

# Transdisciplinary Research for Transformation in an African Context

**John van Breda and Mark Swilling**

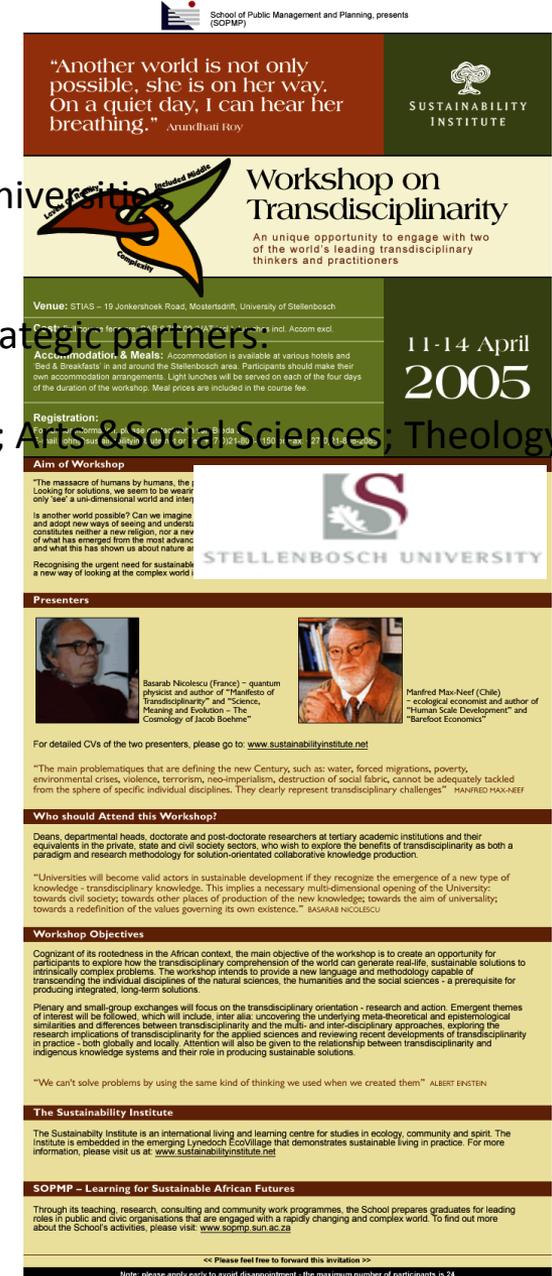
**Based on research by John van Breda for his PhD thesis  
and a jointly authored journal article that will be  
published this year in Sustainability Science**



**SUSTAINABILITY  
INSTITUTE**

# Short History of TD at SU: 2005 – 2016

- April 2005 – TD Workshop: attended by 35 academics from various SA Universities
- TsamaHUB 2008: Inter-faculty research centre, with the following key strategic partners:
  - Seven Faculties (Economics [home]; Science; Eng; AgriSciences; Education; Arts & Social Sciences; Theology)
  - Council for Scientific and Industrial Research (CSIR)
  - Human Sciences Research Council (HSRC)
  - Sustainability Institute (NGO)
- Panel of Supervisors (Natural, Social Sciences and Engineering)
- TD Doctoral Programme in Sustainability: 2010 – 2016
- TD Summer / Winter Schools (10) : 2011 - 2016
- TD Case Study – “Enkanini” Research Project: 2011 – 2016



“Another world is not only possible, she is on her way. On a quiet day, I can hear her breathing.” *Arundhati Roy*

**SUSTAINABILITY INSTITUTE**

## Workshop on Transdisciplinarity

An unique opportunity to engage with two of the world's leading transdisciplinary thinkers and practitioners

**11-14 April 2005**

**Venue:** STIAS – 19 Jonkershoek Road, Mostertsdrif, University of Stellenbosch

**Accommodation & Meals:** Accommodation is available at various hotels and B&B's in and around the Stellenbosch area. Participants should make their own accommodation arrangements. Light lunches will be served on each of the four days of the duration of the workshop. Meal prices are included in the course fee.

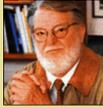
**Registration:** Registration is free of charge. However, a small fee of R150 will be charged for the workshop materials and a R200 fee for the workshop materials and a R200 fee for the workshop materials.

**Aim of Workshop**

“The massacre of humans by humans, the Looking for solutions, we seem to be aware only ‘see’ a uni-dimensional world and infer Is another world possible? Can we imagine and adopt new ways of seeing and acting? constitutes neither a new religion, nor a new of what has emerged from the most advanced and what this has shown us about nature as Recognising the urgent need for sustainable a new way of looking at the complex world”

**Presenters**

 Basarab Nicolaeu (France) – quantum physicist and author of “Manifesto of Transdisciplinarity” and “Science, Meaning and Evolution: The Cosmology of Jacob Boehme”

 Manfred Max-Neef (Chile) – ecological economist and author of “Human Scale Development” and “Barefoot Economics”

For detailed CVs of the two presenters, please go to [www.sustainabilityinstitute.net](http://www.sustainabilityinstitute.net)

“The main problematics that are defining the new Century, such as: water, forced migrations, poverty, environmental crises, violence, terrorism, neo-imperialism, destruction of social fabric, cannot be adequately tackled from the sphere of specific individual disciplines. They clearly represent transdisciplinary challenges.” *MANFRED MAX-NEEF*

**Who should Attend this Workshop?**

Deans, departmental heads, doctorate and post-doctorate researchers at tertiary academic institutions and their equivalents in the private, state and civil society sectors, who wish to explore the benefits of transdisciplinarity as both a paradigm and research methodology for solution-orientated collaborative knowledge production.

“Universities will become valid actors in sustainable development if they recognize the emergence of a new type of knowledge – transdisciplinary knowledge. This implies a necessary multi-dimensional opening of the University: towards civil society; towards other places of production of the new knowledge; towards the aim of university; towards a redefinition of the values governing its own existence.” *BASARAB NICOLAEU*

**Workshop Objectives**

Cognizant of its rootedness in the African context, the main objective of the workshop is to create an opportunity for participants to explore how the transdisciplinary comprehension of the world can generate real-life, sustainable solutions to intrinsically complex problems. The workshop intends to provide a new language and methodology capable of transcending the individual sciences, the humanities and the social sciences – a prerequisite for producing integrated, long-term solutions.

Plenary and small-group exchanges will focus on the transdisciplinary orientation – research and action. Emergent themes of interest will be followed, which will include, inter alia: uncovering the underlying meta-theoretical and epistemological similarities and differences between transdisciplinarity and the multi- and inter-disciplinary approaches; exploring the research implications of transdisciplinarity for the applied sciences and reviewing recent developments of transdisciplinarity in practice – both globally and locally. Attention will also be given to the relationship between transdisciplinarity and indigenous knowledge systems and their role in producing sustainable solutions.

“We can't solve problems by using the same kind of thinking we used when we created them” *ALBERT EINSTEIN*

**The Sustainability Institute**

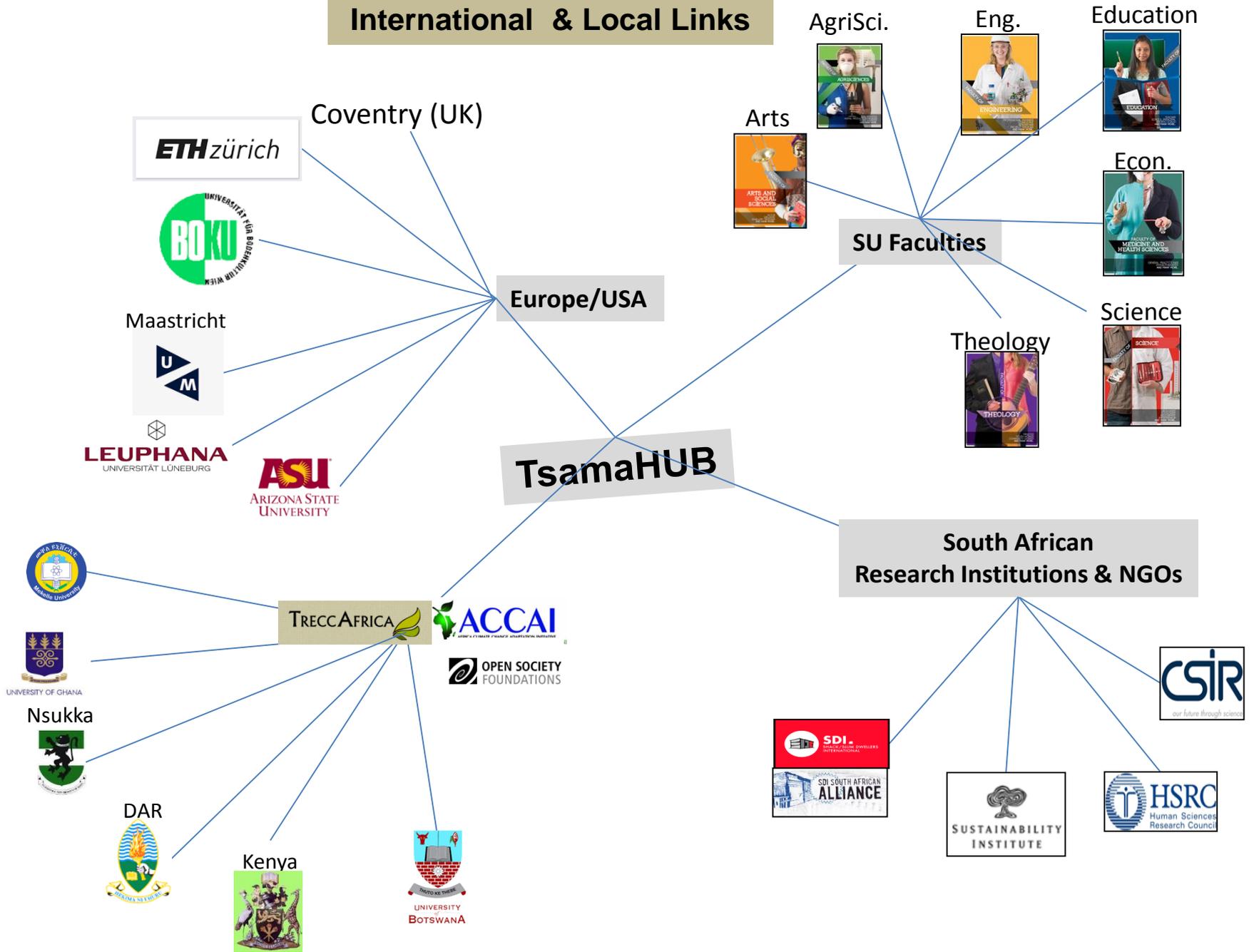
The Sustainability Institute is an international living and learning centre for studies in ecology, community and spirit. The institute is embedded in the emerging Lynedoch EcoVillage that demonstrates sustainable living in practice. For more information, please visit us at [www.sustainabilityinstitute.net](http://www.sustainabilityinstitute.net)

**SOPMP – Learning for Sustainable African Futures**

Through its teaching, research, consulting and community work programmes, the School prepares graduates for leading roles in public and civic organisations that are engaged with a rapidly changing and complex world. To find out more about the School's activities, please visit [www.sopmp.sun.ac.za](http://www.sopmp.sun.ac.za)

<< Please feel free to forward this invitation >>  
Note: please apply early to avoid disappointment - the maximum number of participants is 24

# Network of International & Local Links



# TD PhD Programme in Sustainability Studies: 2010 - 2016

❑ Research focus/orientation: on core sustainability challenges facing Africa today:

- Poverty
- Food
- Energy
- Water
- Waste
- Biodiversity
- Natural resource depletion
- Urbanisation
- Climate change



❑ Three-year degree (full-time)

❑ Registration in 'home' Faculty / Department (as per existing PhD system)

❑ Co-supervision by interdisciplinary supervisory teams (Natural, Social Sciences and Engineering)

❑ Core modules [non-credit bearing]

- TD Theory & Methodology
- Complexity Theory
- Sustainable Development & Sustainability

❑ Two-weekly PhD Seminars

❑ Regular co-supervisory meetings between individual students + supervisors

# The role of wild vegetable species in household food security in maize based subsistence cropping systems

S. Mavengahama · M. McLachlan · W. de Clercq

Received: 2 November 2012 / Accepted: 18 January 2013  
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Main supervisor  
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**Abstract** Wild vegetables (WV) are an important source of food in the maize based subsistence farming sector of rural South Africa. Their main role is as relish as they are used as an accompaniment for staple cereal based diets. They are generally reported to be rich in micronutrients. Although they may be consumed in small quantities, they influence the intake of cereal staples, manage hunger and play a central role in household food security for the poorer rural groups. Mixing several WV species in one meal contributes to dietary diversity in terms of more vegetable types as well as in terms of choice of relish. For some very poor families WV are substitutes for some food crops. The seasonal occurrence of these vegetables leaves many families without a food source during the off-season. Wild vegetables increase agro-biodiversity at the household level. This agro-biodiversity helps in buffering against the accumulation and multiplication of pests and diseases and provides important cover for the soil. Further research on agronomic, social and economic dimensions is required to understand

the roles of WV in subsistence farming systems in South Africa.

**Keywords** Household food security · Wild vegetables · Maize based cropping systems · Subsistence farming system

## Introduction

Wild vegetables (WV) are an important source of food, mainly in the rural parts of South Africa (Jansen van Rensburg et al. 2007; Modi et al. 2006; Vorster et al. 2007; Vorster et al. 2008; Shackleton 2003). This is especially so in the maize (*Zea mays* L.) based subsistence farming sector where they are eaten as relish to accompany phutu which is prepared from maize meal. The emphasis on maize based cropping systems is premised on the knowledge that the main staple, maize meal porridge, (phutu) invariably requires relish to complement it and that among the most impoverished groups of the rural population WV assume the role of main relish. Some of the commonly occurring and important WV in selected regions of South Africa are presented in Table 1. A comprehensive discussion on the occurrence and distribution of other and lesser utilised WV in different parts of South Africa can be found in Jansen van Rensburg et al. 2007; Maanda and Bhat 2010; Steyn et al. 2001 and Odhav et al. 2007.

The importance of WV has, until recently, been largely unrecognised and unacknowledged by agricultural policy makers (Rubaihayo 2002; Shackleton 2003), researchers and nutritionists alike. The main valuable attribute of these WV plant species, about which many researchers are in agreement, is their high nutritional (micronutrient) content (e.g. Steyn et al. 2001; Nesamvuni et al. 2001; Odhav et al. 2007). The ability of any food to provide nutrients is one of the important components of food security. WV presently contribute to the alleviation of household food insecurity

This paper is part of a thesis to be submitted to the Department of Soil Science, Faculty of AgriSciences, Stellenbosch University, South Africa.

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“Transdisciplinary Training for



Change Adaptation in Africa”

Erasmus Mundus for Africa: Academic mobility scheme only

Research focus :

TRECCA AFRICA challenges facing Africa: poverty, food, water, energy, biodiversity, urbanization etc. in the face of climate change warranting TD approaches

Funding:

- 2012 – €2,4M
- 2015 – €2,3M

Six African Universities:

- Ethiopia [Mekelle]
- Ghana [Ghana]
- Nigeria [Nsukka]
- Tanzania [DAR]
- Kenya [Nairobi]
- Botswana

Stellenbosch = Coordinating University

When the Intra-ACP Mobility Scheme TRECCAfrica provides doctoral and master's training to 80 postgraduate students in Africa at six leading African Universities. This in turn enables the next generation of academics and professionals to address an interlocking set of real challenges for Africa's future development: climate change and resource depletion. This project has been funded with support from the European commission. [Read more...](#)

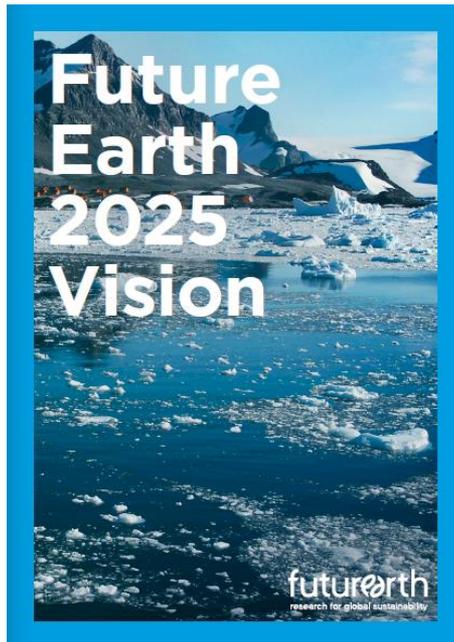
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PhD students: 54

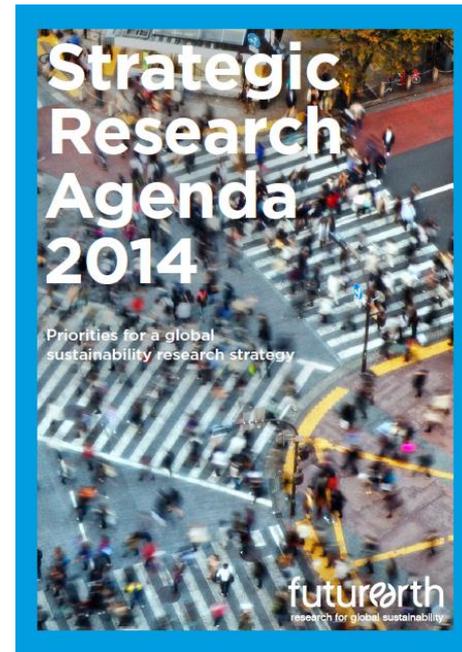
Staff: 22



# Why Transdisciplinarity?



futureearth  
research for global sustainability



The vision of Future Earth is for people to thrive in a sustainable and equitable world.

This requires contributions from a new type of science that links disciplines, knowledge systems and societal partners to support a more agile global innovation system.

How will Future Earth work?

By 2025 Future Earth will have

Pioneered approaches to co-design and co-produce solutions-oriented science, knowledge and innovation for global sustainable development

Who will Future Earth be?

By 2025 Future Earth will have

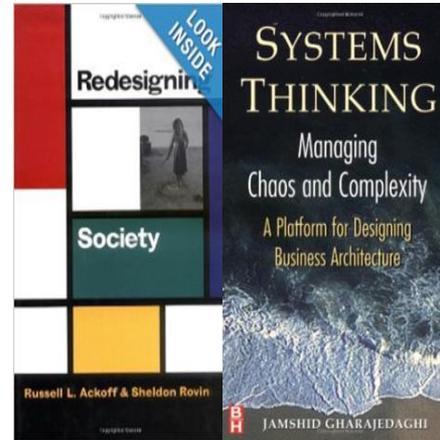
Enabled and mobilised capacities to co-produce knowledge, across cultural and social differences, geographies and generations

Useful concepts for *speaking ontologically* about the complexity of the Anthropocene ...

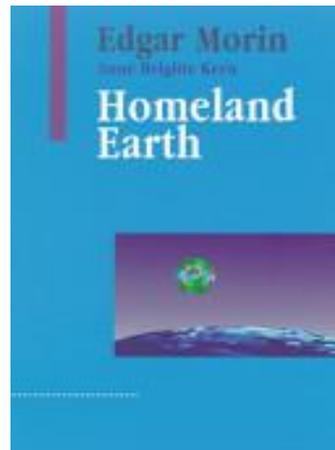
*“Hybrid world”*



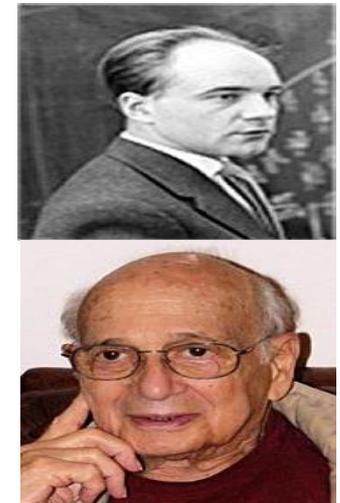
*“Messy Problems”*



*“Polycrisis”*



*“Wicked Problems”*



Rittel & Webber (1973)



**Logics and principles for designing emergent transdisciplinary research processes:  
*Learning experiences and reflections from a South African case study***

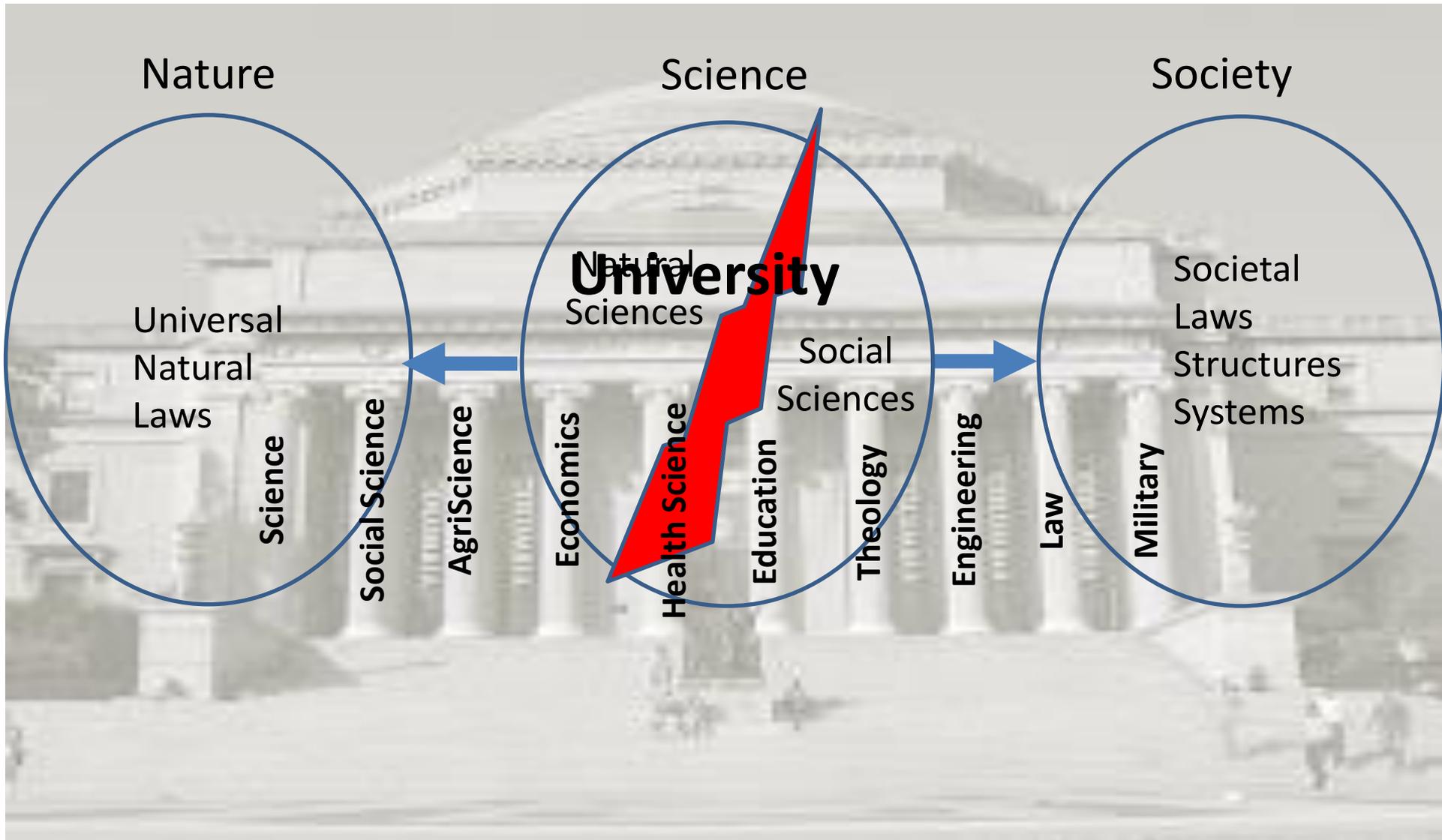
**John van Breda<sup>1</sup>, Mark Swilling<sup>2</sup>**

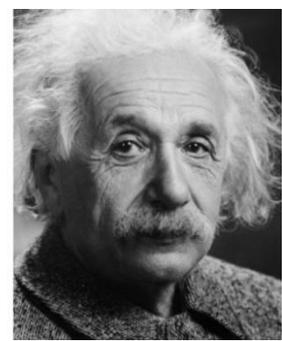
<sup>1</sup> Lead Author, Email: [jrvb@sun.ac.za](mailto:jrvb@sun.ac.za), TsamaHub, School of Public Leadership, Stellenbosch University, Private Bag X1, Matieland, 7602, South Africa, Tel: +27-21-808 2152, Fax: +27-21-808-2085.

<sup>2</sup> Email: [swilling@sun.ac.za](mailto:swilling@sun.ac.za). School of Public Leadership, Stellenbosch University; Private Bag X1, Matieland, 7602, South Africa, Tel+ 27-21-808-2152; Sustainability Institute, Lynedoch, 7603, Stellenbosch, Tel: +27 21-881-3196, Fax: +27-21-881-3294

# **WHY COMPLEXITY THINKING?**

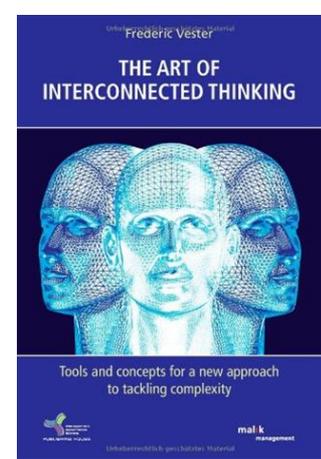
# Dominant scientific world view: Two-world theory / Disciplinary divide



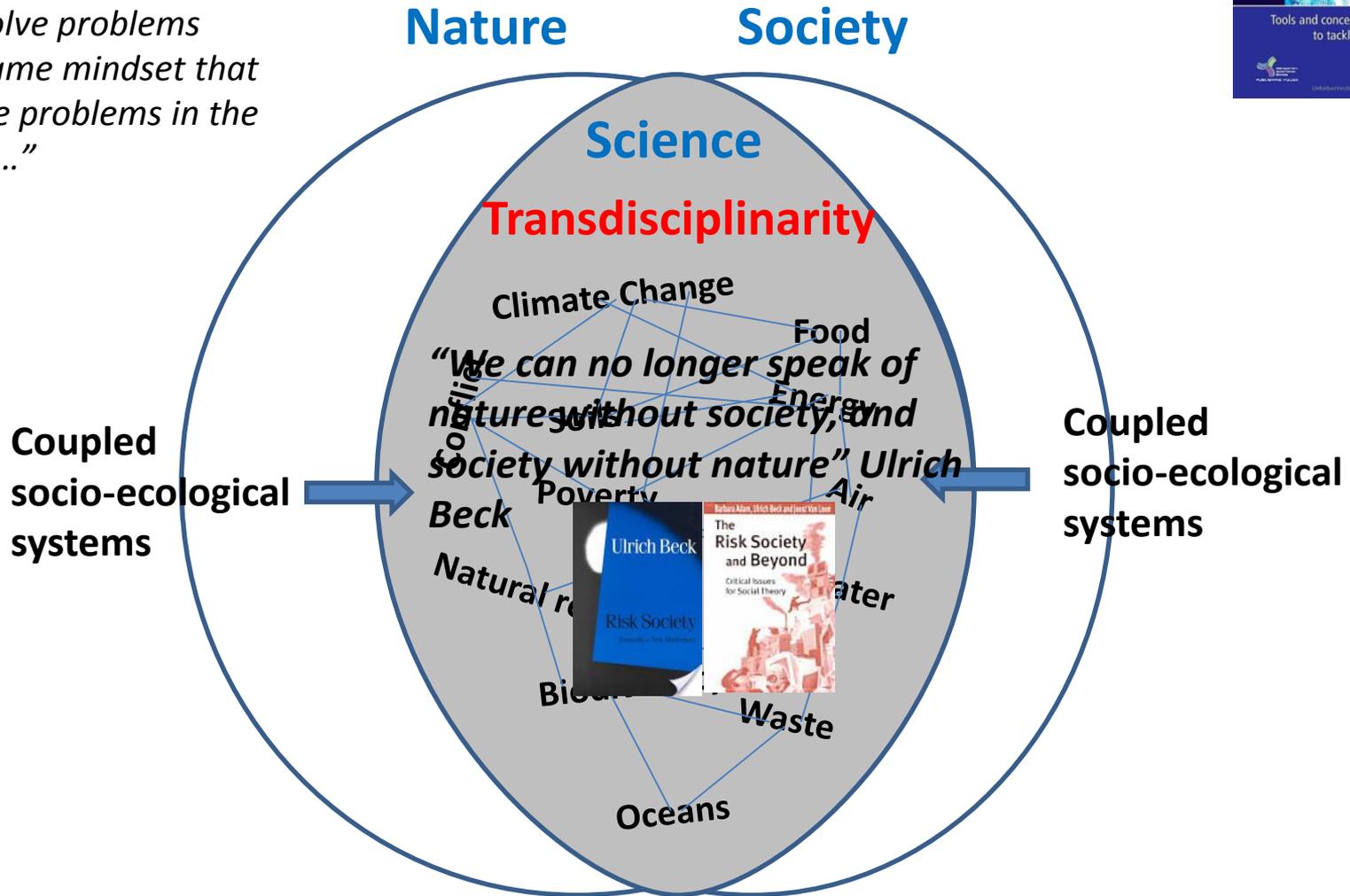


# Anthropocene

[denotes a radical shift in our understanding of the fundamental interconnectedness & complexity of the world]



“Cannot solve problems with the same mindset that created the problems in the first place ...”



# Cynefin

## Decision-making Framework

Kuh-ne-vin

“Place”, “habitat”

“Place of your multiple belongings”



Dave Snowden  
(Cognitive Edge)

**Complex**

Probe-Sense-Respond

Emergent Practice

**Complicated**

Sense-Analyse-Respond

Good Practice

**Disordered**

Novel Practice

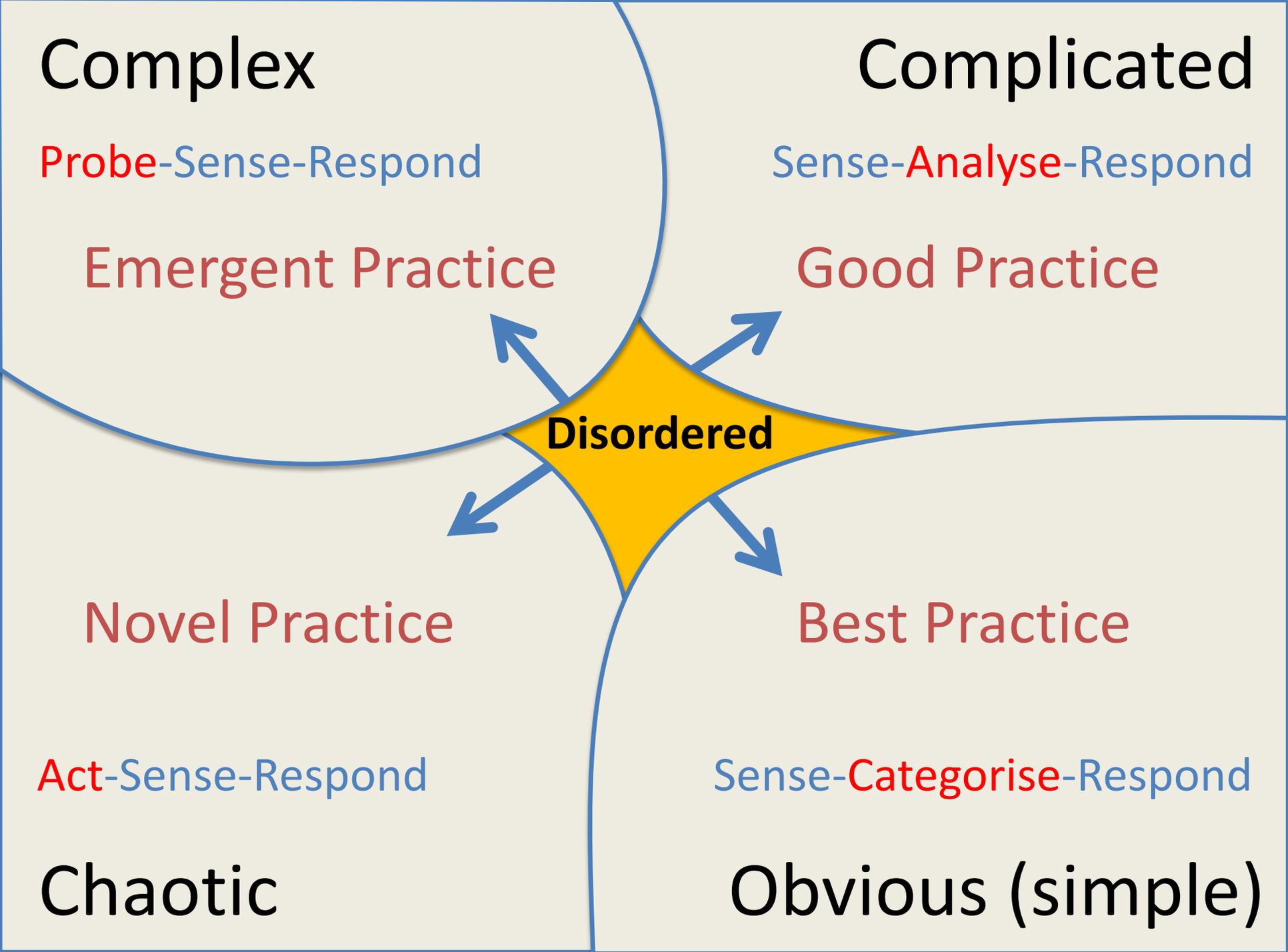
Best Practice

Act-Sense-Respond

Sense-Categorise-Respond

**Chaotic**

**Obvious (simple)**



**WHAT IS  
TRANSDISCIPLINARITY?**  
*(epistemological considerations)*

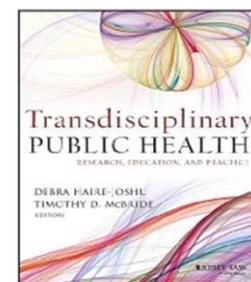
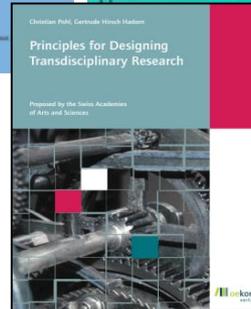
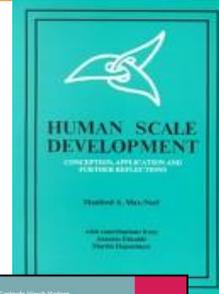
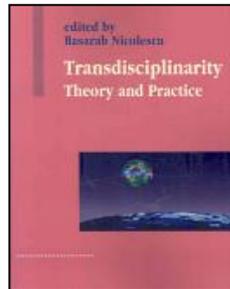
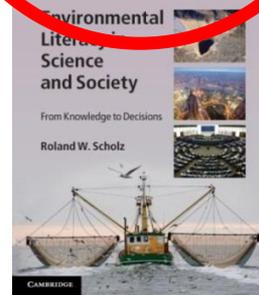
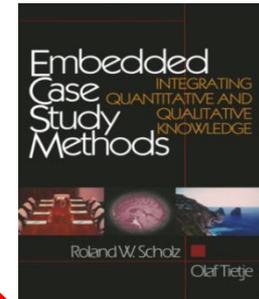
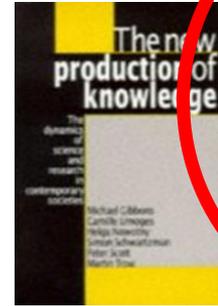
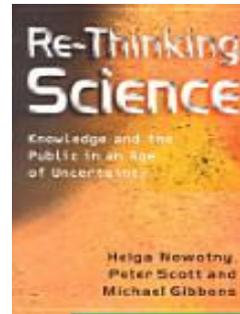
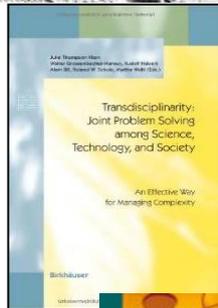
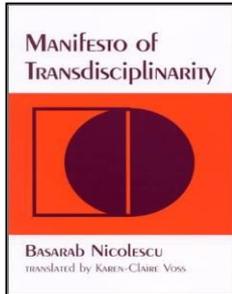
# Transdisciplinarity

## *Different Schools of Thought*

**Piaget (1972)**



**Jantsch (1972)**



## Epistemology

**Philosophical definition:** derived from the Greek word *episteme* [ἐπιστήμη] meaning 'understanding' or 'knowledge' and *logos* [λόγος] meaning 'word', referring to our assumptions, understanding and theories of the *nature and scope of our knowledge*:

- What *is* knowledge? How do we *gain* or *produce* knowledge? What is the *status* of our knowledge? What are the *effects* [if any] of our knowledge?



### **Epistemological positions in research:**

- **Positivism:** if 'reality' consists of 'objective laws' *independently* of our minds, then it is possible to know and produce **certain** or **exact scientific explanations and knowledge** of this law-like existence of reality, *without* it being affected by our senses and perceptions.  
**[subject vs. object separation]**
- **Constructivism/relativism:** we can *never* know 'reality' objectively as it exists *in and of itself, independently* from our perceptions; we are part of what we are observing; there is no 'neutral' position from which we can view reality *untainted* and *unaffected* by our assumptions and perceptions; our views of 'reality' is always produced from 'somewhere', from a particular position, and all positions are equally valid.  
**[non-separation of the subject and object]**

# Towards a Transdisciplinary Epistemology

## TD Epistemology:

Is fundamentally a **pragmatic, relational** and **constructivist** epistemology:

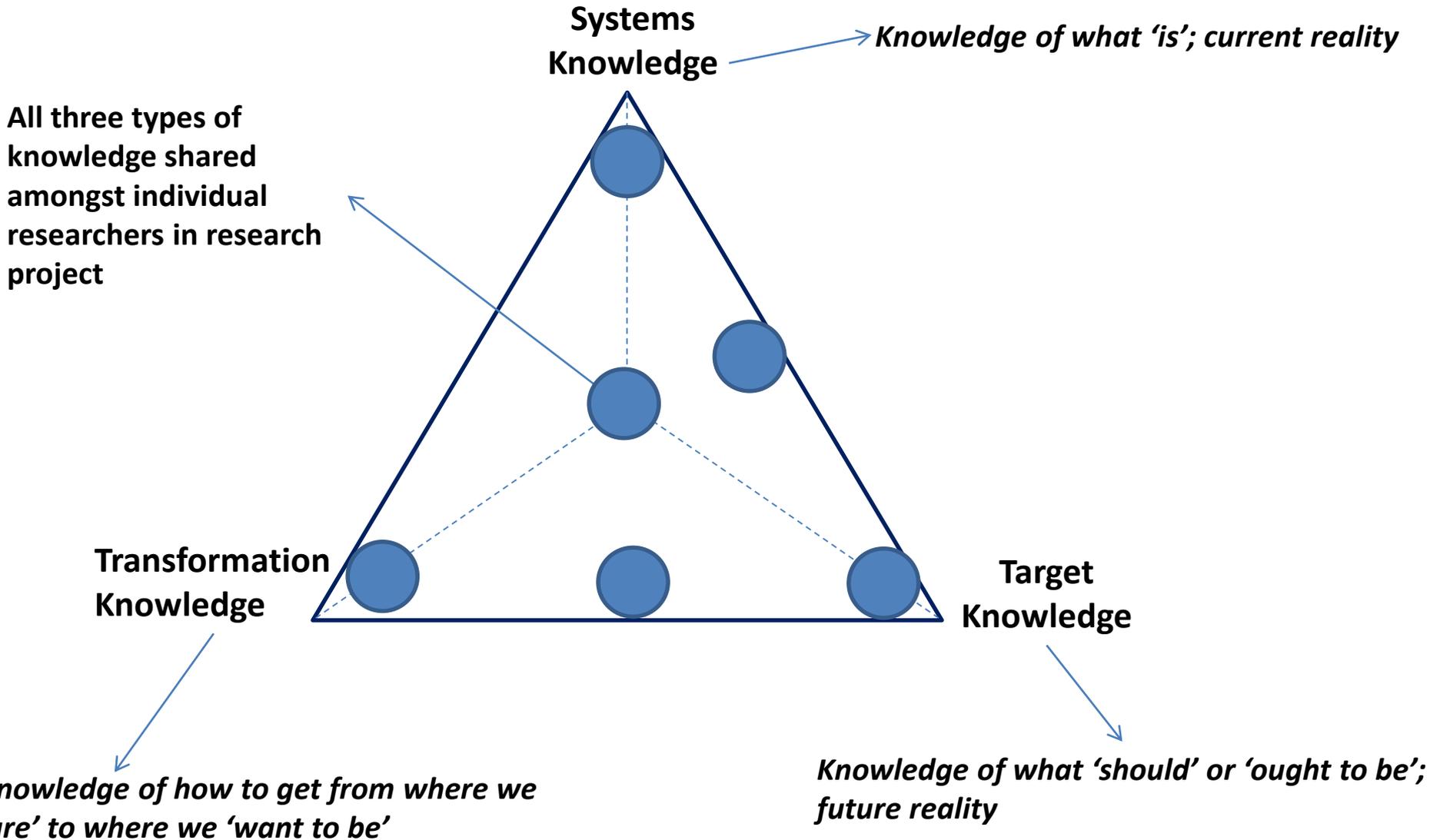
- Explicitly directed towards finding **integrated solutions** for ‘**complex**’, ‘**wicked**’, ‘**hybrid**’ societal challenges – not just interpreting / understanding / explaining problems;
- For this [finding solutions], knowledge always has to be **co-produced / co-generated / co-constructed** in collaborative processes *between* scientific experts and societal actors;
- **Cannot** be done from *within* the **boundaries of the single disciplines *only*** and in **isolation** from society, because this can only yield *partial* solutions based on specialised knowledge;
- Therefore, can only come from **purposely *working together across the disciplinary divide***, i.e. *between* the natural and social science disciplines as well as *across* the disciplines *with* social knowledge systems.

# What types of knowledge should be co-produced?

- **Systems knowledge** – what ‘is’ vs. what ‘ought to be’ (complexity)
- **Target knowledge** – what ‘ought to be’ - *scenarios, forecasting, future studies, policy analysis*
- **Transformation knowledge** – what can we already *do in the present* to move or nudge us from where we *are* in the direction of where we *want to be* - *evolutionary potential of the present*].

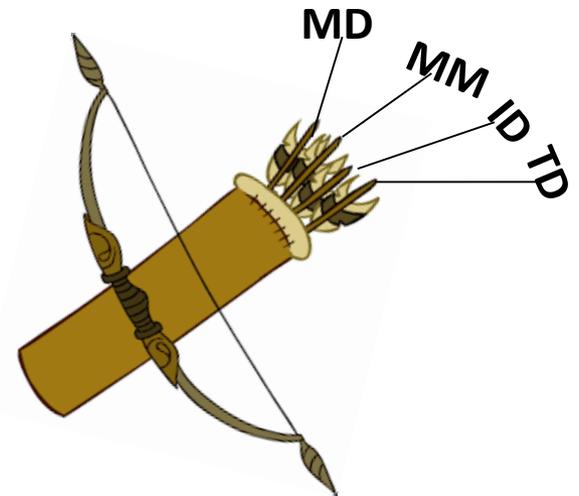
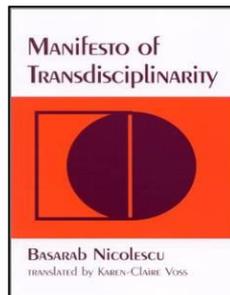


# Co-producing: Systems, Target & Systems Knowledge



# Mono-, Multi-, Inter- and Transdisciplinarity *(Differences & similarities)*

*“... they are all arrows shot from a single bow:  
knowledge”* Nicolescu (2002)

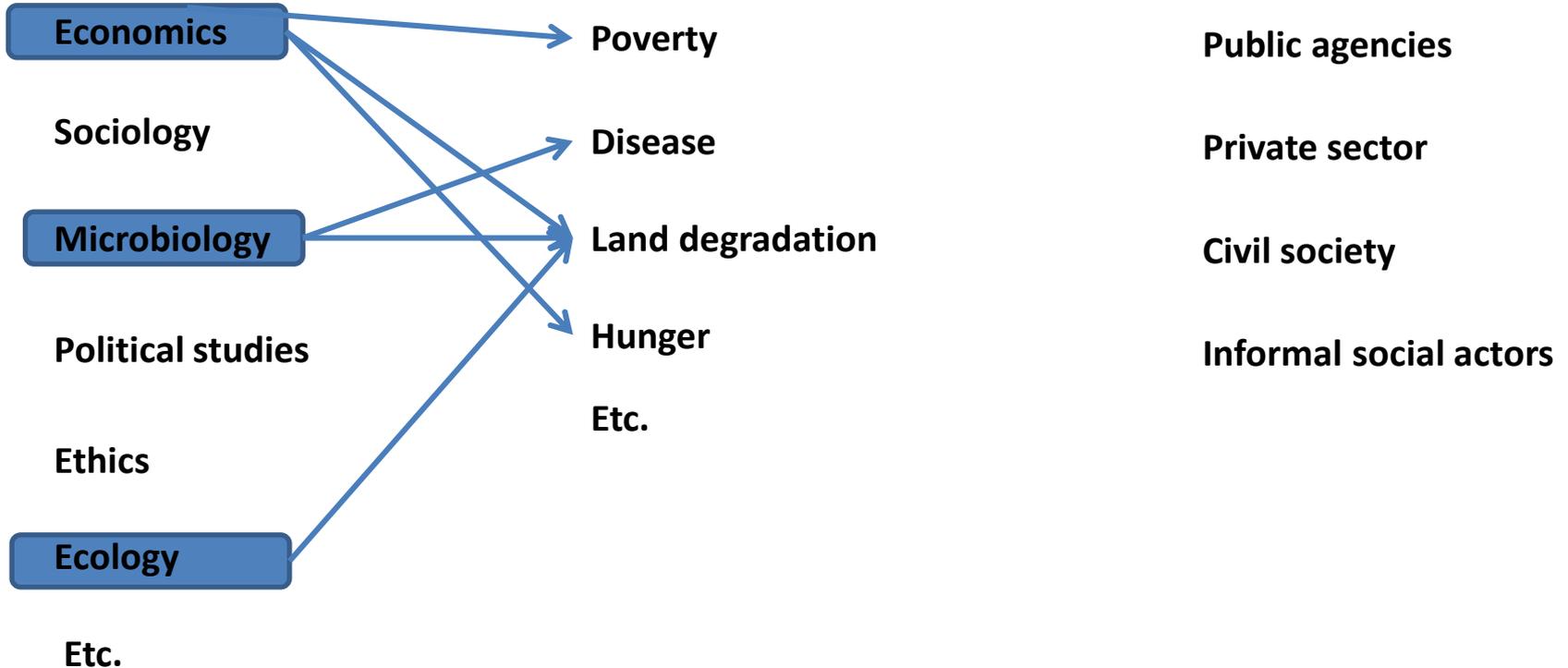


# Mono-disciplinarity

## *Scientific disciplines*

## *Problem fields*

## *Societal actors*



**Note:** individual disciplines working **separately** on **different** societal issues with: **(i)** problem statements, **(ii)** research questions and **(iii)** research methods generated and determined entirely **within** the boundaries of the single disciplines, without any interaction with other disciplines and without any collaboration with social actors and their knowledge systems.

# Multi-disciplinarity

## *Scientific disciplines*

Economics

Sociology

Microbiology

Political studies

Ethics

Ecology

Etc.

## *Problem fields*

Poverty

Disease

Land degradation

Hunger

Etc.

## *Societal actors*

Public agencies

Private sector

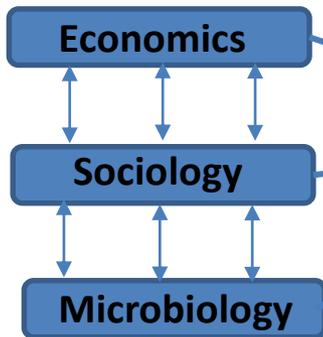
Civil society

Informal social actors

**Note:** individual disciplines working **separately** on **same** societal issues with: **(i)** problem statements, **(ii)** research questions and **(iii)** research methods still being generated and determined entirely **within** the boundaries of the single disciplines, without any interaction with other disciplines and without any collaboration with social actors and their knowledge systems.

# Inter-disciplinarity

## *Scientific disciplines*



Political studies

Ethics

Ecology

Etc.

## *Problem fields*

Poverty

Disease

Land degradation

Hunger

Etc.

## *Societal actors*

Public agencies

Private sector

Civil society

Informal social actors

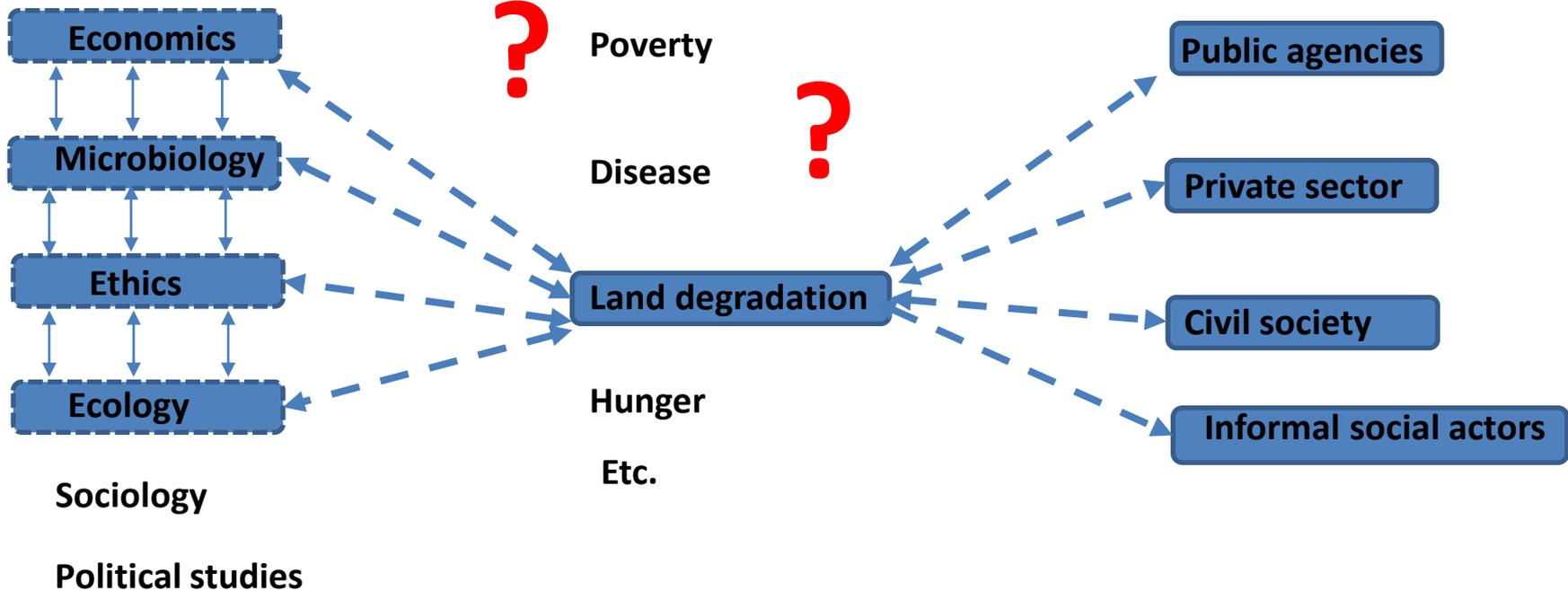
**Note:** individual disciplines **collaborating** whilst working on the **same** societal issues with: **(i)** problem statements, **(ii)** research questions and **(iii)** research methods being generated and determined by borrowing ideas, concepts, models, methods from other disciplines in service of the base discipline. No interaction and collaboration with social actors and their knowledge systems.

# Transdisciplinarity

## Scientific disciplines

## Complex Problems

## Societal actors



**Note:** TD starts radically **from** the complex societal issues at hand, with **collaboration** amongst the relevant natural and social disciplines and social actors and their practical knowledge systems taking place from the start of a process of **knowledge co-production**. This involves **joint**: (i) problem framing, (ii) research questions and (iii) methods generation and development. Key in this is **knowledge integration**: finding appropriate ways and means of **integrating theoretical and practical knowledge**.

# What is TD?

Transdisciplinarity is an emerging *new methodology for doing science with society ...*

**VS.**

*... purporting to be a new 'science' per se doing science: on, about or for society.*

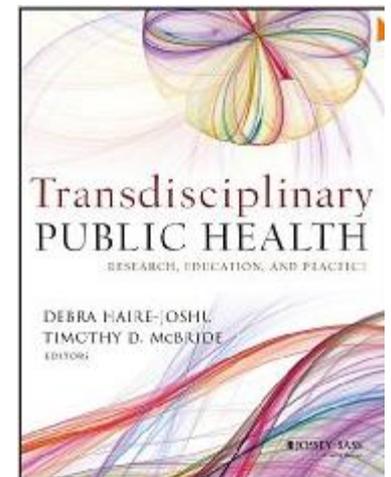
Fundamental importance for *how we – academics and students together – (re)learn and teach the theory and praxis of solution-oriented TDR in the context of the Anthropocene.*



## Definitions of Transdisciplinarity

Transdisciplinarity is an integrative process whereby scholars and practitioners representing different disciplines and epistemologies, work jointly to develop and use novel conceptual and methodological approaches, that synthesize and extend discipline-specific theories, methods, and translational strategies, to yield innovative solutions to particular scientific and societal problems.

Stokols, Hall, & Vogel (2013)



# TD: Fundamental Characteristics

In order to do science *with* society, TD is:

- ❑ **Collaborative** - *boundary crossing*;
- ❑ **Transformative**: solution-oriented [*useful knowledge*];
- ❑ **Integrative**: to integrate the co-produced knowledge or designing new methods;
- ❑ **Innovative**: developing new ways of understanding [*theory-building*] and co-producing...:
  - *Systems knowledge – what ‘is’ [factual knowledge]*
  - *Target knowledge – what ‘ought to’ be [normative knowledge]*
  - *Transformative knowledge – how to transition from where we ‘are’ to ‘want to’ be [strategic knowledge]*
- ❑ **Egalitarian**: treating *all* knowledge – theoretical and practical – as of *equal value*

# **What is Transdisciplinarity?**

*(Methodological considerations)*

**'Methodology' vs. 'Methods'**

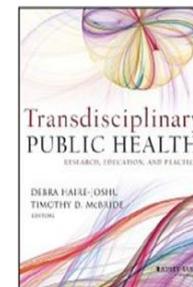
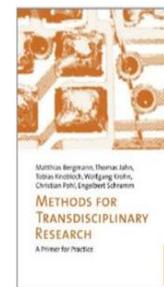
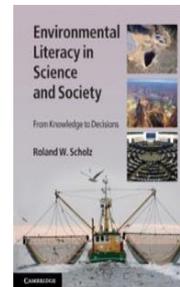
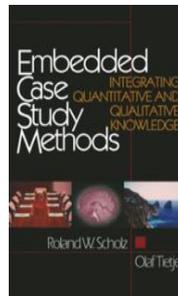
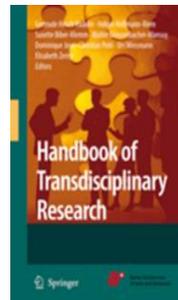
# Methodological Aspects of Transdisciplinarity

‘**Metho-hodo-logy**’ has its origins in the Greek words:

- “Meta” [μετά] = underlying / underpinning
- “Hodos” [ὁδός] = a way / journey / path / road
- “Logos” [λόγος] = reasoning / logic / principles
- **Literal meaning:** the reasoning, logic and principles (*logos*) that underpin (*meta*) and guide our decision-making when navigating a path/road/journey (*hodos*).

**TD Methodology:** is our **reasoning, logic** and **guiding principles** for **navigating** our way in/around the existing methodological landscape when embarking on emergent and collaborative research processes.

**Question:** what type of **reasoning, logic** and **guiding principles** are necessary and relevant for embarking on and navigating **emergent TDR** processes?



## Methodical Aspects of Transdisciplinarity

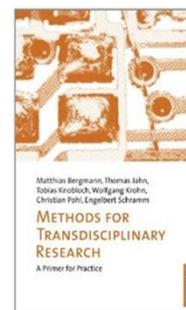
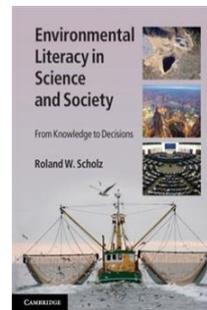
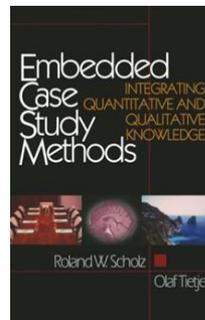
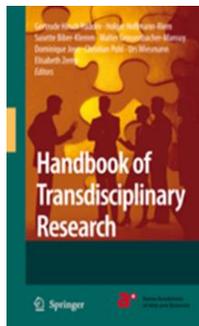
‘**Methods**’ comes from Greek word “methodos”, sharing the same root word “hodos” [ὁδός] as **methodology**, signifying a path or journey, but refers more specifically to the things we are **doing** and **using** for **navigating** a journey.

- **Research methods** are therefore about **METHODING**: it is about **verbs** vs. **nouns** – ways of **assembling, doing, using** etc. things / tools / techniques / instruments etc. with which to **producing** knowledge .

**TD Methods: using** and **adapting** existing methods for **co-producing** and **integrating** **context-relevant systems, target** and **transformation** knowledge.

**Alternatively**: if these existing methods are found to be too limited or inappropriate for the task at hand, then it is about: **co-designing new integrative methods**.

**Question**: what type of **methods** are appropriate for **co-producing** solution-oriented knowledge during **emergent** TDR processes?

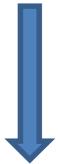


# TD Methodology

Guiding **logic** and **principles** are necessary for **navigating** our way in/around a rather cluttered and 'silo'ed **methodological landscape**, populated by the **research activities** and **methods** of three distinct and dominating **research paradigms**:

## Positivism

**Quantitative methodology:**  
Driven by **hypothesis / truth-seeking** inductive / deductive logic for **analysing** and **explaining** the '**Truth**' about the world – Natural Sciences [*Erklärung*]



### **Quantitative methods:**

- Empirical experiments
- Stats & math modeling
- Bayesian modeling
- System dynamics modeling
- GIS
- Etc. ....

## Interpretivism

**Qualitative methodology:**  
Driven by **sense-making logic** for **understanding** the '**Meaning**' of the our world – Social Sciences [*Verstehen*]



### **Qualitative methods:**

- Surveys
- Ethnography
- Case studies
- Interviewing
- Narratives
- Discourse analysis
- Modelling [MM / ABM / SDM]
- Etc. ...

## Transformativism

**Transformative methodology:**  
Driven by **transformative logic** of **changing** society [not just interpreting it] [*Verändern*]



### **Transformative methods:**

- Action research
- Participatory action research
- Focus groups
- Visioning exercises
- Participatory theatre
- Etc. ....

# TD Methodology

## *Guiding Principles*

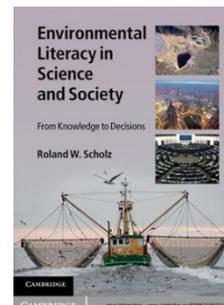
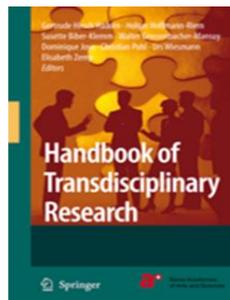
Achieving knowledge integration and innovation through:

**1st Principle: Reducing complexity** by:

- *Developing* a joint understanding of the complex problems at hand in *everyday* language [e.g. via narratives];
- *Translating* the everyday shared understanding *into researchable* theoretical problem statements and research questions [epistemic objects];

**2nd Principle: Contextualising TDR by embedding it into two contexts:**

- ***Social / everyday life-world context:*** where social change / transformation of problem situations need to take place (*indigenising*);
- ***Scientific / theoretical context:*** where new research questions, theoretical knowledge and integrative methods of research into the complex real-world problems need to be continuously co-produced.



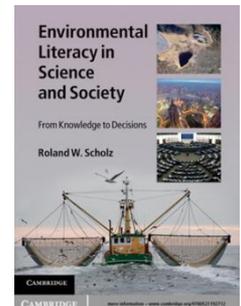
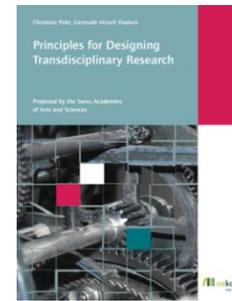
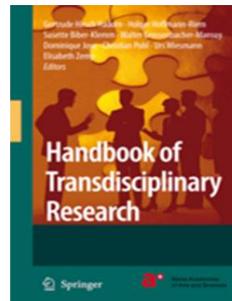
# TD Methodology

## *Guiding Principles*

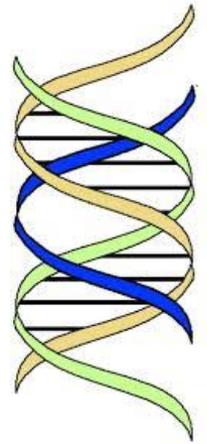
Achieving knowledge integration and innovation through:

**3rd Principle: *Reflexivity and recursivity during all phases and steps of the TDR process;*** ensure that 'mutual' or 'social' learning is fed back into the TDR process and contributes to the emergent design of the process; *iterative process.*

**4th Principle: *Accepting the equality of all knowledge systems:*** facing complex societal problems theoretical / scientific and practical / experiential knowledge are of *equal value*



**Theoretical Learning Points:**  
*Guiding logics and principles for navigating  
emergent TDR Processes*



**Triple logic**

❑ **Transformative logic**

- Explicitly intervening in the ‘messiness’ of complex real-life situations in order to bring about social change that is *more* ‘just’ and ‘sustainable’ than the current situation [*normative*]

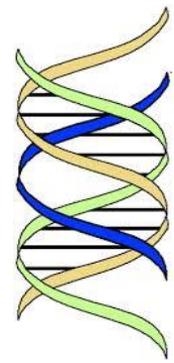
❑ **Abductive logic**

- Best guess, given the complexity of what is at hand vs. deductive and inductive hypothesis-driven and truth-seeking logics [*intuition / hunches*]

❑ **Integrative logic**

- Accommodating differing thinking, weaving disparate parts into creative solutions on all levels [*logic of included middle vs. excluded middle*]

**Theoretical Learning Points:**  
*Guiding logics and principles for navigating emergent  
TDR Processes*



**Guiding principles**

- ❑ **Perturbing the system**
  - Using small-scale, safe-to-fail social experiments, probing for leverage points
- ❑ **Exaptation**
  - Using objects, things and research methods at hand, designed for a specific purpose, creatively to serve different purposes and functions than originally intended [from practical tools and building materials to research approaches, e.g. narratives, rituals, experimental structures]
- ❑ **Multi-loop transformative learning**
  - **Level 1 technical learning:** acquiring new practical knowledge and skills;
  - **Level 2 social learning:** how to share newly acquired knowledge and skills;
  - **Level 3 transformative learning:** leaning about learning, reflexive learning, redesigning the unfolding research process
- ❑ **Allowing for emergence**
  - Allowing new context-relevant ideas and actions to arise from the perturbation process - deep immersion, generate new theoretical problems statements and research questions
- ❑ **Absorbing complexity**
  - Harnessing complexity through direct participation of people involved in knowledge co-generation

# Integrative Methods for *doing* TD Research

## Quantitative

- Empirical Experiments
- Statistical Modelling (SM)
- System Dynamics Modelling (SDM)
- Bayesian Network Analysis (BNA)
- GIS Mapping
- Ecological Modelling
- Surveys
- Etc.

## Qualitative

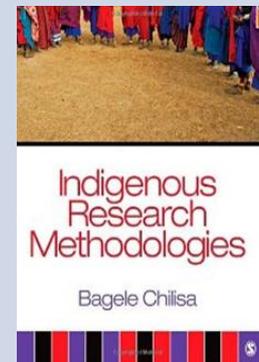
- Agent Based Modelling (ABM)
- Community Based Mapping (CBM)
- Mediated Modelling (MM)
- System Dynamics Modelling (SDM)
- **Narratives**
- Participative Ob'vation
- Ethnography
- Critical Discourse Analysis (CDA)
- Focus Group Discussions
- Participatory Mapping
- Atlas.ti
- Etc.

## Transformative

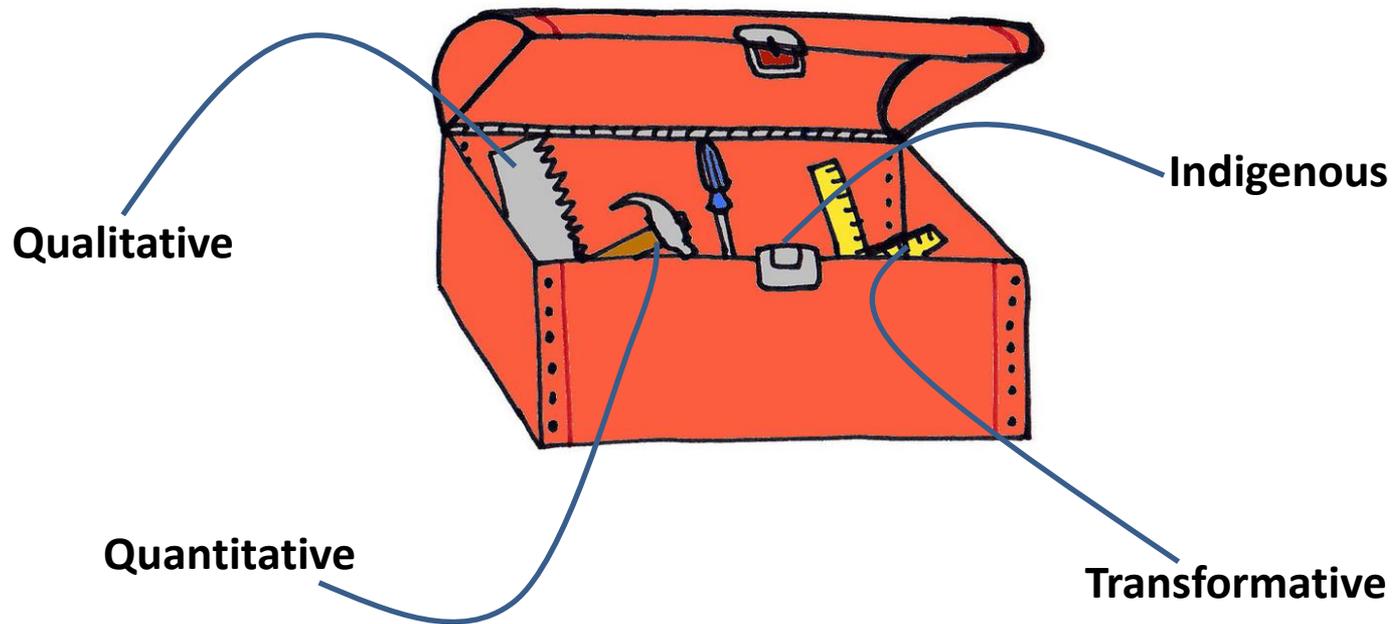
- Action Research (AR)
- Participatory Action Research (PAR)
- Community Based Participatory Action Research (CBPAR)
- Phronetic Planning (Flyvberg)
- Etc.

## Indigenous

- Talking Circles
- Song & Dance
- **Story telling**
- Indigenous focus group interviews
- Indigenous interviews and data analysis
- Medicine wheel
- Etc.



**Toolbox full of methods for  
*using and doing things!***



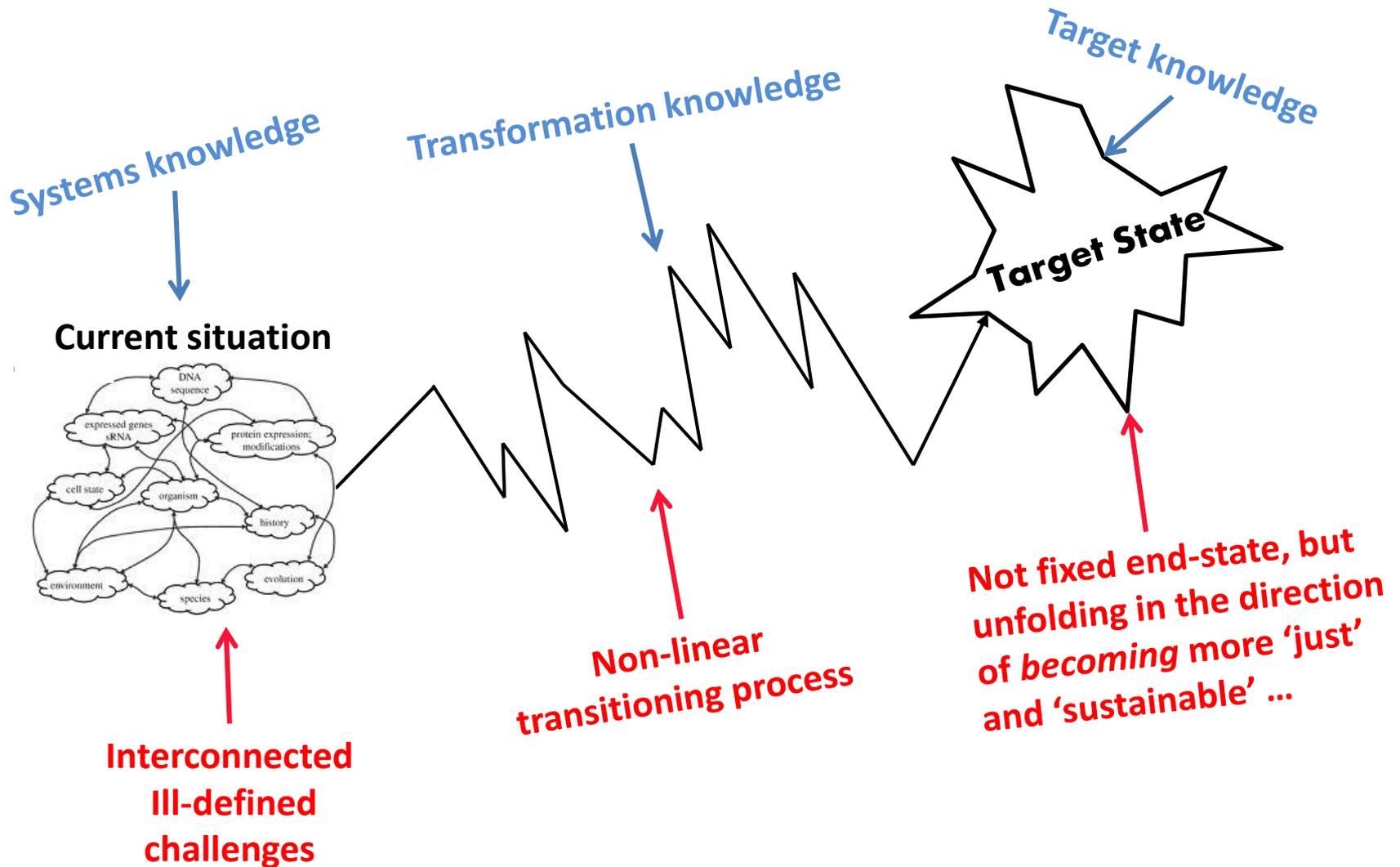
# How do we choose appropriate research methods for *doing* TDR?

## Selection criteria:

- ❑ **Contextuality:**
  - ❖ Capable of *immersing* into and *adapting* to a *particular context (indigenising)*;
- ❑ **Transferability:**
  - ❖ Capable of being used in *different contexts*;
- ❑ **Synergic:**
  - ❖ Capable of dealing with the **quantitative, qualitative and transformative** aspects of research;
- ❑ **Integrative:**
  - ❖ Must be capable of *integrating* other methods and also *being integrated into* other methods [complementarity];
- ❑ **Co-production:**
  - ❖ Capable not only of *co-producing* knowledge (outcomes), but the *method itself* must also be capable of *being* co-constructed during TDR processes;
- ❑ **Continuity:**
  - ❖ Capable of being used *during* all the *phases* and *steps* of TDR process;
- ❑ **Boundary crossing:**
  - ❖ Capable of working *across* the disciplinary and non-disciplinary boundaries; working at the Science |Society interface;
- ❑ **Dynamic:**
  - ❖ Capable of undergoing change *during* the TDR process vs. immutable or ‘blunt’ tools that can only be used in an instrumentalist way (recipe book style).

**Emergent  
Transdisciplinary  
Research Processes**

# Fragmented / Emergent TDR Processes



Although we are dealing with **high levels of uncertainty** in TDR, what we do know is that we have to **co-produce systems, target and transformation** knowledge along the way ...

# Ideal-typical Model

## SOCIETY

### Societal practice

#### Societal Problems

- Everyday life-world
- Actor specific
- Context-specific

#### Societal Discourses

- Social actors
- Policy makers
- Private sector
- NGOs

#### Results Useful for Social Praxis

- Socio-technical innovations
- Strategies
- Policies
- Interventions
- Programmes

## Joint TDR Process

### Science with Society

Phase I

**Preparing & Designing**  
*[Steps 1 – 4]*

Phase II

**Joint Problem Framing**  
*[Steps 5 – 8]*

Phase III

**Joint Problem Transformation**  
*[Steps 9 – 12]*

Phase IV

**Bringing Results to Fruition:**  
*[Steps 13 – 15]*

## SCIENCE

### Scientific practice

#### Scientific Problems

- Contested knowledge
- Knowledge gaps
- Specialisation
- Generalisation / transferability

#### Scientific Discourses

- Universities
- Research institutions
- Industrial research

#### Results Relevant for Scientific Practice

- Theoretical & methodological innovation
- New research questions
- New TDR methods

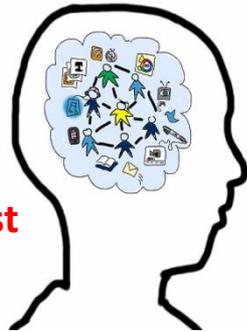
# Changing Roles during emergent TDR Processes

## Roles

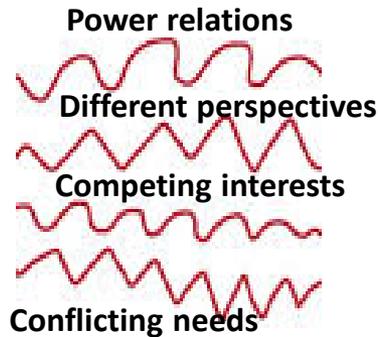
- Reflexive scientist
- Intermediary
- Facilitator
- **Change agent/activist**

Pohl (2010): *Researcher roles in knowledge co-production*

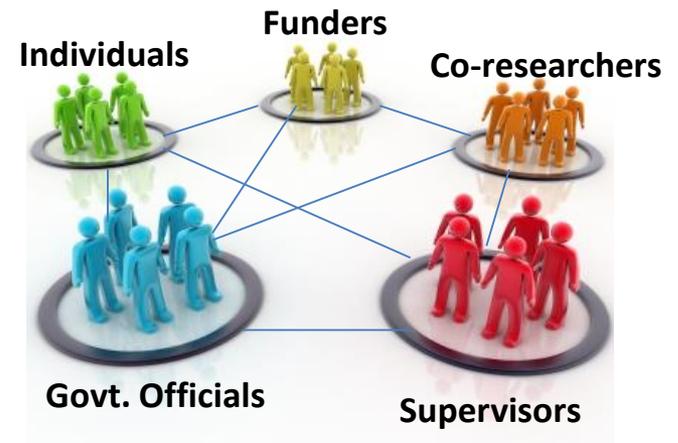
## Researcher



## Negotiating



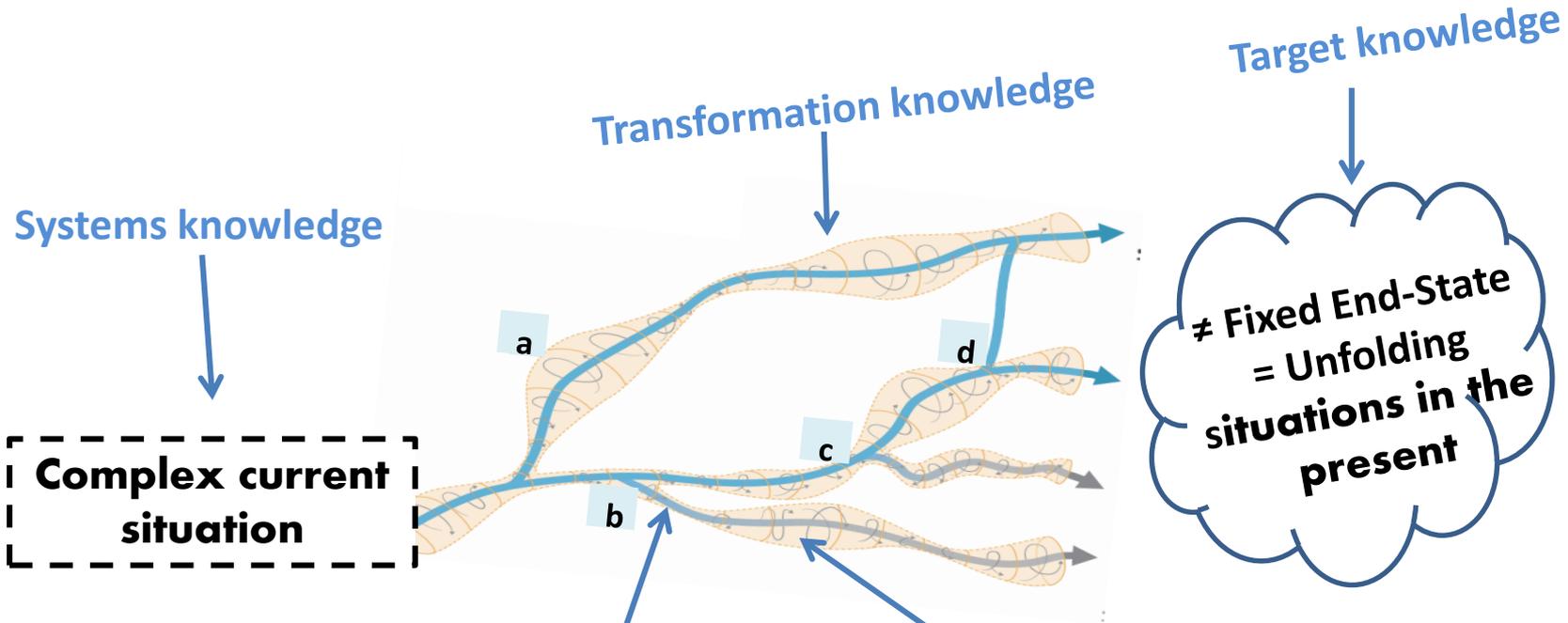
## Social Actors



- **Reflexive scientist**: translating issues expressed in everyday language into theoretical problem statements and research questions [epistemic objects] and back again into ordinary language;
- **Intermediary**: understanding how to work with social actors' competing interests and shuttling between them to create better understanding of different and differing positions [avoiding premature convergence];
- **Facilitator**: helps thought collectives to meet the challenges of knowledge co-production by facilitating learning processes;
- **Activist**: perturbing unequal knowledge/power relations via knowledge co-production, thereby participate purposely in social change processes.

**Multi-Track  
Transdisciplinary  
Research Process**

## Complex issues spark into action: Multi-Track TDR Processes



- Multiple, different **real-world pathways** and **outcomes** [social processes] are possible; moving incrementally from the problematic current situation towards a more desirable [‘just’ and ‘sustainable’] situation;
- In some cases, the **social change processes** are already underway and **TDR processes** follow, join and exit them at particular points in time;
- In other cases, **TDR processes** may **initiate /start** the process of social change;
- In both cases, it is important to keep the **social** and **TDR processes distinct**; the former drives **social change** and the latter supports social change through **co-producing relevant systems, target and transformation knowledge** at each step of the way.

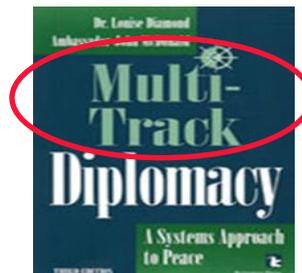
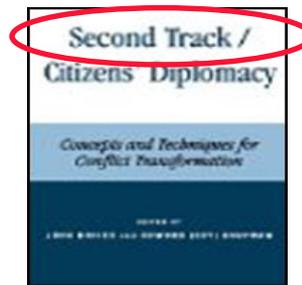
# What type of TDR Processes can *initiate* Social Change Processes?

## Track 1:

Can be broadly defined as highly **formal/structured/institutionalised processes** of doing *science with society* between well-organised/established/mandated stakeholder groups from academia, government, private and non-governmental sectors; **knowledge co-production** is driven by clearly articulated **interests/stakes** in finding integrated solutions for the complex societal problems at hand.

## **NB Characteristics:**

- Stakeholders meet on 'equal footing' in multi-stakeholder forums
- Creating 'conflict-free' zones / spaces
- Knowledge and resources
- First ends, then means
- Rational-teleological decision-making and planning  
[back-casting / forward planning]



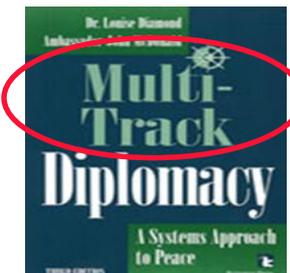
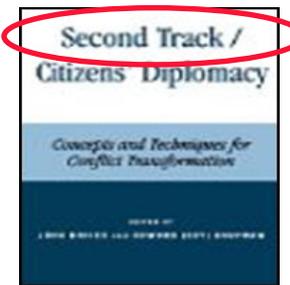
# What type of TDR Processes can *initiate* Social Change Processes?

## Track 2:

Can be broadly defined as the **informal epistemic-relationship building** processes between researchers and individual community members [without necessarily mandated/elected representative status to speak on behalf of the community] working together to find practical solutions to improve the complex challenges/issues at hand; **knowledge co-production** is driven by what can be **practically achieved in the current situation** to achieve more just and sustainable outcomes.

## NB Characteristics:

- Building individual relationships of trust
- Working *with* unequal knowledge/power relationships; *empowerment* through knowledge co-production
- Explorative incrementalism, probing *for* social change *through* multiple small-scale experiments and innovations
- Looking for evolutionary potential of the present [side-casting]



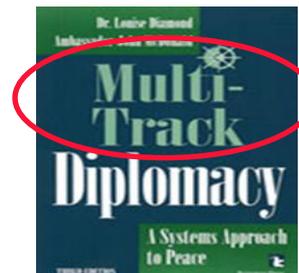
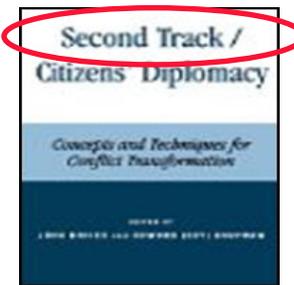
# What type of TDR Processes can *initiate* Social Change Processes?

## Track 3

Can be defined as the **shuttling** back and forth between Track 1 and Track 2 processes, **purposefully looking** for opportunities to opening up **better communication, understanding** and **exchange** of **ideas** and **information**; in so doing, **facilitating** their **coming together/convergence** at the appropriate times and **creating the places** needed for this to happen.

## NB Aspects / Features

- Complementarity
- Two-way communication
- Intermediary / intermediaries
- Context [reading and interpreting *emerging* context]



# Multi-Track TDR Processes

**Track 1:** Municipality, SDI etc.

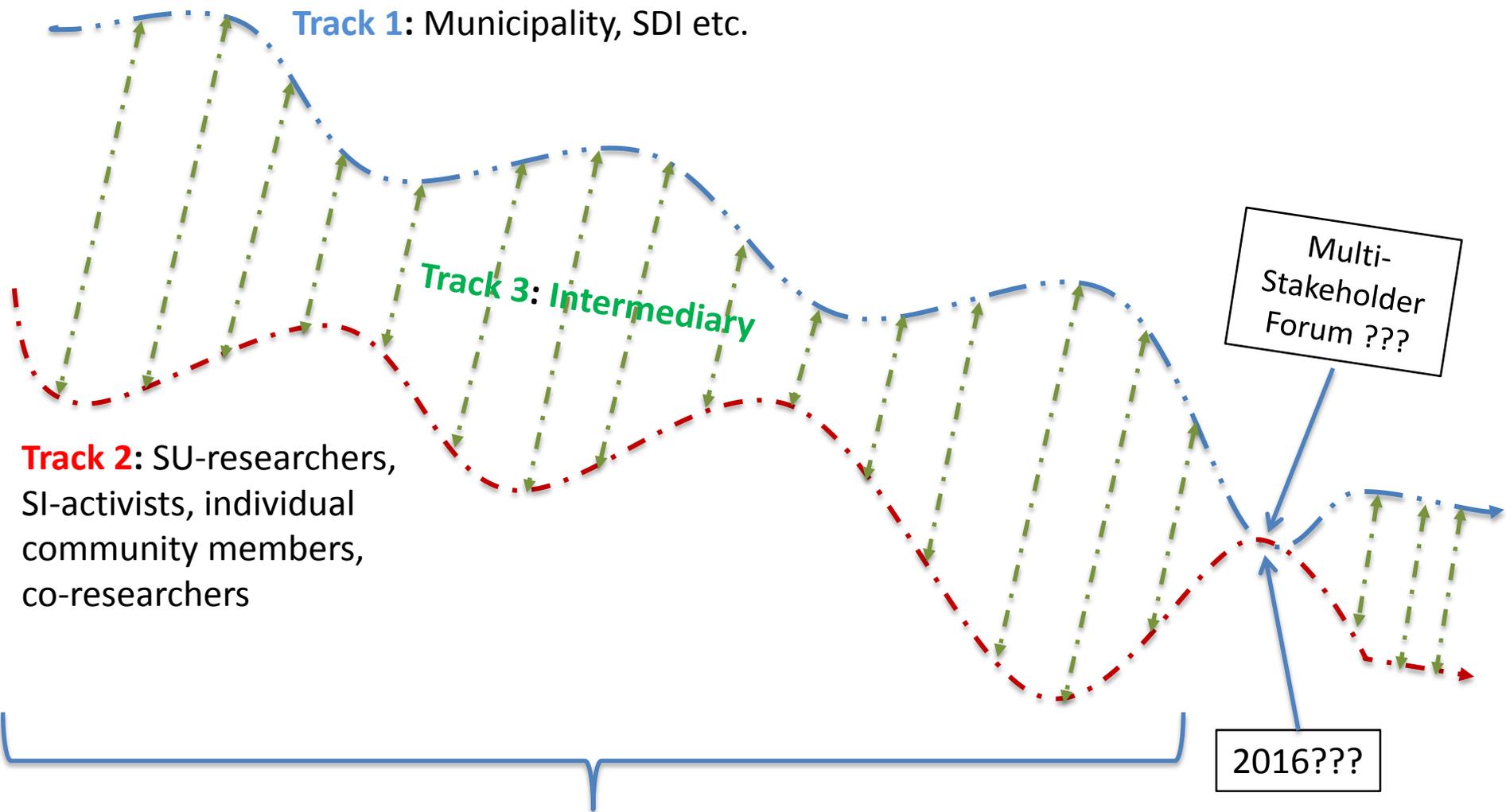
**Track 3:** Intermediary

**Track 2:** SU-researchers, SI-activists, individual community members, co-researchers

Multi-Stakeholder Forum ???

2016???

Enkanini TDCS: 2011 - 2015

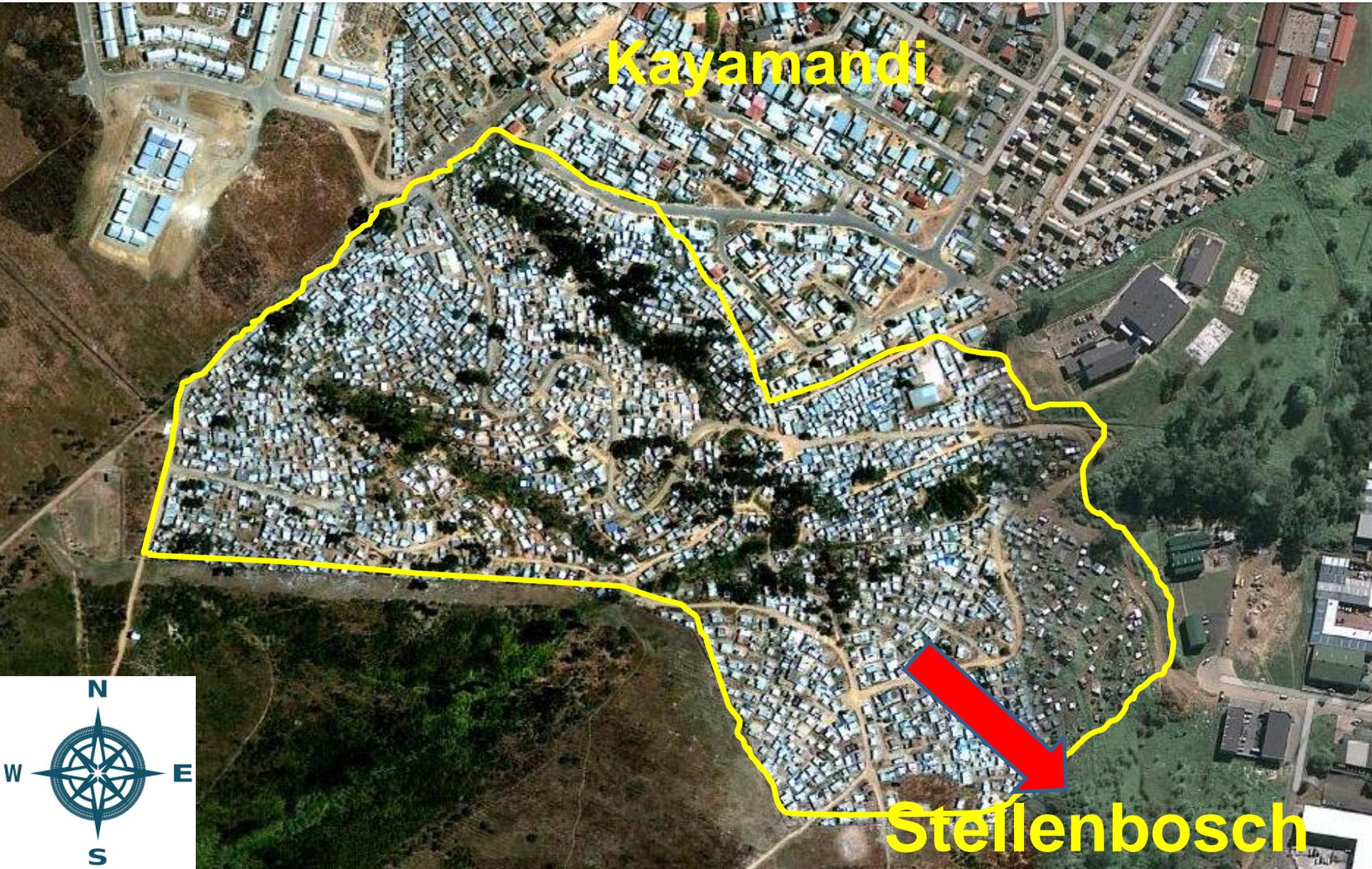


***ENKANINI***

**“Enkanini”  
TD Case Study  
2011 –**



# “Enkanini”

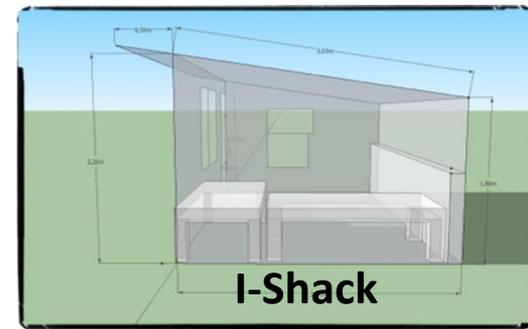


Emerging TDR process:

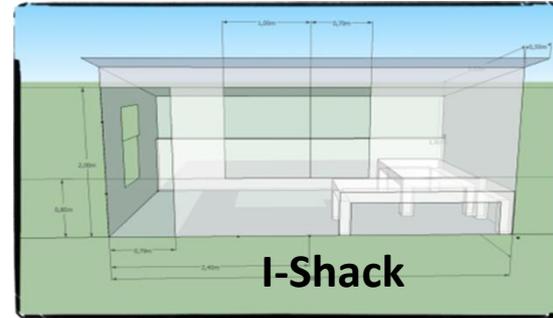
Walking ... painting ...



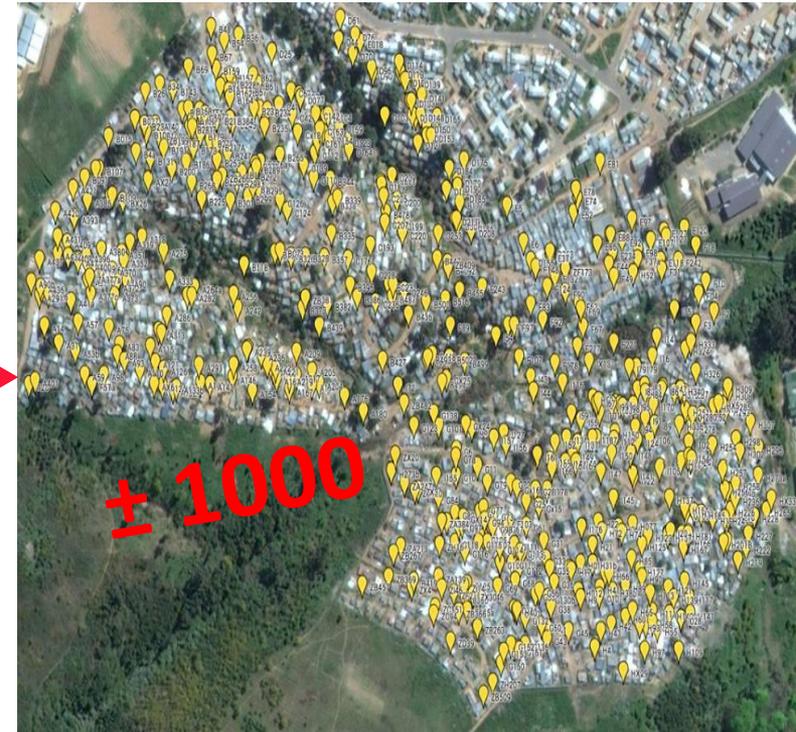
Staying over ...



Co-designing ...



Co-constructing & implementing ...

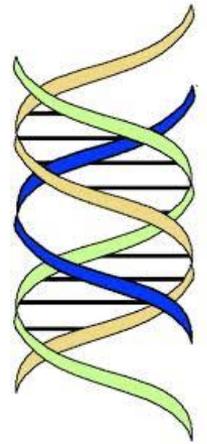


± 1000

Living in the I-Shack...



**Theoretical Learning Points:**  
*Guiding logics and principles for navigating  
emergent TDR Processes*



**Triple logic**

❑ **Transformative logic**

- Explicitly intervening in the ‘messiness’ of complex real-life situations in order to bring about social change that is *more* ‘just’ and ‘sustainable’ than the current situation [*normative*]

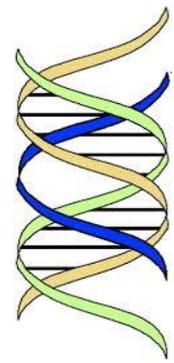
❑ **Abductive logic**

- Best guess, given the complexity of what is at hand vs. deductive and inductive hypothesis-driven and truth-seeking logics [*intuition / hunches*]

❑ **Integrative logic**

- Accommodating different and differing thinking and perspectives and weaving disparate parts into creative solutions on all levels [*logic of included middle vs. excluded middle*]

**Theoretical Learning Points:**  
***Guiding logics and principles for navigating emergent  
TDR Processes***



**Guiding principles**

- ❑ **Perturbing the system**
  - Using small-scale, safe-to-fail social experiments [*incrementalism*]
- ❑ **Exaptation**
  - Using boundary objects
- ❑ **Multi-loop transformative learning**
  - **Level 1 technical learning:** acquiring new practical knowledge and skills;
  - **Level 2 social learning:** how to share newly acquired knowledge and skills;
  - **Level 3 transformative learning:** learning about learning
- ❑ **Allowing for emergence**
  - Allowing for deep immersion in context - generating new theoretical problems statements and research questions
- ❑ **Absorbing complexity**
  - Harnessing complexity through direct participation of people involved in knowledge co-generation; vs. trying to reduce and control complexity by engaging with legitimated decision-makers only [avoiding premature convergence]

**Thank You  
for  
Your Attention!**

