Operational research and critical systems thinking – an integrated perspective

Part 2: OR as argumentative practice

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ABSTRACT: Based on a review of the role of systems thinking in the history of operational research (OR), Part 1 of this essay proposed a systematic understanding of OR as applied systems thinking. Further, it identified the contribution of 'critical' systems thinking (CST) in a combined ability of its two strands, critical systems heuristics (CSH) and total systems intervention (TSI), to enhance the contextual sophistication of OR. Part 2 aims to translate this understanding into a framework for good professional practice. How exactly can CST strengthen the competence profile of OR professionals? Drawing on three experience-based archetypes of professional service and some basic argumentation-theoretical considerations, a new understanding of OR and applied systems thinking as argumentative practice emerges. In this new understanding CST finds a systematic place and some exemplary uses of CSH and TSI can be located – an integrated perspective.

The quest for good professional practice

What can critical systems thinking (CST) contribute to good OR practice? To answer this question, the first part of this essay placed CST within the larger context of the history of OR and the role that systems ideas have played in it. This made it clear that OR needs to be understood as both applied science and applied systems thinking. An unresolved tension between the 'science' and the 'systems' orientation was identified in OR's early attempt to apply scientific methods to the study of systems: OR took systems thinking to define its research *subject* but not equally its research *methods*. Without proper methods, the idea of

studying 'whole systems' lacked practicality. Not surprisingly, then, the profession's technical (analytical and mathematical) skills developed faster than its contextual (integrative and systems thinking) skills: problem-structuring skills lagged behind problem-solving skills. Even when so-called 'problem-structuring methods' (PSMs) were introduced, their role remained marginal; their conception in terms of 'soft OR' was arbitrary and failed to respond to the need for a systematic and transparent handling of contextual selectivity, the key issue that emerged from the discussion thus far.

It is with regard to this problem that CST was found in Part 1 to have an essential contribution to make: it responds to the pioneers' insight into the importance of a systems orientation but avoids the deficits of practicability that their quest for 'whole-systems' rationality entailed. Applied systems thinking has today lost the holistic innocence of its early days. Rather than understanding systems thinking as an attempt to avoid or minimize contextual selectivity, CST understands it as a way to handle selectivity responsibly. Accordingly, Part 1 proposed a new definition of CST as an application of systems thinking that aims to support good professional practice in dealing with contextual selectivity – a practicable way to live up to the systems orientation of OR. The two strands of critical systems thinking, critical systems heuristics (CSH, Ulrich, 1983; 1987, 2000, 2005; Ulrich and Reynolds, 2010) and total systems intervention/creative holism (TSI/CH, Flood and Jackson, 1991; Jackson, 1990, 2003, 2006, 2010), were examined against this background. In different ways, it was concluded, both strands of CST can support a *reflective practice of OR as applied systems thinking,* an understanding of OR that would do justice to the original systems orientation of OR but without sacrificing practicability. This is how CST, in short, can contribute to good OR practice **[/1308]** and why it makes sense to work towards an integrated perspective of operational research and critical systems thinking.

As we now turn to the question of how exactly this new perspective can be given a concrete form and put into practice, it becomes essential to clarify our notion of 'good' professional practice. Ultimately, what matters for good practice is not the role a profession assigns to systems thinking or by what methods it seeks to practice it but rather, what kinds of services it offers and how good (competent) it is in rendering those services. This is what we mean when we ask for OR's notion of 'good practice'. So, what does the proposed understanding of OR as reflective practice of applied systems thinking imply for our understanding of good practice? And how exactly can CST support such practice? In discussing these questions, it may be more appropriate to switch to an explicitly personal style of writing, as different people will have different notions of good practice and competence.

Some personal observations to begin with

I probably owe my readers some hints about the roots of my notion of good practice. I have many years of professional experience as a researcher in government working with both quantitative and qualitative tools, particularly as a policy analyst and evaluation researcher in the domain of public health and social welfare. As a theorist of research and professional practice I also am closely familiar with the state of discussion and literature in many applied fields, including OR. I have always felt that in many respects, my experience as a policy analyst and evaluation researcher mirrors itself to an astonishing degree in what OR practitioners tell me about *their* experience, as well as in published accounts by other OR practitioners. To give just two examples, I recognize much of my experience in Turner's (2008) report on the use of OR in UK civil government and in Ormerod's (1997, 2002, 2007, 2008a, 2010b, c) accounts of his experiences with both private and public sector interventions. Despite obvious differences between OR on the one hand and policy analysis and evaluation on the other hand (eg with respect to the specific tools used), my impression is that the basic needs of decision-makers in these fields are largely the same and that both disciplines seek to support them by means of increasingly sophisticated quantitative as well as qualitative tools.

My notion of good OR practice is also shaped by years of cooperation and exchanges with outstanding scholars and practitioners of both OR and applied systems thinking, among them particularly C. West Churchman (1961, 1968, 1971, 1979; Churchman *et al,* 1957) at the University of California, Berkeley; Peter Checkland (1972, 1981, 1985; Checkland and Scholes, 1990; Checkland and Poulter, 2006, 2010) at the University of Lancaster, Lancaster, UK; Hans Daellenbach (1994; Daellenbach and Flood, 2002; Daellenbach and McNickle, 2004) at Canterbury University, Christchurch, New Zealand; and Richard Ormerod (1997, 2002, 2006, 2007, 2008a, b, 2010a) at Warwick University, Coventry, UK. My ideas on OR have further benefited from the insights of authors such as Boothroyd (1978), Keys (1995), Tomlinson and Kiss (1984) and others, along with uncounted papers and 'Viewpoint' discussions on OR practice in the *Journal of the Operational Research Society,* for example, in the journal's 1998 special issue on 'The foundation, development and current practice of OR' (Fildes and Ranyard, 1998).

A framework for discussing OR practice

Ormerod (1997, 1998, 2002, 2008b, 2010a, c) has discussed his personal OR practice and views on the profession's future by means of a simple framework that I find useful, for three reasons (my personal reading):

a. It is sufficiently flexible for many professionals in different fields to use it in reflecting on their own practice – *What is it that I do when I 'do OR' (or policy analysis and evaluation, management consultancy, etc)?*

b. It is sufficiently comprehensive to capture the basic challenges that most professionals are likely to face in interventions – *What different competencies are essential for my practice?* And

c. It is sufficiently pragmatic to focus on issues that can make a difference in the quest for good practice, whatever their theoretical implications may be – *What matters to me for good practice? How do I make a difference?*

To reflect on such matters Ormerod (first in 1997, pp 1046f and 1053) suggests a focus on three *OR core products* that practitioners are typically expected to provide, although their relative importance may vary: 'smart bits', 'helpful ways' and 'things that matter'. Analyzing the skills and activities involved, he associates these three core products with three *OR core competencies:* analytical competence, process competence, and context competence (2002, p 480). This yields three basic clusters of OR services and corresponding professional requirements and opportunities, which Ormerod (2002, pp 476, 478 and 481) refers to as *archetypes of OR service*. He credits Fildes and Ranyard (2000, p 47) for the term but actually uses it rather differently. Whereas Fildes and Ranyard use the concept to refer to five kinds of strategies or 'roles' on which successful OR groups have empirically relied to survive in organizations, Ormerod's focus is more on the professional demands that OR practitioners face in ever changing, situation-specific combinations. The extent to which they are able to meet these demands will shape each practitioner's individual professional profile and that of the **[/1309]** OR profession as a whole. Other authors have also previously used the term (eg Eilon, 1975, 1980), but Ormerod's understanding is more relevant to my present purpose. To help us appreciate it, we may further draw on a discussion by Daellenbach and Read (1998), to whom Ormerod (2002, p 478) also refers and who, although they do not use the term, analyze related educational requirements. They suggest that the future of OR may require three different types of OR practitioners: highly specialized software developers, highly flexible consultants, and highly sophisticated conceptual advisors. As these three categories of

OR practice correspond to some extent, although not entirely, to Ormerod's archetypes, I will consider them at the same time.

Smart bits

'Smart bits' are the core products and related activities and skills of quantitative analysis and modelling that lie at the heart of OR competence. OR is good at developing and deploying tools for quantitative analysis. With today's abundance of data thanks to information technology, it matters ever more that data be used intelligently to help decision-makers understand the issues they face and the options they have. Such *analytical competence* is the OR profession's recognized special expertise. Ormerod sees its core in the profession's ability to formulate *algorithms that make good use of data:*

> Data is now available in abundance and is obtained and maintained in a disciplined way.... [But] in the rush to get the new technology in place (and it actually has been a long, expensive and hard fought battle) many corners have been cut. In particular, the use made of data has often remained quite crude, even simplistic. Not enough attention has been given to the smart bits, the algorithms that sit at the centre of the systems and work out what best to do. Operational researchers are good at smart bids. (Ormerod, 1997, p 1047)

To be sure, in most OR practice the analysis of data and the development and validation of models can rely on standard mathematical and statistical tools as well as commercially available software packages; yet constructing new algorithms and models remains a craft skill that needs to be maintained and trained carefully. It remains the archetypal skill by which OR professionals distinguish themselves in comparison with the equally well-developed analytical skills of disciplines such as management consultancy, policy analysis, industrial and systems engineering, information systems design, organization development, and many others. There is accordingly, as Daellenbach and Read (1998, p 433) observe, a need for training a relatively small but highly specialized group of developers of OR mathematics and software, in addition to making sure that all OR professionals are skilled in using these tools.

Helpful ways

'Helpful ways' are those *general problem-solving and intervention skills* which enable OR professionals to apply their analytical skills and bring them to bear on real-world problems in cooperation with the other parties involved. They include basic consultancy and project management skills along with more specific expertise in using decision support and planning models, facilitating group processes, and guiding processes of planned change. The archetypal

skill is *process consultation,* a concept developed in the field of organization development (Schein, 1969) which becomes increasingly relevant to other applied disciplines. The core idea is 'to support a participative process that places the managers [and other parties involved] at the heart of the analysis' (Ormerod, 1997, p 1052). This suggests that both a *participative orientation* and a *consultancy orientation* may become more important for OR professionals in future, provided they are well understood (and trained) as an enhancement rather than alternative to an analytical orientation. More than in the domain of 'smart bits' OR practitioners are competing here with other professionals; but OR has developed its own tools in the form of 'soft OR', and in any case it may be said that 'helping clients to solve problems, address issues or improve decision-making lies at the heart of OR' (Ormerod, 1997, p 1052). OR professionals are good at doing this and may become better at it in future:

> OR practitioners are good at relating to clients, good at understanding the issues that clients explain to them, good at thinking about how to tackle the issue and are good at carrying out their assignments in an intelligent and sensitive way. Because OR consultants are used to helping clients take better decisions they have been well placed to engage in the development of decision support systems. Because OR academics and practitioners have been interested in, and have reflected on, the process of helping clients, new approaches to helping have been developed. OR consultants therefore have much to offer clients. In the future, I believe, the OR approaches based both on the methods of natural science and on the insights of the social sciences will come to be seen as complementary in practice. (Ormerod, 1997, p 1052f)

Daellenbach and Read (1998, p 433) similarly recognize a need for training a large group of OR practitioners to offer services as 'flexible, innovative, and commercially competent consultants', whether as internal or (increasingly) as external consultants. Their categorization appears to deviate a bit from that of Ormerod though, in that the skills and activities they have in mind partly overlap with the analytical skills and activities that Ormerod subsumes under 'smart bits'; thus (if I understand them correctly) they would count the use of standard tools of quantitative analysis and modelling under 'helpful ways'. In another sense, however, their notion of consultancy appears to be a **[/1310]** bit narrower, as they see the primary aim in the ability 'to perform analyses, and to provide models and systems, to meet the ever-changing needs of lower-level decision-makers, with an emphasis on timely and cost-effective advice at a fairly localized level'. This leads them to an interesting observation concerning the changing role of systems thinking in OR practice:

> To some extent, this represents a rather drastic change from the ethos of the operations researchers of the sixties and seventies, who liked to see themselves as systems thinkers aiming at global optimization over a longish time horizon. (Daellenbach and Read, 1998, p 433)

Even so Daellenbach and Read make it clear that consultancy at lower levels does of course need to operate within the overall views and policies defined at higher levels of decision-making and to that extent still presupposes basic skills of systems thinking. In their framework as in Ormerod's, these latter skills are also of key importance for the third and last archetype of competent OR practice.

Things that matter

'Things that matter', finally, are those more generalist (but partly also rather specialized) skills that professionals increasingly need to support clients in *appreciating problem contexts.* It is here that the original, systemic rather than technical concept of OR's search for 'optimum solutions' (in the earlier-defined sense of 'overall preferred solutions', see Part 1) gains new importance. Accordingly, the archetypal competence required is what we might call 'integrative' thinking, or using Ormerod's term, *context competence,* that is, the ability to situate problems in their organizational, social and ecological environments and to identify and analyze related assumptions and connections. Another core skill will consist in being able to formulate, analyze and assess strategy and policy options as well as to design ways to implement them and to evaluate their outcomes. Dealing systematically with multiple perspectives while maintaining a neutral and professional stance is important here. Increasingly professionals will also be expected to give methodological support to *participative* processes of context appreciation and strategy or policy deliberation among all the parties concerned, rather than merely to 'inform' them about the results of their own professional analysis. That is, context competence to some extent presupposes 'helpful ways' (and vice-versa). In any case, at this level of problem solving and decision-making professionals need to deal with ill-defined, complex, dynamic and often controversial intervention contexts, which in the first place requires skills of *conceptual* rather than numerical analysis. OR professionals will compete here with other professionals but are not necessarily ill-prepared to do so:

> An OR background rooted in both numerical and conceptual analysis is well suited to strategy analysis and formulation. The OR experience of structuring and managing organizationally complex assignments is highly relevant in strategy exercises. We have something to offer. OR currently has limited presence in strategy but this is not something we need to accept. We can dispute the territory.(Ormerod, 1997, p 1053)

My experience as public policy analyst suggests there is an increasing, at times almost desperate demand for professional support in dealing with 'things that matter'. I observe a rising awareness among decision-makers everywhere that good decisions need to take into

account the larger societal and environmental context and consequently also need to consider the multiple and often divergent views and expectations of various stakeholder groups. At the same time, however, there is a widespread sense of perplexity and helplessness as to how decision-makers should deal rationally with such issues. As Daellenbach and Read conclude:

> There is considerable demand for a relatively small group of *'conceptual advisers'* who must, in some sense, be *'systems thinkers'*. These need to be well trained in both OR and economics, and at least be comfortable with the key concepts of modern managerial culture, and fully versed in the technology involved in a particular sector. (Daellenbach and Read, 1998, p 432, italics added)

Table 1 summarizes the three core products of OR and the services and skills they imply.

Table 1 Three archetypes of professional intervention
(Source: columns 1-5 abstracted from Ormerod, 1997, 1998, 2002, 2008b, and 2010c;
column 6 abstracted from Daellenbach and Read, 1998)

(1) Core products	(2) Core competencies required	(3) Typical activities	(4) Typical tools	(5) Types of service and competitive situation of OR	(6) Type of practitioners to be trained
'Smart bits'	*Analytical competence:* ability to explore and model the logic of problems	*Conducting analysis:* • Problem structuring • Model building • Data analysis • Rational inference	*Algorithms* Quantitative analysis (spreadsheets, statistical analysis, etc) Models Standard software packages	*Technical consultancy:* core profile, highly competitive	Small group of highly trained developers of OR mathematics and software
					Large group of consultants able to use existing tools of quantitative analysis and modelling, including standard software, to meet needs of decision-makers
'Helpful ways'	*Process competence:* ability to design and coach participative processes	*Designing and managing process:* • Intervention design • Facilitation • Project management	Consulting tools including *soft OR methods*	*Process consultancy:* enhanced profile, some competitive advantages but competing with other professions	
'Things that matter'	*Context competence:* ability to situate problems in their contexts and to conceive overall solutions	*Appreciating context:* • Situating problems in their (specific and wider) contexts • Conceiving overall policies or solution strategies • Supporting policy and strategy debates	Contextual analysis Policy formulation, analysis and evaluation *System designs*	*Full service consultancy:* emerging profile, increasing demand and potential	Elite group of conceptual advisors ('systems thinkers')

Professional profiles

The way these three kinds of core competencies come together in individual practitioners defines their professional profile. Similarly, an average (or publicly recognized) profile of an

entire profession may thus be identified. Obviously many additional, specifically 'personal' and 'tacit' competencies are also important, as Polanyi (1966) and Schön (1983) have demonstrated; but the focus here is on skills that can be trained and maintained through professional education, standards, and review.

Ormerod's trilogy of 'smart bids', 'helpful ways' and 'things that matter' can guide reflection on such skills. It avoids playing off any of the three core competencies against the others. It treats the three archetypes of professional services and related skills as a matter of changing *emphasis* rather than choice. The specific tools used and the relative importance of 'technical' (or analytic), 'process' (facilitating) and 'political' (contextual) skills will vary, yet only *together* they constitute a well-developed competence profile (see **Figure 1**).
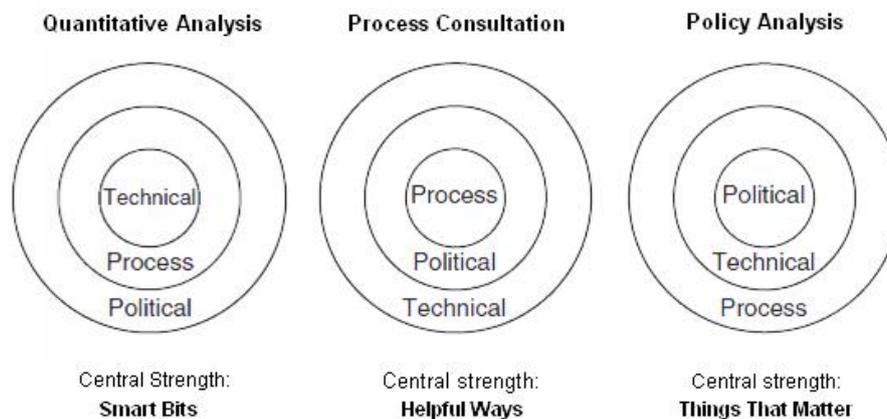

Figure 1 Changing balance of core services and skills in three professional profiles
(Source: adapted from Ormerod, 2008b, p 1587)

A professional profile for the future

It will be those professionals who are ready and able to *vary* the emphasis they put on the three archetypes of [/1311 (Table 1) and **1312** (Fig. 1 and continuing text)] service according to the needs of the people they work with, who will be in a position to respond flexibly and competently to the challenges of the future. The same ability will enable them to do justice to the increasingly important *interdependencies* between the issues involved. It is the engagement with a decision-maker's problem and its context as a whole that is successful and can be rationally defended, rather than any specific activity or skill as such (cf Ormerod, 2010c, p 1771). It might thus be a good idea for any applied discipline to develop its professional training and standards with a view to *striking a better balance* between the three core competencies.

If this general analysis is not entirely misguided, preparing OR professionals for the future will consist in *strengthening* their skills related to 'helpful ways' and 'things that matter' while at the same time *maintaining* the analytical and quantitative craft skills that in the past have constituted its strength when it comes to 'smart bits'. Equally important will be to train them in the ability to apply all three core competencies flexibly as the situation demands it, that is, with varying emphasis and combination. *Good OR practice,* then, will basically consist in deploying the three core competencies according to the demands of the situation (flexibility) with a view to engaging with the decision-maker's problem as a whole (combination of competencies and service doing justice to interdependencies) and to maintaining professional standards throughout (professional attitude and methodological discipline).

CST matters for helping with helpful ways and things that matter!

What skills related to 'helpful ways' and 'things that matter' can CST support? We have seen that both CSH and TSI/CH are engaged in analyzing contextual selectivity and that both also are related to helpful ways, although in different ways. CSH focuses on the normative core of the reference systems (or boundary judgements) that inform relevant facts and values, TSI/CH on the forms of complexity (or diversity) that inform methodology choice. This suggests that CSH may in the first place be expected to support processes of *context analysis and delimitation:* What contexts matter for assessing improvement? What contexts do current proposals actually treat as relevant? In addition, CSH may be expected to support processes of *value clarification and assessment* (What kind of improvement is to be achieved? What may specific proposals contribute to such improvement?) and corresponding *reality checks* (What has been achieved so far, for whom and in what way?). TSI/CH, by contrast, may in the first place be expected to support processes of *intervention design:* What kind of complexity is to be dealt with? What kind of intervention can do the job? In addition, TSI/CH may be expected to support proper *implementation* of chosen methodologies and methods (Are they properly deployed?) and post-hoc *methodology reflection* (Are there lessons to be learned?).

Within the current framework, CSH thus offers itself basically as a contribution to 'things that matter', that is, to *OR context competence;* in addition, inasmuch as its use involves and supports participative processes, it will also be part of OR process competence. Conversely, TSI/CH offers itself basically as a contribution to 'helpful ways', that is, to *OR process competence;* in addition, inasmuch as its use involves and supports contextual judgements, it will also be part of OR context competence. Since context and process competencies are

partly interdependent, it should be clear that once again, we are talking about a matter of emphasis rather than choice; the balance and boundaries between them are and should be kept fluent.

So much for a preliminary assessment of the places that the two strands of CST might take in a future competence profile of OR professionals. To deepen this preliminary analysis, some further-reaching methodological conjectures are required. I propose that we look at these two main issues:

1. In what way can we expect CST to enhance the *rationality* of professional practice? More precisely, how can the basic tools of CST – methodology choice as supported by TSI and systematic boundary critique as supported by CSH – support rationally defensible ways of dealing with 'smart bits', 'helpful ways' and 'things that matter'?

2. What kind of *standard applications* of CSH and TSI should we envisage? More precisely, at what stages of interventions would it seem good practice to make the use of CSH and TSI standard practice, to what ends?

To answer these questions, I propose two interdependent 'turns' (revisions) of perspective. With regard to the first question, I propose that an *argumentative turn* of our understanding of professional competence is in order; it can shed more light on what it means, methodologically **[/1313]** speaking, to contribute 'smart bits', 'helpful ways' and 'things that matter'. With regard to the second question, I propose that a *critical turn* of our understanding of argumentation is in order; it can provide a sharper picture of what CST can contribute to good practice in the use of smart bits, helpful ways and things that matter. On that basis it will then also become possible to locate the use of CSH and TSI in interventions.

The argumentative turn

While Ormerod's framework is sufficiently flexible, comprehensive and pragmatic to capture the meaning of competence across different professional profiles and intervention situations, it is perhaps less strong when it comes to judging and justifying the *rationality* of interventions, that is, their claims to relying on relevant knowledge and methods, to handling value assumptions properly, and to deal adequately with the consequences they may have for third parties. How can we reasonably talk and argue about the nature of 'competent' professional practice without asking what concept of rationality informs it? To put it differently, how can we claim that an intervention is good and successful unless it is clear what *arguments* buttress such validity claims, and how valid they are? How, for example, can

professionals maintain they have done their 'best' to help achieve 'better decisions' (INFORMS, 2003)? In short, what constitutes rational argumentation with regard to such practical claims?

Back to the problem of practical reason

The question leads us back to the earlier-discussed problem of practical reason, the question of how professionals are to handle the normative core of all practice (see Part 1). CST has made us understand that even the most competent and comprehensive professional intervention cannot avoid some selectivity with regard to the context that matters, the facts and values considered relevant, the methods and tools employed, the notions of desirable improvement that inform proposals and evaluations, and ultimately the consequences that may be imposed on different parties. In these various and unavoidable *sources of selectivity* resides the deeply normative core of all claims to rational practice as explained by CSH, along with their theoretical core as explained by TSI/CH. There is thus a pressing need to enhance the competence profiles of professionals in dealing with selectivity. There is equally a need to ensure adequate opportunities and procedures for deliberating such issues among all the parties concerned. We have seen that each of the two strands of CST provides a language and criteria for dealing with specific sources of selectivity, in ways adequate to their particular nature (theoretical-instrumental in the case of methodology choice, practical-normative in the case of boundary critique). What remains to be clarified is the exact link between critical competence as CST understands it (focus: handling selectivity) and the notion of competence captured in the three archetypes of professional intervention (focus: offering service).

OR and CST as argumentative practice

I propose that the crucial missing link consists in relating the three archetypes of intervention to the *argumentation tasks* with which they confront professionals. This is what I mean with the 'argumentative turn' of our notion of competence. There are good reasons for such an argumentation-theoretical understanding of the three core competencies; competence of any kind is of little value to a professional if she or he cannot articulate it, that is, explain to clients and stakeholders why and in what ways it contributes to achieving the aim of an intervention. *Arguability* is in the end how we recognize and can convey to others that some consideration, proposal or evaluation (or any professional *proposition,* as I will say hereafter for the sake of convenience) is sound and credible.

To be sure, we usually expect and accept that professionals are competent to do what they do on the basis of their formal training, academic or professional degrees, status and reputation, professional experience, the mandates and backing given to them by decision-makers, and so on. But any such ascription of competence must ultimately withstand *the test of argumentative challenges* or else it will sooner or later lose its credibility. We 'credit' professionals with credibility precisely because we expect that if for any reason one of their propositions becomes questionable, they will be prepared to sustain it with *good reasons* in the form of well-reflected and *argued* (why does it count?) reference to relevant facts, fair boundaries of concern, and shared ends or notions of improvement. I suspect Boothroyd (1978, p 48) meant something similar when he called for OR interventions 'to provide more completely articulated reflection' or 'articulate intervention'.

Core argumentative requirements

Applying the argumentative turn to the three archetypes, we may specify the argumentation tasks they entail as follows:

i. *Smart bits* are about making sure that a proposition is empirically and technically sound, which is possible by demonstrating that it is consistent with *relevant knowledge* and experience and thus provides a basis for efficacious, or instrumentally effective and efficient (= purpose-rational) action. **[/1314]**

ii. *Helpful ways* are about making sure that a proposition is conducive to improving the situation, which is possible by securing *mutual understanding* about relevant values, ends and ways forward and thus, by providing a basis for purposeful (= value-rational) action.

iii. *Things that matter* are about making sure that a proposition adequately considers the context, which is possible by dealing critically with the assumed *boundaries of concern* and thus, by providing a basis for legitimate (= politically and morally rational) action.

One might object that it is rather arbitrary to associate the three archetypes of professional competence with exactly these argumentative requirements. It certainly is. I do not mean to imply this is the only way the three archetypes can and need to be understood, only to make explicit my personal notion of good (or rational) practice: good practice promotes action that *arguably* is legitimate, purposeful, and efficacious. Or, to put it differently, good practice subjects its claims to legitimate, purposeful and efficacious intervention to systematic argumentation.

One might also object that from a pragmatic point of view, what ultimately justifies professional propositions is not the argumentative skills invested but the actual results and outcomes achieved. True; but as much as a pragmatist philosophy of professionalism appears desirable (see Ormerod, 2006; Ulrich, 2006, 2007), decisions have to be taken before actual outcomes can justify or question them, which is to say they can only rely on anticipated *and argued* consequences. It follows that we cannot well understand competencies unless it is clear how they meet the need for arguing consequences.

The unity of argumentation

Even more important is the following point. As soon as we link the three core competencies to the requirement of arguability, it becomes clear that it would be inadequate to understand them as *alternative* skills that professionals do or do not need to deploy according to the nature of the problem context at issue. We have to avoid the trap of confusing problem contexts with argumentation tasks. The problem contexts professionals face change, but the argumentation tasks they have to master remain essentially the same, namely, the three core arguments just explained (for a full theoretical argument, see Ulrich, 2003).

Against this argumentation-theoretic background, perhaps the suggested specification of the three core competencies in terms of argumentative requirements is not quite so arbitrary after all; in its most simple formulation, it boils down to saying that a proposition can ultimately be defended to the extent it gets (i) its facts, (ii) its values, *and* (iii) its boundaries of concern right. It can be *disputed* by questioning *any one* of these three implicit claims; but it can be *defended* only by redeeming *all three.* All three argumentation tasks thus come into play, although their weight may vary from one situation to another.

The critical turn

The argumentative turn, as much as it helps to clarify our notion of good practice, brings with it a major difficulty: none of the argumentation tasks involved is trivial. Accordingly high are the demands they place on the competencies good practitioners need to have. However, this is not a specific difficulty and disadvantage of our present approach. The difficulty is of a generic philosophical nature: claiming that a proposition is sufficiently justified implies that the reasons advanced in its favour consider all possibly relevant circumstances. The implicit claim is that our 'facts' are more relevant than all unconsidered facts; our 'values' more adequate than those of all other parties; our boundary judgements more defensible than those

underpinning all other conceivable reference systems. To make things worse, the three argumentation tasks are not independent. New facts we recognize as relevant may have us revise our boundary judgements, which in turn may compel us to revise our value judgements and see the relevance of facts in a different light, and so on. We can often simplify the job by temporarily 'bracketing' (suspending) two of the three argumentation tasks while examining the third (eg we take them for granted or keep the conditions in question stable); but in the end claims to practical rationality have to meet all three argumentation tasks or it will be difficult to uphold them against challenges.

In the field of OR, Churchman (1961, 1970, 1971, 1979) has often illustrated the difficulty by means of the inventory problem of industrial enterprises: in order to define an adequate inventory policy, we need to rely on far-reaching assumptions about alternative investment opportunities and related opportunity costs (the cost of the best forgone opportunity). Justifying all these assumptions implies comprehensive knowledge and understanding of all conceivable options to act, as well as of related preferences, risks and uncertainties, costs and opportunities for business success. This is why Churchman requires systems designers to 'sweep in' ever more potentially relevant aspects of the world, and thus to expand the considered problem context more and more – an unending and therefore in my view impractical process. The difficulty, as we found earlier, is that the quest for comprehensiveness is a meaningful *effort* but not a meaningful *claim*. We cannot justify practical propositions on such a basis. My answer to this situation is therefore a different one: rather than pursuing Churchman's heroic **[/1315]** quest for comprehensiveness, it encourages professionals to take the *critical turn.*

Rationality, critically turned

The 'critical turn' (cf Ulrich, 1996, p 11f; 2001, pp 23-25) replaces the impracticable quest for sufficient *justification* by a more practicable quest for sufficient *critique.* Although we cannot ultimately hope to justify all the assumptions on which professional practice relies and all the consequences it may have, we can at least make a systematic effort to render that lack of sufficient justification transparent so that all the parties concerned are aware of the selectivity at work.

To be sure, one of the difficulties is that we are not always aware of all assumptions and implications; but there are two pieces of good news on that front. The first is that in *CSH* and *TSI/CH,* we have two tools that support us in precisely this task of surfacing assumptions and unfolding their implications. The second is that the inevitable lack of comprehensive

knowledge and understanding (which motivates the critical turn in the first place) is not ultimately a stumbling block for merely critical purposes, for we can always handle a lack of knowledge and understanding in such a manner as to be on the safe side, by deciding and acting according to the *precautionary principle.* The principle is best known in the context of environmental risk assessment and regulation, where policy makers often face uncertainties and unclear risks with respect to long-term consequences of policies (say, of GMO risk regulation). I understand it in a somewhat more comprehensive sense here, in that a well-understood precautionary stance for me considers uncertainties or doubts not only with respect to anticipated empirical circumstances but equally with respect to moral aspects of a policy or proposition. Competent professionals will strive to *be on the safe side both empirically and morally.* The two issues often go hand in hand; for example, taking risks on the basis of doubtful predictions may not only turn out to be costly but also has a moral dimension in that it may imply serious harm to some of the parties concerned. Because uncertainties with respect to the one usually entail uncertainties with respect to the other, the two issues cannot be separated as a matter of principle.

In sum, lack of sufficient justification does not imply that there also needs to be a lack of sufficient critique – sufficient, that is, for acting in a rationally and morally defensible way. Between the two extremes of complete justification on the one hand and a complete lack of justification on the other hand, there lies a wide range of opportunities for dealing overtly, carefully and responsibly with the manifold validity claims that professional intervention entails. *Rationality, critically turned,* consists first of all in recognizing the inevitable limits and shortcomings of all claims to rationality. Rationality is in this sense a deeply self-reflective concept or, as Kant (1781, p xi; 1965, p 9) puts it in the *Critique of Pure Reason,* it is reason's self-imposed tribunal.

A new ethos of professional justification

Such a critically turned conception of rational practice relieves professionals from the impossible burden of sufficiently justifying all their findings and conclusions. Instead, it requires them to *qualify* all their claims in terms of underlying assumptions and implications, and/or lack of sufficient knowledge and understanding. Counter to longstanding practice, competent professionals will renounce their usual stance (or appearance) of superior knowledge and justification in favour of disclosing the conditioned nature of their propositions. Their aim will be to put the people they serve in a position of competence, rather than having them depend on their professional expertise. In the language of critical systems

thinking, we will expect professionals to disclose the *selectivity* of their assumptions as well as to unfold the consequences to be expected, that is, to explain the possible *partiality* of their propositions so that all the parties concerned can articulate their doubts and concerns. Their argumentative creditability will depend on such transparency, rather than on glossing over the inevitable lack of sufficient justification.

The implication is a *new ethos of justification* (Ulrich, 1993, 2001). It says that the rationality of applied inquiry and design is to be measured not by the (impossible) avoidance of justification deficits but by the degree to which it deals with such deficits in a transparent, self-critical and self-limiting way. Practically speaking, the consequence is a clear division of responsibilities between professionals and decision-makers or, in the public sector, between expertise and politics: the professional's responsibility is now focused on a *critical* handling of a decision's empirical basis (the facts considered relevant), of its normative core (the values or concerns taken to matter) and its reference system for all claims to relevance and rationality (its boundaries of concern), whereas the ultimate *justification* of all these aspects becomes a matter of societal and organizational *legitimacy,* that is, a question of institutionalized procedures of legitimate decision-making and accountability rather than of expertise.

Obvious as all this may sound, it is not. As a practicing professional I have frequently observed a kind of 'topsy-turvy world of decision-making' in which decision-makers and professionals seem to play reversed roles: decision-makers expect professionals to justify their proposals sufficiently so that they as decision-makers can limit themselves to presenting the professional's findings and conclusions *as if* doing so redeemed them from their mandate as elected officials to take responsibility for decisions. In effect they thus refer to the expertise of **[/1316]** professionals as the supposed justification of their decisions. As against this kind of role reversal, a better way to conceive of the division of responsibilities is certainly to expect professionals to *generate insights rather than justifications* – a formulation that also makes it clear how crucial professional competence is with respect to 'things that matter'. We gain 'insight' into a problem to the extent we learn to see it from different perspectives and to embed it within its larger context – and thus to understand in what ways different perspectives and contexts matter. This is how we recognize and appreciate 'things that matter'. Critically turned, we will expect professionals to generate insight into 'things that *might* matter', while leaving the decision as to which ones *really* matter to legitimate decision-makers and those concerned by their decisions.

The unity of critical argumentation

We have briefly referred to the 'unity of argumentation' as a basis for explaining the interdependence of the core competencies and related argumentation tasks. Consistent with the proposed critical turn, I prefer to speak of the unity of *critical* argumentation, a concept that avoids any idealistic association with a quest for complete justification (cf Ulrich, 2003, p 338f). Still, the basic issue remains the same: we cannot argue reasonably by using logically inconsistent and/or substantially diverging notions of rationality. We cannot, for example, argue that yes, we haven't really reached mutual understanding about what is to be achieved, yet what we propose works and is efficient and for this reason ought to be done; for efficiency in the service of questionable ends is itself questionable. Nor can we argue that yes, the parties don't agree about the relevant facts, but since our facts have all the available theories and experience on their side, we better rely on them; for claims to proper judgement of 'facts' depend on claims regarding relevant contexts and about these, people may legitimately disagree due to different concerns they prioritize. This basic insight finds two different applications in the work of Jurgen Habermas on 'communicative rationality' and in my work on 'boundary critique'. Habermas uses it to explain the theoretical conditions of compete rationality; I use it to pragmatize the critical turn of rational practice. Despite this difference of orientation, both approaches can help us in understanding the exact nature of the 'interdependence' of the argumentation tasks professionals face.

Communicative rationality: Habermas

To begin with Habermas (eg 1979, 1984, 1990, 1993), he refers throughout his writings to three ideal-types of rational action or forms of rationality:

  i. theoretical-instrumental rationality (action aimed at theoretical knowledge and purpose-rational action);

  ii. practical-normative rationality (action aimed at mutual understanding about ends and values); and

  iii. communicative rationality (action aimed at securing conditions of authentic or undistorted expression and rational argument).

The terms Habermas uses for these three forms of rationality vary dependent on whether he is concerned more with language-analytical or with communicative, with scientific or moral issues; for the sake of brevity as well as to stress their interdependence, I will also speak of *'instrumental', 'practical' and 'communicative' reason,* or of the corresponding dimensions (or aspects) of reason or of rationality. We may understand 'smart bits', 'helpful ways' and

'things that matter' as standing for these three dimensions of reason. This reading slightly deviates from Ormerod's (2010c, p 1772), as he tends to align 'helpful ways' with communicative reason while associating 'things that matter' with practical reason or (avoiding reference to reason) with 'norm-performative aspects' of practice. Readers should not worry too much about such alignments, as they always remain to a certain degree arbitrary; what matters for our present concern is that we face three dimensions of reason (or argumentation) that only together can ensure rationality, and that we can learn from Habermas (esp. 1979 and 1984) why exactly this is so.

Habermas finds an insightful basis for explaining the issue in the field of language analysis and specifically in the *speech-act theory* of Austin (1962) and Searle (1969). The crucial concept is the notion of a *double structure of speech.* It says that we cannot communicate a propositional content, say, something about the phenomenal world, without at the same time communicating something about our personal intentions. These in turn involve two essential aspects. In saying what we say, we convey expectations towards the persons we address (eg that they act or respond in a certain way, or at least listen attentively); at the same time we also convey something about ourselves (eg that we believe to be well informed about the facts we assert). We thus have *three functions of speech,* to which Austin, Searle and Habermas refer with different and changing terms; my preferred way to describe them is as the *constative* (or propositional), *regulative* (or normative) and *expressive* (or subjective) aspects of communication. The important point is they are not a matter of choice; for *we cannot avoid that what we say is understood by others in these three ways.* Competent communication accordingly demands that we be aware of conveying these three kinds of messages whenever we talk and handle them carefully. Each message amounts to a validity claim that others may question, and thus to an obligation of the speaker to explain or 'redeem' them if asked to do so (for an example and discussion, see Ulrich, 2009, pp 9-12). **[/1317]**

Speech-act theory thus explains why in all communication we *simultaneously* raise these three validity claims:

i.   that what we say states something about the world – the constative (or propositional) content of our communication – that is *true,* that is, factual and accurate;

ii. that what we say conveys something about our expectations towards others – the regulative (or normative) content of our communication – that is *right,* that is, acceptable and legitimate; and

iii. that what we say reveals something about ourselves – the expressive (or subjective) content of our communication – that is truthful or, as I prefer to say, *authentic,* that is, genuine and undistorted.

[19]

The three claims stand for different ways in which we relate to the world: we refer to 'the' world of phenomena, to 'our' world of human relationships and to 'my' world of subjective experience. Each kind of reference requires its own type of evidence – empirical evidence, reference to mutual understanding, or consistency with the speaker's behaviour – and its own from of rational argumentation – aiming at theoretical-instrumental, practical-normative and communicative rationality, respectively.

To be sure, it is not usually practical (nor necessary) to deal with all three claims simultaneously, given that their argumentative requirements are different. Nevertheless rational communication and argumentation imply that as a matter of principle, we are prepared to support our propositions with regard to all three dimensions of reason involved. What we say and do always relates to each of them. We cannot arbitrarily withdraw from any of the three aspects of the experiential world. This is the deeper reason why communication simultaneously conveys claims to truth, rightness and authenticity.

The 'eternal triangle': CSH

A second way to explain the interdependence of the three argumentation tasks is by means of what CSH calls the *eternal triangle* of boundary critique (see **Figure 2**). The triangle illustrates the dependence of both 'facts' (relevant observations) and 'values' (relevant evaluations) on 'boundary judgements' (relevant reference systems) and thereby also explains the *fundamental interdependence of judgements of fact and value,* namely, via boundary judgements. Figuratively speaking, in a triangle each angle depends on the other two. We cannot modify any one of the three corners without simultaneously modifying the other two.
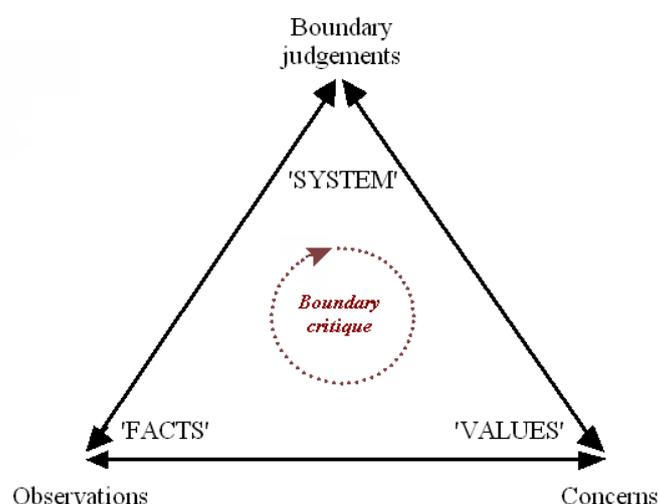

Figure 2 The eternal triangle of boundary critique
(Source: adapted from Ulrich, 2000, p 252, and 2003, p 334)

The aim, as we said, is to promote sufficient critique rather than sufficient justification. Each angle of the eternal triangle can be a pivotal point for critical reflection and argumentation regarding the other two. By means of its boundary categories and questions, CSH turns the idea into a systematic, dialogical process of *systemic triangulation* (Ulrich, 2003, p 334, and 2005, p 6). Under real-world conditions of imperfect rationality, this is perhaps the best approximation of communicative rationality that we can realistically aim for in the quest for good practice. It helps us appreciate both the meaning and relevance of multiple perspectives and the limited nature of our own validity claims. It's what boundary critique is all about from an argumentation-theoretical point of view.

This explains why in CSH a focus on boundary judgements replaces Habermas' ideal requirement of communicative rationality. Communicative rationality aims at securing *undistorted discourse,* that is, authentic and oppression-free communication and argumentation; a meaningful ideal but hardly ever an arguable claim. CSH pragmatizes this ideal with its requirement of a systematic review of boundary judgements. All it demands is that we examine our judgements of relevant facts and values in the light of alternative boundary judgements. We cannot achieve genuine understanding among people without making sure that everyone is in a situation to offer and demand such transparency and authenticity. *Genuine communication* requires that we either talk about the same reference systems (the ideal case) or else, more realistically, at least understand the way our reference systems and underpinning boundary judgements differ. Once we understand how our boundary judgements differ, we'll also understand why our 'facts' and 'values' differ – not primarily because some get their facts and values right and the others don't but because people's reference systems differ. A thus-understood notion of genuine communication does not imply conditions of perfect rationality, of complete consensus and justification; it merely demands that we avow to ourselves and others the conditioned nature of our claims. **[/1318]**

This, in short, is CSH's concept of *argumentation, critically turned.* It is about making sure that we see through the boundaries of concern and the related selectivity of the facts and values that condition people's differing claims, so that we can systematically analyze and discuss their implications. Perhaps we can then achieve agreement, but this is not what justifies the effort or renders it futile. It is already an essential gain in communicative rationality to understand people's different rationalities. We thus at least have a chance to agree that we do not agree and why this is so – and how we might handle the situation in a decent way. Mutual recognition, tolerance and cooperation can grow on this basis. We can

understand one another without needing to agree; only in Habermas' ideal world is consensus an adequate criterion of mutual understanding (Ulrich, 2000, p 253).

Application

We have understood that the critical turn of our notion of good practice ties professional competencies to argumentation tasks. We have identified three main argumentative issues that arise in all practice and have associated them with Habermas' theory of communicative rationality on the one hand and – with a view to *critical* pragmatization – with the eternal triangle of boundary critique on the other hand. Let us now close the circle and relate the thus understood argumentation tasks back to Ormerod's archetypes of professional competence (**Figure 3**).
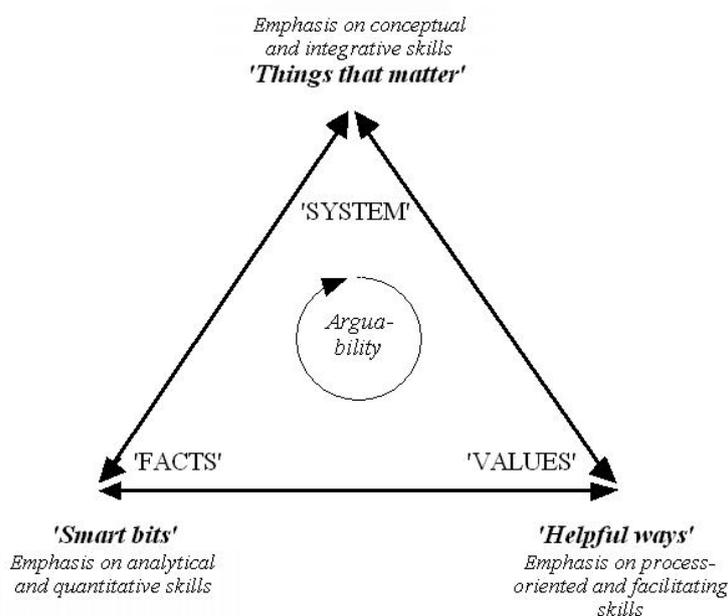

Figure 3 Argumentation tasks in OR practice

Due to the unity of critical argumentation, a professional's competence will in practice be as strong as the weakest argumentative link in the argumentative triangle (as we may now call it). It is probably safe to assume that in OR, unlike some of the earlier-mentioned professions that compete with it, the weak link is not usually to be found in proposing 'smart bits' but rather in facilitating 'helpful ways' and particularly in arguing 'things that (might) matter' – the boundaries of concern (in CSH) and 'complications' of contexts (in TSI/CH) that condition what is 'smart' and 'helpful'. Just as the emphasis between the three archetypes may change with the specific situation and stage of an intervention, so the weak link may change, too; but on the whole the crucial weak link will most often tend to be with the 'things

that might matter', along with 'helpful ways' to guide reflection and discussion of what really matters.

'Things that matter', it should be clear by now, concern the contextual sophistication of OR practitioners, or what from a CST perspective amounts to appreciating two main *sources of selectivity* that shape our handling of problem situations – selectivity built into all methodology choice and implementation (in the case of TSI/CH) and selectivity built into the knowledge and value basis of practical propositions (in the case of CSH). An obvious next and last step consists in examining what CSH and TSI/CH have to contribute to a competent handling of these sources of selectivity, and thus of the argumentative triangle. More precisely, how can we locate and specify the contributions of CSH and TSI/CH in the argumentative circle according to Figure 3?

To this end, we need a list of exemplary applications of CSH and TSI/CH. Regarding CSH, we can draw on a list of four exemplary applications of boundary critique that is available elsewhere (Ulrich, 2005, p 11f). For lack of space it must suffice to point to the basic idea of each application by associating it with a guiding question; interested readers can find more explanation in the cited source:

[1] Reframing: What other context might be relevant?
[2] Ideal mapping: What is our vision?
[3] Evaluation: What is our assessment of the situation?
[4] Challenge: Don't you claim too much?

Regarding TSI/CH, we can draw on its standard phases as listed earlier, in Table 2 of Part 1 (adapted from Flood and Jackson, 1991, p 54; Jackson, 1991, p 276; 2000, p 372; and 2006, p 654). With a view to supporting reflective practice, the following three exemplary applications of the SOSM appear basic; I again characterize each one by a guiding question:

(a) Situation analysis: What metaphors and paradigms are helpful?
(b) Methodology choice and implementation: Which mix of intervention methodology is needed?
(c) Methodology reflection: Have we used an adequate mix of methodology and conforming methods?

Figure 4 locates these *seven exemplary uses of CST* in the argumentative triangle according to their argumentative **[/1319]** relevance rather than in a temporal sense. Judging their argumentative relevance is obviously a matter that can and needs to be adapted to the demands of the situation as well as to individual needs. The suggested use of CST tools is thus merely meant to illustrate the idea or at most, to suggest a conceivable *standard practice;*

[23]

if understood as standard practice, the emphasis given to the seven exemplary uses will obviously need to be handled flexibly. Not each use of CST will always be of equal relevance. Rather, the relevance of the seven exemplary uses – the insights they can generate and the difference they may make – will vary with the specific situation, along with the changing relevance of the three archetypes of professional service and the corresponding argumentation tasks. Focusing on those uses that appear most helpful will ease the practitioner's argumentative burden. Keeping in mind the primarily critical purpose of the three argumentation tasks will equally make it easier to apply the idea, that is, to do justice to the argumentative triangle. To remind us of the critical focus of our understanding of the three core argumentation tasks, I have labelled these tasks 'context analysis', 'value clarification' and 'reality check' (see Figure 4).
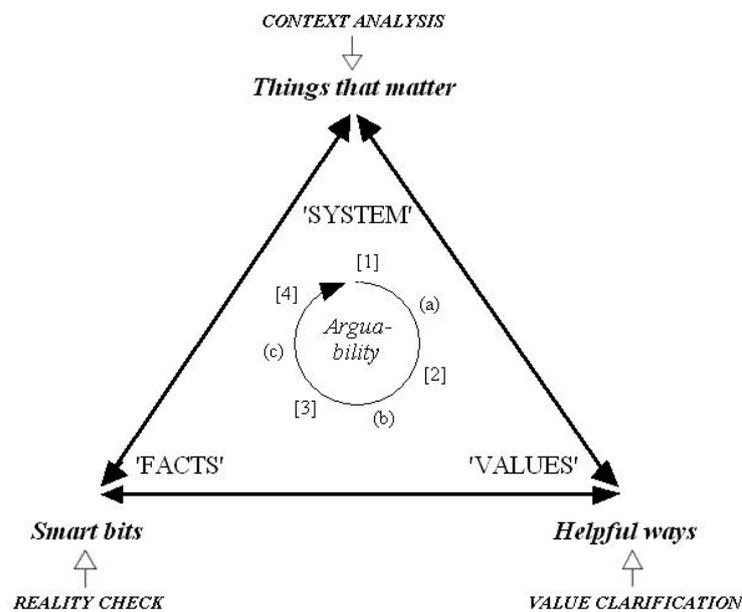

Figure 4 Argumentative uses of CSH [1-4] and TSI/CH (a-c) as explained in text

Summary and Conclusion

Based on an examination of (i) the deep affinities between OR and systems thinking since the early days of the field, (ii) the shared methodological concern and potential of the two main strands of critical systems thinking (CST), and (iii) the major tasks that confront OR professionals in practice, this two-part essay suggests that a revision of the place given to CST in OR practice is in order. Instead of understanding CST as a competing approach that leads from a quantitative (supposedly 'hard') understanding to an interpretive ('soft' OR) and on to a 'critical' conception of good OR practice, CST is more adequately understood as a

particular use of systems thinking for the purpose of enhancing the 'contextual sophistication' of OR practice, while maintaining its traditionally strong profile in analytical skills and continuing to develop its tools for facilitating participative intervention processes. The proposed focus is on supporting reflective practice of all skills and tools of OR.

CST thus becomes an integral part of OR practice and as such a modern, more realistic version of the 'whole systems' perspective that the pioneers had meant to bring **[/1320]** to professional intervention in human affairs. In this new conception, the role of systems thinking is redefined as a tool of critical reflection and discourse about the *selectivity* of professional propositions, that is, their *lack* of whole-systems rationality. Since such selectivity not only is unavoidable but also entails a deeply normative core of all matters practical, it becomes clear that the quest for good practice raises some far-reaching methodological questions as to how professionals are to deal rationally with this normative core. These questions lead to the unresolved philosophical *problem of practical reason,* the question of how the normative core of even the most rational practice can be identified and justified systematically.

From a CST perspective, the only way professionals can realistically do justice to the problem is through *reflective practice,* in the two forms of a transparent and self-critical approach to methodology selection and of an equally transparent and self-critical handling of the findings and conclusions that are reached by means of the chosen methodologies. To put it differently, good professional practice will make a systematic effort to lay open the conditioned nature of all its propositions and so will help the parties concerned in examining and discussing them critically. The paper's comparative analysis of the two strands of CST, critical systems heuristics (CSH) and total systems intervention/creative holism (TSI/CH), suggests that it is possible and makes sense in practice to bring them together under a thus-understood common umbrella – a joint effort to contribute to the contextual sophistication of OR practice.

A crucial methodological step to this end consists in what the paper calls the *argumentative turn* of OR's notion of professional competence. It understands professional competence as the ability to deal with the argumentation tasks involved in all professional intervention, concerning empirical, normative and contextual judgements. Each type of judgement requires different forms of argumentation. Drawing on the work of Jürgen Habermas, these forms of argumentation can be understood to refer to three interdependent ideal-types of rationality – theoretical-instrumental, practical-normative, and communicative rationality. The core of this interdependence is found through an analysis of the functions of

speech that all argumentation involves. A view of good practice emerges that revolves around the idea of attending systematically to these three argumentation tasks and striking a balance between them.

To link these argumentation tasks back to OR practice, a framework for describing OR practice originally proposed by Richard Ormerod offers itself. It not only captures the richness of OR practice but also lends itself to being reinterpreted from the suggested argumentative perspective. The three argumentation tasks thus emerge as constitutive competencies in dealing with the analytical (or quantitative), process-oriented (or facilitating) and contextual (or integrative) issues that professionals face in dealing with problem situations characterized by high and ever increasing complexity and diversity. They can be usefully understood in terms of Ormerod's archetypes of OR service: 'smart bits', 'helpful ways' and 'things that matter'. Management consultancy, policy analysis and many other fields of professional practice can equally be understood in such terms, but their competence profiles with regard to the three archetypes differ. OR is traditionally strong in providing smart bits (quantitative tools), a bit less strong but still reasonably competent in facilitating helpful ways (processes of change), and may benefit from increasing its strengths in arguing things that *might* matter (contextual analysis). This is where CST has something essential to contribute with both its strands. They can help to balance OR's competence profile in a relevant way. OR and CST can thus usefully be brought together; an integrated perspective emerges.

Table 2 summarizes the suggested argumentative perspective of professional practice. Good OR practice will seek to do justice to all the mentioned issues and to deal with them in a transparent, self-limiting and balanced way, avoiding the traps of claiming too much and of putting those it is supposed to serve in a situation of dependence rather than active and competent participation. It will, in the terms that have been used throughout this essay, pursue reflective practice with respect to its handling of the three core issues of *complexity, diversity,* and *selectivity.* It will pragmatize these issues by trying to achieve a critically reflected balance of 'smart bits', 'helpful ways', and 'things that (might) matter', with the emphasis shifting in this order as the focus moves from complexity via diversity to selectivity (see Table 2).

Table 2 Summary of the suggested argumentative perspective of professional practice

Core services (products)	Types of problem pressure (complications)	Argumentation tasks (validity claims)	Required core competencies
'Smart bits'	Handling complexity: Clarifying the logic of the situation and defining relevant facts	Claims to truth and efficacy: Reference to relevant facts and efficient means of achieving change (withstanding expert scrutiny and empirical testing)	Analytical and quantitative: supporting efficacious and evidence-based problem solving
'Helpful ways'	Handling diversity: Value clarification and defining relevant concerns	Claims to rightness and proper participation: Reference to adequate values, ends and processes of change that consider the interests of all the parties concerned (withstanding scrutiny by all those concerned and moral questioning)	Process-oriented and facilitating: promoting mutual understanding
'Things that matter'	Handling selectivity: Clarifying the context that matters and its normative core	Claims to communicative rationality and transparency: Reference to undistorted communication and argumentation about all validity claims involved in the quest for securing improvement (withstanding public scrutiny and questions regarding democratic legitimacy)	Contextual and integrative: securing genuine communication and reflective practice

Bringing OR to bear on the three issues is not a bad idea. Traditionally strong in handling complexity, it now also has the 'soft OR' tools for helping with diversity. The weak link in the argumentative triangle lies probably with the third issue, selectivity, but the tools of CST pave the way to increasing competence in this respect, too. The unity of critical argumentation means we succeed or fail in critically handling the three issues *together.* After the *critical turn,* neither OR nor systems thinking can carry on as before. The case for integrating OR and CST is strong indeed.

References

Austin JL (1962). *How to Do Things with Words.* Clarendon Press: Oxford. **[/1321]**

Boothroyd H (1978). *Articulate Intervention: The Interface of Science, Mathematics and Administration.* Taylor & Francis: London.

Checkland P (1972). Towards a systems-based methodology for real-world problem solving. *J Syst Eng* **3**: 1-30.

Checkland P (1981). *Systems Thinking, Systems Practice.* Wiley: Chichester.

Checkland P (1985). From optimizing to learning: a development of systems thinking for the 1990s. *J Opl Res Soc* **36**: 757-767.

Checkland P and Scholes J (1990). *Soft Systems Methodology in Action.* Wiley: Chichester.

Checkland P and Poulter J (2006). *Learning for Action: A Short Definitive Account of Soft Systems Methodology and Its Use for Practitioners, Teachers and Students.* Wiley: Chichester.

Checkland P and Poulter J (2010). Soft systems methodology. In Reynolds M and Holwell S (eds). *Systems Approaches to Managing Change: A Practical Guide.* Springer: London, pp 191-242.

Churchman CW (1961). *Prediction and Optimal Decision: Philosophical Issues of a Science of Values.* Prentice-Hall: Englewood Cliffs, NJ.

Churchman CW (1968). *The Systems Approach.* Dell: New York.

Churchman CW (1970). Operations research as a profession. *Mngt Sci* **17**: B37-B53.

Churchman CW (1971). *The Design of Inquiring Systems: Basic Concepts of Systems and Organization.* Basic Books: New York.

Churchman CW (1979). *The Systems Approach and Its Enemies.* Basic Books: New York.

Churchman CW, Ackoff RL and Arnoff EL (1957). *Introduction to Operations Research.* Wiley: New York, and Chapman & Hall: London.

Daellenbach HG (1994). *Systems and Decision Making: A Management Science Approach.* Wiley: Chichester.

Daellenbach HG and Flood RL (2002). *The Informed Student Guide to Management Science.* Thomson: London.

Daellenbach H and McNickle D (2004). *Management Science: Decision-Making Through Systems Thinking.* Palgrave Macmillan: London.

Daellenbach HG and Read EG (1998). Success and survival of OR groups – where to from here? *J Opl Res Soc* **49**: 430-433.

Eilon S (1975). Seven faces of research. *Opl Res Q* (now *J Opl Res Soc*) **26**: 359-367.

Eilon S (1980). The role of management science. *J Opl Res Soc* **31**: 17-28.

Fildes R and Ranyard JC (1998). The foundation, development and current practice of OR: an editorial introduction and overview. *J Opl Res Soc* **49**: 304-306.

Fildes R and Ranyard JC (2000). Internal consulting: effective practice in a changing environment. *Interfaces* **30**(5): 34-50.

Flood RL and Jackson MC (1991). *Creative Problem Solving: Total Systems Intervention.* Wiley: Chichester.

Habermas J (1979). *Communication and the Evolution of Society.* Beacon Press: Boston, and Heinemann, London..

Habermas J (1984). *The Theory of Communicative Action, Vol. 1: Reason and the Rationalization of Society.* Polity Press: Cambridge, UK.

Habermas J (1990). *Moral Consciousness and Communicative Action.* Polity Press: Cambridge, UK.

Habermas J (1993). *Justification and Application: Remarks on Discourse Ethics.* Polity Press: Cambridge, UK.

INFORMS (2003) What operations research is. *Operations Research: The Science of the Better,* Web site of the Institute for Operations Research and the Management Sciences, http://www.scienceofbetter.org/what/index.htm.

Jackson MC (1990). Beyond a system of systems methodologies. *J Opl Res Soc* **41**: 657-668.

Jackson MC (2000). *Systems Approaches to Management.* Kluwer/Plenum: New York.

Jackson MC (2003). *Systems Thinking: Creative Holism for Managers.* Wiley: Chichester.

Jackson MC (2006). Creative holism: a critical systems approach to complex problem situations. *Syst Res* **23**: 647-657.

Jackson MC (2010). Reflections on the development and contribution of critical systems thinking and practice. *Syst Res* **27**: 123-139.

Kant I (1781/1965). *Critique of Pure Reason.* Transl by NK Smith. St. Martin's Press: New York, 1965 (orig. Macmillan: London, 1929).

Keys P (ed) (1995). *Understanding the Process of Operational Research: Collected Readings.* Wiley: Chichester.

Ormerod R (1997). The role of OR in shaping the future: smart bits, helpful ways and things that matter. *J Opl Res Soc* **48**: 1045-1056.

Ormerod R (1998). Beyond internal OR groups. *J Opl Res Soc* **49**: 420-429.

Ormerod R (2002). On the nature of OR: taking stock. *J Opl Res Soc* **53**: 475-491.

Ormerod R (2006). The history and ideas of pragmatism. *J Opl Res Soc* **57**: 892-909.

Ormerod R (2007). On the history and future of OR. *J Opl Res Soc* **58**: 832-835.

Ormerod R (2008a). The transformation competence perspective. *J Opl Res Soc* **59**: 1435-1448.

Ormerod R (2008b). The history and ideas of Marxism: the relevance for OR. *J Opl Res Soc* **59**: 1573-1590.

Ormerod R (2010a). Articulate intervention revisited. *J Opl Res Soc* **61**: 1078-1094.

Ormerod R (2010b). Justifying the methods of OR. *J Opl Res Soc* **61**: 1694-1708.

Ormerod R (2010c). OR as rational choice: a decision and game theory perspective. *J Opl Res Soc* **61**: 1761-1776.

Polanyi M (1966). *The Tacit Dimension.* Doubleday: Garden City, NY.

Schein EA (1969). *Process Consultation: Its Role in Organization Development.* Addison-Wesley: Reading, MA.

Schön D (1983). *The Reflective Practitioner: How Professionals Think in Action.* Basic Books: New York.

Searle JR (1969). *Speech Acts: An Essay in the Philosophy of Language.* Cambridge University Press: Cambridge.

Tomlinson RC and Kiss I (eds) (1984). *Rethinking the Process of Operational Research and Systems Analysis.* Pergamon: Oxford.

Turner HS (2008). Government Operational Research Service: civil OR in UK central government. *J Opl Res Soc* **59**: 148-162.

Ulrich W (1983). *Critical Heuristics of Social Planning: A New Approach to Practical Philosophy.* Haupt: Bern (reprint ed Wiley: Chichester, 1994).

Ulrich W (1987). Critical heuristics of social systems design. *Europ J Opl Res* **31**: 276-283.

Ulrich W (1993) Some difficulties of ecological thinking, considered from a critical systems perspective: a plea for critical holism. *Syst Pract* **6**: 583-611.

Ulrich W (1996) *A Primer to Critical Systems Heuristics for Action Researchers.* Centre for Systems Studies, University of Hull: Hull. **[/1322]**

Ulrich W (2000). Reflective practice in the civil society: the contribution of critically systemic thinking. *Reflective Practice* **1**: 247-268.

Ulrich W (2001). The quest for competence in systemic research and practice. *Syst Res* **18**: 3-28.

Ulrich W (2003). Beyond methodology choice: critical systems thinking as critically systemic discourse. *J Opl Res Soc* **54**: 325-342.

Ulrich W (2005). A brief introduction to critical systems heuristics (CSH). *ECOSENSUS project site,* The Open University, Milton Keynes, UK, http://kmi.open.ac.uk/projects/ecosensus/publications/ (also available from the author's home page at http://wulrich.com/downloads/).

Ulrich W (2006). Critical pragmatism: a new approach to professional and business ethics. In: Zsolnai L (ed). *Interdisciplinary Yearbook of Business Ethics, Vol. 1*. Peter Lang: Oxford, pp. 53-85.

Ulrich W (2007). Philosophy for professionals: towards critical pragmatism. *J Opl Res Soc* **58**: 1109-1113.

Ulrich W (2009). Communicative rationality and formal pragmatics – Habermas 1. Reflections on reflective practice (6a/7), *Ulrich's Bimonthly,* September-October 2009, http://wulrich.com/bimonthly_september2009.html and http://wulrich.com/downloads/bimonthly_september2009.pdf for paginated version.

Ulrich W and Reynolds M (2010). Critical systems heuristics. In: Reynolds M and Holwell S (eds). *Systems Approaches to Managing Change: A Practical Guide.* Springer: London, pp 243-292.

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