Introduction to CO-RRI

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SAPIRR – Systems Approach of Public Innovation & Responsible Research

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

Caminante, son tus huellas el camino, y nada mas;

Caminante, no hay camino, se hace camino al andar.

Al andar se hace camino, y al volver la vista atràs se ve

la senda que nunca se ha de pisar.
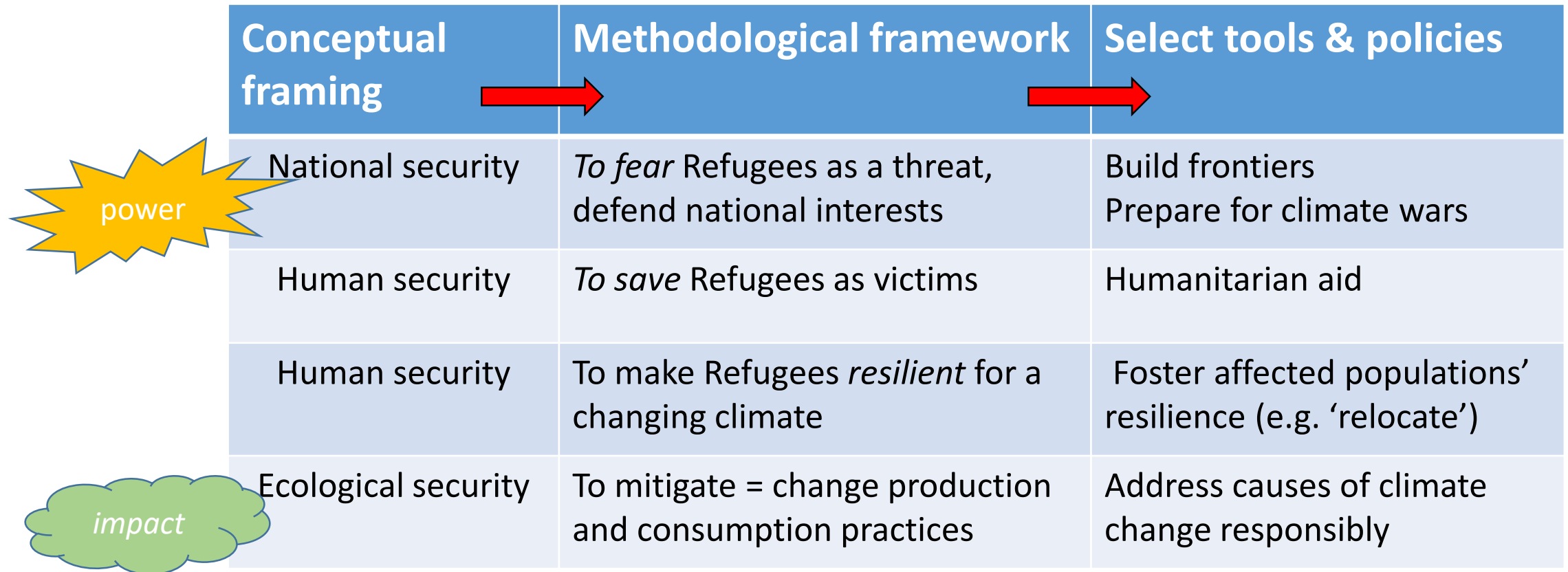
Caminante, no hay camino, sino estelas en la mar.

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: climate refugees as a 'security' challenge ([Dr. Angela Oels](#) – 2:54 - 11:24)

Conceptual framing	Methodological framework	Select tools & policies
National security	*To fear* Refugees as a threat, defend national interests	Build frontiers Prepare for climate wars
Human security	*To save* Refugees as victims	Humanitarian aid
Human security	To make Refugees *resilient* 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

power

impact

RRI too is framed in different ways

Conceptual framing of big challenges/RRI	Methodological framework	Select tools & policies
Objective reality must be analysed and controlled even better	More technical sofistication with additional criteria Example: 'RRI in astronomy' or 'RRI in nano-technology'…	Criteria for RRI as an add-on - Include women, e.g. In STEM - Inform policy makers of results - Explain to citizens - … (= 6 optional parameters)
Challenges are **complex** (non-intended, non-linear) issues of human making (Antropocene), so we should analyse scientific assumptions critically	To co-create a more desirable future state : "what world do we want/dream?"	Co-creation with other actors in society = CO-RRI Tools for inclusive dialogue & creativity *Open* and *gender* aware science and *education* for the common good (*ethics*) including *citizens* & *governance* (= 6 crucial conditions)

Antropocene: human impact on biophysical systems ('Antropos' = Man)

Graph: https://wattsupwiththat
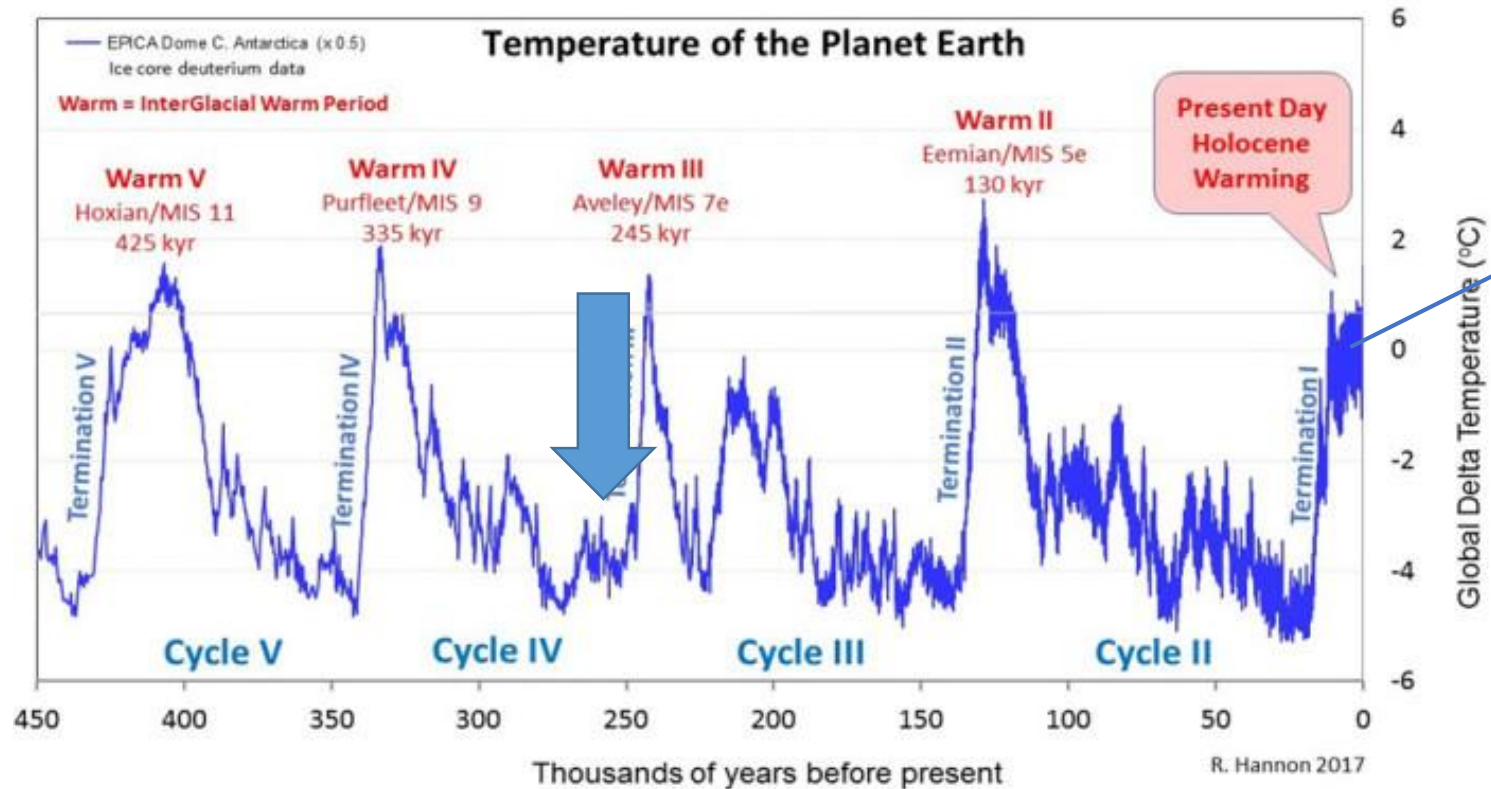
Holocene =
period of stable climate
Created conditions for agriculture
This brought human population growth and increasing complexity (writing, cities, science, culture…)

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

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

Complexity: how to grasp it?

✓ What links the pictures? "Connected, interdependent, embedded one in 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 (biology, architecture, psychology, astronomy…).

✓ "A forest is more than the sum of the trees." Studying every tree does not allow us to understand the way the *forest* functions as an ecosystem. Every scale brings 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 human perception).

✓ So understanding complexity requires co-creation of knowledge in an inter-/transdisciplinary way, linking various scales and disciplines.

Complex problems are non-linear

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

So 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 bug in the laboratory, but within reality at a higher scale of complexity. But…

- 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 research and its unintended effects

✓ Using technologies (especially using fossil fuels and polluting particles) at large scale (i.e. globalisation) destroys human ecosystems

✓ Nobody 'intended' to change the climate, pollute the 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 the bookkeeping of a company…

✓ Today we learn from the past and start understanding complexity

✓ This allows for more 'responsible' research at complex scales = CO-RRI

Reality = complex embedded systems

- Perception & knowledge is embodied (humans versus bats or dolphins)

- Research tools can increase human perception (microscope, telescope), but this does not allow us to see the *interdependence* of scales

- Science = making a representation of reality. This representation is like a *map* to make sense of and orient ourselves in complex reality.

- The map is not the territory !

- For a map to represent all of the territory ('truth') it would have to be as large as the territory... So science is *always* simplification.

- Our methodological framework and tools determine what we see and what we don't see.
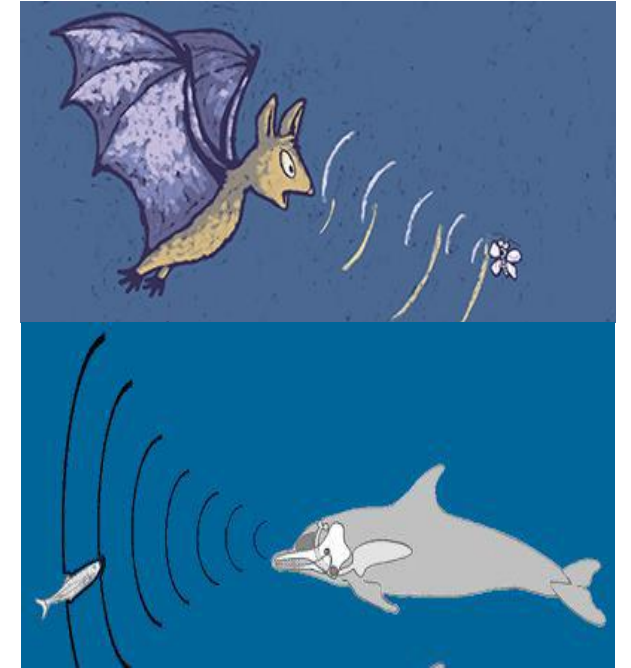
Source: www.wdcs.org

# Why is it so difficult to learn lessons from the past?
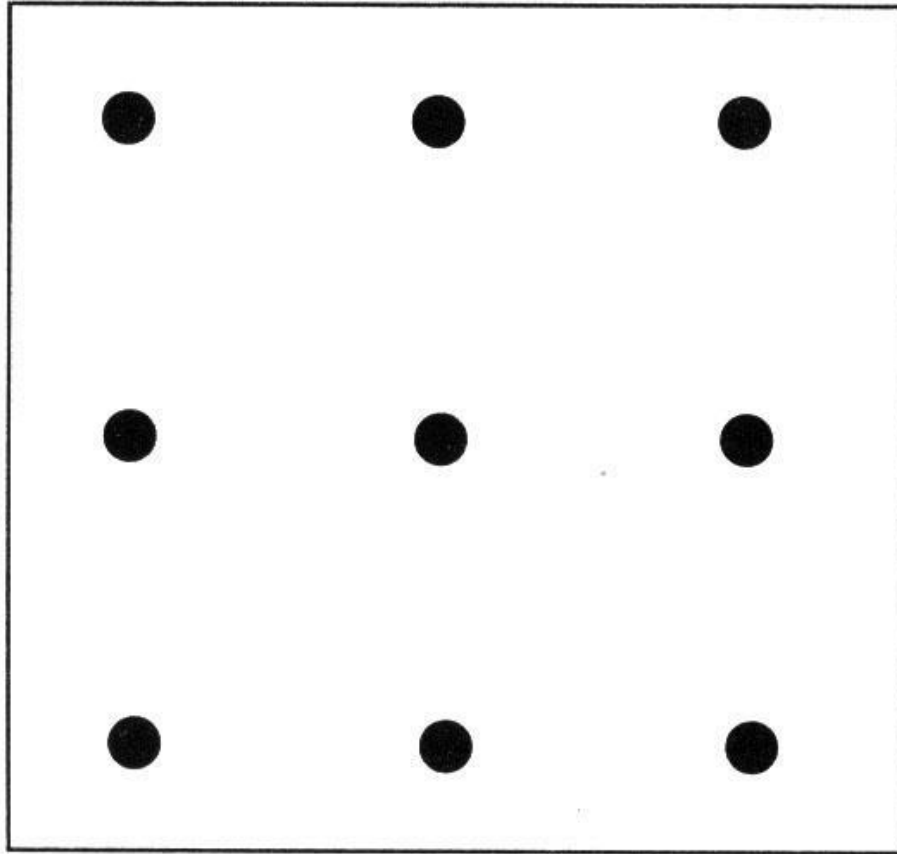
Connect all 9 points with only 4 lines without lifting your pen from the paper
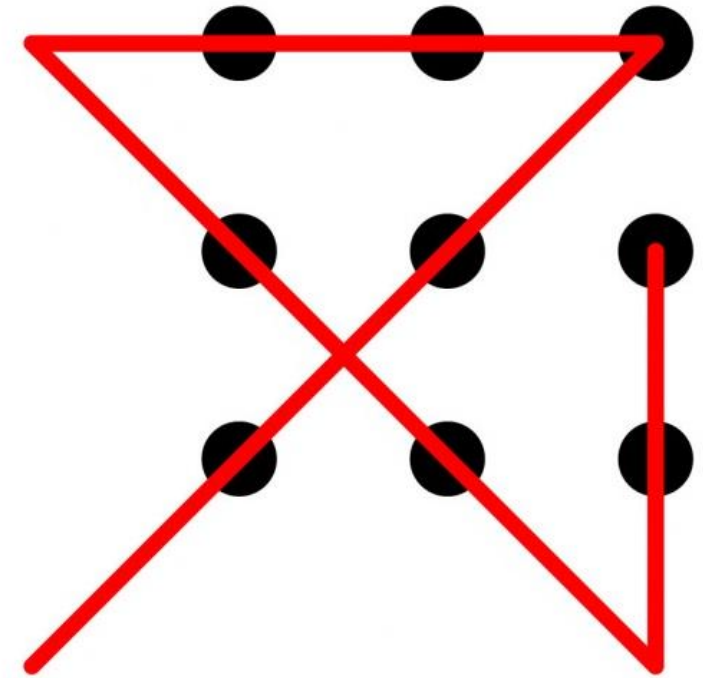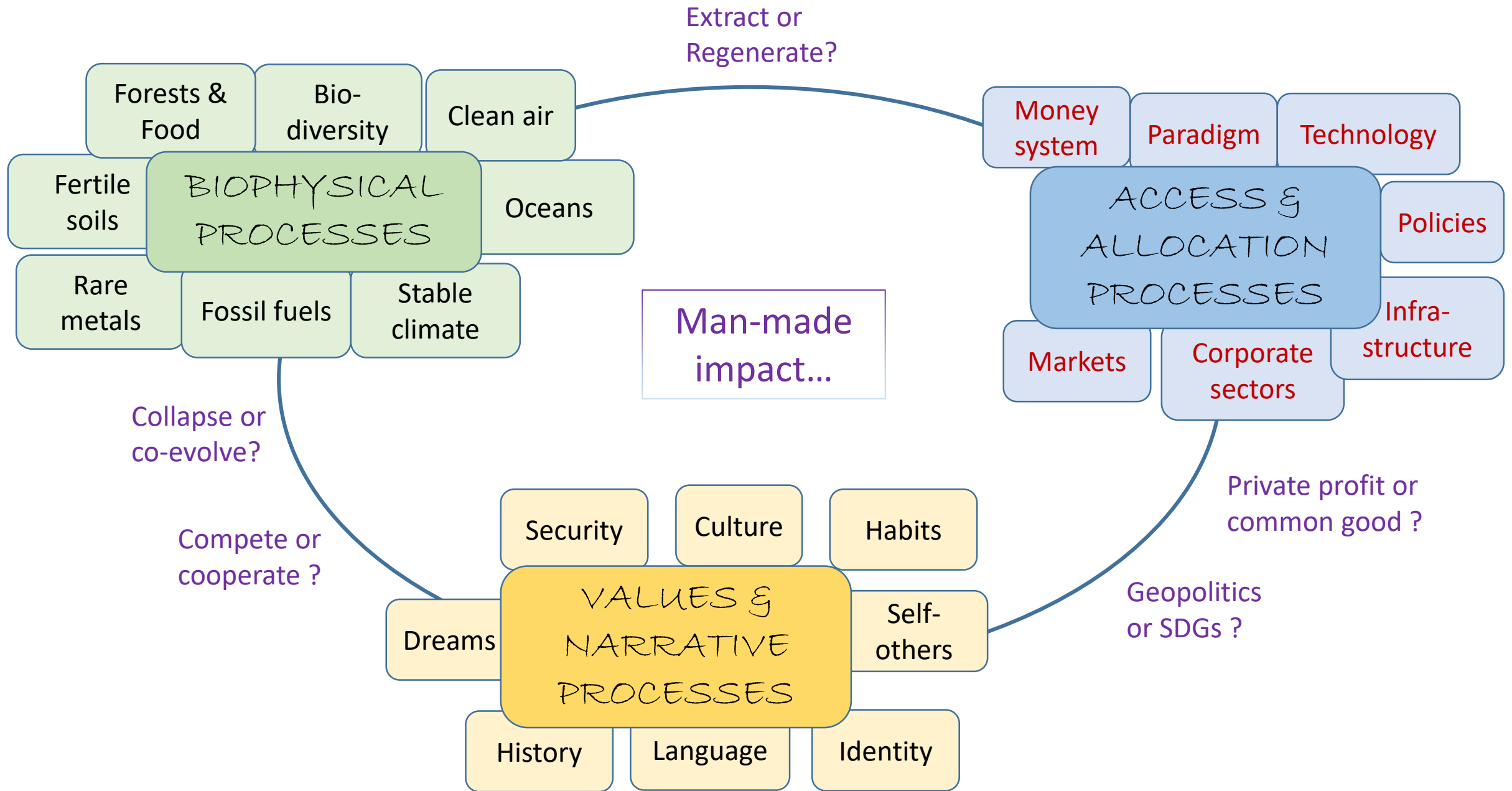
Why does it seem so difficult?

Nine dots puzzle as a reflection on 'science'

- 'Normal' assumption: "stay within the square"

- Scientists as well ***assume*** they have to stick to the rules of a discipline, paradigm…

power

- 'Complex' problems cannot be solved with current (dominant, 'power') approach to science (paradigm)

- Need to reflect on (normal) research: what rules have to change to respond to big challenges?
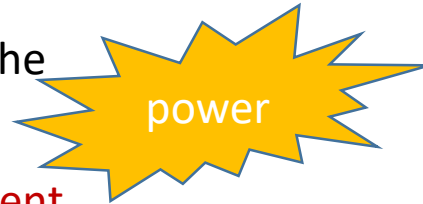
- Innovation 'outside the box' (creativity, plural perspectives…) is needed for solutions !

impact

- Empowerment: co-create solutions with all concerned (not 'for' society but 'with' society)

Extract or Regenerate?

BIOPHYSICAL PROCESSES

Forests & Food
Bio-diversity
Clean air
Fertile soils
Oceans
Rare metals
Fossil fuels
Stable climate

ACCESS & ALLOCATION PROCESSES

Money system
Paradigm
Technology
Policies
Infra-structure
Markets
Corporate sectors

Man-made impact…

Collapse or co-evolve?

Compete or cooperate?

Private profit or common good ?

Geopolitics or SDGs ?

VALUES & NARRATIVE PROCESSES

Security
Culture
Habits
Dreams
Self-others
History
Language
Identity

These spheres differ in various geographical areas

Narratives are powerful !

E.g. Vikings prefered 'collapsing' over adapting to available Inuit technologies – which they thought inferior to their identity & values

To be a CO-RRI broker in your country/continent, take into account local (or regional) narratives, biosphere characteristics and allocation processes – so work with local experts, indigenous knowledge, community leaders - sharing a vision of the future
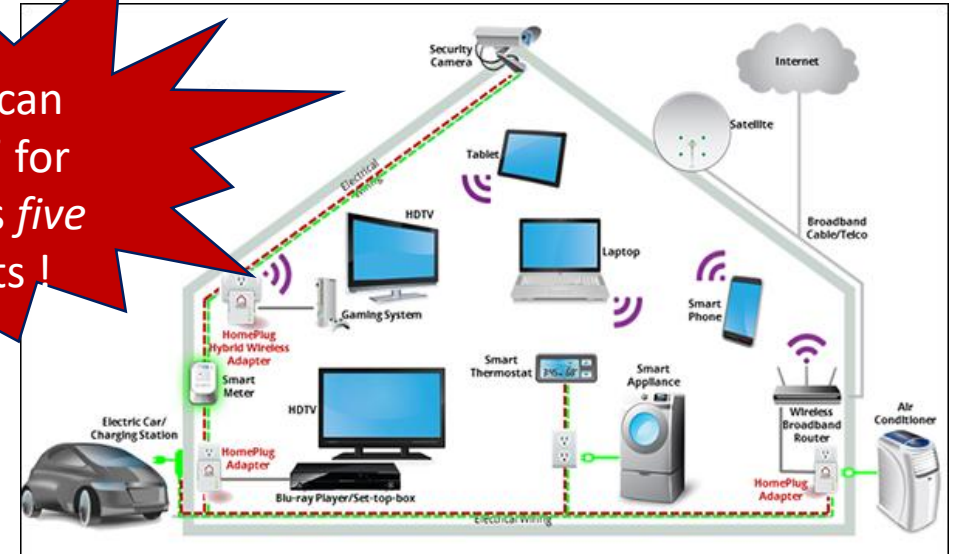
'American dream' for all takes *five* planets !

RRI = 'How to increase global resource justice?'

Ecological free access housing in Botswana
https://commons.wikimedia.org

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

Many 'sustainability' approaches in EU do not look at the whole system (the 3 spheres) – so 'framing' 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
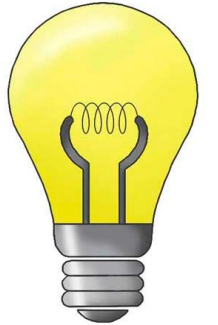
The good news: all three spheres are included in Sustainable Development Goals (SDGs)

- Adopted by United Nations in 2015 → 195 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* sollutions 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:

   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 ☺