

Gaps in Ocean-Related Knowledge, Products, and Observations

Hans-Peter Plag
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Gaps in Sustainability-Related Knowledge, Products, and Observations

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The gaps we see depend on what we want to achieve.

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Our perception depends on the distance we have ...

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Improving the present while liberating the future: requires foresight.

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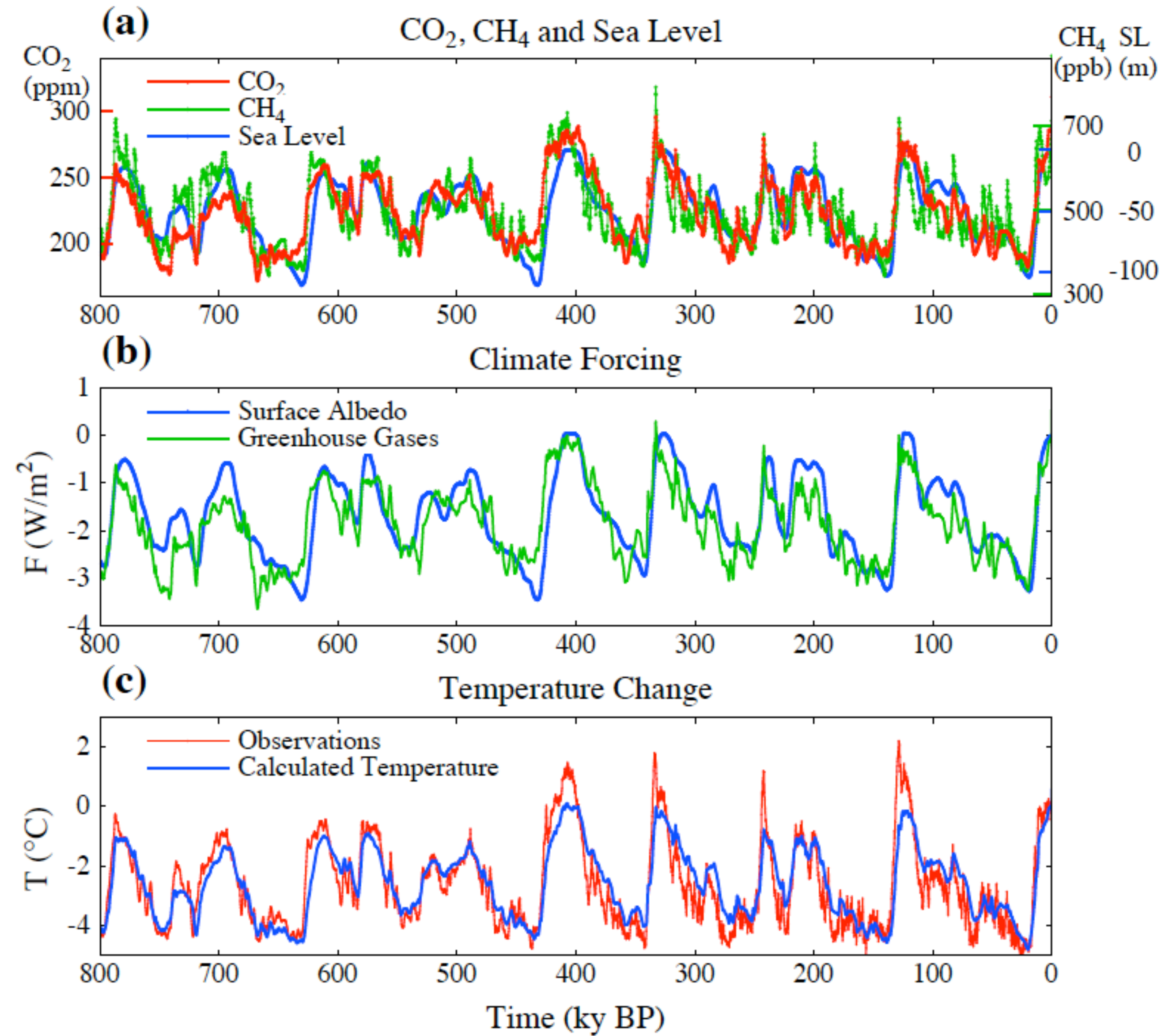
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Epistemic gaps lead to a lack of foresight and result in surprises



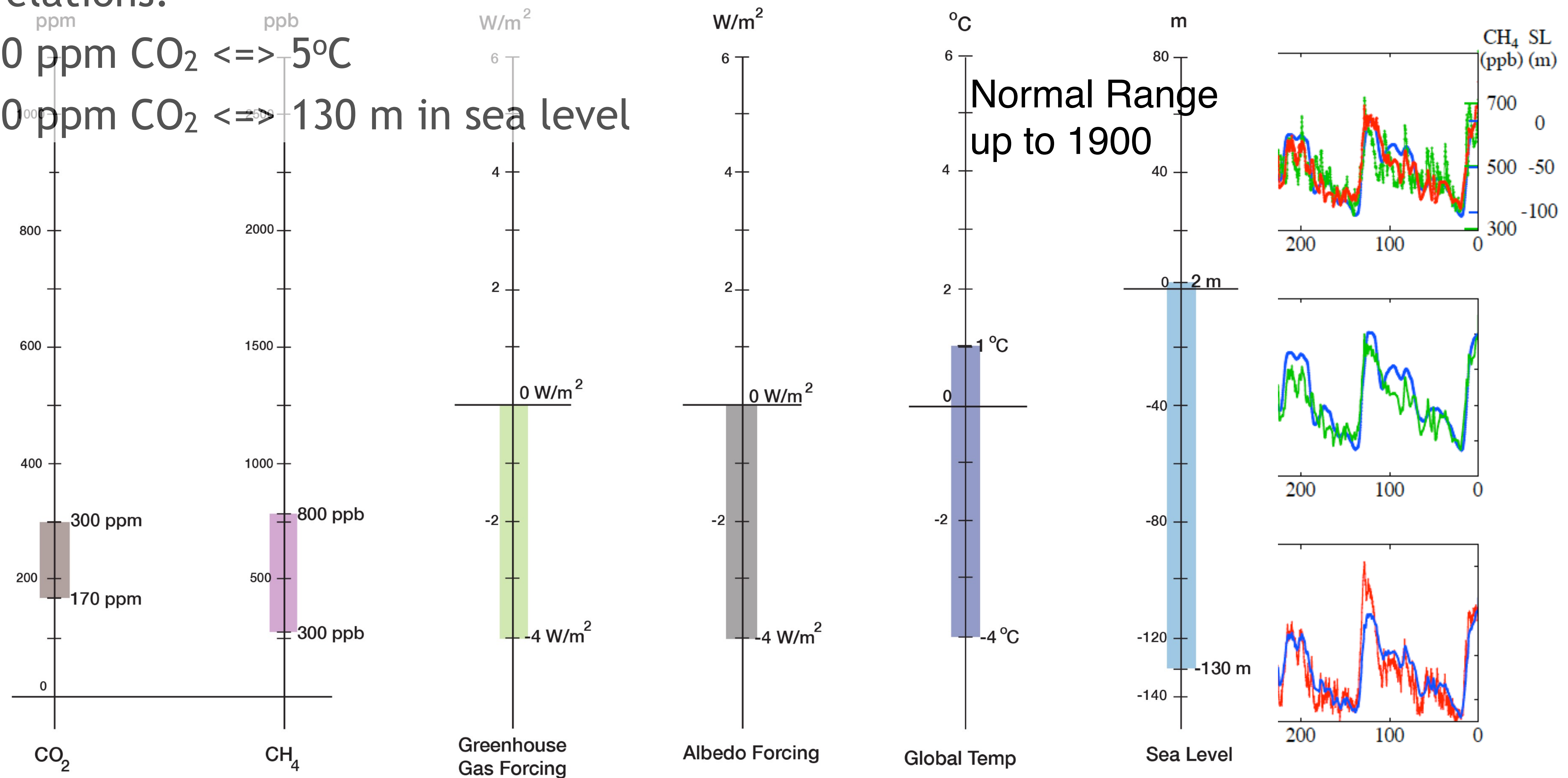
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The Baseline: Past Climate and Global Change

Long-term (centuries to millennia)
correlations:

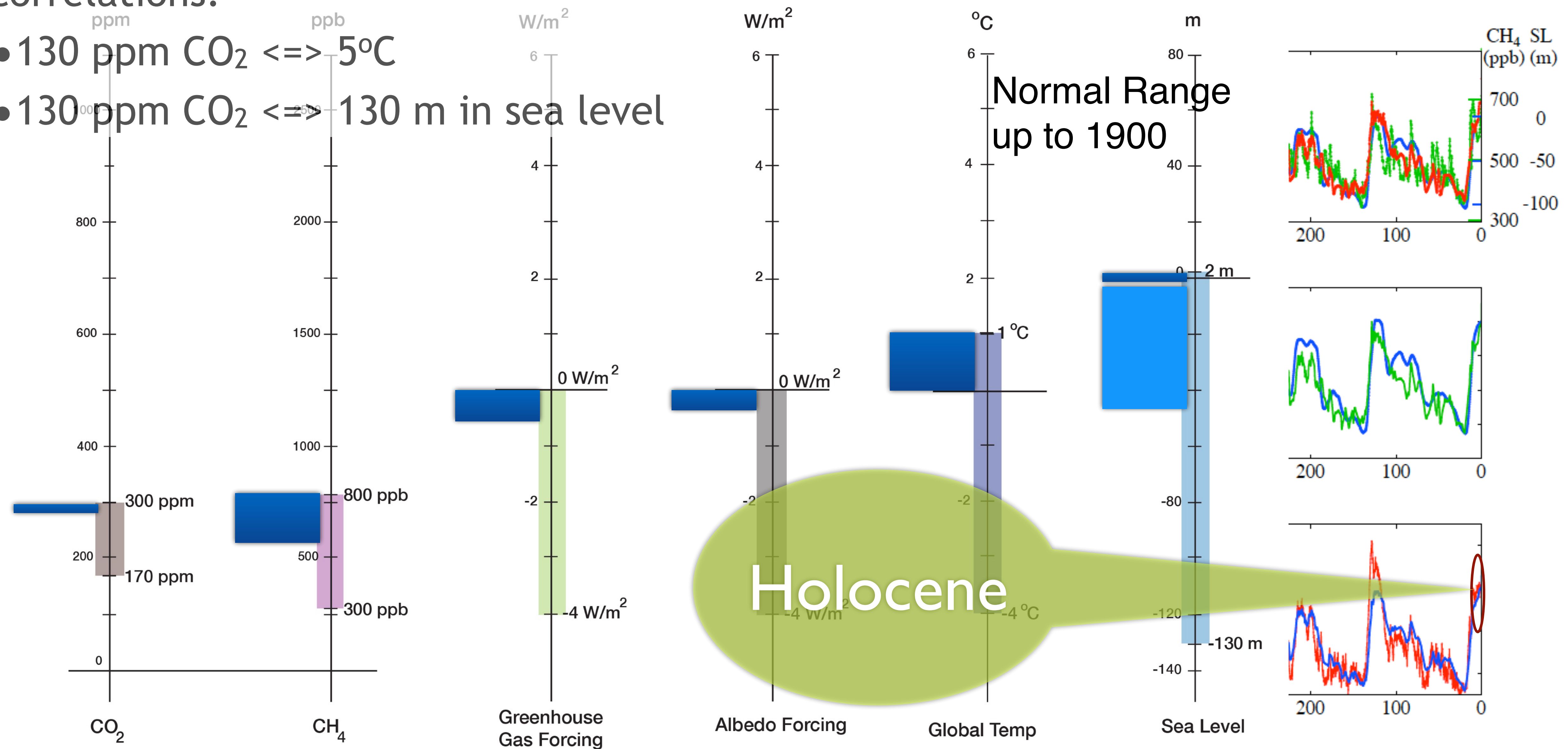
- 130 ppm CO₂ \Leftrightarrow 5°C
- 130 ppm CO₂ \Leftrightarrow 130 m in sea level



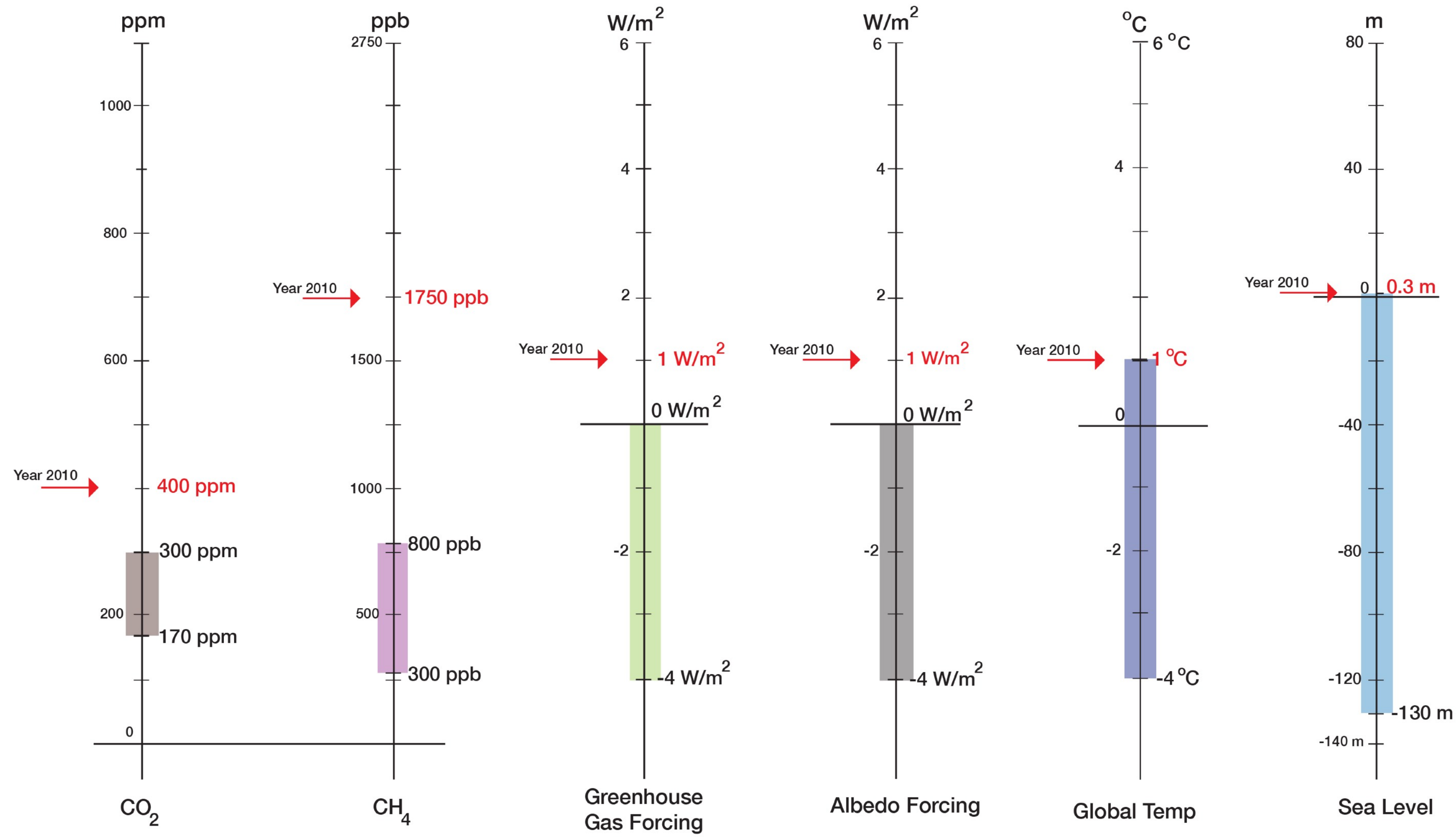
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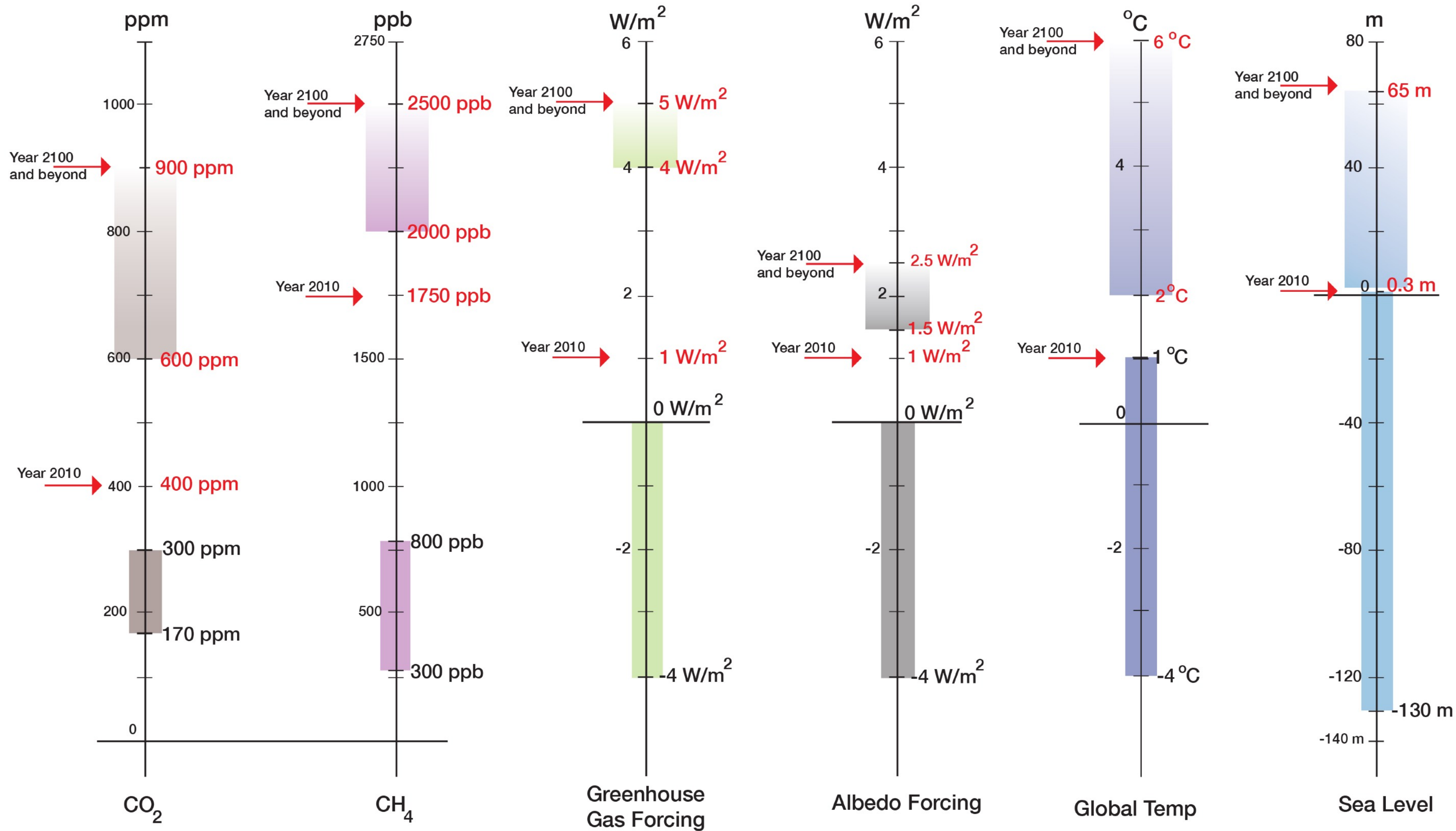
The Prognosis: Anticipating Surprises



“Current State”

“Normal Range”
(800,000 years)

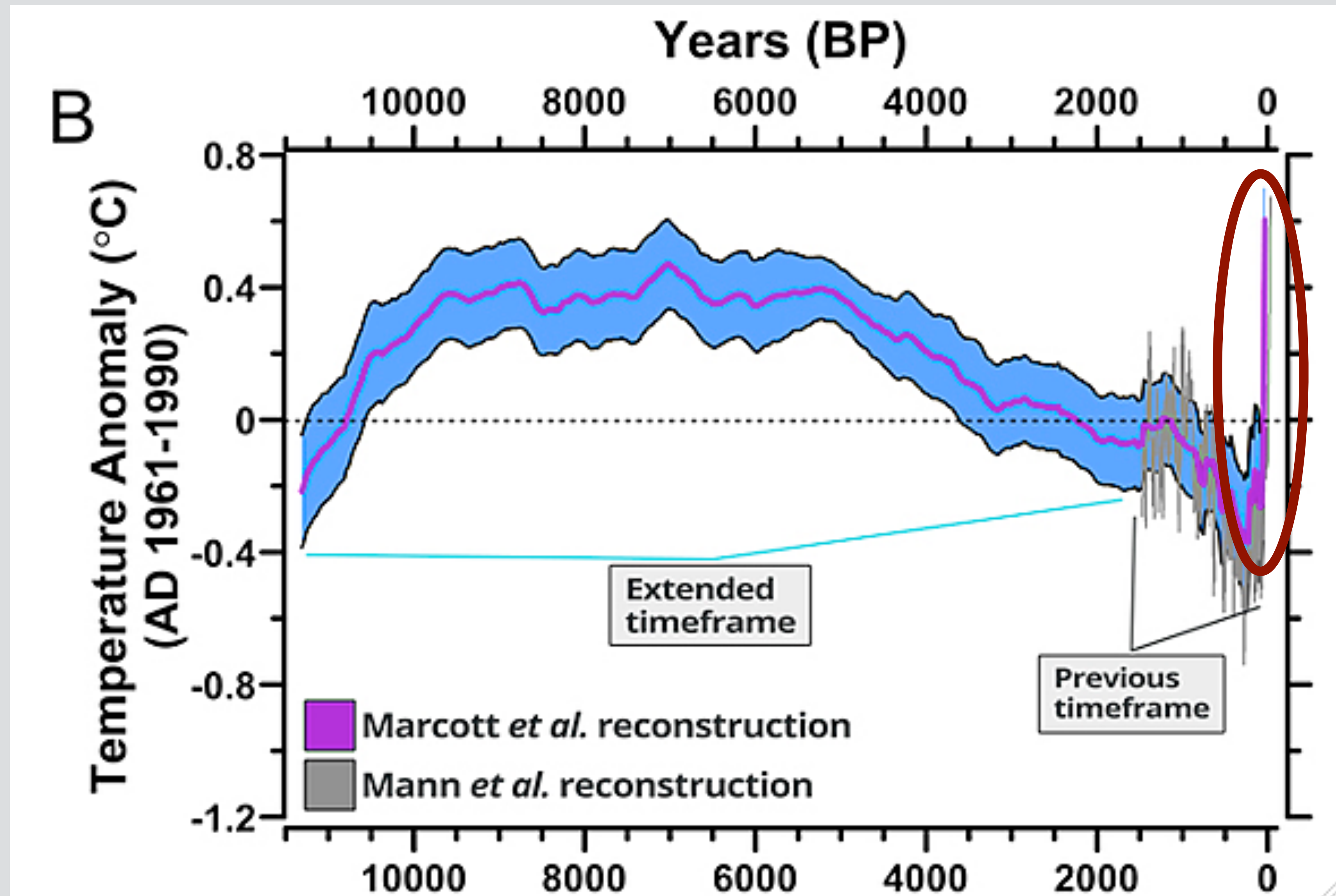
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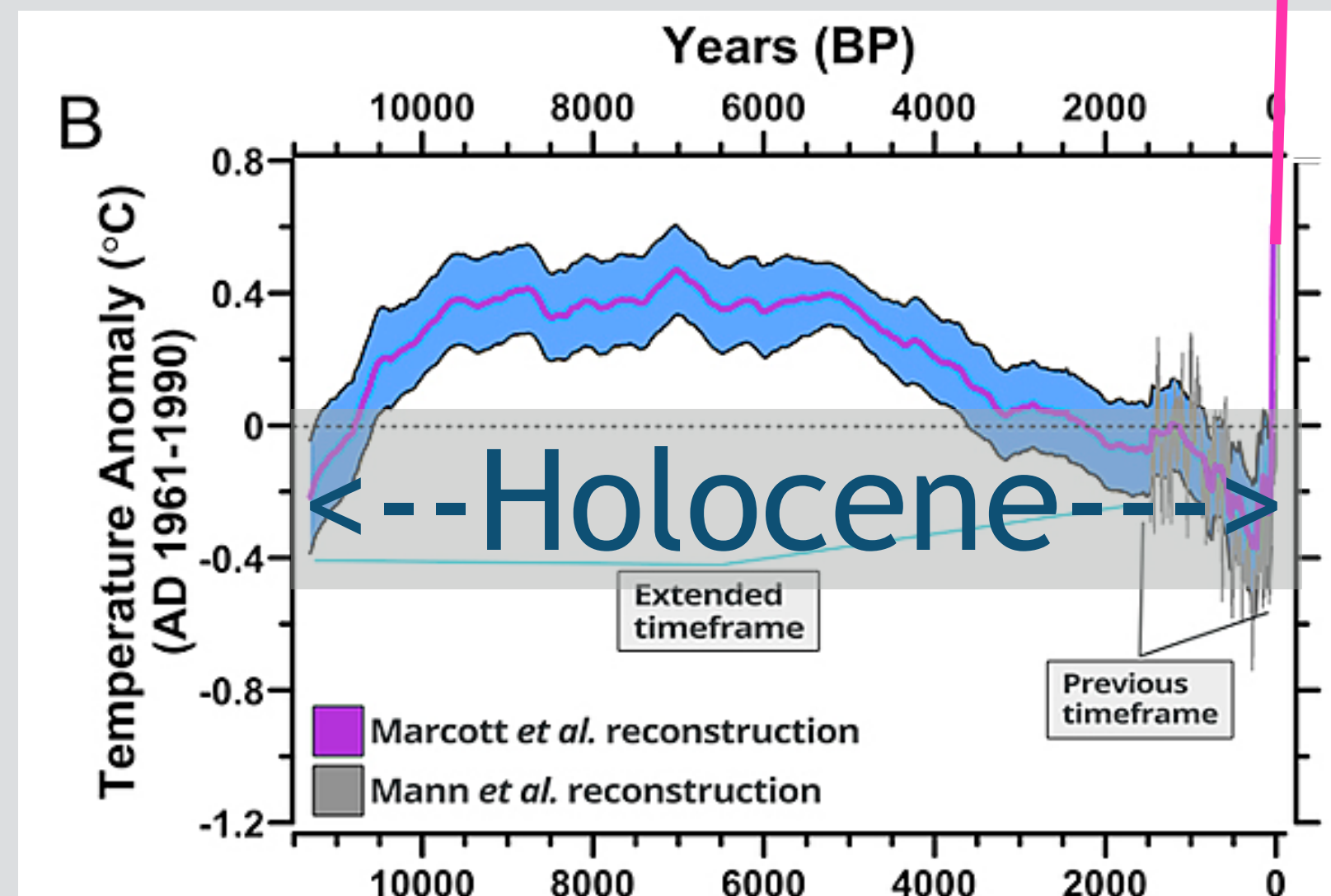


The Prognosis: Anticipating Surprises

<--Post-Holocene

IPCC Assessment:
Very Likely by 2100

1°C



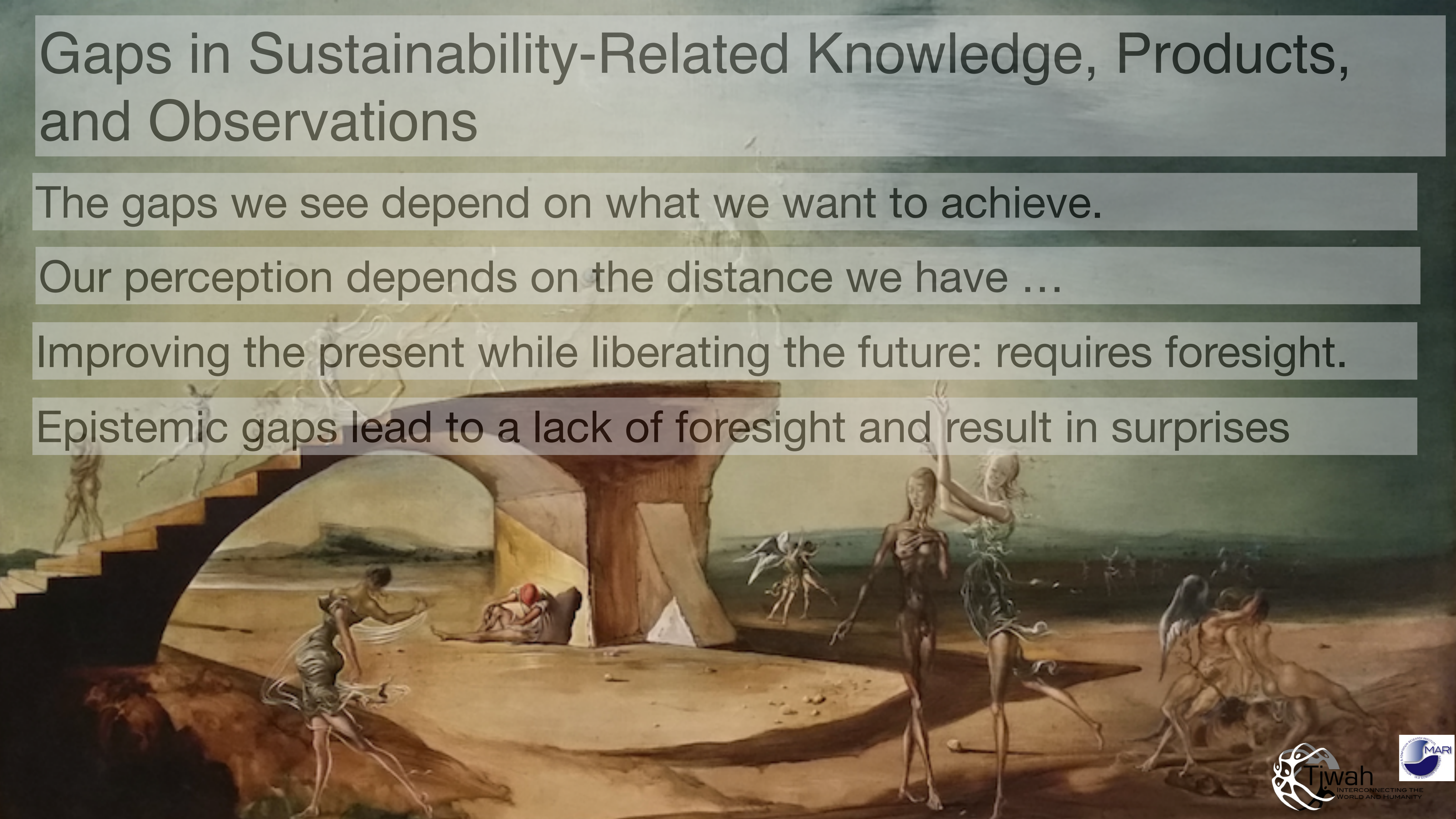
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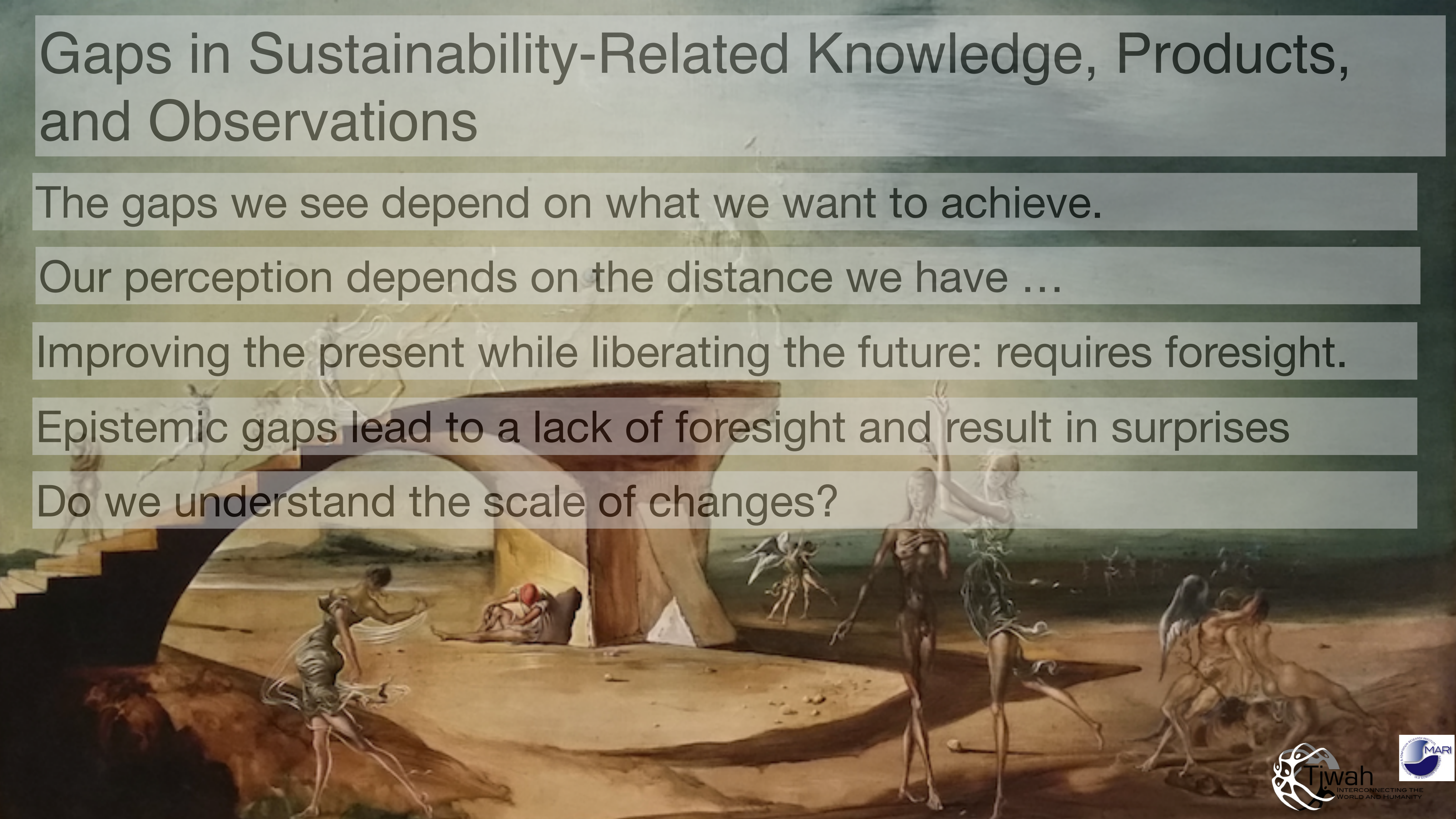
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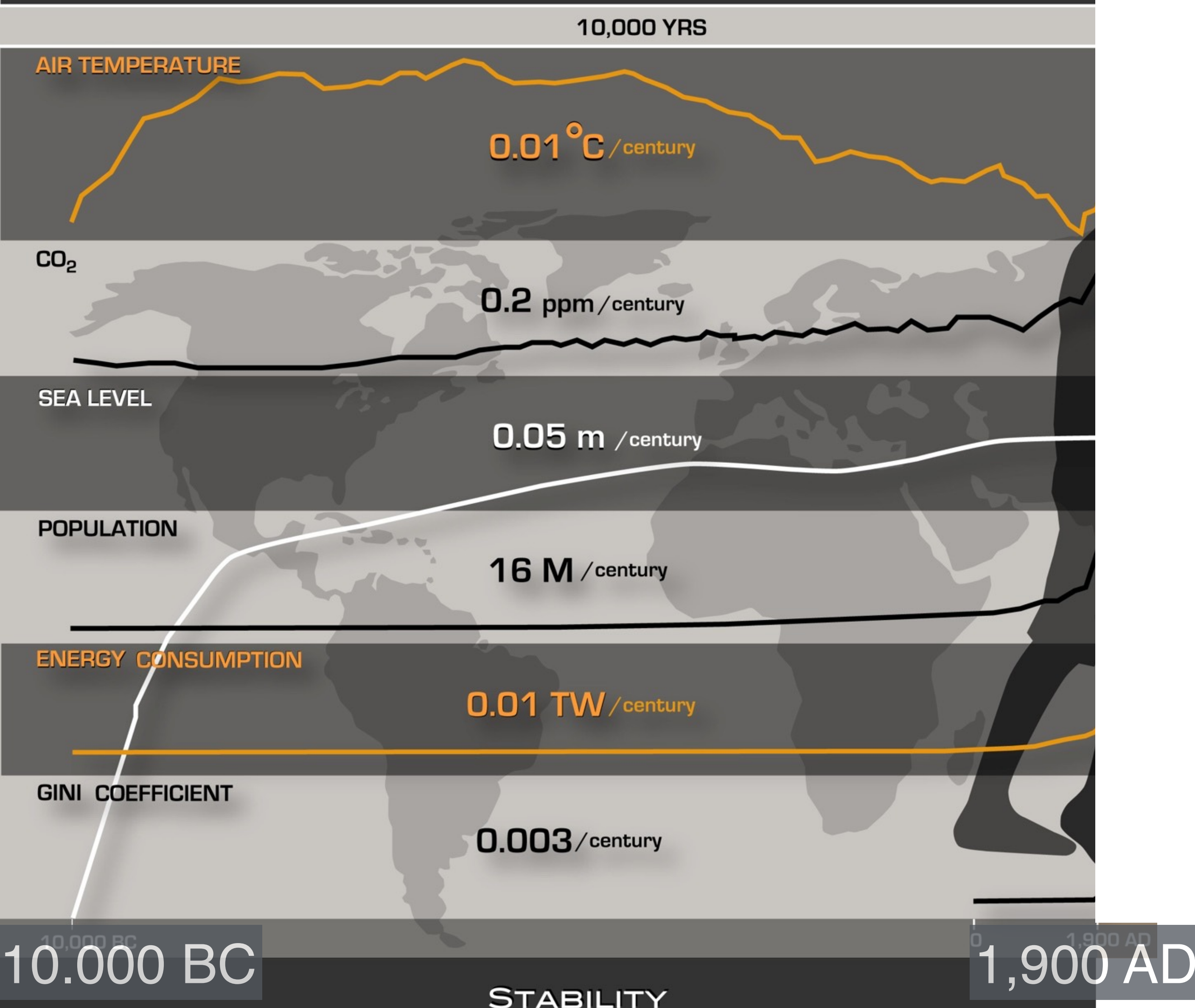
Do we understand the scale of changes?





HUMANITY'S JOURNEY

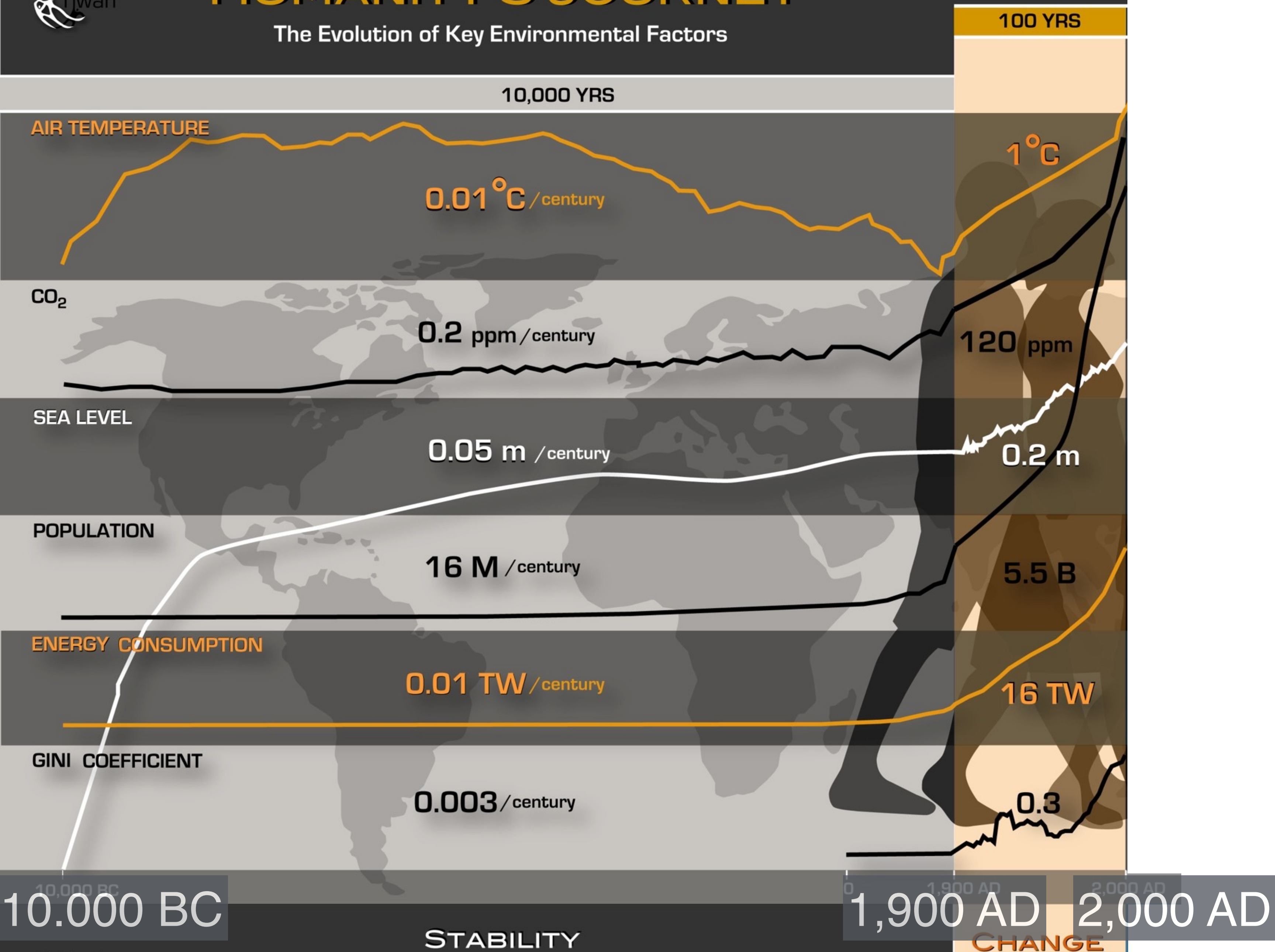
The Evolution of Key Environmental Factors





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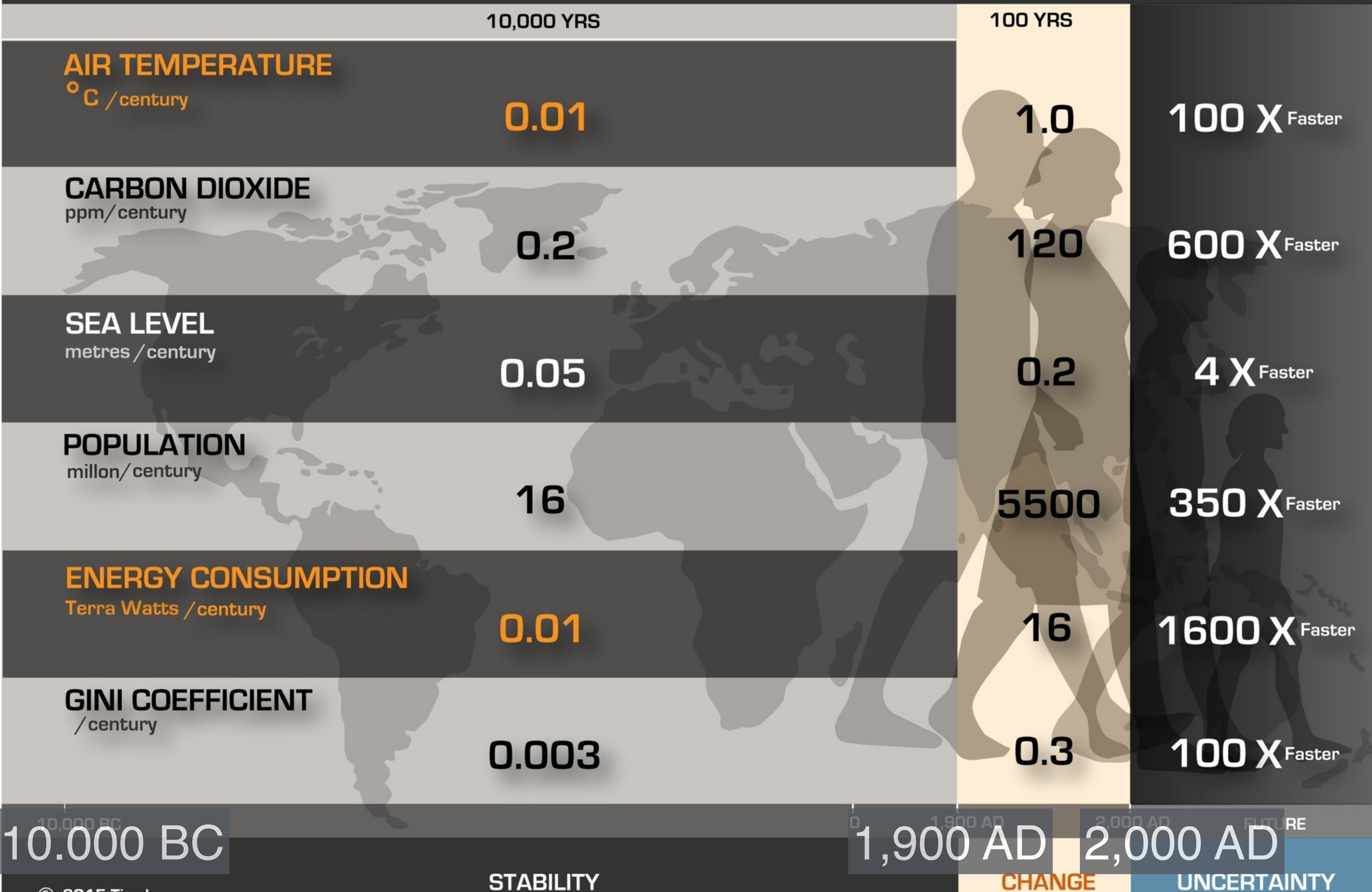
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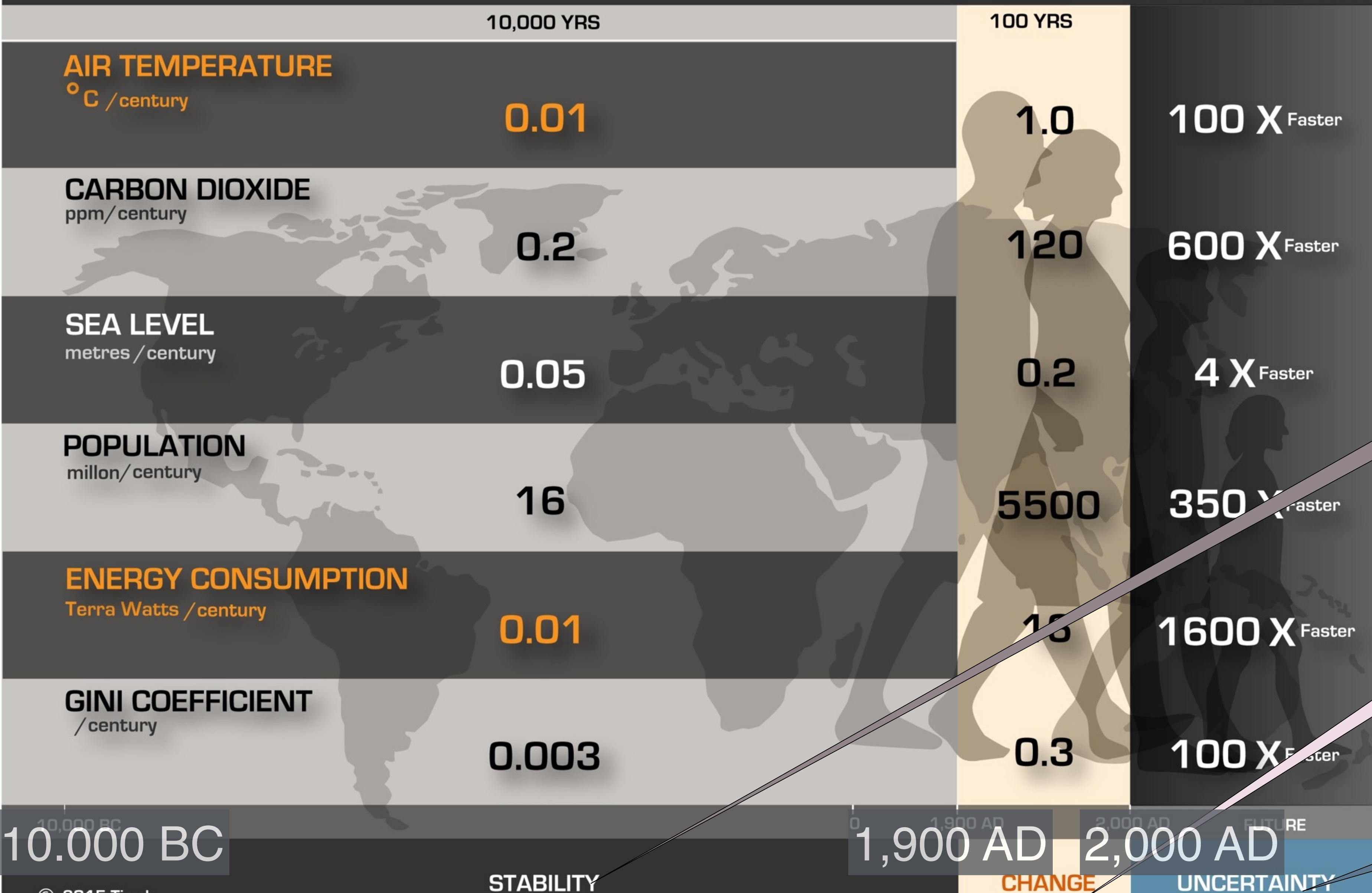
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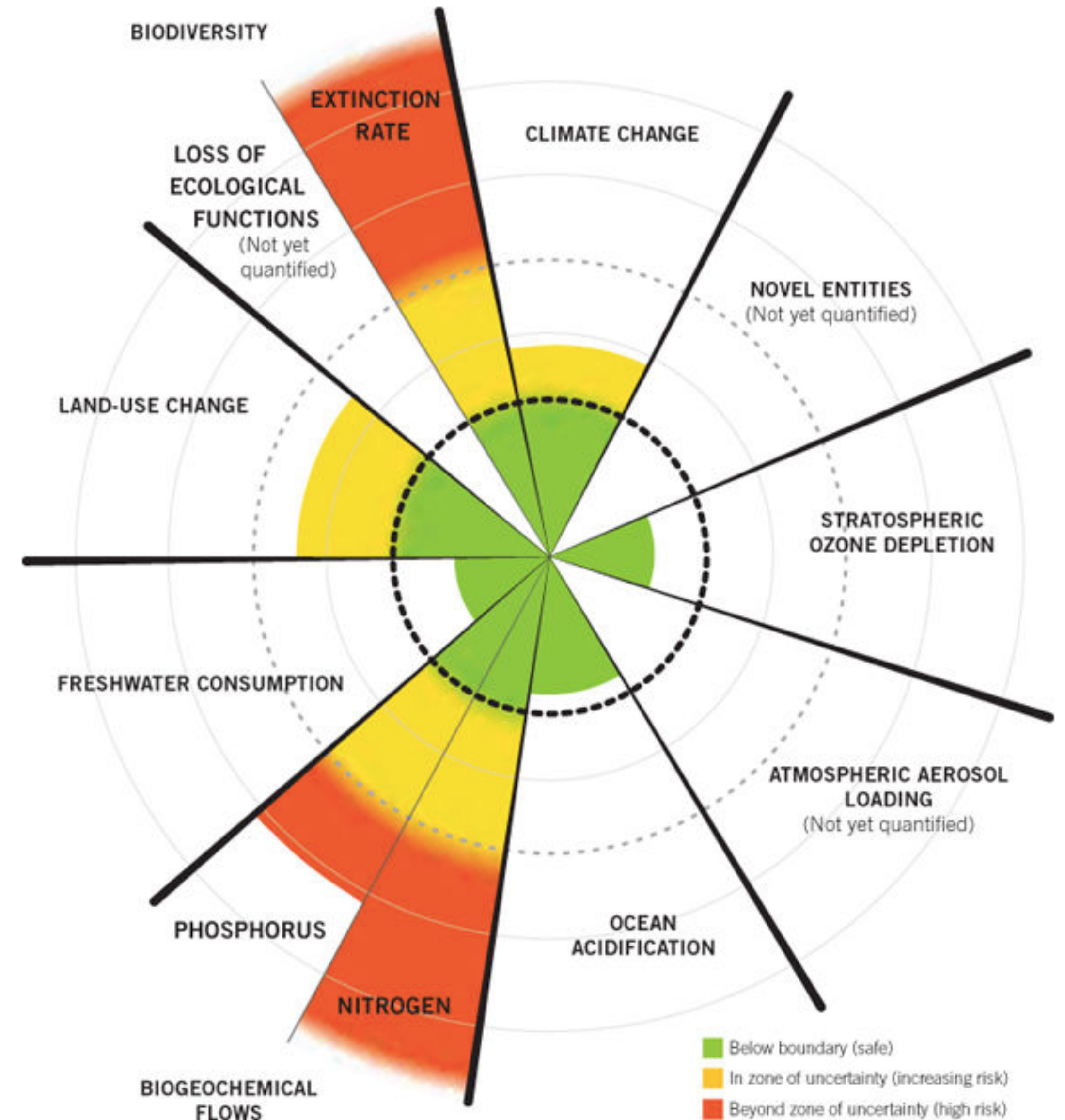
Holocene:
Stability

20th and
21st Century:
Change, imbalance

Future:
Uncertainty

We are the operators of Earth's life-support system

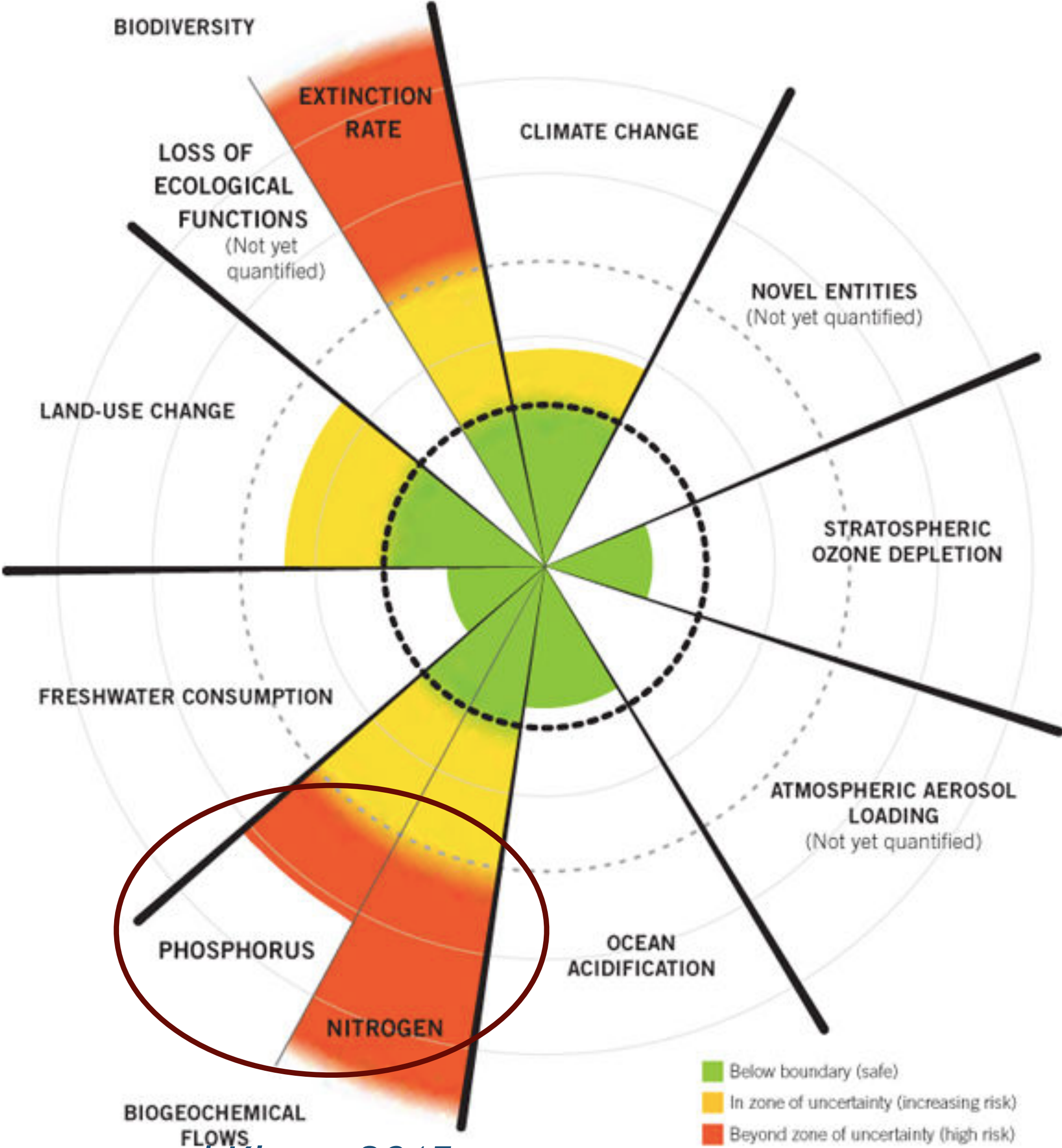
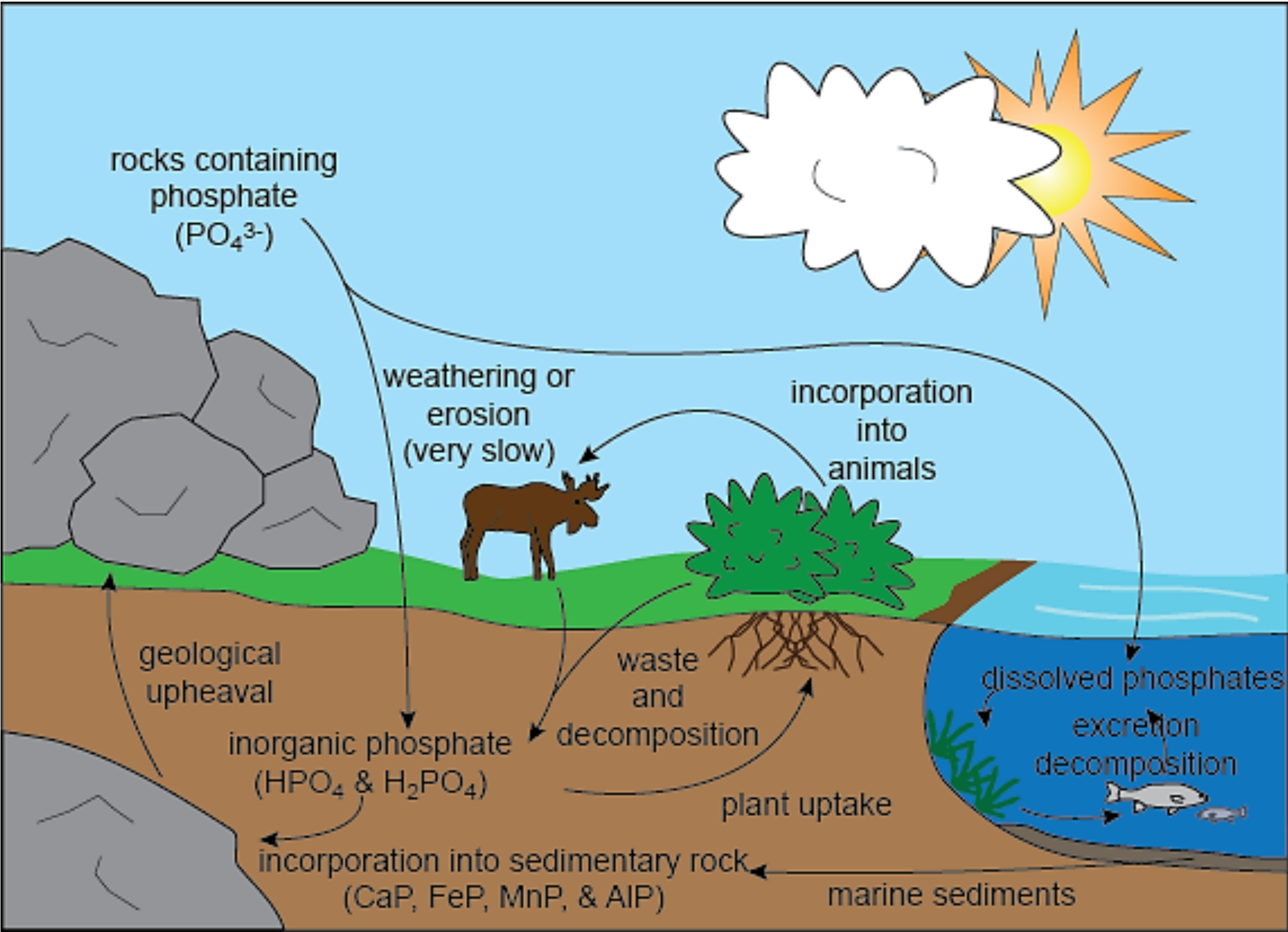
We are rapidly reengineering the planet without a clear strategy, a design consideration, a plan



Rockstrom and Klum, 2015

We are the operators of Earth's life-support system

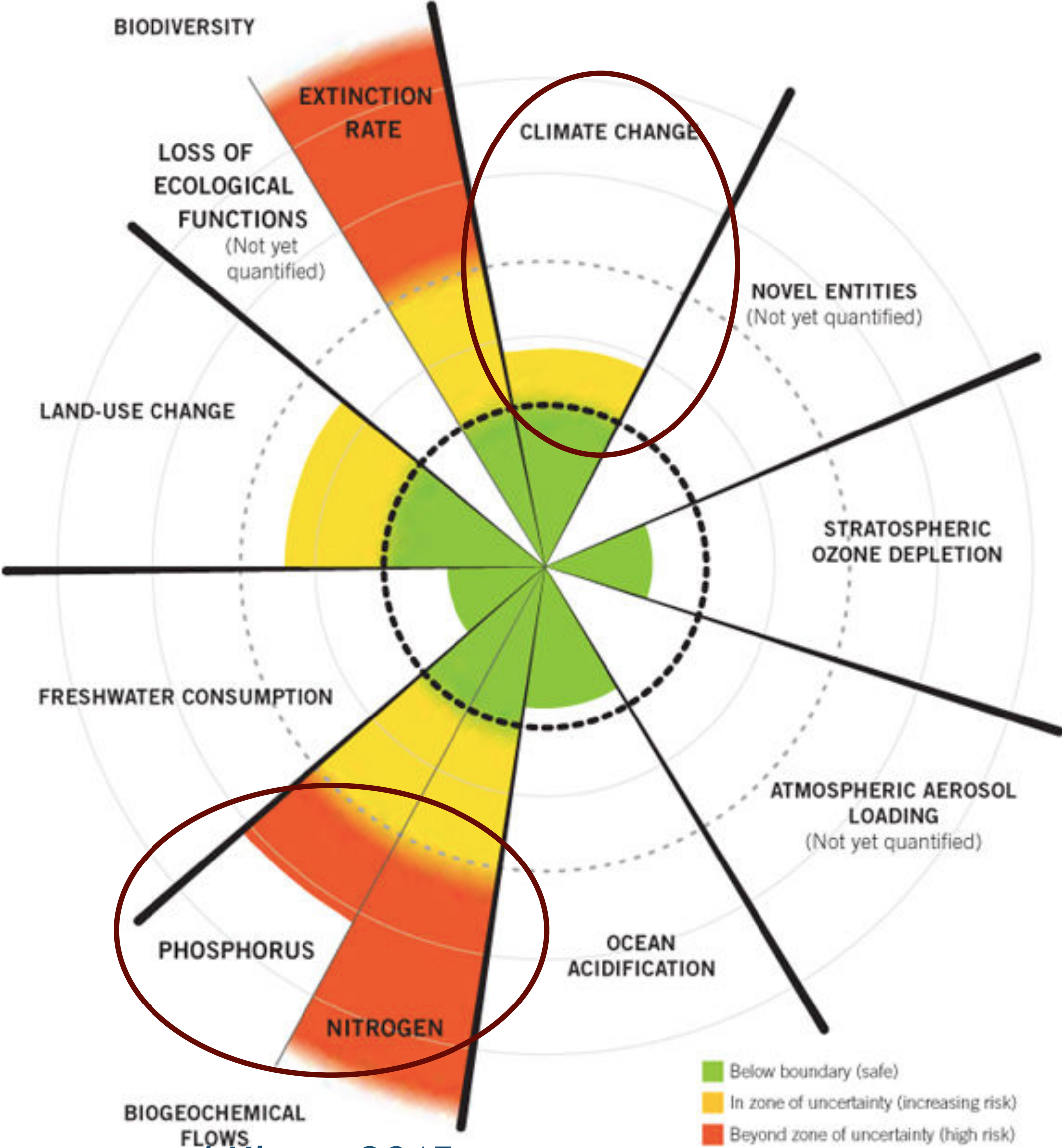
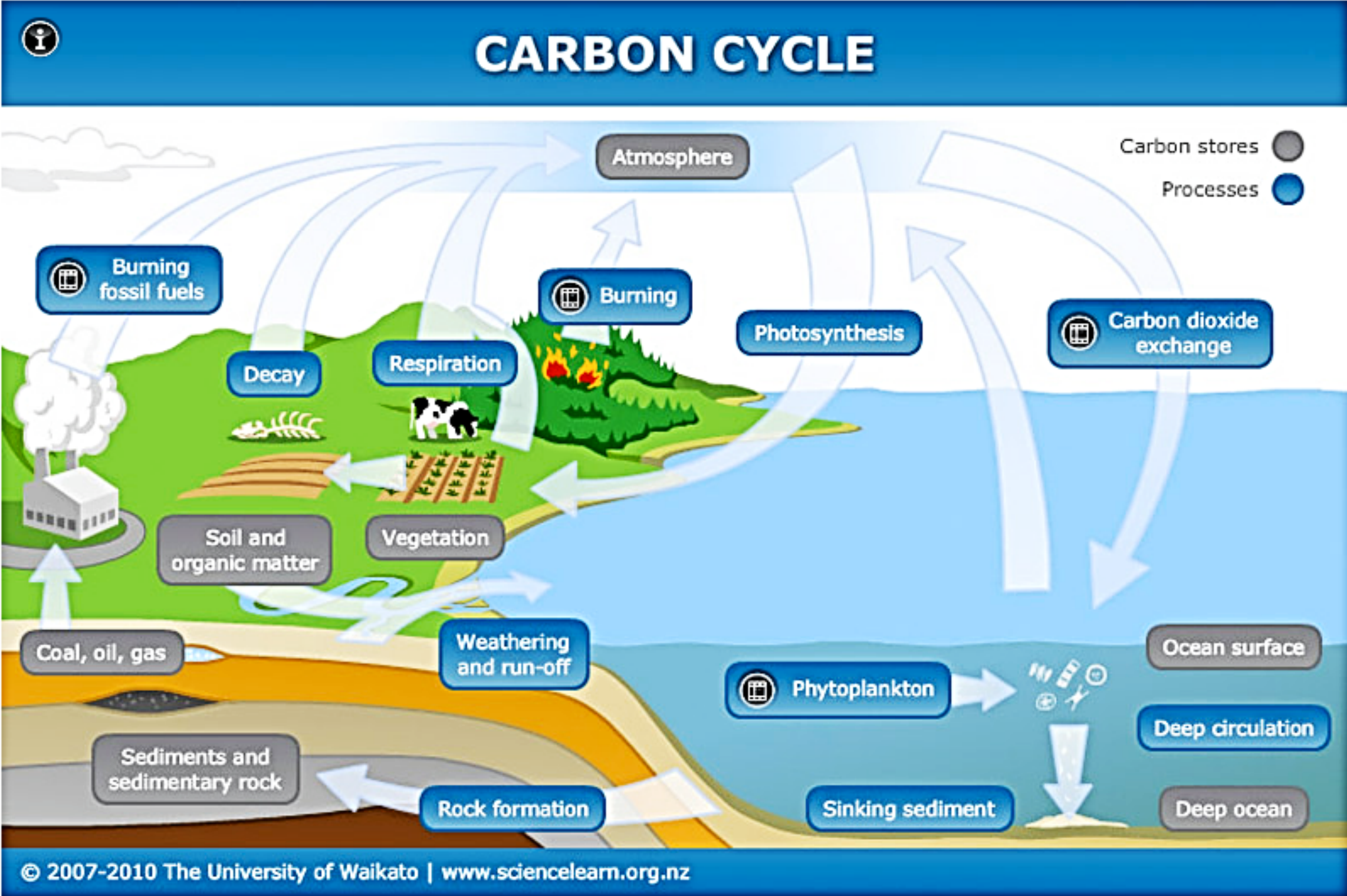
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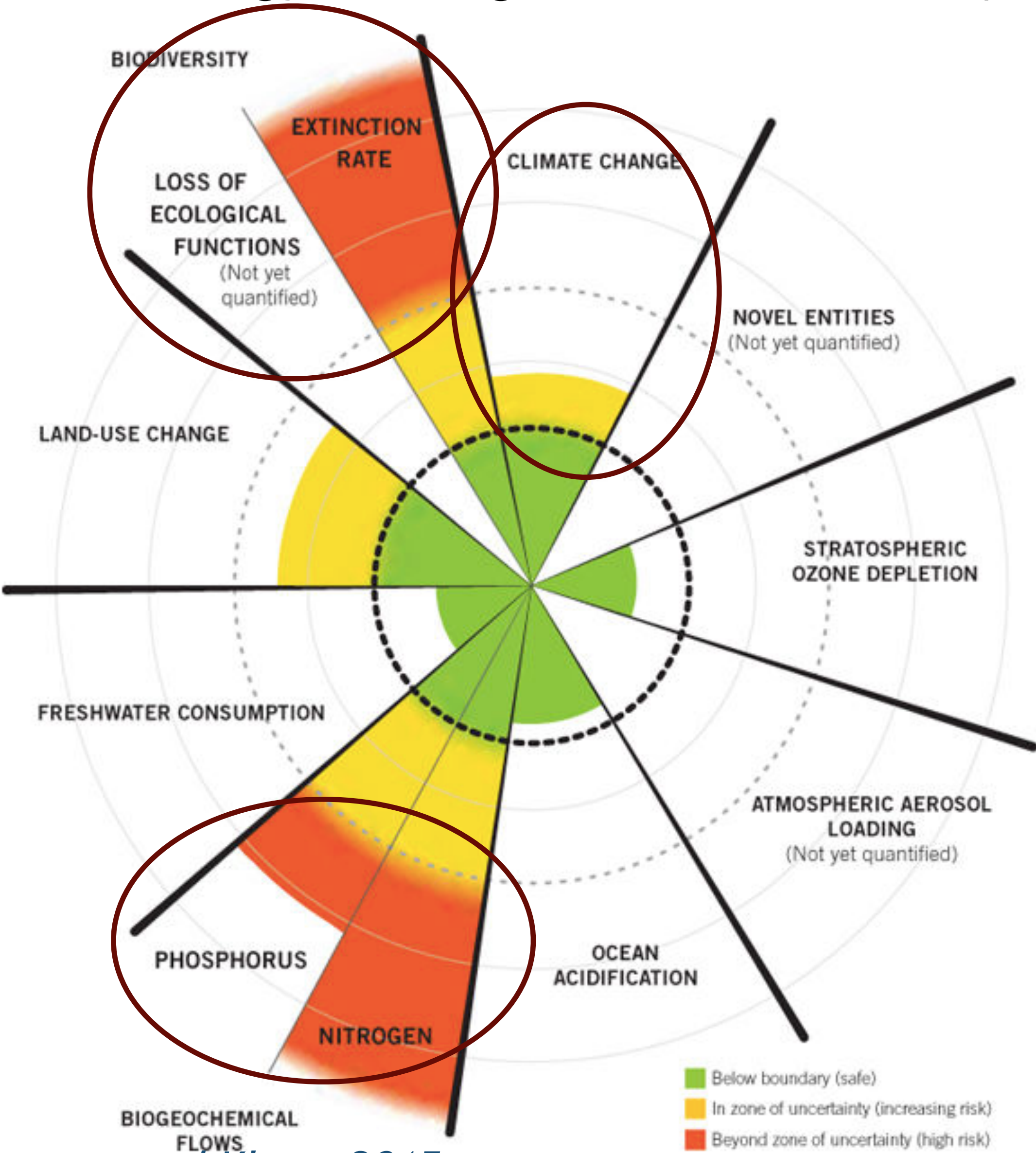
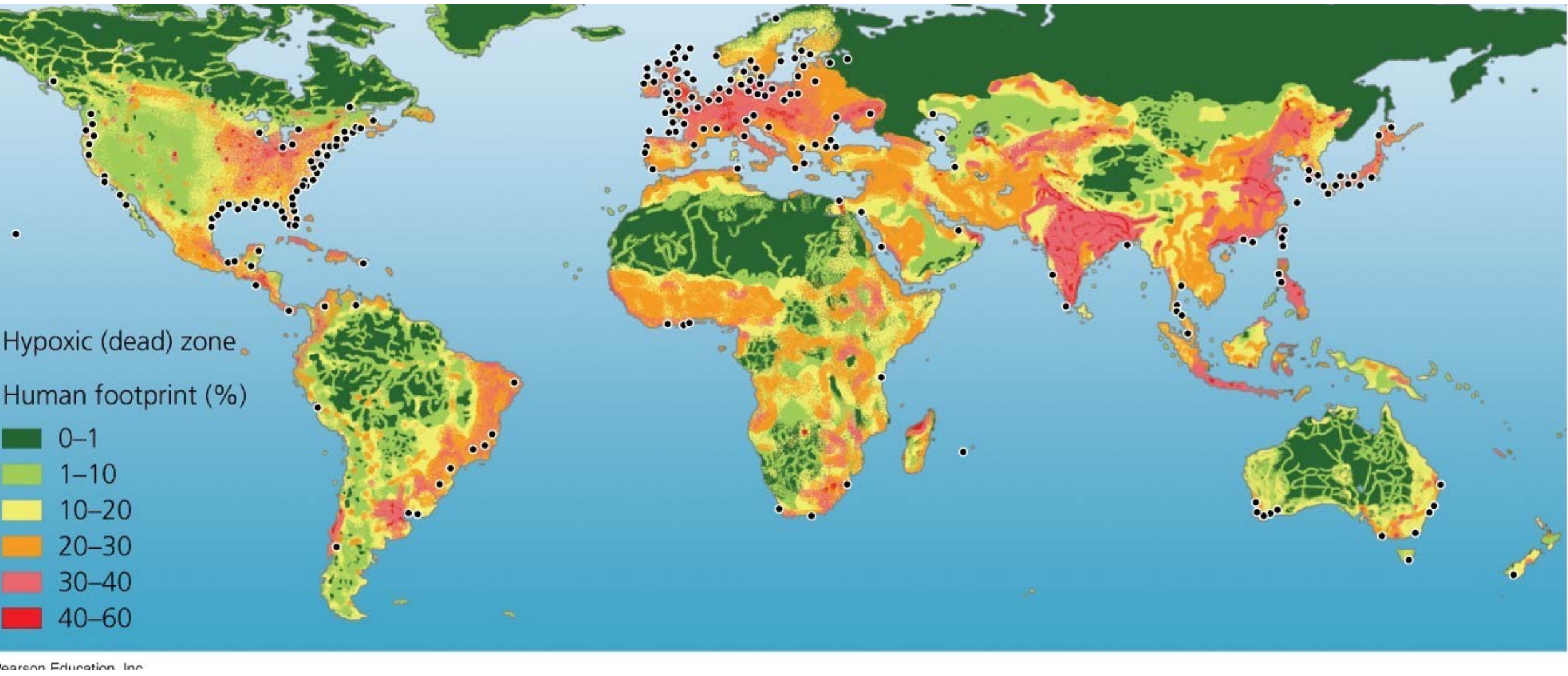
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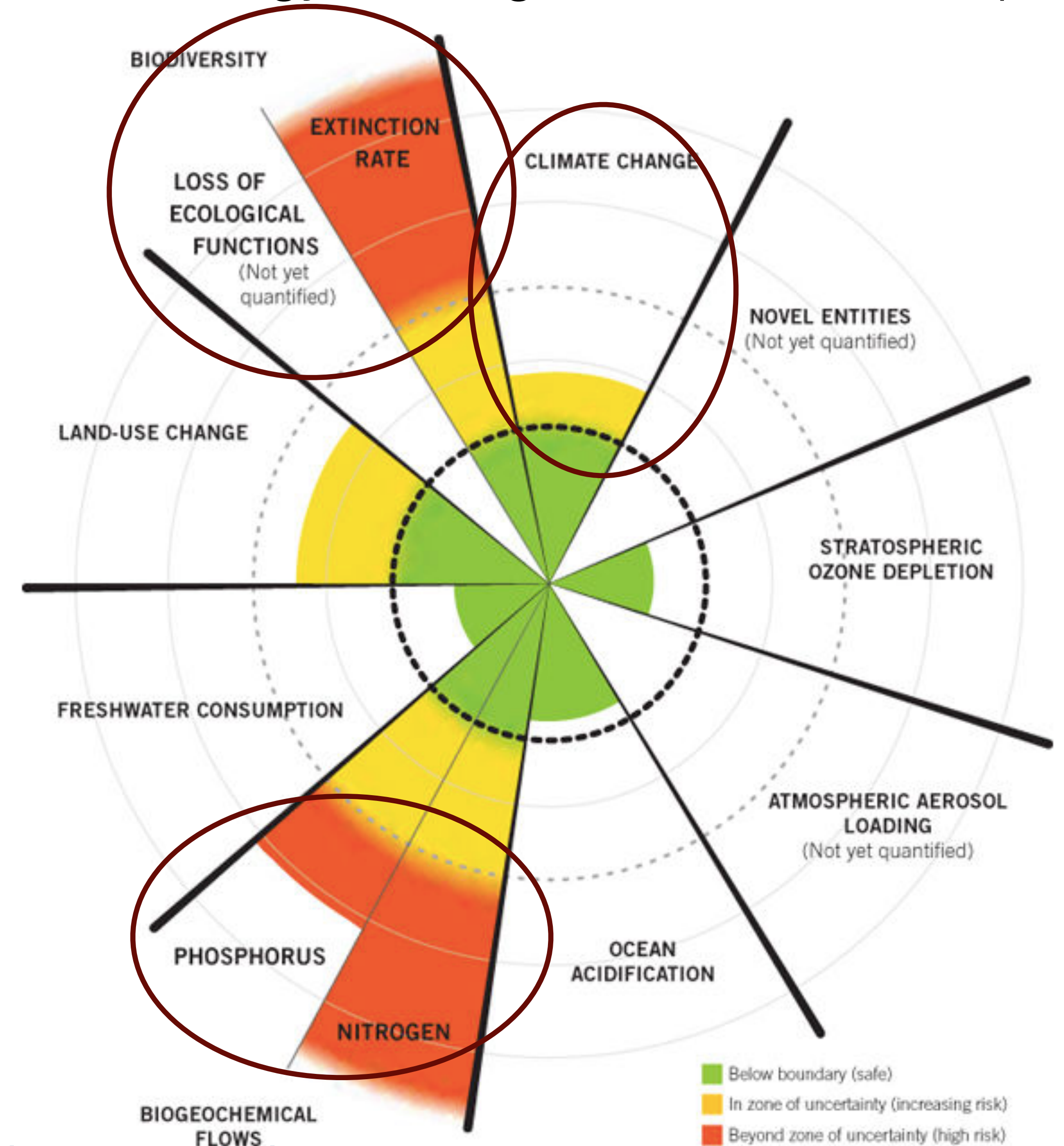


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We are heading for a planet without other large mammals - only sapiens left.



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James White PhD
University of Colorado

0:12 / 6:05

<https://www.youtube.com/watch?v=gPq9YAg9mfc&feature=youtu.be>

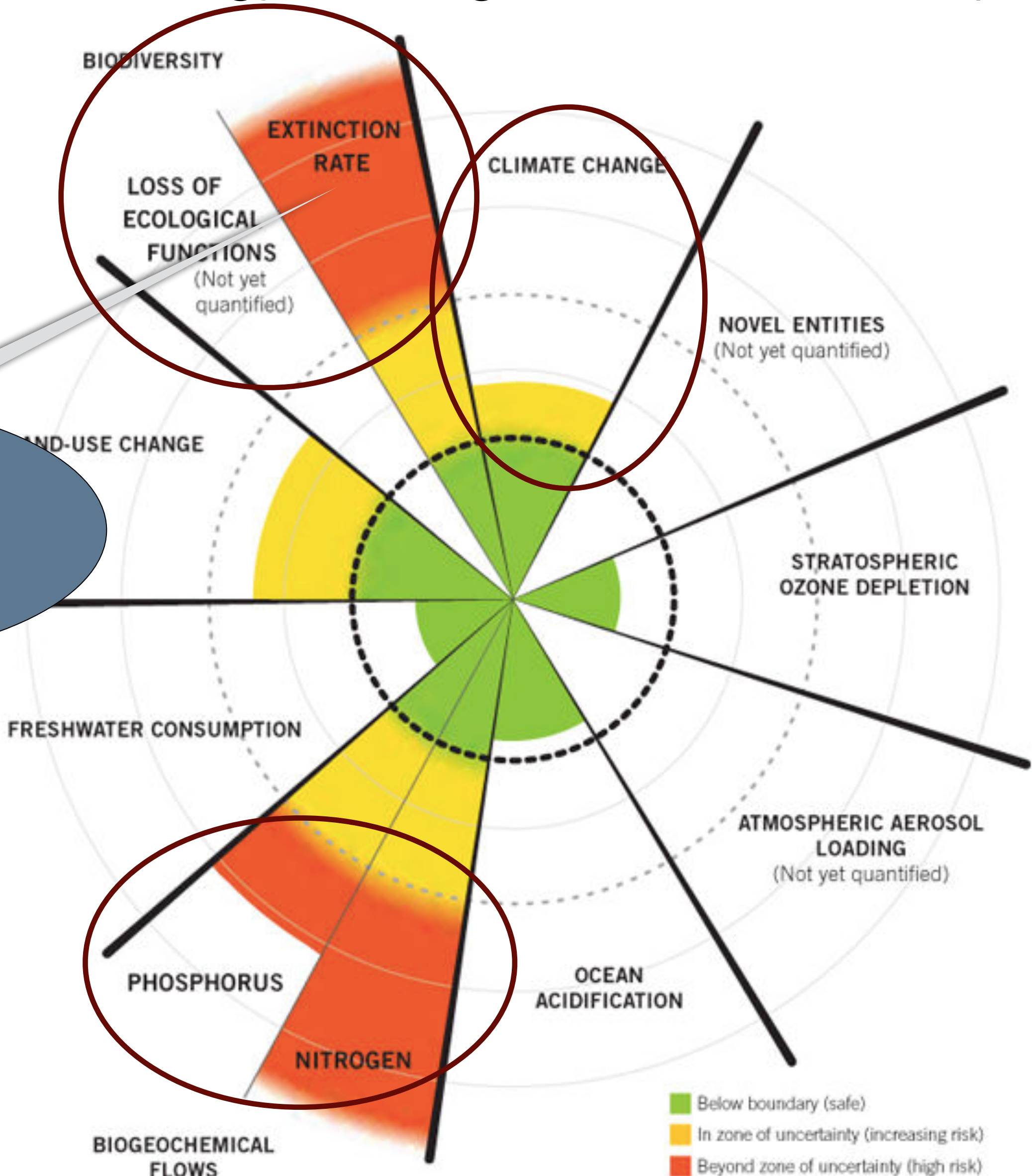
We Are The Asteroid

YaleClimateConnections

Subscribe 3,584

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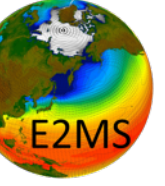
“We are the Asteroid”



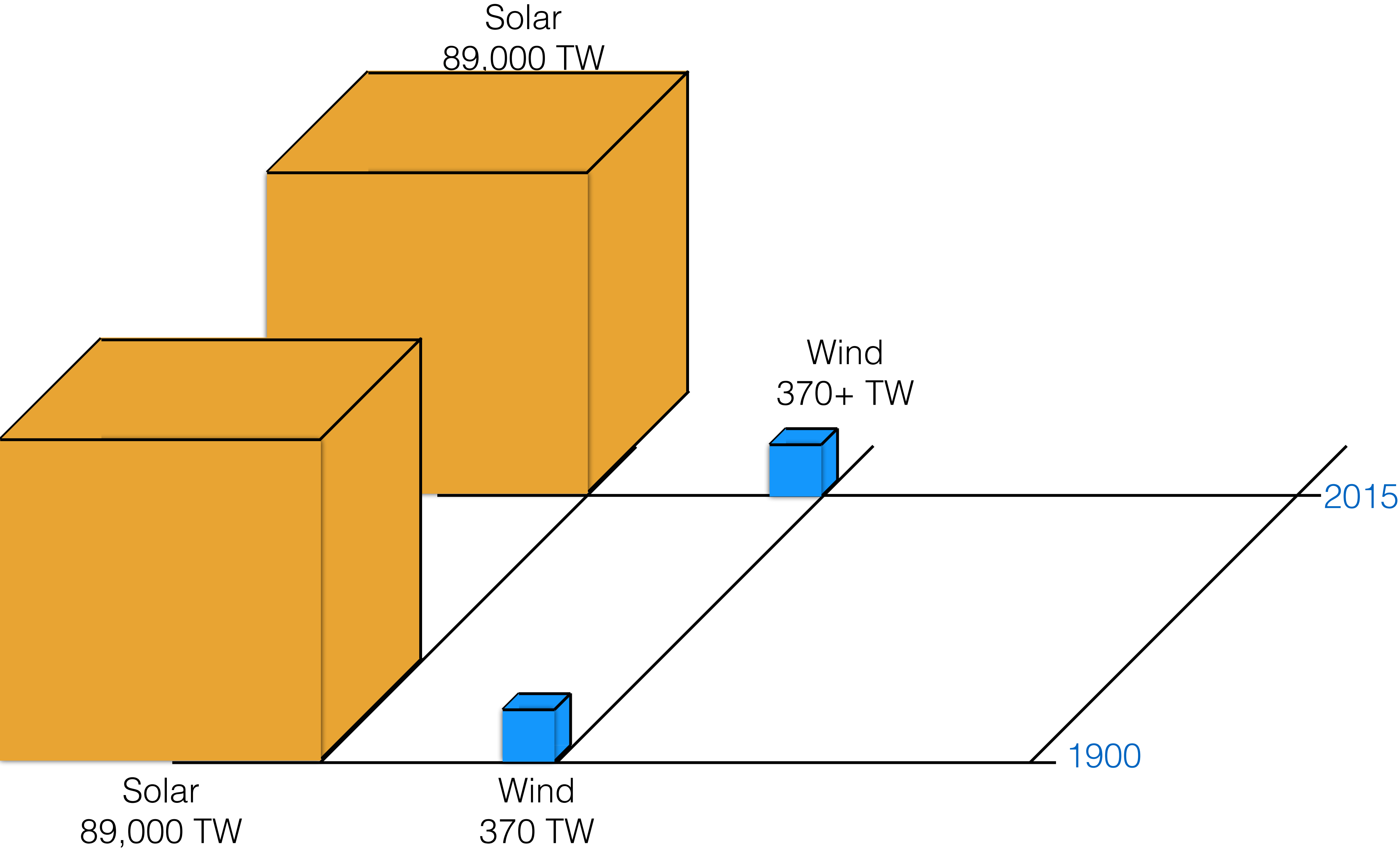
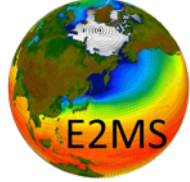
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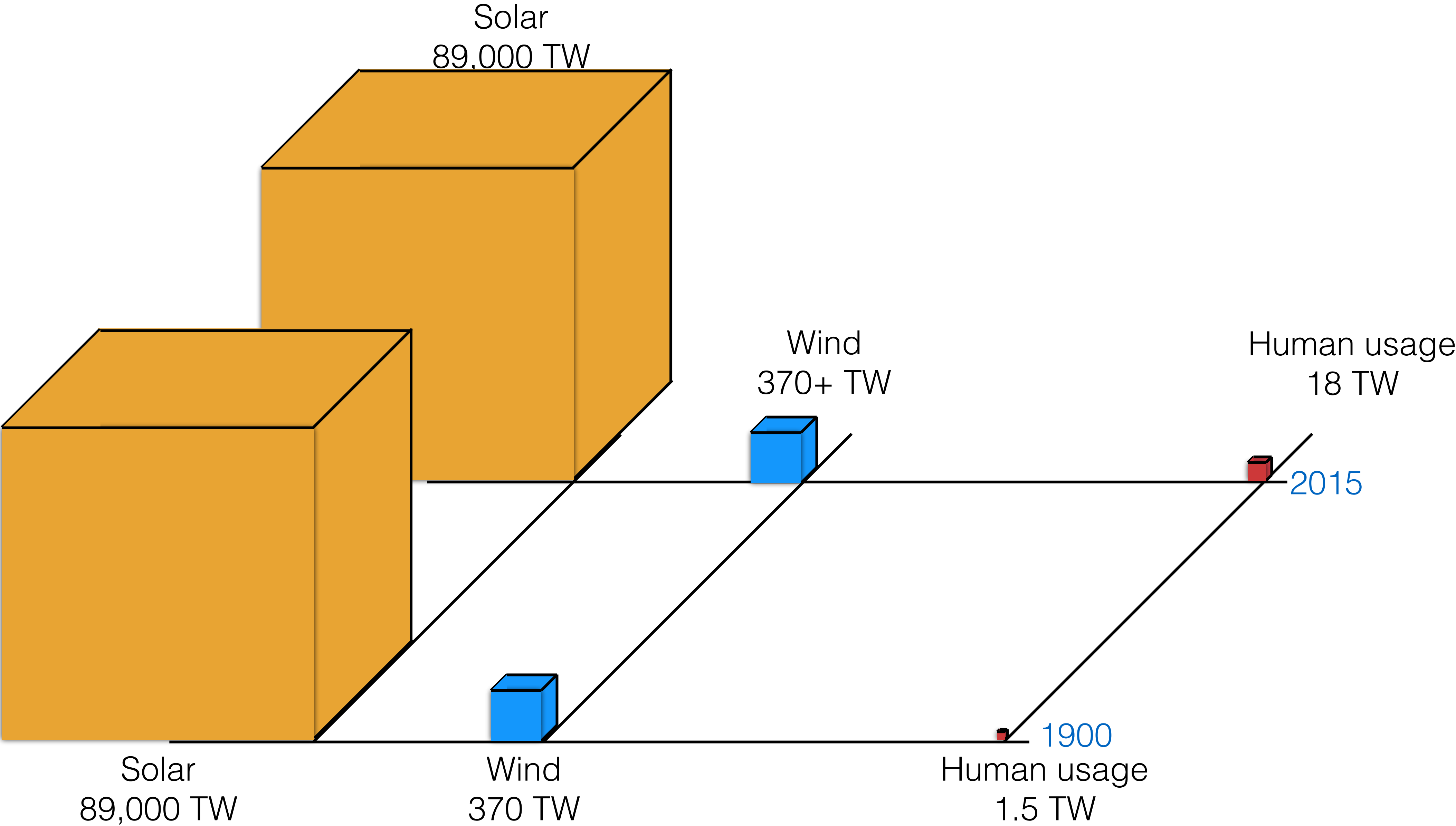
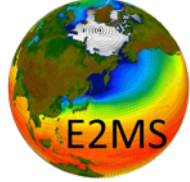
We are replacing homeostasis with disequilibrium



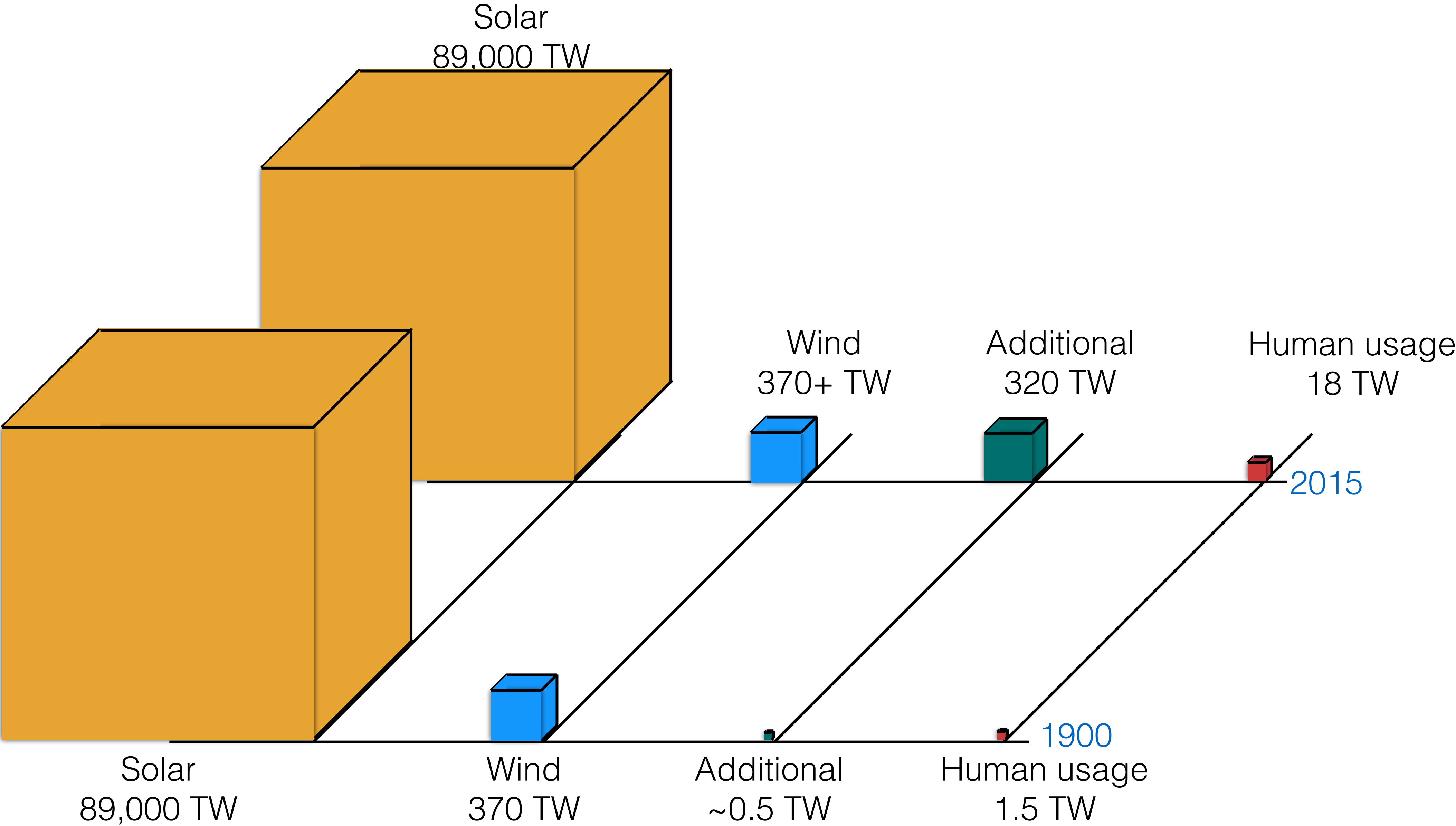
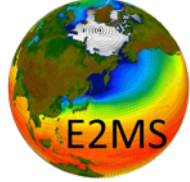
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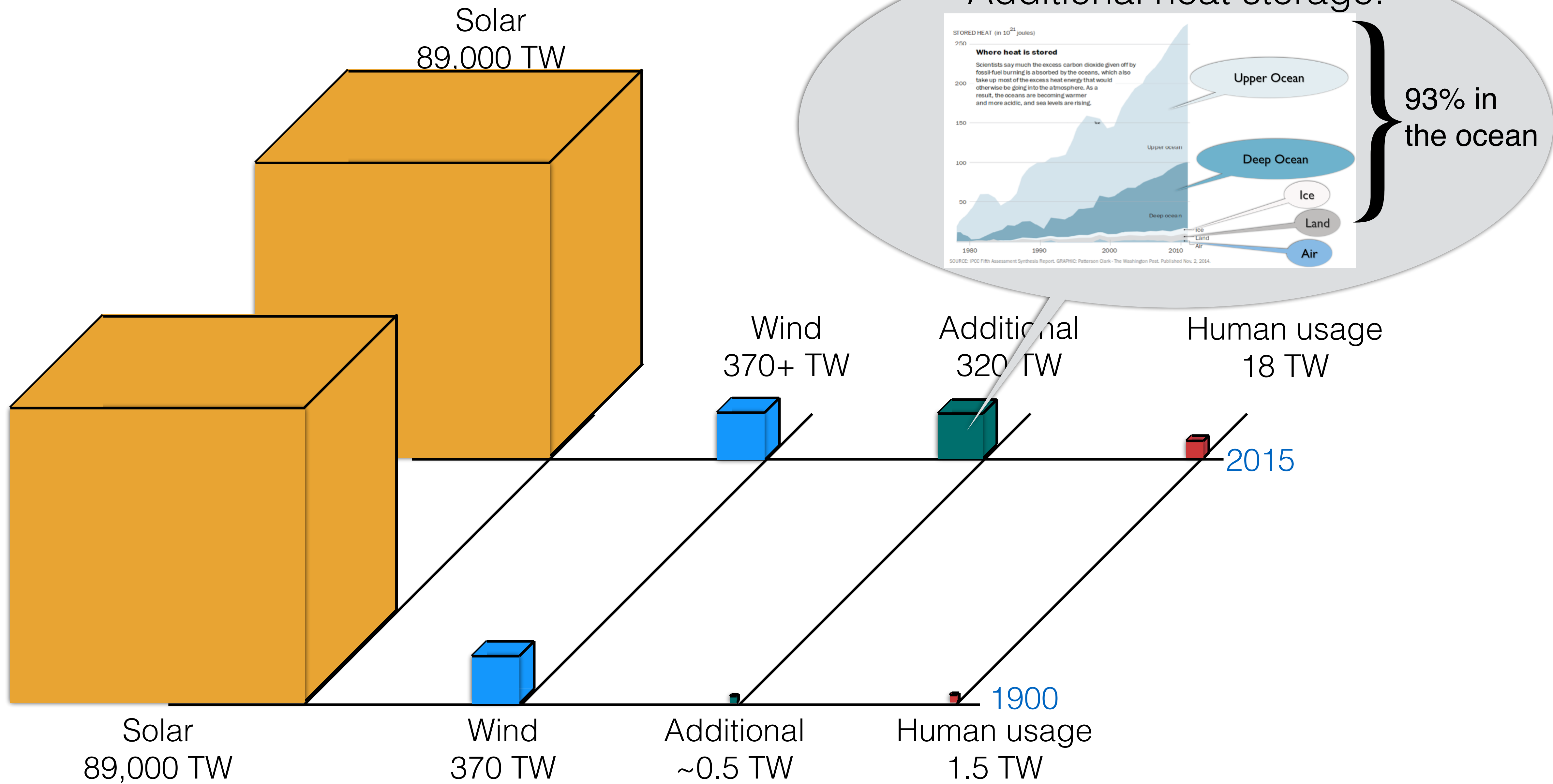
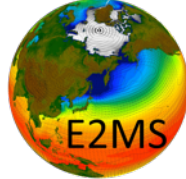
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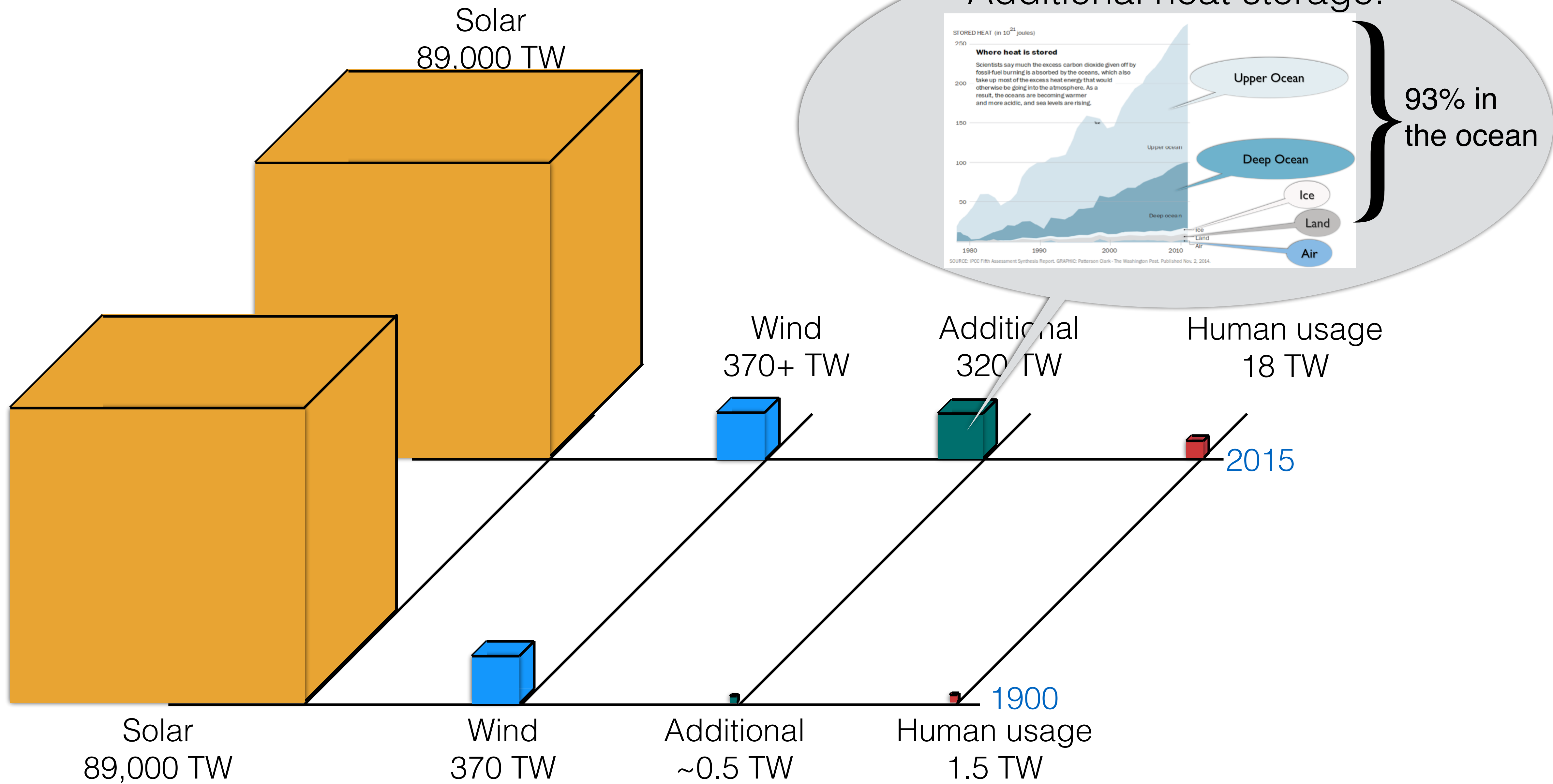
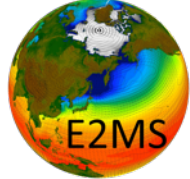
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It's not a Greenhouse effect; it's a Poolhouse effect

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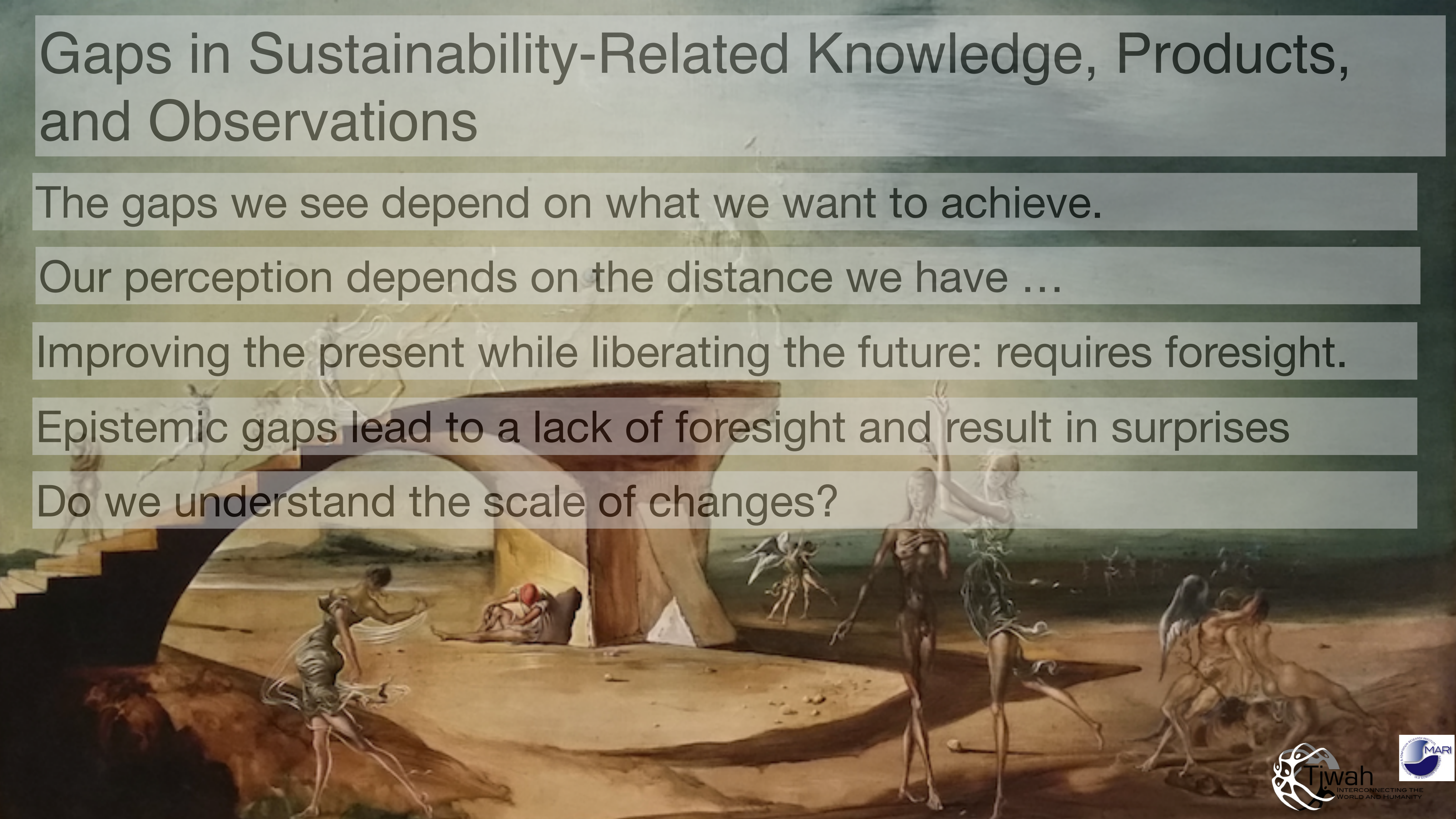
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Do we understand the scale of changes?

Do we have useful concepts?

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Griggs et al., 2013

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Earth: Our Life-Support System

The Ocean is crucial in the life-support system



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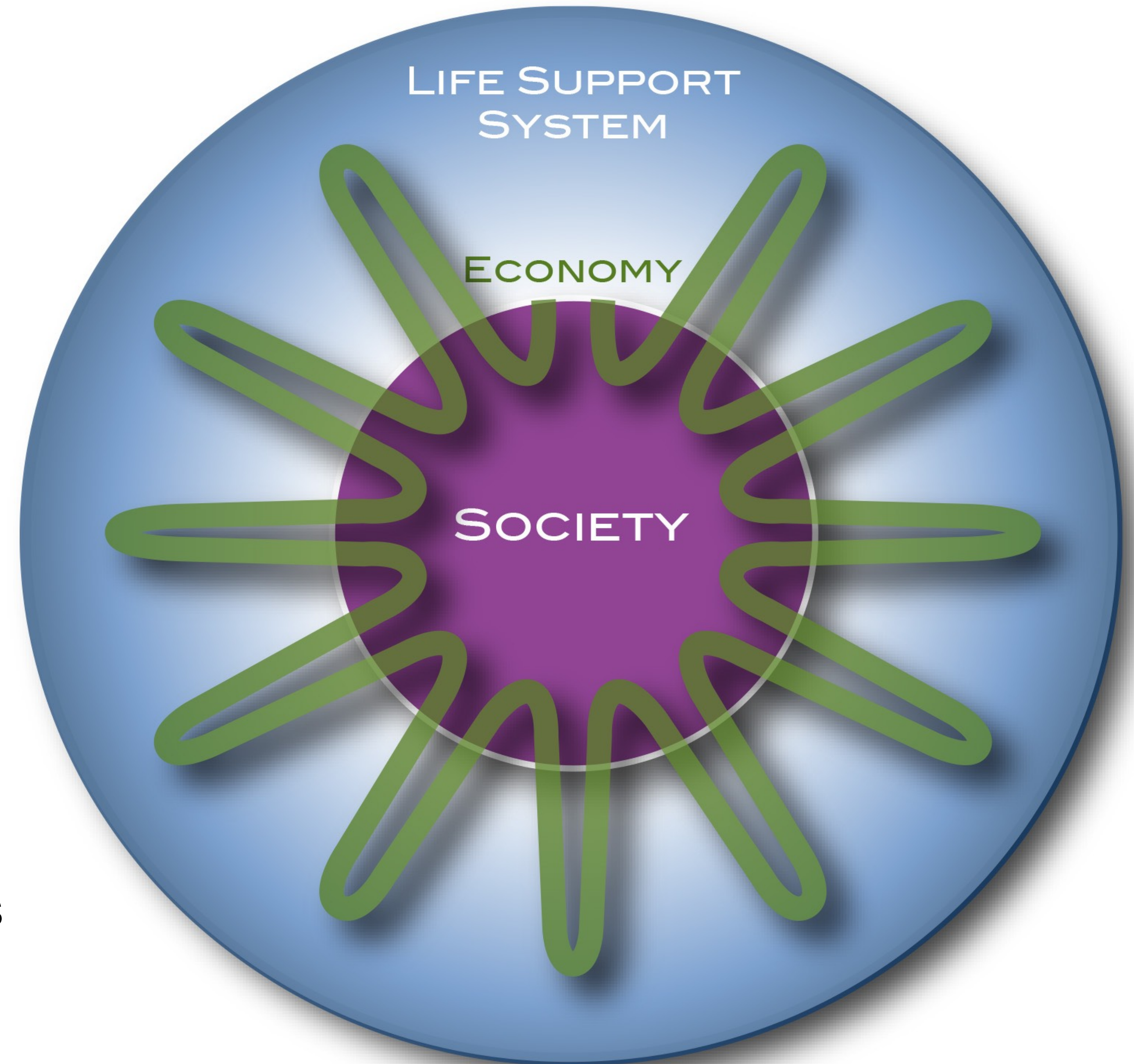
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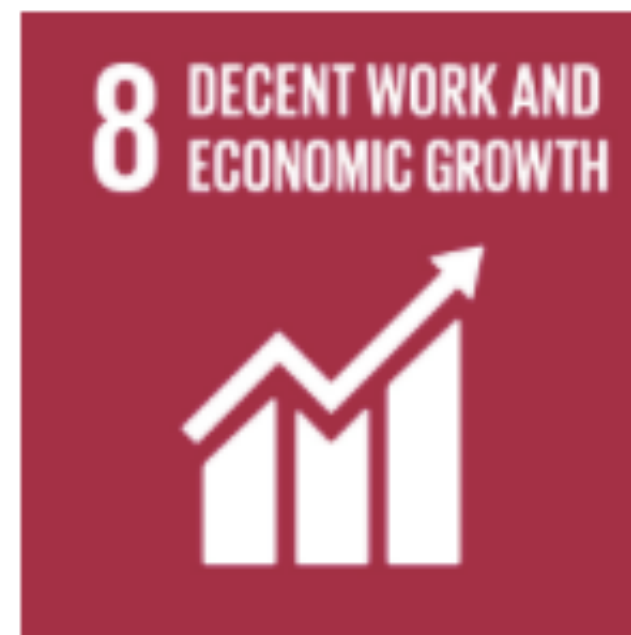
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Everything is about Flows

Flows have accelerated in the last 100 years



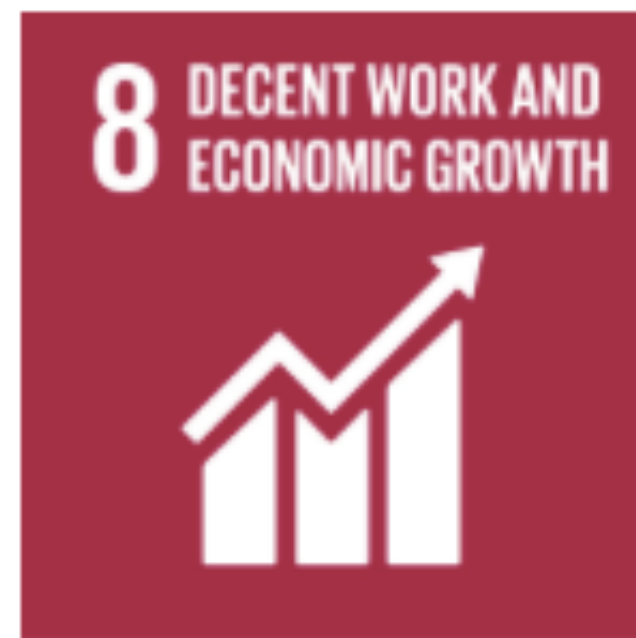
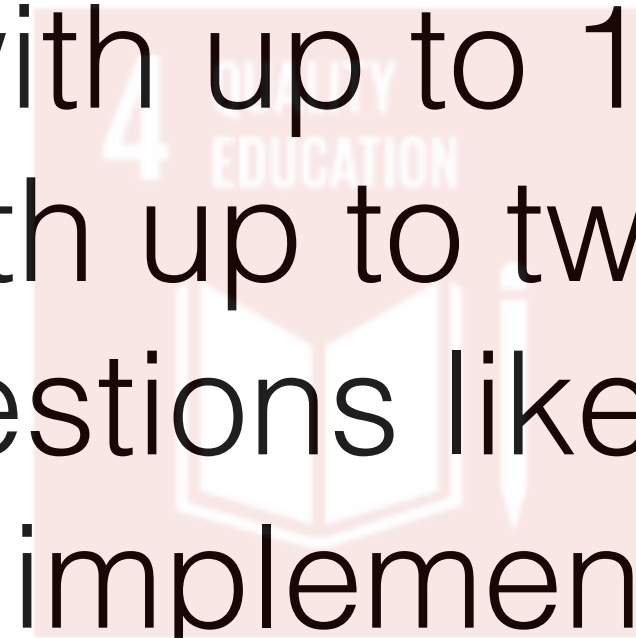
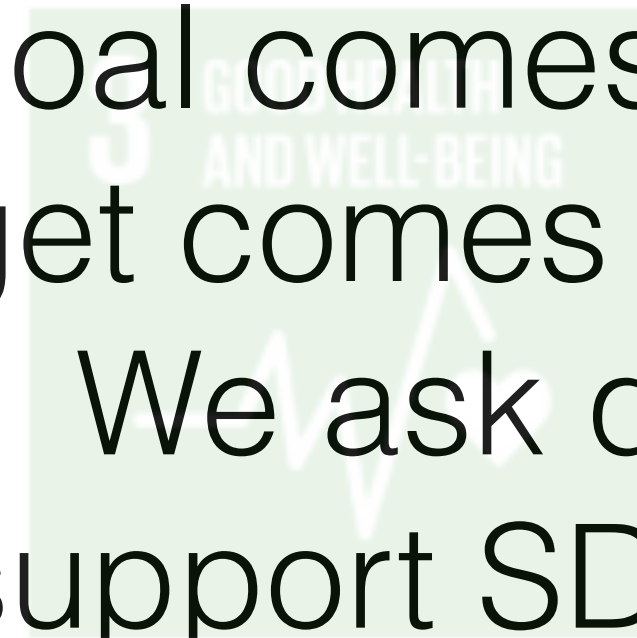
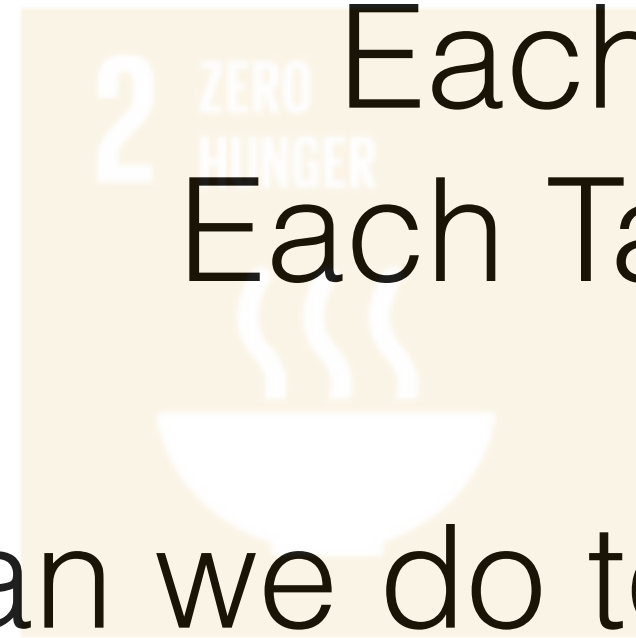
United Nations' Agenda 2013: "Road to Dignity"



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Each Goal comes with up to 10 Targets
Each Target comes with up to two indicators
We ask questions like:

What can we do to support SDG implementation and monitoring?



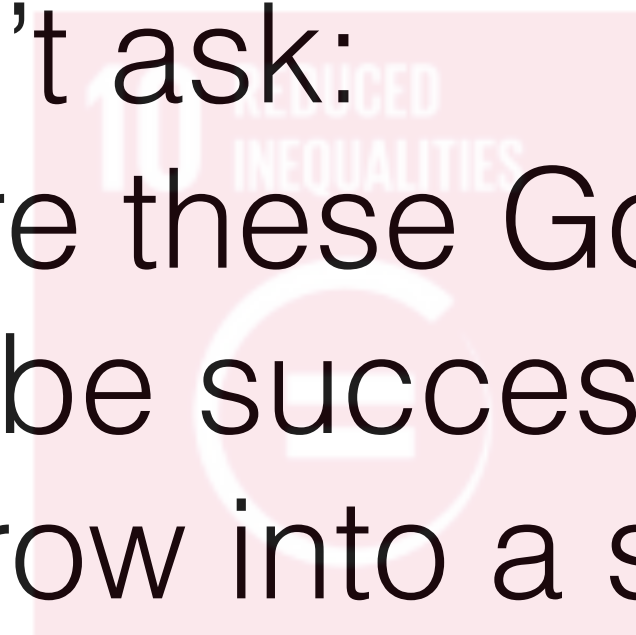
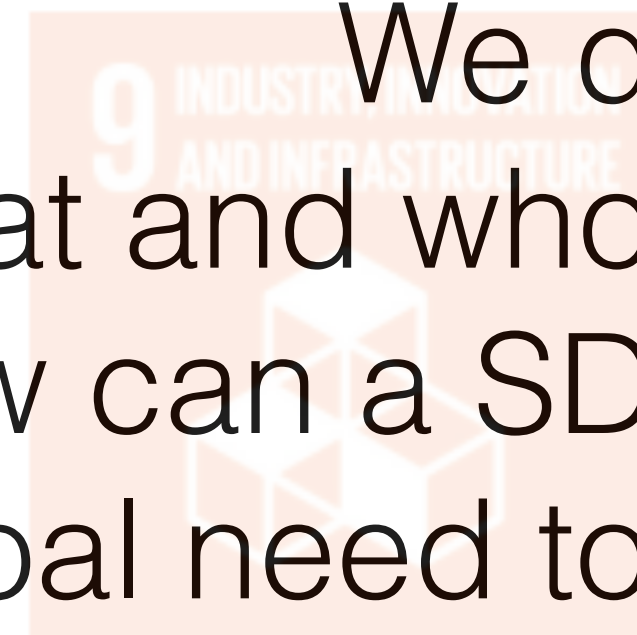
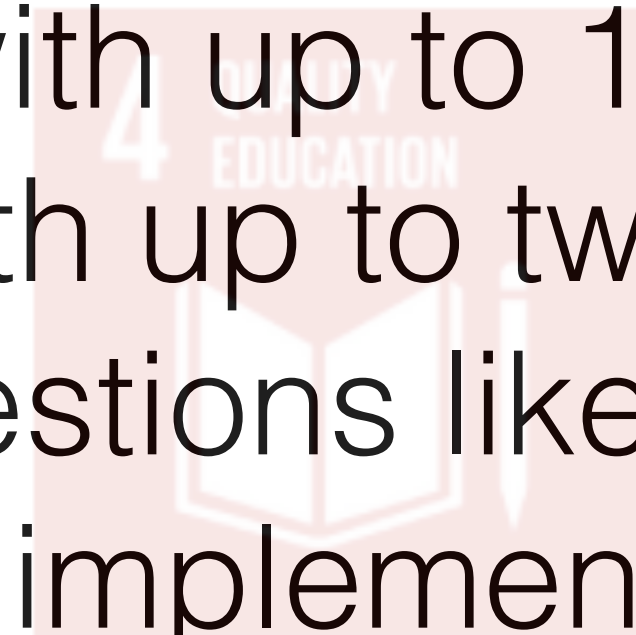
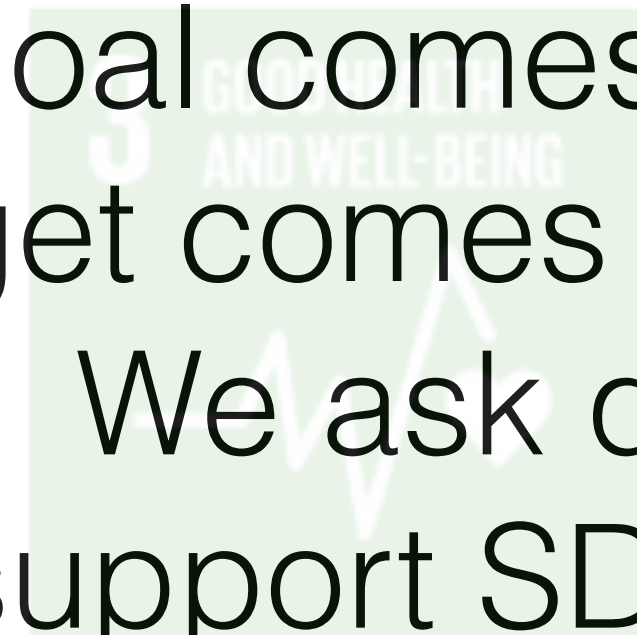
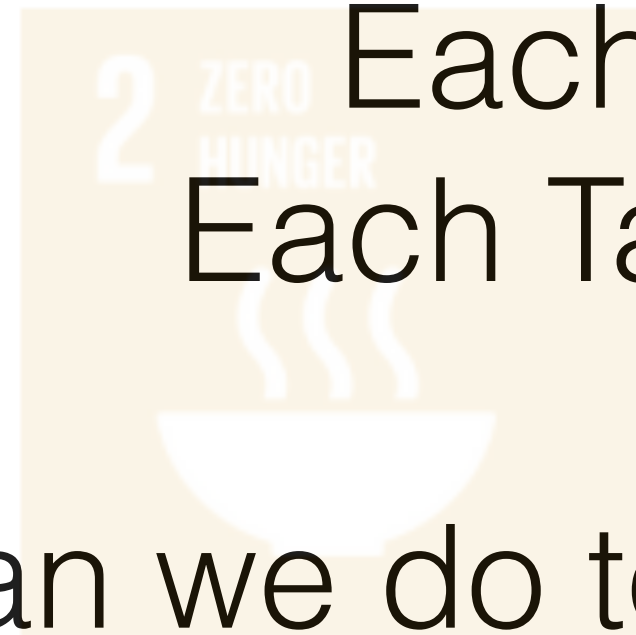
United Nations' Agenda 2013: "Road to Dignity"

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We don't ask:
What and who are these Goals?
How can a SDG be successful?

What does a goal need to grow into a successful goal?



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A new Paradigm:

Giving each SDG its own life

Seeing the world through the eyes of a SDG

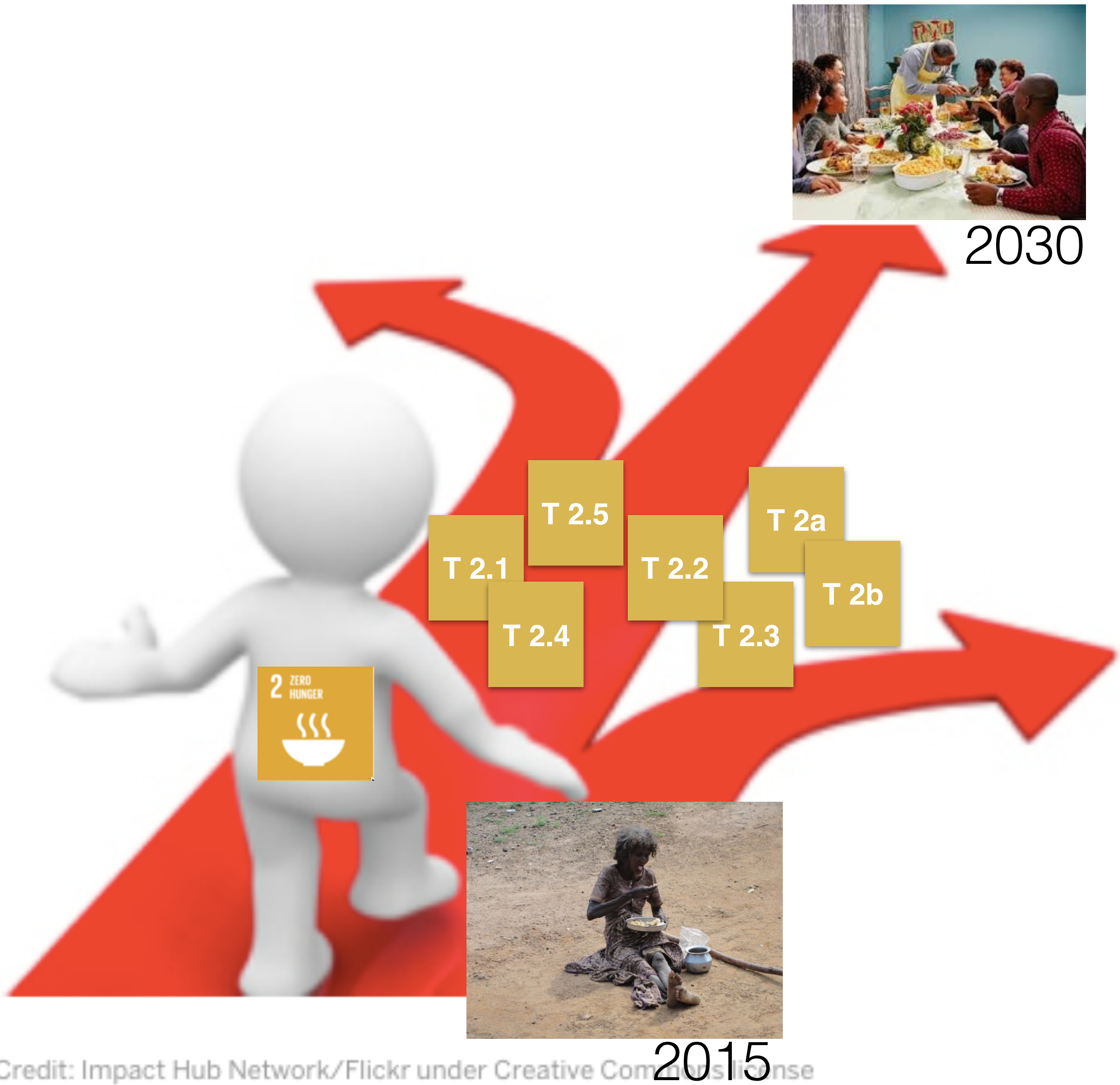
Realizing, the world is not prepared for the goals

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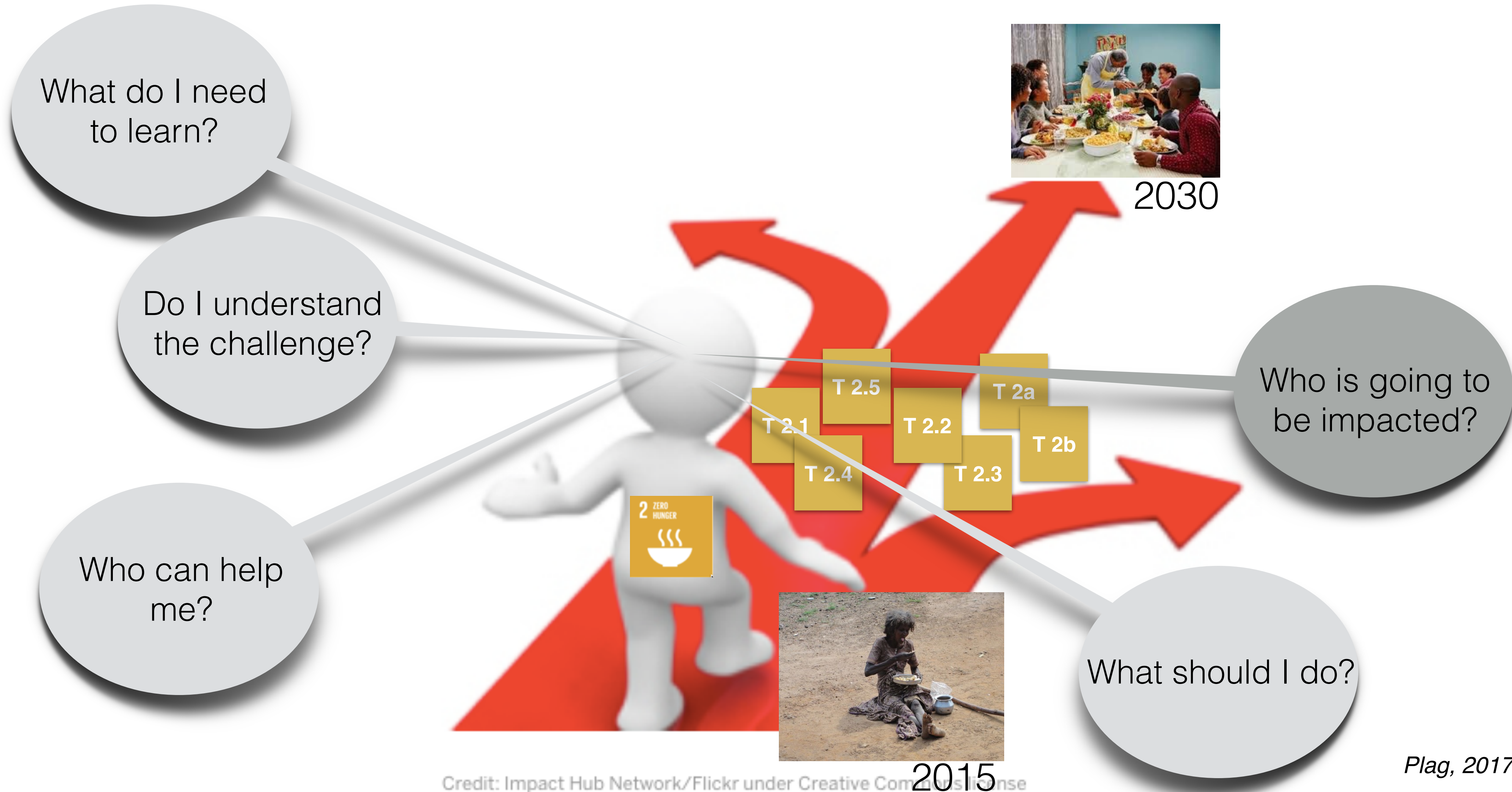
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The Life of a SDG: How to grow into a successful SDG?

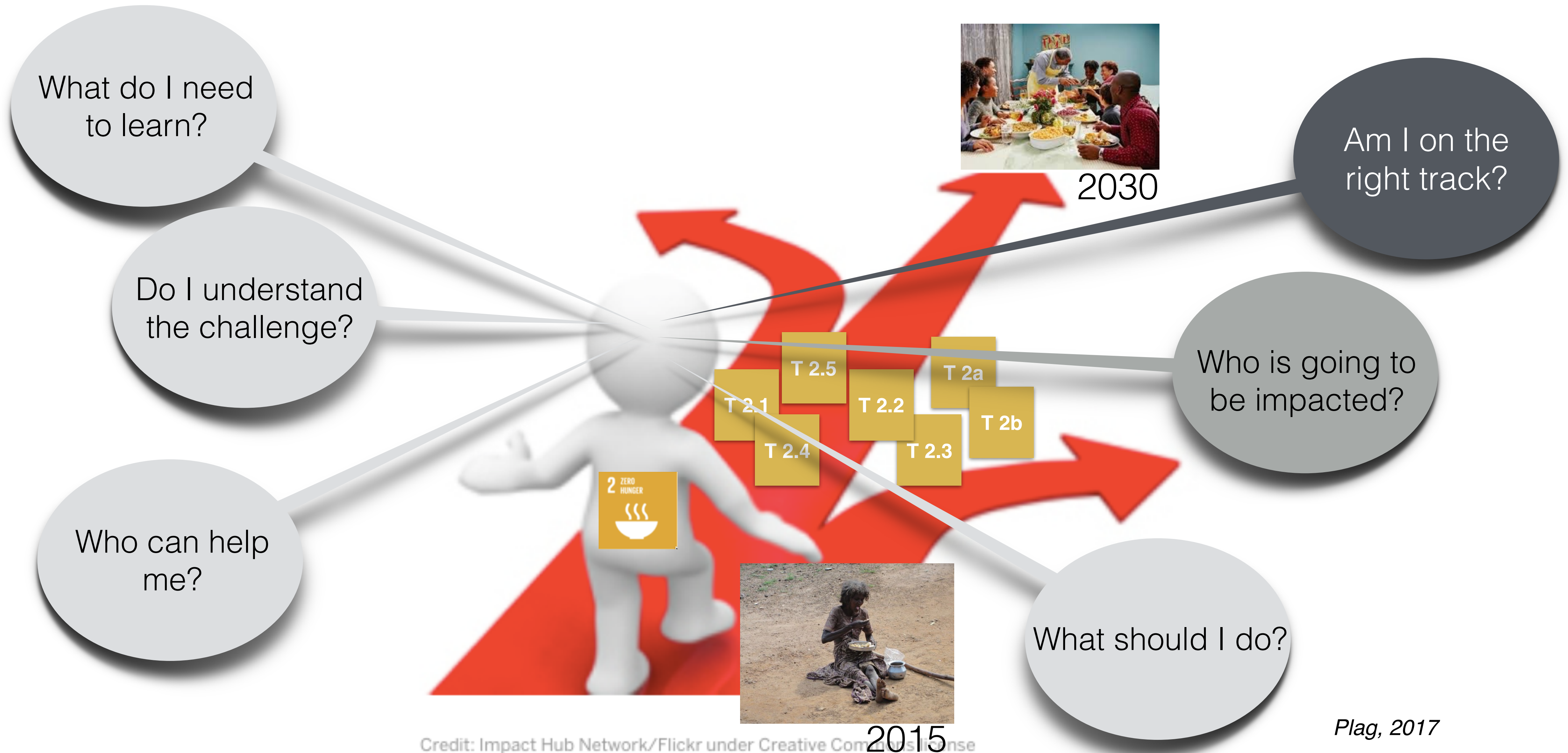


Credit: Impact Hub Network/Flickr under Creative Commons license

The Life of a SDG: How to grow into a successful SDG?



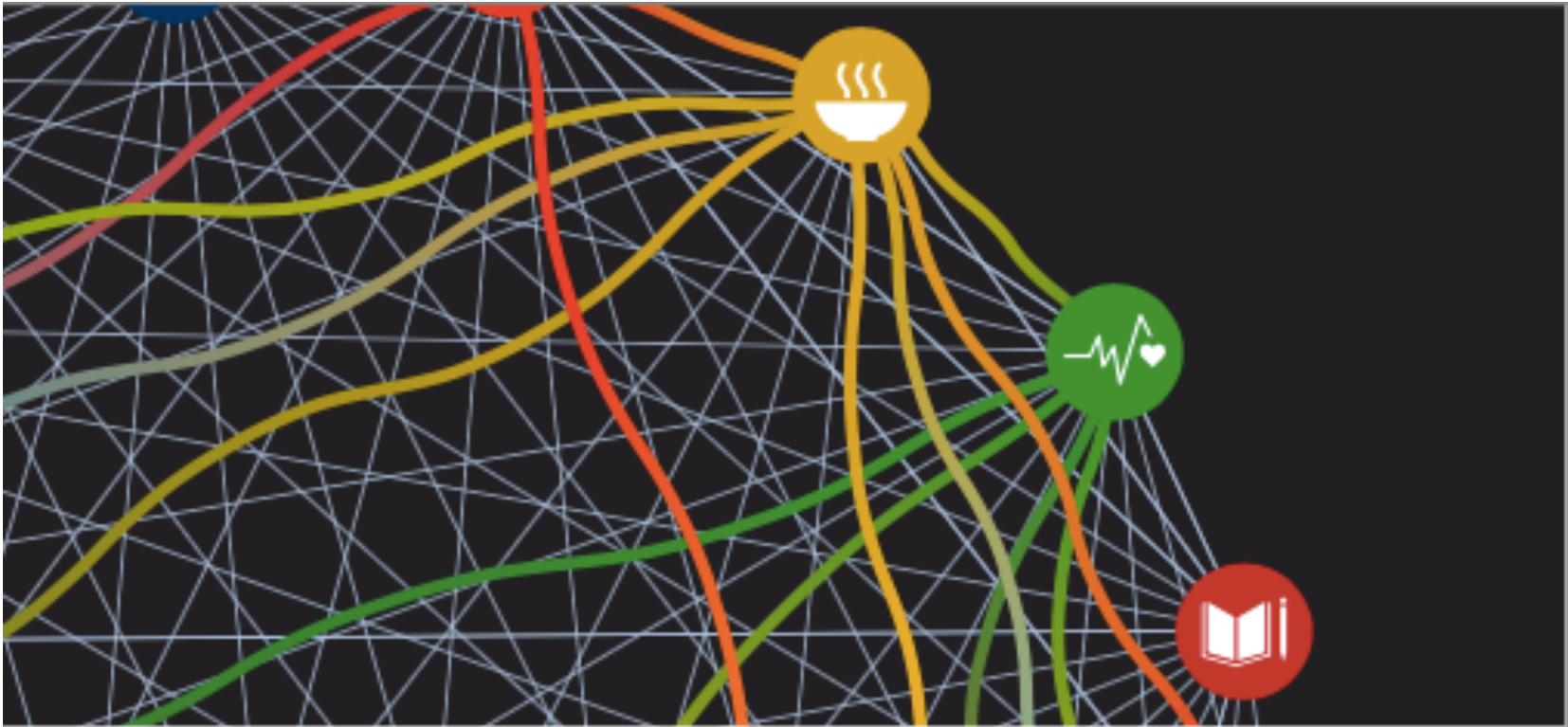
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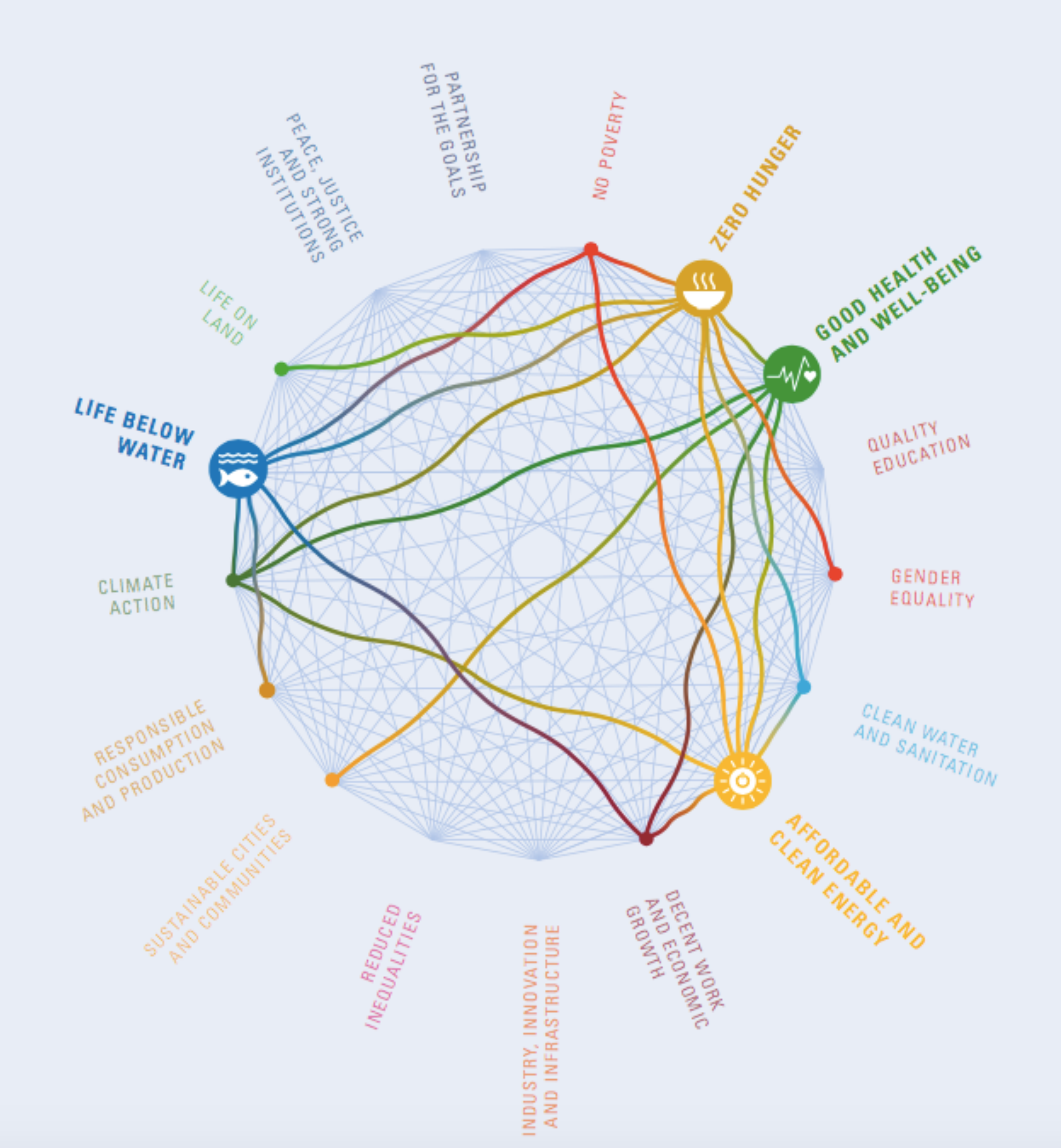
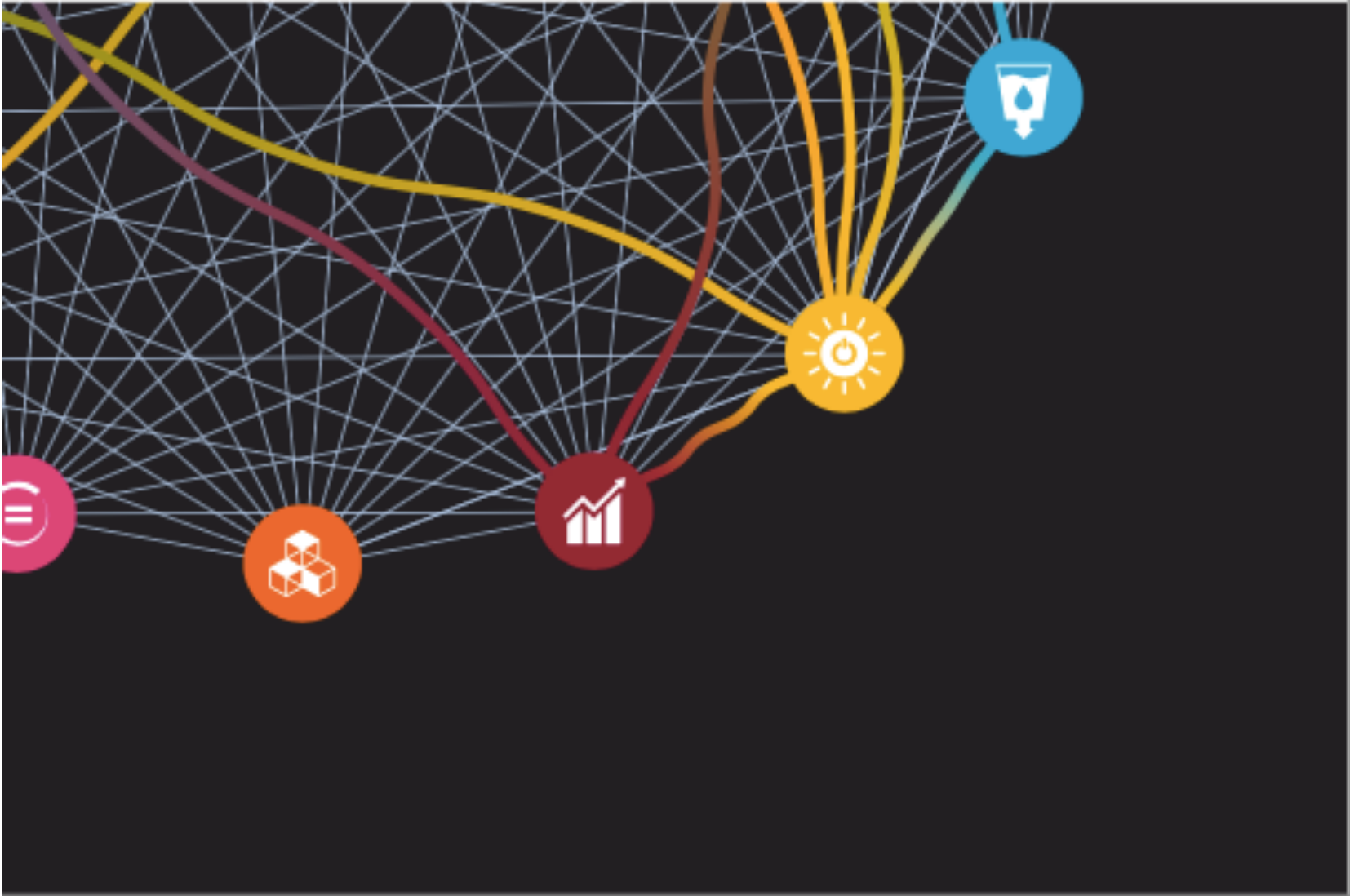
The Life of a SDG: How to grow into a successful SDG?



Assessing Interdependencies



A GUIDE TO
SDG INTERACTIONS:
FROM SCIENCE
TO IMPLEMENTATION



SDG14 CONSERVE AND SUSTAINABLY USE THE OCEANS, SEAS AND MARINE RESOURCES FOR SUSTAINABLE DEVELOPMENT

Stefanie Schmidt
Barbara Neumann
Yvonne Waweru
Carole Durussel
Sebastian Unger
Martin Visbeck

1

NO POVERTY



2

ZERO HUNGER



8

DECENT WORK AND ECONOMIC GROWTH



11

SUSTAINABLE CITIES AND COMMUNITIES



12

RESPONSIBLE CONSUMPTION AND PRODUCTION



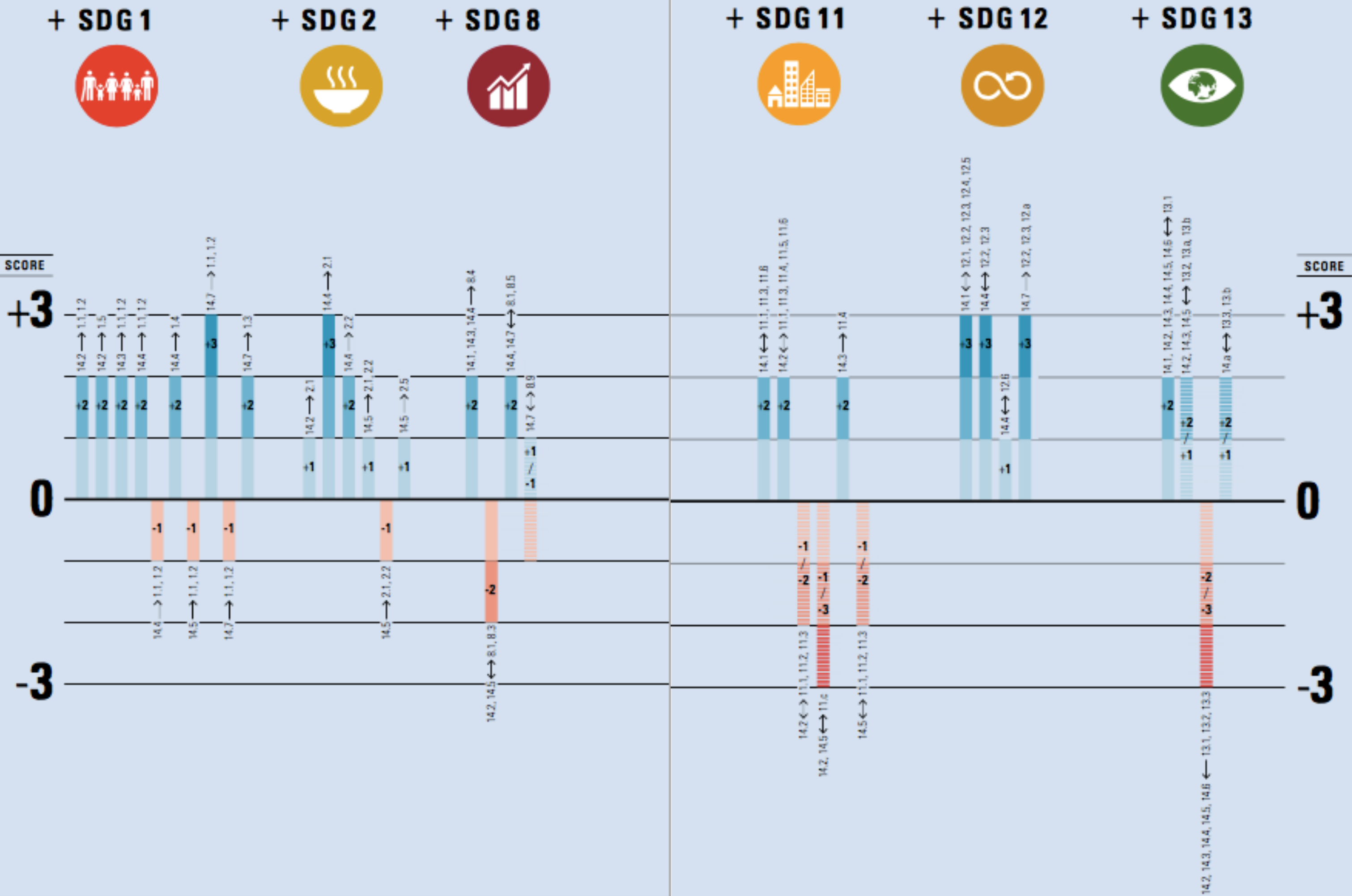
13

CLIMATE ACTION





KEY INTERACTIONS SDG 14 WITH OTHER GOALS



THE NIPPON FOUNDATION

NEREUS PROGRAM

PREDICTING FUTURE OCEANS


Oceans and the Sustainable Development Goals:

CO-BENEFITS, CLIMATE CHANGE &

SOCIAL EQUITY


14

LIFE
BELOW WATER




1

NO POVERTY




2

ZERO HUNGER




3

BETTER HEALTH AND WELL-BEING




4

QUALITY EDUCATION




5

GENDER EQUALITY




6

CLEAN WATER AND SANITATION




7

AFORDABLE AND CLEAN ENERGY




8

DECENT WORK AND ECONOMIC GROWTH




9

INDUSTRIAL INNOVATION AND INFRASTRUCTURE




10

REDUCED INEQUALITIES




11

SUSTAINABLE CITIES AND COMMUNITIES




12

RESPONSIBLE CONSUMPTION AND PRODUCTION




13

CLIMATE ACTION




15

LIFE ON LAND




16

PEACE, JUSTICE AND STRONG INSTITUTIONS



17

PARTNERSHIPS FOR THE GOALS



Implementing the Ocean SDG in the Wider Caribbean: state of play and possible ways forward



Report prepared for the Partnership for Regional Ocean Governance
(IDDRI, IASS, TMG and UNEP)

by

Lucia Fanning¹ and Robin Mahon²

April 30, 2017

¹ Marine Affairs Program, Dalhousie University, Halifax, Nova Scotia, Canada

² Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies, Cave Hill Campus, Barbados

The critical issues include:

- overfished/declining fish stocks,
- loss of habitat and biodiversity,
- marine and land-based sources of pollution,
- invasive species, primarily lionfish,
- climate change impacts.

Fanning and Mahon, 2017

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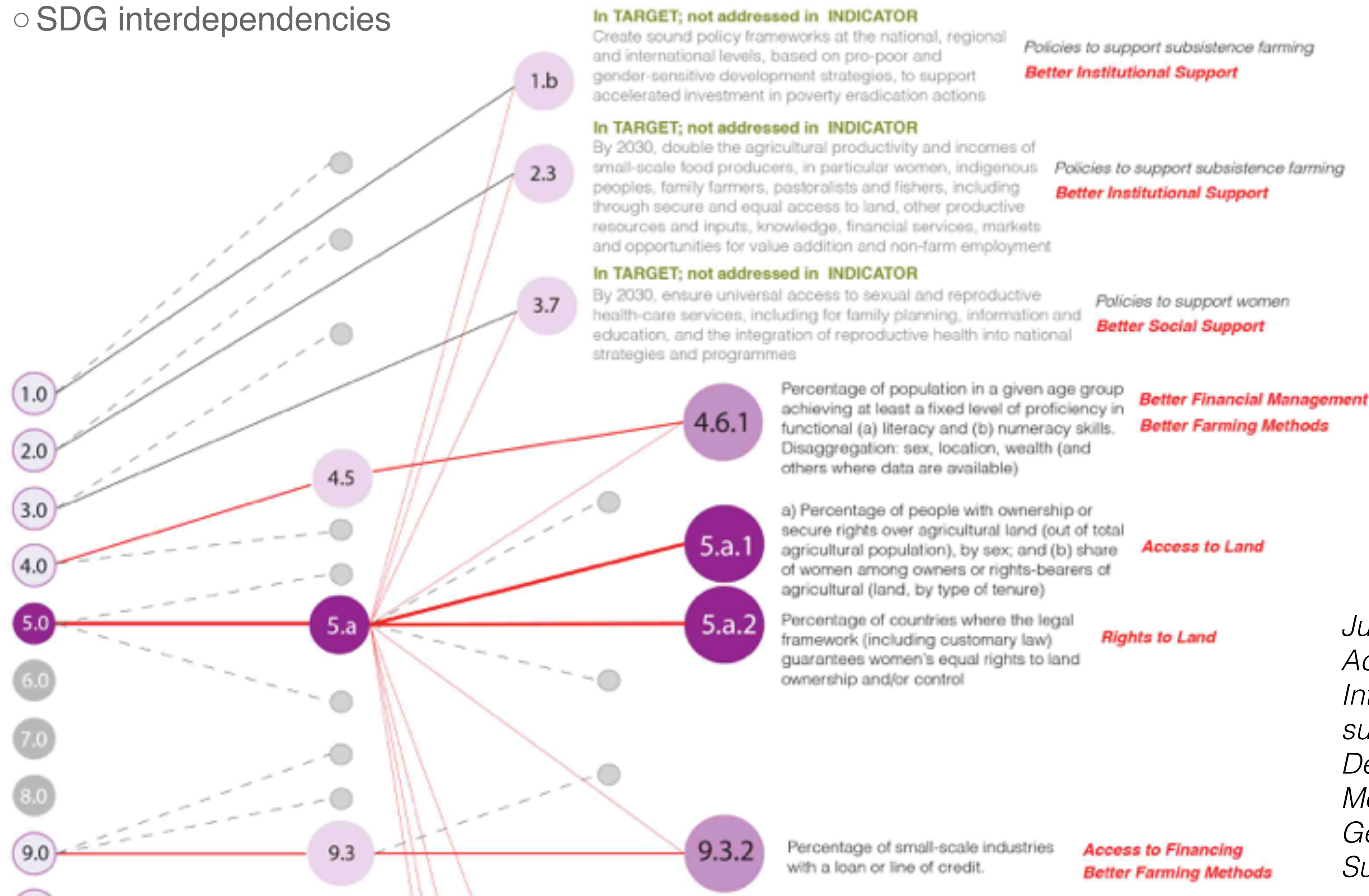
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Symptoms,
not “Issues”/
Causes

Fanning and Mahon, 2017

4 Interdependencies and interactions of SDGs, Targets and Indicators

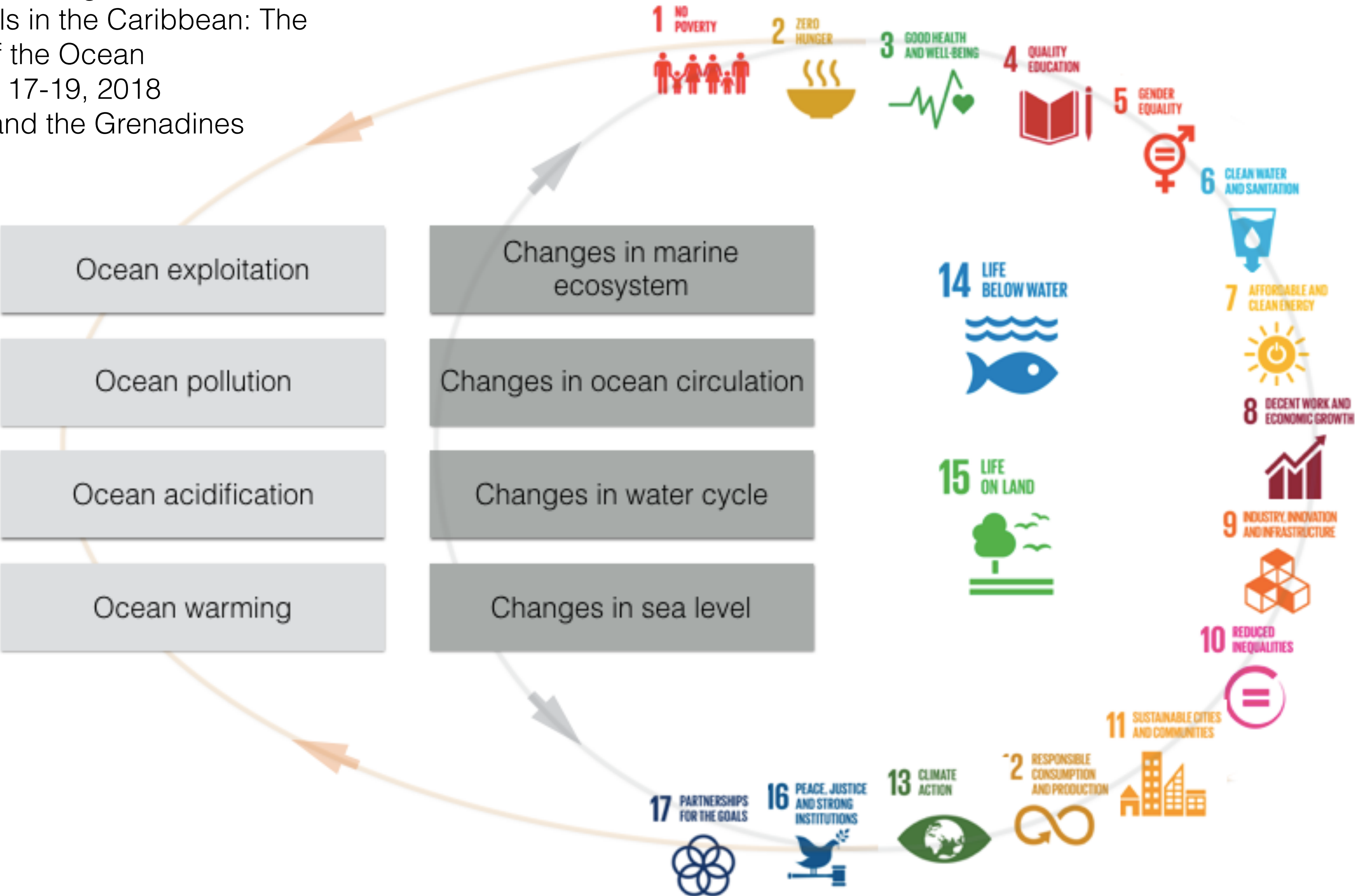
- SDG interdependencies



Jules-Plag and Plag, 2016.
Addressing SDG
Interconnections and
supporting SDG Policy
Development with Agent-Based
Models: The Example of
Gender Equality and
Subsistence Farming

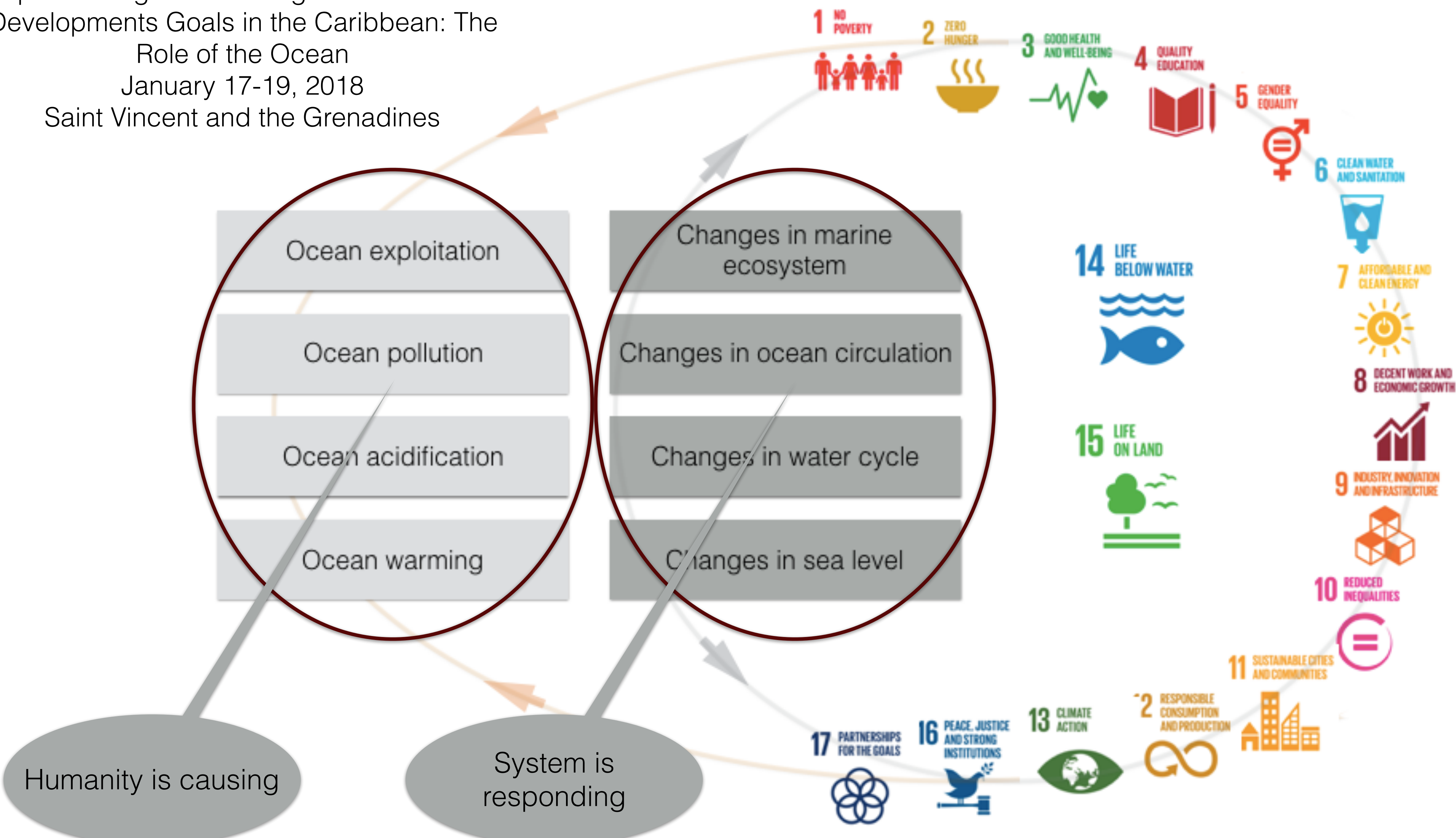
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Role of the Ocean
January 17-19, 2018
Saint Vincent and the Grenadines



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A Holistic View

Feeding a
growing
Population

2 ZERO
HUNGER

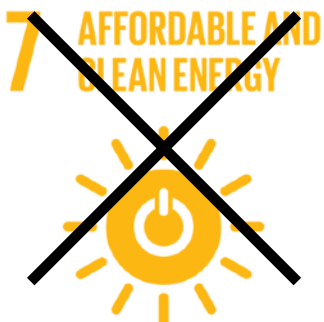


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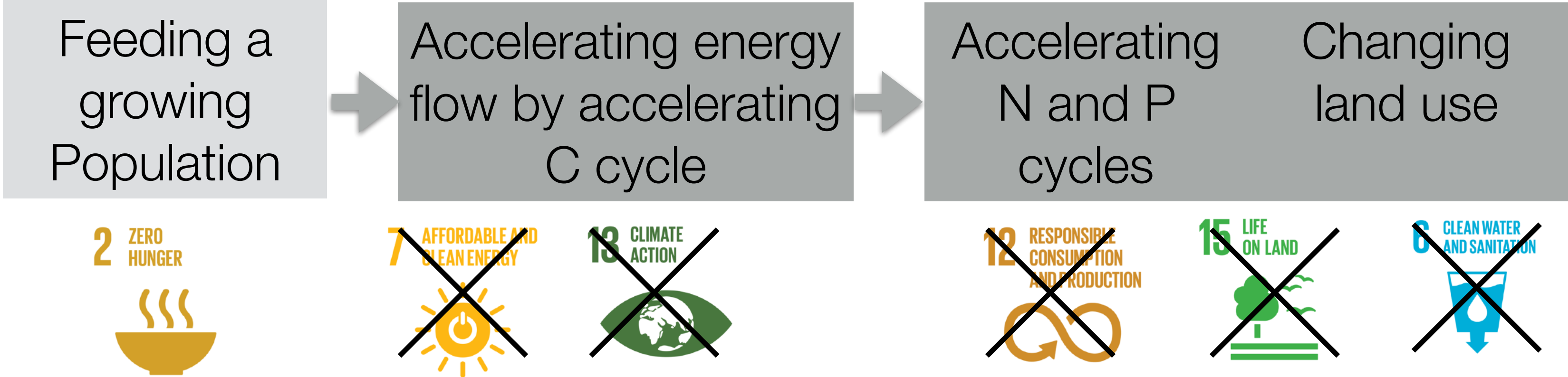
Feeding a growing Population



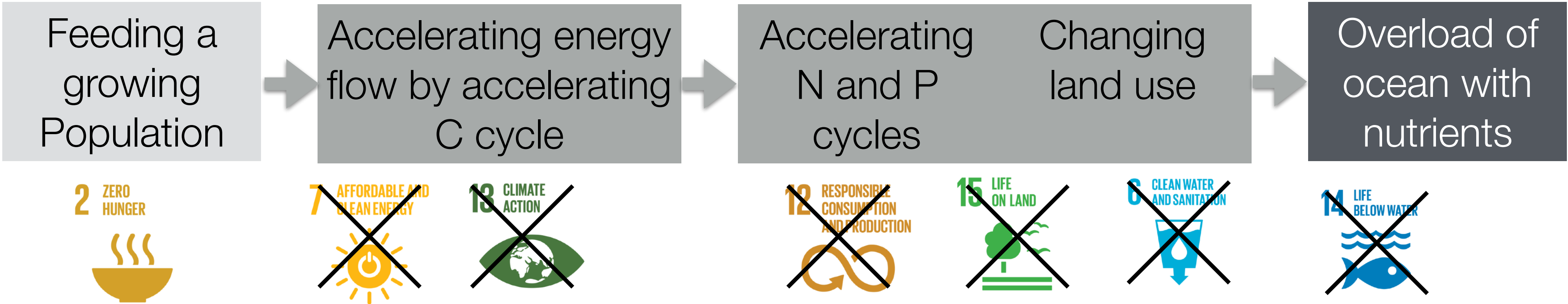
Accelerating energy flow by accelerating C cycle



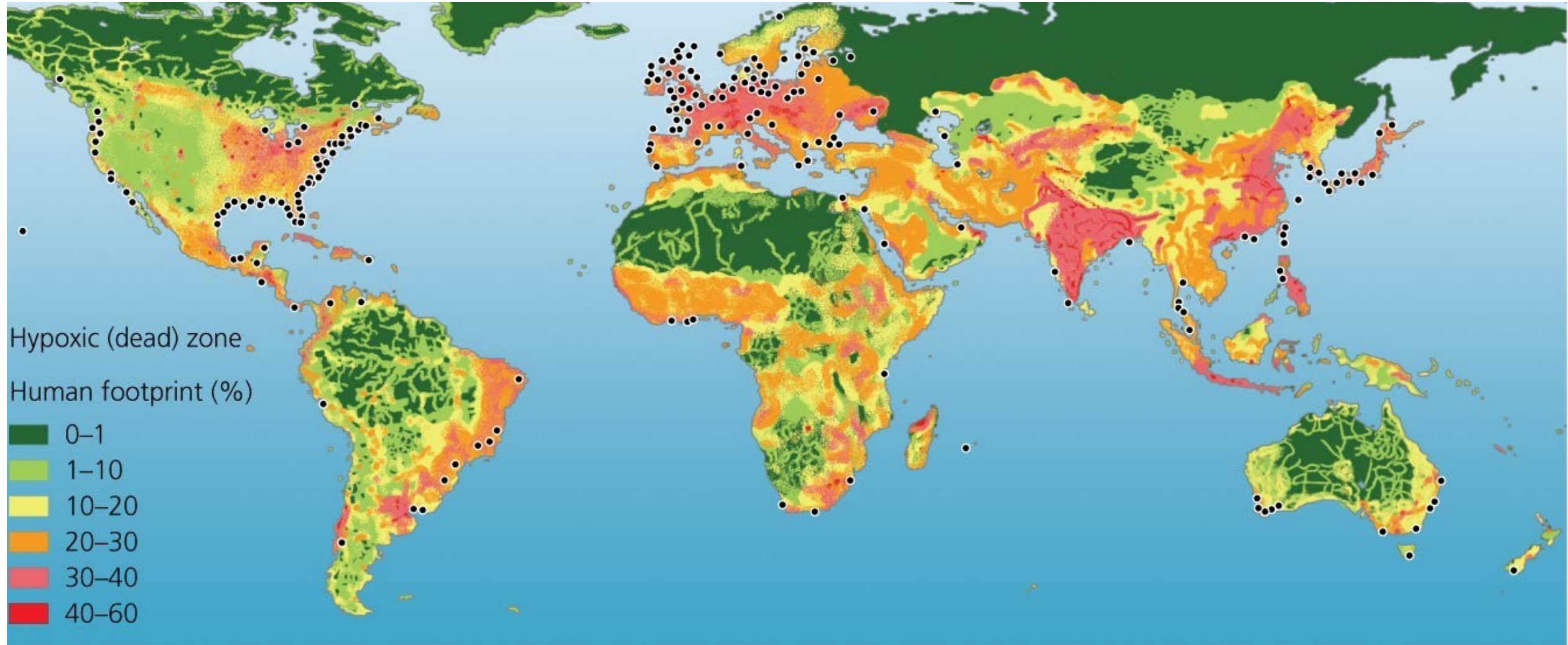
A Holistic View



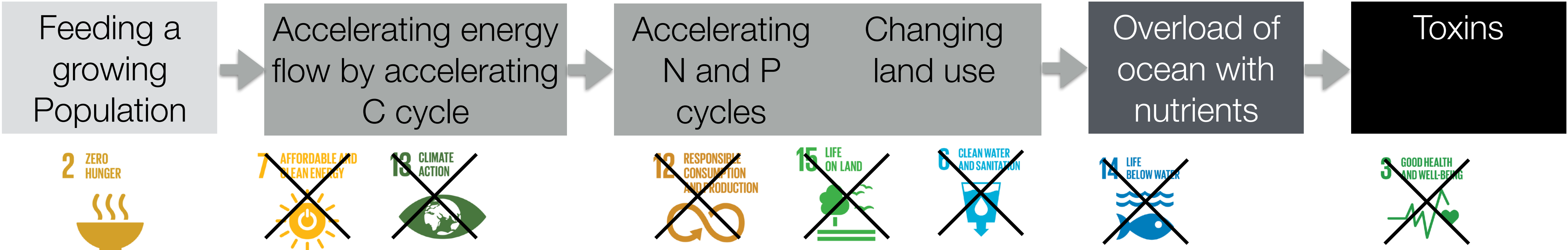
A Holistic View



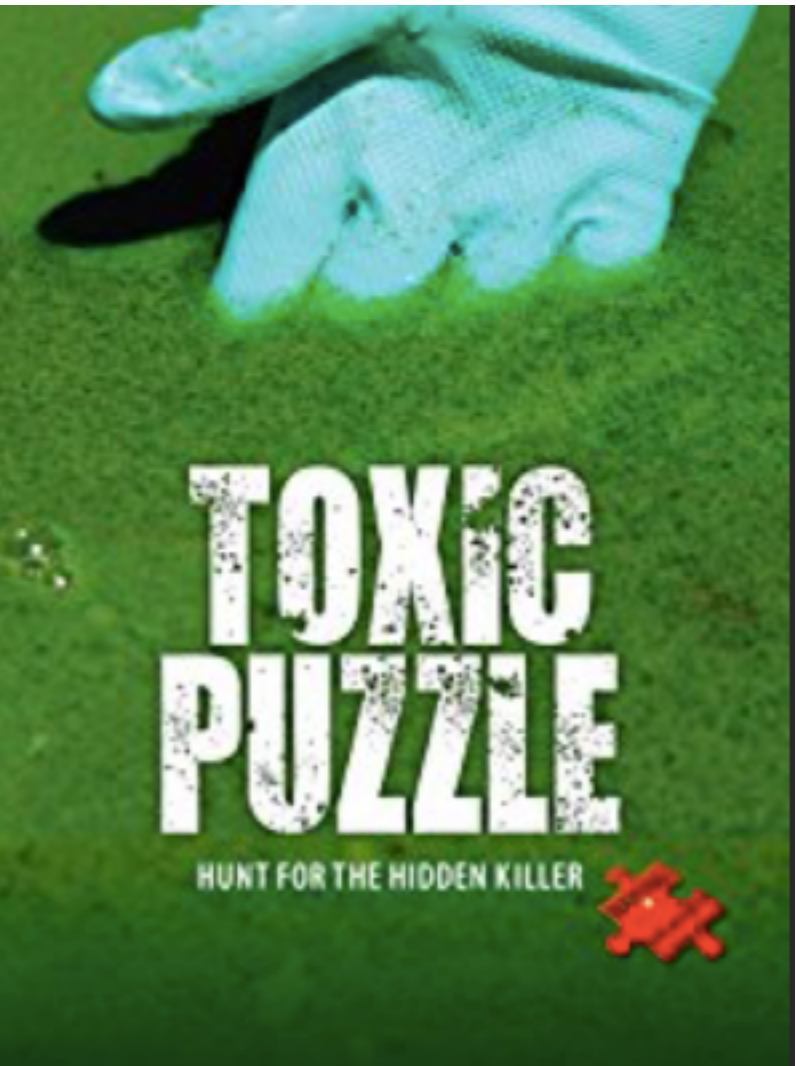
Hypoxic (dead) zones



A Holistic View

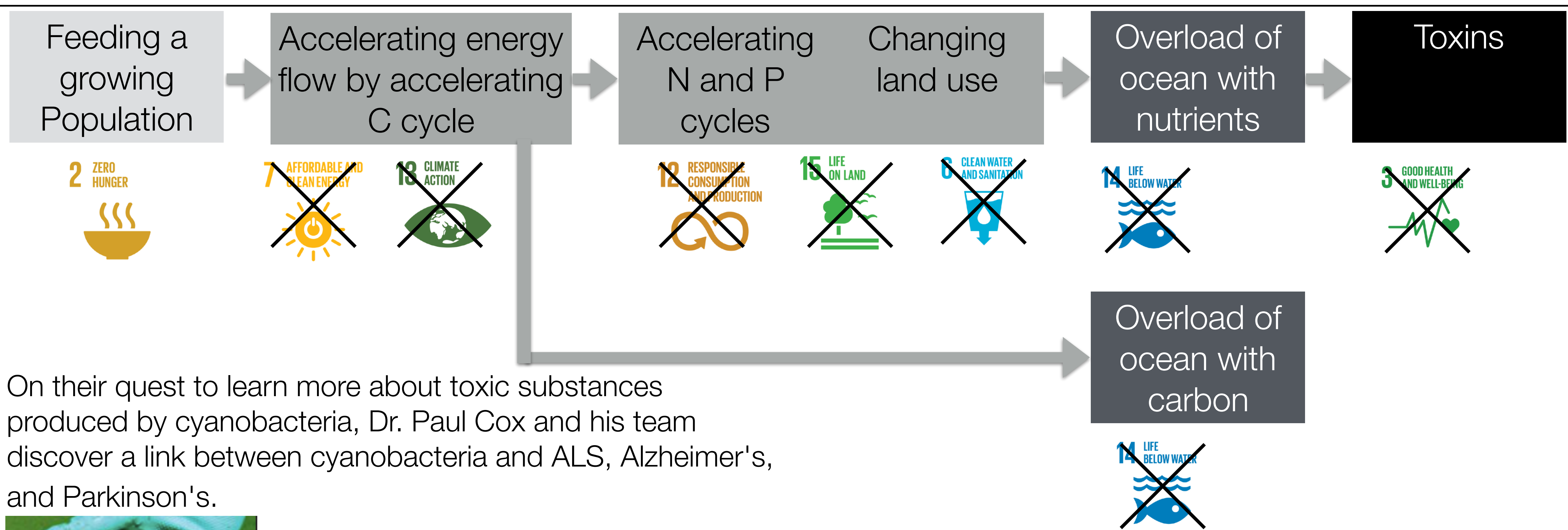


On their quest to learn more about toxic substances produced by cyanobacteria, Dr. Paul Cox and his team discover a link between cyanobacteria and ALS, Alzheimer's, and Parkinson's.



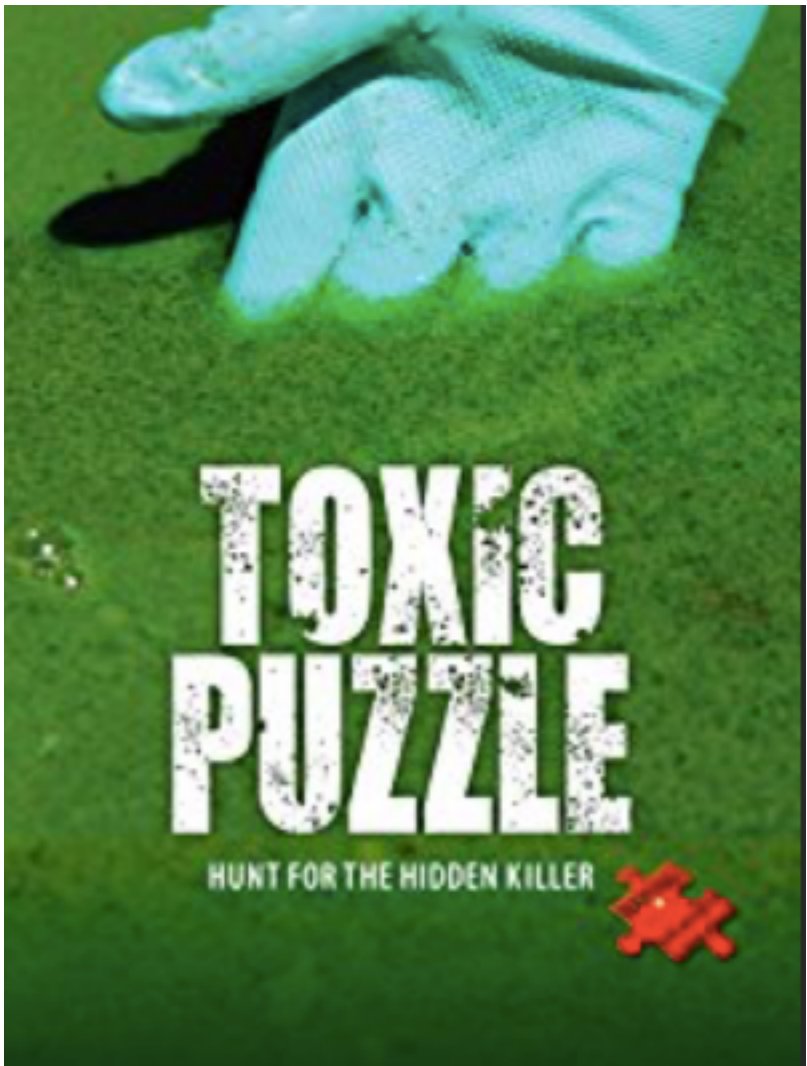
Director: Bo Landlin, 2017

A Holistic View

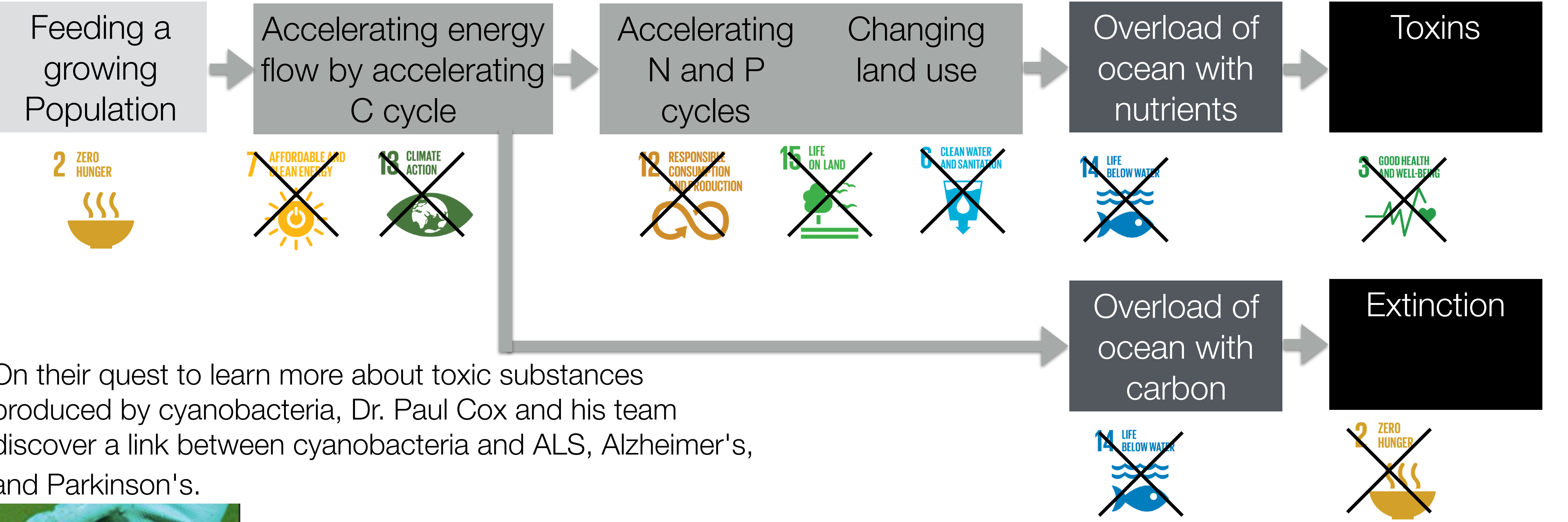


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Director: Bo Landlin, 2017

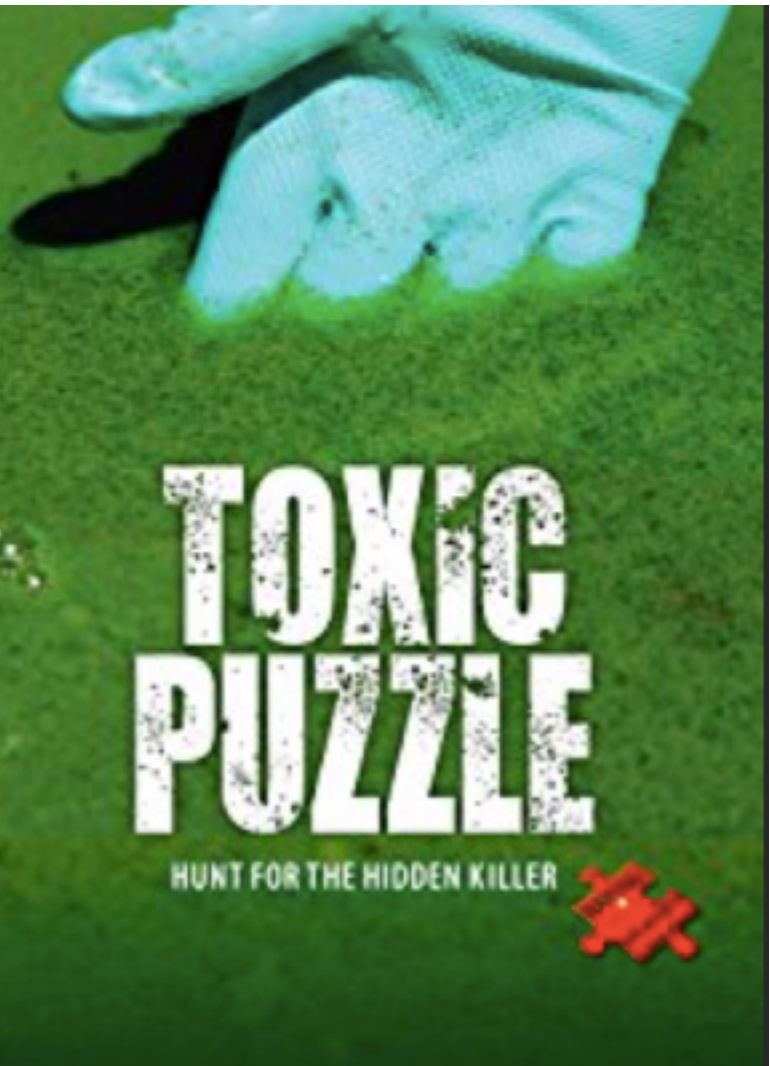


A Holistic View

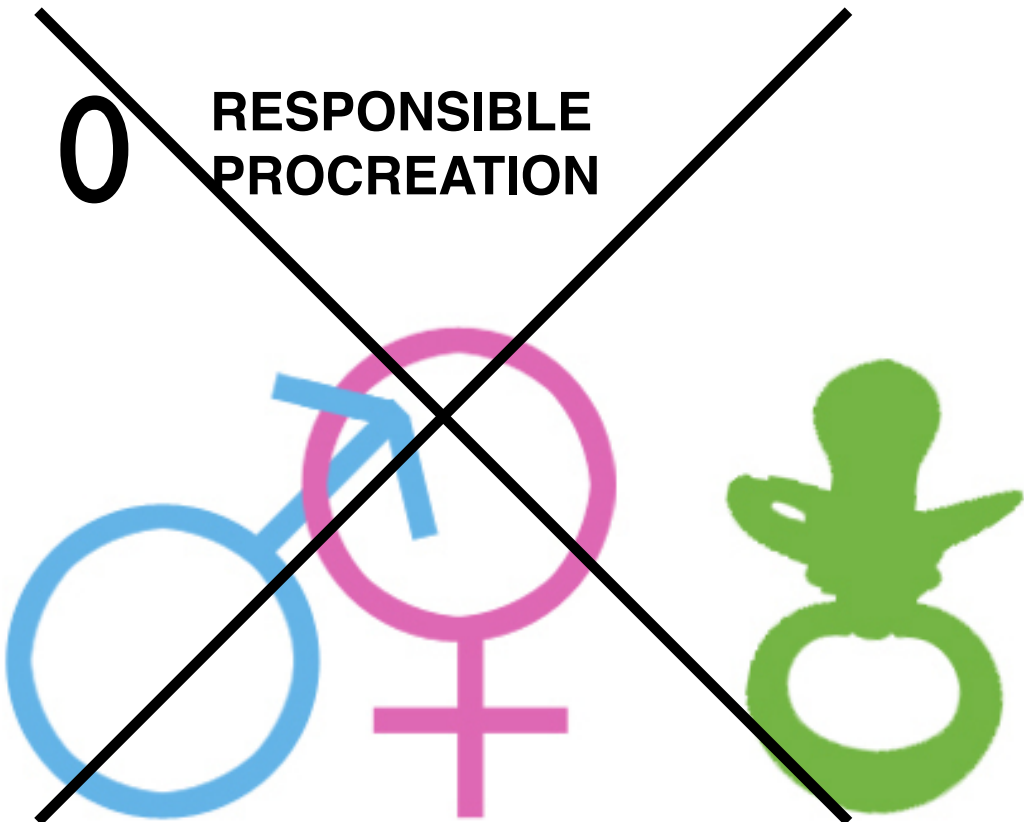
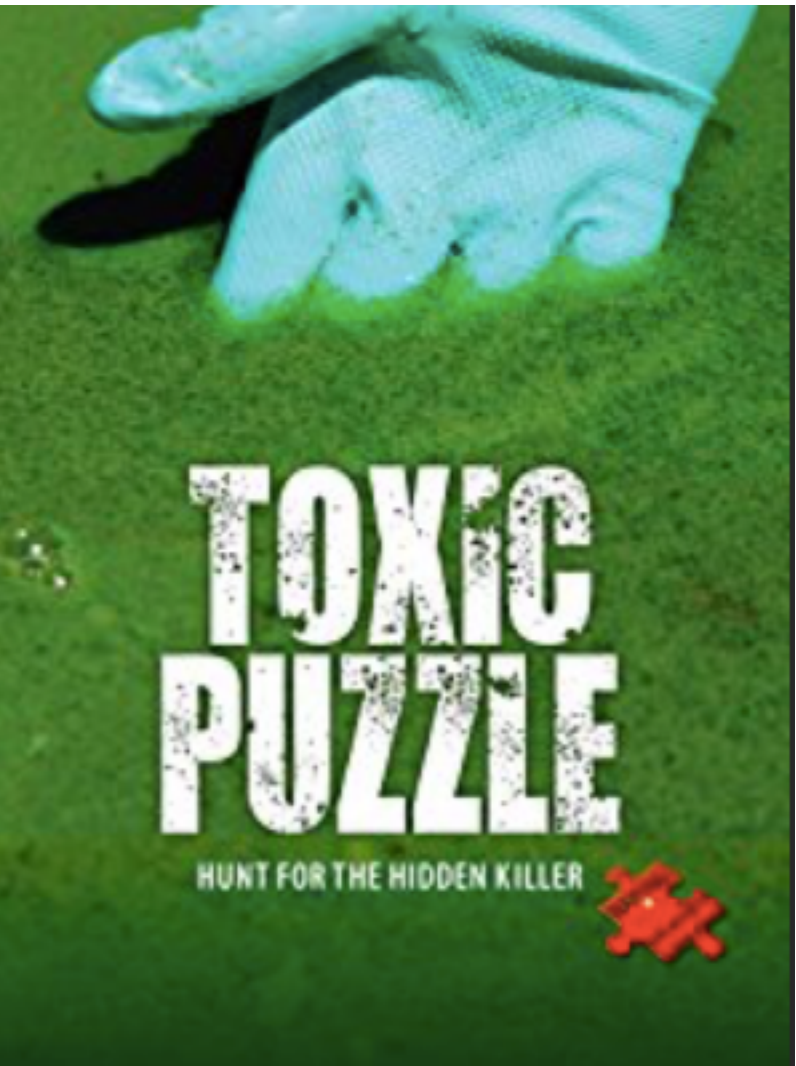
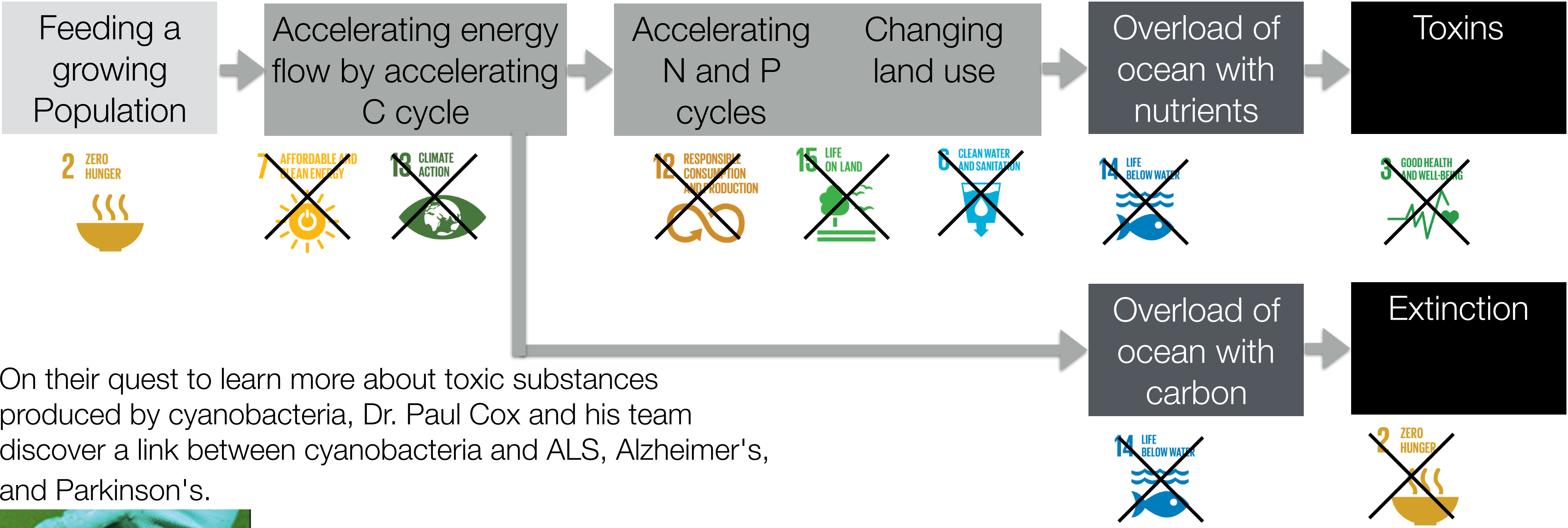


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Director: Bo Landlin, 2017



A Holistic View



Gaps in Sustainability-Related Knowledge, Products, and Observations

The gaps we see depend on what we want to achieve.

Our perception depends on the distance we have ...

Improving the present while liberating the future: requires foresight.

Epistemic gaps lead to a lack of foresight and result in surprises

Do we understand the scale of changes?

Do we have the helpful concepts?

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Do we have the knowledge to get to a desired future?

Foreseeability and Foresight:

- What might happen?
- Possible threats and hazards
- Knowing the system trajectory

} System Knowledge

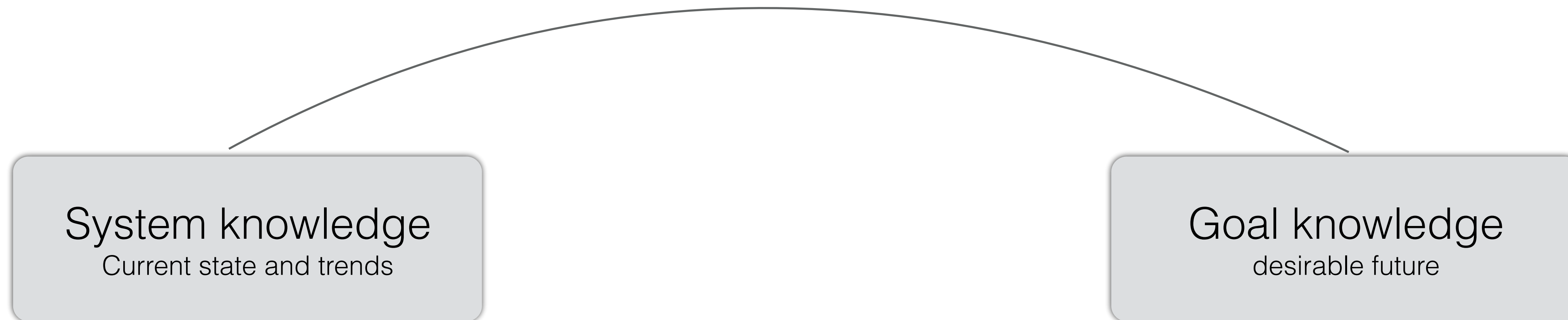
System knowledge

Current state and trends

Foreseeability and Foresight:

- What might happen?
- Possible threats and hazards
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- What do we want to happen?

} System Knowledge
} Goal Knowledge

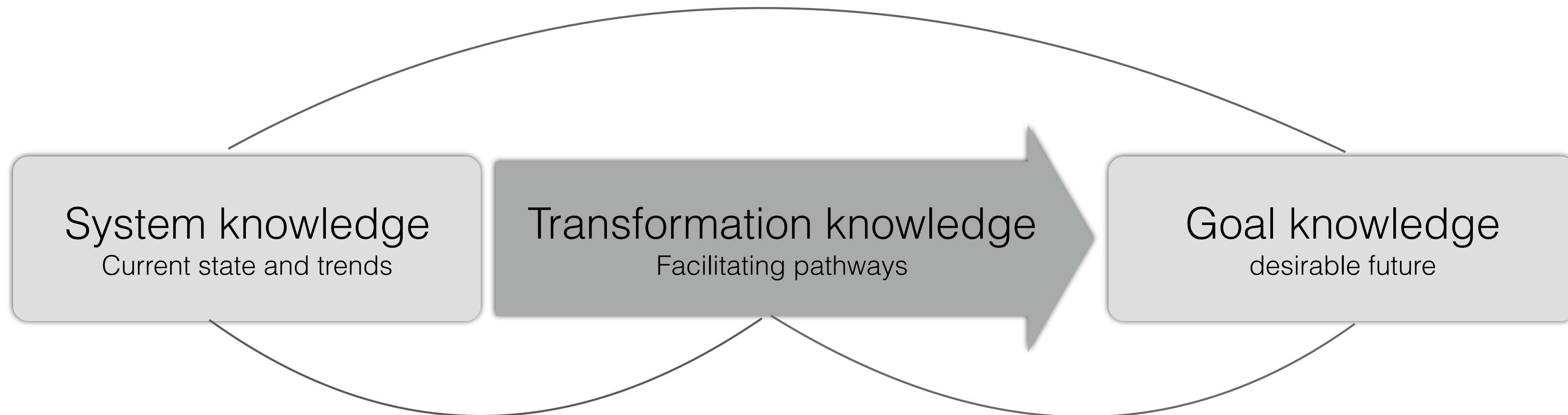


Foreseeability and Foresight:

- What might happen?
 - Possible threats and hazards
 - Knowing the system trajectory
 - What do we want to happen?
 - How can we impact the system trajectory?
- } System Knowledge

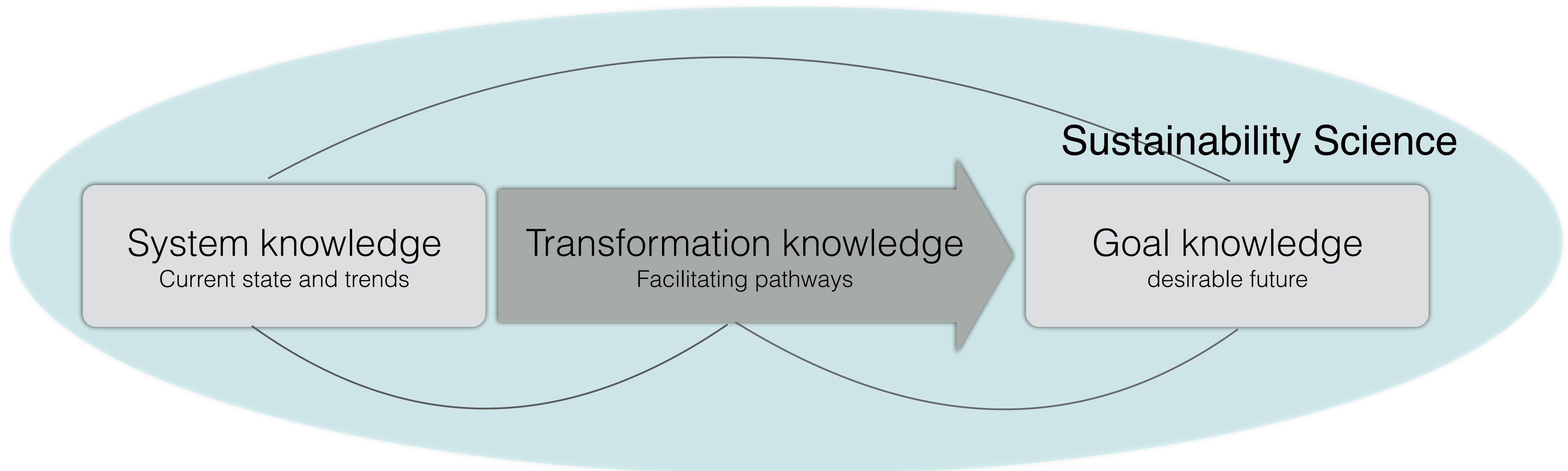
} Goal Knowledge

} Transformational Knowledge



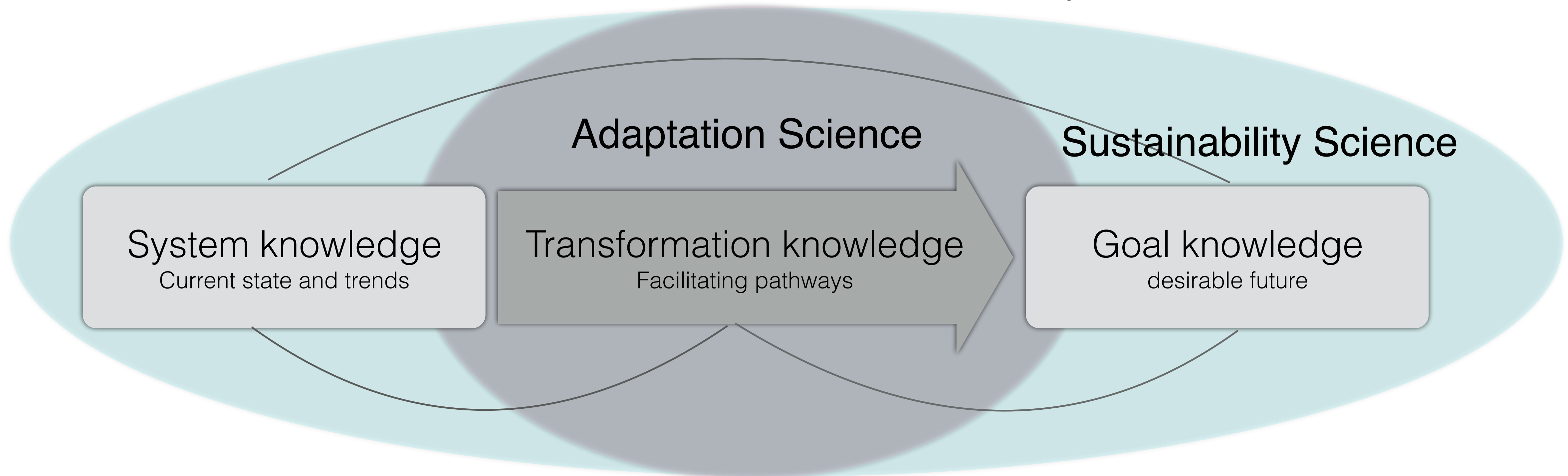
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How can science & earth observations support the SDGs

Gap Analysis

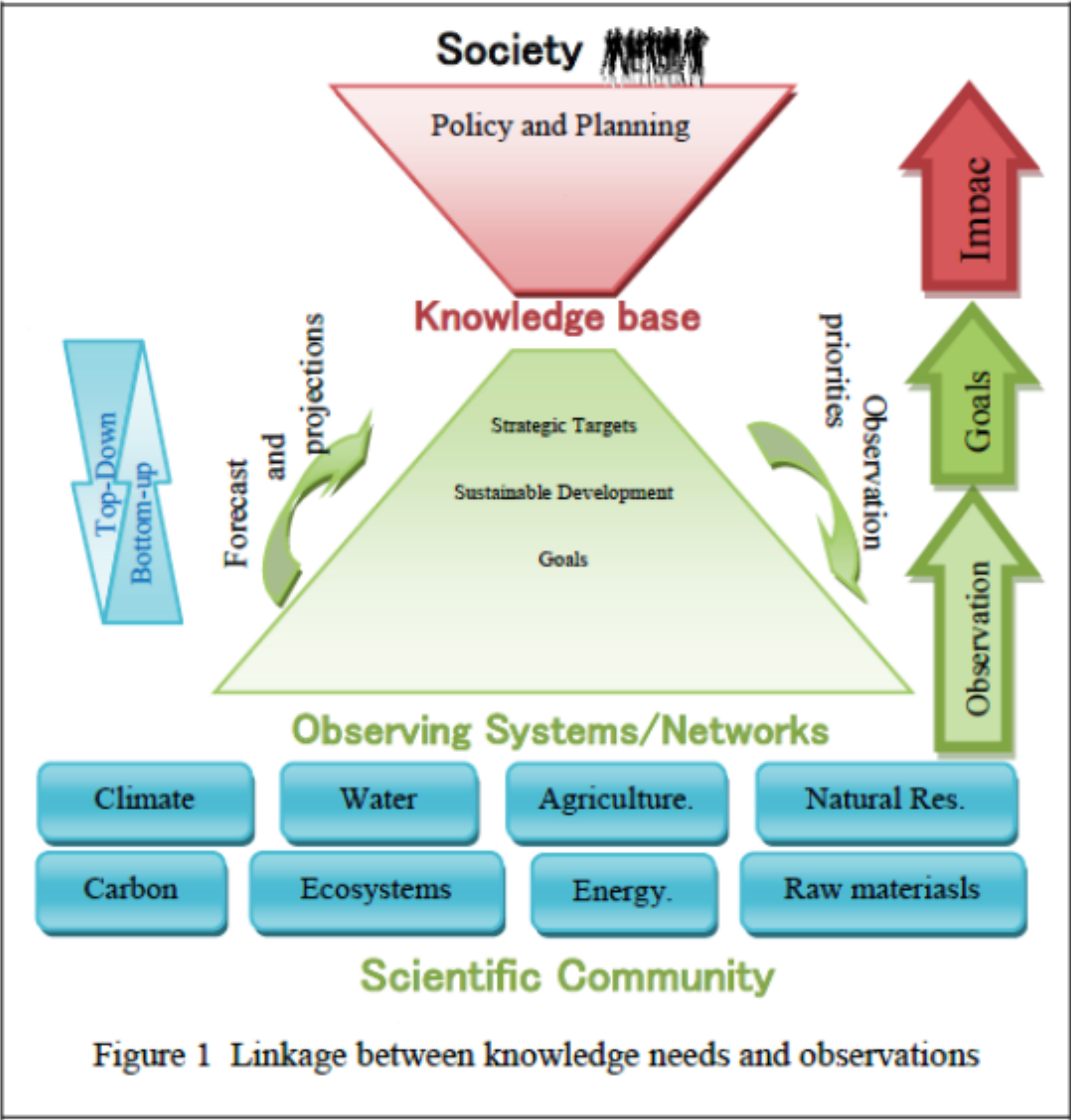


Figure 1 Linkage between knowledge needs and observations

Gaps

Knowledge

Not having the capacity to use
Not knowing how to access

Discovery

Not knowing what is available

Processing

Observation

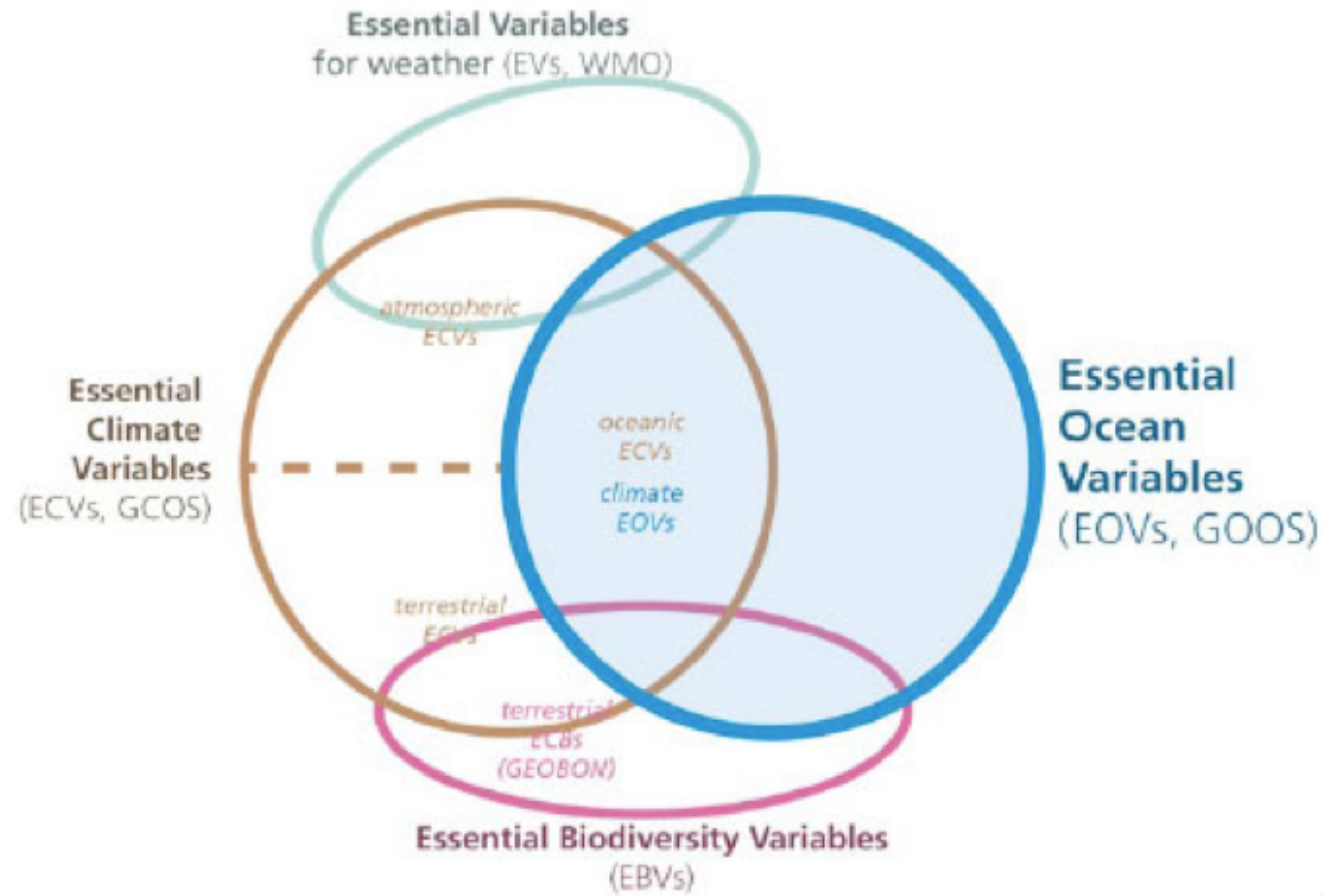
} Experts

Gap Analysis

EVs: Expert-Based Approach

Gap Analysis

EVs: Expert-Based Approach



Gap Analysis

EVs: Expert-Based Approach

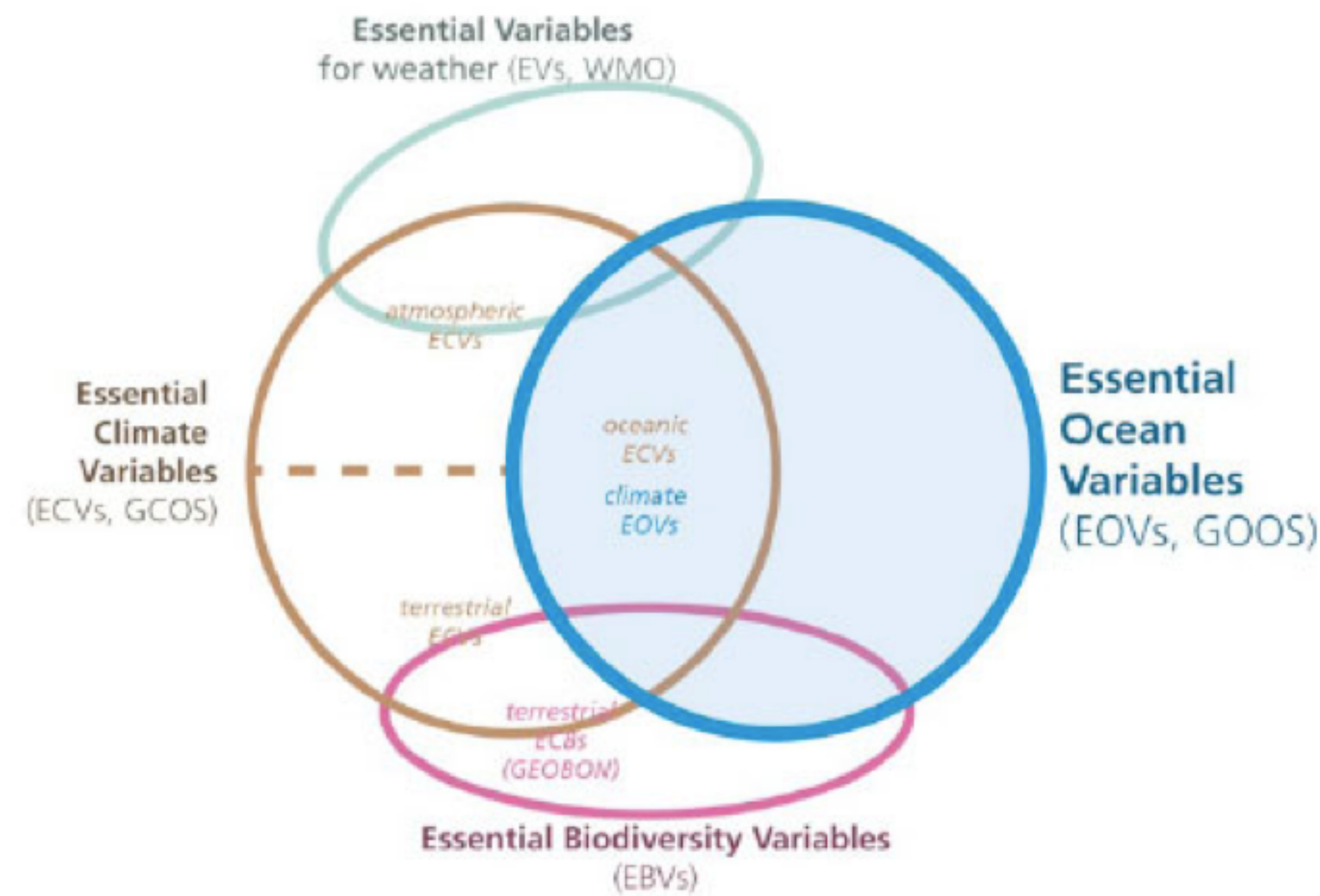


Table 1. Synthesis of EVs status

GEO New SBA (+ Climate)	Themes (according to the Bari's Workshop)	EV name	Domain and/or system component	Status of EV discussion (initial, medium, advanced)	Relevant communities, conventions, others initiatives	Other relevant GEO SBAs
Biodiversity and Ecosystem Sustainability	Biodiversity			Advanced	GEOBON, CBD, Ramsar Convention	
		Genetic composition (Co-ancestry, Allelic diversity, Population genetic differentiation, Breed and variety div.)				
		Species populations (Species distribution, Population abundance, Population structure by age/size class)				

Gap Analysis

EVs: Expert-Based Approach

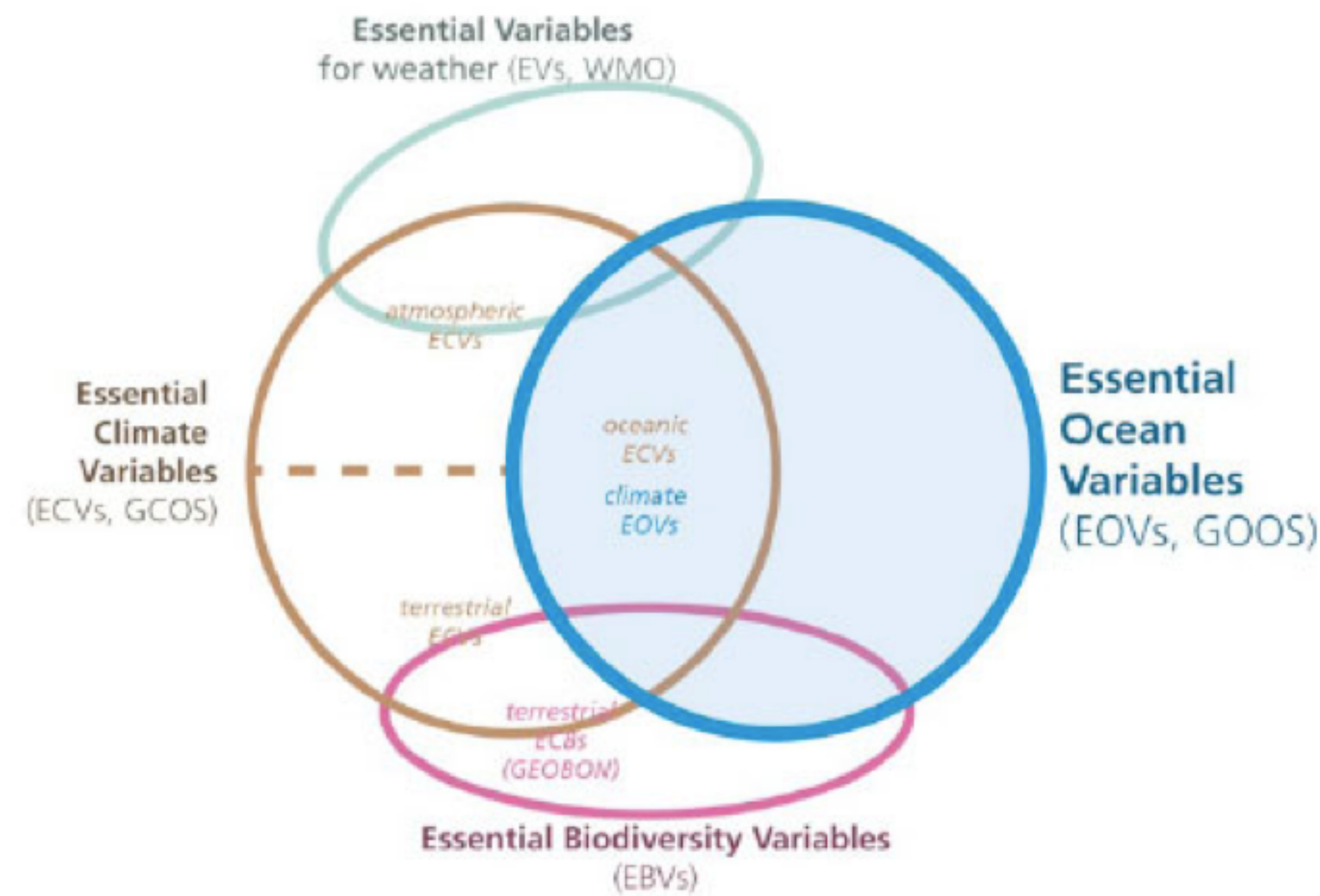


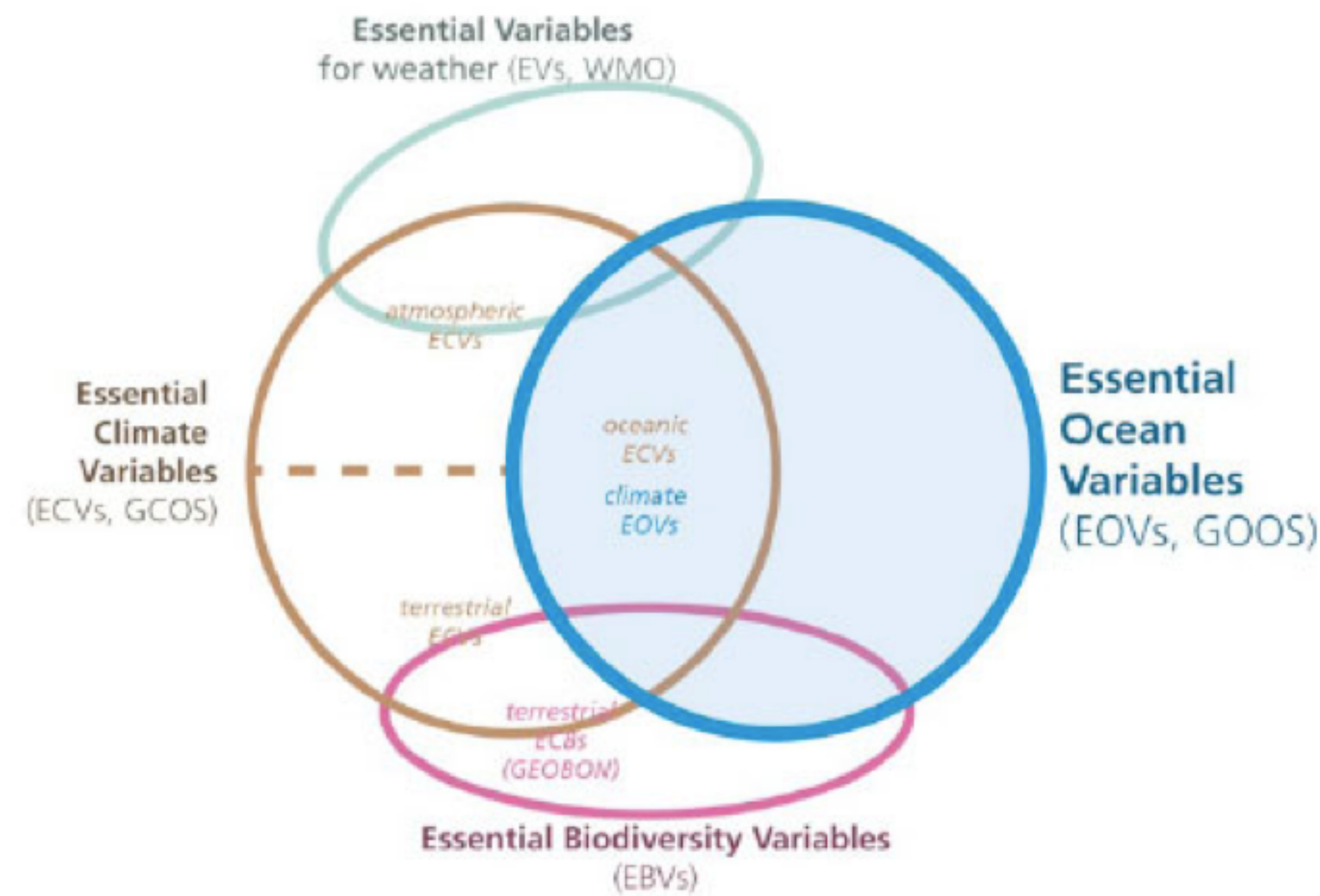
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Disaster Resilience	Disasters			Initial	Sendai Framework	
Energy and Mineral Resources Management	Energy			Initial	IRENA, IEA	
		Ocean (fixed and floating offshore wind, wave, tidal, currents, OTEC)	Ocean			Ocean
		Temperature (sea-surface, sub-surface and deep-sea)	Ocean			Biodiversity & Ecosystems, Ocean, Weather
		Bathymetry	Ocean (Renewable energy)			Ocean
		Current (speed, direction)	Ocean (Renewable energy)			Ocean
		Tidal (min, max, sea surface elevation)	Ocean (Renewable energy)			Ocean
		Wave (height, direction, period)	Ocean (Renewable energy)			Ocean
		Wind speed and direction	Ocean (Renewable energy)			Ocean

Gap Analysis

EVs: Expert-Based Approach



Jill agrees with Jill about what is essential

Table 1. Synthesis of EVs status

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		Wind speed and direction	Ocean (Renewable energy)			Ocean

Gap Analysis

SDG

EVs: Goal-Based Approach

Target

Indicator

Jill, can you provide...?

Essential Variable

Target 6.3: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally

6.3.1 Percentage of wastewater safely treated

6.3.2 Percentage of bodies of water with good ambient water quality

Water usage
Wastewater treated

Water quality

Governance/policy

Socio-Economic

Infrastructure

Environmental

Jules-Plag and Plag, 2016b

Gap Analysis

EVs: Goal-Based Approach

SDG

Target

Indicator

Essential Variable

1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance

1.4.1* Proportion of the population living in households with access to basic services

Water Supply S.

Electricity Supply S.

Sewage S.

...

Communication S.

Public Health S.

Governance/policy

Socio-Economic

Infrastructure

Environmental

Jules-Plag and Plag, 2016b

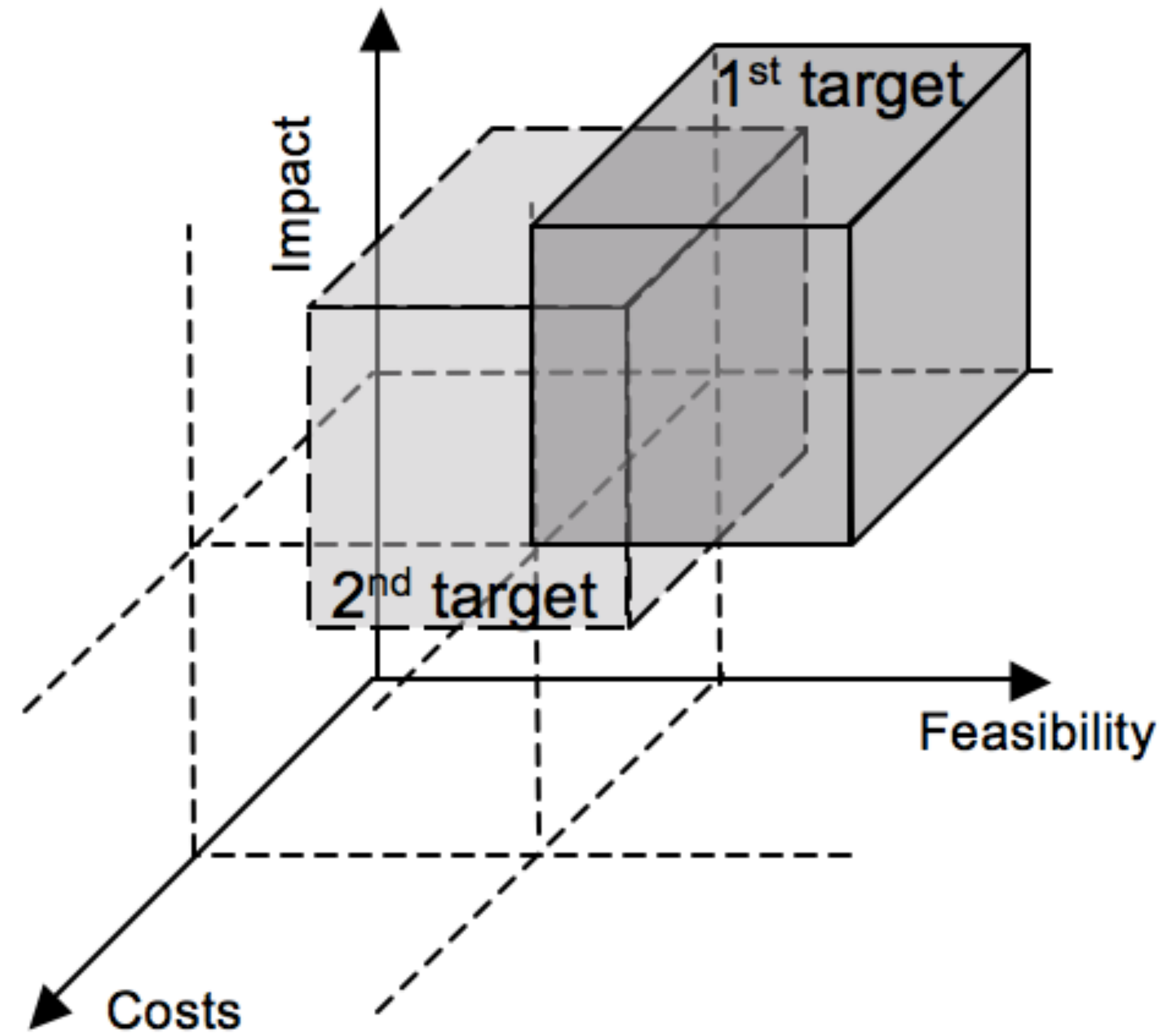


SDGs-Related Gaps

- SDG-GP-0: There is a lack of an epistemology for the creation of transition knowledge from the current system state and trajectory to the desired future.
- SDG-GP-1: No integrated environmental and socio-economic databases
- SDG-GP-2: Insufficient accounting for environmental variables in SDG indicators
- SDG-GP-3: Missing link between SDGs and sustainability
- SDG-GP-4: Missing tools and capacity to assess cross-SDG dependencies
- SDG-GP-5: Missing tools for assessing cross SDG impacts and policies
- SDG-GP-6: Skills required for matching providers and policy makers
- SDG-GP-7: Many of the ESDGSVs for the built environment are not measured

Gap Analysis

Prioritization



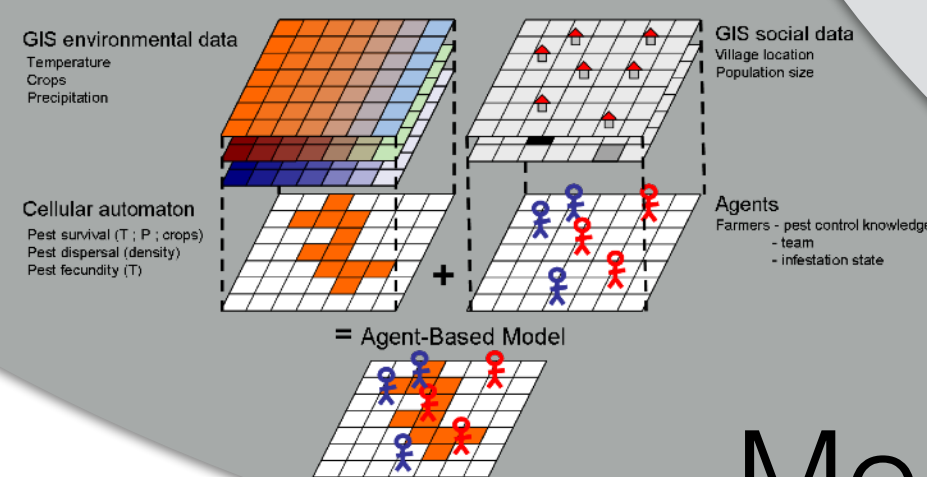
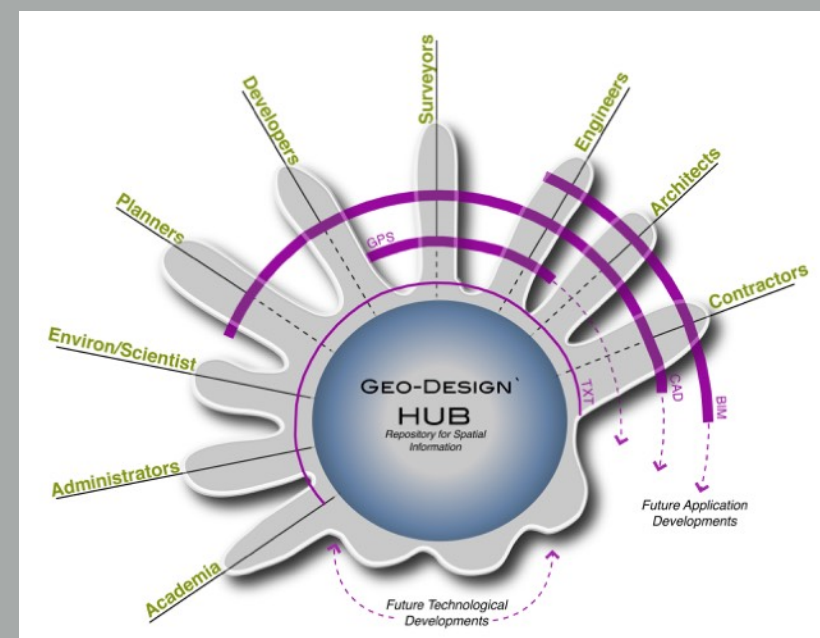
Polyglot Data

Environmental
Social
Economic



SEE-IN KB

Tools
GCI

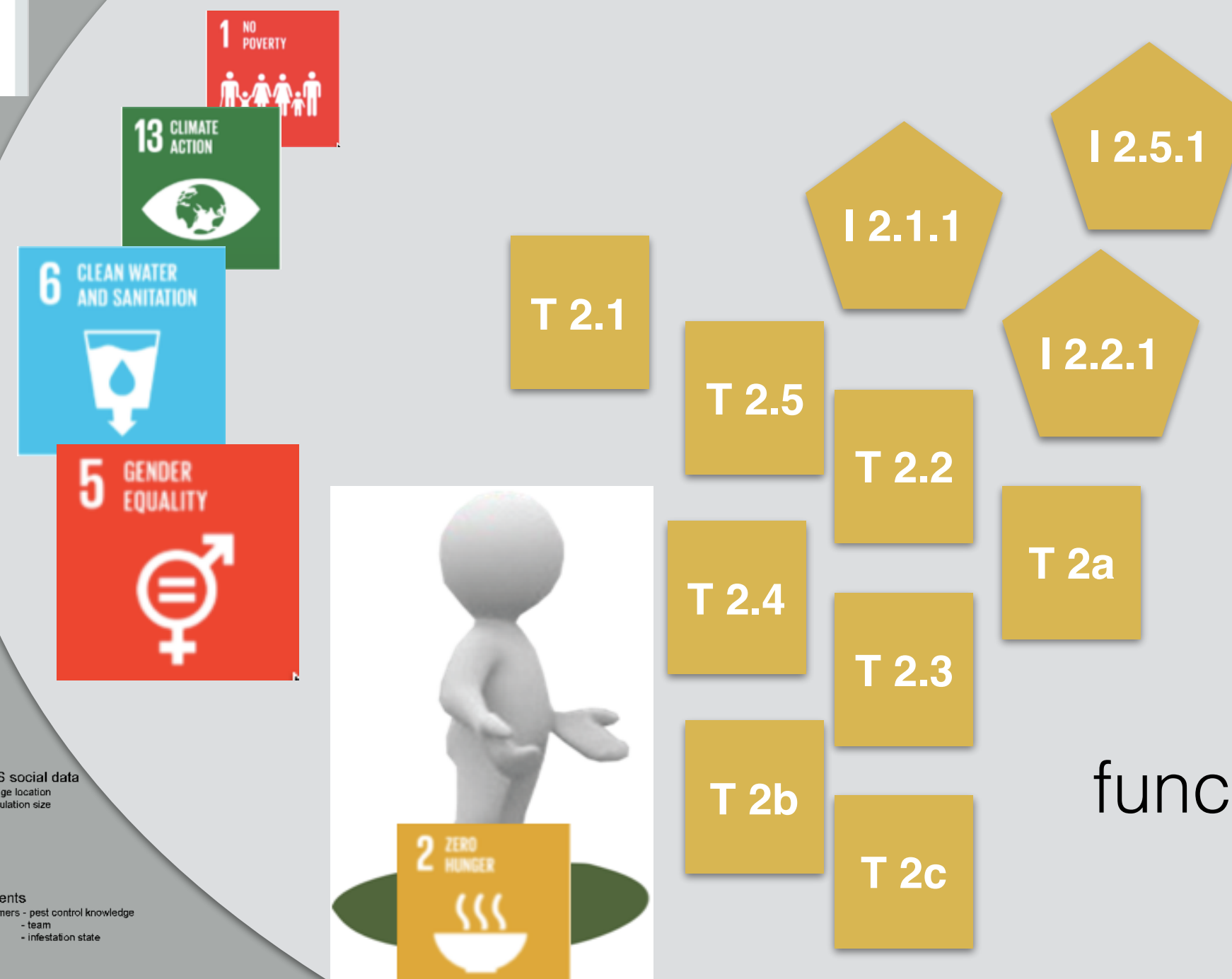


Models

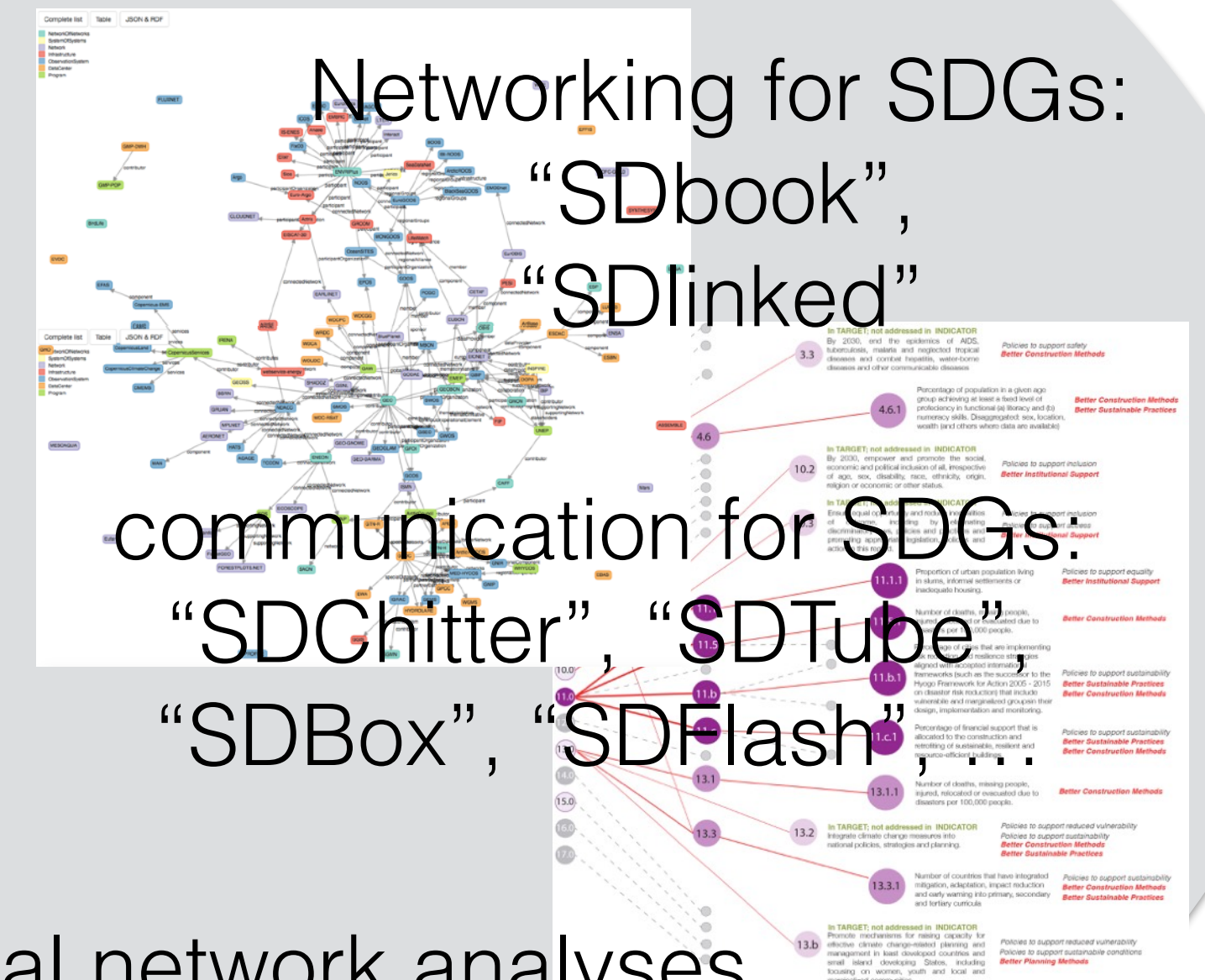
Graphs:

“social” networks

among SDGs, Targets, Indicators, data, models, people



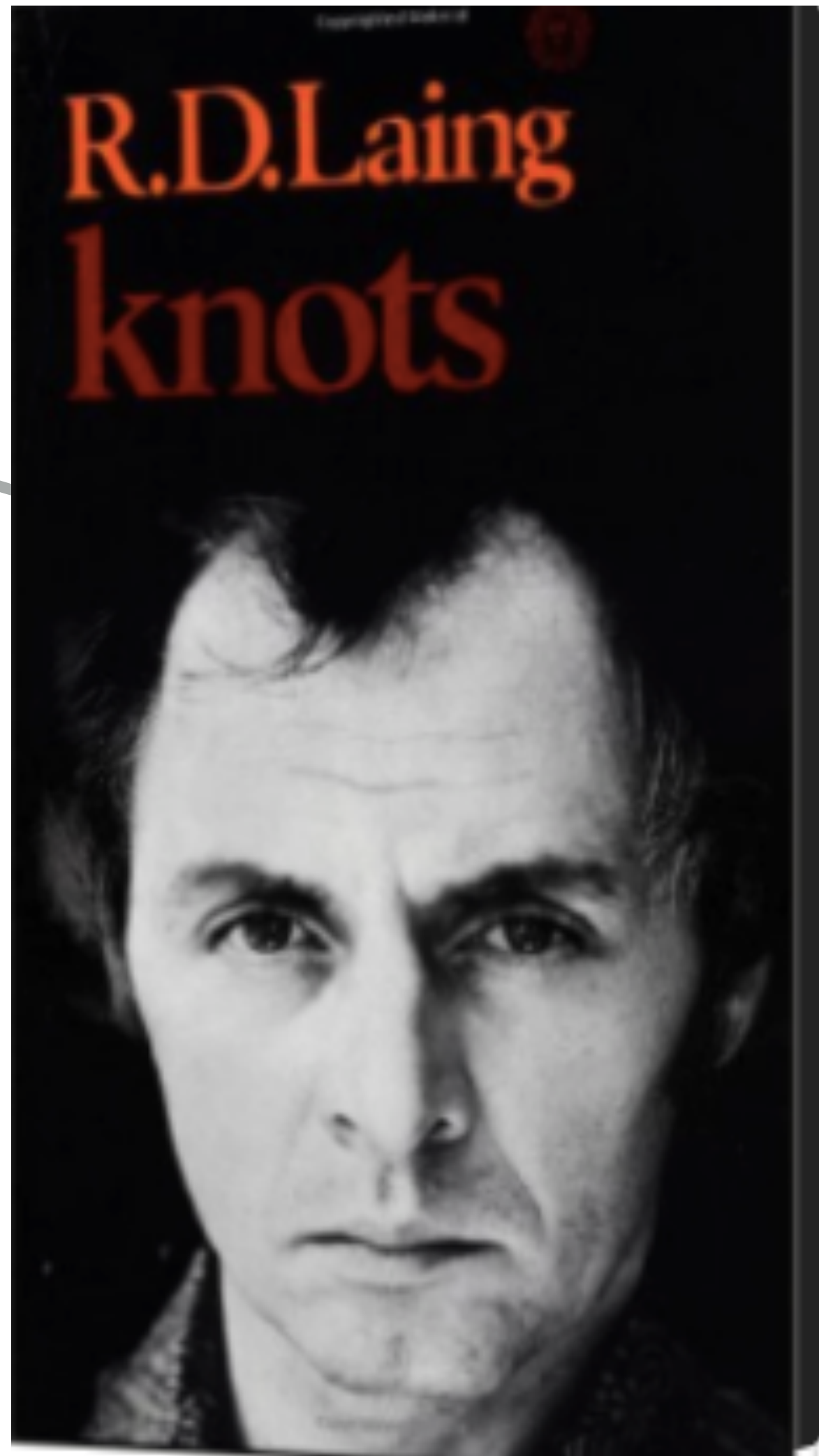
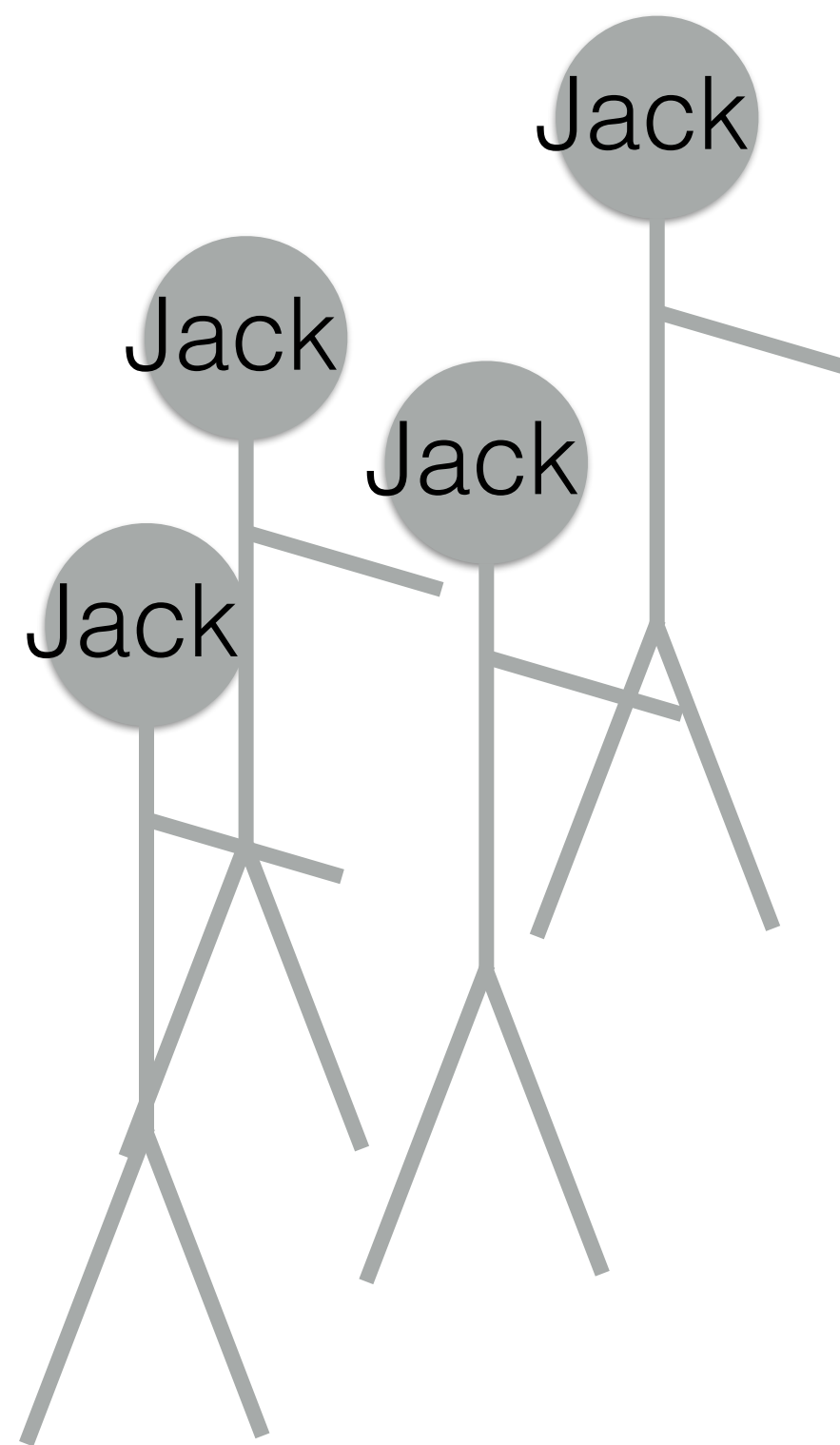
Networking for SDGs:
“SDbook”,
“SDlinked”



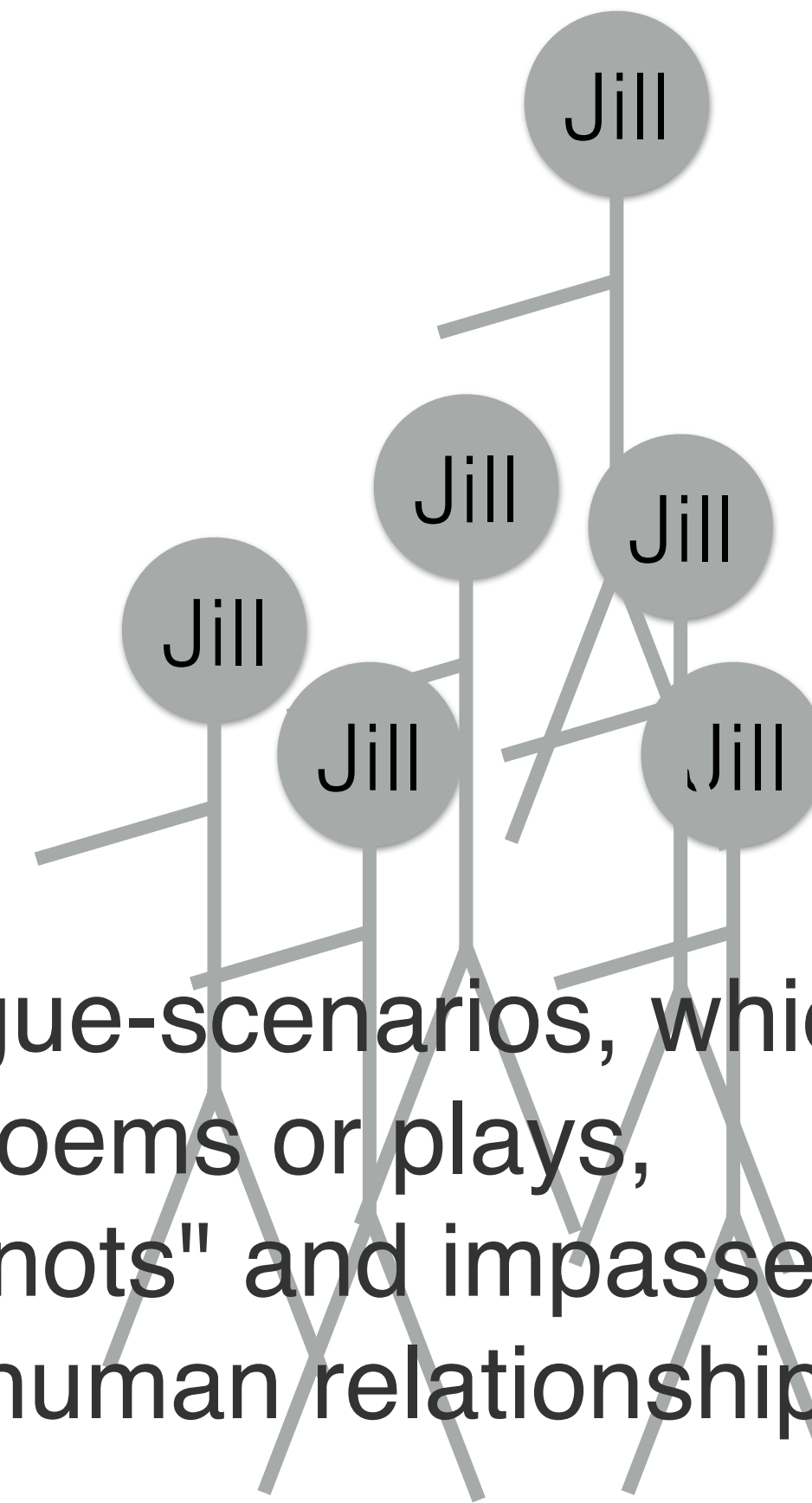
communication for SDGs:
“SDChitter”, “SDTube”,
“SDBox”, “SDflash”

functional network analyses
gap analyses
deep learning

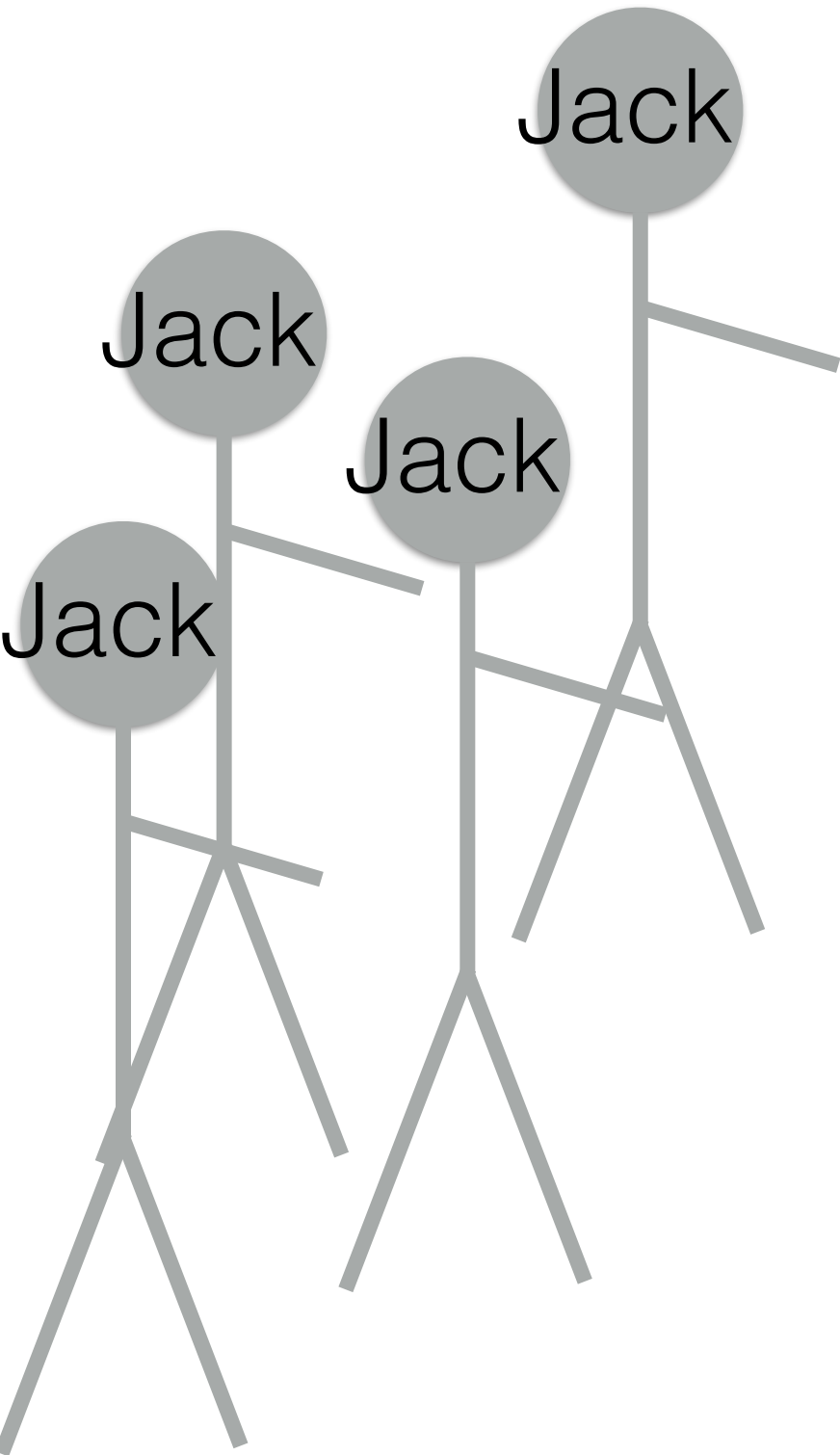
Toward a Better World for the SDGs .



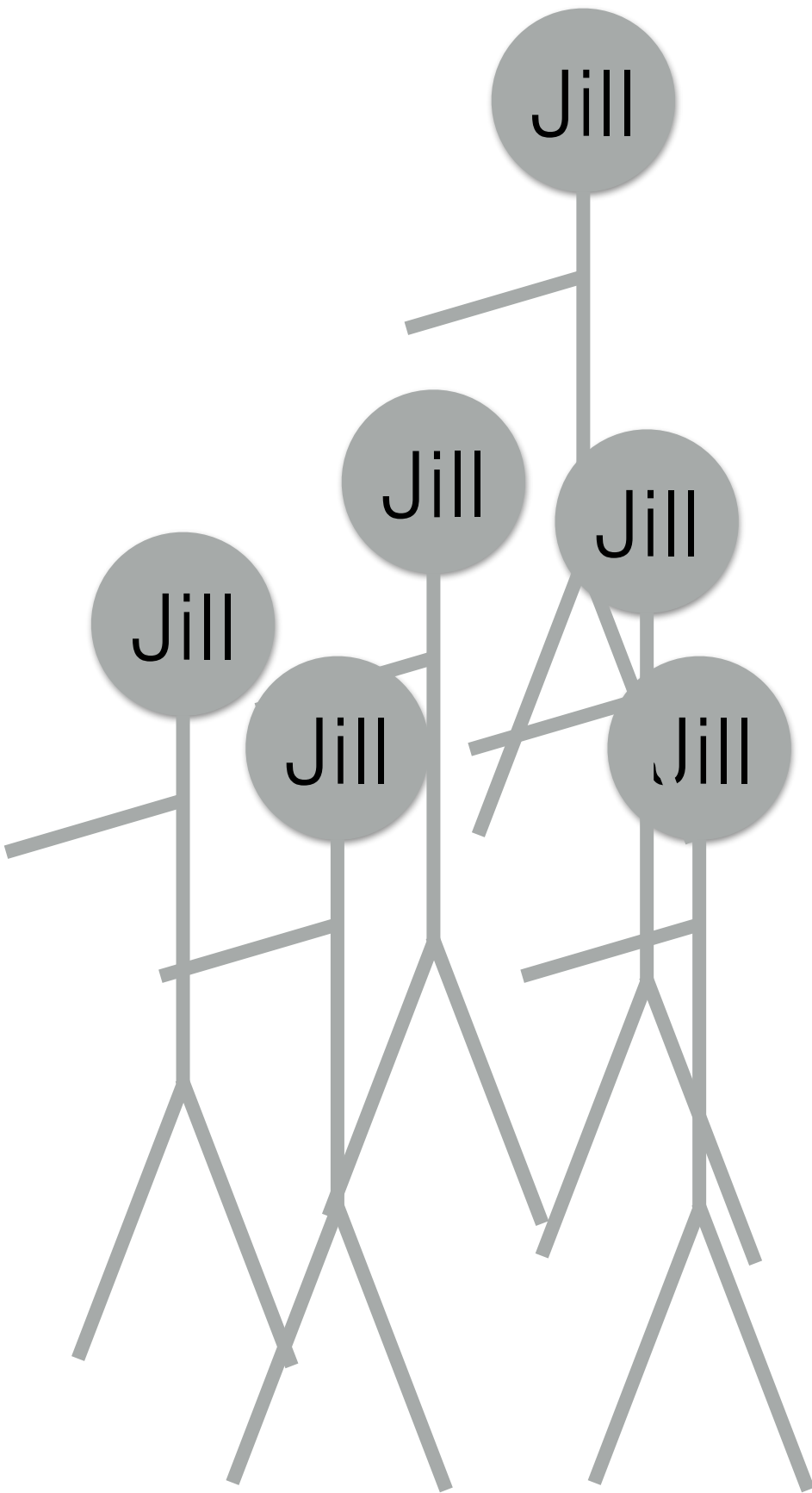
A series of dialogue-scenarios, which can be read as poems or plays, describing the "knots" and impasses in various kinds of human relationships.



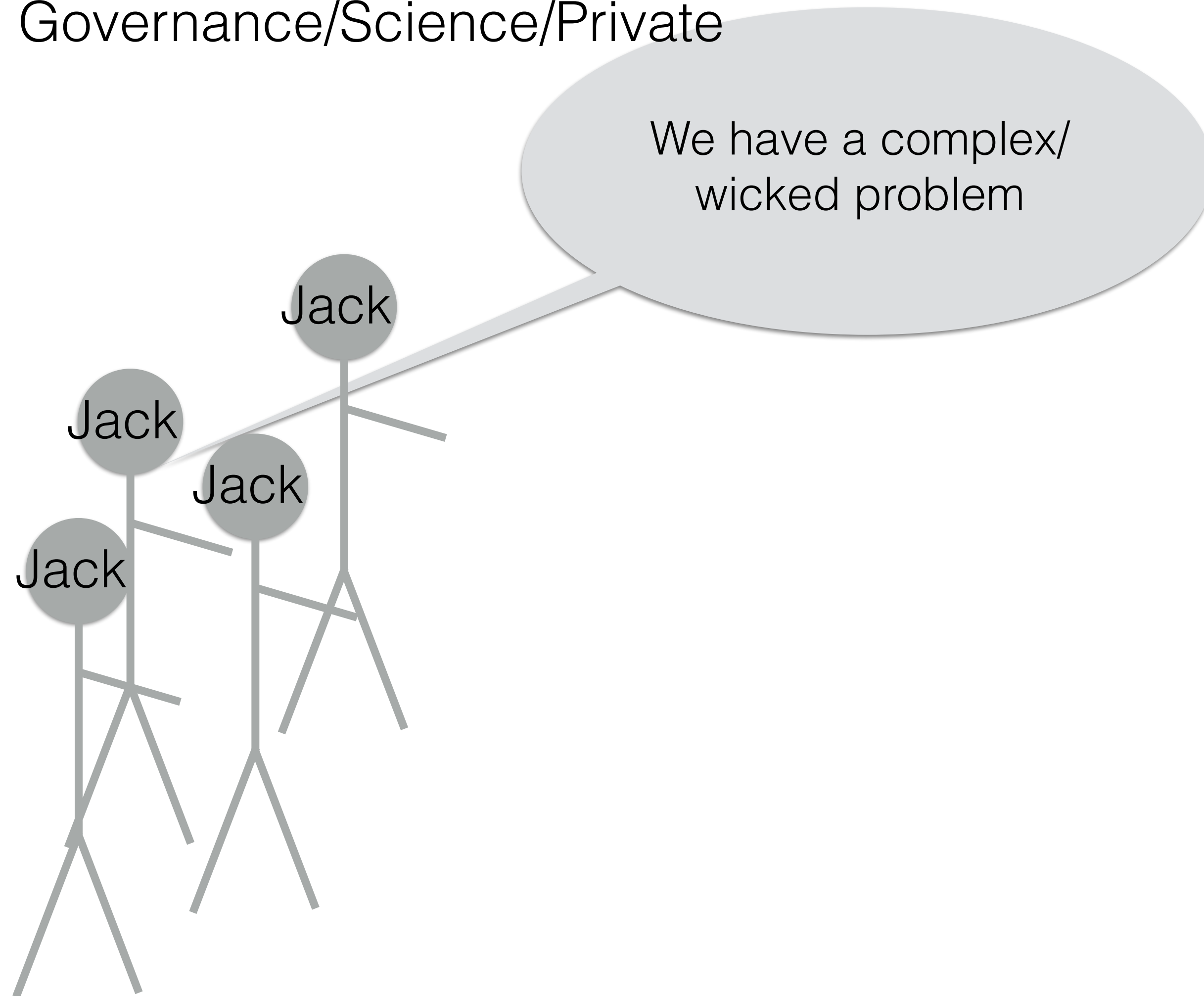
Governance/Science/Private



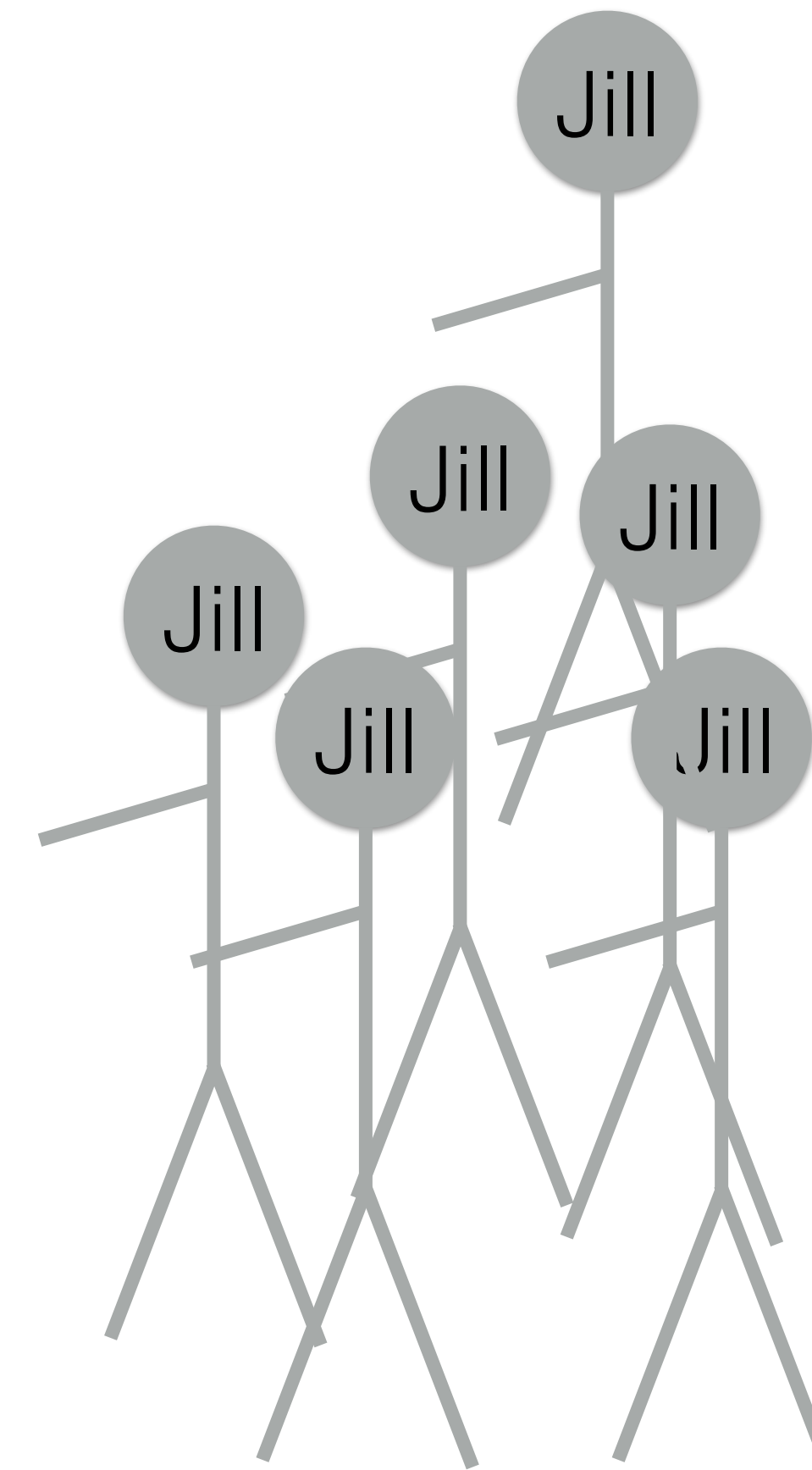
Earth Observation



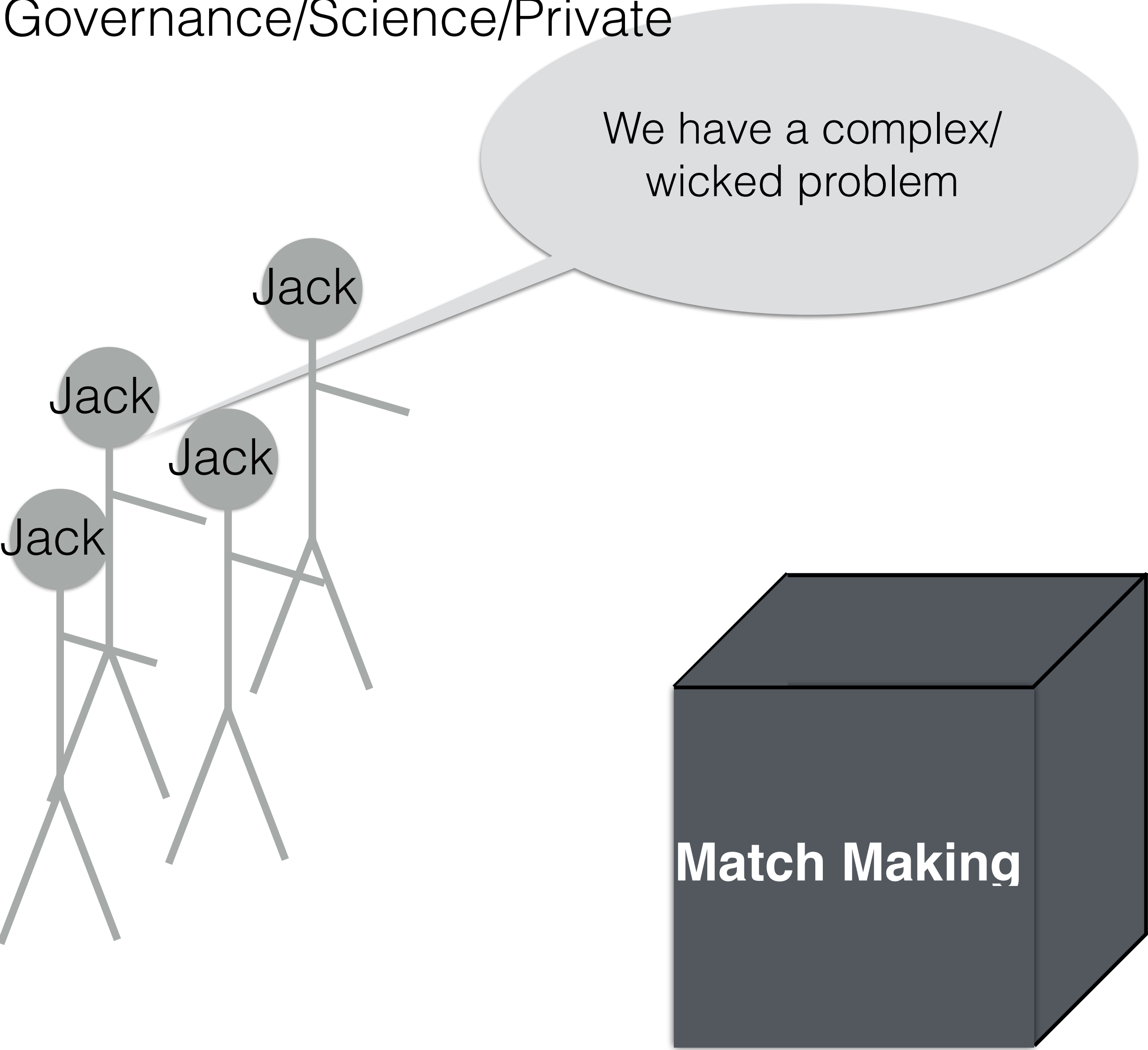
Governance/Science/Private



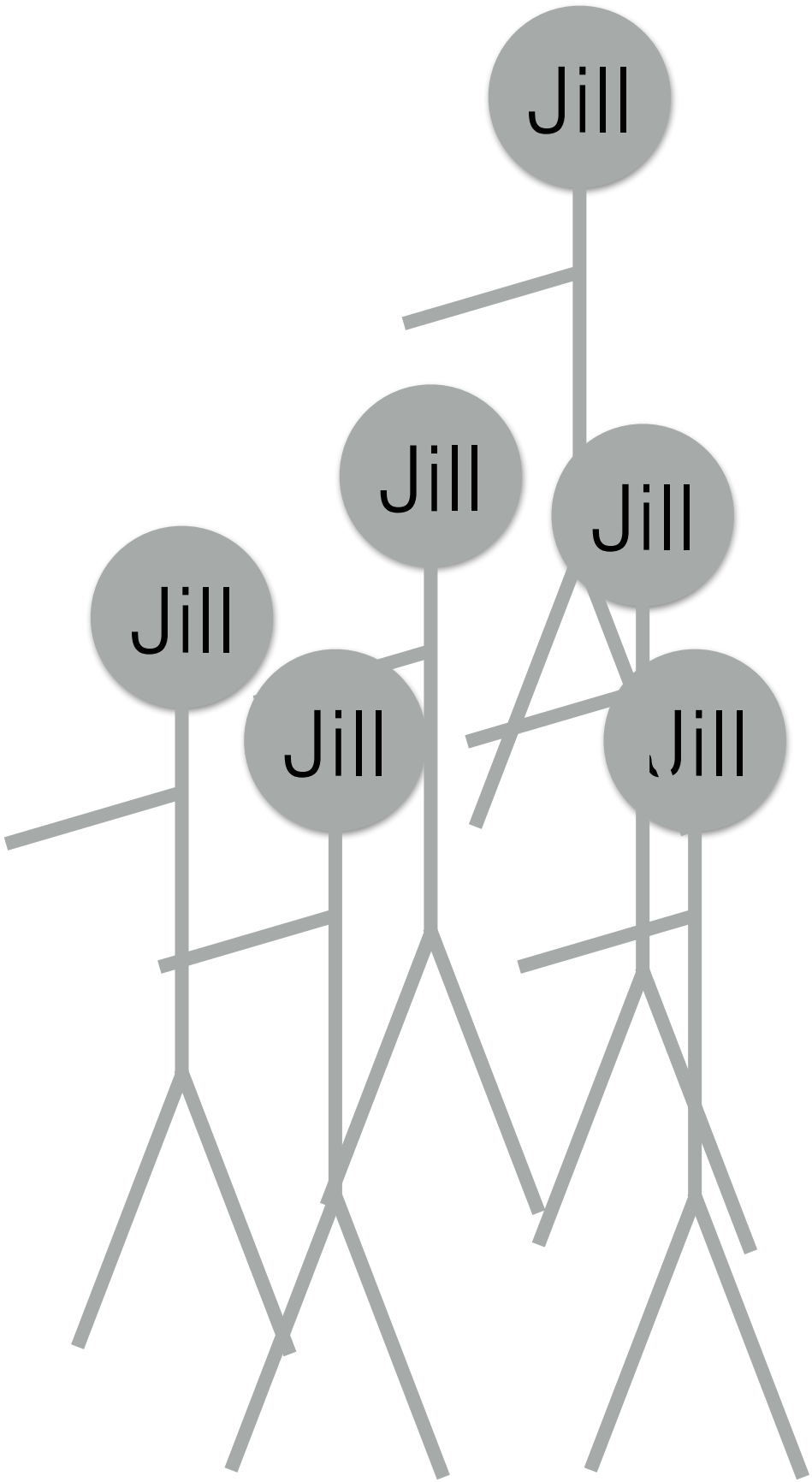
Earth Observation



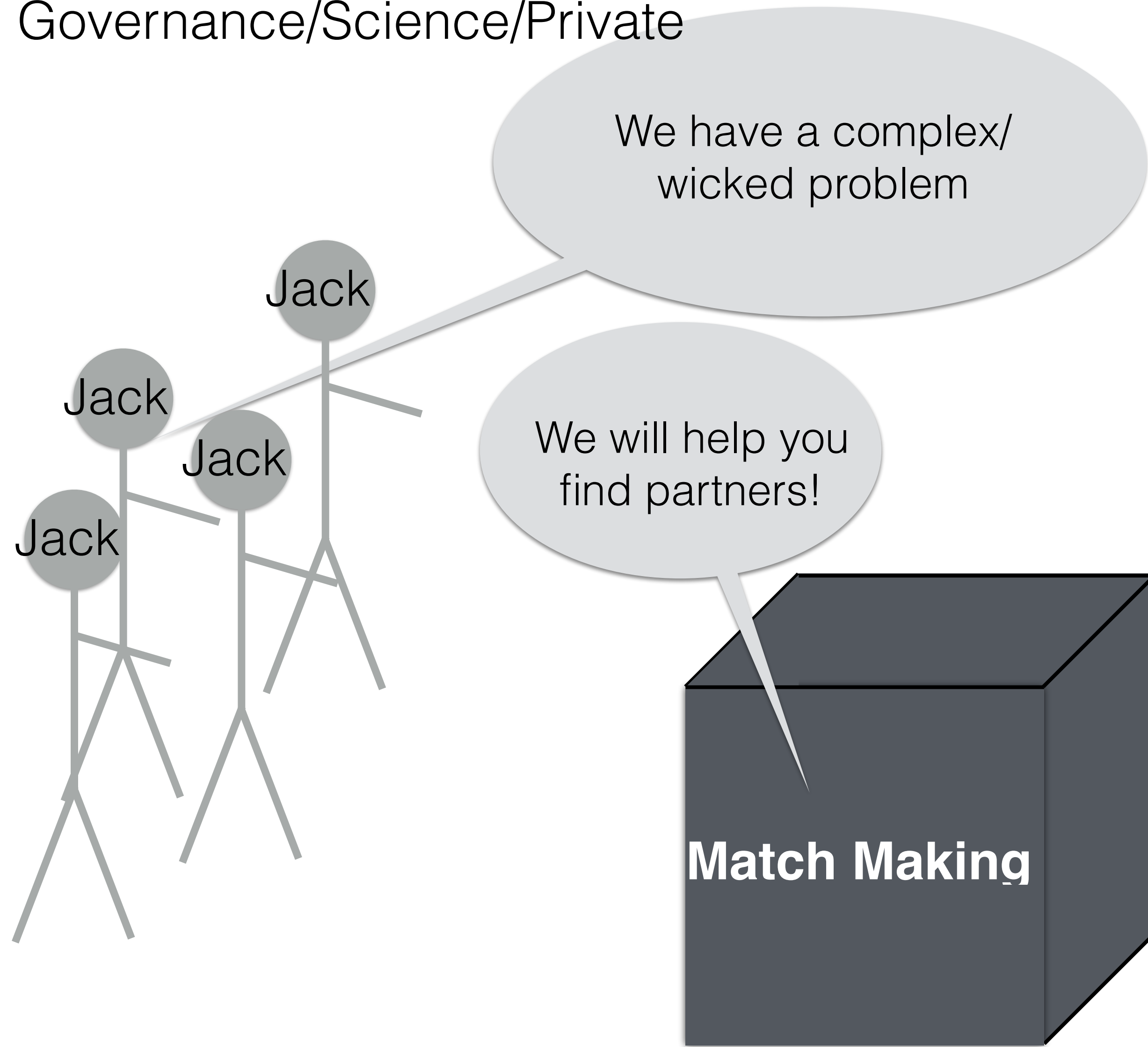
Governance/Science/Private



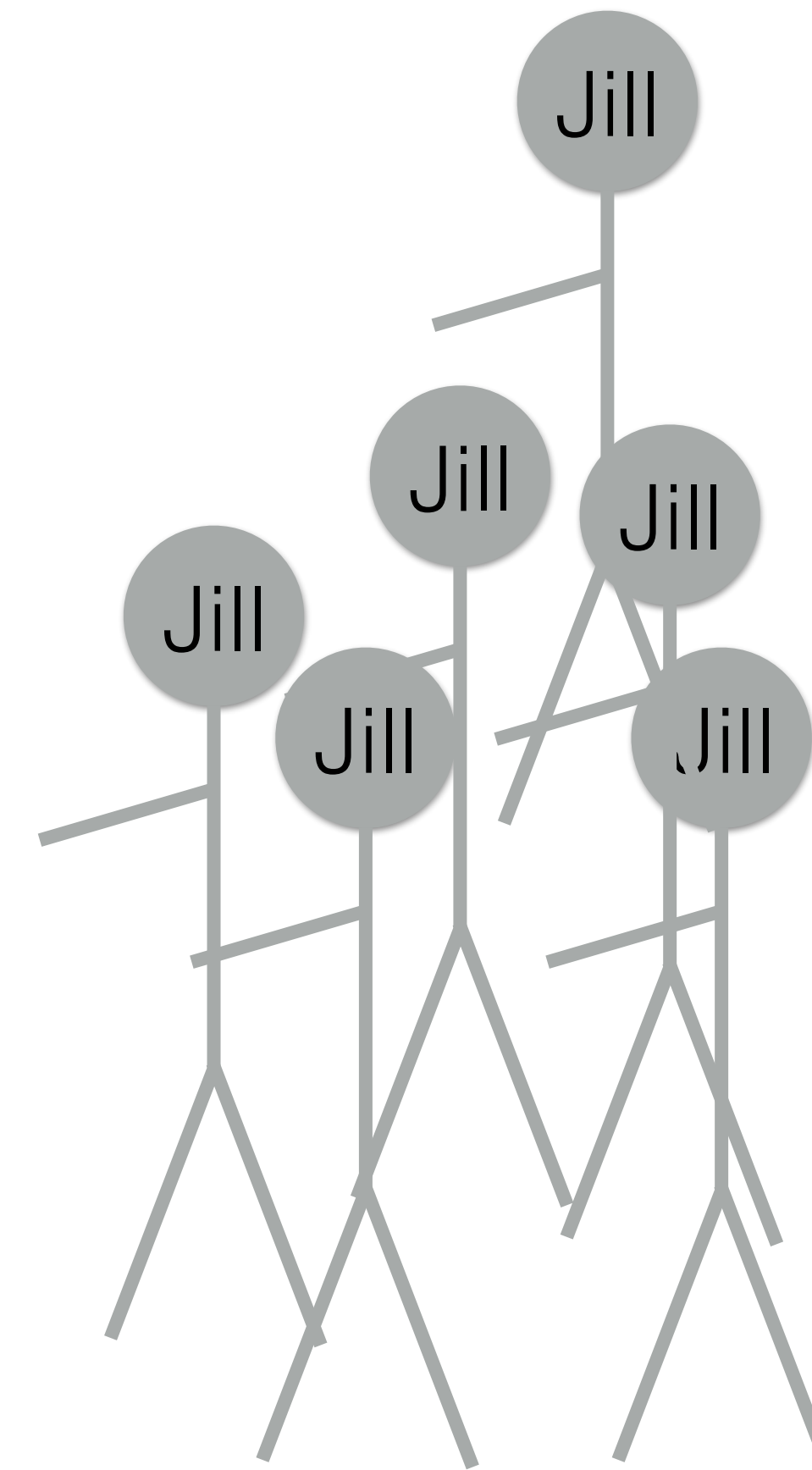
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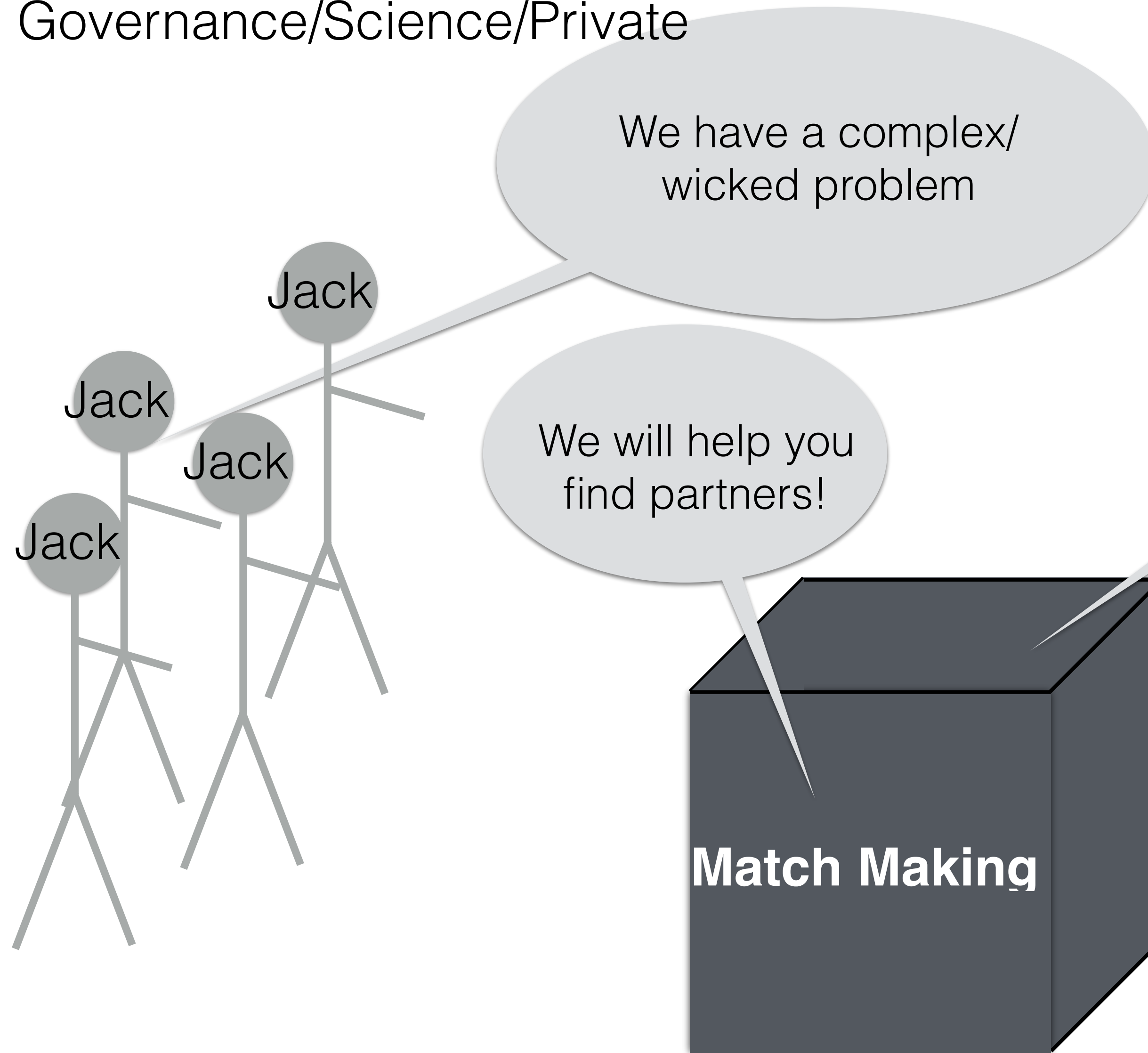
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Earth Observation



Governance/Science/Private



Earth Observation

