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DEALING WITH VULNERABILITY.
The design of learning systems for adaptation

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SOME INTIAL CLAIMS

1. Climate change is among those situations that should be considered as “wicked problems”, or “wicked situations”, since it is a ‘pressing and highly complex policy issue involving multiple causal factors and high levels of disagreement about the nature of the problem and the best way to tackle it’ (Ison, 2010).
2. To the challenge of climate change it is necessary to give a learning response (based on Bawden, 2010).
3. To cope with the consequences of climate change we need [collectively] to develop our capabilities of thinking and acting systemically.

Coping with climate change and variability in agricultural land use: issues to be addressed



- Vulnerability assessment
- Design of adaptation strategies
- Stakeholder involvement (stakeholding)

These issues are concerned with the behaviour of social systems rather than natural systems!

OUTLINE

1. Exploring and unpacking the notion of vulnerability
2. Making sense of adaptation: some metaphors-in-use
3. The design of learning systems for adaptation

1. Exploring and unpacking the notion of vulnerability

WHAT IS VULNERABILITY? Several definitions...

The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity (IPCC – AR4, 2007)

Unpacking the notion of vulnerability...

“Further elucidation of this concept [of key vulnerabilities] requires highly interdisciplinary, integrative approaches that are able to capture bio-geophysical and socio-economic processes”
(IPCC-AR4, 2007, p. 804)



How to achieve an integrative assessment of vulnerability?

Based on Cardona (2001)...

$RISK = VULNERABILITY * THREAT$

A decreased capacity to adapt or to adjust to certain circumstances

From CARDONA (2001) and IPCC (2007)....

ADAPTATION = VULNERABILITY REDUCTION
(A DUALITY)



In search of an operational definition of *vulnerability*

Based on Cybernetics (Ashby, Beer)...

Vulnerability: it's an expression of the difficulty of an evolving system to stay viable in a dynamic and changing environment



["a system of interest is viable if it can survive in a particular environment"]

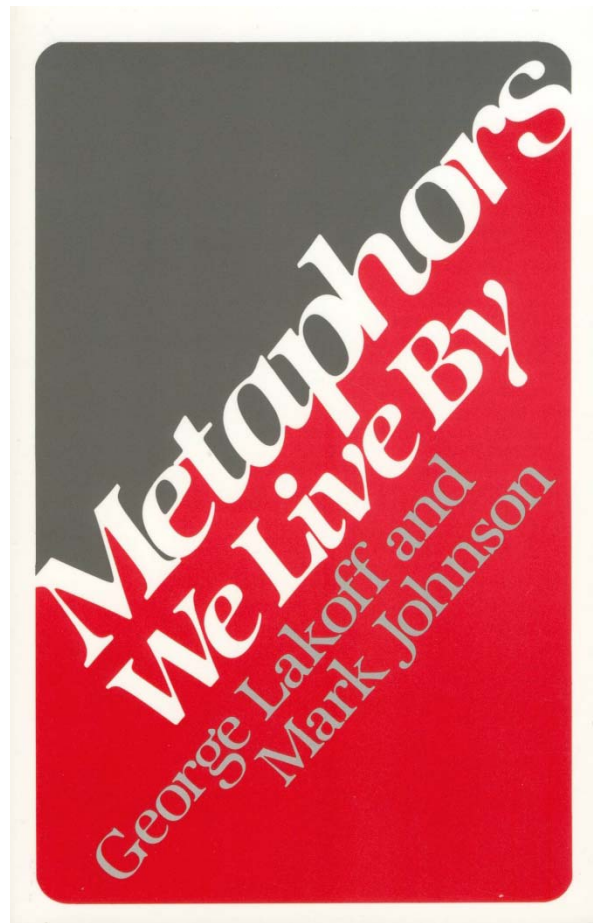
Ashby's Law of REQUISITE VARIETY: "*only variety can absorb variety*".

work in progress...

2. Making sense of adaptation: some understandings...

- a. The **adjustment in natural or human systems** [~changes carried out in socio-ecological systems] in response to actual or expected climatic stimuli or their effects, **which moderates harm or exploits beneficial opportunities** (IPCC, 2007)
- b. Refers to an ongoing, never ending **local decision making process** [a local perspective on adaptation]
- c. A process based on the **combination of "hard" and "soft" measures** to reduce vulnerability

Making sense of adaptation: some metaphors-in-use



Metaphors-in-use
are framing the
features of the
adaptation process

Metaphors-in-use: ADAPTATION AS "FITTING INTO"



- most widespread understanding on adaptation
- assumption: both "the situation" and "what is to be adapted" are known in advance
- most adaptation practices in agricultural systems based on this understanding
- practical implication: set of recommended practices can be transferred to different contexts

Metaphors-in-use: ADAPTATION AS "CO-EVOLUTION"



- results from a process of mutual, recursive interactions between the system of interest and its environment
- is a process of learning and development
- adaptation is an emergent property of a co-evolutionary process
- practical implication: adaptation practices are context or site-specific
- requires an effective form of praxis
 - *a systems practice*

ADAPTATION AS "FITTING INTO"



LEARNING

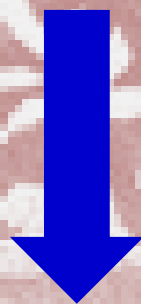


ADAPTATION AS "CO-EVOLUTION"



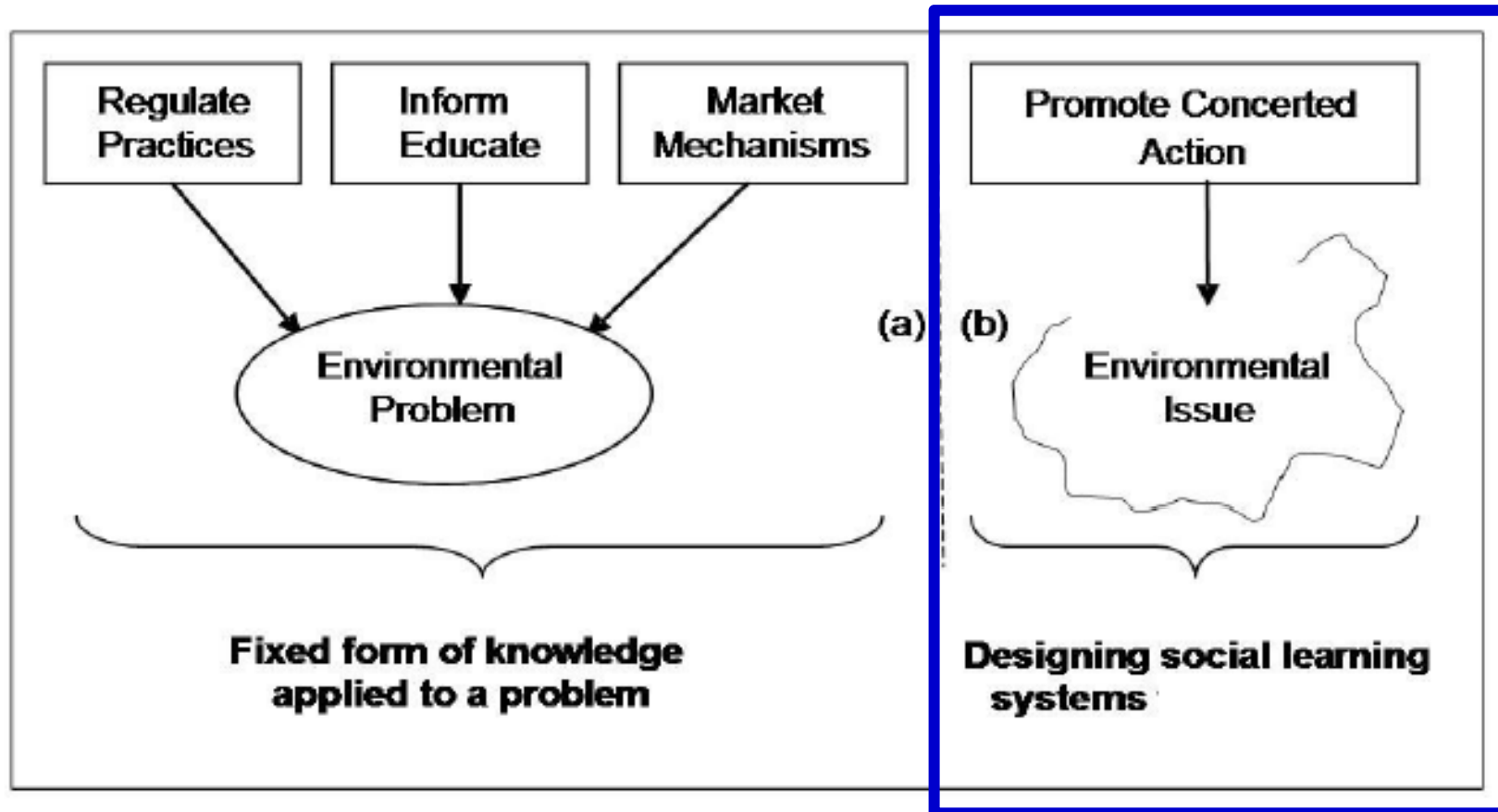
The move: enacts new forms of (systemic) practice!

KEY ISSUE: how to set up an adaptation process based on learning and development in a situation characterized by uncertainty?



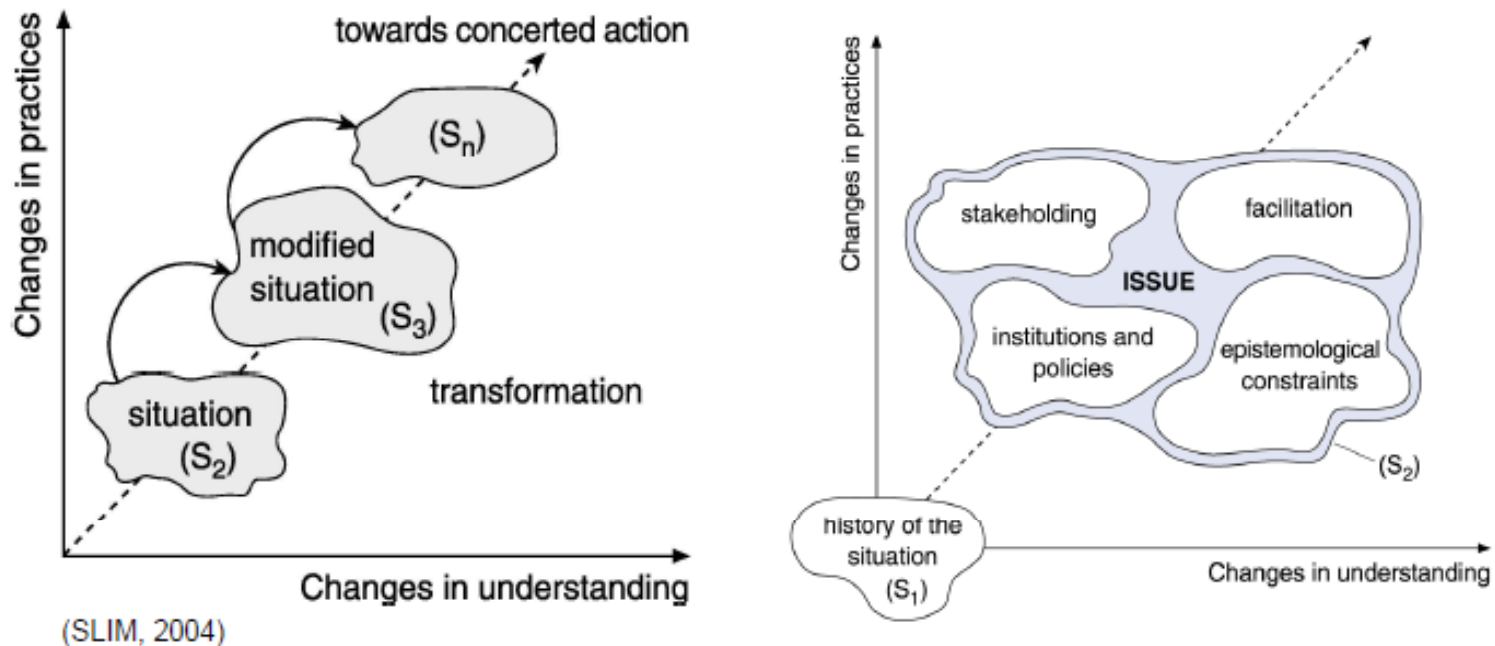
3. The design of learning systems for adaptation

When and why are learning systems appropriate?



Based on Collins (2010)

Social learning for situation transformation...



Social learning [for situation transformation]: a process of socially constructing an issue by *stakeholders* in which their understandings and practices change so as to **transform** the messy situation through **concerted action**

[based on Collins, 2010]

- ADAPTATION -
a learning response

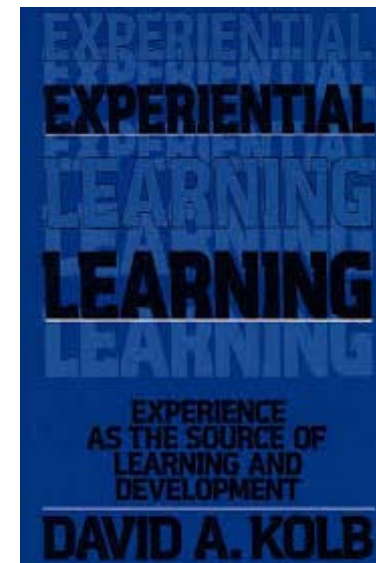
*The **purpose of learning is to help stakeholders recognise the diversity of mental models and to see the situation as one system in which they are interdependent with others in order to bring about situation transformation***

What is meant by a 'learning system'?

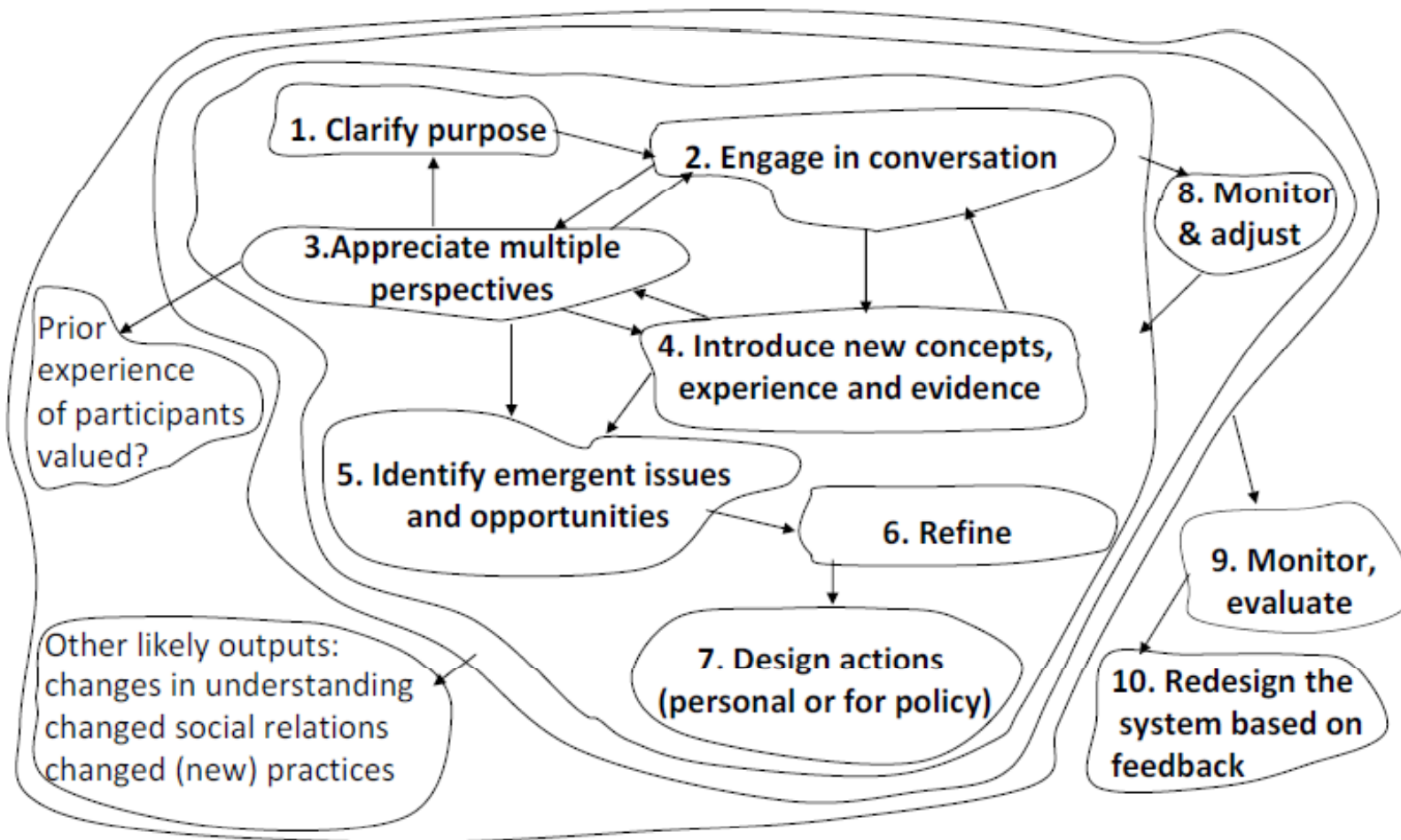


the creation of knowledge
through the transformation
of experience (Kolb, 1984)

- comprises elements and/or activities
- exhibits connectivity
- results in transformation
- has emergent properties
- is bounded in some way
- it is purposeful to those who participate
- it is not deterministic



Designing learning systems...



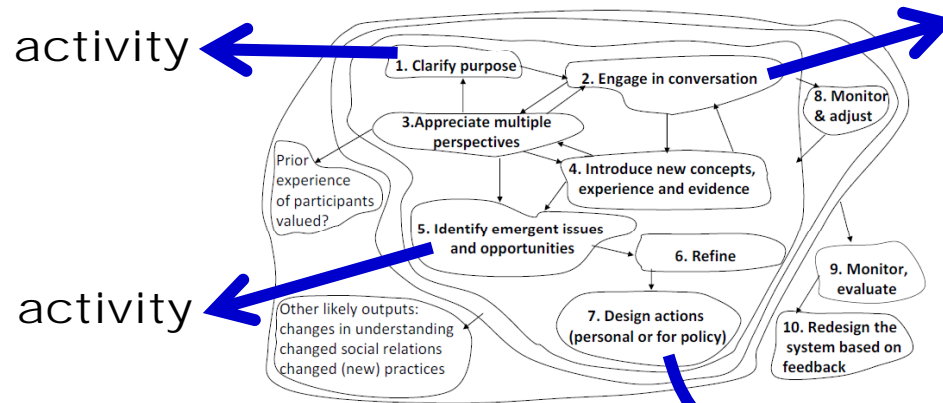
[based on Collins, 2010]

Designing a learning system for adaptation means...

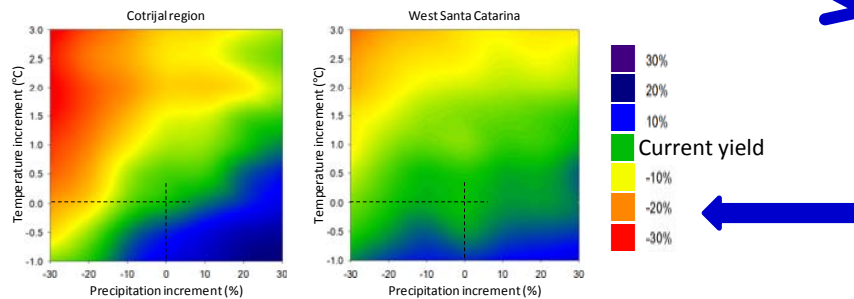
- appreciating the systemic nature of the situation
- appreciating that all contexts are novel and unique
- developing a process for designing, implementing and evaluating adaptation understandings and practices
- understanding how “learning processes” operate
- research practices which develop capacity for communication, social learning and concerted action among stakeholders
- being aware that a key issue is: who are the designers of the learning system for adaptation?

A LEARNING SYSTEM an epistemological device,
a way of knowing and doing

In practice... *a human activity system*...



Crop modelling (DSSAT) as part of a learning system for situation transformation...



Changes in maize yield (%) according different combinations of changes in temperature and rainfall for two sites. The intersection of the dotted lines indicates current yield (100%).

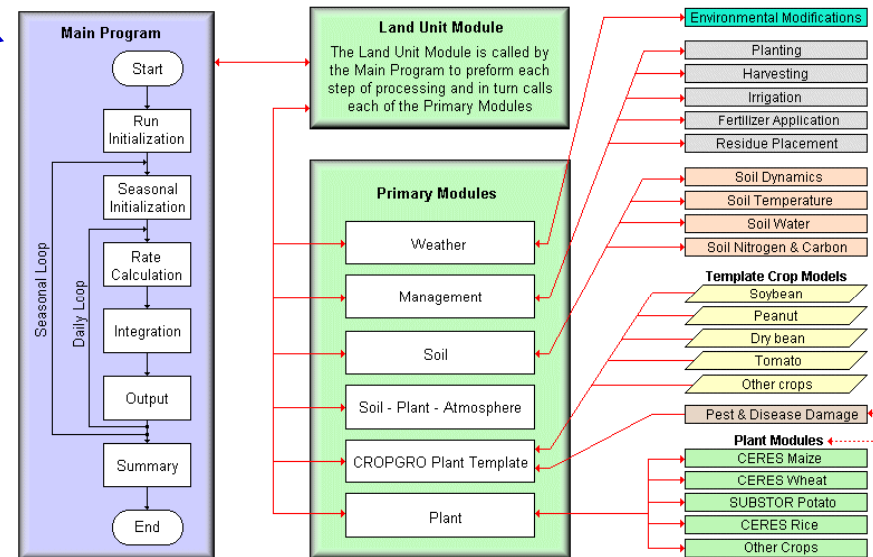
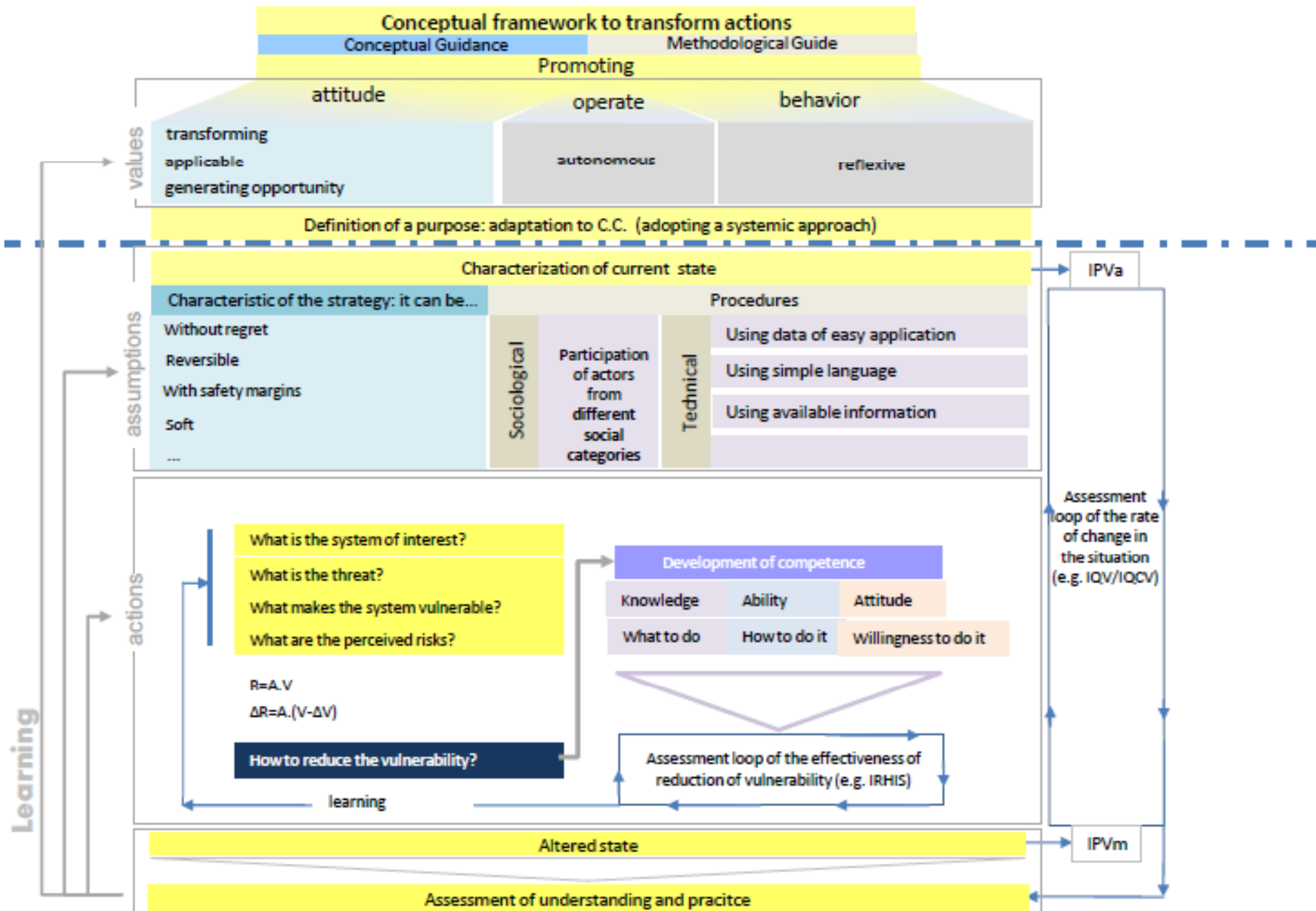


Figure 1. Overview of the components and modular structure of the DSSAT cropping system model.

A conceptual framework as a learning system...



Final remarks...

1. To face the consequences of global warming – as in agricultural land use – it is necessary to think and act differently – systemically!
2. Adaptation should be understood as resulting from the permanent capacity to learn with a changing climate, transforming the situation for the better;
3. Learning emerges in the process of engaging with a situation with the purpose of improving it;
4. “The design of learning systems offers the possibility of strengthening a deliberate and reflective society that is better able to engage with the many situations of complexity, uncertainty and conflict that we now face” (Ison et al., 2007).

