



Faculty of Design, sLAB (Strategic Innovation Lab)

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Designing for emergence: Integrating systems & design

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Designing for Emergence

Framework for Relating Systems Thinking & Design

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Robert K. Logan @logan1939
Strategic Innovation Lab (sLab)
OCAD University

RSD5 Symposium
Toronto, 15 Oct 2016

Image: [flickr.com/photos/andy-li/](https://www.flickr.com/photos/andy-li/)

How might we better understand, support and lead positive change by integrating human-centred mindsets, skillsets, and toolsets?

Toward this end we've built practice & theory, following our 2007 paper. We propose this framework for relating systems & design:

Designing for Emergence

Research article

DESIGNING FOR EMERGENCE AND INNOVATION: REDESIGNING DESIGN

Greg Van Alstyne  & Robert K. Logan

Pages 120-129 | Published online: 06 Nov 2007

 Download citation  <http://dx.doi.org/10.1080/17493460601110525>

 Full Article  Figures & data  References  Citations  Metrics  Reprints & Permissions  Get access

Van Alstyne & Logan (2007).
Designing for Emergence and Innovation:
Redesigning Design. *Artifact*, 1(2), 120-129.
doi:10.1080/17493460601110525

We seek to foster Flourishing

Access to Opportunity
Inclusion, Equity
Social Justice, Community & outcomes
like the Millennium Development Goals

**And to find, frame, forge opportunities
such as
Millennium Project Challenges
49 Continuous Critical Problems**

1. Eradicate Extreme Hunger and Poverty
2. Achieve Universal Primary Education
3. Promote Gender Equality, Empower Women
4. Reduce Child Mortality
5. Improve Maternal Health
6. Combat HIV/AIDS, Malaria & other diseases
7. Ensure Environmental Sustainability
8. Develop Global Partnership for Developm't.

<http://www.unmillenniumproject.org/goals/>

<http://www.millennium-project.org/millennium/challenges.html>

<https://predicament-retrospective.wikispaces.com/49+Critical+Problems>

What is design?

Design is an intentional, human, creative process, and its product.
Design guides propagation of organization.

Design is creation for reproduction.

(About the authors:
Van Alstyne: designer > complexity geek
Logan: physicist > media ecologist)

What is emergence?

A process in which novel forms and behaviours arise (morphogenesis) through interaction of elements in complex systems—physical, biological, economic, social, hybrid.

Such patterns surprise & puzzle us with their properties that are not present in the elements, & invisible to reductionist methods.

Ernst Haeckel, *Kunstformen der Natur*, 1904, *Actiniae* sea anemones

Emergence occurs...

At varying scales and in different excitable media

macro: Jupiter's Great Red Spot

meso: La Ola ('Mexican Wave')

micro: Giant termite cathedrals



Jupiter, NASA.



Farkas, Helbing, Vices (2002) "Mexican waves in an excitable medium," *Nature*, 419.



James Popple, 'magnetic' termite mounds, Australia

Emergence occurs...

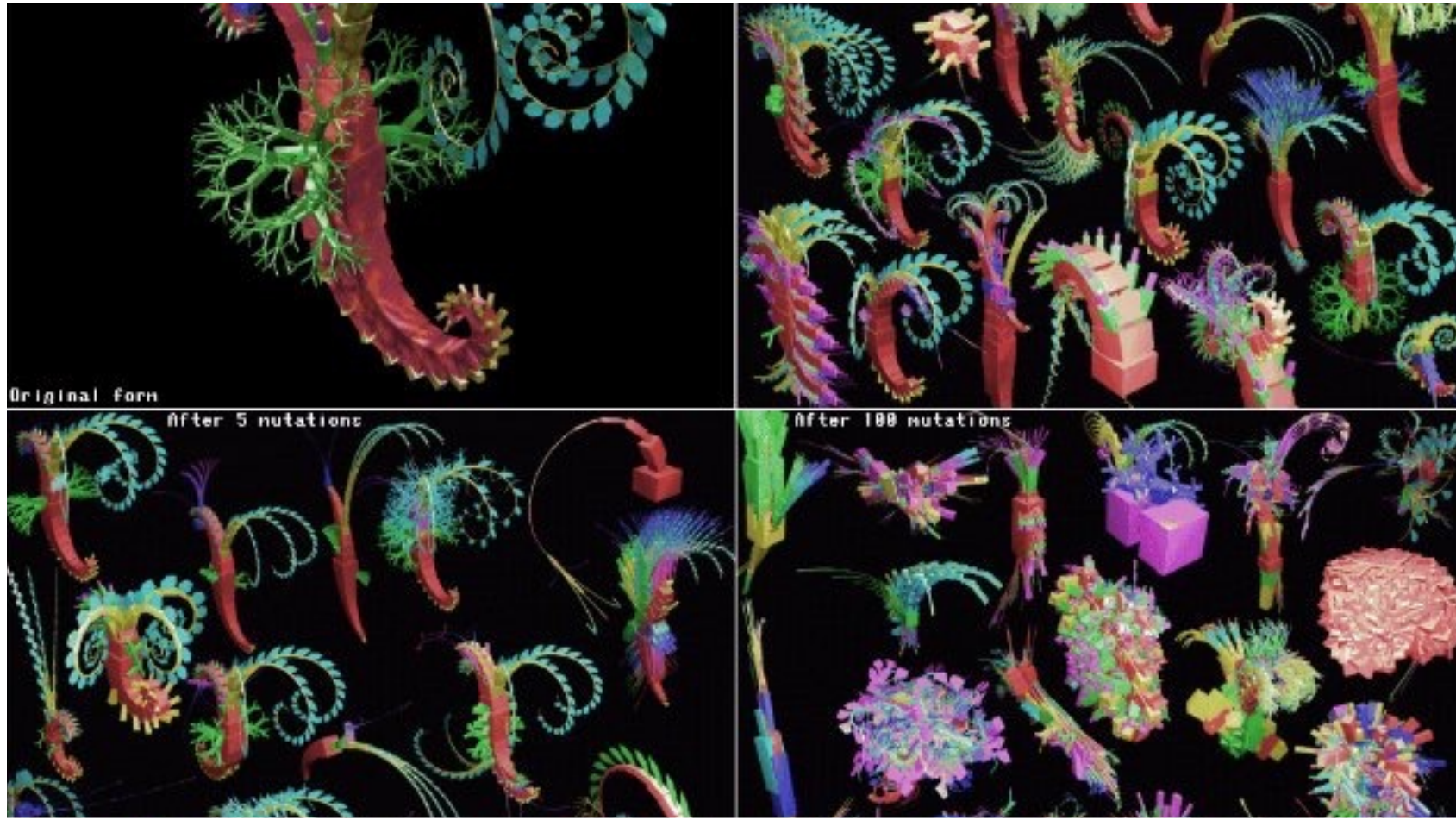
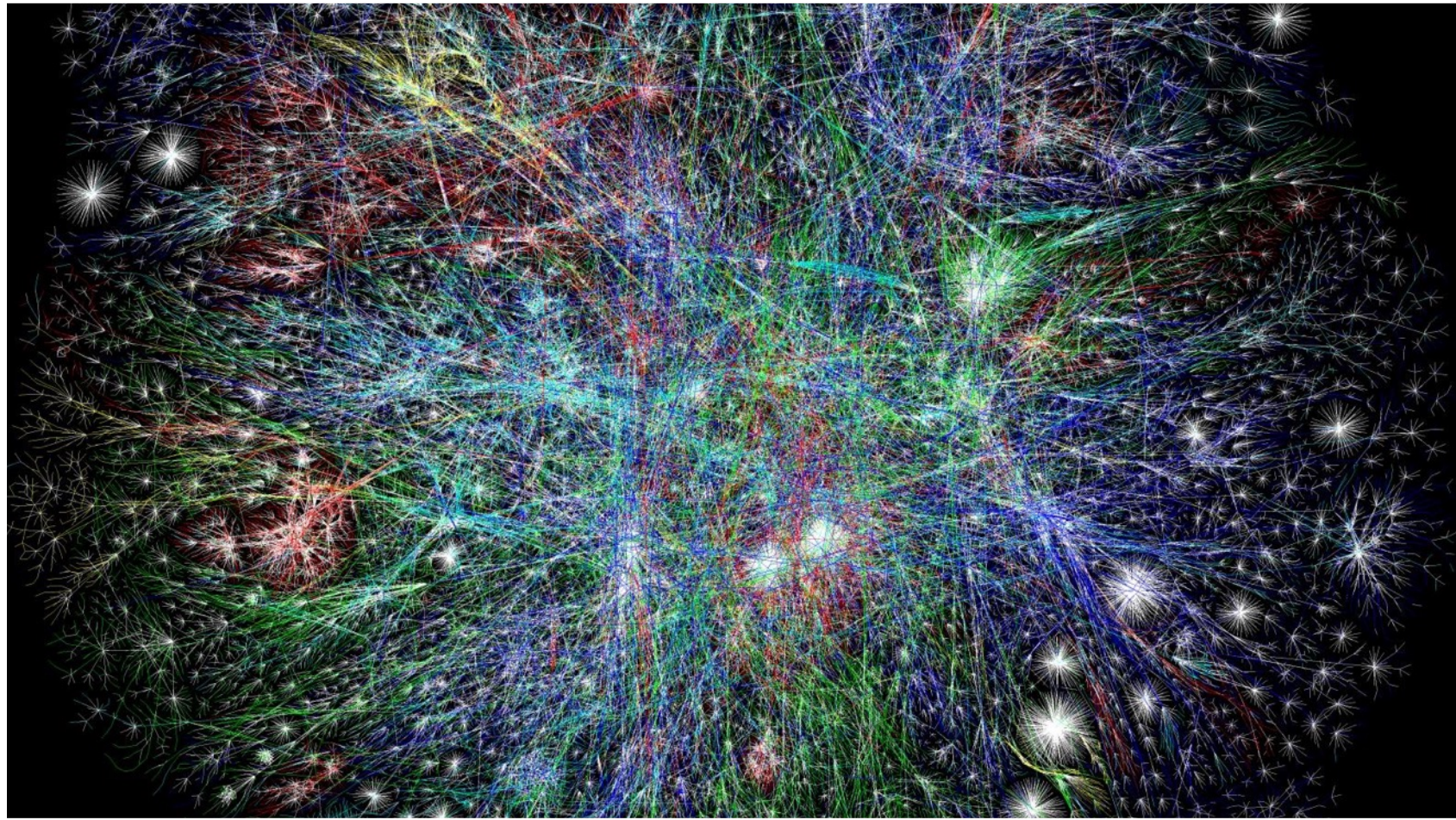
In living, non-living, & hybrid systems

macro: The Internet of Everything

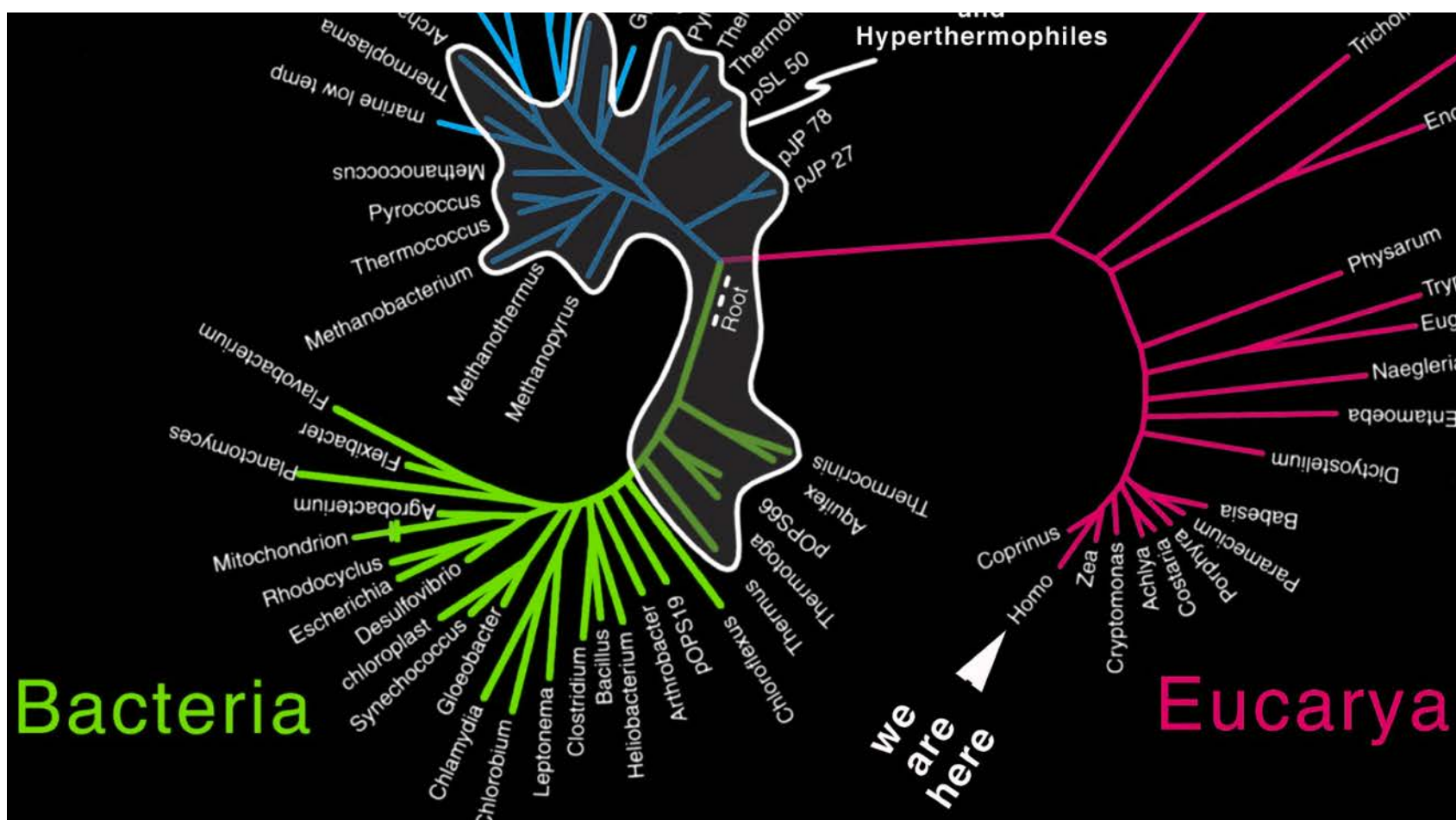
meso: Artificial life

micro: Biological evolution

Barrett Lyon,
The Opte Project, opte.org



Laurens Lapre,
members.ziggo.nl/laurens.lapre/



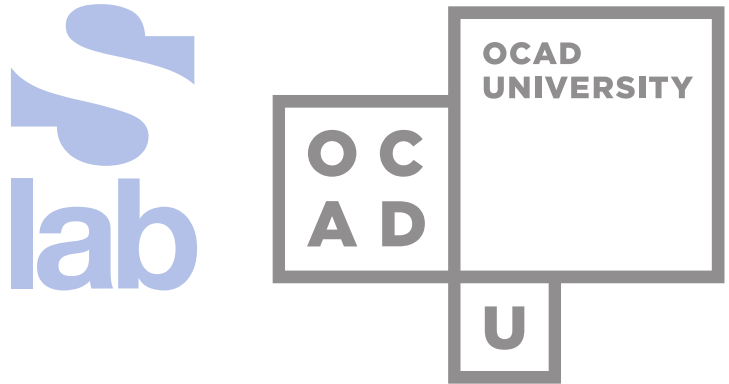
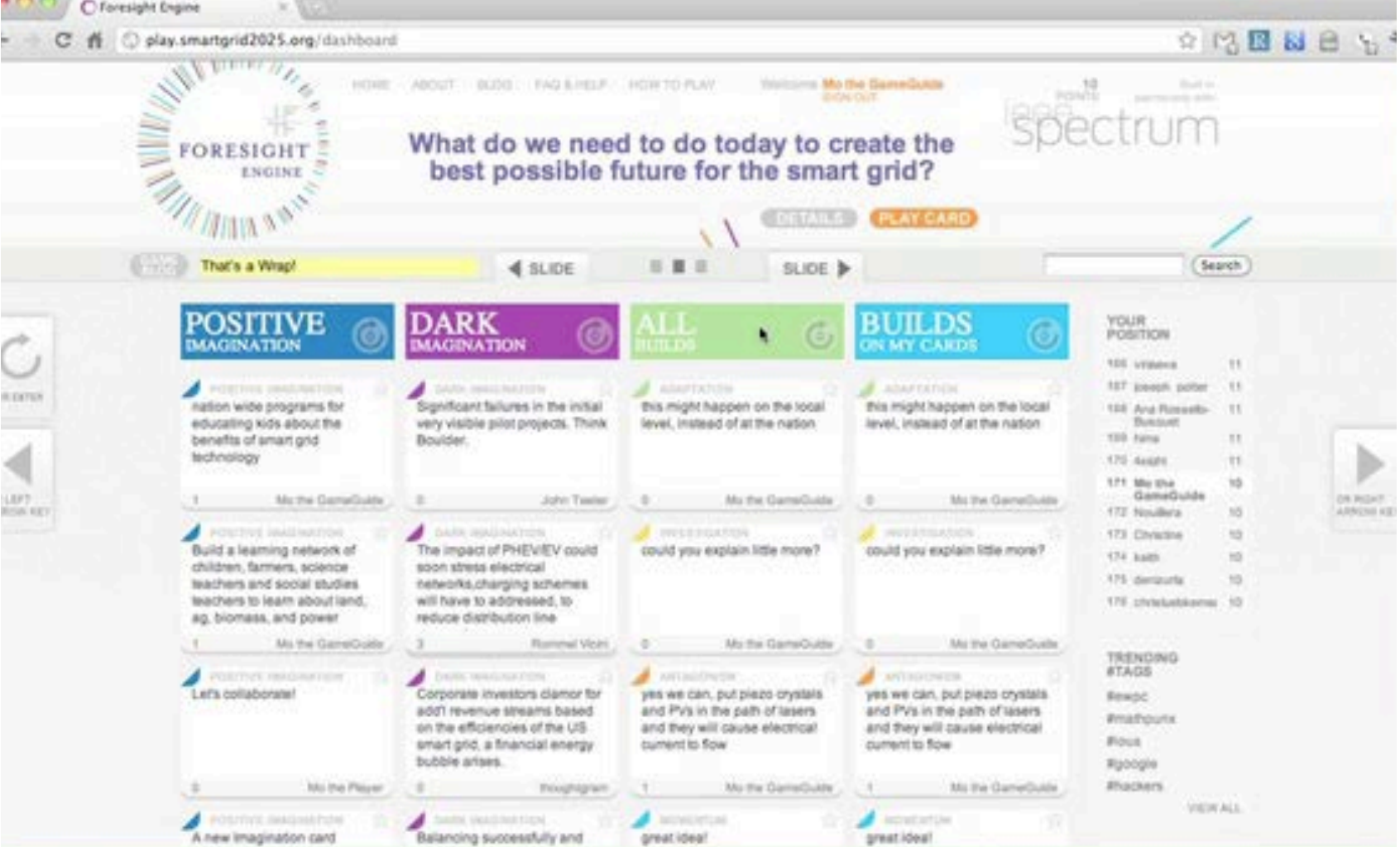
Carl Woese, rRNA Tree
of Life, lovecraftianscience.wordpress.com

Implications

Games and play are emergent

For Eberle (2014), play is “an ancient, voluntary, ‘emergent’ process driven by pleasure...

“that yet strengthens our muscles, instructs our social skills, tempers and deepens our positive emotions, and enables a state of balance that leaves us poised to play some more.”



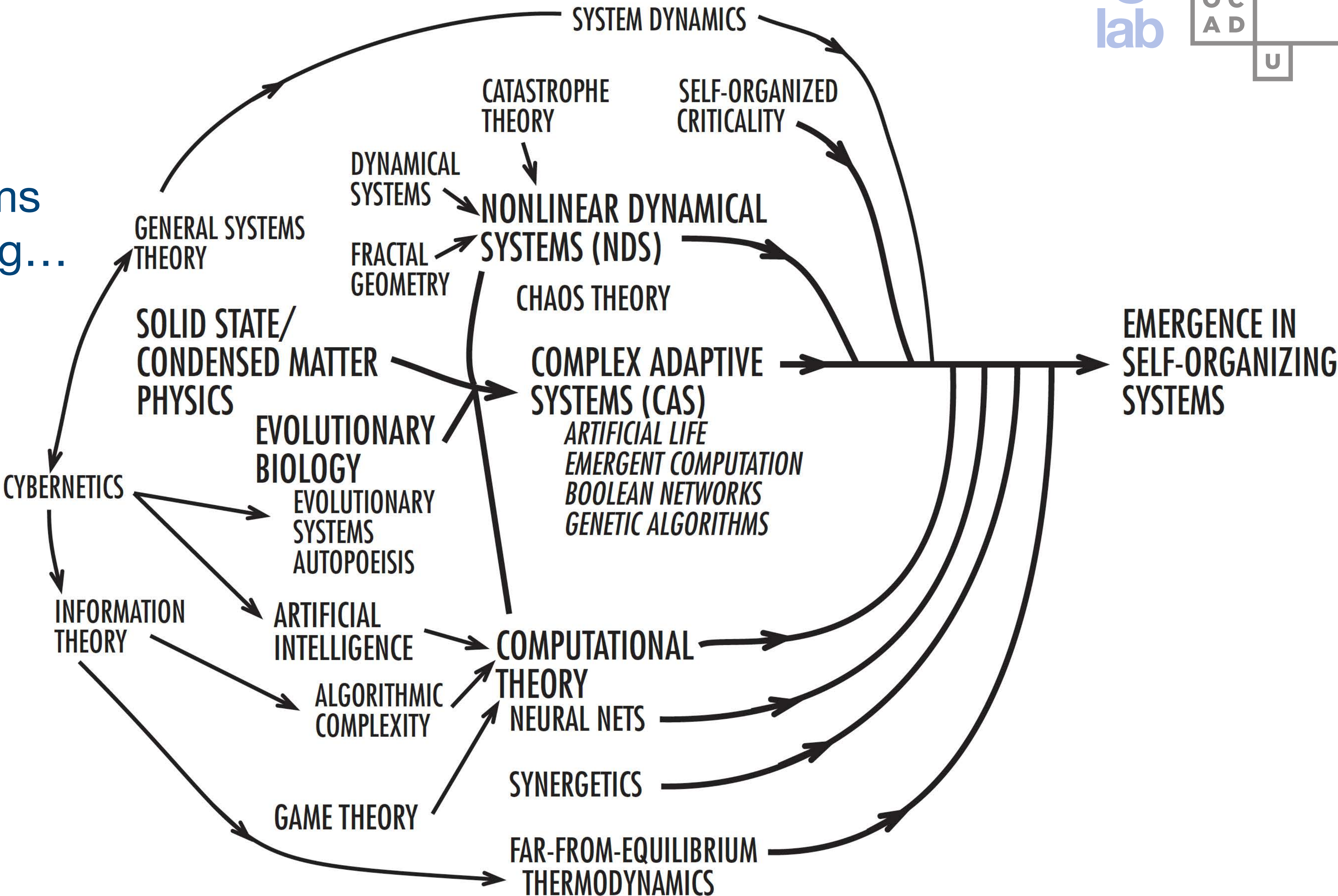
Institute for the Future
Foresight Engine
<https://vimeo.com/26177285>

Lovelock, Daisyworld
<https://www.youtube.com/watch?v=l47vhzErOCE>

Conway, Game of Life
Video: Luk4s Apps
Designing for Emergence

Emergence is

...where systems thinking is going...



Innovation and emergence

“**Innovation** is an idea, practice or object that is *perceived as new* by an individual or other unit of adoption”

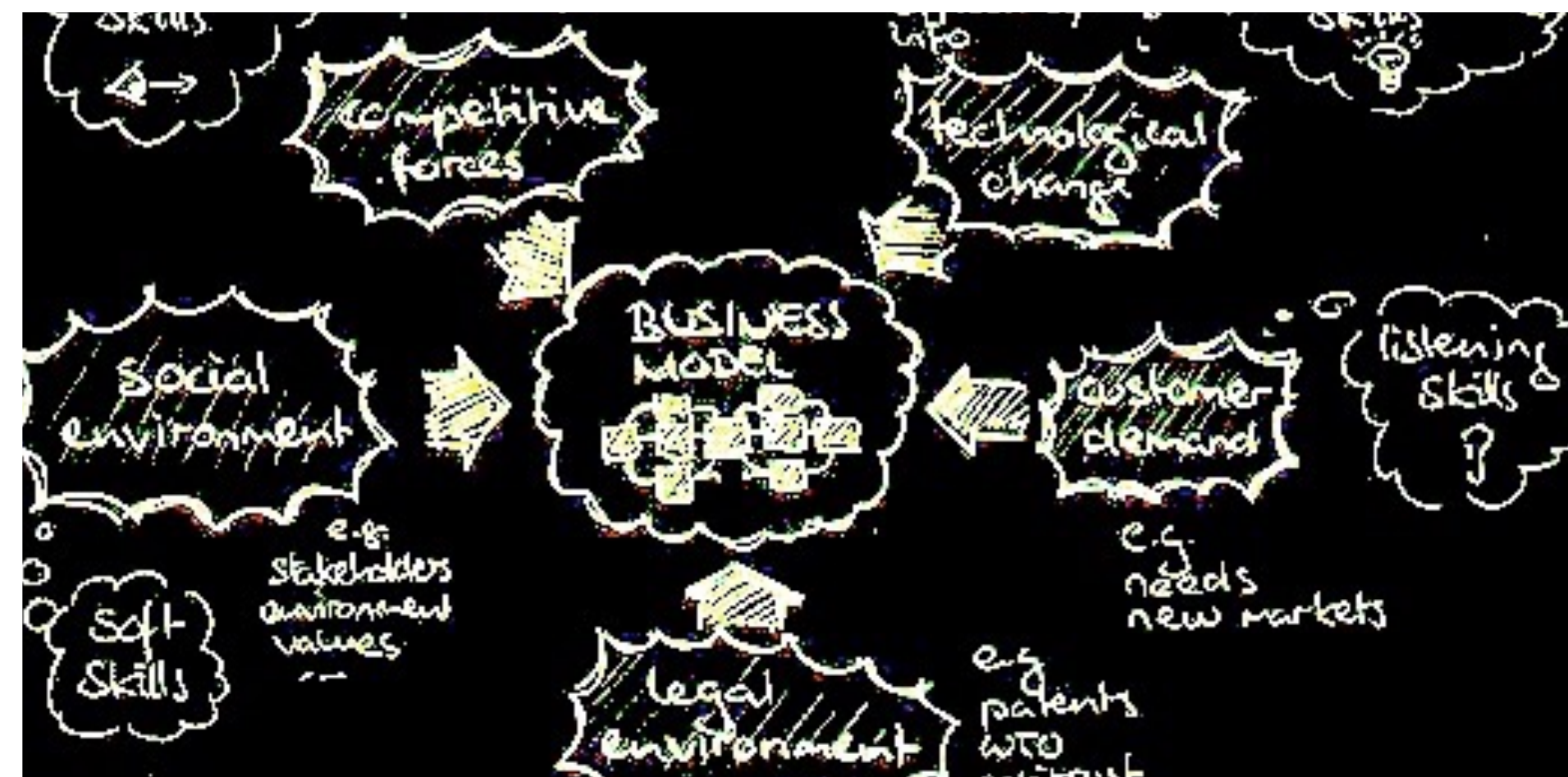
–Rogers, Diffusion of Innovations

From theories of Gestalt, cognition, and mind, *perception is emergent*.

Since innovation refers to *our perception of change*,
Innovation is emergent



flickr.com/photos/
pagedooley/4370352638



flickr.com/photos/
osterwalder/162282102/



Vivotech, Inc.

Designing for Emergence

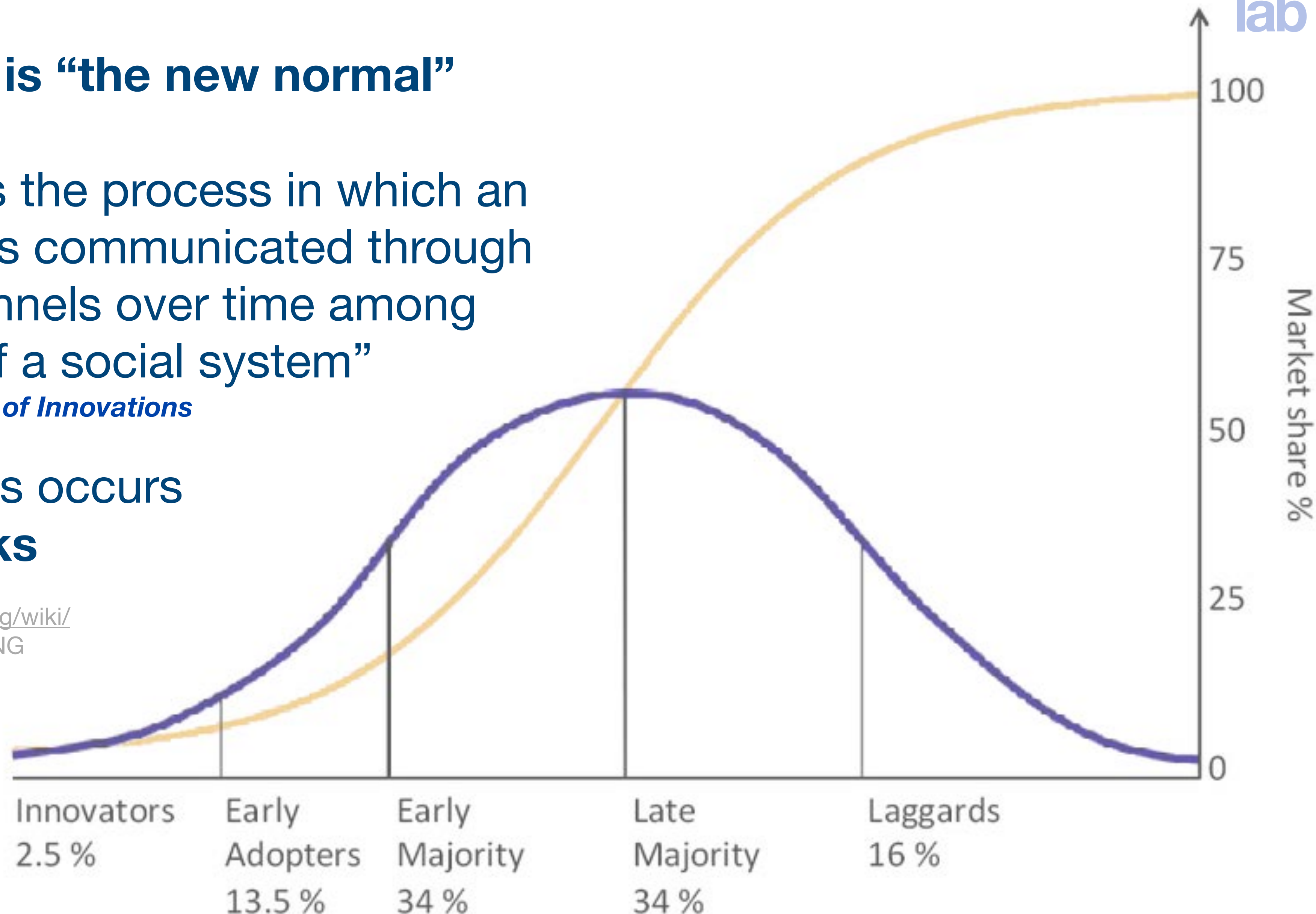
Innovation is “the new normal”

“Diffusion is the process in which an innovation is communicated through certain channels over time among members of a social system”

–Rogers, *Diffusion of Innovations*

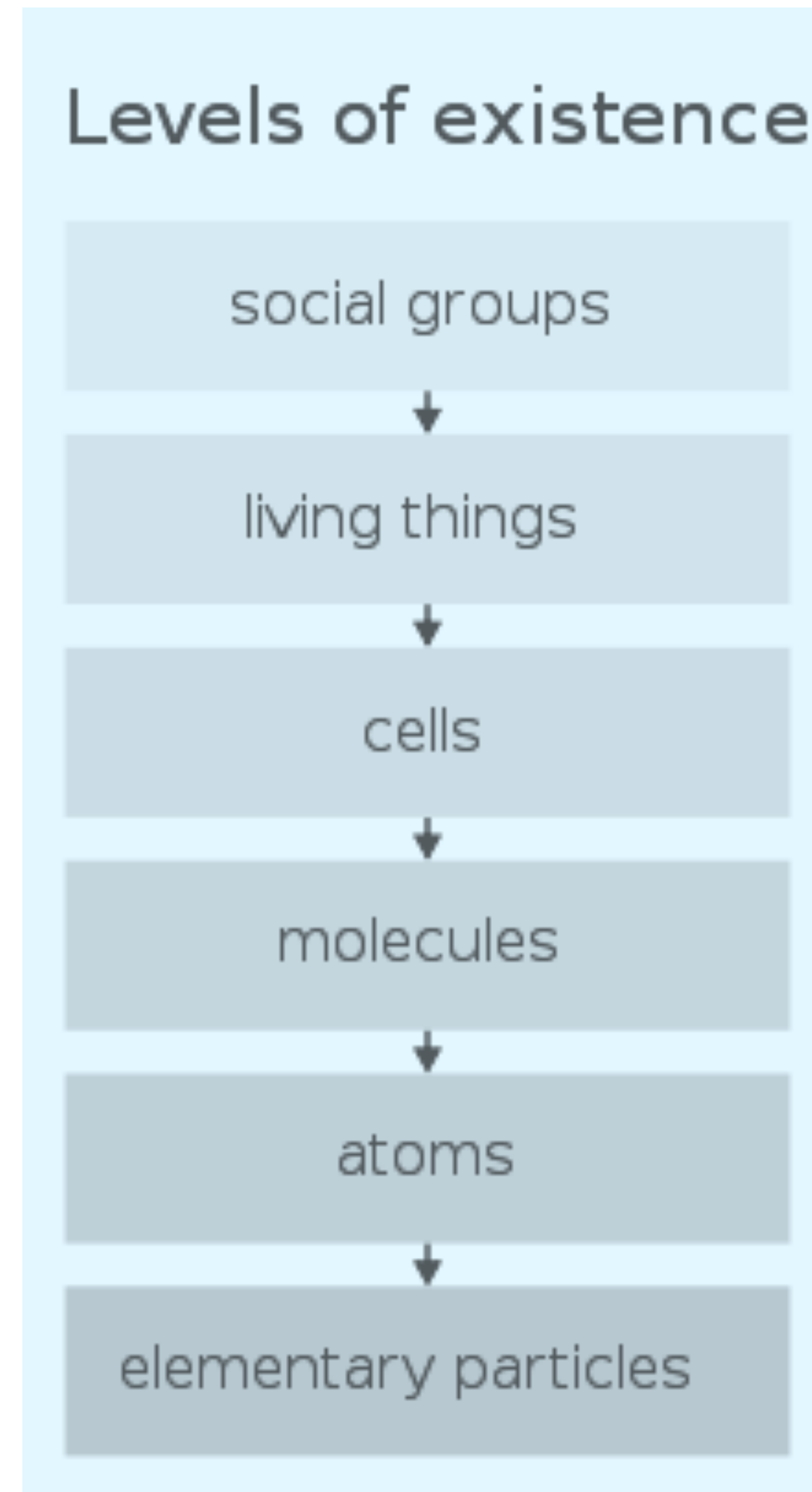
This process occurs
via **networks**

[commons.wikimedia.org/wiki/
File:Diffusionofideas.PNG](https://commons.wikimedia.org/wiki/File:Diffusionofideas.PNG)



What is supervenition?

A philosophical concept describing cases where the higher-level properties of a system are determined by its lower-level properties.



Supervenition
Image: Elembis

Systems thinking

“From parts to the whole
From objects to relationships
From objective
to contextual knowledge
From quantity to quality
From structure to process
From contents to patterns”

—Capra et al., ecoliteracy.org/nature-our-teacher/systems-thinking

“Patterns cannot be weighed or
measured, they must be mapped”

—Fritjof Capra

Flourishing

“A workable metaphor for the bundle of things that make life worth living...”

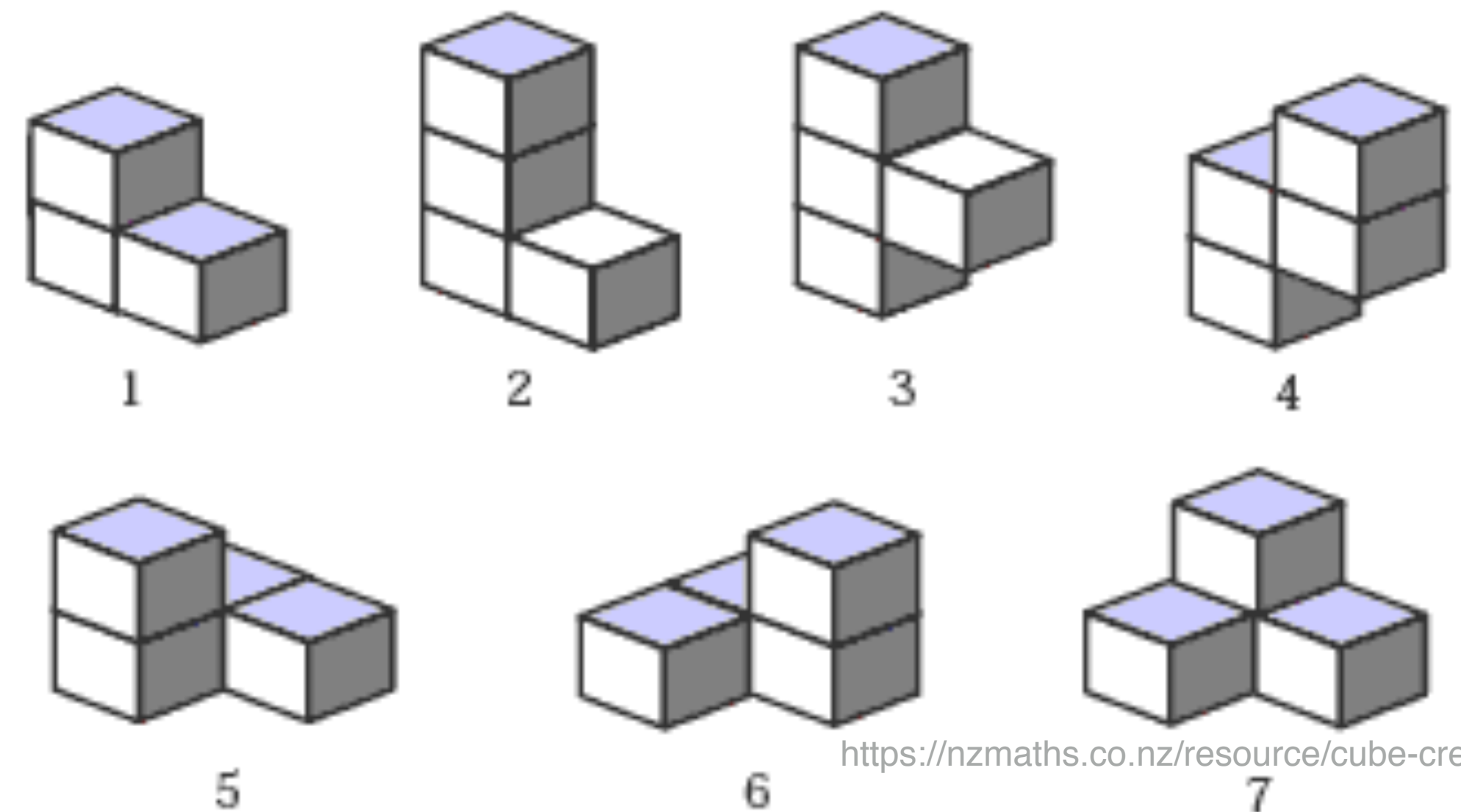
“**[Flourishing]** is emergent from the ever-changing world; it appears universally in all cultures and applies to both... cultures (human) and ecosystems (non-human).”

—John Ehrenfeld

From things to services

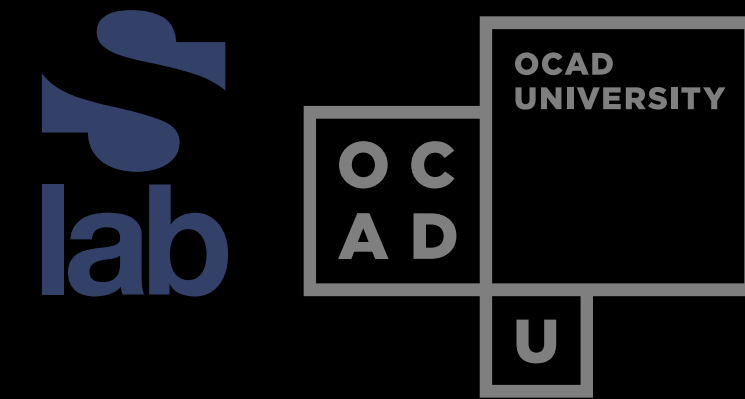
“Think about...consequences...
Consider material & energy flows...
Give priority to human agency...
Deliver value to people, not
...people to systems...
Treat place, time, & cultural
difference as positive values, not as
obstacles;
Focus on services, not on things...”

—John Thackara, *In the Bubble*, 2006 calls for “design mindfulness”



<https://nzmaths.co.nz/resource/cube-creations>

Precedents : Experiments, models, works



1936	Turing	Finite State Machine
1943	McCulloch and Pitts	Neuron model
1945	Weiner	anti-aircraft gun
1940s	von Neumann	Cellular automata
1945	Bush	Memex
1948	Walter	Machina Speculatrix
1960s	U. Michigan	BACH group models
1964	McLuhan	Extended Man
1971	Forrester	World Dynamics
1975	Holland	Genetic Algorithms
1983	Lovelock	Gaian Daisyworld
1986	Reynolds	Boids algorithm
1991	Dorigo	Ant colony algorithms
1993	Venge	Singularity
1999	UC Berkeley	SETI@home
2000	Stanford	Protein Folding@home
2002	JAMSTEC	Earth Simulator
2003	Mabbitt	Codefarm Genetic Algorithms
2007	Sterling	Spimes
2008	Wright	Spore

Source: Greg Van Alstyne, 2008

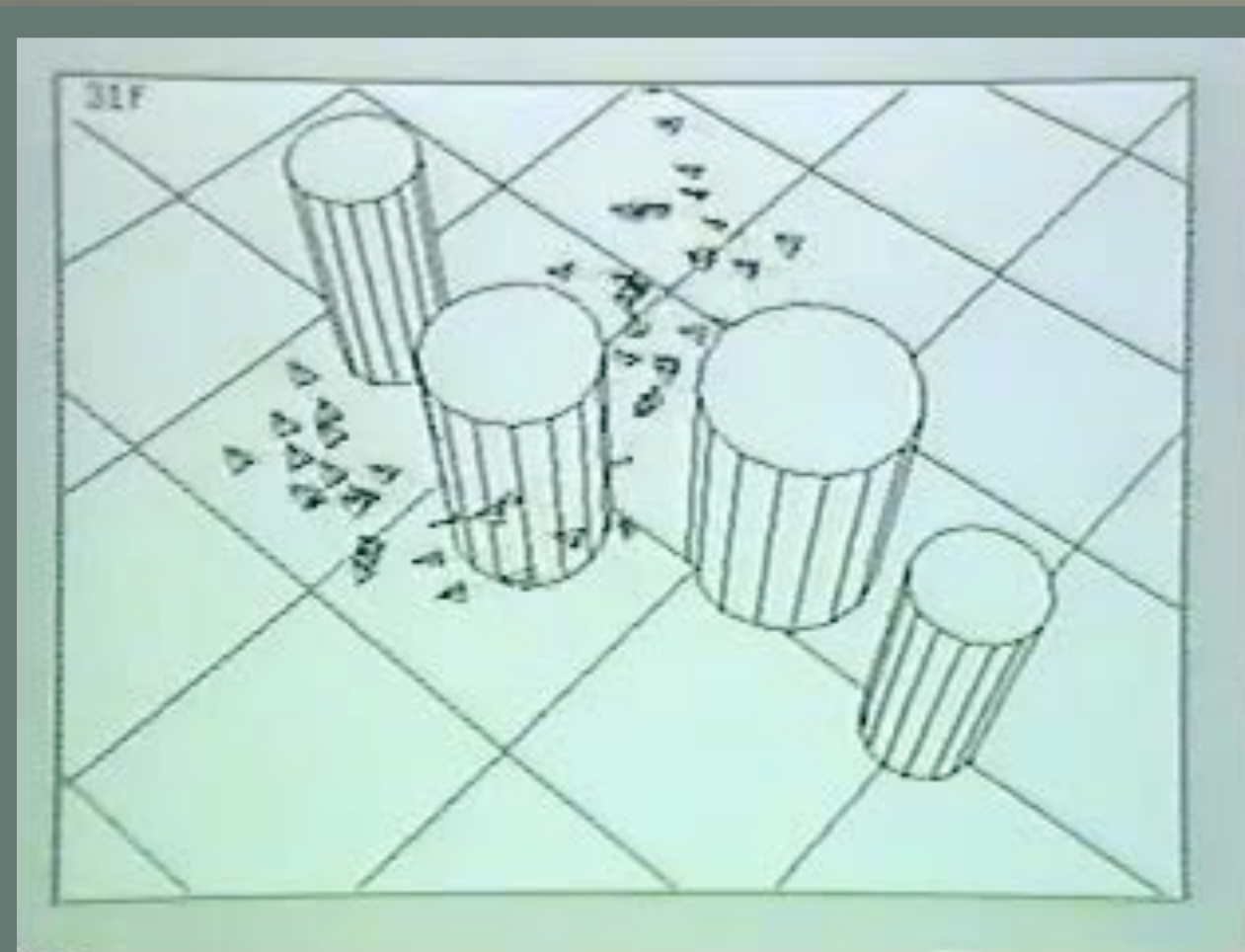
On the Role of Digital Media in Striving for Sustainability

Thesis, MS in Integrated Digital Media,

Polytechnic Institute of New York University

Arenas

Flocking birds, Reynolds's boids



Similarities

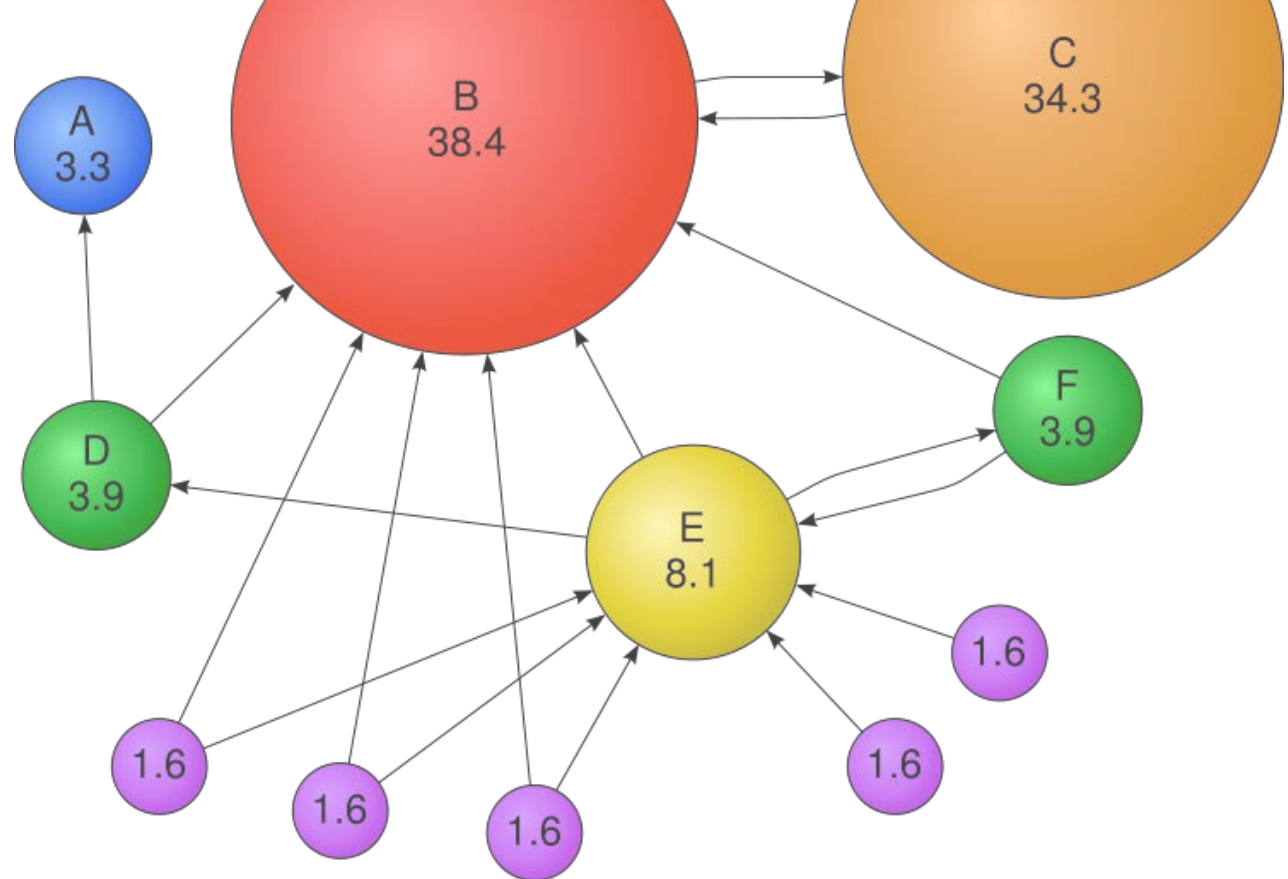
Design and emergence
Propagation of organization
Concerned with selection
Differentiation from generality
Morphogenesis: birth of forms

Differences

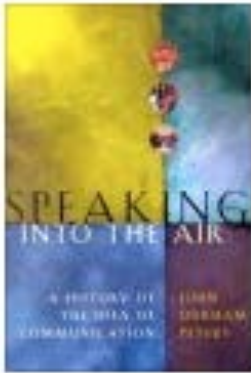
Design	Emergence
Cognitive	A-cognitive
Intentionality	Autonomy
Controlling	Influencing
Specifying	Evolving
Top-down	Bottom-up

D4E in networked services

- Google PageRank algorithm
- Amazon recommender system
- Twitter hashtags
- Flickr & del.icio.us tags

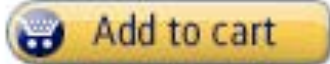
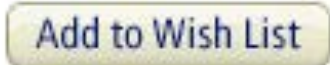


48.



Speaking into the Air: A History of the Idea of Communication
by John Durham Peters (Author)
Average Customer Review: ★★★★★
In Stock
Publication Date: March 4, 2006

Our Price: \$17.00
Used & new from \$12.07

☒ I Own It ☐ Not Interested x|★★★★★ Saved
Recommended because you added Communication in History to your Shopping Cart ([edit](#))

@RSDSymposium FOLLOWS YOU

Join us from October 13-15 for the
Relating **#SystemsThinking** and **#Design**

All time most popular tags

06 africa amsterdam animal animals april architecture art august australia baby barcelona
beach berlin **birthday** black blackandwhite blue boston bw **california** cameraphone
camping **canada** canon car cat cats chicago china christmas church city clouds color
concert day dc dog england europe family festival film florida flower flowers food
france friends fun garden geotagged germany girl graffiti green halloween hawaii hiking
holiday home honeymoon hongkong house india ireland island italy japan july june kids lake
landscape light live london losangeles macro may me mexico mountain mountains museum music
nature new newyork newyorkcity newzealand night nikon nyc ocean paris park party
people portrait red river roadtrip rock rome san sanfrancisco school scotland sea seattle
september show sky snow spain spring street summer sun sunset sydney taiwan texas

High visibility arenas (wet & dry)

Industrial ecology

Biomimetics

Synthetic biology

Social media

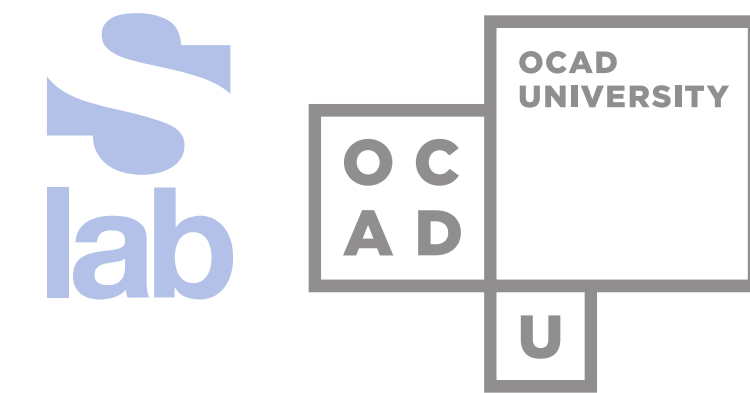
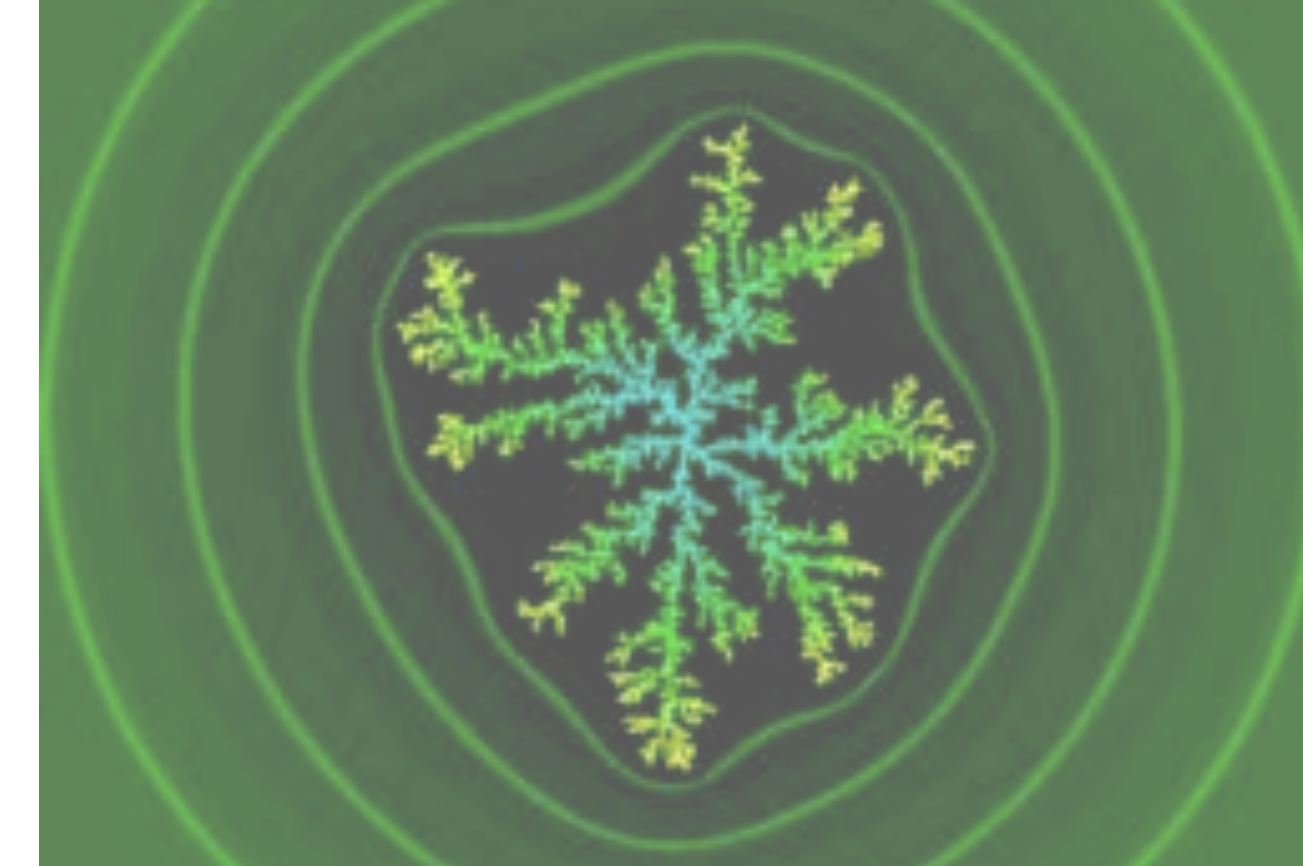
Gaming

Hacking

Artificial intelligence (AI)

Artificial life, genetic algorithms (GAs)

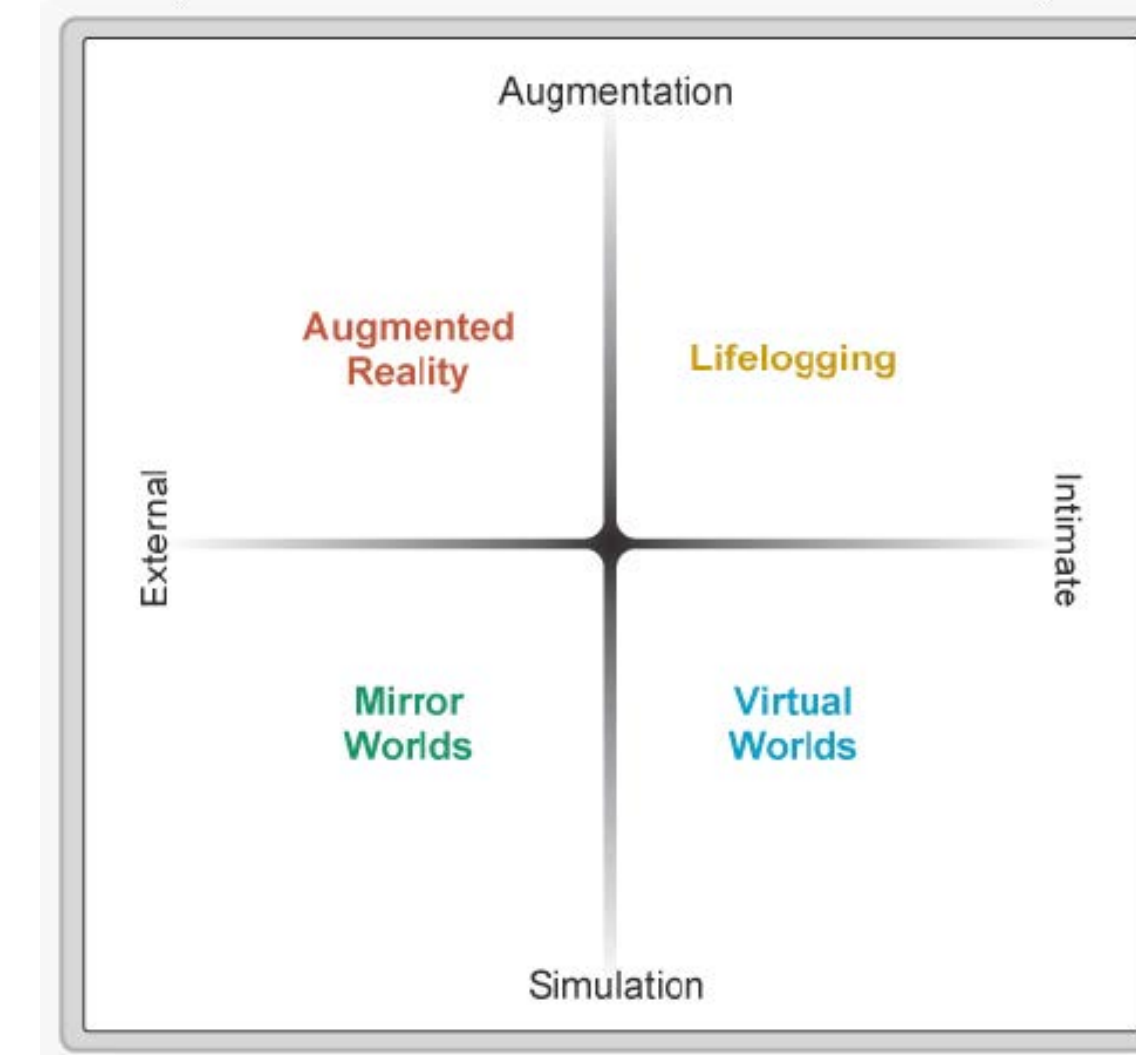
Virtual & augmented reality (VR, AR)



algorithmicbotany.org
University of Calgary



Pokemon Go,
Niantic, 2016



Metaverse Roadmap
metaverseroadmap.org/

Designing for Emergence

Emergence of the unwanted

It is not simply the case that
“What is good emerges and
what emerges is good”

Epidemics
Pandemics
Terrorism
Social panic
Invasive species
Toxic algae
[...]

Toxic algal bloom, Lake Erie, 2011. NASA Earth Observatory

Practice: mitigating the unintended

Emergence does not preclude gaming the system

Gerrymandering
Google bombing
Astroturfing
Spam
Bots
Viruses
Exploits
[...]

<http://www.google.com/search?q=failure>



Relinquish total control.

“In order to harvest the power of organic machines, we have to instil in them guidelines and self-governance, and relinquish some of our total control.”

—author, **Kevin Kelly**

Balance creativity & stability.

“Every human organization contains both designed and emergent structures. The challenge is to find the right balance between the creativity of emergence and the stability of design.”

—physicist, sustainability proponent, **Fritjof Capra**

Hack to adapt.

“Yearning for simple ecosystems is endemic among people who want to ‘fix’ some problem of bad actors on the networks... We are proud parasites... we hack our cars and we hack our PCs. We’re the rich humus carpeting the jungle floor and the tiny frogs living in the bromeliads.”

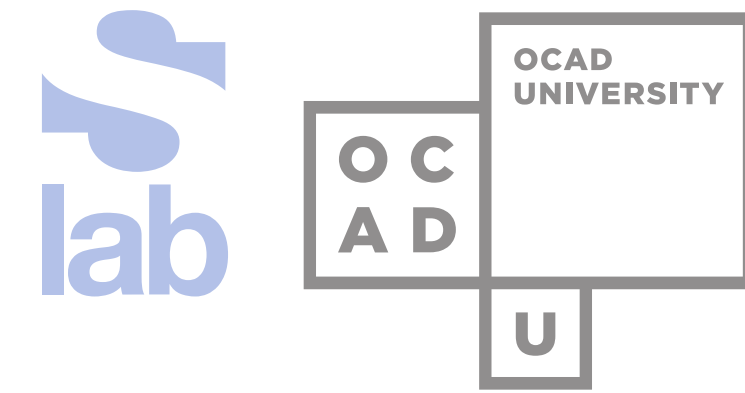
—science fiction author, IP activist, **Corey Doctorow**

Give up strong derivability.

“Give up ‘strong derivability’, learn to harness emergence and live with the uncertainty that comes with it.”

—synthetic biologist, **Norman Packard**

Theory: seeking causes



“Works in practice, not in theory”
— oft-said comment about Wikipedia

Dynamic interplay between design and emergence, seen through social networks, is increasingly theorized:

Christakis, Connected

Barabasi, Linked

Shirky, Here Comes Everybody

Surowiecki, Wisdom of Crowds

Howe, Crowdsourcing

Anderson, The Long Tail; Free

Benkler, The Wealth of Networks

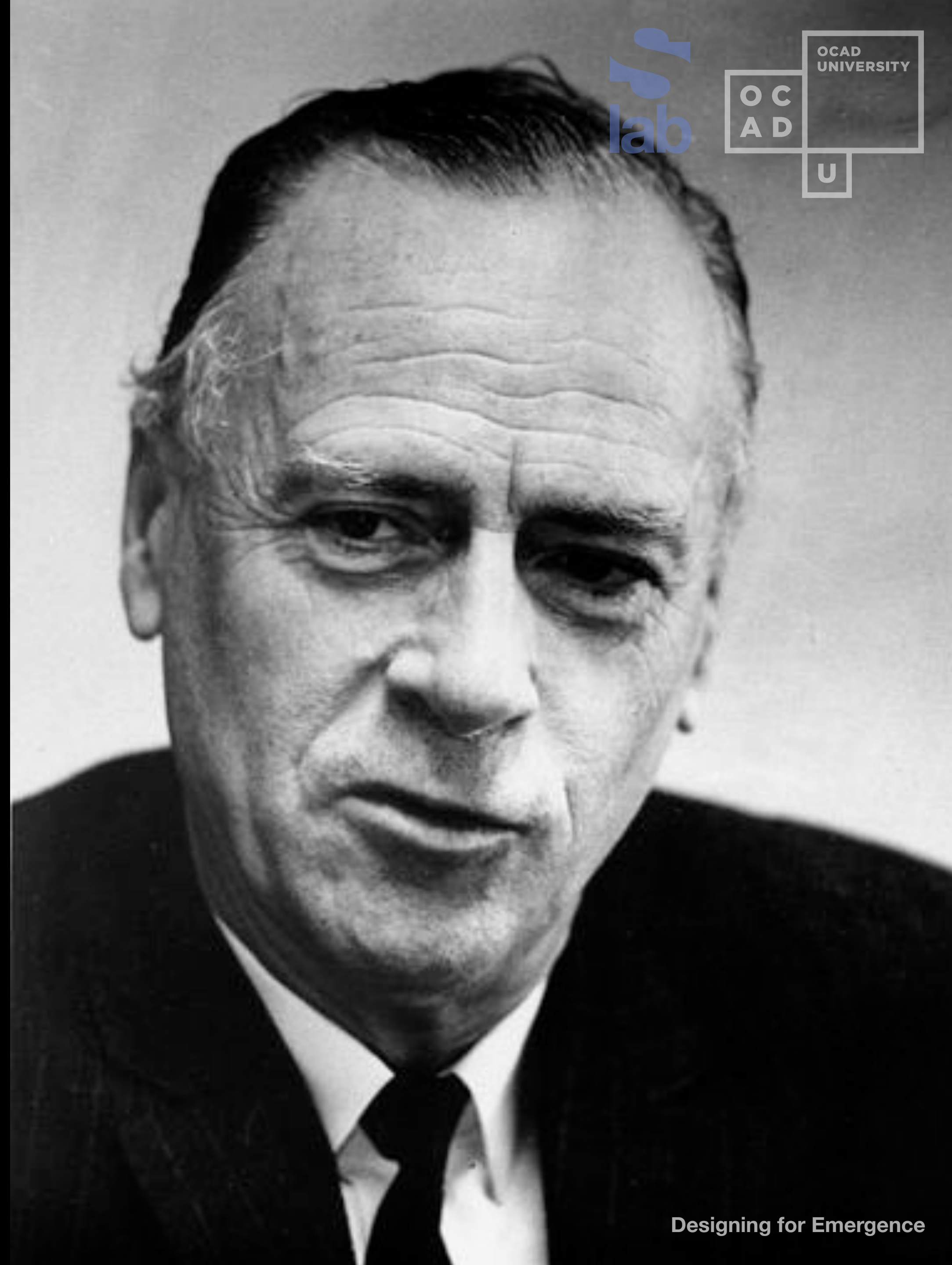
Rheingold, Smartmobs

McLuhan's Reversal of cause & effect

Artists start with desired effects they wish to create and assemble the causes that will help achieve them.

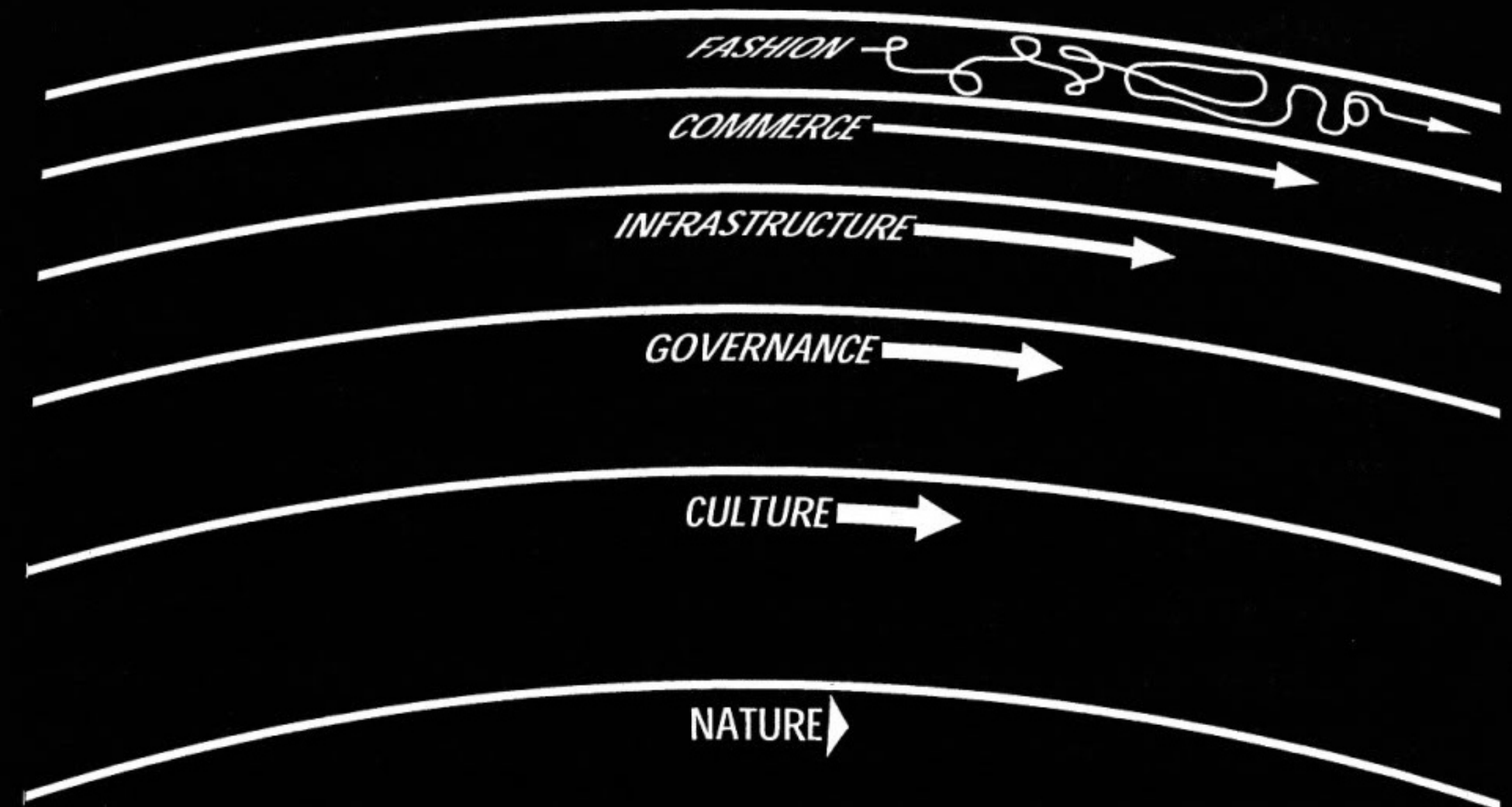
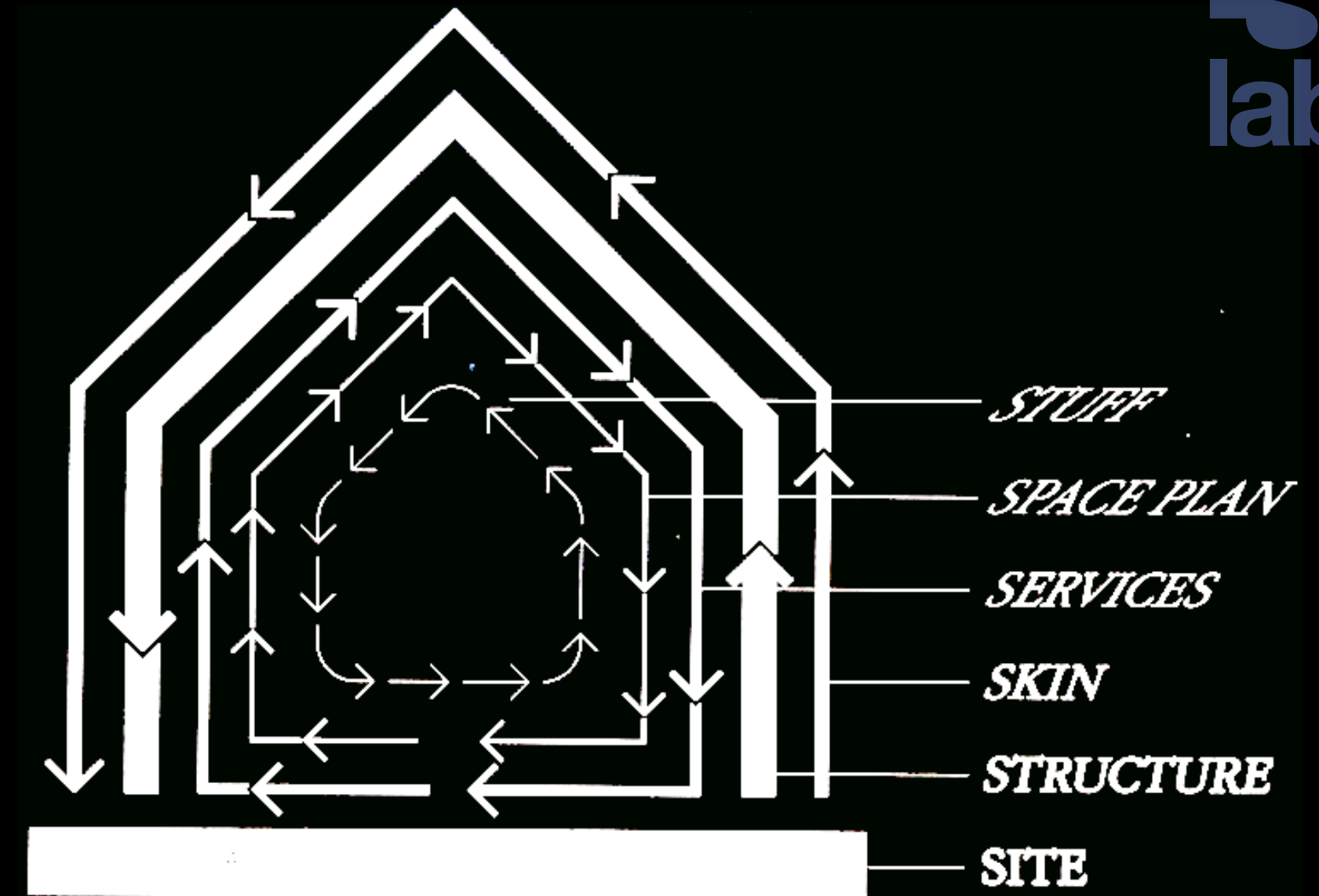
As the future does not exist, it must be created, and its emergence subject to influences

We start with the future we desire and work backwards to design causes and contexts that lead where we wish.



Shearing layers / Pace layers

Architect Frank Duffy's idea of shearing layers is explored by Stewart Brand, first in *How Buildings Learn*, 1994, and later is developed as Pace Layering in *The Clock of the Long Now*, 1999



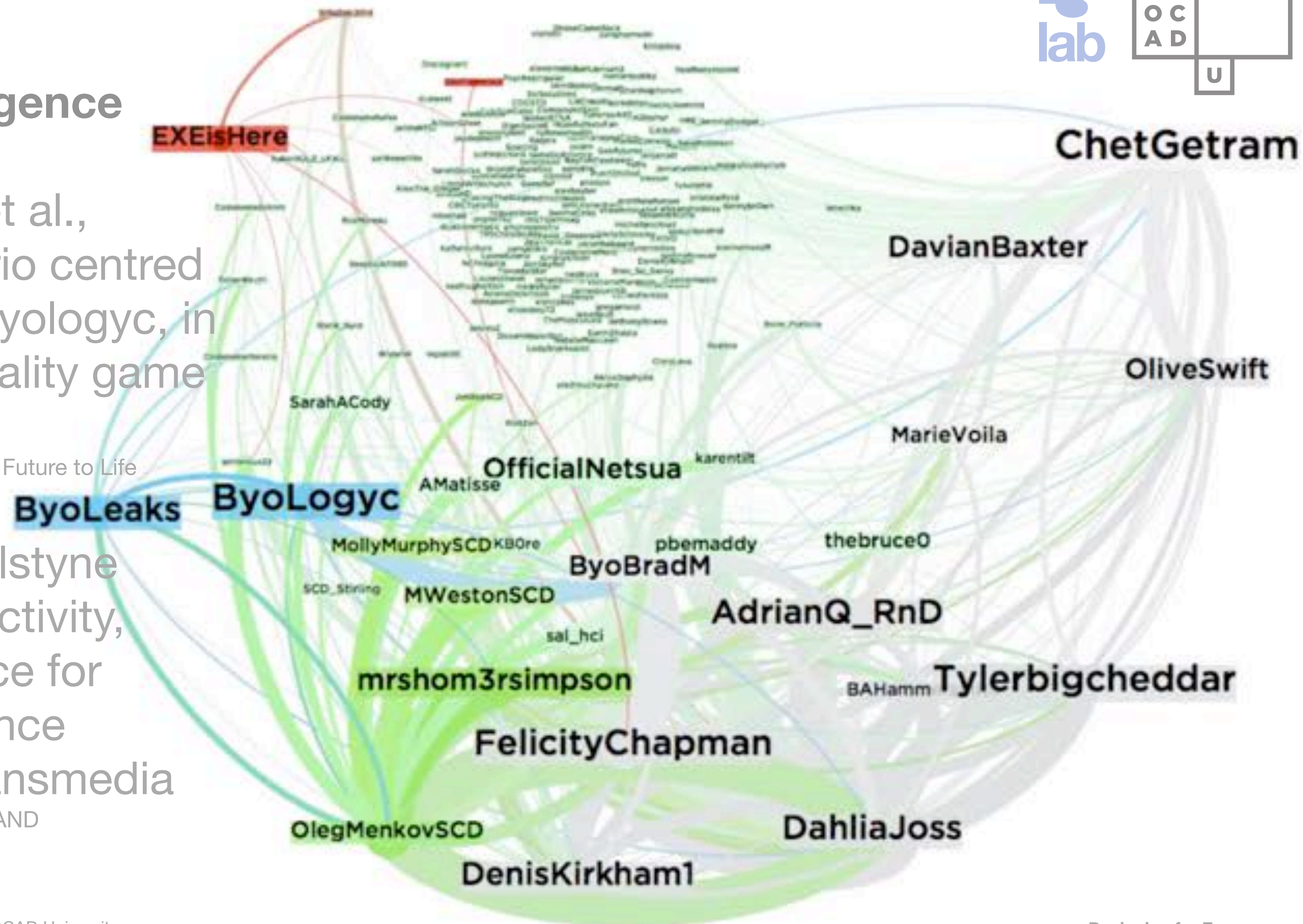
Visualizing Emergence

Trevor Haldenby et al.,
authored a scenario centred
on a future firm, Byologyc, in
their alternative reality game
(ARG), ZED.TO

Trevor Haldenby, 2013, Bringing the Future to Life

Haldenby & Van Alstyne
analyzed Twitter activity,
producing evidence for
exceptional audience
engagement in transmedia

With funding support from NCE GRAND



Strategic Innovation Lab (est. 2008)

sLab at OCAD University is a centre for foresight and innovation research and development.

Rooted in a heritage of **design & social engagement**, sLab's approach places human needs, desires, behaviour & culture at the heart of:

- ▶ opportunity finding
 - ▶ opportunity framing
 - ▶ opportunity forging
- foresight
strategy
design**

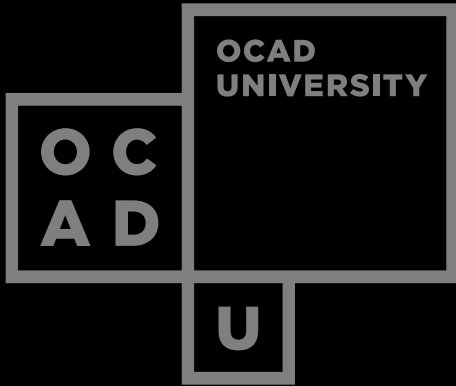


MDes in Strategic Foresight & Innovation (SFI) at OCAD University

Creating a new kind of designer/change-maker, mapping & tackling complexity, shaping futures, understanding change, leading innovation



Selected sLab Projects



DesignJam

Creative business & design skills for young startups & social ventures (ONE)

Digital Governance

Bringing digital culture to Canadian government (SSHRC)

Visualizing Emergence

Understanding diffusion of innovation through data visualization (NCE–GRAND)

Strategic Innovation Lab OCAD University

Imagining Canada's Future Expert Panel on Urbanization

Top ten future challenges for Canada's Social Sciences & Humanities (SSHRC)

2020 Media Futures

Strategic Foresight for Ontario's Cultural Media Industries (OMDC)

What is Foresight?

Orientation video for Policy Horizons Canada

Economic Futures for Ontario 2032

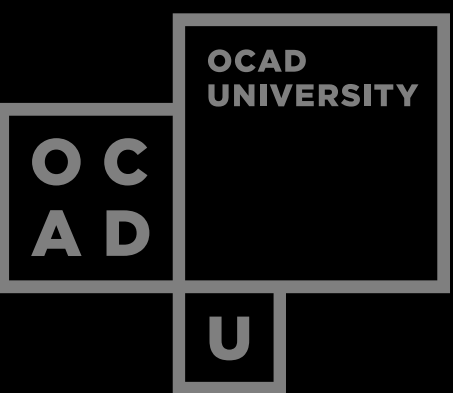
Citizen-centred foresight project for the Government of Ontario

United Way Centraid Canada (UWCC) Strategic Plan

Guiding Canada's largest philanthropic organization

<http://www.flickr.com/photos/santos/27538777/>

Selected sLab Projects



Digital Governance
Transforming government practice in the digital era

Digital Governance
@digitalgovca

Digital Governance: Transforming Government Practice in the Digital Era. Supported by the Social Sciences and Humanities Research Council of Canada

📍 Canada
🌐 digitalgovernance.ca

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Helen Margetts @HelenMar...
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Mark Graham @geoplace
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Popular accounts · Find friends

Trends · Change

#BlackFriday
Promoted by TELUS

#Thanksaivina

<https://twitter.com/opengovpart/status/534154664116101120/photo/1>

2020 MEDIA FUTURES

What will our media and entertainment be like by

Start here!

Welcome to the future of media

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- Register for updates

Latest updates

- Interviews
- Reports
- Participants
- Strategic Foresight
- Signals
- Trends
- ...more

<http://2020mediafutures.ca/Reports>

DesignJam

About BigTents Workshops Toolbox

Creative business & design skills for cultural entrepreneurs & young startups

What is DesignJam?

DesignJam services and tools are co-creative, design-fueled & human-centred. We bring practical, hands-on learning experiences to help you create a business, or make business more creative.

BigTent Events

Attend our all day workshop in Toronto, March 28th. Hear from industry leaders and learn from experienced mentors.

Workshops

We travel around Ontario too. Attend a workshop in your city.

Toolbox

Learn on the go! Our event videos, podcasts and booklets are accessible online.

BigTent Events

A DesignJam 'BigTent' is a multi-channel jamboree – an all-day free event that gathers up to a hundred design leaders & learners, sharing ideas & tools while working to understand and address a complex problem.

Our first BigTent, nicknamed "TrafficJam," illuminated opportunities & challenges of traffic and transit in the Greater Toronto & Hamilton Area (GTHA) in March 2015 at MaRS in downtown Toronto. We're planning more BigTent events together with communities in other parts of Ontario.

[Details](#) [Photos](#)

Workshops

DesignJam offers a series of workshops in different locations across Ontario. Check out some of our upcoming events below.

Scenarios

2020 SCENARIOS

OVERVIEW
MINISTRY OF INVESTMENT
ORDS OF THE CLOUD
NTHILL
MEDIA

TRENDS+ SIGNALS

BOOKS
MAGAZINES
MUSIC
FILM
TELEVISION
INTERACTIVE

SOCIAL
TECHNOLOGICAL
CONOMIC
COLOGICAL
OLITICAL
OFFICIAL
CORPORATE
CONOMIC
TECHNOLOGICAL
CULTURE

Designing for Emergence: The New Design Space

Greg Van Alstyne & Bob Logan
slab.ocadu.ca
@ocadslab

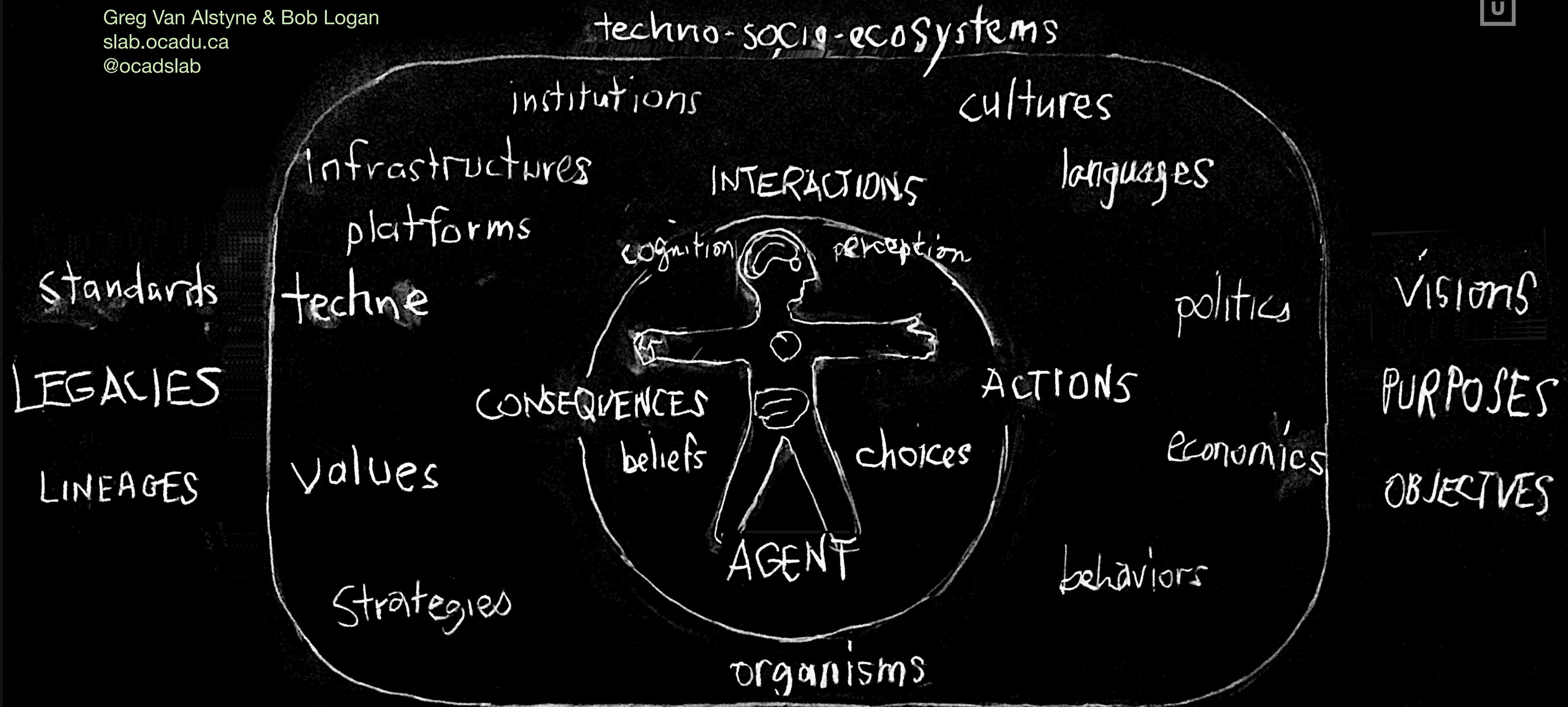


Image: Van Alstyne & Logan, (cc) 2016

Greg Van Alstyne & Robert Logan | sLab | OCAD University

Designing for Emergence