

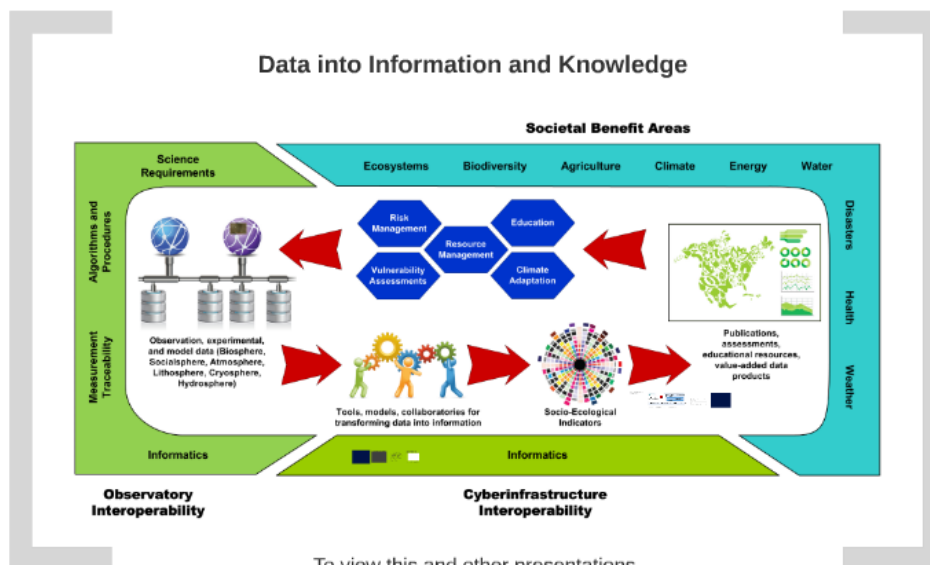
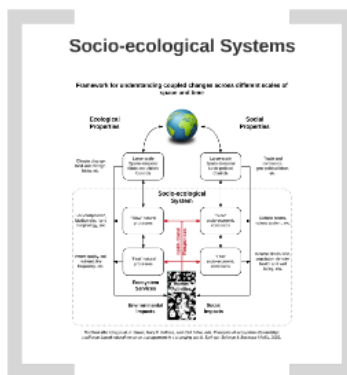
Interoperability: Fomenting Opportunities at the Intersection of Collections and Ecology

Brian Wee, Ph.D.
 Director of Strategic Alliances
 National Ecological Observatory Network (NEON), Inc.

2015-11-06
 iDigBio Summit



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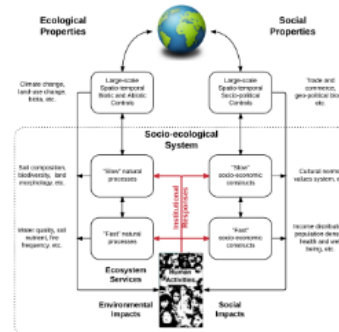


Socio-ecological Systems

Framework for understanding coupled changes across different scales of space and time

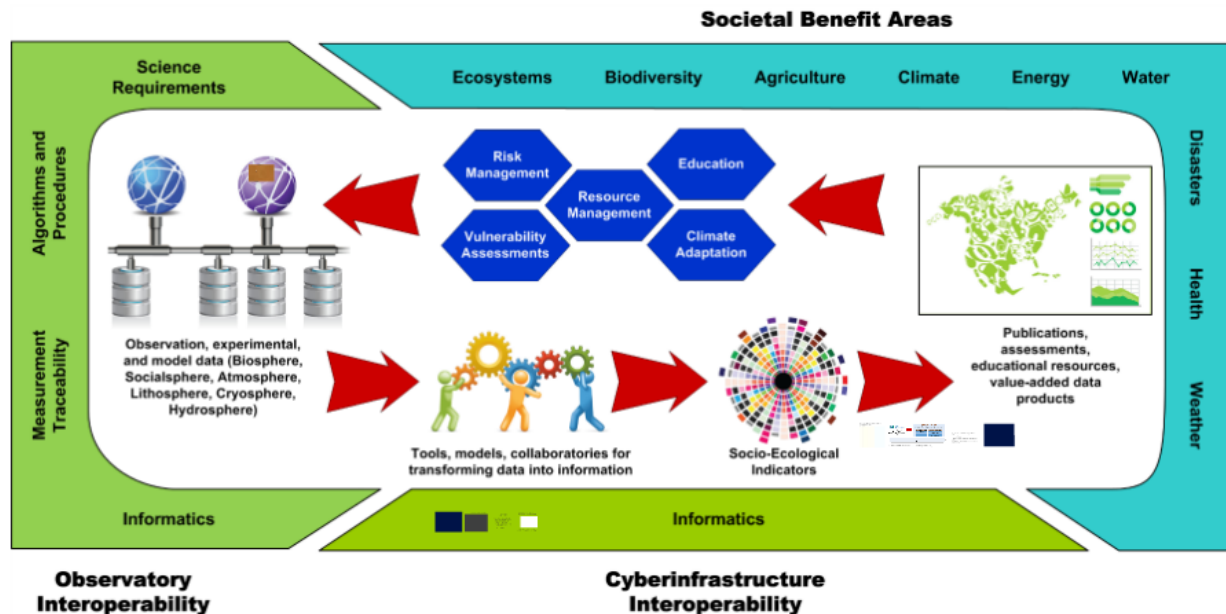
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Reprinted after Chapin et al. (2006), Chapin, Foley, and Cotter (2006), and Cotter (2006), with permission of Springer. Downloaded from <http://www.springer.com/9781402088888>. © Springer Science & Business Media, 2005.

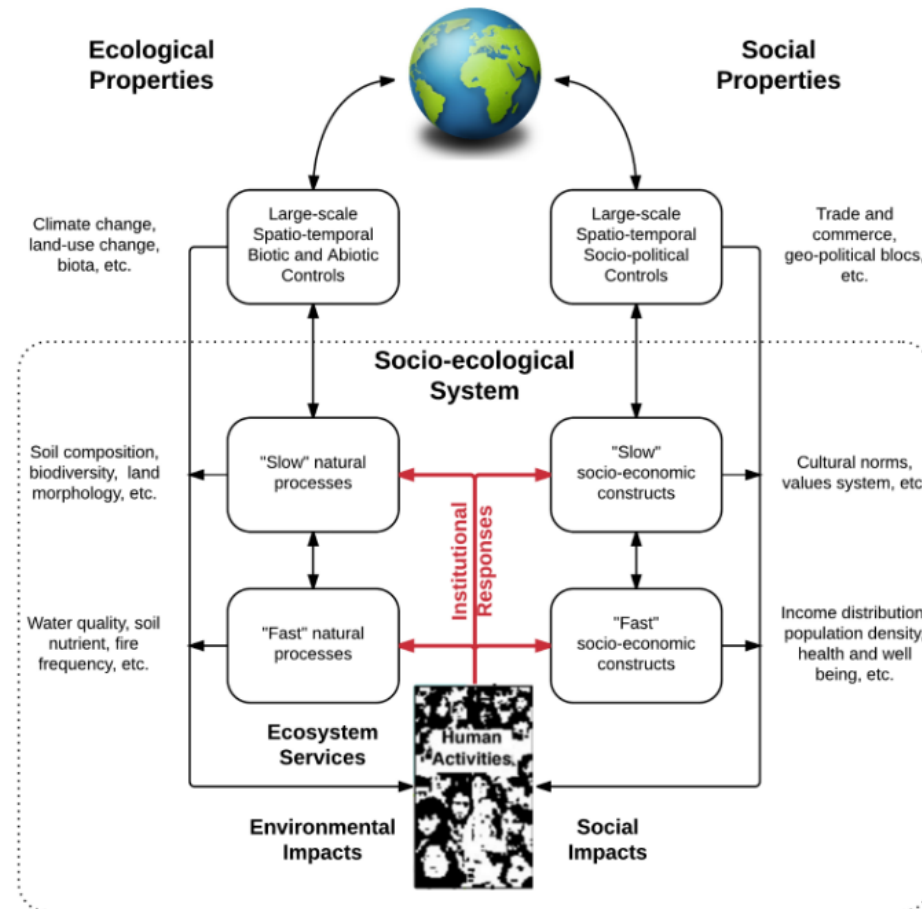
Data into Information and Knowledge



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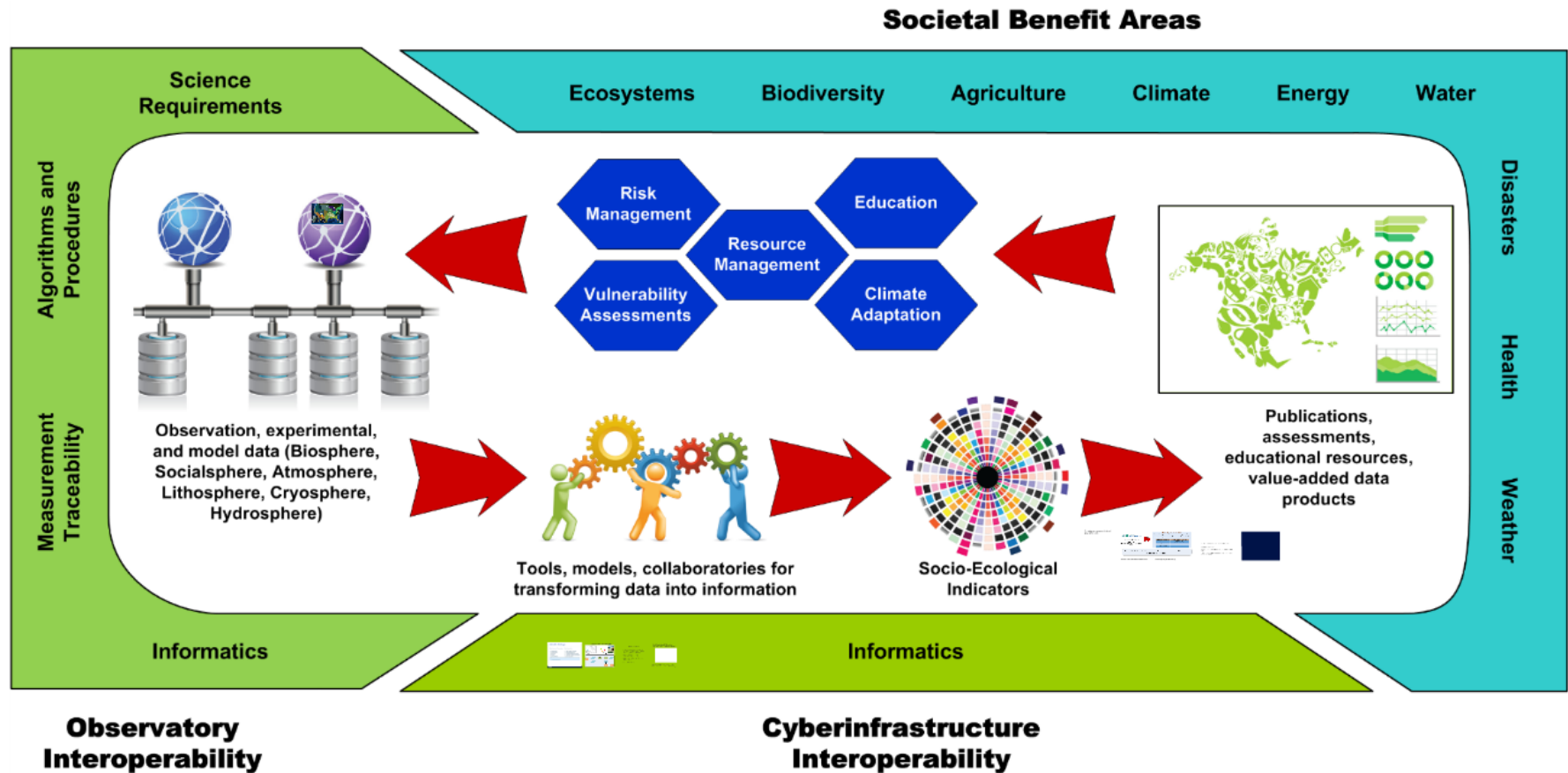
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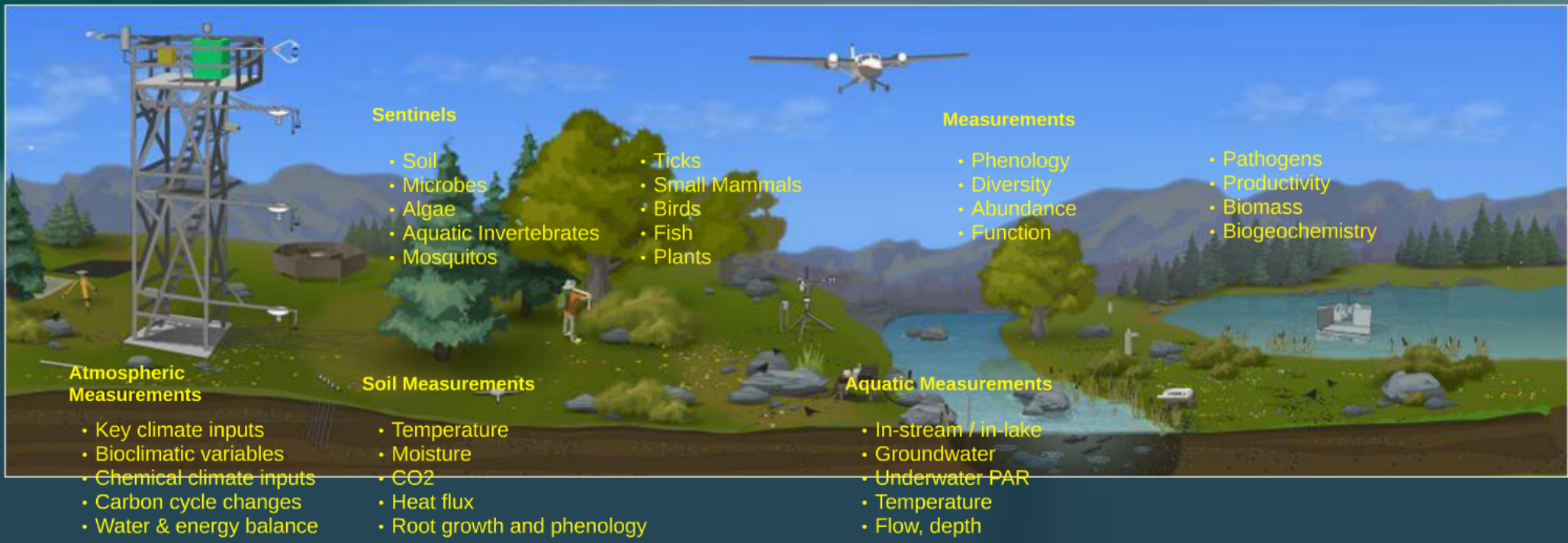
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NEON Science Strategy

- ▮ NEON Core
- ▴ NEON Relocatable
- NEON Aquatic
- NEON STREON
- ◆ LTER Sites

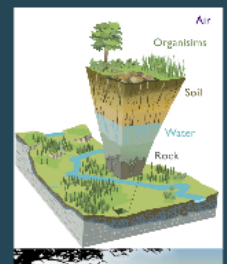
Map data © 2014 Esri, DE LRS, IBM, Intel, Microsoft, Google, Swire, NOAA, GEBCO, Esri, Inc. All rights reserved. NEON Science Strategy 1.0, 2014



(Exemplars limited by space constraint: omission does not imply irrelevance!)



Tri-Trophic Thematic



Soil Measurements

- Temperature
- Moisture
- CO₂
- Heat flux
- Root growth and phenology

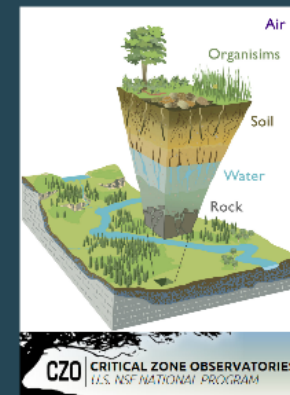
Aquatic Measurements

- In-stream / in-lake
- Groundwater
- Underwater PAR
- Temperature
- Flow, depth

(Exemplars limited by space constraint: omission does not imply irrelevance!)



Tri-Trophic Thematic
Collection Network



**Examples of potential conceptual affinities at
the collections - NEON interface**

**NSF Environmental Observatories
that share conceptual affinities**

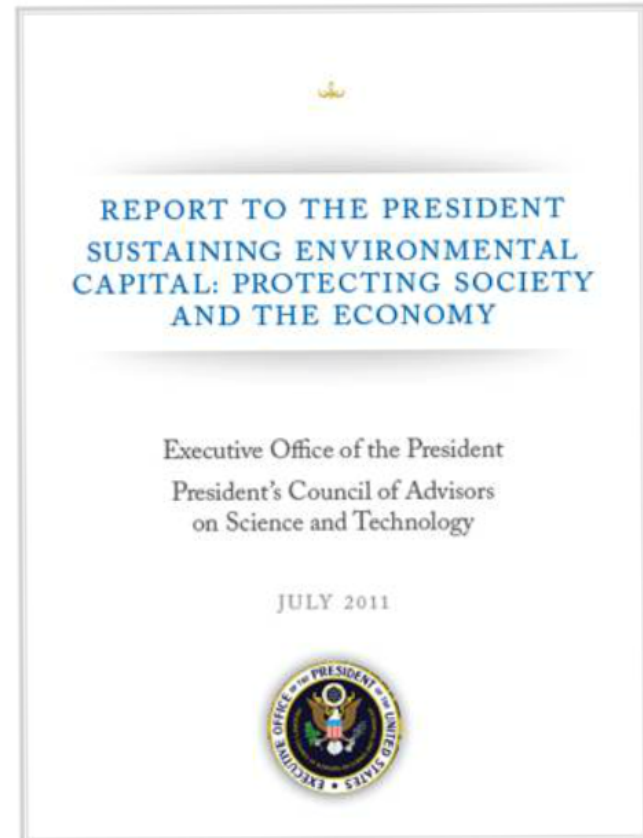
Questions at the nexus of land-use, climate change, and invasive species

Challenges:

- Spatio-temporal sampling regime
- Attributes beyond absence / presence (e.g. phenology)

Data from observations for biodiversity and ecosystem service assessments

“... **collaboration in monitoring** could rapidly improve the information base available for assessment and management....
recommendations should be developed for **integrating** the existing monitoring networks with the help of state-of-the art **informatics**”



Boundary Organizations and Initiatives

- Federated search for environmental data: DataONE
- Communities:
 - EarthCube
 - Earth Science Information Partners (ESIP)
 - Research Data Alliance (RDA)



(Examples limited by space constraint, omission does not imply irrelevance)



Tri-Trophic Thematic Collection Network



Examples of potential conceptual affinities at the collections - NEON interface



NSF Environmental Observatories that share conceptual affinities

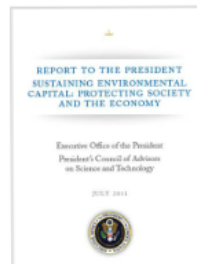
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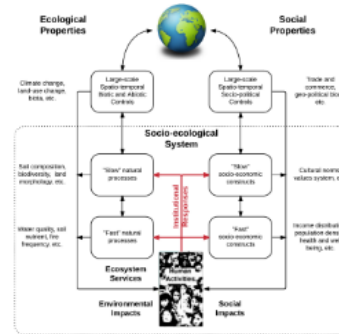


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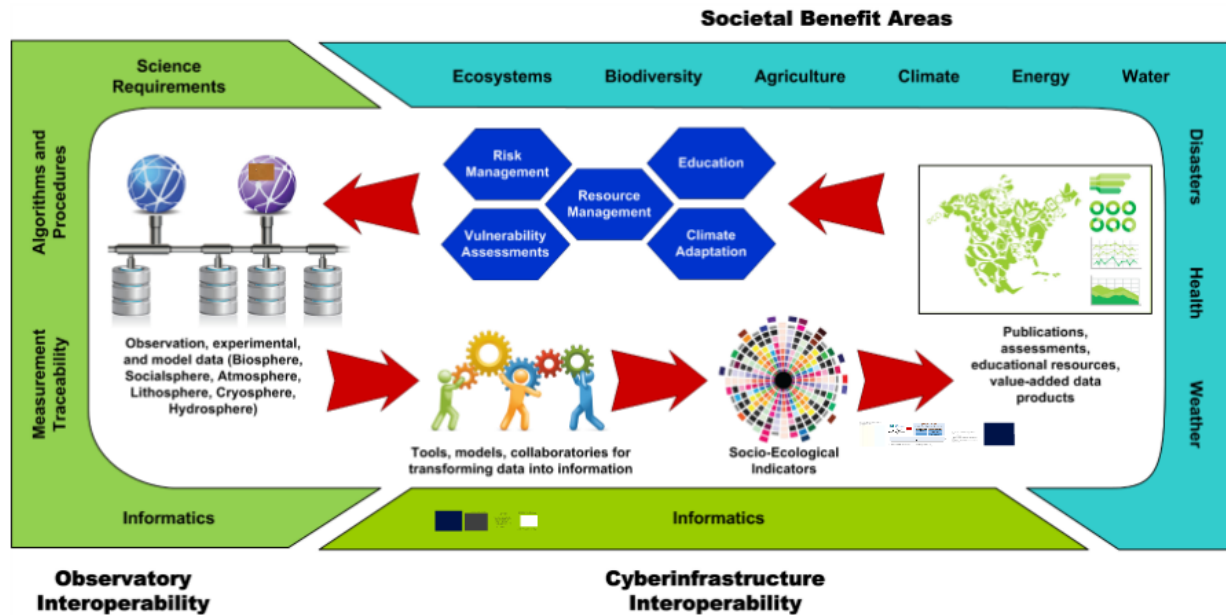
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Framework for understanding coupled changes across different scales of space and time



Adapted from Chapin et al. (2006), Chapin, P. M., and Dale, V. L. (2002). Principles of integrated environmental assessment based natural resource management in a changing world. Springer Science & Business Media, 2005.

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Informatix Challenges

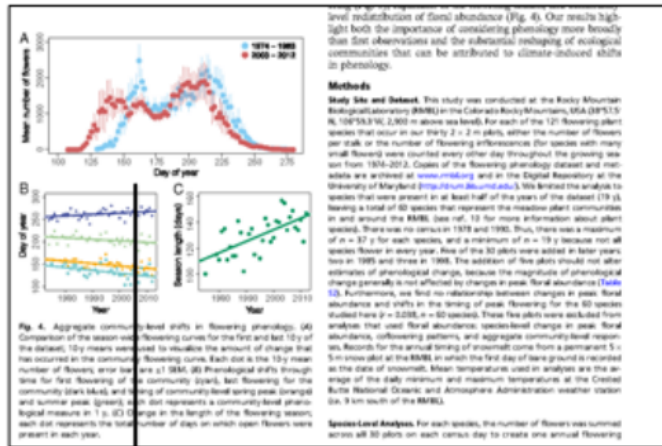
Data Access and Preservation:

- Authentication
- License, policy
- Discovery
- Access
- Archival Policies
- Provenance
- Persistent Identifiers

Data Integration:

- Data formats / schemas
- Metadata standards
- Coordinate reference system
- Taxonomic naming conventions
- Protocol registry
- Semantics

The essential principle of traceability



Is referred to by

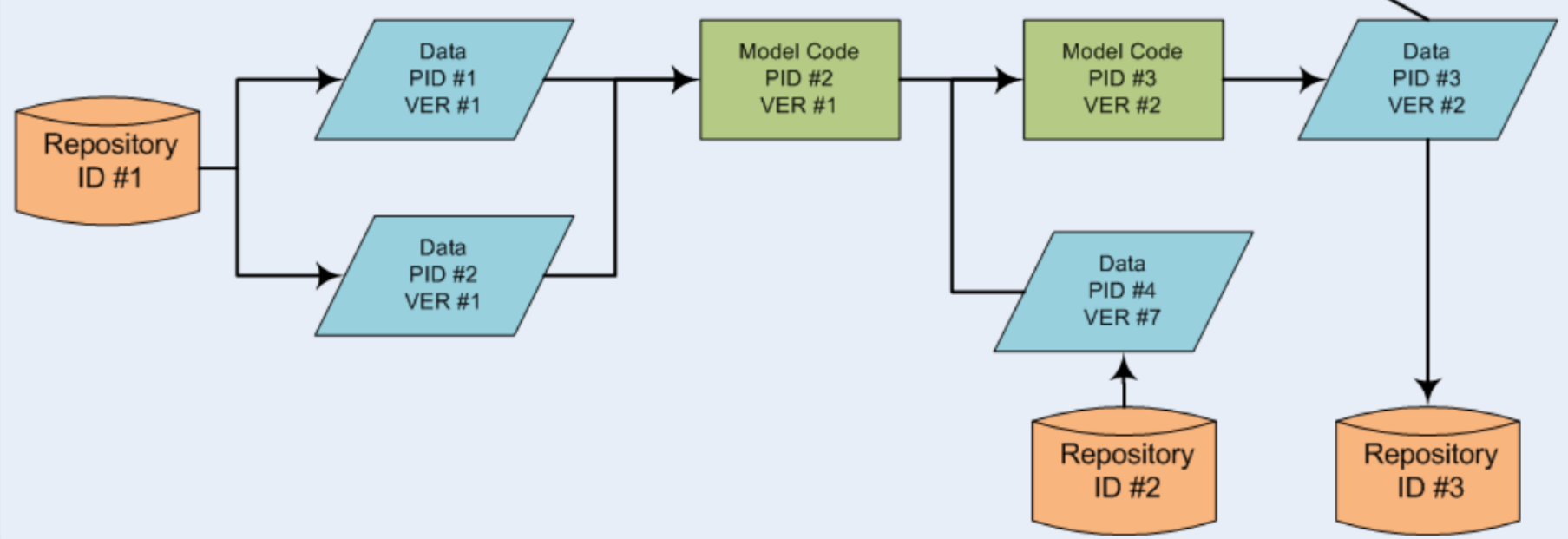
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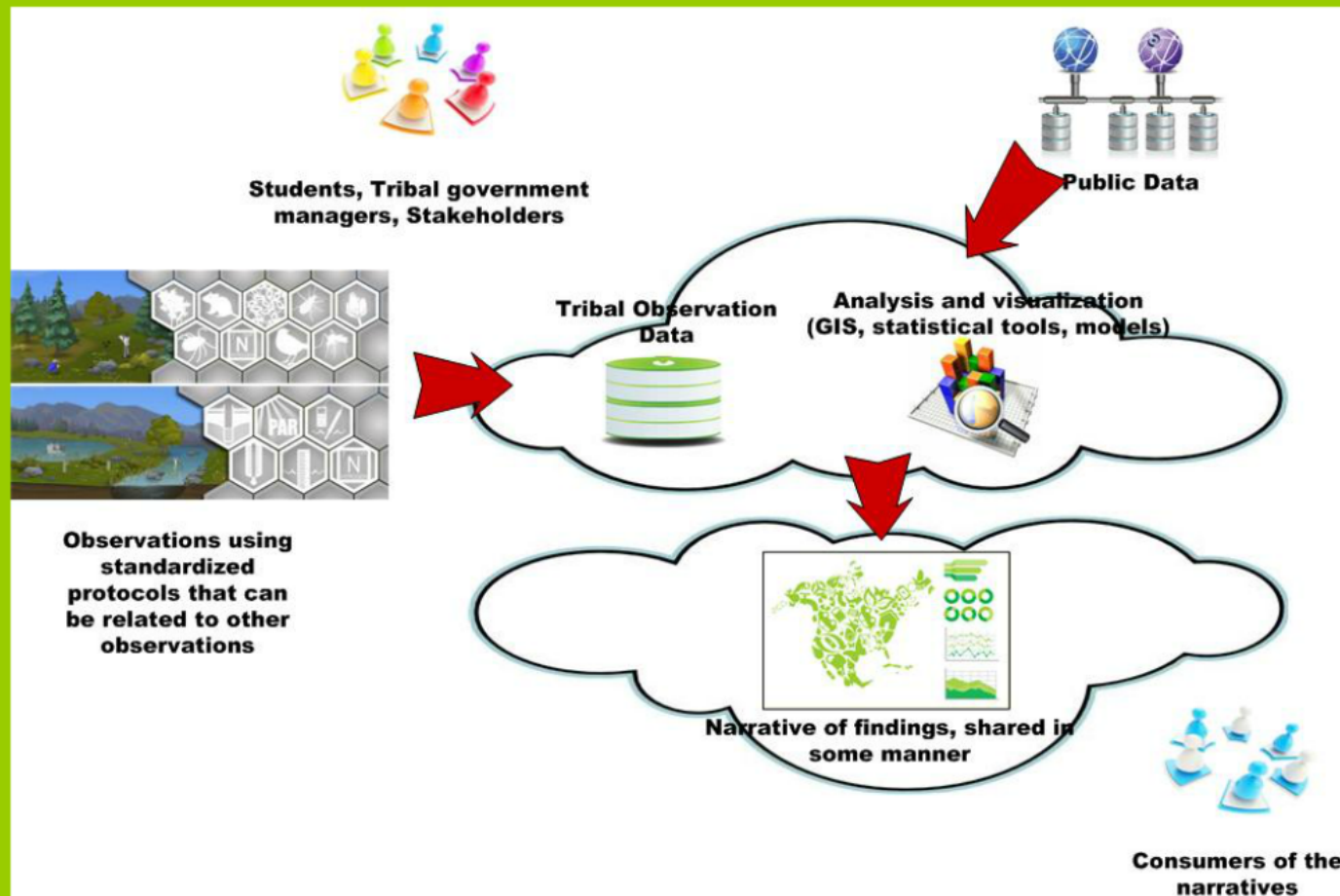
Workflow Associated with Data Plot in Publication



What's needed

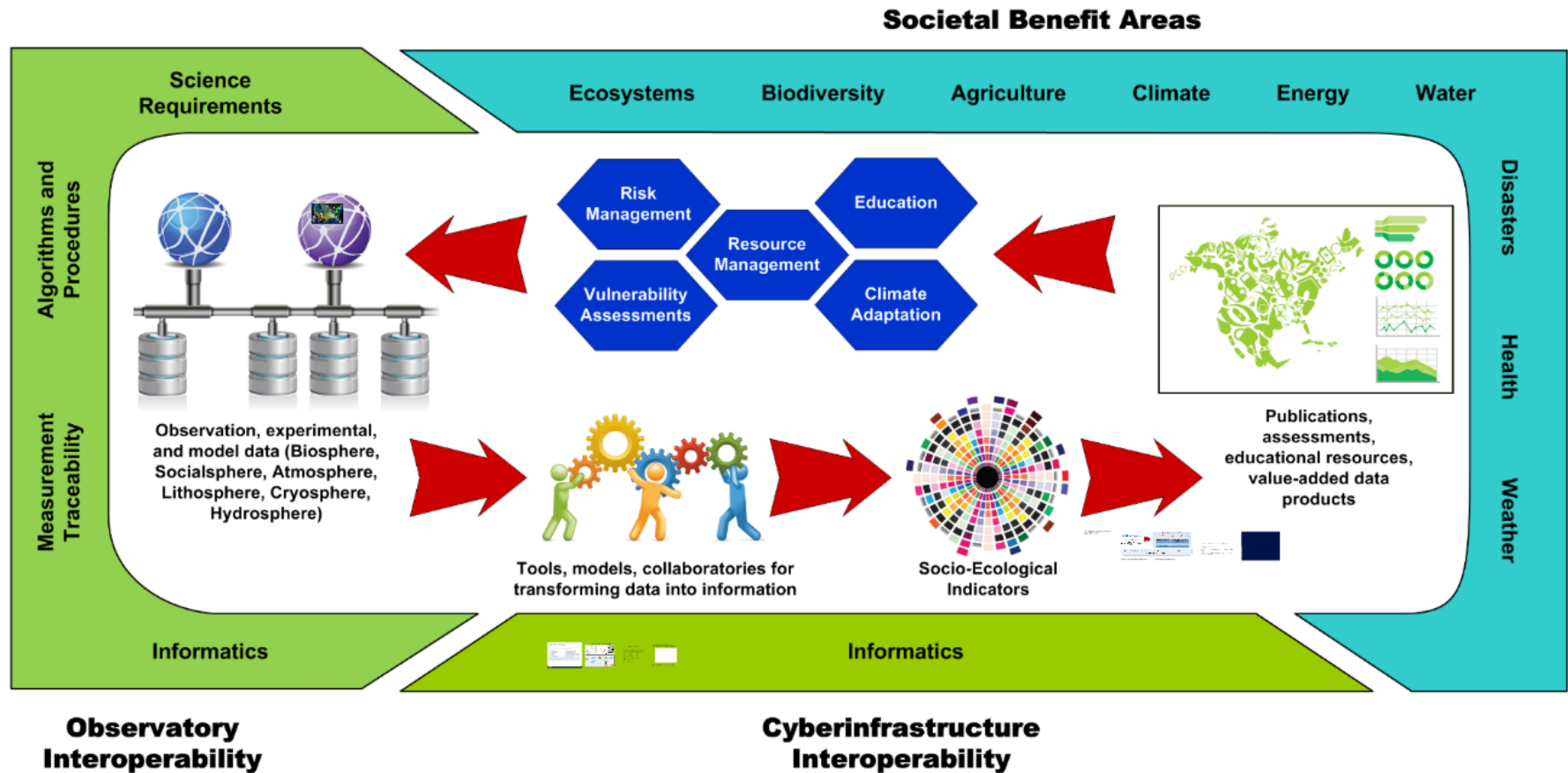
- A web-based "work-bench" that allows collaborators to share research products (code, data, documentation, tools).
- Many ways to implement this.
- Essential element: tracking and linking research products.
- Enable reproducibility.

Prototype Esri-NEON Tribal Lands Collaboratory (TLC) for plant phenology



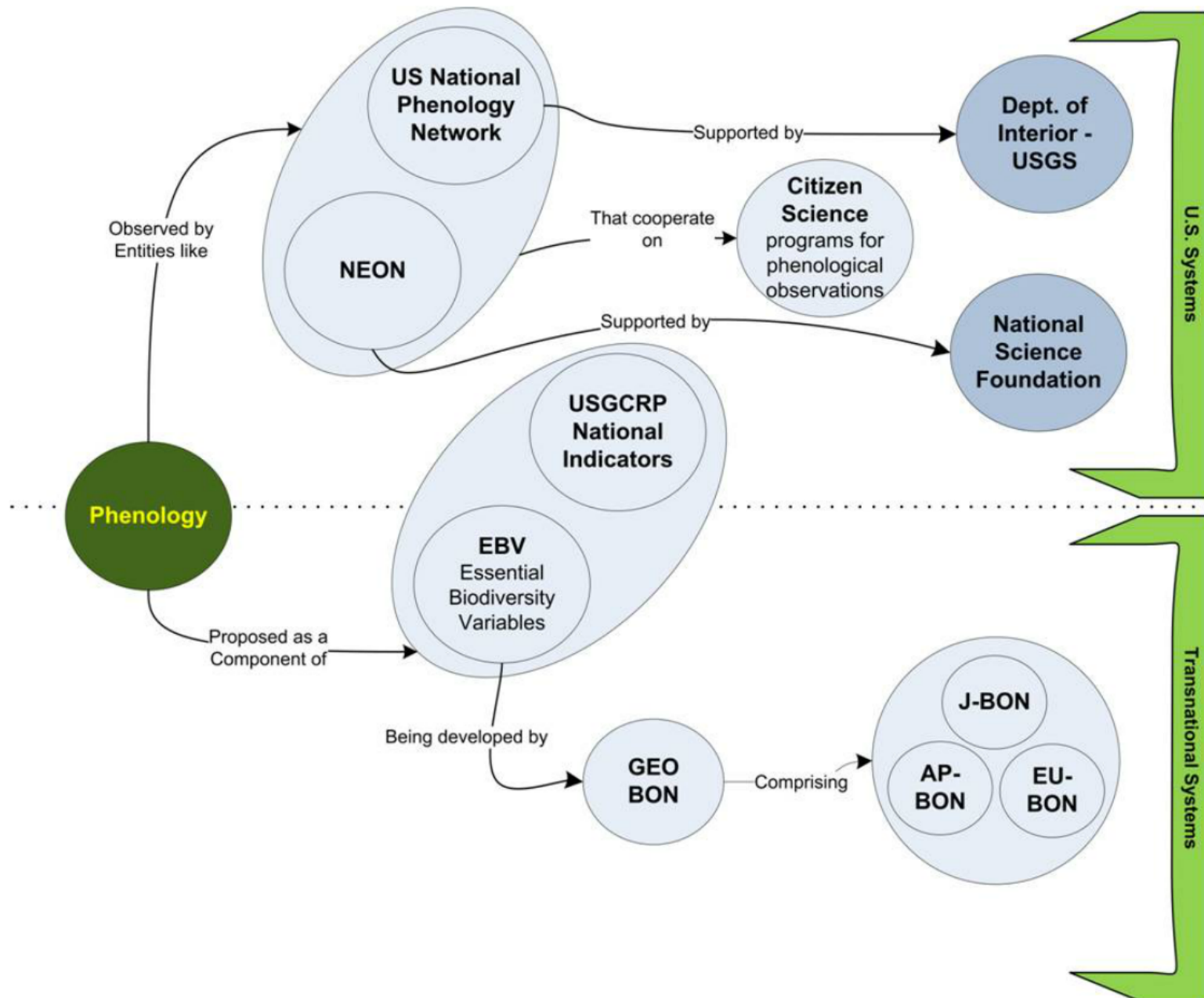
*Candidate technologies: Open Science Framework +
Dropbox + Esri technologies (ODE) An ode to tribal phenology*

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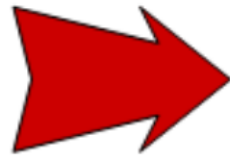
Phenology as an indicator at different geographical scales





GROUP ON
EARTH OBSERVATIONS

Biodiversity Observation
Network's (BON)
Essential Biodiversity Variables
(EBV)



Example of biodiversity/ecosystem indicators

A better understanding of the biosphere may lead to developing explanatory indicators of environmental change that for example may assist in predicting the effects of environmental management strategies that are being considered for implementation. Below are a few indicators related to crucial ecosystem services.

Biodiversity/Ecosystem indicator	Example related ecosystem service
<i>Genetic variability</i>	<i>Genetic pool for food resources or new medicines</i>
<i>Species richness</i>	<i>Ecosystem stability; materials for use (timber, biofuels, food)</i>
<i>Ecosystem functions</i>	<i>Carbon sequestration; fresh water quality; reducing desertification</i>

Research infrastructure that facilitate the transformation of variables (measurements) into indicators for resource management and policy

Credit: Ideas and materials based on



Roadmap (September 2014)



- (GLOB)al (I)nfrastructures for (S)upporting (B)iodiversity Research
- EU Horizon 2020 funded
- Address research needs and infrastructure services to calculate EBVs
- NEON, together with the NSF funded DataONE, are the two US liaison organizations

Biodiversity and Ecosystems: Planet Under Pressure 2012



Biodiversity and ecosystems for a planet under pressure

Transition to sustainability: interconnected
challenges and solutions

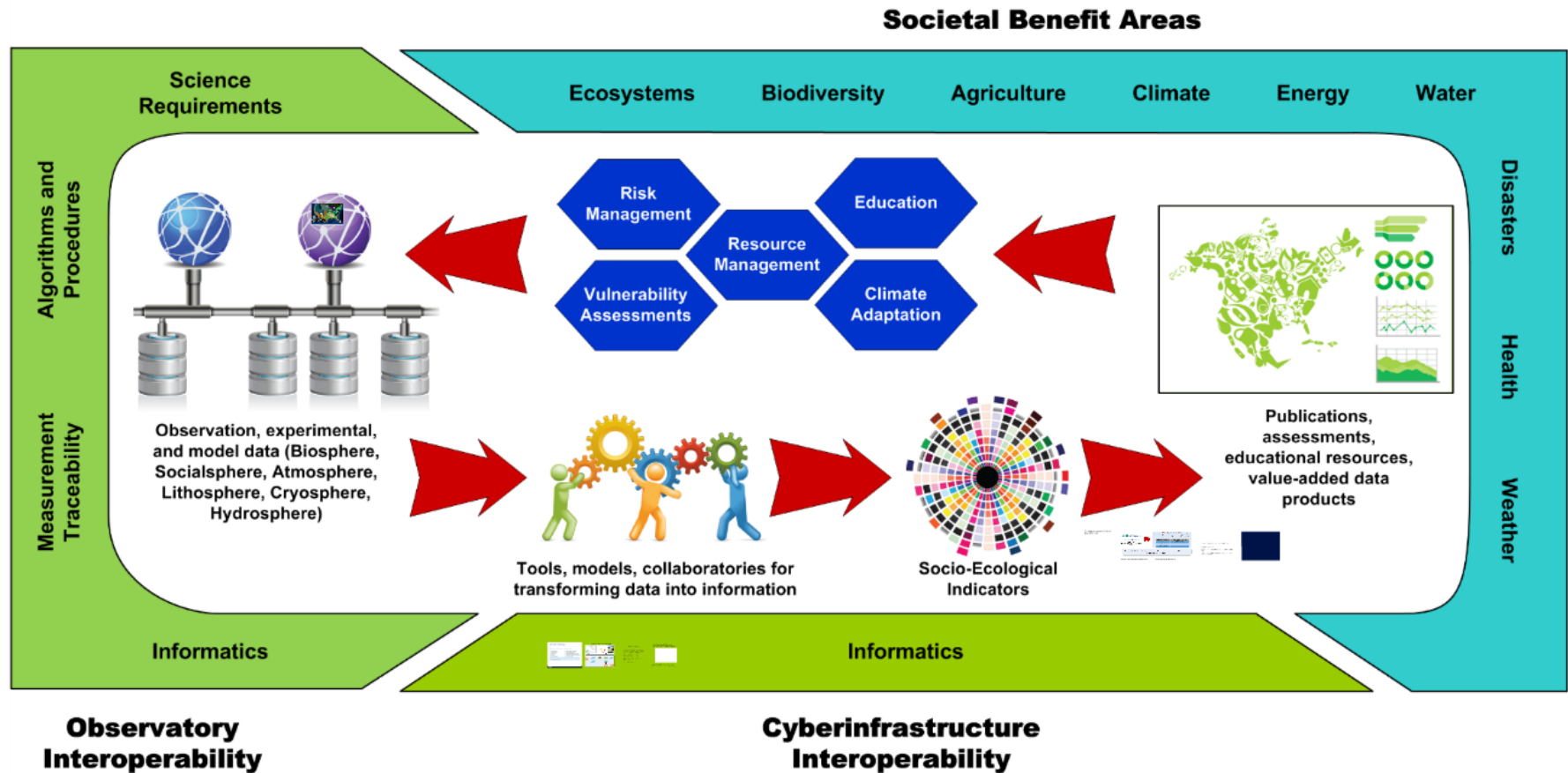


Selected key points:

- Incorporate *biodiversity and ecosystem services* into water- and land-use planning at all scales from local to global.
- Create green economies that include *natural, social, human, financial, and manufactured capital*.
- Shares areas highlighted in a 2011 US White House report.

Source: Planet Under Pressure 2012 website

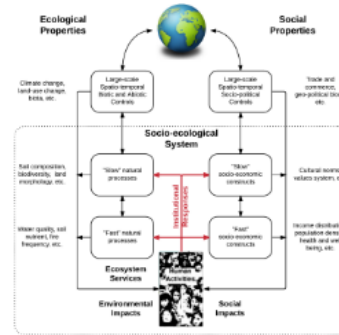
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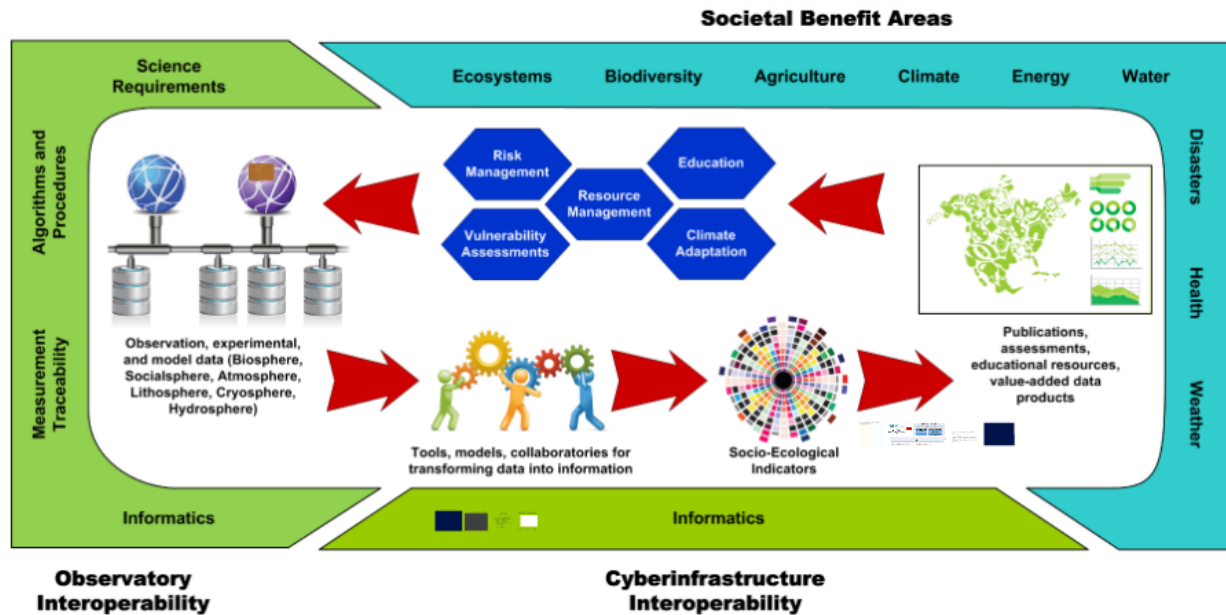
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