Change, Challenge and Opportunity

Six Trends Defining the Future of Online Learning

Stephen Downes

World Conference in Online Learning, Toronto, Canada, October 18, 2017

http://www.downes.ca/presentation/478

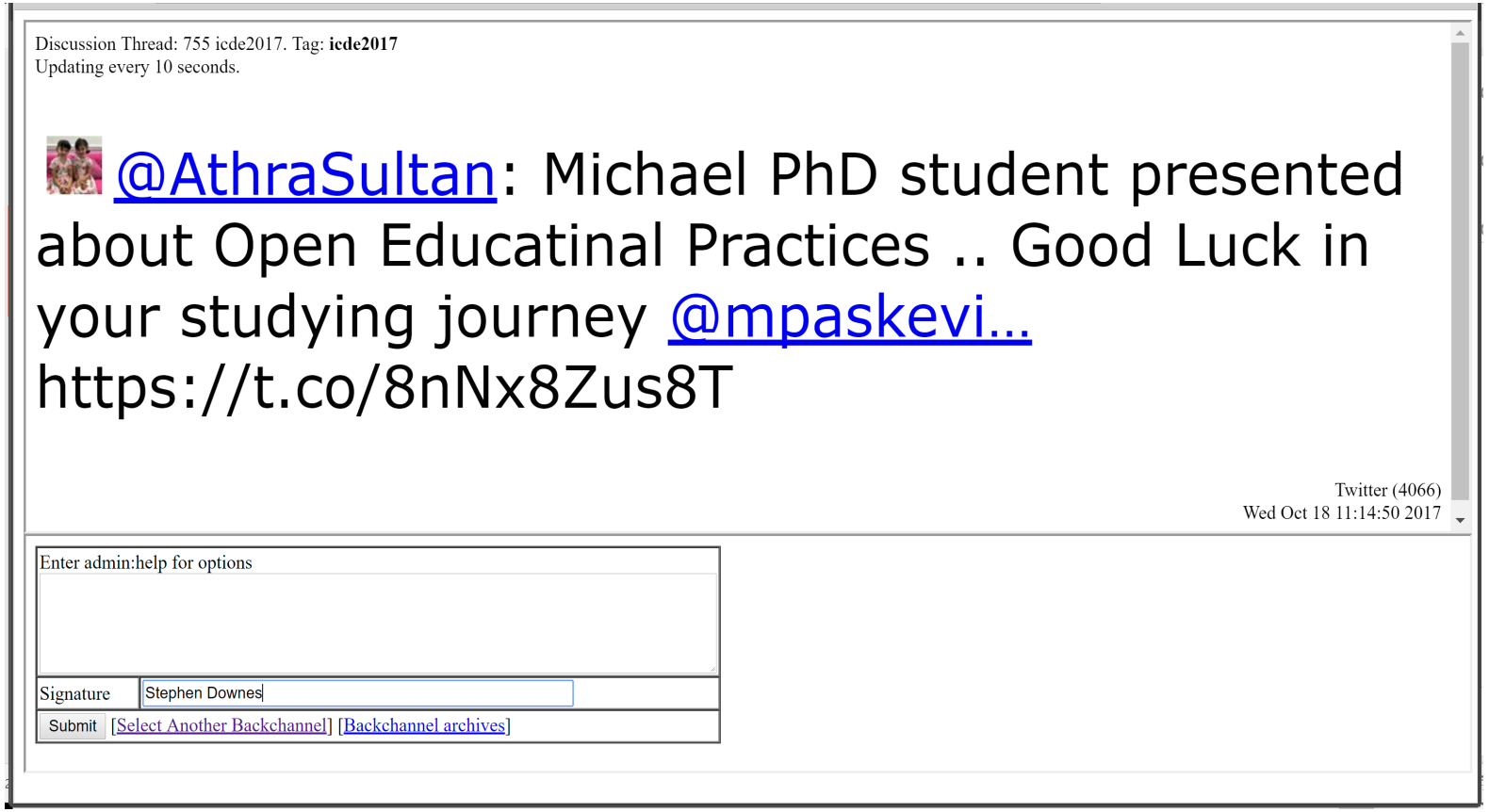
The Backchannel

Use Twitter with the hashtag #icde2017

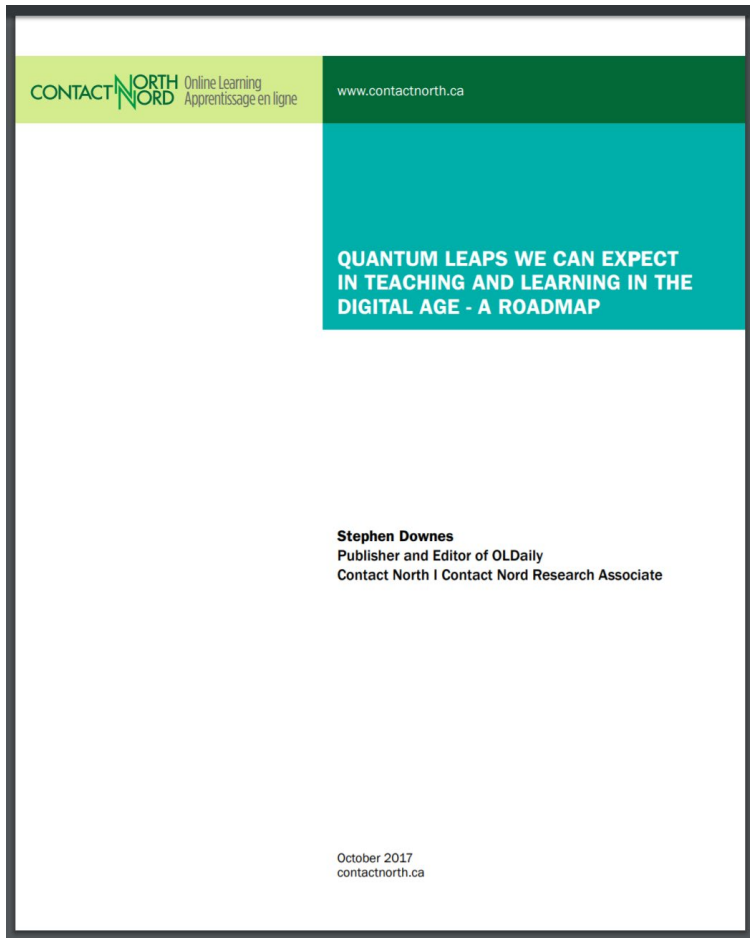
Or go to

http://bit.ly/icde2017 and use the live comments form

If it looks broken, just reload it. ☺



The Report…



You can download this report from:
http://bit.ly/quantum-leaps

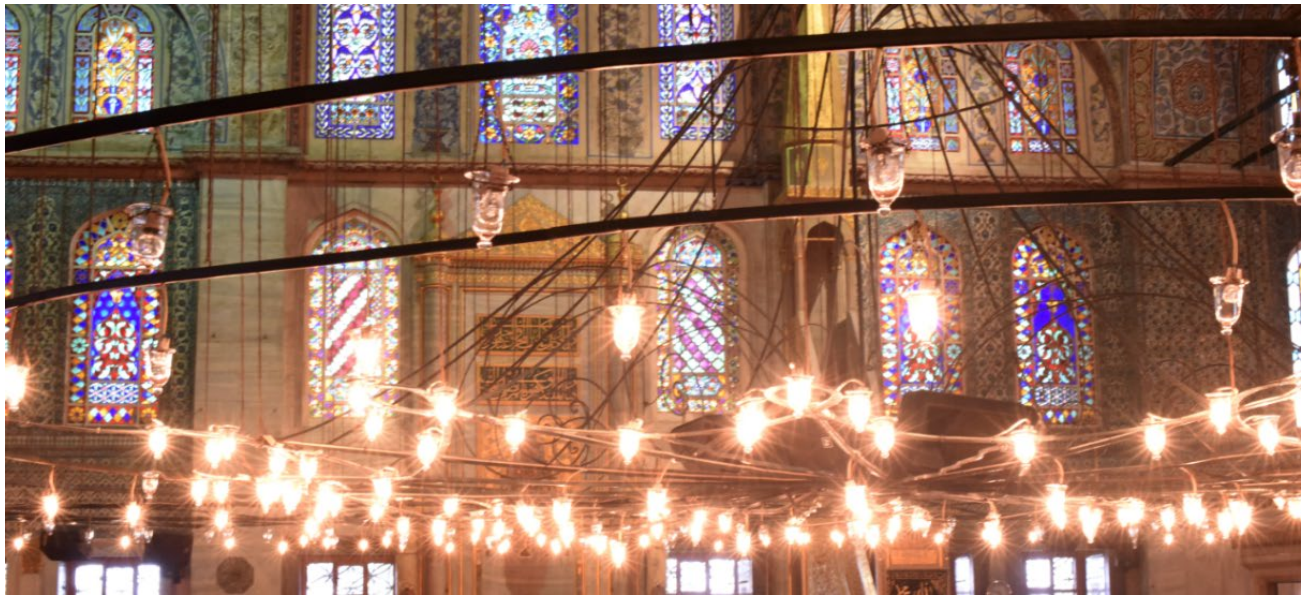
The report talks a lot about what will change (and some about what will not_ and also about *how* things change

Add your comments

http://bit.ly/quantum-edit

The Inflexible Law of Learning

It's when we do stuff that we learn, not when stuff does something for us.



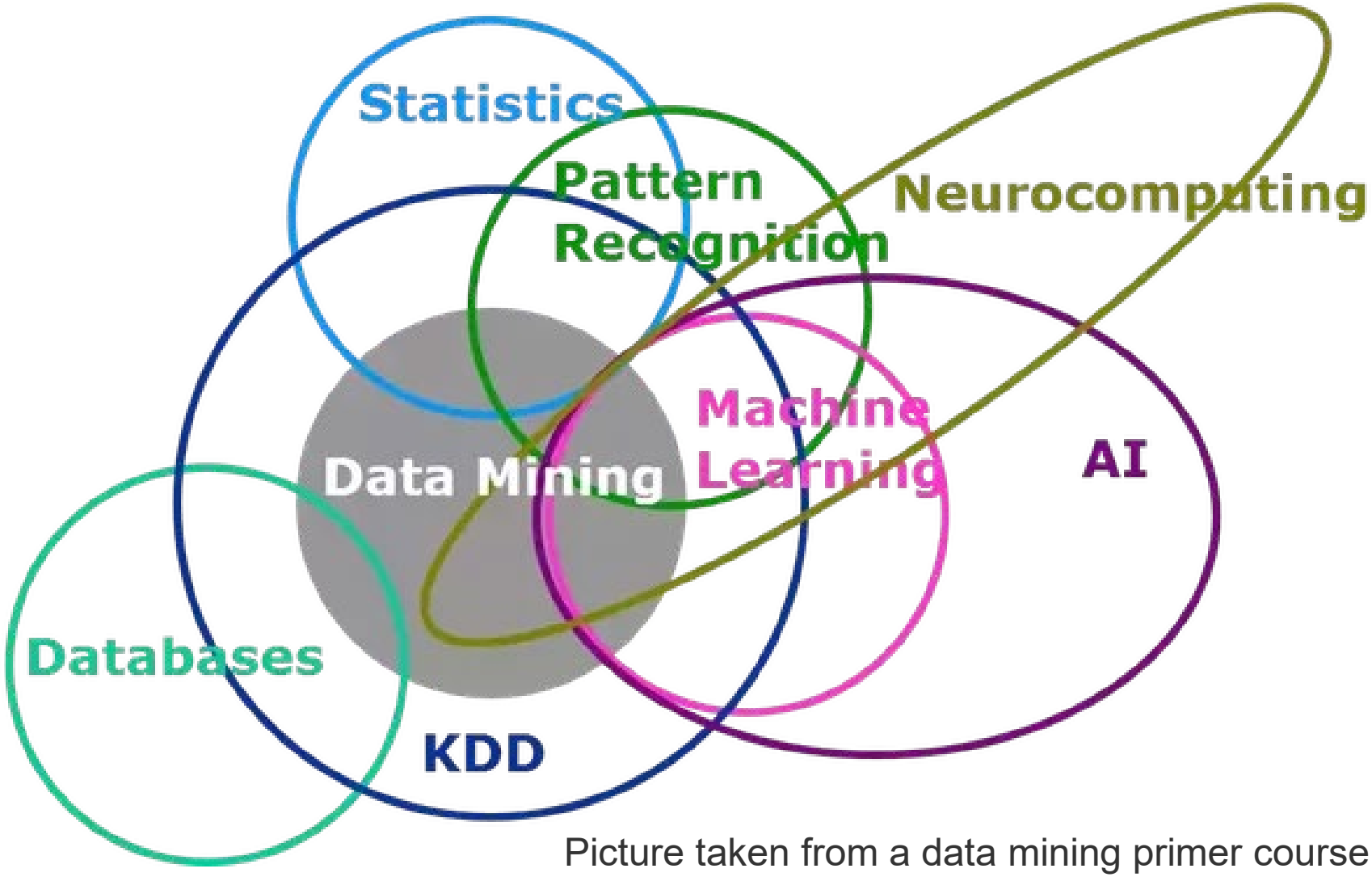
Part One. The Future

1. Machine learning and artificial intelligence
2. Handheld and Mobile Computing
3. Badges and Blockchain
4. Internet of Things
5. Games, Sims and Virtual Reality
6. Translation and Collaborative Technology

http://teachonline.ca/tools-trends/exploring-future-education/2016-look-future-online-learning-part-1

http://halfanhour.blogspot.com.tr/2016/03/the-2016-look-at-future-of-online.html

1. Machine Learning and AI



Picture taken from a data mining primer course SAS offered in 1998.
https://blogs.sas.com/content/subconsciousmusings/2014/08/22/looking-backwards-looking-forwards-sas-data-mining-and-machine-learning/

Three Types of AI

- **decision engines** - these are expert systems that are based on rule-driven strategies
- **pattern recognition** - perceptual systems that identify patterns from partial or disorganized data
- **cluster detection** - detecting nearest neighbours and categories of things

http://research.microsoft.com/en-us/um/people/cmbishop/prml/

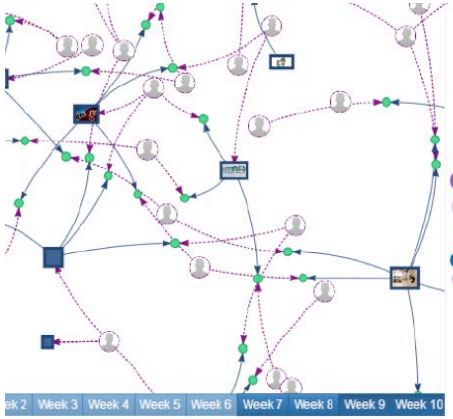
http://www.wtec.org/loyola/kb/c1_s1.htm

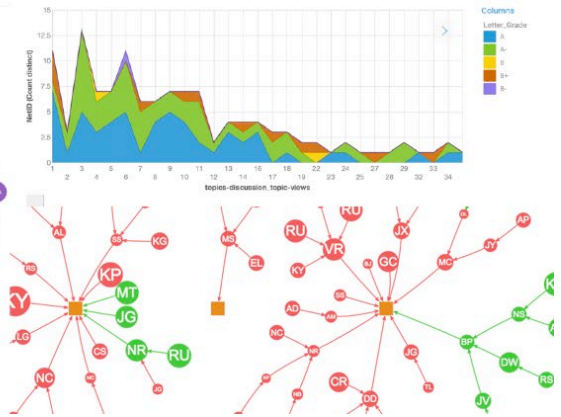
Learning Analytics

Siemens and Long

- Course-level: learning trails, social network analysis, discourse analysis
- Educational data-mining: predictive modeling, clustering, pattern mining
- Intelligent curriculum: semantically defined curricular resources
- Adaptive content: content sequence based on behavior, recommendation
- Adaptive learning: social interactions, learning activity, learner support

https://er.educause.edu/articles/2011/9/penetrating-the-fog-analytics-in-learning-and-education



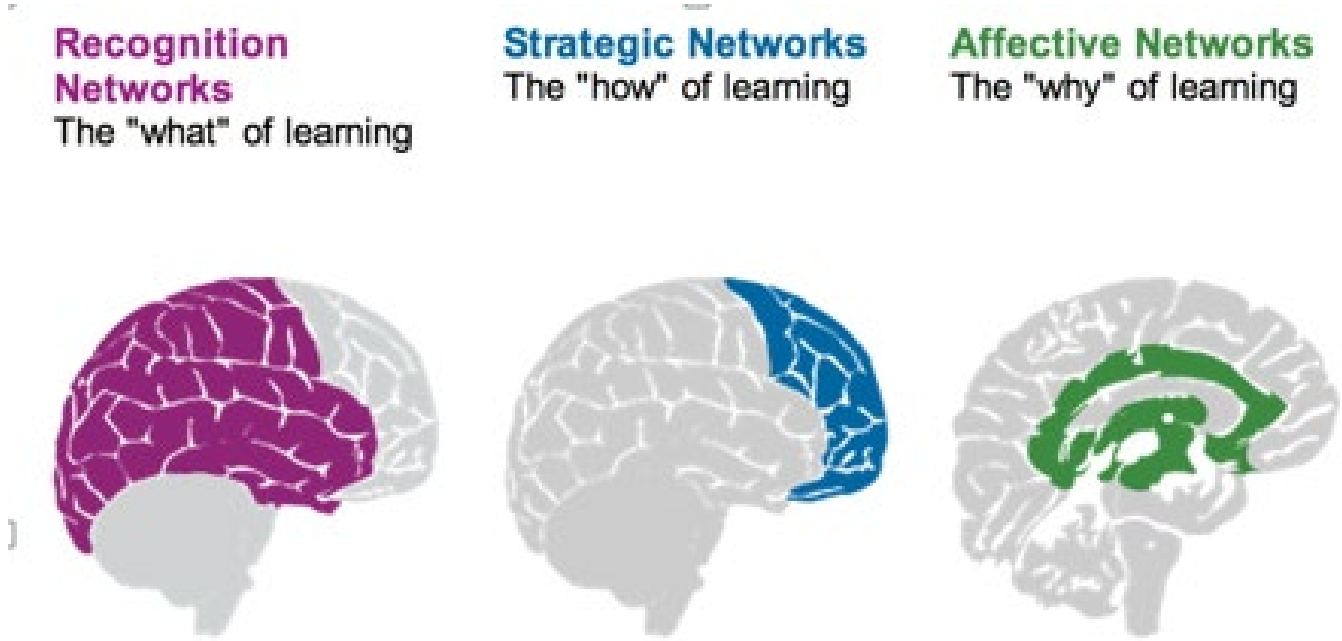


We talk about predictive analytics as though finishing a course is the problem. But I think the real future is in the quantified self

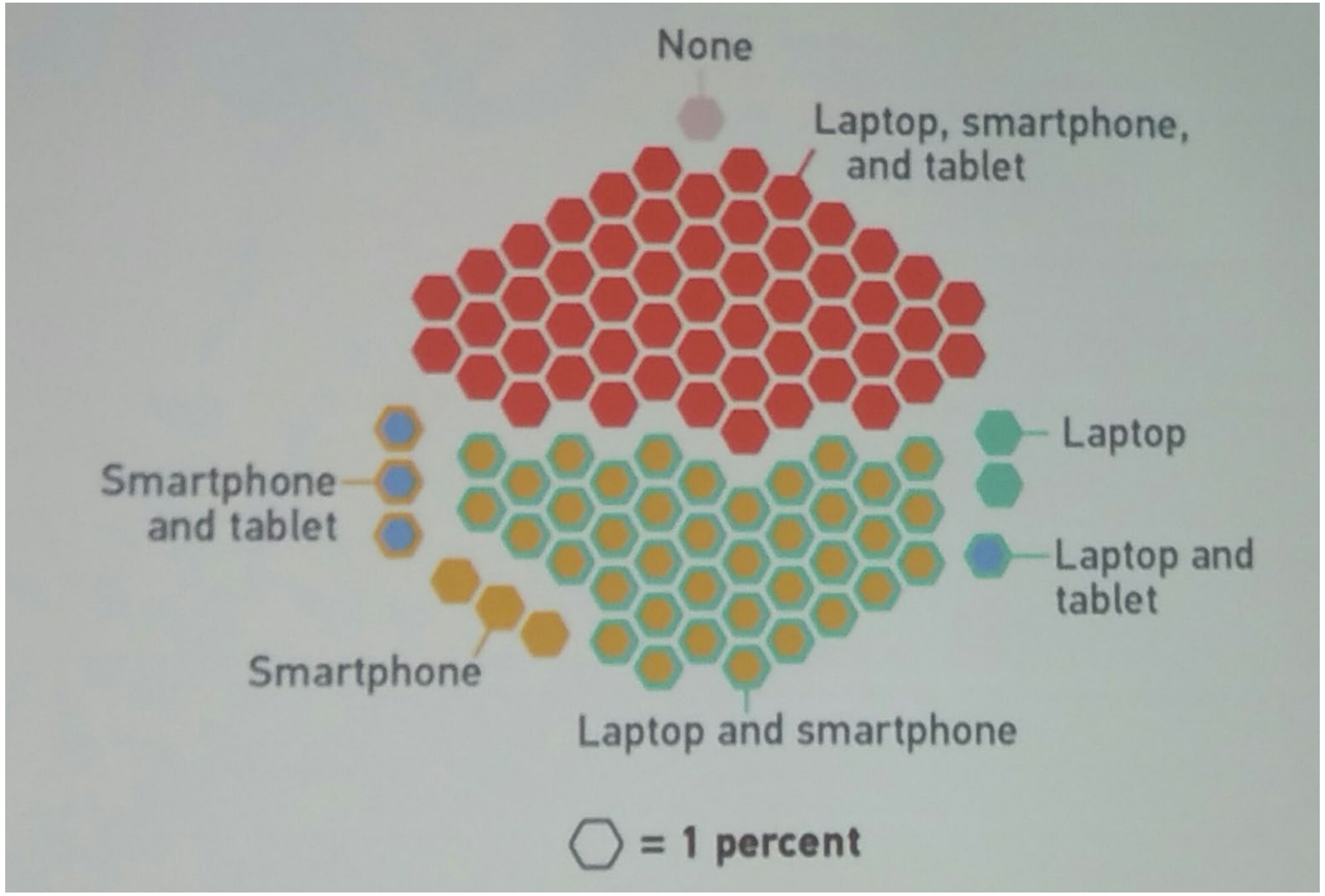
http://quantifiedself.com/

Personalized Learning

- Rules-Based Events (like notifications)
- User Models
- Adaptive Learning



2. Handheld and Mobile Computing

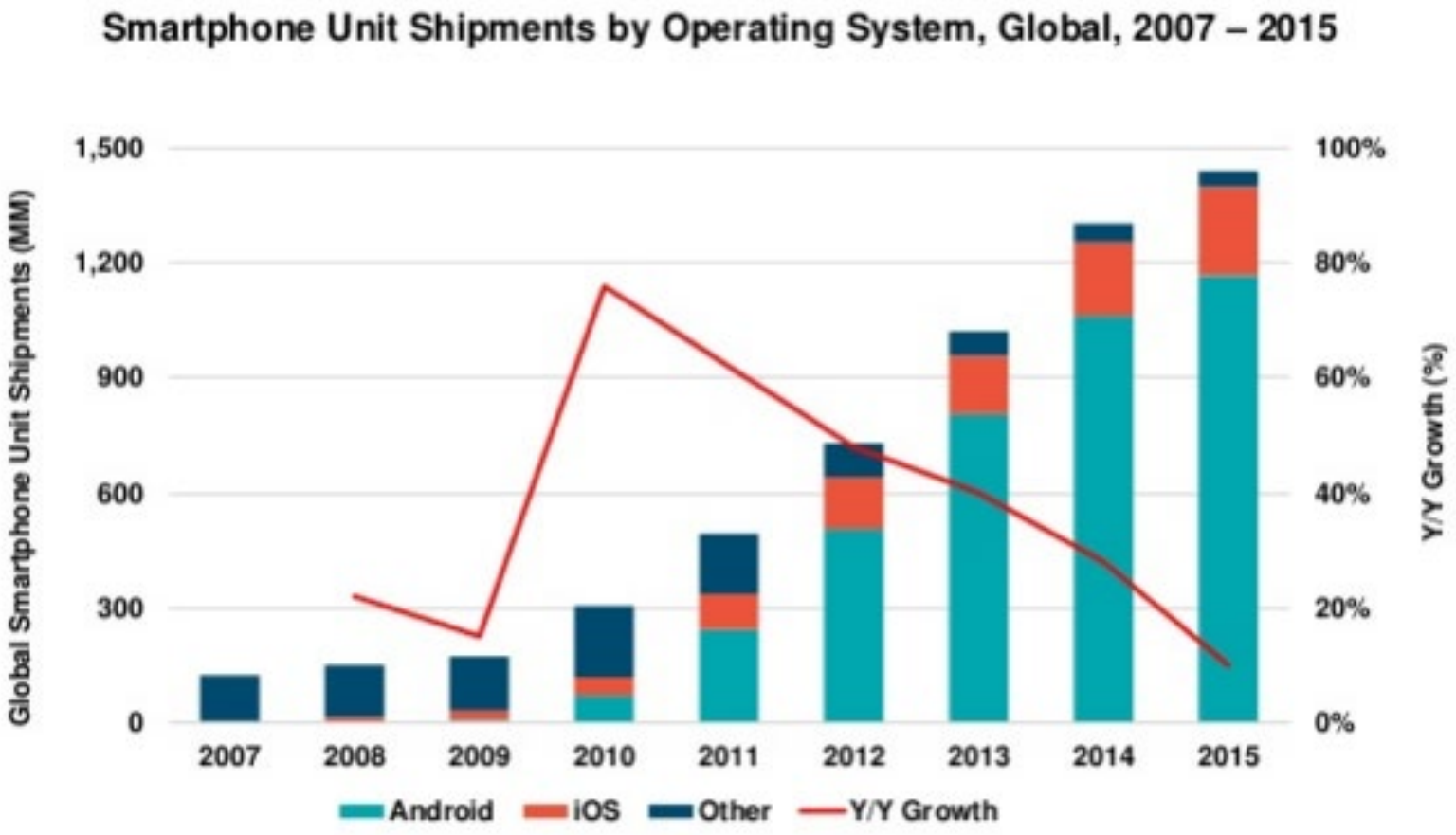


Source: https://library.educause.edu/resources/2016/6/2016-students-and-technology-research-study

Student laptop, tablet and smartphone ownership; EDUCAUSE survey, 2016

https://www.slideshare.net/PhilHill3/hill-slides-world-congress-session-20171018/1

Smartphone Unit Shipments



Mary Meeker http://www.slideshare.net/kleinerperkins/2016-internet-trends-report?ref=http://www.kpcb.com/internet-trends

Microcomputing in Unexpected Places

- Forbes writes about AI on a chip
- A man built a face-recognizing doorbell for about $100 (from O'Reilly).
- MagicBand. It's a bracelet Disney hands out (story on Gizmodo)

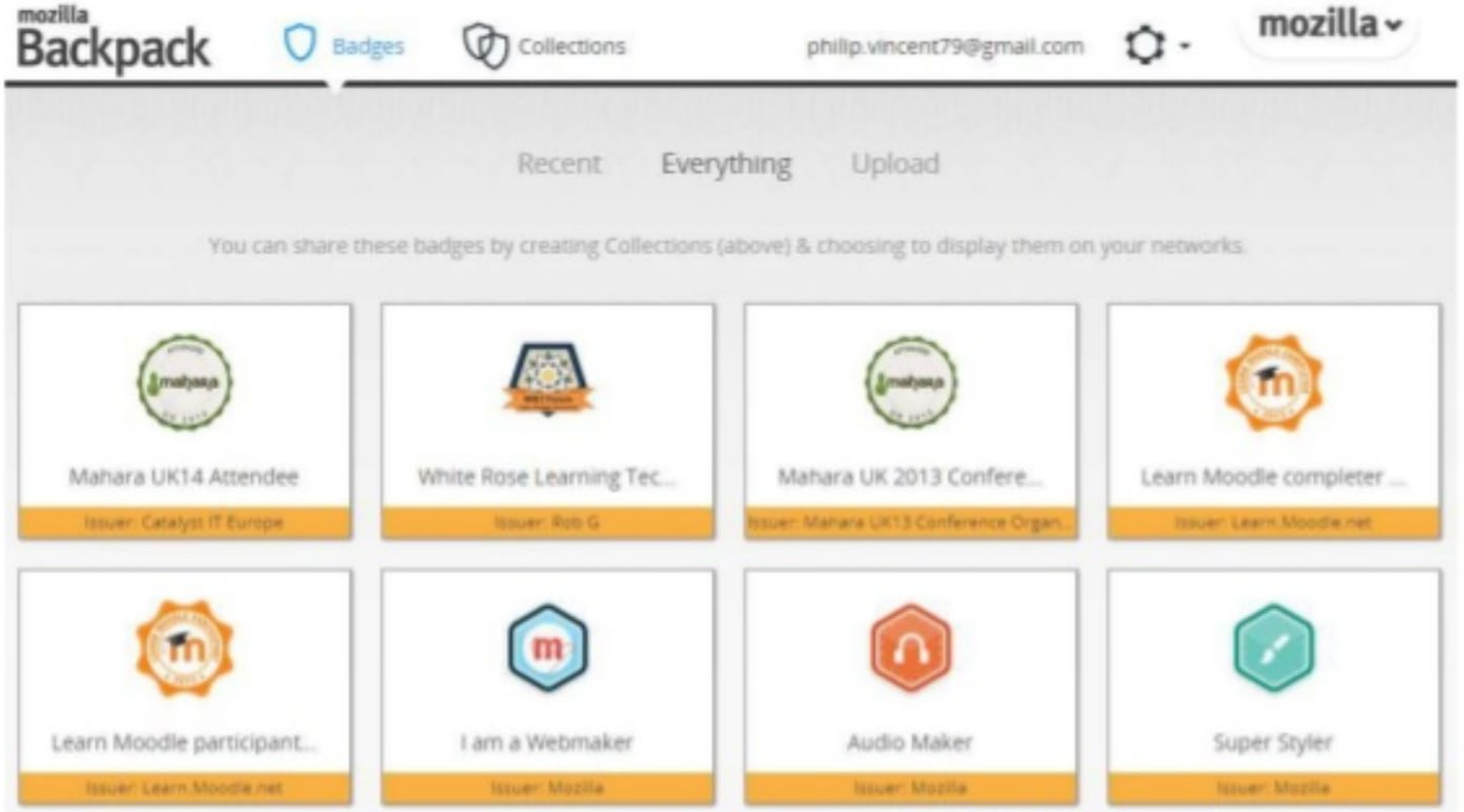
https://www.pinterest.ca/explore/magic-bands/?lp=true

Performance Support

- The future of learning isn't the mobile phone
- It's in the *integrated* performance support system

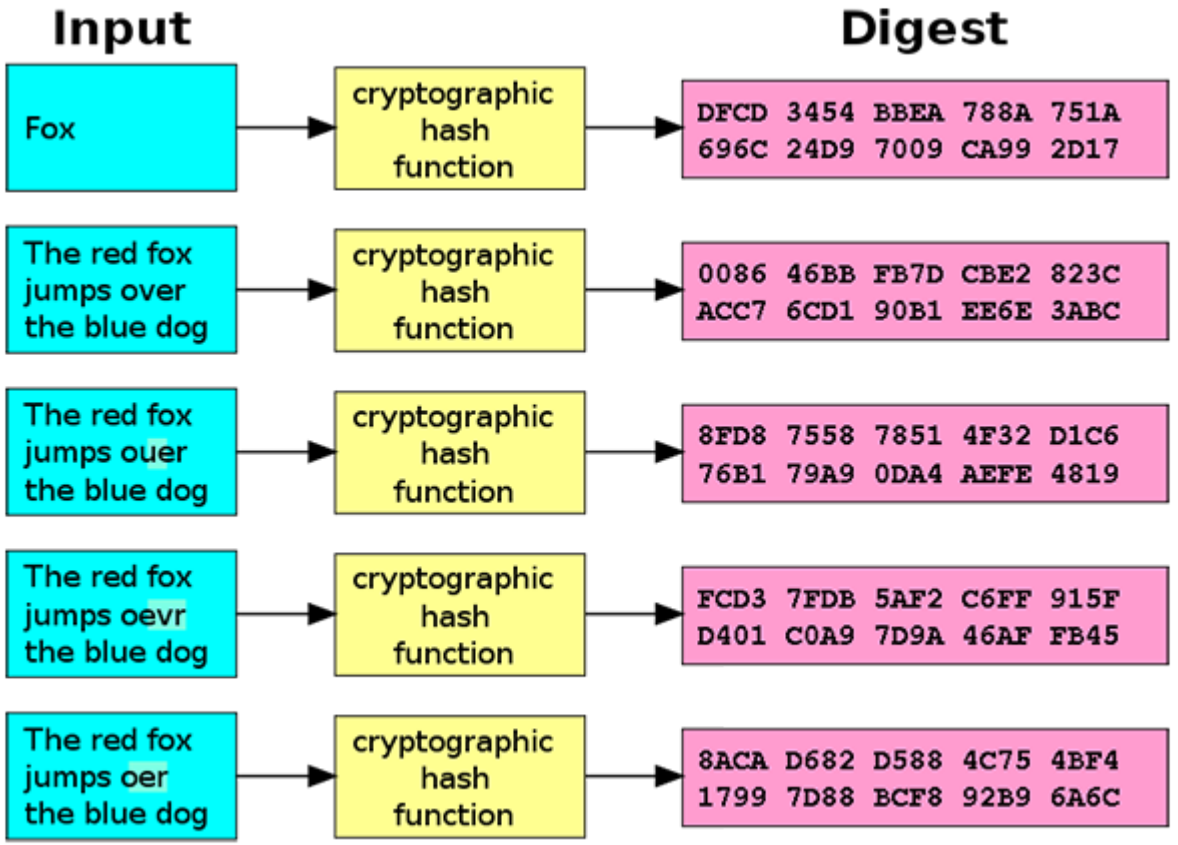
http://fortune.com/2014/05/27/a-tennis-racquet-that-isnt-just-strung-but-wired/

3. Badges and Blockchain



http://backpack.openbadges.org/

3. Badges and Blockchain



http://dmlcentral.net/blog/doug-belshaw/peering-deep-future-educational-credentialing

http://www.downes.ca/search/blockchain

Doug Belshaw:

"If we used the blockchain for Open Badges," he writes, "then we could prove beyond reasonable doubt that the person receiving badge Y is the same person who created evidence X.

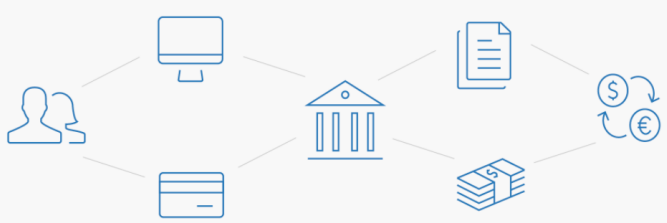
The Dao

- Ethereum is a decentralized platform that runs smart contracts https://www.ethereum.org/
- The Dao is a 'distributed corporation' that receives investments, chooses projects, and pays for their development; some of these projects return revenue to Dao and others don't. https://magazine.backfeed.cc/dao-alive-now-let-evolution-begin/

Hyperledger

Shared Ledger Database

Blockchain allows multiple different parties to securely interact with the same universal source of truth



Finance

Streamlined settlement, improved liquidity, increased transparency and new products/markets

Healthcare

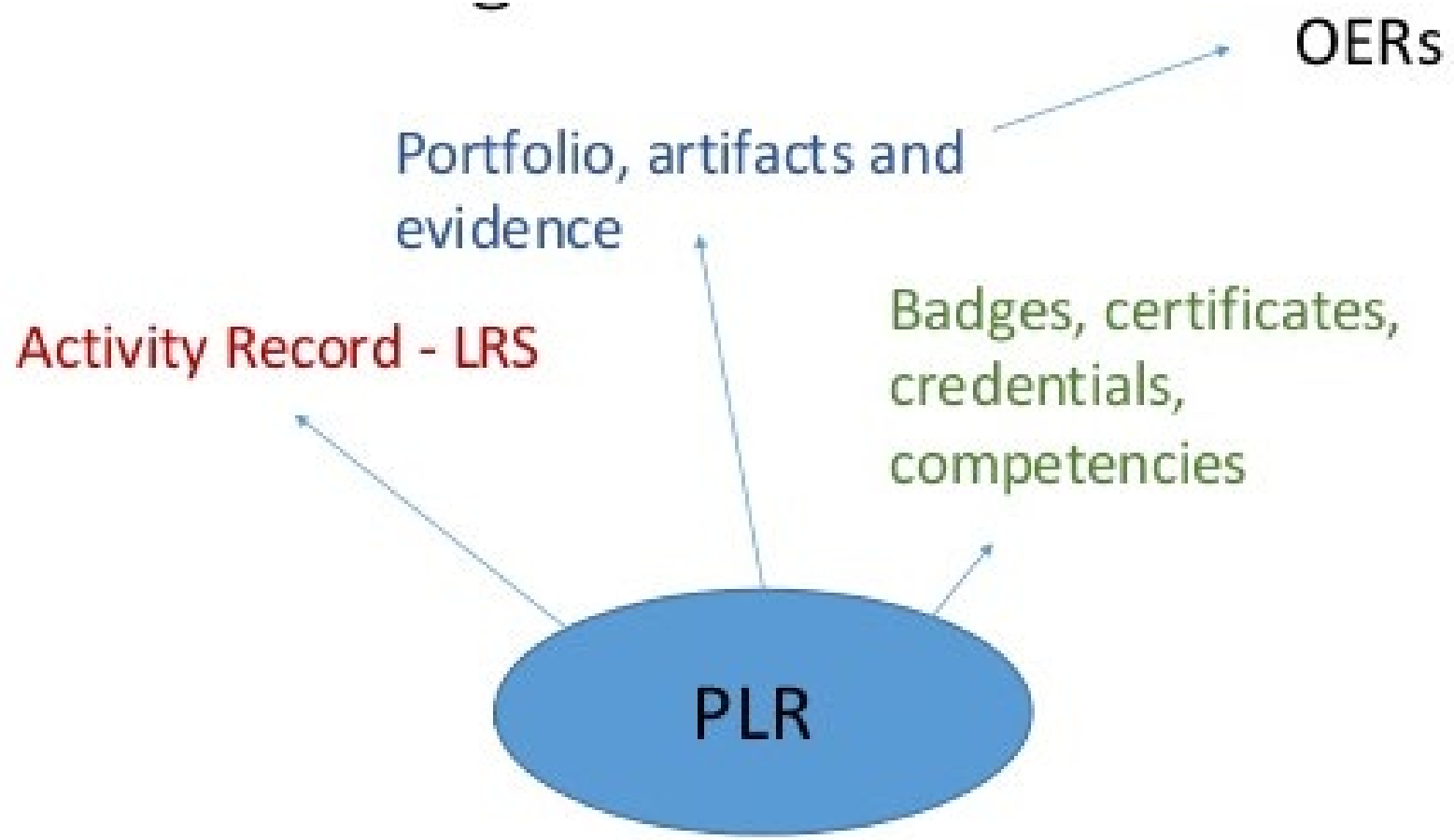
Unite disparate processes, increase data flow and liquidity, reduce costs and improve patient experience and outcomes

Supply Chain

Track parts and service provenance, ensure authenticity of goods, block counterfeits, reduce conflicts

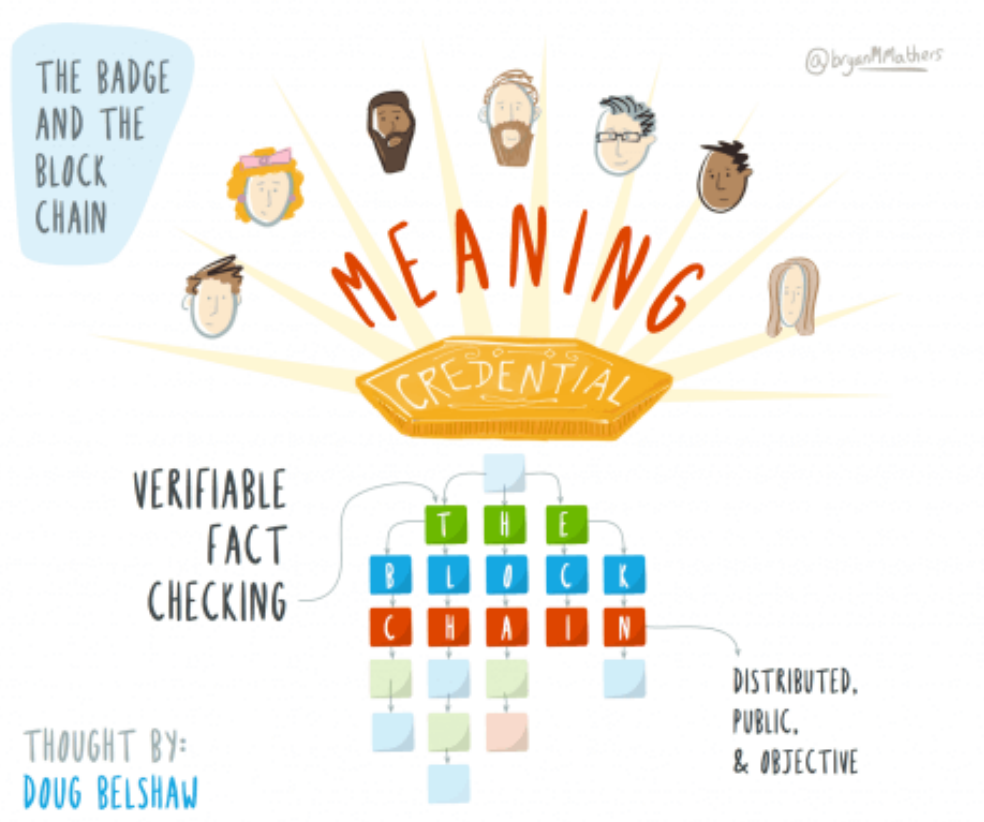
Hyperledger - https://www.hyperledger.org/
MOOC on EdX - http://www.prnewswire.com/news-releases/hyperledger-launches-first-free-massive-open-online-course-mooc-on-edxorg-300532968.html

Personal Learning Records



Credentials

Sony plans to launch a testing platform powered by blockchain and that IBM plans to offer 'blockchain-as-a-service,'"



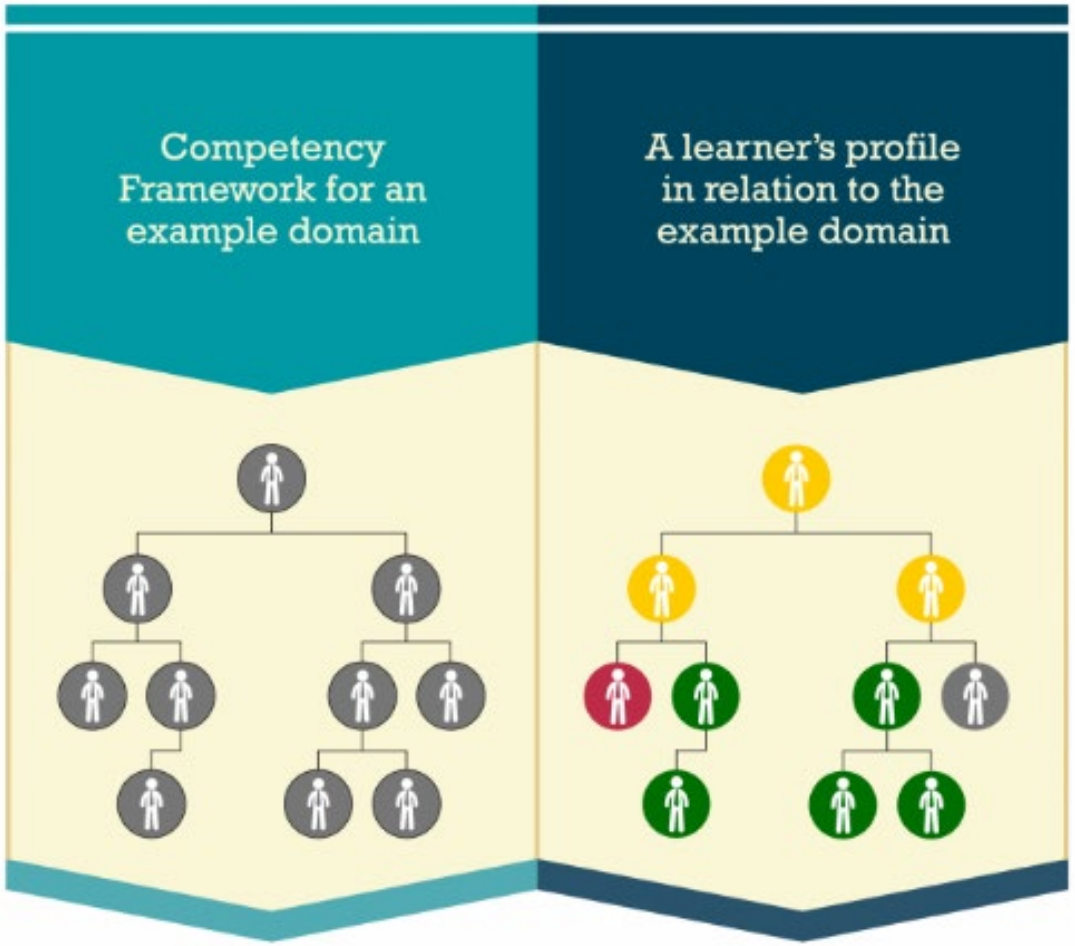
Audrey Watters
http://hackeducation.com/2016/02/25/blockchain-edu1

Microcredentials

- Disaggregation of the traditional degree, breaking it into component parts (Horizon Report).
- “To be profitable privatisation depends on standardisation to scale.” (We The Educators)
- Credentials earn careers, but competencies earn gigs.

http://digitalpromise.org/initiative/educator-micro-credentials/

CASS

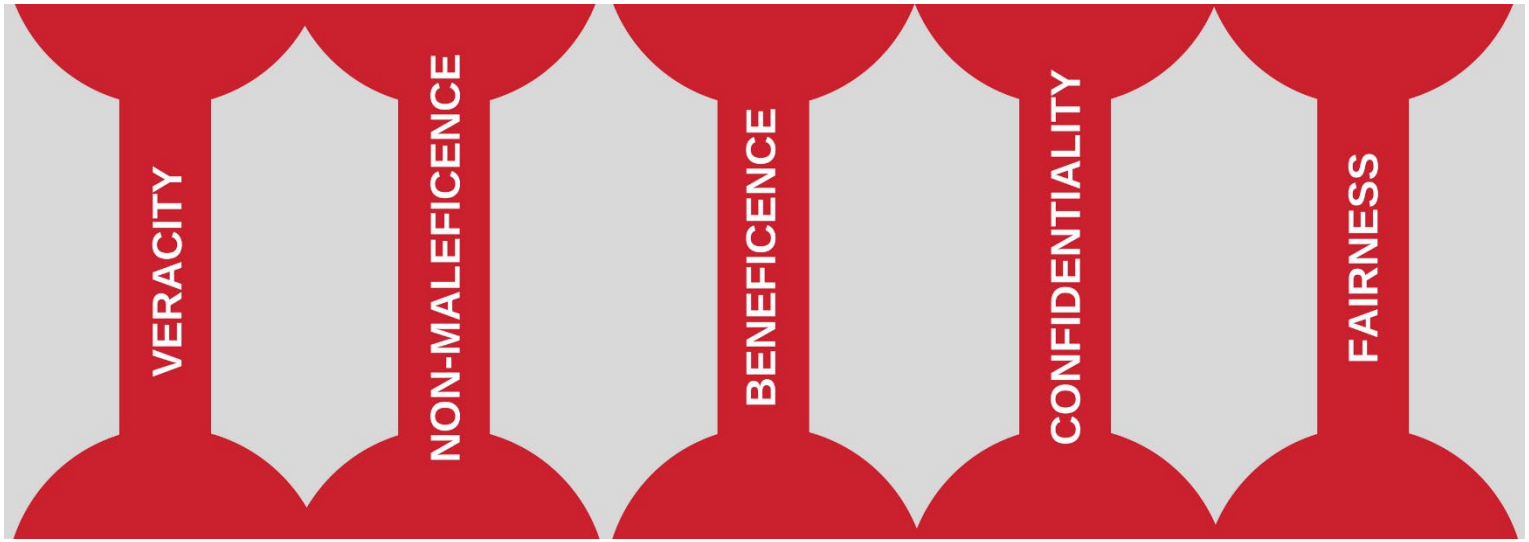


Competency and Skills System

https://www.adlnet.gov/introducing-the-next-big-thing-cass/

The Assessment Dilemma

- How can we design assessment systems that accurately and honestly measure a student's achievement?
- Even more to the point, how can create incentives for *honest* academic behaviour?



http://pagecentertraining.psu.edu/public-relations-ethics/core-ethical-principles/lesson-2-sample-title/the-pillars-of-public-relations-ethics/

Learning Outcomes

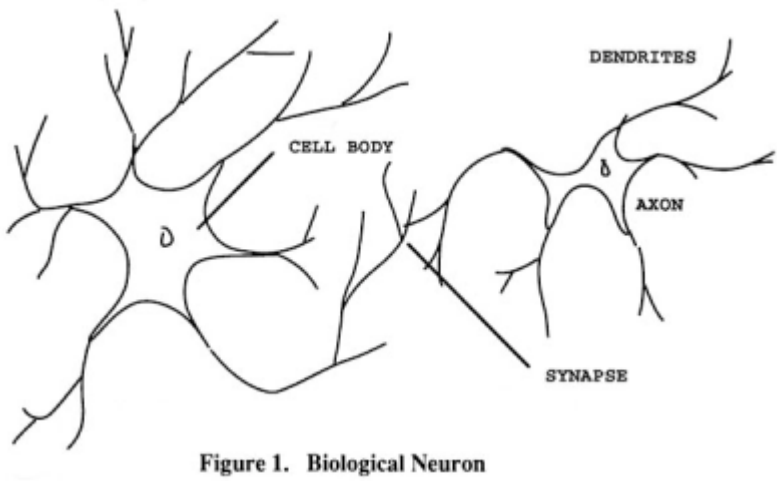
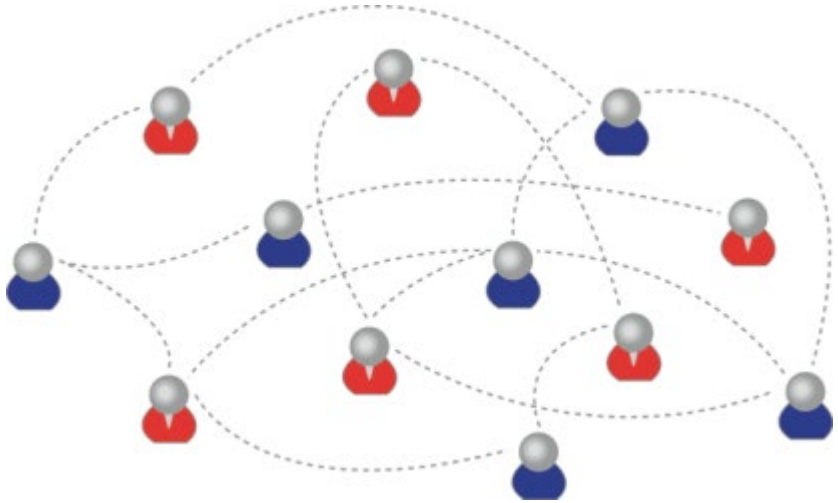


Figure 1. Biological Neuron

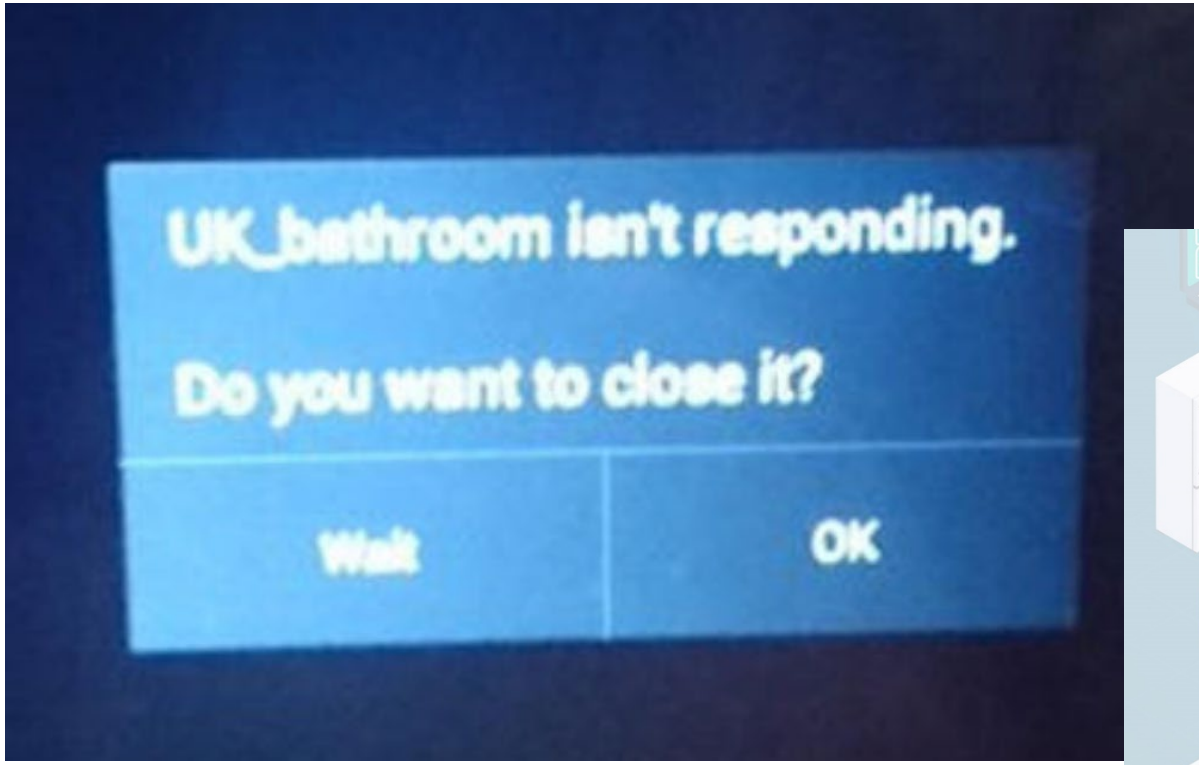
We recognize this

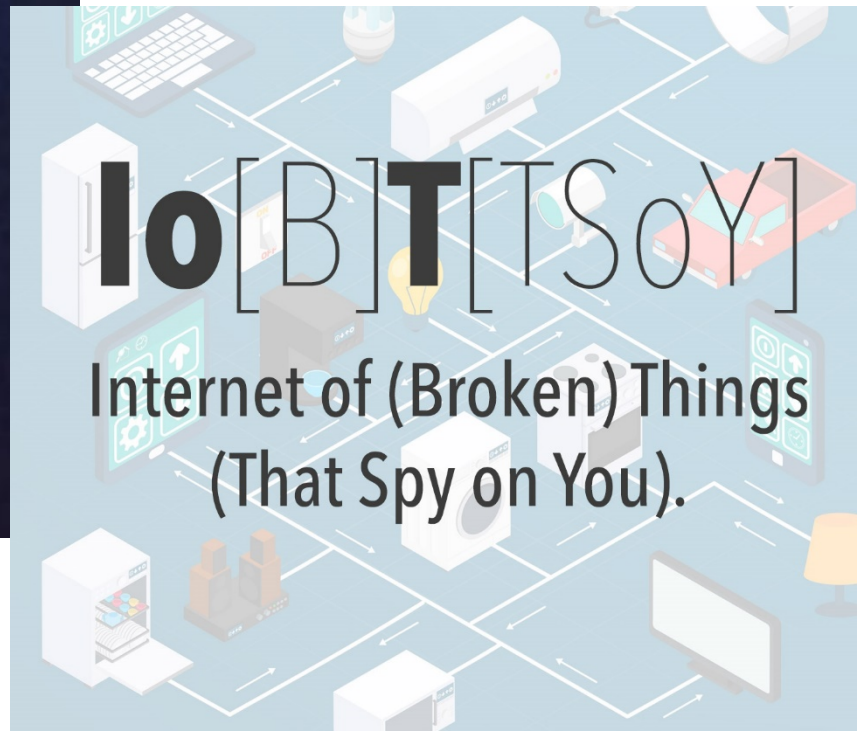


By perfomance in this

There are not specific bits of knowledge or competencies, but rather, personal capacities

4. Internet of (Broken) Things



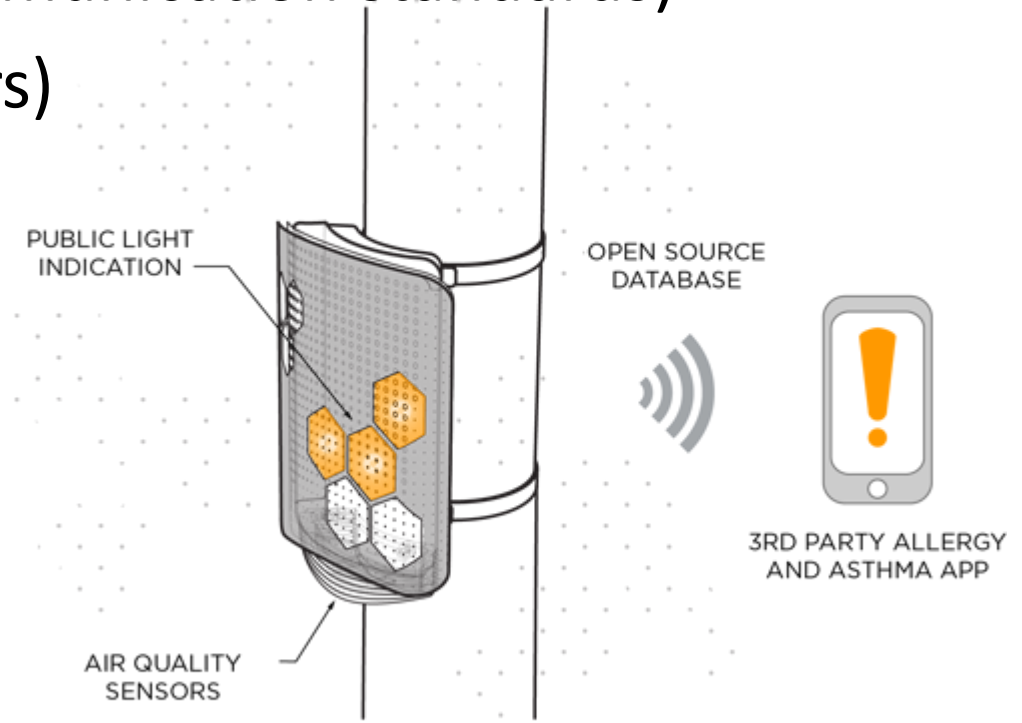


The Internet of Things is Already Everywhere

https://beta.theglobeandmail.com/report-on-business/rob-magazine/the-future-is-smart/article24586994/?ref=http://www.theglobeandmail.com&

The Main Enablers

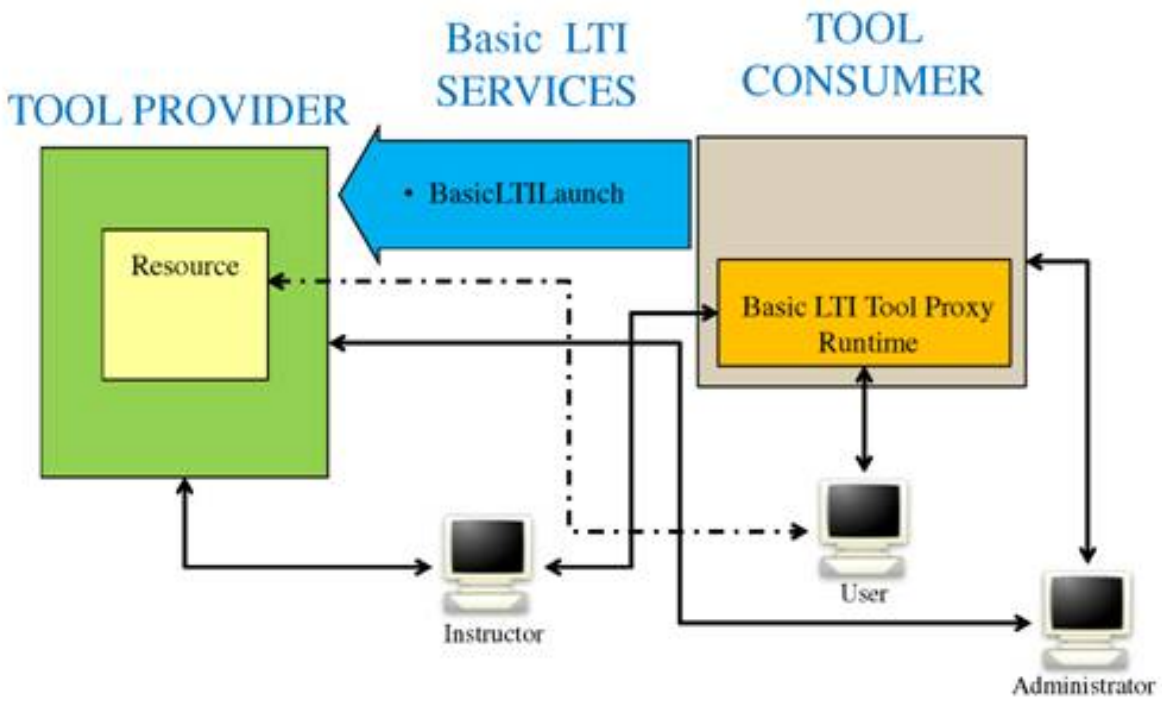
- Microcomputing & cloud computing
- Wireless communication (and communication standards)
- Sensors (and AI-augmented sensors)
- Remote control / interfaces



https://arrayofthings.github.io/

Learning Tools

- LTI Producer – provides features
- LTI Consumer – connects to features



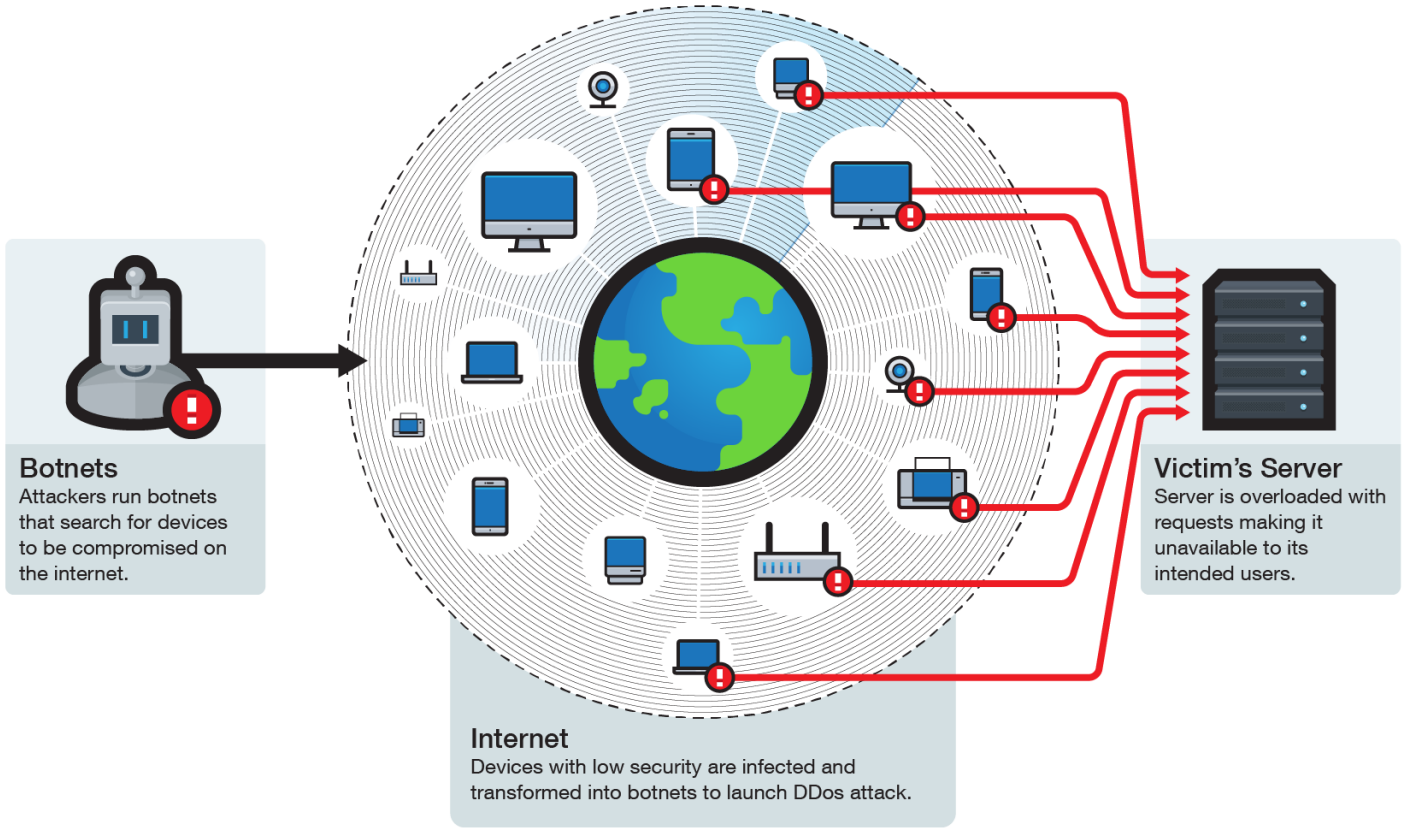
https://www.imsglobal.org/specs/ltiv1p0/implementation-guide

https://gizmodo.com/roombas-next-big-step-is-selling-maps-of-your-home-to-t-1797187829

What happens when companies know the state of all your devices?

http://www.cbc.ca/news/canada/car-tracking-devices-spark-privacy-concerns-1.1366687

What Happens when they Break?



- Botnets and worse

http://blog.trendmicro.com/trendlabs-security-intelligence/internet-things-ecosystem-broken-fix/

5. Games, Sims and Virtual Reality

https://www.pcgamesn.com/grand-theft-auto-v/the-best-grand-theft-auto-v-mods

‘Gamification’ – adds game elements to learning

‘Serious Games’ – employs a game to facilitate learning

https://badgeville.com/wiki/Gamification

Oculus Rift

1. Freezers
2. Smilers
3. Grippers
4. Swayers
5. Screamers
6. Freak-outs

http://donaldclarkplanb.blogspot.ca/2014/11/oculus-rift-freezers-smilers-grippers.html

http://www.downes.ca/search/oculus

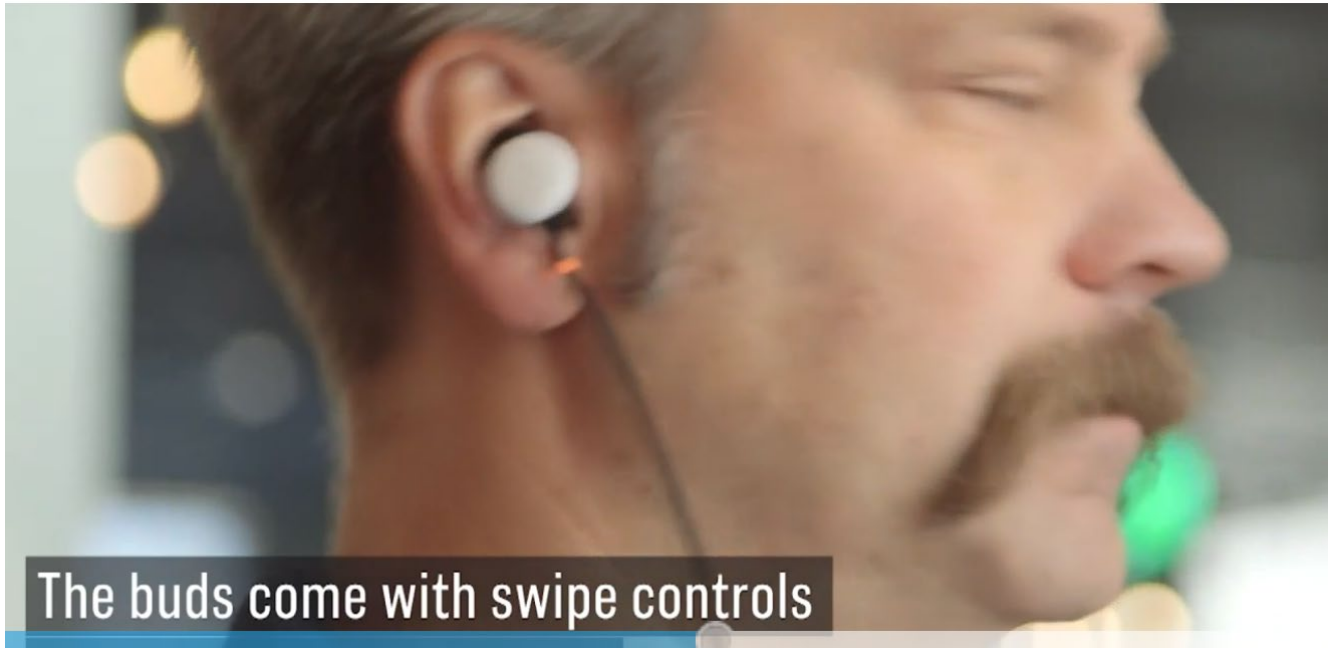
Immersive Reality

- What is ‘Immersive’ – a VR helmet?
- Key element of immersion: belief
  - (authentic) applications that matter
  - social presence (cognitive presence, teaching presence) - https://www.mnsu.edu/its/academic/isalt_social_presence_theory.pdf
  - multi-modality – cognitive + kinesthetic, etc. - https://www.slideshare.net/jtholden/the-learning-styles-revelation-research-from-cognitive-science
- Games and Gamification?

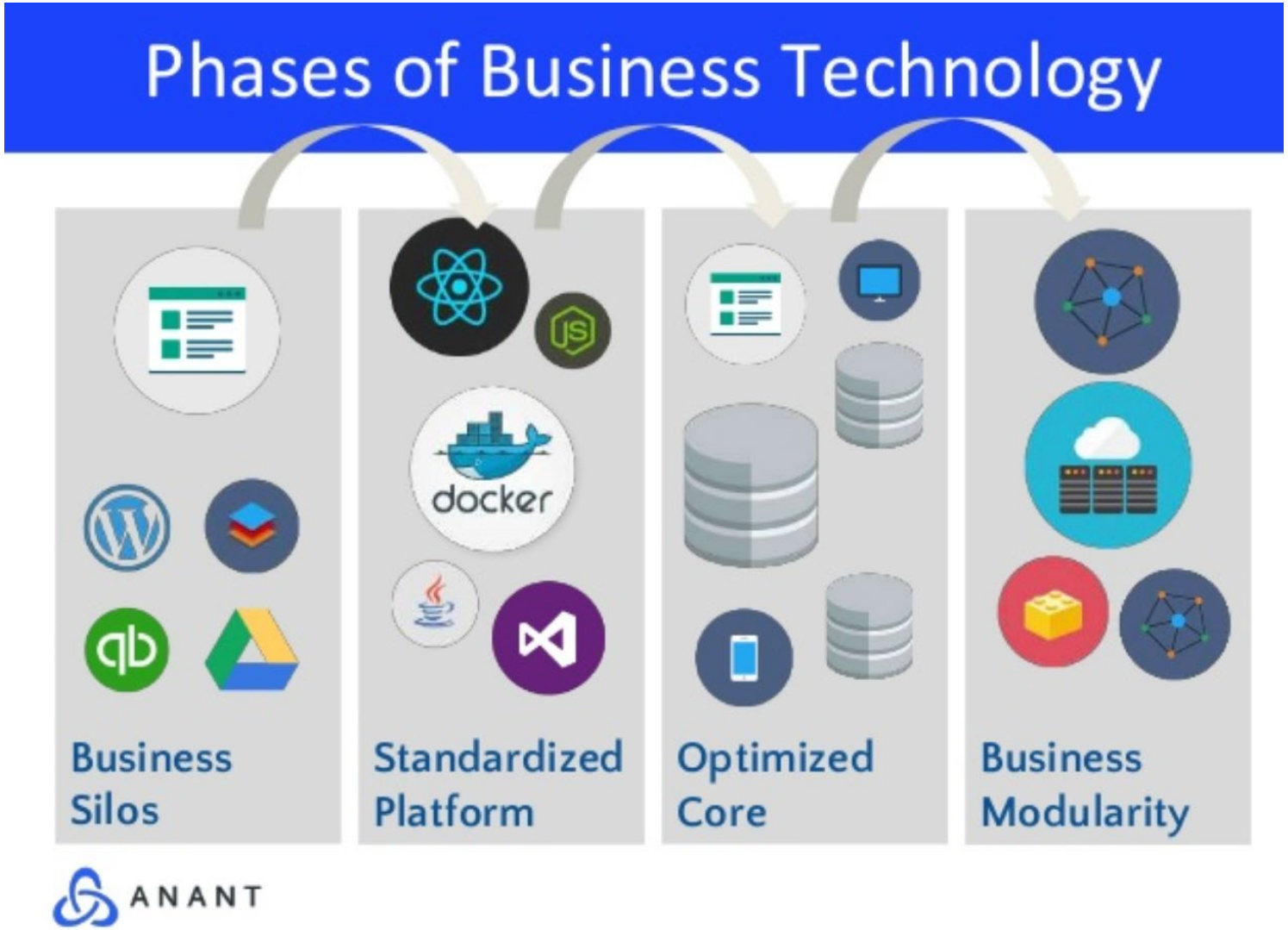
6. Translation and Collaborative Technology

https://en.wikipedia.org/wiki/Videotelephony

Google shows off wireless headphones that it says can translate languages on the fly



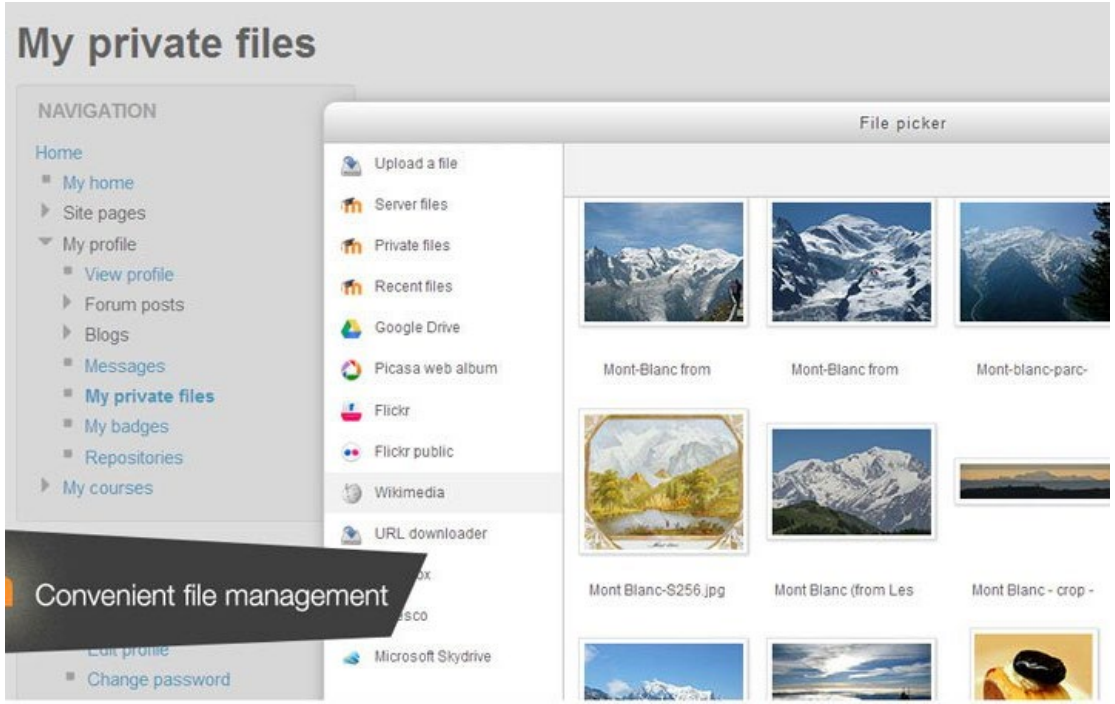
https://www.cnbc.com/2017/10/04/google-translation-earbuds-google-pixel-buds-launched.html



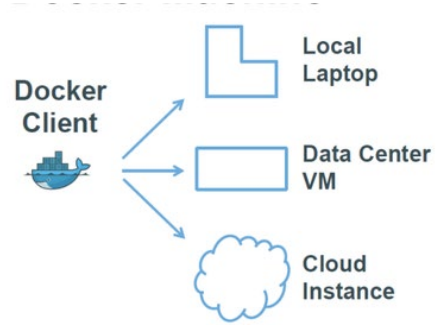
Slack, Airtable, Trello: what makes them good? https://pt.slideshare.net/AnantCorp/team-collaboration-slack-airtable-trello-what-makes-them-good-76384318

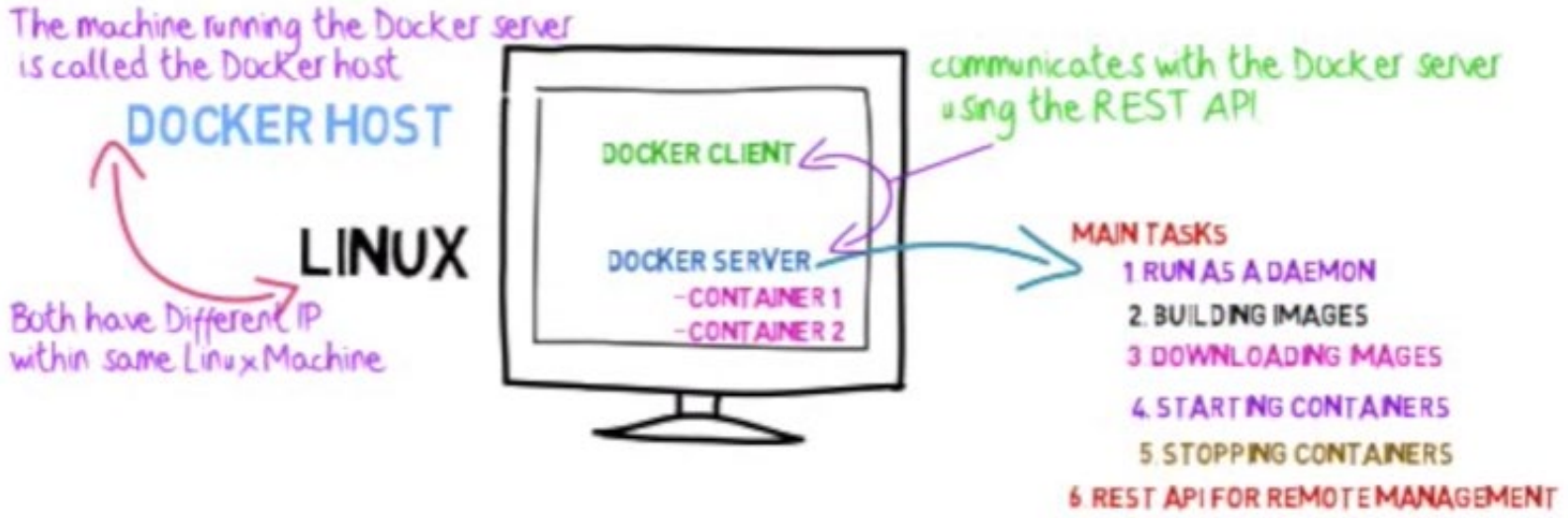
Cloud Storage

- Cloud hosting of Moodle
- File management



Docker

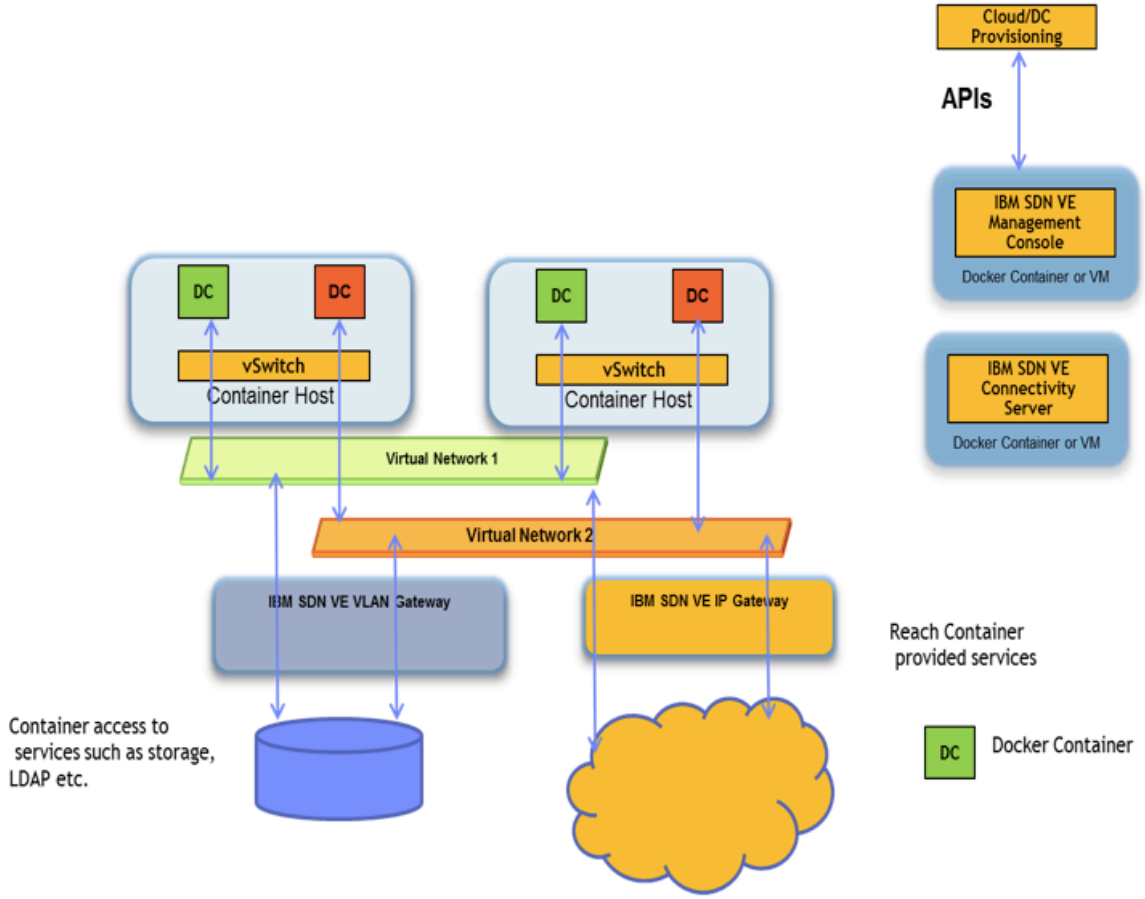




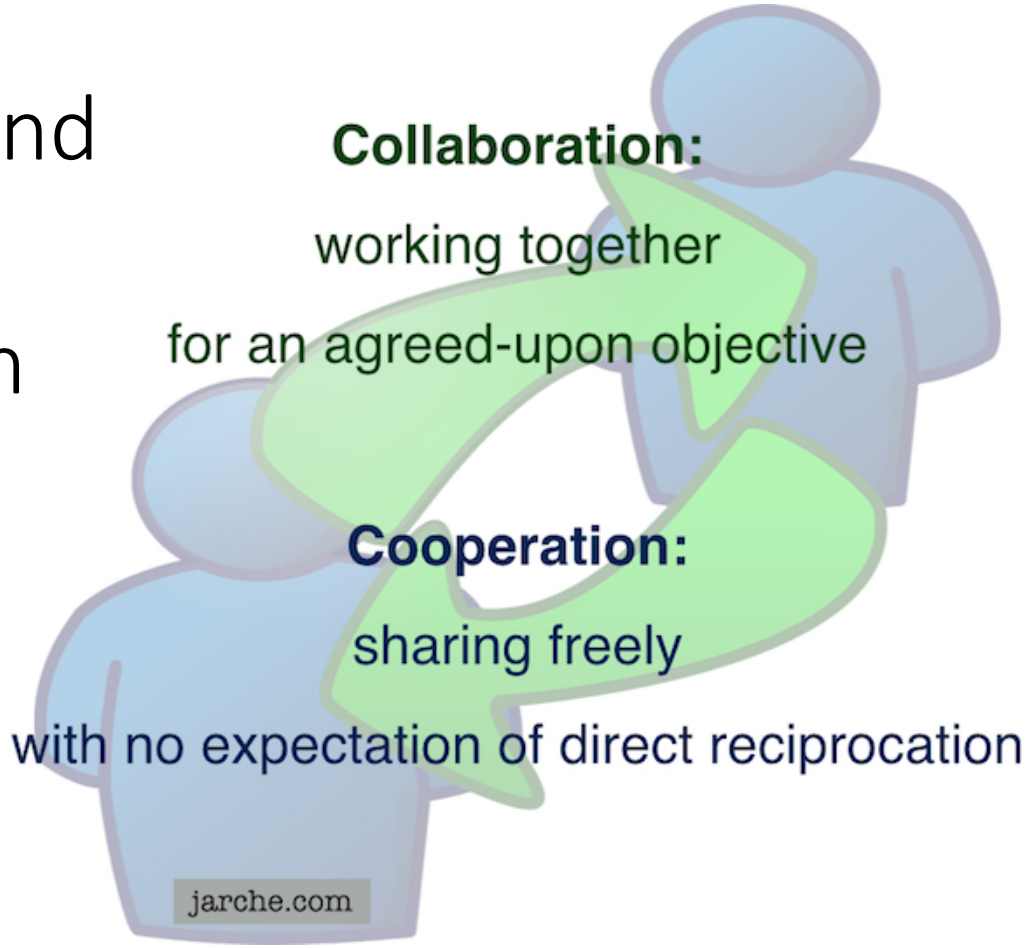
http://www.tomsitpro.com/articles/docker-enterprise-hub-orchestration,1-2375.html

Cloud Infrastructures

- Environments: VMWare Fusion, VirtualBox
- Provisioners: Docker, Vagrant
- Configuration: Chef, Puppet
- Providers: AWS, MS Server
- Services: MS Cognitive, Wolfram Alpha, Segment
- Serverless CMS - http://www.downes.ca/post/66459



- Communication is and will be everywhere
- But the future lies in cooperation, not collaboration



https://cyber.law.harvard.edu/research/cooperation
Image: http://Jarche.com

Part Two. What Does Learning Become?

1. Context-Sensitive
2. Engaging
3. Personal

Any Time / Any Place?

- It’s all about context
- The airplane cockpit is no place for a two week course
- Learning will be like water or electricity – or text

http://www.sciencedirect.com/science/article/pii/S1319157813000372

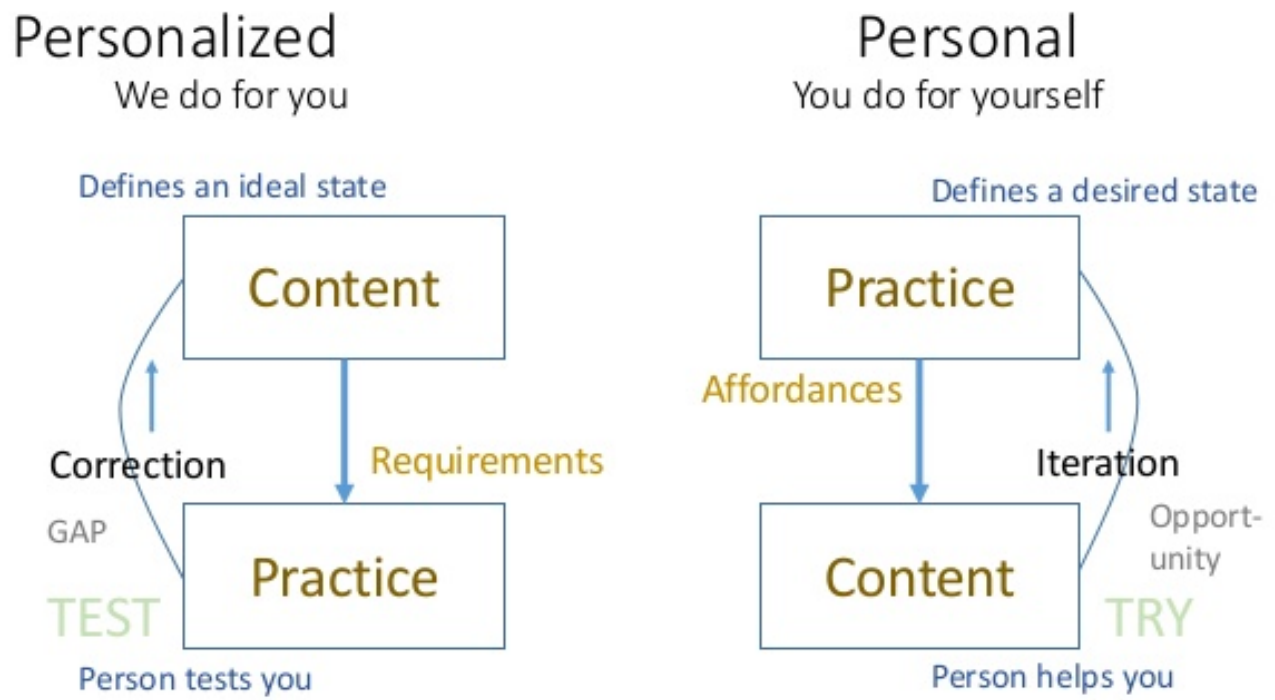
Engaging = Immersive + Wanted

- Just because it's interactive doesn't make it engaging
- We have to *want* to be there
- And we have to *believe* that we're there

$$dA = -PdV - SdT \rightarrow dA = (\partial A/\partial V)_T dV + (\partial A/\partial T)_V dV \;\&$$
$$dG = VdP - SdT \rightarrow dG = (\partial G/\partial P)_T dP + (\partial G/\partial T)_P dV$$
$$\& \; dH = (\partial H/\partial S)_P dS + (\partial H/\partial P)_S dP \rightarrow V = (\partial H/\partial P)_S = (\partial G/$$
$$\partial P)_T \rightarrow -S = (\partial A/\partial T)_V = (\partial G/\partial T)_P \;\&\; (\partial P/\partial T)_V = (\partial S/\partial V)_T$$

http://www4.ncsu.edu/unity/lockers/users/f/felder/public/Columns/Active.pdf

Learning is Personal



Tomorrow: 9:45 a.m. – Birchwood Room – Mezzanine Level

http://www.downes.ca