

ELL-i: Build an internet for your (fixed) things

Internet and Computing Forum

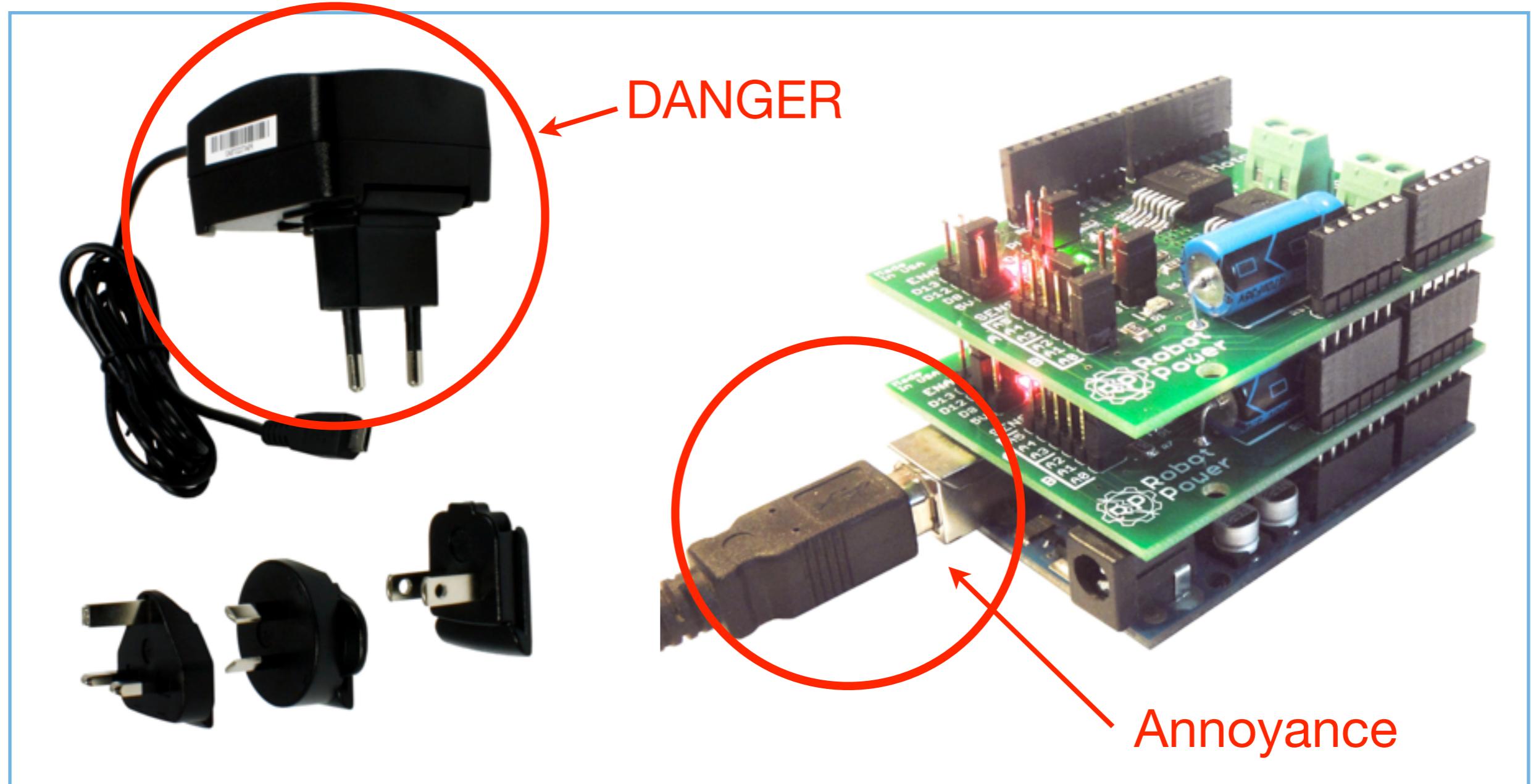
Monday Feb 10th, 2014

Dr. Pekka Nikander, ELL-i co-op

Presentation contents

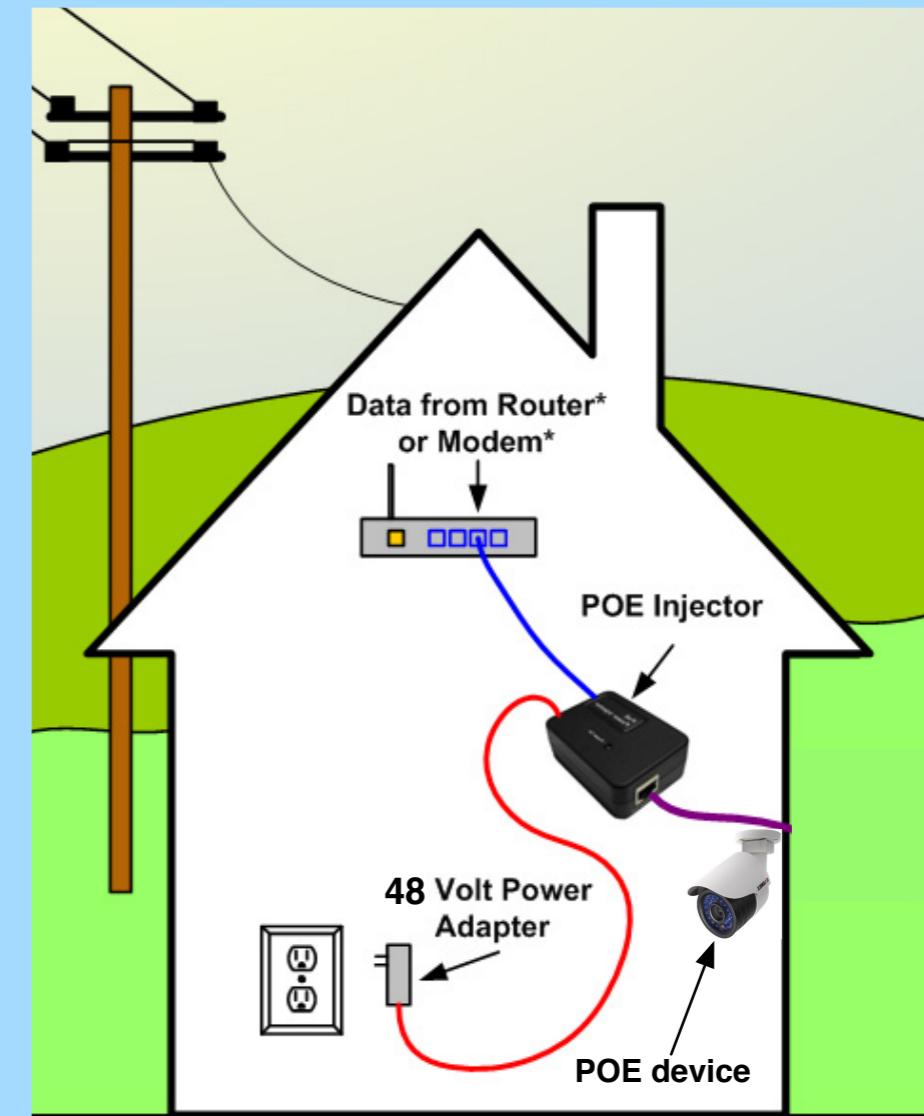
- ▶ Motivation
 - ▶ Cool power, not hot!
 - ▶ The ELL-i story
- ▶ ELL-i as a technical platform
 - ▶ ELL-i vs. Arduino
- ▶ ELL-i as an organisational experiment
 - ▶ New way to grow business
- ▶ Summary

The ignored secret: the power supply



PoE in a nutshell

- ▶ Mains power converted to 48VDC
- ▶ Data and 48VDC through a single CAT cable
- ▶ POE device converts 48VDC for its internal use
 - ▶ e.g. 5V or 3.3V for MCU
 - ▶ e.g. constant current for a high power LED lamp



Cool power — not hot!

- ▶ Electricity is **not only** mains power
 - ▶ 110 / 230 VAC is a deadly artefact of the past
- ▶ ELV (extra low voltage) is a **free domain**
 - ▶ not dangerous to humans; fire still an issue
 - ▶ anybody can design & install
- ▶ Power-over-Ethernet 48 VDC is ELV
 - ▶ Both power and data via a **single CAT cable**
 - ▶ 13W, 25W, or even more, at **our hands**

The ELL-i story

- ▶ Started by
Pekka Nikander & Teemu Hakala in Summer 2012
 - ▶ Pekka has had home automation since 2005
 - ▶ Sauna not integrated; actuator & sensor issues
 - ▶ Teemu wants to automate lights, car warming, ...
 - ▶ Power-over-Ethernet looked good
 - ▶ Power and control in a single cable
 - ▶ Uses existing CAT5 cabling (from the 2005 system)
 - ▶ Clearly growing towards higher power levels
 - ▶ And the whole story grew from there ...





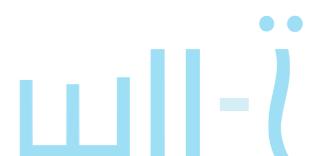
ELL-i technical platform

<http://www.ell-i.org>

ELL-i:

Democratising power

- ▶ Internet democratised *information*
- ▶ 3D printers are democratising *manufacturing*
- ▶ ELL-i wants to democratise *power*
 - ▶ Regulated as ELV – anyone may install
 - ▶ No electrician needed
 - ▶ DC – easy to understand, convert, and store
 - ▶ Safe – has automatic circuit breakers

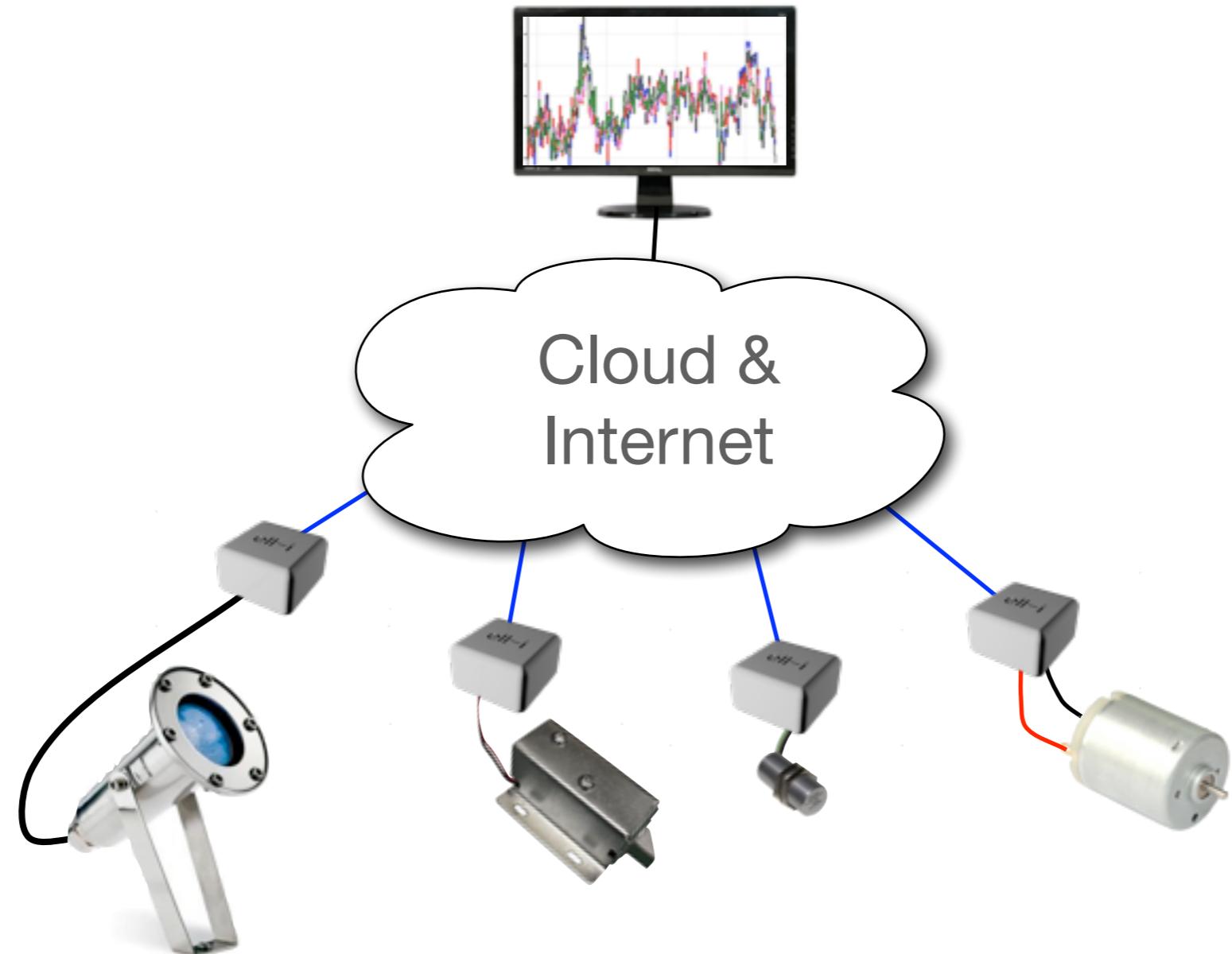


Platform goals

- ▶ **Intelligence and power to everywhere**
 - ▶ Inexpensive and flexible
 - ▶ Installable by anyone; no electrician needed
 - ▶ Easy to start with; Arduino compatible
 - ▶ Powerful, cloud connected, upgradeable
- ▶ Open sourced for Open Innovation



An ELL-i network



ELL-i project: The platform vision

LED
lighting

Intelligent
home

Industrial
automation

Your own
fixed,
powered
IoT
vision

An open source platform

mW power

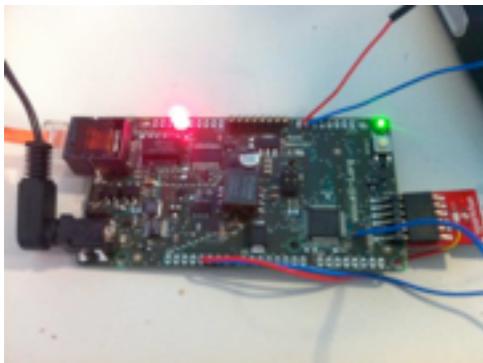
1–100 W = PoE

kW Power

ELL-i technical roadmap

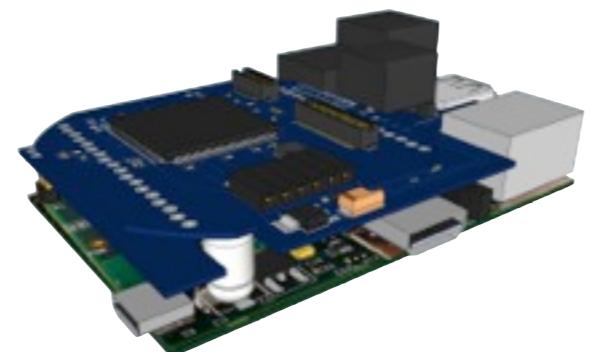
v1.0 prototype

- Arduino compatible!
- 32-bit CPU
- 48 MIPS
- 16 kb RAM
- 64 kb FLASH
- 10 Mb/s Ethernet
- 13W of power



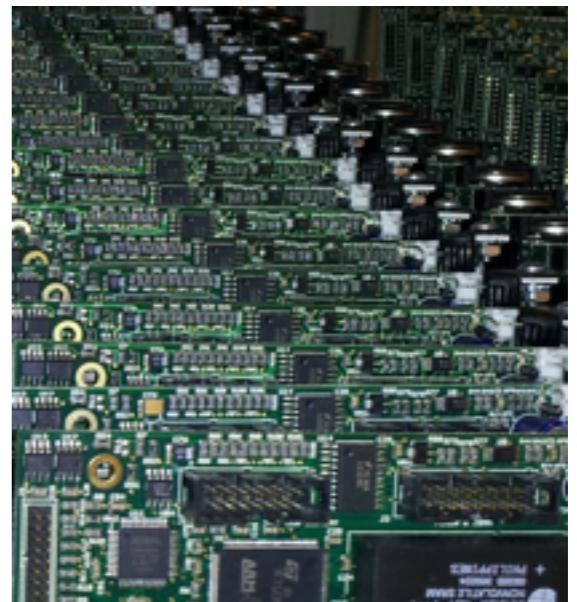
v2.0 design

- JS compatible?
- Two alternatives
- 48 or 180 MIPS
- 16 or 256 kb RAM
- 64 kB or 1 Mb FLASH
- 100 Mb/s Ethernet
- 13 or 25W of power



KICKSTARTER

v2.0 production run



May 2013

Dec 2013–Jan 2014

Apr–May 2014

Aug–Sep 2014

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ELL-i as an organisational experiment



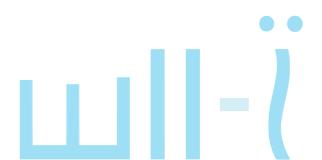
open source
hardware

coop



Organisational experiment

- ▶ Why unconventional organisational model?
- ▶ Why (exactly) open source?
- ▶ The ELL-i co-operative
 - ▶ A meritocracy and an ecosystem
- ▶ GTM or crossing the chasm
 - ▶ Kick starter and contagious STEPPS
 - ▶ Disruptive innovation



Why to do it differently?

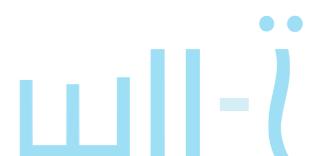
- ▶ Technically ELL-i is nothing special
 - ▶ A drop of visionary thinking
 - ▶ A few man months of engineering
- ▶ So everything boils down to “marketing”
 - ▶ How to source the wisdom of the crowds?
 - ▶ How to establish a mind share and brand?
 - ▶ How to make it sustainable?
- ▶ Innovate in incentive models



ELL-i

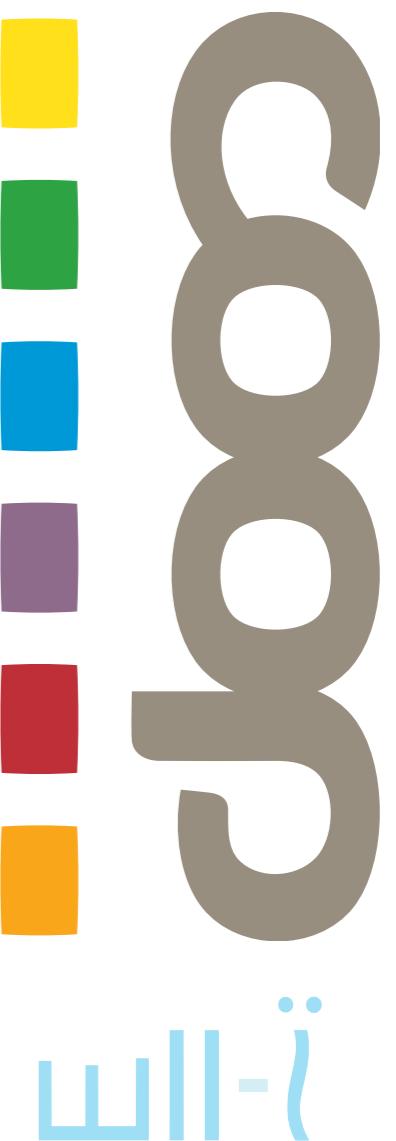
Open source

- ▶ Of course – a necessity these days
 - ▶ Unless you have deep pockets...
- ▶ Lowers the entry barrier
 - ▶ Also for competitors...
- ▶ Enables open innovation
 - ▶ But you still need a business model for it...
- ▶ Creates a marketing platform
 - ▶ Word-of-mouth marketing by geeks, but ...

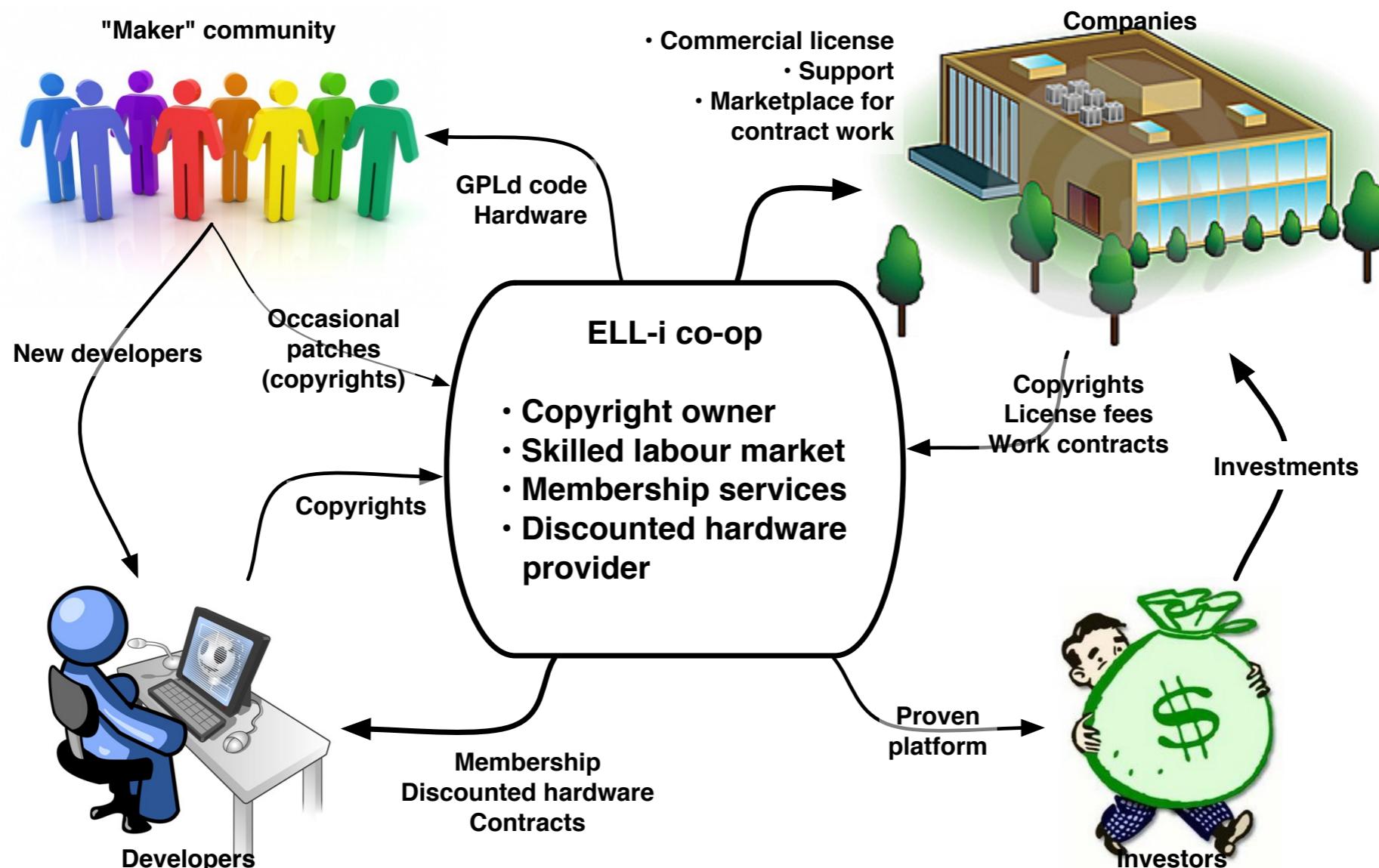


ELL-i co-operative

- ▶ The home for the incentive model
- ▶ An organisational bases for forming an ecosystem
- ▶ **Co-own the software and hardware copyrights**
 - ▶ Anyone may donate copyrights & join the co-op
- ▶ Strengthen the community
 - ▶ Provide development hardware
 - ▶ Form a model for licensing the IPR
- ▶ Create a market place for skilled labour



The ecosystem



Go to market

- ▶ Early market
 - ▶ Kick starter
 - ▶ Contagious STEPPS

- ▶ Crossing the chasm
 - ▶ First pins
 - ▶ Disruptive innovation



Early market

- ▶ Establish a base
 - ▶ Build upon existing communities
- ▶ Make it viral
 - ▶ Value, Stories, Triggers, Emotions, ...
- ▶ Spur it to sprout
 - ▶ A kickstarter campaign



Bowling alley

- ▶ What are the first pins?
 - ▶ Lighting
 - ▶ Automation
 - ▶ Education
 - ▶ ...
- ▶ Who has the pain?
- ▶ Who could we help?



Disruptive innovation

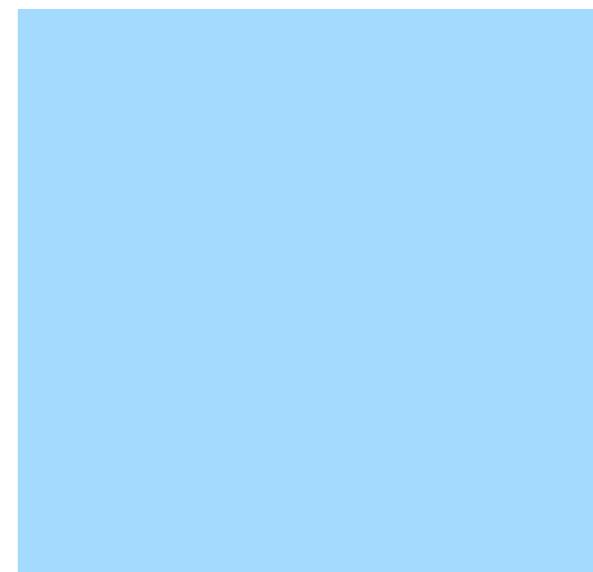
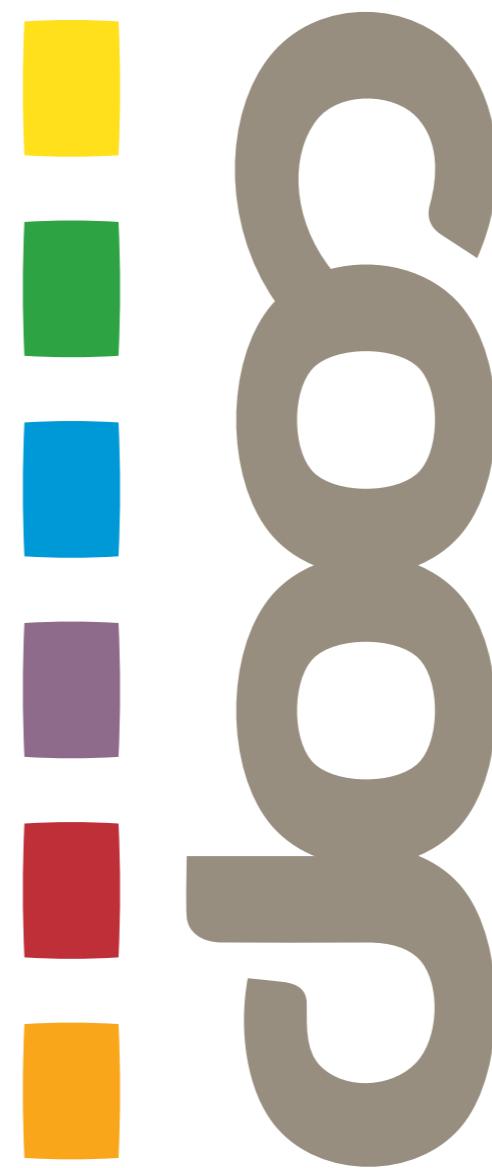
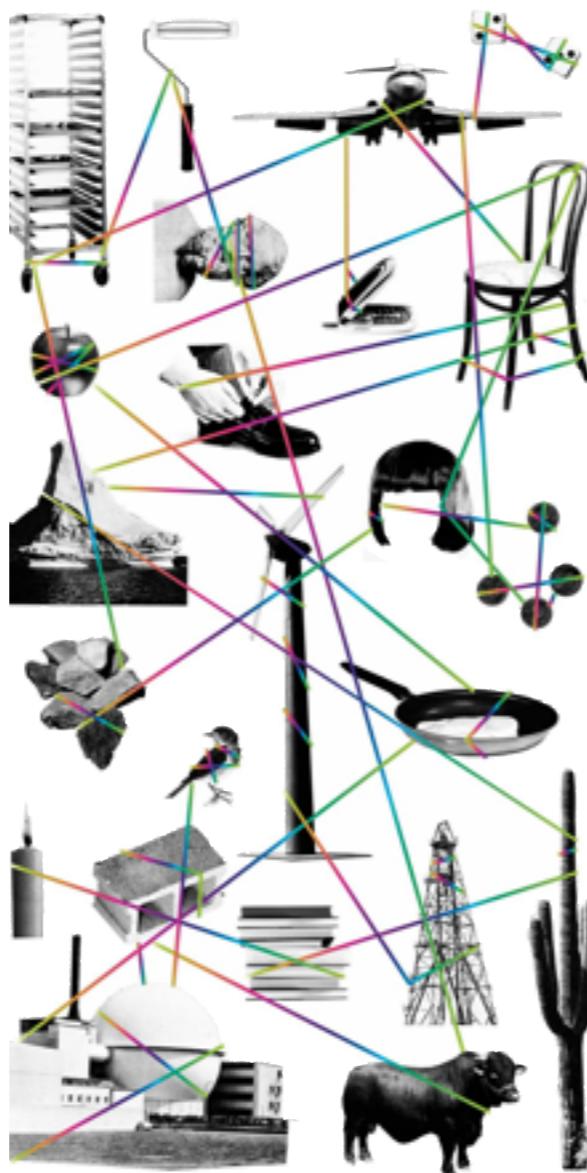
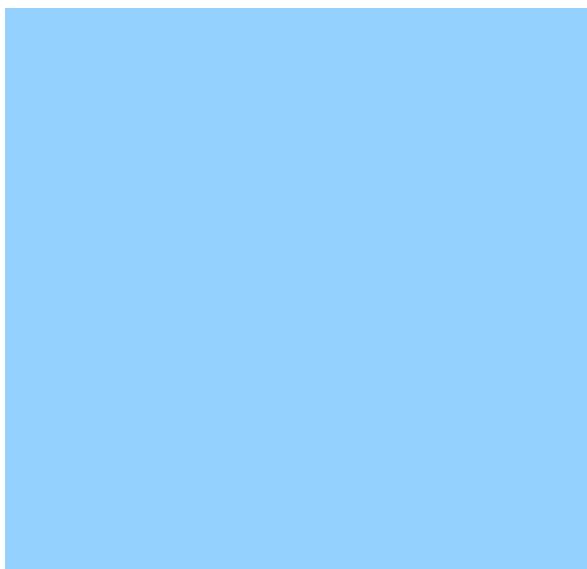
- ▶ Lucrative markets do exist
 - ▶ Industrial automation
 - ▶ Public safety
 - ▶ Large vehicles
 - ▶ ...
- ▶ How to establish a base
 - ▶ Sufficiently credible &
 - ▶ Undetectable enough



Presentation summary

- ▶ A modest start to revolutionise fixed things
 - ▶ Start from e.g. lighting and smart spaces
 - ▶ Initiated from our own needs
- ▶ Utilises now maturing technologies
- ▶ Versatile and flexible technical platform
- ▶ Open sourced for open innovation
- ▶ Organised as a co-operative
- ▶ Facing the marketing challenge







Thank you!