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A reflection on *connecting complexity theory and design for policy*

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Marzia Mortati, Assistant Professor, Department of Design, Politecnico di Milano

POLITECNICO
MILANO 1863

DIPARTIMENTO DI DESIGN

RSD7 2018

CHALLENGING COMPLEXITY
BY SYSTEMIC DESIGN
TOWARDS SUSTAINABILITY

RSD7 - RELATING SYSTEMS THINKING AND DESIGN 7
SYMPOSIUM - TURIN - OCTOBER 24-26 . 2018

Overview

1. Research question
2. Complex problem and complexity
3. How can policy respond effectively to these problems?
4. Applying design practice in the public sector
5. Connecting complexity theory and design for policy

How can the connection between ***complexity theory*** and ***design for policy*** impact positively ***policy innovation and development***?

Complex problems and complexity

- Nowadays the most crucial and significant socio-technical problems for society involve a **complex system of stakeholders** with different interests (Don Norman, 2014).

Kibera

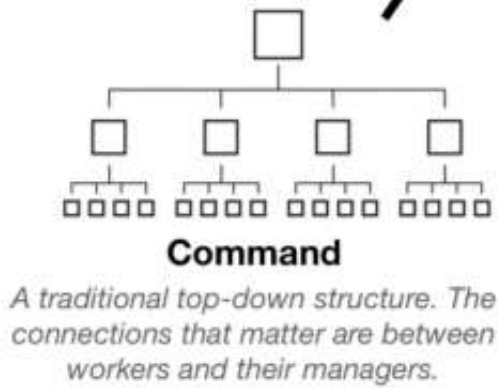
Complex problems and complexity

- Nowadays the most crucial and significant socio-technical problems for society involve a **complex system of stakeholders** with different interests (Don Norman, 2014).

- The **digital transformation** (and in general the development of the artificial) **increased the interactions** between the elements of sociotechnical systems, **thus increasing the complexity**.

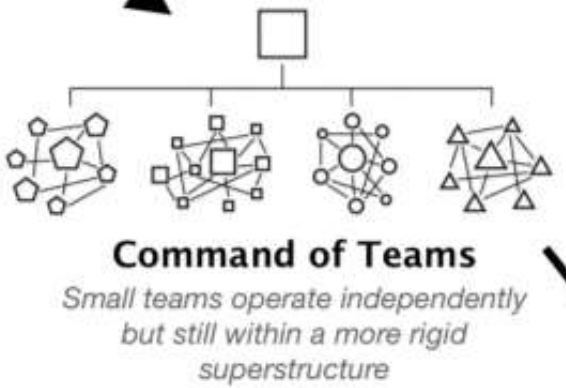
Digital transformation

What we were designed for →



Command

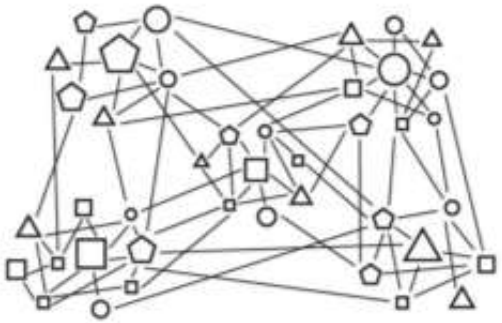
A traditional top-down structure. The connections that matter are between workers and their managers.



Command of Teams

Small teams operate independently but still within a more rigid superstructure

What we were facing →



Team of Teams

The relationship among teams resembles the closeness among individuals on those teams.

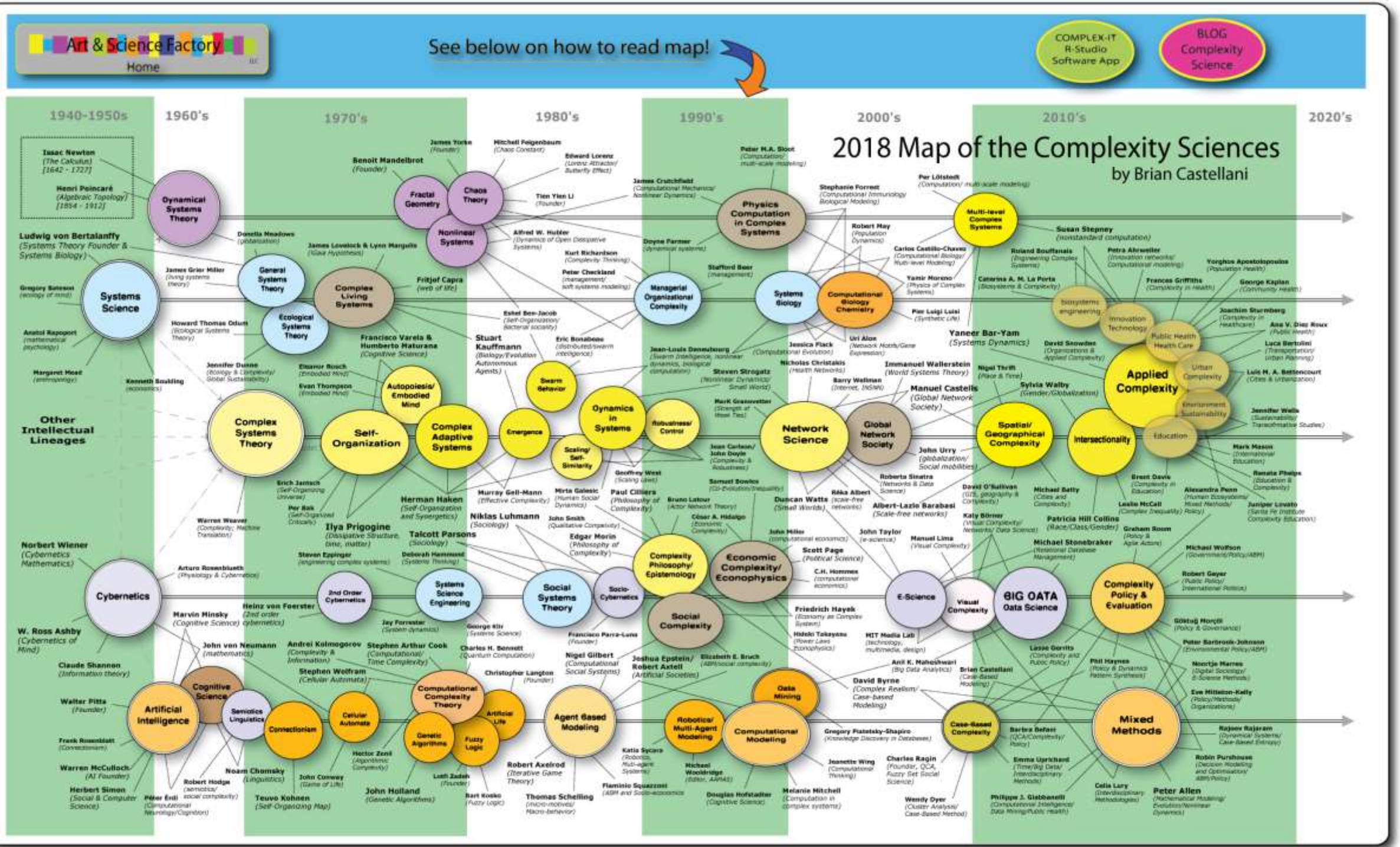
Illustrations from McChrystal et al. *Team of teams: New rules of engagement for a complex world*. Penguin, 2015.

Complex problems and complexity

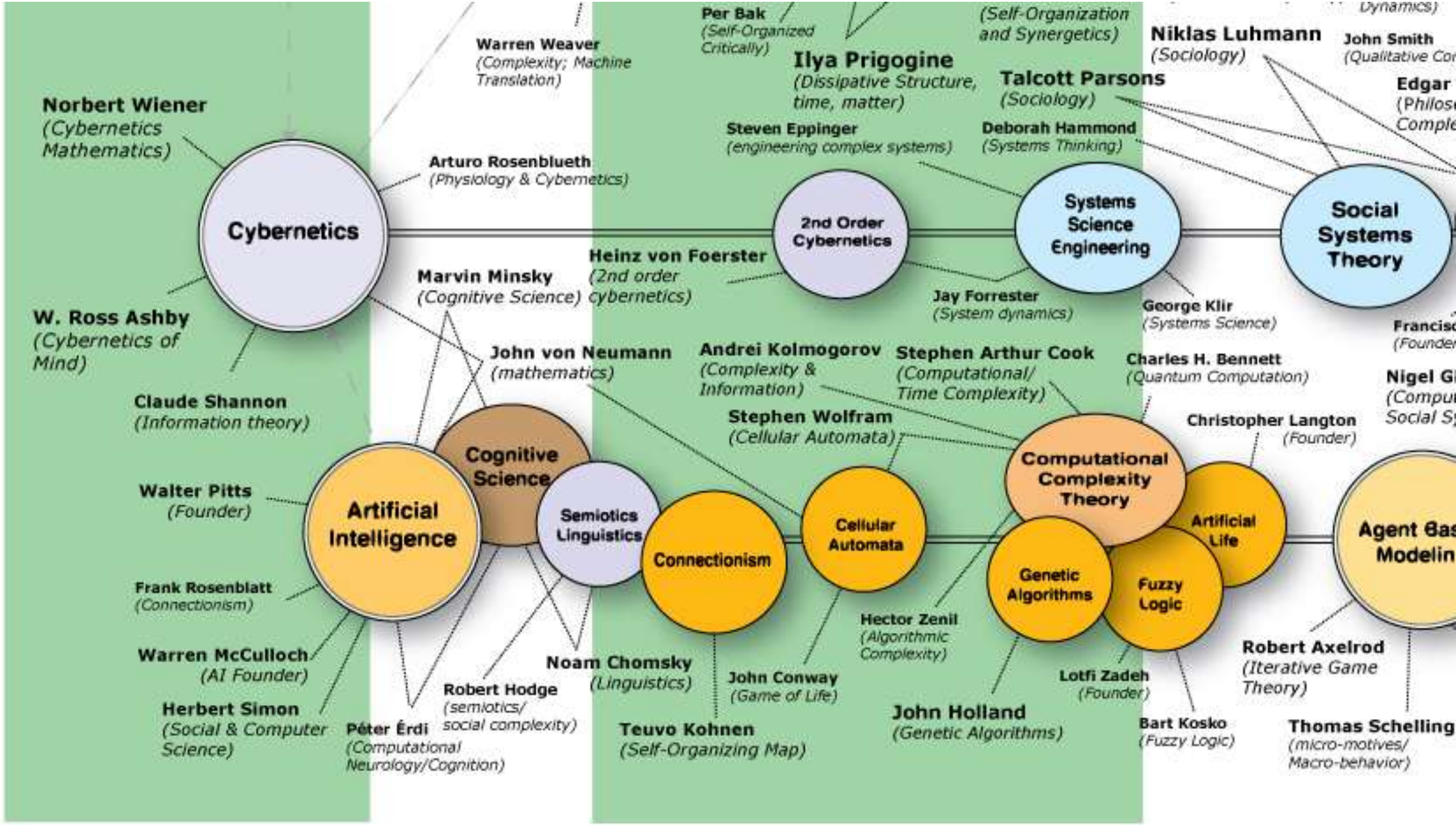
- Nowadays the most crucial and significant socio-technical problems for society involve a **complex system of stakeholders** with different interests (Don Norman, 2014).

- The **digital transformation** (and in general the development of the artificial) **increased the interactions** between the elements of sociotechnical systems, **thus increasing the complexity**.

- In the last century studies on complex phenomena increased defining what is called **complexity theory**, which is covered by different disciplines.



http://www.art-sciencefactory.com/complexity-map_feb09.html


Norbert Wiener
(Cybernetics Mathematics)
Warren Weaver
(Complexity; Machine Translation)
Per Bak
(Self-Organized Criticality)
Ilya Prigogine
(Dissipative Structure, time, matter)
(Self-Organization and Synergetics)
Niklas Luhmann
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John Smith
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Steven Eppinger
(engineering complex systems)
Deborah Hammond
(Systems Thinking)
Arturo Rosenblueth
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Cybernetics
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Heinz von Foerster
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Marvin Minsky
(Cognitive Science)
Jay Forrester
(System dynamics)
George Klir
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Francisc
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W. Ross Ashby
(Cybernetics of Mind)
John von Neumann
(mathematics)
Andrei Kolmogorov
(Complexity & Information)
Stephen Arthur Cook
(Computational/ Time Complexity)
Charles H. Bennett
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Nigel G
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Stephen Wolfram
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Christopher Langton
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Walter Pitts
(Founder)
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Semiotics Linguistics
Connectionism
Cellular Automata
Artificial Life
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Fuzzy Logic
Frank Rosenblatt
(Connectionism)
Hector Zenil
(Algorithmic Complexity)
Warren McCulloch
(AI Founder)
Noam Chomsky
(Linguistics)
Robert Hodge
(semiotics/ social complexity)
John Conway
(Game of Life)
Lotfi Zadeh
(Founder)
Robert Axelrod
(Iterative Game Theory)
Herbert Simon
(Social & Computer Science)
Péter Érdi
(Computational Neurology/Cognition)
Teuvo Kohnen
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John Holland
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Bart Kosko
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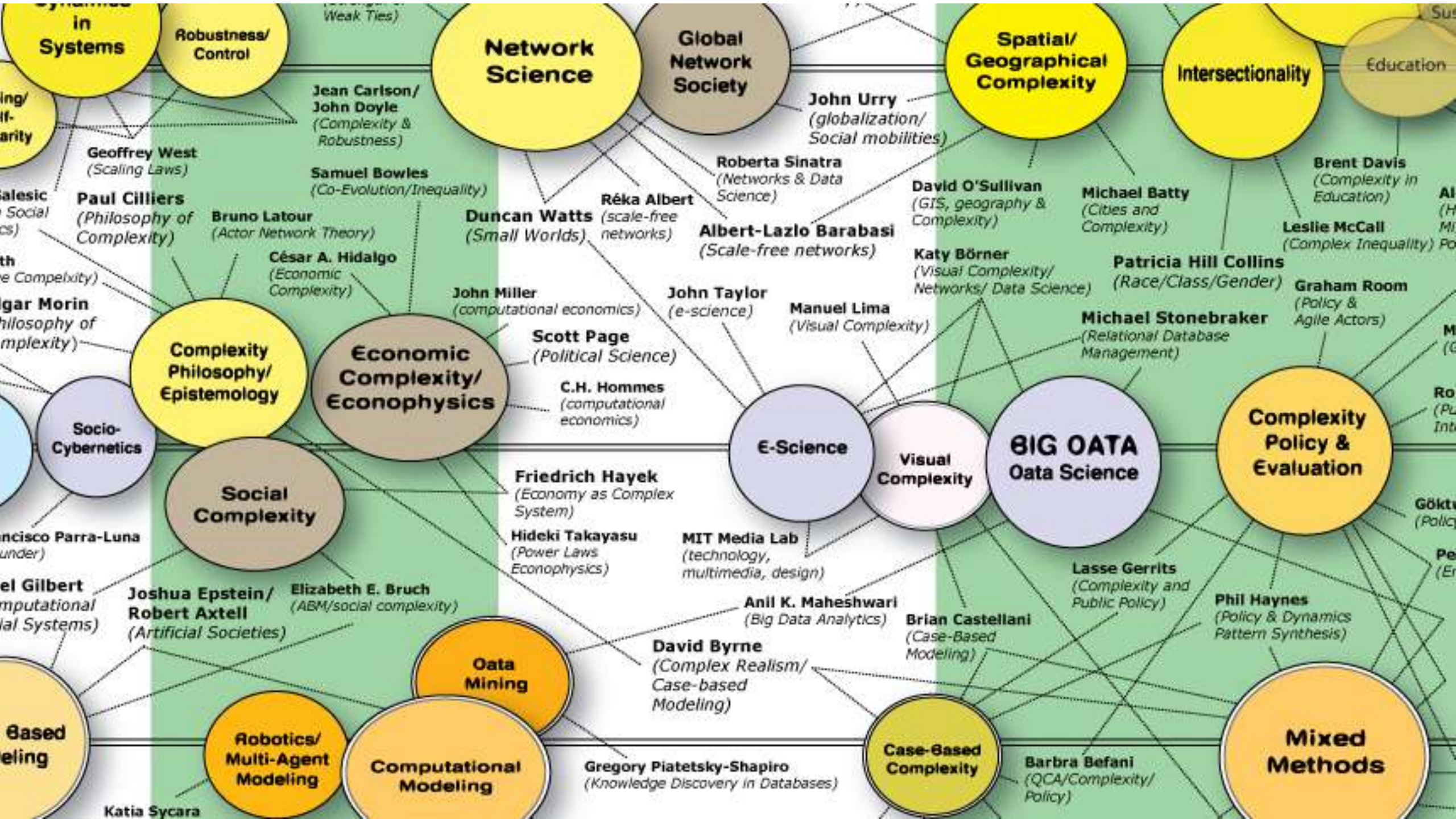
Thomas Schelling
(micro-motives/ Macro-behavior)


Weak Ties)
in Systems
Robustness/ Control
Network Science
Global Network Society
Spatial/ Geographical Complexity
Intersectionality
Education
Jean Carlson/ John Doyle (Complexity & Robustness)
John Urry (globalization/ Social mobilities)
Geoffrey West (Scaling Laws)
Samuel Bowles (Co-Evolution/Inequality)
Roberta Sinatra (Networks & Data Science)
Brent Davis (Complexity in Education)
Paul Cilliers (Philosophy of Complexity)
Bruno Latour (Actor Network Theory)
Duncan Watts (Small Worlds)
Réka Albert (scale-free networks)
Albert-Lazlo Barabasi (Scale-free networks)
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BIG OATA Oata Science
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David Byrne (Complex Realism/ Case-based Modeling)
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Mixed Methods
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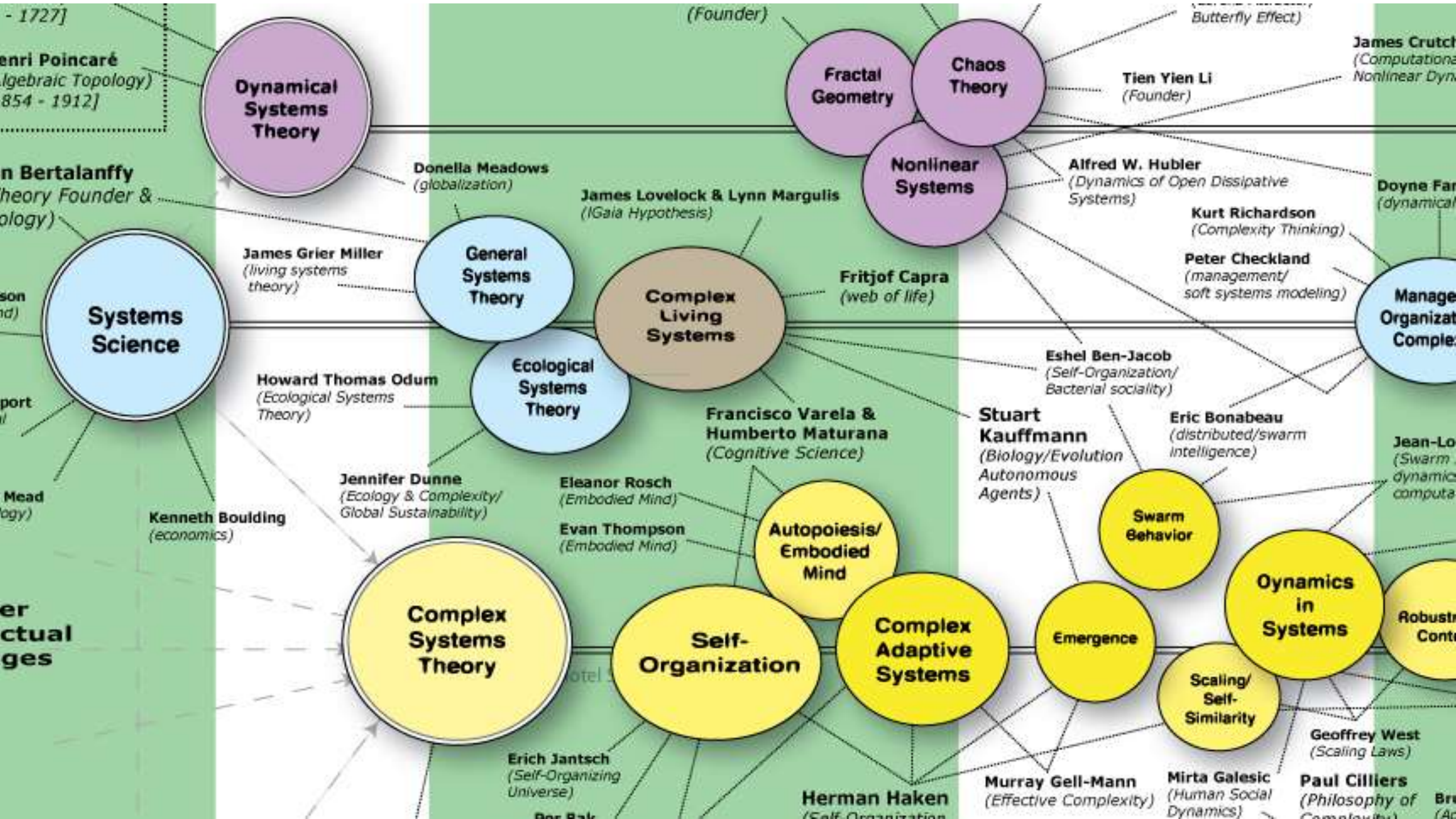
Barbra Befani (QCA/Complexity/ Policy)
Katia Sycara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Dynamical Systems Theory
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Doyne Far
(dynamical
Kurt Richardson
(Complexity Thinking)
Peter Checkland
(management/ soft systems modeling)
James Grier Miller
(living systems theory)
General Systems Theory
Complex Living Systems
Fritjof Capra
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Systems Science
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Howard Thomas Odum
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Eshel Ben-Jacob
(Self-Organization/ Bacterial sociality)
Francisco Varela & Humberto Maturana
(Cognitive Science)
Stuart Kauffmann
(Biology/Evolution Autonomous Agents)
Eric Bonabeau
(distributed/swarm intelligence)
Jean-Lo
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Jennifer Dunne
(Ecology & Complexity/ Global Sustainability)
Eleanor Rosch
(Embodied Mind)
Evan Thompson
(Embodied Mind)
Autopoiesis/ Embodied Mind
Swarm Behavior
Kenneth Boulding
(economics)
Complex Systems Theory
Self-Organization
Complex Adaptive Systems
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Oynamics in Systems
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Geoffrey West
(Scaling Laws)
Erich Jantsch
(Self-Organizing Universe)
Herman Haken
Murray Gell-Mann
(Effective Complexity)
Mirta Galesic
(Human Social Dynamics)
Paul Cilliers
(Philosophy of

How can policy respond effectively to these problems?

- Jesper Christiansen (2012) states ‘In order to respond effectively to a changing context of complexity and uncertainty, governments and other public service organizations need to consider **innovating the processes and practices of public policy** itself.’

- To innovate socially many governments have started to **explore new approaches, methods, and tools** including also **design** (Junginger,2013; Howlett, 2015; Kimbell, 2017; Junginger, 2018)

Renovation starting from:

- **Procedures**, that are often inappropriate and obsolete following old dynamics of the public sector compared to the scale and speed of change and technological development, frequently the traditional process followed by policymakers is linear and deterministic (Hubert, 2010);

- **Organisational structures and procedures**, that are often inadequate to support the flow of Information and collaboration (i.e. old silos structure) (Froy, F. and S. Giguère 2010);

- **Citizen engagement**, that is often not appropriately applied to the design and development of policy (Holmes 2011).

Applying design practice in the public sector

- Wicked problems and Third and fourth orders of design. (Buchanan, 1992, 2001).

- Norman et al. (2015) have described how **design** can play an **active role in reducing political, social and cultural disruption** while building more resilient solutions alongside optimizing resources.

- Bason (2017) has underlined the potential of applying **design practice in public sector** and administration using three dimensions:
  - *Exploring the **problem space***
  - *Generating alternative **scenarios***
  - *Enacting **new practices***

Design for Policy

- «[…]**Design research** and **design methods** can support the efforts of **public officials** to identify new ways of working and to aid in the **implementation of new thinking and doing**» (Junginger, 2018).

- «What "**designing for policy**" seems to be questioning is how the mandate for change is created and sustained, as well as how a better relationship between **policy and practice** could increase the likelihood of successful state interventions and build **public legitimacy**. » (Mortati et al. 2018).

Connecting complexity theory and design for policy

Complex theory to support design for policy

- When **design** start to deal with **policy** it is implicit that it works with **complex system**. Therefore, through the lens of the complexity theory, design for policy has tools and the perspectives to **understand the complexity**.

- On the other hand, **not connecting** design for policy to the complexity theory make complex system perceived as **confused** and difficult to understand, therefore complexity would be perceived as a **problem**.

Design & complexity

- Pizzocaro (2004) notices how design in its practices embraces **uncertain contexts** for the ability of designers to **frame problems** mentioning Morin (1977) which referring to designers says “they need to have a method which enables them to design the **multiplicity of viewpoints** and **being able to switch from one to another**”.

- Referring to complexity Manzini(2015) states “the traditional **boundaries between designer, provider, and user** of a solution become increasingly **blurred**.[…] The emergence of this “enriching complexity” can be considered a value that reflects the true nature of human beings”.

- **Design X** (Norman et al, 2015).

Complexity and policy

- Ceruti (2007) supports the idea of a **complex view** in contrast with the (iper)specialization of the modern time. In order to have an understanding of complexity, it is needed a **dialogue between areas of knowledge**. Furthermore, he states, this dialogue becomes relevant not only in research, but for **policymakers** which are **not equipped with the adequate paradigms and the cultural maps** neither to solve complex problems nor to formulate them.

- In a time when policymakers are tasked with developing innovative solutions to **increasingly complex policy problems**, the need for **intelligent design** of **policies** and a better understanding of the **policy formulation** processes they involve has never been greater. (Howlett et al, 2015)

A shared vocabulary

- The aim of this position paper is to start building a shared vocabulary, by analysing the area of knowledge between Complexity & Design & Policy.

- The research is in an early stage in which it is under analysis what has been produced in the common areas of knowledge between:
  - *Complexity and Design*
  - *Complexity and Policy*
  - *Design and Policy*

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