our Vision

- Powering Australia in the global ICT innovation competition.

## How?

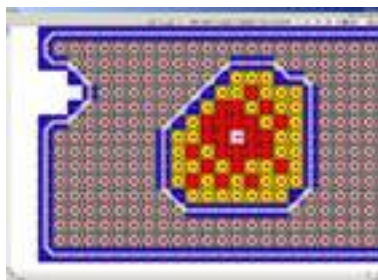
- By applying research results to challenges across all industry sectors in Australia and internationally.
- By being the hub for all ICT research in CSIRO



# Who are we?

[www.ict.csiro.au](http://www.ict.csiro.au)

- ~ 170 researchers with a \$40M p.a. budget
- Located in
  - Sydney, Canberra, Brisbane
- Research expertise in
  - Telecommunications, Networking, Information Technology, Data Mining and Interpretation, Web Services, Telepresence.



- The Centre has four Research Laboratories:

## Autonomous Systems

- *To improve the international competitiveness of diverse Australian enterprises through the adoption of autonomous systems.*

## Information Engineering

- *To change the way we engage with information as individuals and as teams.*

## Networking Technologies - home of \*

- *To create new systems for real-time networked human interaction*

## Wireless Technologies

- *To shatter the barriers to high-speed, wideband, untethered communication.*

And Domain delivery through the *e-Health Research Centre*

# ICT Centre Research Portfolio

[www.ict.csiro.au](http://www.ict.csiro.au)

<b>Autonomous Systems</b>	<b>Intelligent Systems</b>	<b>Robotics</b>	<b>BioMedia Lab</b>		
<b>Information Engineering</b>	Web Services	Information Retrieval	Information Analysis	Information Delivery	Information Security & Privacy
<b>Networking Technologies</b>	Networking Research	Networked Virtual Environments	Networked Media	Trusted Systems	Telehealth
<b>Wireless Technologies</b>	Communications	Imaging	Positioning & sensing	Supporting radio astronomy	

- **Panoptic<sup>®</sup>**
  - The Panoptic<sup>®</sup> search engine is oriented towards corporate and government intranets and portals but can be used in almost any web search application. Panoptic<sup>®</sup> supports all common metadata formats and can be customised to meet the needs of your organisation.
  - Panoptic<sup>®</sup> is currently in use on a commercial basis in over 45 organisations including the ABC, ASX, NineMSN, the Queensland Government, University of Sydney and the ACCC. For a full list of current customers visit [www.panopticsearch.com](http://www.panopticsearch.com).

**P@NOPTIC<sup>®</sup>**

- **PERSiMON<sup>®</sup>**
  - PERSiMON<sup>®</sup> is a non-contact monitoring system which makes use of recent advances in sensing, telecommunications and information technologies.
  - By using sensors which do not rely on gels or adhesive patches, and by using mainstream wireless technology, PERSiMON<sup>®</sup> can provide truly continuous monitoring of vital signs for extended periods, in almost any location.



- Annodex™
  - Annodex™ allows users to search for video clips and link to further video content simply by activating a hyperlink while watching the clip.
  - Video content can be explored using any digitally networked device – including mobile phones, handheld PDAs and digital TV.
  - Annodex™ uses the CSIRO-developed Continuous Media Markup Language (CMML). CMML does for time-continuous media what HTML does for text. It allows the user to search, access, navigate and query.



# Business Development Opportunities

www.ict.csiro.au

- ViCCU®
  - In collaboration with Wentworth Area Health Service and NSW Health, CSIRO has developed ViCCU™ (Virtual Critical Care Unit). This system allows a specialist located at one hospital to supervise a team located at a remote hospital, in real-time. Critical care applications typically include Emergency, Obstetrics and Intensive Care.

**CeNTIE2**





*The Centre for Networking Technologies for the Information  
Economy*

*Dr. Dean Economou*

*Program Manager*

*CeNTIE*

- CeNTIE is major project within CSIRO's ICT Centre, jointly supported by *DCITA's Advanced Networks Program* and the *CSIRO*.
  - \$14.1m (\$29m) stage 1 (2001-2004)
  - \$10.1m (\$23m) stage 2 (2004-2007)
  - Total \$70m over 6 years counting all in-kind from industry and research partners.
- The goal of the CeNTIE project is to accelerate the development of the Australian Information economy by exposing industry and government to new network technology and advanced applications, and in the process create new technology and commercial opportunities for our partners, Australia and CSIRO.
- CeNTIE 1 was positioned as infrastructure creation, CeNTIE 2 aims to make maximum use of that infrastructure and applications developed during CeNTIE 1: moving from a focus from networks to a focus on what you can do with networks.
- What have been the outcomes? What have we learned? Where next?

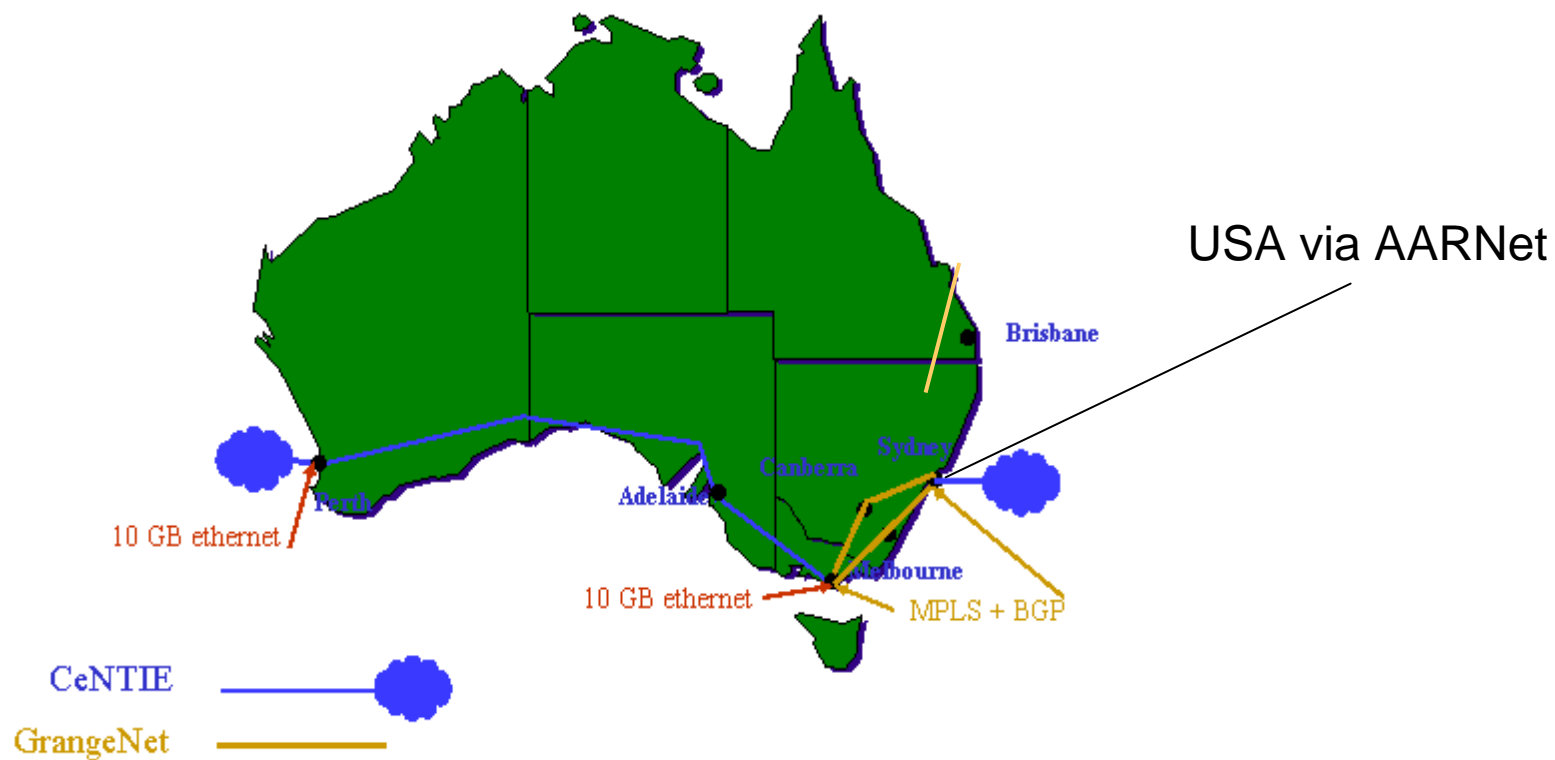
- User focus: if bandwidth were free and unlimited, what would you do with your business? - expressed through Focus Groups
- A unique national resource for network research and advanced applications research, 3-5 years ahead of commercial practice.
- Control from user to the fibre – ability to create a complete vertical solution in response to Focus Groups and industry partner requirements (CSIRO has the depth and breadth to support this).
- The only national resource for researching new network technology with a unique Acceptable Use Policy to allow industry to develop new markets.
- Focus on removing impediments to the Information Economy: technology, policy and economic using new network and applications technology

- **Health**
  - Clinicians, health services, government
- **Media**
  - Post-production houses, vendors, other digital content-producers
- **Enterprise**
  - Major corporates and government
- **Education**
  - Tertiary sector
- ***In CentIE 2 apply to***
  - First Mile Forum (with ATUG): Vendors, researchers, users, policy makers, carriers
  - Regional (non-metro): Major vendor/carrier, regional town decision makers, other focus groups

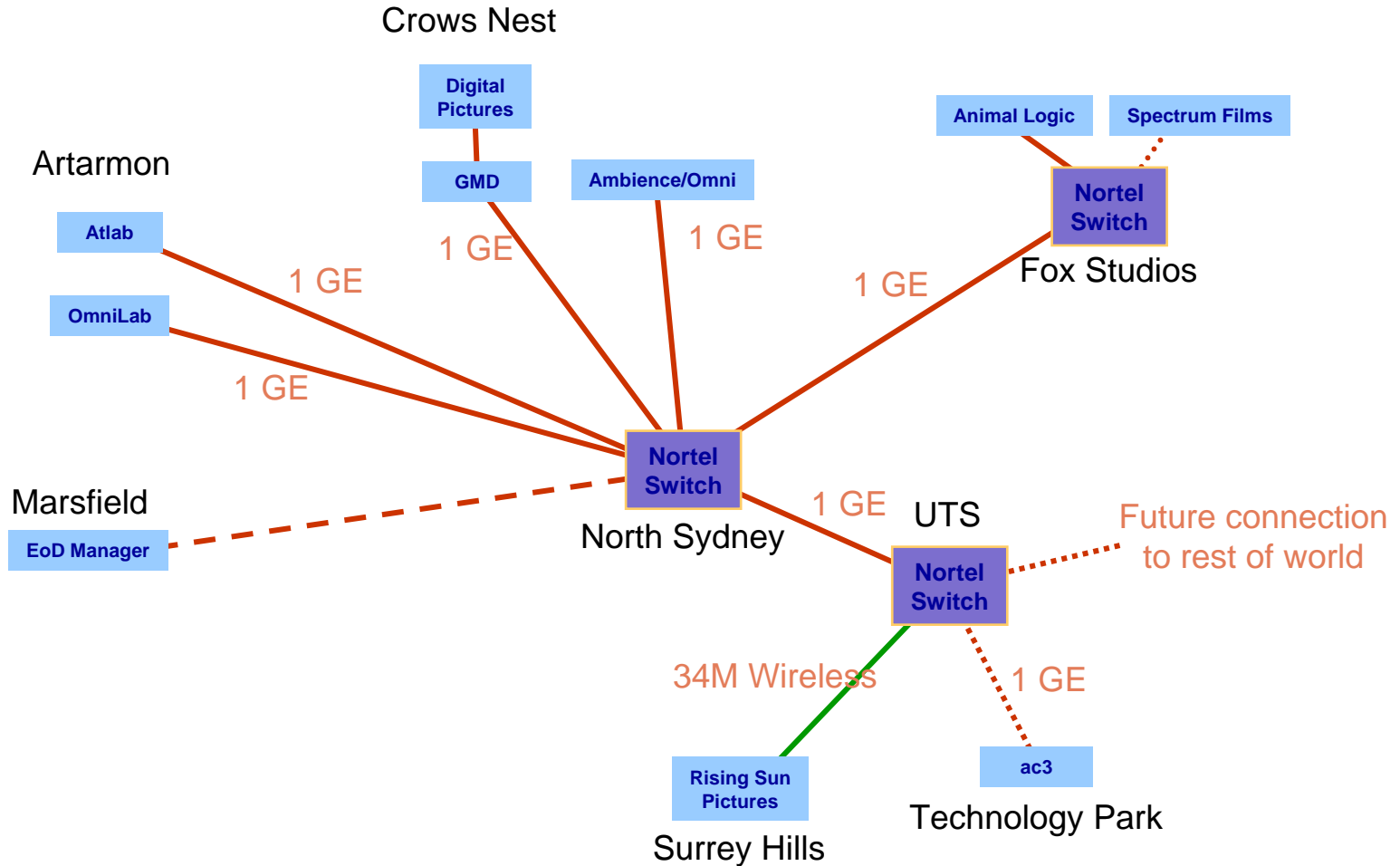
- **Technologies:**
  - 10Gbps wavelength between Melbourne and Perth (Telstra Commercial)
  - CWDM used in Metropolitan Areas
  - Gigabit Ethernet as the basic interface for participants
  - Ethernet core switching in the Metro areas
  - VLANs and CWDM used for logical separation of networks
  - MPLS Ethernet tunneling over capacity swaps with GrangeNet
- This was conceived in 2001.

# The Continental Network

www.ict.csiro.au



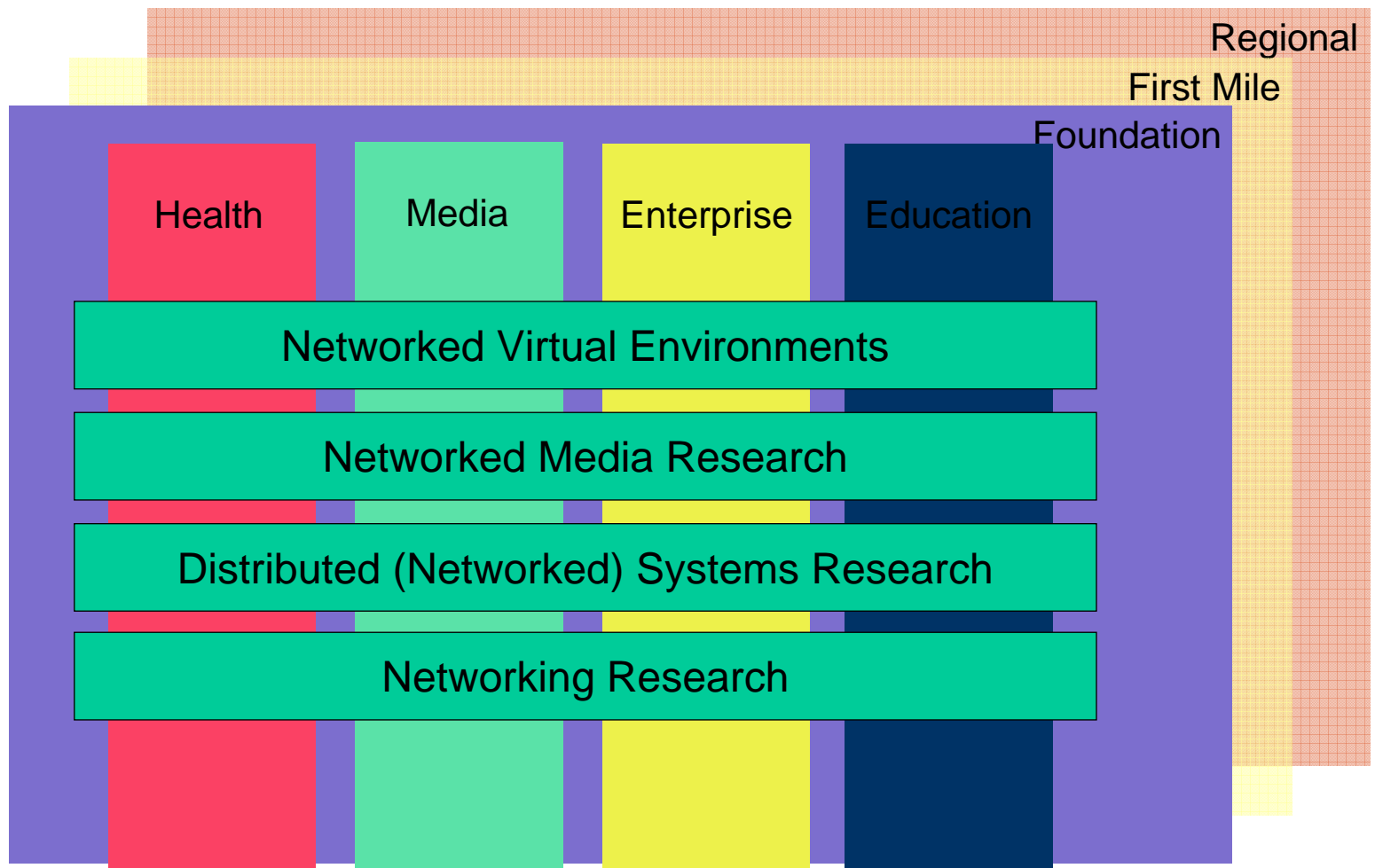
# Post-production Research Network



- **Networked Virtual Environments**
  - Immersive, human-centered, networked worlds, with sound, sight and touch. Initially applied to surgical training, now moving to more general applications
- **Networked Media Research**
  - Telepresence research – foundation for ViCCU™, Virtual Classroom, includes Applied Human Factors
  - Digital content production – Continuous Media Web, Annodex™
- **Distributed Systems Research**
  - Trusted Systems – Trusted Computing, Secure Distributed Storage
- **Networking Research**
  - Virtual Network Operators
  - Advanced Traffic Management
- **Foundation Network**
  - Provision of advanced national network research platform
  - Network operations research

# Matrix in CeNTIE

[www.ict.csiro.au](http://www.ict.csiro.au)



*The CeNTIE project is supported by the Australian Government through the Advanced Networks Program of the Department of Communications, Information Technology and the Arts.*



- Health Focus group members were shown various prototypes of video over IP technology
- Calibration of the technology and focus group discussion led to the concept of a “Virtual Critical Care Unit” (ViCCU®)
- An iterative research and development process involving medical teams and CSIRO researchers refined the concept
- A project was started in 2002 to prototype and test the concept in the form of a \$1.2m contract between CSIRO and the then Western Area Health Service
- The unit became operational in late 2003 between Nepean and Katoomba in NSW – approx 100km distance.



# Case 1 – January 2004

- 10 year old child with fractured arm
- Late night admission to Katoomba
- Without ViCCU<sup>®</sup> – transfer to Nepean
- Outcome:
  - Consultation with orthopaedic specialist
  - Videoconference with parents
  - No admission deemed necessary
  - Patient treated next day as outpatient



# Case 2 – January 2004

- 76 year old man in end-stage asbestos-related lung disease admitted with respiratory failure
- Without ViCCU<sup>®</sup>, intubation and retrieval to Nepean for intensive care
- ViCCU<sup>®</sup> consultation involving family: decision to keep him comfortable at Katoomba
- Outcome: He died peacefully with minimal intervention in his local hospital



# ViCCU<sup>®</sup> at Katoomba

[www.ict.csiro.au](http://www.ict.csiro.au)

# ViCCU<sup>®</sup> at Katoomba

[www.ict.csiro.au](http://www.ict.csiro.au)

# ViCCU<sup>®</sup> at Nepean

[www.ict.csiro.au](http://www.ict.csiro.au)

# ViCCU<sup>®</sup> at Nepean

[www.ict.csiro.au](http://www.ict.csiro.au)

# ViCCU<sup>®</sup> after 1 year live

- Has been used for hundreds of patients
- Has become SOP
- Also used for non-Emergency
- Emerging as a training tool
- Highly reliable
- A treatment aid of measured value
- Many ideas for how to extend technologically
- Undergoing commercialisation



au

# Summary of Outcomes

- Phase 1 of the CeNTIE program was a great success – government and industry combined to solve real problems faced in the Australian economy
- Developed leading Focus Groups in Health, Education, Media and Enterprise and a unique process of end user engagement with researchers
- Created a national network testbed, with unique acceptable use policy aimed at fostering new technologies and markets
- Created a unique resource for the Sydney film post-production community
- Advanced telepresence technology directly attributable to the CeNTIE network, and applied in areas directed by the focus groups (ViCCU<sup>®</sup>, Virtual Classroom)
- Developed successful techniques for human needs analysis in medical ICT (major trend)
- A second round of funding, and commercialisation

- If you are big enough dark fibre is cheap. It is also really arduous to get it laid and to obtain rights of way.
- What people want when there is a lot of bandwidth is good quality interactive collaboration (ie really good video and audio) but you must show people
- You can achieve a great deal just with GigE and CWDM. Route only where needed.
- There is an ongoing need for a testbed which allows industrially focussed research – to develop new markets and to foster new technology and business approaches
- Getting significant bandwidth (100Mbps plus) to an SME is only marginally economic at present

Dean.Economou@ csiro.au

- Creation of a First Mile Forum (with ATUG) and Regional Focus to exploit CeNTIE 1 transformational applications
- For the Foundation Network
  - Include First Mile and Regional components, run pilots
  - Migrate CeNTIE backbone to AARNet 3 (with CSIRO IT)
  - Upgrade to next generation of optics in the MAN
- Move telepresence up to HD standard
- More emphasis on educational applications
- Explore wireless – new wireless technologies can support applications which would only work on fibre 5 years ago.
- Sustainability beyond 2007 – thinking about CeNTIE 3 now