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Governing in the Anthropocene: what future systems thinking in practice?"

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Short title: Governing in the Anthropocene

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Abstract

The revealing and concealing features of the metaphor 'earth as Anthropocene' are explored in an inquiry that asks: In the Anthropocene what possible futures emerge for systems thinking in practice ? Framing choice, so important yet so poorly realised, is the starting point of the inquiry. Three extant conceptual pathway-dependencies are unpacked: governance or governing; practice or practising and 'system'. , New data on the organisational complexity within the field of cybersystemics is presented. These issues are illustrated by means of a research case study that sought to transform situations of concern so as to realise systemic water governance as a product of the transformation. Several new 'imaginaries' are proposed as novel institutions and practices to facilitate systemic transformations; these include systemic co-inquiry and institutional recovery. It is argued that future systems research can be understood as the search for effective 'imaginaries' that offer fresh possibilities within an Anthropocene framing.

KEYWORDS: framing choice; research practice; imaginaries; systemic governing; metaphors; water catchments

To what extent can governing, researching, managing.....doing what we do when we do what we do...be understood as a systemic praxis (theory-informed practical action) able to respond to the 'problematique' (Moll 1991) that an Anthropocene framing of our current human circumstances reveals? This paper, based on the 2015 Presidential address to the ISSS (International Society for the Systems Sciences), reflects critically on this question and asks: In the Anthropocene what possible futures emerge for systems thinking in practice

(STiP) and for a society, the ISSS, committed to an internationalist discourse that - in name - revolves around 'the systems sciences'?ⁱⁱⁱ Alternatively: How might the promise of STiP be more fully realised at this critical time? What institutional forms and praxis innovations are needed to carry us forward, to be capable and seen to be capable, of responding to, and in, the Anthropocene? Responses to these questions are grounded in my 35 years of researching experience, particularly in relation to water, or river, governance, one of the most challenging issues of our times, and the elucidation of what systemic governing, researching and managing praxes might become.

This paper first addresses why framing choice is so important, yet is done so poorly; the revealing and concealing features of the framing metaphor 'earth as Anthropocene' are explored. Three extant conceptual pathway-dependencies are then unpacked: governance or governing; practice or practising and 'system'. The arguments of the paper are illustrated through a research case study based on attempts to transform towards systemic water governance and in which several new 'imaginaries' are proposed as novel systemic institutions and practices. The final section summarises and highlights the implications that arise.

Framing and reframing what is at issue

Framing situations is a choice we have...and one we always make whether knowingly or not (Schön and Rein, 1994). As George Lakoff (2010 pp. 71-72) notes:

"All thinking and talking involves "framing." And since frames come in systems, a single word typically activates not only its defining frame, but also much of the system its defining frame is in."

Not even Lakoff (2010) in making this claim can escape the limitations of how language and its use contorts the very explanations we seek to offer. How, you might well ask? Well, Lakoff has utilised the word system as a noun; so just like a 'snail', the concept 'framing' carries with it its 'shell', that which surrounds, which has been called by Lakoff a 'system'. Of course Lakoff, more than anyone, knows that all language is metaphorical (Lakoff and Johnson, 1980; 1999); no doubt with further conversation which is difficult using only written text, it might have been found that Lakoff's concept 'system' was 'an interconnected set of entailments and concealing and revealing features', understandings of which are key

to Contemporary Theory of Metaphor, or CTM (Lakoff, 1993; McClintock *et al.*, 2003; 2004; Ison *et al.*, 2015). So to reframe, let us imagine that Lakoff's (2010) claim could be rewritten as:

All thinking and talking involves "framing." And since frames come with metaphors, or metaphor clusters, with revealing and concealing features as well as theoretical entailments, a single word typically activates not only its defining frame, but also much of the systemic set of relations its defining frame is in.^{iv}

My reframing of Lakoff's (2010) explanation avoids the reification, the making into a thing, of the concept 'system' and thus the idea that, just like the snail's shell, the system existed *a priori*, as if it were something that could enter the fossil record! Instead, my reframing invites consideration not of a 'thing', *a*, or *the*, 'system', but a network of relations, a dynamic in the sense that a tornado is, but at the same time is not, a thing – i.e., a tornado is a particular dynamic configuration of air particles, from which a tornado 'as named thing' emerges. Unfortunately we inhabit a world that focuses on 'thingness' rather than the other side of the distinction, in this case the relational dynamics. This propensity is pervasive and debilitating.

Understanding the ideas that sit behind Lakoff's (2010) claims are important, because how they are understood also determines how framing and reframing praxis can be imagined and thus enacted (Schön and Rein, 1994). Framing choices create initial starting conditions that become conserved as lineages (pathway dependencies) and as institutions (norms, 'rules of the human game') or social technologies (Ison, 2010). Unfortunately many past framing choices can, from today's perspective, be seen to be inadequate, ill-informed, powerful and persistent e.g., markets as free. It thus makes little sense to imagine that situations of concern can be transformed for the better without paying attention to past, present and anticipated future framing choices.^v

Governing in the Anthropocene

The Anthropocene is a term formulated by earth scientists Crutzen and Stoermer (2000) to claim that we have entered a new geological era in which human influences are so great that they are affecting 'whole Earth dynamics' through a range of biophysical and social processes. The phenomena which triggered this proposal vary from human-induced climate

change to ocean acidification, biodiversity loss and air quality decline at global scales as well as major disruptions to key biological cycles associated with water, nitrogen, phosphorus and carbon (see Ison and Shelley, this volume).

Acceptance of the entailments of a choice to frame our circumstances as ‘the Anthropocene’ - including as it does human-induced climate change - also means accepting we are in a period new in human history. This is the issue of our times, perhaps of all times, and thus the greatest challenge for systems thinking in practice – or all human endeavour for that matter. Whilst the phenomena that motivated the use of the term ‘Anthropocene’ are well established in science, what is less clear is whether the Anthropocene is an adequate framing choice for our human circumstances. There is now much written about the Anthropocene – even a new journal, [The Anthropocene Review](#), and there are already contested perspectives on the term as a framing choice (Biermann, 2014; Malm and Hornborg, 2014). What the Anthropocene is, or could be, beyond a classification for a geological era, is yet to stabilise as for example:

“We need to question the use of the species category in the Anthropocene narrative ...because it is analytically flawed (i.e., only some, not all, humans have contributed) ...and it is inimical to action” (Malm and Hornborg, 2014)

Being open to what ‘the Anthropocene’ as a ‘framing choice’ reveals and conceals seems a sensible strategy at present; metaphor theory and practice can help (Ison *et al.*, 2015). For example, choice of the Anthropocene places all humans clearly in the frame which reveals the power that humans have over our circumstances but conceals the fact that only some humans have contributed and that it is tied to particular ways of thinking and acting e.g., the great expansion in capitalist activity after WW2 – see Norgaard (2015) where the ‘econocene’ is put forward as a more appropriate term, or framing choice, based on its ideological foundation in ‘economism’, the reduction of all social relations to market logic. Also concealed are inter and intra-species inequalities that are too often ignored. Another theoretical entailment with implications concerns classification – naming geological epochs – which is not necessarily conducive to what has to be done to change i.e., classification and typologies are inimical to action, or transformation, as outlined by Malm and Hornborg, (2014) and Ison *et al.*, (2014).

Engaging in metaphor inquiry is one way to break out of the reification trap, a trap that all too often leads to the conservation of inadequate or consistently mis-interpreted metaphors that commit individuals, groups, organisations and cultures to inadequate co-evolutionary trajectories through pathway dependency (Norgaard, 1994).

Exploring three current pathway dependencies

In this section I want to unpack understandings and praxis associated with • governance or governing; • practice/practising and • ‘system’, and in particular, ‘the systems sciences’. For most concepts there is a mainstream or dominant interpretation or view, but equally there are often alternative, subjugated possibilities with the potential to serve us better in current circumstances.

Governance or governing

In mainstream political theory, relatively little is made of the connection of the concept of governance with systems and cybernetics, although the origins of the term from the Greek for steering are generally acknowledged: “like government, the word governance derives, ultimately, from the Greek verb κυβερνάω [kubernáo] meaning to steer” (see <https://en.wikipedia.org/wiki/Governance> Accessed 7th June, 2016). The act of steering in a Greek world was that of the sailing boat, hence κυβερνάω was what a helmsperson with hand on rudder did (Figure 1).^{vi}

The term ‘cybernetics’, from the Greek noun kybernetes, meaning governor or steersman, was adopted and re-placed in circulation by Norbert Wiener in his 1948 book *Cybernetics: Or the Control and Communication in the Animal and the Machine*.^{vii} In the postwar years and in the Macy Conferences (Pias 2003) the concept of cybernetics framed some very influential and intellectually vibrant conversations in which both Wiener and Bateson (amongst others) participated. But what has been conserved of those conversations is problematic, from today’s perspective. As Russell and Ison (2016) explain: “Gregory Bateson (1977/1991) asserted that the word ‘cybernetics’ had become seriously corrupted following its initial introduction by the French physicist and mathematician André-Marie Ampère in his 1834 essay *Essai sur la philosophie* (see Tsien, 1954). Ampère used the word to describe the science of civil government.” Clearly Bateson was disillusioned by the

trajectory of use and understanding of cybernetics by the time he published 'Steps to an Ecology of Mind' in 1977.

What has not been conserved from the original Greek is the verb form for steering (Figure 1) except for the term 'governing' which is not widely used in the literature or professional practice. Unfortunately when used it is often seen as synonymous with control or controlling as a form of external 'power over' rather than the central revealing feature of the cybernetic metaphor of someone (or a collective) constantly assimilating and responding to feedback and gaining control through self-regulation and self-organization (Figure 1).



Figure 1. The key features of a cybernetic metaphor for governing based on the Greek verb for 'steering' by a helmsperson, who despite positioning, with the aid of wires or ropes keeps her hand on the rudder or tiller.

When an image such as that in Figure 1 is carefully interpreted, or by participating in the act of sailing (i.e., embodiment), it is possible for the cybernetic metaphor to reveal:

- that through the agency of a helmswoman or steersman (with a personal, cultural and evolutionary history) it is possible to 'steer' the boat through assimilation, or 'integration', of social feedback (interpretations of purpose; reactions of crew members etc.) and biophysical feedback (wind, currents);

- how the act of sailing arises in relational terms in which the social-biophysical relationship is mediated by technology – a boat with certain design features – or institutions (norms, rules of the ‘game’) such as the rules of a sailing race;^{viii}
- that sailing is always socially embedded, and mostly done with others e.g., where there is a crew it involves co-building and enacting an effective sailing performance. Just as every explanation has an explainer, every act of sailing has a sailor;
- from a meta-perspective it is possible to understand sailing as a form of practice, or an act of practising, that enacts a particular set of systemic relational dynamics and from this perspective it is possible to say it was done well, or not i.e., it had certain qualities.^{ix}

The metaphor perhaps conceals the idea that the purpose is often not pre-set i.e., that it arises in the doing and is thus emergent. Unless enacted in a bodily way it may also conceal how certain moments can be said to be an ‘unconscious flow’ of doing, as happens when one is immersed in a game or a sport.

The tragedy of our current circumstances is that what is experienced in most parts of the world as governance is theoretically and practically inadequate in relation to the cybernetic metaphor and its use to transform our circumstances through governing. There is a need to reframe how we think and act in relation to governance (Straw, 2014; Micklethwait and Wooldridge, 2015; Tingle, 2015); for example, how do we frame what is being governed and the acts of governing in the Anthropocene? And what do we seek to realise by engaging in STiP in relation to this question? For my part I suggest we humans inhabit a flawed contemporary, mainstream, ‘governance diamond’ that operates across democracies as well as authoritarian or centralised nations (Figure 2a). From my perspective we have to reinvent governance in ways that recreate the systemic, relational dynamic that the cybernetic metaphor can reveal (Figure 2b).

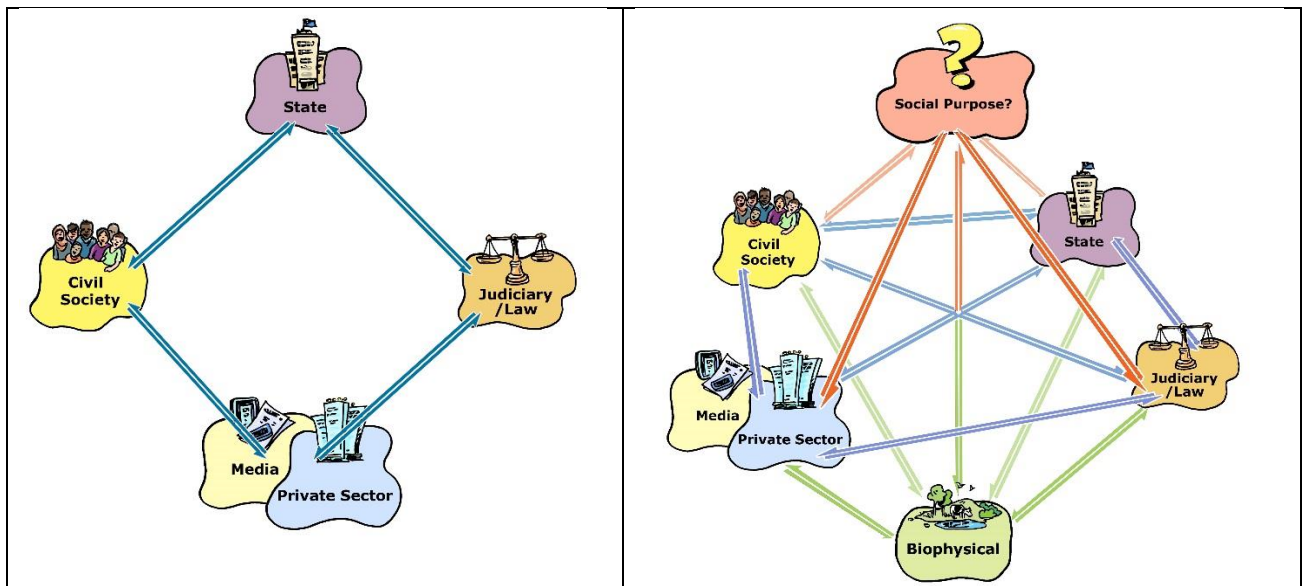


Figure 2 The simple, historically determined ‘governance diamond’ as a one-dimensional set of relationships between the state (and bureaucracy), civil society, the private sector (including the media) and the judiciary (or institutions of the rule of law) (a, left) compared to a three-dimensional governance diamond yet to be invented, yet alone enacted, needed for governing in the Anthropocene (b, right).

The ‘Anthropocene’ framing brings awareness that we have entered into a period new to human history and thus all of our governance arrangements, understandings, practices, and institutions demand critical scrutiny in terms of continuing fitness-for-purpose – hence the addition in Figure 2b of relations with the biophysical world and to yet-to-be-invented institutions for effectively charting a course, or courses, in relation to articulations of social purpose.

Practice: reframing research practice

Motivated by the desire to articulate criteria for doing effective and publically defensible action research (AR), Checkland (1985) and colleagues (e.g. Checkland and Scholes, 1990; Checkland and Holwell, 1998; Checkland and Poulter, 2006) articulated an FMA model (Framework of ideas; Methodology; Area of application) as a desired-in-advance intellectual framework against which new knowledge claims could be made. This has proved useful with researchers wishing to employ AR (e.g., Sankaram *et al*, 2009; Stowell and Cooray, 2016). However, as a general model of practice, particularly research practice, the FMA

model has some limitations, not least of which is its heuristic value for critical reflection on practice (see Ison, 2010). The FMA model is potentially open to epistemological confusion if the explanation of Cook and Wagenaar (2012 p. 3) is taken seriously, i.e., that “knowledge and context can be explained in terms of—and are evoked within—practice, and not the other way round—and ... this transpires within real worlds each of which has its own unique constraints and affordances, histories and futures.” From this, I suggest that new knowledge, or more precisely, new knowing, arises as an emergent property of the systemic dynamics of all elements (Figure 3).

All practice is situated (S) and embodied in a practitioner (P) although rarely solitary unlike Figure 3; research practice comprises the systemic relations between a researcher (P) with a history acting out of a tradition of understanding (recursive arrows in head of P) who may, or may not, purposefully choose a framework of ideas (F) and a method or methodology (M) including tools and techniques. This systemic dynamic, when enacted, creates the possibility of learning about each of S, F, M, P and also a research performance of a particular quality realised through the systemic dynamic, over time, of all elements. With the introduction of other researchers the dynamic in Figure 3 becomes more complex, and more like a performance as in a play, dance or team game. ^x

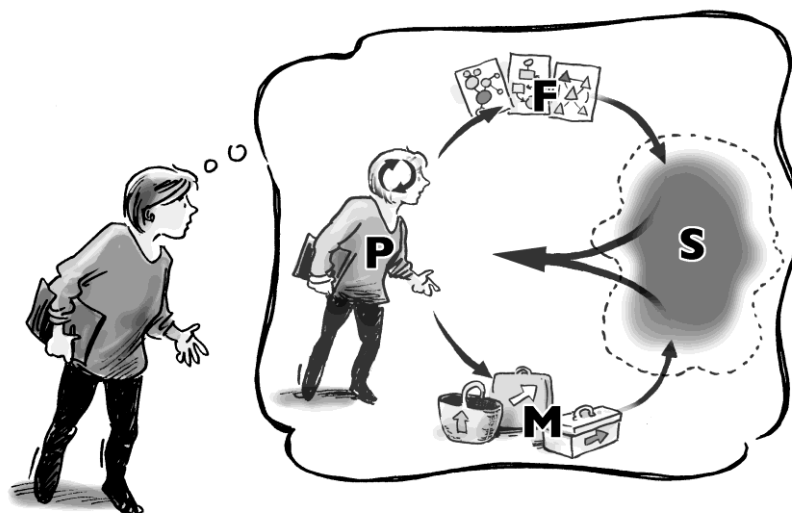


Figure 3. An heuristic for reflecting on the systemic dynamics of research practice (Source: Ison, 2010).

The heuristic intent of Figure 3 is not to claim this is how research is, but to use its elements interactively, in conversation, to reflect on the doing of research. In this spirit F could be

understood in two ways, as making a framing choice in relation to the situation of concern (see Ison *et al.*, 2014) or as the purposeful choice of a theoretical framework within which to situate the research. Equally F could be left out as in much research where the S is framed as 'reality' and theory does not enter into considerations of praxis.^{xi} On the other hand a declared F is critical to most social science research and AR. Although rarely framed as such, science is a domain of practice; it is not science but scientists who generate scientific explanations and what is, or is not, accepted as a scientific explanation arises in a network of social relations combining different forms of practice e.g. experimenting, theorizing, reporting, refereeing, languaging, publishing etc., (see <https://medium.com/@mtobis/who-decides-what-is-true-b6d9057489cd#.rzcf75d4d> Accessed 13th June 2016). In my lived experience much science practice lacks reflexive practitioners (i.e., those with the capacity to reflect on reflection) and is characterised by:

- epistemological conflict – implicit or explicit, but endemic
- confusion about the distinctions between technique, method and methodology
- lack of awareness of how the products of science mediate practice
- an inadequate ethics of practice in relation to social purpose (Figure 2b)

Within this reframing away from the mainstream understanding of research practice, the question arises: What makes research systemic...or systems research? And are they different questions?

Systems, systems sciences, systems thinking in practice

The word 'system' has 'gone feral' (Table 1; Ison, 2016). In the last fifty years there has also been a failure to effectively institutionalise 'systems' narratives, conceptions and praxis except as 'things' e.g. ecosystems. In ecology feral species often thrive in new contexts where predators, pests and diseases are not present, so at least metaphorically a 'feral concept' may be no bad thing? On the other hand, a lot of societies invest heavily in trying to protect native or indigenous species of plant and animal from the impacts of ferals i.e., to conserve biodiversity. My use of the feral metaphor is not meant to be pejorative but ecological in that both the word and concept system can be understood to have escaped from how systems scholars would have it used, albeit there is no common agreement about usage in this community either. To extend the metaphor, the lack of appreciation of the

implications of the feral nature of the concept system presents three challenges: • loss of appreciation of diversity and plurality of approach and commitment (theoretical, methodological, epistemological) in a scholarly community; • failure to be responsible and rigorous in making one’s epistemological and theoretical commitments clear, and • the difficulty to organise, institutionalise, innovate and attract investment around the transformative possibilities that cybersystemic scholarship offers.^{xii}

Table 1. Some of the ways the concept ‘system’ has gone feral and some implications^{xiii}

Usage type	Implications : revealing and concealing features
Nouns	<ul style="list-style-type: none"> • ‘the system’ is the main noun which has gone feral; • ecosystems originally conceived as a conceptual tool, now seen as ‘real’ (concept reification); • these are classificatory nouns (as in physics, chemistry) to denote an intellectual field, none are in widespread use; • cybersystemics connotes different but synergistic intellectual lineages (cybernetics + systems).
system	
ecosystem	
systemics	
systemology	
cybersystemics	
Compound nouns I	<ul style="list-style-type: none"> • system or systems are generally seen as things (i.e., real or as ontologies rather than epistemologies – ways of knowing a situation); • boundary judgments and the bringing forth of ‘systems’ by someone are concealed as are what a set of interconnected elements might be; • epistemological confusion and conflict and the valuing, funding and rewarding of different types or practices happens; • appreciating connectivity of all earth-life processes can be metaphorically valuable but often there are too many variables and connections to allow acting purposefully; • Xⁿ is to denote the propensity to add the word system to all sorts of thing.
earth system	
complex adaptive system	
social-ecological system	
computer system	
health system	
education system	
transport system	
Xⁿ system	
Compound nouns II	
systems approaches	
systems practice	
systems praxis	
systems science	
systems	
methodologies	
systems analysis	
systems research	
systems thinking	
systems thinking in practice (STiP)	

	<ul style="list-style-type: none"> • if systems is understood as comprising the systemic and systematic then 'systems' could be seen as adjectival?
	<ul style="list-style-type: none"> •
Adjectives	<ul style="list-style-type: none"> • together they can encompass relational, or circular causality (systemic) and linear causality (systematic) to create a duality • used in relation to each other the 'thingness' of systems can be avoided; • in popular culture systemic is often associated with failure rather than with success?
systemic	
systematic	
Adverbs	<ul style="list-style-type: none"> • in everyday use adverbs evoke praxis e.g., thinking, or acting systemically or systematically; • use can avoid some of the semantic confusion associated with noun group II.
systemically	
systematically	
cybersystemically	

The feral nature of the term system and its variations also presents some opportunities if grasped in appropriate ways; these are outlined later. The constraint/opportunity relationship is governed by the ways in which 'systems' has been institutionalised in different organisations.

Asking how those concerned with cybersystemics (and 'complexity approaches') have institutionalised themselves can be revealing (see Figures 4 and 5). There is considerable organizational and institutional complexity and, at this stage, not a lot of solidarity between different organisations, though umbrella bodies, such as IFSR (International Federation for Systems Research) offer some future potential for building solidarity and leveraging advances in intellectual and political impact, investment, professionalization etc., (Figure 5). More could be appreciated by deepening this organisation analysis e.g., membership demographics; activity; espoused purpose; effectiveness, to name but a few.^{xiv} At present there is, from my perspective, much of our collective history and institutionalizing that needs to be overcome, or discarded. These constraining historical legacies include:

- the exacerbation of differences, rather than commonalities, between approaches, groups etc., which was emphasised and valued in the post 1960s and, in the

academic world, associated with organisational positioning, brand and ego cultivation;

- competition rather than cooperation in terms of resources, prestige, my M is better than your M etc.;
- substantive presence in Higher Education was not sustained nor institutionalised in many academic groups e.g., research centres;
- there has been little or no active presence at the ‘key tables’ in policy and research funding discussions;
- failure to create ‘demand pull’ for cybersystemic scholarship (e.g. institutionalised competency frameworks) compared with supply push models for research and education;
- confusion in popular discourse (which may differ between cultures) over the plethora of systems-related terms and concepts (Table 1);
- failure to generate a coherent and ethically defensible narrative of effectiveness (however understood) that attracted investment (which might take many forms);
- major groups still lack effective and institutionalised forms of collaboration (solidarity) and thus leverage (Figure 4) although there have been recent attempts to change this situation.

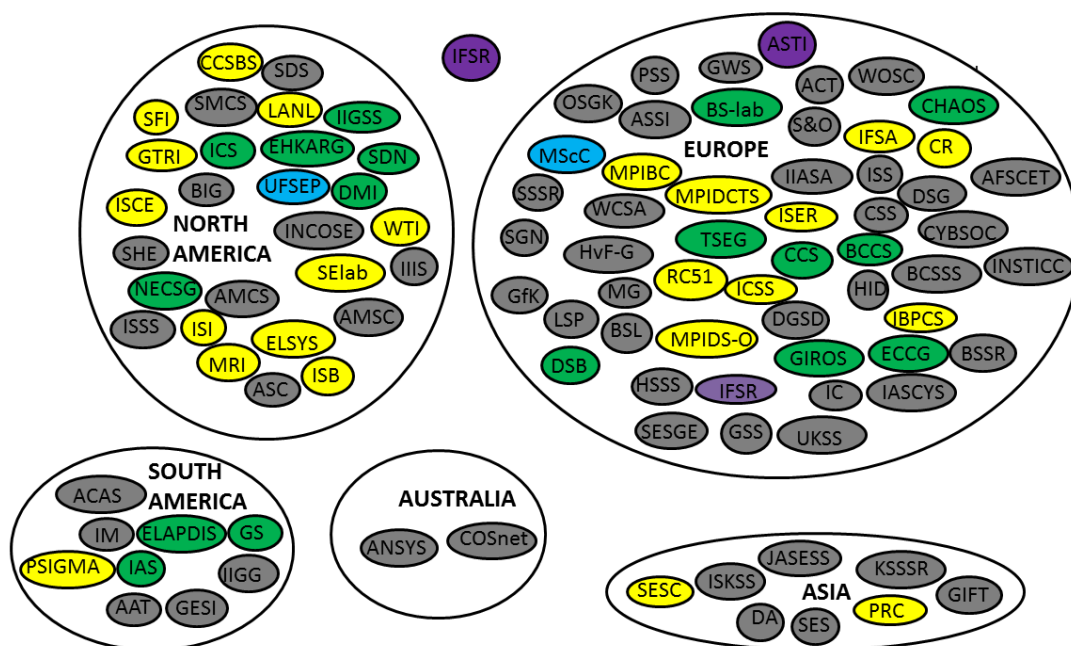


Figure 4. A first iteration 'system mapping' of the complexity of cyber-systemic organisations from different continents; yellow = research only; blue = teaching only; grey = membership organisations; purple = umbrella organisations; green = ???; all abbreviations are explained in Annex 1.

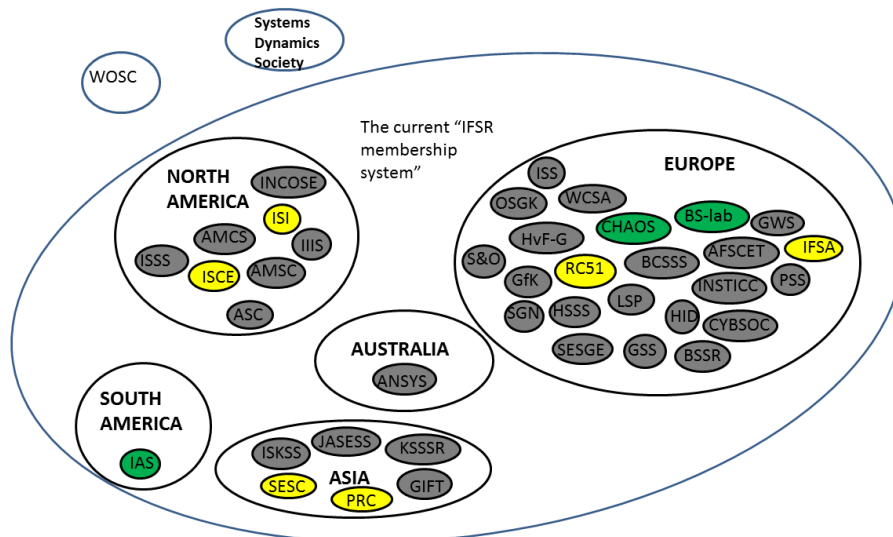


Figure 5. Systems map of the IFSR (International Federation of Systems Research) with some other major, influential organisations in the IFSR environment – see Annex 1 for explanations of all abbreviations; (Data source: <http://www.ifsr.org/index.php/member-societies/> Accessed 18th June 2016).

Given these reflections what can be said about my framing question as to what possible futures emerge for STiP and for a society (ISSS) committed in name to an internationalist discourse that to date revolves around 'the systems sciences'? To respond fully would require a more profound engagement with the history of ISSS, particularly the shift in discourse and organisation in the 1950s and then in 1988, than I have space for here:

*“The society initiated in 1954 as Society for the Advancement of General Systems Theory started in 1955/56 as **Society for General Systems Research**, and became the first interdisciplinary and international co-operations in the field of [systems theory](#) and [systems science](#).^[2] In 1988 it was renamed to the International Society for the Systems Sciences”* (https://en.wikipedia.org/wiki/International_Society_for_the_Systems_Sciences Accessed 13th June 2016).

What seems certain is that whatever the Society chooses to do moving forward will need to be framed in the context of our current 'Anthropocene' circumstances (Figure 2) and be responsive to: (i) the implications of the many interpretations of the 'feral' system-concept (Table 1) and (ii) the ethical imperative to facilitate understanding and action that is transformative and viable (in the sense of Beer, 1984) in a co-evolutionary sense. This will require shifts in the 'imaginaries' of the field.

New 'imaginaries': towards systemic water governance

For Thompson (1984) an 'imaginary' is "the creative and symbolic dimension of the social world, the dimension through which human beings create their ways of living together and their ways of representing their collective life" (p.6). It is claimed that 'imaginaries' have material outcomes as they can "influence behaviour, feelings of individual and collective identity, and the development of narratives, policy and institutions" (Jasanoff and Kim, 2009).^{xv} Of course to act, 'imaginaries' need embodied imaginations and deployment in language or discourse.^{xvi} In this section I deploy the concept 'imaginary' in relation to a current and possible future, cyber-systemic milieu, including ISSS and the other organisations making up Figures 4 and 5. I ground this exploration of possible 'imaginaries' in my own research context because it is systemically informed and designed and is a .situation of global importance in an 'Anthropocene context' (Powell *et al.*, 2014). A manifestation of human over-exploitation of the biophysical world (a phenomenon consistent with an Anthropocene framing) is the global fresh-water situation (see <http://www.gwsp.org/about/introduction.html> Accessed 13th June 2016). This situation exemplifies long-standing systemic failings, including framing, practice and governing failure, of rivers (or river catchments or basins), other fresh-water bodies and groundwater (Armitage *et al*, 2015). The present situation can be understood as human disruption to the water cycle on a global scale but with many localised features that warrant new ways for understanding and enacting water governance. The project CADWAGO (Climate change adaptation and water governance: reconciling food security, renewable energy and the provision of multiple ecosystem services) was a response to this 'global challenge' in the context of Europe (Figure 6).

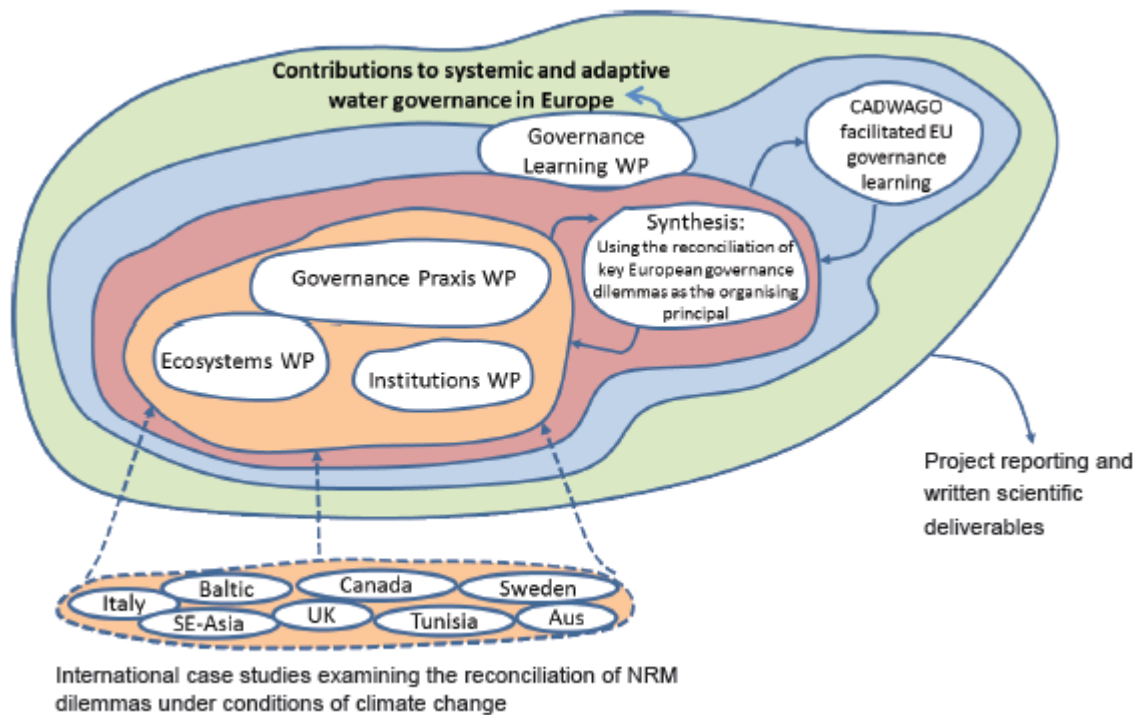


Figure 6. The CADWAGO (Climate Change Adaptation and Water Governance) project design heuristic showing systemic elements and levels; NRM, Natural Resource Management; WP, workpackage; EU, European Union; Aus, Australia (Source: CADWAGO 2013 – accessible at <http://www.cadwago.net/wp-content/uploads/2013/09/Research-process.png> 15th June, 2016).^{xvii} Through governance reform (making the cybernetic metaphor discussed earlier, actionable) CADWAGO sought to develop new understandings and test new practices within the European context from a water security perspective. In the space at my disposal I provide a flavour of (i) the systemic design elements for doing the CADWAGO research, and (ii) some outcomes of CADWAGO that illustrate possible ‘imaginaries’ relevant to building a praxis of transformation in an Anthropocene setting.^{xviii} It is important to say at the outset that a ‘project’ as an institutional form is inadequate for enacting research that is transformational in aspiration in relation to global challenges; this requires new institutional forms (Ison 2010). That said, CADWAGO was funded and enacted as a ‘project’ of 3.5 years duration, ending in March 2016.

Systemic design elements

Whilst the CADWAGO proposal focused primarily on the dynamic between climate change and water security, it was designed to incorporate crucial links between good water

governance, food security, renewable energy and the provision of multiple ecosystem services (sometimes called 'nexus elements') in contexts characterized by controversy and uncertainty.^{xix} The key systemic design elements can be understood as:

- (i) Building in a framing of:
 - a. the 'problematique' at the heart of the water/river global challenge which recognised not only 'nexus elements' (IWA/IUCN/ICA, 2015) but that transformational action required 'orchestrating performances in a landscape of contested resilience narratives' whilst 'appreciating [that] the wicked character of natural resource issues inspires a view of human nature that is not instrumental, strategic or selfish, but calls for narratives that support the fostering of concerted action through interactive, non-violent 'performances' (Powell *et al.*, 2014);
 - b. river catchments as structurally coupled social-biophysical systems i.e., a social system and biophysical system in a mutually changing and adapting co-evolutionary dynamic, rather than the traditional static framing of a catchment as a hydrological or ecological, or social-ecological system (Ison *et al.*, 2013);
 - c. knowledge and knowing elements with the former arising from studies in multiple contexts (international case studies) through three systemically related 'theoretical lenses' institutionalised as workpackages (see Baird *et al.*, 2016; de Lourdes Melo Zurita *et al.*, 2015; Westberg and Powell, 2015) with emergent understandings feeding into contextually designed 'knowing' events (see below), called 'governance learning events' (Figure 6);
 - d. the enactment of knowing transformation as a social learning process where neither changes in understanding or practice are prime, but which through facilitated learning processes build and sustain relational capital (SLIM, 2004; Ison *et al.*, 2007).

These systemic framings that were integral to the CADWAGO design and which were then enacted are novel within the 'water governance' research domain i.e., these are not mainstream framings and thus they offer new innovation pathways.

- (ii) Purposefully embracing *systemic design* through:

- a. Conceptual design of the project as depicted in Figure 6 – which encompasses concepts like system, sub-system, boundary, hierarchy, interaction, emergent properties and connectivity;
- b. Enacting the project in ways that allowed for emergence – especially in terms of building and sustaining relationships through governance learning events, responding to policy consultation processes (e.g. OECD water governance innovations) and facilitating the formation of loosely bound communities of interest through institutional platforms such as a ‘catchment systems group’ in the UK;
- c. Bringing forth and valuing multiple, partial perspectives of a situation of interest (e.g. Larson *et al.*, 2012); CADWAGO brought together 10 partners from Europe, Australasia and North America with extensive social science research experience in climate change adaptation and water governance issues, who in turn engaged with stakeholders in Australia, Canada and Europe through their research.

Systemic design is a growing field of scholarship with strong affinities to the ‘systems sciences’ that demands attention and investment within an Anthropocene context (van Alstyne and Logan, 2007; Jones, 2014; 2015).

‘Imaginaries’ as outcomes

CADWAGO drew on a lineage of earlier European research concerned with how to effect systemic transformations in multi-stakeholder, or ‘wicked’, contexts (see LEARN, 2000; Collins *et al.*, 2005; Steyaert and Jiggins, 2007; Blackmore, 2010; Hubert *et al.*, 2012), and thus utilised methods and approaches that have become embodied in researcher’s traditions of understanding and praxis (Russell and Ison, 2000). This has been referred to as enacting different modalities of praxis that generate either 1st or 2nd order data, then using these data as inputs, or design elements, for governance learning events (van Bommel *et al.*, 2016; Ison *et al.*, 2011). Two modalities of praxis as ‘imaginaries’ are discussed briefly here.

The first ‘imaginary’ is *systemic inquiry* and/or *systemic co-inquiry*, which has been developed in several settings (Ison 2008a, b) as an institutional innovation that can be seen as an antidote to living in a ‘projectified world’. It is both a meta-institution and a process for governing in situations of uncertainty, or framed as ‘wicked’, with greater adaptive

managing potential than traditional projects or programs. Systemic co-inquiries are purposefully designed, but not as blueprints, are open to unfolding circumstances in their enactment, and last as long as engaging with the issue(s) of concern remain relevant. In other words they are designed and managed to foster innovation through emergence. Systemic co-inquiries were designed and enacted with stakeholders in the CaBA (Catchment-Based Approach) initiative in England with very positive outcomes (Foster *et al.*, 2015; 2016). This systemic action research demonstrated the utility that systemic co-inquiry has in policy and practice innovation in multi-stakeholder policy settings. All co-inquiries are enhanced by the use of systems diagramming techniques for engaging visually with different stakeholder issues and triggering meaningful interaction. The most common systems diagramming forms are rich pictures; conversation maps; systems maps; influence; multiple cause, sign and control model diagrams (Open University, 2006).

The second 'imaginary' arises from understanding the history and significance of institutions that sit within a situation of concern. In 2015 CADWAGO researchers from the Desertification Research Centre (NRD – University of Sassari) organized a public event in Arborea (Sardinia) where a complex set of water governance-related issues were interrelated with agricultural production, natural resource management, the environment and regional cultural and economic heritage (Ruiu *et al.*, 2014). In a purposeful creation involving local stakeholders, European policy officials and CADWAGO researchers "La Rasgioni", a traditional reconciliation tool, inspired by an ancient form of conflict resolution operating in Gallura until 50 years ago, was restaged with very positive outcomes (de Bruin *et al.*, 2016). In common with many institutions in traditional societies, La Rasgioni, was designed to solve disputes peacefully, but primarily to restore pre-existing relationships negatively affected by a conflict, thus preserving community cohesion (Roggero, 2015).

The CADWAGO project elucidated innovations able to transform historical conceptualisations, or framings, of water governance evidencing shifts towards systemic governance. If institutionalised within a conducive governance setting, these 'systemic imaginaries' demonstrate considerable promise for building on-the-ground, joined-up actions in response to policies for water-food-ecosystems services-climate change and the like. The systemic practices that were tried and tested have the potential to 'dissolve' many historical social and institutional barriers and to create opportunities for adaptive and

systemic responses to change but only if they attract future investment, including for building STiP capability.

Concluding thoughts and suggestions

The imperative from the phenomena that give rise to an Anthropocene framing of our circumstances is that innovation in thinking, acting, governing, institutional designing and investing are all needed as soon as possible and in systemically related ways. Given the complexity and uncertainty we humans face it is hard to imagine any long term effective responses that are not grounded in STiP. But STiP of what type and how institutionalised and organised? There is yet to be an effective, strategic and collaborative response to the 'system' concept going feral and the reflexivity and epistemologically aware praxis demands this creates. All STiP oriented organisations, such as ISSS which is now in its 60th year, might well commit to ongoing review of their rationale, or purpose, and modes of engagement with others as an organisation. Reflexive practice and institutions are required, such as addressing the motion 'should we continue to exist', as an annual governance device and commitment to regeneration, or institutionalising systemic co-inquiries into ongoing governance of the organisation, modes of collaboration and into the relevance of STiP – whether in the practice of science, or releasing or effecting systemic sensibilities and Institutional innovations that ISSS and other cybersystemic organisations need to adopt include:

- creating diffuse boundaries to the conversation/organisation e.g. always co-organise events with at least one other cybersystemic organization or group (Figure 4);
- facilitate the emergence of a strong, strategic organisational platform (e.g. a peak body) that builds solidarity based on what groups have in common, our societal need in the Anthropocene and the creation of demand-pull for cybersystemics (IFSR could possibly transform into this role – Figure 5);
- commit to facilitating epistemologically aware conversations - new knowing ecologies;
- commit to a collaborative endeavour across all cybersystemic organisations (Figure 4) and those not yet institutionally close (Figure 5), or in the organizational picture

(e.g. consultancies; higher education bodies), to release and effect systemic sensibilities and literacy at large (see the papers in this volume).

Through the CADWAGO example I have attempted to demonstrate some of the institutional forms and praxes needed to innovate, to be capable (and seen to be capable), of responding in the Anthropocene. Significantly, CADWAGO research was not about ‘systems’ *per se* because ‘systems’ were rarely present in the situations of concern, if one accepts that systems are best understood as “an integrated whole distinguished by an observer whose essential properties arise from the relationships between its parts - from the Greek *synhistanai*, meaning ‘to place together’” (Ison, 2010). Rather, what is generally encountered are situations that warrant framings such as ‘wicked’ or ‘Ackoffian messes’, or complex, or ‘problematiques’ (Ison *et al.*, 2014) and in which STiP, including ‘designing’ relevant systems as epistemological devices, offer scope for situational transformation.

Many opportunities exist to better exploit cyber-systemic concepts in the design and enactment of new institutions, governance reform and praxis innovation – new ‘imaginaries’. Examples include:

- Renewing focus on innovation based on the aphorism that arises from Gregory Bateson’s work: ‘the difference that makes a difference’;
- Exploiting Ashby’s Law of Requisite Variety (Ashby 1956), that only variety can manage variety, could be invoked more widely especially in moving towards bottom-up, citizen-led innovation and governance rather than the top-down command-and-control model that is now pervasive; the Requisite Variety principle has important implications for many practical situations;
- Breaking out of pathway dependencies by ‘green field’, systemic institution-building through co-design approaches;
- Breaking away from linear, mechanistic and systematic thinking and action by embracing the emerging fields of systemic design/innovation and systemic evaluation (see Reynolds *et al.*, this volume);

Despite the implications of the analysis in Table 1, the ubiquity of ‘system’ in general usage, its feral nature if you will, could, with strategic forethought, be exploited for effecting harnessing extant systemic sensibilities and effecting more systems literacy – for which there is an urgent need. Spread of the word ‘system’ is testimony to as yet unrealised

possibilities for those who do not fully understand how to use the language – the epistemics of systemics – to reframe and grasp the significance of “those four magic and inter-related concepts of: wholeness, interconnectedness, embeddedness, and most vital of all, emergence” (R .Bawden *pers comm*, June, 2016).

Future systems research must be built on systems thinking in practice; it can be understood as the search for effective ‘imaginaries’ that offer fresh possibilities within an Anthropocene framing. In moving forward it is worth remembering the advice that Helm Steirlin (2004 p. 164) philosopher, medical practitioner and psychoanalyst, offered based on a lifetime of systems practice: ‘systemic thinking can only be learned through one’s work; it cannot be instilled into others; it needs time to gather experience and to make mistakes’. In other words praxis is central.

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ⁱ This paper is based on the author's Presidential Address to the 15th Annual Conference of ISSS, Berlin August 2-7.

ⁱⁱ This paper is based on the author's Presidential Address to the 15th Annual Conference of ISSS, Berlin August 2-7.

ⁱⁱⁱ This paper does in fact draw on two keynote addresses delivered a week apart in Germany; the first was "Cyber-systemics, systemic inquiry and institutional reform?" given at 'Governing the Anthropocene: Cyber-systemic Possibilities? Systemic Inquiry', Herrenhausen Palace, Hannover, July 30-31st 2015 and the second, the ISSS Presidential Address 'Governing in the Anthropocene: what future systems thinking in practice?' delivered on Monday August 3rd 2015.

^{iv} If this paper were about metaphor theory it would be worth unpacking how the concept 'defining frame' could be understood and, perhaps, reframed – but that is another paper.

^v There are some very different views on the underlying philosophical positions for "framing." For example, one view locates framing as more of a cognitive/individual act, while another locates the process of framing more as rooted in interaction, with the latter growing more from the work of Gregory Bateson and Erving Goffman. Reviews of the importance of these different orientations can be found in: Dewulf, Gray, Putnam, et al., "Disentangling approaches to framing in conflict and negotiation research: A meta-paradigmatic perspective" in *Human Relations* (2009); Cornelissen and Werner, "Putting framing in perspective: A review of framing and frame analysis across management and organizational literature," in *The Academy of Management Annals* (2014), and Jorgenson and Steier, "Frames, framing and designed conversational processes: Lessons from the World Café," in the *Journal of Applied Behavioral Science* (2013).

^{vi} See <https://www.monash.edu/sustainability/programs-initiatives/systemic-governance-research> (Accessed 12th June 2016)

^{vii} There seems to me to be ongoing confusion about how best to relate the English cybernetics with a Greek precursor; from a praxis perspective use of the verb *kybernao* would be best though there is also *kybernesis* (government) and *kybernetike* (governance).

^{viii} Elsewhere I argue that institutions can be better understood as 'social technologies' (Ison 2010)

^{ix} The meta-perspective may come from an outside observer or oneself acting reflexively.

^x The dynamics in this figure are not meant to be read as strictly sequenced but iterative and mutually informing of each other e.g. concerns for F may inform M, or framing choice for S may preclude certain Ms etc.

^{xi} From this perspective 'reality' is a framing choice.

^{xii} In two German keynotes in 2015 I made the case for use of the term 'cybersystemic' as acknowledgement that two dominant intellectual lineages inform the majority of discourse within the so-called 'systems sciences'. The term was coined by the late Garry Boyd, Professor of Education (Educational Technology) at Concordia University Montreal, Canada (See: <http://www.col.org/blog/Lists/Posts/Post.aspx?ID=136>);

xiii The implications in the second column can apply to more than one of the terms in the first column;

xiv In this first iteration I make no claims that this analysis is comprehensive; ideally my depiction ought to be checked out with all those organisations named. Please contact me if you have information which may help refine this analysis.

xv See <http://steps-centre.org/methods/pathways-methods/vignettes/sociotechnical-imaginaries/> Accessed 13th June 2016.

xvi To my knowledge no links have been made between scholars concerned with 'imaginaries' and Kenneth Boulding's (1956) book concerned with understanding 'how individual worldviews are created and changed, and how such worldviews affect behavior' (see <http://www.colorado.edu/conflict/peace/example/boulimag.htm> Accessed 2nd August 2016).

xvii CADWAGO was one of 15 shortlisted proposals to the Europe and Global Challenges Call released by a trio of European Foundations (Riksbankens Jubileumsfond, Compagnia di San Paolo and VolkswagenStiftung); the project proposed development of the knowledge base and capacity to adapt to climate change through improved water governance approaches building on several earlier projects including the well-known SLIM project coordinated from the OU in 2000-2004. A grant of 9.000.000 SEK (equivalent of about 1.000.000 Euro) was awarded to CADWAGO one of only four proposals funded.

xviii These are my own interpretations, for which I take responsibility; others within the CADWAGO consortium of c. 25 researchers and over 12 organisations may not concur.

xix As one of four projects of 70 applications funded CADWAGO required features that the assessors felt able to support; it is feasible that one of these key features was the systemic design elements of the proposal as the VolkswagenStiftung, one of the trio of funders, has a record of funding innovative systems-based research having funded the Club of Rome for the 'Limits to Growth' study (Meadows et al 1972).