DECIVIL
DEPARTAMENTO DE ENGENHARIA
CIVIL, ARQUITETURA E GEORRECURSOS
TÉCNICO LISBOA

Área Científica de Sistemas Urbanos e Regionais
Master in Engineering and Management of Innovation and Entrepreneurship
Master in Environmental Engineering
Avaliação Ambiental Estratégica / Strategic Environmental Assessment

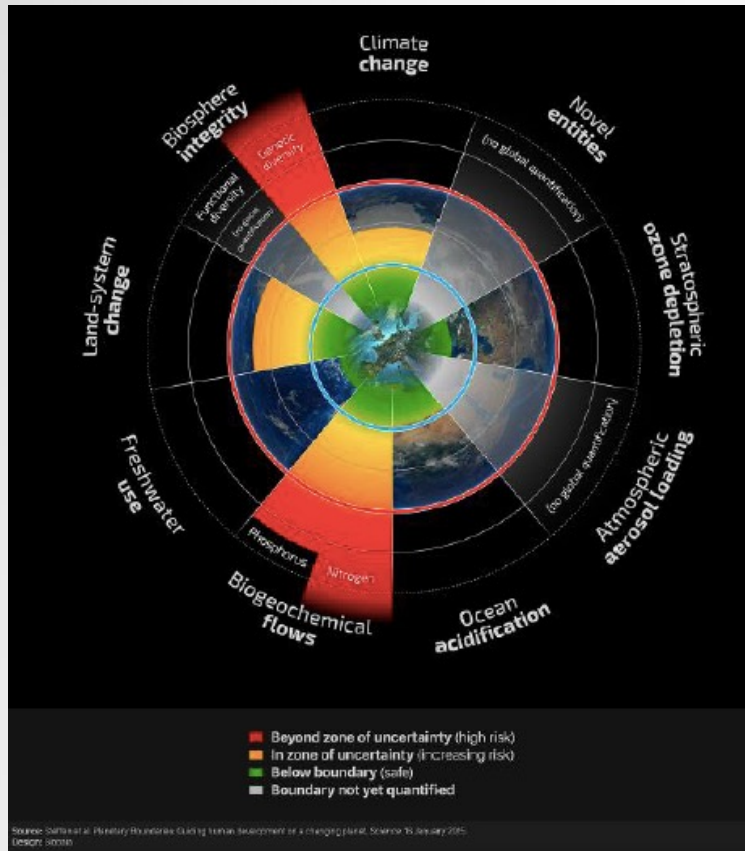# SEA, global problems and sustainability (big picture)
Basic concepts
Concept of strategy
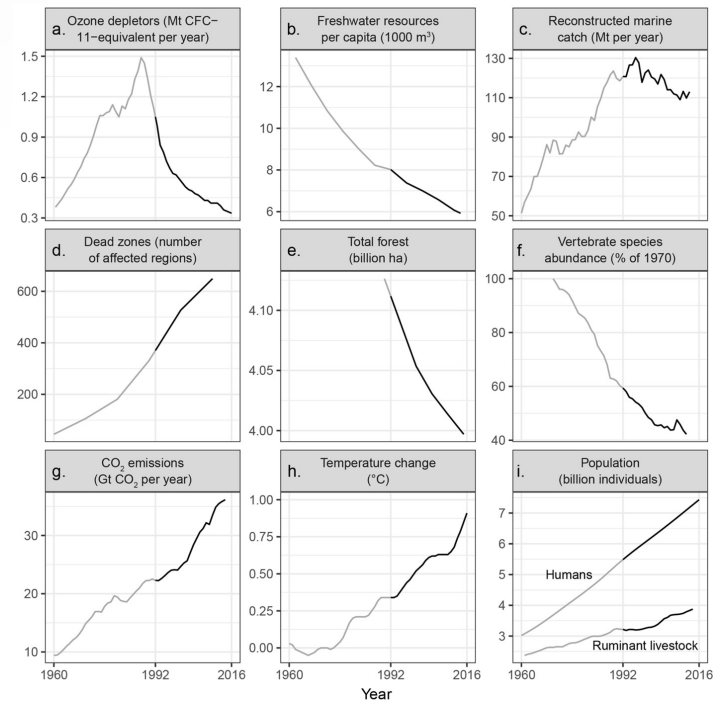
Prof. Doutora Maria do Rosário Partidário

Multi-scale

We Are One Planet
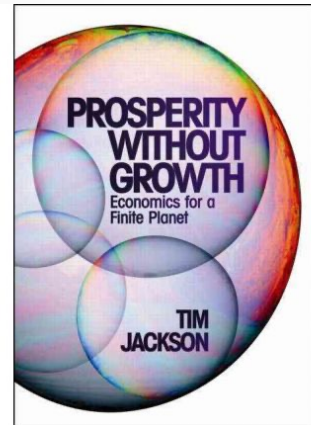
Carl Sagan

Strategic Environmental Assessment @ MRPartidário

Planetary boundaries

Second notice from scientists (Nov 2017)

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Global changes and persistent environmental problems are complex and uncertain and call for new attitudes and actions

The frequency of extreme heat events is increasing.

2007

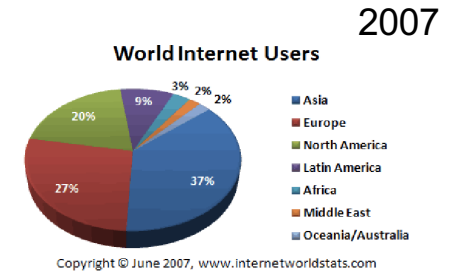**World Internet Users**

- Asia 37%
- Europe 27%
- North America 20%
- Latin America 9%
- Africa 3%
- Middle East 2%
- Oceania/Australia 2%

Copyright © June 2007, www.internetworldstats.com

Internet Users in the World by Regions - June 30, 2017

- Asia 49.7%
- Europe 17.0%
- Lat Am / Carib. 10.4%
- Africa 10.0%
- North America 8.2%
- Middle East 3.8%
- Oceania / Australia 0.7%

Source: Internet World Stats - www.internetworldstats.com/stats.htm
Basis: 3,885,567,619 Internet users in June 30, 2017
Copyright © 2017, Miniwatts Marketing Group

sky NEWS
Terror attack in Barcelona tourist spot

PARIS TERROR ATTACKS

Petit Cambodge
La Belle Equipe
Bataclan Concert Hall
Hostage Situation
Avenue de la Republique

BREAKING NEWS
AT LEAST 153 DEAD IN PARIS TERROR ATTACKS
CNN TONIGHT

PROSPERITY WITHOUT GROWTH
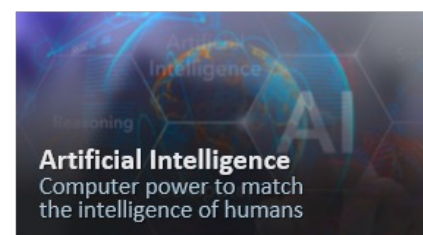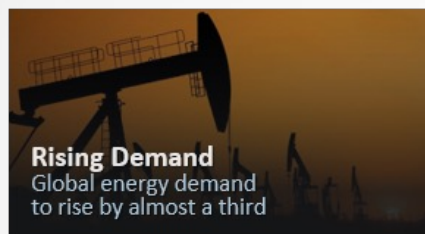Economics for a Finite Planet
TIM JACKSON

ELSEVIER

Contents lists available at SciVerse ScienceDirect

Ecological Economics

journal homepage: www.elsevier.com/locate/ecolecon

Analysis

Beyond GDP: Measuring and achieving global genuine progress

Ida Kubiszewski [a,*], Robert Costanza [a], Carol Franco [b], Philip Lawn [c], John Talberth [d], Tim Jackson [e], Camille Aylmer [f]

Economic growth no longer ensures prosperity (Jackson 2009)

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Top 10 Global Megatrends 2020-2030

MEGATRENDSWATCH
Think Tank Institute for Futures Research

Demographic Shift
Global ageing population to increase by 60 percent

Rising Demand
Global energy demand to rise by almost a third

Economic Expansion
Global economy to double in size to about $150 trillion

Hyperconnected Earth
Connected devices to surge eightfold reaching 125 billion

Ecological Overshoot
Human ecological footprint will demand 2 planets Earth

Mega Urbanisation
Another 15 cities will have populations above 10 million

Resource Scarcity
Half of the global population to face severe water shortages

Multipolar Globalisaton
Emerging economies (E7) will overtake developed ones (G7)

Artificial Intelligence
Computer power to match the intelligence of humans

Climate Change
Global temperatures to rise by about 1.5 degrees celsius

Megatrends Watch Institute | Megatrends.Watch

http://www.megatrendswatch.com/megatrends-2050.html

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SUSTAINABLE DEVELOPMENT GOALS

"Transforming our world: the 2030 Agenda for Sustainable Development" (A/RES/70/1), adopted on 25th September 2015

Objectives
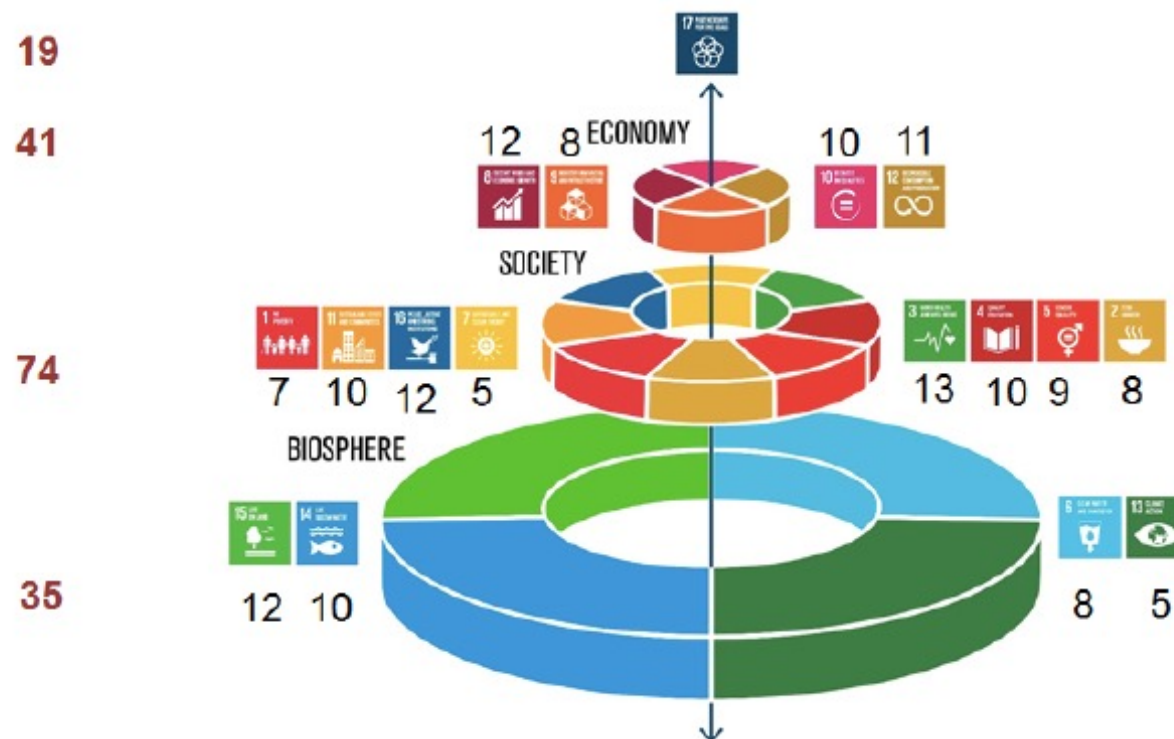
17

Targets

169

Indicators

232

https://www.un.org/sustainabledevelopment/decade-of-action/

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SUSTAINABLE DEVELOPMENT GOALS

17 SDGs and 169 targets across biosphere, society and economy

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SUSTAINABLE DEVELOPMENT GOALS

- PEOPLE (74 targets, 44%)
- PLANET (35 targets, 21%)
- PROSPERITY (41 targets, 24%)
- PEACE – horizontal target
- PARTNERSHIPS (19 targets, 11%)

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Solution: Simplify → holistic & co-creation
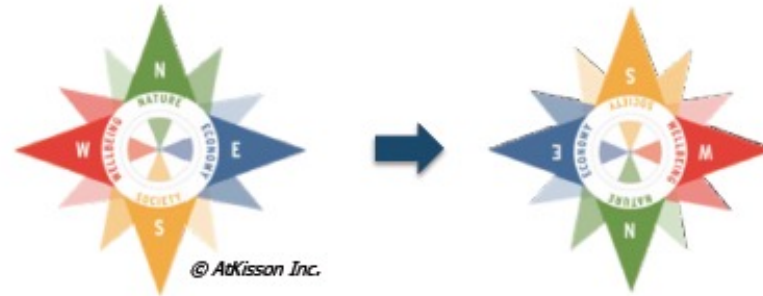
SUSTAINABLE DEVELOPMENT GOALS

Single (one by one) or Groups (sets) – cherry picking

Network – centred in one looking at synergies with others

Full network of the 17 – synergies all accross

SUSTAINABLE DEVELOPMENT GOALS

We find support for our passion in four specific goals, namely:

No. 7   Ensure access to affordable, reliable, sustainable and modern energy for all;

No. 11   Make cities and human settlements inclusive, safe, resilient and sustainable;

No. 13   Take urgent action to combat climate change and its impacts;

No. 17   Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Systemic view on the SDG - *indivisible whole*
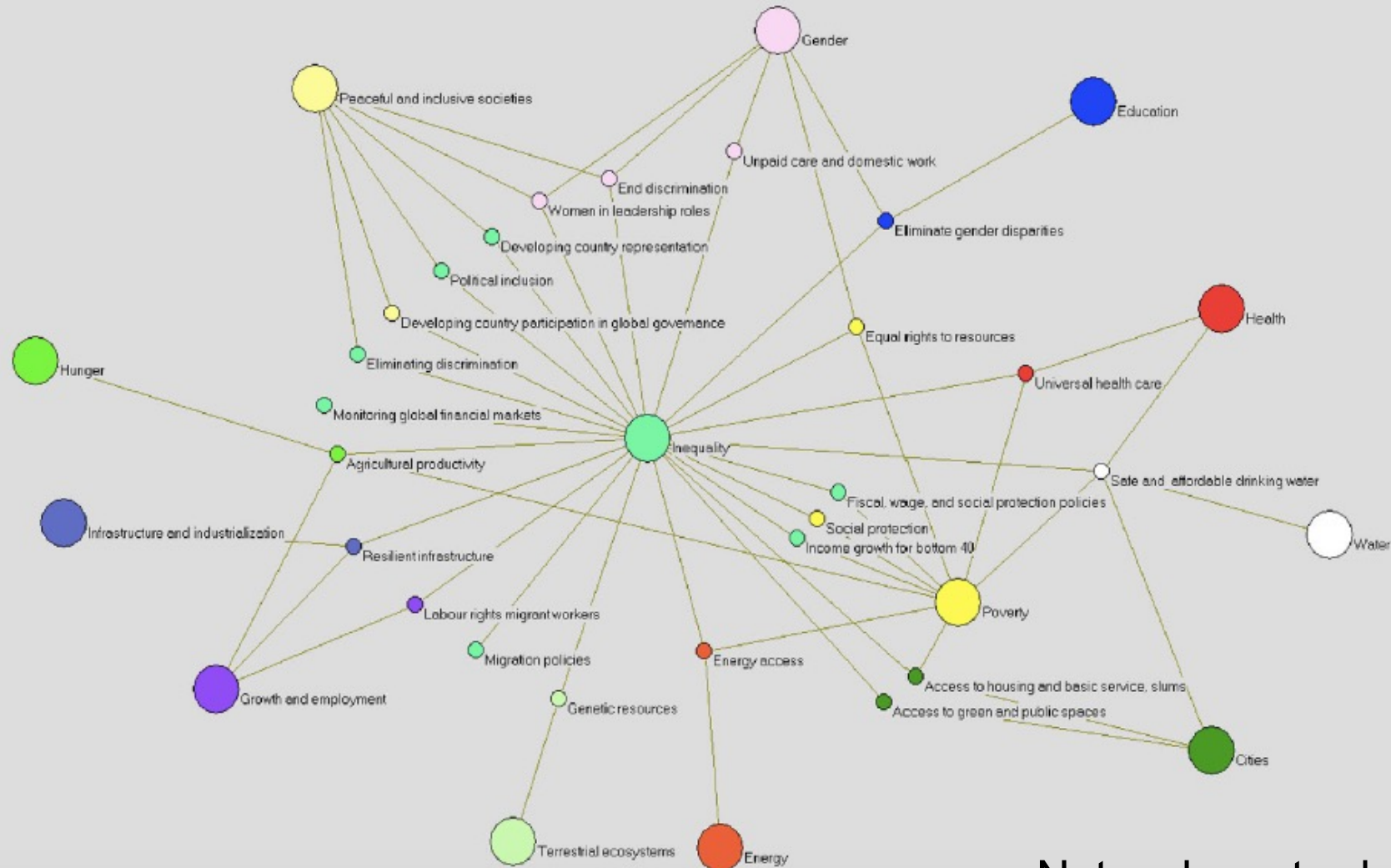
Network centred on SDG10

Systemic view on the SDG - *indivisible whole*

Network of goals

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Goals scoring

The influence of one Sustainable Development Goal or target on another can be summarized with this simple scale.

| Interaction	Name	Explanation	Example
+3	Indivisible	Inextricably linked to the achievement of another goal.	Ending all forms of discrimination against women and girls is indivisible from ensuring women's full and effective participation and equal opportunities for leadership.
+2	Reinforcing	Aids the achievement of another goal.	Providing access to electricity reinforces water-pumping and irrigation systems. Strengthening the capacity to adapt to climate-related hazards reduces losses caused by disasters.
+1	Enabling	Creates conditions that further another goal.	Providing electricity access in rural homes enables education, because it makes it possible to do homework at night with electric lighting.
0	Consistent	No significant positive or negative interactions.	Ensuring education for all does not interact significantly with infrastructure development or conservation of ocean ecosystems.
−1	Constraining	Limits options on another goal.	Improved water efficiency can constrain agricultural irrigation. Reducing climate change can constrain the options for energy access.
−2	Counteracting	Clashes with another goal.	Boosting consumption for growth can counteract waste reduction and climate mitigation.
−3	Cancelling	Makes it impossible to reach another goal.	Fully ensuring public transparency and democratic accountability cannot be combined with national-security goals. Full protection of natural reserves excludes public access for recreation.

Basic theories and concepts in SEA

Sustainability Transitions
Complexity and Systems thinking
Strategy and strategic thinking

Inspiring strategic minds

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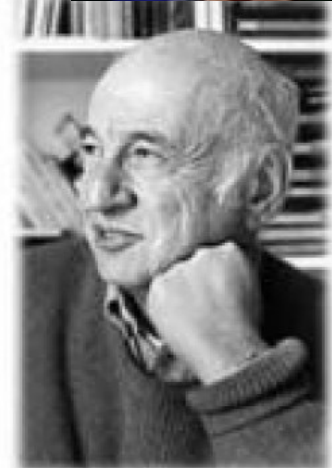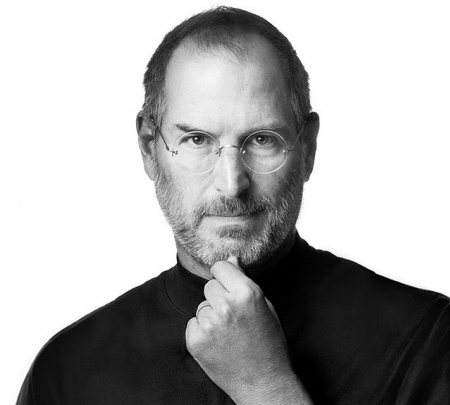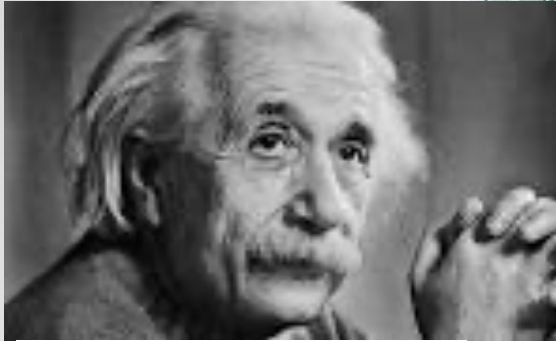
Sustainability transitions

Transition – nonlinear shift from one dynamic equilibrium to another (process of change from one state to another)

Sustainability transitions – large-scale (disruptive) societal system changes necessary to solve grand societal challenges

Need for realizing more fundamental transitions as opposed to following gradual processes for reacing sustainable development

Loorbach et al, 2017

Transitions emerged from the intersection between science and policy, during the 1990's

Approaches:

Socio-technical – science and technology (eg mobility, energy, water)
Socio-institutional – role of agency and governance (social learning)
Socio-ecological – ecology and resilience theory and societal context (coupled socio-ecological systems)
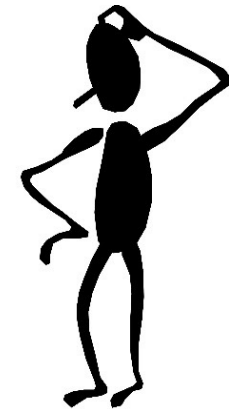
Loorbach et al, 2017

Commonalities in ST: path dependencies, regimes, niches, experiments and governance
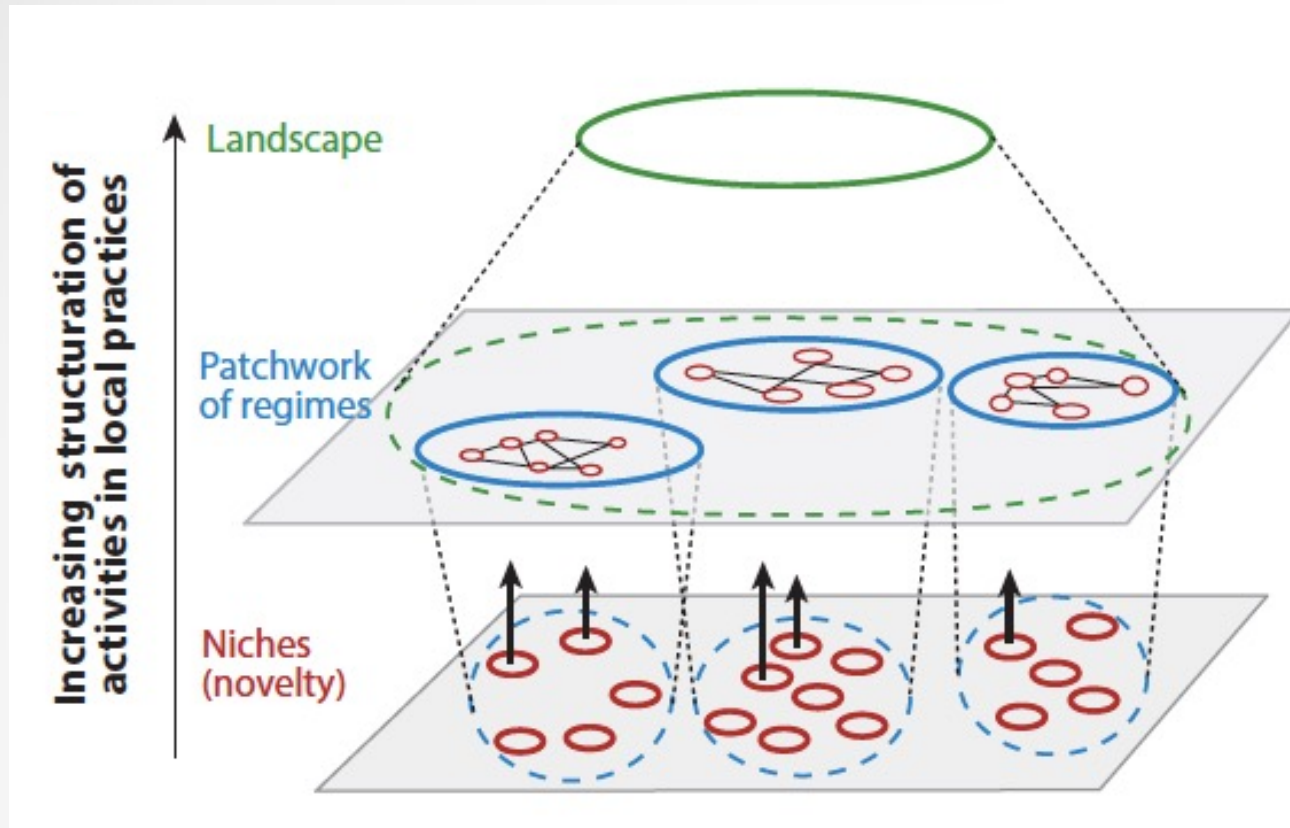
Regime:
the dominant order
(dominant and stable
configuration) in a
societal sub-system

Loorbach et al, 2017
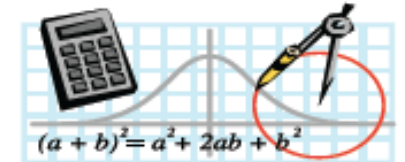
Complexity
Systems thinking

Schools of thought influence decision-making culture

Cartesianism (Descartes) philosophy – use of reason

Newtonianism paradigm –mechanic view of the universe

Postulates rationality, objectivity and measurement as unique means to reach knowledge; Techno-rationalistic "divide to conquer": nature has a defined order and structure and must be decomposed in simpler parts to be measured; The future is knowable given enough data points - to predict and control the future; phenomena can be reduced to simple cause & effect relationship – linear thinking

vs

Complexity science (multi-level strategic culture) – no assumption on linearity of processes, require adaptation, flexibility, participative and collaborative perspectives, learning and knowledge creation (Edgar Morin, Barlow) – systems thinking, sustainability transitions

From Newtonion mechanics to complexity science

We need to shift from seeing the world as composed mainly of **simple** predictable and controlable **machines**

To seeing it as composed mainly of **complex systems**

- Many components
- High degree of connectivity
- Not bounded – energy flows
- Non linear
- Emergent

https://homerdixon.com/wp-content/uploads/2017/05/Homer-Dixon-Oxford-Leadership-Journal-Manion-lecture.pdf

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Wicked problems

A problem that is difficult or impossible to solve because of incomplete, contradictory and changing requirements often difficult to recognize.
Or a problem whose social complexity means that it has no determinable stopping point.

Because of complex interdependencies, the effort to solve one aspect of a wicked problem may reveal or create other problems.
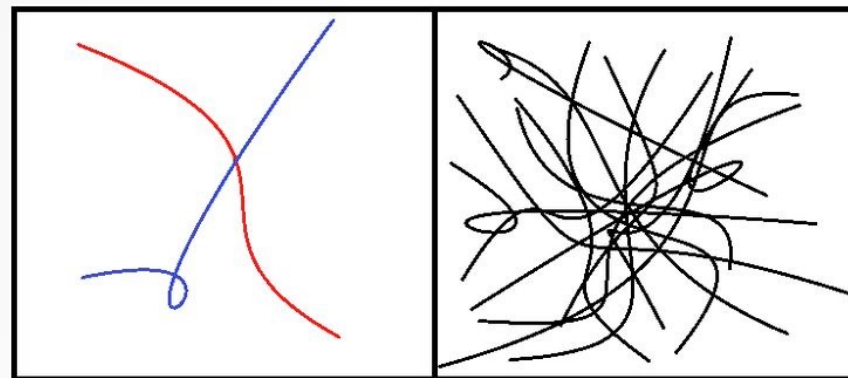
Traditional Problem   **Wicked Problem**

"There are a whole realm of social problems that cannot be treated with traditional linear, analytical approaches" (Rittel and Weber 1973)

There Are Several Types of Problems

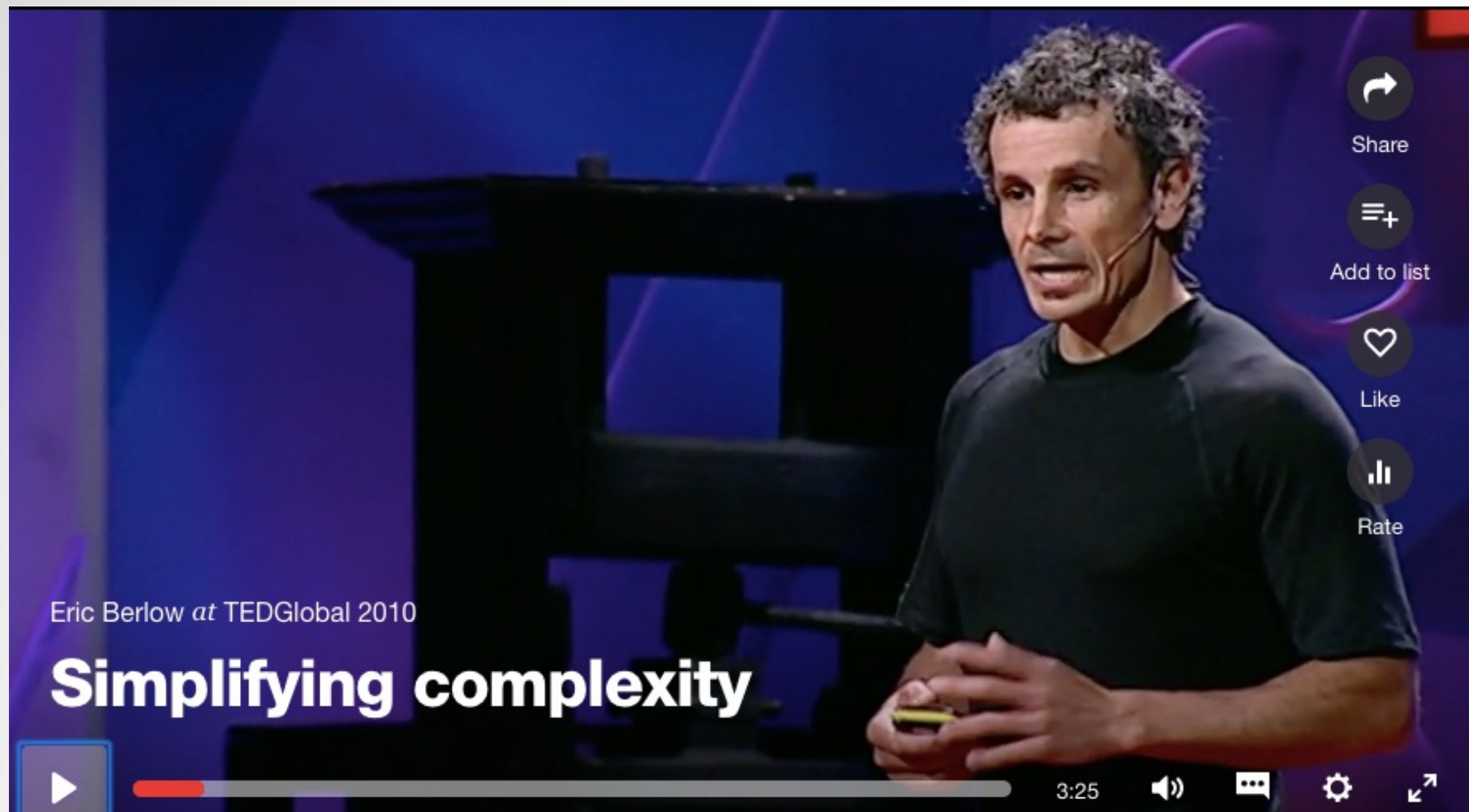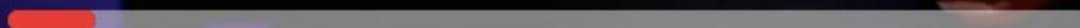| Simple	Complicated	Complex
Baking a Cake	**Sending a Rocket to the Moon**	**Raising a Child**
Right "recipe" essential Gives same results every time	"Formulae" needed Experience built over time and can be repeated with success	No "right" recipes or protocols Outside factors influence Experience helps, but doesn't guarantees success

Source: Zimmerman, SIG, 2013

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Eric Berlow *at* TEDGlobal 2010

Simplifying complexity

3:25

https://www.ted.com/talks/eric_berlow_how_complexity_leads_to_simplicity

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Flock of birds behaviour

Craig Reynolds

1. **Separation** - avoid crowding neighbors (short range repulsion)
2. **Alignment** - steer towards average heading of neighbors
3. **Cohesion** - steer towards average position of neighbors (long range attraction)
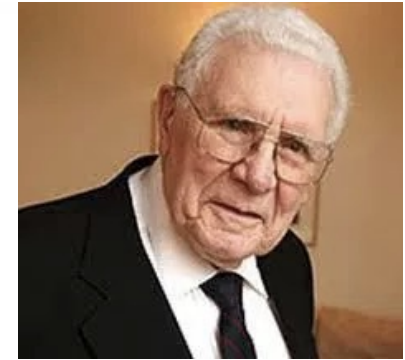
Fragmentation of knowledge

One of the tragedies of the dominant thought in our society today is that we have eminent specialists of very compartmentalized thought

(Edgar Morin, 2010)

The compartmentalization of disciplines impedes or limits understanding complexity
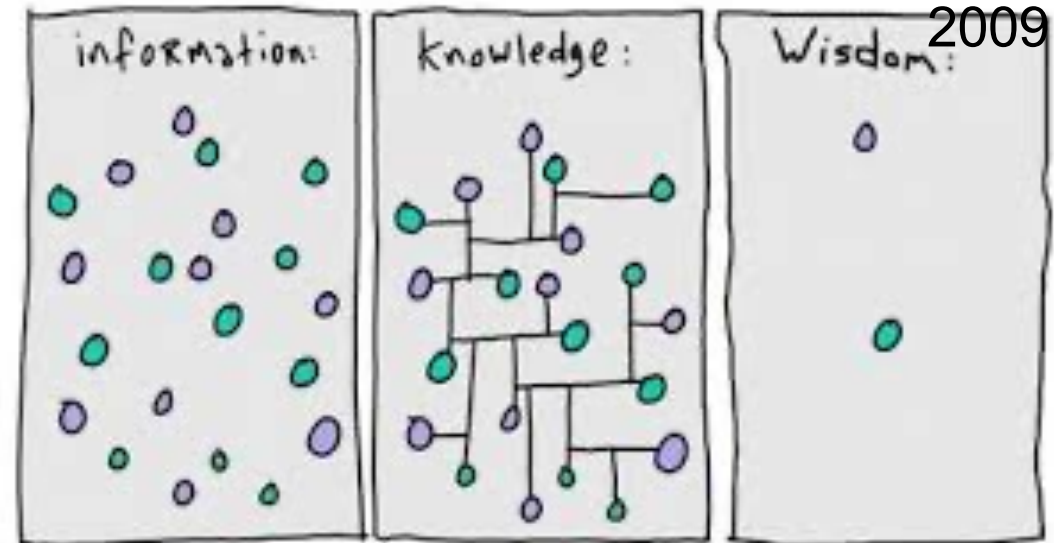
Systems thinking

1919-2009

A system is not a sum of the behavior of its parts, it's the product of their interactions
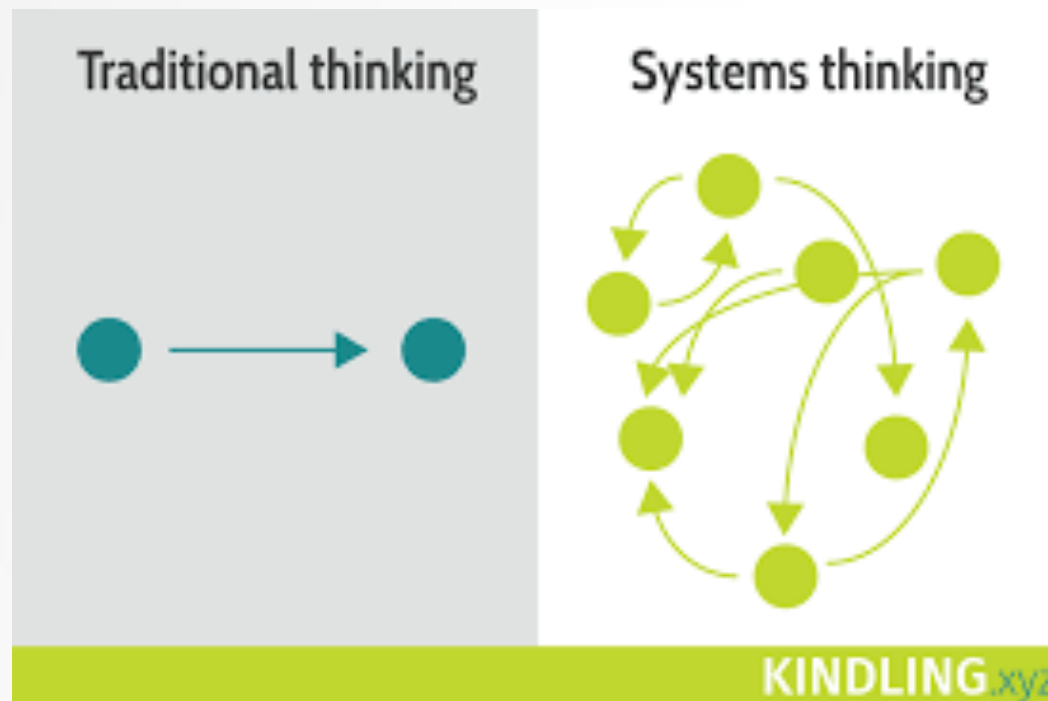

"The whole is greater than the sum of its parts"

information: knowledge: Wisdom:

Russel Ackhoff wisdom theory, 1989

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Acknowledge complexity and systems thinking

Strategy and strategic thinking

Sun Tzu oriental philosophy
544–496 BC

The Art of War

The ideal general wins the war before the fight begins.

Like water:

- Flow around obstacles and challenges
- Seek to follow the most effective path
- Respond quickly and adapt readily to change

# Concept of strategy

Strategy is opposed to programme

Like the programme, establishes an objective and a scenario for action

But contrary to the programme, modifies its action as a function of the information as well as the emerging unexpected events it encounters in its pathway.

Strategy is characterized by a strong conscience of uncertainty

(Edgar Morin)
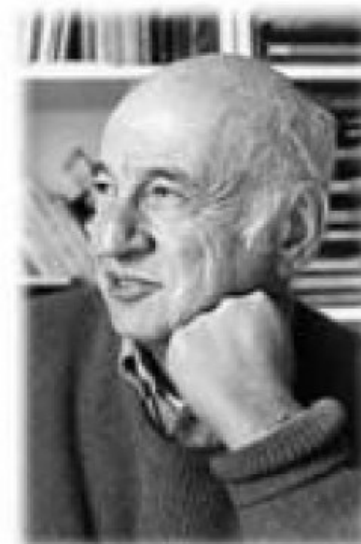
Strategy making involves shaping future development trajectories (Healey, 2009)
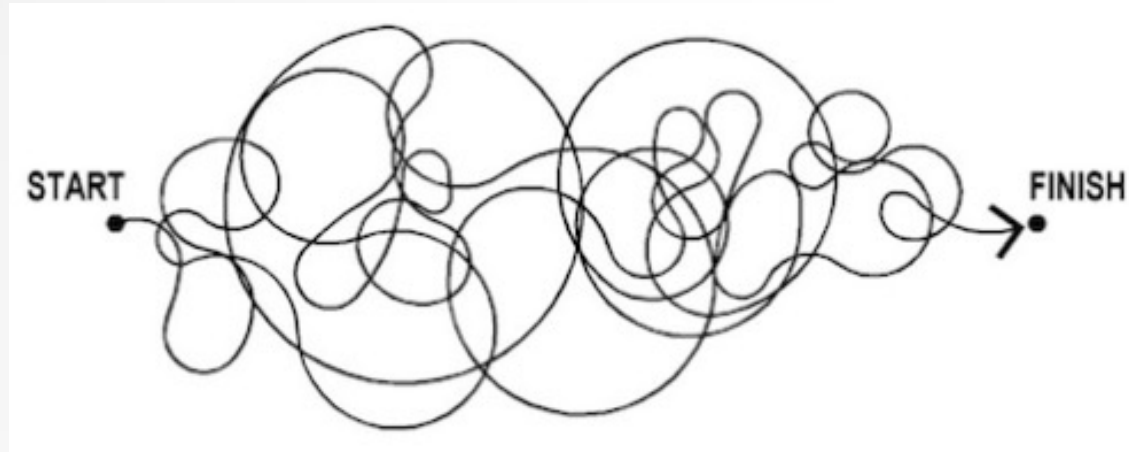
Strategic thinking is "a messy, back-and-forth process, with multiple layers of contestation and struggle" (Healey, 2007)

Strategy making is no simple activity which can be managed by procedural formulae - Demands systemic thinking rather than analytic thinking

"Strategic" implies that some decisions and actions are considered more important than others

> Creating the frame and identifying critical actions are both acts of intense simplification and selectivity, exercising power, making synthesis
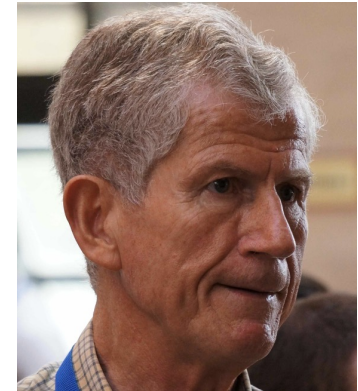
It involves taking risks, with unknown consequences

It is this frightening prospect which so often pulls actors back to easier short-term compromises, or to hand over the judgements to someone else

Albrechts, L. (2004) Strategic (Spatial) Planning Reexamined, Environment and Planning B: 31:743–758

Intended strategy

Deliberate strategy

Unrealized strategy
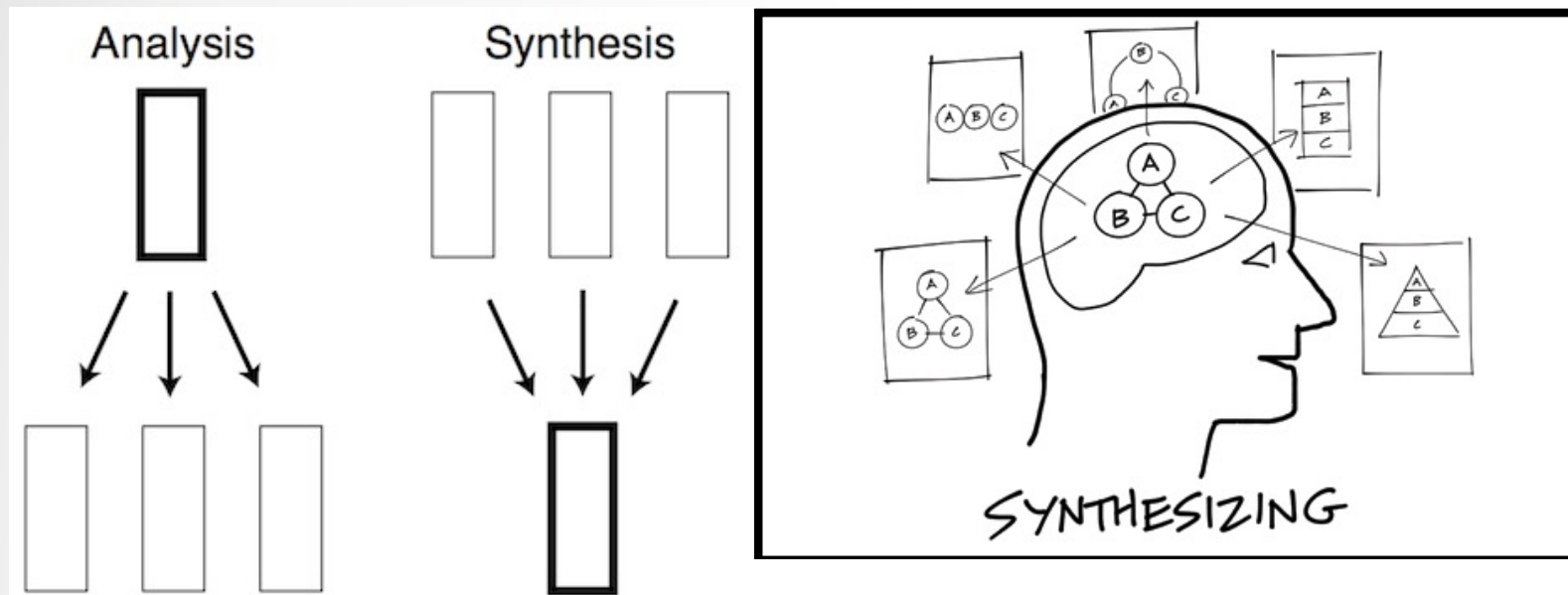
Emergent strategy

Realized strategy

According to Mintzberg (1994) strategic approaches in policy and planning are not intended to find out what can happen in the future but instead to guide actions that can perform pathways for a desirable future.

Based on Mintzberg, 1994

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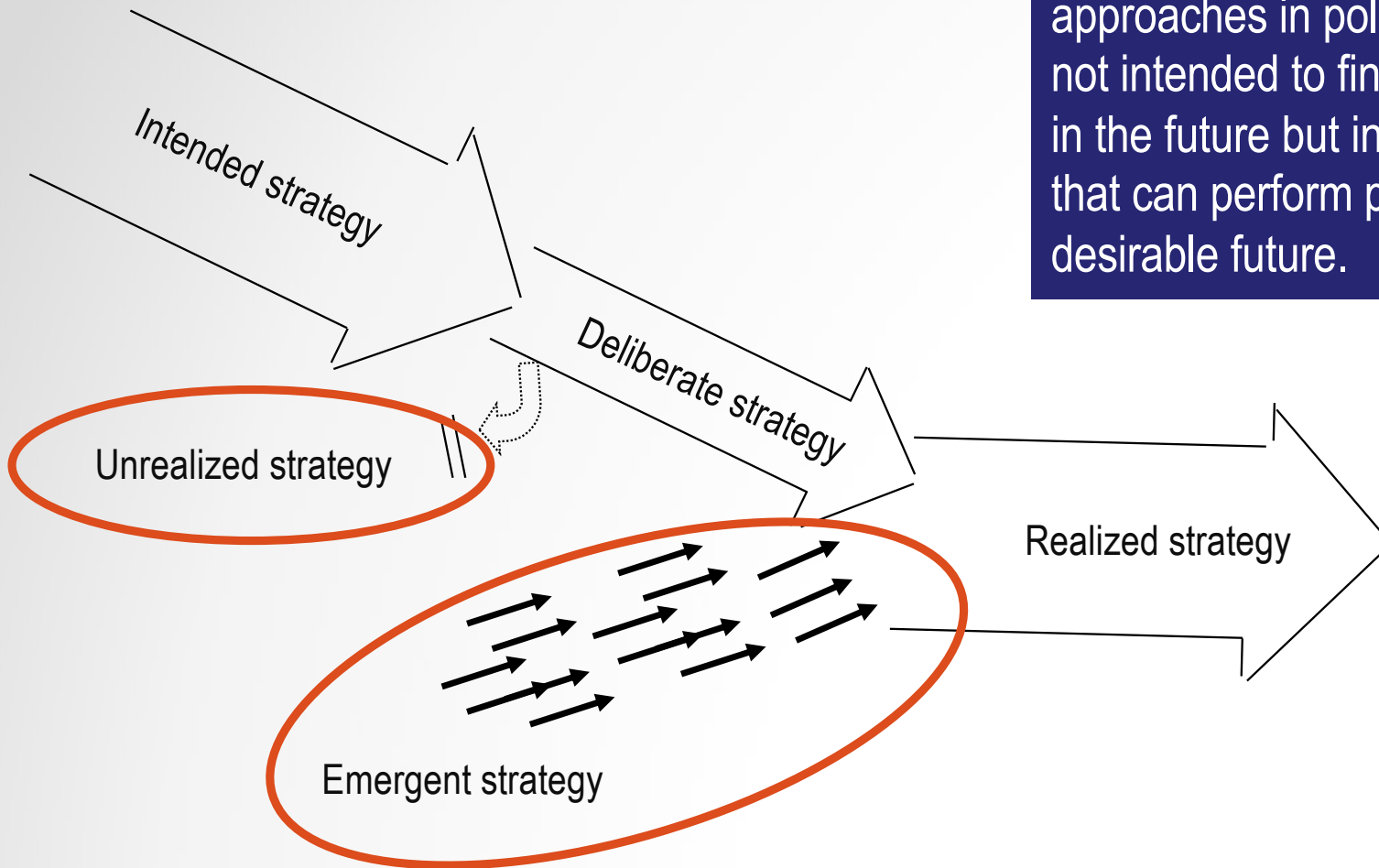
Analysis vs synthesis

Planning is analysis, strategy is synthesis Mintzberg (1994)

Strategic Plan

https://www.youtube.com/watch?v=74maeLEbdwk

(2,36 min)

Mintzberg 5 P

https://www.youtube.com/watch?v=ZhM1JW2Bb8Q

(8 min)

Why you need a strategy

https://www.youtube.com/watch?v=6c5kI5rJyBo

(4 min)

Discussion of Mintzberg (1987):
5 Ps for Strategy

Discuss the concept of strategy through the meaning of each P
-   Main idea retained (orange)
-   What you did not understand and want to clarify (pink)