Innovative Business Cases & The Internet of Things
or
How to put Linear Types, Control Theory and Bigraphs into one neat storyline

Jon Crowcroft,
http://www.cl.cam.ac.uk/~jac22
Old school capitalism & socialism

- See Future Perfect: The Case For Progress In A Networked Age, by Steven Johnson
  http://www.amazon.com/dp/1594488207

  - There’s a good case made for new ways of doing business
    - Not a Legrand Star or a Hayek Hub, but
    - A Baran Web....
Taking sides...

- Alec Broers wants Big Companies
  - Like Intel, IBM, etc
  - ex IBM, VC Cambridge, now chair of house of lords ctee on S&T

- Andy Hopper likes what we do
  - Head of dept CL
  - 10 startups, 2 IPOd....

- Who do you believe?
Cambridge has been doing new business cases for some time

- **ARM**
  - Mostly fabless chip designer
  - More chips than intel out there...

- **RealVNC**
  - Open source desktop virtualisation
  - Millions of users...

- **Ubisense**
  - Actually, fairly traditional h/w -> IPO
  - Used by BMW on production line.
More radical

- Xen
  - Open Source - the Cloud (Amazon EC2)
  - Engaged with ALL of industry (not just 1 preferred initial customer)
  - Intel AND AMD
  - Microsoft and Sun/Oracle and HP ...
  - Acquired by Citrix for 500M USD.
    - Pretty much standard value in expertise
    - 50 kernel hackers with PhDs:
  - Big 2nd customer was Tescos... ...
  ...
More radical still

- Raspberry Pi
  - Charity
  - 500,000 units shipped in 6 months.
  - Doubled application rate to University CS
- BOB
  - Building Open Buildings
  - Internet of things - to be seen
- Digital Life Foundation
  - Signpost ... ... disintermediation
  - Open Source, decentralised, appstore
BOB, e.g. of Internet of Things

- Thing 1 - we need an app store to network legacy (and new) appliances
  - Commodity Appliance Thing

- Thing 2 - we need a new app store for people to contribute apps to federate (and isolate) Systems of Things
  - Home Appliance Thing

- See Dr Seuss for more details:
  http://www.youtube.com/watch?v=fj_xwgLW_4I
Internet of Things

- Need a grass roots (cottage industry)
  - Therefore need to give people tools
  - Equivalent of knitting needles+wool
    - Or sewing machines and thread (better)
    - Or even looms

- Hence need 3D Sculpters & Printers
  - But also need to give them upload capability
  - Moral equivalent of knitting pattern contributions made to magazines & books
  - But 3D CATs uploaded to websites
  - 3D HATs are easy (c.f. Fresnel project:)

- Hence need 3D scanners too
Render Unnecessary

http://fffff.at/free-universal-construction-kit/
Intellectual Property is Theft

- See aforesaid book for why
- Patents are not capitalism,
  - they are monopolistic
  - Long patterns incentivize companies to hide background longer term knowledge
  - 10 year pharma pattern is longer than the survival rate of someone's creativity
  - So blocks the sideways flow of innovation
  - Especially in methodologies
Alternatives

- Xensource worked without IP protection because....

- A big incumbent cannot catch up with 5, or even 50 smart people working on an exciting new idea
  - Throwing 500 people (at MSR) doesn’t work
  - Old news (c.f. Mythical Man Month)

- So novel S/W doesn’t need any protection than raw speed of development
Some possible exceptions

- Modest, but useful, genuine h/w innovations -
  - e.g. Dyson bagless vacuum cleaner
  - Patent lifetime perhaps could be shorter
  - Invention to market cycle*2 == 5 years?

- Peer Patent Review
  - Deals with scale out of
    - Finding prior art
    - Detecting obviousness << patent >> sufficiency
Employee Owned Business models

- Good karma
  - Works outside of business too
  - Incentive alignment without toxicity
- What if society is the employer?
  - So government is the employee
  - So how to use EOB in government?
Conclusions, Discussion

- Today Ocaml Labs
  - [http://www.cl.cam.ac.uk/projects/ocamllabs/](http://www.cl.cam.ac.uk/projects/ocamllabs/)
- Tomorrow, 
  - World Peace and an end to Hunger?
- Live long and prosper