

The CeNTIE Research Programme

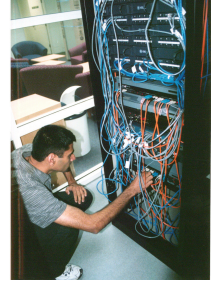
Glynn Rogers
Research Leader – Advanced
Networking Technology

ict.csiro.au

Glynn Rogers © CSIRO 2004

What is CeNTIE ?

- CeNTIE is supported by the Australian Government through the Building on IT Strengths (BITS) Advanced Network Program (ANP) of the Department of Communications Information Technology and the Arts
- It's a Centre based in CSIRO with six members, funded with \$14M contract from DCITA
 - A hierarchically structured, world-class research network
 - ICT researchers whose laboratory is the CeNTIE network
 - Focus Group members
 - End users who use the networks



ict.csiro.au

Glynn Rogers © CSIRO 2004

Major CeNTIE Participants

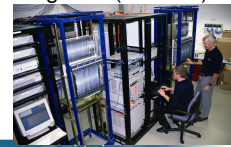
- Research Organisations
 - CSIRO ICT researchers: Sydney (x2), Canberra, Perth
 - Engineering and computer science at UNSW and UTS
 - WA-IVEC: UWA, Curtin Uni, CSIRO, TAFE
- Vendor & Research Lab - Nortel Networks
- Carrier - IP1 Australia now Telstra
- End Users including, surgeons, clinicians health professionals, film post-production industry, educators, finance industry, Government Departments
- 110 individuals contributing to CeNTIE

ict.csiro.au

Glynn Rogers © CSIRO 2004

CeNTIE Foundation Network

- Foundation Network
 - the basis of communications between nodes
 - distributed research laboratory
- Dark fibre in Sydney, Canberra, Perth $n \times$ Gbit/s
- 10 Gbit/s link from Perth to Melbourne
- East coast long haul from GrangeNet (1 Gbit/s)
- Advanced equipment from Nortel Networks



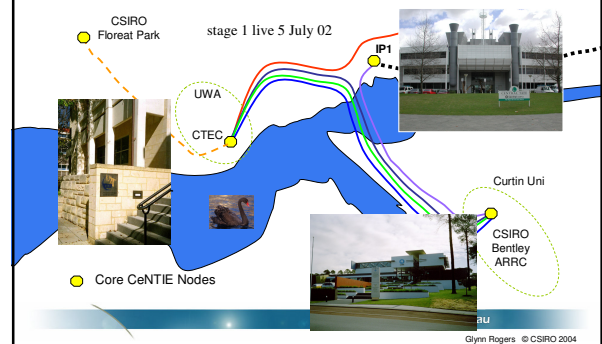
ict.csiro.au

Glynn Rogers © CSIRO 2004

in Sydney CeNTIE



in Perth CeNTIE



Glynn Rogers © CSIRO 2004

CeNTIE Focus Groups

A principal objective has been to -

- Establish Focus Groups of leading edge users and researchers
- Identify new Business Systems for the Information Economy
- Identify and quantify technology impediments and establish research directions
- CeNTIE develops and demonstrates network and application technologies
- Stimulate the early adoption of new Business Systems in Australia

ict.csiro.au

Glynn Rogers © CSIRO 2004

Business Systems for the Information Economy

- End user and industry interface, ask focus groups "What would you do if"
- Four Focus Groups
 - Tele-health
 - Tele-collaboration
 - Media systems
 - Information brokering
- Implementation
 - develop concept demonstrators in response
 - demonstrate on CeNTIE Network
 - modify using feedback from Focus Group



ict.csiro.au

Glynn Rogers © CSIRO 2004

Did This Work as Expected?

- Of course not!
 - This was a research project in it own right
- Was it successful – Yes!
 - We have learned a great deal
 - The Focus Group – Business System – Technology interaction is more complicated than initially expected
- My interpretation - three basic models have emerged
 - The champion model
 - The motivation model
 - The tutorial model

ict.csiro.au

Glynn Rogers © CSIRO 2004

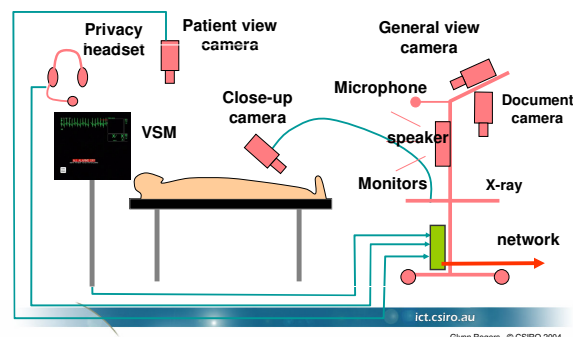
1. The Champion Model

- The Telehealth Focus Group produced a runaway success – ViCCU™
- Brainchild of Dr Pat Cregan
 - Director of Surgery – Wentworth Area Health Service
 - Saw potential of CeNTIE DV (30Mb/s) video to solve A&E problem at Katoomba
- Developed by CeNTIE team
 - Supported by \$M1.2 funding from NSW State Health as well as CSIRO
 - Now in 'production' between Nepean and Blue Mnts Hospitals
 - Specialist A&E consultation
 - Hand over
 - Team meetings
 - Training
- Commercialisation is currently being explored

ict.csiro.au

Glynn Rogers © CSIRO 2004

Stage 1 ViCCU™



Glynn Rogers © CSIRO 2004



This Wasn't a Spontaneous Event

- CSIRO ICT's E-Health Group has a long association with the medical world
 - Leader, Laurie Wilson, inherited from Ultrasonic Institute – pioneers in medical ultrasound
 - Current research in haptics based surgical simulation for training
- Developed considerable credibility
 - Important in establishing Focus Group
- We have been discussing high rate telemedicine for years

ict.csiro.au

Glynn Rogers © CSIRO 2004

The Telementor's Workstation Screen – an Idea from 10 Years Back!

Mr. Art Cardino is a 51 year old smoker who became aware of hypertension 10 years ago and has been warned on several occasions that his blood pressure warranted further medical attention.

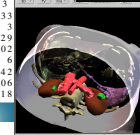
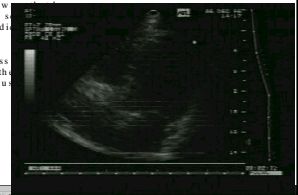
Mr. Cardino lives alone, is overweight with a body mass index of 30 kg/m², and has smoked 15-20 cigarettes a day for the past 20 years. He is plethoric, with parotid enlargement and a high alcohol intake. He has NIDDM.

Examination

- BP 180/110
- Prominent 4th heart sound on auscultation
- optic fundi - marked arteriovenous nipping
- Liver span - 14cm

Further Investigation

Albumin	35	Bilirubin	13
Hb	168	Na	133
HCT	52	K	3
WBC	9.6	HCO	29
Platelets	416	Cl	102
ESR	2	Urea	6
GOT	60	ALT	42
AST	47	MCV	106
TC	7.5	TG	18
BGL	8.5		



2. The Motivation Model

- Media Systems Focus Group
 - Involves Digital Post Production Industry
 - no runaway success (yet)
 - No prior involvement with CSIRO
 - However, industry leaders had understood value of high speed network technology
 - stimulate collaboration in a very competitive industry
 - discussions with DCITA prior to CeNTIE
- Focus Group discussion revealed potential for creating Virtual Enterprises
 - Bring together companies with complementary skills and capacities
 - Bid for large Hollywood contracts
 - Form network based Virtual Enterprise for duration of contract

ict.csiro.au

Glynn Rogers © CSIRO 2004

Extranet on Demand

- CeNTIE networks research team conceived of extranet structure to support VE
 - Created 'on the fly' by high level service provider (or even the users themselves!)
 - Motivated by team's exposure to Programmable Networks concepts
- Successful funding proposal in Nortel Networks' external development process
 - Sponsored by Nortel Networks R&D Centre in Wollongong
 - Concept developed jointly by CSIRO and Nortel R&D under CeNTIE umbrella
 - Concept demonstrator drew favourable comment from industry
 - 'Industrial strength' V2 developed by Nortel R&D
 - Ready for trials in CeNTIE Post Production Network
- In this case the research team provided the starting point for a development shaped by feedback from FG
 - Stimulated further research in network technology in CeNTIE

ict.csiro.au

Glynn Rogers © CSIRO 2004

3. The Tutorial Model

- 'Information Brokering' Focus Group
 - Inaccurately named
 - About large commercial transaction based systems
 - Regular attendances by CTO level from Commonwealth Bank, ATQ, ASX
- Primarily briefings on developments in areas such as Web Services and other interactive distributed transaction systems
 - CeNTIE personnel involved in standards development
 - Supplemented by some concept demonstration activity
- Regarded as valuable by Focus Group members
 - Discussions provided feedback for research team

ict.csiro.au

Glynn Rogers © CSIRO 2004

Are These Models Related?

- Yes!
- Really just different points in time along a single process
 - Time needed to develop the relationship with the particular industry
 - Time needed for the understanding of the implications of the technology to mature
- On going Focus Groups facilitate both of these subprocesses
 - Understanding this helps refine the Focus Group structure for CeNTIE 2

ict.csiro.au

Glynn Rogers © CSIRO 2004

CeNTIE 2

- Funding announced in Federal Budget
- Being planned right now
 - with handover of directors on the middle of it!
 - Terry Percival succeeded by Dean Economou
- Evolution of CeNTIE 1
 - Network substantially in place – can now exploit
 - Hope to use AARNet to extend coverage to nonmetro areas
 - Learn from valuable experience of Focus Group idea
 - Really a 'meta' research project itself!
- Adopt concept of a 'technology ensemble' as a major theme
- Add a pilot project (or two) as a top level integration activity
 - Example – a nonmetro professional telecentre
 - Local professionals (GPs, solicitors, dental practitioners (major issue!)) to confer with 'big city' consultants – ongoing training also

ict.csiro.au

Glynn Rogers © CSIRO 2004

A Networking Research Perspective

- Where is networking technology headed?
- Not very far!
 - It has climbed the steep slope of technical innovation but has reached a plateau.
 - danger of getting lost in the swamp of commercial incrementalism
- Much evidence (John Wroclawski's keynote at Questnet03)
 - Technical
 - Failure of IP QoS – slow adoption of MPLS – abysmal security
 - Commercial
 - High cost infrastructure – telephone centric business models

ict.csiro.au

Glynn Rogers © CSIRO 2004

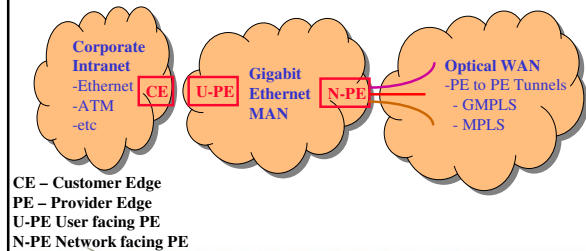
Avoiding the Swamp

- Look for some more high ground to head for
 - MIT's NEWARCH project
 - *Developing a Next-Generation Internet Architecture* - Robert Braden, David Clark, Scott Shenker, and John Wroclawski
 - Develop a new, self organising network management technology
 - A 'third way' which combines –
 - the distributed semi-autonomous Internet structure and
 - the engineered quality and security of the traditional telecommunications system
 - With CeNTIE 1&2 backed up by AARNet, we are in a good position to contribute to the first and mount a substantial attack on the second

ict.csiro.au

Glynn Rogers © CSIRO 2004

The Network Architectural Context



ict.csiro.au

Glynn Rogers © CSIRO 2004

The Research Context - Virtual Networks Technology

- Networks running on networks
 - Analogous to virtual machines running on computers
- First step – Virtual Private Networks (VPNs)
 - Current commercial and standards development
 - All assume a particular addressing (subnet) structure
- ExtraNet on Demand (EoD) – Finished !
- We have developed a more general concept
 - Virtual Private Extranet Service (VPES)
 - Experimental prototype completed
- Next step – generalise Virtual Network Operator (VNO) concept
 - Explore potential of creating and operating networks using **programmable networks** technology – links to Nortel
 - Node architecture developed in CeNTIE sponsored UTS PhD project – (Computer Science)

ict.csiro.au

Glynn Rogers © CSIRO 2004

End to End System Perspective

- This is the key
 - We don't have the resources to get bogged down in incremental technology development
 - We need to pick our targets very carefully
- Continue the Ensemble theme down to the networking research level
 - Exploit and integrate outside research and standards development
 - Focus on revealed missing links for any detailed internal research

ict.csiro.au

Glynn Rogers © CSIRO 2004

