Churchman and Maturana: Enriching the Notion of Self-Organization for Social Design

Churchman and Maturana: Enriching the Notion of Self-Organisation for Social Design[1]

Martin Reynolds[2]

Mailing address
15 Knutsford Avenue, Old Trafford, Manchester M16 7SA
E-mail: m.d.reynolds@open.ac.uk
Phone: 01908 654894 (direct)
Phone: 01908 654992 (Secretary)
Fax: 01908 652175

Abstract

C. West Churchman and Humberto Maturana share similar cultural traditions involving frustrations with applying conventional systematic methods in domains of social systems design (Churchman) and neurobiology (Maturana). They have independently of each other developed a rich systemic framework of analysis based on a constructivist epistemology. But there appears to have been little correspondence between the two traditions. This paper explores six possible areas of congruence between Churchman's critical systemic perspective and Maturana's autopoiesis. This initial sketch reveals possible ways-forward in applying ideas of autopoiesis to our social world through a more constructive and adaptive conversation with the works of Churchman.

Key words: autopoiesis, critical systemic

[1] Paper originally presented for UK Systems Society International Conference, St Anne's College Oxford (7-8 September 2004) on *Citizens and Governance in the Knowledge Age - The Contribution of Systems Thinking and Practice*

[2] Systems Department, The Open University, Milton Keynes, UK.

1. Introduction

As far as I'm aware, C. West Churchman and Humberto Maturana have never published reference to each other's work. The two worlds of critical systemic philosophy (Churchman 1971; 1979; 1984) and autopoiesis (Maturana and Varela 1980; 1992; Maturana 2002) appear to have had little or no interaction. With the death of Churchman in April 2004, this paper is my own small tribute to a remarkable systems philosopher whose legacy, I believe, will continue to provide a source of enrichment for systemic intervention. The application of thinking around autopoiesis in the social domain of governance and citizenship represents one such trend of initiatives to which Churchman's ideas are, in my view, relevant and perhaps under-recognised.

Autopoiesis describes a mechanism by which a system continually produces its own components which are then involved with the same production processes: "Such an autopoietic system has a circular organization, which closes in on itself, its outputs becoming its own inputs. This gives it an important degree of independence or autonomy from its environment since its own operations ensure, within limits, its future continuation" (Mingers, 1995, p.*ix*). Autonomy is thereby ensured through existing as a *self-producing* system. This enables the system's *organisation* (relations that must exist among the system's components which gives a system identity – e.g., a living system) to be largely maintained. Autopoietic systems have a variable and changing *structure* (actual relations and components that constitute a particular bounded unity) delimited by the organisation of the system. The *boundary* of the system is also a product of the structural components. Key to the theory of autopoiesis is the notion that the development and growth of the system is solely dependent on the internal structure of the system. Changes in the environment of the system do not *cause* changes in the system but only possibly *trigger* changes in the system's structure (if the system is organisationally predisposed to respond to changes in the environment). Interactions with the environment are determined by a system's structure rather than - as is commonly understood, for example, through understandings of 'natural selection' - determined by environmental change.

Despite Maturana's own insistence that autopoiesis, as he sees it, relates only to living systems autopoiesis has nevertheless acquired the status of a *general* systems theory (Jackson 2000), with its ideas being widely and imaginatively applied outside of the biological sciences from which they were generated. Mingers (1995) reviews four dimensions in which the theory has been applied to social organisations and social systems: (i) "naïve application", citing earlier works of Beer, Zeleny and Robb which attempted to translate directly the features of an autopoietic system to an organisational or social system; (ii) limited in-part resonance with autopoietic systems, citing Varela (who saw social systems as possibly 'closed organizations' but nothing more) and Maturana (who sees social systems as the medium in which autopoietic systems, including individual humans, exist); (iii) substantial modification of original theoretical construct of autopoiesis in adaptation to social systems, citing the works of Luhmann; and (iv) as a metaphorical device for illuminating fresh ideas about social systems, citing the works of Morgan. In exploring the relevance of Churchman's ideas on social systems design with autopoiesis I shall be journeying dimensions (i) and (iv), though inevitably engaging a little with (iii). Whilst trying to avoid naïvety, I wish to metaphorically explore Churchman's ideas on social systems design *as if* social system is autopoietic. My journey will focus on six questions:

1. What is the epistemological status of autopoiesis?
2. What is the ontological status of autopoietic systems?
3. What constitutes the boundaries?
4. What do social autopoietic systems produce?
5. What are the components?
6. What constitutes the environment and what is its significance?

An overriding question is what might we learn of Churchman's insights regarding social systems *as if* social system was autopoietic? I will explore the implications of such learning for enhancing responsible intervention, good governance and purposeful stakeholder participation.

2. Epistemological Status: from 'systemic' to 'critical systemic'

Both Churchman and Maturana are recognised as being systemic in their approach to enquiry. A systemic approach "… involves using systems thinking to construct an epistemological device through which we can generate fresh and insightful explanations about the world – in contrast to descriptions of it – and which trigger new ways of taking *purposeful action* in the world" (Armson and Ison 2003 p.126, my italics). Autopoiesis ('self'-producing and 'self'-defining) itself might be described as constituting a 'systemic' approach in contrast with allopoiesis ('other'-producing and 'other'-defining) constituting more of what might be called a 'systems' approach. In the latter case the 'observer' is regarded as more distinct from 'the system' being observed. The distinction is made clear by Bell and Morse (1999) in defining a systemic approach to sustainability which emphasises the transformation of awareness required from practitioners of first-order cybernetics to practitioners of second-order cybernetics:

"… the transition of oneself from an *observer* of a reality which is considered to be outside oneself, to a *participant* in the same reality, and then towards being a *co-creator* of that reality, requires fundamental cognitive and emotional reorientation" (Buddrus, 1996, quoted in Bell and Morse, 1999 p. 85, p. 99. My italics)

Maturana's work is clearly embedded in the tradition of second-order cybernetics. Similarly, Churchman was a pioneer of this constructivist tradition in the domain of operational research and systems thinking and practice. Systems are not objective entities simply waiting to be 'observed'. Systems are better described in terms of 'whole systems judgements' used primarily to raise peoples' understandings through enabling the right questions to be asked. Systems practice ought not to be about unveiling some absolute truth regarding some objective social reality, but a process of inquiry to improve our systems design; that is, our collective social well-being. For Churchman, systems are predominantly in the mind of the observer rather than in the real world. For this reason Churchman's work triggered much of what we now understand as constituting the 'soft systems' tradition.

Following the phenomenological tradition of Husserl and Heidegger, Maturana's radical constructivism denies the existence of an independent reality. All that can exist is only what we constitute, and there is no reality outside of experience. The act of 'doing' supersedes conventional Cartesian dualities of mind-body and thinking-being, and entailed dualities like reason-emotion. It is in the *action* that knowledge is generated. In contrast, Churchman's ideas build upon the dialectical (Hegelian) tradition, accepting and working with dualistic thinking in the cognitive domain. For Churchman, the key to improvement (in mind and body) relied on keeping alive the tension between dualities, as against either dogmatically arguing for the importance of one over the other (i.e., dual*isms* of 'either-or' dichotomous thinking) or, as Maturana sometimes suggests, dismissing or questioning their relevance altogether. Maturana's epistemological stance posits multiple realities in the ontological world, he by default permits only one reality in his epistemological world: "Maturana's challenge… is ultimately made problematic by the proposal of a unitary biological theory that, *by virtue of being unitary*, presupposes a degree of independent observation" (Midgley 2000, pp.58-59 Original italics). Churchman encapsulates his dialectical/ critical corrective to this dilemma: "We have to maintain the contradiction or else we allow ourselves to be overwhelmed by the consistent" (Churchman, 1968, cited in Ulrich, 1983, p.275).

Churchman's dialectical approach is encapsulated in the title of his publication The Systems Approach and its Enemies (Churchman, 1979). His prime dualistic constructs - *systems approach* and *enemies to systems approach*, and *systems rationality* and *social rationality* (or *systems irrationality*) - provide the driving mechanisms behind the process of systems design. After initially being concerned with the holistic attempt at *sweeping in* all relevant values and perspectives pertaining to a systems design, a *process of unfolding* draws out the implications of making the necessary and inevitable boundary judgements required for further purposeful action. Such a process is itself described by Churchman in dialectical terms, using "the imagery of striving-force and the opposite, passive helplessness" (Churchman, 1979, p. 80). Churchman's dialectics associates him with the prefix *critical* in systems discourse. Churchman's work itself is described as constituting 'critical systemic thinking' (Flood 1999) and 'critical systemic praxis' (McIntyre 2003; 2004). Moreover, authors associated with traditions of 'critical systems thinking' (Ulrich 1983; Jackson and Flood 1991; Midgley 2000) acknowledge the profound influence of Churchman.

In my view, Churchman's critical systemic ideas invokes Maturana's concern for addressing issues of emotion and love as epistemic functions. Churchman's portrayal of some suggested 'e*nemies of the*

systems approach' - politics, morality, religion, and aesthetics - makes explicit a need for humility as well as tolerance, but also prompts an added important dimension of *discomfort*; the implications of which are discussed later.

3. Ontological status: from descriptive to normative

In describing autopoiesis as a process of systemic *self-production* in living systems in the biological realm, it is not too surprising to see these ideas extended to describing *self-organisation* in human activity systems in the social realm:

"All members of the system are interconnected in a vast and intricate network of relationships… The success of the whole community depends on the success of its individual members, while the success of each member depends on the success of the community as a whole… In contrast, engineered systems have predictable outcomes, because all their components can be *precisely designed* and controlled. Most of our political, administrative business and NGO leaders assume that purposeful human systems should be as predictable as engineered systems... As Margaret Wheatley, the American leadership and systems thinker, says 'you can't look at something like self-organisation or complex adaptive systems in science, no matter what unit you're looking [at] – plants, molecules, chemicals – without realizing that this is a kind of democratic process'… Thus, if we can think of 'democracy' as meaning a system through which members of communities organize themselves, rather than a system for controlling them, our democratic systems would be getting closer to being complex, adaptive and self-organizing" (Madron and Jopling 2004, my italics)

The term 'organisation' used in the social realm does not have the same meaning as described in relation to autopoiesis. In the social realm organisation relates more to what Maturana might refer to as structure. In the New Internationalist extract above 'democracy' is envisaged in terms of a "self-organising system" which might be interpreted as autopoietic in contrast with what might be referred to as the more allopoietic "engineered system".

The ontological distinction between Maturana (largely descriptive focus on what 'is') and Churchman (explicitly normative focus on what 'ought' to be) is encapsulated in the contrast between the systems terms predominantly associated with the respective authors, 'emergence' and 'design'. In the social domain, autopoiesis might be useful in describing emergent characteristics of, say, globalisation or a knowledge-based society (e.g., Luhmann, 1986). But what does it offer in terms of guiding design? In a special edition of *Systems Research and Behavioural Science* devoted to *conscious evolution* (Banathy 2003) there is not one reference to autopoiesis or its prime authors. This may not be surprising from Maturana's viewpoint, in that autopoiesis describes a process which downplays conscious intention and is explicitly non-teleological. For Churchman, in contrast, the emphasis is centred on social systems design guided explicitly by teleological concerns.

Significantly, Churchman's design fundamentally critiqued the 'precise' manner invoked with engineering systems described in the New Internationalist excerpt above. Publication of *The Systems Approach and its Enemies* recognised the need to counter the inherent sense of precision embedded within notions of design, and to alert systems practitioners to the idea that the success of any systems design is very much linked with the ability to couple in-system design processes with out-of-system uncertainties and unforeseen events (including the generation of 'victims' of systems' design). This lies at the heart of Churchman's open-systems approach. The problem in transferring the closed-systems approach of autopoiesis (carrying the implicit normative value of preserving the sanctity of life, as it is associated with living systems) to the social realm is that organisational closure is not necessarily good! Other writers explicitly using ideas of autopoiesis in the social realm implicitly recognise Churchman's sense of first recognising and then engaging 'enemies' of our systems designs. Some examples are given below.

1. "To those who would see the achievement of autopoietic organization as a desirable objective in organizing, I warn that such an aim may result ultimately in the subordination of all human aspirations and ambitions, values and welfare to the service of preserving the unity of such systems, and not to any human end. Once formed such organizations appear to be beyond human control, indeed, to be real-world living systems" (Robb, 1989 quoted in Jackson, 2000,

pp.188-189). Stafford Beer (cited in Mingers, 1995) similarly alerts us to what he terms 'pathological' autopoietic systems in the realm of organisational development.

2. Winograd and Flores (1993) reflect that conventional computer (systems) design "assumes that the programmer (or 'knowledge engineer') can articulate an explicit account of the system's coupling with the world – what it is intended to do, and what the consequences of its activities will be… We can define the domain of perturbations (the space of possible effects the interaction can have on the system), but we cannot model how the system's activity will engender them" (p.53).
3. Capra (2002) draws substantially on autopoiesis as a basis for framing a design for sustainable living. Whilst *globalisation* might be seen as 'an emergent property' of evolution, Capra sees the present *economic globalisation* as the result of human design and therefore in need of re-design. Designing an alternative system requires fundamental shifts in values. Capra signals the need to address associated political upheavals arising from such value conflicts.
4. Espejo (2002) suggests that generating *requisite* self-organisation (organisational closure, representing a shift from being merely a collective to a bounded organisation) requires an element of outside design but that "it is apparent that autonomy, or the capacity to norm and construct oneself, is contextual and therefore not all 'closures' are going to be socially acceptable" (p.523).

The unity of an autopoietic system is defined in part by the boundary. In Churchman's social systems design, it is the *judgement* on boundaries that inform appropriate design.

4. Boundaries: from materials to purposes

In biological terms, boundaries (e.g., cell membranes) are comprised of material components (e.g., molecules) produced by, and producing, the system. An autopoietic system is considered as being dynamically *closed*. For Churchman, drawing on the teleological tradition of his mentor, Edgar A. Singer, it makes no sense talking about social systems unless reference is made to underlying purpose. Following the tradition of Churchman in reinforcing the notional heuristic (as against the 'realistic') idea of 'systems', the term *systems of interest* (SoI) is used. The 'organisation' of any system of interest is mapped out in terms of fulfilment of purpose. Boundary judgements might then be made in accord (or discord) with such purposes. Churchman focuses on *purposeful* rather than purposive SoI. In purposeful systems, purposes are generated principally from within the SoI. In purposive systems, purposes are established from outside the SoI. Like the boundaries in living cells, the notion of purposeful systems design suggests that the boundaries are not fixed, and may change as a result of triggers from the environment, if structurally predisposed to such changes, or from changes in the component roles within the system. Hence, purposeful SoI have the autopoietic feature of being structurally-determined, whereas purposive SoI are more allopoietic. Whereas autopoietic systems *are* dynamically closed, Churchman would argue that social systems of interest are (or ought to be) dynamically *open*.

An open system of interest does not imply the absence of a boundary, but does imply the need for potential change in boundary judgements. If component parts to SoI are defined in the first instance by *purpose*, appropriate self-organisation and governance ought to invite constant reflection on purpose. This is what gives SoI identity.

5. Products: from self-production to 'meaning'

The challenge in shifting from physical entities of living organisms to virtual entities of social systems is not only problematic in terms of defining the boundary, but also in defining the products. If the boundary setting of such human activity systems are determined by 'purpose', their output might be considered as the 'meanings' embodied within the purpose. The centrality of 'meaning' or 'understandings' in descriptions of social systems informed by autopoiesis appears elsewhere to attract some consensus (e.g., Luhmann, 1986; Espejo, 2002; Capra, 2002).

The meaning embodied in purpose might also be represented by what Churchman termed the 'worldview' (or 'Weltanschauung') underpinning any purposeful action associated with a system of

interest. Churchman considers worldviews not as commodified output but as an intrinsic value which needs revealing in relation to the effect they may have on contrasting worldviews (i.e., meanings associated with what Churchman calls the 'enemies'). A significant feature of worldviews as described by Churchman is their strong resistance to change; worldviews embody fixed presuppositions which determine how 'facts' are interpreted, even, and perhaps particularly, facts that may appear to undermine an underlying worldview!

If purposes and embodied meanings or worldviews represent significant component of any SoI, what are the other components recognised by Churchman?

6. Components: from people/language to stakes/ stakeholdings

"The elements that compose a system are not its components by themselves, they are its components only as they participate in its composition, and only while they do so" (Maturana, 2002, p.10). The component parts of social systems are not necessarily individual people (a key objection from Maturana in conceptualising social systems as autopoietic is that 'people' when thought of as components are relegated from being autopoietic living systems to allopoietic sub-systems). Luhmann (1986) and Capra (2002) resolve this problem by insisting that 'communications' rather than individual humans constitute the component parts. For Capra, 'networks' provide the organisational frame (Luhmann chooses not to refer to the term 'organisation' as it has particular sociological meanings which, as stated above, are different from those adopted by Maturana).

As McIntyre (2003) points out, Churchman appreciated the importance of languaging in the development of self-organised systems of interest. But Churchman has more to offer with respect to the delineation of four generic stakeholder roles (not people) each associated with particular concerns and problems (stakes and stakeholdings). In my view, these twelve category types constitute what might be termed as the structural components of an organisational framework associated with any system of interest. The structural components (though not referred to as such) were mapped out in two key publications (Churchman, 1971; 1979). Churchman's student, Werner Ulrich , reworked Churchman's 12 categories in terms of roles, concerns and problems and in the form of 12 critical systems heuristics (CSH) questions (Figure 1).

Categories			Dimensions of intentionality		
1	Beneficiaries?	(role)	Sources of motivation	Those involved	The purposeful system of interest (in its environment) or context of application on which depends the meaning of 'improvement'
2	Purpose?	(concerns)			
3	Measure of improvement?	(problems)			
4	Decision maker?	(role)	Sources of control		
5	Components?	(concerns)			
6	Environment?	(problems)			
7	Planner?	(role)	sources of expertise		
8	Expertise?	(concerns)			
9	Guarantor?	(problems)			
10	Witness?	(role)	sources of legitimisation	Those affected	
11	Emancipation?	(concerns)			
12	Worldview?	(problems)			

Fig. 1 Critical-Heuristic Categories as Structural Components
(adapted from Ulrich, 1983 p.258, originating from Churchman, 1979 p.80)

In translating CSH categories as stakeholder attributes, I'm agreeing with Robb who echoes Maturana's statement above: "… only those human properties which are required for the production of the autopoietic system need be regarded as components" (cited in Jackson, 2000, p.188). The categories can be used as a source for identifying the range of 'stakeholder' roles (categories 1,4,7, and 10), their concerns or 'stakes' (categories 2,5,8 and 11) and generic problems associated with 'stakeholdings' (categories 3, 6, 9 and 12) relevant to any particular situation of interest. A significant contribution from Ulrich is in making more explicit the conceptual demarcation between those stakes and stakeholdings 'involved' with the SoI (categories 1-9) and those 'affected' by, but not involved with, the SoI (categories 10-12). For a more detailed account of how Ulrich's CSH questions derive directly from Churchman's work see Ulrich (1983).

The 12 categories provide a useful generic organisational template for inquiry into, and design of, a human activity system of interest. For any system of interest, it is useful to appreciate, first, the underlying purpose of the system (which provides the overall boundary) and associated intended beneficiaries, second, the components or resources (e.g. human, financial, infrastructure, natural) needed to enable the system to work, and those in command of such resources (the 'decision makers'), and third, the expertise (guarantor attributes) and associated experts (e.g., planners) used to help secure (or guarantee) success of the system's purpose. Furthermore, it is also essential to bear witness to the potential conflicting value-sets or worldviews that may affect and be affected by the SoI. Churchman referred to this type of enquiry as a *process of unfolding*. Figure 2 illustrates my own interpretation of how these components might be linked as if they constituted an autopoietic entity (using slightly different terminology for some of the structural influences).[3]

[3] The lay-out of this diagram draws on a diagnostic framework on 'social learning' arising from a collaborative research project that I was involved with (SLIM, 2004)

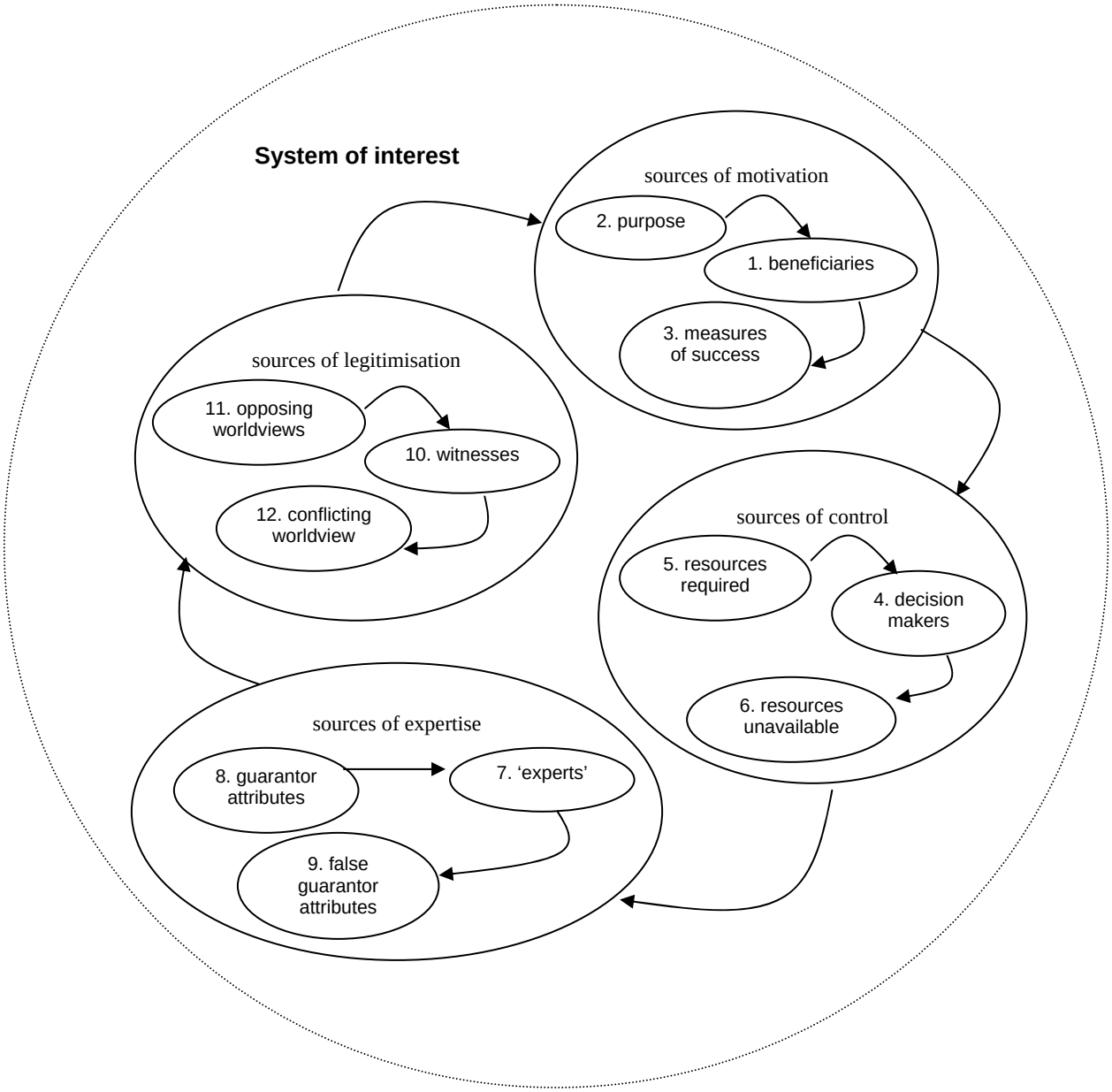

Fig. 2 Organisational Framework using adapted CSH Categories (numbered according to Ulrich's typology) to illustrate a Social System as if it was Autopoietic

From this generic organisational framework it would clearly be possible to identify particular structural components relating to any specified system of interest. Such an exercise can be undertaken both as an empirical analysis of what approximates to an actual ('real-world') situation (*is* mode) juxtaposed dialectically with explorations of an ideal situation (*ought* mode). Both Churchman and Ulrich emphasise the importance of 'unfolding' as an ethical process.

The question arises as to how far Figure 1 relates to a social system *as if* it was autopoietic, and what might we learn from it? The following features of Figure 1 may help to trigger further reflection.

1. The component parts are only of relevance to a *purposeful* SoI; that is, the purposes and underlying meanings determined by systems components.
2. The component parts are represented as structural *influences* rather than specified determinant factors. The relationships (represented by arrows) are not necessarily *causal*. This is an appropriate feature of relations between structural components.
3. The sequencing between categories belonging to any one source of influence begins with stakeholder concerns rather than stakeholders. Churchman, for example, suggested that the best place to begin unfolding is with category 2 (purpose). From this 'concern' it might then be possible to reveal (actual) surrogate as well as (ideal) intended beneficiaries.
4. The control function (categories 4 and 5) lie within the boundary of the system. The SoI is a structure-determined system.
5. Sources of expert support and sources of legitimisation are separate entities from sources of control. In real-world scenarios it might be that 'experts' and 'witnesses' of the affected are actually controlled or co-opted by decision makers rather than (ideally) independent from them, leading to claims that the system is corrupt.
6. The SoI is closed. There is an outer boundary (signalling 'purpose' embodied with meaning, determined by the systems components) and there is an unspecified 'environment' outside the boundary. Two aspects of a systems environment as normally depicted with CSH categories, are incorporated within the overall boundary of SoI; category 6 (the 'environment'), and category 11 (opposing worldview).
7. The 'environment' as specified in Table 1 (CSH category 6) is translated in Figure 1 in terms of 'a problem' for decision makers; resources or components that lay outside the system's control but yet might be relevant in affecting the system's performance. Figure 1 prompts the question what might constitute the systems environment? What *is* relevant but not component? It might also prompt the question, what *ought* to be in the environment of SoI, that might otherwise be actually under the control of decision makers (category 5). Such questions are particularly relevant to issues of natural resource management.

From a critical systemic perspective, it is important to reflect (i) on the location of the researcher (as 'observer' and 'navigator' in Maturana's terms) as a key stakeholder or participant *in* the system of interest, and (ii) about short and long term possible effects of the system of interest, and those (witnesses) who may represent the interests of the affected ('victims'). Both these reflections are associated with what Maturana may refer to as the 'environment' or medium of the system.

7. Systems environment: from structural coupling to responsibility

A key point of congruence between autopoiesis and Churchman's critical systemic perspective is that factors in the environment of SoI are recognised as not being *causal* factors. Environmental factors can only *trigger* or influence events; but by virtue of them being outside of the system they cannot *determine* events.

In autopoiesis, the environment of a system is understood in terms of its input to 'structural coupling'; the history of recurrent interactions leading to structural congruence between two or more systems, or a system with its medium. Individual structures (within the biological system) determine perturbations, not the perturbing agent. So what value is put on 'the environment' and its perturbing agents? Autopoiesis conceives "living systems in terms of the processes that realized them, and not in terms of the relationships with an environment" (Maturana and Varela, 1992 p.12). Autopoiesis provides the law of conservation of organisation. A separate law of conservation of adaptation specifies the relationship between a system and the medium (or environment) in which a system exists. Autopoiesis

constitutes a set of "processes that that are structurally congruent yet blind to the consequences to which they give rise" (Maturana, 2002, p.9). The 'environment' is only valid to the 'observer' (in the environment), not the 'navigator' in the living system.

As an observer, it is possible to revisit Figure 2 and be more explicit about the environment. Categories 6 and 11 represent 'environmental' factors (see Fig. 3). Category 6 relates to those factors principally *affecting* the SoI whilst category 11 represents those factors principally *affected by* the SoI.

It is significant that Churchman's original term for what Ulrich refers to as 'witness' was the 'systems philosopher' (1979 p.80). This suggests an important reflective dimension to the traditional 'systems practitioner' role (category 7). The key concern (category 11) for the systems philosopher is described by Churchman in terms of 'enemies of the systems approach'. Ulrich later renamed this category as 'emancipation':

> "... it [emancipation] reminds us that social mapping and design is not merely a matter of instrumental orientation toward some purpose (as functionalistic "systems science" seems to assume), but that for *socially* rational planning it is essential that the planner initiate a *process of emancipatory self-reflection on the part of the affected*" (Ulrich, 1983 p.257 original italics)

For a critical systemic approach, the 'navigator' then embodies two roles; one being the planner/ expert or traditional systems *practitioner* (category 7) and the other being the witness or reflective systems *philosopher* (category 10). Figure 3 is a systems map illustrating the role and role concerns of a systems practitioner (or any similar expert) involved with a SoI. A distinguishing normative feature of social autopoietic systems, from Churchman's viewpoint, appears to be that navigation requires continual reflection on *relationships* between SoI and its environment.

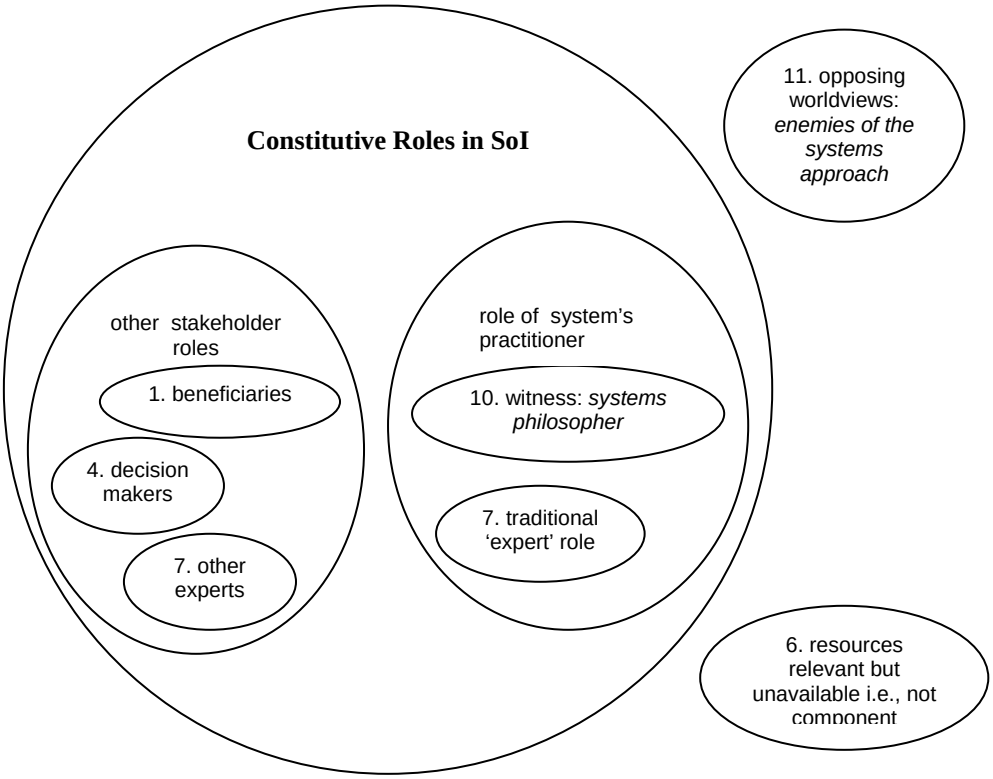

Fig. 3 Stakeholder Roles and 'Environmental' Concerns Relating to a generic (Social) System of Interest (SoI), numbered according to Ulrich's (1983) typology

In my view, Churchman's notion of 'enemies' embodies the essence of response-ability from a critical systemic perspective. Figure 4 illustrates two dimensions of responsibility for a systems practitioner; each dimension carrying risks of narrow dogmat*isms* (see Reynolds, 2001 and 2003 for more detailed explanation).

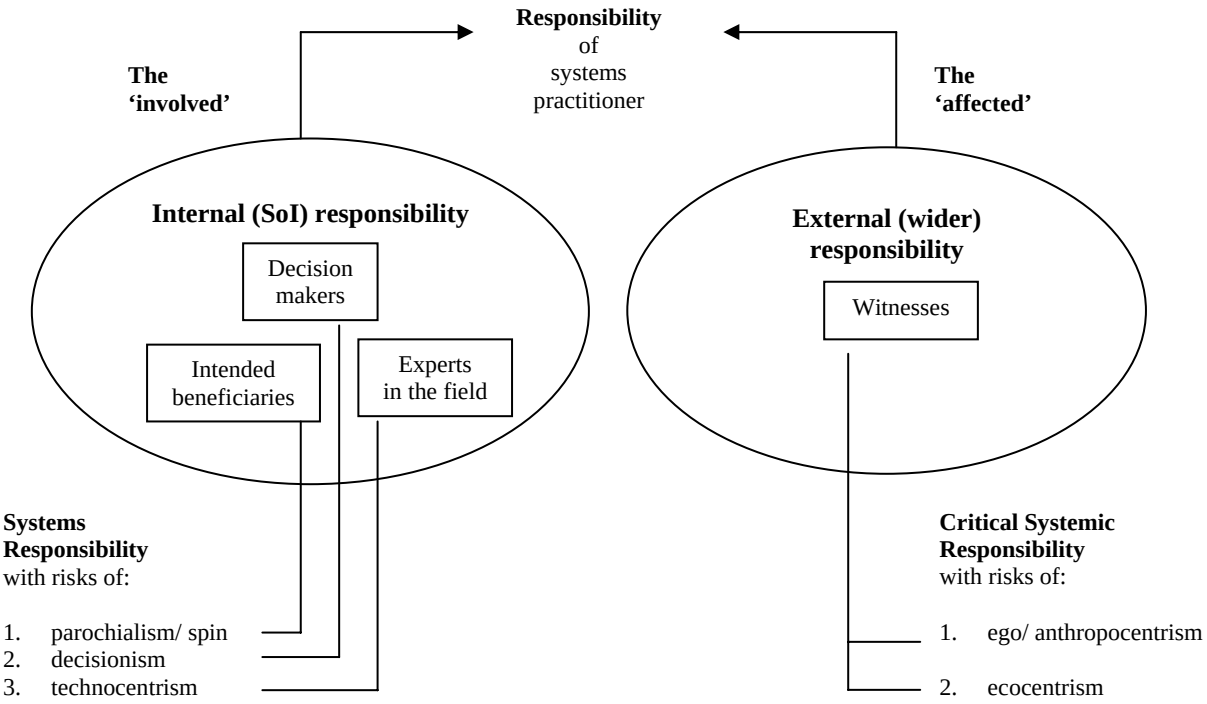

Fig.4 Role of Critical Systemic Practitioner

To be constructively responsive to 'enemies' requires an ability to cope with discomfort. Flood and Ulrich succinctly echo Churchman's ideas on 'enemies' in a joint statement affirming their commitment to a critical systems perspective:

> "… it is anticritical to expect that we can work toward a view with which "we all feel comfortable" (a bounded idea promoted by several eminent "systems thinkers"), be it with the outputs of methodological activities or indeed the methodological approach itself! Contrary to this, we propose that we should remain uncomfortable. A "truly" critical approach must be open to emancipation from itself and even to calls of abolishment, as must the "output" of methodological activities. As we take our theories to the practical world of men and women, we must equally allow these practical people to bring their worlds to our systems intervention" (Flood and Ulrich 1990)

Being response-able in a critical systemic sense requires shifting from a cosy 'group-think' mentality towards embracing instances of discomfort, and being open to changing boundaries. A response-able community of practice needs to remain openly critical of its own premises and promises - to entertain attack from its worst enemies – and to be prepared to learn and change as a result. The difficulty and challenge resides in the notion that what is outside our immediately relevant systems boundaries is, from the perspective of the system of interest, essentially unbounded, and from the perspective of Maturana, essentially unknowable.

8. Implications for governance and citizen participation

8.1 How might we better appreciate our systems of interest?

Churchman's process of unfolding can be used as a powerful analytical tool for revealing structural shortcomings in prevailing governance systems. In this sense, the structural components offered by Churchman provides an alternative (though possibly complementary) set to those offered by Luhmann (i.e., 'communications'). I have personally used the process of unfolding as a descriptive means of understanding phenomena relating to natural resource-use planning in a developing country (Reynolds 1998). In focusing particularly on projects encouraging citizen participation, the process of unfolding revealed structural features of a self-organising system of expert support which, rather than serving intended overriding purpose of rural poverty alleviation, served surrogate purposes associated with maintaining particular dominant stakeholder interests. In this sense, the process of unfolding revealed what Robb referred to as 'mind-sets' "which guarantees compliance with the dominant culture so preserving the unity of the organisation" (cited in Jackson, 2000, p.188); the 'organisation' here being what I viewed as the prevailing system of natural resource-use appraisal. Both Ulrich (1983) and Van Wyk (2003) have undertaken similar detailed analyses focusing on governance and citizen participation in health sector planning.

8.2 How might we improve support for social systems design?

If Churchman's social system of inquiry is autopoietic, as described by Maturana in relation to living systems, then experts, including systems practitioners, working *in the* system can have no moral responsibility to what happens in the system's environment. Such a notion sits comfortably with the absence of social responsibility amongst traditional 'experts'; a shortcoming of expert-support that Churchman continually fought against throughout his life. Churchman's ideas prompt two questions regarding this dilemma. First, how might 'experts' working within a system of interest mitigate against the inevitable lack of knowledge regarding unforeseen and/or unintended consequences of their support to the system? To answer this question I think it important first to recognise and acknowledge the role

of expertise associated with any system of interest, rather than subscribe to the often-used platitude that 'there are no experts'. Whilst Churchman himself (unfortunately, in my view) used this expression, he was keen to emphasise the point that no one set of expert guarantors can ever provide absolute guarantee. This in my view ought not to distract attention away from the idea that any system of interest (including all systems of governance) has an 'expert' component; that is, some implicit or explicit set of underlying guarantor attributes used to underwrite or ensure the 'success' of the system. Whilst Maturana may claim that such judgements can only ultimately be made with regards to individual preferences (given that all 'realities' are equally valid), there is a view that we ought to try and standardise criteria for making such judgements (Mingers, 1995). The fleshing out of CSH categories 8 and 9 (what I call co-guarantor attributes and false guarantor attributes respectively, see Fig. 1) in terms relating to Habermasian knowledge constitutive interests provides one such attempt at standardising criteria (Reynolds 2001; 2003).

A second question arising from the epistemological dilemma is how might citizens themselves be better equipped to participate within the system of interest either as experts or as active checks against dominant forms of expertise? More recently, McIntyre (2003) used Churchman's process of unfolding for developing an integrated model for governance defined and owned by an indigenous public housing association in Australia. But Ulrich himself has been the most prominent and tireless advocate for citizen empowerment using Churchman's ideas: "In a democratic society in which every citizen is sovereign, only the voluntary consent of those affected but not involved can possibly legitimize the costs and risks imposed upon them. This assertion again points to the importance of institutionalizing practical discourses in which the involved must publicly secure the consent of the affected" (1983, p.257). Ulrich believes that all citizens ought to have basic ground skills in CSH (Ulrich 2000)

9. Summary

Churchman and Maturana have similar lineages. Both started as scientists during the 1950s and in the 1960s began to question the reductionist principles underlying their disciplines. Both then went on to develop revolutionary constructivist systemic perspectives to counter reductionist shortfalls, focusing on 'process' (unfolding/ autopoiesis) rather than 'outcome' (categories/ characteristics). Both acquired an increasing interest in ethics, in-part as a result of their work. Whilst both individuals have had very significant influence on systems theory and practice, correspondence between the two traditions has been at best limited. A comparison between terms used in autopoiesis and those used in the critical systemic tradition of West Churchman reveals interesting points of congruence.

- The *organisational* aspects of Churchman's system of interest might be represented by the four sets of influences – motivation, control, expertise and legitimacy. Each set consisting of a social (stakeholder) role, key concerns (stakes) associated with the generic role, and key problems (stakeholdings) associated with the source of influence. These are generic characteristics of a human activity system of interest.
- Specific *structural* characteristics are expressions of the generic characteristics when applied to any particular human activity system of interest. Unfolding these particular characteristics relating to a system of interest can reveal the level of success at which self-organisation and requisite governance for social and ecological well-being is being generated.
- The primary feature or *boundary* setting for a specific system of interest is the purpose or set of purposes being served. This is a feature of human activity systems of interest clearly distinctive from autopoietic living systems. Normative ideas of 'design', invoking purposes with embodied meanings, is central to the notion of self-organising human activity systems. The generation of change (or lack of change) in collective 'meaning' or Weltanschauung is what distinguishes human social systems.
- The influencing effects of social design on factors outside the boundary (the system's 'enemies' or environment), and vice versa, mirrors autopoietic ideas of dynamic change in *structural coupling*. Environmental factors are not causal factors with respect to the development of *self*-organising social systems, but are nevertheless critical to their success.
- A focus on design brings into question the precise role of the 'expert' as a source of support. Maturana's distinction between *navigator* and *observer* mirrors in-part the tension implicit in the role of the systems practitioner as both *expert* and *witness* to the effects generated by systems design. The tension provides insightful perception on the *ethical responsibilities* associated with systems thinking and systems practice in supporting appropriate systems of governance.

There are differences between Churchman and Maturana in relation to their epistemological and ontological perspectives. Partly this arises from the different domains in which they have specialised. Collective human activity (social) systems are different from individual biological systems. Both are special. But an understanding of, and improvement of, social systems ought not to ignore the interplay between the social and the biological. A more worthy tribute to the memory of C. West Churchman might be to explore this interplay further in relation to the processes addressed by Churchman and Maturana.

References

Armson, R. and R. Ison (2003). Block 1:Juggling with Complexity: Searching for a System. T306 Managing Complexity: A Systems Approach. Milton Keynes, The Open University.

Banathy, B. H. (2003). "Editorial: Our Challenge in the 21st Century: Conscious, Self-Guided Evolution; and Self-Guided/ Conscious Evolution." Systems Research and Behavioural Science **20**(4): 307-308; 309-323.

Bell, S. and S. Morse (1999). Sustainability Indicators: Measuring the Immeasurable. London, Earthscan.

Capra, F. (2002). The Hidden Connections: A Science for Sustainable Living. London, HarperCollinsPublishers.

Checkland, P. B. (1981). Systems Thinking Systems Practice. Chichester, John Wiley.

Churchman, C. W. (1971). The Design of Inquiring Systems: basic concepts of systems and organizations. New York, Basic Books.

Churchman, C. W. (1979). The Systems Approach and its Enemies. New York, Basic Books.

Churchman, C. W. (1984). "Churchman's Conversations." Systems Research **1**(2): 89-90.

Espejo, R. (2002). "Self-Construction and Restricted Conversations." Systems Research and Behavioural Science **19**(6): 517-530.

Flood, R. L. (1999). Rethinking the Fifth Discipline: Learning within the unknowable. London/ New York, Routledge.

Flood, R. L. and W. Ulrich (1990). "Testament to Conversations on Critical Systems Theory between Two Systems Practitioners." Systems Practice **3**: 7-29.

Jackson, M. C. (2000). Systems Approaches to Management. London, Kluwer Academic/Plenum Publishers.

Jackson, M. C. and R. L. Flood (1991). Creative Problem Solving: Total Systems Intervention. Chichester, John Wiley.

Luhmann, N. (1986). The Autopoiesis of Social Systems. Sociocybernetic Paradoxes. F. Geyer and v. d. Zouwen. London, Sage.

Madron, R. and J. Jopling (2004). "The Web of Democracy." New Internationalist **360**: 16-18.

Maturana, H. (2002). "Autopoiesis, Structural Coupling and Cognition: A history of these and other notions in the biology of cognition." Cybernetics and Human Knowing **9**(3-4): 5-34.

Maturana, H. and P. Bumell (1998). "The Wisdom of Nature." Patterns **January 1998**: 5-10.

Maturana, H. R. and F. J. Varela (1980). Autopoieses and Cognition: The realization of the living. Dordrecht, Reidel.

Maturana, H. R. and F. J. Varela (1992). The Tree of Knowledge: The Biological Roots of Human Understanding. Boston and London, Shambhala Publications.

McIntyre, J. (2003). "Participatory Democracy: Drawing on C. West Churchman's Thinking When Making Public Policy." Systems Research and Behavioural Science **20**(6): 489-498.

McIntyre, J. (2004). "Facilitating Critical Systemic Praxis (CSP) by Means of Experiential Learning and Conceptual Tools." Systems Research and Behavioural Science **21**(1): 37-61.

Midgley, G. (2000). Systemic Intervention: Philosophy, Methodology and Practice. New York, Kluwer/Plenum.

Mingers, J. (1995). Self-Producing Systems: Implications and Applications of Autopoiesis. New York, Plenum.

Reynolds, M. (1998). ""Unfolding" Natural Resource Information Systems: fieldwork in Botswana." Systemic Practice and Action Research **11**(2): 127-152.

Reynolds, M. (2001). Co-Guarantor Attributes: A Systemic Approach to Evaluating Expert Support. Eighth European Conference on Information Technology Evaluation: Conference Proceedings, Oriel College, Oxford.

Reynolds, M. (2003). Towards Systemic Evaluation: A Framework of Co-guarantor Attributes. Evaluating Regional Sustainable Development submission to Workshop of the EU Thematic

Network project REGIONET "Evaluation methods and tools for regional sustainable development", University of Manchester (UK). 11-13 June 2003.
SLIM (2004) SLIM Framework: Social Learning as a Policy Approach for Sustainable Use of Water (available at http://slim.open.ac.uk). 41p.
Ulrich, W. (1983). Critical Heuristics of Social Planning: a new approach to practical philosophy. Stuttgart (Chichester), Haupt (John Wiley - paperback version).
Ulrich, W. (2000). "Reflective Practice in the Civil Society: the contribution of critically systemic thinking." Reflective Practice **1**(2): 247-268.
Van Wyk, G. (2003). A Systems Approach to Social and Organisational Planning. Victoria, Canada, Trafford.
Winograd, T. and F. Flores (1993). Understanding Computers and Cognition: A New Foundation for Design. Massachusetts, Adison-Wesley publishing Company.