So What’s Collaborative Infrastructure Ever Done for You?: Twenty-Five Years of Network Effect applied to Research and Teaching

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Twenty-Five Years of Network Effect applied to Research and Teaching

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Agenda

• Network Effect
• Digital Disruption
• Collaborative Infrastructure
• Beyond Connectedness
NETWORK EFFECT
What Was The Year?

Canberra Raiders won NRL beating Balmain Tigers 19-14

Newcastle rocked by magnitude 5.6 earthquake, killing 13

Acropolis Now debuts on Australian TV
... and the Internet arrived in Australia
Early Internet (AARNet) Speed

56 Kbps
Early Internet Experience

- A world dominated by 24 x 80 screens, and command-line applications like telnet, and FTP
- No Google, No Facebook, No Youtube
- No Web, No Audio, No Video ...
But 50 Million Users in 4 Years!

Reaching 50 Million users

It took about 75 years for the telephone to connect 50 million people. Today a simple iPhone app like Draw Something can reach that milestone in a matter of days. In the past 10 years the rate of adoption of new technologies has accelerated at a dizzying speed. Can we keep up with it all?
Network Effect

• A network effect describes how a service becomes more valuable to its users as more people use that service.

• Standardised, low cost, ubiquitous

• Provided (and continues to provide) a **PLATFORM FOR INNOVATION**
Digital Disruption
Innovation ... Change ... Disruption

Ease-of-Use, Mobility, Device Independence, Business Models, etc. etc. ... Speed
Digital Natives

9 Facts about Digital Natives

- Literary reading has declined 28% since 1982 among those 18-34.
- 20% meet the clinical standard for addiction to the Internet.
- They are bored by traditional lectures in the classroom.
- A higher frequency of family dinners directly related to a greater commitment to learning.
- 30% of kids aged 3-6 have a TV in their bedroom.
- Females tend to use the Internet for social reasons; males tend to use it for virtual gaming.
- 90% of children and adolescents play video games.
- Multi-tasking may decrease brain efficiency by as much as 50%.
- They may benefit from online educational games.

Based on the research of Gary Small, MD & Gigli Vorgan and their book, iBrain: Surviving the Technological Alteration of the Modern Mind.
Connectedness

• “Connectedness” enables Online and Blended Education

There may be less contact hours, yes, but that’s already happening by student choice

– Prof. Shirley Alexander, DVC (Teaching), UTS
MOOC Hype

But the initial hype about MOOCs challenging existing higher education business models has faded away. For students, content knowledge is only one of the outcomes they hope to achieve through higher education.

– Andrew Norton, Grattan Institute
Vertically Integrated Higher Education

- Course Content
- Course Delivery
- Assessment
- Experience/Exposure
Digital Disruption: Education

- **32%** of the Australian economy
  - **SHORT FUSE, BIG BANG**
    - ICT and media
    - Finance
    - Business and Professional Services
    - Real estate
    - Retail trade
    - Arts and recreation
  - **LONG FUSE, BIG BANG**
    - **Education**
    - Transport and post
    - Agriculture
    - Health
    - Government services
    - Utilities
    - Mining
    - Manufacturing
    - Construction
    - Wholesale trade
    - Accommodation and food services

- **17%** of the Australian economy
  - **SHORT FUSE, SMALL BANG**
  - **LONG FUSE, SMALL BANG**

*Deloitte. Harnessing the ‘bang’, Stories from the frontline, Digital Disruption Map*
COLLABORATIVE INFRASTRUCTURE
To provide telecommunications services to the Australian research and education sector which the market does not provide or does not provide at a reasonable price.
Differentiation

- Technically
- Commercially

Direct Access to Fibre, Expertise
Demand Aggregation
Consumption Model
For Purpose, Not For Profit Mission
Globally Interconnected
Long Term
Regional Connectivity

Technically • Commercially
Universities

- **Fees**: $25.2B
- **Federal**: 58%
- **Research**: $5.0B
- **Federal**: 76%

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Go8 and Department of Education, Higher Education and Research Data Collection, 2012
Demand Aggregation *(Collaboration)*

- All Universities, *and*
- All functions (Education, Research, Administration), *and*
- All other research organisations, *and*
- All other education organisations, *and*
- Assets generated,
- Over long periods of time.
Peering = Optimised Marketplace

120+ Countries

The Internet

$
International Capacity

[Map showing international capacity with different cities connected by lines with varying capacities marked by colors and line thicknesses.]

KEY:
- Other R&E PoP
- Other R&E Network
- AARNET PoP
- < 622 Mbps
- < 1 Gbps
- < 2.5 Gbps
- < 10 Gbps
- < 40 Gbps
- WDM Transmission
NRN (Metropolitan Projects)

- Cooperatively defined
- Shovel ready initiatives
- Broad sector outcomes
- Non-Competitive

NRN – National Research Network
Square Kilometre Array

- Site Selection
- NRN Projects
- Design
- National and International Partnering
BEYOND CONNECTEDNESS

... so What?
Annual Member Traffic

CAGR 47.6% pa
Annual Member Subscriptions

CAGR 3.04% pa
Declining Unit Price

- Year: 2007 to 2014
- Price in $ per GB decreasing from $12.00 to $0.00
- $ million values from 35 to 0

Graph showing a consistent decrease in unit price over the years.
Platform for Innovation (Revisited)

- Marketplace tailored to sector requirements

**Peer**
- Microsoft
- Google
- Amazon

**Connect**
- Netspot
- Blackboard
- Desire2Learn

**Partner**
- Box
- Zoom
- Amcom
- Code42

**Build**
- Cloudstor
- Uc-xchange
- Eduroam

AARNet Network
What Else?

• Replicable to other collaborative infrastructure?
  – Compute, Storage, Tools ...
  – Not quite the same metrics around infrastructure assets

• Unique consumption model ... ?
  – Perhaps not 100% unique

• Collaboration works! NCRIS (and AARNet) proof
  – What enables the sector to compete globally?
  – What differentiates institutions?
Sustainability

• Technology (networking) disrupts

• Australia is critically dependent on networking because of both our location and distributed population

• The higher education and research sector must collaborate to compete globally

• The (Research Infrastructure) System needs to work as a System

• The network effect has multiple dimensions – more than just the number of entities – and is very powerful sustainment mechanism
Thank You!

Questions?