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Chapter 4

WHAT IS SYSTEMIC ABOUT INNOVATION SYSTEMS? THE IMPLICATIONS FOR POLICIES, GOVERNANCE AND INSTITUTIONALIZATION

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Abstract

In research for development (R4D) discourse, and innovation studies more generally, the ‘S’ word – ‘system’ – has gone feral with significant implications for understanding, practice and policy development. This conceptual confusion is unpacked and a case made for shifting the focus on the use of ‘system’ to that of ‘systemic innovation’. Four praxis (contexts) ground the theoretical and methodological ideas: (i) the Learning Project (LP) for the Africa Food Security Initiative (AFSI); (ii) the Social Learning for the Integrated Management and Sustainable Use of Water project (2001-2004); (iii) the development of strategic adaptive management within South African National Parks; and (iv) experiences of developing undergraduate and postgraduate systems courses at The Open University (OU), UK over the last 40 years. Systemic innovation is posited as a particular form of systems thinking in practice (STiP), a mode of praxis (theory-informed practical action) that draws on a rich tradition of systems scholarship and as both process and outcome. It is particularly constrained or enhanced by institutional, especially governance, arrangements.

Keywords: Social learning, Praxis, Systems thinking, Systems scholarship

Introduction

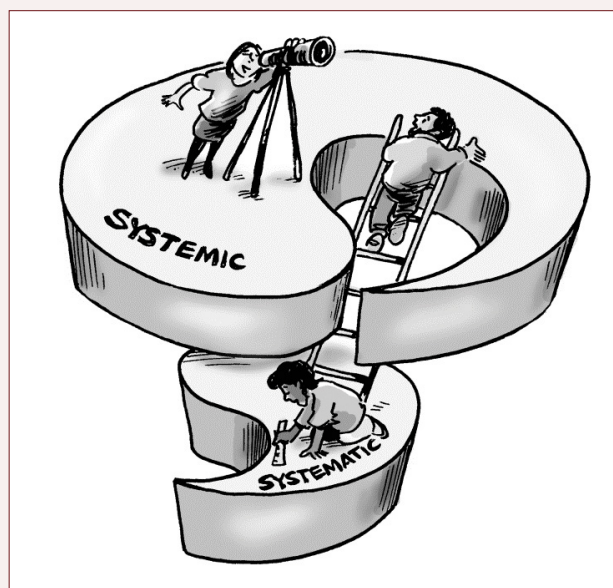
In research for development (R4D) discourse, and innovation studies more generally, the ‘S’ word – ‘system’ – has gone feral. Mainly, it is used as a noun but sometimes as an adjective as in ‘system innovation’ or ‘innovation system thinking’ in which, if my memory of grammar is correct, there really 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 OU, we have undertaken ‘conceptual battle’ with these words over the last 40 years. So, what can be made of the ways in which terms like ‘innovation system’, ‘system innovation’ and ‘systemic innovation’ are used?

This chapter is intended for systemic innovation practitioners. It makes a case for shifting the focus of use of the ‘S’ word to that of ‘systemic innovation’, a mode of praxis (theory-informed practical action) that draws on a rich tradition of systems scholarship (Ramage and Shipp, 2009; Ison, 2010). The paper is framed as an inquiry into what systemic innovation practitioners do when they do what they do. The purpose is to improve systemic innovation praxis, particularly in R4D, through a discussion of systems’ concepts and the history of systems scholarship. Four praxis contexts are used to ground the theoretical and methodological ideas: (i) the LP for the AFSI (Ison et al., 2012c; Ison et al., 2014a); (ii) the Social Learning for the Integrated Management and Sustainable Use of Water (SLIM) (SLIM, 2004) project (2001-2004); (iii) the development of strategic adaptive management (SAM) within San African National Parks (SANParks) (Kingsford and Biggs, 2012); and (iv) the experience of developing undergraduate and postgraduate systems courses at the OU in the UK over the last 40 years (Blackmore and Ison, 2012).

At the OU, the explanations we offer regarding the ‘S’ word and its variations have changed over time, often in response to our own learning as academics about our students’ 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, Figure 1 shows how we see systemic and systematic praxis combining to form a whole, a duality (e.g. like the predator and prey concept), rather than a self-negating pair (a dualism, such as objective and subjective) (Ison, 2010).

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)



In recent years, whenever I have been 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?’¹ Almost invariably the answers that are given are grounded in systematic, linear or causal thinking. Only rarely do I receive 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 a systemic innovation.

These 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 (1981) 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 i.e. for innovation. 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 realize 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. In other words, they understand the relational dynamics at play as in the example of walking. It is this latter tradition that Checkland (1981) elucidated, but perhaps unfortunately labelled, the soft-systems approach. It is also important that people working with systems’ concepts appreciate the history and diversity of the different systems’ intellectual lineages (Ison, 2010; Ison, 2012a; Ison, 2012b). Table 1 outlines how we currently explain the ‘S’ words to OU students.

Table 1. Explanations associated with the use of the word ‘system’ and related terms

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 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
STiP	A term to convey the understanding that systems (systemic + systematic) thinking and practice operate as a duality

Source: Ison (2010)

¹ In doing this I follow the example of Humberto Maturana, as for example his foot-shoe example, cited in Maturana and Poerksen (2004:83-85).

Other systems' concepts are central to the concerns of this paper – 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. The animating questions of this chapter are: *What types of STiP is relevant for systemic innovation praxis? What exactly is a systemic innovation and what could a systemic innovation approach become? How would systems concepts be systematically applied to improve systemic innovation approaches?*

Why Systemic Innovation?

The confusion around the 'S' word is not restricted to R4D as a recent major report called *Systems Innovation* makes clear (Mulgan and Leadbeater, 2013). These authors describe their concerns as:

“[part of a] growing interest in systemic innovation². We are defining this as an interconnected set of innovations, where each influences the other, with innovation both in the parts of the system and in the ways in which they interconnect. Yet rather than simply theorizing, we want to make this practical. We want to explore the potential of systemic innovation to help tackle some of the key challenges the UK currently faces, from supporting an ageing population to tackling unemployment.”

My own contention is that the distinctions between systematic and systemic are not trivial as how the terms are understood affect what we do – our praxis – and the institutions (norms, rules of the game) we invent which, knowingly or not, impinge on what we try to do in the name of innovation. Mulgan and Leadbeater's (2013) espoused concerns above are probably shared by most R4D practitioners – to get R4D innovations working together, or joined-up, in ways that deliver ongoing benefits, such as in an effective 'innovation platform' (IP) (e.g. Hounkonnou et al., 2012). In other words, the 'what' of their concerns is held in common, but to be genuinely systemic, 'how' and 'why' have to be addressed in relation to each other and to 'what! Praxis, as I will use it, is about addressing 'what', 'how' and 'why' systemically in a given context, to create what I will call a STiP performance. Framed in this way, innovation can come about in multiple ways (see below).

Armed with the distinctions I am making, I would rewrite the quote above because unfortunately the language confuses systemic innovation, a form of praxis, and a 'system' that is assumed and, unwittingly through language, given an ontological status. Too often means and ends are confused in the use of the 'S' word. The essences of Mulgan and Leadbeater's (2013) narrative are (N.B. I start and finish with *'the situation'* – not *'the system'*):

- (i) there is a situation of concern in which some form of systemic innovation (interconnected set of innovations) is desired;

² The shift to the term systemic innovation away from system innovation came at the suggestion of Martin Reynolds, an OU colleague and myself.

- (ii) engaging with the *situation* through a praxis of systemic innovation if done well can realize improvements (innovations) that are systemically desirable and culturally feasible;
- (iii) formulating systems of interest, as epistemological devices to learn about and transform a situation of concern, is central to systemic innovation praxis;
- (iv) the driving purpose is to transform a situation of concern to a new situation in which stakeholders appreciate the systemic dynamics, possibly claiming that a system now exists and is functioning, because questions of boundary, purpose and connectivity of elements have been understood and resolved, and possibly institutionalized;
- (v) a systemic innovation can be claimed.

Central to my distinctions around ‘S’ are the epistemological commitments that are knowingly or not brought into the practice space. Community of Practice (CoP) theory (Wenger, 1998; Blackmore, 2010) can be used to explore the implications. Figure 2 is central to CoP theory as it describes the duality that exists between participation and reification (made into a thing) that unfolds through the life of a CoP, e.g. a concern for ethics might arise through conversations and other forms of R4D practice and these abstract concerns may then be reified by the generation of an ethics clearance process and/or a consent form (or the process could operate the other way). There is thus a link that can be made in STiP to the processes of generating a system of interest in the participation domain. 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! Thus a system, as an epistemological device, is only ever relevant to the context of its generation. It cannot be ‘rolled-out’ or ‘scaled-up’, although the processes associated with the generation of a praxis like systemic innovation can.



Figure 2. The participation-reification duality in CoP theory
 Source: Wenger (1998)

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 causality to wider scrutiny through a form of participation or social learning. 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 institutionalization, 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.

Evidence

Reflexive R4D Praxis

From late 2011-2013, my colleagues and I in the Systemic Governance Research Program designed and ran an LP as part of an Australian Agency for International Development (AusAID)-Commonwealth Scientific and Industrial Research Organisation (CSIRO) funded and led AUD\$30 million (€20 million) AFSI, which partners with the Council for Agricultural Research and Development in West and Central Africa in West Africa and Biosciences Eastern and Central Africa (BecA) Hub in Eastern Africa³. The LP was funded by CSIRO (for background see Ison et al., 2012c) and its aim was to design a learning system in the AFSI situation such that reflexive and responsible R4D practice was an emergent outcome. We drew on Schön (1983) who 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 University and CSIRO LP participants and, subsequently, with BecA-connected African-based counterparts – see Ison et al. (2013b) where material from one of the emergent inquiries is published). 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. It is too early to elaborate fully what we have learned from this project but we do know that (i) initial framing and starting conditions and (ii) institutional arrangements were not conducive to realizing our design ambitions (Ison et al., 2014a; RCEP, 2010).

One of our first tasks was to produce a document we called ‘Notes for the Field’ (Ison et al., 2013c) designed to introduce, to the mainly CSIRO biophysical scientists, ideas about reflexive praxis, action research, and some possible theoretical frameworks which could be used to interpret their R4D experiences. To do this, we argued, there is a need to appreciate systemically what we (as researchers) do when we do research as a form of practice, rather than what we might claim we do. Figure 3 is a heuristic model developed for this purpose depicting an engagement of two researchers, although there are usually many more researchers involved. For clarity, the researcher/practitioner (P) with his/her unique traditions of understanding is abstracted out of the research situation (S). Practice, as performance, arises through the systemic interaction of P;

³ The former AusAID is now part of the Department for Foreign Affairs and Trade.

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, i.e. others could be chosen.

What becomes apparent from understanding research in terms of Figure 3 is that there are multiple sites for learning, and thus innovation, i.e. changes in understanding or practices of the situation (S) such that it might be *transformed* to a new situation; in a framework of ideas or theory, in method or methodology, in practitioner embodiment and the overall performance of the practitioner in context (with others). I would argue that all of these dynamic processes are central to the functioning of an IP.

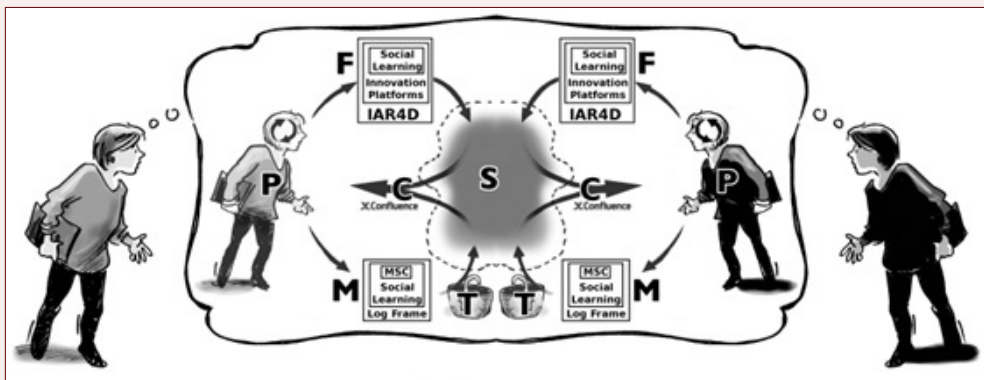


Figure 3. A heuristic designed to facilitate systemic reflection on what is done in the practice of collaborative research. P, practitioner; F, framework of ideas; S, situation; M, method or methodology; T, tools or techniques used as part of method; C, confluence, an on-line data repository used to aid assimilation of data; MSC – most significant change; IAR4D – integrated agricultural research for development.

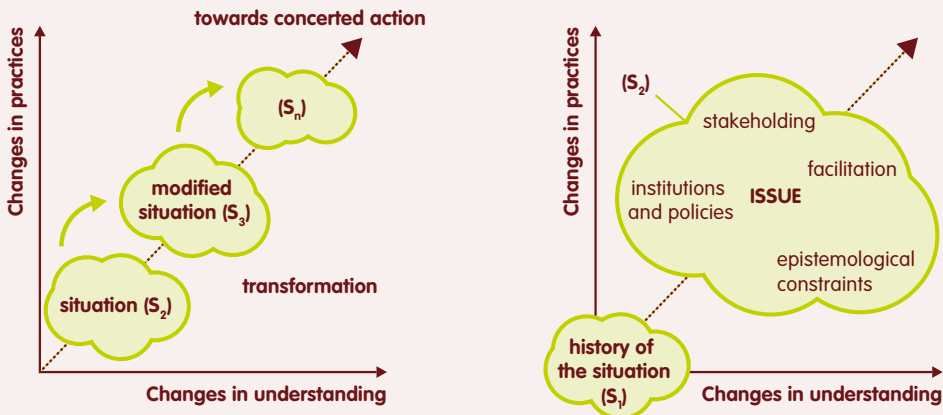
A number of factors get in the way of the praxis dynamics revealed in Figure 3 which leads to poor performances as in, for example, the functioning of an IP. Thus the factors, or ‘variables’ that constrain effective performance, the transformation of one situation to another (which is what an IP essentially tries to do), need to be understood, and if necessary changed so that they do not constrain but enhance innovation. This is a role for governance of innovation based on social learning (Ison et al., 2013a).

Social Learning

We conceptualize social learning as we have come to understand it through 14 years of research as a duality – a social process of situational transformation (or innovation), and a governance mechanism which can be invested in by governments (think of an orchestra as both entity and

social process engaged in creating performances). Social learning is theoretically and methodologically central to our design and interpretation of LP activities and systemic governance research. Figure 4 shows the adapted SLIM heuristics, which can be used to design, mediate, facilitate, theorize or interpret research practice in situations characterized by interdependencies, complexity, uncertainty and multiple stakeholders, such as natural resource dilemmas and ‘wicked’ situations (Blackmore et al., 2007; Ison et al., 2007). I would argue systemic innovation could be understood in these terms. The same approach could be used to determine what is needed in a given context to create and sustain an IP.

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 4. Adapted SLIM heuristics for innovating in situations of uncertainty (for more detail see Steyaert and Jiggins, 2007; Collins and Ison, 2009)

I reprise our current version of the SLIM heuristics (SLIM, 2004; Ison et al., 2007; Steyaert and Jiggins, 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 Table 2. In terms of this chapter’s ambition, a question to ask is: is it possible to conceptualize, develop and thus institutionalize (e.g. systemic innovation) when reflexive, epistemologically aware praxis is missing?

Table 2. The main elements of the SLIM heuristics

1. Start with situations not systems and utilize agency (freedom to reframe) to make framing choices relevant to the circumstances – this includes the choice to frame aspects of a situation as a system, or to frame a situation as a complex adaptive system.	6. 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.
2. 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).	7. Epistemology refers to the different ways of knowing that each person (or groups, including organizations) carries with them in engaging with the situation; of particular concern is the implications of differences that arise from ecological, technical and constructivist rationalities.
3. 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 also applies to people in the situation.	8. Learning processes underpin the arrow in the heuristics based on social theories of learning, including single, double and triple loop learning.
4. Institutions refer to the set of formal and informal rules, norms, regulations and policies that are created to shape what we do.	9. Transformation of situations driven by changes in understanding and practices of those involved, as well as 10 below.
5. Stakeholders who actively engage in stakeholding are influenced by and influencers of the situation, and have different perspectives on what is at stake.	10. Changes in social relations , including trust that emerges from being involved in a ‘joint enterprise’ and which produces ‘ relational capital ’.

Just as the research my colleagues and I undertook on social learning was driven from the realization that participation was necessary but not sufficient in complex, uncertain dilemmas, or ‘wicked’ situations. As a result, we have also come to understand that the governance aspects of social learning requires more attention, including innovative means to institutionalize social learning approaches. The experiences of Hounkonnou et al. (2012) are similar.

Systemic Governance and Social Learning

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 or confused (Rhodes, 1996). Within this framing (Cook and Yanow, 1993; Ison, 2010), the central organizing metaphor, as shown in Figure 5, is that

of two helmsmen (sailors) charting an ongoing, viable course in response to feedback (such as currents or wind, for example) and in relation to a purpose that is negotiated and renegotiated within an unfolding context (i.e. in response to uncertainty). Within this organizing metaphor, it is important not to assume that the sailors are navigating to some pre-set map or course but, as in historical times, ‘wayfinding’ (Ingold, 2000:231) or ‘sensemaking’ (Weick, 2009).

Thus governing encompasses the totality of mechanisms and instruments available for influencing social change in certain directions including a practitioner’s own history (i.e. traditions of understanding and identity). Whether purposeful or not, the collective 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.

What we have learned from the SAM research, undertaken primarily within SANParks (and which is currently being studied further in collaborative research), is that systemic governance is the context in which adaptive planning, designing, regulating and then managing sits. Governance, that is genuinely ‘adaptive’, is also systemic and incorporates learning and change in response to uncertainty but, despite the growing need, is usually poorly done (e.g. Allan and Curtis, 2005). Often this is because of a lack of clear rationalization (and critique) of the interacting effects of private and public forms of action (Osberghaus et al., 2010).

Systemic governance?

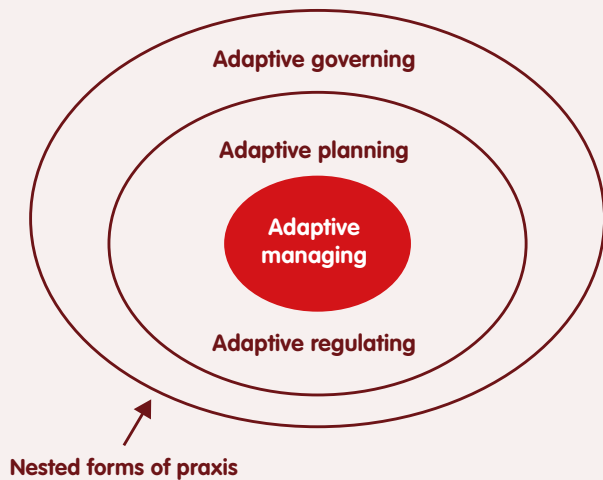


Figure 5. Helmsmen responding to feedback (e.g. currents, winds, purpose)

Source: http://upload.wikimedia.org/wikipedia/commons/3/3c/Girls_sailing.jpg

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 (Steyaert and Jiggins, 2007; Ison et al., 2013a). Governance can operate at the level of a meeting, a project, a programme, an organization, a set of policies, an IP 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 institutionalization are critical to the transformations that are sought within such a framework.

Praxis and Praxeology

The term praxis, rather than practice, is used in our work to make the point that all practice is theory-informed. 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 IPs, or ‘systemic innovations’, generates both context and new ways of knowing; the choices Cook and Wagenaar (2011) offered exemplify why theoretical framing of choices matter in relation to processes of acting out our conceptual understandings.

Through practice that engages with situations, a range of reframing and framing choices become apparent. But, a lack of awareness in policy and professional practice, as to how much an 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. 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 institutional economics sense – North, 1990), which characterize the praxis domain⁴.

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 and 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 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. This framing and praxis, I would argue, is much needed in sustaining any innovation in an R4D context and relates to findings of Woolley and Douthwaite (2011) that R4D “projects need to intervene at three or more system levels, with their corresponding actors, to bring maximum benefit to small rural households.”

⁴ This section draws on Ison et al. (2014b).

Conclusions, Recommendations and Implications

Like Convergence of Science-Strengthening Systems of Innovation (CoS-SIS) (Hounkonnou et al., 2012; Jiggins, 2012; Jiggins et al., 2016), 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 4; Table 2). 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, 2008). The main lessons of this chapter are:

- The importance of conceptual and methodological clarity around the ‘S’ word as well as all other framing choices (e.g. Hall and Clark, 2010; Woolley and Douthwaite, 2011).
- 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) (Wallis and Ison, 2011a) and the systemic implications understood for ongoing 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* Colombian researcher, Orlando Fals-Borda who championed participatory action research, and saw reclaiming historical narratives as empowering⁵ 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 institutionalizing new modalities of praxis (Seddon, 2008; Ison et al., 2011; Ison et al., 2013a; Ison et al., 2014b); 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 (Ison et al., 2013b).
- The nature and level (i.e. upper middle management) of an intervention in organizational contexts sets the constraints and possibilities for institutionalization of any learning (J. Seddon pers. comm. 2013; Ison et al., 2014a).
- Reframing institutions as social technologies can expand understandings and practices in theoretical and methodological terms (Ison, 2010); this opens up, in addition to the new institutional economics literature, the philosophy and sociology of technology literature which facilitates a move from seeing institutions as entities to understanding their affordances in mediating human experience.
- 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.

⁵ http://en.wikipedia.org/wiki/Orlando_Fals_Borda [Accessed 8 September 2014].

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 sectors 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 systemic innovation for smallholders 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 (2010) claim that, “*the policy implications of [their study] suggest a policy agenda that recognizes adaptation capacity as the life blood of complex adaptive systems*”, this will make little sense unless accompanied by the institutionalization 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.

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References

- Allan, C. and Curtis, A.** 2005. Nipped in the bud: Why regional scale adaptive management is not blooming. *Environmental Management* 36(3):414-425.
- Blackmore, C. (ed.).** 2010. *Social Learning Systems and Communities of Practice*. Springer, London.
- Blackmore, C. and Ison, R.** 2012. Designing and developing learning systems for managing systemic change in a climate change world. p.347-364. In: A.E.J. Wals and P.B. Corcoran (eds.), *Learning for Sustainability in Times of Accelerating Change*. Wageningen Academic Publishers, Wageningen.
- Blackmore, C., Ison, R. and Jiggins, J. (eds.).** 2007. Social learning: An alternative policy instrument for managing in the context of Europe’s water. *Environmental Sciences and Policy* 10(6):491-586.
- Blunden, M. and Dando, M. (eds.).** 1994. Rethinking public policy-making. Questioning assumptions, challenging beliefs. *American Behavioral Scientist* 38:1-192.
- Checkland, P.** 1981. *Systems Thinking, Systems Practice*. Wiley, New York.
- Collins, K.B. and Ison, R.L.** 2009. Jumping off Arnstein’s ladder: Social learning as a new policy paradigm for climate change adaptation. *Environmental Policy and Governance* 19(6):358-373.

- Cook, S.D.N. and Wagenaar, H.** 2011. Navigating the eternally unfolding present: Toward an epistemology of practice. *The American Review of Public Administration* 37(1):17-50.
- Cook, S.D.N. and Yanow, D.** 1993. Culture and organizational learning. *Journal of Management Inquiry* 2(4):373-390.
- Fischhendler, I. and Katz, D.** 2012. The use of 'security' jargon in sustainable development discourse: Evidence from UN Commission on Sustainable Development. *International Environmental Agreements* 13:321-342.
- Hall, A. and Clark, N.** 2010. What do complex adaptive systems look like and what are the implications for innovation policy? *Journal of International Development* 22:308-324.
- Hounkonnou, D., Kossou, D., Kuyper, T.W., Leeuwis, C., Nederlof, E.S., Röling, R., Sakyi-Dawson, O., Traoré, M. and van Huis, A.** 2012. An innovation systems approach to institutional change: Smallholder development in West Africa. *Agricultural Systems* 108:74-83.
- Ingold, T.** 2000. *The Perception of the Environment: Essays on Livelihood, Dwelling & Skill.* Routledge, London and New York.
- Ison, R.L., Röling, N. and Watson, D.** 2007. Challenges to science and society in the sustainable management and use of water: Investigating the role of social learning. *Environmental Science and Policy* 10(6):499-511.
- Ison, R.** 2010. *Systems Practice: How to Act in a Climate-Change World.* Springer, London.
- Ison, R.L., Collins, K.B., Colvin, J.C., Jiggins, J., Roggero, P.P., Seddaiu, G., Steyaert, P., Toderi, M. and Zanolla, C.** 2011. Sustainable catchment managing in a climate changing world: New integrative modalities for connecting policy makers, scientists and other stakeholders. *Water Resources Management* 25(15):3977-3992.
- Ison, R.L.** 2012a. A cybersystemic framework for practical action. p.269-84. In: J. Murray, G. Cawthorne, D. Dey and C. Andrew (eds.), *Enough For All Forever. A Handbook for Learning about Sustainability.* Common Ground Publishing, Champaign.
- Ison, R.L.** 2012b. Systems practice: Making the systems in farming systems research effective. p.141-158. In: I. Darnhofer, D. Gibbon and B. Dedieu (eds.), *The Farming Systems Approach into the 21st Century: The New Dynamic.* Springer, Dordrecht.
- Ison, R.L., Bruce, C., Carberry, P.S., Maru, Y., McMillan, L., Pengelly, B.C., Sparrow, A., Stirzaker, R. and Wallis, P.J.** 2012c. A 'Learning System Design' for more Effective Agricultural Research for Development. Proc. of the European Farming Systems Research Conference, Aarhus, Denmark 1-4 July 2012.
- Ison, R.L., Blackmore, C.P. and Iaquinto, B.L.** 2013a. Towards systemic and adaptive governance: Exploring the revealing and concealing aspects of contemporary social-learning metaphors. *Ecological Economics* 87:34-42.
- Ison, R.L., Holder, R. and Davies, J.** 2013b. Integrating Social and Biophysical Researching in R4D: African Food Security Initiative Researcher Perspectives MSI Report 13/6, Monash Sustainability Institute, Melbourne.
- Ison, R.L., Wallis, P., Bruce, C., Stirzaker, R. and Maru, Y.** 2013c. Enhancing Learning from AFSI Research: Notes for the Field. MSI Technical Report 13/10, Monash Sustainability Institute, Melbourne.

- Ison, R.L., Carberry, P., Davies, J., Hall, A., McMillan, L., Maru, Y., Pengelly, B., Reichelt, N., Stirzaker, R., Wallis, P., Watson, I. and Webb, S.** 2014a. Programs, projects and learning inquiries: Institutional mediation of innovation in research for development. *Outlook on Agriculture* 43(3):165-172.
- Ison, R.L., Grant, A., and Bawden, R.B.** 2014b. Scenario praxis for systemic and adaptive governance: A critical framework. *Environment and Planning C: Government and Policy* 32(4):623-640.
- Jiggins, J. (ed.)**. 2012. Diagnosing the scope for innovation: Linking smallholder practices and institutional context. *Wageningen Journal of Life Sciences* 60-63:1-121.
- Jiggins, J., Essegbey, G., Klerkx, L., van Paassen, A., Pyburn, R. and Tossou, R.** 2016. The uses of research: Action researching in and across nine agro-enterprise domains. The experience of the Convergence of Sciences-Strengthening Innovation Systems programmes in Benin, Ghana and Mali. p.101-123. In: J. Francis, L. Mytelka, A. van Huis and N. Röling (eds.), *Innovation Systems: Towards Effective Strategies in Support of Smallholder Farmers*. Technical Centre for Agricultural and Rural Cooperation (CTA) and Wageningen University and Research (WUR) Convergence of Sciences-Strengthening Innovation Systems (CoS-SIS) programme, Wageningen.
- Kingsford, R. and Biggs, H.** 2012. Strategic adaptive management guidelines for effective conservation of freshwater ecosystems in and around protected areas of the world. IUCN WCPA Freshwater Taskforce, Australian Wetlands and Rivers Centre, Sydney.
- Leach, M.** 2008. Pathways to sustainability in the forest? Misunderstood dynamics and the negotiation of knowledge, power, and policy. *Environment and Planning A* 40:1783-1795.
- Leeuwis, C. and Pyburn, R. (eds.)**. 2003. *Wheelbarrows Full of Frogs: Social Learning in Rural Resource Management*. Van Gorcum, Assen.
- Marsden, T.** 2012. Third natures? Reconstituting space through placemaking strategies for sustainability. *International Journal of Sociology of Agriculture and Food* 19:257-274.
- Maturana, H. and Poerksen, B.** 2004. *From Being to Doing. The Origins of the Biology of Cognition*. Carl-Auer, Heidelberg.
- Mulgan, G. and Leadbeater, C.** 2013. *Systems Innovation: Discussion Paper*. Nesta, London. Available at: http://www.nesta.org.uk/sites/default/files/skills_systems_innovation.pdf.
- North, D.** 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge University Press, Cambridge.
- Osberghaus, D., Dannenberg, A., Mennel, T. and Sturm, B.** 2010. The role of the government in adaptation to climate change. *Environment and Planning C: Government and Policy* 28:834-850.
- Ramage, M. and Shipp, K.** 2009. *Systems Thinkers*. Springer, London.
- Rhodes, R.A.W.** 1996. The new governance: Governing without government. *Political Studies*, XLIV:652-667.
- Royal Commission on Environmental Pollution (RCEP)**. 2010. *Adapting Institutions to Climate Change. Summary Report*. RCEP, London.
- Röling, N.** 2008. Conceptual and methodological developments in innovation. Keynote for Innovation Africa Symposium, Kampala, 21-23 November 2006. p.9-34. In: P. Sanginga, A. Waters-Bayer, S. Kaaria, J. Njuki and C. Wettasinha, (eds.), *Innovation Africa: Enriching Farmers' Livelihoods*. Earthscan, London.

- Schön, D.** 1983. *The Reflective Practitioner: How Professionals Think in Action*. Basic Books, New York.
- Seddon, J.** 2008. *Systems Thinking in the Public Sector*. Triarchy Press, Axminster.
- Social Learning as a Policy Approach for Sustainable Use of Water (SLIM).** 2004. *Social Learning as a Policy Approach for Sustainable Use of Water: A Field Tested-framework for Observing, Reflecting and Enabling*. SLIM Framework.
- Steyaert, P., Barzman, M., Billaud, J-P., Brives, H., Hubert, B., Ollivier, G. and Roche, B.** 2007. The role of knowledge and research in facilitating social learning among stakeholders in natural resources management in the French Atlantic coastal wetlands. *Environmental Science and Policy* 10(6):537-550.
- Steyaert, P. and Jiggins, J.** 2007. Governance of complex environmental situations through social learning: a synthesis of SLIM's lessons for research, policy and practice. *Environmental Science and Policy* 10:575-586.
- Wallis, P. and Ison, R.L.** 2011a. Appreciating institutional complexity in water governance dynamics: A case from the Murray-Darling Basin, Australia. *Water Resources Management* 25(15):4081-4097.
- Wallis, P.J. and Ison, R.L.** 2011b. Institutional change in multi-scalar water governance regimes: A case from Victoria, Australia. *Journal of Water Law* 22(2/3):85-94.
- Wallis, P., Ison, R.L. and Samson, K.** 2013. Identifying the conditions for social learning in water governance in regional Australia. *Land Use Policy* 31:412-421.
- Weick, K.E.** 2009. *Making Sense of the Organization*. Vol 2. Wiley, Chichester.
- Wenger, P.** 1998. *Communities of Practice: Learning, Meaning and Identity*. Cambridge University Press, Cambridge.
- Woolley, J. and Douthwaite, B.** 2011. *Improving the Resilience of Agricultural Systems Through Research Partnership: A Review of Evidence from CPWF projects*. CGIAR Challenge Program for Water and Food (CPWF), Colombo.