Innovation in Educational Technology

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Bayonne, France

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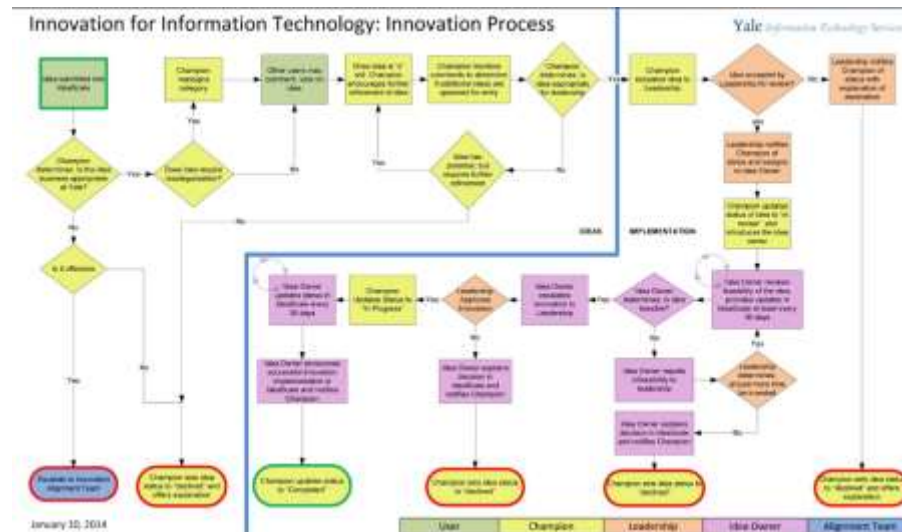# Innovation

- "Innovation means creating value from ideas."
  http://www.downes.ca/post/67693
- "As a consensus summary definition, innovation is
  - something fresh (new, original, or improved)
  - that creates value" https://www.freshconsulting.com/what-is-innovation/
- "Executing an idea which addresses a specific challenge and achieves value for both the company and customer"
  https://www.ideatovalue.com/inno/nickskillicorn/2016/03/innovation-15-experts-share-innovation-definition/

Ideas

- "Coming up with ideas is relatively easy, fast and cheap, but then those ideas need to be executed." – Nick Skillicorn

  https://www.ideatovalue.com/inno/nickskillicorn/2016/03/innovation-15-experts-share-innovation-definition/

- Really?

Innovation for Information Technology: Innovation Process

https://its.yale.edu/sites/default/files/IdeaProcess011014.pdf

A New What?

- Product – iPhone, Tesla, Pet Rock
- Service – eBay, Amazon Web Services, Thankster http://www.coca-colacompany.com/stories/6-companies-with-innovative-services-you-never-knew-existed
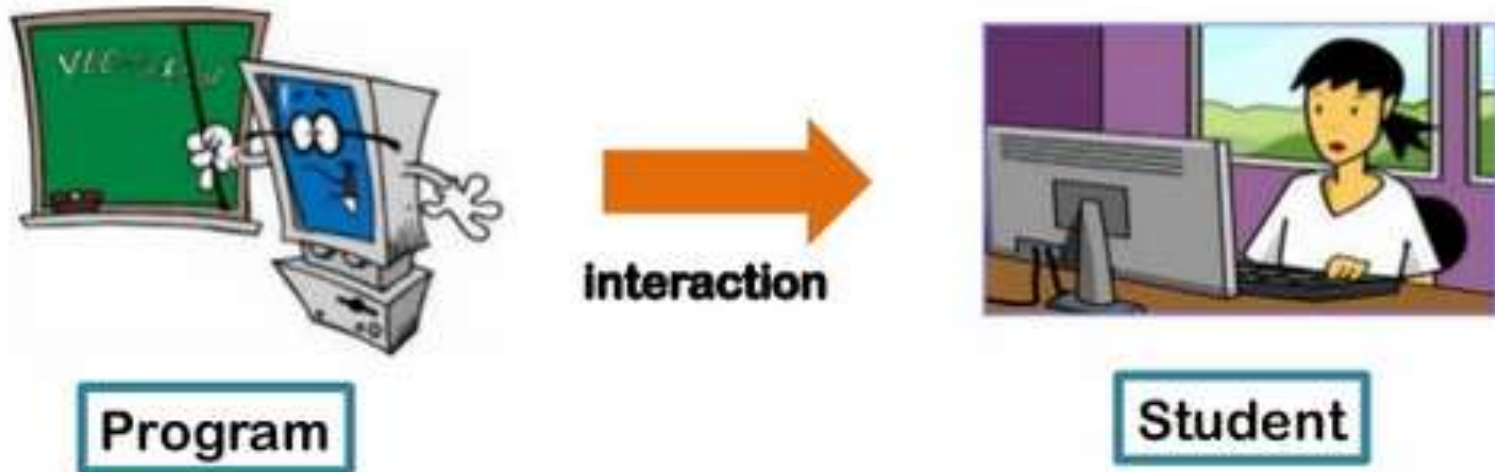- Business method – Uber, AirBnB, Bodega

Value for Whom?

- "… for which customers will pay?"

- "… must satisfy a specific need?"

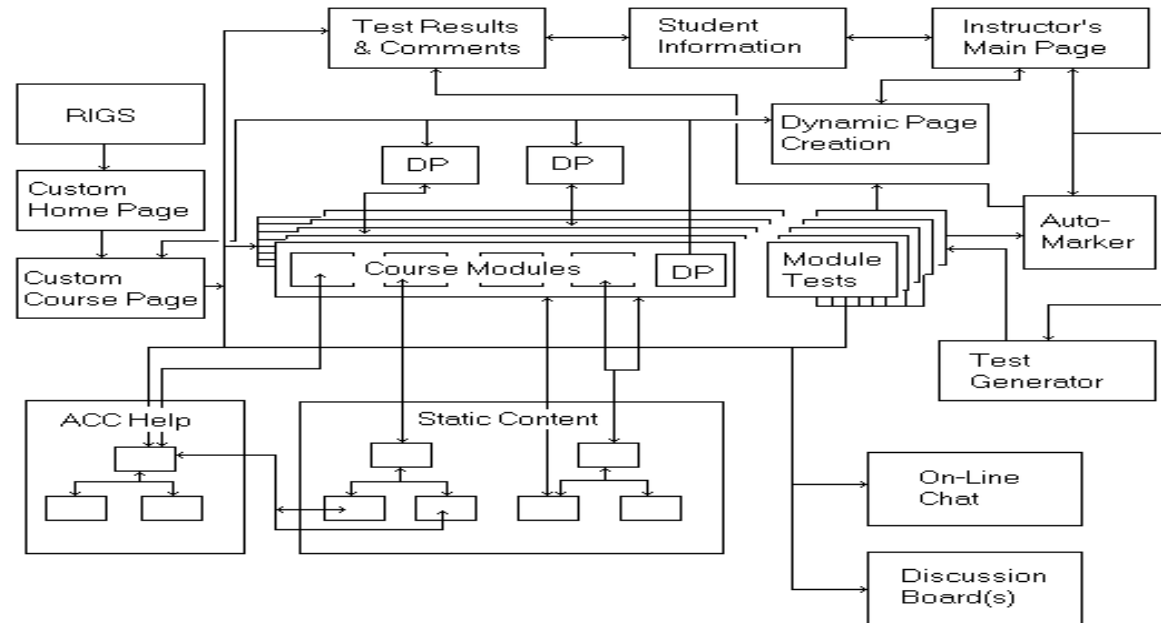- "… further satisfy the needs and expectations of the customers?"

Creating Value

What are the factors that motivate innovation in educational technology, and what is the outcome that results from those factors?

Some Recent History

From LMS to MOOC

- *Learning objects*
- IEEE: "any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning."
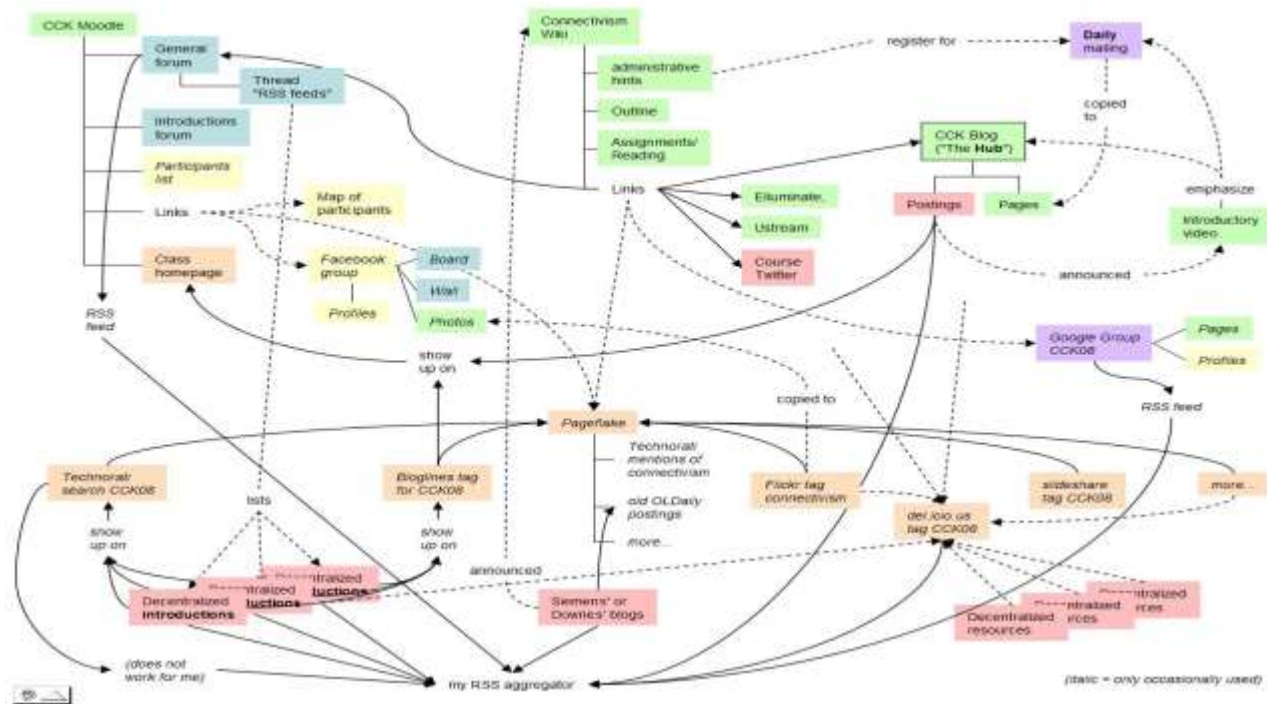
Content and Open Educational Resources

Stop thinking of learning objects as though they were classes or lessons or some such thing with built-in intent. It is preferable to think of them as a greatly enhanced vocabulary that can be used in a multidimensional (as opposed to merely linear) language
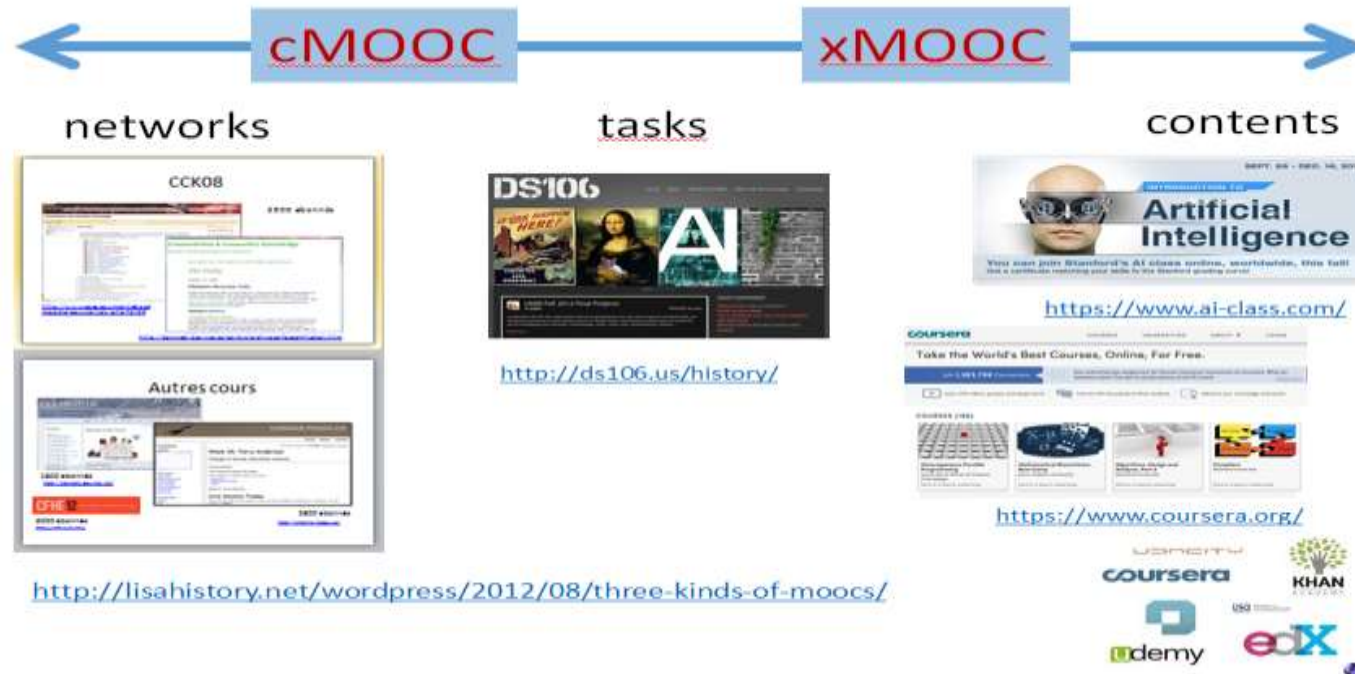
The MOOC
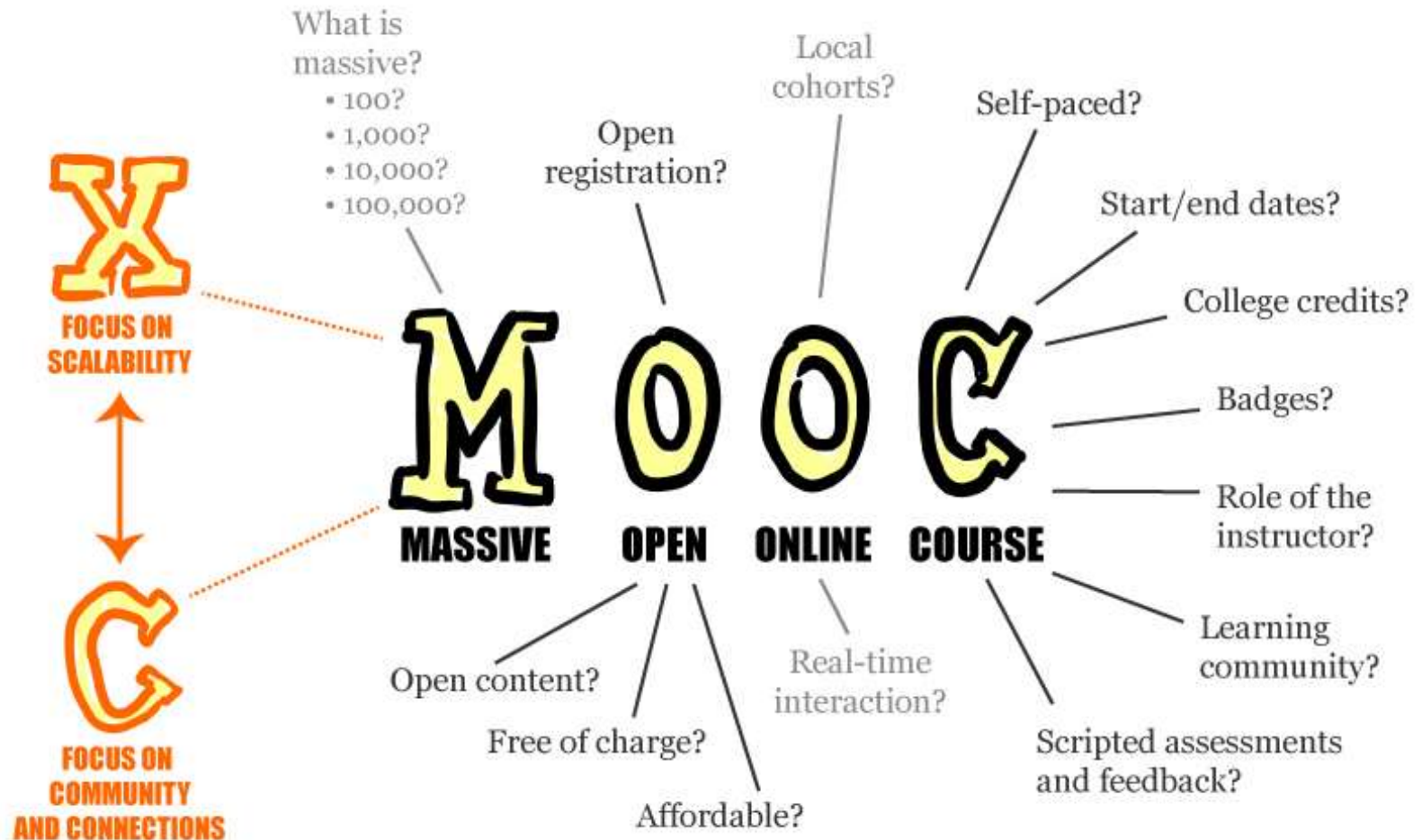
Origins of the MOOC

Students are responsible for their own education. Students would bring in additional resources, contribute to the discussions, and over time, develop their own thoughts and theses.

Adaptations: xMOOC and Beyond

The xMOOCs which followed (Stanford AI, EdX, etc
- they depended mostly on pre-recorded videos for content
- they dispensed pretty much entirely with the community
- the assignments were created centrally
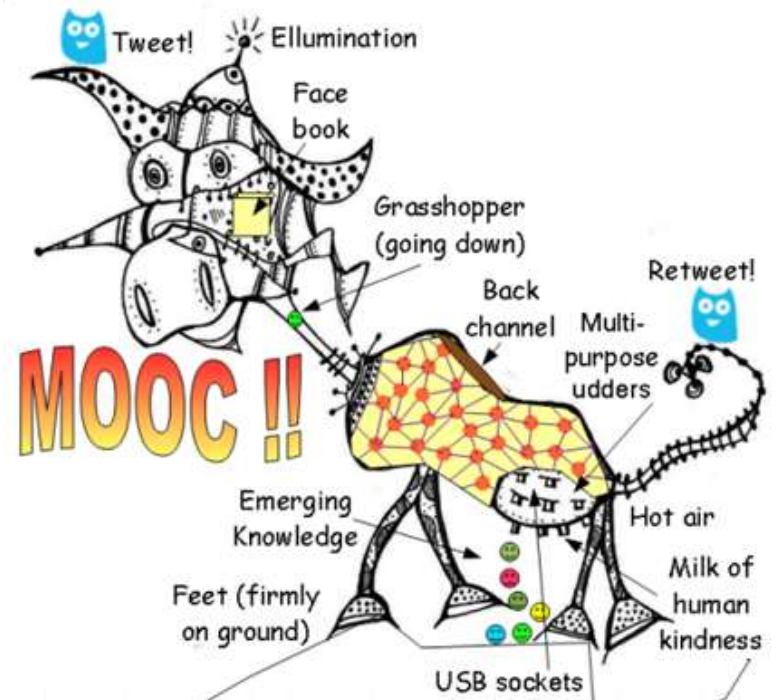- they commercialized and monetized the course

The MOOC Today

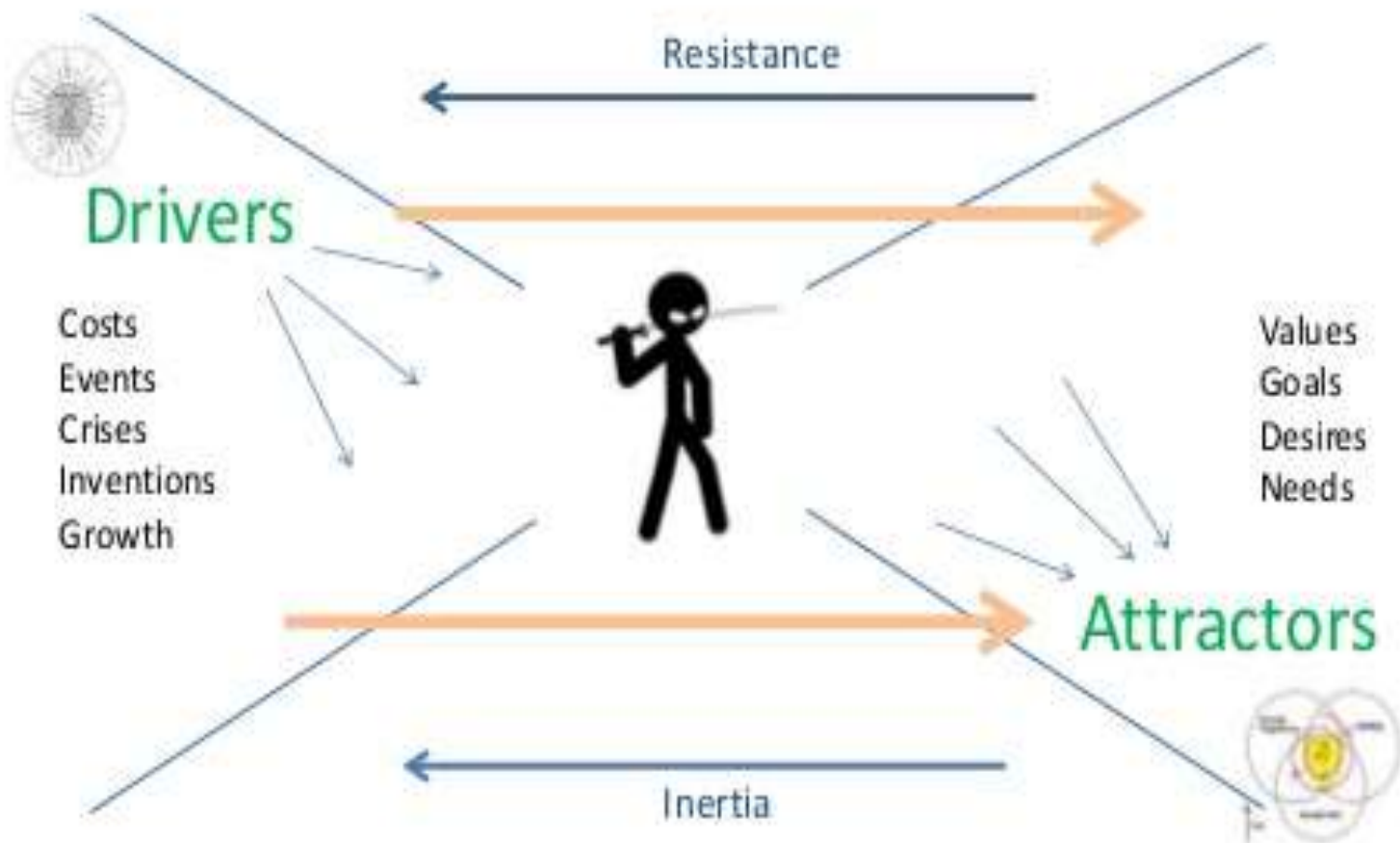CLASS CENTRAL

78M Students

800+ Universities

9.4k Courses

By the Numbers: MOOCs in 2017

https://www.class-central.com/report/mooc-stats-2017/

Causes of Change

Resistance

Drivers

Costs
Events
Crises
Inventions
Growth

Attractors

Values
Goals
Desires
Needs

Inertia

Drivers

A 'driver' is a *force* operating on schools and society pushing us toward change.

'Drivers' include factors ranging from demographic change to economic restraint to technology development.
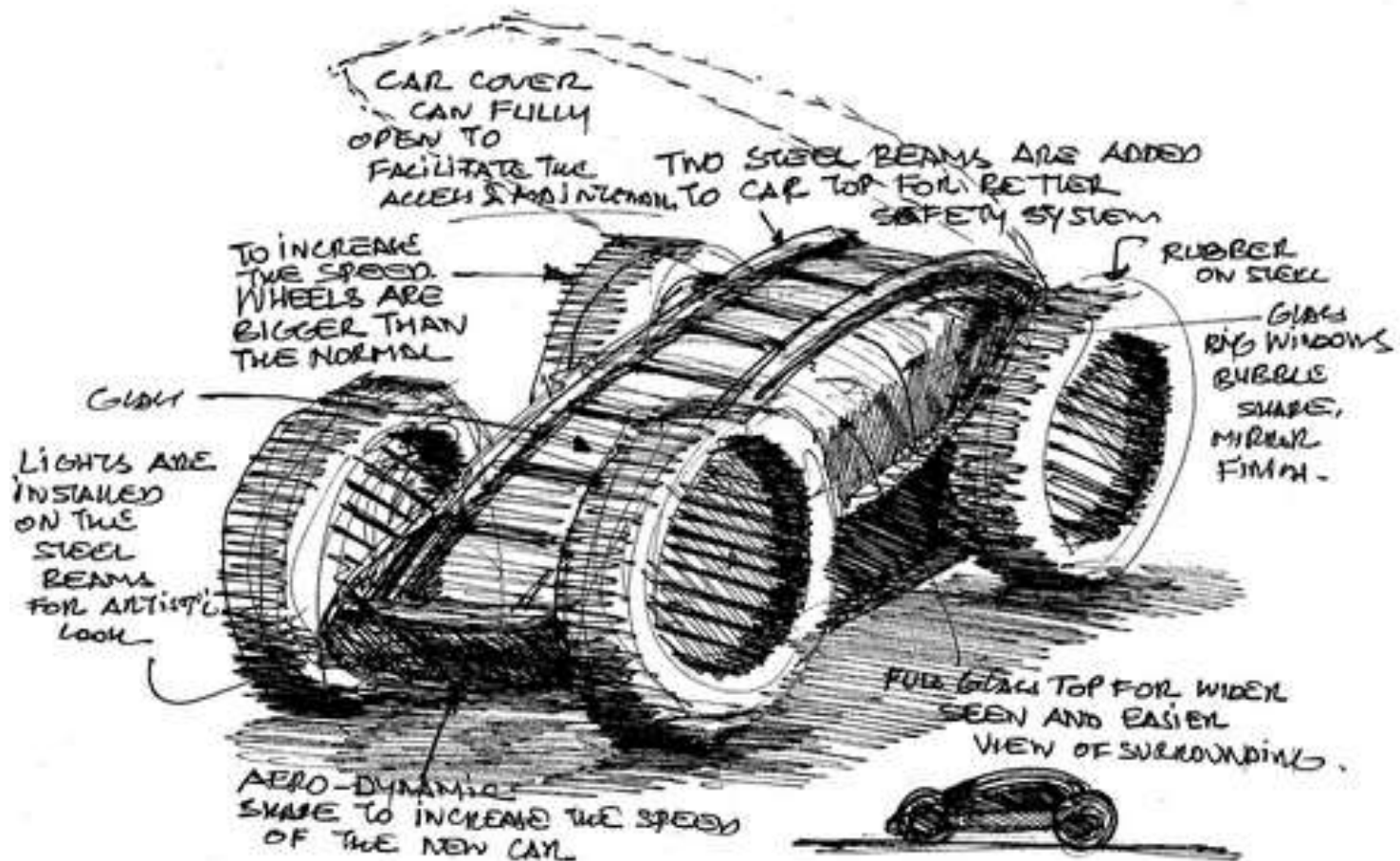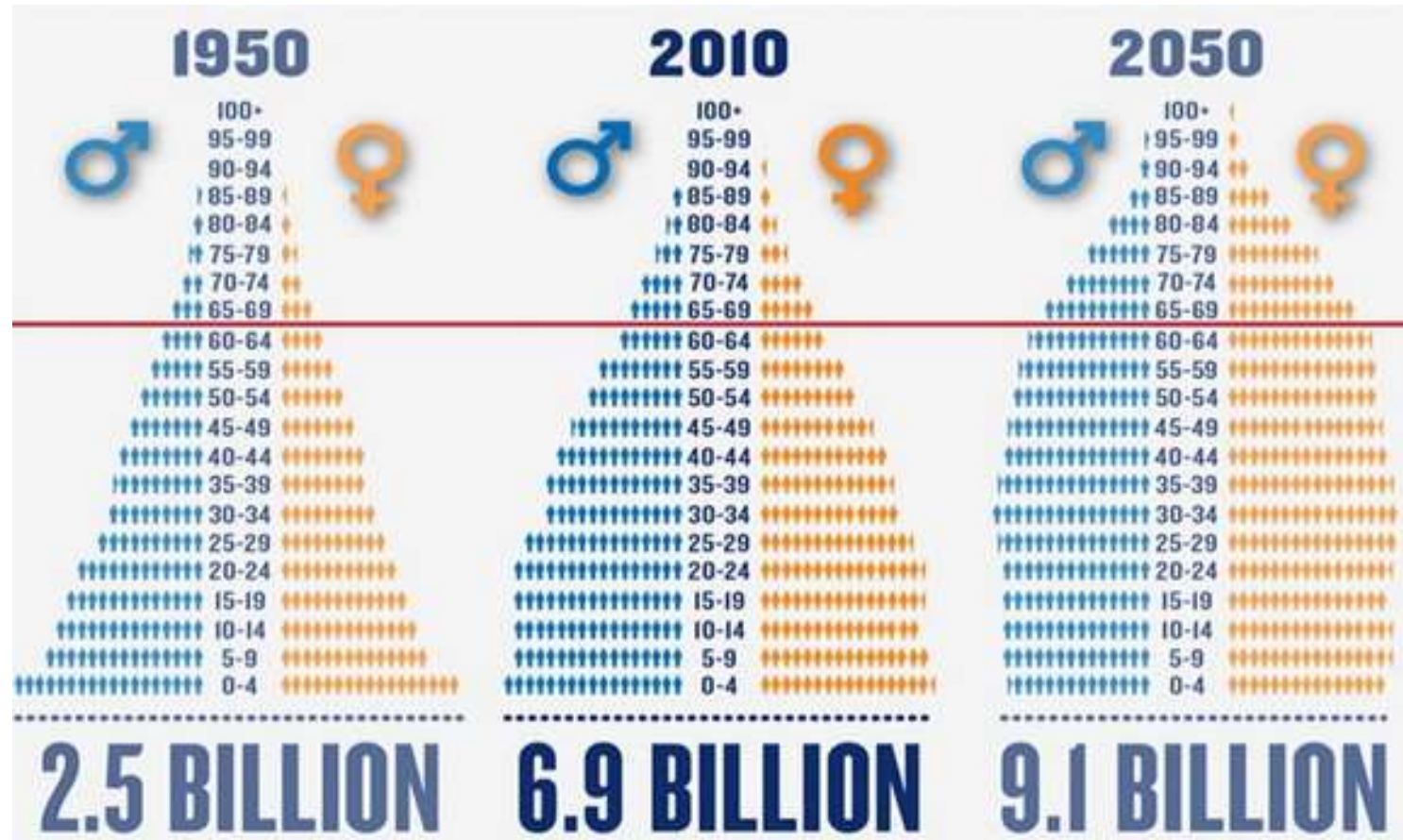
Costs

Events

1958: Sputnik

Crises

Inventions

Growth and Demographic Change

Attributes of Drivers

- They are presented as inevitable and irresistible

- They are external

- They tend to be constant

- They are directionless

Attractors

- 'Attractors' are the factors that define what we want to accomplish through education, factors that range from personal self-improvement to workplace training to social and cultural development.

Stakeholders and Benefits

Concept: why are we doing what we do? If we assume directionality, toward what are we working?

Systems have a built-in direction or outcome

Networks have no common direction or outcome
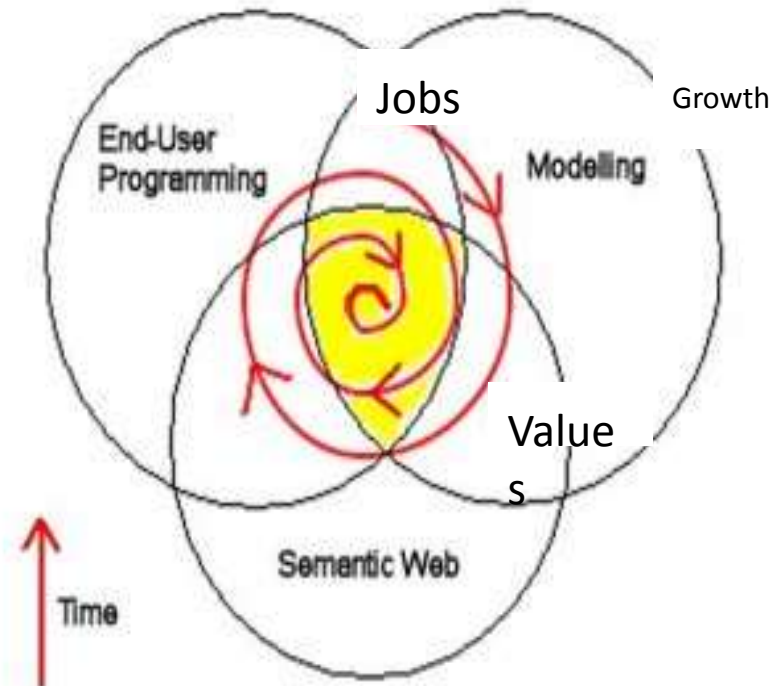
Core Questions

Who do we serve? (students, industry, governments, society, etc) - but we want to focus - 'government' eg. is too vague, do we mean 'support the party in power', 'further a policy agenda', 'work for broad social goods' etc?

What is the benefit - not just the good that is produced (graduates, certifications, etc) but the value that is produced (jobs, growth, prosperity)?

Needs

Values

- Education & Learning?
- Religion & Spirituality
- Development
- Compassion & Healing
- Sharing

Aspirations…

- 1950s – soldier
- 1960s – scientist
- 1970s – athlete / activist
- 1980s – banker & investor
- 1990s – celebrity
- 2000s – entrepreneur
- 2010s – startup

Goals

- Employment? Or sustenance?
- Fame, fortune
- The success of children and family
- Preserving heritage and culture

Attributes of Attractors

- They are personal or individual

- They are not always rational

- They depend a lot on models or examples

- They are variable (strange attractors)

Perspective

From the perspective of these factors we can comprehend not only the recent history of educational technology, but also gain perspectives on the future as well. We can also comment on what we want, need and value in an education system, and thus frame the decisions that we will need to take in the short term in order to prepare for the long term.

Today's Innovations

- Machine learning and artificial intelligence
- Handheld and Mobile Computing
- Badges and Blockchain
- Internet of Things
- Games, Sims and Virtual Reality
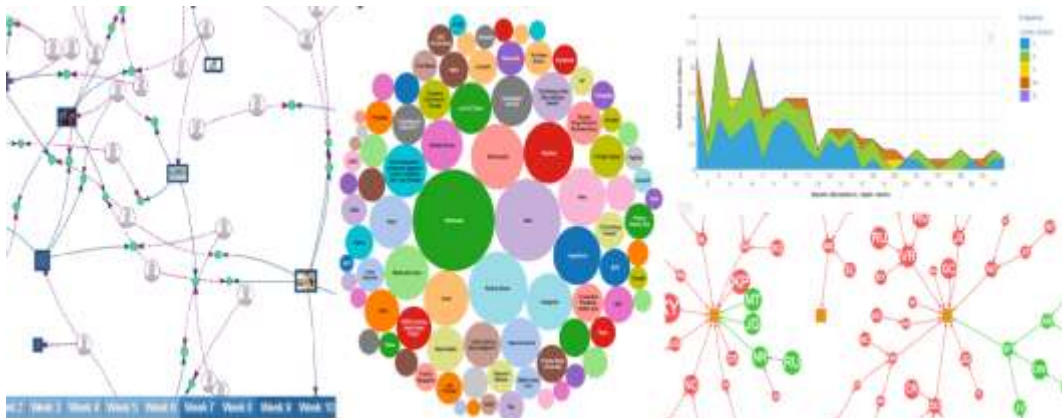- Translation and Collaborative Technology

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

Learning Analytics

- Learning trails, social network & discourse analysis

- Predictive modeling, clustering, pattern mining

- semantically defined curricular resources

- Content sequence based on behavior, recommendation

- Social interactions, learning activity, learner support

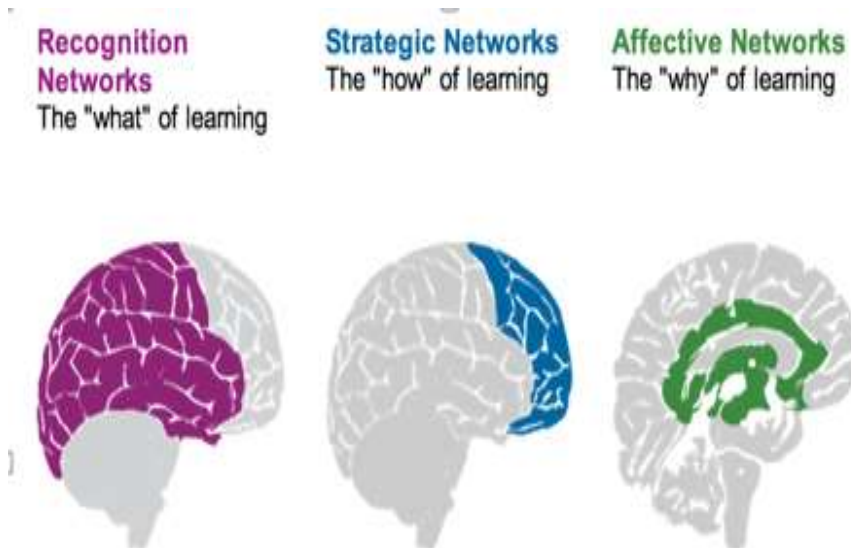https://er.educause.edu/articles/2011/9/penetrating-the-fog-analytics-in-learning-and-education Siemens and Long

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

Recognition Networks
The "what" of learning

Strategic Networks
The "how" of learning

Affective Networks
The "why" of learning

We talk about personalized learning as though finding a resource. But I think the real future is in creating our own learning

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
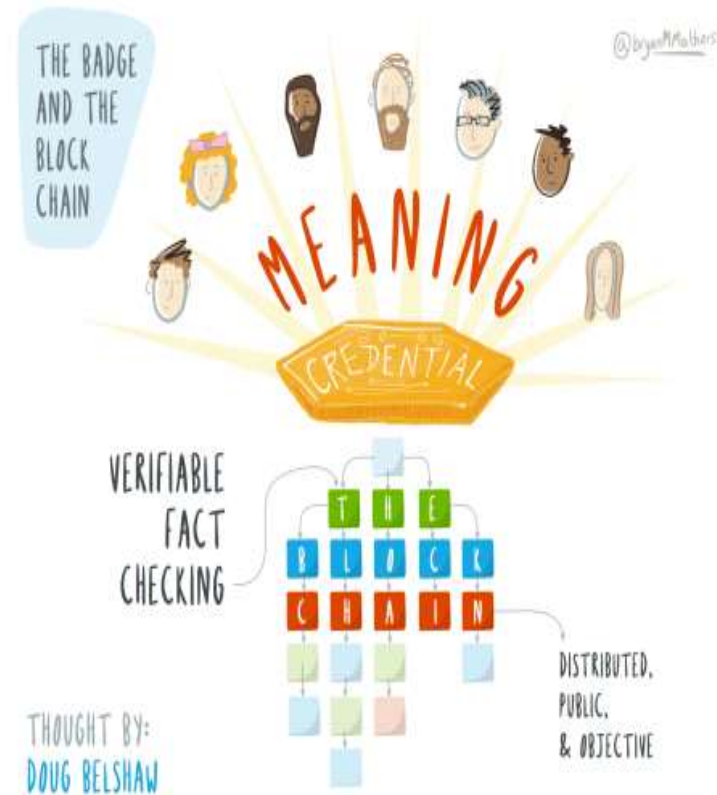
- It's in the *integrated* performance support system

PHOTO COURTESY B

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

Credentials

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

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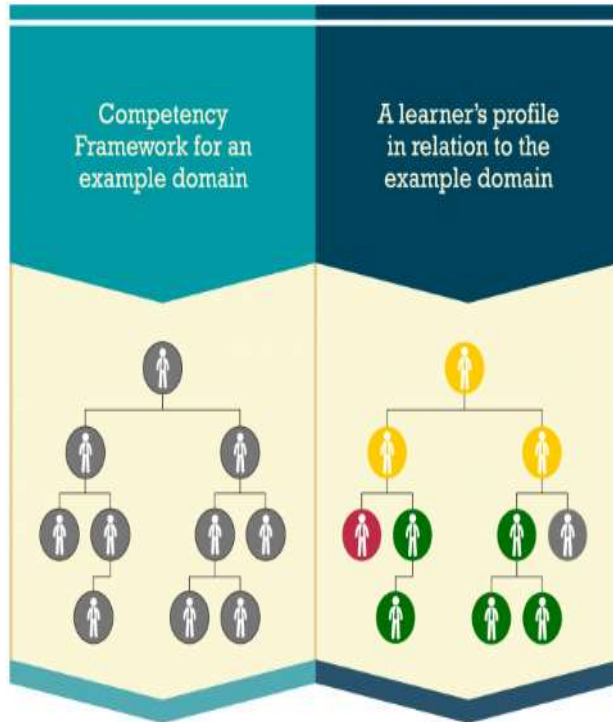http://hackeducation.com/2016/02/25/blockchain-edu1

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 caree[r] earn gigs.

CASS

Not attempted   Novice

Intermediate   Advanced
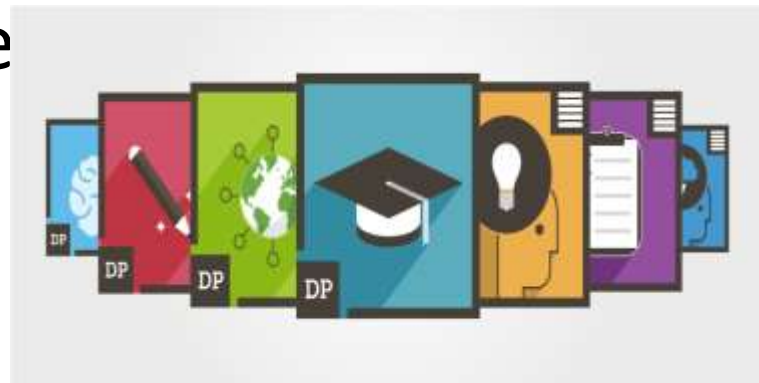
Competencies and Skills System

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?
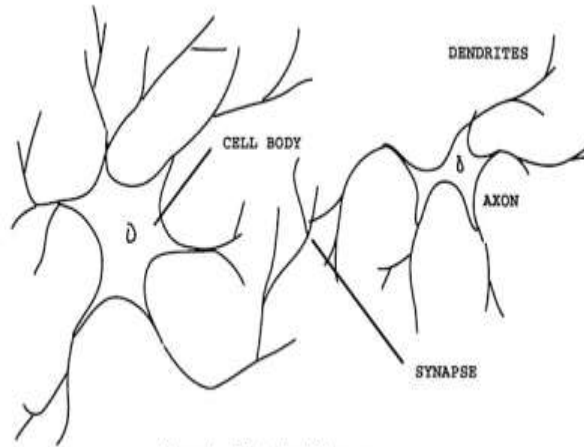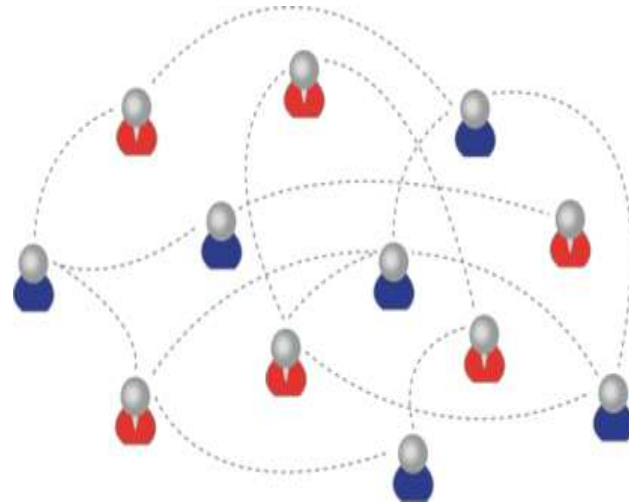
Learning Outcomes

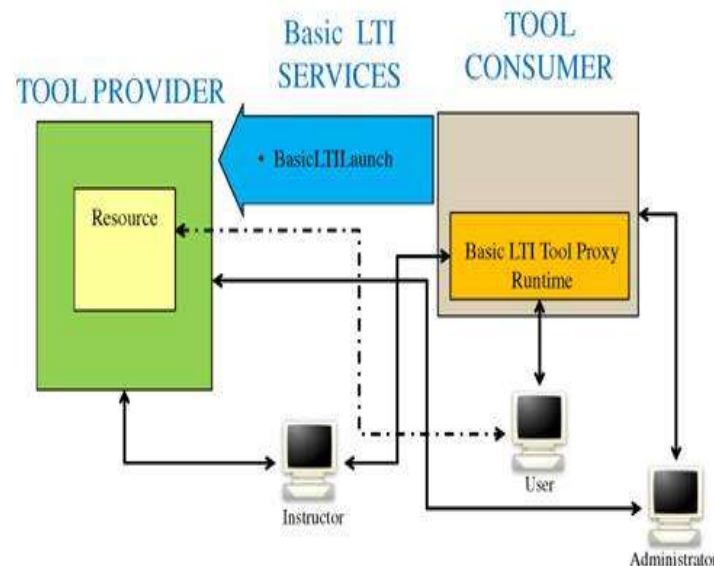

Figure 1. Biological Neuron

We recognize this

By perfomance in this

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

Learning Tools Interoperability

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

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

Games and Gamification

'Gamification' – adds game elements to learning

'Serious Games' – employs a game to facilitate learning

https://badgeville.com/wiki/Gamification

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?

Translation & Collaborative Technology

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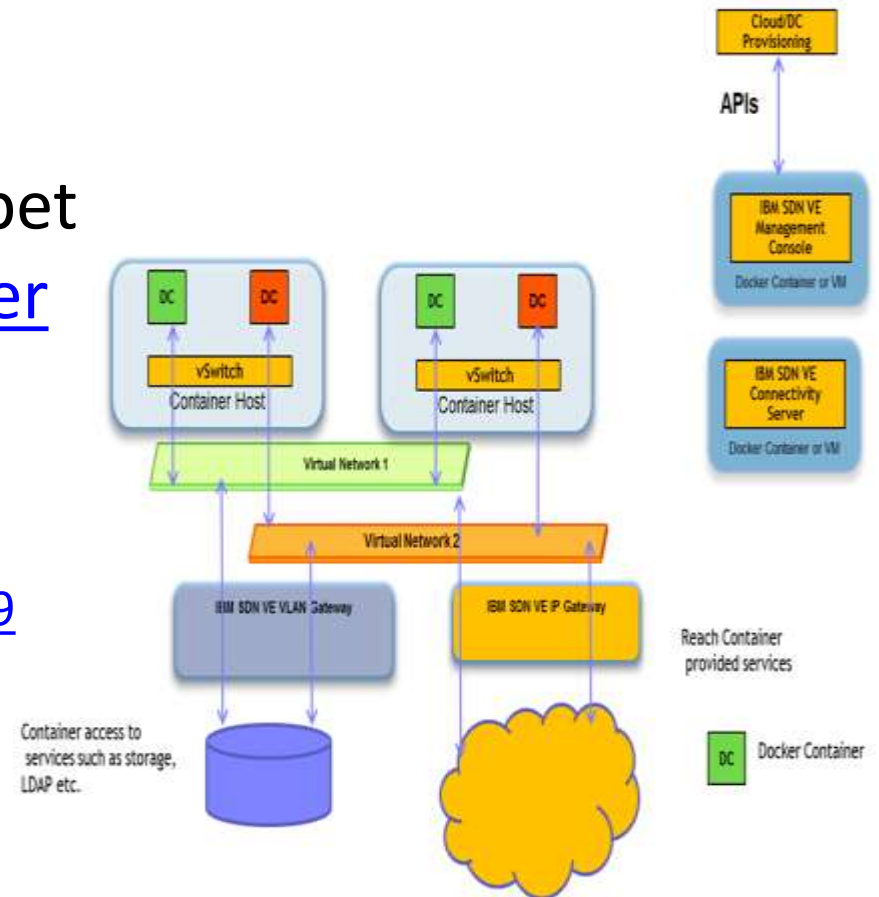

The buds come with swipe controls

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

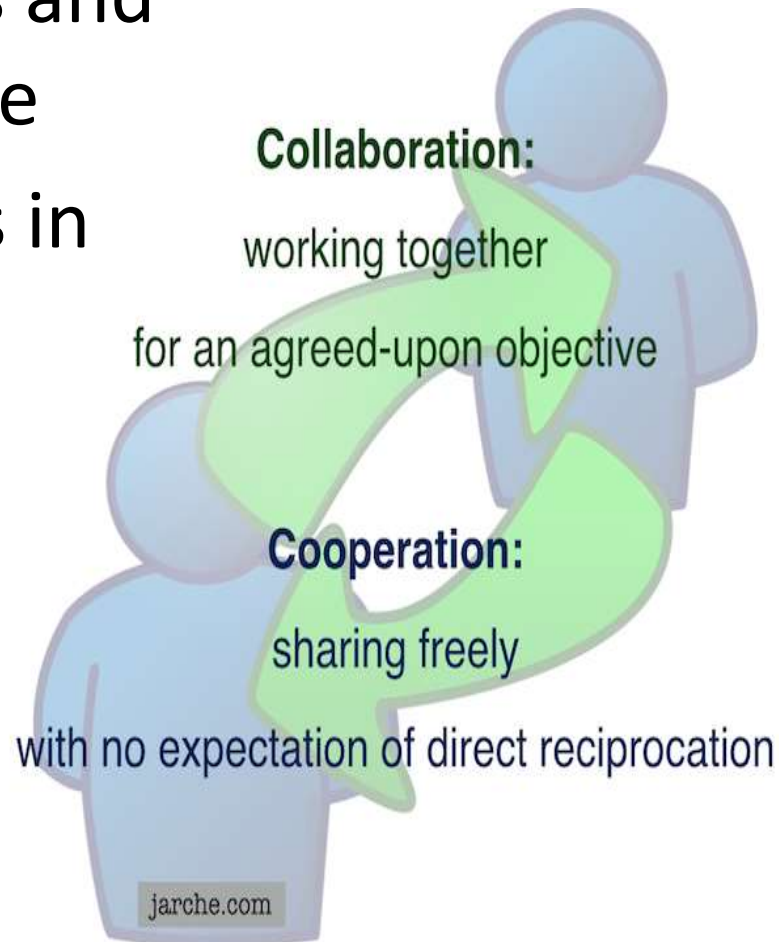# Cloud Infrastructures

- 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
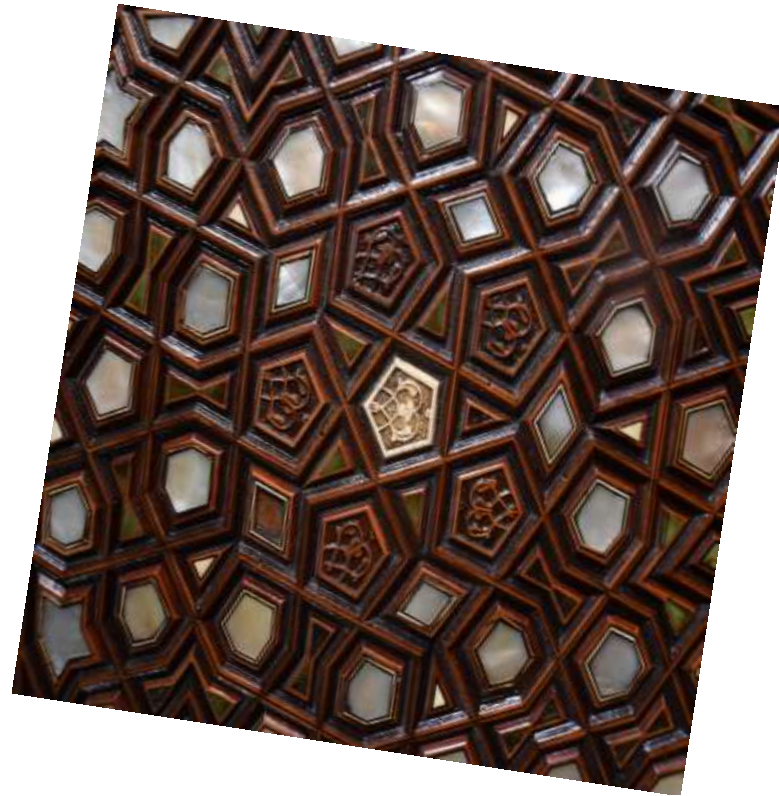- But the future lies in cooperation, not collaboration

What is the good?

What Does Learning Become?
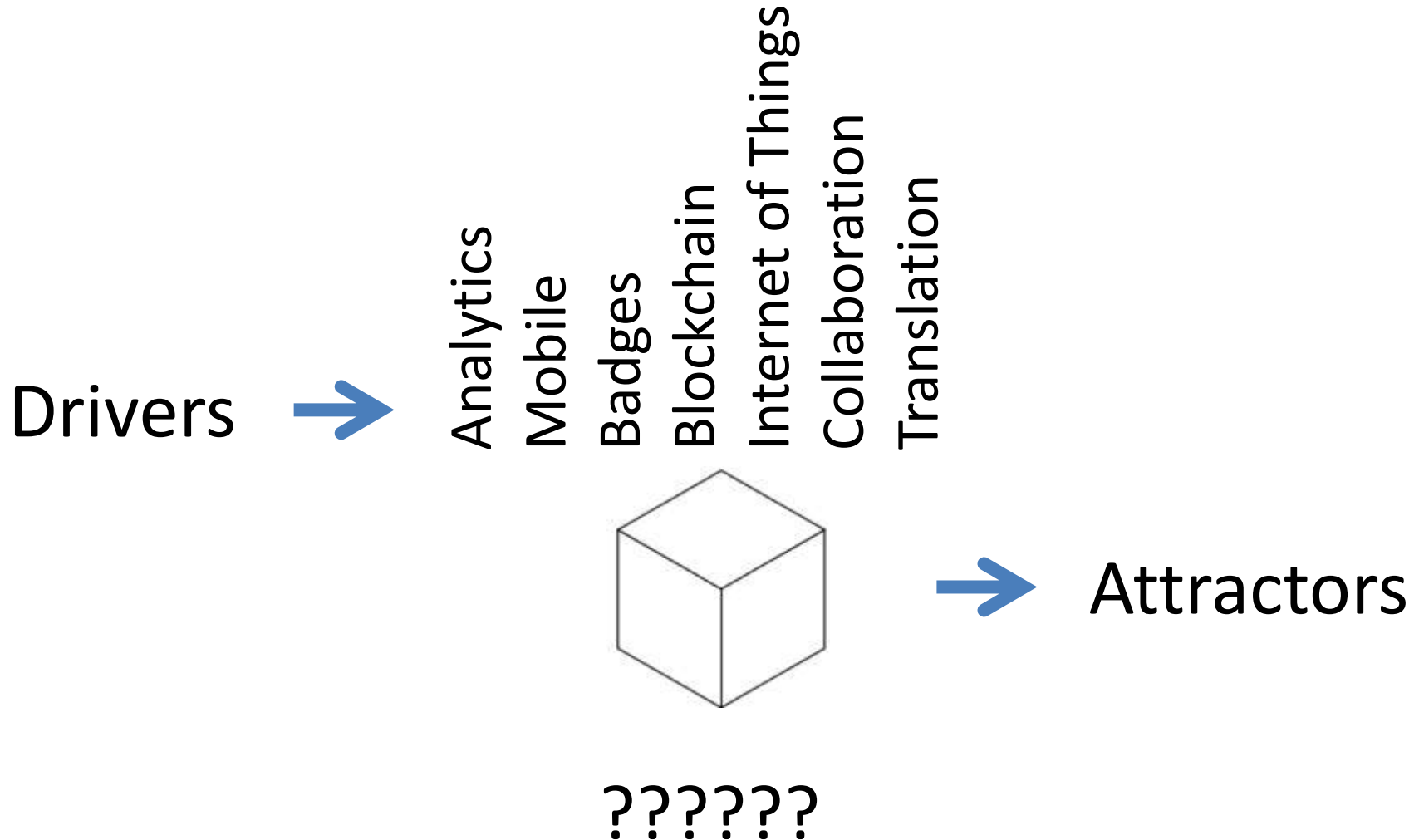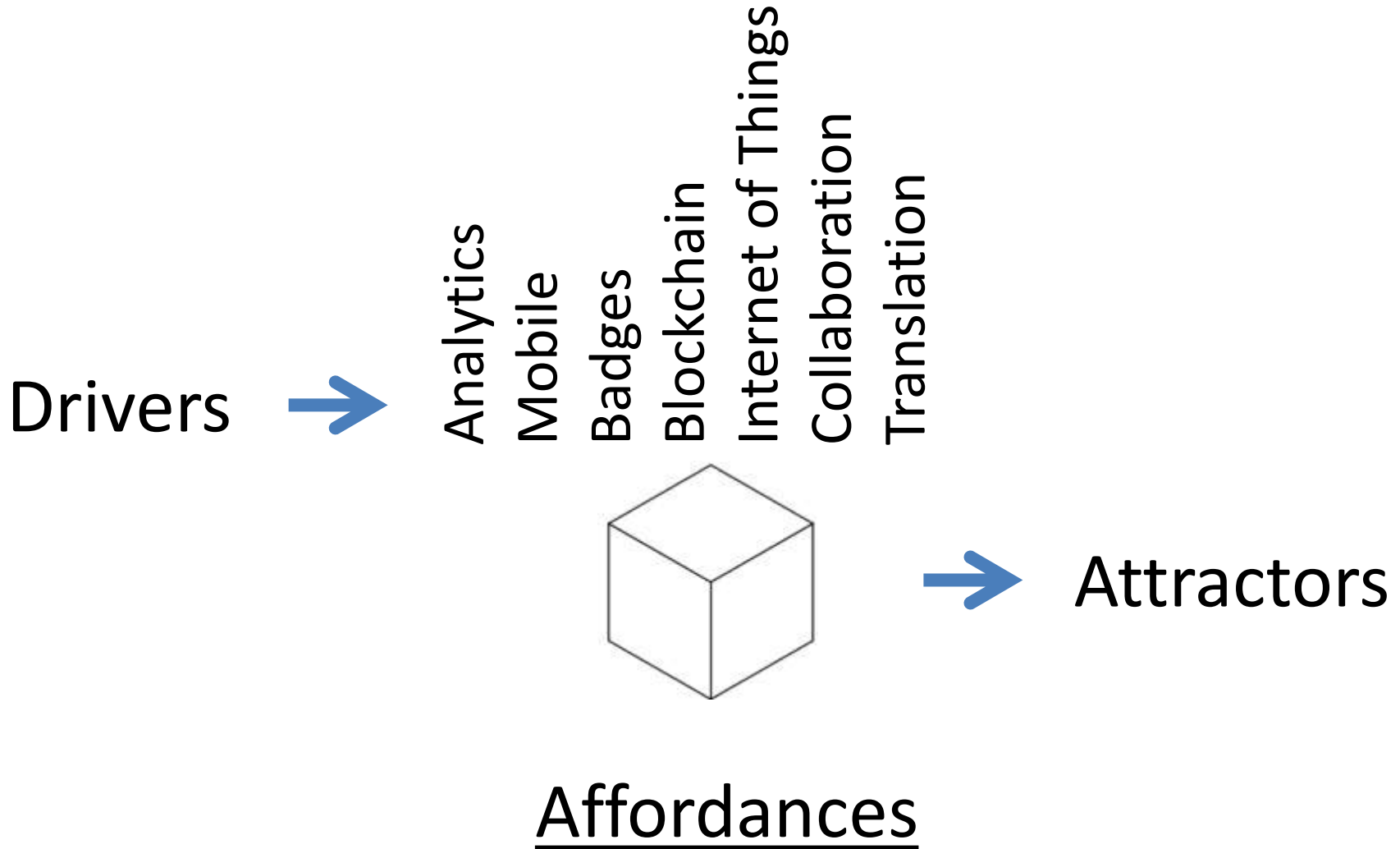
1. Context-Sensitive

2. Engaging

3. Personal

What is Innovative?

Drivers →

Analytics Mobile Badges Blockchain Internet of Things Collaboration Translation

→ Attractors

??????
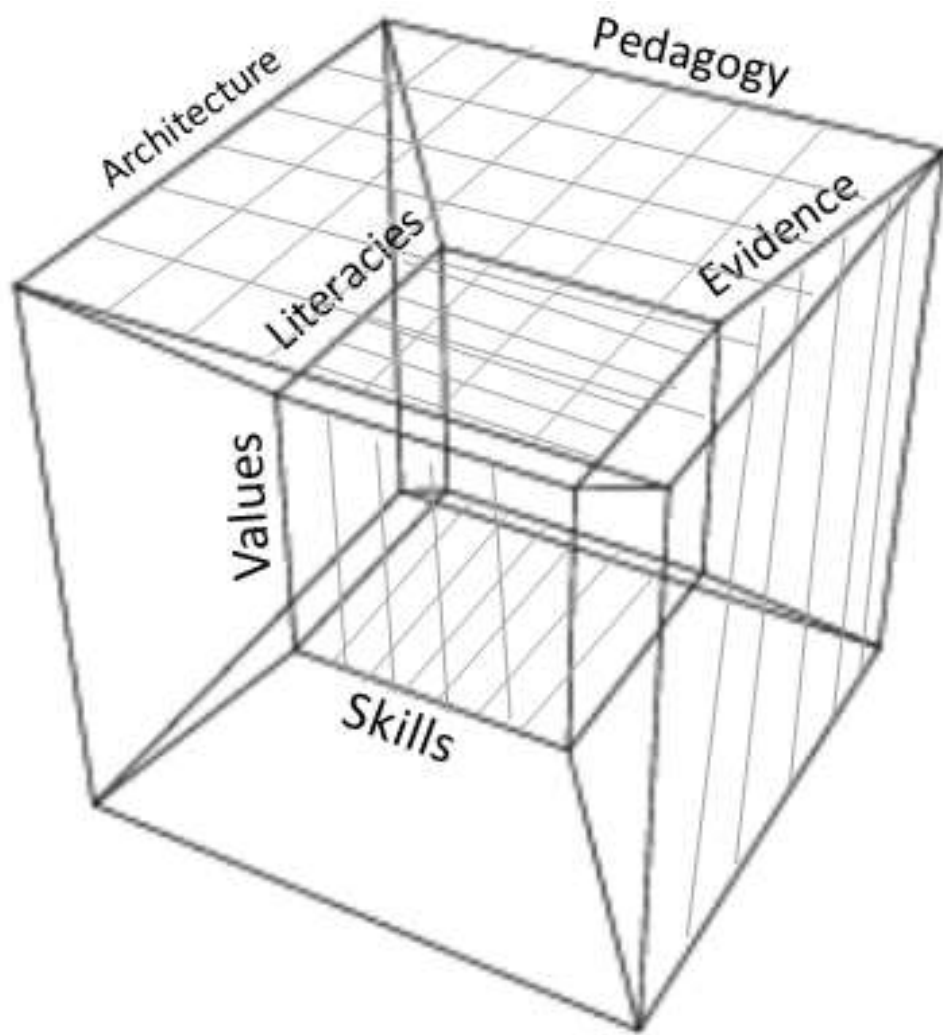
- The truly innovative ideas are not rooted in creating value
  - The drivers they respond to are generally understood only after the fact
  - The attractors they realize are actually created by the innovation

What is Innovative?

Drizers →

Analytics Mobile Badges Blockchain Internet of Things Collaboration Translation

→ Attractors

<u>Affordances</u>

Make it possible for people to define their own good, in their own way, and to cooperate with others in exchanges of mutual value.

Stephen Downes

http://www.downes.ca

Moncton, Canada, 2005

http://www.downes.ca/presentation/486