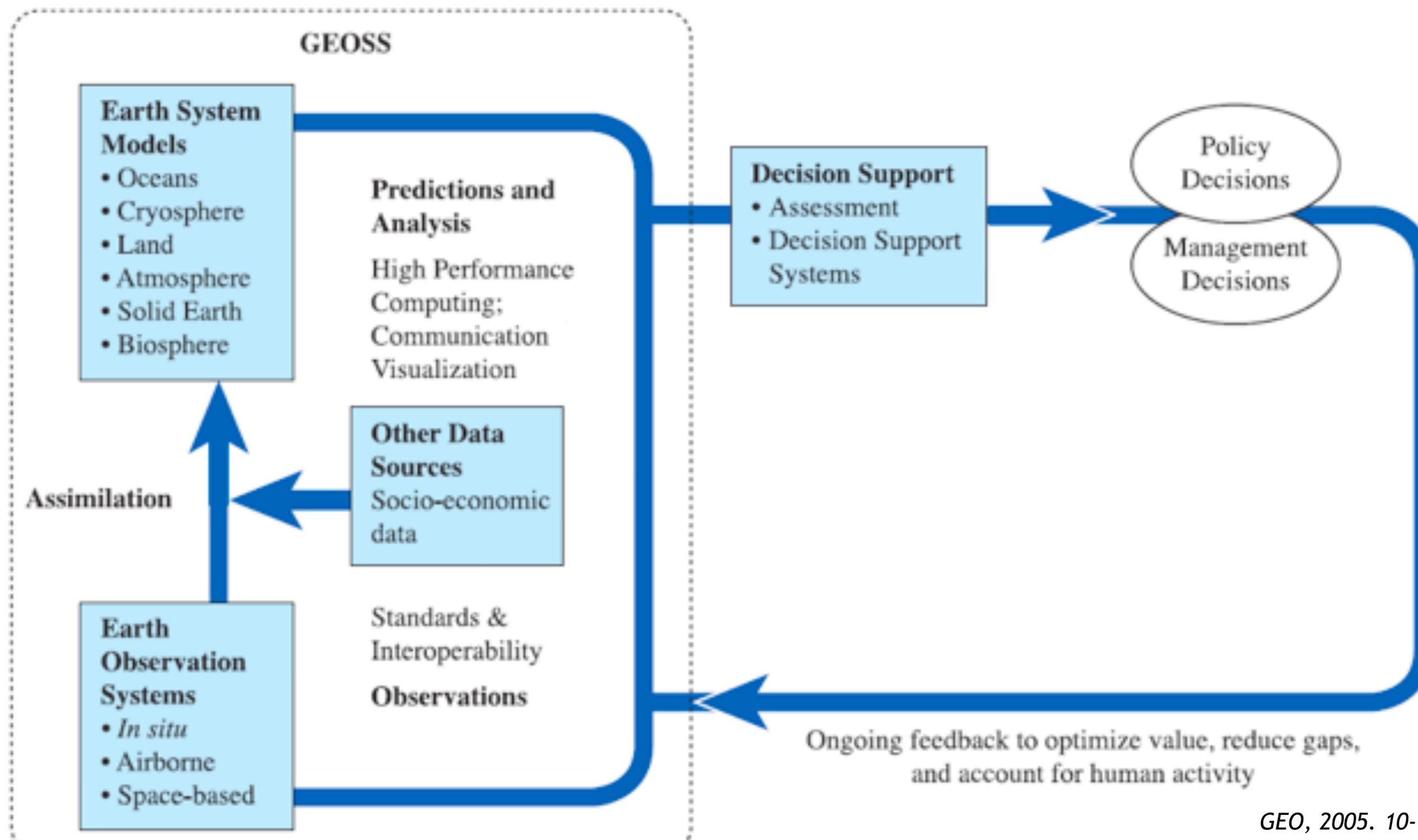


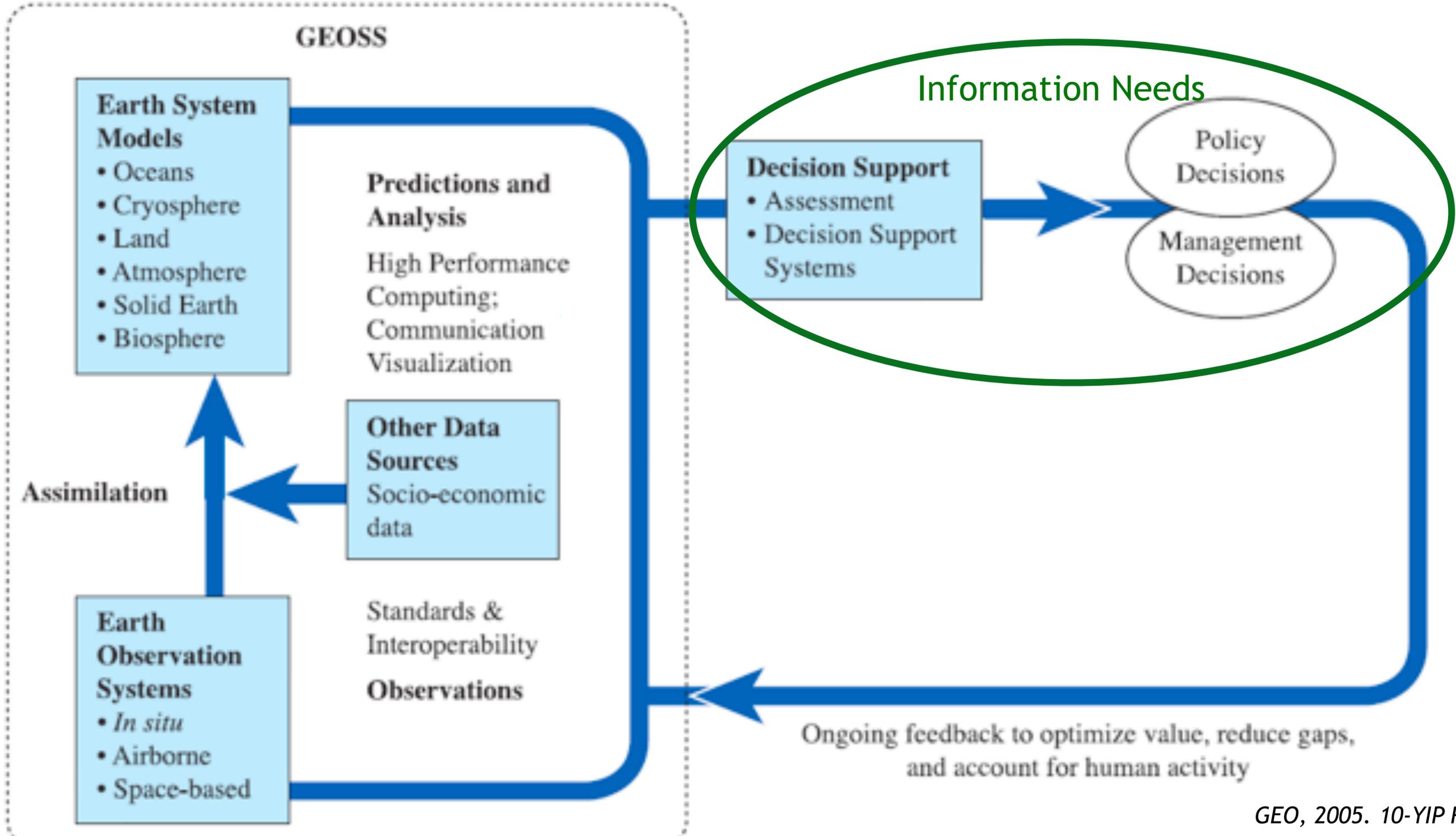
The GEO Knowledge Base and Gap Analysis

Hans-Peter Plag

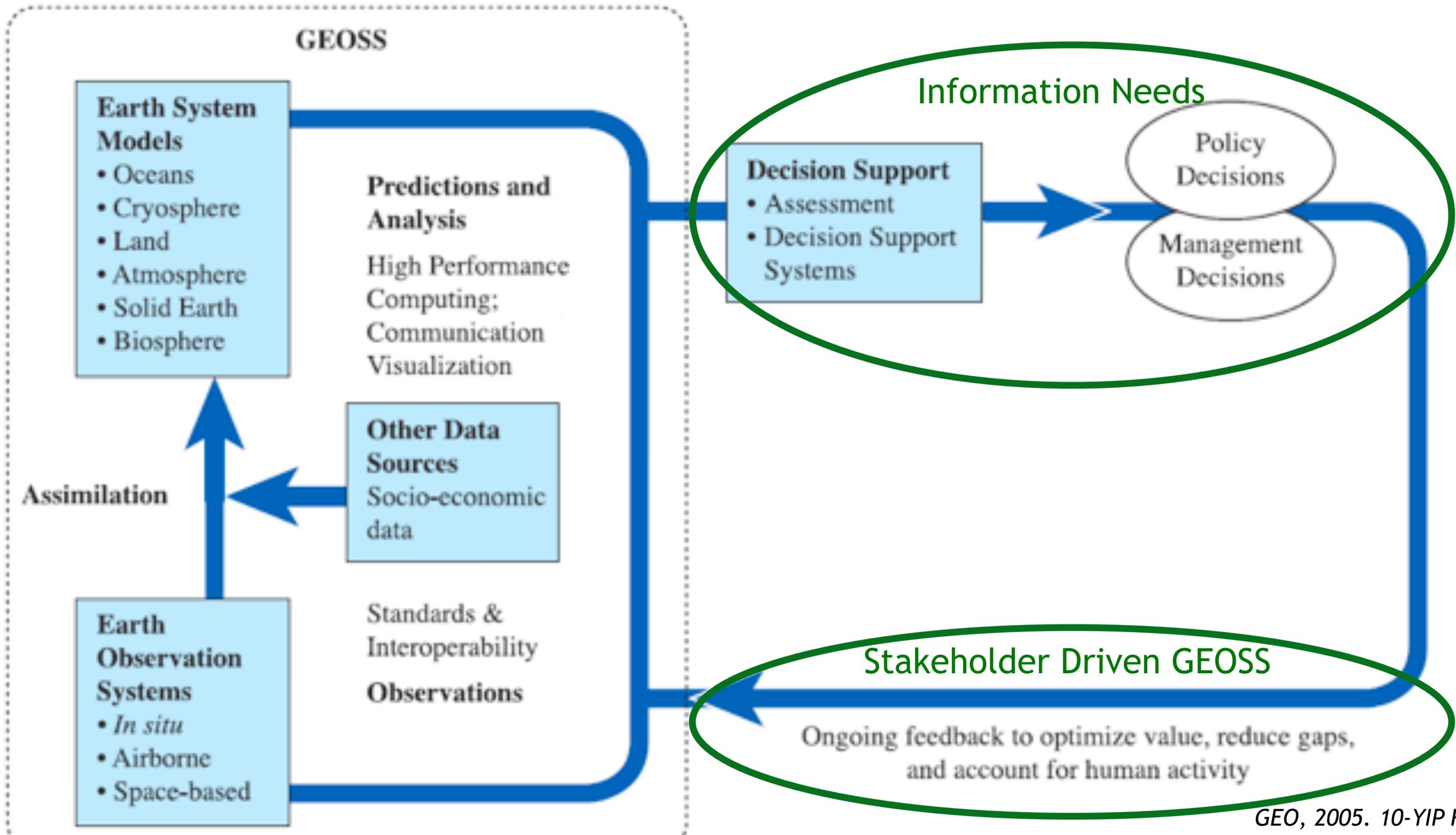
Enabling Informed Decision Making



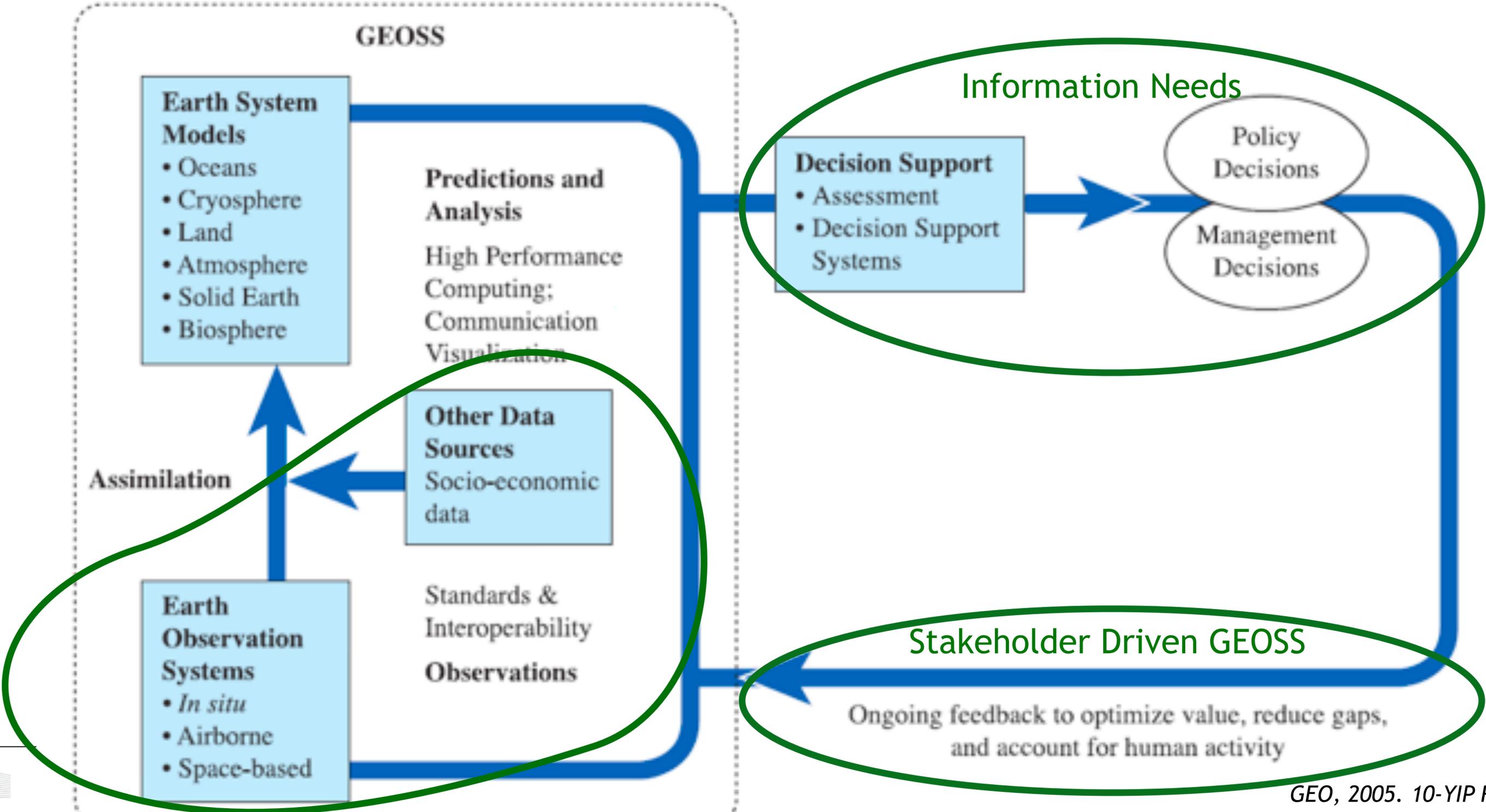
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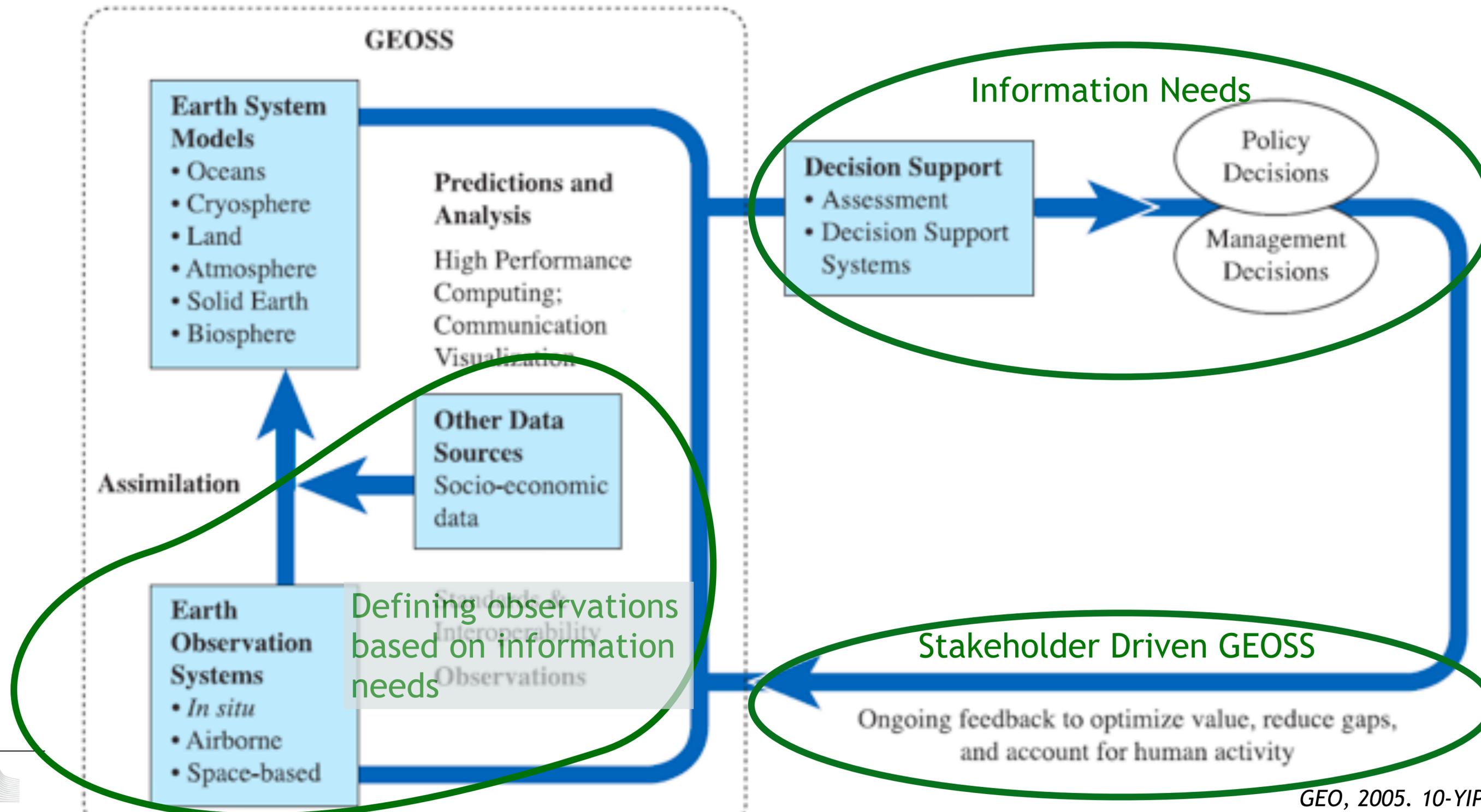
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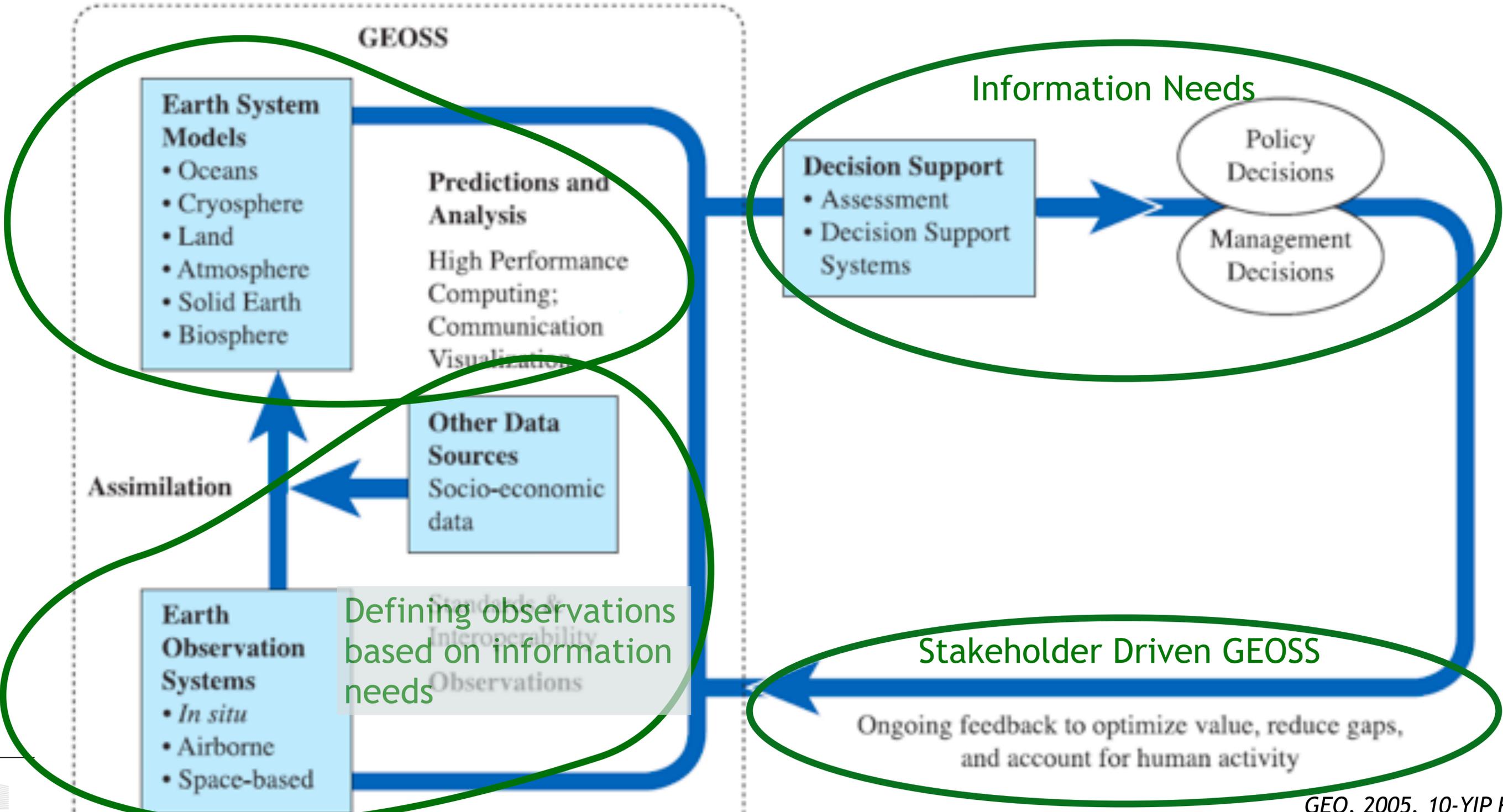
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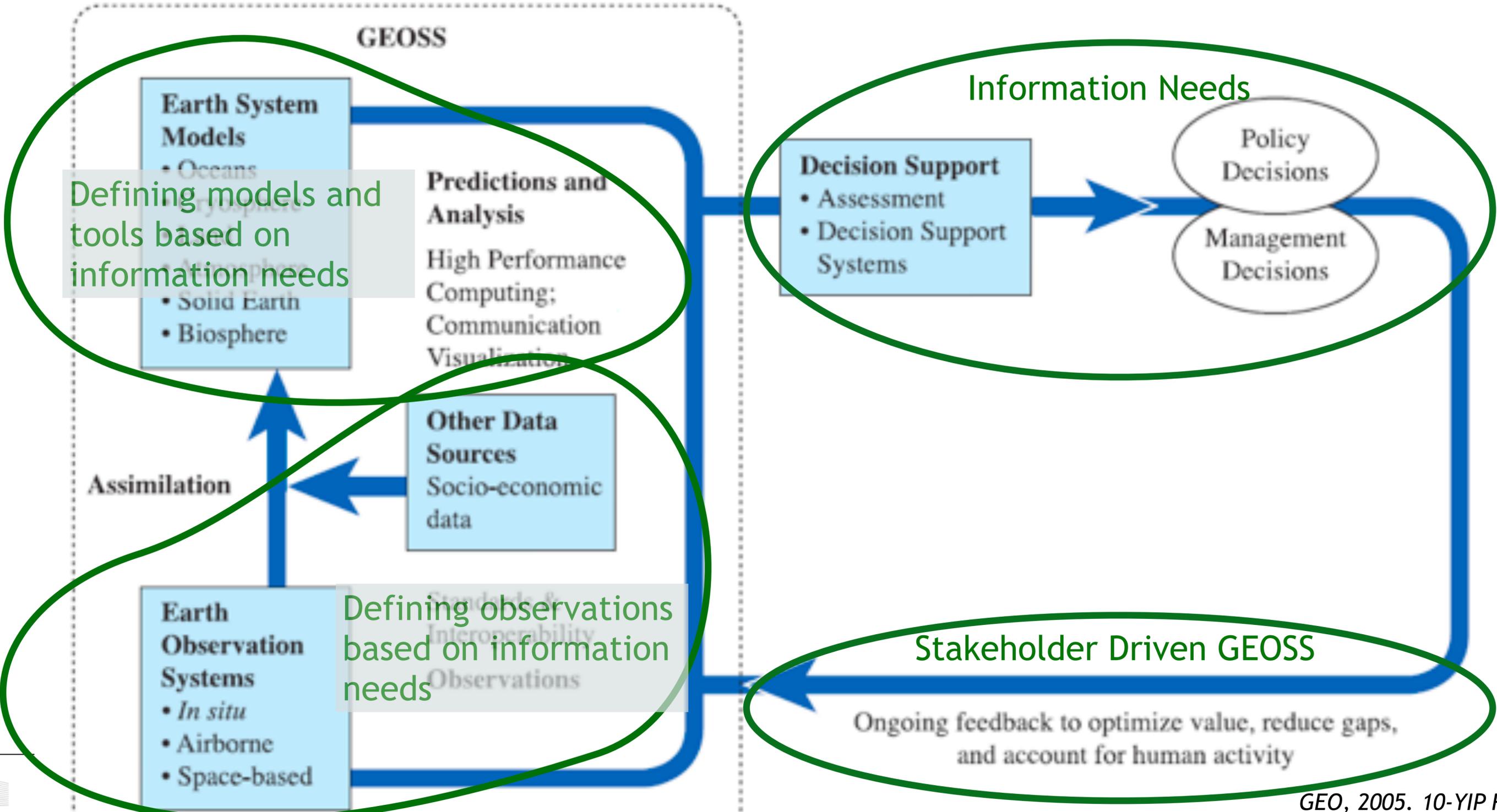
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Gap Analysis



GEO Science and Technology Committee (2011):

Geographic: Observation systems or data set has good coverage in one geographic region or country but not in others

Observational: Observation technologies or systems are not available or have not been sufficiently developed for key analyses or issues of global importance.

Structural: Structural gaps are internal to GEOSS eg. Missing tasks required to meet our targets. Tasks or products not meeting expectations from other components of GEOSS (this may be common when analysis is done across SBAs).

Qualitative/quantitative: Product exists but at insufficient timeliness, frequency or quality for use in key products or utility for other GEOSS components

Capacity: Products are available but there is insufficient technical capacity or capability to make use of such products.

Gap Analysis: Types of Gaps for ConnectinGEO



Information (I) Gap:

An information missing that is needed to make an informed decision

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Capability/Technology/Tool (CTT) Gap:

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Observation (O) Gap:

An observation (with required specifications) of an (essential) variable missing that is required to by an indicator in a relevant metric or an application generating the information needed by a user.

Gap Analysis: Methodology



- Compare what is available to what is needed

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- Take an “layered” approach”: IK Gaps -> CTT Gaps -> 0 Gaps

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Preliminary denoted as:

Socio-Economic and Environmental Information Needs Knowledge Base
SEE IN KB

Comments on EV Discussion



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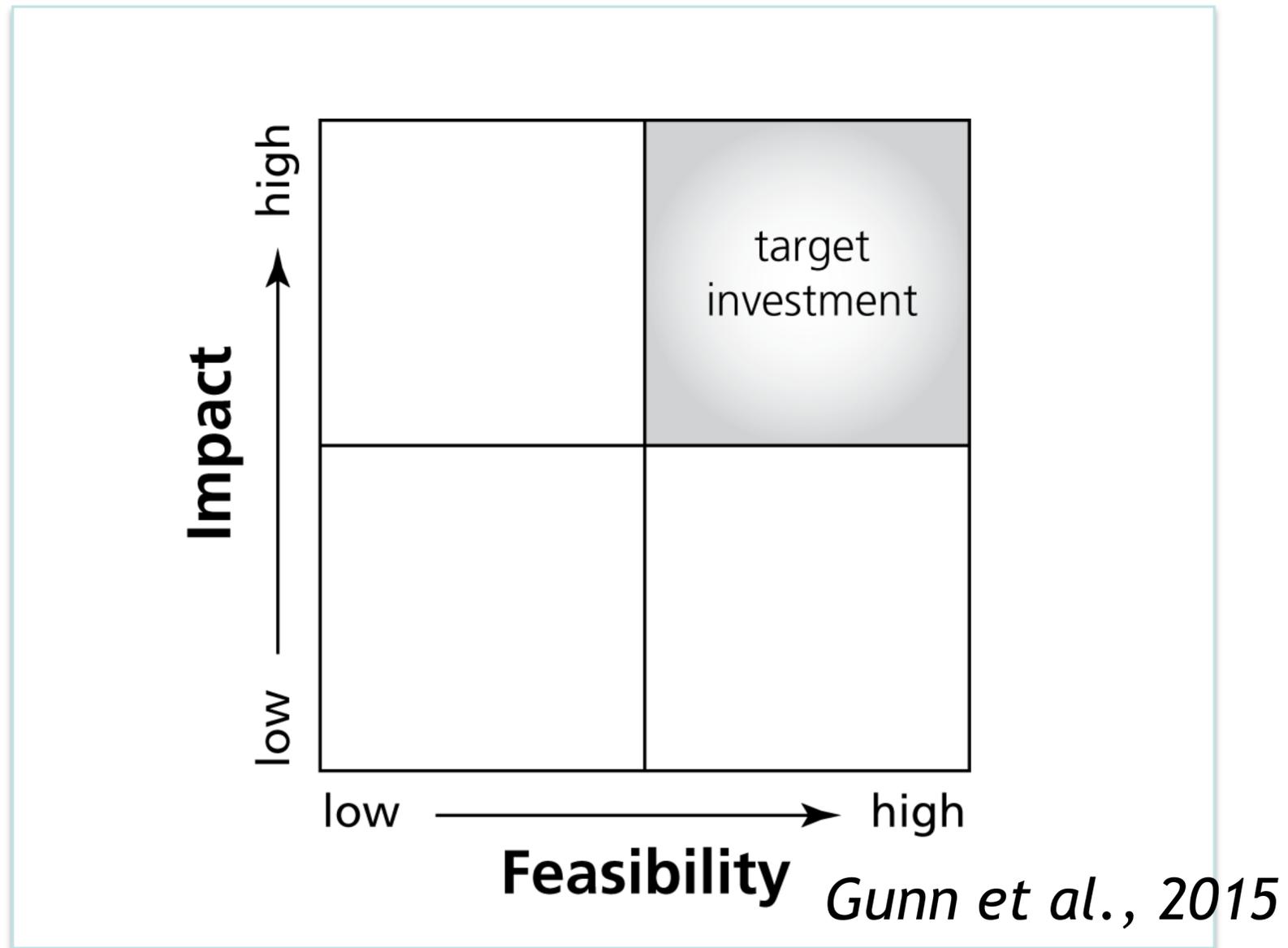
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Efforts to determine EVs are not new:

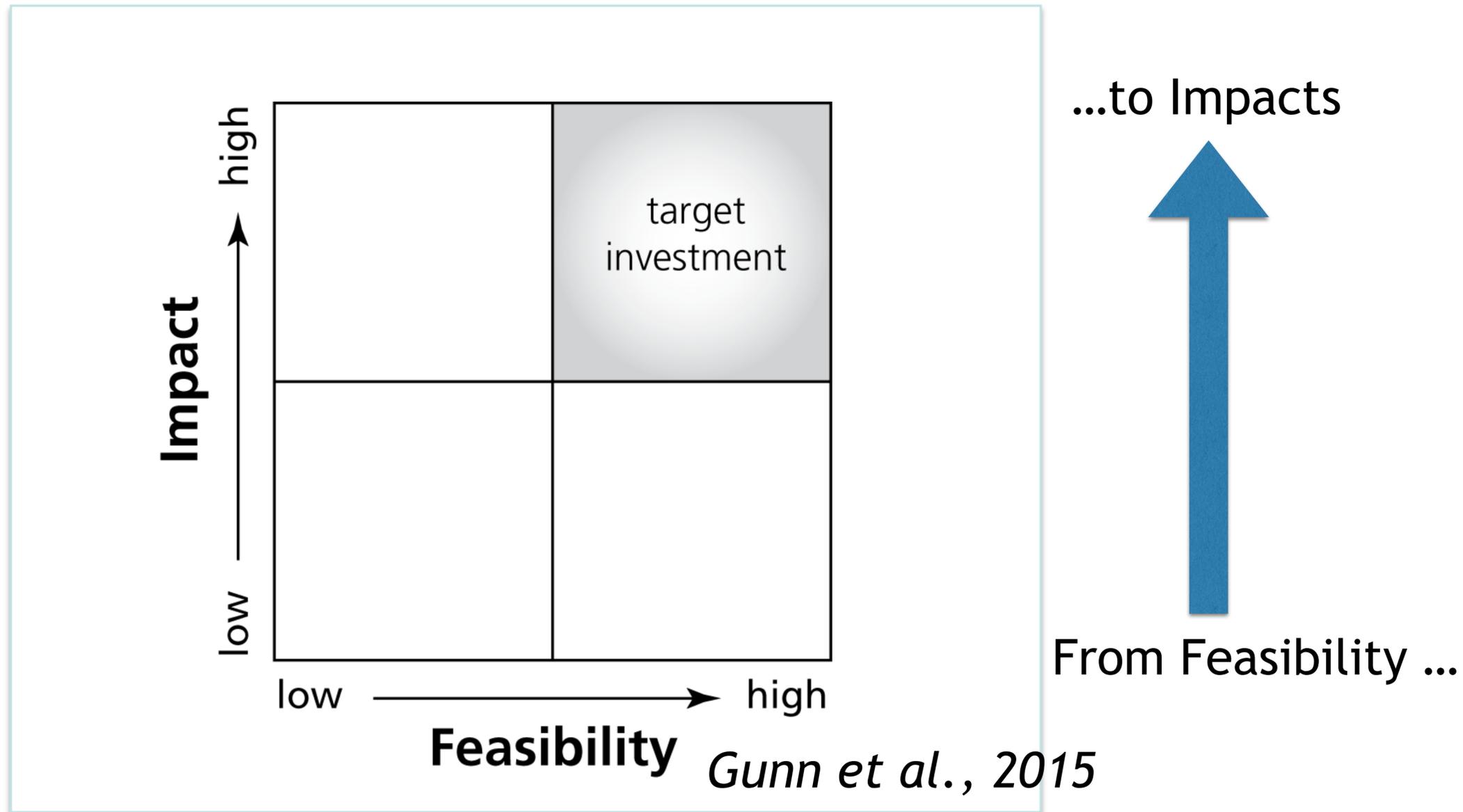
- Integrated Global Observing Strategy (IGOS) had the goal to ensure comprehensive monitoring of what is essential,
- IGOS-Partnership (IGOSP) Themes had the main goal to determine the variables that need to be monitored to address a societally relevant issue.

Most (GEO) approaches to EVs are expert and feasibility based

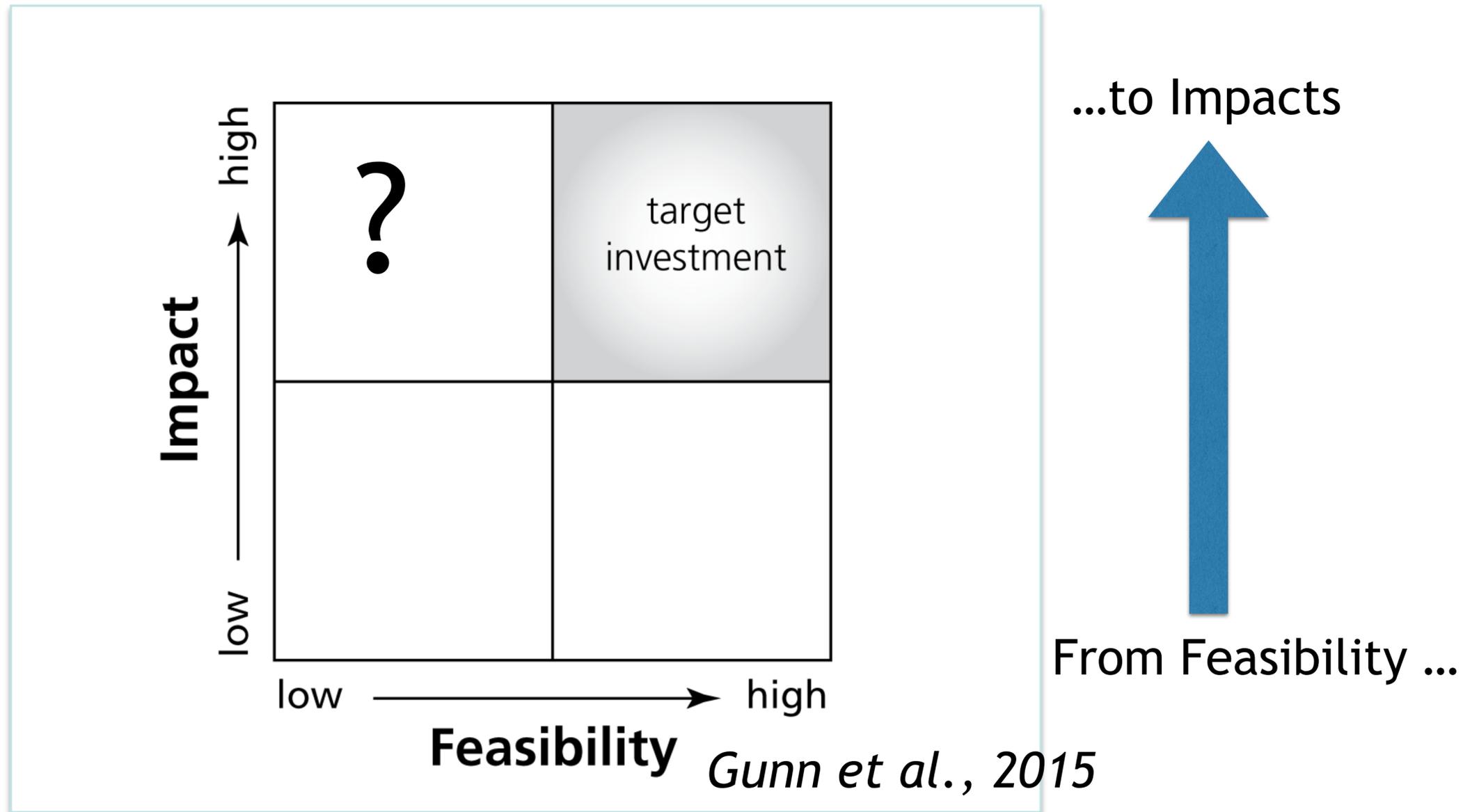
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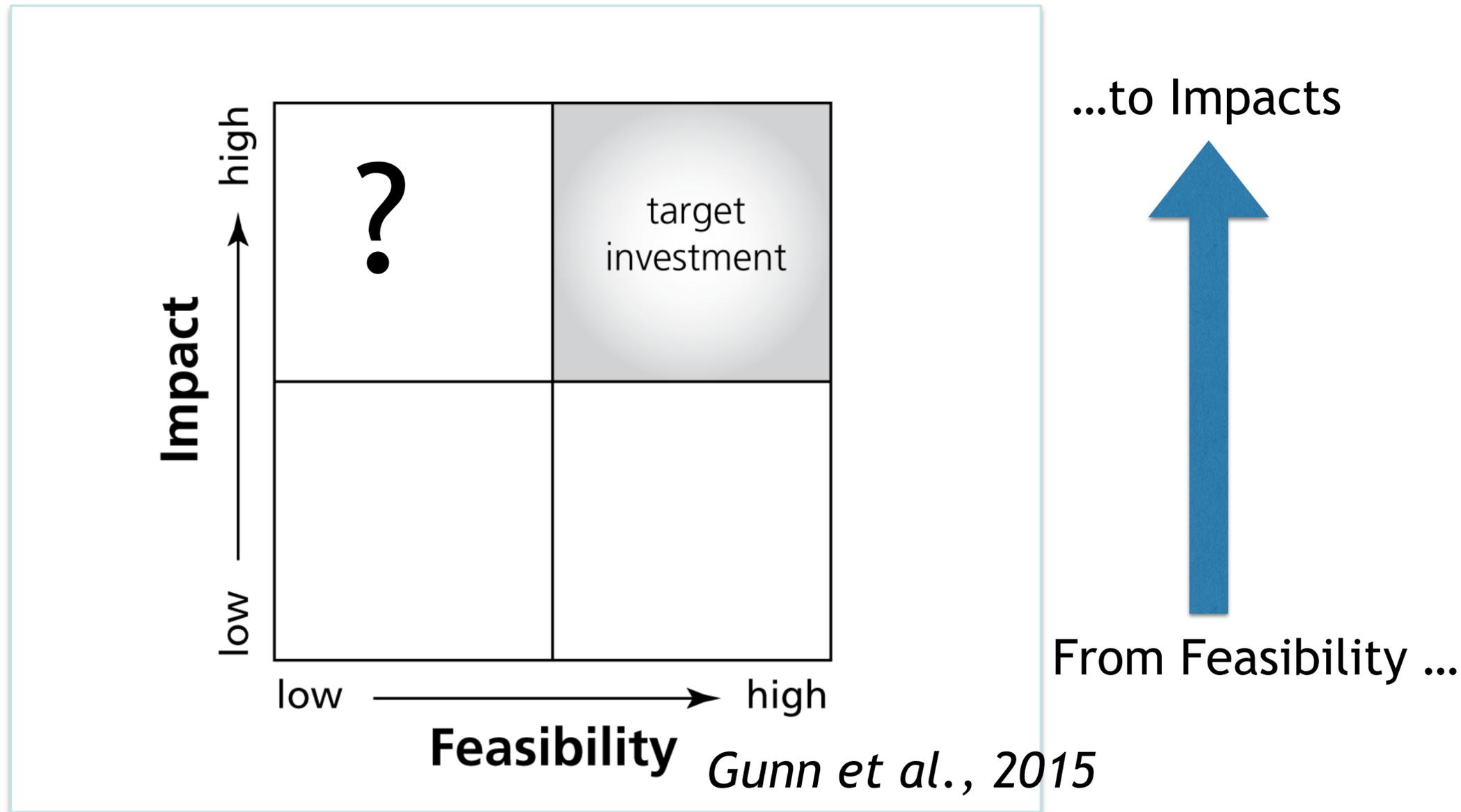
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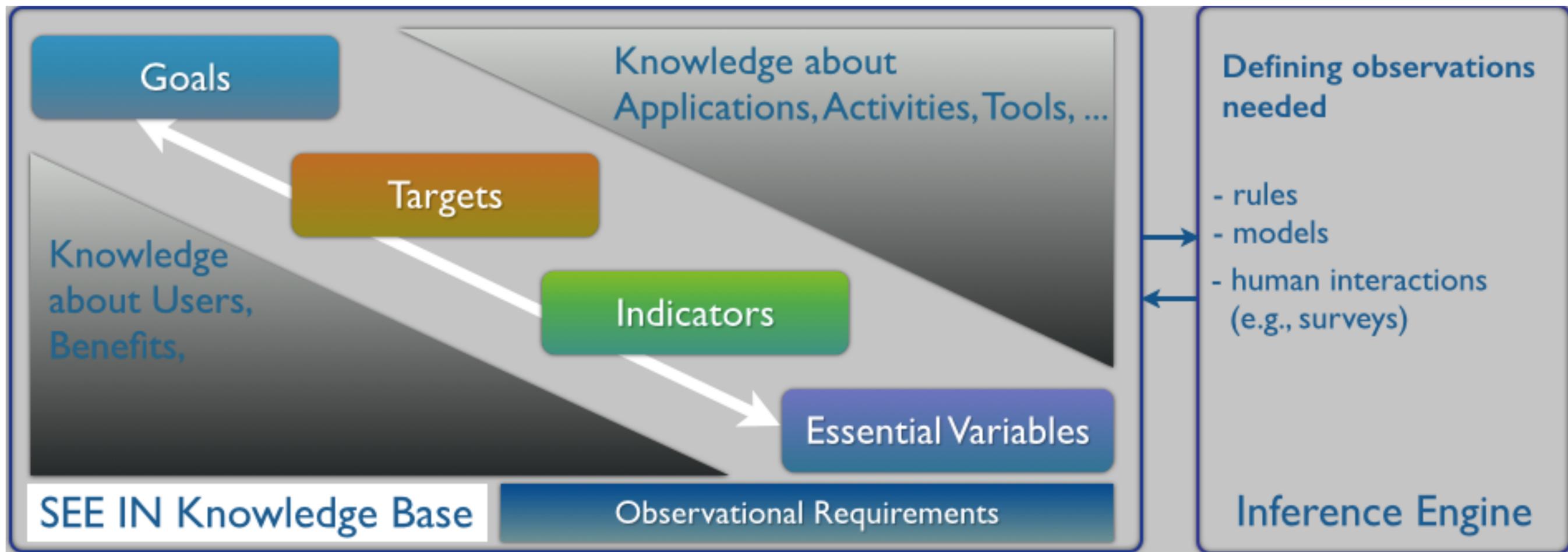


- Societal goals may not be captured.
- Societal goals may be in the high impact, low feasibility box.
- Gap analysis should identify more than missing observations ...

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Comments on EV Discussion



What do we mean when we say “essential”?

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adjective

1. absolutely necessary; indispensable:
2. pertaining to or constituting the essence of a thing.
3. noting or containing an essence of a plant, drug, etc.
4. being such by its very nature or in the highest sense; natural; spontaneous: (*essential happiness*).
5. Mathematics.
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My preferred meanings:

“indispensable for reaching the goals” and

“pertaining to something needed to reach/supporting reach progress towards the goals”

Comments on EV Discussion



How do we define an “essential variable”?

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Essential Variables:

“Variables that determine the system’s state and developments, are crucial for predicting system developments, and allow us to define metrics that measure the trajectory of the system.”

Limited knowledge of essential variables implies limited predictive capabilities and limited means to measure where the system is heading.

Comments on EV Discussion



What does “...” stand for in “The variable is essential for ...”

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- Ministers to GEO: **Sustainable Development Goals (SDGs)**

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What are the goals, targets, and indicators?

Some examples ...

What goals to be considered?

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For example, “Safe operating space for humanity;”
Rockström et al. (2009)

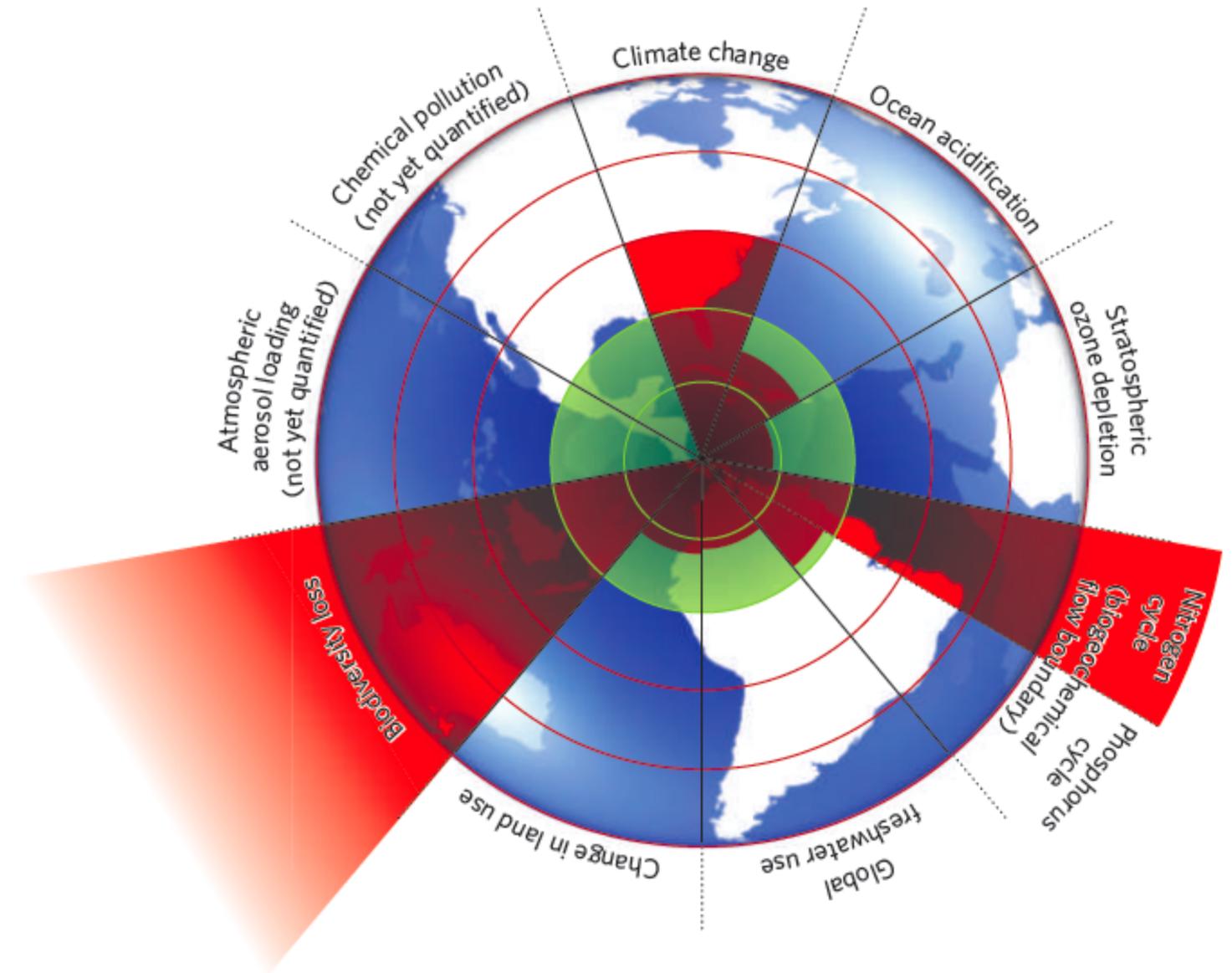


Figure 1 | Beyond the boundary. The inner green shading represents the proposed safe operating space for nine planetary systems. The red wedges represent an estimate of the current position for each variable. The boundaries in three systems (rate of biodiversity loss, climate change and human interference with the nitrogen cycle), have already been exceeded.

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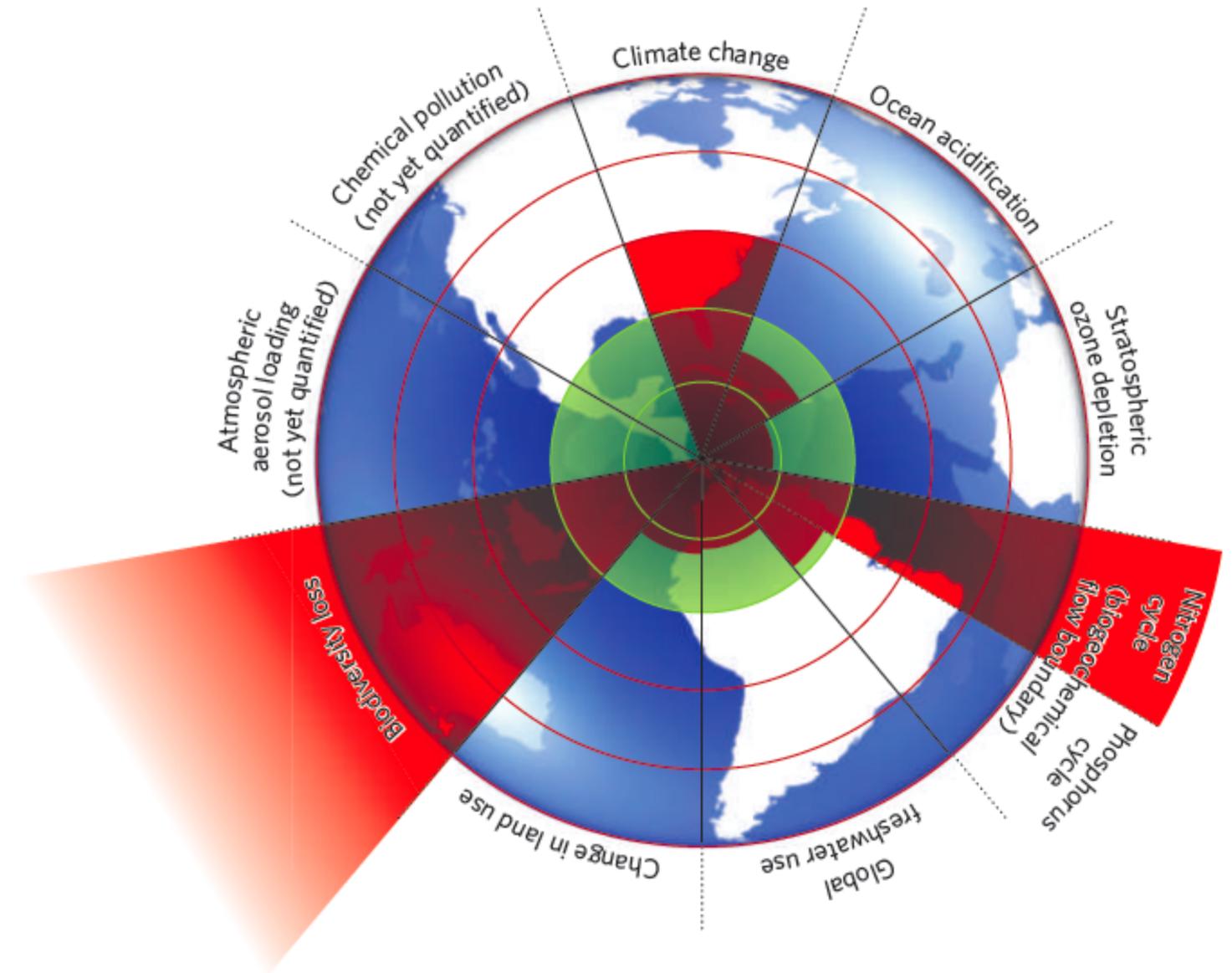


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Potential Indicators:
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GEOSS the planetary cockpit ...

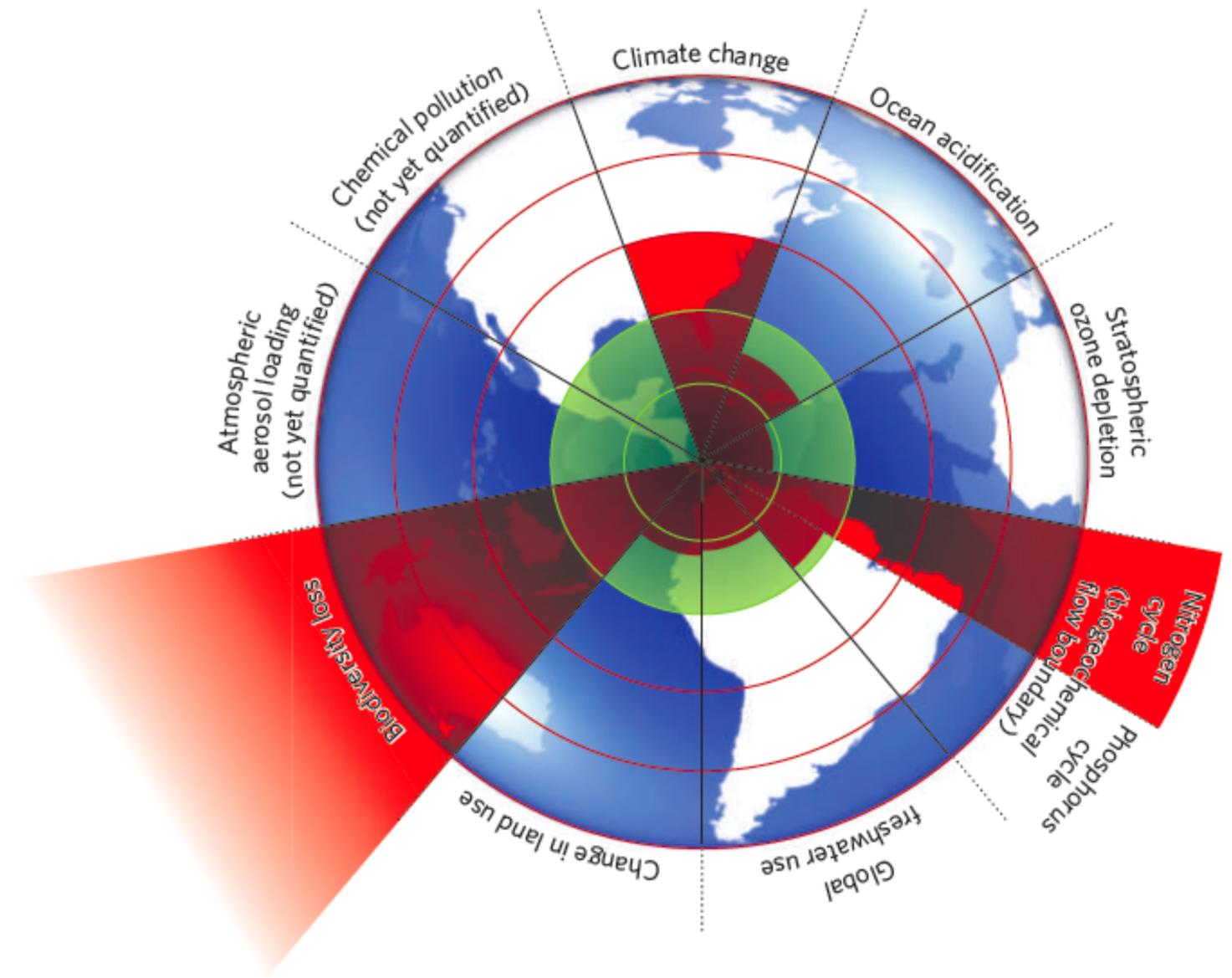
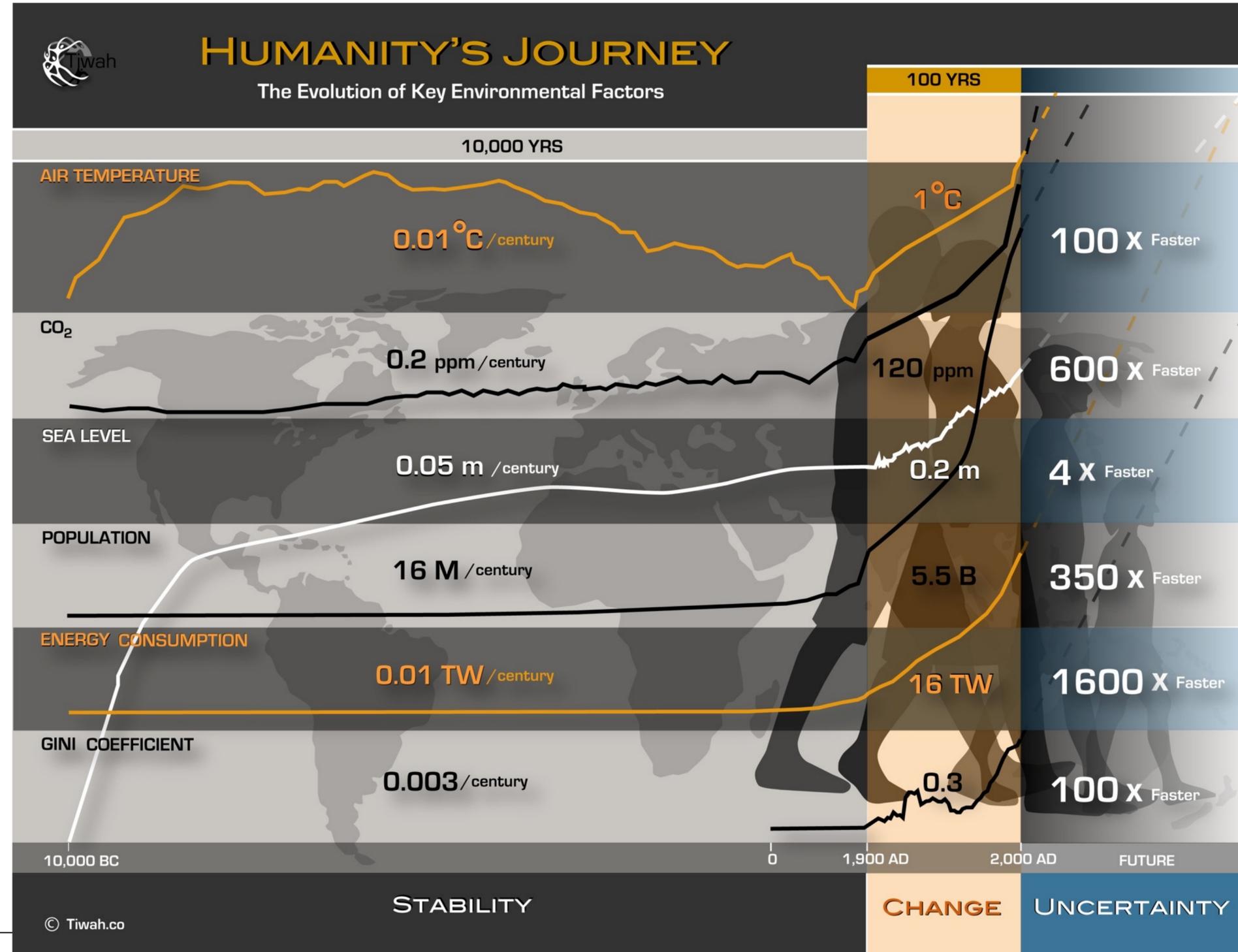


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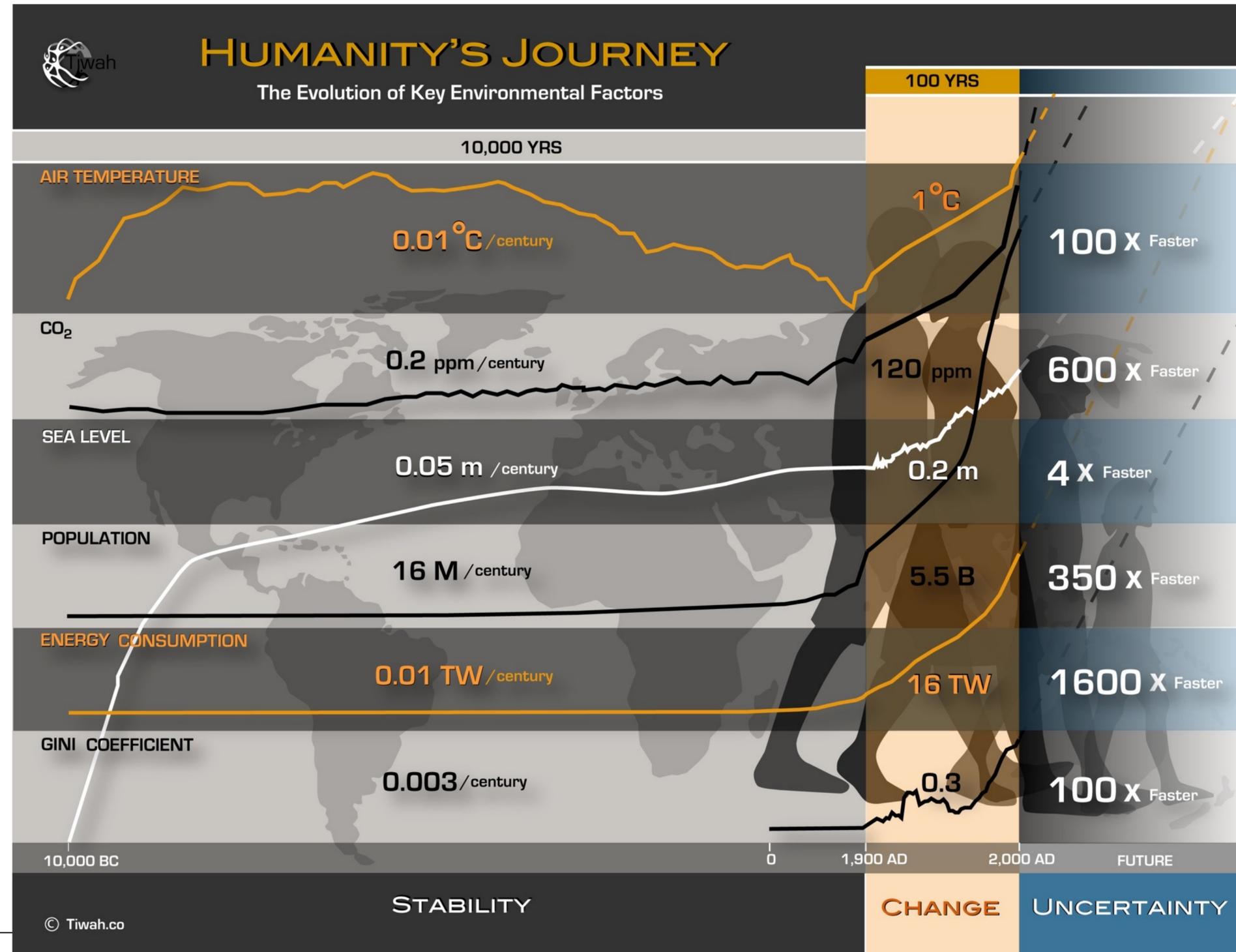
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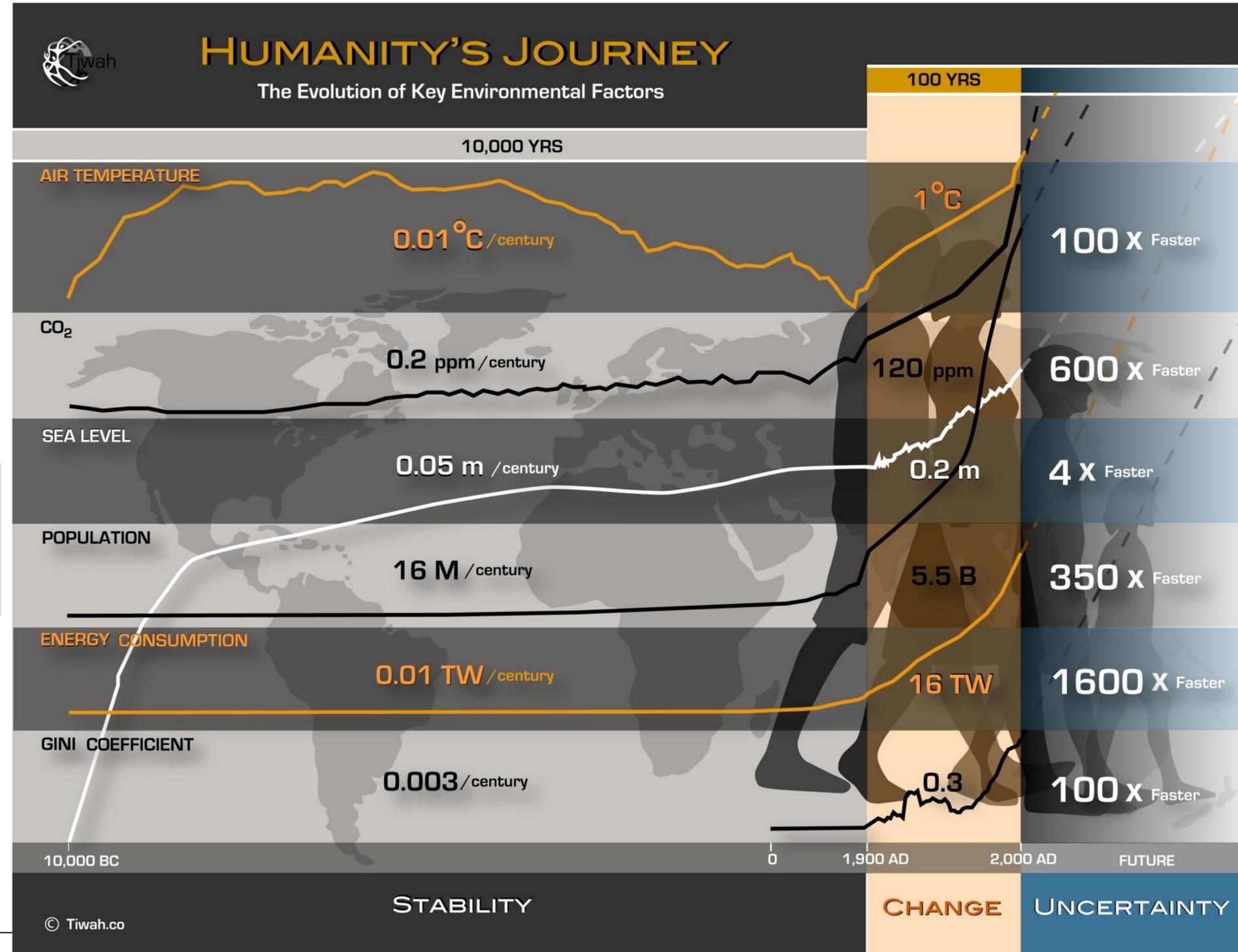
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GEOSS the “archive” for the future ...



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Advance unedited

4 December 2014

10:00 a.m.

United Nations

**The Road to Dignity by 2030:
Ending Poverty, Transforming All Lives and Protecting the Planet**

*Synthesis Report of the Secretary-General
On the Post-2015 Agenda*

**New York
December 2014**

What goals to be considered?

For example, following the Ministerial Guidance and supporting the Sustainable Development Goals

Table 1. Sustainable development goals

Goal 1	End poverty in all its forms everywhere
Goal 2	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Goal 3	Ensure healthy lives and promote well-being for all at all ages
Goal 4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Goal 5	Achieve gender equality and empower all women and girls
Goal 6	Ensure availability and sustainable management of water and sanitation for all
Goal 7	Ensure access to affordable, reliable, sustainable and modern energy for all
Goal 8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Goal 9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Goal 10	Reduce inequality within and among countries
Goal 11	Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12	Ensure sustainable consumption and production patterns
Goal 13	Take urgent action to combat climate change and its impacts*
Goal 14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Goal 17	Strengthen the means of implementation and revitalize the global partnership for sustainable development

** Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.*

Source: Report of the Open Working Group of the General Assembly on Sustainable Development Goals (A/68/970).

December 2014

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Potential Indicators:
SDG Indicators



Indicators for Sustainable Development Goals

A report by the Leadership Council of the
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*Preliminary Draft for Public Consultation (extended until 28 March)
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GEOSS the reporting card for SDGs



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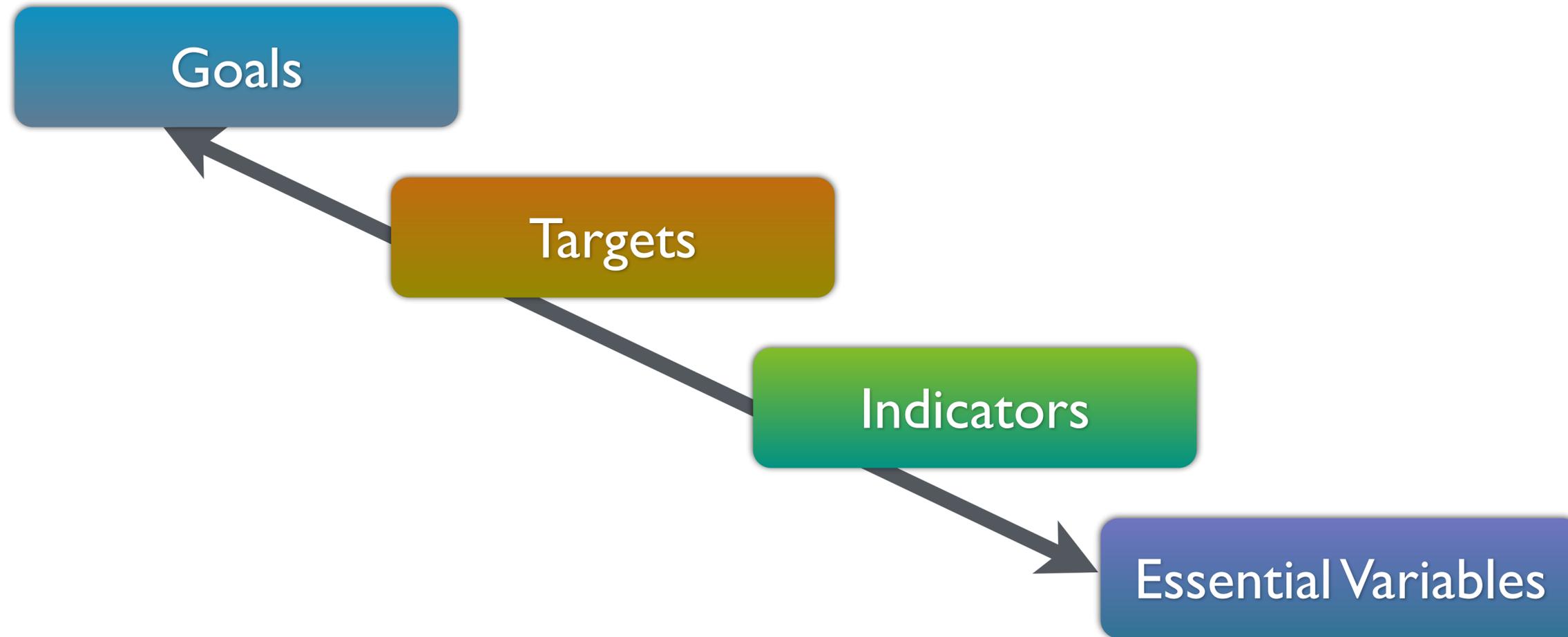
Methodology: Goal-Based Approach

Goals

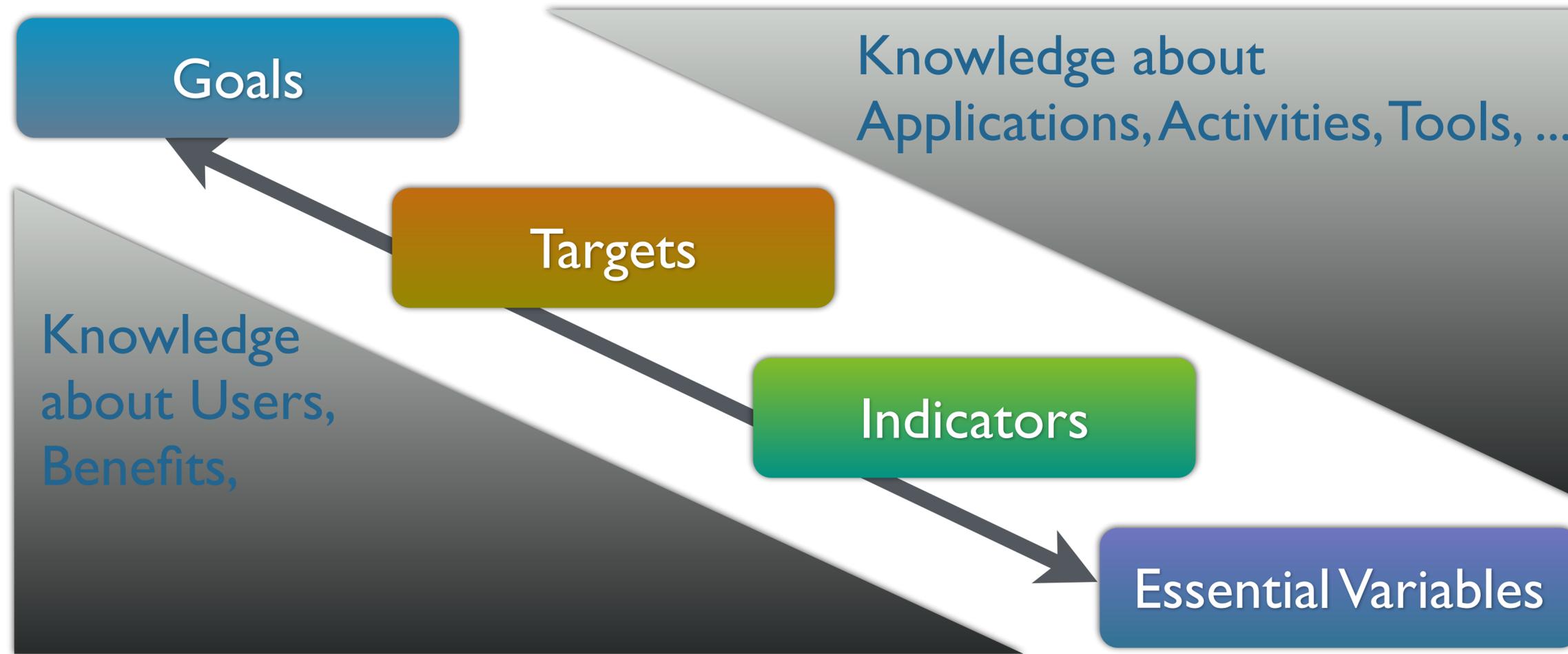
Targets

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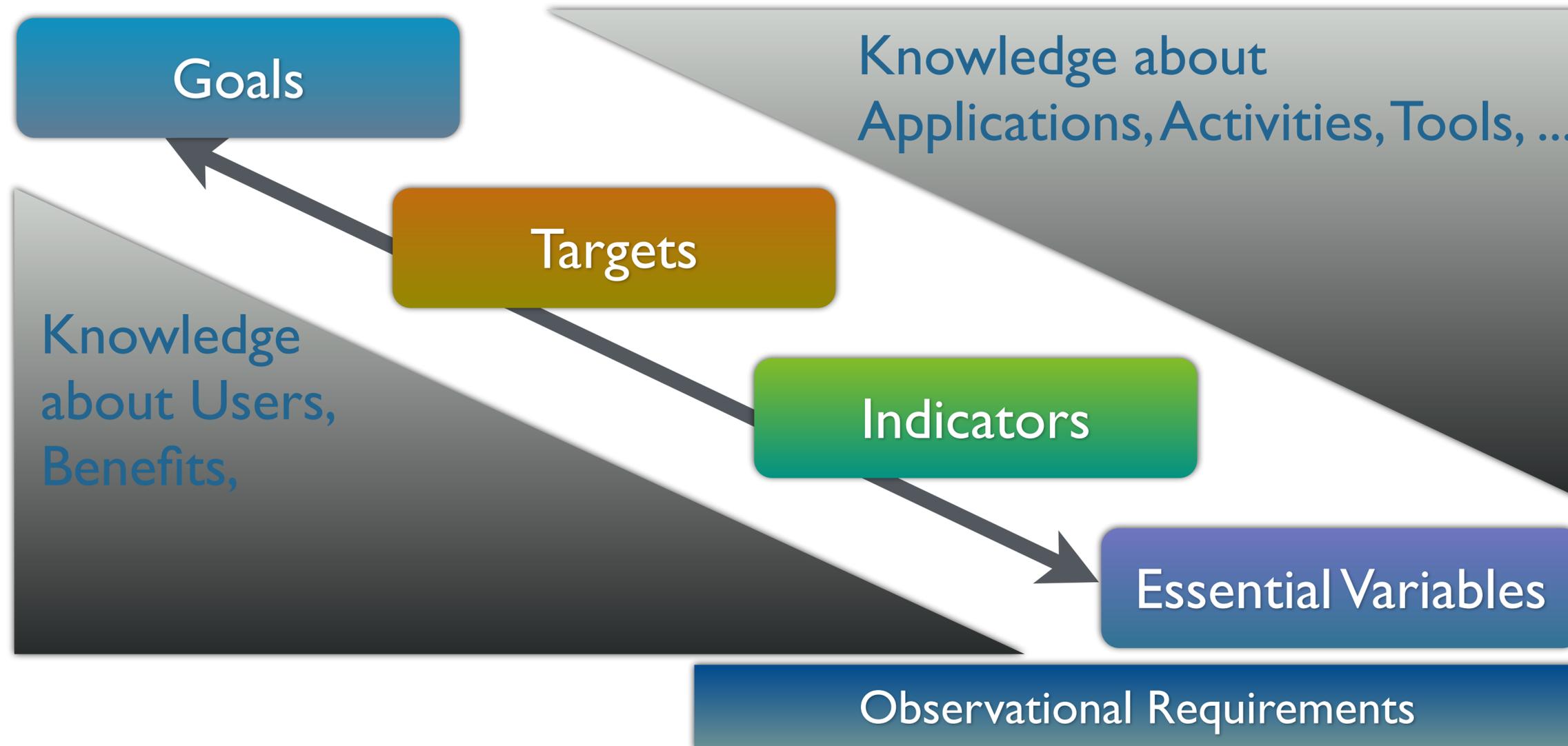
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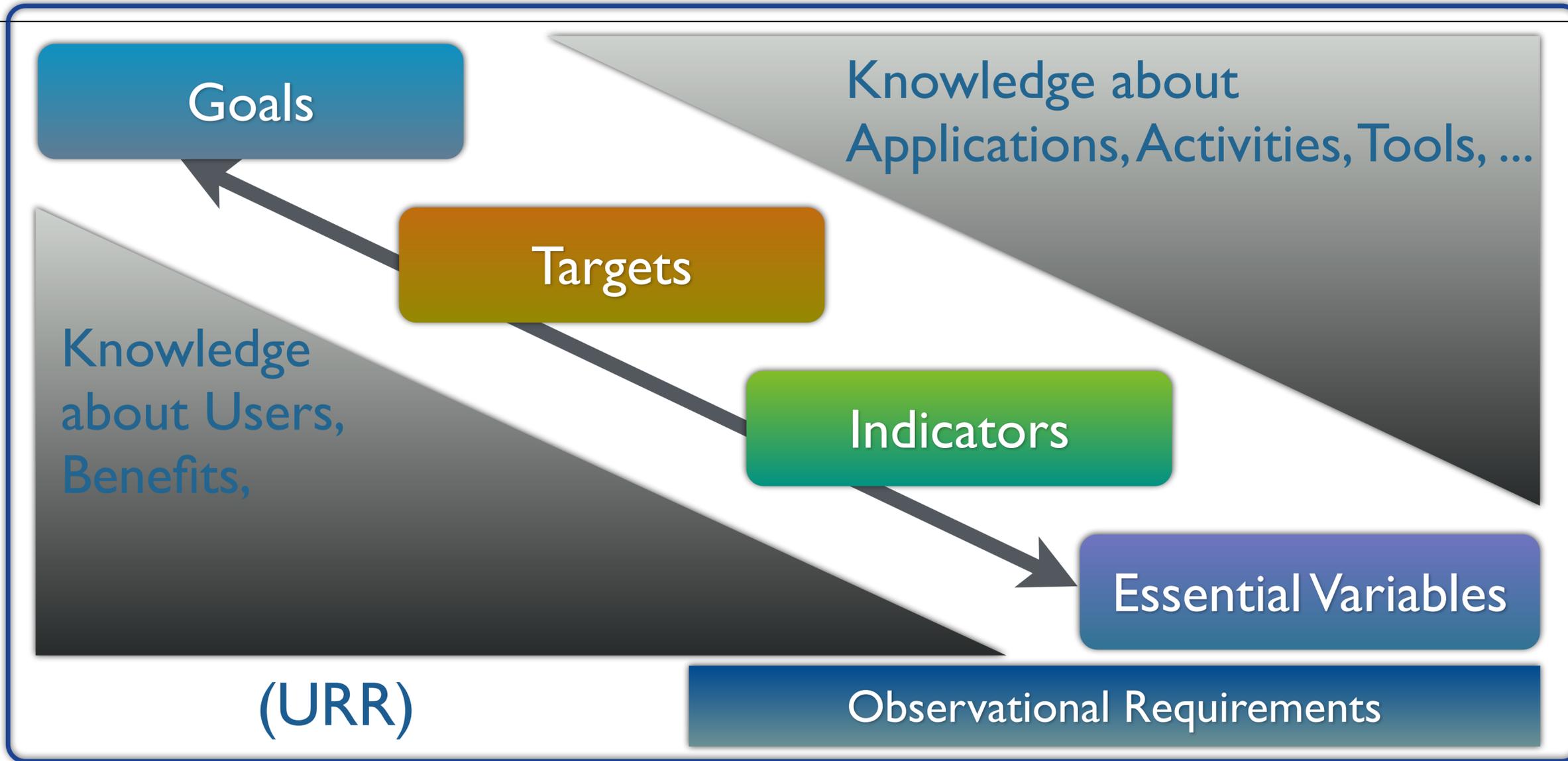
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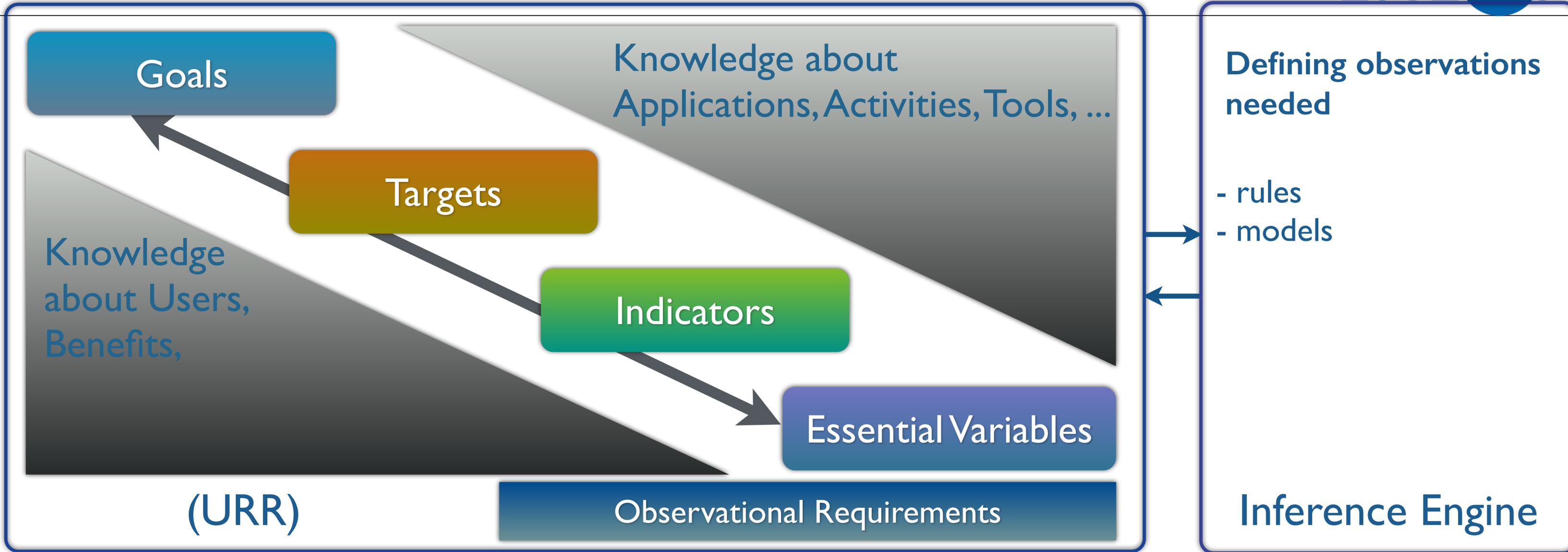
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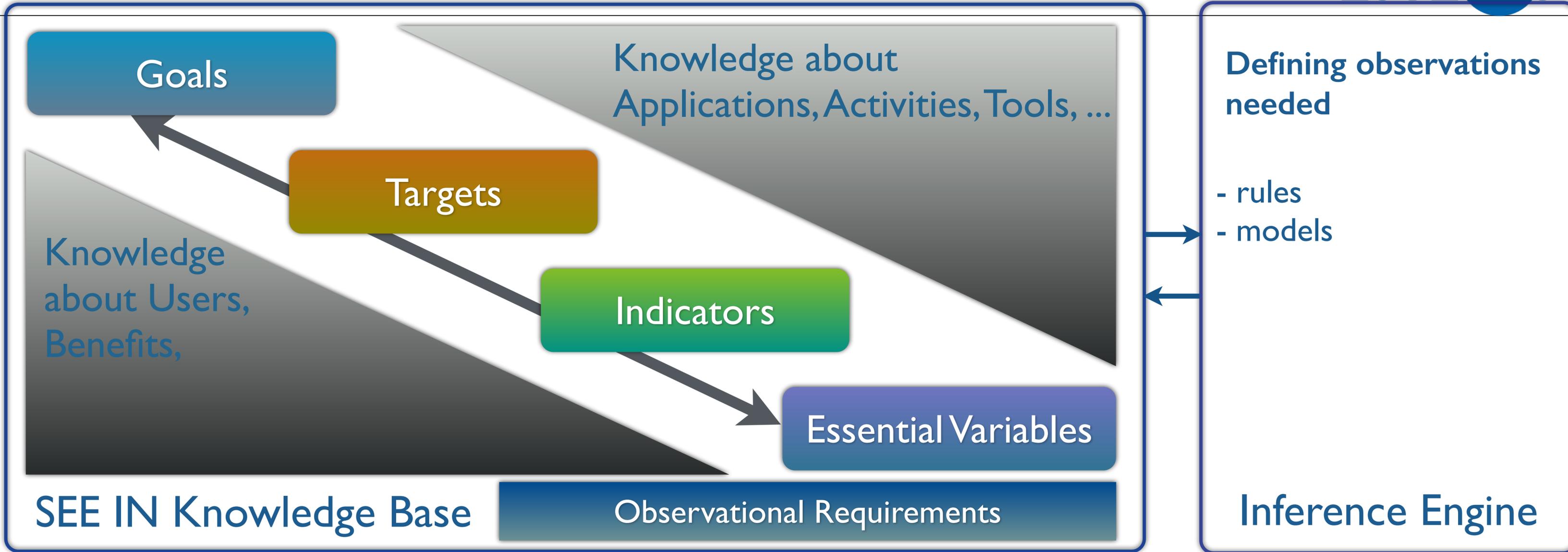
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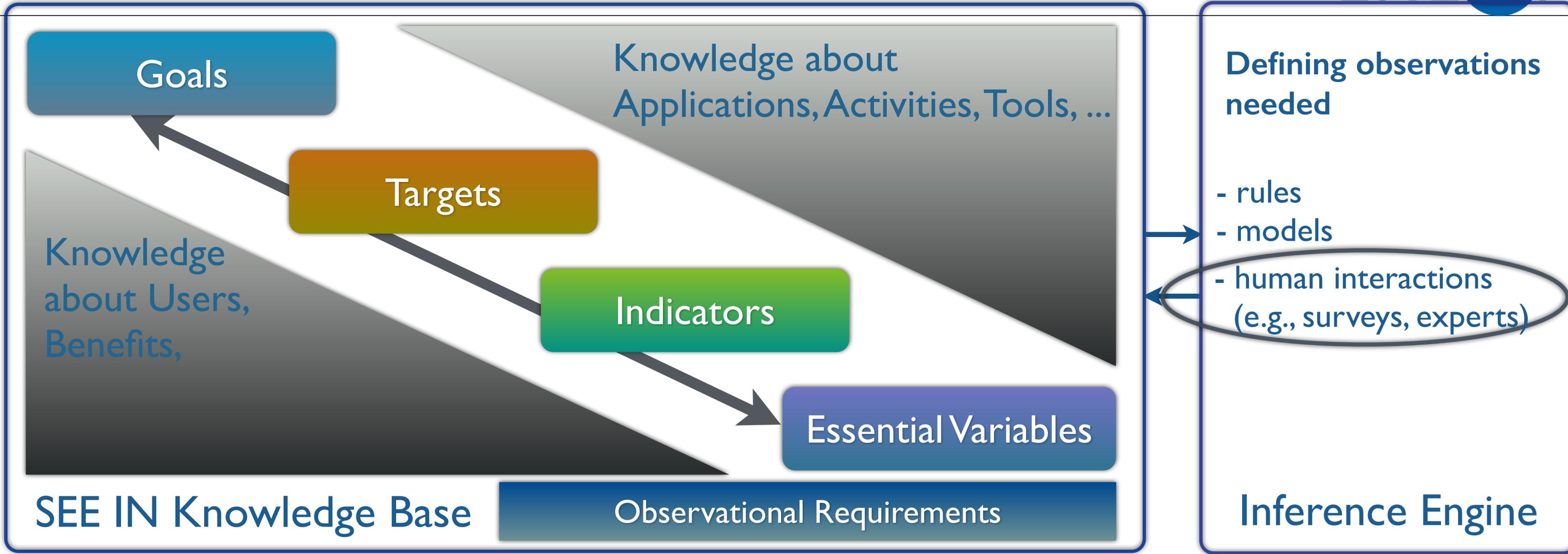


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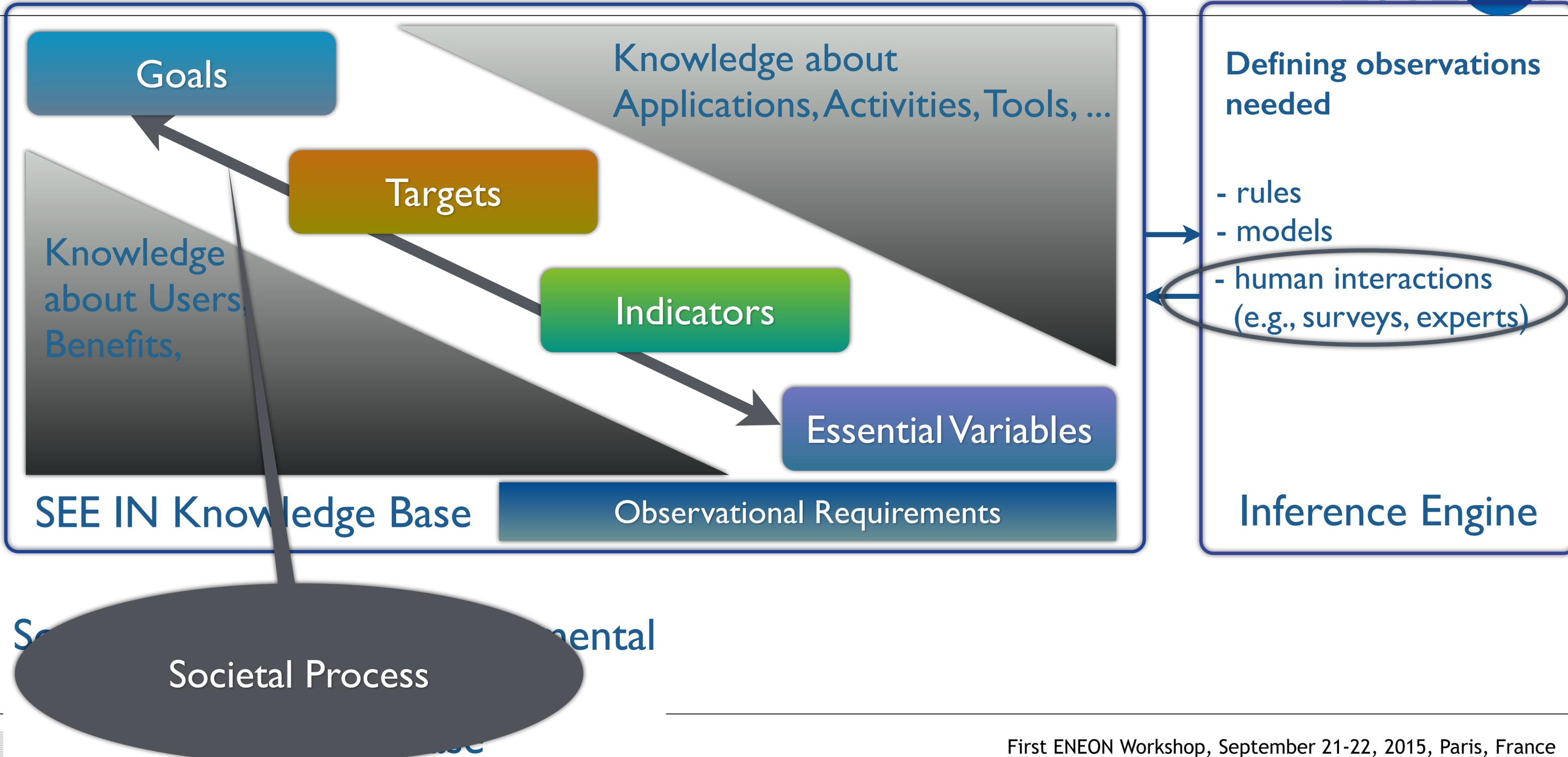
Socio-Economic and Environmental
Information Needs
Knowledge Base

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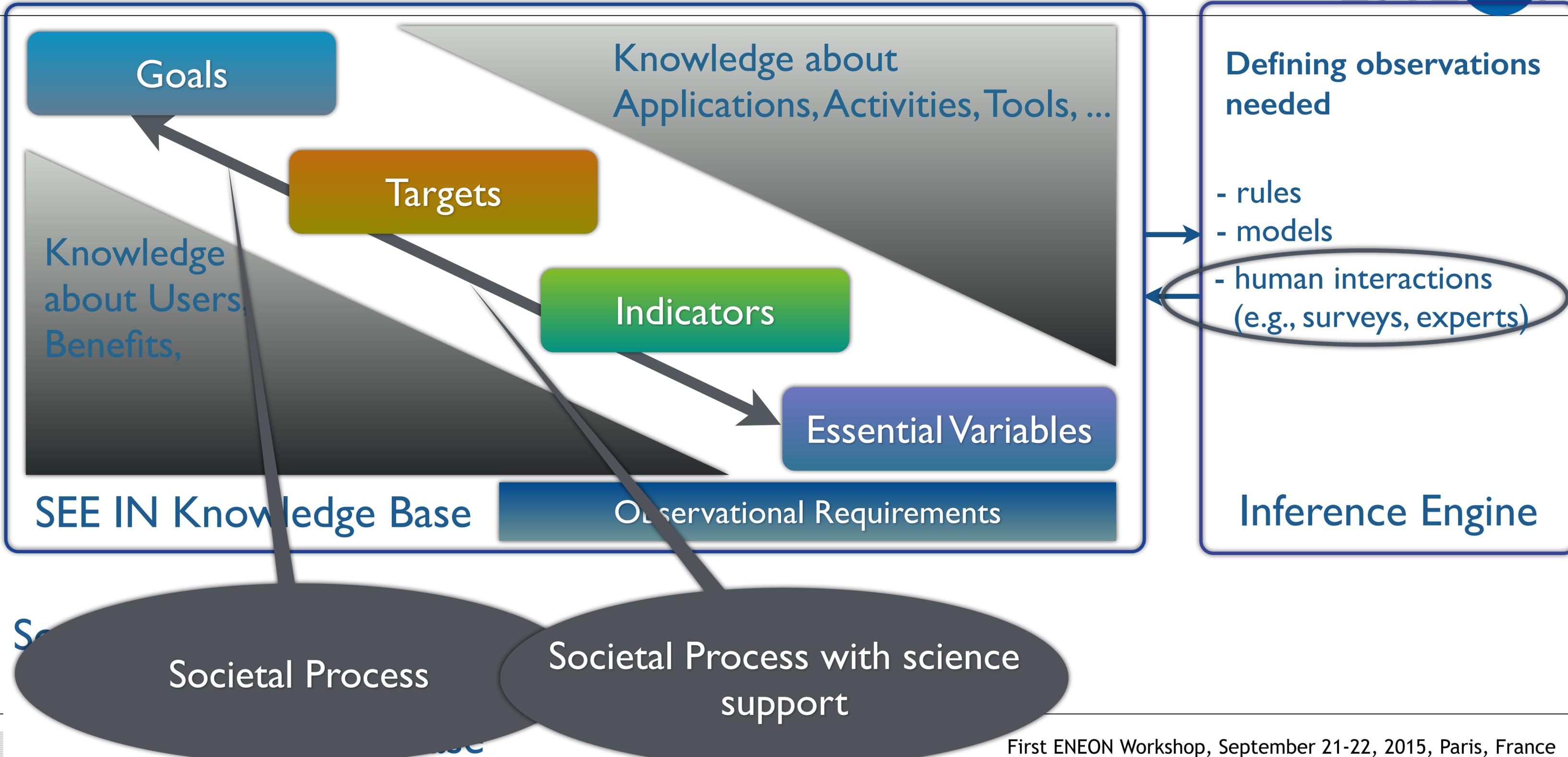


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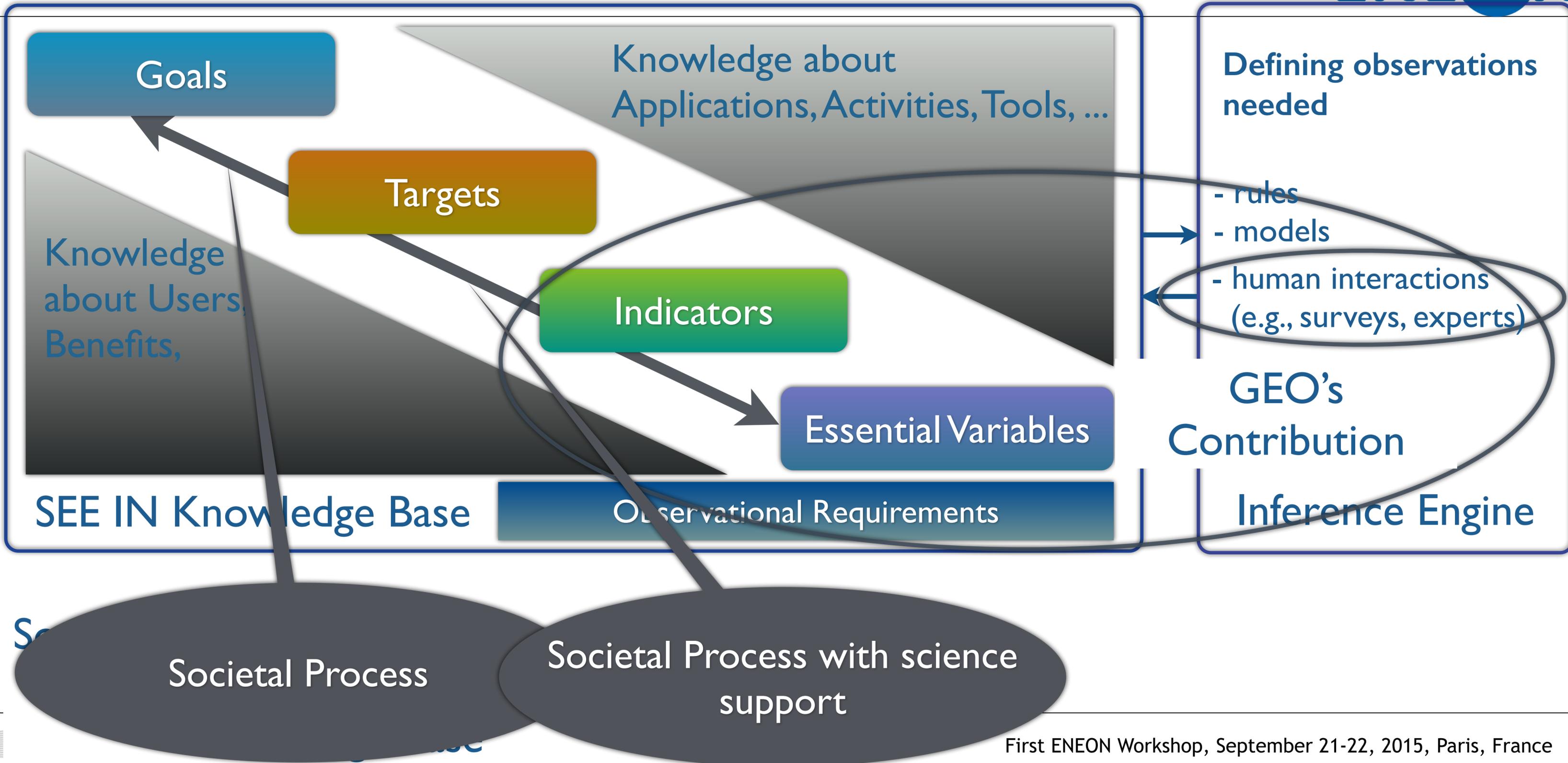
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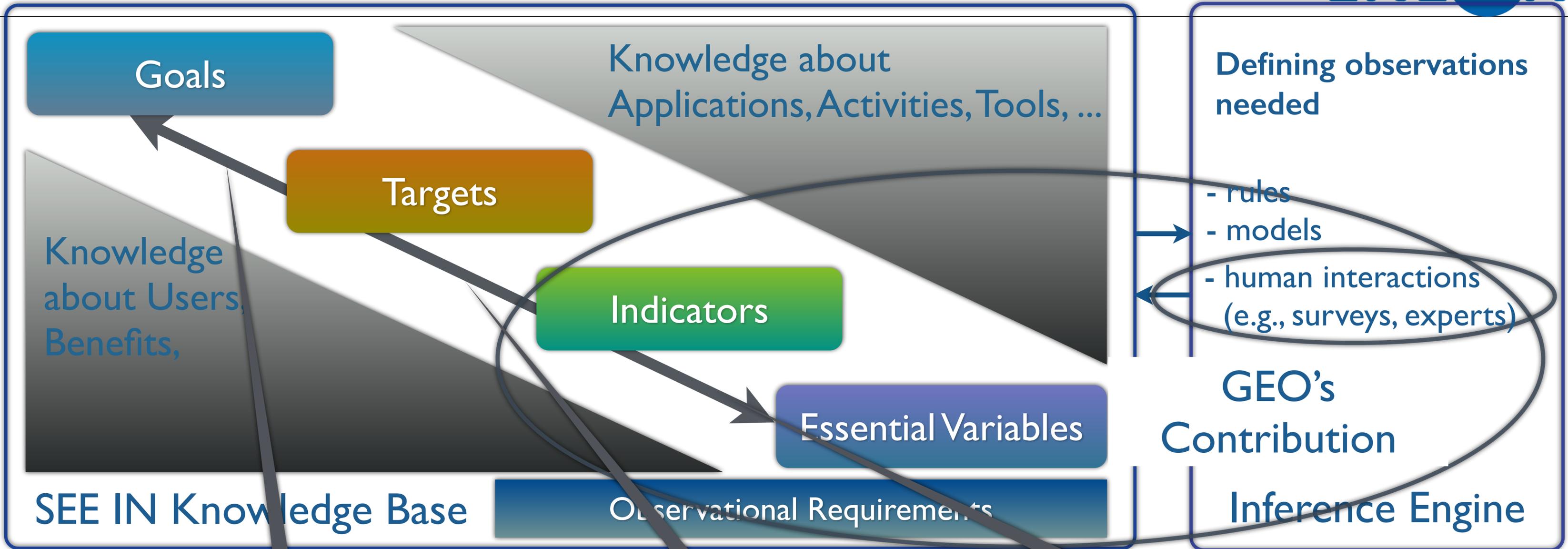
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Methodology: Goal-Based Approach

General Blue Print for goal-based approach:

- For each set of goals, we can agree on targets
- For targets, we can develop a metrics based on indicators
- For indicators, we can identify “essential variables” needed to quantify the indicators
- For EVs, specify requirements meeting the needs of applications

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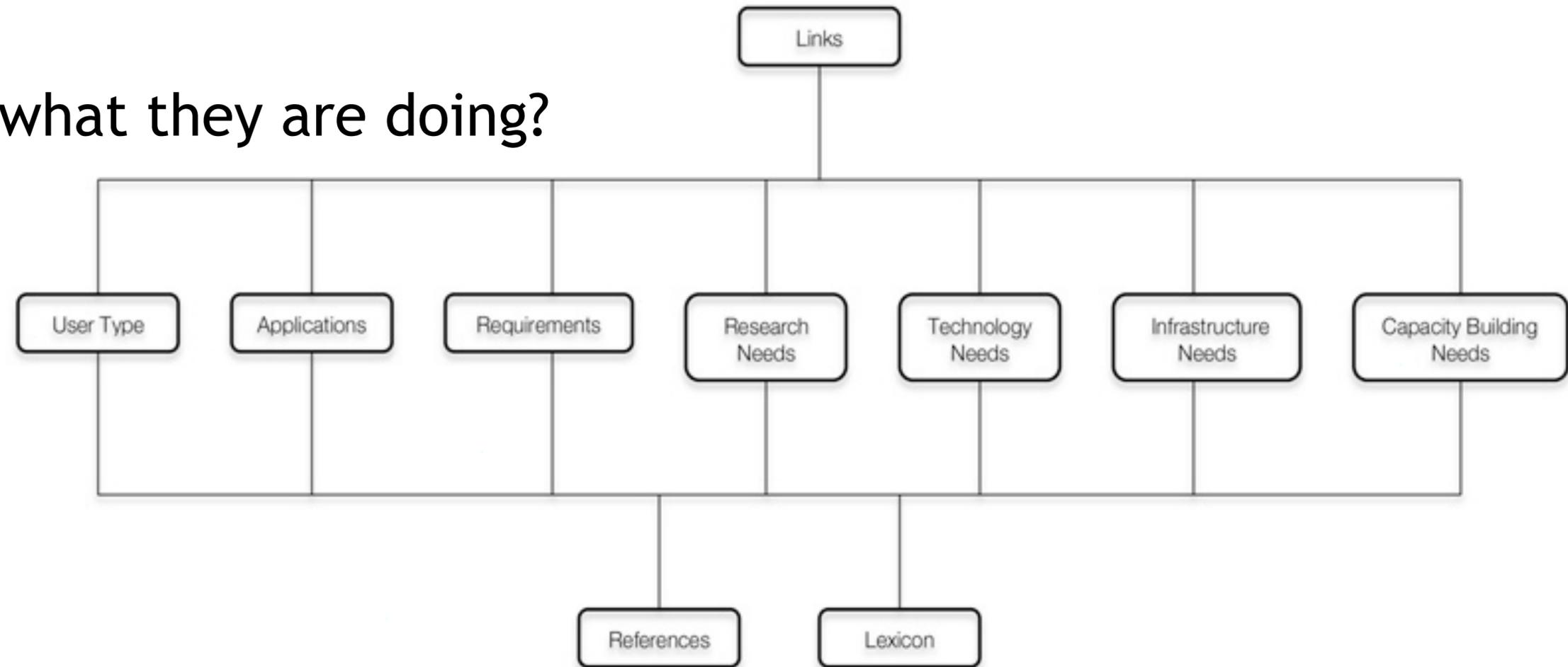
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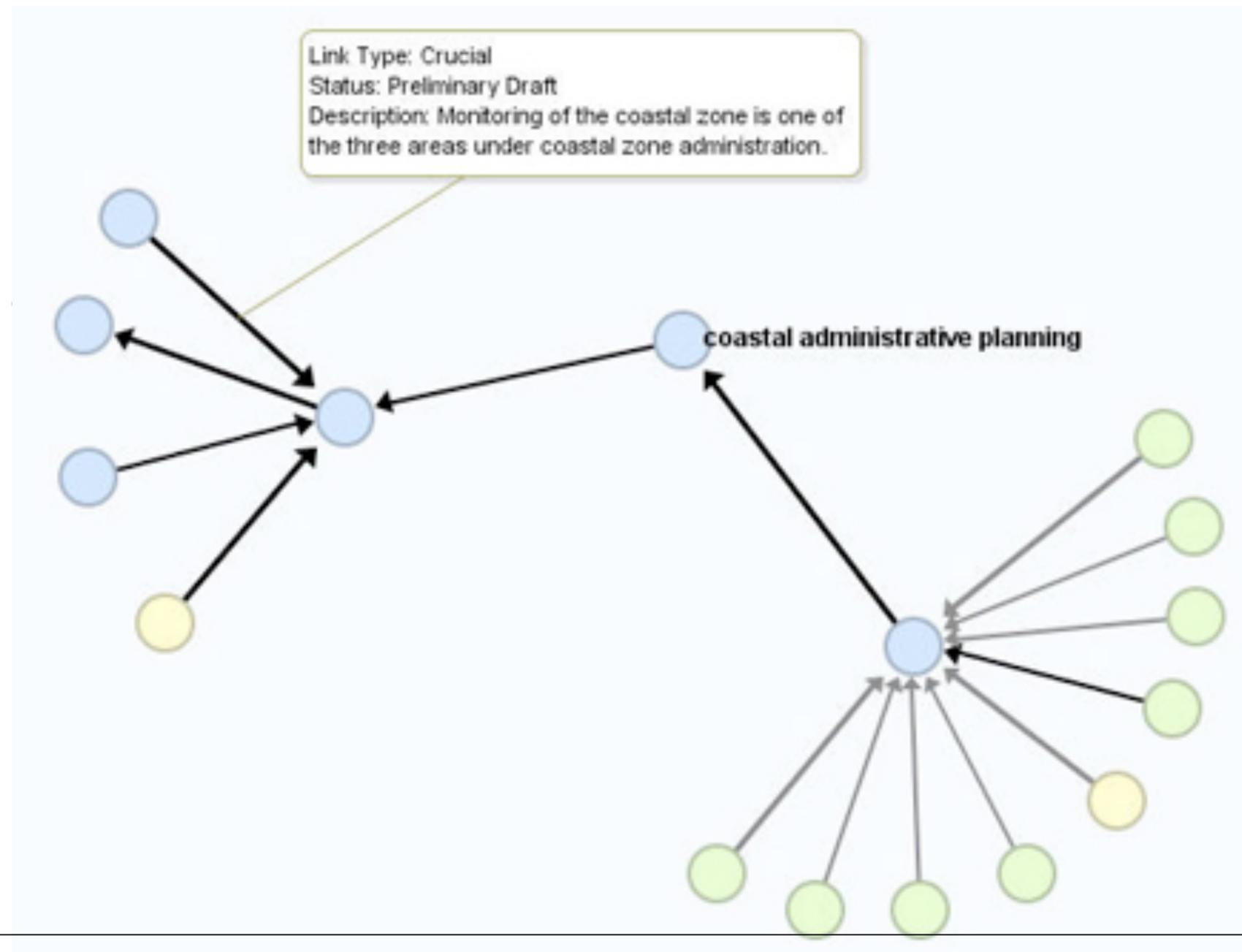
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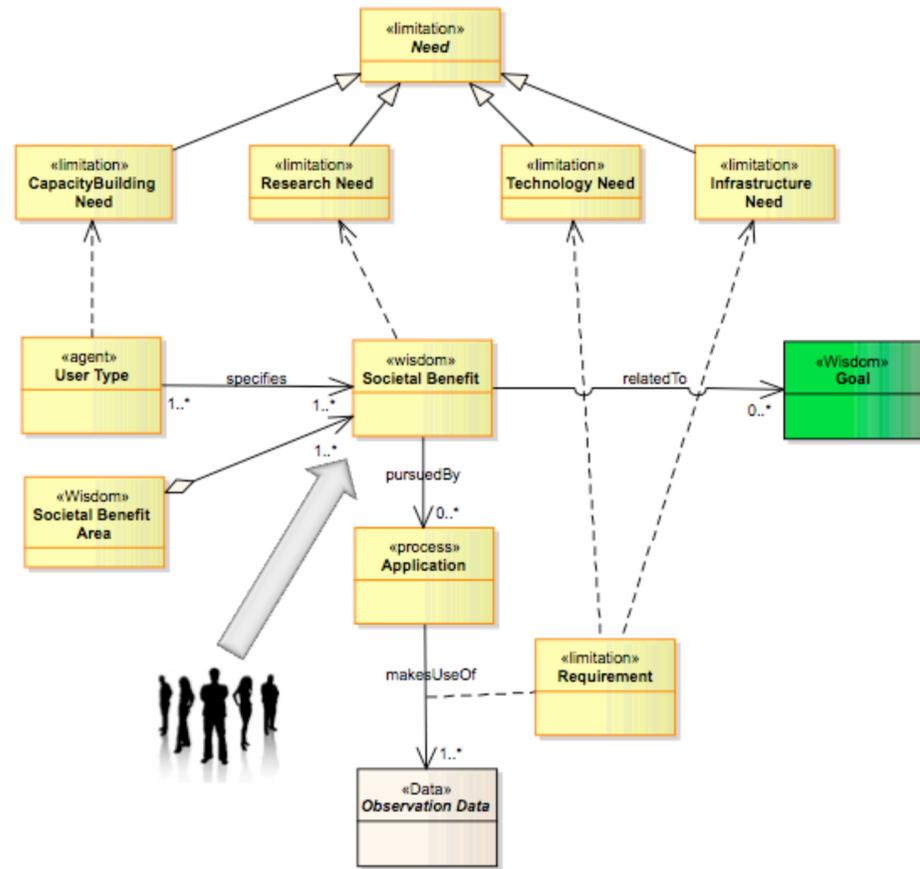


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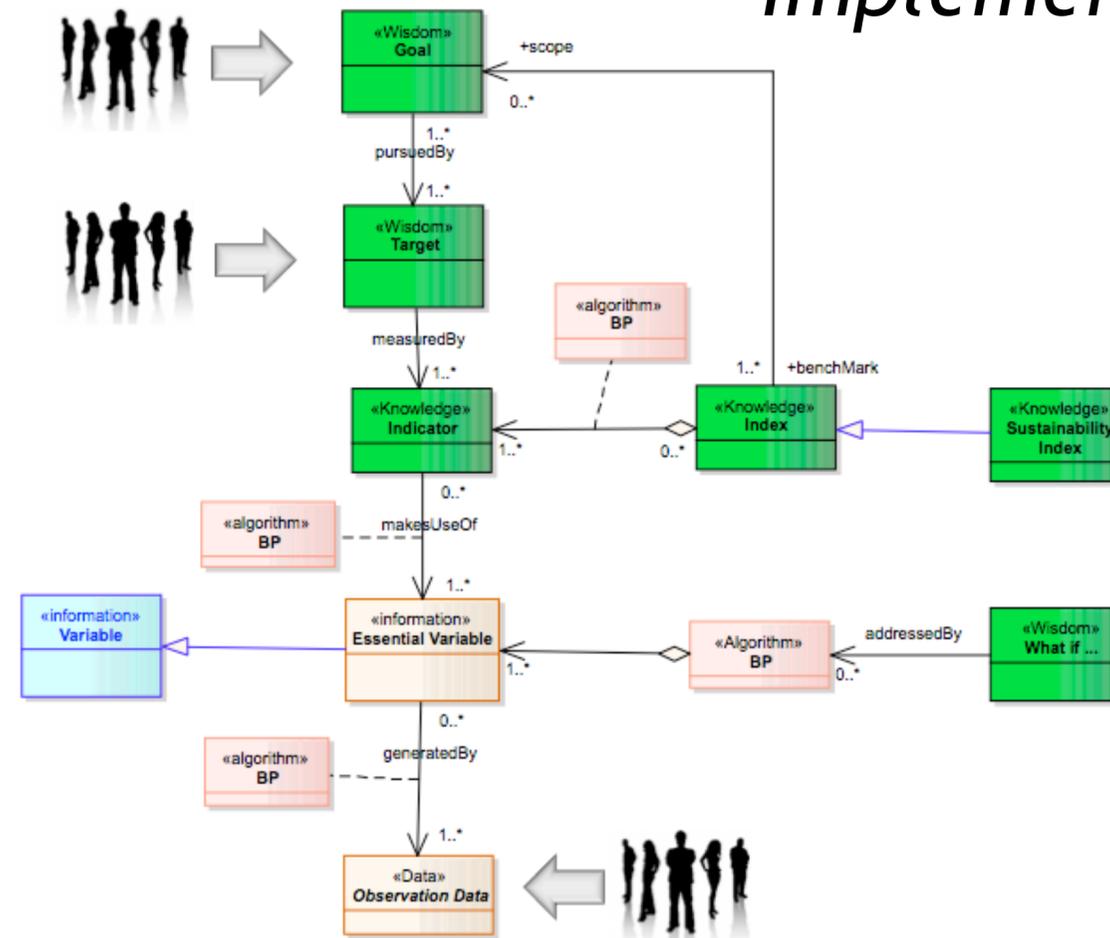
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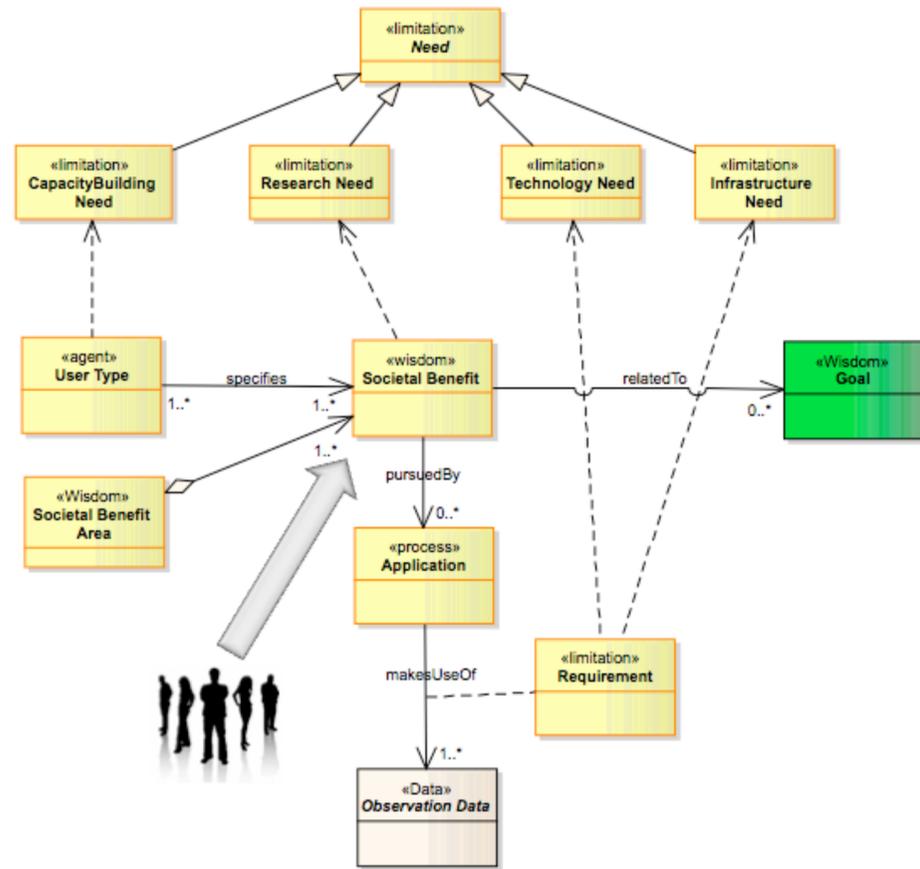
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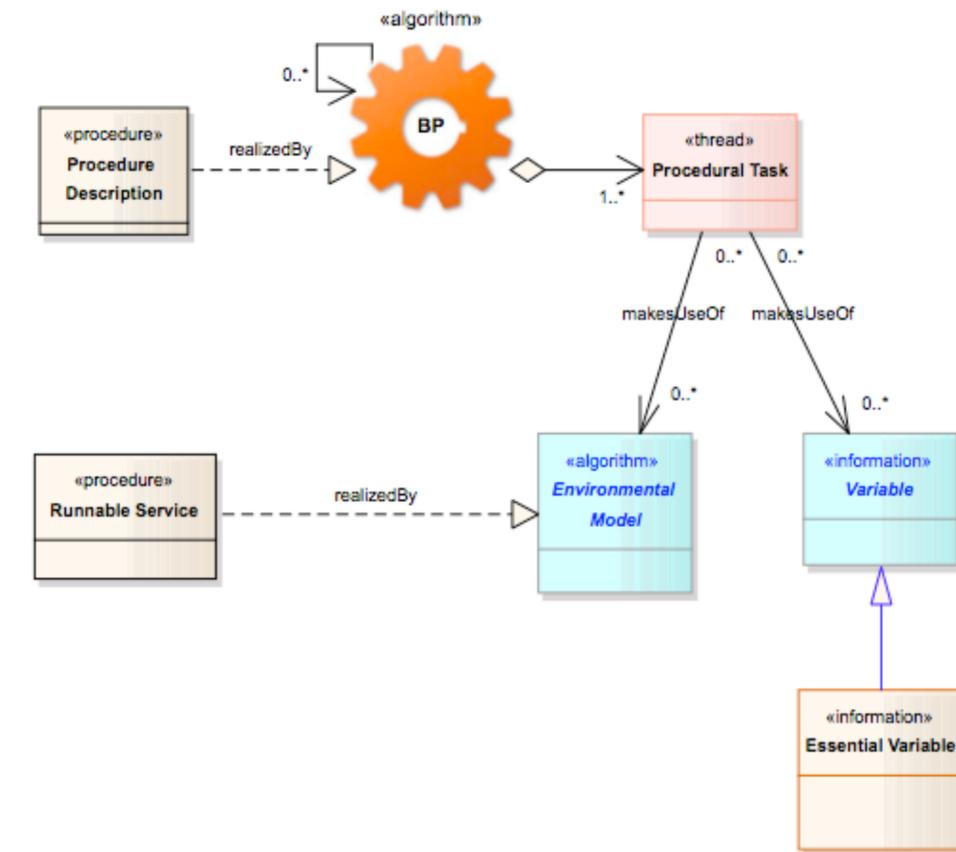
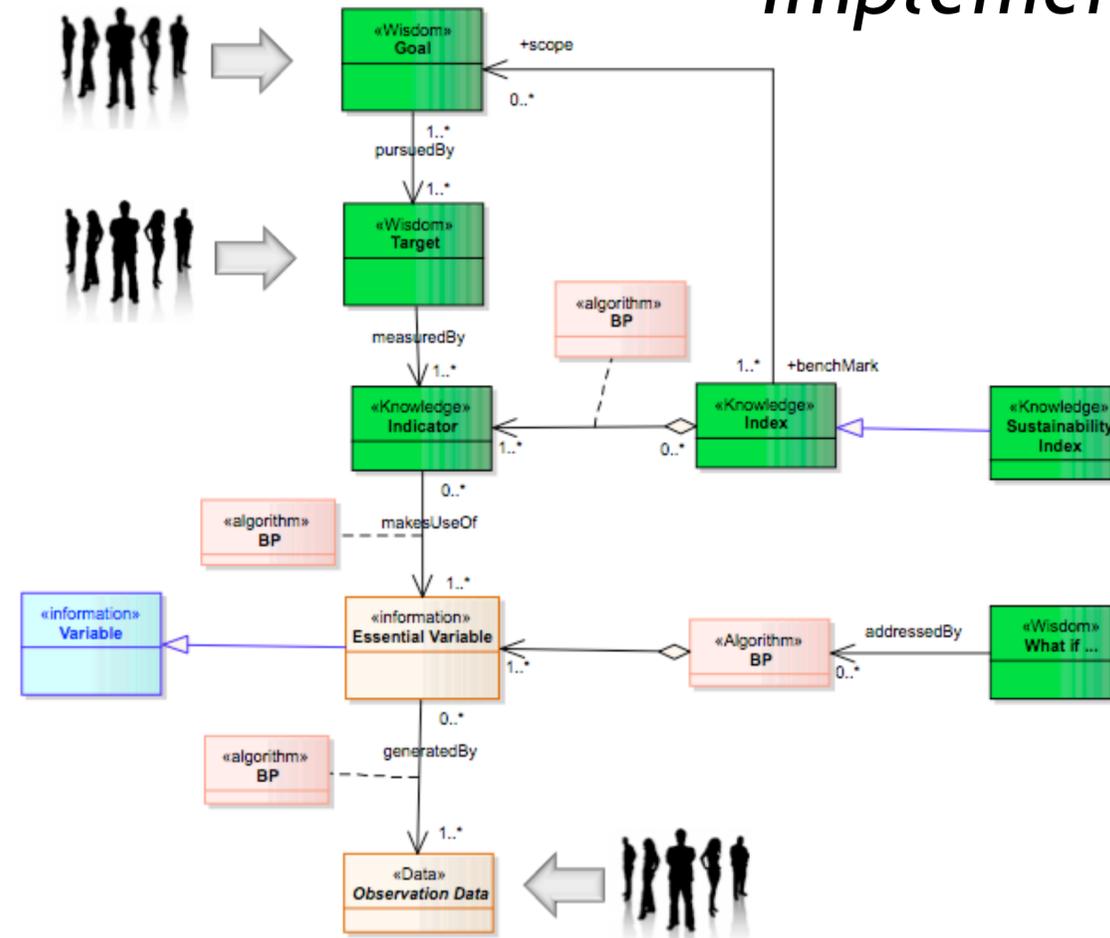


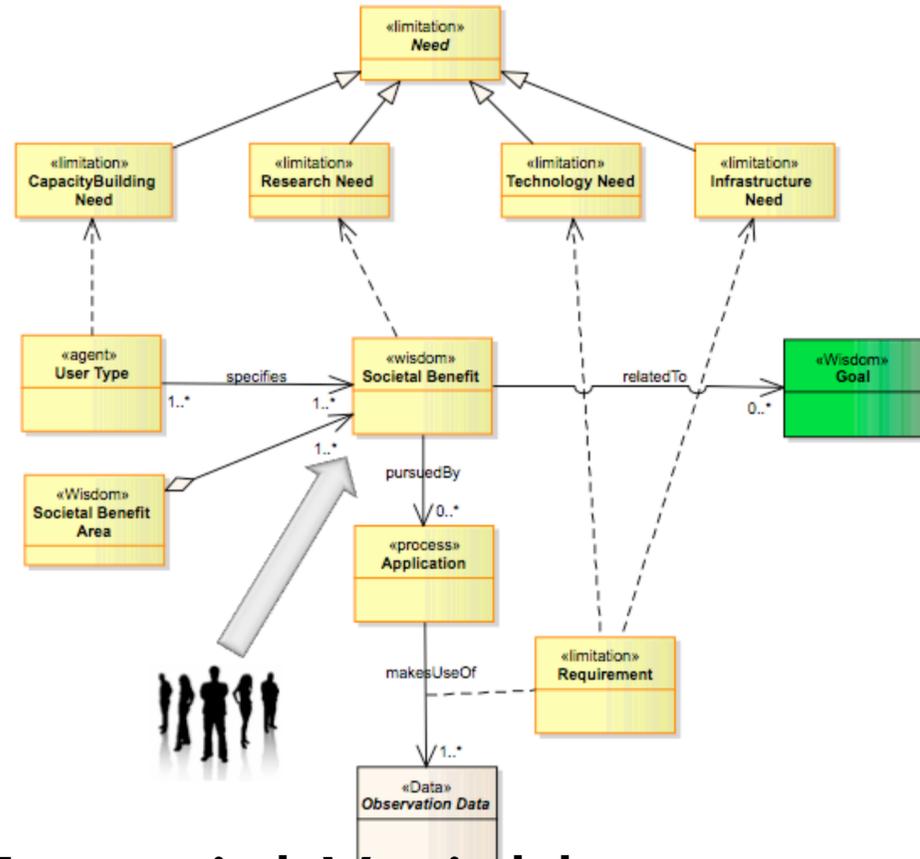
Goals, Metrics and Essential Variables: *Implementation in SEE IN KB*



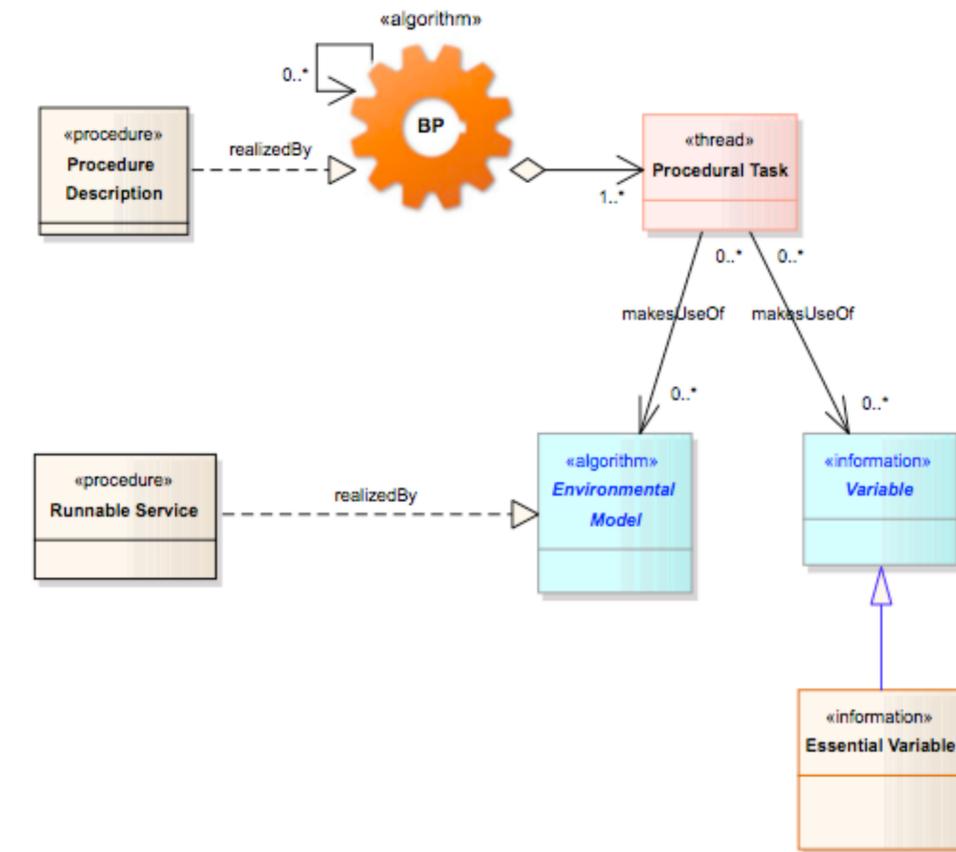
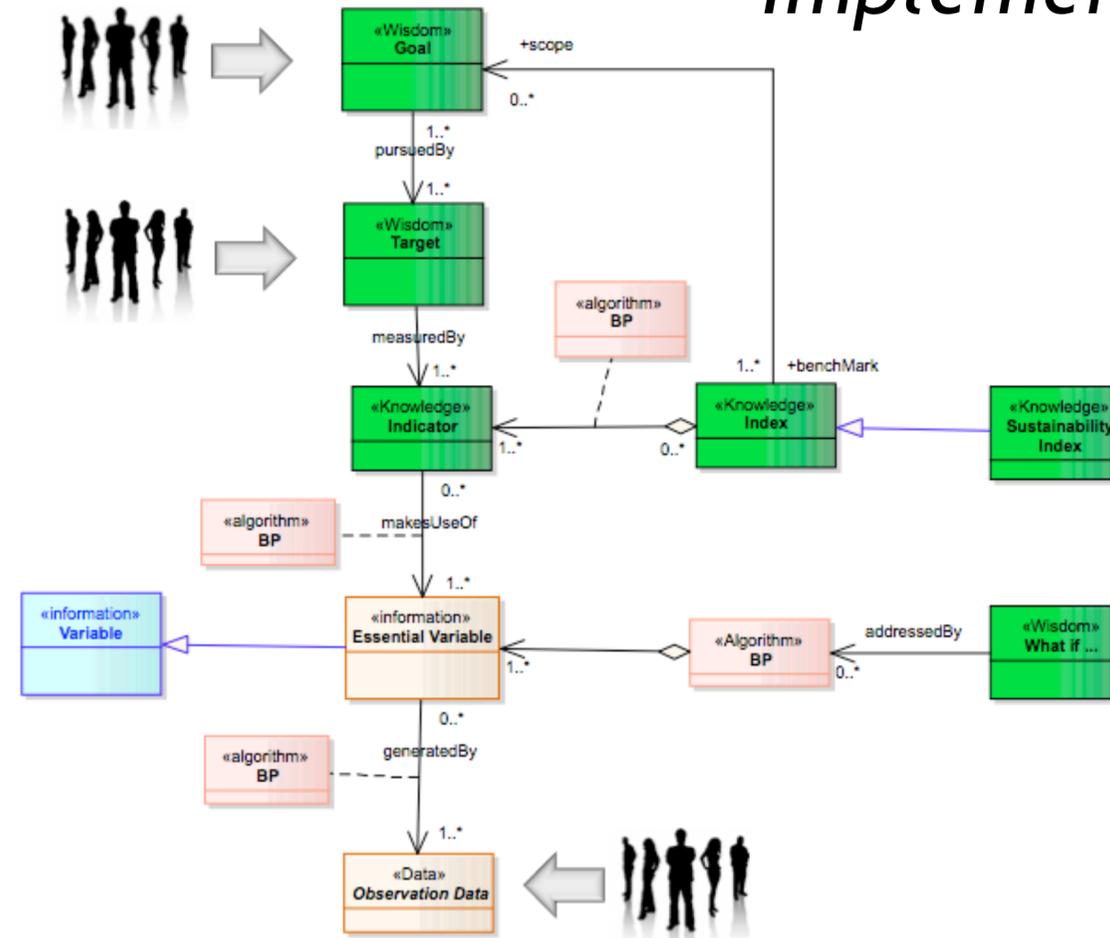


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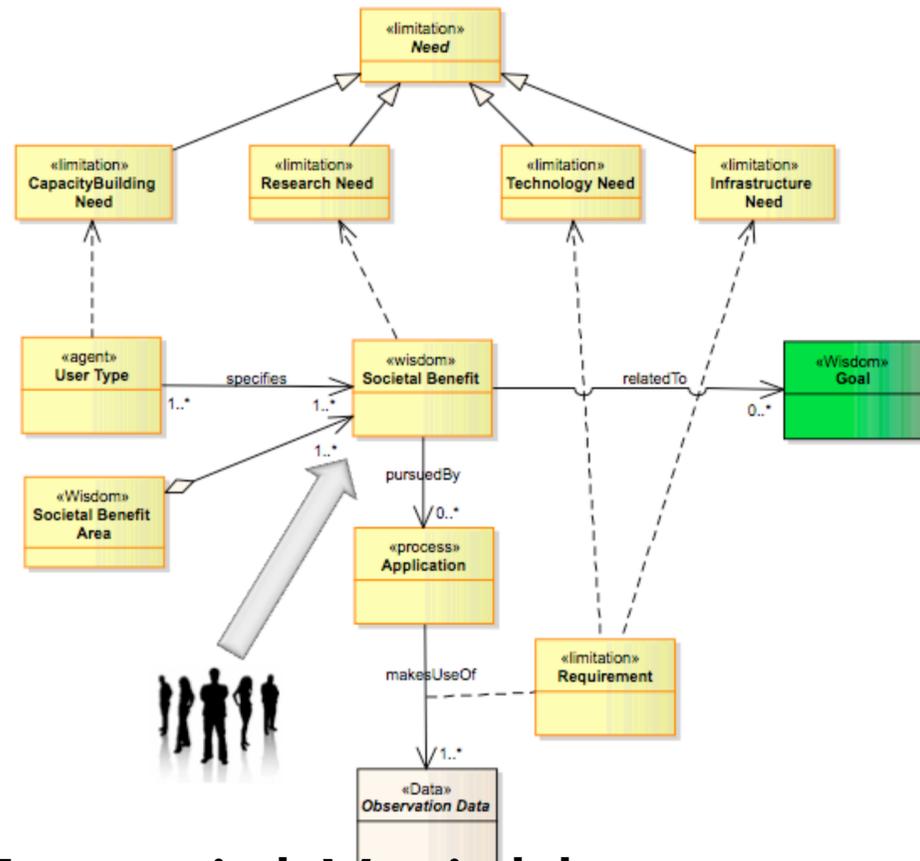


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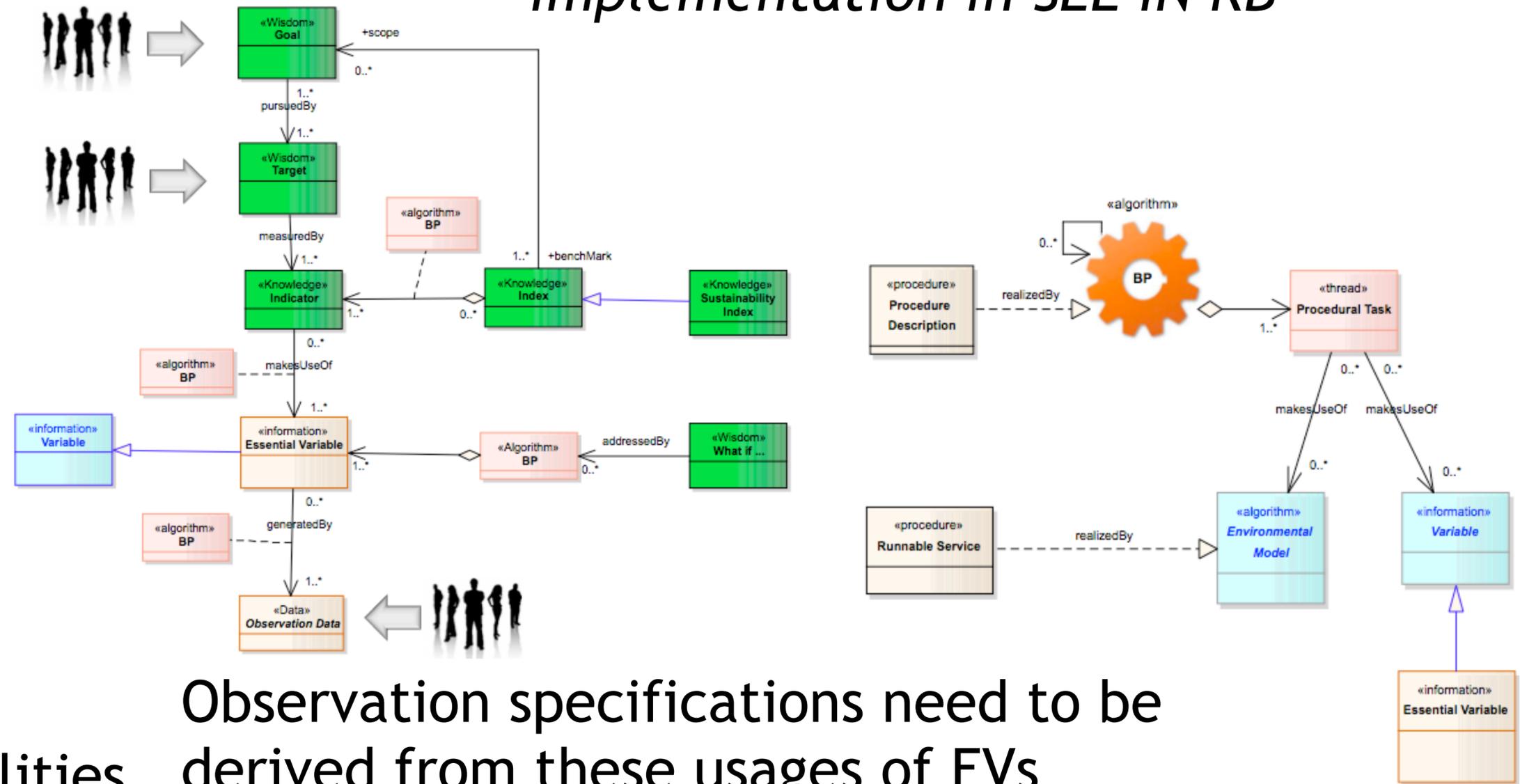


Essential Variables:

- Linked to metrics
- Basis for management
- Populate report cards
- Increase predictive capabilities



Goals, Metrics and Essential Variables: Implementation in SEE IN KB



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Observation specifications need to be derived from these usages of EVs

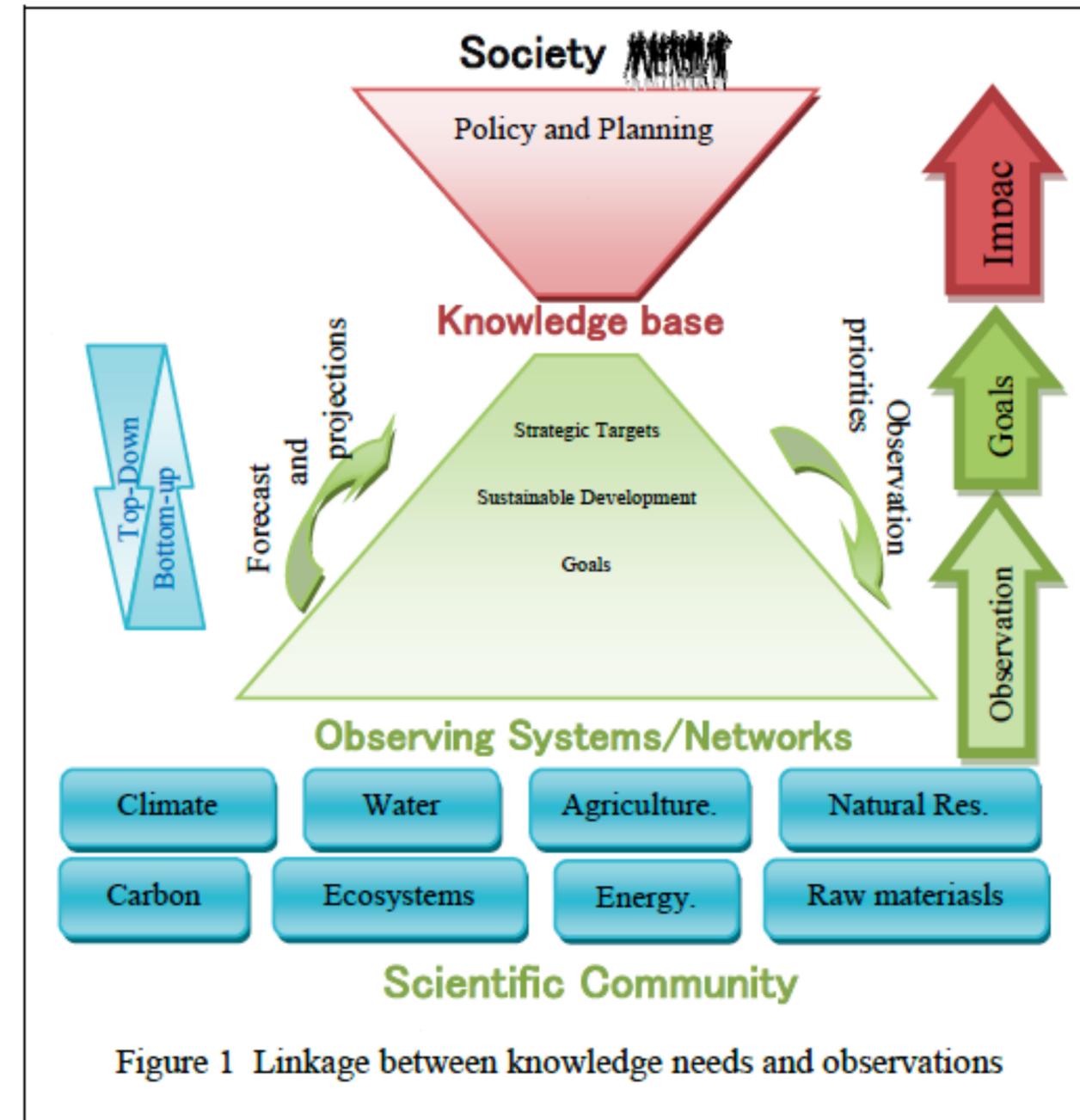
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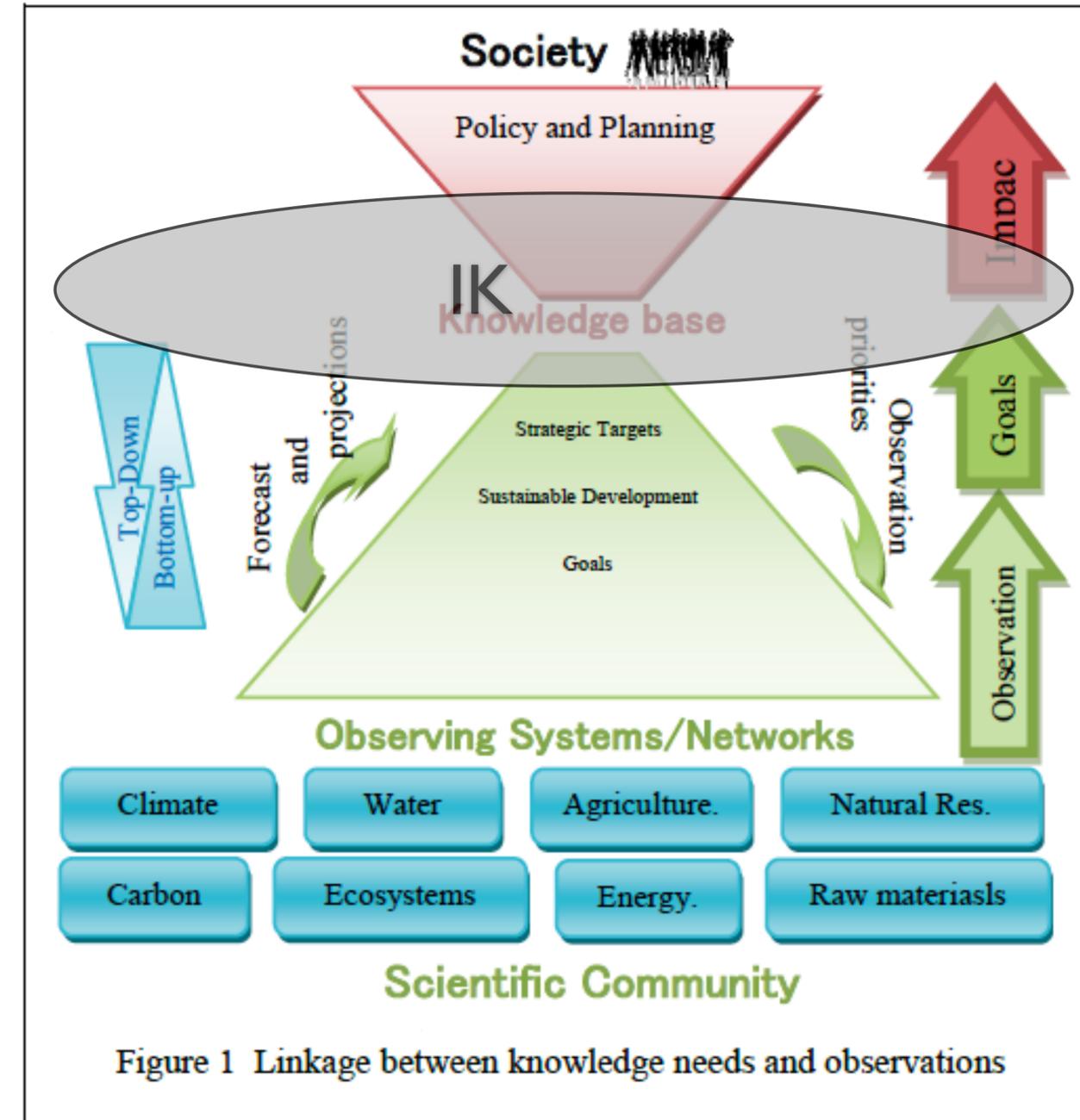
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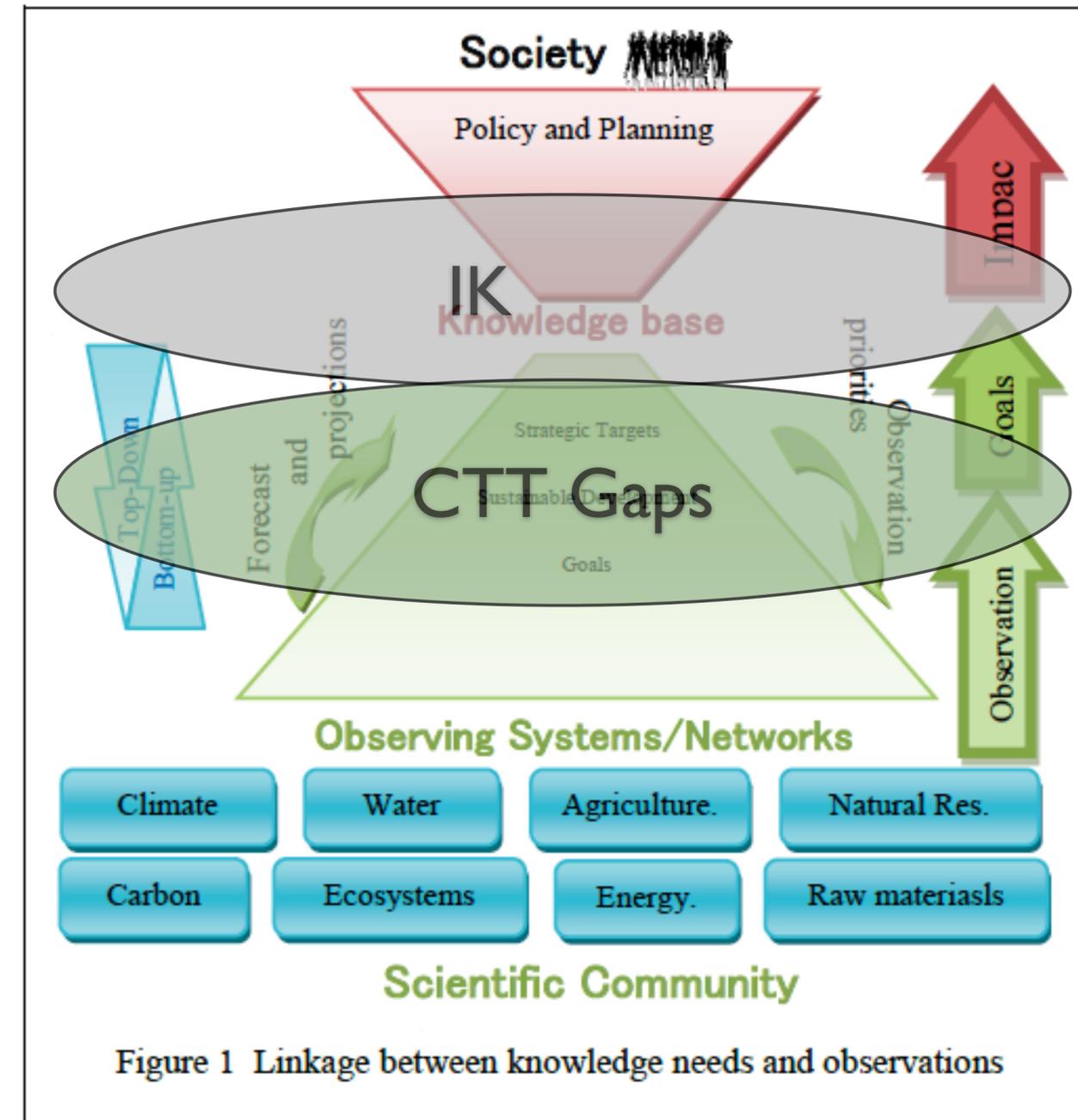
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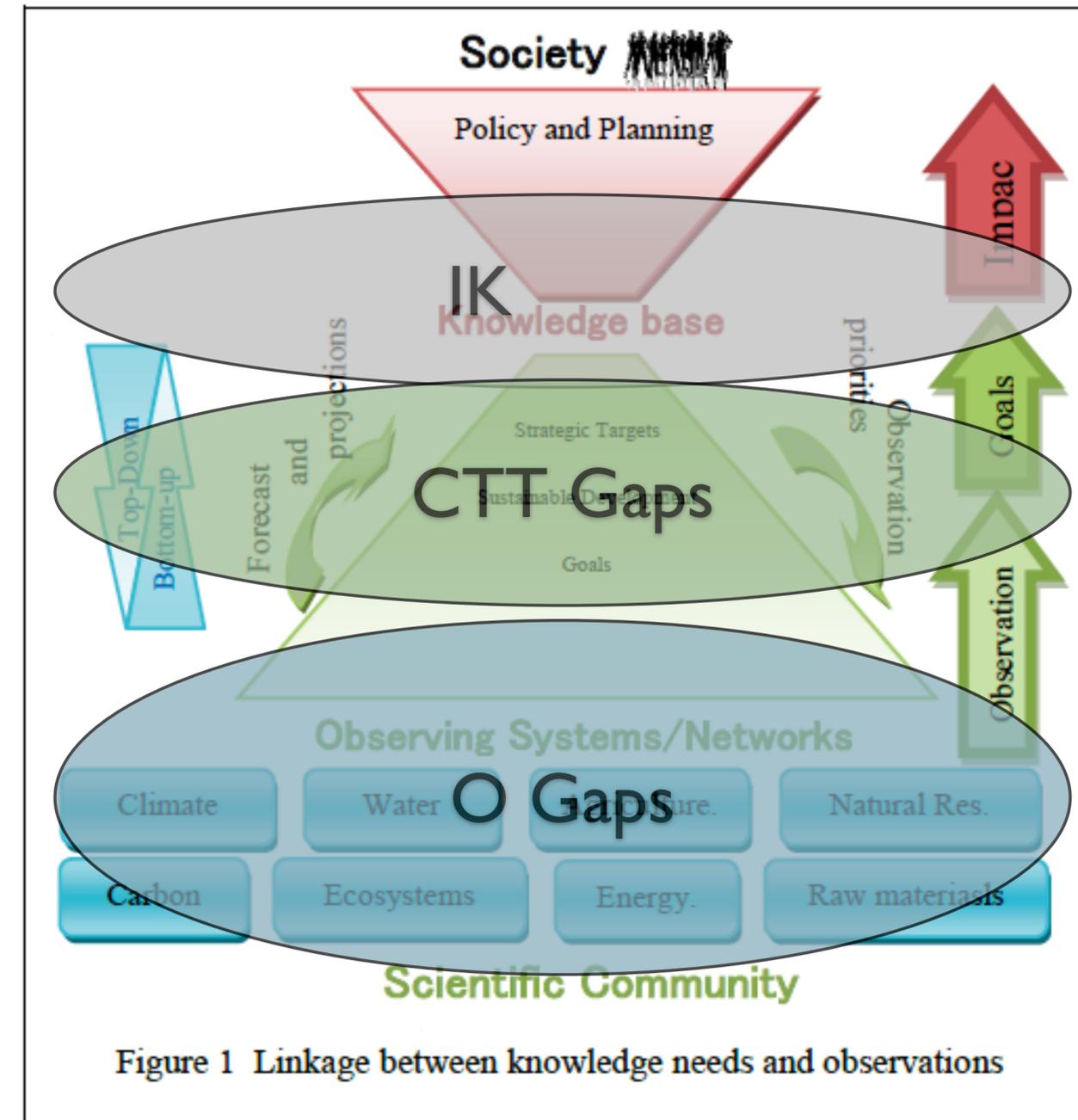
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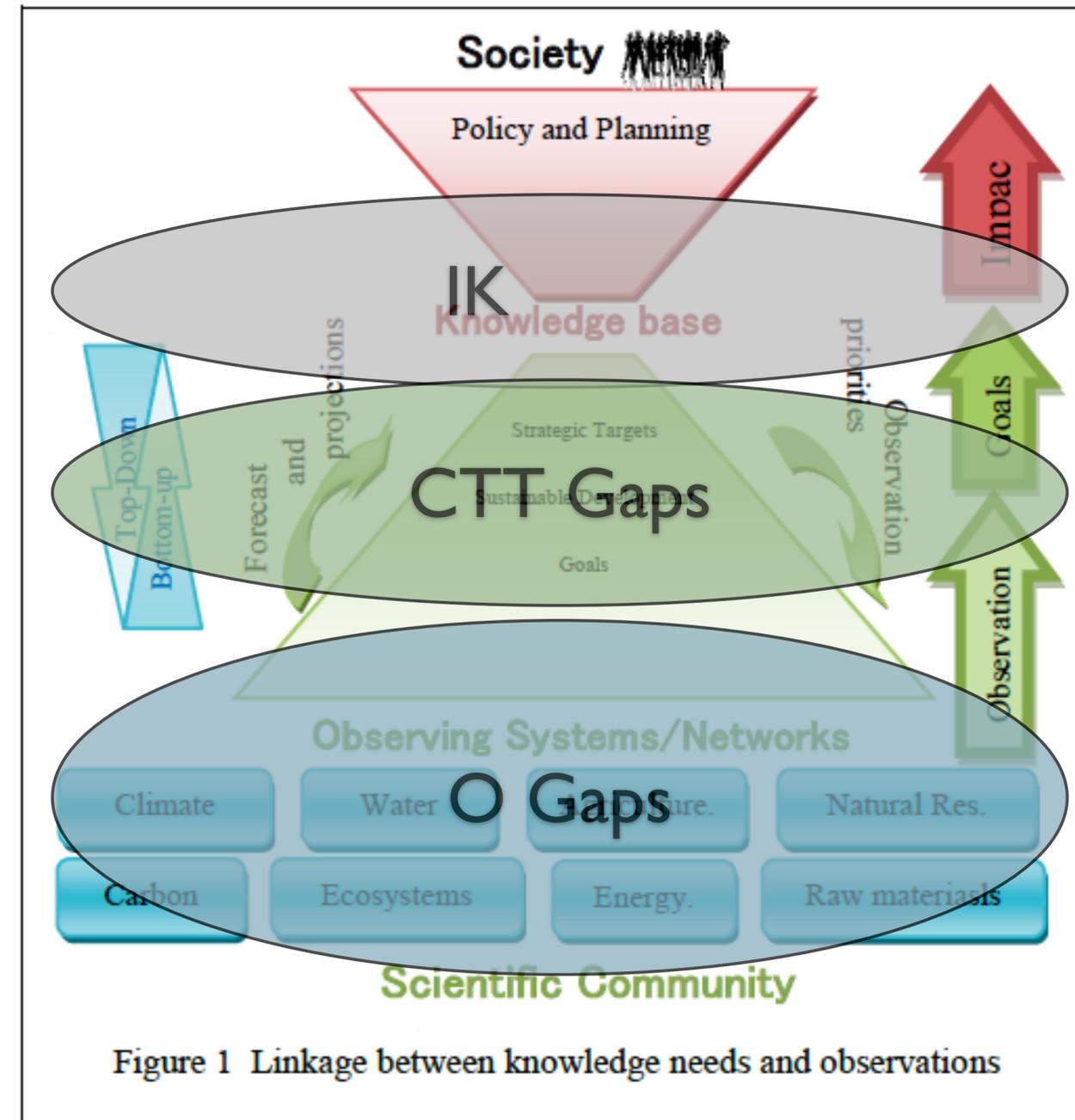
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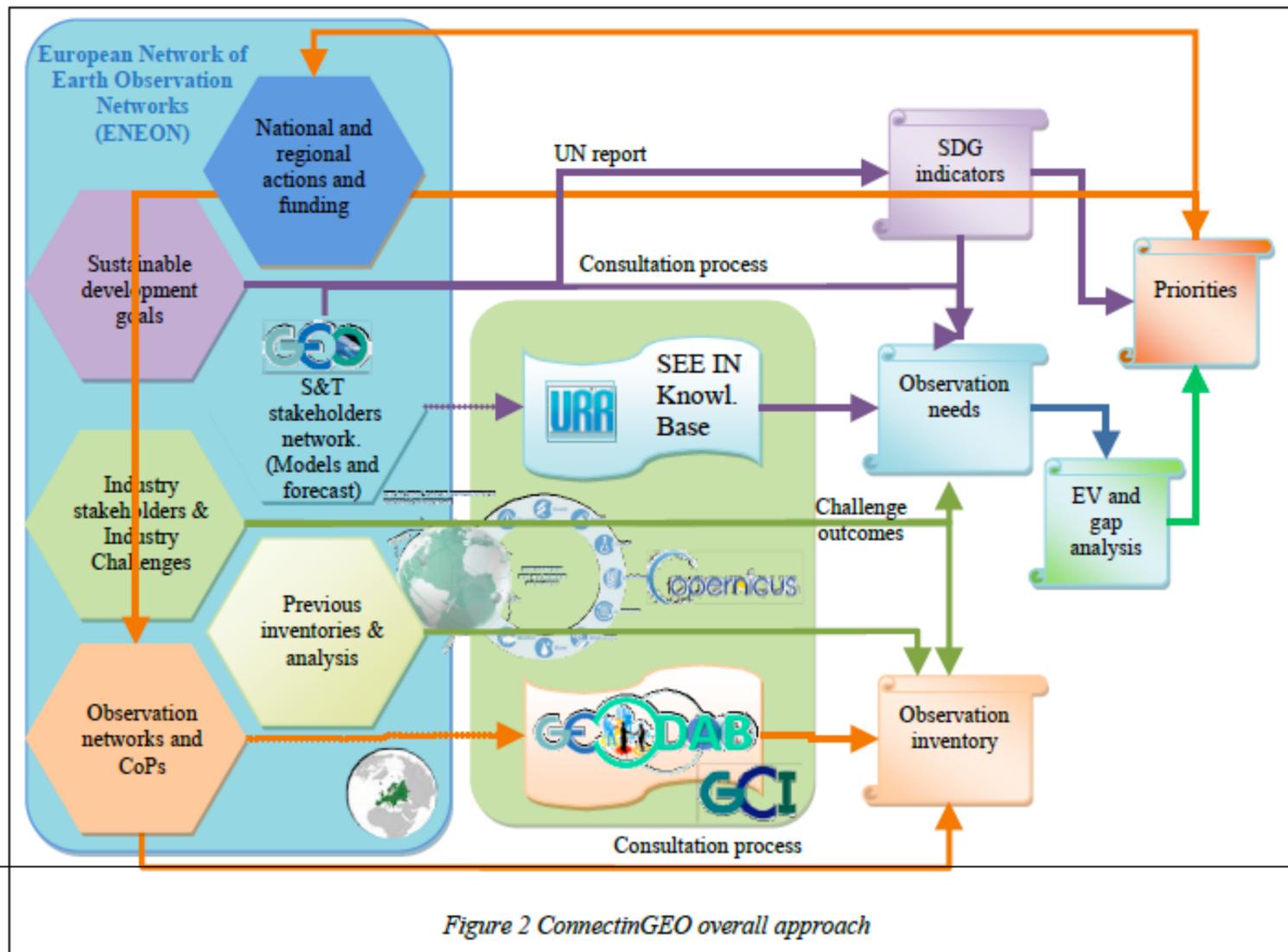


Figure 2 ConnectinGEO overall approach

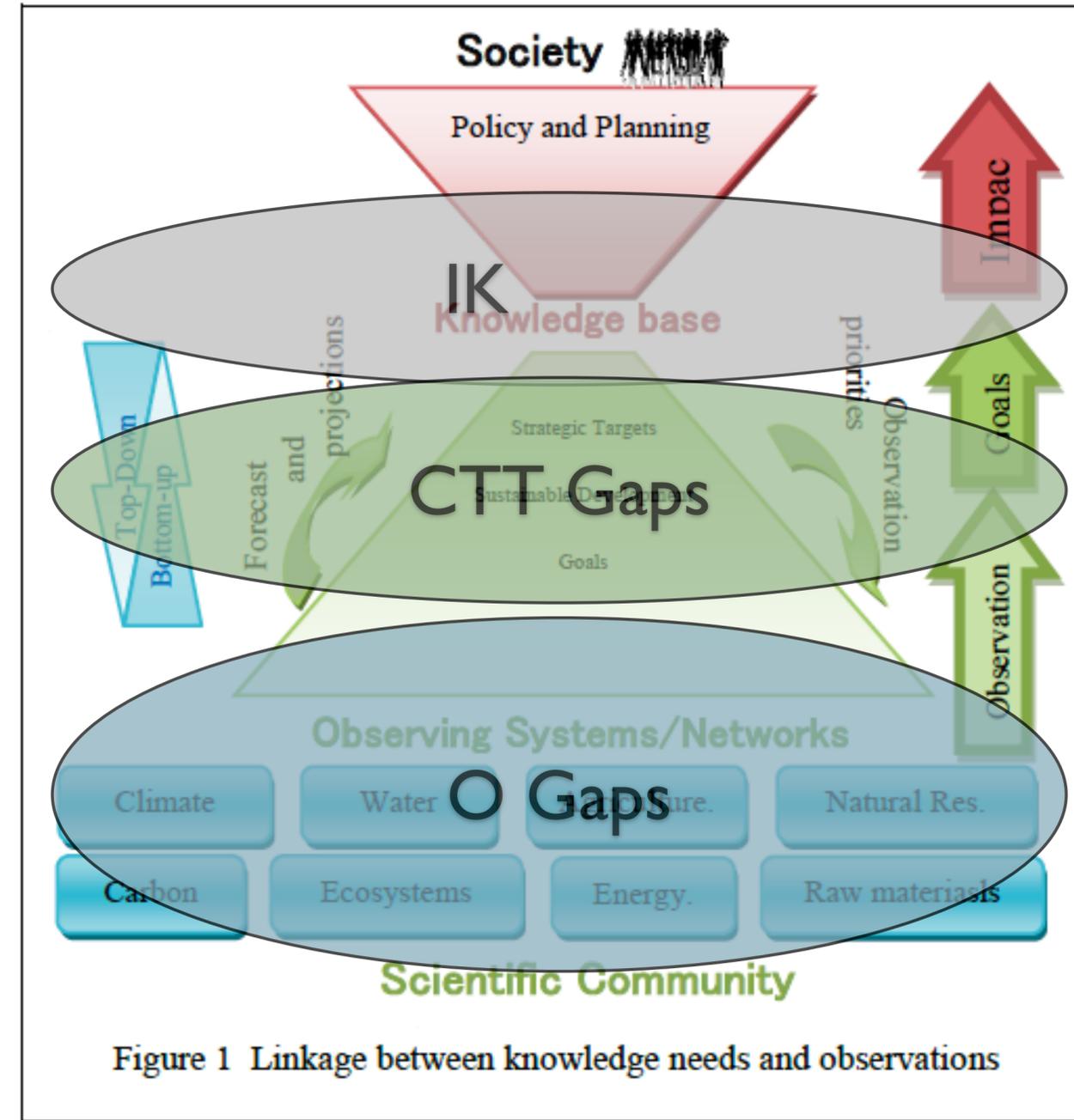


Figure 1 Linkage between knowledge needs and observations

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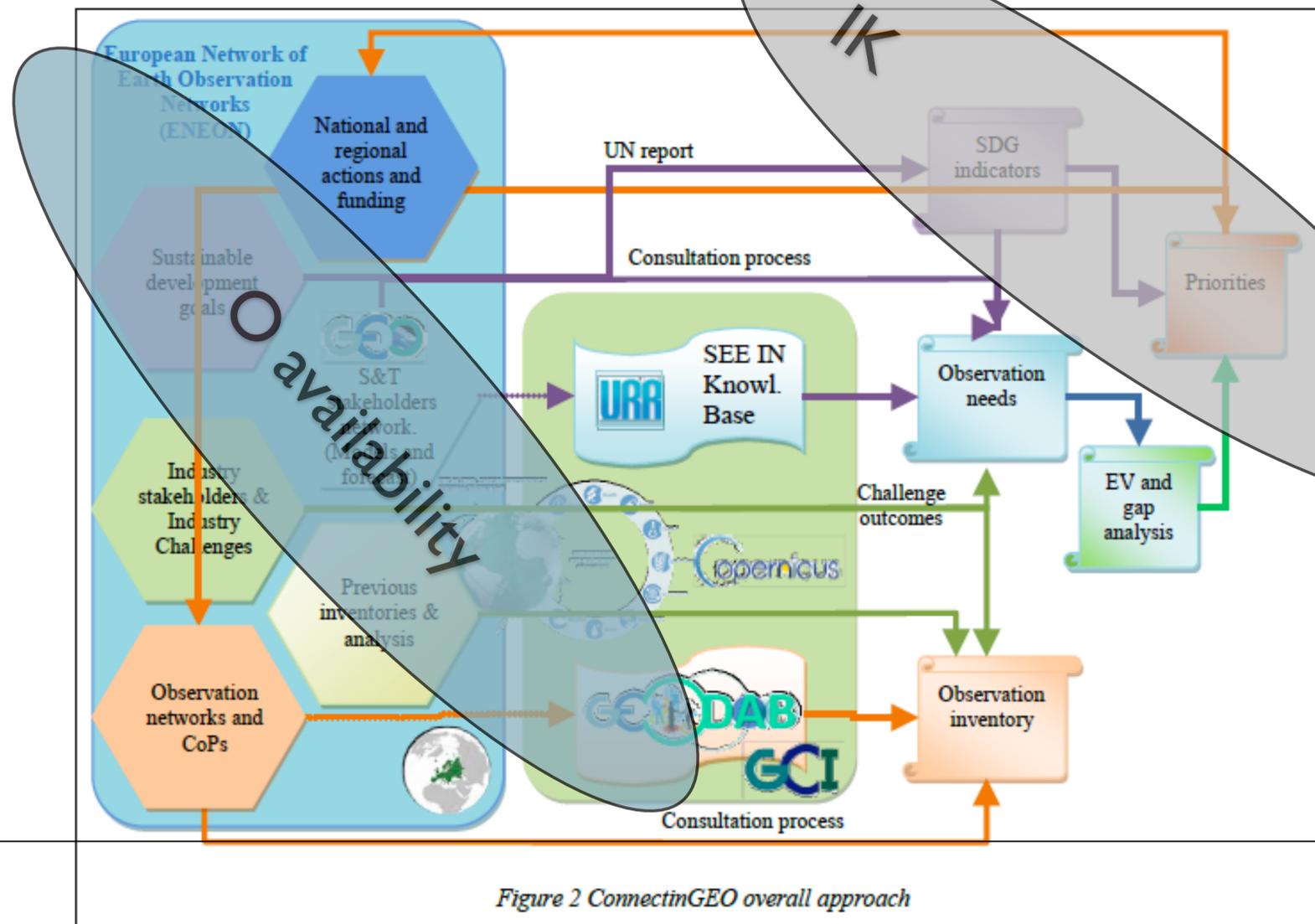


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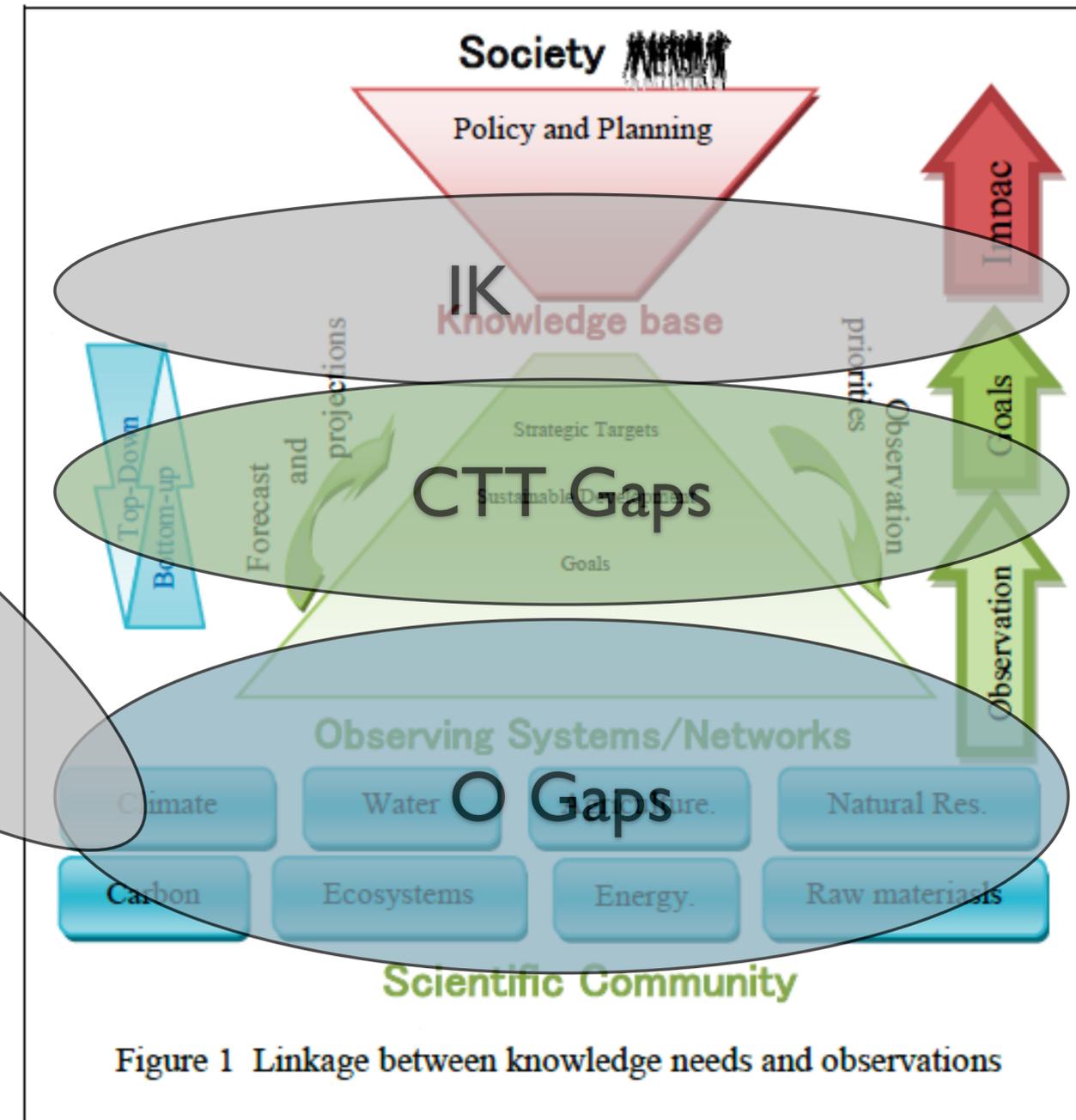


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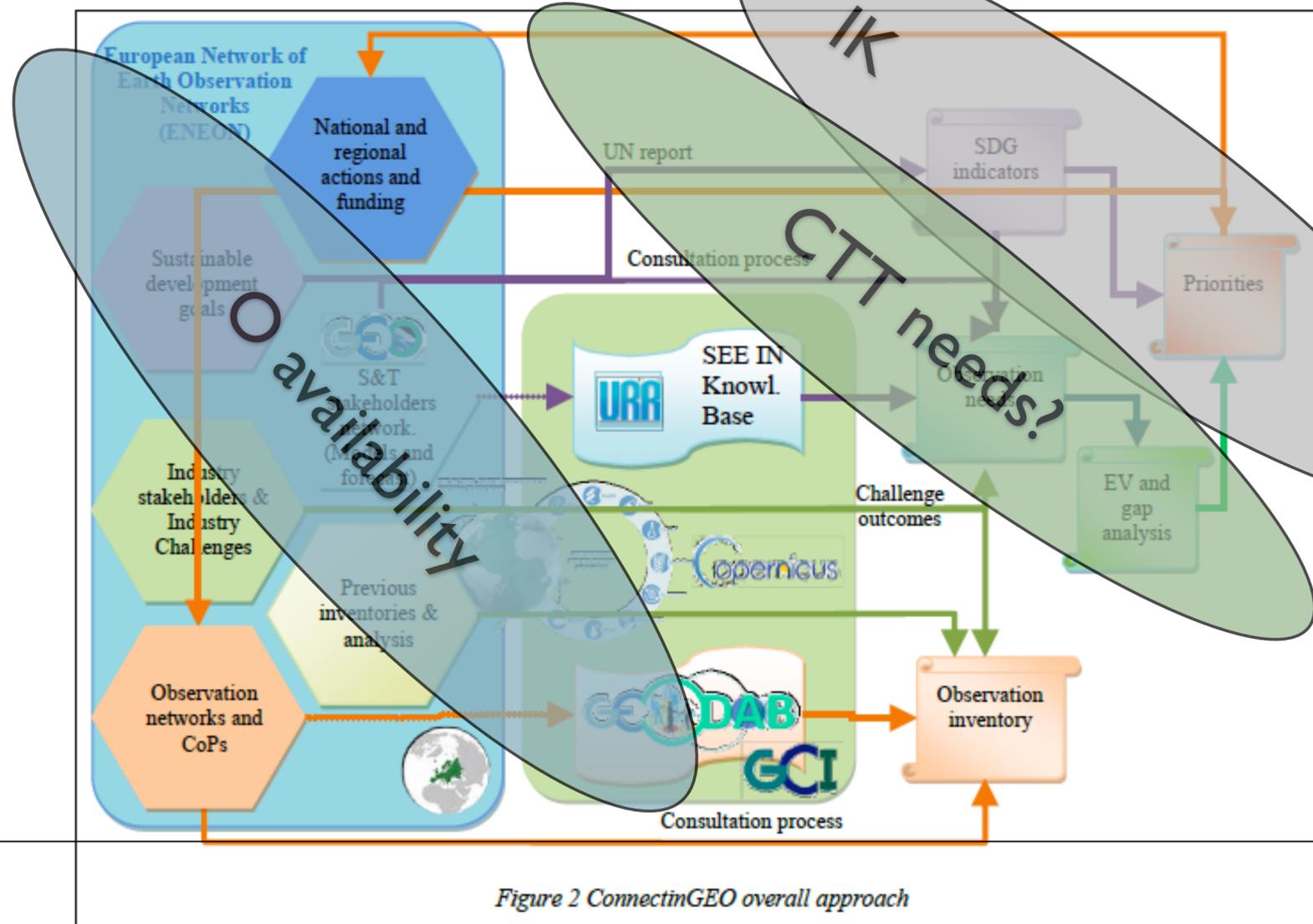


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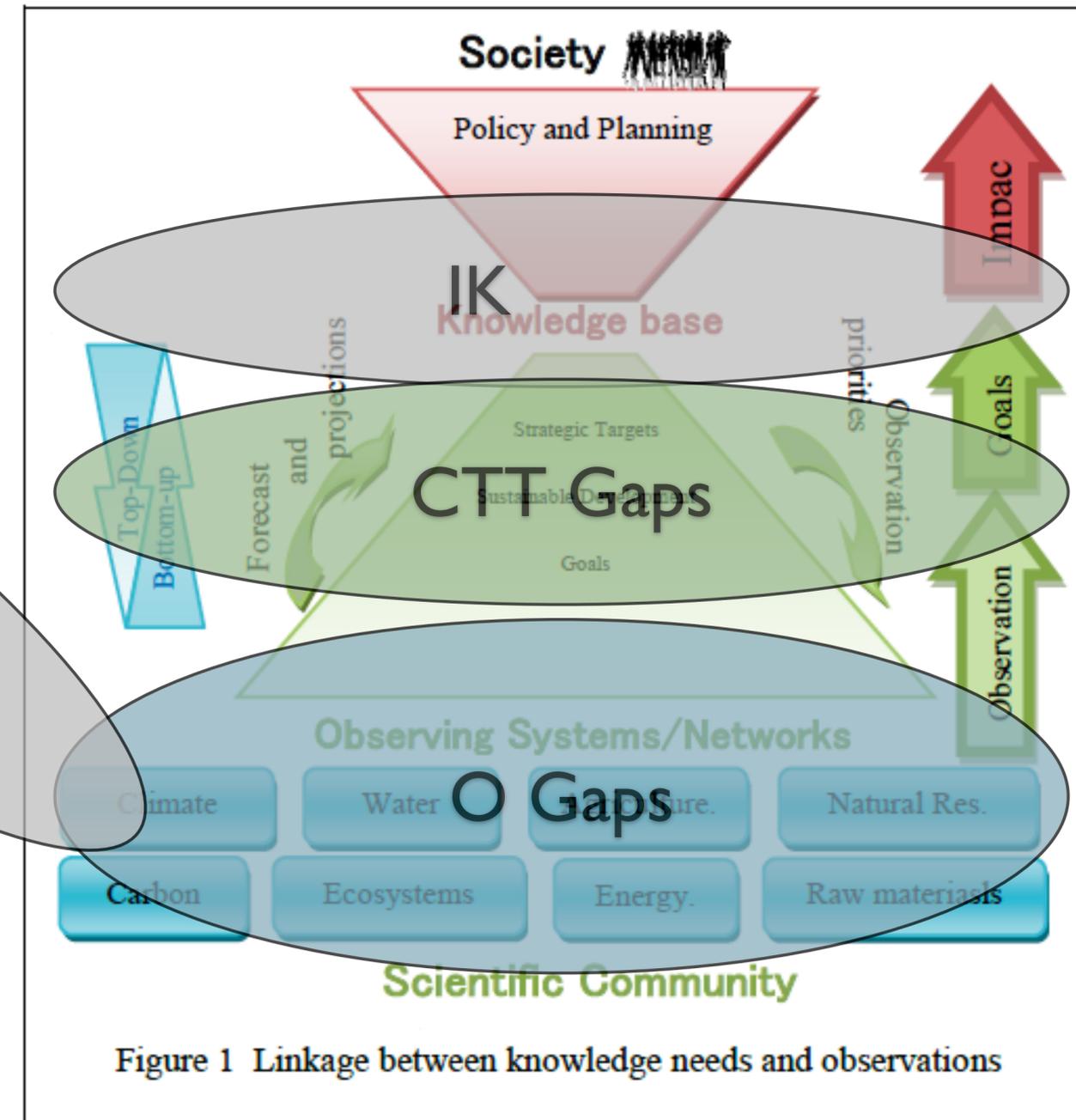


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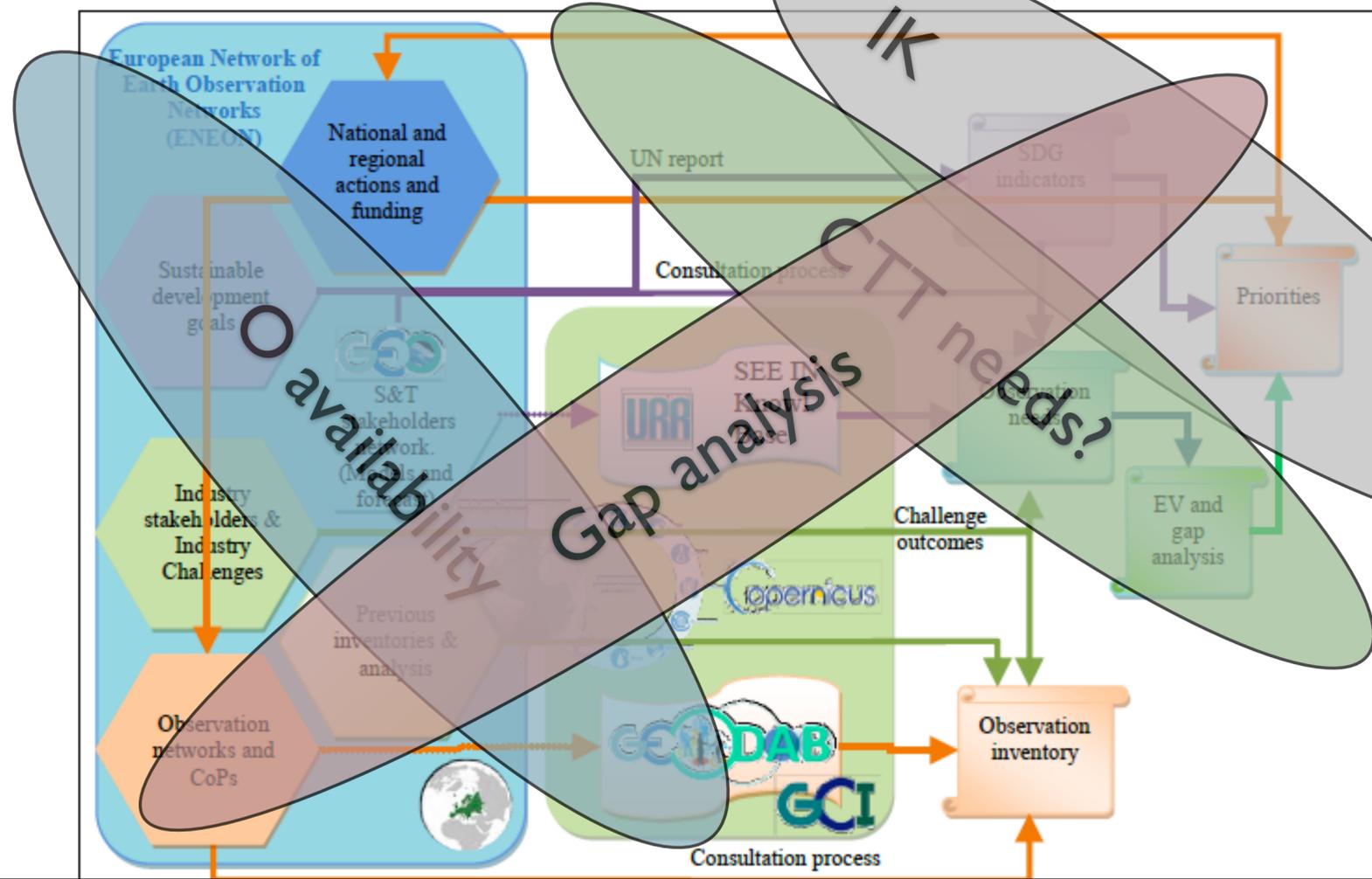


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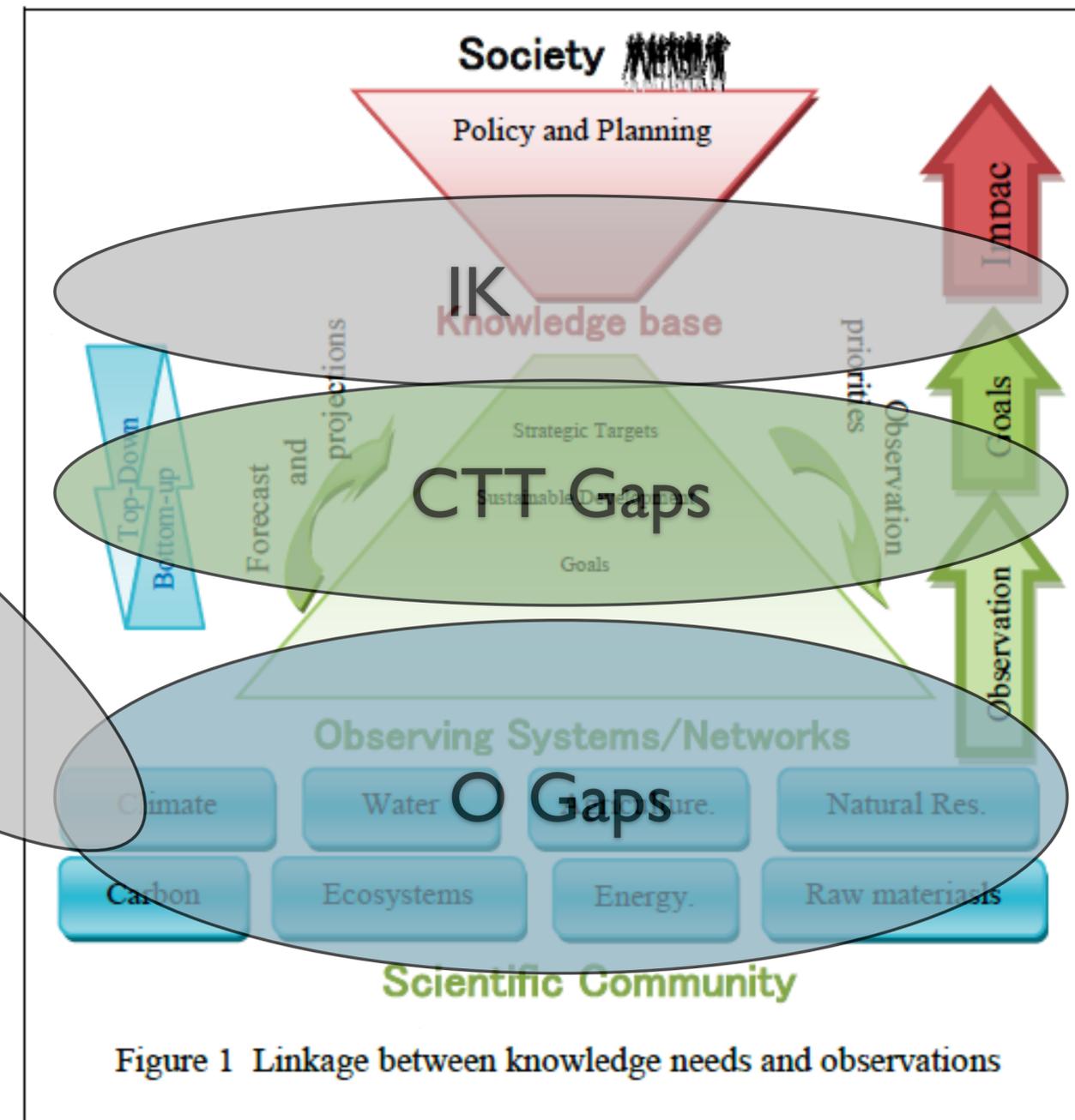


Figure 1 Linkage between knowledge needs and observations

Gap Analysis depends on:

- We need IK, CTT, O needs and availability
- Populated SEE IN KB accordingly
- Comparison algorithm needs careful consideration

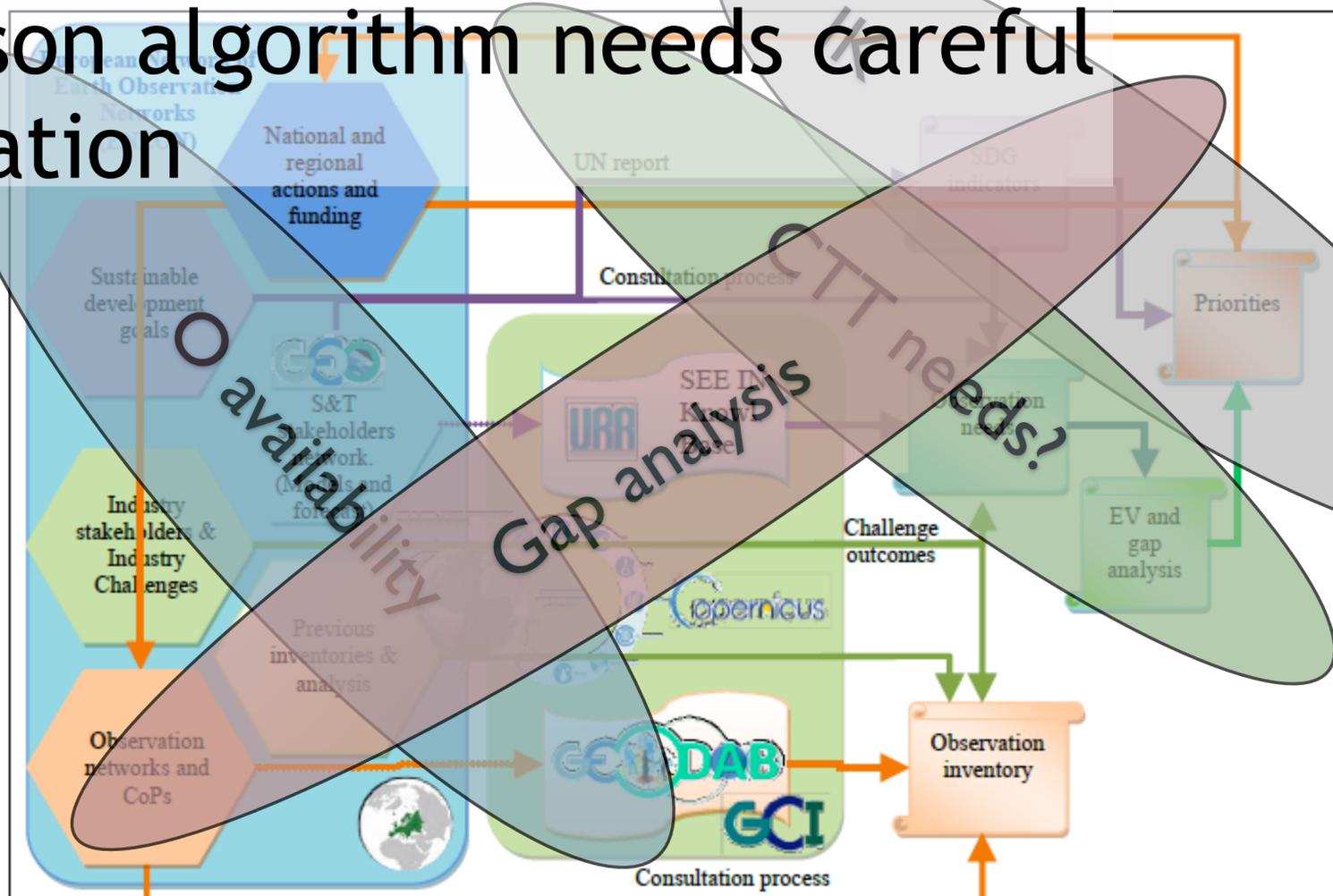


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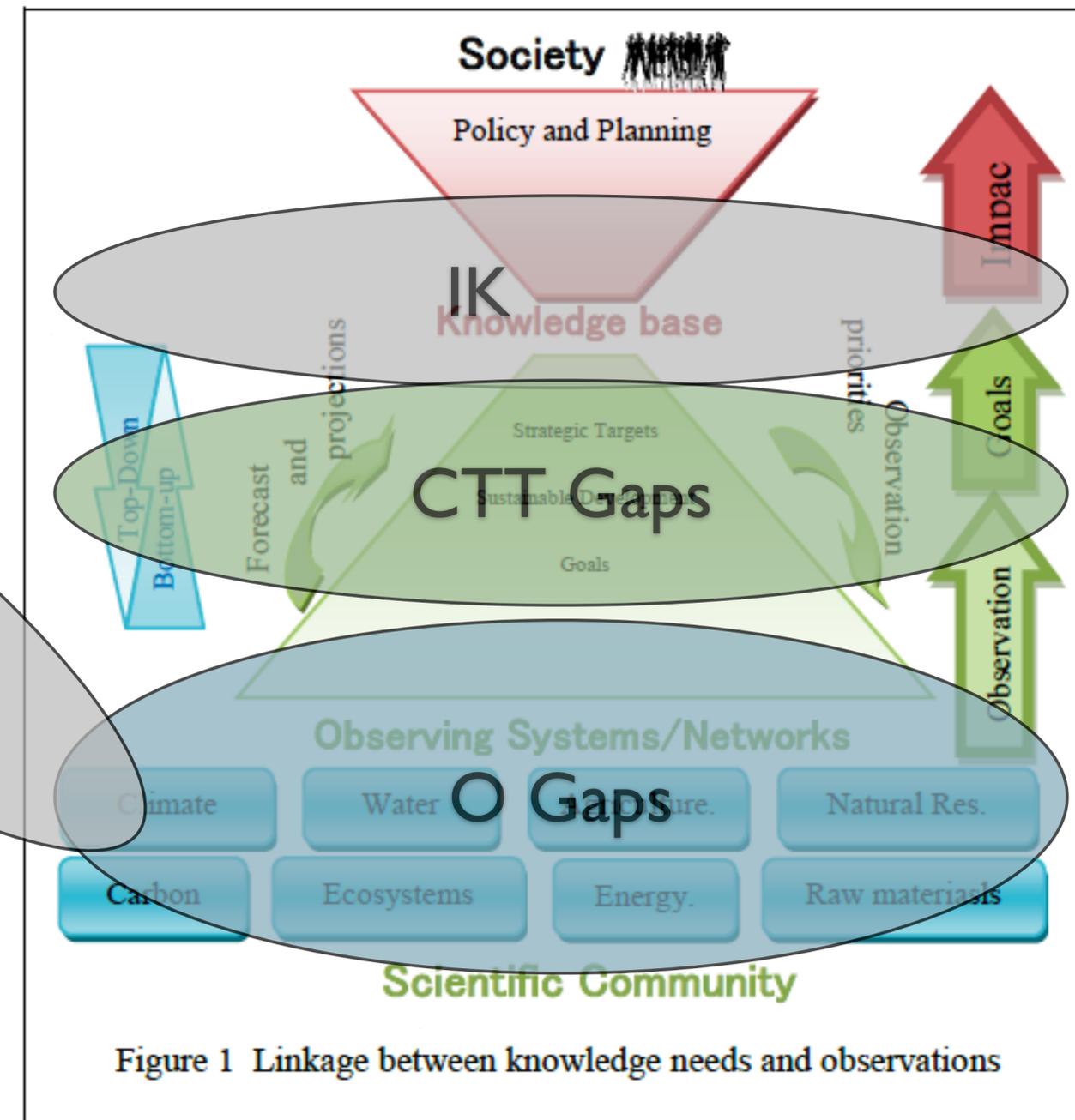


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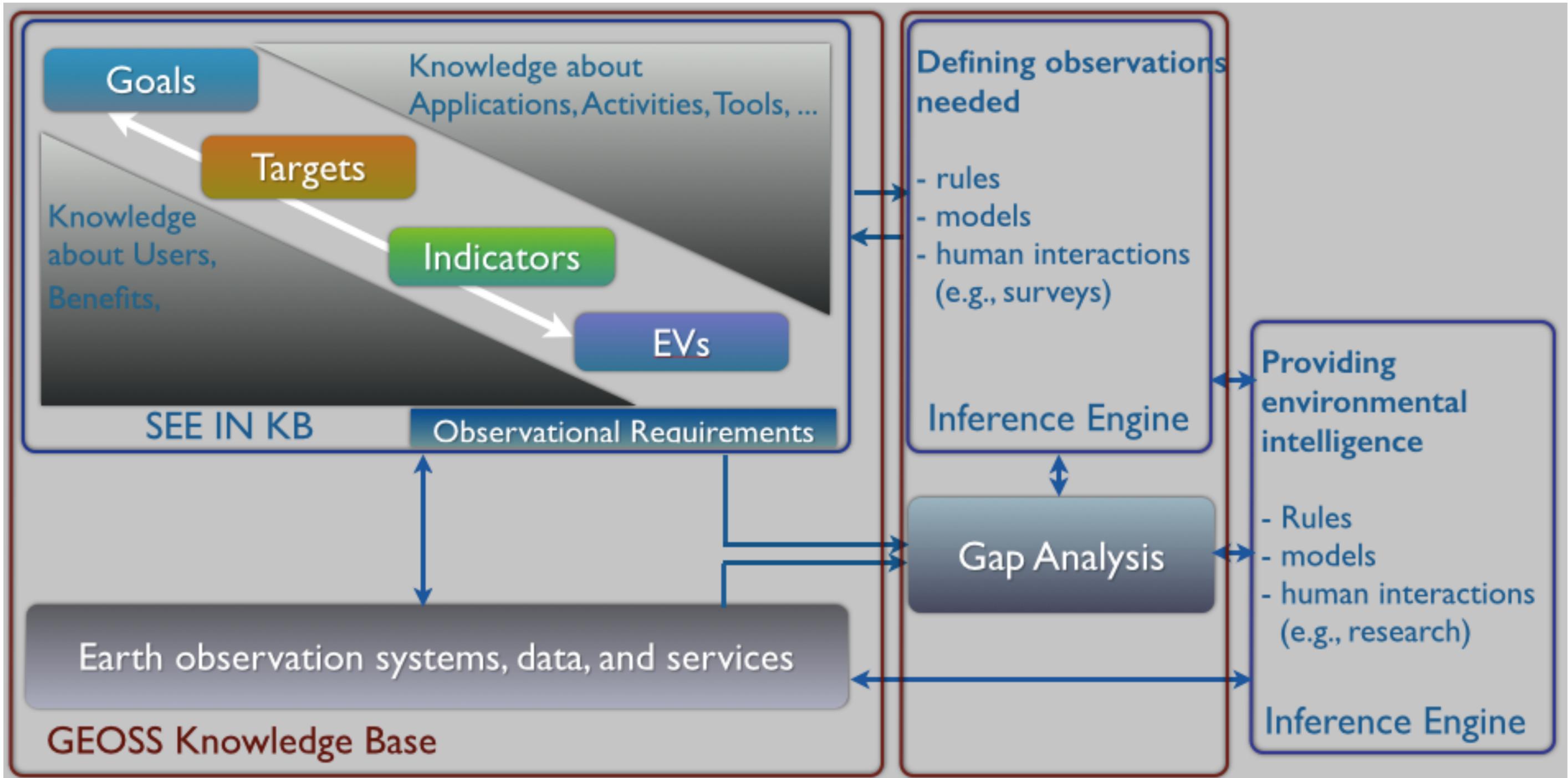
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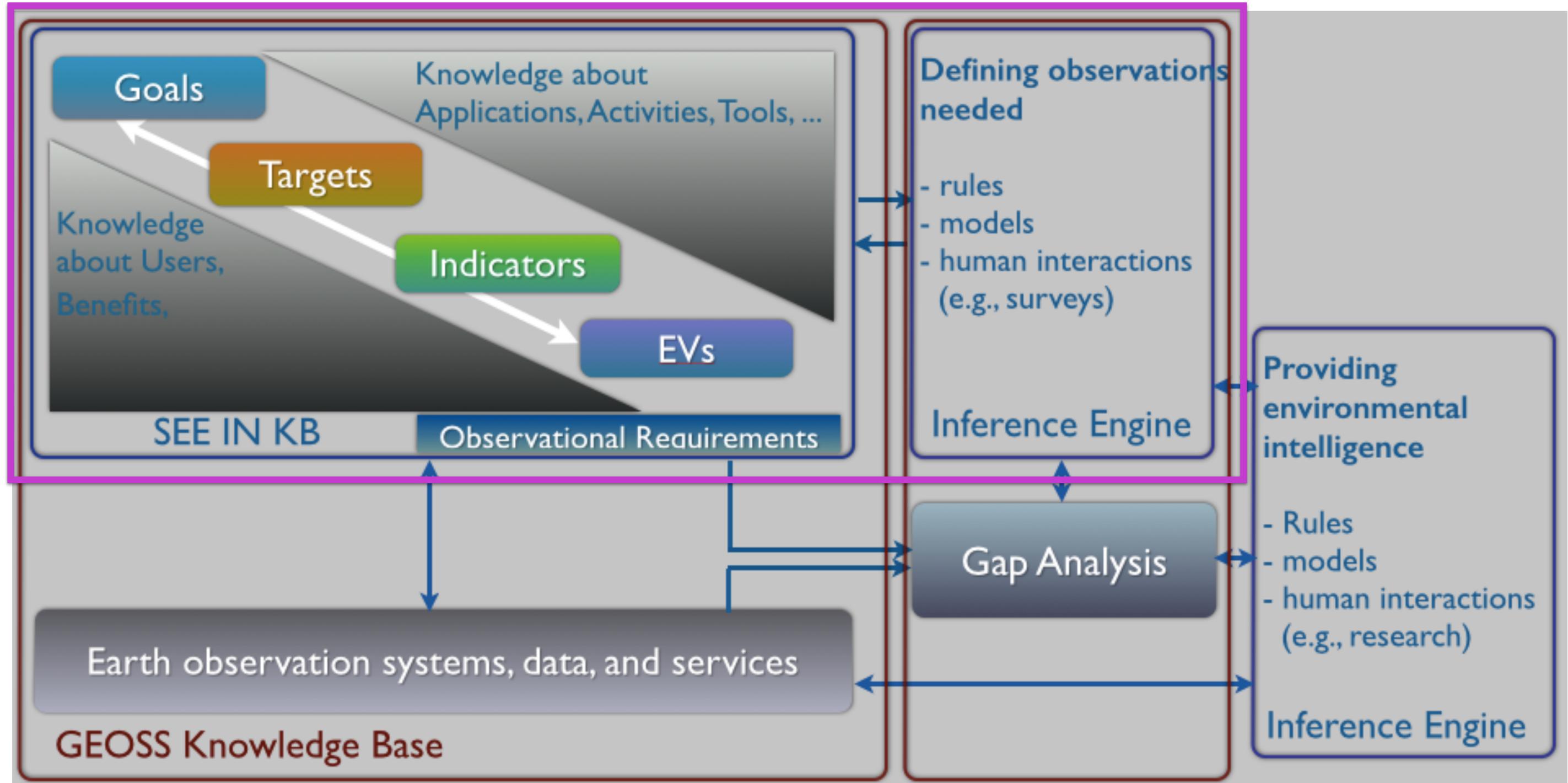
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- Is a starting point for SEE IN KB;
- Needs to be improved





Final Thoughts

ENEON:

Linking European Earth Observation Networks to the SEE IN KB, ensuring that:

- European Knowledge Needs are included
- European EO capabilities are represented
- European IK, CTT, O Gaps can be identified
- Enable/facilitate data to knowledge transition
- Data and knowledge finds its users