Critical systems heuristics

Book Chapter

Chapter 6
Critical Systems Heuristics[1]

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Abstract Critical systems heuristics (CSH) is a framework for reflective professional practice organised around the central tool of boundary critique. This paper, written jointly by the original developer, Werner Ulrich, and Martin Reynolds, an experienced practitioner of CSH, offers a systematic introduction to the idea and use of boundary critique. Its core concepts are explained in detail and their use is illustrated by means of two case studies from the domain of environmental planning and management. A particular focus is on working constructively with tensions between opposing perspectives as they arise in many situations of professional intervention. These include tensions such as 'situation' versus 'system', 'is' versus 'ought' judgements, concerns of 'those involved' versus 'those affected but not involved', stakeholders' 'stakes' versus 'stakeholding issues', and others. Accordingly, boundary critique is presented as a participatory process of unfolding and questioning boundary judgements rather than as an expert-driven process of boundary setting. The paper concludes with a discussion of some essential skills and considerations regarding the practice of boundary critique.

6.1 What Is CSH?

> A systems approach begins when first you see the world through the eyes of another.
> (C.W. Churchman 1968, p. 231)

> We do not need the systems concept at all if we are not interested in handling systems boundaries critically. (W. Ulrich 1996, p. 17)

Critical systems heuristics (CSH) as developed by one of the authors (Ulrich 1983) is a philosophical framework to support reflective practice. In its most simple

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formulation, CSH uses a set of 12 questions to make explicit the everyday judgements on which we rely (consciously or not) to understand situations and to design systems for improving them. Table 6.1 describes the 12 questions.

The precise nature and use of these so-called *boundary questions* will be explained later. For now we can briefly summarise three basic reasons for raising them and hence, three reasons for using CSH.

Table 6.1 The boundary categories and questions of CSH (Adapted from Ulrich 1996, p. 44)

Sources of influence	**Boundary judgements informing a system of interest (S)**			
	Social roles (Stakeholders)	*Specific concerns (Stakes)*	*Key problems (Stakeholding issues)*	
Sources of motivation	1. *Beneficiary* Who ought to be/is the intended beneficiary of the system (S)?	2. *Purpose* What ought to be/is the purpose of S?	3. *Measure of improvement* What ought to be/is S's measure of success	**The involved**
Sources of control	4. *Decision maker* Who ought to be/is in control of the conditions of success of S?	5. *Resources* What conditions of success ought to be/are under the control of S?	6. *Decision environment* What conditions of success ought to be/are outside the control of the decision maker?	
Sources of knowledge	7. *Expert* Who ought to be/is providing relevant knowledge and skills for S?	8. *Expertise* What ought to be/are relevant new knowledge and skills for S?	9. *Guarantor* What ought to be/are regarded as assurances of successful implementation?	
Sources of legitimacy	10. *Witness* Who ought to be/is representing the interests of those negatively affected by but not involved with S?	11. *Emancipation* What ought to be/are the opportunities for the interests of those negatively affected to have expression and freedom from the worldview of S?	12. *Worldview* What space ought to be/is available for reconciling differing worldviews regarding S among those involved and affected?	**The affected**

1. Making sense of situations: understanding assumptions and appreciating the bigger picture

The boundary questions try to make sense of a situation by making explicit the *boundaries* that circumscribe our understanding. Such boundaries inform all our thinking about situations and systems; they constitute what in CSH we call our 'reference systems' (a concept to be introduced a little later). Broadly speaking, the boundary questions may be understood to cultivate a more holistic awareness of situations with regard to these wide-ranging issues:

- *Values and motivations* built into our views of situations and efforts to 'improve' them
- *Power structures* influencing what is considered a 'problem' and what may be done about it
- *The knowledge basis* defining what counts as relevant 'information', including experience and skills; and
- *The moral basis* on which we expect 'third parties' (i.e., stakeholders not involved yet in some way concerned) to bear with the consequences of what we do, or fail to do, about the situation in question

In CSH, these four dimensions of problems or problem situations are called *sources of motivation, control, knowledge, and legitimacy*, respectively (see column 'sources of influence' in Table 6.1). In sum, the 12 questions prompt an understanding of the 'bigger picture'.

2. Unfolding multiple perspectives: promoting mutual understanding

The boundary questions (hereafter referred to as CSHq1–12) reveal *contrasting* judgements as to what aspects of a situation ought to be/are part of the picture we make ourselves of it and what other aspects ought to be/are left out. CSH calls these judgements *boundary judgements*. They offer a way to examine how we frame situations. When people talk about situations, it often happens that their views differ simply because they frame the situations differently; more often than not, people are unaware of this source of misunderstanding and conflict, and even if they are vaguely aware of it they do not know how to examine its influence systematically. Thus seen, CSH offers a tool for understanding the *multiple perspectives* people bring into situations. By examining the different underlying boundary judgements, we can better understand people's differences and handle them more constructively.

As Table 6.1 suggests, we can identify and examine boundary judgements by asking different kinds of questions. First, for each boundary category there are two modes of question, a normative, ideal mode (i.e., what 'ought' to be…) contrasting with a descriptive, more realistic mode (what 'is' …). Second, judgements can be contrasted among the four stakeholder groups associated with the four sources of influence. So the set of judgements relating to intended beneficiaries (CSHq1–3) can be compared with those relating to decision makers (CSHq4–6), or experts (CSHq7–9), and/or witnesses (CSHq10–12). Third, at a more generalised

level of analysis, judgements can be contrasted between those stakeholders 'involved' in the system design (CSHq1–9) and those 'affected' by its consequences but not involved (CSHq10–12). Fourth and last, moving onto an even further generalised level, we can review an entire set of boundary judgements (CSHq1–12) associated with any one reference system in the light of another set of boundary judgements belonging to a different reference system. It is at this last level of contrast that we can best begin to appreciate the phenomenon of people talking at cross purposes or talking past each other. Put quite simply, such arguments occur because people are using different reference systems. CSH helps to reveal such practice.

3. Promoting reflective practice: analysing situations – and changing them

The boundary questions support first of all an *analytical focus* on understanding situations, by revealing to ourselves and to others the boundary judgements at work and allowing everyone to understand their implications. Such understanding then also enables a *practical focus* on ways to improve a situation, by engaging with people having different perspectives. The aim in both cases is to enable *reflective practice*, in a way that reaches beyond the usual, mainly psychological-introspective understanding of the concept (see Ulrich 2000; 2008). Beyond supporting us (say, as professionals or managers involved in an intervention) in disclosing and reviewing our boundary judgements, CSH also supports uninvolved people in uncovering undisclosed boundary judgements imposed on them by not so reflective professional or managerial practice. The boundary questions can thus also be used with an *emancipatory focus* – allowing people to make their own authentic boundary judgements.

Before examining how CSH can be used in pursuing these three endeavours, it may be helpful to situate CSH in the two main traditions of thought on which it draws. The first is the tradition of *systems thinking* of which the work of C. West Churchman (1968; 1971; 1979) is representative. The widely cited remark of Churchman opening this chapter invites the question of the lens through which one might see the world differently. In CSH such a lens is referred to as a *reference system* – a conceptual device circumscribed by the 12 boundary categories which in turn are defined in Table 6.1 by the boundary questions for which they stand. While Churchman preferred to envisage systems as real-world entities, he nevertheless provided the initial foundation categories adapted later for delineating a CSH reference system. He first identified nine 'necessary conditions' (approximately aligned with CSHq1–9) for conceiving of anything as a system in his book *The Design of Inquiring Systems* (Churchman 1971, p. 43), and later extended these to 12 'planning categories' in a book entitled *The Systems Approach and Its Enemies* (Churchman 1979, p. 79f.). The three additional conditions are 'systems philosophers', 'enemies of the systems approach', and 'significance'; Churchman understands them to raise issues related to the significance of a systems perspective as distinguished from the partial (because non-holist) perspectives of the 'enemies' (i.e., politics, morality, religion, and aesthetics; cf. Churchman 1979, p. 80 and p. 156). In strict CSH terms, they are critical 'ideas' for meta-level reflection about the

meaning of a systems approach rather than 'categories' for mapping any specific system (which is why CSHq10–12 are defined differently, as categories that are indeed constitutive of systems).

Despite this difference of understanding, Churchman's theme of the 'enemies' pointed the way to CSH's notion of boundary critique, in an effort to give a precise methodological meaning to his credo 'know (and love) thy enemy'. It also engendered an important heuristic device of CSH, the idea of maintaining tensions between contrasting perspectives for critical purposes; "we have to maintain the contradiction or else we allow ourselves to be overwhelmed by the consistent" (Churchman 1968, p. 229; Ulrich 1983, p. 275; Reynolds 2004, p. 542).

The second main tradition picked up in CSH is the tradition of *practical philosophy*. This comprises two largely independent strands of philosophical thought. On the one hand, there is the tradition of American *philosophical pragmatism* as rooted in the works of Charles Peirce (1878), William James (1907) and John Dewey (1925). On the other hand there is the European tradition of *critical social theory* as found particularly in the works of Jurgen Habermas (e.g. 1972 and 1984/87). Both strands of practical philosophy are to an important degree rooted in Immanuel Kant's (1787) *critical philosophy*, from which CSH derives many of its central concepts (see Ulrich 1983, Chapters 3–5). The 'American' pragmatic perspective of CSH means that it is oriented towards practical rather than theoretical ends; accordingly, CSH employs an *action-theoretical* framework, that is, it looks at situations from the point of view of an agent rather than an observer. Its 'European' critical perspective means that CSH considers values – and value conflicts – as integral part of all claims to rational practice; it relies on a *discourse-theoretical* (or 'discursive') framework to assist users in dealing openly and critically with the value implications of boundary judgements. All these influences have been detailed elsewhere (see Ulrich 1983; 1987; 1988a; 2001; 2003; 2004; 2006). Ulrich is now developing the two pillars of pragmatism and critique into an integrated framework of *critical pragmatism*, as a basis for a future 'philosophy for professionals' (see 2006; 2007a, b).

The peculiar combination of these very rich traditions has enabled CSH to significantly influence a strand of systems thinking and practice known as *critical systems thinking*. The point of departure for a critical systems approach as we understand it lies in the simple notion that all approaches, methodologies, methods, whether described as systems or something else, are partial, in the dual sense of (i) representing only a section rather than the whole of the total universe of possibly relevant considerations, and (ii) serving some parties better than others (Ulrich 2002, p. 41; 2005, p. 2). No specific proposal, no decision, no action, no system can get a total grip on the situation and get it right for everyone (Reynolds 2008a). The implication is that using a 'systems approach' requires us (i) to consider systematically what our systems maps or designs may leave out and (ii) to always examine them from multiple perspectives.

CSH is a critical systems approach developed to embrace this dual sense of partiality head-on. Let us see, then, how it attempts to provide this reflective lens.

6.2 Applying CSH

6.2.1 Two Studies in Applying CSH

CSH can support professional interventions in two general ways: it can help us to *evaluate* an intervention, or it can *inform* the methodologies used for intervention. The two interventions we describe are similar in that they both deal with complex situations of natural resources planning and management; they differ, however, in that they employ CSH for these two alternative purposes. The first project, an evaluation study of NRUA ('Natural Resource-Use Appraisal'), was part of a wider study by Reynolds (1998) exploring participatory planning for rural development in Botswana. The NRUA study examined how CSH could help evaluate existing practices in natural resource-use management with a particular view to poverty alleviation. The second project, ECOSENSUS – an acronym for 'Electronic/Ecological Collaborative Sensemaking Support System' – involved both authors and explored how a number of computer-assisted tools, among them CSH, could support participatory environmental decision making by geographically distributed stakeholder groups in remote rural areas of Guyana (Berardi et al. 2006; Reynolds et al. 2007). Before discussing the use of CSH in these two projects, a brief general description of their context and of the reasons for employing CSH may be useful.

6.2.1.1 NRUA-Botswana

Botswana is about the size of France or Kenya, despite supporting a relatively small population of less than two million people. It is classified as being semi-arid with most of the surface area being a harsh environment of land covered by the Kalahari sands, making it difficult to practice commercially sustainable agriculture. Natural resource use involving agriculture (livestock and arable) and wildlife utilisation is constrained further by a shortage of surface water, along with low and variable patterns of rainfall. The country's relative political stability in a volatile region is underpinned by the wealth generated by the *non-renewable* natural resource sector – particularly diamonds. However, over two thirds of the population live in rural areas and are variously engaged with livelihood activities based on *renewable* natural resource use.

Since the early 1990s considerable attention has been given to promoting participatory planning in less-developed countries as a means of alleviating poverty in the rural areas and protecting the natural environment. During the 1990s the national government in Botswana, in partnership with a number of donor agencies, was actively piloting participatory forms of rural appraisal, as an alternative to conventional large-scale survey techniques and scientific monitoring procedures. The idea was to rely less on scientific techniques such as large-scale surveys and monitoring, and more on the knowledge and concerns of local people. The most popular approach amongst development practitioners at the time was Participatory Rural

Appraisal (PRA), an approach known mainly through the work of Robert Chambers (1994a, b; 1997). PRA can be described as a set of participatory methods and techniques, from visualization and interview techniques to group-dynamic methods, used to elicit and structure the knowledge and concerns of stakeholders.

Referring to the two kinds of applications mentioned at the outset, CSH could basically support PRA interventions in two ways:

1. We might want to use CSH *within* the framework of PRA, as yet another method for eliciting and structuring responses. Such a use might not do full justice to the larger philosophical framework and spirit of CSH; but it might still complement PRA's basket of methods in some essential ways, by adding the missing dimension of critically-discursive tools (i.e., tools to support processes of critical reflection and discourse on the value implications of alternative proposals) and indirectly also by drawing the attention of facilitators and users of PRA to this dimension. CSH would thus *inform* the use of PRA in a way that might make a real difference.
2. We might want to use CSH *in addition* to approaches like PRA, as a wider philosophical and methodological framework for analyzing the process and outcome of PRA interventions. This use is independent of the previous one – it makes sense regardless of whether CSH was used in the analyzed interventions themselves. CSH would thus serve to *evaluate* the use of PRA and similar participatory approaches in specific interventions, with a view to assessing their outcomes as well as modifying participatory planning in general.

The use of CSH in the NRUA study reported here was of the second kind; the aim was not to modify PRA but rather, to evaluate its use and outcome in three participatory planning projects of that time in Botswana. CSH served as the principal framework for all three evaluations.

The reasons for applying CSH as a framework for evaluating participatory planning in Botswana were:

– CSH should help reveal the limitations of the NRUA project projects with regard to its claim of being inclusive and holistic;
– CSH should prompt a critical awareness among those involved in participatory development projects such as NRUA as to what interests were given prominence and which others were marginalised; and
– CSH should suggest ways in which 'participatory' planning might be improved to incorporate more responsible professional intervention.

6.2.1.2 ECOSENSUS-Guyana

The Makushi tribal region situated in the Rupununi River catchment area in Guyana is the size of south east England and contains one of the highest diversities of animal and plant species in the world. The region is under intense pressure by government as well as international corporations to expand the exploitation of its natural resources, including timber, gold, and commercially viable fish species.

The indigenous Makushi Amerindians in Guyana are personally affected by many of the land-use projects in Guyana's North Rupununi District without being directly involved.

ECOSENSUS was conceived as a preliminary study to explore the potential of providing better support to such communities than is possible with conventional project-orientated management and its predominant reliance on scientific and technological expertise. For example, conventional GIS (geographic information system) applications as well as other e-science tools have largely focused on scientific and technological issues, whereas wider socio-economic issues that arise with land-use and development planning have traditionally been beyond the reach of such tools. Along with participants drawn from the community of Makushi Amerindians and the two authors, the study involved a small number of environmental scientists and software experts from Europe and Guyana.

The reasons for applying CSH in ECOCENSUS were:

– CSH should offer an opportunity for revealing and promoting wider stakeholder interests in the preservation and development of the Rupununi wetlands;
– CSH should serve as a meaningful tool for communicating about the use and preservation of natural resources; and
– CSH should enable more sustainable planning and sustainable development of the wetlands.

6.2.2 Using CSH as an Intervention Tool: Some Basic Concepts

The descriptions above give the broad contexts in which CSH was applied, along with the reasons why in each case CSH was considered relevant. But what methodological conjectures make us believe that CSH is an intervention tool that supports such demanding aims? Before examining the two studies in detail, it is necessary to first clarify some basic concepts associated with the use of CSH.

We have already hinted at the basic aims that we associate with CSH (see What is CSH?). With its conceptual framework of boundary categories and questions (as shown in Table 6.1 above) and a number of supporting concepts and guidelines, CSH offers a systematic structure for making sense of situations, unfolding multiple perspectives, and promoting reflective practice. Methodologically speaking, CSH uses the boundary questions to uncover the *reference systems* that inform our views of both problem situations and options for improving them. In the form of explicit reference systems, CSH provides a means of well-structured 'conversation' between *systems and situations*. In the language of CSH, the aim and nature of that conversation consists in *systematic boundary critique*. The relationship of 'systems' and 'situations' and the concept of 'reference systems' will be introduced first; 'boundary critique' will then be explained in the subsequent main section 6.2.3 titled *A core concept of CSH: systematic boundary critique*.

6.2.2.1 Systems Versus Situations

Among contemporary systems practitioners – particularly in the two traditions of soft and critical systems thinking – it is widely acknowledged that 'systems' are essentially *conceptual* constructs rather than real-world entities. Systems concepts and other constructs help us describe and understand the complex realities of real-world situations, including natural, technical, social, psychological or any other aspects that might potentially or actually be relevant at any one time.

Acknowledging the *fundamental divide between systems and reality* is basic to contemporary systems practice. Particularly SSM (soft systems methodology; Checkland 1981) and CSH understand systems as conceptual tools for learning *about* reality, rather than as being part *of* reality itself. However, CSH handles the distinction a bit differently from SSM. While in soft systems thinking, practitioners are supposed to reflect on their systems conceptions, and feasible interventions to be based on them, by 'comparing' them with the real-world situation perceived to be problematic, CSH interrogates the notion of a 'perceived situation' itself. CSH makes problematic 'the situation perceived to be problematic', so as to help practitioners see through their underpinning assumptions. In doing so, CSH handles the distinction of 'system' and 'situation' not so much as an absolute opposition between an epistemological construct and an ontological reality but rather as a *continuum* between two poles of contrasting proximity to reality; one pole being closer to the 'real' than the other but both belonging to an epistemological domain of talking about a reality that we cannot grasp in any direct and strictly objective way. The reason is, whenever we talk of 'situations' and 'systems' we are always already abstracting from the infinitely rich 'real world' and using judgement to *select* some aspects we assume to be particularly relevant. That is, both poles are always involved, although to a different extent – with varying degrees of proximity and selectivity – and in different ways – with a descriptive versus prescriptive intent. CSH uses three interrelated terms to refer to varying degrees of proximity to reality:

1. *Maps:* These commonly (but not necessarily always) assume quite close proximity to reality. Typical examples can be found in everyday life (e.g. road maps), in regional and environmental planning (e.g. zone maps), and in the natural sciences (e.g. in biology, maps of cellular organisation or the double-helix of DNA). A good map tries to approximate some section of reality as much as is feasible *and* required by the map's purpose; but it should not have us take the map for the reality itself. A good map will therefore make explicit its underlying assumptions (e.g. in a geographical map, its coordinates, scale, and symbols). Maps should serve as signposts to reality but should never be taken for that reality itself.
2. *Designs:* These are less proximate to reality than are maps; they serve as signposts pointing to how the real world *might* be or *'ought'* to be, which includes everything from detail improvements in existing maps to radically new and encompassing visions for the future (also called 'ideal maps' in CSH). A good design tries to give us critical distance to reality, as a basis for developing alternative futures. Designs embody an implicit critique of the present, for we cannot understand what constitutes an improvement over the present without seeing its shortcomings.

3. *Models:* These are heuristic devices for engaging with reality in terms of mapping or design. 'Model' is a generic term that emphasises the abstraction from reality involved rather than the specific purpose for which the abstraction is made. 'Model' is the least specific term of the three. Among the heuristic devices to which it refers, we might also count the methods we use to construct maps and designs. CSH would then itself be a model.

To avoid a blurring of terms, CSH refers to the notions we make ourselves of a relevant context of intervention as 'maps' or 'designs' and of CSH itself as a *framework* for reflective practice or a *methodology* of critical systems thinking.

The important point in conceiving of professional intervention in terms of mapping and design is this. However close to reality our maps and designs may be or claim to be, we must never, as Alfred Korzybski (1933, p. 750) once famously said, confuse the 'map' with the 'territory'. Now this applies also to our perception of the territory, which is itself a kind of map! Accordingly, CSH assumes that "all our knowledge is in terms of maps" (Ulrich 1983, p. 185). Counter to what is often assumed, we can then not simply align 'situations' with the 'territory' and 'systems' with the 'maps' or 'designs' we make of it. Whatever we can think and say about a situation, it already contains some mapping and/or design elements. 'Situations' and 'systems' stand for different degrees of abstraction and conceptualisation rather than for a strict opposition of the 'territory' (an ontological concept) and 'maps' or designs (an epistemological concept). We might say we speak of 'situations' when we mean a low-level conceptualisation – a notion of the real world that remains close to ordinary perception – whereas when we speak of 'systems', we mean a higher-level conceptualisation in which we make conscious and careful use of the systems concept along with other abstractions.

We should, then, not expect that we can ever validate or test systems maps and designs by comparing them with 'the situation', as if the latter provided an independent touchstone. Rather, from a critical point of view, our notion of the situation is itself a map and thus is likely to be conditioned by the same sort of selectivity that informs the map or design in question. We can, however, use differences between maps (or between designs) to drive our thinking about the underlying judgements that lead to these different models.

Ultimately, what matters is not the terms we use but the way we use them. For example, terms such as hydraulic systems, legal systems, ecosystems, inventory systems, financial systems etc. are often used as descriptors ('maps') of the real world, and there is no reason why we should ignore such common use of language or deviate from it. Likewise, systems for traffic control, for timetabling, for mitigating climate change, for poverty alleviation, for bringing up children etc. are often expressed as planning devices ('designs'). And of course, all such systems might also be regarded as 'models'. For the sake of simplicity, we may even continue to refer to the 'territory' as the 'situation' or 'context', as it is common practice in the systems literature, at least so long as we mean to refer to its basically ill-defined and ill-structured nature which still awaits careful definition – the 'mess', using Ackoff's (1981) well-known term. But as soon as we begin to define

and structure the situation in some way, for example as a *problem* situation, or as a certain context *that matters*, or as *relevant* territory, then systems conceptions of some kind are already at play. In CSH terms these are called *reference systems*.

6.2.2.2 Reference Systems

To say that all our knowledge is in terms of maps is equivalent to saying that it is selective with regard to the aspects of the (undefined) territory or (defined) situation that it considers. Consequently, the crucial methodological issue for CSH is that in everything that we can think and say about the 'situation' at issue or a 'system' of concern, *selectivity* is at work. Reflective practice requires that we make ourselves and everyone concerned aware of this selectivity; for once our systems maps and designs become a basis for action, selectivity turns into *partiality* – it means that some parties will be better served than others, and still others may merely have to bear disadvantages.

The point is not that we ought to avoid selectivity – we can't. The point is, rather, that we should handle the selectivity of our maps and designs carefully, lest we deceive ourselves and others about their meaning and validity. Identifying and analysing our reference systems systematically is a methodologically rigorous way of putting into practice Churchman's observation cited at the outset: "A systems approach begins when first you see the world through the eyes of another."

By analogy, a *critical* systems approach begins when we first appreciate the ways our systems maps or designs depend on the reference systems we assume, whether consciously so or not. This does justice to the insight that the real world as such (the territory) is beyond what any conceivable method of inquiry can reveal to us in a secure and definitive way. Any conception we may have of it remains for ever open to doubt, contestation, and redefinition. There is an element of freedom involved: nobody can claim to advance the single right and objective map! This element of freedom does not imply, however, that all reasonable discussion about different maps and designs must stop here. The contrary is true: we may and should indeed argue and discourse about different maps and designs, to make sure we understand why and how exactly they differ – the different lenses they use to grasp the territory, as it were – and what implications these differences may have for all the parties concerned. The only 'stop signal' is one that prohibits indifference and intolerance in the way we handle our boundary judgements; for once we have understood the role of the reference systems they constitute, we can never again reasonably claim to own a monopoly for the single right view of the situation or the way to improve it – a common shortcoming even in professional practice.

In a sense, then, we can agree with Slavoj Žižek (1989, p. 21), who in his psychoanalytical work observes that 'the Real' is an extra-discursive realm, a realm apart from any of the constructs of 'realities' that we can talk about and which at bottom are inevitably ideological ('ideological' in the widest sense of the word: we make up 'reality' through our own ideas, depending on our interests and needs).

"Ideology is not simply a 'false consciousness', an illusory representation of reality, it is rather this reality itself which is already to be conceived as 'ideological'." Simply put, what is real we cannot talk about except through some lens, and the lens is at bottom ideological.

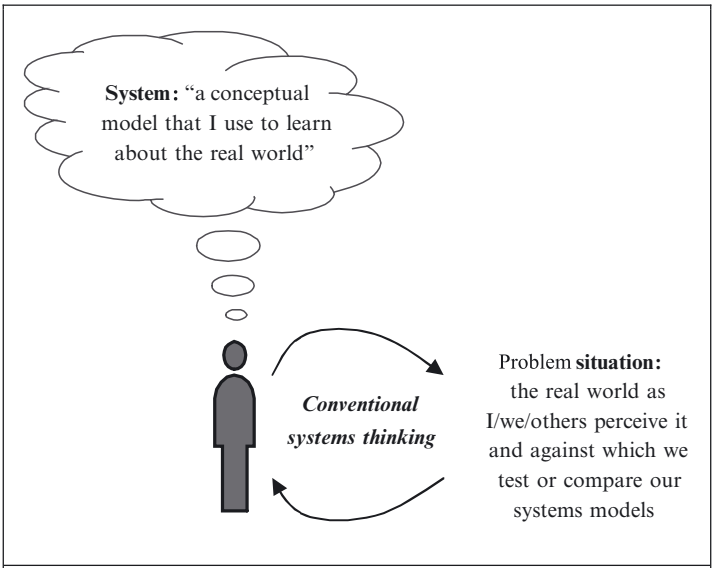
Žižek's observation is another way to remind us that in all our efforts to grasp situations, we map reality through some lens, the origin and exact nature of which lies in an extra-discursive realm. What is new in CSH is that it offers us a way of drawing the lens at least partly into the discursive realm. Through the analysis of underpinning reference systems, we acquire a shared language or literacy by means of which we can identify and unfold the normative implications of the lens systematically. In the language of CSH, we can thus understand partiality in terms of underlying selectivity. Although we may not ultimately fully understand the psychological and ideological forces behind that selectivity, we can and should nevertheless undertake a systematic effort to make ourselves and all those concerned aware of the partiality that it implies in a specific situation. Furthermore, although we cannot claim to talk about reality as such, it makes nevertheless sense – and is indispensable from a critical point of view – to talk about the different lenses people use, namely, in the form of (conscious or unconscious) reference systems. After all, what other means do we have, if not reflection and discourse, to improve mutual understanding about our differences?

How, then, does CSH operationalise this notion of a reference system? A basic definition is this: *a reference system is 'the context that matters when it comes to assessing the merits and defects of a proposition'* (Ulrich 2000, p. 251). 'Context' here means quite generally all those aspects of a situation that influence our appreciation of it, before and beyond any particular conceptualisation or modelling effort; whereas by 'reference system' we mean an explicit conceptualisation of 'a context that matters' as circumscribed by the four sources of influence (Table 6.1).

A specific reference system can thus also be described as *the set of answers that we give to the 12 boundary questions* and by which we determine the basic sources of selectivity at work in our systems' maps and designs – the sources of motivation, of control, of knowledge and of legitimacy informing our views. Note, however, that the purpose of the boundary questions is a purely critical one: the aim is boundary surfacing and review (i.e., making us aware of and reflect on boundary assumptions) rather than boundary setting (i.e., doing away with boundary questions by fixing the answers) – a frequent misunderstanding of CSH that we need to avoid. The point is not that we should claim we have the answers but rather, that we should uncover the inevitable selectivity of all our claims.

The idea that reference systems, as operationalised in CSH, inform all our maps of situations or designs for changing them, can shed some new light on the tension of 'system' and 'situation' about which we have been talking. Figures 6.1 and 6.2 illustrate the different light CSH sheds on the issue of handling the map-territory distinction, as compared to conventional systems thinking.

In the terms of Fig. 6.2, where might we locate problem situations and reference systems in the two case studies? In the NRUA-Botswana study, the problem

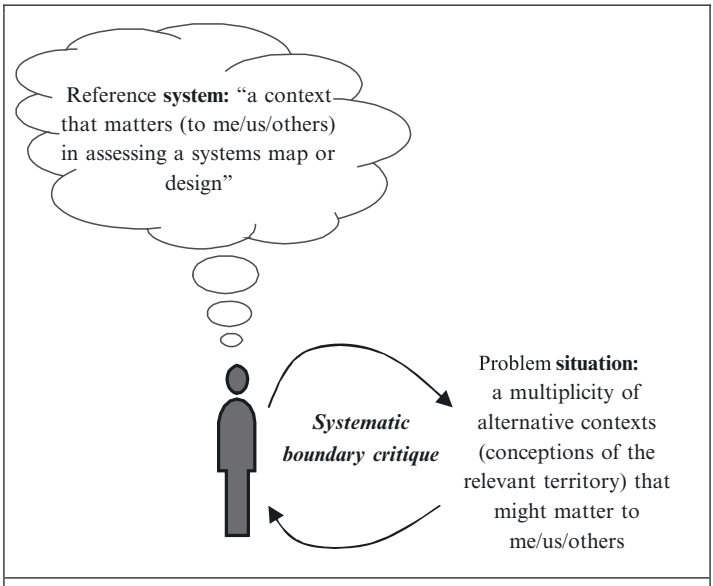


Working with the tension of system and situation in conventional systems thinking:
Systems models are understood as devices for learning about a real-world situation perceived to be problematic, by reducing complexity and allowing well-structured analysis and discussion about desirable and feasible change. The problem perception itself is not questioned systematically, as the modelling tools offer little support for analysing its selectivity and appreciating the resulting partiality of action to improve the situation.

Fig. 6.1 System and situation in 'conventional' systems thinking

situation can be described in terms of the role of participatory planning in rural development. The central issue was, how did participatory planning in Botswana change the ways in which issues of value, power, expertise and moral engagement were handled; did it actually create opportunities to improve the reference systems at work? The focus was on evaluating existing systems of participatory planning.

In the ECOSENSUS-Guyana study, the problem situation might be described in more challenging terms which include the possibility of impoverished marginalised groups to have a greater 'say' (or meaningful involvement) in the mapping, design, and modelling of their livelihood strategies. The central issue was, how might stakeholders in a situation of marginalisation better engage with issues of value, power, expertise and moral dilemmas as they arise with their use of natural resources in fragile ecosystems? The focus was on learning to question the reference systems at work and to make transparent and constructive use of them in communicating with other stakeholders.



Working with the tension of system and situation in CSH:
Situations as well as systems maps or designs are understood as expressions of an underlying reference system, by which people frame situations differently and selectively. Systematic analysis and discussion requires boundary critique, an effort to unfold the built-in selectivity of people's grasp of situations, so as to appreciate the resulting partiality of systems maps or designs and to improve mutual understanding of differences and options for cooperative action.

Fig. 6.2 System and situation in 'critical' systems thinking

6.2.3 A Core Concept of CSH: Systematic Boundary Critique

Boundary critique is defined in CSH as a systematic – reflective and discursive – effort of handling boundary judgements critically, whereby 'critically' means both 'self-critically' questioning one's *own* claims and 'thinking for oneself' before adopting the claims of *others*. Boundary critique involves first of all a *process of unfolding*, that is, making ourselves and others aware of the boundary judgments assumed with respect to the 12 kinds of boundary judgements listed in Table 6.1. The concept of unfolding is adopted from the writings of Churchman (esp. 1979; cf. Ulrich 1988b, and Reynolds 1998). But Churchman used it in a somewhat different sense. In Churchman's systems thinking, 'unfolding' was essentially a metaphor for the holistic orientation of what he called more accurately the *sweep-in* process; the aim was to include in our systems notions ever more aspects of the real world

so as to achieve a 'whole systems' view of a problem situation. In CSH, by contrast, the process of unfolding is a specific tool for uncovering the inevitable *selectivity* of all our systems maps and designs; that is, it serves a critical purpose against all holistic pretensions (cf. Ulrich 2004, p. 1127f). Behind this distinction are two different strategies for dealing with the unavoidable tension between systems and situations: overcoming or minimizing selectivity in Churchman's systems thinking, embracing selectivity openly and critically in CSH.

In addition to the process of unfolding, systematic boundary critique involves a second effort, the systematic *questioning* of boundary judgements with respect to their adequacy in terms of relevance, justification, and ethical defendability. Whereas the aim of 'unfolding' consists in uncovering the selectivity of the reference systems at work in our claims, the aim of 'questioning' consists in exploring and, if necessary, challenging their resulting partiality. To this end, boundary questioning requires that we thoroughly analyse actual and possible consequences and ask what they may mean for all the parties concerned; and furthermore, that we examine what options may be available that might provide a better basis for mutual understanding and cooperative action towards 'improving' the situation. Note that once again, in pursuing this quest for value clarification, the strategy of CSH is different from that of Churchman's systems approach: while Churchman sought the source of rationality for our claims in systems thinking itself, CSH seeks it in legitimate processes of discourse and decision-making *informed* by critical systems thinking (for a full discussion of CSH's underlying concept of a merely 'critical solution' of the problem of boundary judgements, see Ulrich 1983, entire Chapter 5). The step from holistic to critical systems thinking implies that "systems practice should not misunderstand itself as a guarantor of socially rational decision making; it cannot, and need not, 'monologically' justify the social acceptability of its designs." (Ulrich 1988a, p. 158)

6.2.3.1 Unfolding Boundary Judgements

We have understood that the process of unfolding aims to uncover the *selectivity* of the reference systems at work in our systems maps and designs or in any other propositions we make or face in a professional intervention, for example, problem definitions, criteria for improvement, proposals for action, evaluations of success, etc. For the sake of both simplicity and accuracy, CSH refers to all these propositions as *'claims'*, for they all imply a claim to the validity and relevance of what is proposed. We constantly need to judge the validity and relevance of claims; but we can reasonably do this only to the extent we are aware of the selectivity built into them in the form of boundary judgements. Only then can we fully understand the *partiality* that such selectivity implies in a specific context of application (the intervention context), in the form of consequences with which the different parties concerned may have to live with.

How, then, can we learn to unfold selectivity? The basic idea should be clear by now: we can do this by examining the ways in which specific claims are conditioned

by boundary judgements. For example, the claim that participatory planning in NRUA-Botswana is 'good' might be revised when examining the various boundary judgements associated with the claim in a particular context. Similarly, in ECOSENSUS-Guyana, a claim that environmental planners work on behalf of marginalised communities may be quite a partial view when examined in the context of other reference systems.

To help us identify and unfold boundary judgements *systematically*, CSH proposes the 12 boundary questions listed in Table 6.1. They are methodologically grounded in a reconstruction of Kantian *a priori* science, which represents the epistemological basis of Kant's critical philosophy (see Ulrich 1983, Chapters 3–5); but this philosophical justification need not concern us here, as it is quite sufficient for convincing ourselves of their critical relevance that we start applying them to situations of professional or everyday decision-making and thus experience that they do indeed make a difference to our accustomed ways of thinking and arguing about problem situations and solution proposals. You will soon discover that thinking in terms of boundary questions allows you to come up with new and relevant conjectures and questions. At the very latest when others first ask you how it is you come up with such questions, you know you are on your way to becoming a practitioner of boundary critique!

In what order should one try to answer the boundary questions? Basically, due to the interdependence of the boundary categories, we may begin the process of unfolding with any one of the boundary categories that we find particularly relevant or easy to specify, and can then follow the line of thought that develops. However, beginners find it often useful to follow a *standard sequence*. We have found it useful (both in our teaching and professional practice of boundary critique) to follow the sequence suggested in Fig. 6.3, beginning with the interests of intended or actual beneficiaries (the sources of motivation, that is) and then thinking through the sources of control, knowledge, and legitimacy in this order, each time beginning with the concerns of the relevant stakeholders. Box 6.1 takes you through a corresponding short narrative of unfolding CSH questions.

The sequence works both with the 'is' and the 'ought' boundary questions. Experience suggests it is easier for many people to begin reflecting and communicating about their 'ought' answers, that is, their hopes and visions for the kind of change to be brought about in a situation, rather than analysing 'is' boundary judgements at the outset. This holds true especially in group settings; people who do not know one another well can 'warm up' and develop a sense of mutual trust and cooperation as they reveal to each other their visions for improvement, while at the same time familiarizing themselves with the spirit of boundary critique. Furthermore, this way of proceeding has the advantage that when it comes to the 'is' questions, the normative basis from which 'is' answers are to be assessed has already been clarified, so that an illusion of objectivity is avoided from the start.

Let us briefly highlight the material issues at which the 12 boundary questions aim. As you may recall, they are grouped into four basic sets of boundary issues or *sources of selectivity* that inform any reference system:

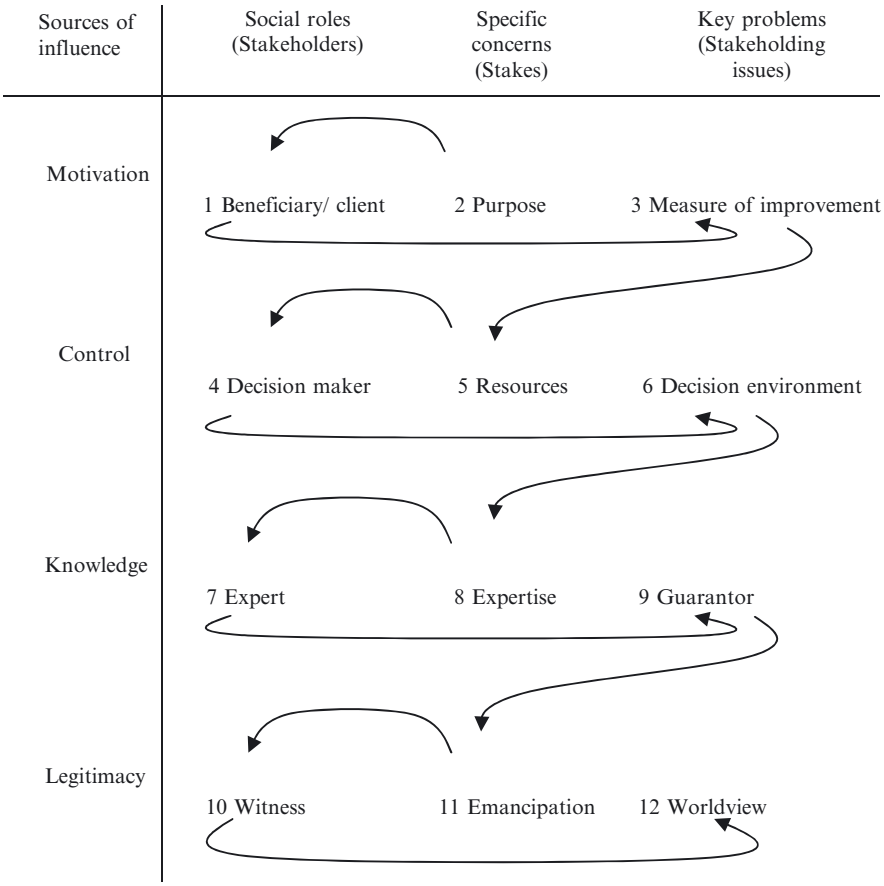


Fig. 6.3 Standard sequence for unfolding the boundary questions of CSH (Adapted from Reynolds 2007, p. 106)

1. Sources of *motivation* – where a sense of purposefulness and principle value comes from
2. Sources of *control* – where the necessary resources and power are located
3. Sources of *knowledge* – where sufficient expertise and experience is assumed to be available
4. Sources of *legitimacy* – where social and legal approval is assumed to reside

Identifying these four sources of selectivity is essential for gaining a sense of orientation: *"What is the intervention all about?"* It is equally essential for assessing and qualifying the claims that we or others associate with the intervention: *"What exactly does the intervention claim to achieve and what are its built-in limitations, that is, the assumptions and conditions on which its 'success' depends?"*

It is always recommended to consider all four sources of selectivity, for *together* they constitute the reference system assumed. They embody the four basic and

unavoidable kinds of boundary issues that we need to understand if we wish to grasp an intervention's built-in selectivity.

Each of the four boundary issues is then further structured into three boundary categories, the first standing for a social group or *role* (stakeholder), the second for a *role-specific concern* (what's at stake), and the third for a *key problem* in reconciling clashes between such concerns (a stakeholding issue). (The term 'role' is to remind us that any one person or group of people may in a specific intervention hold several roles, that is, role-specific concerns.) These 12 kinds of boundary judgements, or the boundary categories to which they refer, signal what we must be looking for in order to make a system meaningful and to validate or challenge the claims we associate with it. Taken together, they define the selectivity of the reference system at work.

Box 6.1 An unfolding narrative of CSH

Notes:

(a) The example is for the purpose of 'ideal mapping', as explained in sections 6.2.4.1 (on 'Ideal Mapping') and 6.2.5.1 (on 'Developing CSH Literacy').
(b) The numbers in brackets refer to CSH categories 1–12.

Any human reference system might start with questions regarding some notion of 'purpose' in order to provide some initial sense of orientation. This then prompts the question regarding 'whose purpose?' An underpinning purpose reflects embedded values associated with some person or persons (even if that someone is representing the intrinsic value of non-human nature). Identifying first the *ideal* purpose (2) of the reference system in the 'ought' mode therefore suggests who the *intended* beneficiaries should be (1). This in turn suggests what might be appropriate measures of success in securing some improvement (3). In other words, how might the underpinning values be given formal expression (quantifiably or qualitatively) – through evaluation – to gauge improvement? Such questions make transparent the *value basis* of the ideal system.

Unfolding questions of motivation leads to questions regarding the necessary resources or components needed for success (5). Financial capital and other forms of tangible assets like natural, physical, and human capital might be complemented with less tangible factors such as social capital (access to networks of influence); but who is in control of such resources and might thus best be placed to provide them (4)? This in turn prompts questions as to what should be left *outside* the control of such decision makers in order to ensure some level of accountability. What *relevant* factors having an important potential impact on the system ought to lie outside the system, lest all the parties concerned depend entirely on those in control? In other words, what

(continued)

Box 6.1 (continued)

should be part of the system's decision environment (6) in order to keep it in check and accountable? What should be relevant but not component? So for example, if a system initiated with good intention becomes malignant, corrupt or disabling because of changing circumstances, are there factors in the environment that might ensure that the system deemed appropriate for one context and time is prevented from continuing indefinitely? Such questions help to make transparent the *power-basis* of the system.

One such set of factors requiring independence from the decision maker is 'knowledge' or expertise. That is, in an ideal setting human 'capital' (embodying expertise) ought not to be under the sole control of the decision maker but should have some independence. So what are the necessary types and levels of competent knowledge and experiential know-how (8) to ensure that the reference system actually has practical applicability and works towards its ideal purpose? Who ought to provide such expertise (7)? How might such expert support prove to be an effective guarantor; a provider of some assurance of success (9)? This invites the need to look out for false guarantors – that is, sources of deception. False guarantors are manifest by, for example, having expertise being incomplete and/or incompetent in terms of a specialised field, or more generally through assuming a dogmatic authority and complacency (e.g. a technocratic viewpoint) that does not allow for inevitable uncertainties (unforeseen events and unexpected consequences) and/or for the validity of other viewpoints and perspectives. Such questions help to make transparent the *knowledge-basis* of the system.

Finally, given the inevitable bias regarding values (motivation), power (control) and even knowledge (expertise) associated with any reference system, what is the legitimacy of such a system within wider spheres of human interests? In other words, if the reference system is looked at from a different, opposing viewpoint, in what ways might the activities be considered as coercive or malignant rather than emancipatory or benign (11)? Who (or what – for example non-human nature) hold such concerns, that is, who are the 'victims' of the system – and, importantly, what type of representation ought to be made on their behalf? That is, who may regard themselves capable of making representations on the victims' behalf and on what basis would they make this claim (10)? Finally, how might the underlying worldview associated with the reference system be reconciled with opposing worldviews (12)? Where might representation of opposing views be expressed, and what action ought to happen as a result? Such questions help to make transparent the reference system's *basis of legitimacy*, with special regard for the underpinning worldviews and moral assumptions, in dealing with the concerns of third parties and with long-term social and ecological implications.

The narrative in Box 6.1 illustrates a gradually unfolding shift in emphasis and concern from core constituents of a system of interest to features of its environment. In this way an unfolding (or peeling back, as it were) of successive sources of influence enables us to step out of the immediate point of reference in order to see 'the bigger picture' – a first step in reflective practice.

With Churchman, CSH operationalises this quest for the bigger picture as a dialogue (or in CSH terms, a reflective and discursive effort) among increasingly wider conceptualisations of the system of concern, as embodied in the three perspectives of *goal planning, objective-planning*, and *ideal planning* (see Churchman 1979, p. 82f; Ulrich 1983, p. 263 and 1988b, pp. 425–427). However, in line with its different understanding of the process of unfolding, the focus in CSH shifts from Churchman's quest for holistic thinking – for expanding system boundaries ever more – to the critical purpose of uncovering the unavoidable selectivity of our claims, whatever the underlying boundary judgements may be. This new focus on boundary critique rather than boundary expansion developed from the author's experience as a policy analyst:

> My personal conclusion is that dealing rationally with the problem of boundary judgements depends not so much on a never-ending sweep-in process – a heroic enterprise – but on a conscious and critical employment of bvoundary judgements. *Not what our boundary judgements are but how we treat them will determine the quality of our systems thinking in the first place*. For example, do we as policy analysts hide disputable boundary judgements ... behind a façade of expertise or do we really seek to make them transparent to everybody concerned? Any other conclusion would imply that the best systems thinker is the one who deals with the biggest problems. I think, rather, that the best systems thinker is the one who deals most consciously and overtly with the way in which s/he bounds the problem. (Ulrich 1988b, p. 420, slightly edited)

That is, unfolding in CSH is about value clarification rather than a hopeless (because never-ending) quest for comprehensiveness. The search for a whole-systems view of problems, while all right as an ideal, does not free us from the need to reflect on the selectivity of whatever standpoint we assume for grasping and assessing a situation as comprehensively as possible. But we cannot properly appreciate our standpoint without first gaining some critical distance – which is what the process of unfolding selectivity is all about.

6.2.3.2 Questioning Boundary Judgements

In CSH the process of questioning boundary judgements is crucial, and it is to this second level of boundary critique that we can now turn. Boundary questioning consists in analysing, evaluating and challenging the rightness of boundary assumptions; in one word: in testing rather than settling them, which would mean to fix them and thereby to turn them into 'givens' or even to withdraw them from any further critical discussion. Obviously, boundary questioning presupposes some previous awareness and unfolding of boundary judgements; which is to say, the distinction between boundary unfolding and questioning is an analytic one rather than a practical one.

In practice, unfolding and questioning boundaries inform and support one another in a closely interrelated way.

The basic idea is this. When it comes to boundary judgements, no one can claim to have the single right answers; therein consists the basic problem raised by the unavoidability of boundary judgements. The only practical approach is to examine the different selectivity of *alternative* proposals, as a basis for well-informed and transparent processes of opinion forming and decision making within democratically legitimate institutional settings. This is why CSH gives priority to *boundary questioning* (also referred to as 'boundary testing' in some sources) rather than to an illusory attempt to overcome selectivity through some kind of 'whole-systems' perspective.

Once we have found tentative responses to the 'is' and 'ought' boundary questions through the process of unfolding, the next task consists in questioning their validity. How can we be confident that the boundary judgements in question are right? What alternatives might be found more adequate? How would we want to defend them if challenged to do so? This sort of questions requires us to identify the exact nature and scope of the claims to which the boundary judgements give rise – for example, what is claimed to be achieved and who is supposed to benefit, and how can this choice be justified rationally? – and to submit these claims to the critique of the different parties concerned. Ultimately, since there are no objectively right or wrong answers to such questions, only legitimate processes of decision-making informed by such critique can achieve this. Not unlike a good map, a good process of decision-making should make transparent the boundary judgements on which the claims to be decided upon rely, and should also shed light on how different these claims may look in the light of alternative boundary judgements. In short, when we subject a claim to 'boundary questioning', we examine its consequences in the light of alternative sets of boundary judgements (those it assumes as well as options).

To be sure, clarifying consequences may require careful inquiry, at times with professional support. However, this is not to reserve boundary questioning to a setting in which professional expertise is available. We are dealing with an in-principle requirement rather than an absolute necessity. Where consequences are reasonably clear, say in everyday situations in which those involved oversee the implications of their propositions, it may be perfectly feasible to question boundary assumptions on the basis of knowledge available to everyone. For example, knowing something about the possible climate effects of fuel consumption may be sufficient to change our views about what 'improvement' means in the design of traffic policies, so we will revise our measure of improvement (CSHq3). Revision of boundary assumptions takes place quite naturally in everyday life as soon as our attention is drawn to previously neglected circumstances that in some way matter to us. We practice boundary critique every day without being aware of it! The difference is only that we do not practice it consciously and systematically. Once we become aware of the basic idea, we will be able to question boundary judgements so much more effectively, both in individual reflection and in dialogue with others:

1. *Boundary reflection:* Do my/our/their current 'is' boundary judgements agree with my/our/their 'ought' boundary judgements? That is, is there a discrepancy between what I/we have identified as my/our/their actual boundary judgements on the one hand and what we would consider adequate, if not ideal, boundary judgements on the other hand? If so, should I/we revise my/our boundary assumptions?
2. *Boundary discourse:* Do my/our boundary judgements conflict with yours? If so, may this help us understand why we disagree about what is the problem or what to do about it? Can we revise our boundary judgements so that we then agree about the issues, although perhaps still not about solutions? (cf. Ulrich 2000, p. 255)

The first mode of boundary questioning aims at handling boundary judgements *self-critically*, the second at using them *dialogically* so as to improve mutual understanding and, where necessary, to challenge those who may not handle their boundary judgements so self-critically. (It should again be clear that these two modes of boundary questioning are closely interrelated and support each other, and that a similar distinction applies to the boundary unfolding that is presupposed in boundary questioning.) Figures 6.4 and 6.5 illustrate the two modes of boundary questioning.

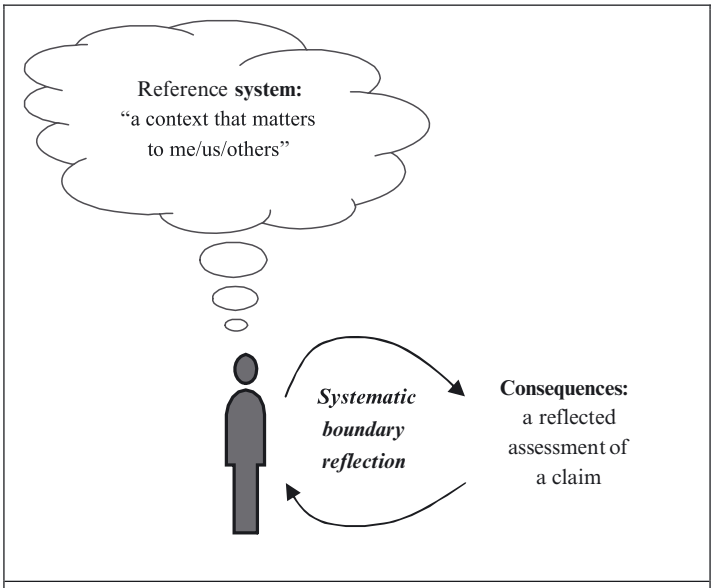


Fig. 6.4 Boundary reflection: first of two complementary forms of boundary questioning.

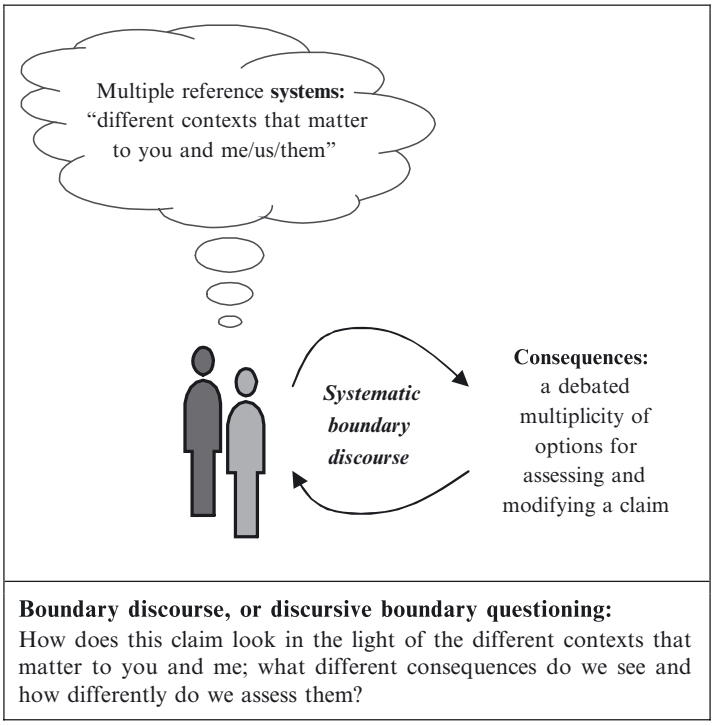


Fig. 6.5 Boundary discourse: second complementary form of boundary questioning

Through both boundary reflection and boundary discourse, we can make ourselves and everyone else concerned aware of the ways in which all proposals and claims are conditioned by boundary judgements, and can on this basis begin to be more open to alternative proposals and appreciate the reasoning behind them. Once it becomes apparent that there are options for the boundary assumptions in question, it is no longer necessary and meaningful for anyone to claim objectivity for their specific reference systems; we can gain a new level of mutual understanding and tolerance in dealing with the often conflictual nature of interventions. Through boundary *reflection*, we can achieve a new quality of professional self-reflection; through boundary *discourse*, a new quality of communication in and about professional interventions.

The two case studies, to which we now turn, exemplify both modes of boundary critique, the quest for professional self-reflection as well as for improved communication. They also address both levels of boundary critique, unfolding and questioning. Combining the two distinctions, the NRUA-Botswana study exemplifies mainly a reflective mode of boundary unfolding, whereas the ECOSENSUS-Guyana study exemplifies more a discursive mode of boundary questioning.

6.2.4 Boundary Critique Applied to NRUA-Botswana

The Botswana study (for a full account, see Reynolds 1998) aimed to evaluate three projects that were all concerned with participatory planning in rural development:

- Participatory Rural Appraisal (PRA) Pilot Project
- Natural Resource Management Project (NRMP)
- Botswana Range Inventory and Monitoring Project (BRIMP)

Each project was considered as an effort to design a system of interest that could meaningfully be examined in the terms of boundary critique, by identifying and unfolding its major sources of influence:

- Motivation: the prime stated objectives were centred on promoting participatory planning
- Control: along with government, donor agencies provided significant resources (finance, infrastructure etc).
- Knowledge: significant expertise came from non-governmental sources (such as NGOs, private consultants and parastatal organisations)
- Legitimacy: the prime stated objectives were more aligned with social and environmental improvement rather than conventional drivers of economic improvement

The basis for evaluating the projects was to be furnished by field research; its results were then to be assessed against the researcher's own ideal reference system. Accordingly, the evaluation started with an effort by the author (*qua* evaluator) to map out both an 'ideal map' and an 'actual map' of the situation he encountered in Botswana. Not unlike the way Ulrich had used these two kinds of maps in the two case studies that are included in *Critical Heuristics* (1983, Chapters 8 and 9), the ideal (or normative) map was to clarify the evaluator's 'ought' reference system whereas the actual (or descriptive) map was to identify major boundary judgements built into the current situation. Our account therefore starts with ideal mapping.

6.2.4.1 Ideal Mapping (Identifying the 'Ought')

As a first step, the evaluator reflected on his personal reference system for evaluating natural resource-use appraisal (NRUA) and participatory planning for rural development in Botswana. Wherein consisted his preconception (or perhaps bias) as to what such planning was all about? How *should* he understand the relevant context, and thus the reference system of his evaluative endeavour? Based mainly on preparatory background reading, as well as some previous personal familiarity with the situation in Botswana, he tentatively defined his reference system as follows: *'a system to enhance natural resource-use appraisal (NRUA) through participatory planning for assisting rural poverty alleviation and protection of the natural environment in Botswana'*.

Next, a reflective exercise of ideal mapping was to clarify the normative orientation to be associated with this reference system for the purpose of the evaluation. Obviously, this normative orientation might later change, but an evaluation has to start with *some* normative assumptions and these should be clear from the start.

Table 6.2 illustrates the result of this ideal mapping exercise, constructed by means of the 12 boundary categories of CSH; the categories were unfolded following the sequence recommended in Fig. 6.2.

In an ideal world of purposeful human activity, the roles of beneficiary, decision maker, expert and witness are closely interrelated and ultimately converge (Ulrich 1996, p. 40f). For natural resource-use appraisal, a system of self-organisation and appraisal involving conscientious natural resource users (sharing communal land) might be considered as such an ideal situation. The point is not that we should assume we live in an ideal world; the point is that ideal mapping provides us with critical distance to what is real. With this aim in mind, the ideal map summarised in Table 6.2 provided a helpful point of reference for subsequently constructing and questioning descriptive maps (or 'actual maps', in the terms of CSH) of each of the three projects.

6.2.4.2 Descriptive Mapping (The 'Is' Analyses)

The descriptive mapping in the NRUA study occurred in two stages: firstly, it was to identify the relevant stakeholder groups for each project; and secondly, it was to specify the role-concerns of all identified stakeholders and surface key problems in reconciling these concerns.

Stage 1: Identifying Stakeholder Groups

It was found that in all three projects, the social roles of beneficiary, decision maker, expert and witness were largely played out by four main kinds of institutional agents. These were, respectively, government departments, donor agencies, consultants, and non-government organisations (see Table 6.3). Whilst impoverished natural resource users would clearly represent the *ultimate intended* (or 'ideal') beneficiaries (see Table 6.2), for the purpose of identifying *actual* stakeholders associated with each project there was a need to address and interview the *immediate* beneficiaries of NRUA – the various government departments who would claim to be working on behalf of the rural poor. During the later evaluation, the author kept in check and made transparent in fieldwork notes the assumptions (a) that government authorities would indeed ensure appropriate representation of such stakeholders and (b), to the extent they would fail to do so, that NGOs would provide such representation.

The primary roles and role-related concerns assigned to the four major institutional agents are not to be understood as being mutually exclusive. While there was considerable overlap among the stakeholders' concerns, it was useful to have this first mapping of stakeholders as a basis for starting a more detailed evaluation of NRUA associated with each project.

Table 6.2 Ideal map of participatory natural resource-use appraisal in Botswana

Sources of influence	**Social roles** (*Stakeholders*)	**Role-specific concerns** (*Stakes*)	**Key problems** (*Stakeholding issues*)
Motivation	*Beneficiary* Rural poor, future generations and non-human nature	*Purpose* To improve natural resource use planning in addressing needs of the vulnerable	*Measure of improvement* Indices of (i) Rural poverty alleviation (ii) Enhanced condition of natural resources
Control	*Decision-maker* Communal resource users	*Resources* Necessary components to enable NRUA, including: (i) Project/ finance/human (ii) Social networks	*Decision environment* (i) Interest groups affected by NRUA (ii) Expertise not be-holden to decision maker
Expertise	*Expert* Communal resource users informed by natural and social scientists and other sources of relevant knowledge and experience	*Expertise* Technical/experiential/ social knowledge and skills, including (i) Rural peoples' knowledge and experience (ii) Interdisciplinary and intersectoral facilitation skills (iii) Social and environ-mental responsibility	*Guarantor* Competent professional and non-professional knowledge, avoiding: (i) 'Scientism' (sole reliance on objective and statistical 'fact') (ii) 'Managerialism' (sole reliance on facilitating communication) (iii) 'Populism' (allowing loudest collective voice as sole guarantor)
Legitimation	*Witness* Collective citizenry representing interests of all (including private sector) affected by NRUA, both local and global, and present and future generations	*Emancipation* NRUA open to challenge from those adversely affected, including interests of private land owners and diamond industry competing for access to communal resources	*Worldview* Manage conflicts of interest between: (i) National economic growth, privatization and fencing policies (ii) Vulnerable rural livelihoods and nature

Stage 2: Eliciting Concerns and Key Problems in Each System of Interest

The crux of the study then consisted in identifying precise stakeholder representatives from each of the four institutional agents for each of the three projects, and eliciting from these representatives information on the concerns and key problems they associated with participatory NRUA practice, and perhaps also with participatory

Table 6.3 Actual stakeholder map of natural resource-use appraisal in Botswana in the 1990s

Major stakeholders (primary roles of the institutional agents identified)	Major stakeholder roles (primary concerns of the institutional agents identified)
Government departments	Beneficiary: getting chances to participate in improved NRUA practice for better delivery on, and design of, government policy, on behalf of rural constituency
Donor agency	Decision maker: providing resources efficiently for effective NRUA practice
Consultancy (academic or private business)	Expert (professional): ensuring impartial production of knowledge for sustainable and ethical natural resource use
Non-government organisations (NGOs)	Witness: representing interests of impoverished natural resource users, future generations, and non-human nature

planning in Botswana in general. The fieldwork of gathering this information occupied the most time in the study and correspondingly generated the most data. There is no need (nor space) here to go through the descriptive maps assembled for each of the three projects. Neither is there space for detailing the process of critiquing each descriptive map against the corresponding/respective ideal map of NRUA. More important is that readers get a feel for the outputs of this systematic boundary critique.

6.2.4.3 Critique: 'Ought' and 'Is'

Boxes 6.2–6.4 provide brief summaries of the final critique resulting for each project which was presented in more detailed form to the project personnel. Each Box summarises some descriptive mapping and specific critique of 'role', 'role-specific concern' and 'key problems' associated with each source of influence.

It may appear that the critiques presented for each project are very negative. The summaries provided here do not give justice to the creative aspects of each project which were also detailed in the reports to project personnel. Nevertheless a central task of CSH is to nurture an attitude of creative disruption. From a critical systems perspective critique does not equate to being negative, but rather should provide a platform for *improving* understanding and practice associated with a situation of interest or a context that matters.

6.2.4.4 Extra-discursive and Discursive Evaluation

The NRUA-Botswana study represents an example of systematic boundary critique adopting a largely extra-discursive, 'expert-driven' use of CSH categories. In other words, the use of CSH categories was reserved for the author's own purposes. For example, interview schedules were designed around CSH questions; not organised in terms of systematically going through each CSH question but rather customised according to

Box 6.2 Participatory Rural Appraisal (PRA) Pilot Project

Motivation *critique*	Local government *extension officers* were immediate beneficiaries rewarded with facilitation skills to enable greater involvement of local people in extension work. But to what extent might *alleviating perceived rural social inertia* lead to poverty alleviation? The key measure of success for the project was centred on *high levels of participation* and generation of *self-help projects*. Perhaps instead, rural poor might benefit from better access to and control over resources rather than being subject to further consolidation of government extension practices.
Control *critique*	Under trajectory of (i) increased privatisation and fencing of communal land resulting in further alienation of natural resource, and (ii) reduced government assistance for local development projects, rural poor livelihoods are increasingly dependent on contracts with landowners and donor support for collective projects. Is there a risk that rural people's knowledge loses its independence in becoming increasingly subject to government extension practice which itself is circumscribed by government central policy?
Expertise *critique*	To what extent might participation levels amongst rural poor in PRA exercises provide a guarantee for poverty alleviation? Might this guarantor attribute distract from large body of empirical data and experience suggesting significant correlation between rural poverty and land fencing policy since the mid-1970s?
Legitimacy *critique*	Dominant underpinning belief that benevolent government (through tradition of generous handouts and transfer of technology projects) has been responsible for generating rural social inertia, hence the need for government to step back and allow 'development from within'. Danger of further marginalising rural poor through not appreciating perceived root cause relating to control and access to land.

(i) the perceived stakeholder role (beneficiary, decision maker etc.), (ii) the particular project being focused upon (often, interviewees would have a stake in several projects at the same time), and (iii) information arising from prior interviews with other stakeholders and/or relevant grey literature. During the course of this study three separate

Box 6.3 Natural Resource Management Project (NRMP)

Motivation *critique*	Key beneficiaries of NRMP appear to be management staff of community based natural resource management (CBNRM) projects responsible for eliciting support/ resources from different line Ministries (e.g. Wildlife and Tourism, Agriculture, Water Affairs, Local Government). But to what extent might improved *multisectoral planning* address rural poverty and communal land degradation? Key measure of success is the number of CBNRM projects, primarily as indices of improved intersectoral collaboration. But do CBNRM projects (i) use or simply bypass line ministries? (ii) elicit collaboration with government or dependency on donors? and (iii) serve the *very* poor?
Control *critique*	Have CBNRM projects become new currency for rural development? Whilst CBNRM might appear to be better grounded in local needs, are there greater levels of accountability in use of financial resources as compared with government extension programmes? Does short term funding support from donor agencies allow government to divert resource support away from local rural development?
Expertise *critique*	CBNRM management requires multidisciplinary expertise and skills in facilitation. But to what extent are participatory techniques involving rural participants a useful trigger for intersectoral collaboration and communication between traditional sector and disciplinary based experts? Rural people's knowledge may be regarded as a useful check on professional judgements but how far is it appreciated as a potential driver for rural development initiatives?
Legitimacy *critique*	Dominant underpinning belief that appropriate expertise ought to drive rural development rather than traditional dependence on civil service sector-based bureaucratic functions that inevitably create the closed 'silo' mentality. Possible conflict with local understandings of the need for greater autonomy and control over development amongst rural participants in conjunction *with* locally-elected government officials rather than donor-promoted project managers.

Box 6.4 Botswana Range Inventory and Monitoring Project (BRIMP)

Motivation *critique*	Immediate beneficiaries are *policy advisors* wishing to *instil longer-term coordinated planning* to address problems of previous piecemeal development in rural sector. BRIMP is housed in the Ministry of Agriculture, dominated by free market neo-liberal economic development planning and policies associated with fencing communal rangeland. So how likely is it that such coordinated planning might benefit rural poor? Do economic measures of success associated with gross national (agricultural) product equate with rural poverty alleviation and enhanced condition of natural environment?
Control *critique*	Commoditised resources provide the most appropriate means for economic planning. Thus fencing of communal land, privatising water supply, project-oriented development, and having rural participants on-tap for consultations during monitoring and evaluation efforts, might be considered as important measures of control; consolidating existing relations of economic power rather than empowering the rural communities (?). Are there risks of further disenfranchising rural communities through consolidating private ownership of land?
Expertise *critique*	Central guarantee for ensuring properly co-ordinated efforts is through purposive *monitoring and evaluation* using econometric indices based on criteria of efficiency and effectiveness in terms of generating economic wealth from natural resources. Participatory techniques using rural people's knowledge are regarded as a means of (in PRA terms) 'ground-truthing' or checking information arising from more technically oriented surveillance systems like remote sensing.
Legitimacy *critique*	Dominant belief that free-market determinism using econometric devices applied to natural resource-use provide most effective means for reducing poverty and protecting the natural environment. Needs reconciling with the Botswana tradition in communal rangeland management, and primacy of democratic debate as a means of determining policy.

learning journals were kept – one for each of the NRUA projects being evaluated. The material in each of the three journals provided an essential resource for writing up an 'is' analysis (descriptive map) of each project. The ensuing critique was generated largely from individual reflection on the data gathered and experiences gained.

But the real value of boundary critique lies in its dialogical use to test other stakeholders' reference systems. Despite the methodological conception of the evaluation study itself as an extra-discursive intervention, in the sense that CSH

was employed in a monological (problem-structuring and practice-reflecting) way, that is, as a tool of post-hoc boundary reflection, an important dialogical component came into play though the process of sharing the findings with the project personnel. This was done, firstly, through formal interviewing; secondly, through informal engagement amongst stakeholders involved with actual PRA activities; and thirdly, through the interim reporting stage where feedback from stakeholders was sought.

How did CSH inform the interviews with 78 stakeholders associated with the three projects? Each interview began with questions relating to what the stakeholders considered to be their main role, their main concerns and key problems in fulfilling their role. Wider questions were then asked about relationships with other stakeholders and *their* perceived roles, concerns and key problems. These responses were mapped in the form of initial ideal ('ought') and actual ('is') maps, which then provided further prompts in developing the conversation throught further interviews. Conflicts coming to the fore among respondents belonging to same stakeholder group were recorded and used for further enquiry and/or included in interim reports. Some of the interviewees were further interviewed less formally during subsequent fieldwork.

In recording all these conversations, it proved useful to continually update the respondents' ideal and actual maps. The mapping of stakeholder views was found to be a continually evolving exercise during conversations and accompanying reading of informal grey literature made available through the conversations. At the same time, critiques were emerging which equally needed continual recording. Again, this was essentially a subjective exercise on the part of the evaluator, although other ways of handling the critical process are of course conceivable, for example, making it a central concern of some (moderated) groups of stakeholders. In any case, it was important to keep a record of the developing critique as a basis for reporting back.

Reporting back on a CSH-based evaluation clearly involves transparency. As well as revealing contrasting values, power-relations, expert-biases, and questions regarding the wider legitimacy of NRUA practice, the evaluation also invoked the transparency of the evaluator regarding the reference system that informed the evaluation. Skills in translating findings and impressions into a mutually appreciated vocabulary and narrative were equally required, remembering that stakeholders are not conversant with CSH terminology. A key to successful evaluation lies in eliciting critical appreciation and further engagement among stakeholders. All stakeholders were invited to comment on the interim reports either orally or in writing, which generated considerable feedback. Finally, a specially convened seminar at the University of Botswana provided further opportunity for dialogue among more than 50 participants from all three projects.

Each report began with an explicit statement of (i) what the author's perception was on the main issues of the evaluation, including underlying values and purposes of the project, issues of power and decision making, relevant knowledge, and moral underpinnings; and (ii) the author's own role and purpose with respect to the evaluation exercise. Respondents should be made aware that scientific data and statistics, while useful to support the output of a CSH evaluation, provided only one element in the overall evaluation; its core was a qualitative exercise primarily aimed towards collaborative improvement of, and developing responsibility over, the situation.

6.2.5 Boundary Critique Applied to ECOSENSUS-Guyana[2]

In the ECOSENSUS study, the discursive mode of boundary critique moved into the centre. Whereas in Botswana CSH served as a framework for evaluating the use of participatory planning, in Guyana it was to serve as a framework for engaging underprivileged stakeholders along with researchers and planners in participatory processes of decision making, by giving them a new language for articulating their concerns. To put it differently: whereas the Botswana study used boundary critique directly to formulate reference systems for evaluative research, ECOSENSUS wanted to make a start towards generating *CSH literacy* among stakeholders. It should be said though that this was not the main aim of the project; it primarily was a pilot study for developing and testing new software tools to support participatory planning and management of natural resource use among geographically distributed stakeholders and professionals. The connection between the two aims was the idea that the software tools might incorporate concepts of boundary discourse, so as to encourage and facilitate a critical handling of stakeholding issues.

The stakeholders involved included Makushi Amerindians and their NGO representatives in the Rupununi wetlands; planners and other experts in the field of environmental management and computational software development; University of Guyana postgraduate students, and project funders.

Given that the project was conceived as an exploratory pilot study, its financial and time frame were rather limited and its level of ambition was accordingly modest. Within this frame, ECOSENSUS had two specific objectives:

1. To help develop open-source software tools that should enable marginalised communities to engage with partners and experts elsewhere in shared, Internet supported processes of decision making about environmental issues
2. To develop open content learning units able to support the use of the software tools developed in the project, thereby also promoting collaborative skills in managing natural resource dilemmas.

With a view to the first objective, the technical basis was provided by *uDig*, an open-source graphic surface for geographical information systems (GIS) – from where comes the name ‘uDig’ (= user-friendly Desktop/Internet GIS, see http://udig.refractions.net/). A second technical basis consisted in *Compendium*, an open-source software for *dialogue mapping* developed at the Open University on the basis of Kunz and Rittel’s (1970) concept of issue-based information systems (IBIS), (see Conklin 2005 and http://projects.kmi.open.ac.uk/compendium/). ECOSENSUS should achieve an integration of Compendium with uDig, so as to facilitate their simultaneous use. At the same time, the project should explore possibilities to extend Compendium with mapping tools developed on the basis of CSH, so as to help users unfold the vital stakeholding issues involved in the aim of supporting marginalised

[2] We are indebted to colleagues working with us on the ECOSENSUS project for some of the ideas expressed in this chapter. ECOSENSUS was supported by the United Kingdom’s Economic and Social Research Council (ESRC), Project Reference Number RES-149-25-1017.

communities. Finally, the project should pilot-test whether such software applications would indeed enable the stakeholders to adopt a wider problem perspective and unfold it in a well-structured, graphically supported, manner.

With a view to the second objective, the project began developing and testing a pilot online course with participants from Guyana, as an opportunity for them to develop some initial practice in using the software tools as well as in boundary discourse. The course was provisionally entitled *Team Building for Sustainable Natural Resource Management*. The participants included NGO representatives of the Amerindian community and students at the University of Guyana, two staff members from the University of Guyana acted as tutors. The authors were part of a wider course development team with colleagues from the Open University, the University of London and the University of Guyana.

The project thus comprised a number of interrelated endeavours which, though often running concurrently and being very iterative, may nevertheless be laid out in rough chronological order:

1. Initial team building and familiarisation with existing software tools (uDig, Compendium, video conferencing software) and systems ideas (CSH) among distributed team members
2. Technical integration of uDig with Compendium and testing with the team
3. Development of CSH templates for Compendium
4. Empirical testing of CSH templates in Guyana
5. Development and testing of open content learning material for team building

For the present purpose we need not concern ourselves with the technical side of the project (which progressed satisfactorily) but can focus on endeavours 3 and 4. We can also briefly explore the intent and challenges behind using CSH as an input to building open educational resources (OERs) for the wider purpose of team building (endeavour 5).

6.2.5.1 Developing CSH Literacy

Since in Guyana CSH was to serve mainly as a discursive framework for mediating conversation, language issues became central. While in Botswana the evaluator was reasonably familiar with the language of CSH, in ECOSENSUS the intended users were new to boundary critique. It was necessary to 'translate' CSH in two respects – firstly, into short expressions that could easily be captured in the graphic surface of uDig and Compendium, and secondly, into terms accessible to a marginalised non-European community accustomed more to verbal and visual communication than to written literacy. Other studies have equally reported on the importance of adapting the tools of boundary critique to specific users groups; compare, for example, Carr and Oreszczyn (2003) and Achterkamp and Vos (2007).

In promoting CSH literacy among specific users, an immediate question arises: Why might they wish to engage in boundary conversation? We found it useful to 'pick up' our intended users by responding to specific motives they might have for engaging in boundary reflection and discourse. We thus developed *four basic templates for boundary critique*, each relating to a particular motive or purpose (see Box 6.5).

Box 6.5 Templates for four basic applications of boundary critique (Adapted from Ulrich 2005, p. 12)

Template (a):	*Ideal Mapping*
Purpose:	'Vision building'
Guiding question:	'What's our vision?' (or: Where do we want to go from here?)
Template (b):	*Evaluation*
Purpose:	'Value clarification'
Guiding question:	'Where are we standing?' (or: How satisfied are we with the state of affairs?)
Template (c):	*Reframing*
Purpose:	'Boundary revision'
Guiding question:	'What's the relevant context?' (or: How else can we frame the picture?)
Template (d):	*Challenge*
Purpose:	'Emancipation'
Guiding question:	'Don't you claim too much?' (or: How can we rationally claim this is right?)

Once stakeholders can see a purpose behind the use of a particular language tool, the motivation to engage increases. Moreover, the templates offer some direction for training and practice, in that they stand for increasingly demanding uses of boundary critique. They thus also represent levels of increasing competence in boundary reflection and discourse. The first two templates (a) and (b) represent an elementary use of boundary questions – in the 'ought' mode for (a) and in both the 'ought' and 'is' modes for (b) – which we have found easiest to learn for most users of CSH. The third template – (c) reframing – additionally involves a critique of 'ought' and 'is', with the aim of providing an alternative reference system (i.e. another set of answers to the boundary questions). Template (d), finally, represents a more advanced, argumentative use of boundary critique, where any one of the responses to a question might be countered by, say:

- A suggestion: e.g. "I see young people as beneficiaries but I don't see them included at present"
- A doubt: e.g. "I wonder about the assumed assurances of success, what if you ignore…?"
- A contradiction: e.g. "if this is the client, we will not accomplish the right thing, because…" or finally
- A simple what-if inquiry: e.g. "what if we would redefine expertise as…?"

So much for the basic issue of providing impetus for boundary reflection and discourse. The next issue was testing how the intended users understood the boundary questions. In a field test with participants in Guyana, we first found considerable variability in their understanding of the questions. But when we subsequently applied the questions more specifically to one of the four purposes (a)–(d) mentioned above, rather than simply testing CSH's language without a clear end in mind, there was more appreciation and comprehension. Box 6.6 illustrates some responses of 18

Box 6.6 Getting familiar with CSH questions

(Selected responses from 18 participants of the ECOSENSUS-Guyana study to boundary questions relating to land-use planning for the North Rupununi wetlands)

Responses to questions about motivation (CSHq1–3)

"There shouldn't be one client in all of this. There should be a sort of a continuum where 'clients' are of different [and] varying levels of importance, and the dependency on the Rupununi should be the tool that identifies these levels. For example, a villager in the Rupununi seeking economic gain, so that he can send his children to school, should be able to use the [natural] resources in the area to do this."

"The researchers ought to be the client because they are the ones who provide information [for] the both local communities and the world – the purpose is for people to have knowledge of the project, their objective and purpose."

"National institutions in terms of meeting their CBD [community based development] [with] objectives having more information for decision-making – information is power"

"It should serve everyone's interest, even though this project involves few groups of people, e.g. the communities, field staff, [and] scientists but in the long term the purpose is for everyone. So it should serve everyone's purpose."

Responses to questions about control (CSHq4–6)

"The decision makers now are project managers, and to some extent field researchers. For example, with the water chemistry kit being broken, the data on water quality is not being collected."

"Project coordinators, researchers the people living in the communities must work to make decisions."

"The immediate clients working with the wetlands project [ought to be decision makers]"

"The North Rupununi District Development Board ought to be the decision maker."

(continued)

Box 6.6 (continued)

Responses to questions about expertise (CSHq7–9)

"Those who ought to be considered [as] professional [are] communities of the north Rupununi [and] field researchers."
"Expertise of research, planning, consulting"
"Everyone's expertise [should] be consulted because everyone's knowledge [should be] considered. The project would [then] have a better impact to everyone and this would be a better understanding among different groups of people."
"[The actual source of expertise comes from] Conservation International, Guyana Foundation."

Responses to questions about legitimacy (CSHq10–12)

"One of the things that is affecting how stakeholders [feel] is that they buy into what the project is about but their vision may be different from the people that conceptualised it."
"Having everyone involve to understand [how] to manage what is there for everyone's benefit."
"The worldview that is determining is … land as sustainable wetlands area."
"Sustainable development is possible."
"Viewing the scientific knowledge is important. Use of scientific data is the professional thing to [do] in decision making."

respondents who were asked to try and use the questions as a help to voice their concerns about current land-use development plans for the North Rupununi wetlands.

Not all 18 respondents were equally articulate. English was a second language for most and cultural differences made some questions more challenging than others to them. The questions on legitimacy for example recorded a relatively low response – a difficulty to be expected as questions of legitimacy are not easily raised in the Amerindian culture (legitimacy resides with the authority of the village elders). Despite such obstacles, there was evidence among the responses that with appropriate facilitation, meaningful stakeholder dialogue might develop.

Turning now to the four purposes (a)–(d) mentioned above, it proved easiest to achieve a basic degree of CSH literacy in having the Amerindian participants talk about their visions for the future of the Rupununi wetland ('ideal mapping' as an entry-level use of boundary discourse, as suggested in Box 6.6 above).

But how should we structure templates for ideal mapping and the other purposes specifically for stakeholders accustomed to oral and visual rather than written communication? Clearly, the templates needed to use terms that would help the Amerindian participants relate the boundary questions directly to their experience; as well as provide a basis for visualising the sequence of unfolding suggested earlier (Fig. 6.3) within the Compendium software. As a basis for formulating such templates we used the kind of decision (or deliberation) trees reproduced in Table 6.4 (the example shows a tree for an ideal-mapping template).

Table 6.4 Specification of CSH questions for an ideal-mapping template ("What's our vision?")

Boundary issues	Root issues	Main questions	Specified prompts
Sources of motivation	What are the motivating factors?	Whom do we want to serve?	Primary clients? Secondary clients? Whom can't we realistically serve although ideally we would?
		What do we want to achieve?	Primary aims? Secondary aims? Unrealistic aims?
		What should be our measure of improvement?	Quantitative measure(s) of improvement? Qualitative aspects of improvement?
Sources of control	Who's in control?	Whom do we want to decide?	Those able to stop us Those able to change or redefine our measures of improvement Those already in control of resources
		What resources do we aim to have available?	Financial Material Political/social Other
		What conditions of success should rightly be controlled by third parties?	Public sector authorities Private sector organisations Individual stakeholders not involved Nature/chance
Sources of knowledge	What information and skills are relevant?	Whom do we want to contribute their experience and expertise?	Indispensable experts Desirable experts Impossible experts Undesirable experts
		What information and skills do we want them to contribute?	Ordinary experience Professional know-how Professional skills Other
		Where should we look for some guarantee of success?	True guarantors False guarantors Doubtful/potential guarantors
Sources of legitimacy	What stakeholders should be considered?	Whom do we want to voice the concerns of those not involved?	Those affected but not involved Those concerned but not directly affected Those normally without voice (future generations, non-human nature etc.)
		What do we want to do to emancipate stakeholders from our premises and promises?	In terms of rights In terms of compensation Other
		What worldview do we want to rely on/privilege?	Privileged view Clashing views

The template-trees were then translated into the Compendium dialogue mapping software. Answers, questions or conjectures arising in a conversation can be noted directly in the software.

6.2.5.2 Team Building for and by Using Boundary Critique

In addition to software support, appropriate facilitation and team-building efforts were explored so as to help the participants in familiarizing themselves with the spirit of boundary critique. Some local meetings were held in different locations in Guyana, offering a facilitated opportunity to practice the software tools and simultaneously to express feedback on the draft templates. Later, the focus shifted to the development of an open educational resource. A pilot course on *Team Working for Natural Resource Management* should offer the participants both an introduction to natural resource management issues and another opportunity to practice the new software tools.

The course development relied on a conceptual framework drawing on two traditions: systems thinking informed by CSH, and participatory action research (PAR, cf. Fals-Borda 1996) partly informed by critical pedagogy (Freire 1970). CSH appeared relevant to address both the earlier-discussed duality between systems and situations as well as the PAR dimension of the project, as it has explicitly addressed such contexts (see Ulrich 1996); PAR appeared relevant to encourage active participation of the Guyana stakeholders.

We mapped these two dimensions of systems thinking and participation onto a standard project management and learning cycle involving the four basic activities of *observing, evaluating, planning* and *acting*. This yielded the framework shown in Fig. 6.4.

The framework understands systems thinking and participation as involving *two basic tensions* that need to be dealt with in most professional interventions (see Reynolds 2008b for a similar framework application to project management in international development programmes). The first, horizontal dimension represents the *tension of 'system'* versus *'situation'* (cf. Figures 6.1and 6.2). The second, vertical dimension represents the *clash of multiple perspectives* that tends to make it difficult in practice to achieve mutual understanding among stakeholders, regarding both their different views and concerns ('stakes') and alternative ways to develop these into joint action for improvement ('stakeholding development').

The two dimensions may be combined with our earlier distinction of non-discursive versus discursive boundary questioning (cf. Figs. 6.4 and 6.5). *Boundary reflection* may then be said to focus attention on the reference systems that inform our understanding of situations, for example, when it comes to evaluating the real-world consequences of action ('system' versus 'situation'); whereas *boundary discourse* would focus more on the conflicts arising between stakeholders due to different reference systems informing their view of the situation and of options for improving it, and on the consequent need for acquiring some mutual understanding. Taken together, these two basic tensions thus also capture the familiar and rarely avoidable tension between *individual* appreciation of situations and the need for *cooperative* action. Even though we rarely achieve shared understanding in the sense of consensus,

we have to achieve some kind of shared practice, through decision making based at least on mutual (though not shared) understanding – which is what we expect boundary discourse to facilitate.

We used this framework to inform the development of on-line course material structured around three main topics: (i) learning to identify stakes and stakeholders; (ii) unfolding stakeholding issues; and (iii) developing an individual project dealing with a problem situation in Guyana. All three parts should provide practice in boundary reflection and discourse, partly supported by the software tools. The project ended before the course had been completed, but some of the material is now available as an open educational resource (OER). ECOSENSUS became one of the first content providers of the Open University's OER initiative called OpenLearn (www.open.ac.uk/openlearn); see the site's experimental 'LabSpace' section.

The hope is for some of the ECOSENSUS ideas to be taken up by users in the growing open-access community and to be adapted for users in different contexts. Some of the course material has already been taken up in a subsequent development of OERs for the North Rupununi Adaptive Management Plan (NRAMP), again using the LabSpace facility of OpenLearn.

6.2.5.3 Final Reflection

Looking back on the 18-month ECOSENSUS-Guyana study, what have we learned about the use of CSH? It was clear from the outset that the project was to explore new territory rather than implementing anything definitive; our hope was to learn about the limitations in transposing our tools into a totally different cultural context. We certainly did!

Here is a brief summary of the limitations we learned about, structured around the four basic CSH sources of influence (which may inform limitations no less than success in achieving improvement):

1. *Motivation*: There was a certain technocratic bias built into the project to fulfill predetermined objectives around the development of electronic tools (Compendium and uDig) for our sponsor, rather than first exploring the needs of the intended users.
2. *Control*: There were limitations on time, staffing and other resources (particularly local facilitation and Internet access for our Amerindian colleagues) that had been underestimated in the project design and turned out to impede the 'distributed' stakeholder dialogue we aimed to support.
3. *Knowledge*: There was little experience and expertise with the use of software tools such as uDig and Compendium to support dialogue on issues of natural resource management among marginalised stakeholders. For example, it proved to be difficult to record the content of such conversations in a (partly graphic) form and language that would be easily accessible for all participants despite differing technical equipment, skills, and cultural backgrounds.
4. *Legitimacy*: Raising questions of legitimacy proved difficult for some of the participants, but also for the authors as there were limited opportunities to gauge

effects of the project on third parties, including likely 'victims' such as conventional environmental planners.

Despite such limitations, we found that the use of CSH did make a difference in the way software tools and other planning tools were used in this project. It made sure that in the course of the project, the original focus on technical issues gradually shifted to substantive issues of the stakeholder discourse to be facilitated. In particular, it created space for such crucial issues to be deliberated upon as, for example, what views and concerns were to inform the maps of the Rupununi land-use situation drawn by means of these tools, rather than allowing them (as is more usual) to remain hidden away or being treated as mere inconveniences.

On the other hand, we do not feel we managed to mobilize as much involvement on the part of the Amerindian participants as we might have hoped. This may be due in part to the cultural differences we have mentioned, along with the dominance of software-related technical and conceptual concerns and the limited reach of a short-term project such as ECOSENSUS. Even so we believe that ECOSENSUS demonstrated the feasibility of supporting project management by e-social science tools such as those we explored. Just as important, it demonstrated a simultaneous need for basing professional intervention and project management on enlarged frameworks such as the one envisaged in Fig. 6.6. ECOSENSUS certainly made us aware of how

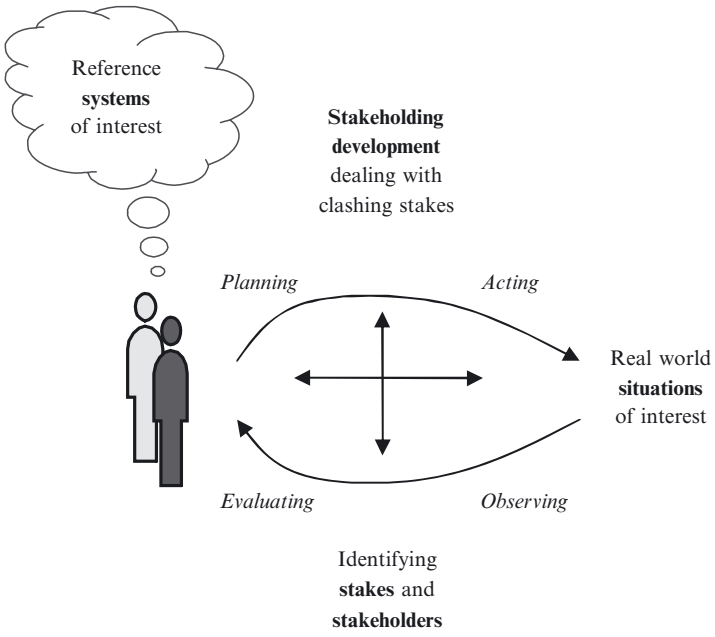


Fig. 6.6 ECOSENSUS Framework (Adapted from Reynolds 2008b, p. 779). "Reframing expert support for development management", *Journal of International Development*, Pergamon, with permission from Elsevier

long a way current managerial and e-science approaches still have to go so as to really create spaces for an open and reflective handling of crucial stakeholding issues.

In this early phase of their development it is probably inevitable that the tools themselves, rather than the processes they ought to facilitate, are in the centre. As long as this is so, boundary critique is better thought of as a personal stance and competence that is acquired primarily through personal study and practice along with dialogue with others, rather than through intermediate software applications. The third and final section of this introduction to CSH discusses some of the personal skills in question.

6.3 Developing CSH Skills and Significance

6.3.1 Boundary Critique and Personal Competence

Understanding methodological ideas is not enough, we must also develop some personal competencies and attitudes in applying them. As we have thus far focused on introducing some core concepts of CSH and reviewing two case studies in their light, let us now consider some of the skills and virtues involved in practicing boundary critique.

The basic theme of this concluding section is that boundary reflection and discourse have a lot to do with who we are and how we work as professionals, that is, with our sense of professional identity and competence. Readers may find it meaningful to reflect on the degree to which they are already on their way to acquiring such competence, or what they can do to become competent practitioners of boundary critique.

6.3.2 Recognising Boundary Judgements – and Keeping Them Fluid

Learning to practice boundary critique begins with understanding the role boundary judgements play, that is, with reading some of the sources on CSH. In addition, it helps to listen attentively to how people talk and argue in everyday conversations, on the bus, at work or in TV discussions; try to *hear* the boundary judgements they make without apparently being aware of them, and discover how they consequently misunderstand one another and talk at cross-purposes.

Once you have understood the importance of boundary judgements as a factor that conditions all our thinking, a *critical* impetus comes into play: you will then no longer want them to operate unrecognised in your thinking. You will prefer to control *them*, rather than allowing them to control you. Likewise, in discussions with others, you will probably no longer want their boundary judgements to go unrecognised or be imposed on you and others as 'given'. Rather than seeing them withdrawn from any critical consideration, you will want them to be transparent

and open to revision. *To understand the role of boundary judgements means to keep them under review and fluid rather than allowing them to become 'hard' and taken for granted*. In this respect, we may indeed take the talk of a shift from 'hard' to critical systems thinking quite literally!

But what is it that contributes towards rendering boundary judgements visible and fluid? All the skills that we are going to discuss are contributing to this aim, but perhaps the two most basic ones are what CSH calls 'systematic iteration' and 'systemic triangulation'.

6.3.2.1 Systematic Iteration of Boundary Judgements

Our reference systems change over time, as do the situations to which we apply them. Some of our boundary judgements may be put into question by the way a situation of concern evolves, others by new knowledge we acquire or in discussion with others, or we gain new experience through other situations in which we are professionally or privately involved, and so on.

An important point in this natural evolution of our thinking is this: all our boundary judgements are interdependent. We cannot simply adapt a boundary judgement (say, as to who should belong to the beneficiaries) to some new piece of information and for the rest continue with our previous understanding of the situation, without revising the other boundary judgements that constitute our reference system (e.g. our measure of improvement might need to be adapted, and consequently the resources needed, the decision maker controlling them, the kind of expertise called for, and so on). *Whenever we change any one boundary judgement, all the others may be in need of change, too.*

Consequently, the process of unfolding and questioning boundary judgements is not a simple matter of observing a standard sequence of boundary questions such as Table 6.1 and Fig. 6.3 may be understood to suggest it in two slightly different versions. Rather, boundary critique becomes a cycle of multiple revisions which may take us through *several* and *changing* sequences of boundary reflection. This is what we mean by describing boundary critique as an *iterative process*.

In the NRUA-Botswana study, the process of evaluating each of the three projects was essentially iterative in that new insights about any one of the three projects prompted the evaluator to revise his reference system for each of the other two projects, too. In the ECOSENSUS-Guyana study, it was the gradual progress of mutual understanding and better communication, along with equally growing awareness of obstacles and difficulties, which provided a main driver for revising the authors' reference systems.

There are three important aspects to this basic skill of iterating boundary judgements:

– Since new insights into the limitations or arbitrariness of our reference system may at all times prompt us to revise our boundary judgements, we need not

worry so much about 'getting them right' from the outset. What matters more is that we start developing a sense of the *different* kinds of reference system that might guide us, before we invest too much time and effort for inquiry and reflection about any particular boundary judgement.

– Since the answers we give to the 12 boundary questions are interdependent, it does not really matter where we start. Rather than following some predefined order mechanically, we can start with any boundary question that we find particularly interesting or relevant, or easy to answer, or helpful to stimulate discussion, and so on. The ensuing boundary reflection or dialogue can then follow where the process takes it, as the interdependence of the boundary judgements will quite naturally lead us to previously unconsidered boundary issues and make sure that we clarify our reference system in terms of all 12 boundary issues.
– Similarly, since boundary revision is an iterative process, when the need for revising our reference system arises we may start with any of the boundary judgements concerned. We will then usually see some of our other previous boundary judgements in a new light, or new boundary issues emerge. So we can move to those other boundary issues and examine how our reference system is changing. Likewise, moving back and forth between 'ought' and 'is' answers may drive the process of revision, as may any other kind of input that can help us better understand the conditioned nature of our boundary judgements.

This is not to say that it is not a good idea for beginners to start with a standard sequence such as the one suggested in Fig. 6.3. However, you need not be its slave. Use it as long as it proves helpful; drop it when it becomes a constraint. As we grow more accustomed to thinking in terms of boundary critique, we can free ourselves from following a fixed order and allow more naturally flowing reflection and discussion.

6.3.2.2 Systemic Triangulation

The boundary judgements that we continually make (whether consciously or otherwise) are influenced by two other sets of judgements that are continually at play. Firstly there are judgements on what we take to constitute reality, for example, based on what we observe or expect to happen in consequence of our actions. We call such observations and anticipations *judgements of 'fact'*. In NRUA-Botswana, they involved, for example, the monitoring of land use through extensive surveys and geographic information systems (GIS). Likewise, for ECOSENSUS-Guyana, the importance of uDiG as a device for accessing and making immediate judgements on the ecological well-being of local ecosystems, was integral to the study.

Secondly, and just as importantly, there are more intuitive judgements on what we take to constitute improvement, that is, what we individually and collectively ascribe to the real world in terms of measures of worth. We call such assessments

judgements of 'value'. In both NRUA-Botswana and ECOSENSUS-Guyana there was to be expected considerable variability in value judgements regarding, for instance, the worth of some notion of pristine nature as compared with the worth of, say, a natural 'resource' such as timber or other forms of land use for human development.

We have thus three sets of judgements that condition the ways we conceive of situations and systems: factual judgements, value judgements, and boundary judgements. Judgements of fact and judgements of value are often said to be interdependent, but it usually remains unclear what exactly that means and how it is to be explained. CSH gives us a precise explanation: 'facts' and 'values' depend on one another as both are conditioned by the same boundary judgements. For example, when we expand our boundary judgements regarding what belongs to the relevant situation (say, when we recognise a previously ignored condition of success), previously ignored facts may become relevant; but in the light of new facts, our value judgements may suddenly look different and need revision. Similarly, when our value judgements change, we will need to revise our boundary judgements accordingly, and in consequence new or different facts become relevant.

CSH refers to this triadic interplay of reference system, relevant facts and values as an *eternal triangle* that we need to think through, and to its methodological employment for critical purposes as *systemic triangulation* (Ulrich 2000, p. 251f; 2003, p. 334; and 2005, p. 6). The term 'triangulation' originally refers to the need for using at least three triangulation points for surveying land; in the empirical social sciences it has come to mean the use of different data bases (gained preferably by different research approaches) to describe and analyse social issues. 'Systemic' triangulation goes beyond this concept by combining different data bases (judgements of fact) with different reference systems (boundary judgements) and value sets (judgements of value) to gain a deeper understanding of the selectivity of claims.

Systemic triangulation can also be understood as an extended form of systematic iteration of boundary judgements. Whereas in the basic form the iteration takes place among changing boundary judgements, in the extended form it takes place among boundary judgements, factual judgements and value judgements.

Stepping back from one's reference system in order to appreciate other perspectives is perhaps the most challenging attribute of a systems practitioner. This is what systemic triangulation is all about. It is a core skill we need to develop in order to become competent in boundary critique. The eternal triangle suggests a way to do this: we can make it a habit to consider each corner of the triangle in the light of the other two, by asking questions such as these: "What new facts become relevant if we expand the boundaries of the reference system or modify our value judgements? How do our valuations look if we consider new facts that refer to a modified reference system? In what way may our reference system fail to do justice to the perspective of different stakeholder groups? Any claim that does not reflect on the underpinning 'triangle' of boundary judgements, judgements of facts and value judgements, risks claiming too much, by not disclosing its built-in selectivity." (Ulrich 2002, p. 42; similarly 2003, p. 334, and 2005, p. 6).

Systemic triangulation is indeed highly relevant from a critical point of view. It serves several critical ends:

- It helps us in becoming *aware* of, and thinking through, the selectivity of our claims – a basis for cultivating reflective practice.
- It allows us to *explain* to others our bias – how our views and claims are conditioned by our assumptions. We can thus qualify our proposals carefully, so that they gain in credibility.
- It allows us to *see through* the selectivity of the claims of *others* and thus to be better prepared to assess their merits and limitations properly.
- It improves *communication*, for it enables us to better understand our differences with others. When we find it impossible to reach through rational discussion some shared views and proposals, this is not necessarily so because some of the parties do not want to listen to us or have bad intentions but more often, because the parties are arguing from a basis of diverging boundary judgements and thus cannot reasonably expect to arrive at identical judgements of fact and value. And finally, as a result of all the above implications
- It is apt to promote among all the parties involved a sense of modesty and mutual *tolerance* that may facilitate productive cooperation; for once we have understood the principle of systemic triangulation, we cannot help but realise that nobody has a monopoly for getting their facts and values right, and that accordingly it is of little help simply to accuse those who disagree with us to have got their facts and values wrong!

6.3.3 Towards a New Ethos of Professional Responsibility

The five critical elements mentioned above amount to a *new ethos of responsibility* for systems practice, and for professional practice in general. It says that the rationality of professional claims and arguments is to be measured not by the impossible avoidance of justification deficits but by the degree to which we deal with such deficits in a transparent, self-critical, and self-limiting way (Ulrich 1993, p. 587). It is a stance that takes the 'enemies of the systems approach' no less seriously than the different reference systems of those involved in an intervention (cf. Reynolds 2004, p. 550f). Let us conclude with three pertinent reflections.

6.3.3.1 "Context Matters": Working with the Tension of System and Situation

The phrase 'context matters' provides perhaps the simplest and most generic description of what it means to develop competence in boundary critique. First, it prompts the question: What is the relevant context? or simply: *Which context matters?* Second, it prompts the question: What makes this context matter more than

other conceivable ones? or simply: *Why does it matter?* The first question raises issues of meaning and relevance; it invites us to reflect on our understanding of 'the problem' (the 'situation') and ways to improve it. The second question raises issues of validity and rationality; it urges us to reflect on the validity claims involved in our 'systems' maps and designs and to examine the arguments that support or challenge them.

As evidenced in the two case studies, getting to grips with real-world situations of intervention does not usually allow us to stay within the pristine conceptual world of our systems methodologies. Rather, it compels us to face the basic tension between 'system' and 'situation', by continuously questioning our systems maps and designs as to how selective they are in capturing the situation, and our notion of the situation as to what options there are for our underlying reference system. By consciously working with the tension of 'system' and 'situation', either can play a critical role for the other; together, they can help us develop and maintain some healthy self-critical distance to our own professional assumptions, findings, and conclusions.

Boundary critique, then, is not just a process of delimiting and arguing our *systems* conceptions. It should equally inform our notion of the relevant problem *situation* – of the 'context that matters'. Our systems maps and designs can hardly be better than the notion of the context that informs them! But whereas in the case of our systems maps and designs, boundary critique will usually require a systematic and explicit effort of boundary unfolding and questioning, in the case of our notion of the context it will often tend to be more intuitive and implicit. We all bring into professional interventions a background of personal experiences and skills that shape our views of the context, and it will hardly ever be possible that we render all those background assumptions fully explicit. What matters more is that we develop a sense of openness and flexibility with respect to the differing contexts that matter to different people, and are prepared to revise our initial notion of the relevant context.

Regarding this important aspect of personal competence, our experience is that boundary critique works best as a reflective framework that most of the time operates in the *background* – a set of concepts and questions we need not talk about all the time but should simply allow to inform our critical thinking. In our communication with others, we can probably best convey the spirit of boundary critique by the example we give in handling our boundary judgements carefully and limiting our claims accordingly, whereas constant talk about boundary judgements may only cause others to switch off. Even in individual reflection, once we have understood the role of boundary assumptions it is hardly possible to 'forget' their importance.

Thus seen, boundary critique ultimately becomes a Socratic professional stance rather than an explicit technique. It encourages a *new methodological modesty* that expresses itself in the way we qualify our claims and deal with those of others. Such a stance will also make a difference in the way we meet people concerned about a situation who have no special expertise and skills: we will understand *and let them feel* that we are prepared to meet them on an equal foot-

ing. Rather than putting them in a situation of incompetence, as professional practice often does, we will treat them as competent partners in exploring the context that matters (Ulrich 2000). When it comes to the contextual assumptions informing our views, ordinary citizens have no disadvantage as compared to the experts.

6.3.3.2 "Deep Complementarism": The Significance of Using CSH in Support of Other Methodologies and Methods

The new ethos of responsibility that we associate with boundary critique has also consequences for our cooperation with other professionals. It should inspire in us a *new openness regarding the methodologies others use*. Whatever our own preferred methodology may be in a certain situation, it cannot supersede a careful handling of the eternal triangle that is at work in all our professional findings and conclusions. In this respect, we all meet as equals, regardless of the methodologies we master. Consequently, we may develop and practice skills of boundary critique in conjunction with any kind of methodology, whether it is a 'hard', 'soft' or 'critical' systems methodology or any other kind of approach.

Developing competence in boundary critique thus goes hand in hand with a methodological stance of 'deep' methodological complementarism (Ulrich 2003, p. 337f): while the *problem situations* we face as professionals change and may require different methodologies, the *argumentation tasks* we face remain basically the same. Whatever professional tools we use, in the end we need to convince the parties concerned that we have got our 'facts', 'values' and 'boundary judgements' right, that is, conducive to improvement *in the eyes of the parties concerned*. Professionals cannot delegate this act of approval to themselves; no methodology, no method, no kind of expertise can justify it. All that professional competence can contribute is to lay open to those concerned the assumptions on which it relies, the consequences they may have, and the options available for alternative proposals. Since unfolding and questioning such selectivity is the core business of boundary critique, must we not conclude that all sound professional practice requires *some* skills of boundary critique, whether in explicit CSH terms or not?

CSH accordingly proposes that boundary critique should become part of the critically reflective skills of every professional and should also be considered a core competence of group leaders and facilitators. Particularly in interventions in which disagreements about essential questions arise, appropriate space for boundary reflection and discourse should be set up, both among those involved in the intervention on the one hand and among those involved and other parties concerned but not involved on the other hand.

Consequently, CSH aims not to replace but to *complement* the use of other methodologies, with a view to supporting reflective practice. We consider it one of the strengths of CSH that it is thoroughly grounded philosophically and methodologically yet does not constrain the user's flexibility with respect to the specific approaches and tools that one may prefer and master. It thus enlarges rather than replaces the

specific professional skills of its users, and thereby also can provide a common language for reflective practice across different professions and methodologies.

6.3.3.3 "Seeing the World Through the Eyes of Others": Systems Thinking as Constructive Critique

Revisiting the two quotations introducing this chapter, we may finally ask: What insight and value is there in CSH that contributes to the aspiration of *'seeing the world through the eyes of another'*? And moreover: What insight and value does it contribute to the need for being *constructively critical* of the worlds we see 'through the eyes others', as well as of our own worlds?

Answering these two questions is the topic of the entire chapter. But perhaps we can summarise the particular competence and ethos boundary critique is meant to convey to the reader a bit differently. It starts by recognising that boundary judgements are not an invention of CSH but are operational out there in the messy world of professional practice, waiting to be unfolded and questioned! You may choose to ignore them, but does that make you a better researcher and professional? Remember the mountain climber who was asked why he had climbed a mountain; his answer was, 'because it exists'. Similarly, the fact that boundary judgements exist and underpin all our claims should be sufficient impetus to explore them. That they exist may be bad news at first, for they may put into question many of our cherished ideas about competent research and practice; but if we handle them carefully, they may also offer opportunities for gaining a deeper understanding of what it means to be a good professional.

As you, the reader, learn to practice boundary critique and grow more familiar with it, you will gradually discover its power to stimulate your thinking in new, constructively critical ways. You will discover that it helps you in better appreciating what others say and why it differs from your views, but also why people so often talk past one another and are intolerant. Likewise, you will discover that the cogency and credibility of your own proposals and arguments increase to the same degree to which boundary critique makes you appreciate their conditioned nature and limit them accordingly.

What is at stake is the quality of our professional thinking and communication with others. If that is reason enough for you to read more about boundary critique, you may want to start with a more comprehensive and detailed discussion of the quest for competence in systems research and practice than is possible here (Ulrich 2001). Some down-to-earth guidelines for getting started with boundary critique are equally available elsewhere (Ulrich 2000). But ultimately, as with all skills, the only way to learn boundary critique is by trying, and by experiencing the difference it makes in practice, for yourself. *"Dare to articulate your own boundary judgements and to question those of others!"* must be the beginner's motto.

Boundary critique (dare we say?) is never a bad idea. It reminds us that a well-understood systems approach begins and ends with the questions we ask, not with the answers we give.

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