# 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
http://hubofallthings.wordpress.com/

# 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?**
  - Time for science (experiment w/ biz model)

# 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/HAT
  - Building Open Buildings
  - Internet of things - to be seen
- Digital Life Foundation
  - Signpost … … …disintermediation
  - Open Source, decentralised, appstore

# BoB, e.g. HAT: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:
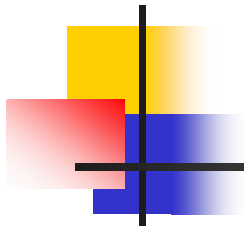
  http://www.youtube.com/watch?v=fj_xwgLW_4I
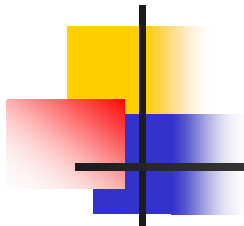
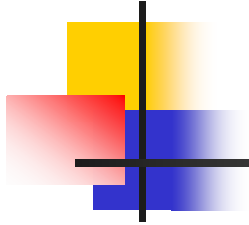By Dr Parry, with apologies to Dr Seuss and image copyright holders

# The D.E. in a HAT

An Alternative presentation
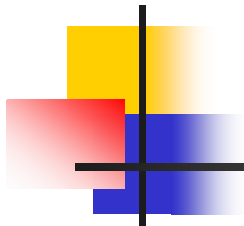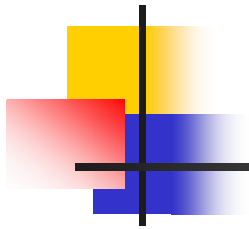
A home tech platform
What ever is that?
The Hub of All Things
Which we know as the H.A.T.

How to will it work?

Well let me tell you,
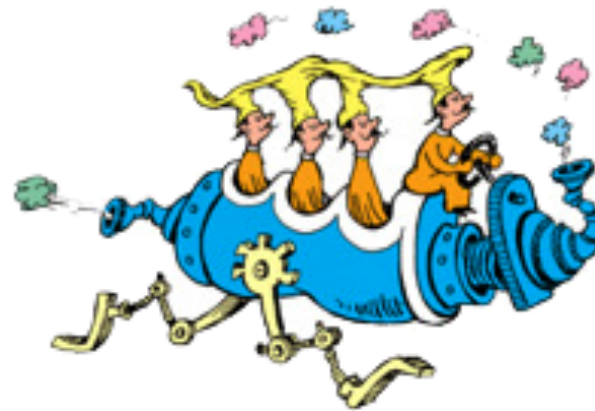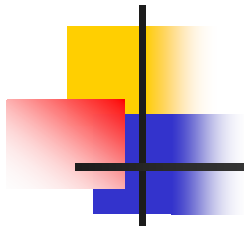
We collect data using things

Named Thing 1

And Thing 2

Thing 1 is a smart thing

IoT ready you know

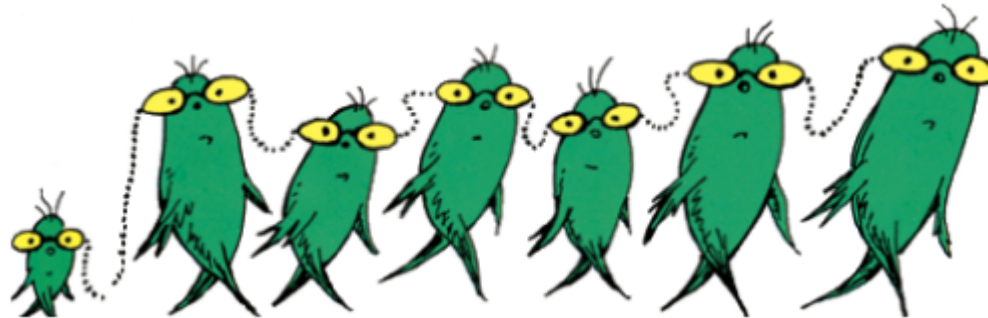We just need to name him

And link him

And then let him go
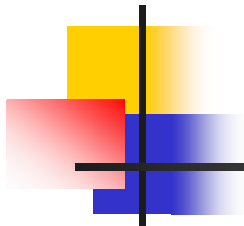
Thing 2 makes objects smarter
With just a little finance
Milk bottles, cups and kettle
They IoT enhance

The things collect data
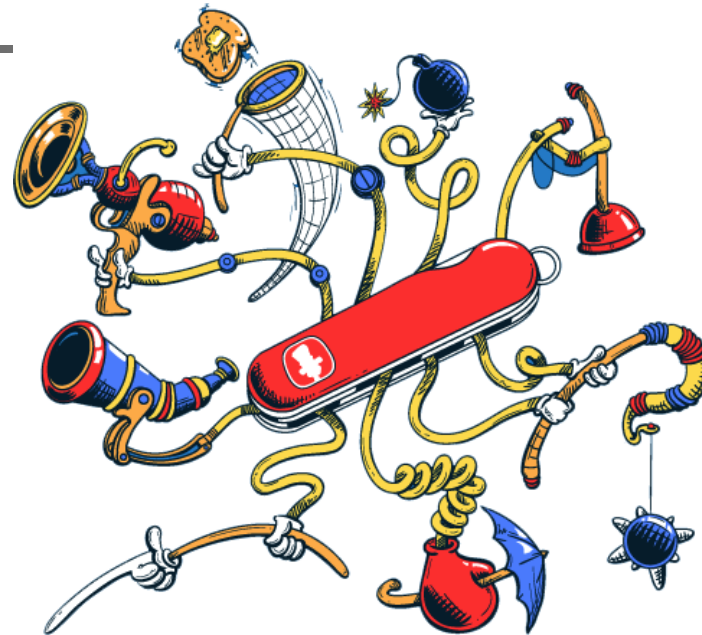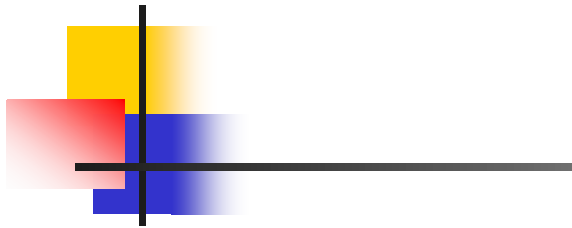Which algorithms analyse
Contextual archetypes appear
Right in front of your eyes

We learn from the home
And from each other too
We learn all about the things
And what they tend to do

SMEs play at the HAT-Fest
With the data compiled
Creating novel offerings
Which are deployed in the wild

**The Hub of All Things**
**We commend it to you**
**We think it is the future**
**We hope you do too**

# 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/
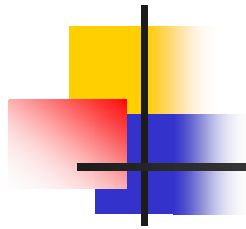
# Intellectual Property is Theft

- 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 HAT, REMS, Ocaml Labs
  - http://hubofallthings.wordpress.com/
  - http://www.cl.cam.ac.uk/~pes20/rems/
  - http://www.cl.cam.ac.uk/projects/ocamllabs/
  - Platform (free), toolchain (free), service (tbd)
- Tomorrow,
  - World Peace and an end to Hunger?
- Live long and prosper