

# Innovation System Thinking: Policies and Institutionalisation

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## 1. Framing the paper and concepts

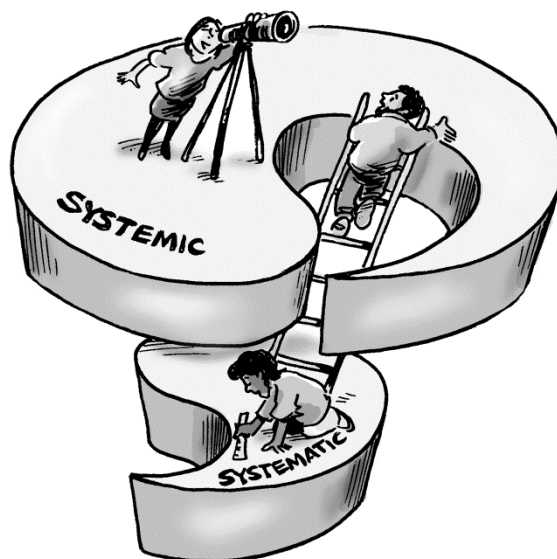
In research for development (R4D) discourse and innovation studies more generally the word 'system' has gone feral. Mainly it is used as a noun but sometimes as an adjective as in 'system innovation' or 'innovation system thinking' in which, if my memory of grammar is correct, there really should be a hyphen between 'innovation' and 'system' when referring to thinking! In my experience there is limited, or unsophisticated, differentiation between the two adjectives derived from system, namely systemic and systematic (Figure 1). As systems educators at the Open University (UK) we have had to do 'conceptual battle' with these words over the last 40 years.

The explanations we offer regarding the 'S' word and its variations have changed over time, often in response to our own learning about our student's learning. I say explanations because an explanation is something that is more fluid and open to social negotiation and renegotiation than a definition. As Ison et al (2013a) explain: 'the common understanding of definitions can be constraining because, as abstractions or declarations, they become limited to a one dimensional snapshot of a complex dynamic including loss of focus on the boundary conditions that a definition creates'. Instead we invite user responsibility in making it clear how they choose to use a term or concept. Following this imperative Table 1 outlines how we currently explain the 'S' words to our students and Figure 1 shows how we see systemic and systematic praxis (theory informed practical action) combining to form a whole, a duality, rather than a self-negating pair (a dualism) (Ison 2010).

**Table 1. Explanations associated with the use of the word 'system' and related terms (Ison 2010).**

System	An integrated whole distinguished by an observer whose essential properties arise from the relationships between its parts; from the Greek <i>synhistanai</i> , meaning 'to place together'
System of interest	The product of distinguishing a system in a situation, in relation to an articulated purpose, in which an individual or a group has an interest (a stake); a constructed or formulated system, of interest to one or more people, used in a process of inquiry; a term suggested to avoid confusion with the everyday use of the word 'system'
Systemic thinking	The type of thinking that arises from mammal's evolutionary trajectory which in humans is the systemic action of our own cognitive system that is not limited to language and logic (background systemic thinking). Within language (i.e. in the foreground) it can be understood as the understanding of a phenomenon within the context of a larger whole; to understand things systemically literally means to put them into a context, to establish the nature of their relationships
Systematic thinking	Thinking which is connected with parts of a whole but in a linear, step-by-step manner

<sup>1</sup> Expert consultation meeting CTA/CoS/SIS, 4-6 February 2013, Wageningen University, the Netherlands

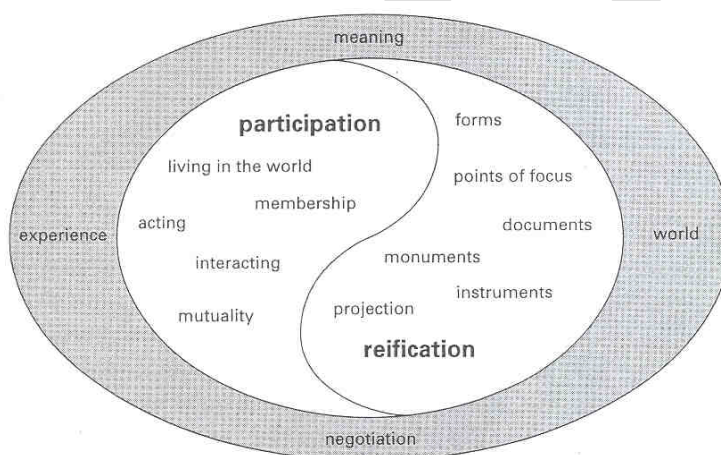


**Figure 1. My understanding of the relationship between systemic and systematic, the two adjectives arriving from the word 'system' - the systematic is nested within the systemic or, in other words the systematic is a special case of the systemic; together systemic and systematic form a whole, a unity, known as a duality (Source Ison 2010)..**

So, what are we to make of the uses which are being made of terms like 'innovation system', system innovation', 'systemic innovation'? In undertaking this inquiry, and before concerning ourselves with questions of institutionalisation and enabling or disabling policies, do we seek some conceptual clarification, even cleansing? Or do we start in 'the swamp' of practice, to borrow Donald Schön's metaphor, and explore what people are doing in the name of different conceptions? The latter is an inquiry into what we do when we do what we do, that I take from my conversations with Humberto Maturana (see Ison 2010). Before responding to these questions let me first address two matters that are relevant to our discussions. The first concerns the nature of the thinking that informs a conversation about systems. The second is the intellectual territory that a conversation about systems can draw upon.

In recent years whenever asked to give a talk or run a workshop I usually pose early-on the following question to audiences or participants: 'how does walking arise as a practice?' Almost invariably the answers that are given are grounded in systematic, linear or causal thinking. Only rarely do I have the answer that walking arises in the relational dynamics between a person, or organism, and a medium such as a floor. If the relational dynamics between the two are broken then walking as a practice does not arise. The thinking that underpins these two answers is radically different and has major implications for what we do when we do what we do, such as how we might understand the governance of a water catchment or an 'innovation system' (see below). The different modes of thinking are also relevant to the 'S' word. Within the systematic tradition systems are seen as things in the world (as ontologies) that can be discovered, described, modelled or engineered. Historically this can be understood as the mainstream understanding and is what Checkland (1980) labelled the hard-systems tradition. In contrast the systemic tradition understands a system to be an epistemological device for knowing about a situation of concern, so as to learn means for improvement and change. Thus a system in this tradition is a product of a distinction, formulation, or invention by someone, or a group, concerned with improving situations using systems thinking. In

this tradition practitioners realise that when a system is generated it is not a thing but a system-environment (or context) relationship mediated by a boundary judgment made for a purpose. It is this latter tradition that Checkland (1980), perhaps unfortunately, labelled the soft-systems approach. The tensions between these two positions can be appreciated in some of the questions posed for this meeting e.g. *'What type of 'systems' are relevant? What exactly is an innovation system (IS) and the IS approach? What is the relationship between farming systems and IS approaches? Are they the same or different? What exactly are the differences? Is there need to explicitly embrace Checkland's Soft Systems Methodology? What are the consequences of hard system assumptions? What is the use of normative systems for guiding interventions?' What defines the boundaries of the (agricultural) innovation systems (agricultural sectors, industries; domains; farming systems)? What hierarchy of levels should be assumed and what are the interactions among those levels?* Perhaps in the meeting there will be time to tease these matters out? It is also important that people in this conversation appreciate the history and diversity of the different systems intellectual lineages (Ison 2010).



**Figure 2. The participation-reification duality in CoPs theory (Wenger, 1998)**

My own contention is that the distinctions between systematic and systemic are not trivial as they affect what we do – our praxis – and the institutions we invent, or which knowingly or not, impinge on what we try to do in the name of innovation (see below). These distinctions affect practice in another way – through the epistemological commitments that are knowingly or not brought into the practice space. Another way to understand these distinctions is through the lens of CoP (Community of Practice) theory (Wenger 1998; Blackmore 2010). Figure 2 is central to CoPs theory as it describes the duality that exists between participation and reification that unfolds through the life of a CoP e.g., a concern for ethics might arise through conversations, and other forms of practice in R4D and these abstract concerns may then be reified (made into a thing) by the generation of an ethics clearance process and/or a consent form. There is thus a link that can be made to the processes of generating a system of interest in the participation domain, even if it is oneself engaging with a context; this would constitute starting out systemically and an outcome could be the reification of a system design that makes sense in the context of its generation (but problems arise when such a 'system' is taken out of context without another round of participation!) Alternatively it would be possible to start out in the systematic tradition – seeing systems as things, as reifications - but it would be a trap in the medium to long term to not open-up boundary judgments and patterns of

connectivity and casualty to wider scrutiny through a form of participation. Failure to do this may lead research, for example, down the wrong pathway from the start. The reification-participation duality can also be understood as a key element in processes of institutionalisation i.e., an institution is a reification or codification of some abstract set of concepts which may, or may not be generated through appropriate participation.

Other systems concepts are central to the concerns of this meeting – these include *connectivity* and its relationship to *networks* (my own view is that systems theory and network theories are compatible if one accepts the need for some form of boundary judgment when attempting to act purposefully to transform a situation) as well as *feedback* – because of the role it plays in monitoring, controlling, learning and adapting.

### ***Praxis and praxeology***

The dominant paradigm or the ‘mainstream framing’ of how knowledge relates to practice is practice as applied knowledge, what Cook and Wagenaar (2011) call the ‘Received View’. They posit that *“knowledge and context can be explained in terms of—and are evoked within—practice, and not the other way round—and that this transpires within real worlds each of which has its own unique constraints and affordances, histories and futures.”* From this perspective the practice of developing ‘innovation platforms’ (IPs), or ‘innovation systems’ generates both context and new ways of knowing; the choices Cook and Wagenaar (2011) offer exemplify why theoretical framing choices matter in relation to processes of acting out our conceptual understandings. Through practice that engages with situations a range of framing choices make themselves apparent and lack of awareness in policy and professional practice as to how much agency exists in relation to framing choices has subsequent, or ‘downstream,’ implications (RCEP 2010). Unfortunately the current mainstream approach stems from adoption of a narrow understanding of how science informs policy (e.g. Leach 2008) and practice which does not admit multiple partial perspectives from the start. All too often the praxis that is privileged and conserved in R4D is ‘doing good science’ with all that this now entails. Of course it need not be this way as doing good science need not be incompatible with doing good R4D, but the current institutional framings for science practice seem neither systemic, ethical nor viable in the long term.

The term praxis rather than practice is used in our work to make the point that all practice is theory-informed. We adopt a stance consistent with praxeology, that branch of knowledge that deals with practical activity and human conduct (Ison 2010). We note that all praxis is contextual and dynamic. Thus history matters as do circumstances, stakeholders, small ‘p’ politics, skills of those involved, and the institutional arrangements (‘rules of the game’, in the new institutional economics sense - North 1990) which characterise the praxis domain.<sup>2</sup>

From 40 years of practice as systems educators we learnt that it was not enough to equip our students with their own systems thinking and practice skills – too often we set students up to fail in inhospitable institutional and praxis contexts. In our most recent programmes (Blackmore & Ison 2012) we have seen it as an ethical responsibility to enable students to take what we call ‘a design turn’ i.e., to develop ways to improve practice at the same time as striving to transform their

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<sup>2</sup> This section draws on Ison et al (2013b)

contexts of practice through systemic design. Another way to understand or frame this concern is under the rubric of systemic governance of a systems practice-context co-evolutionary dynamic.

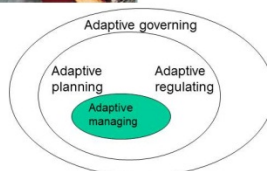
### **Systemic governance and social learning**

Hajer and Wagenaar (2003) describe a 'governance turn' in several domains and disciplinary fields claiming that the '*vocabulary of governance speaks to a widely acknowledged change in the nature of politics and policymaking*' that '*opens up the cognitive commitments implicit in the thinking about governing and political decision making*'. This, they said, '*seems to help practitioners and theorists alike to unlearn embedded intellectual reflexes and break out of tacit patterns of thinking*' (p.2).

despite a widespread 'governance turn' it seems reasonable to claim that the way in which governance as a concept is understood, and how its enactment is pursued in context sensitive ways, remains contested and subjugated in policy processes.

The cyber-systemic lineage of framing governance which we adopt in the Systemic Governance Research Program based at Monash University is not new (see Blunden and Dando 1994) but it is possibly neglected in recent governance discourse. Within this framing the central organising metaphor is that of a helmsperson (sailor) steering, or charting, an on-going viable course in response to feedback (from currents, wind etc.,) and in relation to a purpose that is negotiated and renegotiated within an unfolding context i.e., in response to uncertainty (Cook and Yanow 1993; Ison 2010; Figure 3). Thus governing encompasses the totality of mechanisms and instruments available for influencing social change in certain directions including a practitioners own history (i.e., traditions of understanding and identity). Whether purposeful or not, the collective of activities of governance produces effects comprising varying degrees of coordination/ lack of coordination, control/ loss of control and certainty/ uncertainty. The point is to arrive where a loss of control does not lead to fear but to social learning and innovation. Systemic governance, or governing, is the context in which adaptive planning, designing, regulating and then managing sits (Figure 3). Governance that is 'adaptive' incorporates learning and change in response to uncertainty but despite the growing need is, in the main, poorly done (e.g., Allan and Curtis, 2005). Often this is because of a lack of clear rationalisation (and critique) of the interacting effects of private and public forms of action (Osberghaus et al 2010).

### **Systemic governance?**



e.g. [South African National Parks - Kruger](#)

- leadership
- 17 years of adaptive learning
- attention to process and relationships
- changed boundaries of 'system of interest'
- changed role for science
- but may not be able to do it purposefully in another context – praxis?

**Figure 3.** A collaboration has just been established to explore lessons from South African National (SAN) Parks in terms of the purposeful design of systemic governance arrangements; in a cyber-systemic tradition the organising metaphor is that of a helmsperson responding to currents, winds, purpose etc (i.e. feedback).

Within a systemic governance framing, and following SLIM (2004) and Leeuwis and Pyburn (2003) we have come to see social learning as a key element comprising governance mechanism and an unfolding social dynamic (Jiggins and Steyaert 2007; Ison et al 2013a). When Andy Hall says (2012) *‘that in order for agricultural research to effectively contribute to development it needs to be reframed as an activity that bundles together different sorts of research and bundles together research with entrepreneurial activity and activities that build capacity by stimulating organisational, institutional and policy change’* I would claim he is arguing for research to be set within a systemic governance framework that also includes governance research itself, preferably undertaken as systemic action research. Governance can operate at the level of a meeting, a project, a program, an organization, a set of policies, an innovation platform or a government and in relation to the biophysical world and other species (e.g. biodiversity). As outlined in the next section institutions (or social technologies) and institutionalisation are critical to the transformations that are sought within such a framework.

## 2. Notes for the field

Since late 2011 we have been designing and running a ‘Learning Project’ (LP) as part of an AusAID-CSIRO funded and led A\$30 million Africa Food Security Initiative (AFSI) which partners with CORAF-WECARD in West Africa and BECA in East Africa. The LP is funded by CSIRO (for background see Ison et al 2012). Our research question is: Can a learning system be designed in the AFSI situation such that reflexive and responsible research for development (R4D) practice is an emergent outcome?

In framing our research question in this way we draw on Schön (1983) who challenged the technical rationality of Herbert Simon. He sought to establish *‘an epistemology of practice implicit in the artistic, intuitive processes which [design and other] practitioners bring to situations of uncertainty, instability, uniqueness and value conflict’*. Within this tradition ‘learning systems’ cannot be designed deterministically (i.e. as a blueprint), rather theory-informed contextual design is pursued to create favourable conditions for emergence (in our case emergent co-research inquiries between Monash and CSIRO LP participants and, as of this last week, with BECA-connected African-based counterparts). Thus a ‘learning system’ can only be said to exist after its enactment, i.e. upon reflection. ‘Design’ of learning systems is also a form of systemic action research.

One of our first tasks was to produce a document we called ‘Notes for the Field’ designed to introduce to the mainly biophysical scientists involved from CSIRO ideas about reflexive praxis, action research and some possible theoretical frameworks which could be used to interpret their R4D experiences. To do this, we argue, there is a need to appreciate systemically what we do when we do research as a form of practice, rather than what we might claim we do. Figure 4 is a heuristic model developed for this purpose depicting an engagement of two researchers, but of course there are usually many more researchers involved. It might be useful to explore this heuristic during the meeting as well as the metaphor of doing R4D or building an IP as a performance?



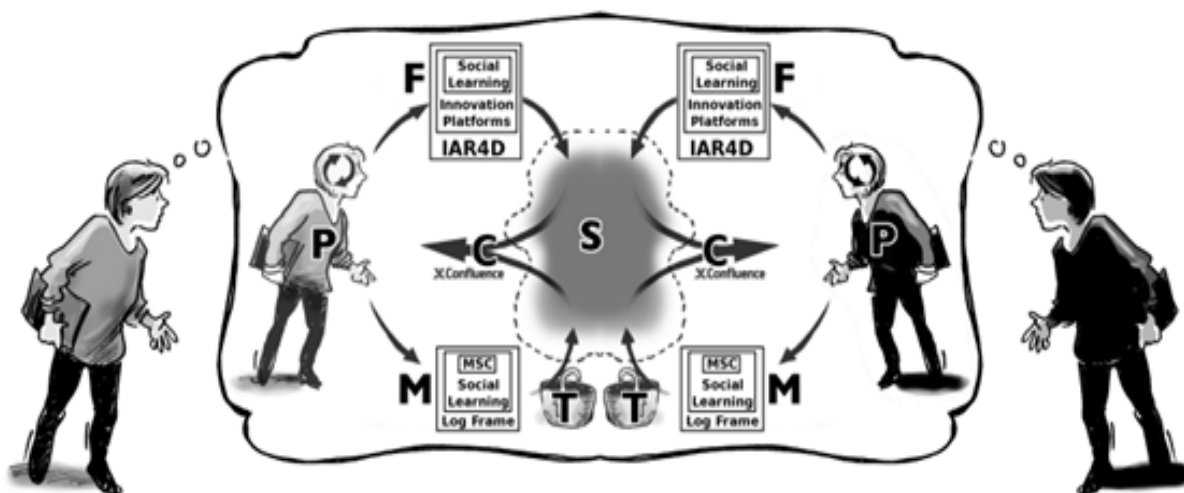
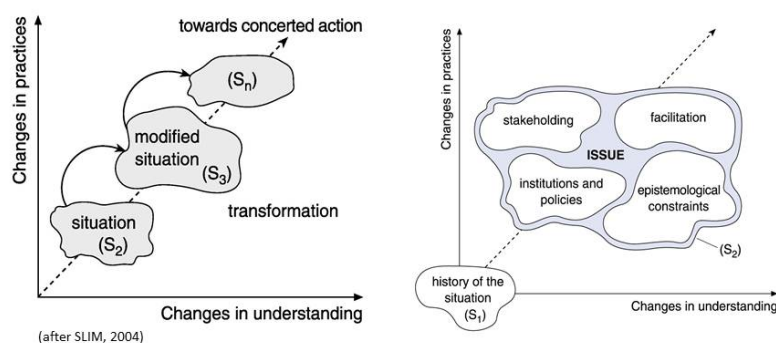


Figure 4. An heuristic designed to facilitate systemic reflection on what is done in the practice of collaborative research. Although never the case the researcher/practitioner (P) with their unique traditions of understanding is, for clarity, abstracted out of the research situation (S). Practice as performance arises through the systemic interaction of P, F (a chosen framework of ideas), M (methodological choices aided by T, tools or techniques), S (situation of concern which may be framed in many ways) and C (capturing or reifying some outputs of the process). The theoretical framings and methodological choices shown here reflect preferences and appreciation of context.

How do we design for transformative research  
(or practice) using systems approaches?



Social learning: process of socially constructing an issue by actors in which their understandings and practices change, leading to transformation of the situation through collective / concerted action.

Figure 5. The adapted SLIM heuristics which can be used to design, mediate or facilitate and theorise or interpret research practice in situations framed as natural resource dilemmas, or wicked situations, or situations characterised by interdependencies, complexity, uncertainty and multiple stakeholders.

Social learning as we have come to understand it through 13 years of research is theoretically and methodologically central to our design and interpretation of LP activities (Figure 5). I reprise our current version of the SLIM heuristics (2004; Ison et al 2007; Jiggins and Steyaert 2007; Collins and

Ison 2009) because it is in this framing that I wish to elaborate on policies and institutions in the next section. The detail and theoretical ideas which these heuristics integrate are given in Annex 1. In terms of this discussion a question to ask is, is it possible to conceptualise, develop and thus institutionalise when reflexive, epistemologically aware praxis is missing?

### 3. Notes from the field

In this section I want to draw out some findings and issues that arise from recent research and which seem germane to a session concerned with policies and institutions. Many issues are fresh in my mind as this paper was written whilst undertaking a set of semi-structured research interviews with personnel associated with the AusAID-CSIRO-BECA AFSI program and constituent projects mentioned earlier. Our research concern was to understand experiences of integrating biophysical and social research. As this audience would appreciate the data is rich with institutional (including policy) issues. As I understand it major objectives of the CoS-SIS program have included: (i) improving smallholders' opportunities through an enabling institutional environment; (ii) testing an innovation-systems approach to institutional change, (iii) facilitating nine innovation platforms engaged in institutional experimentation around carefully identified entry points and (iv) drawing [out] and institutionalizing policy relevant lessons. I look forward to learning more about what those involved did when they did what they did. Like CoS-SIS our research, post SLIM, has focused on institutions because of the critical role they play in enabling, or constraining, social learning as a process and because of the need for recognition of social learning as an institutional form (governance mechanism) worthy of investment (Ison et al 2013a). That said we have not lost sight of the systemic interplay of all 'variables' in the SLIM heuristics (Figure 5). We have learnt some things about institutions but perhaps not in such a major and coherent way as CoS-SIS (Hounkonnou et al 2012; Röling unpub). The main lessons, which can be expanded upon during the workshop, are:

- The role institutions play in shaping landscapes and creating initial starting conditions is not well appreciated – a capability to cultivate is that of 'reading' an institutional landscape and appreciating the historicity of particular institutions (Wallis and Ison 2011b)
- Institutional complexity needs to be appreciated (made apparent) (see Wallis and Ison 2011a) and the systemic implications understood for on-going governance of a situation – institutions may need to be avoided, accommodated, subverted (e.g. Steyaert et al 2007), dissolved (e.g. greenfield planning), redesigned or invented (e.g. systemic inquiry as an antidote to living and working in a projectified world – Ison 2010).
- Consistent with learnings from Participatory Action Research (*sensu* Orlando Fals-Borda) historical institutions which have been lost can be resurrected through research e.g. evidence of historical social learning in salinity management in Victoria (Wallis et al 2013)
- There is a strong case for institutionalising new modalities of praxis (Seddon 2008; Ison et al 2011; 2013); these do not have to be radical as shown in recent research where processes of human ethics clearance and questionnaire development, if done appropriately in multi-disciplinary teams, can act as mediating objects which break down epistemological divides
- The nature and level of an intervention in organisational contexts sets the constraints and possibilities for institutionalization of any learning (Ison et al 2013c; Seddon pers comm.)
- The emerging evidence from SAN Parks in South Africa in relation to their application of Strategic Adaptive Management (Biggs et al 2011) suggests that high level governance



stability and either purposeful or benign support for internal innovation and learning have been critical – now some 17 years.

- In theoretical and methodological terms it can help to reframe institutions as social technologies (Ison 2010); this opens up in addition to the new institutional economics literature the philosophy and sociology of technology literature.
- Finally we could ask whether some of the issues that are framed or described as power asymmetries may not be more usefully framed as a failure of institutional innovation? Why? Because in some circumstances the latter framing may leave those involved with more agency to act.

Emerging findings in our AFSI Learning project support the conclusions of Woolley & Douthwaite (2011) re: (i) framing choices - when these authors explore *'the potential benefits of working to improve the resilience of complex adaptive systems in agriculture and aquaculture through engaging in diverse partnerships among different types of research and development institutions, and the people in those institutions'* – they make framing choices such as 'complex adaptive systems' and recognise the systemic relationships between people and institutions (as do Hall and Clark 2009); (ii) the need to consciously test their conclusions that 'that projects need to intervene at three or more system levels, with their corresponding actors, to bring maximum benefit to small rural households' and (iii) 'that diverse partnerships increase the chance of innovation and success when that diversity covers at least three institutional scales, for example, farm households, community-based organizations and regional policy-making.' They further note that: 'there is therefore likely to be a close link between resilient results and broad partnerships in research and development.' This suggests a role for social learning as a governance mechanism for partnership working in complex situations.

Of course all these points need to be appreciated within the dominant meta-framings that shape development cooperation e.g. productivism, security (e.g. Fischhendler and Katz 2012), market chain, economic rationalism etc. For example, is the assumption that sustainable intensification will make a major contribution to global food security and food sovereignty, and make the global food system more resilient in the face of predicted shocks and disturbances an appropriate framing? Is not the 'real politik' the world over that parents want their children to move into other worlds than farming? Marsden (2012) advocates paying closer attention to place-based knowledge systems and the contradictory notions of 'sustainable intensification'. This might be useful to use when framing innovation systems for small farm-holders involving complex multi-scalar governance systems with different agendas i.e. the neoliberal paradigm reflected in agricultural policy at national/state level and the particular production landscape situations as perceived by local actors at, for example, the property scale - landholders/farmers. Innovation as social learning and institutional change within a production sub-system can be impeded by the incongruity between variably scaled governance agendas for rural landscapes. Thus when Hall and Clark (2009) claim that *'the policy implications of [their study] suggest a policy agenda that recognises adaptation capacity as the life blood of complex adaptive systems'* this will make little sense unless accompanied by the institutionalisation of appropriate praxes – what I have referred to elsewhere as policy as praxis. There is also, I suggest, a need to break out of rural-urban dualisms into institutional innovations that connect urban communities to place based activities and narratives.

#### 4. Acknowledgements

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## Annex 1.

### The main elements of the SLIM heuristics

- Start with **situations** not systems and utilise agency in making **framing choices** – this includes the choice to frame aspects of a situation as a system, or to frame a situation as a complex adaptive system
- Reject the problem metaphor and belief in a knowable, fixed problem at the start in favour of **constructing the issue** (or system of interest as an epistemological device)
- The **history** of the situation can influence the possibilities of the current situation, by enabling learning from past experiences, or by constraining opportunities for action from past decisions – history applies to people in the situation as well.
- **Institutions** refer to the set of formal and informal rules, norms, regulations and policies that are created to shape what we do.
- Stakeholders that actively engage in **stakeholding** are influenced by and influencers of the situation, and have different perspectives on what is at stake.
- **Facilitation** can be carried out by a person or ‘mediating object’ (which may be a new technology such as new breed etc), not necessarily someone in a leadership position, and is an enabling role in social learning.
- **Epistemology** refers to the different ways of knowing that each person (or groups, including organisations) carries with them in engaging with the situation; of particular concern is the implications of differences that arise from ecological, technical and constructivist rationalities.
- **Learning processes** underpin the arrow in the heuristics based on social theories of learning, including single, double and triple loop learning.
- **Transformation** of situations driven by changes in understanding and practices of those involved, as well as
- Changes in **social relations**, including trust that emerges from being involved in a ‘joint enterprise’ and which produces ‘**relational capital**’