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Systems Thinking, Systems Practice, and Practical Philosophy: A Program of Research

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If *Systems Practice* is to serve the cause of socially rational decision making, its understanding of systems approach must open itself up to the communicative dimension of rational practice uncovered by contemporary practical philosophy. This programmatic paper argues that building the bridge between the two traditions of systems thinking and practical philosophy is a key challenge to be faced by the systems community. A three-level framework of rational systems practice is suggested as a point of departure for a program of research.

KEY WORDS: systems thinking; systems practice; practical philosophy; critical heuristics; strategic systems management; normative systems management.

1. SYSTEMS PRACTICE: THE NEED FOR A PROGRAM OF RESEARCH

> Reason is impelled by a tendency of its nature to venture to the utmost limits of all knowledge, and not to be satisfied save through the completion of its course in a self-subsistent systematic whole. Is this endeavour the outcome merely of the speculative interest of reason? Must we not regard it as having its source exclusively in the practical interests of reason?
>
> Immanuel Kant
> *Critique of Pure Reason* (1787, p. 825)

C. West Churchman diagnosed the case several years ago: the systems approach will not serve the cause of socially rational decision making unless it opens itself up to the social life-worlds of the "*enemies*" of systems

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rationality—the life-worlds of politics, morality, religion, and aesthetics. "What's really happening in the human world is politics, or morality, or religion, or aesthetics" (Churchman 1979, p. 53.)

The systems approach, *because* it strives for comprehensiveness, must learn to live with its own unavoidable incomprehensiveness and must draw the necessary conclusions from this insight. It must bother to *take into account that which is not systemic in its nature* and hence cannot be rationalized in the terms of systems rationality. Otherwise its quest for comprehensiveness—originally directed critically against the reductionistic tendencies of conventional scientific discipline—is bound to lead into new kinds of reductionism, e.g., by reducing everything to "nothing but" functional systems aspects.

But of course, what is the use of the most insightful diagnosis if remedies are wanting? Decision makers and planners taking the systems idea seriously enough to consider their decision's (or design's) inevitable *lack* of comprehensive rationality will face a true dilemma: while conventional decision-making tools such as cost–benefit analysis and scientific modeling are clearly too narrow a base for practicing the systems idea, they are yet the only tools available that are well defined, and they are apt to offer—within the limits of their range of application—some sort of "objective" basis of argumentation.

It is thus understandable that, for instance, the dialectical debate among systems planners and "enemies" advocated by Churchman has hardly appealed to decision makers as an alternative. Of course Churchman does not sell it as such; he employs it as a tool of philosophical reflection rather than a stringently defined procedure for practical decision making (which is not to say that it could not be "operationalized" in terms of reproducible procedural and institutional arrangements). And of course, the apparent stringency of conventional decision-making tools should not deceive us about their methodological helplessness in dealing with essential issues such as measuring benefits, opportunity costs, or trade-offs between different dimensions of benefits or costs considered. Moreover, it is hardly fair to blame the systems approach for *causing* the difficulty of which it is only the messenger, namely, the inevitable *lack* of comprehensiveness in our knowledge and understanding of whole systems (Ulrich, 1981a). Nevertheless, as justified as these excuses may be, the fact remains that the systems movement has not been able thus far to develop a stringent methodological framework.

1.1. The Methodological Challenge

In view of this situation, we should probably not pretend to be able to do without conventional tools. Rather—and this is my basic proposition for

a research program under the title of "systems practice"—we should develop a *conceptual framework* that would

(a) assign an adequate place to, and yield *proper standards of improvement* for, all kinds of systems methodologies—conventional "hard" systems tools as well as newer "soft" and (anticipated) "critical" systems methodologies;[2]

(b) help us to deal critically with the theories of social reality, and corresponding *concepts of rational social action*, implied by each type of systems methodology; and

(c) finally, embed the application of these tools within well-defined *institutional and procedural arrangements for rational debate* among the various parties involved in, and affected by, a decision.

Such a program of research will require the systems movement to expand considerably its universe of discourse. It will need to open itself up to traditions of thought that promise to offer methodological support for the task of mediating between systems concepts and the life-practical concerns of the "enemies." I propose that one such tradition is *practical philosophy*, which has recently experienced a considerable renaissance, especially in German philosophy (see, e.g., Riedel, 1972–1974; Bubner, 1975; Apel, 1976; Höffe, 1979; Habermas, 1971a, 1973a, 1981).

In the present essay, I argue that building a bridge between systems philosophy and practical philosophy is not only necessary but also possible, in a systematic and fruitful way. Both traditions are likely to benefit from a systematic link: they share not only a common origin in the critical philosophy of Immanuel Kant, but also the same practical intent—to bring more reason into actual social practice. Historically they have gone separate ways in pursuing this intent and, accordingly, have brought forth different insights and encountered different difficulties. But it seems to me that their respective insights and difficulties are largely complementary: while practical philosophy has failed to take into account Kant's demonstration of the critical significance —and, indeed, unavoidability—of the systems idea, the systems movement has long been neglecting Kant's lesson that practical reason cannot be reduced to (or derived from) "value-neutral" theoretical-instrumental reason but must be grounded in a critically reflected interest. "An interest is that by which reason becomes practical—that is, a cause determining the will" (Kant, 19786, p. 122n). In order to reflect and debate systematically on the normative implications of systems designs, we shall need both the *idea of practical reason* as a critical standard against which to examine the instrumental rationality that our decision-making tools may produce and the

[2]Compare, for instance, P. B. Checkland's (1972, 1981) "soft systems methodology" and the recent developments toward a "critical management science" (Jackson and Keys, 1987).

systems idea as a critical reminder to reflect on those implications of our designs which reach beyond the limited context of application that we are able to consider for all practical purposes, i.e., their *whole-systems implications.*

The following attempt to sketch out the framework for a systematic linkage of the two traditions draws mainly on my recent inquiry into the epistemological foundations of a critically normative systems approach: *Critical Heuristics of Social Planning* (Ulrich, 1983) and, additionally, on Jürgen Habermas' (1981) *Theory of Communicative Action.* First, however, it is necessary to give a short introduction to contemporary practical philosophy and, especially, to the major change of its underlying paradigm.

2. PRACTICAL PHILOSOPHY: TOWARD A "COMMUNICATIVE" PARADIGM OF RATIONAL SOCIAL PRACTICE

Practical philosophy is the philosophical effort to come to terms with the *problem of practical reason*: How can we rationally determine and justify the norms of action contained in recommendations or plans for action?

"Norms regulate legitimate chances for the satisfaction of needs" (Habermas, 1973c, p. 251). Thus we can say that it is the task of practical reason to decide upon the societal acceptability of disputed value premises or life-practical consequences of actions with respect to the chances of all those affected to satisfy their needs.

2.1. Practical vs Theoretical Reason

It is helpful to contrast the task of practical reason with that of theoretical reason: while theoretical reason is to decide on disputed claims regarding the *empirical validity* of theoretical propositions (hypotheses), practical reason is to decide on disputed claims concerning the *normative validity* of practical propositions (assertions of norms, recommendations for action). In both cases, the decision is to be reached by "the peculiarly unforced force of the better argument" (Habermas, 1973a, p. 240) rather than by resort to power or deception.

Both problems also lead into the same logical difficulty: How can we ever justify the generalizability of empirical observations or normative assertions to universally valid statements? Since there is no logical principle allowing us to generalize observational to theoretical statements (nomological "laws"), the *problem of induction* has become the fundamental philosophical problem of empiricism; and since there is likewise no logical principle that would permit us to universalize subjective valuations to generally binding norms of

action (moral "laws"), the *problem of practical reason* has become the fundamental concern of practical philosophy.

There are, of course, essential differences between the two basic dimensions of reason. These have to do with the fact that theoretical reason is concerned with producing *"objective" knowledge* about some segment of "the" phenomenal world, whereas practical reason is to secure *ethically justified consensus* about norms regulating interpersonal relationships within "our" world of society (cf. Habermas, 1979a, p. 63ff). That is to say, theoretical reason is bound to "observe" (in the double meaning of the word) the "laws" that effectively govern the phenomenal world of experience, while practical reason is free to determine the laws which—according to its own judgment —*ought* to govern our social world of human relationships. This difference explains why "facts," i.e., empirical statements, cannot be shown to be valid ("true") without reference to some objectified aspects of the phenomenal world, whereas "norms" or practical statements can be established as valid ("right") by their mere intersubjective assertion. As Kant writes in his inimitable terseness: "By 'the practical', I mean everything that is possible through freedom" (1787, p. 828).

The challenge to practical reason consists in using this freedom reasonably, that is, in determining the ends and means of one's actions "with reason." We call this effort of rational deliberation on one's use of freedom, on the ends and means of anticipated social practice, *planning*. Whenever there is freedom to plan, claims to rationality will therefore inevitably involve the problem of practical reason. If such claims are disputed, it will be of no avail for the systems planner to seek refuge in references to theoretical reason, e.g., with the common arguments that he "merely" provides tools for those legitimately in control of purposes (cf. Ulrich, 1983, p. 25) or that the critic is not knowledgeable or expert enough with respect to the system in question (Ulrich, 1983, p. 309).

2.2. Practical vs Subjective Reason

A second way to introduce the concept of practical reason is by contrasting it with the concept of *subjectively* rational action. This approach is less customary but has the advantage of starting from our daily experience that our personal freedom of choice may conflict with that of others and of taking us from there immediately to the current change of paradigm in practical philosophy.

Subjectively an individual acts rationally if his ends are in agreement with his standards of value *and* if he efficiently utilizes the means at his disposal to achieve these ends. The two conditions mentioned correspond to

Max Weber's "ideal types" of rational action, "value-rationality" (*Wertrationalität* = convergence of purposes and values) and "purposive-rationality" (*Zweckrationalität* = adequacy of means in regard to purposes). Together they are constitutive of the *utilitarian concept of rationality*. This type of rationality is oriented toward the success of one's actions, whereby ends are assumed to be given and "success" is measured in terms of cost–benefit analysis. It clearly belongs to the dimension of theoretical reason. Because theoretical reason here serves an instrumental purpose with respect to given ends rather than a theoretical interest in gaining knowledge, Max Horkheimer (1967) has aptly called it *"instrumental" reason*.

In practice, subjectively rational action tends to produce consequences that affect individuals not involved in the underlying decision. Their way of being affected need not correspond to *their* standards of value; the action in question may appear "irrational" or unreasonable to them. Hence any action the consequences of which are not certain to remain limited to those involved —in one word, any action that is *not strictly "private"*—sees itself faced with the question, How can the involved claim rationality for their action even though not all the affected may benefit or agree with the costs imposed upon them, and some may seriously be harmed? How can *conflicts of interests* among the involved and the affected be resolved "with reason," i.e., by argumentative processes of consensus-formation rather than by resort to power and deception?

Rationality that meets the intent of this question is what contemporary practical philosophers call *practical reason*. In addition to the two conditions constitutive of the utilitarian concept of rationality, practical reason requires that the standards of value of all the affected—be they involved or not—converge. And since the group of those actually or potentially affected can never be delimited in advance with certainty, this third condition entails the previously mentioned requirement of the *generalizability* of the standards of value ("norms") underlying the action in question.

Now we have already seen that a logical principle of ethical generalization is not available. Hence another type of "logic" is needed. Kant invented one such logic, his "transcendental logic"; contemporary practical philosophy instead relies on a *pragmatic (or "language-pragmatic") logic of argumentation*. We need only familiarize ourselves with a few basic points in order to be able to understand the major implications of this shift of perspective for systems practice.

2.3. The Language-Pragmatic Turn of Practical Philosophy

The change of paradigm distinctive of contemporary philosophy is accurately designated "language-pragmatic."

(a) Philosophers no longer conceive of rational action, as did classical philosophy, from the point of view of the subjective consciousness of an abstract and lonely individual but, rather, in terms of specific contexts of *social action*. Social action, in distinction to nonsocial, is conceived as depending for its success on constructive interpersonal relationships with others and on taking account of their intentions. Hence *language* becomes important as the medium of communicative experience and action.

(b) As a consequence of item a, the question arises of what constitutes "the peculiarly unforced force of the better argument" that we have earlier invoked as a rationality criterion. In distinction to the syntactic-semantic approaches to the analysis of language in the tradition of analytical philosophy, practical philosophy cannot reduce the scope of analysis to the syntactic and semantic levels of communication. The force of arguments can be grasped only at a *pragmatic* level, by considering their meaning and significance to human agents in specific contexts of social action. (If it were otherwise, computers could "argue" with each other.) That is, argumentative power is a matter not of deductive-logical modalities such as consistency/contradiction or necessity/impossibility but, rather, of the pragmatic modality of *cogency*.

An argument to the validity of some "fact" or "norm" is *cogent* not if it is logically conclusive (necessary)—as would be the case at the syntactic level—but if it is logically possible (that is, the facts or norms it asserts can be backed by reference to undisputed empirical findings or shared needs and values, rather than being contradicted by them) *and* if the discourse participants can be rationally motivated, by virtue of the backings, to recognize it as valid (cf. Toulmin, 1964; Habermas, 1973c; Ulrich, 1983, p. 137ff). Hence comes the need for a *pragmatic logic of discourse* that would allow us to distinguish rationally motivated ("rational") from merely factual consensus.

As a consequence of the language-pragmatic turn, rationality claims can no longer be established "monologically" but only "dialogically," in a discourse that meets the requirements of the pragmatic logic of argumentation. Whereas rational critical debate about theoretical validity claims has a long tradition in the scientific community, the shift to a communicative paradigm has major implications for the applied disciplines in dealing with normative (especially ethical and political) issues.

2.4. Implications for Systems Practice

(a) "Systems rationality" thus far has been conceived *one dimensionally* (Marcuse, 1964) in terms of functionalist, utilitarian reason. Just like Max Weber, Karl Popper, Max Horkheimer, and a majority of other scholars, most systems scientists have succumbed to a *fundamental confusion of nontechnical rationality with irrationality*.

Table I. Two Concepts of Rationality

Aspect	Concept of rationality	
	Utilitarian	Communicative
Concept of action	Nonsocial action	Social action
Fundamental category of practice (Habermas)	Work	Interaction
Dimensions of rationality considered	*Subjective rationality* 1. Value-rationality (of ends) 2. Purposive-rationality (of means)	*Social rationality* 1. Rationally secured consensus on norms of action 2. Choice of ends conforming to 1 3. Choice of means conforming to 1 *and* purposive (effective and efficient) with regard to 2
Ideal type of rational action (M. Weber)	Purposive-rational action (in regard to given ends)	Socially rational action (with regard to socially acceptable norms)
Perspective of . . .	Those involved	Those involved *and* those affected

Underlying concept of reason (Kant)	*Theoretical reason* (or instrumental)	*Practical reason*
Methodological problem	Theoretical validity ("truth") of nomological hypotheses on causal (means–end) relationships (generalization of empirical observations)	Practical validity ("rightness") of norms of action (generalization of subjective standards of value)
Basic formal theory	Decision theory (theory of rational choice)	Discourse theory (theory of undistorted communication)
Root paradigm of basic theory	Cost–benefit analysis (utilitarian calculus)	Rationally motivated consensus (pragmatic logic of argumentation)
Underlying ethics	Utilitarian ethics	Communicative ethics

(b) It is probably this confusion which has prevented us from fully realizing the fact that the "objective" instrumental rationality of our tools and the merely "subjective" rationality of ordinary citizens contesting the life-practical consequences that our rationality may impose upon them share a common difficulty: neither meets the standards of practical reason.

(c) The only way to meet these standards is by unfolding "one-dimensional" systems rationality into a *two-dimensional understanding of rational systems practice*. The "monological," utilitarian dimension is to be complemented by the communicative dimension of rational practice. (See Table I for an overview of some defining aspects of the two dimensions.)

(d) The *language-pragmatic* turn of contemporary practical philosophy offers us a key to conceiving of this second dimension in well-defined terms of rational discourse. Although the ideal of completely rational discourse will always remain counterfactual, the pragmatic logic of discourse at least gives us stringent criteria of critical reflection on (and improvement of) the procedural and institutional conditions of decision making.

(e) Finally, because in practice the two dimensions of rationality will frequently be in conflict with each other, it is not sufficient to "welcome" the idea of communicative in addition to functional rationalization of systems. It is indispensable to demonstrate exactly how practical reason can be practiced *without* presupposing that those affected by a decision are always willing or able to subject themselves to the rationality standards of rational discourse. In this respect, a research program for system practice must go beyond the actual state of practical philosophy and *develop practicable ways of mediation between the divergent requirements of cogent argumentation* (on the part of the involved) *and democratic participation* (on the part of the affected).

3. SYSTEMS PRACTICE GROUNDED IN PRACTICAL PHILOSOPHY: A THREE-LEVEL CONCEPT OF RATIONAL SYSTEMS PRACTICE

In his *Theory of Communicative Action*, Habermas (1981, p. 384) has developed a simple but analytically powerful taxonomy of action (Table II). Habermas starts with two basic orientations that correspond to the two concepts of rationality thus far introduced: "*success-oriented action*" refers to the utilitarian paradigm of purposive-rational action; "*consensus-oriented action*" to the communicative paradigm of action based on norms acceptable to those affected. The distinction is akin to his earlier discussion of two fundamental dimensions of practice, the dimensions of "work" and "interaction" (1971b). Rationalization of these two domains implies two entirely different concepts of rationality: rationalization of "*work*" implies an expansion of technical control over objectified processes, while rationalization

Table II. Types of Action According to Habermas

	Orientation	
Situation	"Success oriented" (own interest)	"Consensus oriented" (mutual understanding)
Nonsocial	Instrumental action	—
Social	Strategic action	Communicative action

of "*interaction*" implies an expansion of argumentative means for resolving conflicts of interests and needs through mutual understanding, which amounts to an expansion of control over the domination of men by men (power). The point is not primarily that the interactive dimension of rational practice is different but that it exists: philosophers of science of all schools, from Max Weber to Max Horkheimer as well as to Karl R. Popper, have succumbed to the earlier-mentioned confusion of nontechnical rationality with nonrationality.

Habermas now refines this earlier distinction by adding a second distinction, that between situations of action in which interpersonal relationships do and do not play a role ("*social*" vs "*nonsocial action*"). Cross-tabulating the two distinctions yields *three basic types of action*, one referring to nonsocial action and the remaining two to social action.

It seems to me that this taxonomy offers itself as a systematic framework of *three complementary levels of systems practice*, each of which requires its own concept of systems rationality (Table III).[3] The three levels of systems practice thus gained are roughly parallel to the three levels of planning distinguished by Erich Jantsch (1975, p. 209ff) in his "*vertical integration*" approach to planning: operational (or tactical), strategic, and normative planning.[4]

[3] My understanding of the three levels is inspired partly by a similar effort by my brother Peter Ulrich (1988) to explore some implications of Habermas' three types of action for a critically normative theory of business administration. Close parallels are to be expected since management theorists have been similarly blind on their "communication-theoretical eye," as have systems scientists, in conceiving of rational concepts and tools of business administration.

[4] My own earlier comparison of three major systems paradigms (Ulrich, 1981, p. 38, 1983, p. 333) might also be useful to characterize the intent of the three levels of systems rationalization. The three systems paradigms in question were defined in terms of their underlying root metaphors ("machine," "organism," or "polis") and of their implied design ideals ("purposiveness," "viability," or "purposefulness"). The original machine paradigm of cybernetics with its focus on regulatory issues is still an effective design ideal at the instrumental level of systems rationalization; the shift of interest to strategic issues of systems management has necessitated a change from the mechanistic to the contemporary "evolutionary" paradigm of cybernetics and systems theory; and the growing interest in more radical approaches to systems management —approaches that would deal critically with the repercussions of functional (instrumental and strategic) systems rationalization on the social life-worlds of those affected—will require a breakthrough to a critically normative paradigm such as the one suggested in *Critical Heuristics*, a paradigm that can deal with the communicative dimension of systems rationalization.

Table III. Three-Level Concept of Rational Systems Practice

Level of action (type of situation)	Orientation	Core problem	Level of systems rationalization (type of systems rationality)
Social	Critically normative ("consensus")	Social integration of conflicting interests (*management of conflict*)	Communicative rationality
Social	Functional ("success")	Effective steering of complex systems (*management of complexity*)	Strategic rationality
Instrumental (nonsocial)	Functional ("success")	Efficient use of scarce resources for given ends (*management of scarceness*)	Instrumental rationality

Similarly to Jantsch (although with a different purpose in mind), I think that the usual way of presenting systems thinking as an interdisciplinary effort to "*sweep in*" different strands of knowledge and world views through a process of "*horizontal integration*," as it were, needs to be differentiated in terms of a multilevel concept of systems rationality.[5] Only thus can we hope to overcome the currently dominant one-dimensional concept of systems rationality and to integrate systematically within our framework of rational systems practice the communicative dimension opened up by contemporary practical philosophy.

Let us then briefly describe the three levels so as to render clear their respective importance for systems practice—for a systems practice that

[5]It is unfortunate that "vertical" thinking has become almost exclusively the hallmark of reductionistic systems thinking, e.g., in Herbert A. Simon's (1962, 1969) hierarchy theory of complexity. From a systems point of view, vertical thinking is more of interest because of those emergent systems qualities (including the communicative dimension of social systems) that cannot be grasped and "explained away" in the functional terms of the lower ontological levels. As a counterpart to Simon's brilliantly exposed "Architecture of Complexity," see Feibleman's (1954) "Theory of Integrative Levels," an equally terse statement of the position of non-reductionistic hierarchy theory of complexity. Compare, also, Churchman's counter-position as summarized in a fictive debate with Simon (Ulrich, 1987a). In any case it should be clear that in calling for a multilevel concept of systems rationalization, I do not intend ontological reductionism but methodological pluralism.

would really *practice* the systemic idea of comprehensiveness.[6] Due to page constraints, I limit the discussion to some very general comments on a few key aspects summarized in Table IV.

3.1. Level 1: Operational Systems Management

> One of the most important characteristics of any methodology is its limitation.
>
> S. P. Nikaranov (1965)

This is the level of nonsocial, *instrumental* action. It is concerned with the efficient employment of *things* rather than the development of interpersonal relationships. It is the genuine field of application for the problem-solving and planning techniques grown out of World War II *operational research* efforts: quantitative techniques of systems modeling and optimization which later have been embedded within systematic procedures of *systems analysis* (e.g., Smith, 1966; Quade and Boucher, 1968; Emery, 1969; de Neufville and Stafford, 1971; Quade *et al.*, 1978) and *systems engineering* (e.g., Goode and Machol, 1957; Gosling, 1962; Hall, 1962; Chestnut, 1967; Jenkins, 1969; Optner, 1973; Daenzer, 1976). An excellent historical account of these two strands of the systems movement has been given by Checkland (1978); thus I can be very brief.

The two traditions share an orientation that is better called *systematic* rather than *systemic*: they systematize the problem-solving process within a conventional framework of instrumental reasoning.[7] Ends have to be assumed to be "given" to systems from outside and cannot be questioned within this framework, except with respect to their purely functional implications for higher-level systems. The diversity of the specific modeling techniques developed cannot conceal the fact that they all ultimately rely on the same underlying model of rational choice, *cost–benefit analysis*, whereby costs and benefits arising outside the boundaries of the system to be optimized are disregarded as "external" costs or benefits. The underlying model of theory-practice mediation[8] is *decisionistic*; it adopts Weber's means–end

[6] Compare the quotation from Kant (1787, p. 825) that serves as the motto of this paper.

[7] An exception holds partly true for the RAND and IIASA approaches to systems analysis (Quade and Boucher, 1968; Quade *et al.*, 1978). More than other approaches they emphasize policy considerations and, in this respect, overlap with the methodologies assigned here to the level of strategic systems management.

[8] See Habermas' (1971b, p. 62ff) distinction of three basic models of the relationship between questions of "fact" (theory, science) and questions of "values" (practice, politics), the decisionistic, technocratic, and pragmatistic model. For a discussion of these models in a context of social systems design and, especially, a critical review of the rise and the implications of decisionism, see Ulrich (1983, p. 67–79, passim).

Table IV. The Three Levels of Systems Practice

Aspect	Level 1: operational systems management	Level 2: strategic systems management	Level 3: normative systems management
Dominating interpretation of systems idea	"Systematic"	"Systemic"	"Critical idea of reason" (Kant)
Strand of systems thinking (paradigm)	"Hard": mechanistic paradigm	"Soft": evolutionary paradigm	"Soft": critically normative paradigm
Dimension of rationalization	*Instrumental*	*Strategic*	*Communicative*
Main object of rationalization	Resources: means of production	Policies: steering principles	Norms: collective preferences
Crucial task of the expert	*Management of scarceness*: how to allocate resources in view of scarceness	*Management of complexity*: what policies to pursue in the face of uncertainty	*Management of conflict*: whose interests to be served given conflict of needs and values
Type of problem pressure	Costs	Change	Conflict
Basic approach	Building up potentials of productivity (optimization)	Building up strategic potentials of success (steering capacities)	Building up potentials of mutual understanding (consensus)
Criterion of good solution	"Efficient"	"Effective"	"Ethical"

Characteristic model of theory-practice mediation	Decisionistic: expert adopts ends given by decision maker	Technocratic: expert discloses necessities of the system to the decision maker	Pragmatistic: expert seeks consensus with those affected
Key disciplines			
(a) Formal	Decision theory	Game theory	Discourse theory
(b) Empirical	Economics and engineering	Ecology and social sciences	Ethics and critical theory
Examples of specific tools	Cost–benefit analysis, linear optimization models	Sensitivity analysis, large-scale simulation models	Purposeful systems assessment, ideal planning
Major trap to be avoided	Suboptimization	Social technology	Ideal standards of rationality excluding the affected

schema which is distinctive of *"hard" systems thinking* (cf. Checkland, 1978, p. 109, and Ulrich, 1983, p. 329). In fact not only ends but also problems are assumed to be given; the crucial task of the systems analyst is seen in *problem decomposition* so that complex systems are divided into smaller ones that are easy to control. In sum, the focus is on what Habermas (1971a, p. 309) has designated the *interest in technical control* over objectified processes of feedback-monitored instrumental action.[9]

Even so these techniques may be of considerable value to social planners and decision makers faced with problems of the *management of scarceness*, that is, efficient allocation of scarce resources. These may include intellectual and organizational capacities of project management: NASA's Apollo-Moon Project may be cited as an almost ideal-typical example of the power of this kind of systems management. As long as it is employed within its proper field of application and with a clear understanding of its inherent limitations originating in the underlying concept of rationality, this operational or instrumental level of system rationalization will remain an indispensable part of systems practice. It is in order to take into account the limitations in question that an adequate framework of systems practice must conceptualize at least two additional levels of systems rationalization, the "strategic" and the "normative" levels.

3.2. Level 2: Strategic Systems Management

> Human systems are different.
>
> Sir Geoffrey Vickers (1983)

The strategic dimension of systems practice comes up when the success of an agent's decision is contingent upon the decisions of other agents, each of whom pursues his own interest or, as we have earlier said, his own subjective rationality. As may be seen from Table III, this situation lends itself to two different types of rational action.

Strategic action shares with purely instrumental action a utilitarian orientation toward *success* in maximizing one's own interest. The underlying concept of systems rationality remains functional even where the subjective intentions of human agents are taken into account, for the functioning of the system of interest remains the crucial point of reference. (As far as ethical,

[9] Extensive critical discussion of "hard" systems thinking is given by, apart from the sources already mentioned, e.g., Hoos (1972), Checkland (1981), Jackson (1985), and Jackson and Keys [(1987); see especially, Chap. 1 by Keys and Chap. 8 by Jackson] and is, of course, also implied in the writings of Churchman (e.g., 1968a, b, 1971, 1979, 1981).

political, or other normative concerns are considered, they are typically understood to fall outside the range of "rational" argumentation.)

Communicative action, in contrast, is oriented toward *mutual understanding*, and its concept of systems rationalization *includes* the search for rationally motivated consensus on the normative implications of systems designs or interventions.

In both cases there may be a conflict of interests between the parties concerned. In both cases, too, there is a conscious attempt to deal rationally with the conflict. The difference lies in the point of reference for determining the rationality of alternative policies: in strategic management, the point of reference is "the system;" in "communicative" management it is the shared (generalizable) interests of all those actually or potentially affected. Thus strategic systems management is concerned with the *management of the complexity and uncertainty* that is distinctive of situations in which the actions of third parties coproduce the system's outcome and hence ought either to be predicted or to be influenced; but only communicative action at the level of normative systems management is oriented toward the *management of conflict* by means of argumentatively secured mutual understanding.

In the case of strategic action, the immediate orientation toward results and efficiency that is distinctive of instrumental action must be replaced by an orientation toward securing "strategic *potentials* of success," i.e., systems capabilities of self-regulation, resilience, and innovative adaptation in the face of turbulent environments (Emery and Trist, 1965). Strategic management has therefore been understood as "evolutionary management" (e.g., Jantsch, 1975; Malik and Probst, 1982). The focus on problem decomposition and control is replaced by a focus on *problem identification and understanding* with a view to basic policy decisions that will minimize surprise and lost opportunities. To that end, decision-making tools not only need to be capable of processing and condensing a large variety of data about both intrasystemic and environmental interdependencies, but also should help managers to recognize and understand "weak signals" (Ansoff, 1975).

It is with regard to this task of complexity management that systems practice has seen its most impressive development in the past decades. Simulation techniques, cybernetic modeling, the theory of games, the "key factors of success" approach, and portfolio management—to name only a few basic approaches—have considerably expanded our understanding and sensitivity regarding the requirements of complex sociotechnical, socioeconomic, or socioecological systems. Out of these approaches have grown specific tools and concepts that have become widely known and applied: Forrester's "system dynamics" technique for large-scale simulation (1971) has become popular through the Club of Rome's report on the *Limits of Growth* (Meadows *et al.*, 1972). Ashby's (1956) "law of requisite variety" has

been of tremendous importance for the cybernetic understanding of complexity management and has found an impressive application in Beer's (e.g., 1972) "managerial cybernetics," which has now been developed into a method for the cybernetic diagnosis of organizations (Beer, 1985). Neumann and Morgenstern's (1944) theory of games has become a core paradigm of strategic thinking, best known as the "prisoner's dilemma" described by Rapoport (1960), and has even become influential in the development of ethical theory (Rawls, 1971). As a final example, Frederic Vester's "cybernetic sensitivity model" (Vester and Hesler, 1980) has combined classical sensitivity analysis with bio-cybernetic modeling so as to provide a tool for "systems compatibility assessment," in distinction to conventional environmental impact assessment.[10,11]

These tools, and many more that must remain unnamed, burst the narrow cost–benefit calculation scheme of conventional systems analysis in favor of a truly *systemic* perspective. Strategic systems thinking overcomes the "technological imperative" and the "environmental fallacy" so well described by Churchman (1979, p. 4ff) as the common but inadequate way of dealing with complex social problems.

Fritjof Capra's (1982) widely read book, *The Turning Point*, has made it popular knowledge that the *change of paradigm* from "linear" to systemic thinking pioneered by the systems movement is now gaining ground in almost all fields of knowledge. It seems to me that this change of paradigm, as formulated by Capra, is characterized by the step from the first to the second level of our three-level concept of systems rationality—which is also to say that the social dimension of truly rational systems practice is not yet adequately captured. The social dimension will be adequately grasped only by breaking through the bounds of functional (including ecological) systems

[10] A computerized version of the model is presently developed by NIXDORF Computers Inc., Switzerland, and UNICON Management Systems GmbH, Meersburg, Germany. Since the model is hardly known in the English speaking world, Professor Vester, at my request, has agreed to present it to the readers of *Systems Practice*. His contribution will be included in the journal's first special issue, scheduled to be published as No. 4 of the first volume.

[11] The reader will have noticed that I have not mentioned the specific "soft" systems approaches of Churchman, Ackoff, and Checkland. In fact I do not subsume them under the strategic type of rationality. Although in their present form they may not meet all the requirements of communicative rationality established by Habermas' pragmatic logic of discourse [as Jackson (1982, 1985) has argued], they certainly do have a potential for contributing to communicative systems rationalization—no less than Habermas' ideal model of discourse, which in practice cannot secure rational consensus either. In addition, their orientation toward a dialogical, interpretive understanding of systems practice clearly distinguishes them from the decision-theoretical and natural-science orientation of cybernetic modeling, game theory, and other concepts of strategic rationalization. For these reasons, I consider them at the level of normative systems management.

rationality and considering the level of communicative systems rationalization. To that end, the still dominating natural-science orientation of Capra's "holistic" systems paradigm will have to be complemented by an orientation toward the cultural and social sciences, as well as toward a grounding in practical philosophy.

Our framework thus suggests that the further development of the systems movement will depend on its readiness to pioneer yet another change of paradigm, the change from today's biologically inspired systems concept (with its root metaphor of the functioning organism or the ecological community) to a systems concept that would be inspired by practical philosophy's *emancipatory utopia* of a community of autonomous and responsible citizens. In view of the steadily increasing gap between the scientifically informed rationality of our systems designs and the practically experienced social *ir*rationality of many of their repercussions upon our daily social life-world, the reproach of "utopianism" is no longer justifiable: the utopia becomes the only means today for maintaining the social and democratic achievements of the past.[12]

3.3. Level 3: Normative Systems Management

> The capacity for *control* made possible by the empirical sciences is not to be confused with the capacity for *enlightened action*. . . . The scientific control of natural and social processes—in one word, technology—does not release men from action. Just as before, conflicts must be decided, interests realised, interpretations found—through both action and transaction structured by ordinary language.
>
> Jürgen Habermas (1971b, p. 56)

While strategic systems thinking takes account of the subjective rationality of other agents coproducing its outcome, it does so with an eye to the effective steering of complex systems (management of complexity) rather than to the ways in which the interests of others may be touched (management of conflict). Its orientation is utilitarian, not communicative. This is not to say that strategic thinking is necessarily ethically reprehensible; management of complexity is a necessary condition of socially rational decision making. But the most sophisticated tools of complexity management will not free us from having to decide upon the interests or needs that are to be served by the systems in question, and that will always mean to decide among *conflicting* needs and interests.

[12] In the ideal of practical reason, systems rationality and social rationality converge. See Ulrich (1983, p. 294ff) for a discussion of the dialectic of systems rationality and social rationality from the point of view of a critically normative systems approach.

It is at this point that the second, communicative dimension of rationality comes into play. As long as systems thinking remains oriented toward a one-dimensionally functional understanding of rationality and does not *systematically* include the communicative dimension of social action, it will imply not a gain of social rationality but only an expansion of systemic *control* over social processes (*social technology*). Whether or not this enlarged capacity for control will be used for enlightened action toward improvement of the human condition remains (at best) an open question.

Let us briefly consider an example, the concept of *open systems*. When systems are strongly interconnected with their environment, it is advisable from a strategic systems point of view to treat them as open systems that cannot be completely controlled by the decision maker. Now there is a widespread belief that open systems models are more conducive to socially rational decision making than are closed systems models. "Open," in contrast to "closed," systems models consider the social environment of the system; but so long as the system's effectiveness remains the only point of reference, the consideration of environmental factors does nothing to increase the social rationality of a systems design. In fact, if the normative orientation of the system in question is socially irrational, open systems planning will merely add to the socially irrational effects of closed systems planning. For instance, when applied to the planning of private enterprise, the open systems perspective only increases the private (capital-oriented) rationality of the enterprise by expanding its control over the environmental, societal determinants of its economic success, without regard for the social costs that such control may impose upon third parties.

Generally speaking, a one-dimensional expansion of the reach of functional systems rationality that is not embedded in a simultaneous expansion of communicative rationality threatens to pervert the *critically heuristic purpose of systems thinking*—to avoid the trap of suboptimization and to consider critically the whole-systems implications of any system design—*into a mere heuristics of systems purposes*. This means that it is no longer "the system" and the boundary judgments constitutive of it that are considered as the problem; instead, the problems of the system are now investigated (cf. Ulrich, 1983, p. 299).

It is against this danger that I have been advocating a *critically normative systems approach* (e.g., Ulrich, 1981b, c, 1983, 1984, 1987b, 1988). I suggest that we call a methodology "critically normative" if it offers methodical help not only in formulating and justifying theoretical or practical propositions but also in rendering transparent the normative implications of these

propositions in an envisaged context of application.[13] The point is, of course, that *no standpoint, not even the most comprehensive systems approach, is ever sufficient in itself to validate its own implications.* Hence a definition (map, design) of a system can be called "objective" only inasmuch as it makes explicit its own normative content; whether or not it does so cannot be established "monologically," by reference to the expertise of the involved, but only communicatively, by reference to the free consent of those affected (cf. Ulrich, 1983, pp. 306, 308ff). Thus a critically normative systems approach will, of necessity, be a communicative approach.

Practically speaking, a critically normative approach will have to face at least *three basic challenges.*

(1) Simply "adding on" critically normative reflection to instrumental and strategic reasoning will not be enough. *Critically normative reflection must not remain extrinsic to systems thinking and systems practice,* e.g., in the form of occasional decisionistic appeals to the moral responsibility of systems planners. Rather, it must become an intrinsic part of our understanding of systems rationality. That is to say, it must be conceptualized *in genuinely systemic terms.* To that end, we shall have to go back to the genuinely critical intent of the systems idea in Kant's philosophy. Some philosophical competence *within* the systems community will be indispensable.

(2) Habermas' pragmatic logic of discourse implies that not *any* sort of debate will allow the systems planner to claim communicative rationality for his designs. In order to maximize chances for the *free* consent of concerned citizens—or what Habermas calls rationally motivated consensus—it will be imperative to arrange for, and cultivate, processes of maximum *undistorted communication,* i.e., communication in which the force of the better argument gets a chance to prevail over other forces (cf. Section 2).

Practically speaking, we, nevertheless, shall have to make allowance for the fact that Habermas' model of discourse describes an *ideal*; it cannot make the ideal real. We cannot expect a practicable model of critical debate to secure complete rationality; we can only seek to lay open its inevitable *lack* of complete rationality. It follows that we should not require systems methodologies to be able to secure the conditions of unconstrained discussion, as Jackson (1982, p. 25) demands in his forceful critique of the "soft" systems

[13] Recently a growing number of management scientists (especially in Great Britain) appears to be prepared to help develop a critical management science in the sense intended by my definition. See, e.g., Jackson (1982, 1985, 1987), Keys (1987), Rosenhead (1982, 1984, 1987), and Tinker and Lowe (1984). Compare, also, the series of debates between Bryer (1979, 1980) and Churchman and Ulrich (1980; also Ulrich, 1981a); Christenson (1981) and Churchman *et al.* (1981); Ulrich (1981b) and Beer (1983); and Jackson (1982, 1983) and Ackoff (1982), Checkland (1982), and Churchman (1982).

methodologies of Churchman, Ackoff, and Checkland [cf. also their replies: (Churchman, 1982; Ackoff, 1982; Checkland, 1982)]. Quite to the contrary, *the systems movement will make a real contribution toward communicative systems rationalization if it puts the systems idea to work on the job of dealing critically with conditions of imperfect rationality.*

There is, for instance, the important task of training ordinary citizens, planners, and decision makers in tracing the normative implications of designs, e.g., by explicating the kinds of boundary judgments (or whole-systems judgments) that usually flow into the definition of a system. Under the guise of expertise and rationality, these whole-systems judgments (if unchallenged) may provide an unequal distribution of decision power in systems. Or they may make someone other than the declared client the real beneficiary of a plan, etc. Should not systems practitioners be at least as sensitive as, say, practical philosophers, to the unavoidability of such whole-systems judgments and to the fact that no amount of expertise of theoretical competence is ever sufficient to justify all the judgments on which recommendations for action depend? (cf. Ulrich, 1983, p. 306). It seems to me that the soft systems methodologies do indeed have a contribution to make here.

(3) Finally, let us not forget that neither systems methodology nor any other kind of methodology can ever supersede the need for democratic legitimation of decisions affecting others than those involved. It is not a sign of insufficient comprehensiveness or rationality to avow that one's procedural arrangements for critical debate remain dependent for their effectiveness on democractically secured *institutional arrangements.* Methodology cannot replace ongoing efforts at institutionalizing, in all domains of socially relevant decision making, democratic participation and majority vote among sovereign and equal (not "equally rational!") citizens, according to Abraham Lincoln's principle: "government of the people, by the people, for the people." In this respect, *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.

In *Critical Heuristics* (Ulrich, 1983), I have sought to lay out the epistemological foundations for a critically normative systems approach that would take due account of such practical limitations on complete rationality. Critical heuristics does not pretend to secure an objective solution to the problem of practical reason; it aims at a merely *critical solution.* A critical solution does not yield any "objective" justification of normative validity claims. It prevents us, rather, from submitting to an objectivist illusion regarding such claims, by helping us to become self-reflective with respect to the normative implications of *any* standard of rationality (cf. Ulrich, 1983, pp. 20, 176, passim).

This is not, of course, the place for an adequate introduction to critical heuristics or to any other systems methodology that might conceivably contribute to communicative systems rationalization. As in the case of the previous levels, I must content myself with pointing to a few major concepts and tools that the systems movement has brought forth so far.

In comparison with the instrumental and strategic strands of the systems movement, the critically normative strand has, of course, hardly begun to develop a basic array of well-defined concepts and practical tools. Apart from Kant's original presentation of the systems idea as an "unavoidable" critical idea of reason (cf. Ulrich, 1983, p. 222ff, passim), I would like to mention Churchman's (1968a, p. 4ff, 1979, Chaps. 6, 9) "ethics of whole systems," Jantsch's (1975, p. 209ff) earlier-mentioned concept of "vertical integration" (or "vertical centering"), Checkland's (1981, p. 166ff) concept of "root definitions," Mason and Mitroff's (1981) "assumptional analysis," Ackoff's (1974, pp. 26, 29) and Churchman's (1979, pp. 65, 106) concept of "ideal planning," and the related concept of a "process of unfolding" [of whole systems judgments (Churchman, 1979, pp. 80, 82, passim; Ulrich, 1983, Chap. 5)]. Perhaps I may also refer to some key concepts of critical heuristics, apart from the before-mentioned concept of a (merely) "critical solution" to the problem of practical reason, e.g., the concept of "*a priori* (vs *a posteriori*) judgments of practical reason" (Ulrich, 1983, pp. 166, 190f, 266, 278), the understanding of "argumentation break-offs" as boundary judgments (Ulrich, 1984, 1987b), and the concept of the "polemical employment of boundary judgments" [or whole-systems judgments (Ulrich, 1983, p. 305ff, 1987b)]. As a practical tool relying on these concepts, I have sketched out a "purposeful systems assessment" of designs with respect to their normative implications (Ulrich, 1983, p. 334ff). Finally, there is the hardly spelled-out idea of a "critically heuristic training of citizens" on the basis of such concepts (Ulrich, 1983, p. 407).

These, as well as additional concepts and tools, will need much further elaboration and practical testing. It is my firm conviction that in performing this task, we shall considerably benefit from taking up the current state of the art in practical philosophy. We should systematically probe its implications for a *critical* employment of the systems idea, as well as the implications of the systems idea for *practicing* the idea of practical reason.

4. CONCLUDING REMARKS

The three-level framework presented in this paper is meant, first, to give us a general sense of direction for further advancing the systems movement; second, to provide impetus for debate on a program of research toward socially

rational systems practice; and third, to facilitate this task by distinguishing three points of attack for critical systems thinking.

(a) At the level of operational systems management, the challenge is to lay open, in each application of systems tools, the limitations and normative implications of instrumental rationality, *without* therefore relaxing our efforts at ever more efficient management of scarceness (a task that is vital as a prerequisite for achieving goals at the other levels of systems rationalization).

(b) At the level of strategic systems management, we must equally recognize the one-dimensionality of strategic social action that is not embedded in consensus-oriented communicative action while, at the same time, continuing to foster the systemic steering capacities that have become indispensable today for the effective management of complexity and uncertainty in our sociotechnical, socioeconomic, and socioecological systems.

(c) Finally, at the level of normative systems management, we must seek to procure the heuristic means for systematically tracing the normative implications of systems designs (or steering interventions) and cultivate settings of debate that are conducive to securing argumentative agreement about these implications with those affected by them.

Regarding the last-mentioned task, it is clear that a critically normative systems approach will need to go beyond the actual state of practical philosophy and to develop a *practicable*, although necessarily imperfect, model of practical discourse. On other occasions, I have sought to show that such a model must reconcile the conflicting demands of cogent argumentation (on the part of everybody involved) and democratic participation (of everybody affected). I have argued that the systems idea indeed provides the key to just this requirement. It must suffice here to refer the reader to the main sources (Ulrich, 1983, pp. 301–314, 1984, p. 333ff, 1987b).

I do not say that the task of integrating the communicative dimension of rationality will be easy. But if eventually we succeed, this will considerably ease the quest for rational systems practice, for it will *free the systems approach from the impossible (and elitist) pretension of securing a "monological" justification of rational practice.*

I am well aware of the fact that the program that I have sketched out is apt to raise more questions than it can answer. My only excuse is that a research program *is* supposed to formulate questions, not answers. I hope some of the issues raised will prove challenging enough to provoke further discussion.

If this hope is not entirely in vain, perhaps the day is not too far when systems practitioners, asked by young people about how to acquire methodological competence with regard to the pressing social problems of our time, will not have to give the kind of answer that the German satirist Karl Kraus is reported to have given to a student: "You want to study business ethics? Then decide yourself for the one or the other!"

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