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Designing for emergence: Integrating systems & design
Van Alstyne, Greg and Logan, Robert K.

Suggested citation:

Designing for Emergence

Framework for Relating Systems Thinking & Design

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OCAD University

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Image: flickr.com/photos/andy-li/
Purposes

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

Van Alstyne & Logan (2007).
doi:10.1080/17493460601110525
Purposes

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
Definitions

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)
Definitions

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.

Definitions

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

Definitions

Emergence occurs...

In living, non-living, & hybrid systems

macro: The Internet of Everything
meso: Artificial life
micro: Biological evolution

Laurens Lapre, members.ziggo.nl/laurens.lapre/
Carl Woese, rRNA Tree of Life, lovecraftianscience.wordpress.com
Barrett Lyon, The Opte Project, opte.org
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.”

Greg Van Alstyne & Robert Logan
sLab
OCAD University
Emergence is

...where systems thinking is going...

Goldstein, 1999, 55
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Definitions

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
Definitions

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
Definitions

What is supervention?

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

**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
Mindsets

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

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
Flocking birds, Reynolds’s boids

Craig Reynolds, 1986, Boids simulation

greenkert, http://www.youtube.com/watch?v=b8eZJnbDHIg
Analysis

Similarities

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

Differences

Design
Cognitive
Intentionality
Controlling
Specifying
Top-down

Emergence
A-cognitive
Autonomy
Influencing
Evolving
Bottom-up
D4E in networked services

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

[...]
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
Practice: design principles

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
“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

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** foresight
› opportunity **framing** strategy
› opportunity **forging** 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)

**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
Selected sLab Projects

**Digital Governance**
Transforming government practice in the digital era

**2020 Media Futures**
What will our media and entertainment be like by 2020?

**DesignJam**
Creative business & design skills for cultural entrepreneurs & young startups

**SSHRC Partnership Development Grant**
Bringing digital culture to parliament

**Visualizing Emergence**
Understanding innovation through data visualization

**SSHRC: Imagining Canada's Future, Expert Panel on Urbanization**
Top ten future challenges for Canada's Social Sciences & Humanities

**Access for All**
Inclusive Design online training for Ontario's Public Employees

**2020 Media Futures**
Strategic Foresight for Ontario's Cultural Media Industries

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

**Digital Innovation Lab**
OCAD University

**Designing for Emergence**
United Way Centraide Canada (UWCC) Strategic Plan

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Designing for Emergence: The New Design Space

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Image: Van Alstyne & Logan, (cc) 2016

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