

Introduction to CO-RRI

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SAPIRR – Systems Approach of Public Innovation & Responsible Research

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Background of this presentation

These slides are from a guest lecture (on 09/10/2018) in the course “Communication and Responsible R&I” (since 2018 a mandatory part of the *Master in Social Communication* at Complutense University Madrid - UCM)

- This course was launched at UCM as a result of H2020 project FoTRRIS (<http://fotrris-h2020.eu/>)
- The group consisted of 48 students, 2/3 of whom from China, about 10 from Latin-America and some from Spain.

The slides show:

1. The information that was given (mostly verbally) to the students (story-telling to explain the concepts)
2. The games to let them experience ‘complexity versus reduction’ (the embedded reality series) and the importance of ‘questioning assumptions’ (the 9-dots puzzle)
3. The results of the practical assignment (‘Cocreate and pitch a proposal for a more sustainable campus’). *(NB the whole group will set up a CO-RRI project on one of the proposed themes during the rest of the semester, in parallel with theoretical sessions and workshops.)*

These slides are the result of a cocreation with Dr. Liisa Hanninen (Lector) and the students.

CO-RRI = R&I for cocreating the future we dream

Wanderer, your footsteps are the road and nothing more;
Wanderer, there is no road, the road is made by walking.
By walking one makes the road, and looking back one sees
the path that will never be trod again.
Wanderer, there is no road, only a wake upon the sea.

Antonio Machado, from 'Proverbios y cantares'
(Cited in Kelly Chapman, 'Complexity and Creative Capacity')



Photo: The Next System Project

Conceptual-methodological framing of complex problems

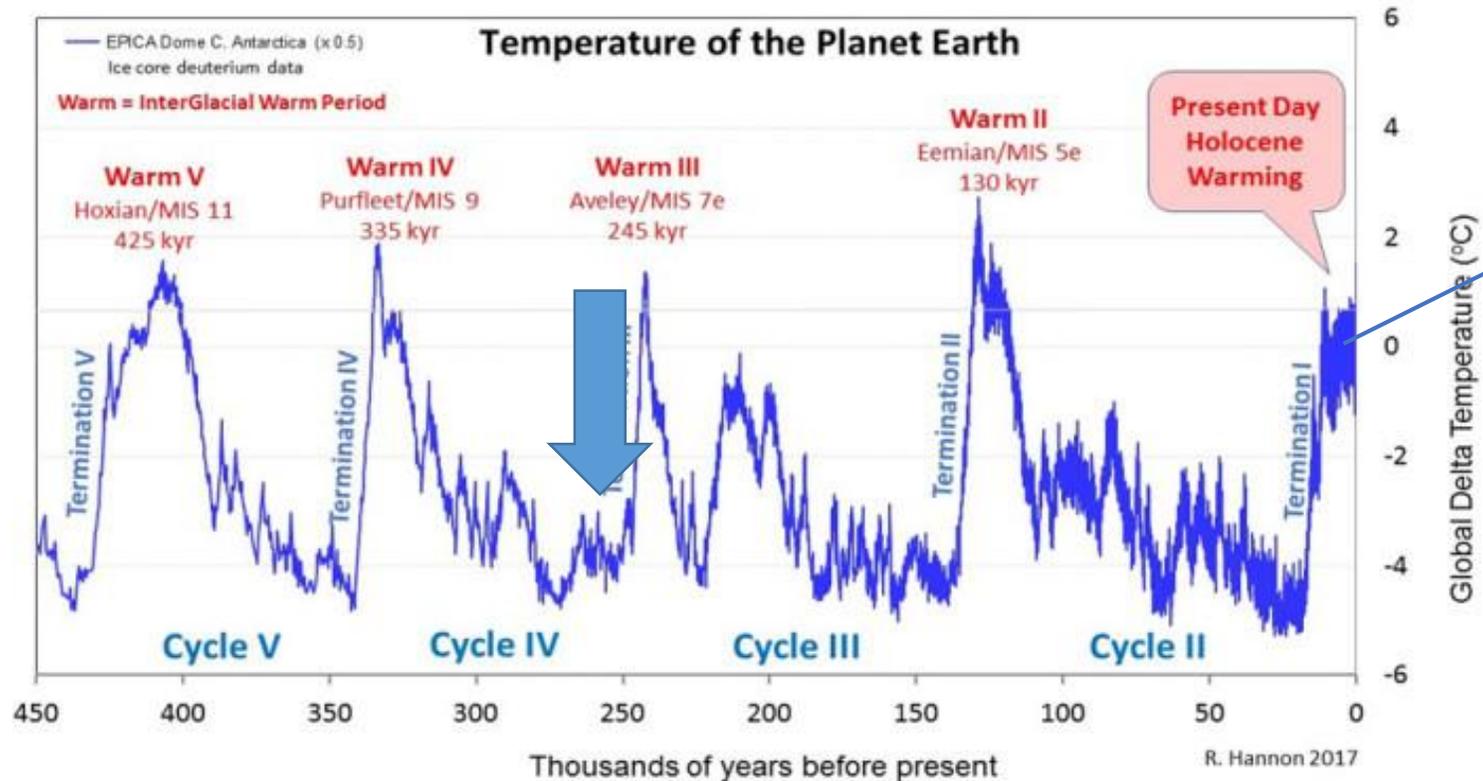
Example: framing climate refugees as a 'security' challenge (film [Dr. Angela Oels](#))

	Conceptual framing	Methodological framework	Select tools & policies
	National security	<i>To fear</i> Refugees as a threat, defend national interests	Build frontiers Prepare for climate wars
	Human security	<i>To save</i> Refugees as victims	Humanitarian aid
	Human security	To make Refugees <i>resilient</i> for a changing climate	Foster affected populations' resilience (e.g. 'relocate')
	Ecological security	To mitigate = change production and consumption practices	Address causes of climate change responsibly

RRI too is framed in various ways: from 'linear' (silo) to 'complexity based'

Ontological linear framing	Epistemological model	Selected tools & policies
<p>Reality must be analysed and controlled even <i>better</i> using the current scientific assumptions viz. linear reality, possible to control its variables and predict outcomes</p>	<p>More technical sophistication with additional criteria Example: from 'astronomy' to 'responsible astronomy'</p>	<p>Add-on optional criteria for RRI</p> <ol style="list-style-type: none"> 1. <i>Include women, e.g. in STEM</i> 2. <i>Inform policy makers of results</i> 3. <i>Explain to citizens</i> 4. <i>Science education</i> 5. <i>Ethics = researcher integrity</i> 6. <i>Open science</i>
<p>New emergent framing</p>	<p>Relevant knowledge = Ethics & Arts + STEM</p>	<p>Methods = transdisciplinary cocreation WITH all societal actors</p>
<p>Current challenges are complex (non-intended, non-linear) issues of human making (Antropocene), so the assumptions and 'responsibility' of science must be analysed critically</p> <p>Emergent ontology = (next level of) complexity</p>	<p>Define a desired future state : "what world do we want/dream and how do we get there?" = ethical question SDGs as leverage</p> <p>Ethics of RRI = support co-evolution towards Common good (SDGs)</p>	<p>Tools for ethical, inclusive dialogue & creativity <i>Openness, gender awareness, citizen engagement, education and governance for a sustainable future and the common good (ethics) = crucial conditions for RRI</i></p> <p>Methodology = transdisciplinary cocreation = learning how to co-evolve with life</p>

Anthropocene: human impact on biophysical systems ('Anthropos' = Man)



Holocene =
period of stable climate
Created conditions for agriculture
This brought human population
growth and increasing complexity
(writing, cities, science, culture...)

Anthropocene =
Climate change causes more
extreme weather conditions
(for which our agriculture and
infrastructure are not prepared...)

Graph: <https://wattsupwiththat>

The good news: if humans can have a destabilising impact on the planet, they can also have a more responsible impact.
How? With CO-RRI !

Complexity: how to grasp it?

- ✓ What links the pictures? “Connected, interdependent, embedded, one is part of the other...”. The small scale things depend on the large scale, but the large also depends on (is built up from) the small scale.
- ✓ At various scales different concepts & methodologies allow us to understand what we see (e.g. biology, architecture, psychology, astronomy...).
- ✓ Complex systems: “a forest is more than the sum of the trees.” Studying *all trees* does not allow us to understand the way the *forest* ecosystem functions. Every scale represents an increasing level of complexity.
- ✓ Classical sciences = specialist disciplines which focus on *one scale only*, unaware of (interdependence with) higher and lower scales or of large time scales (beyond direct human perception).
- ✓ So understanding complexity requires co-creation of knowledge in an inter-/transdisciplinary way, linking various scales and disciplines.

CO-RRI = CO-creative (interdisciplinary) response to complex problems



Understanding complexity and non-linearity

A medicine which kills 95% of the bug (germ) in the laboratory is “very successful”

Scientists, political leaders and companies **assume** that using *more* of this medicine will bring *more* health (linear)

So they start operating not only at the scale of the laboratory, but within a global reality at a higher scale of complexity. So...

- Only the 5% strongest bugs are allowed to reproduce (this is a ‘breeding program’ for superbugs)
- Our immune system no longer learns how to deal with bugs, so our resistance weakens
- Antibiotics wash out in the ground water, tap water, food... even children's’ immune system gets lazy



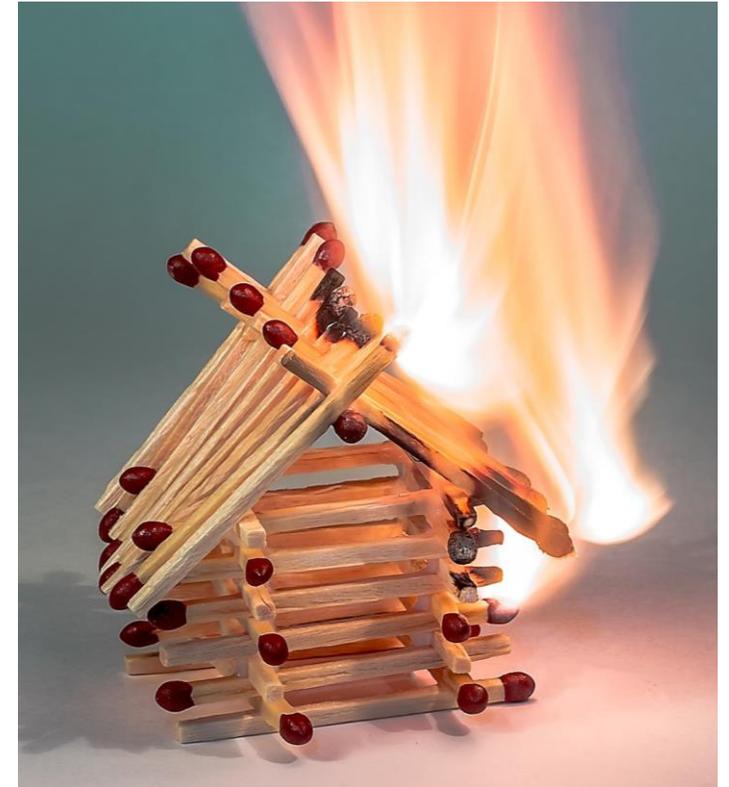
- ✓ A tipping point: what was ‘good’ at small scale becomes ‘bad (a crisis) at large scale (non-linear)
- ✓ This falsifies the ‘assumption’ of a linear reality at all scales
- ✓ More is not *always* better, growth is not *always* good, for this depends on scale !

Classical (non-complex) research and its unintended effects

- ✓ Using technologies (especially with fossil fuels and polluting particles) at large scale (i.e. globalisation) destroys human ecosystems
- ✓ Nobody 'intended' to change the climate, pollute oceans, kill biodiversity...
- ✓ These impacts were 'unforeseen' because classical science *does not see* larger scale picture and so does not understand non-linear complexity
- ✓ E.g. economics calls these effects at other scales 'externalities' → they are not taken into account in the price of a product or in the book-keeping of a company...

The good news:

- ✓ Today we learn from the past and start understanding (emergent) complexity
- ✓ This allows for more 'responsible' research at *complex* global scales
- ✓ Which is CO-RRI (Complexity Oriented RRI)

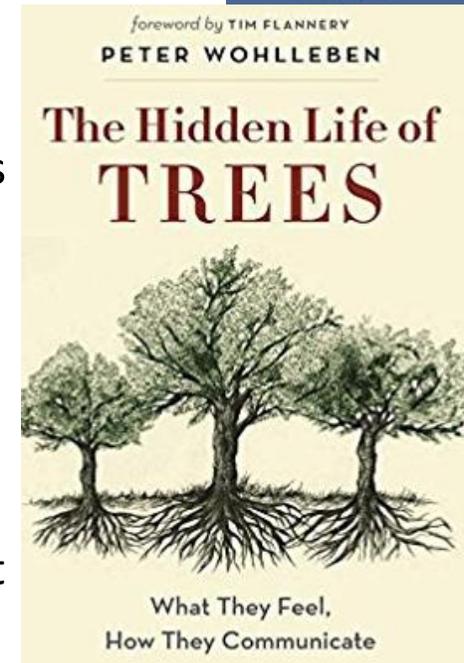


Reality = complex embedded systems

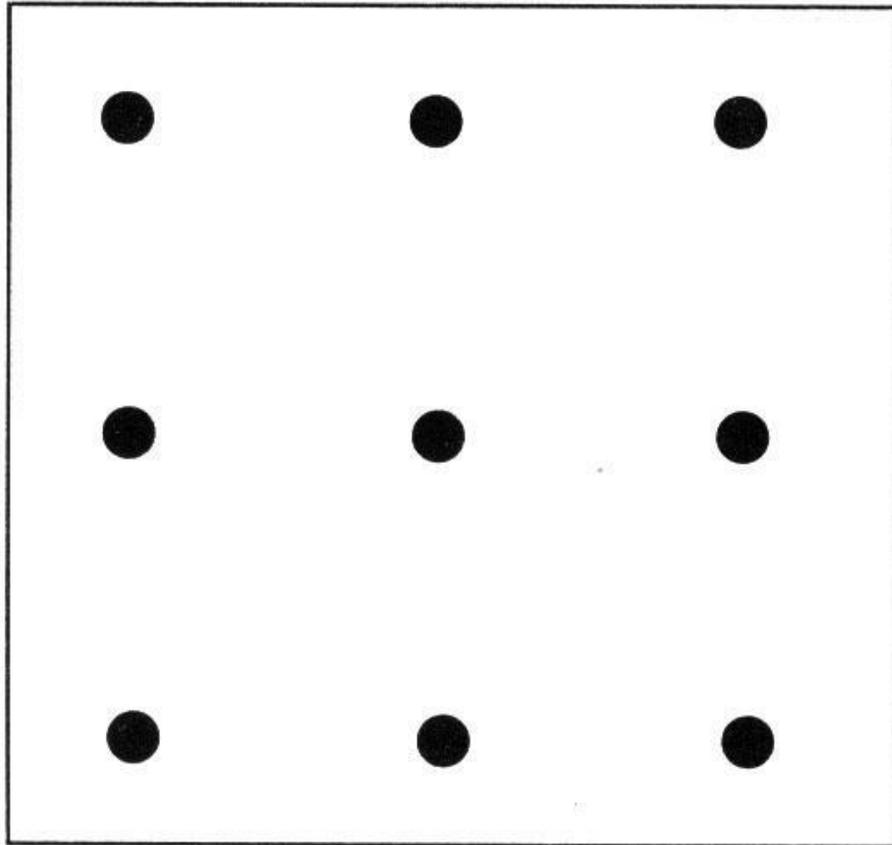
- Perception is embodied (humans versus bats or trees)
- Research tools can increase human perception (microscope, telescope), but this does not allow us to 'see' the *interdependence* of scales (so tipping points emerging at large scales were not 'foreseen' by science)
- Science = making a representation of reality. This representation functions as a *map* to make sense of (and orient ourselves in) complex reality.
- **But: the map is not the territory !**
- E.g. at subatomic level, this is accepted: the *subject* determines what is seen (particle or wave), no 'neutral' perception of an 'objective' reality
- Science is *always* simplification, a construction to help us navigate reality. Our conceptual and methodological frameworks determine what we see and what we don't see
- **Systems theory = understanding complex interconnected systems, i.e. in which *interactions* among the parts (sub-systems) determine the behaviour of the whole, which means a system cannot be improved by changing its parts!**



www.wdcs.org



Why is it so difficult to learn lessons from the past?

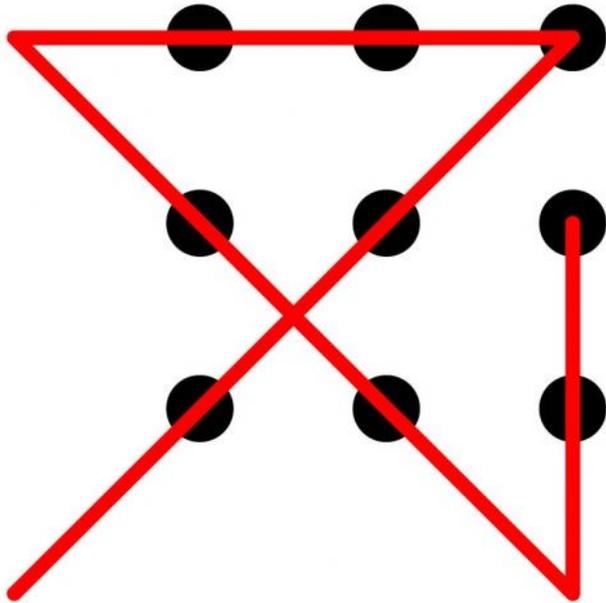


Connect all 9 points with only 4 lines without lifting your pen from the paper

Why does it seem so difficult?

(Time to solve this puzzle is limited: what is important is not that you solve it, but that you understand why you did not.)

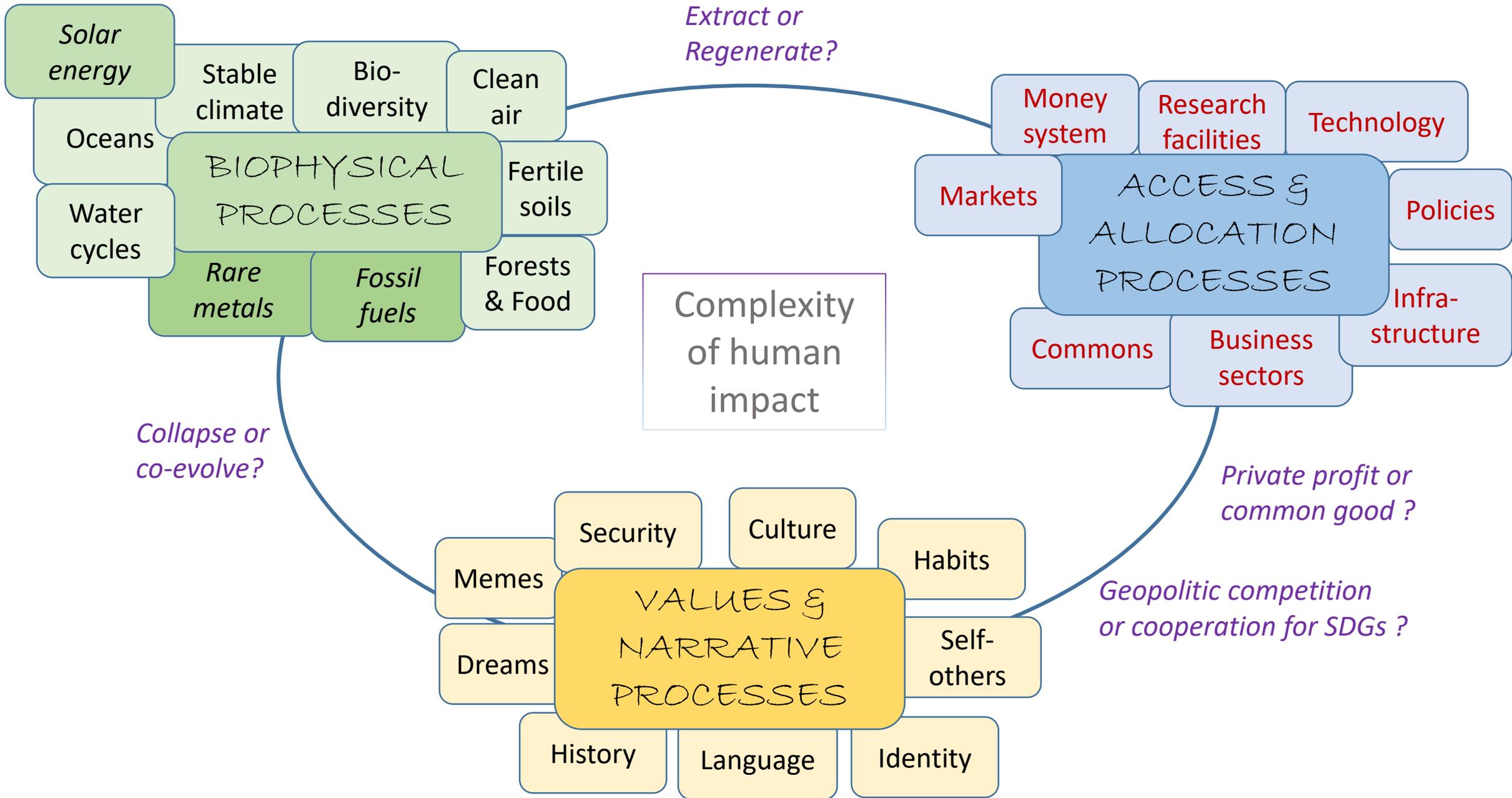
Nine dots puzzle as a reflection on 'science'



- Normal assumption: “stay within the square” (a self-imposed rule)
- Scientists as well **assume** they have to stick to the rules of a discipline, paradigm... (power mechanisms in science reinforce this)
- ‘Complex’ problems cannot be solved with current (dominant) approach to science (paradigm)
- Need to reflect on (normal) research: what rules have to change to respond to big challenges? How to make science more ‘responsive’ to complex problems?
- Innovation ‘outside the box’ (creativity, arts, plural perspectives...) is needed for solutions !
- Empowerment: co-create solutions with all agents concerned (not ‘for’ society but ‘with’ society)

power

impact



These 3 spheres differ in various geographical areas

Narratives are powerful !

E.g. Vikings preferred 'collapsing' over adapting to available Inuit technologies – which they thought inferior to their identity & values (source: Jared Diamond)

To be a CO-RRI broker in your region, take into account (interdependencies among) local **narratives**, **biosphere** characteristics and **allocation** processes
So work with **local** experts, **indigenous** knowledge, **community** leaders - sharing a vision of the future

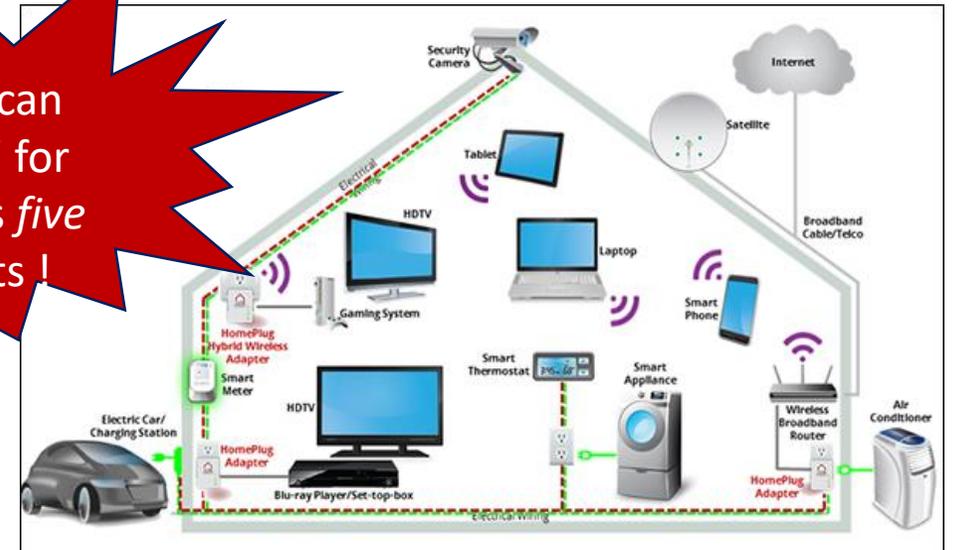


Ecological free access housing in Botswana embedded in cultural & legal practices

<https://commons.wikimedia.org>

'American dream' for all takes *five* planets !

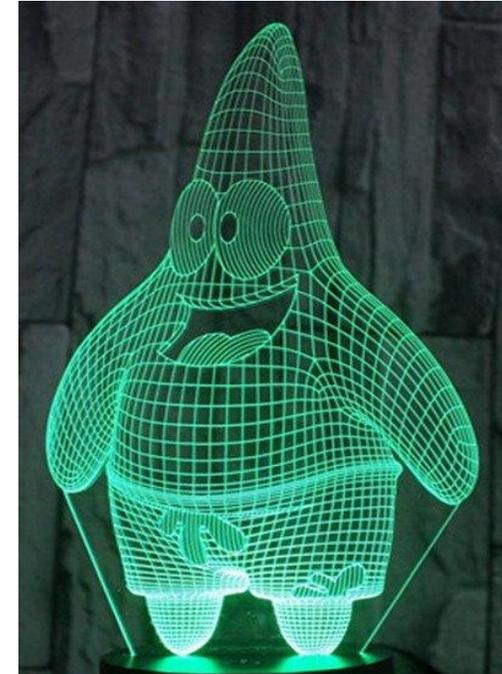
RRI = 'How to increase global resource justice?'



"Smart" house in the USA
(<https://www.cadpro.com>)

Many 'sustainability' approaches do not look at the whole system (the 3 spheres) – so 'framing' is too limited...

- Example : LED lamps to reduce energy consumption of bulbs
 - Fantastic **technological** innovation (reduced energy use in the laboratory)
 - Supported by **government** policies ("Replace your bulbs with LED!")
 - But no questioning of the **economic paradigm** (*assuming more is better, growth...*), so *large scale* production
 - No questioning of the '**needs**' narrative ("How much light do we really need for wellbeing? Can it not be daylight? Do we need light in everything, everywhere?"), so large scale consumption
- **Result :**
 - *Increased* use of energy for lighting since LED was introduced
 - large scale spreading of non-recyclable technology with poisonous materials





The good news: all three spheres are included in Sustainable Development Goals (SDGs)

- Adopted by United Nations in 2015 → 193 countries signed “Global agenda 2030”
- Global agenda, so not a ‘choice menu’ of separate goals – interdependency is essential (e.g. ‘economic growth’ but with no damage to the climate, life on land, social equality, peace & justice etc...)
- So... will require a new (complexity based) approach to all sciences (including economics)
- SDG17 = partnership to *cocreate* solutions to reach the goals (= CO-RRI)

So... CO-RRI = Co-create a dreamed future state (at local scale)

1. Describe the future as a *process*, not a product (= a vision of what people *do* and *feel* and have *access* to, not of products they should *have*) → products can be a means, but are never a goal!
 - E.g. *mobility* = ‘how to bridge the distance between people and the things they need?’ e.g. by giving them access to local solutions rather than ‘making consumers buy clean cars’...
 - E.g. *housing* = ‘how to give people access to a quality place to live?’ e.g. by supporting co-housing or preventing speculation on houses, rather than ‘making consumers buy smart appliances’...
2. List all actors that share that vision/dream = stakeholders
 - Invite (*representatives of*) all stakeholders who are concerned in your local context (not everyone is motivated to participate personally, so find ways to ‘include their perspective’)
 - Look for ‘innovators’ in all domains (civil society, politicians, regenerative companies, pioneers...)
3. Together with them map the things that keep you from reaching the vision (lock-ins)
 - Three spheres are relevant ! More voices means better understanding
4. Together think of possible solutions/leverages to get there
 - Integrate innovations in various spheres, check for unexpected impacts in other spheres
5. Use SDGs as checklist to judge on the ‘best solution for here & now’
→ Think of *global justice*: countries in developing world may need access to more resources, while developed countries (already overshooting the planet’s boundaries) should do with less

Practical task

1. Choose a theme = **desired future state on campus = DREAM**
2. List possible participants (on & off campus) for co-creating this
3. Tell us why it's feasible – will have impact
4. Pitch your idea in 2 minutes

→ Ideas that came up:

1. Mobility on campus – bicycle sharing & public transport, less parking lots
2. Food on campus
3. Building
4. Health – less smoking
5. Noise on campus
6. College fees for international students
7. Pet friendly campus – mental health, concentration
8. Recycling in our faculty

Thank you, you were fantastic 😊

