

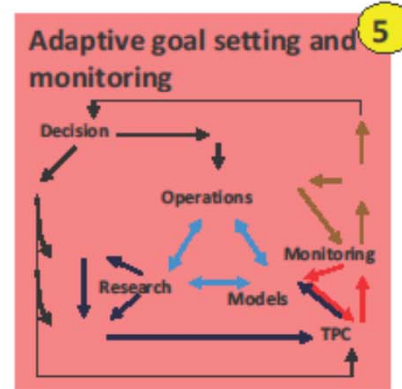
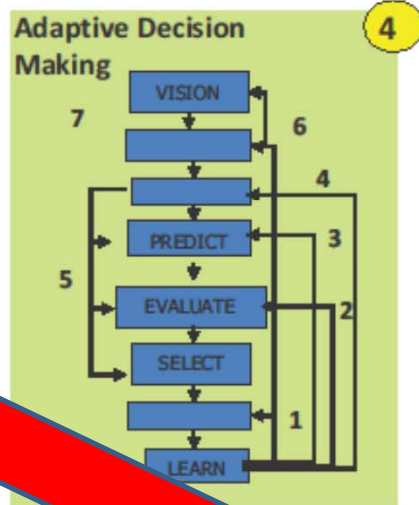
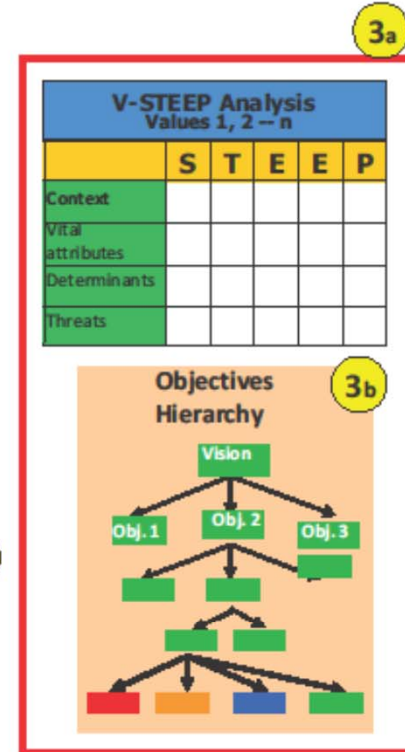
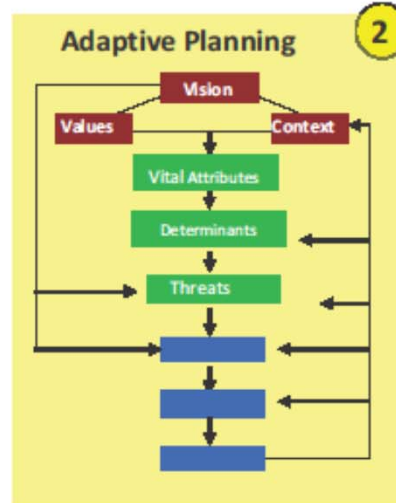
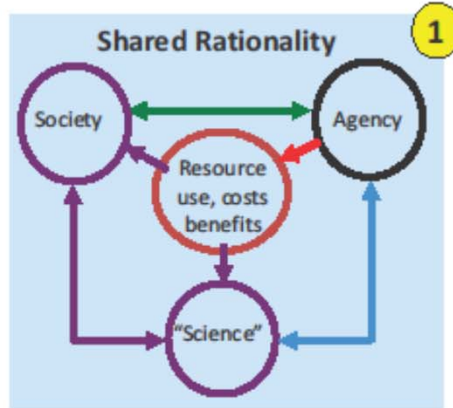
# **The role of participatory agent-based social simulation modeling in adaptive management**

By

Mark Dent

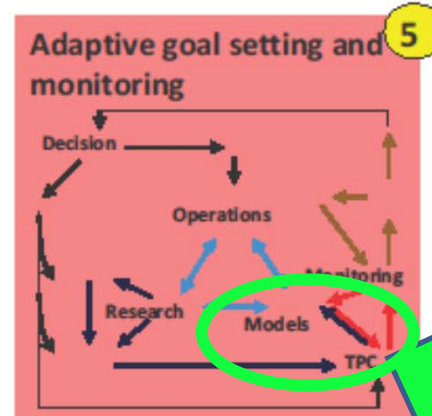
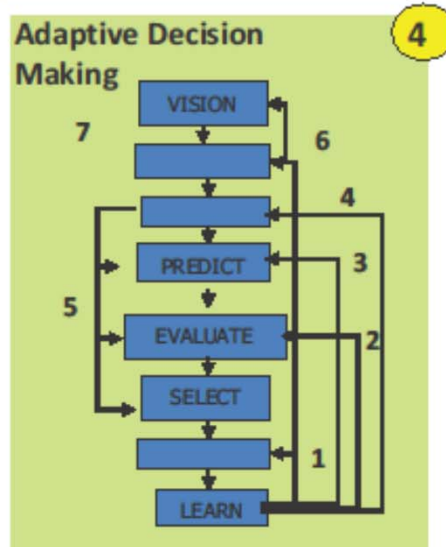
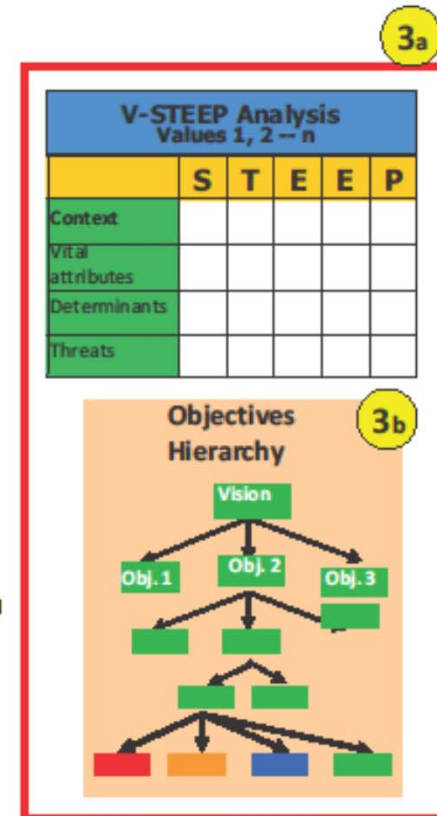
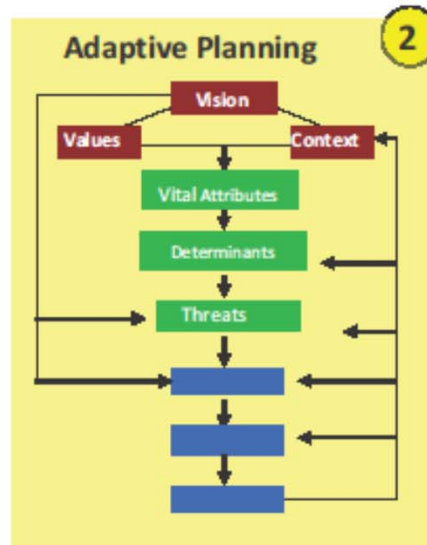
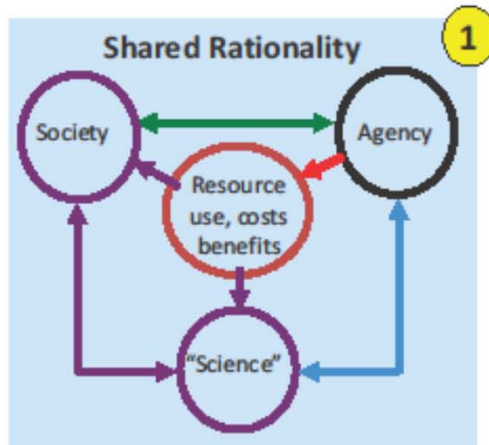
**The role of participatory agent-based  
social simulation modeling  
in  
adaptive management**

# Strategic Adaptive Management



Rogers (2010) paper at UNESCO Chair South African Water Governance Workshop. 25 November 2010, ANU  
<http://www.water.anu.edu.au/UNESCOChair/20101125>

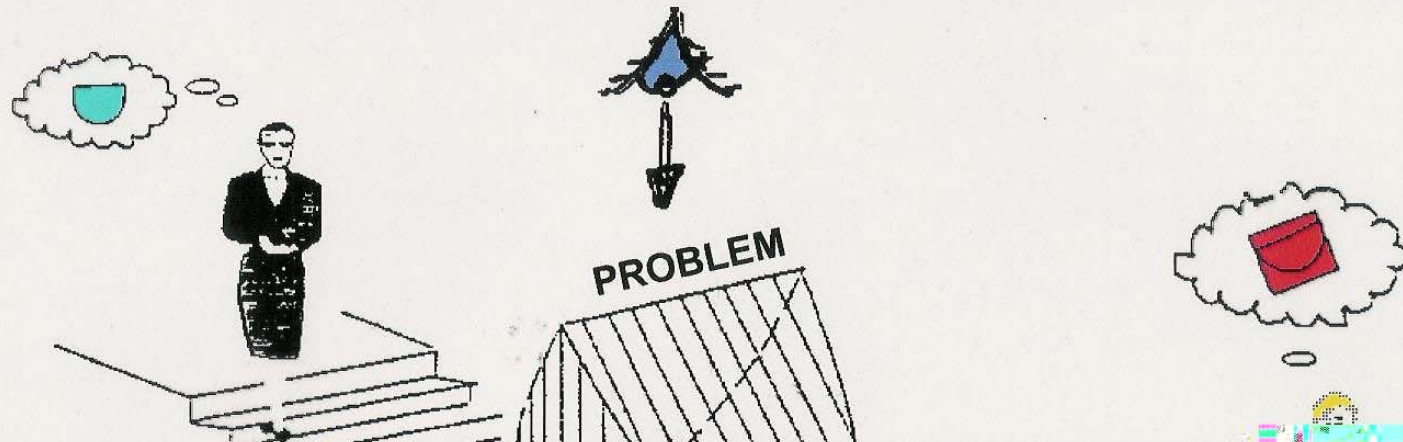
# Strategic Adaptive Management



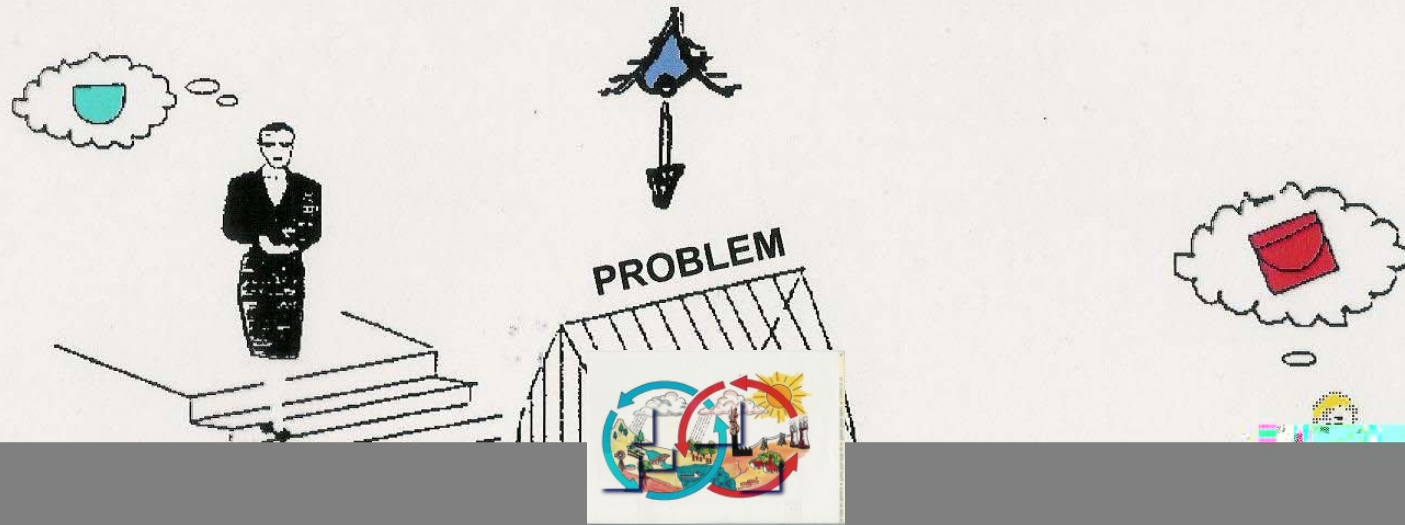
Rogers (2010) paper at UNESCO Chair Soc. Governance  
Workshop, 25 November 2010, ANU  
<http://www.water.anu.edu.au/UNESCOChair/20101125>

**The role of **participatory** agent-based  
social simulation modeling  
in  
adaptive management**

To solve a problem we must see it from all sides

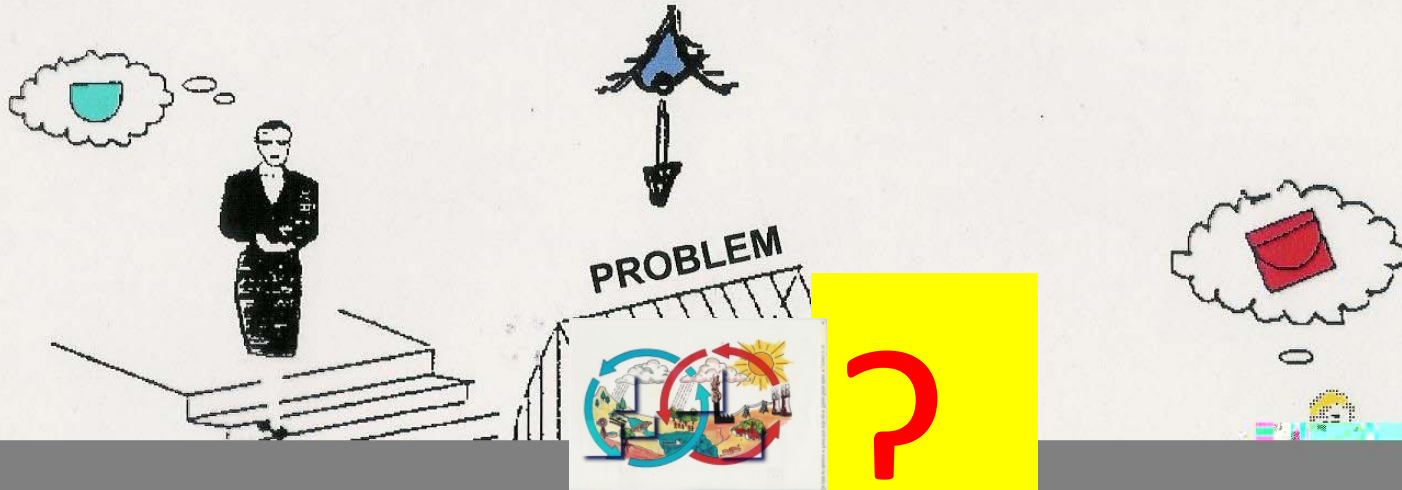


To solve a problem we must see it from all sides



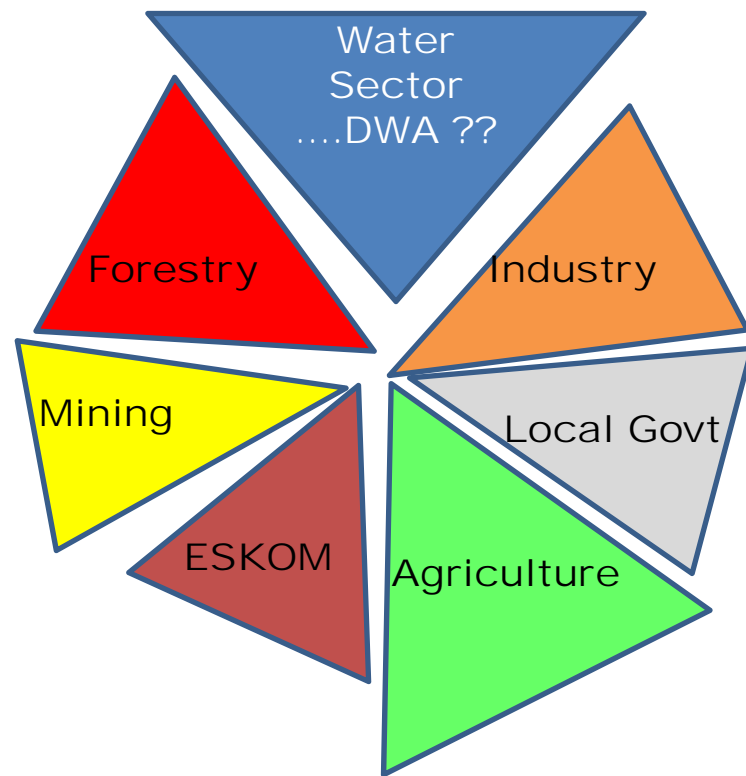


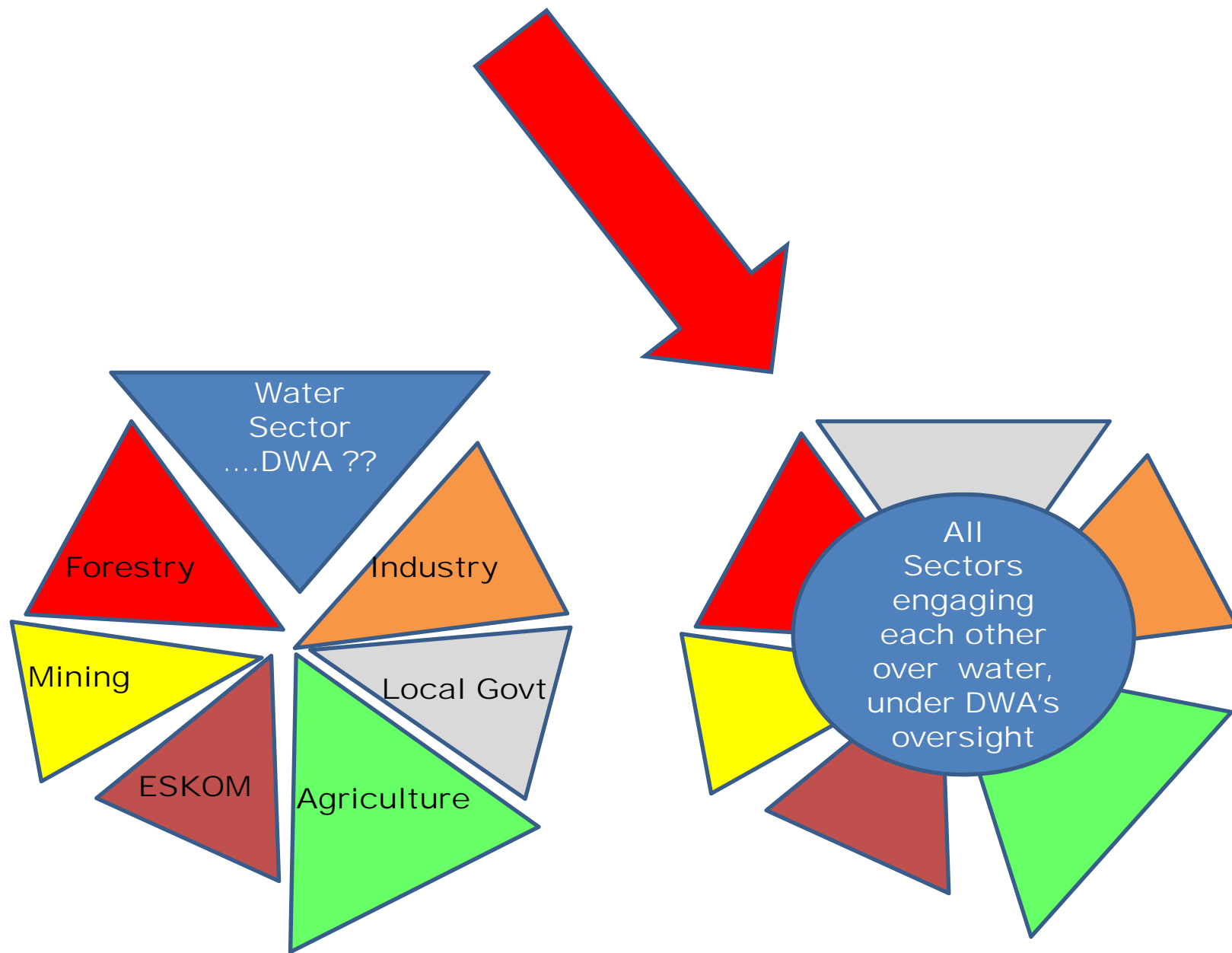
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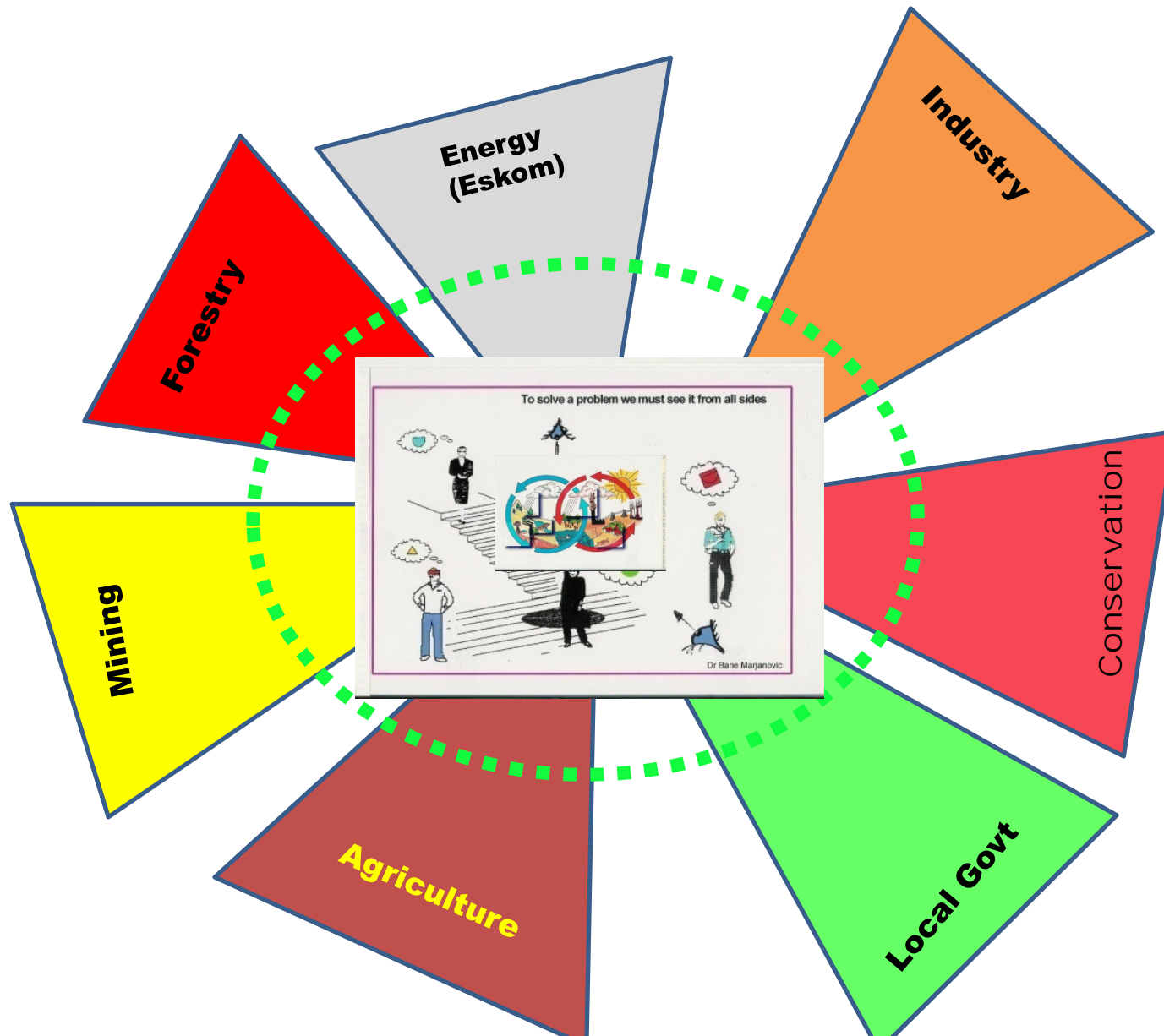




**The role of participatory **agent**-based  
social simulation modeling  
in  
adaptive management**

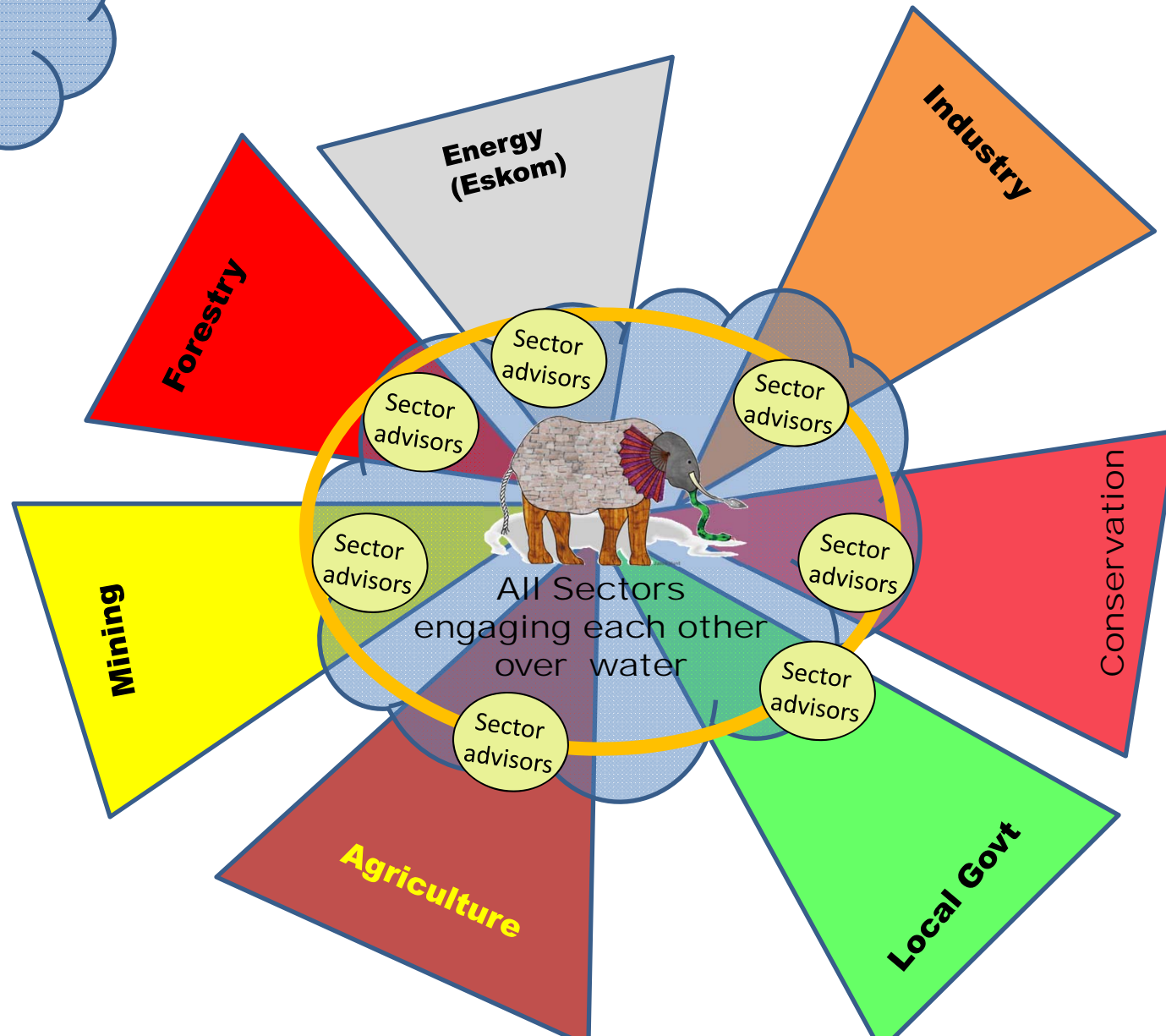






## Key

The cloud depicts an intense virtual network of inter-sector engagement

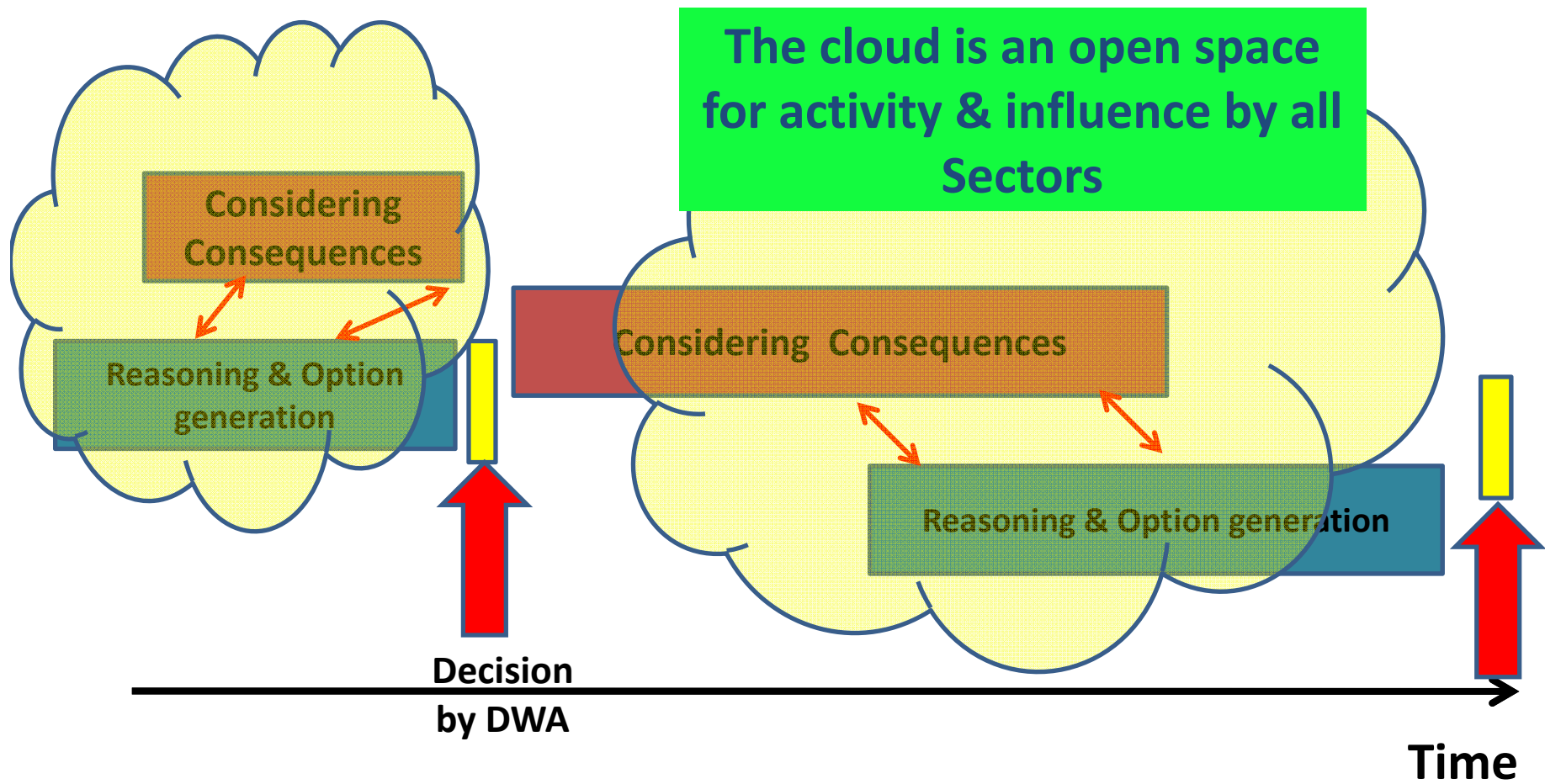


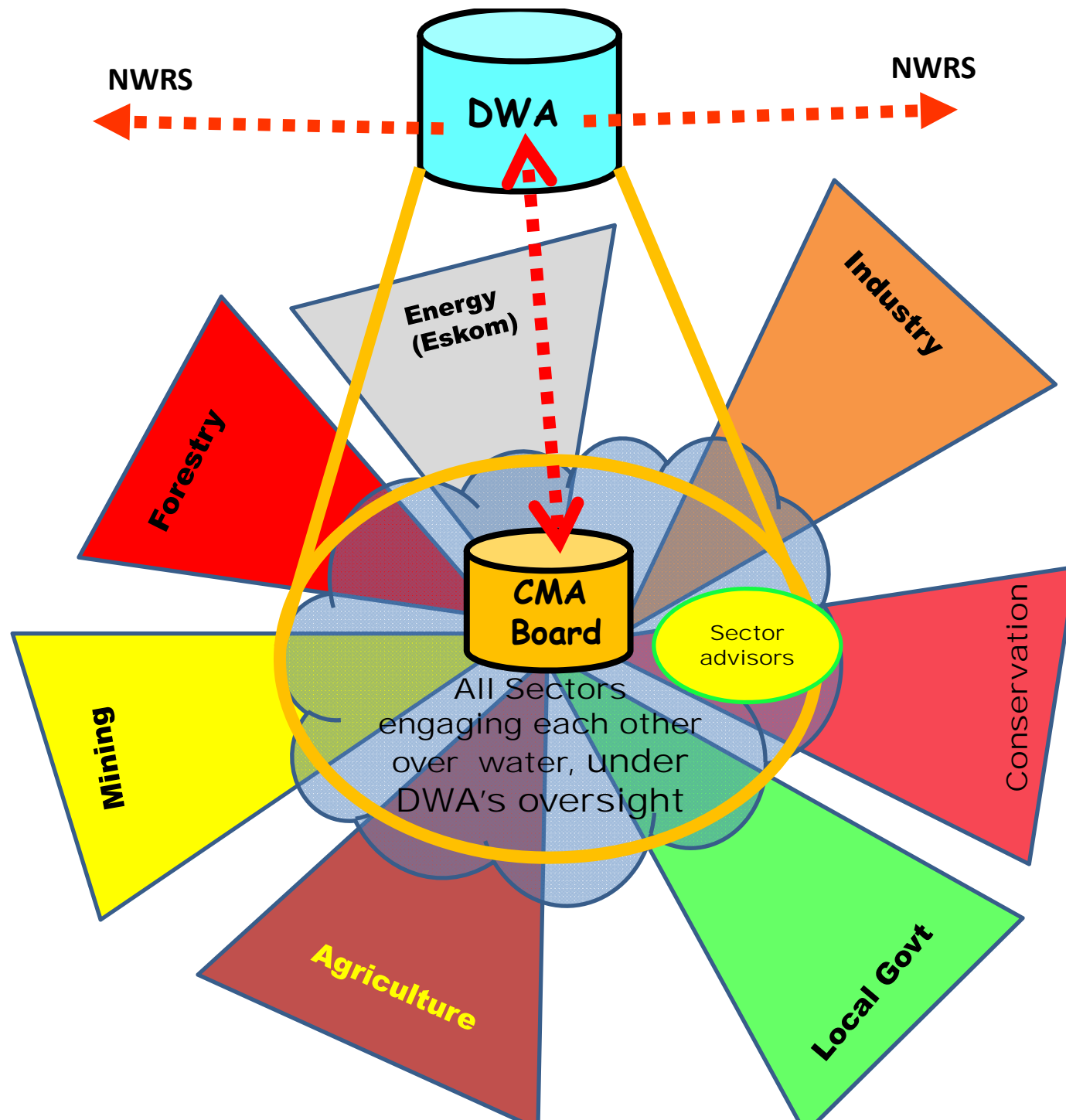
**The role of participatory agent-based  
**social** simulation modeling  
in  
adaptive management**

**Water allocation  
is a  
social process.**

**There is no scientifically proven  
“best allocation”**







# In the cloud of activity

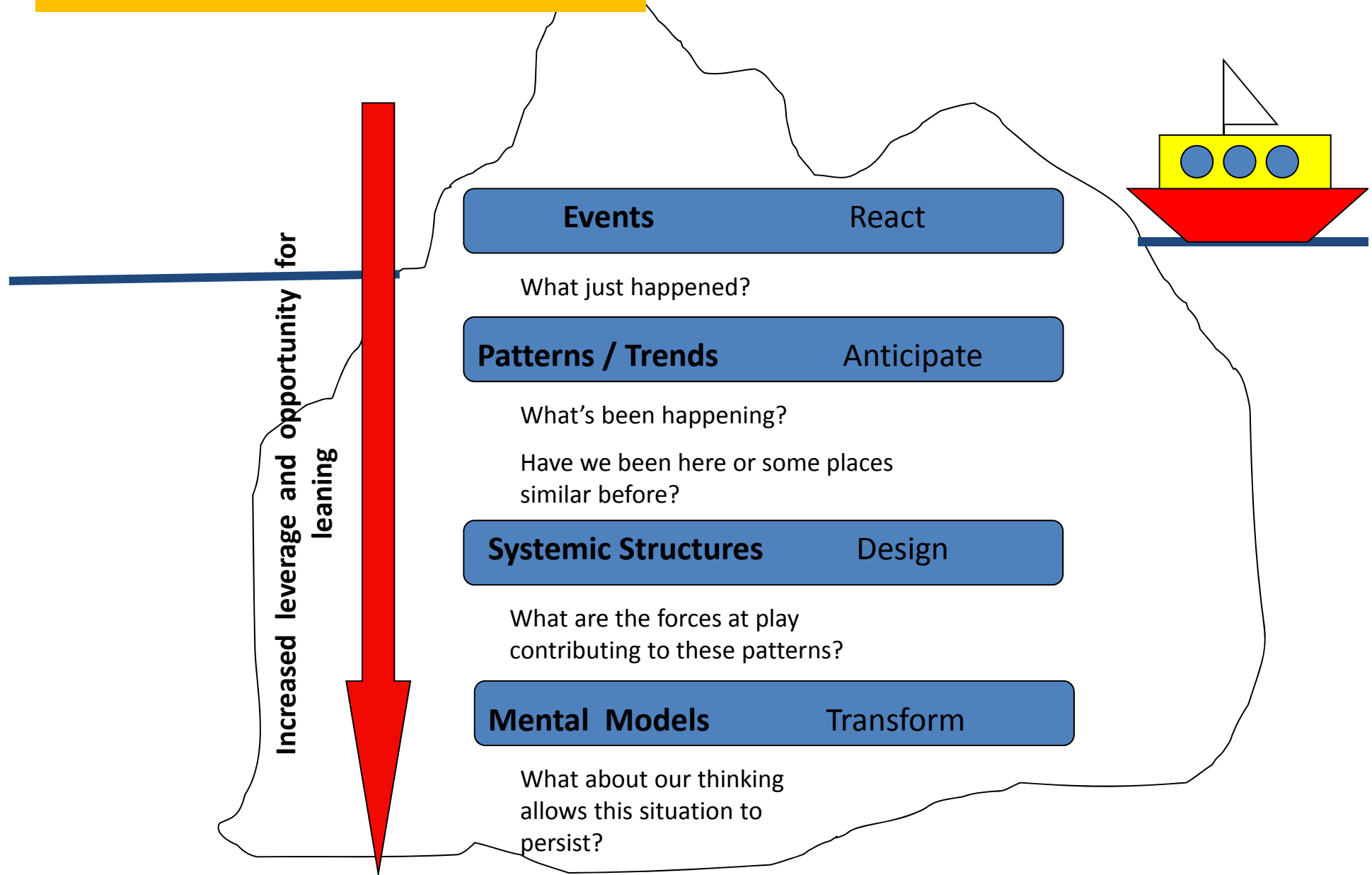
- Self organising
- Self control
- Feedback
- Leadership
- Self monitoring

Modeling ?

"Modeling is the process of  
making **implicit** assumptions  
**explicit**"

Senge et al (1995) Vth Discipline Fieldbook

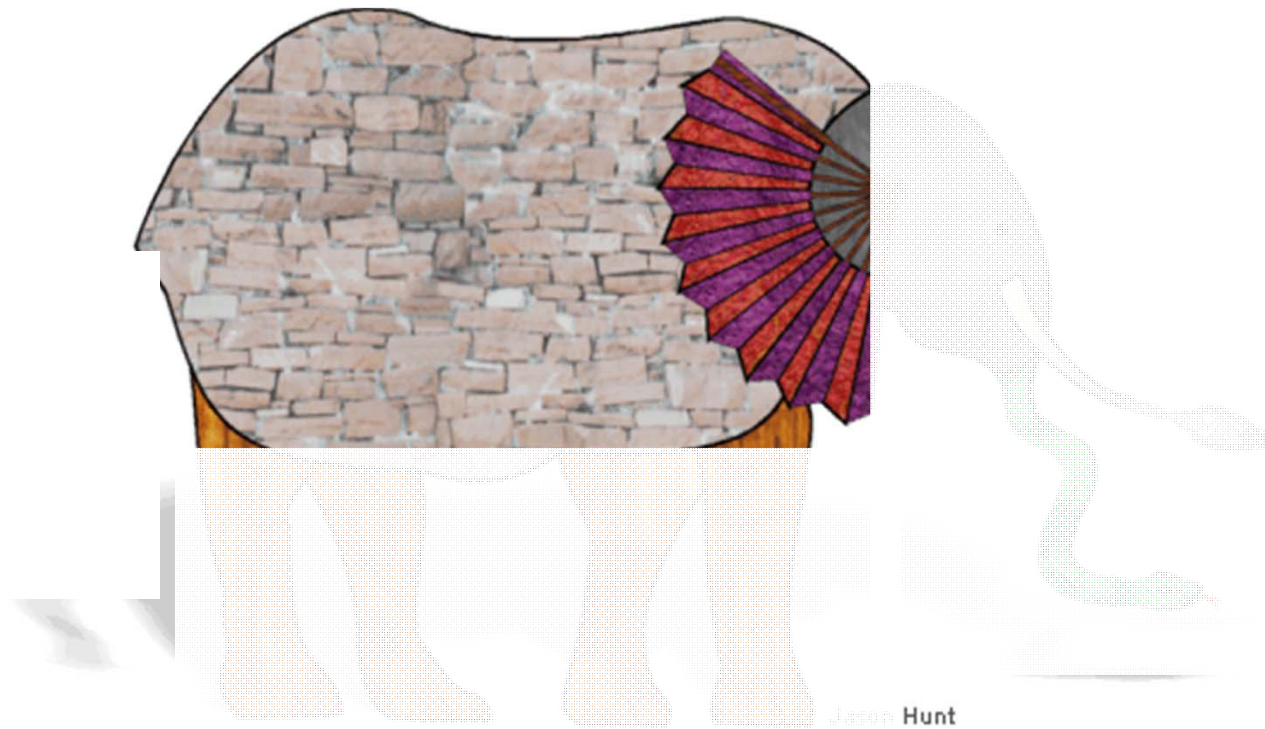
## WAYS OF EXPLAINING REALITY



One of the most common implicit assumptions is,

“What I am seeing is the whole.”





Saxe, John Godfrey, 1963, "The Blind Man and the elephant", New York: Whittlesley House

Elephant illustration ©2002 Jason Hunt  
[www.naturalchild.org/jason](http://www.naturalchild.org/jason)

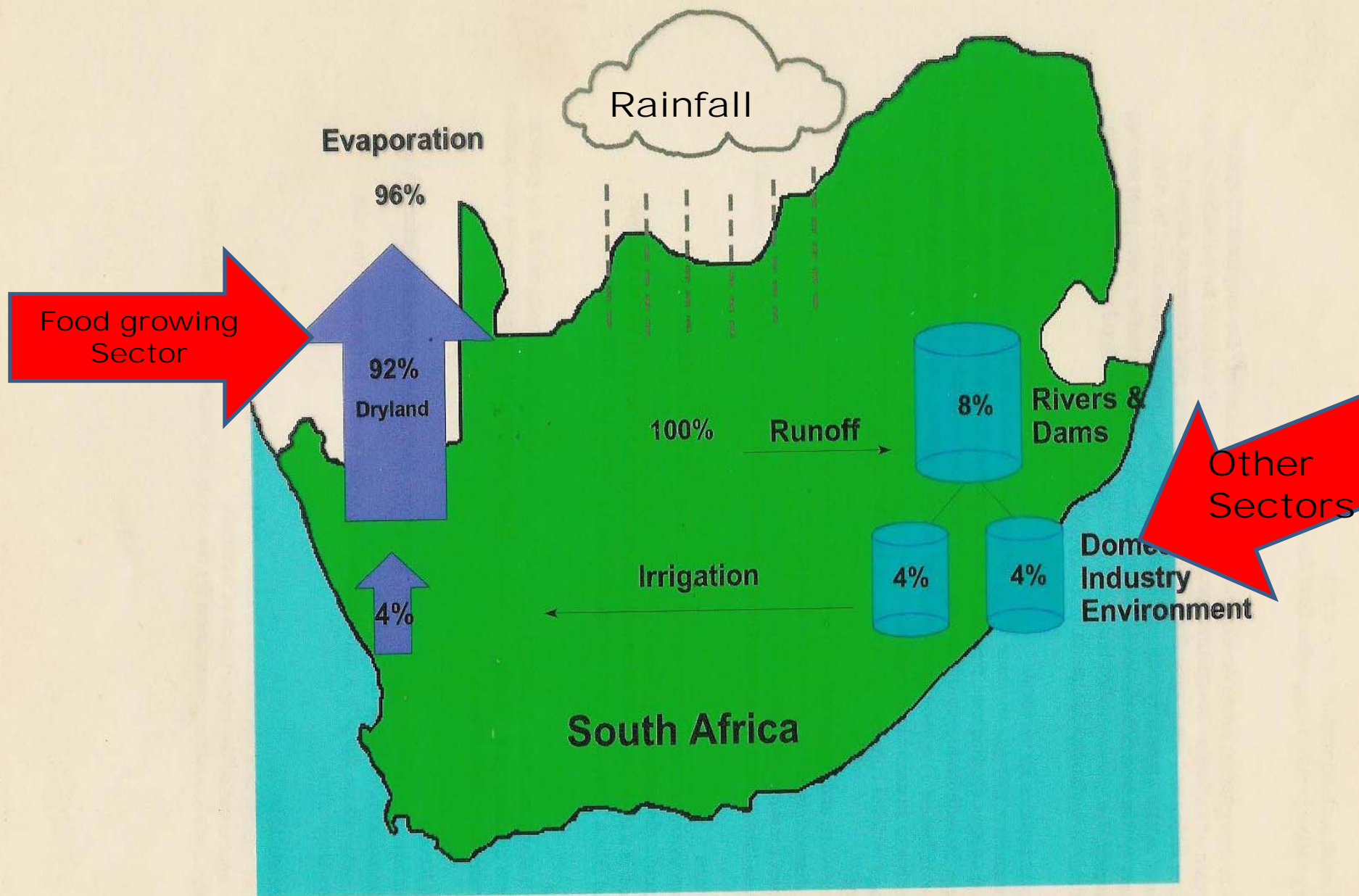
To solve a problem we must see it from all sides



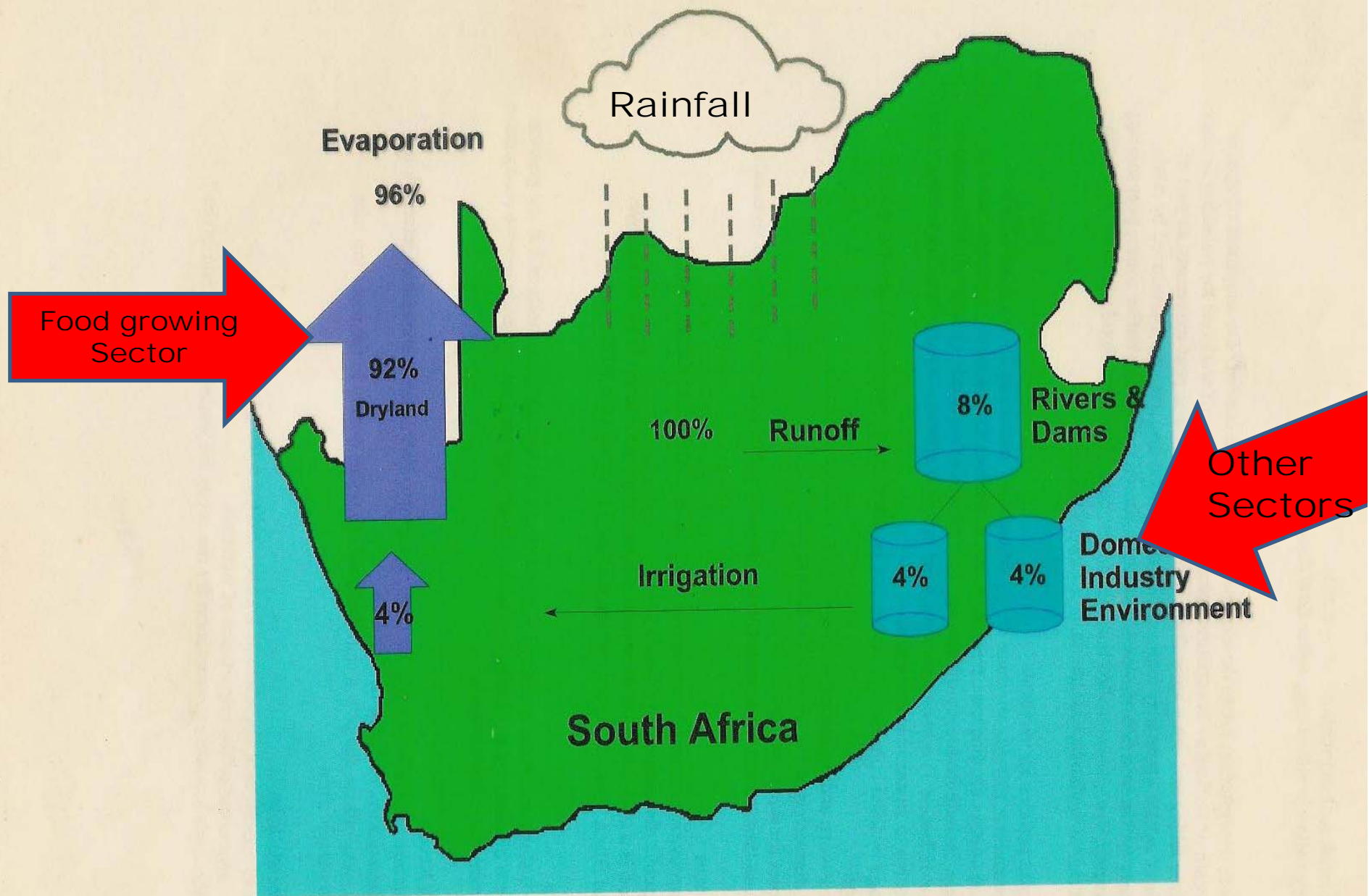
Another implicit assumption

is

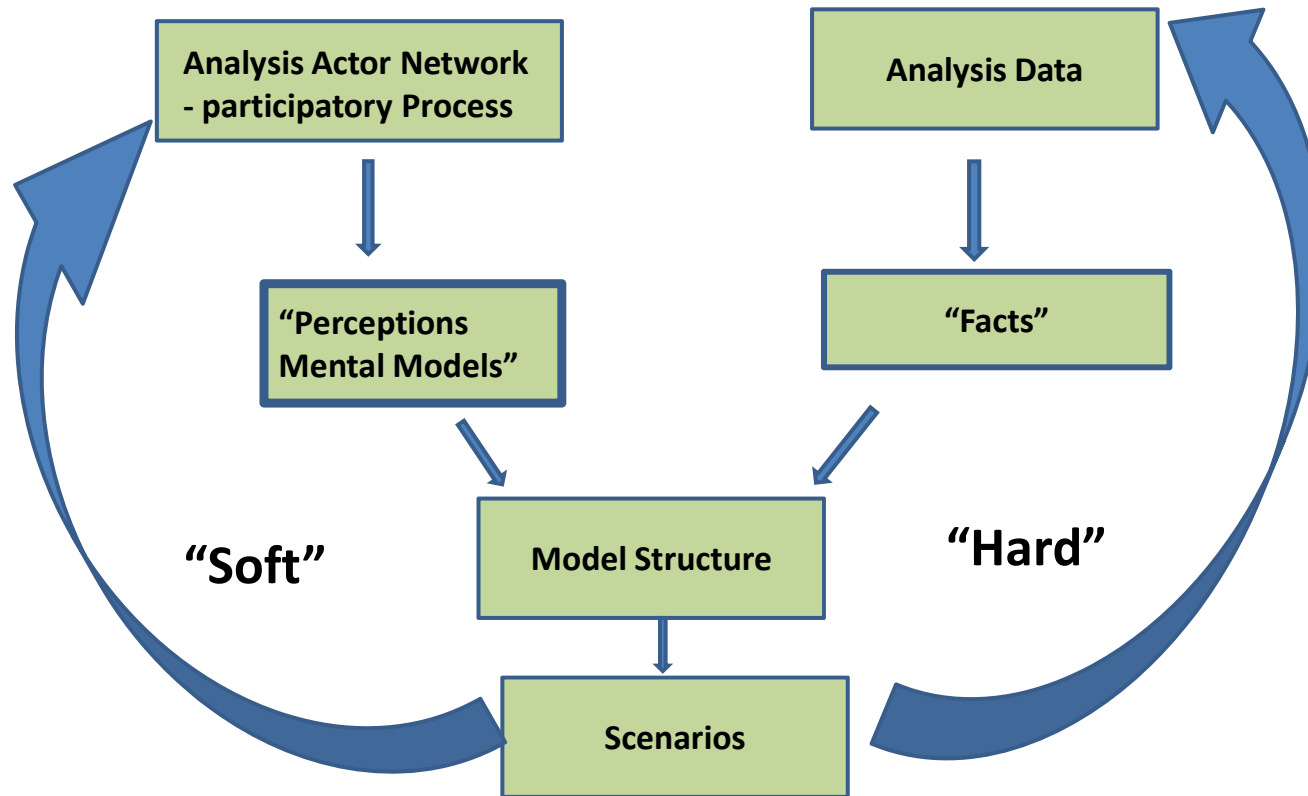
“DWA is in charge of water”







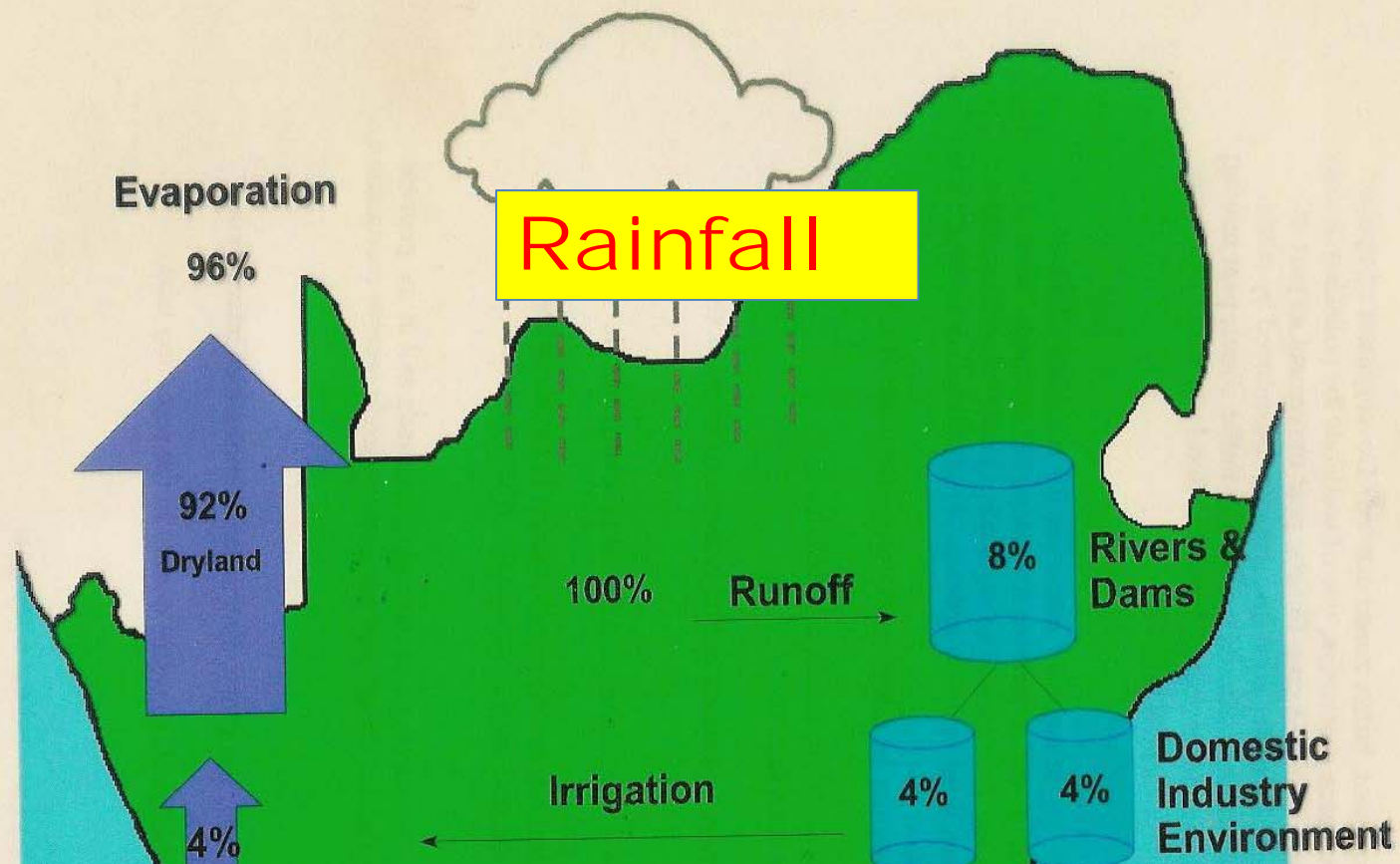
Should Agriculture be the lead Department wrt water ?



Combining “soft” **subjective perceptions** and “hard” factual knowledge in a participatory group model building process.

The parentheses indicate that the distinction between soft and hard elements of knowledge is of gradual nature with a blurred interface.

after Pahl-Wostl (2007) Pg 564



Total rain gauge catch surface of our 10 000 rain gauges represents

1

-----  
100000000000000

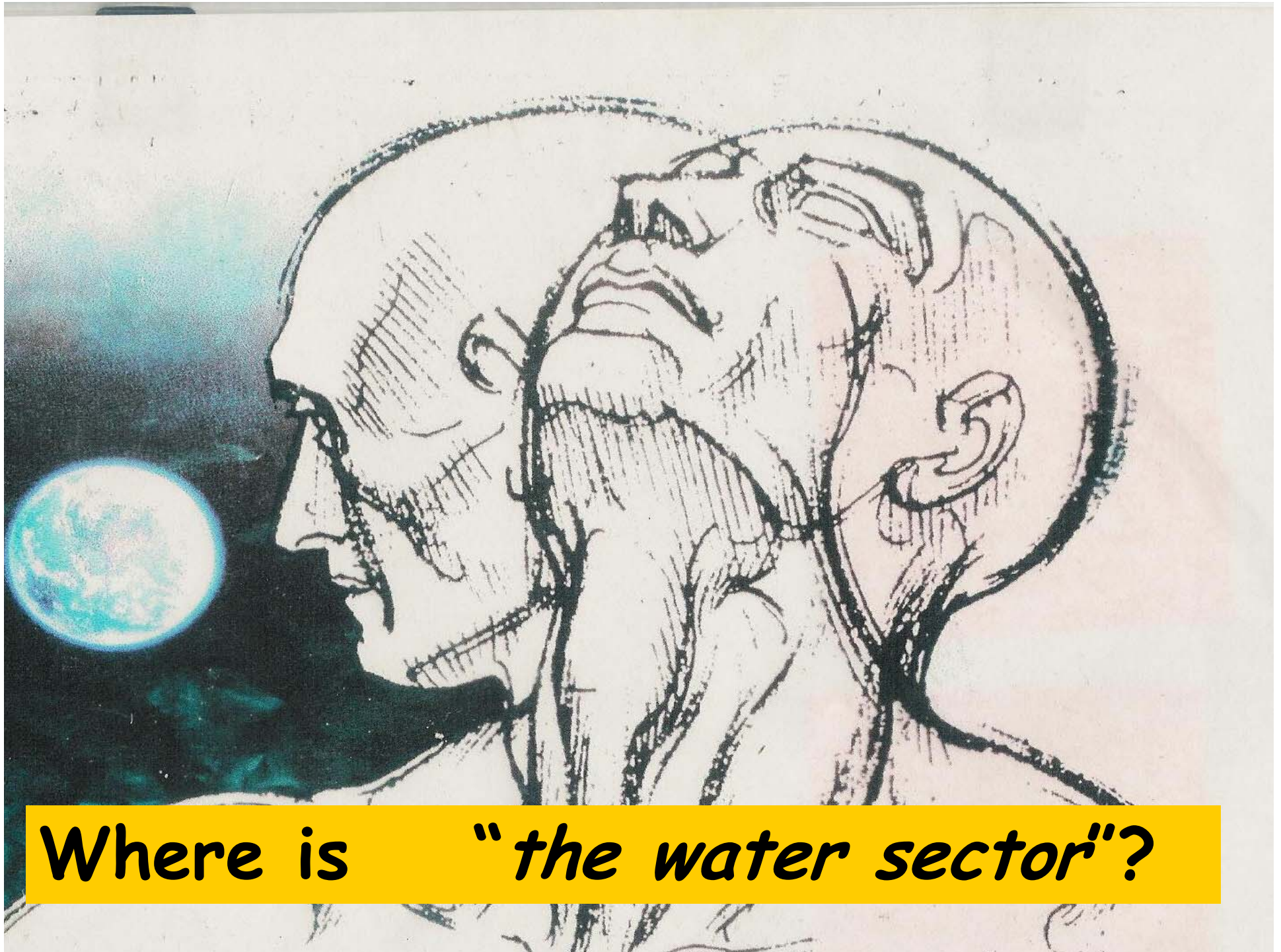
of the surface area of South Africa



Assumptions implicit in our language.

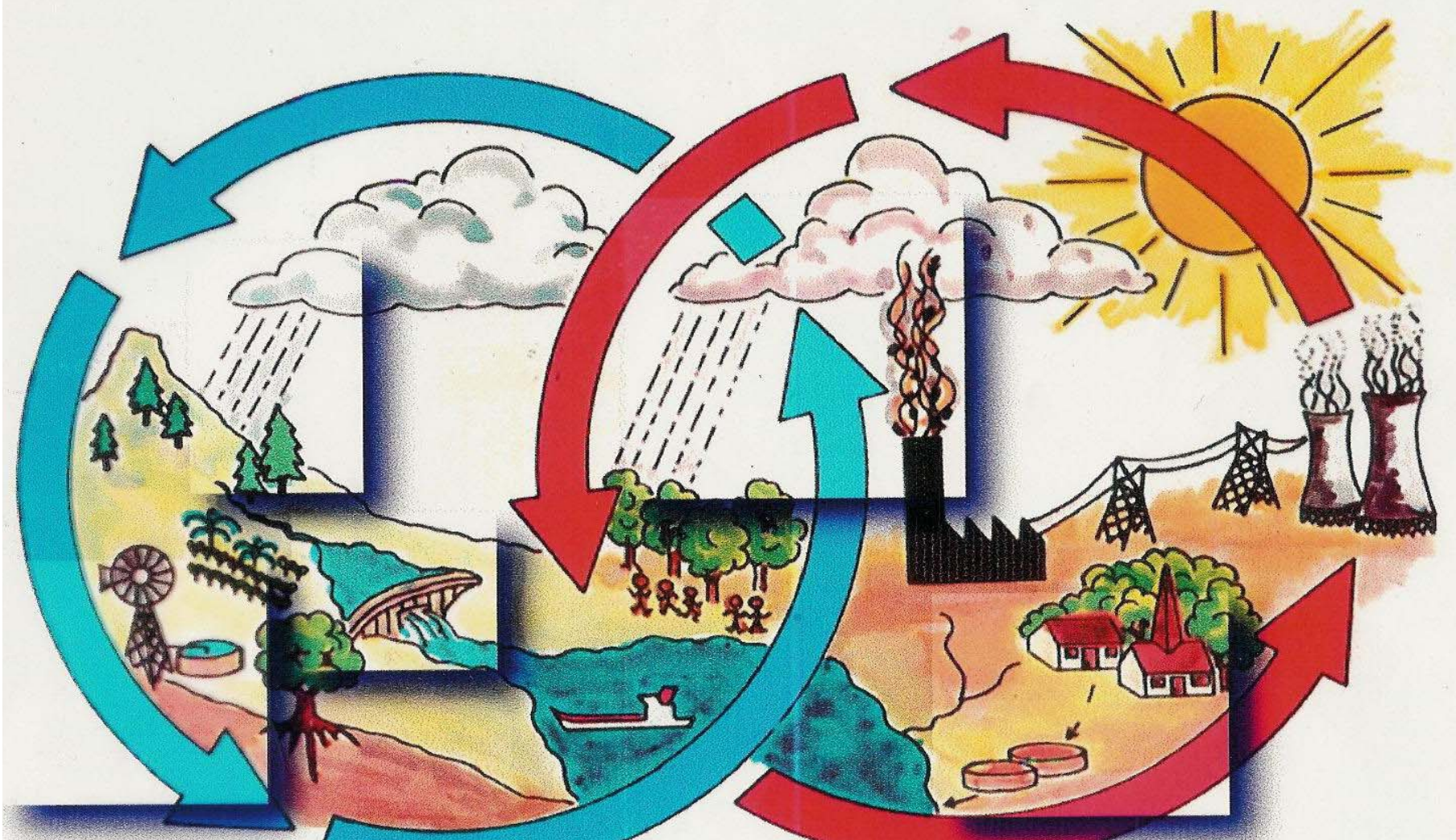
We speak of,

“the Water Sector”



**Where is *"the water sector"*?**





Where is *"the water sector"*?



# THE CUBE

ENVIRONMENTAL STRATEGIES FOR THE 1990s

Where is *"the water sector"*?



INDICATOR PROJECT SOUTH AFRICA



# What is Participatory agent based social simulation modeling?

*“Agent based social simulation is a very promising approach to represent the complex dynamics of social systems and to develop integrated models for **human-technology-environment** systems.*

*It is an excellent potential framework for combining insights from different social science disciplines and it is particularly suited for being used in **participatory** processes*

*(Pahl-Wostl, 2002).*

**Thank you**









# THE CUBE

ENVIRONMENTAL STRATEGIES FOR THE 1990s

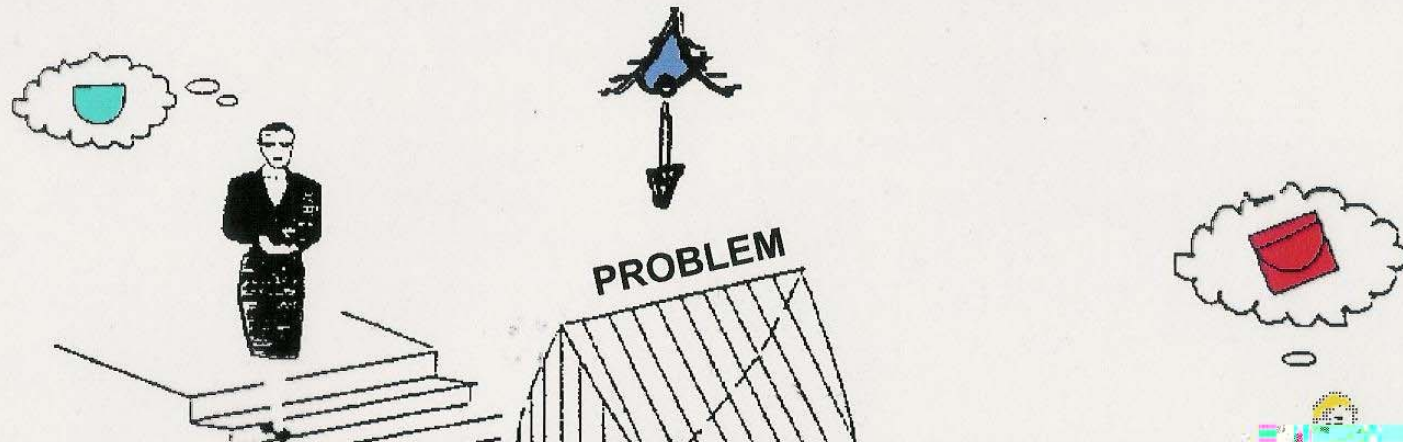
Where is *"the water sector"*?



INDICATOR PROJECT SOUTH AFRICA

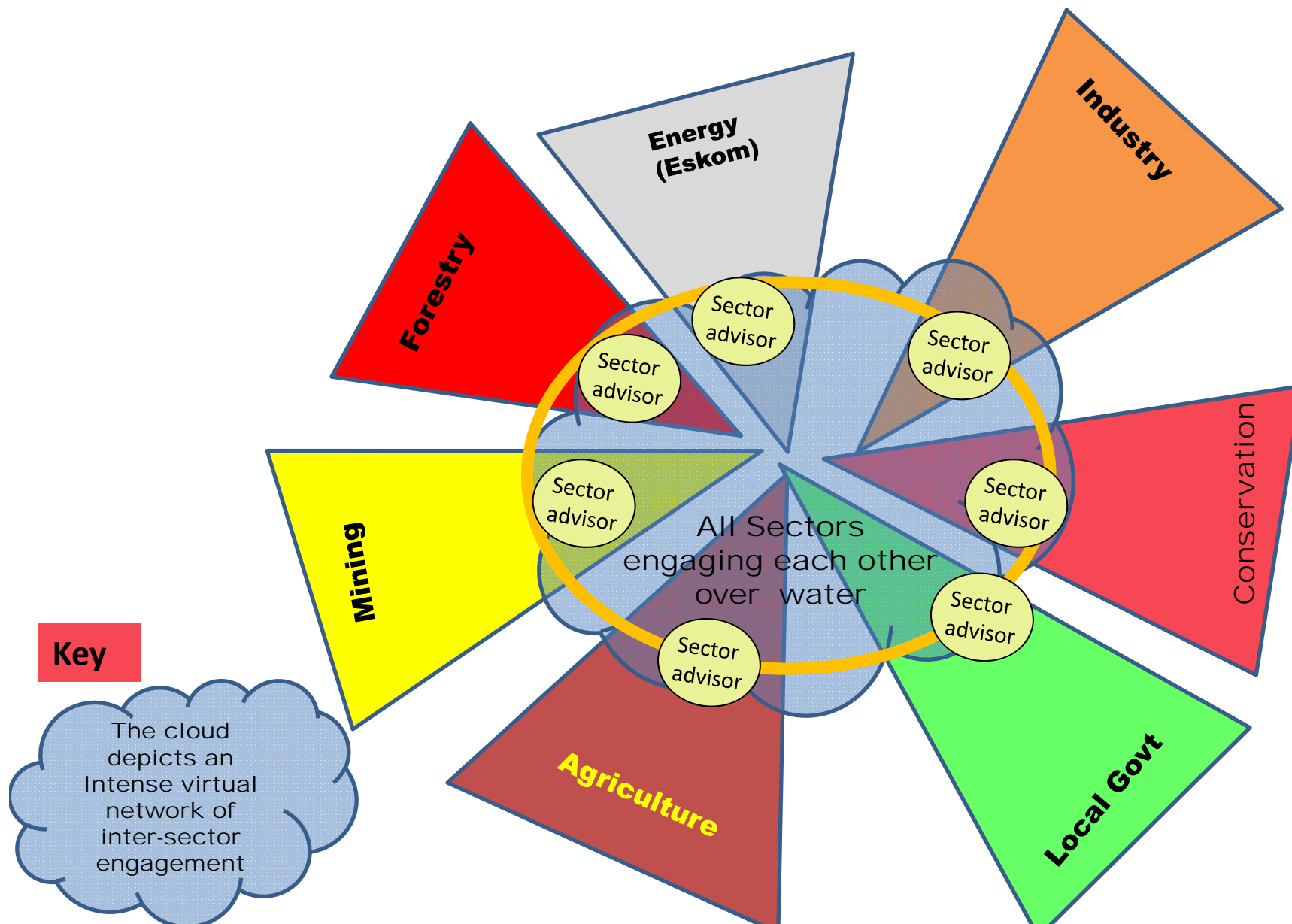


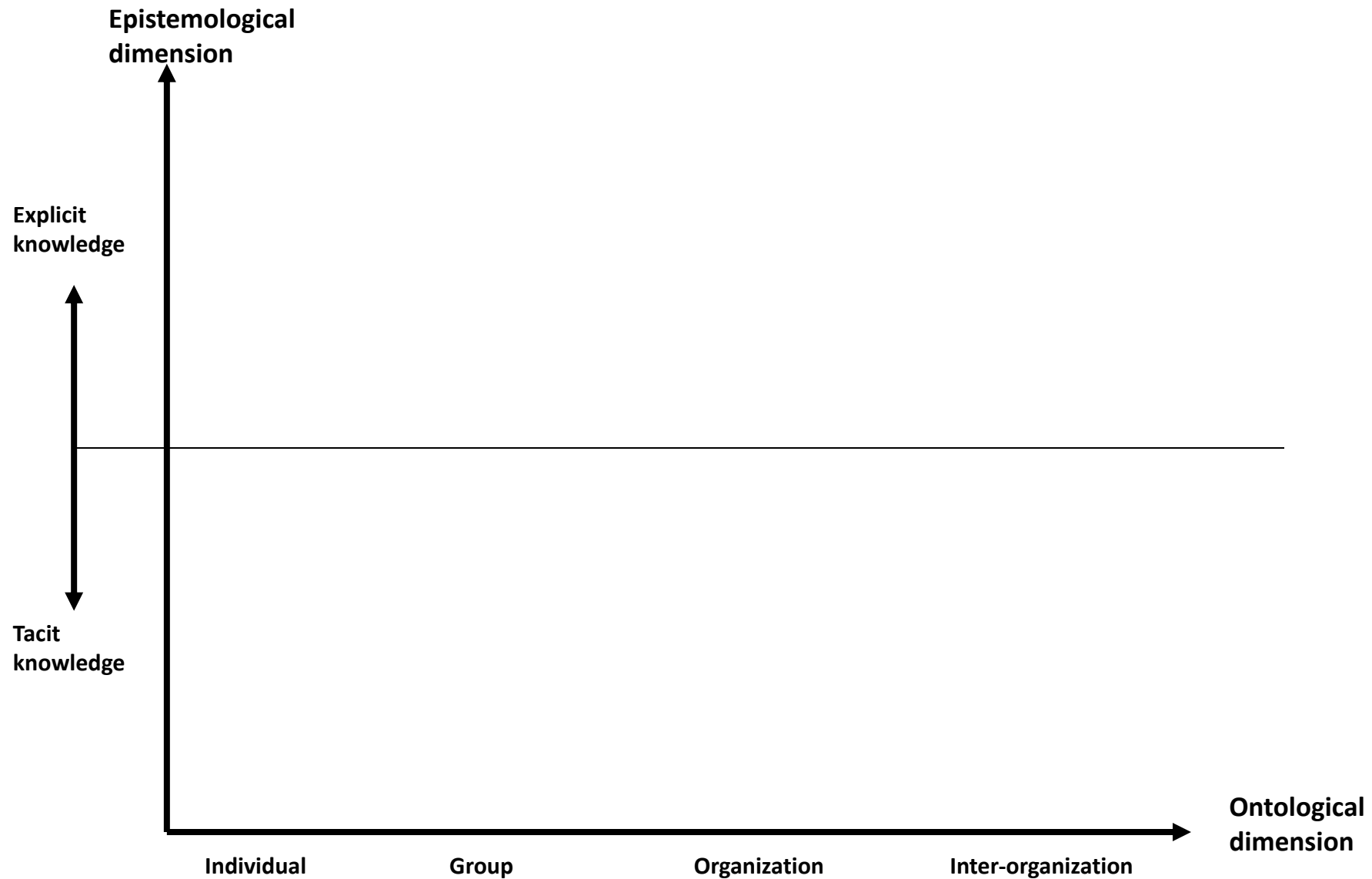
To solve a problem we must see it from all sides



**Water allocation  
is a  
social process.**

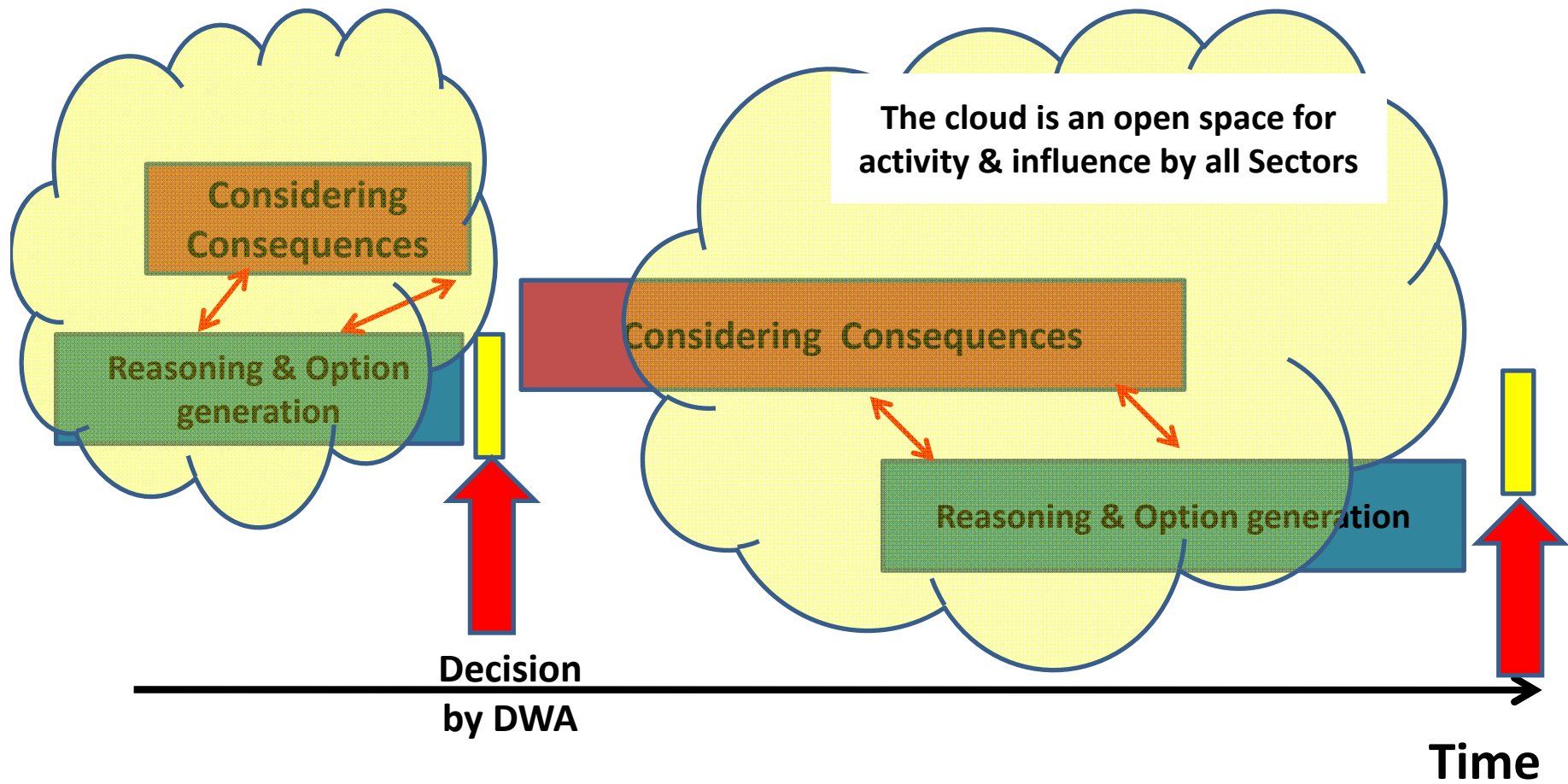
**There is no scientifically proven “best  
allocation”**

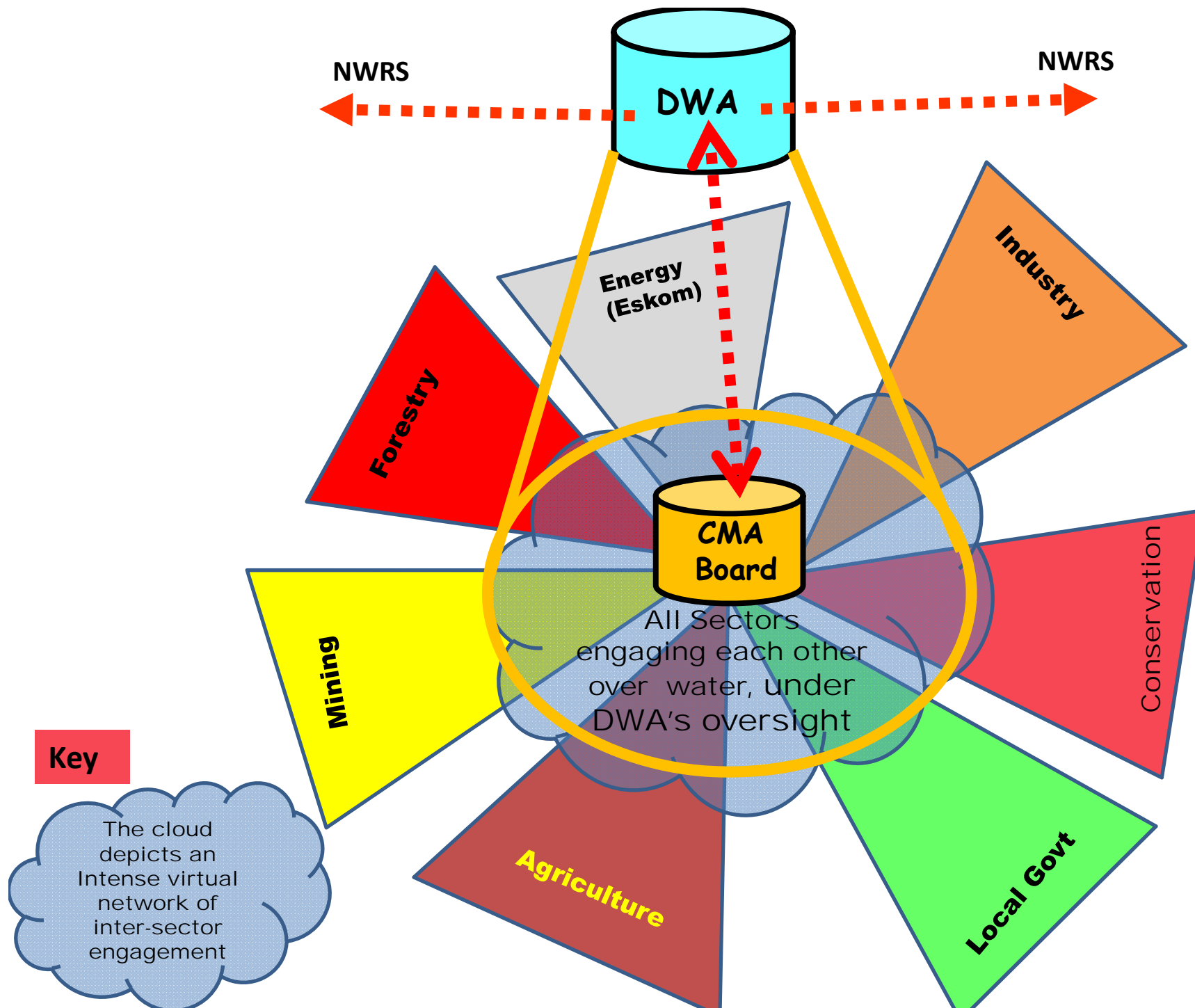




**Epistemology** :- the theory of knowledge

**Ontology** :- the science that investigates the nature of pure being, its essential properties and the relation one universal bears to another. (*the socialization dimension*)

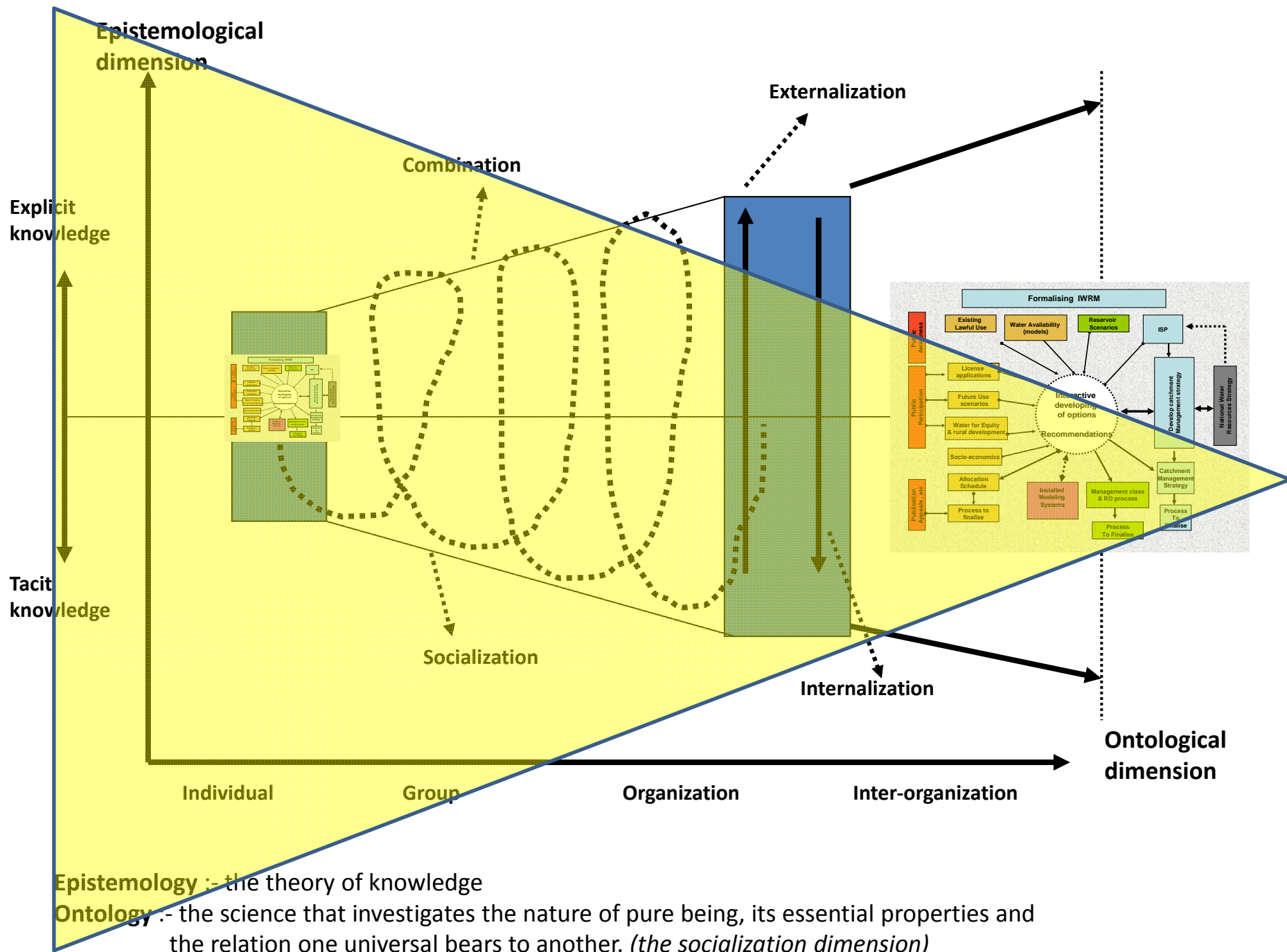


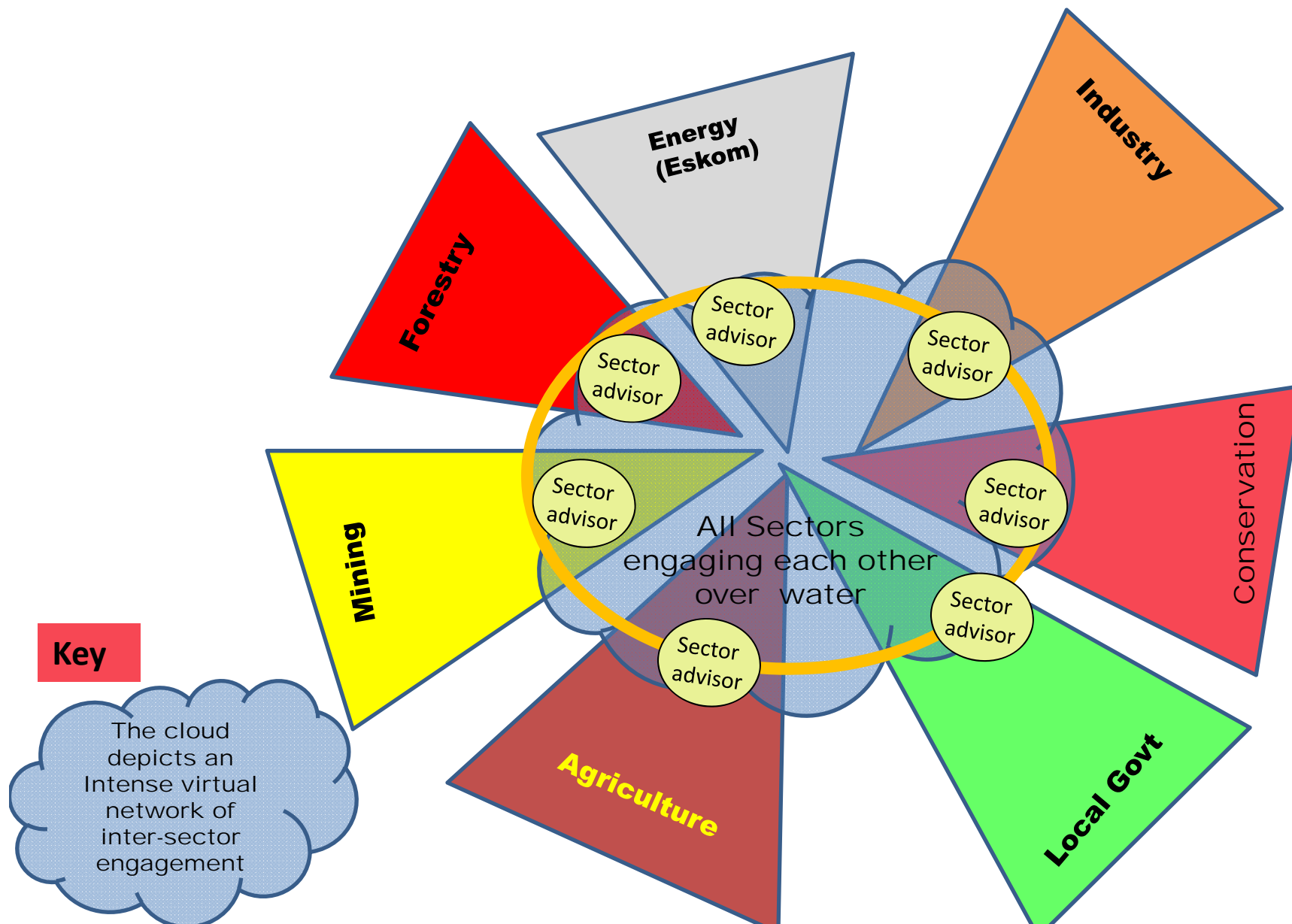


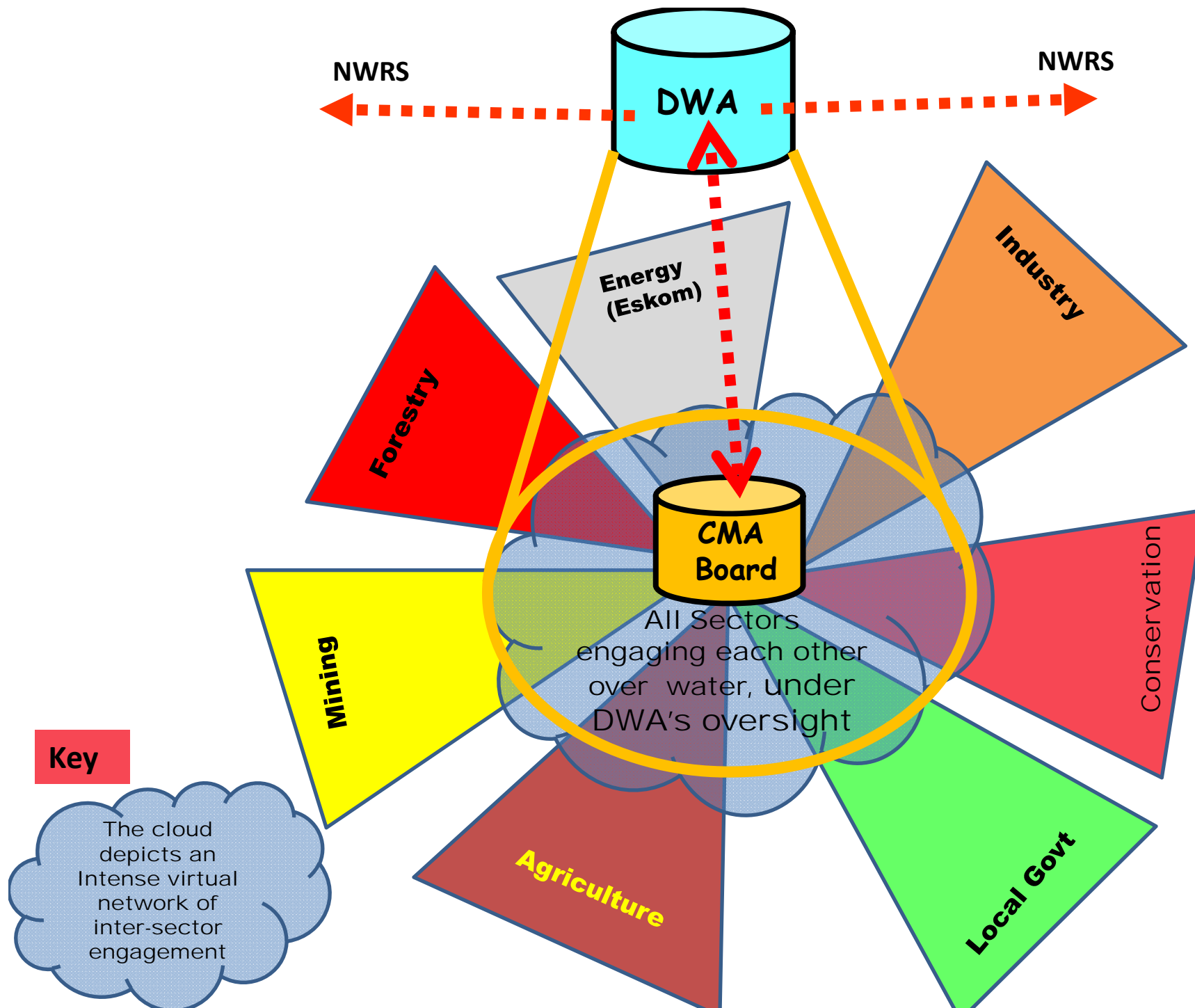




Mining

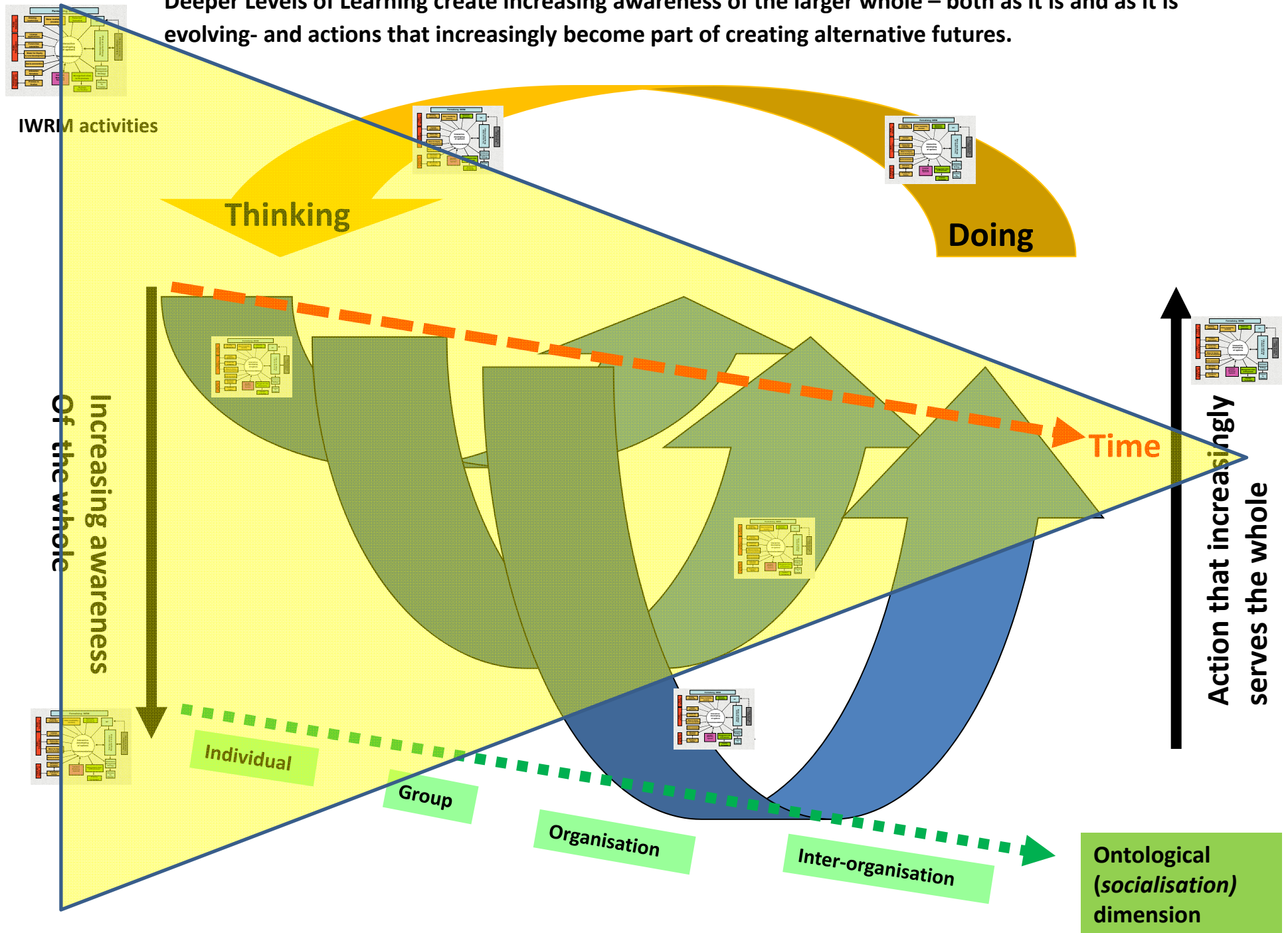


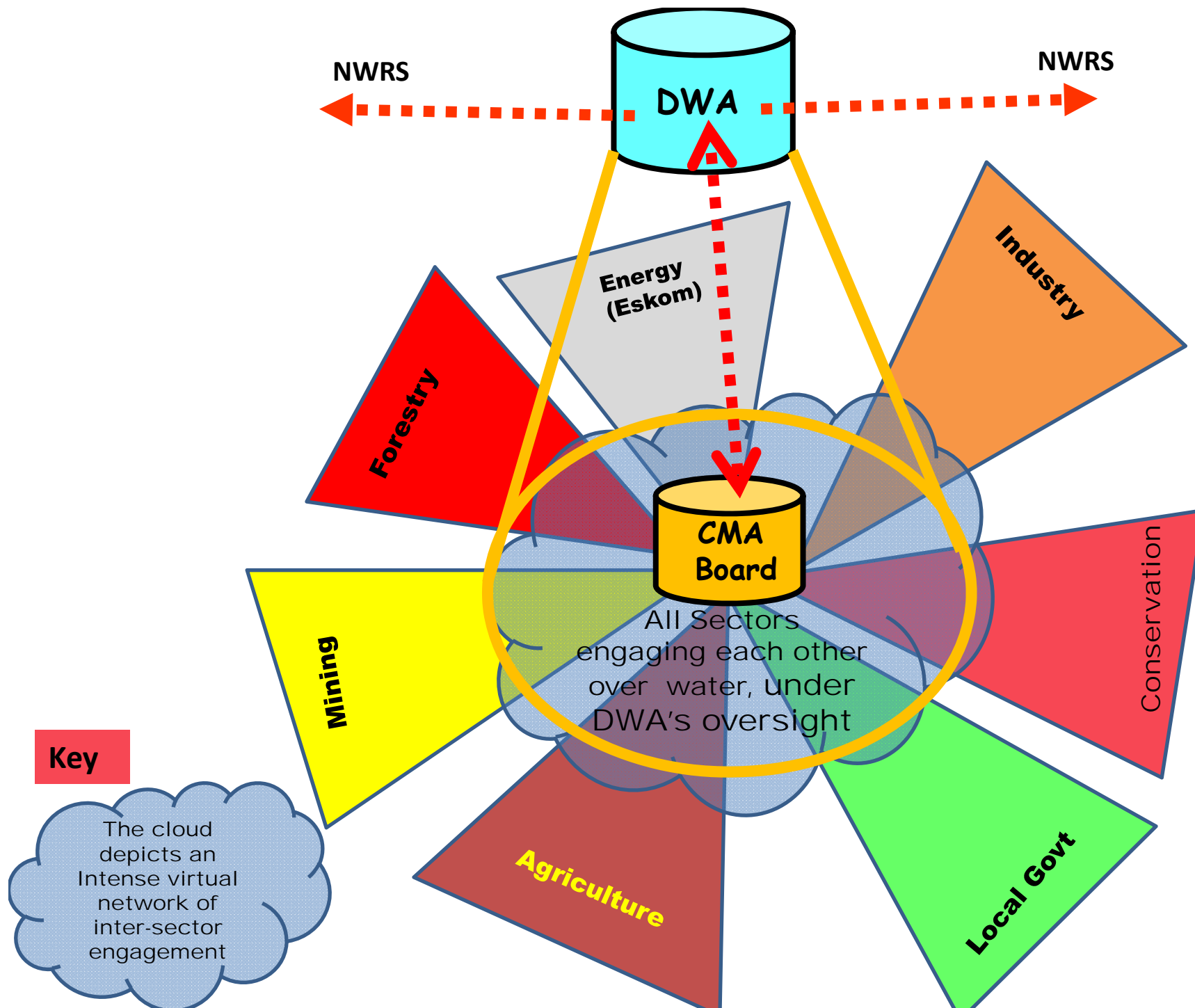


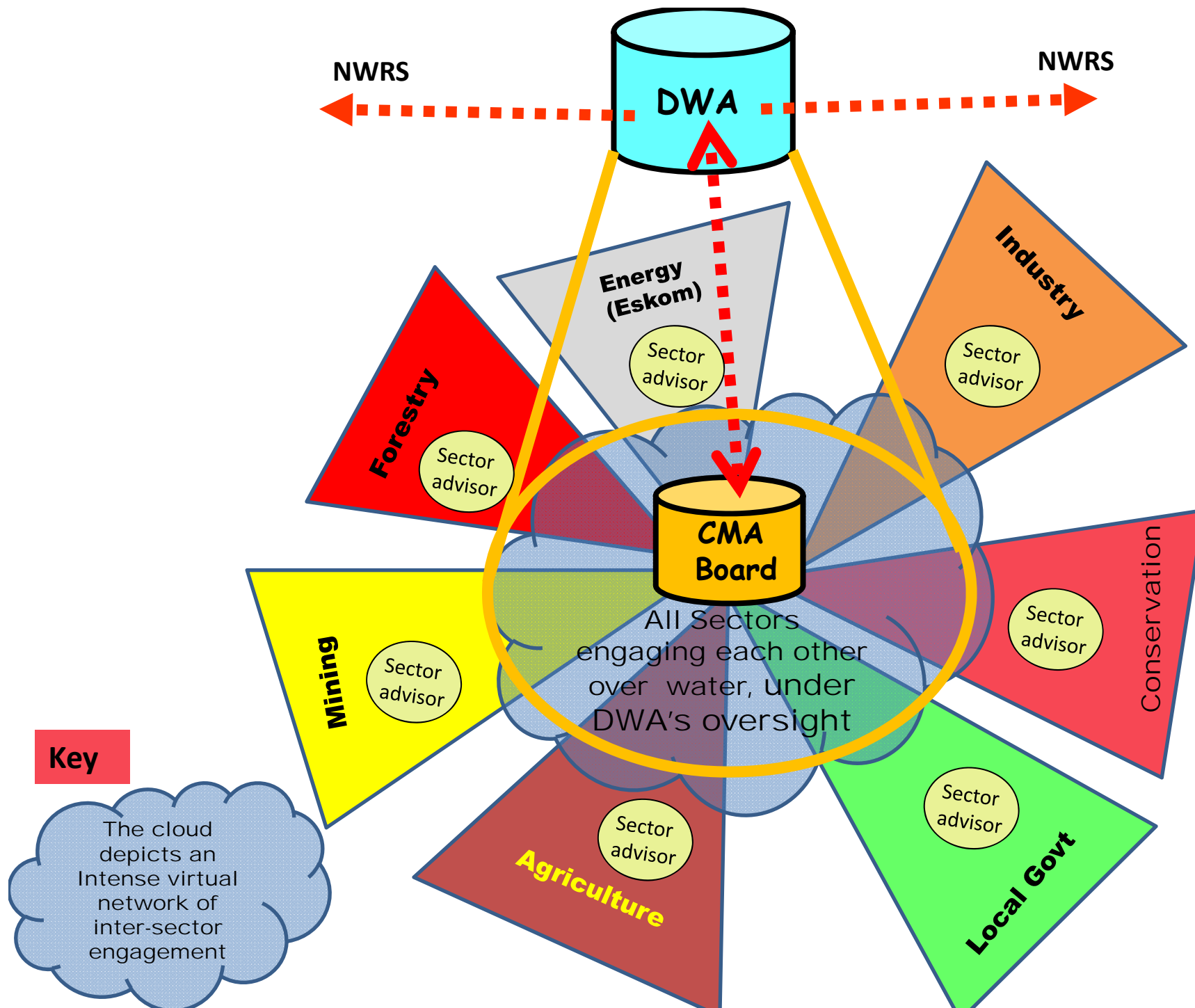


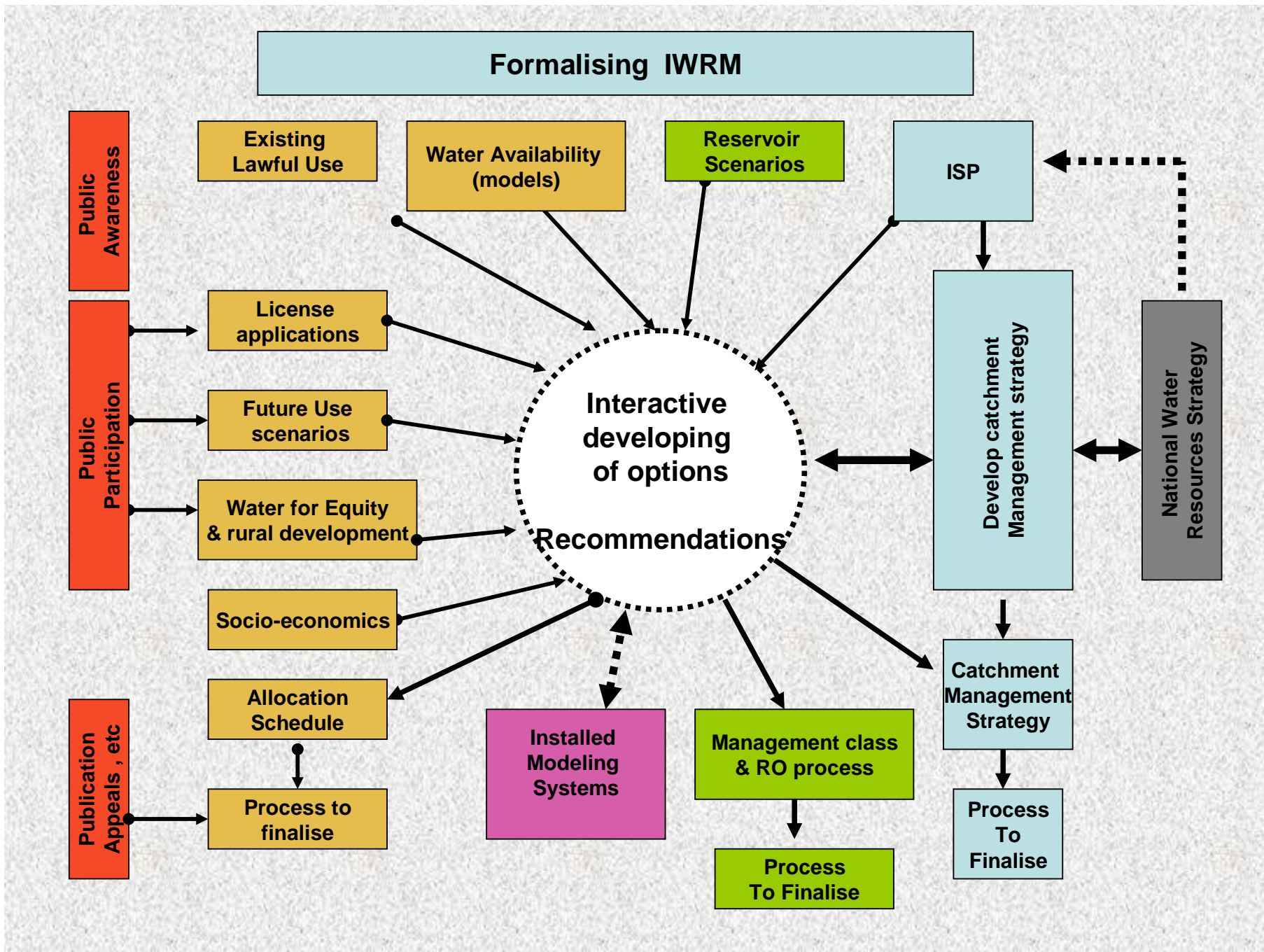


Deeper Levels of Learning create increasing awareness of the larger whole – both as it is and as it is evolving- and actions that increasingly become part of creating alternative futures.



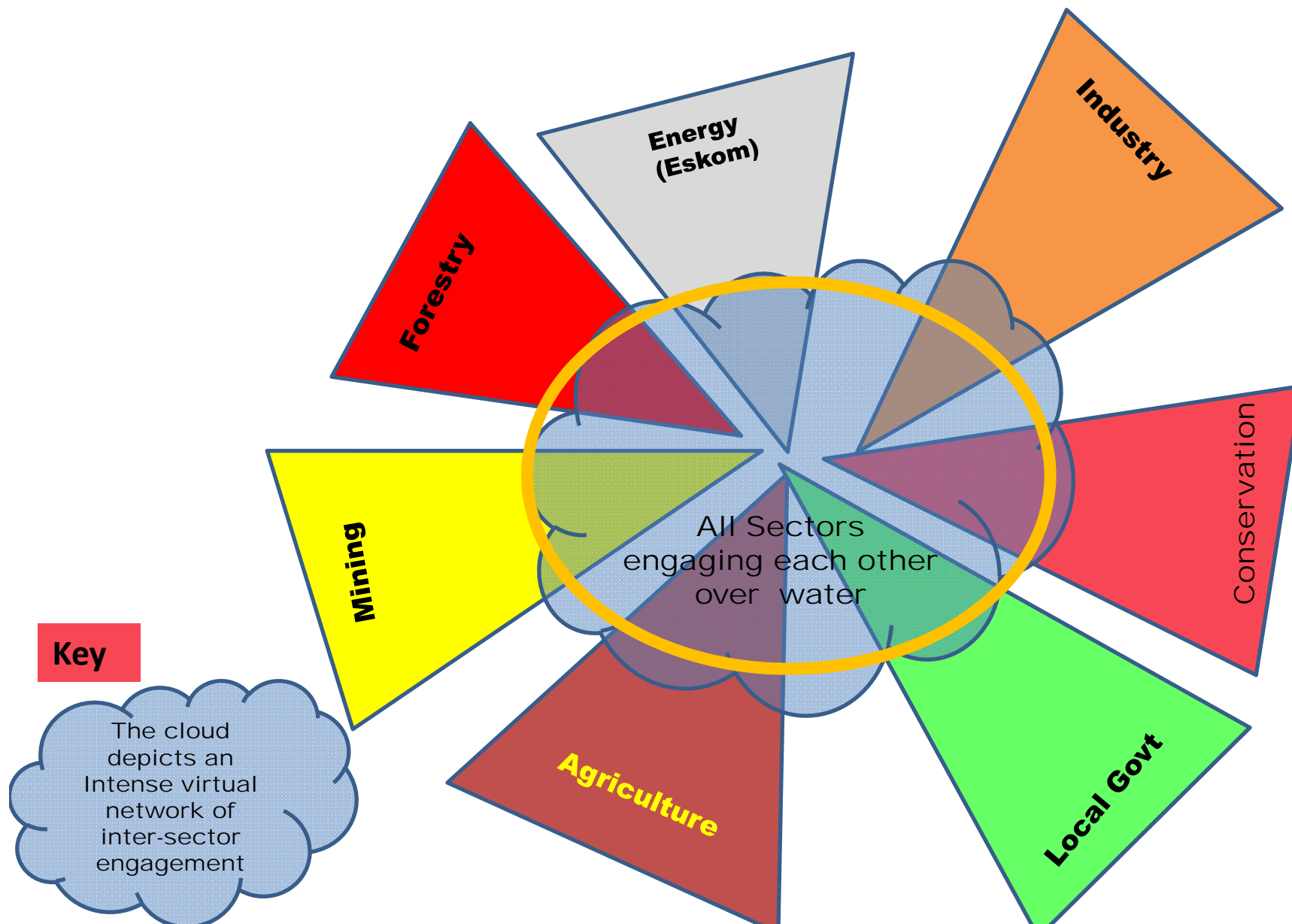


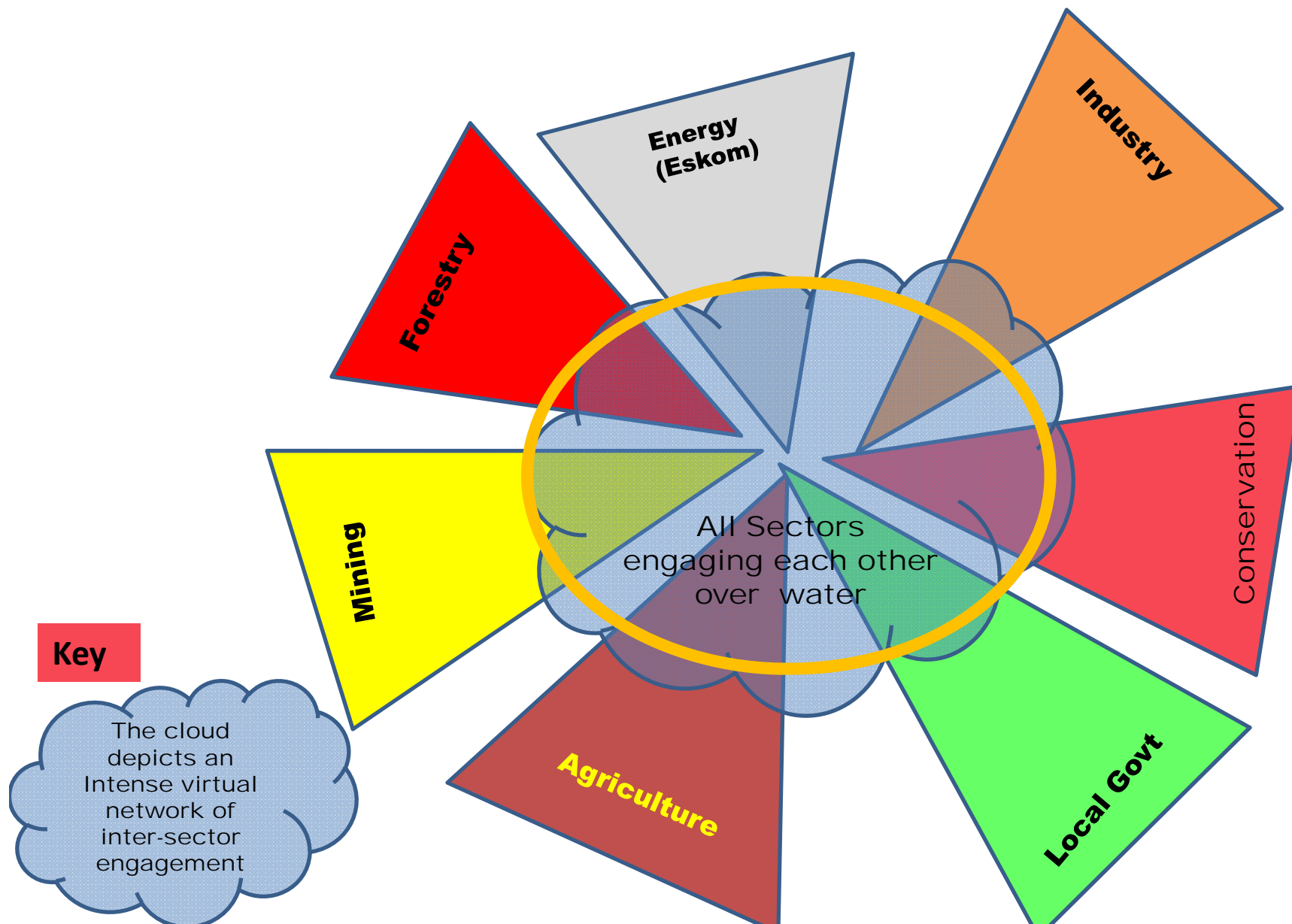


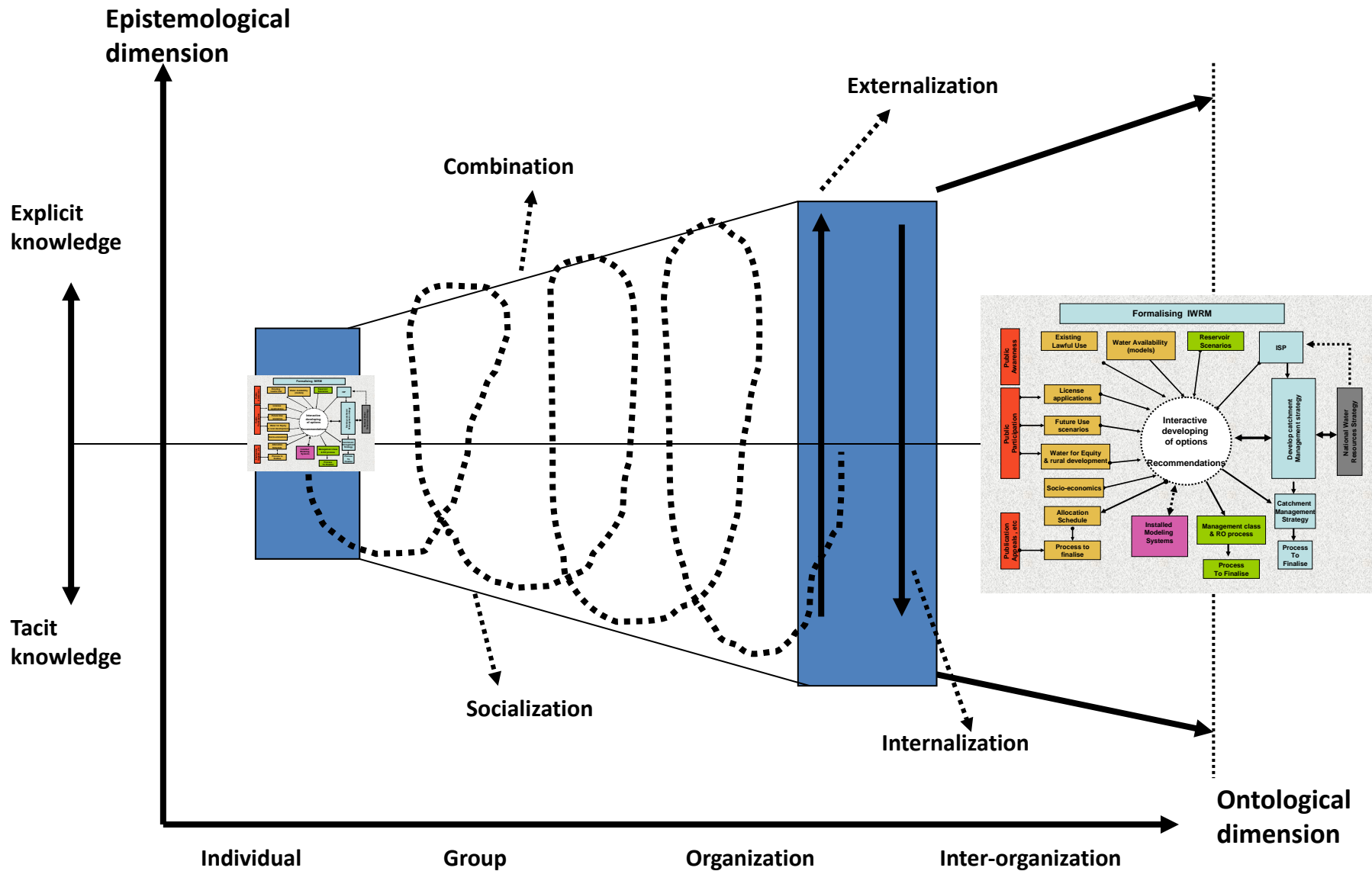






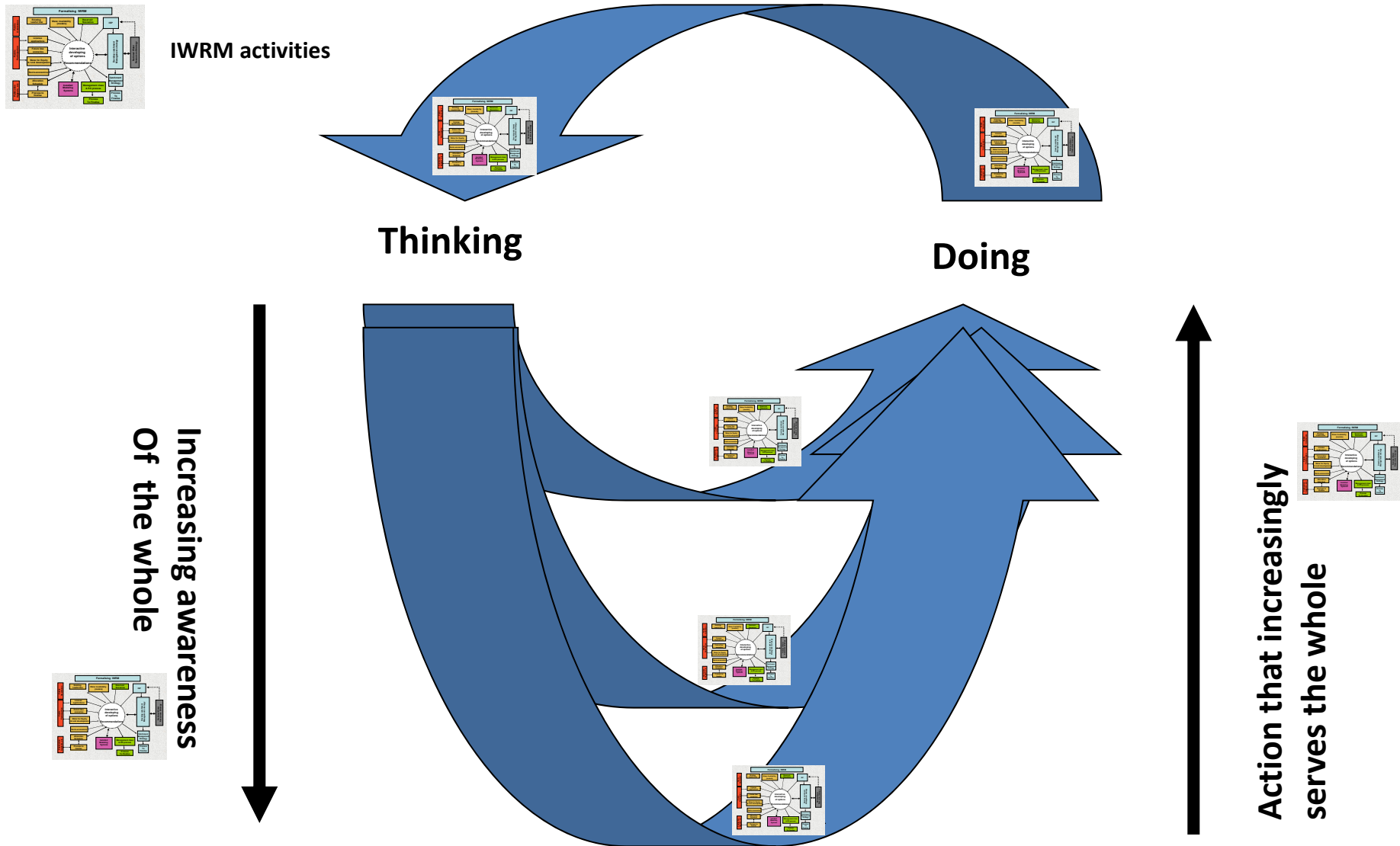




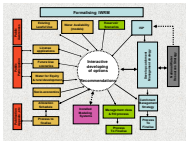


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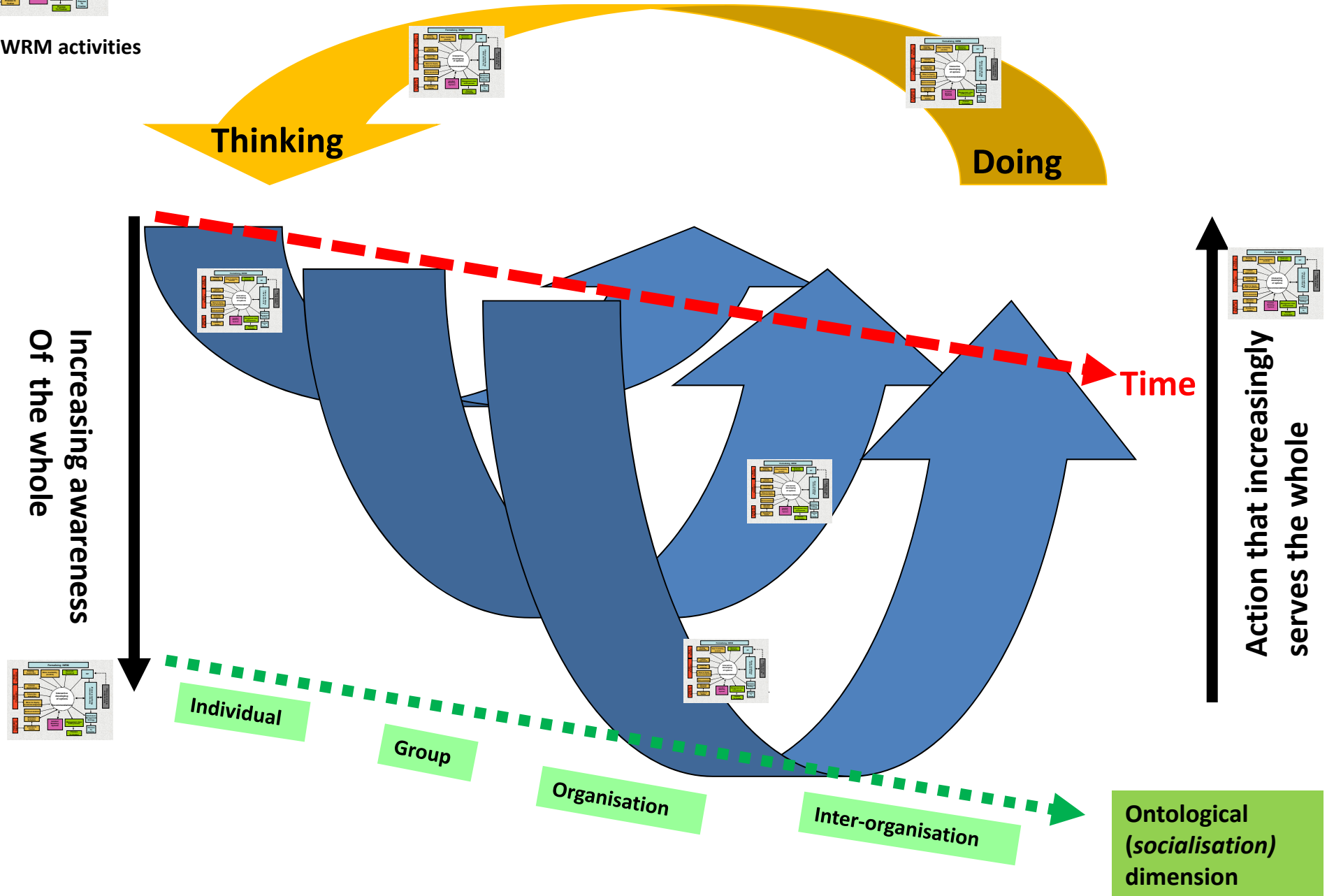


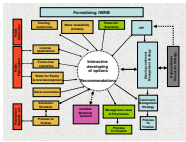
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IWRM activities

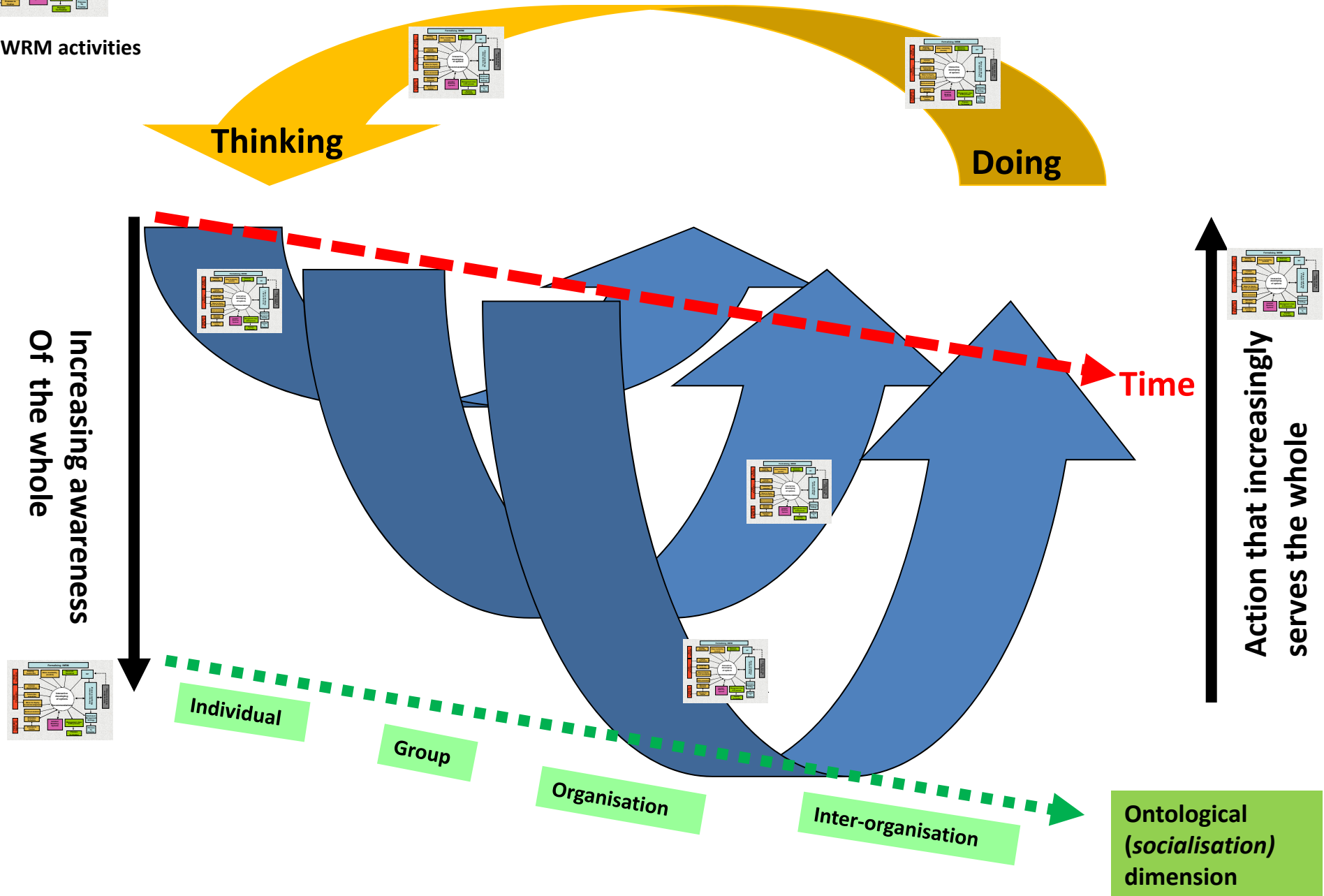
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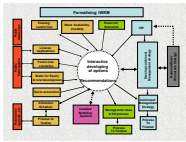




IWRM activities

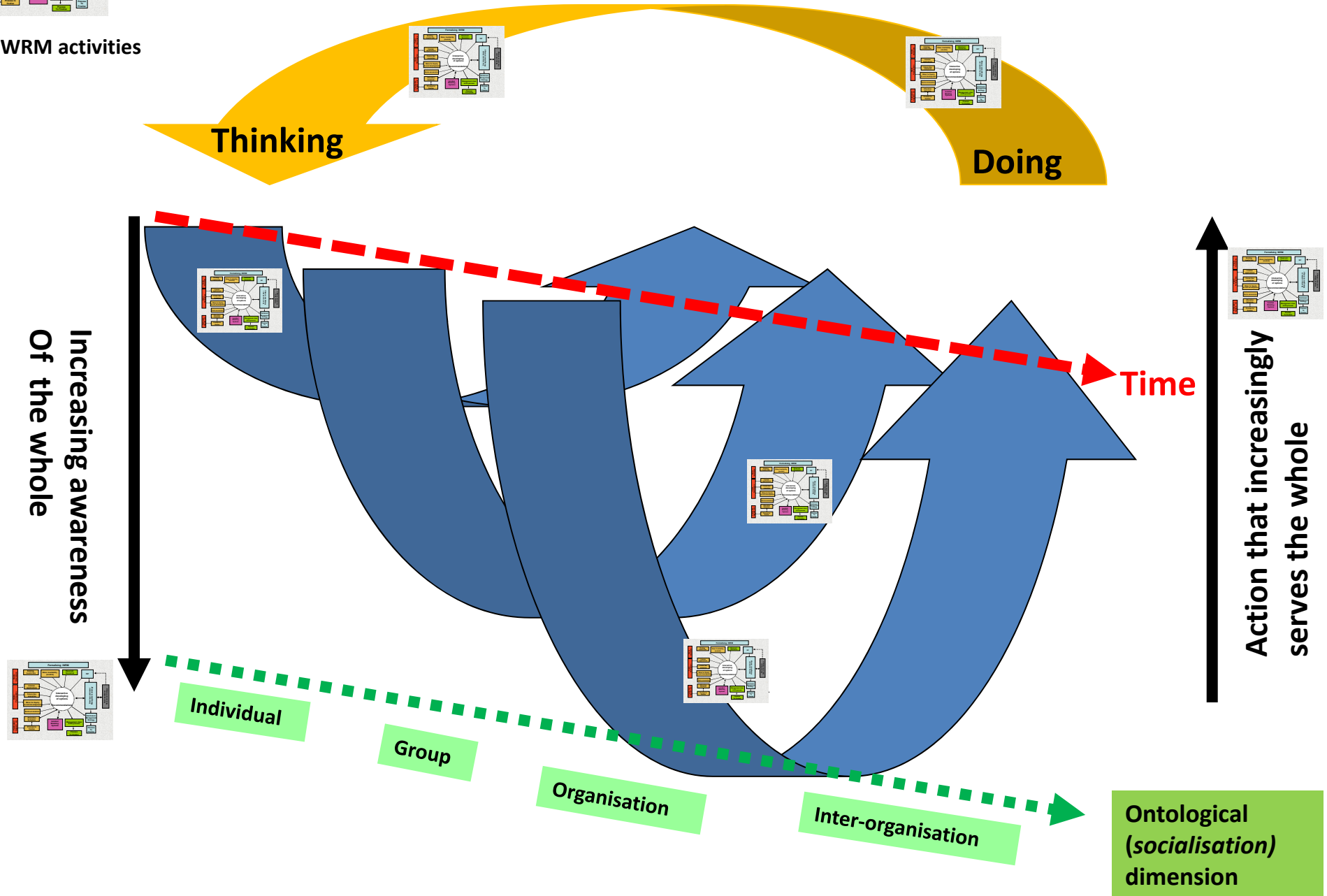
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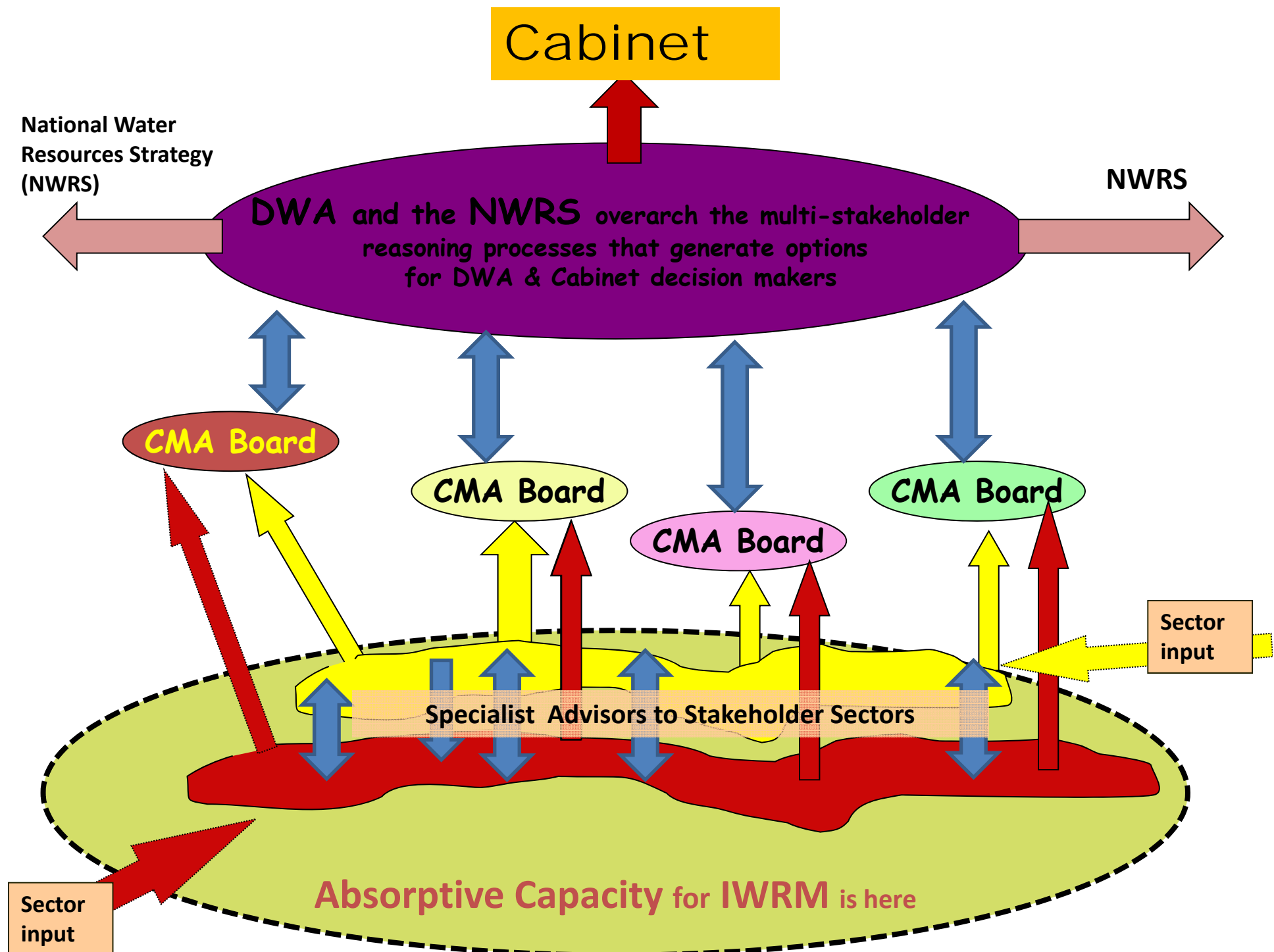


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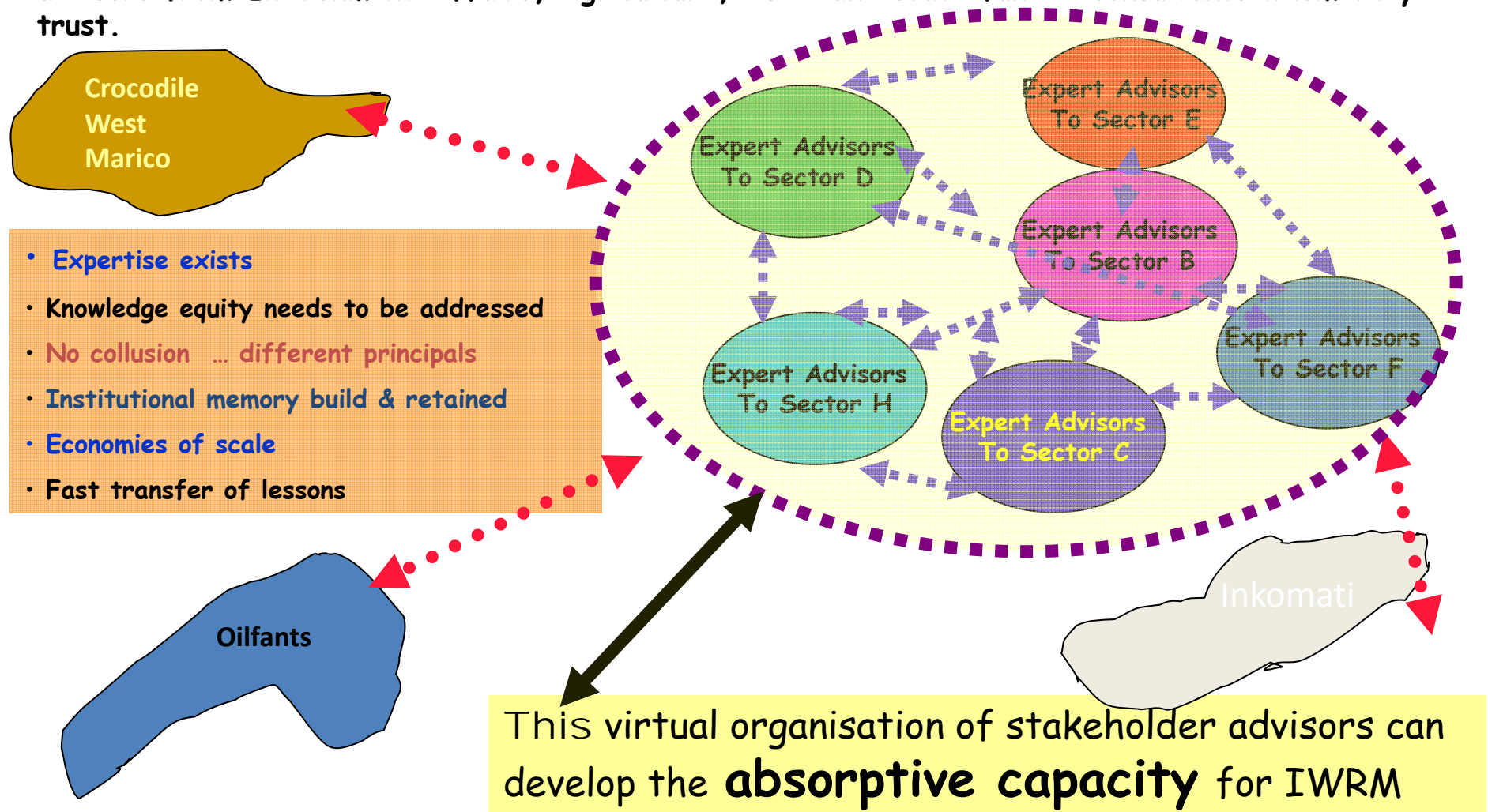
IWRM activities

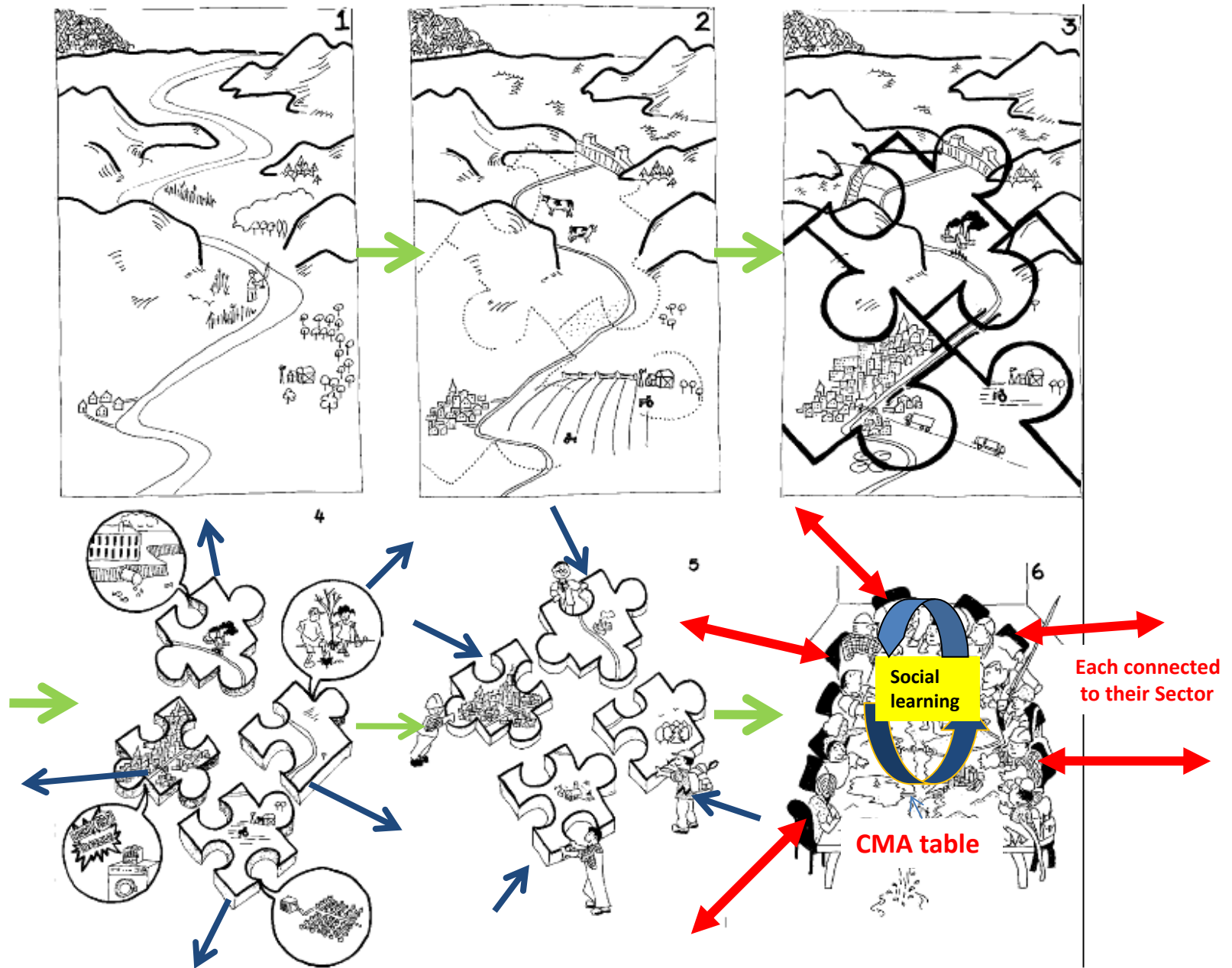




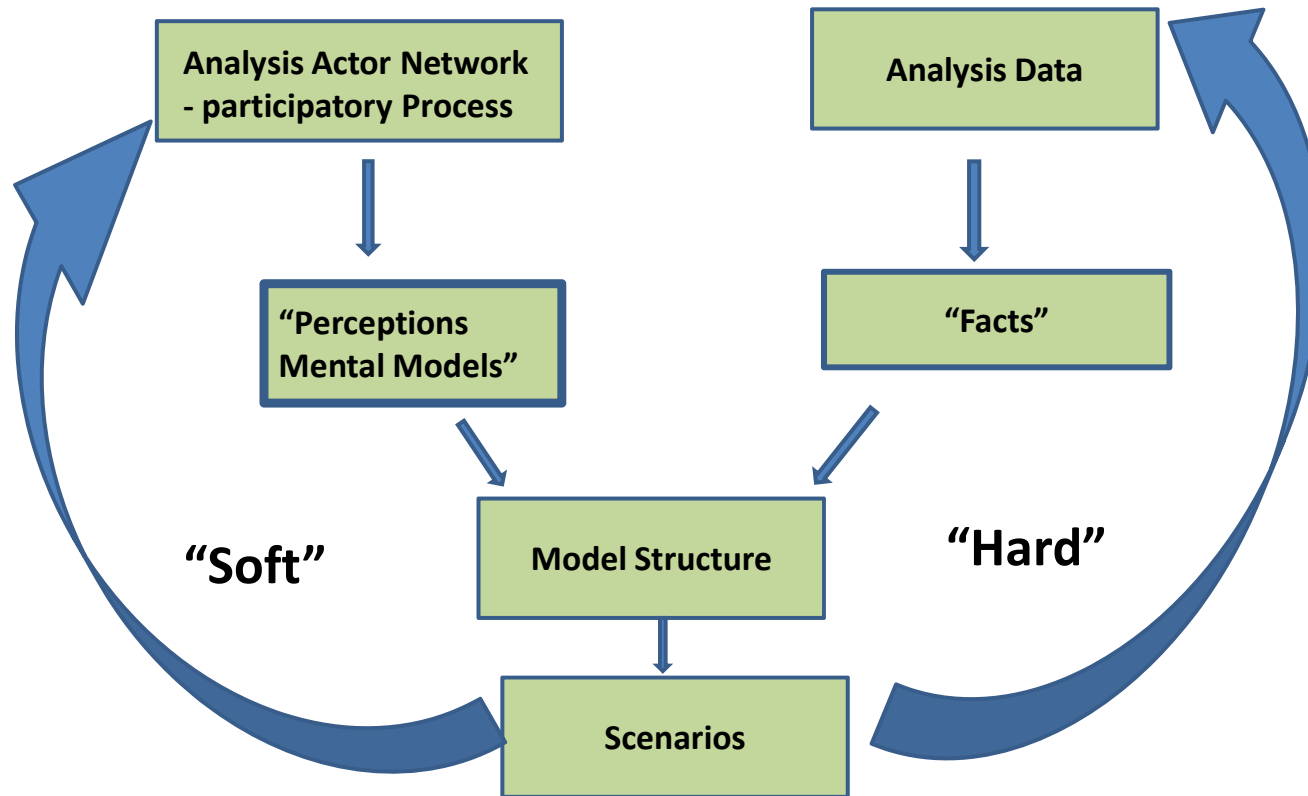


There are probably 15 major Sectors that cover the full spectrum of stakeholder groups in South Africa. If 5 top experts exist in each we are looking at a target leadership group of 75 people. This dynamic *de facto* leadership group could make an enormous difference as they self organise and use participatory agent-based social simulation modeling with the best from the OpenMI world combined with social learning as explained by Nonaka, Mintzberg, Senge, Scharmer and countless others. The previously disadvantaged sectors would need state funded advisors from Environment Affairs, Agriculture, CSIR and state funded consultants whom they trust.

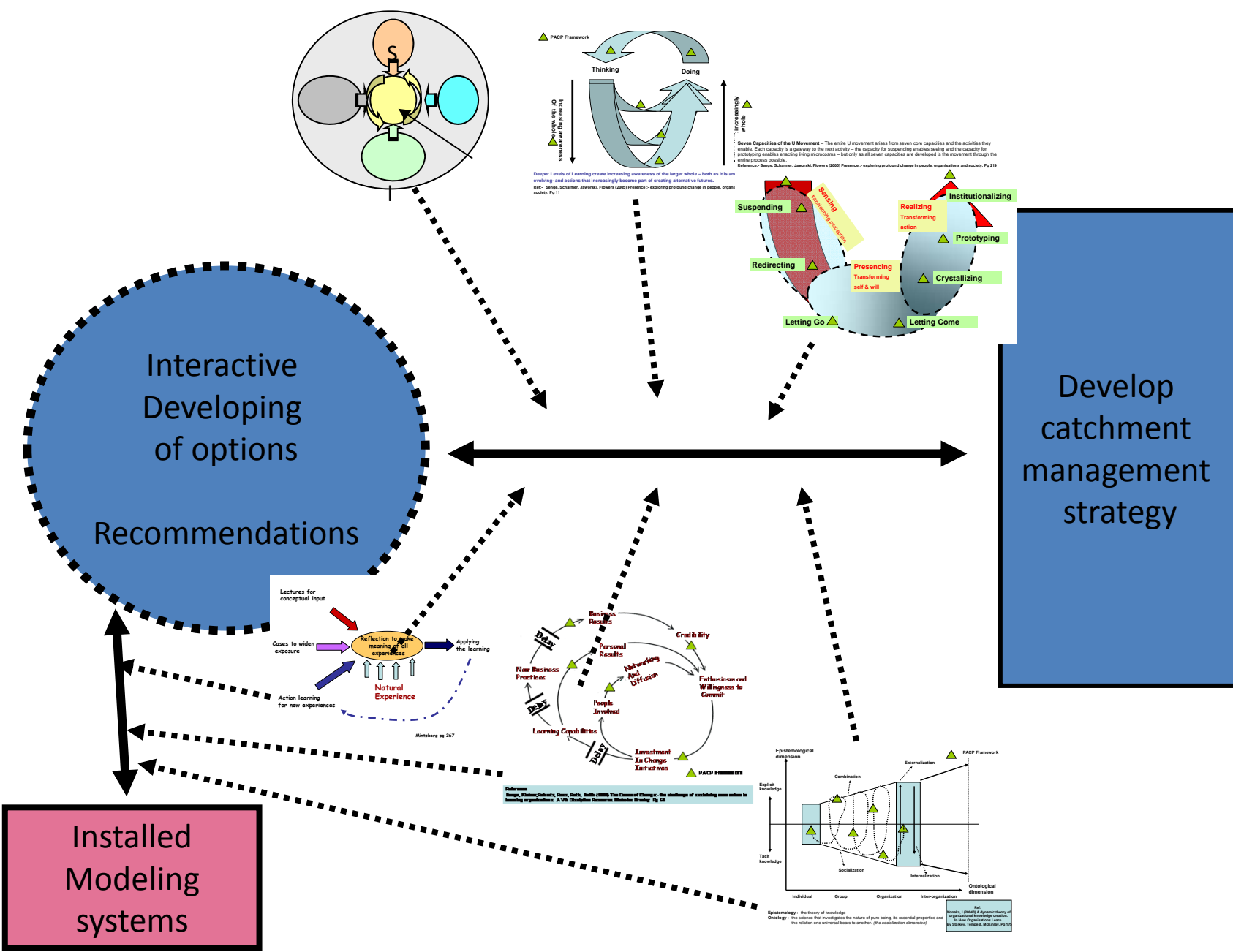




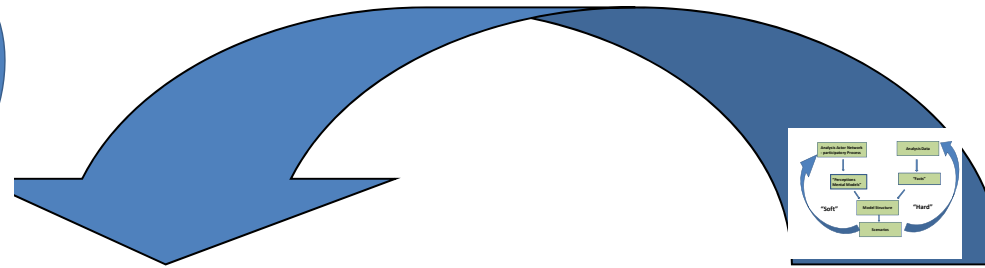
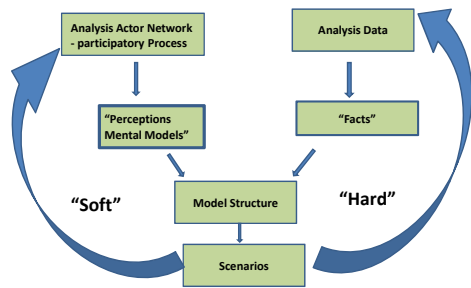
(After) & Zheng (2011) Lerner, D.N. and Zheng, C. (2011) **Integrated catchment management: path to enlightenment.** Hydrological Processes. *Hydrol. Process.* **25**, 2635–2640. page 2639



The overall approach of combining "soft" **subjective perceptions** and "hard" factual knowledge in a participatory group model building process. The parentheses indicate that the distinction between soft and hard elements of knowledge is of gradual nature with a blurred interface. (after Pahl-Wostl (2007) Pg 564







**Thinking**

**Doing**

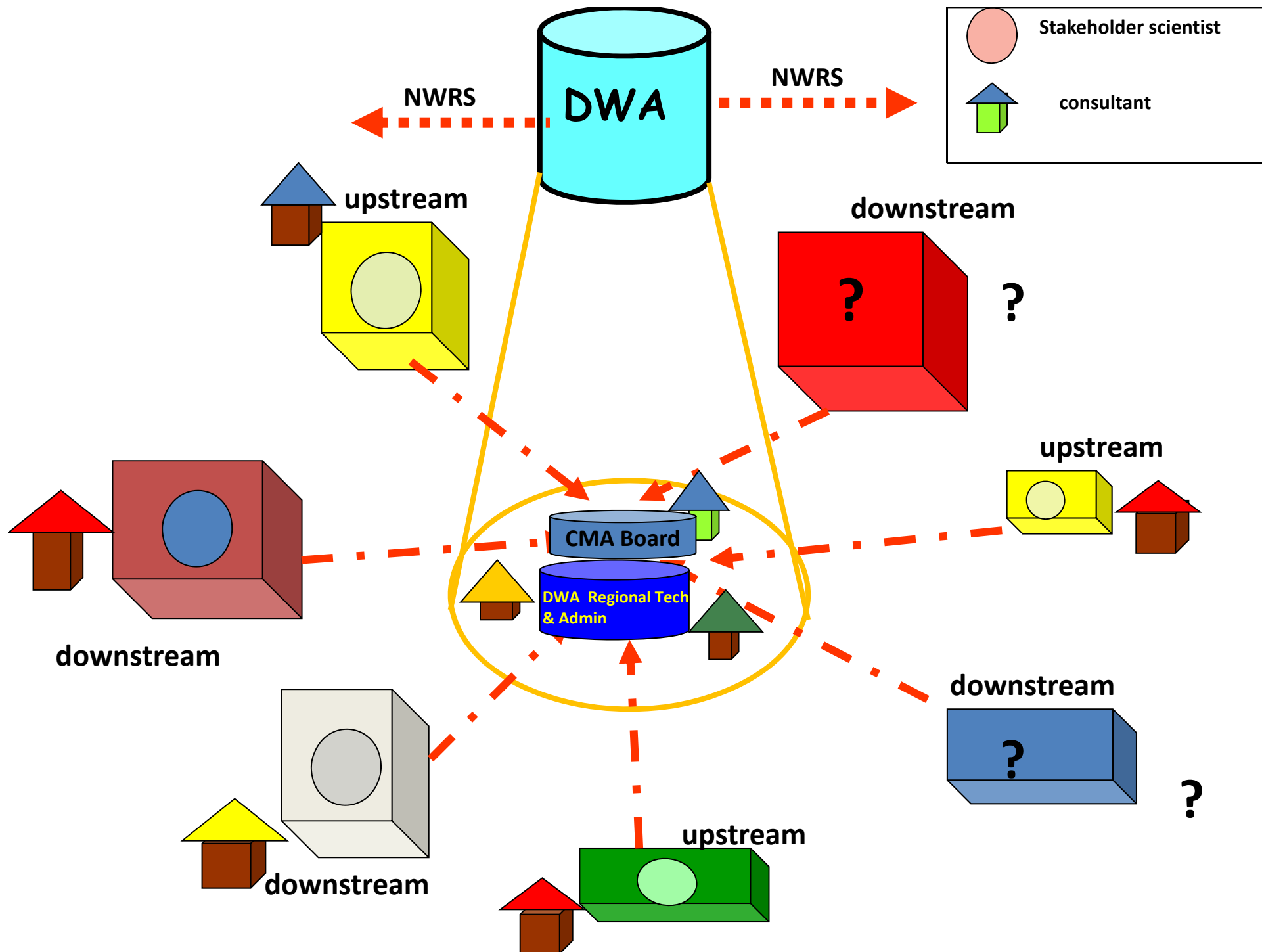
**Increasing awareness  
Of the whole**

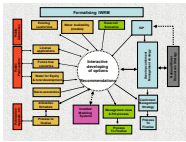


**Action that increasingly  
serves the whole**



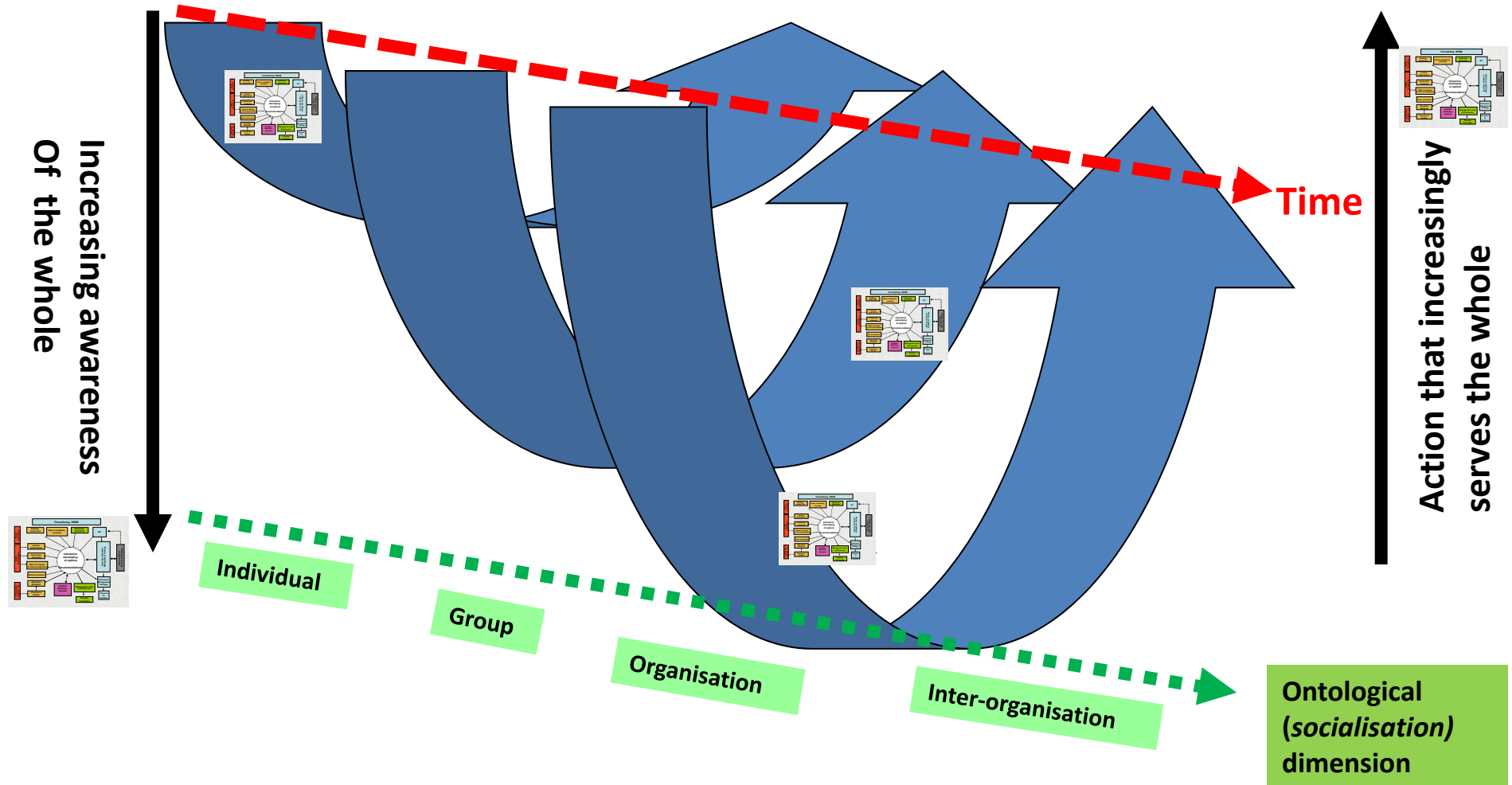
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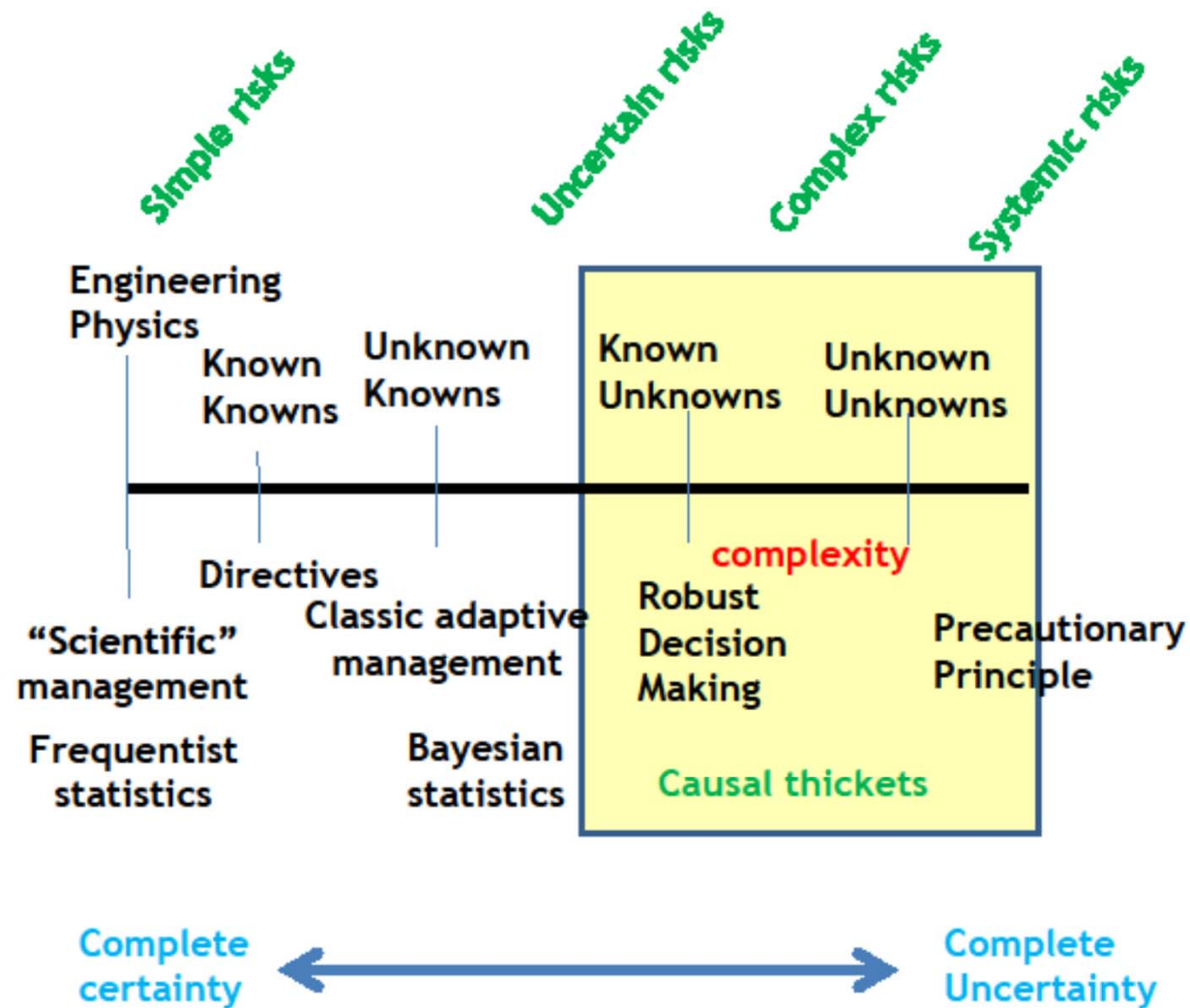




Deeper Levels of Learning create increasing awareness of the larger whole – both as it is and as it is evolving- and actions that increasingly become part of creating alternative futures.

IWRM activities





Adapted from Graeme Harris

Rogers (2010) paper at UNESCO Chair South African Water Governance Workshop, 25 November 2010, ANU  
<http://www.water.anu.edu.au/UNESCOChair/20101125>

- What is **Participatory Agent** based social simulation?
- Who are the potential **Participatory Agents** in respect of water in South Africa?
- What will motivate the **Participatory Agents** to participate?
- What experiences can the **Participatory Agent** based social simulation modelers draw on?



# What is Participatory agent based social simulation modeling?

*“Agent based social simulation is a very promising approach to represent the complex dynamics of social systems and to develop integrated models for human-technology-environment systems.”*

*It is an excellent potential framework for combining insights from different social science disciplines and it is particularly suited for being used in participatory processes  
(Pahl-Wostl, 2002a).*

*The result of the combination of these two practices, participatory agent based social simulation, deviates in a number of ways from conventional modeling.*

*As in group model building (Vennix, 1996), the actors who are supposed to later use the models for decision-making and strategic planning, participate and contribute to the entire modeling process.*

*This guarantees that the model captures issues that are of relevance to the actors involved.*

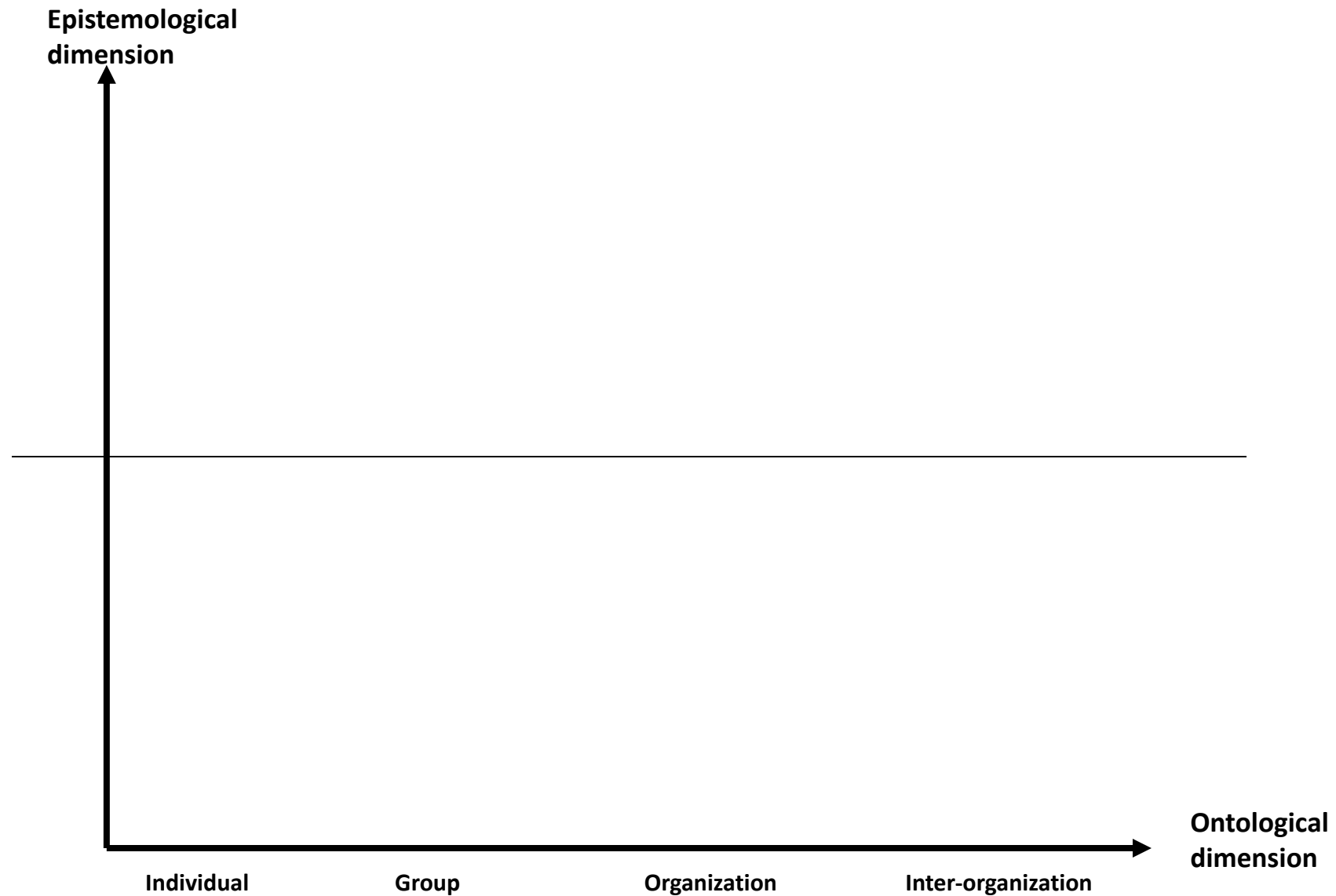
*In addition to group model building, however, the agent-based aspects of the resulting models mean that the actors themselves are represented in the models.*

*As well as capturing their **subjective perceptions** and expectations within the model, the social and human elements of water resource management are also represented.*

*This allows the actors to incorporate their decision-making into assessing the outcomes of management decisions and, importantly, to use the model as a medium by which they can represent and reflect upon their own and others' goals, beliefs and perspectives.*

*"Models and the whole process of model development therefore become part of a process of **social learning**."*

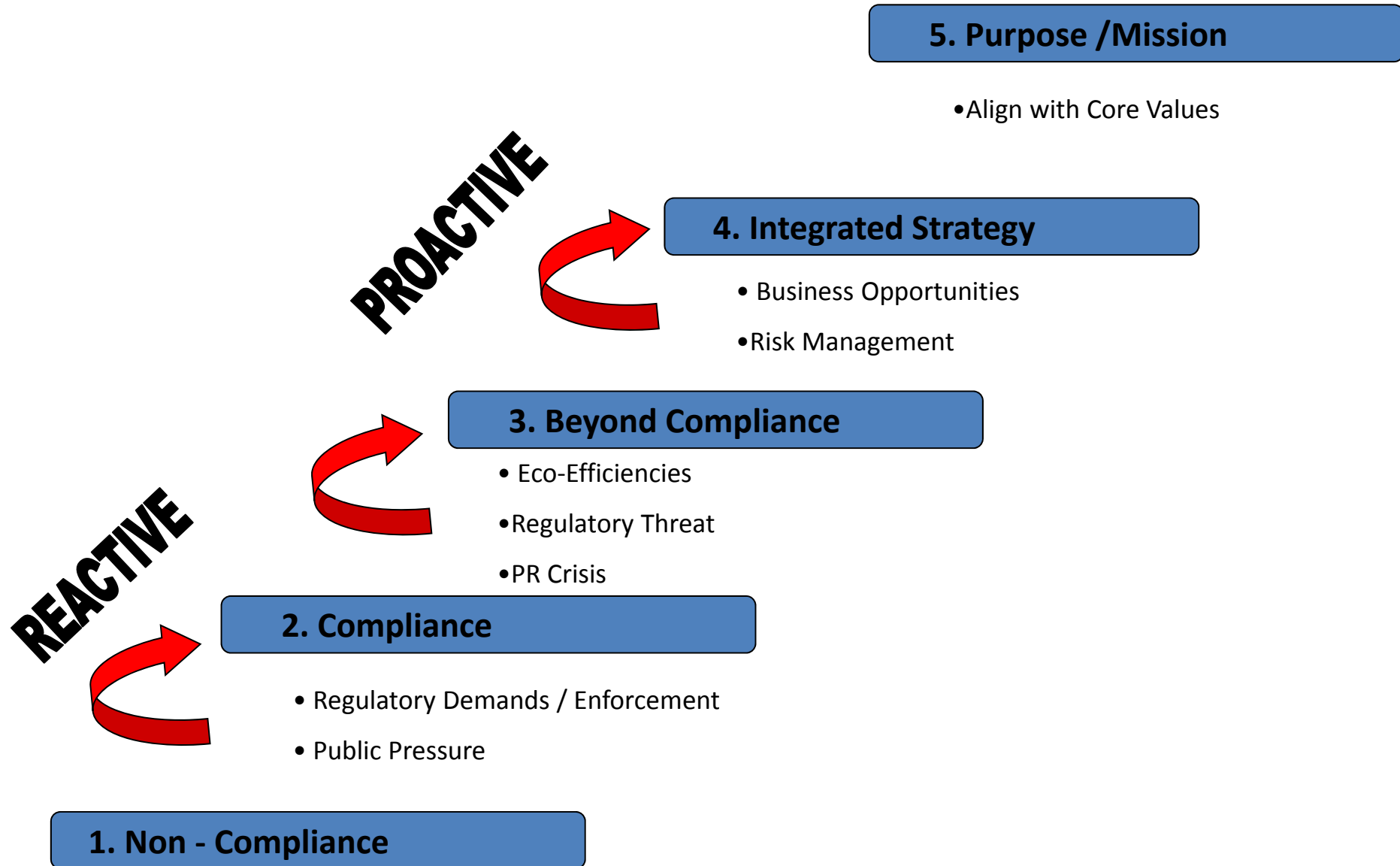
Pahl-Wostl & Hare (2004)

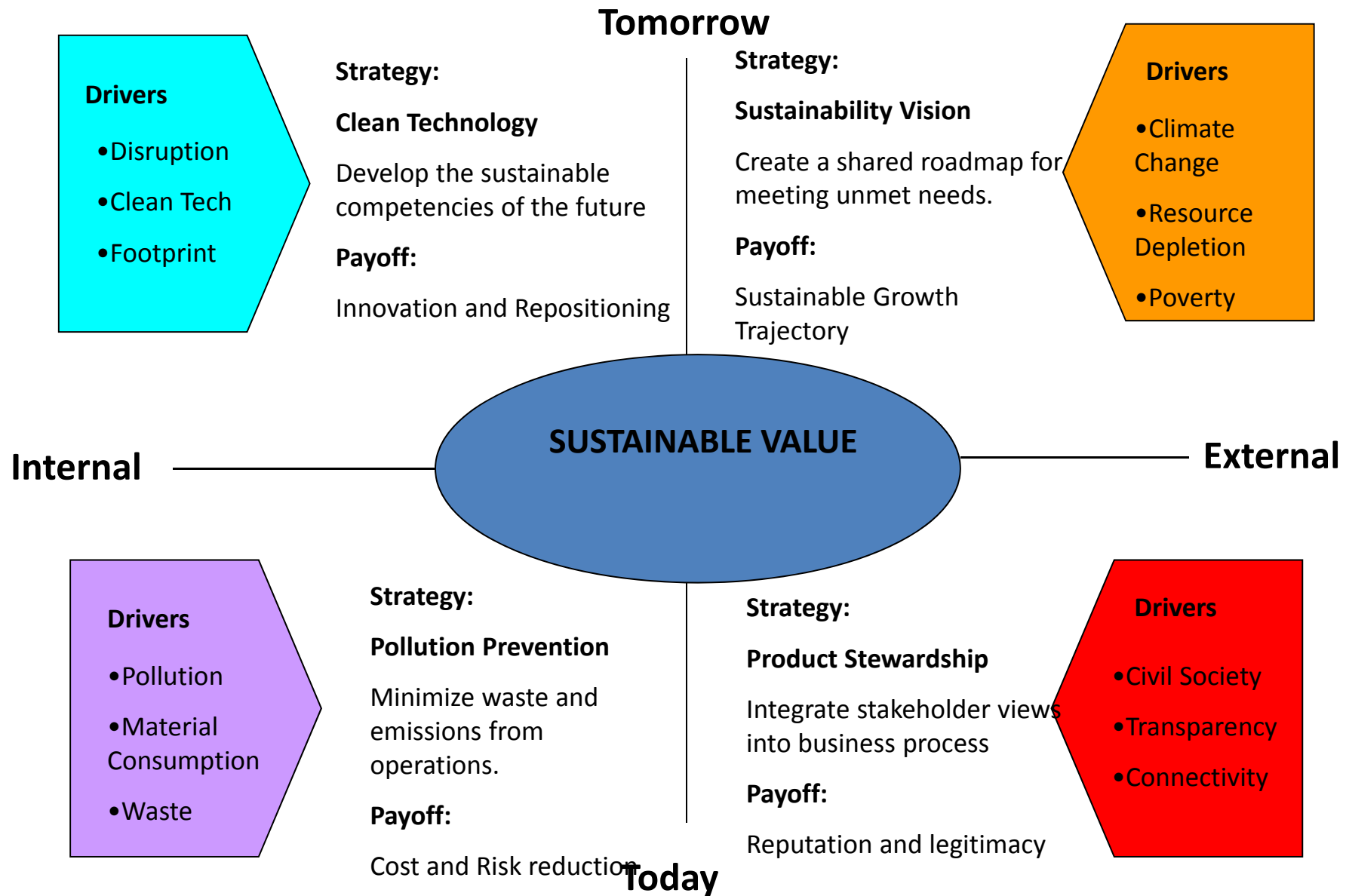


**Epistemology** :- the theory of knowledge

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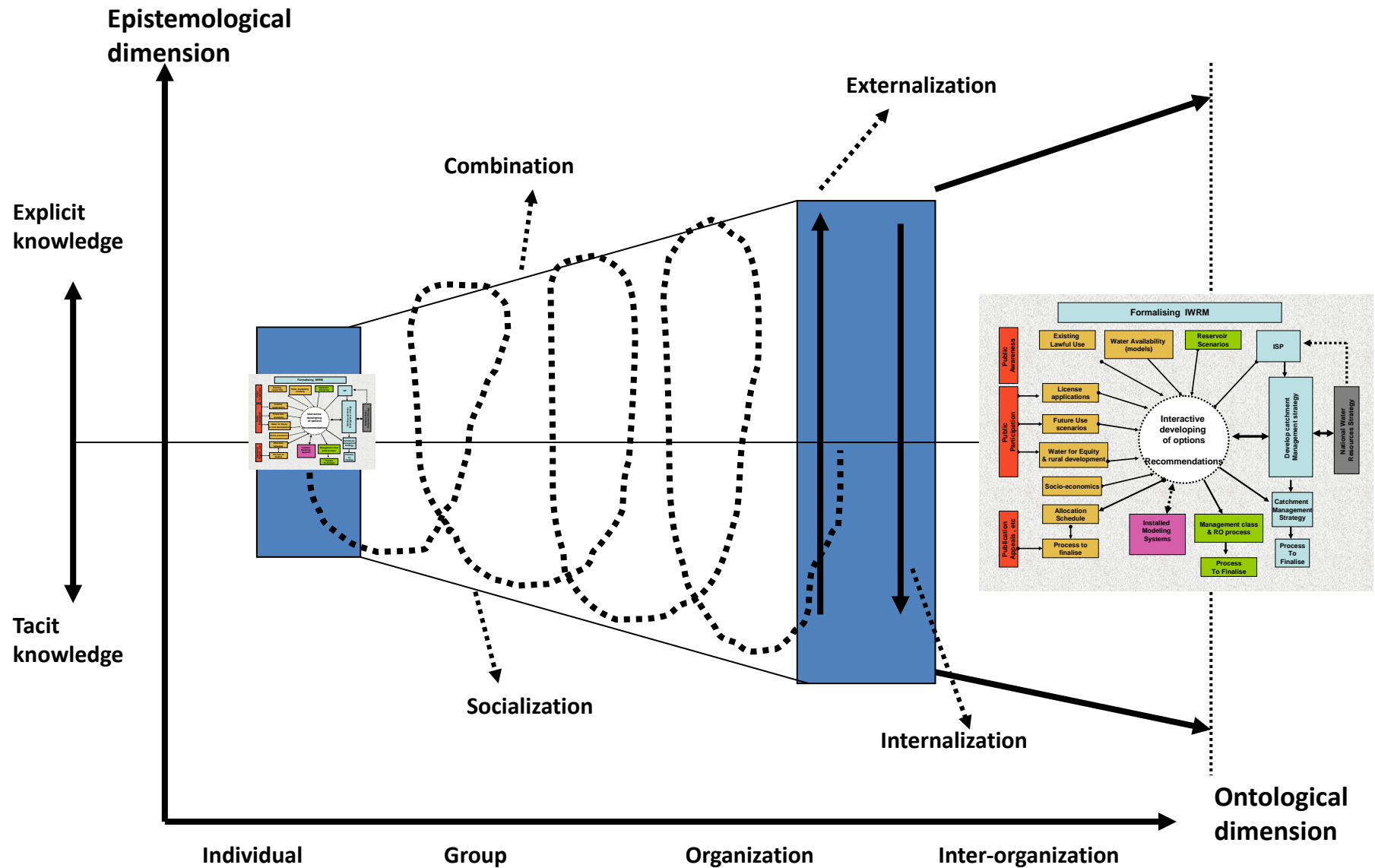






# Decision making process misunderstood

- Decisions (authority) ... decision literally means to “*kill alternatives*” ... we need to generate alternatives first
- Reasoning (opens the space) .... options
- We are not looking at the whole management process...
  - information generation
  - reflection
  - *mental models*
  - options generation
  - consequences of options



**Epistemology** :- the theory of knowledge

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