Global and Regional Challenges Benefiting from Systems Analysis

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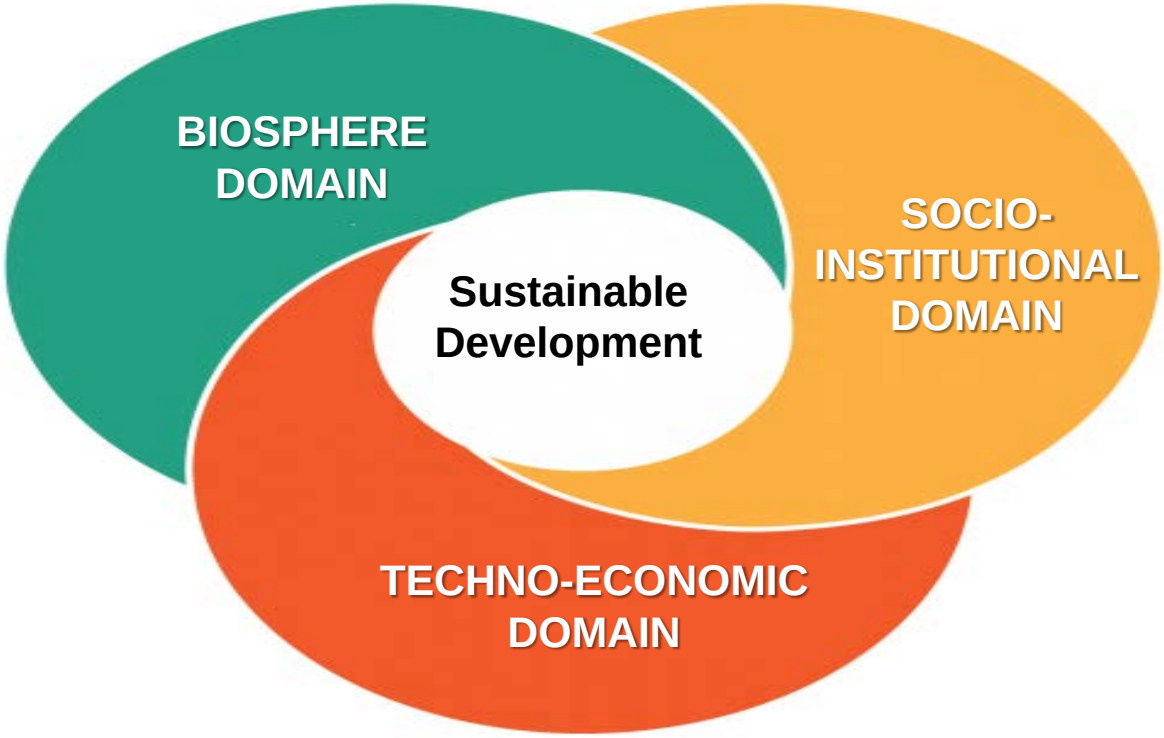
Systems Analysis and the Americas

Complex Global Challenges

The urgent **Global Challenges** of our times include several that already existed decades ago, as well as new and emerging ones...

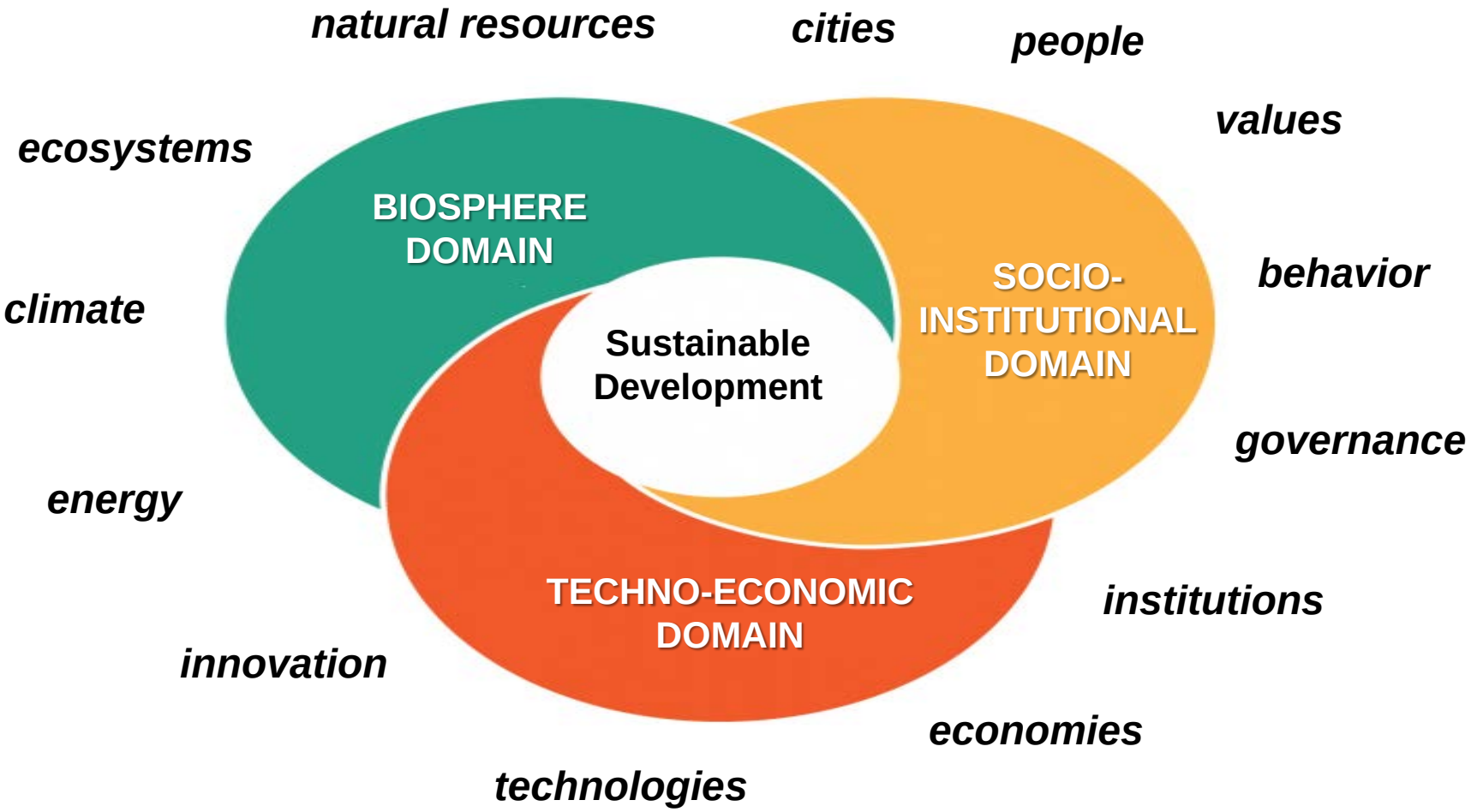
Discuss how **Systems Analysis** can bridge sectors and actors, as well as temporal, social, and spatial scales to facilitate the task of policy and decision makers to address them.

Complex Global Challenges



Relevant challenges to sustainable development in three interlinked domains

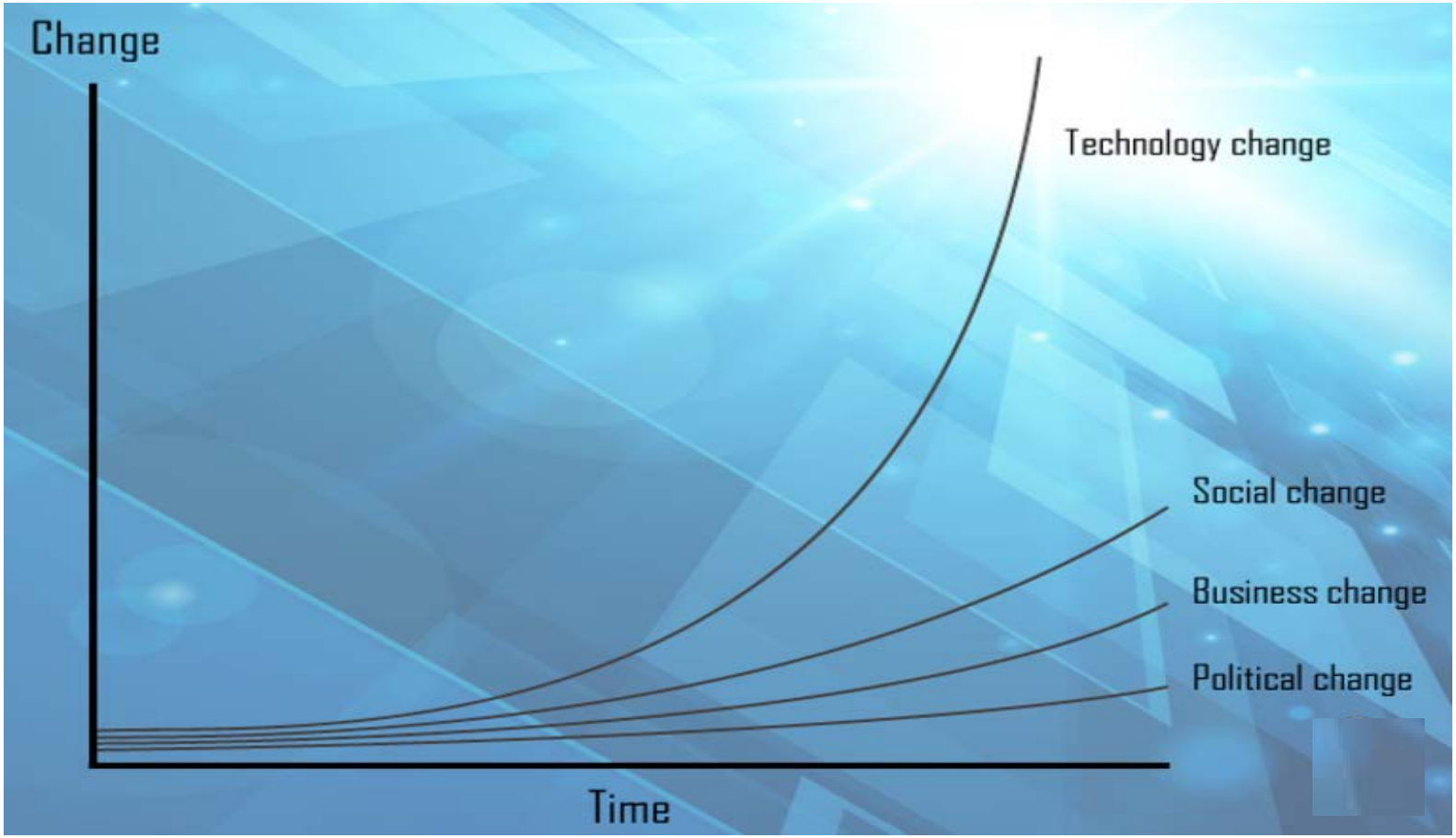
Complex Global Challenges



Many are persistently around for decades…
Many others emerging in recent years...

Complex Global Challenges

Technology has been a major source of progress to humanity...
...but also a major source of challenges and risks!
A disconnect between the pace of change - exponetial x slow

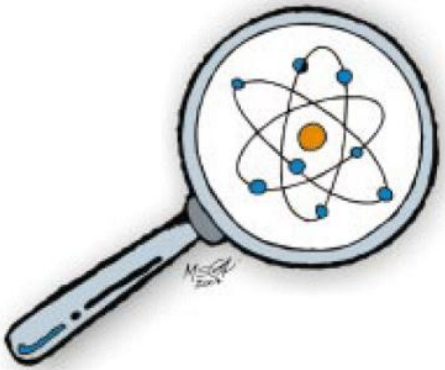


Source: Pieter Haasnoot - upnext.nl

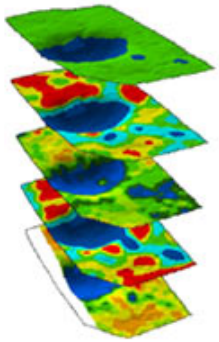
Complex Global Challenges

Bio

Nano



Geo



Data

Complex Global Challenges

Complex Global Challenges

INTERNET
SOCIAL MEDIA

Wonderful opportunities...

...not without problems.

#FakeNews
#Relations
#Trust

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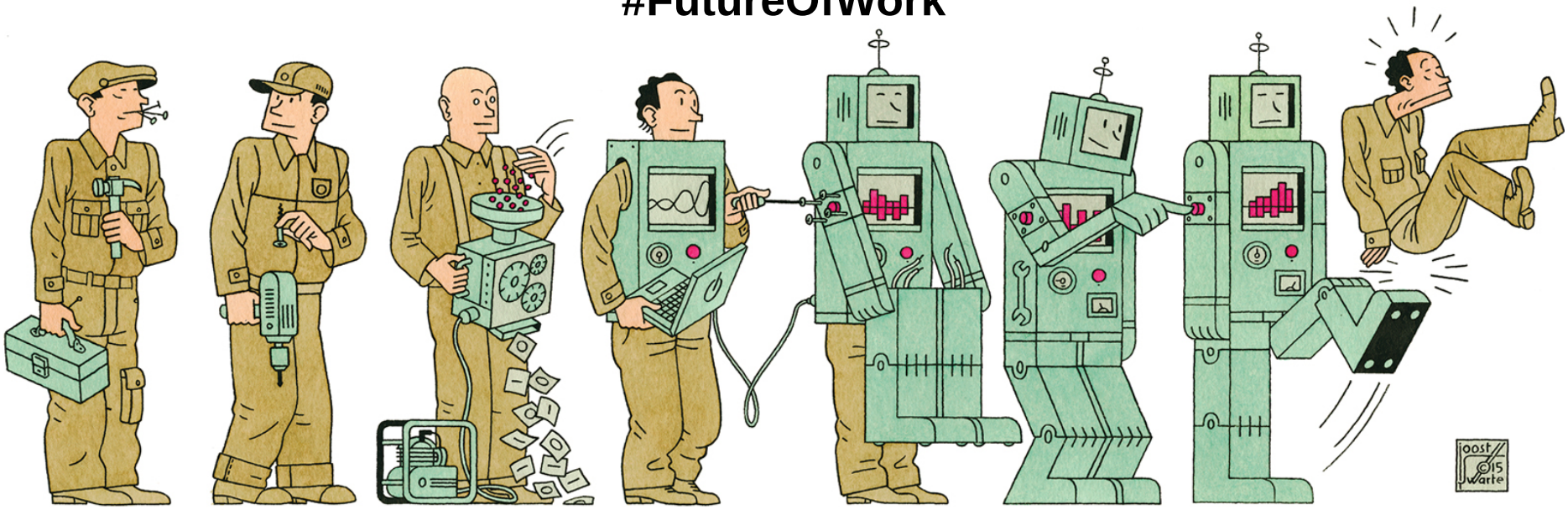
Complex Global Challenges

Wonderful opportunities...
not without problems...

#FutureOfWork



Source: Technology Review

Complex Global Challenges

Source: Pieter Haasnoot - upnext.nl

Complex Global Challenges

Complex Global Challenges

Complex Global Challenges

Global Order?

Less predictable world…

Weakening multilateral dialogue…

Too many forces at play…

#governance #institutions

Complex Global Challenges

We lack good metrics to capture the complexity and the breadth of the changes occurring…

The world may be improving better than most pessimists know…

Future dangers may become worse than most optimists are willing to accept…

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Complex Global Challenges

Science is our best source of credible metrics…

<u>Sectoral and fragmented approach to research and innovation</u>…

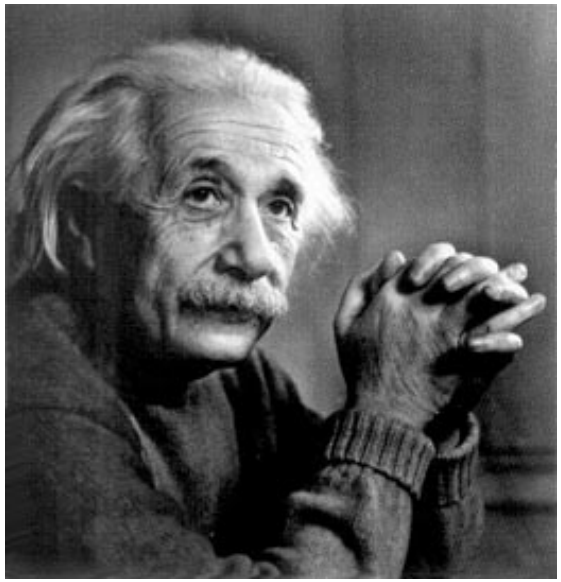
Disciplines - Departments - Programs

1 – Energy
2 – Water
3 – Food
4 – Environment
5 – Poverty
6 – Health
…

Complex Global Challenges

Our capacity to address the complexity and breadth of the changes occurring has been limited by several factors…

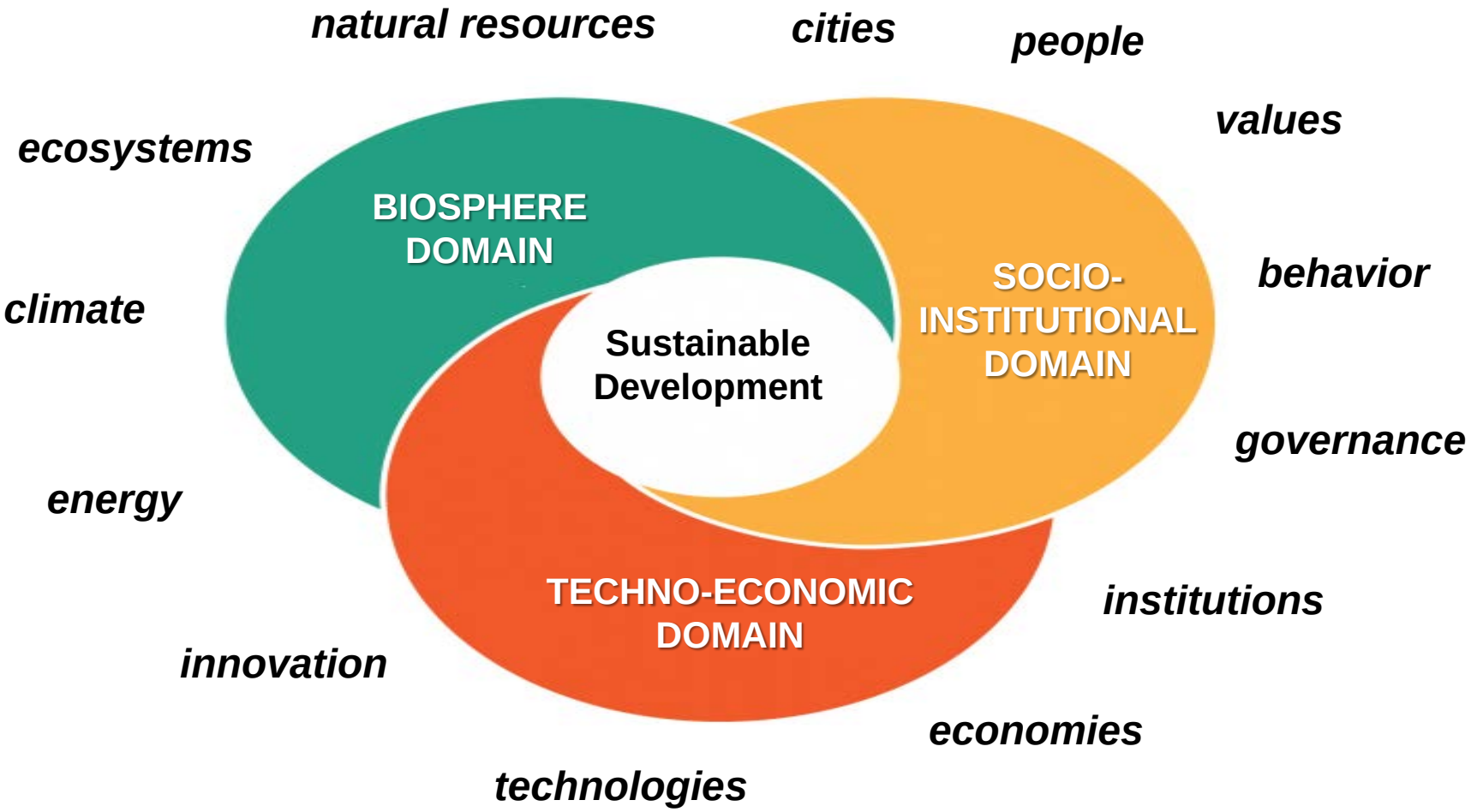
<u>Mental Models – Patterns of Thought</u>



”Without changing our patterns of thought, we will not be able to solve the problems we created with our patterns of thought”

Albert Einstein

Complex Global Challenges



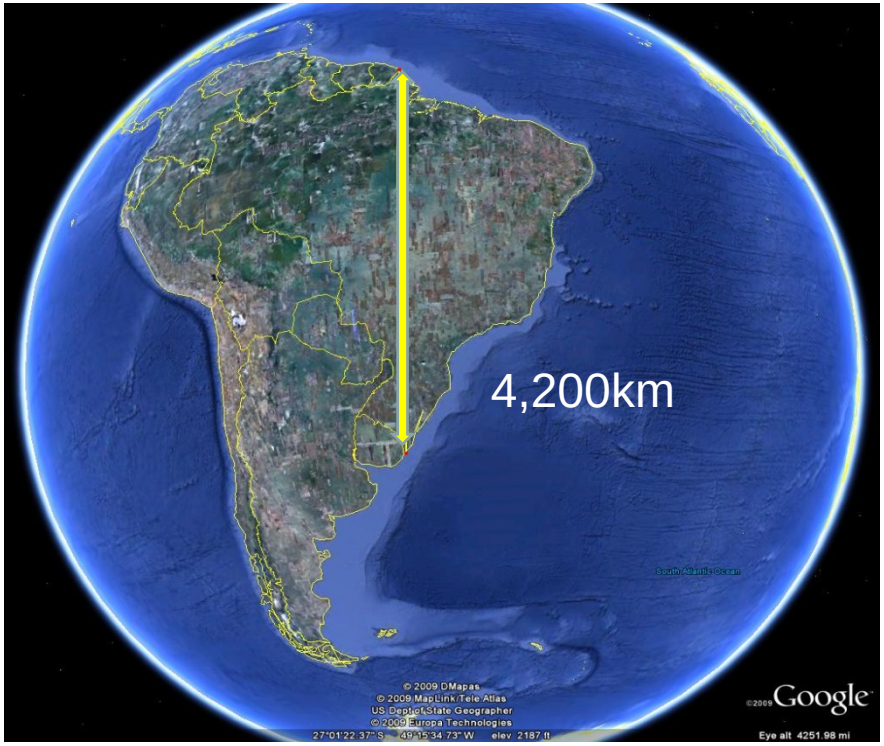
Many are persistently around for decades…
Many others emerging in recent years...

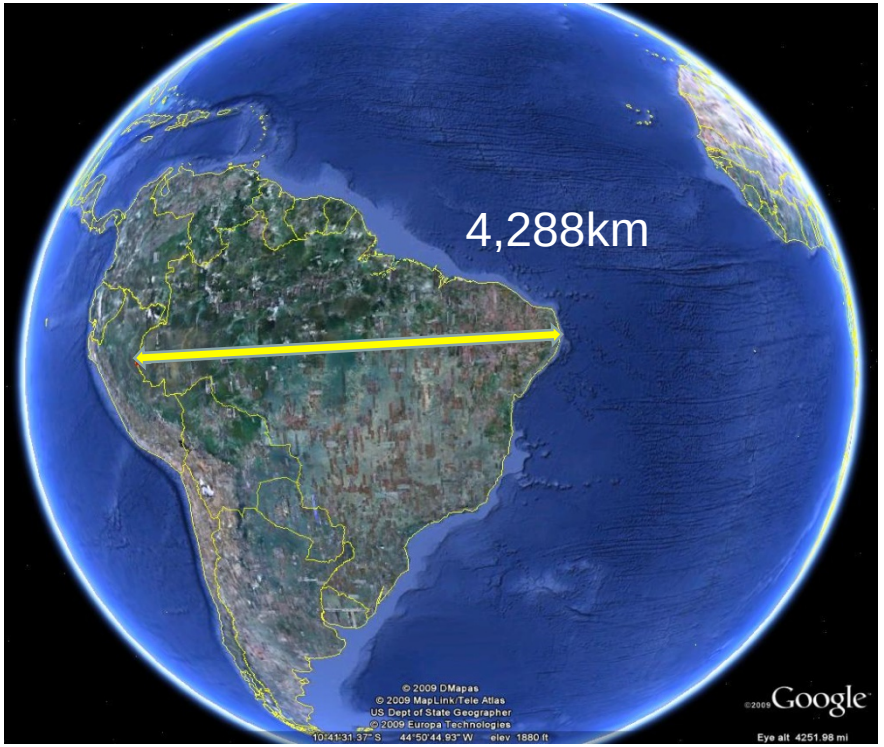
Systems Analysis and Nexus Thinking

Help us understand a cohesive conglomeration of interrelated and interdependent parts that are either natural or man-made.

Systems Analysis and Nexus Thinking

Brazil: Continental Size and Environmental Diversity





Systems Analysis and Nexus Thinking

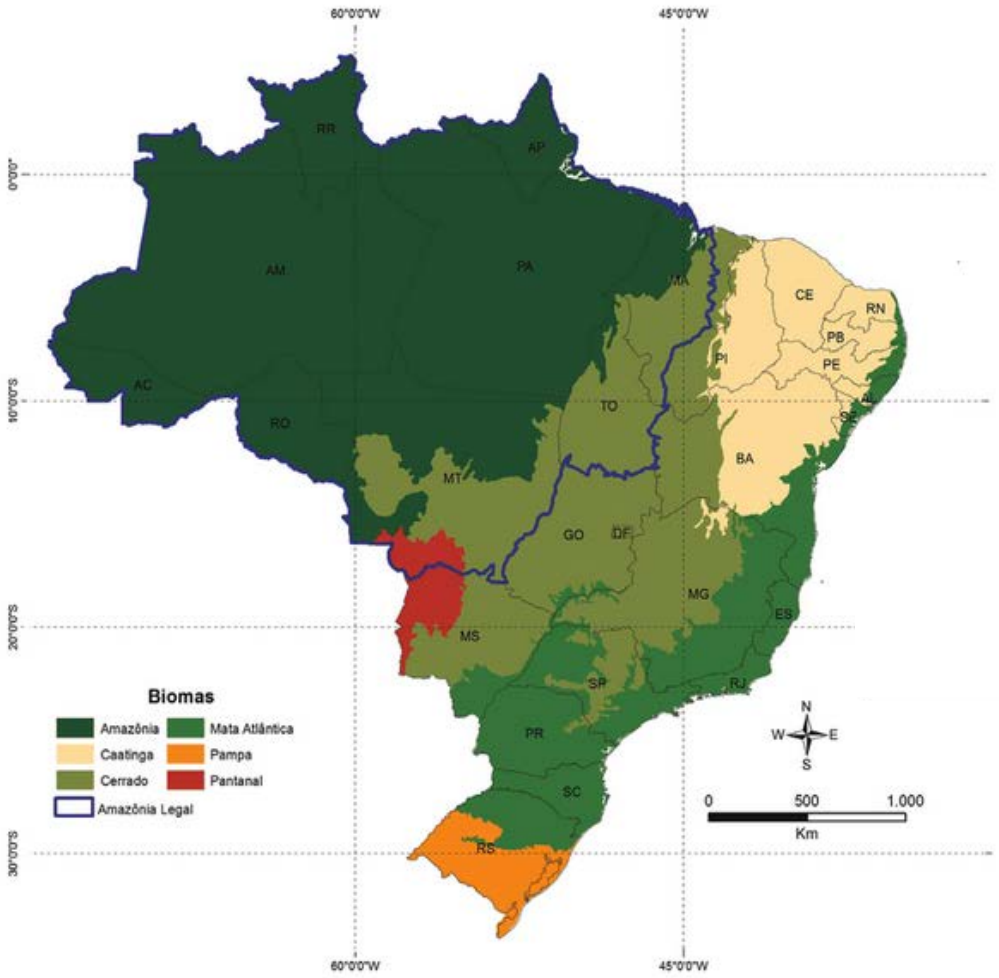
Important Food Producer

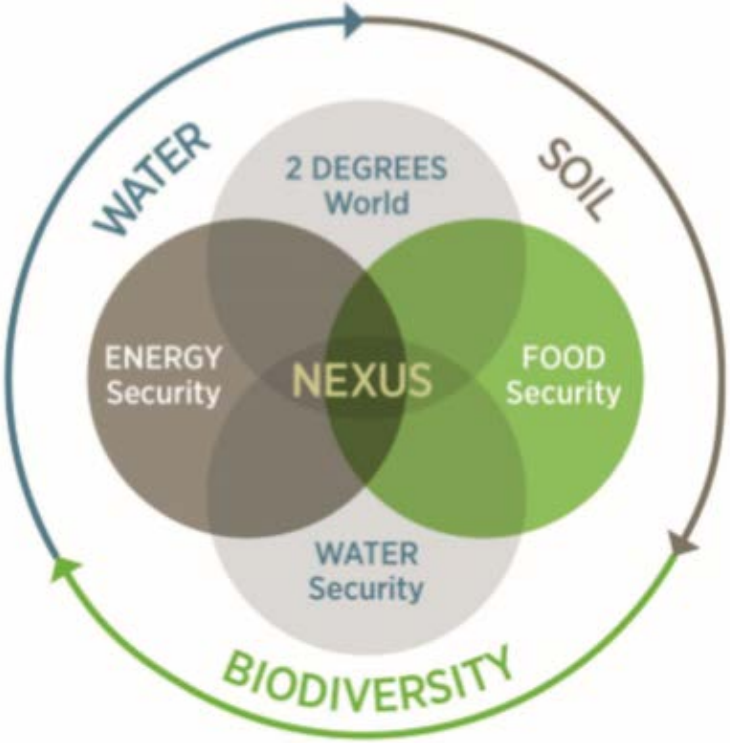
…

A Mega-diverse Country

It is estimated that Brazil contains greater biodiversity than any other country on Earth.

Systems Analysis and Nexus Thinking





The soil-water-energy-food biodiversity-climate nexus

Müller et al. 2015

Systems Analysis and Nexus Thinking

1

EXPANSION

2

COMPETITIVITY

3

SUSTAINABILITY

4

MULTIFUNCTIONALITY

Systems Analysis and Nexus Thinking

Functionalities from Agriculture

Agriculture... Food – Fiber – Bioenergy .....

Systems Analysis and Nexus Thinking

Multiple Functionalities from Agriculture

Agriculture... Food – Fiber – Bioenergy ...

Agriculture... Food – Nutrition – Health ...

Agriculture... Environmental and Ecossystemic Services

Agriculture... Biomass – Biomaterials – Green Chemistry...

Agriculture... Organic – Agroecology – Agroforestry ...

Agriculture... Food – Culture – Tradition – Gastronomy – Tourism

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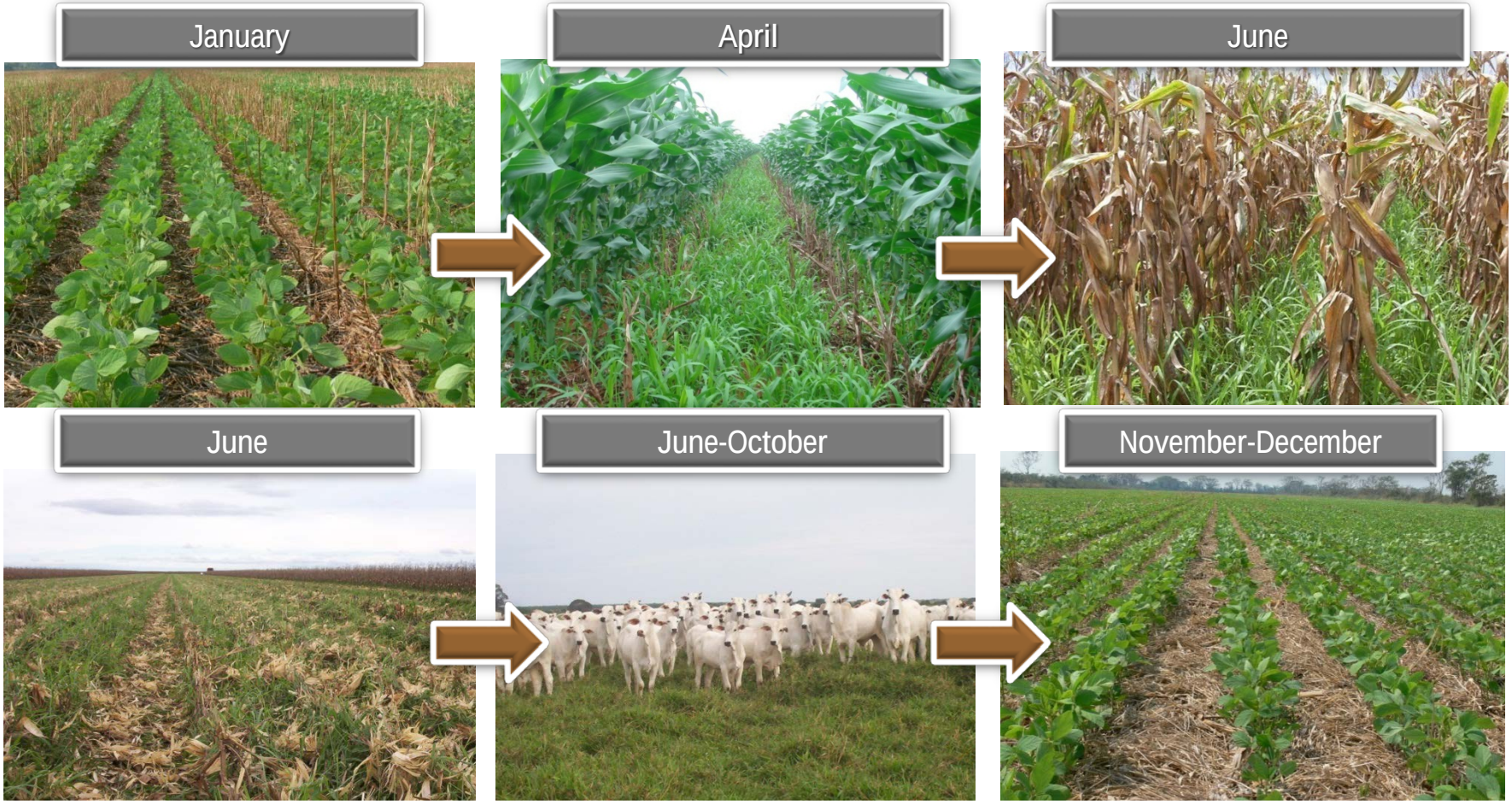
Reconcile Production and Conservation

Sustainable Intensification – Crop/Livestock/Forest

Systems and Nexus Thinking

Sustainable Intensification – Crop/Livestock/Forest



INTEGRATED SYSTEMS ARE BECOMING A NORM FOR RECOVERY OF DEGRADED LAND

14 MILLION HA OF INTEGRATED SYSTEMS, AND GROWING...

Photos: J.C.M. Sá

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Sustainable Intensification of Land Use

Cycling crops and livestock – and adding trees…

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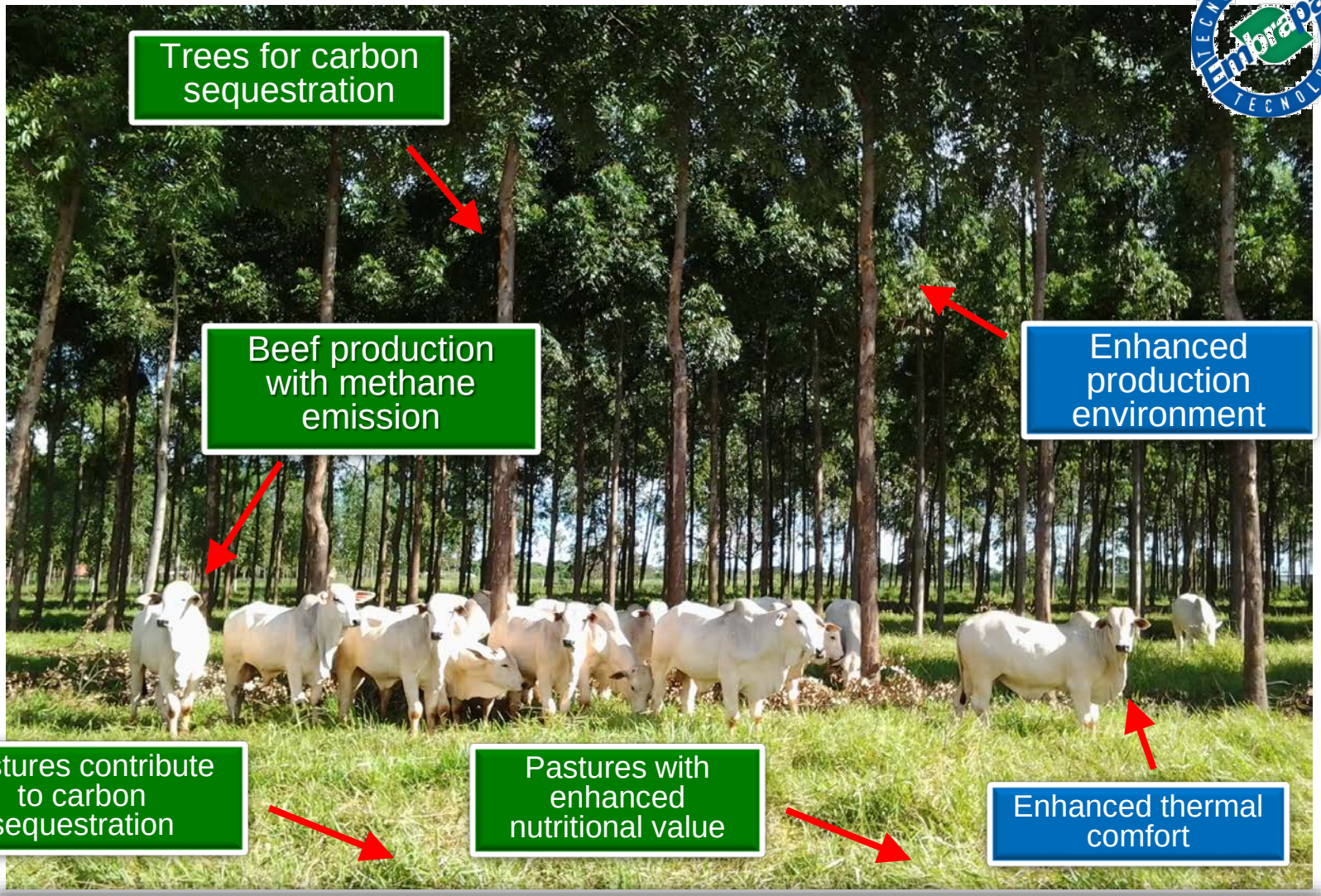
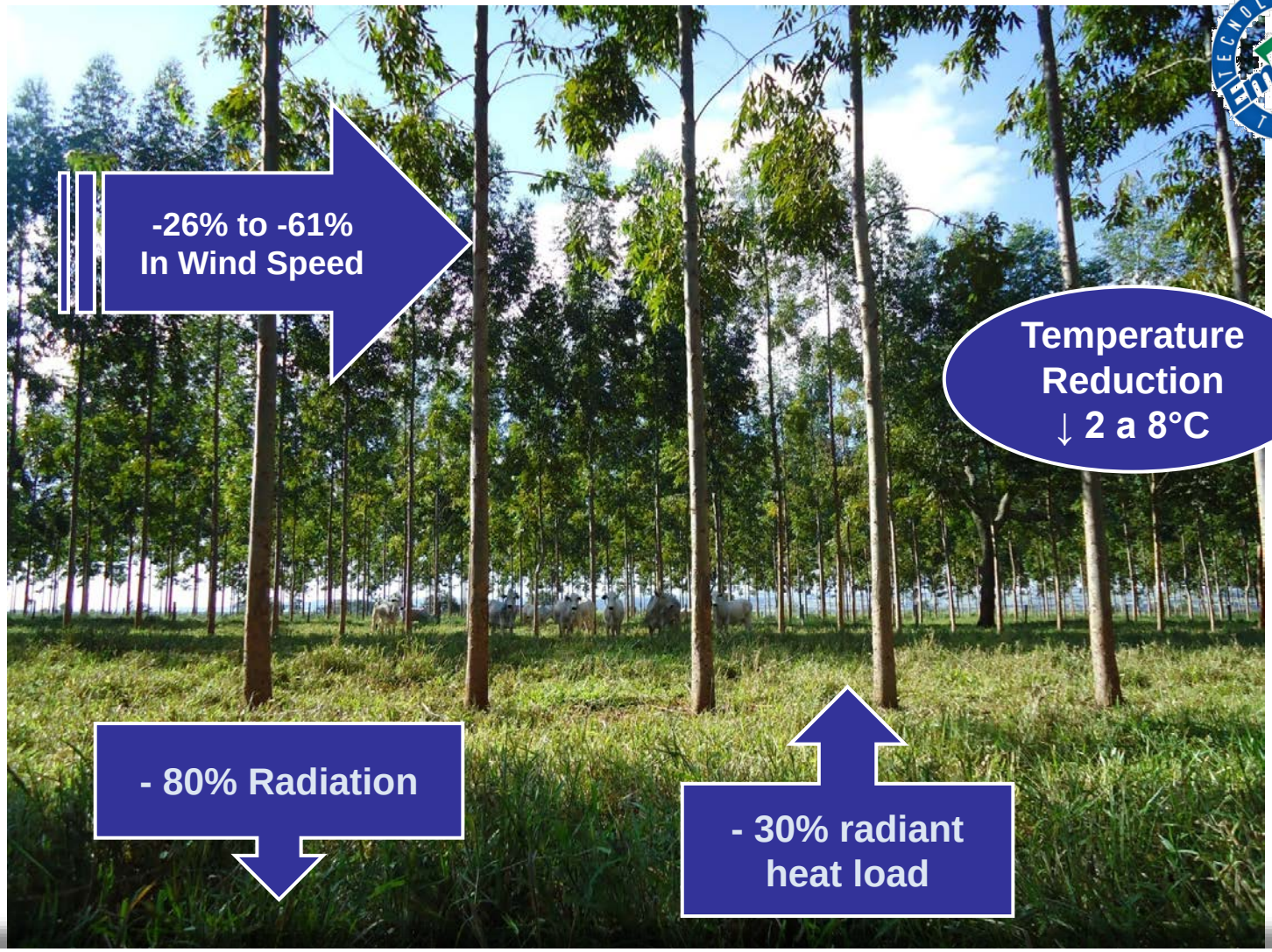
Improved Environment and Animal Welfare



METRICS FOR ENHANCED ENVIRONMENT AND ANIMAL COMFORT

Improved Environment and Animal Welfare



METRICS FOR ENHANCED ENVIRONMENT AND ANIMAL COMFORT

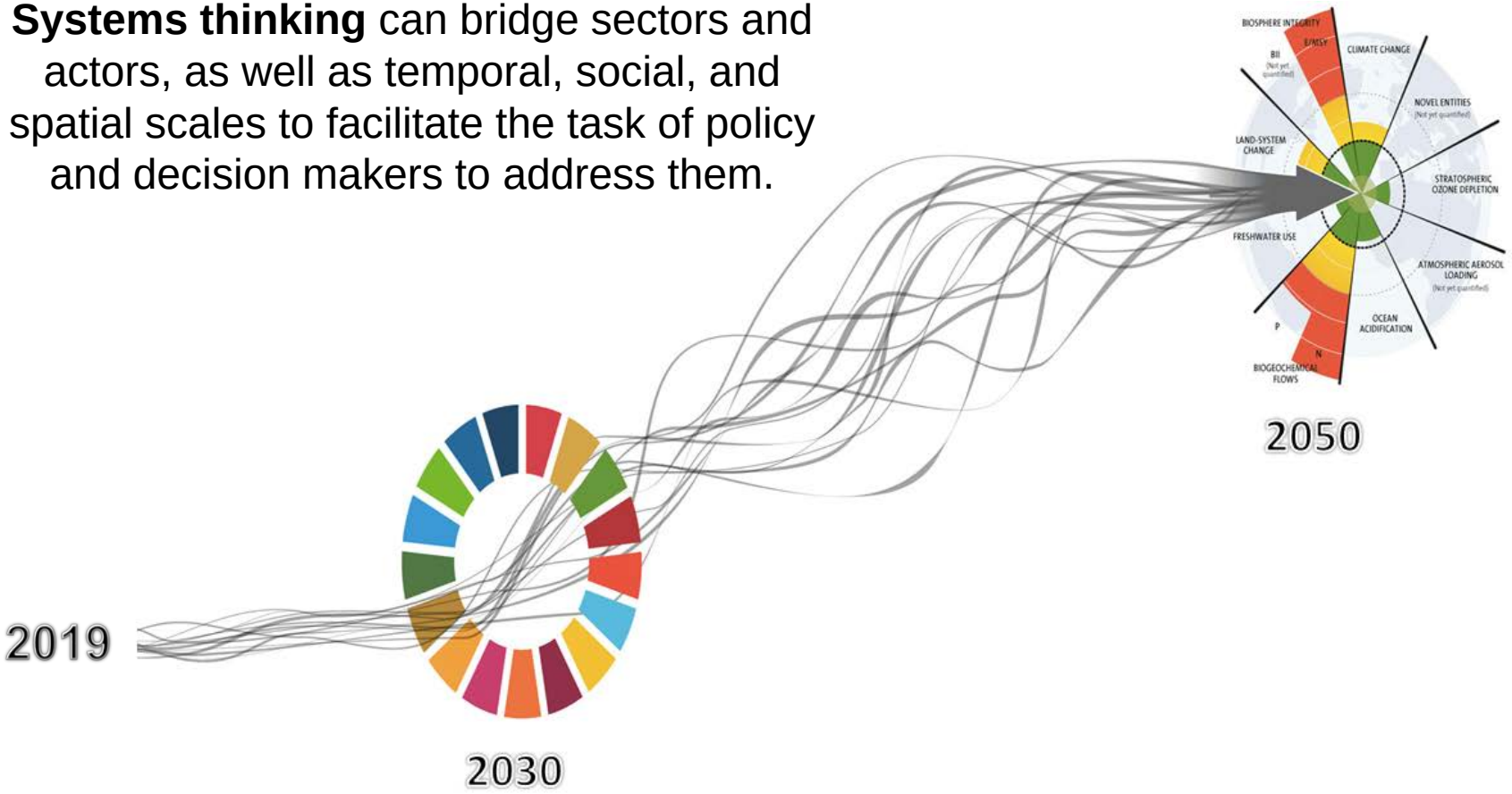
Low Emission, Sustainable Production

CERTIFIED LOW CARBON PRODUCTION SYSTEMS

CONCLUSION

Systems Thinking and Sustainability

Systems thinking can bridge sectors and actors, as well as temporal, social, and spatial scales to facilitate the task of policy and decision makers to address them.



Source: Modified from J. Lokrantz/Azote

Systems Thinking and Sustainability

We need learners…

*"In a time of drastic change, it is the **learners** who will inherit the future.*

*The **learned** usually find themselves prepared for a world that no longer exists."*

-- Eric Hoffer

Questions?

(and thanks!)

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