Soft Systems Methodology

An Introduction

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This is a note for the lecture on Checkland's Soft System Methodology (SSM) held on March 29, 2000 on Department of Computer Science, Roskilde University. It is a short introduction to SSM based on two primary literature's,

- Checkland, Peter: *Systems Thinking, Systems Practice*. Chichester, West Sussex, UK, 1981, (referred to as SSM, 81), and

- Checkland, Peter, and Ji Scholes: *Soft Systems Methodology in Action*. Chichester, West Sussex, UK, 1990, (referred to as SSM, 90).

First some background for SSM is given followed by a description of SSM as described in (SSM, 81) and the revised SSM as described in (SSM, 90). SSM and the construction of Information Systems (IS) is briefly mentioned and, as a summary, a table of key concepts and techniques/guidelines is presented. Finally, the philosophy of SSM and the Work Analysis' critique of SSM is described.

Background

SSM was developed in the 1970s by Peter Checkland and others at Department of Systems, University of Lancaster. The SSM approach stems from the 'systems movement', which Checkland see as an attempt to give holistic approaches to problems, which the traditionally reductionistic approach within natural science has failed to solve. The systems movement can be located within disciplines as Biology, Ecology, Economics, Geography, Demography, Management (Operational Research), Engineering, and Cybernetics.

Checkland distinguish between 'hard' and 'soft' systems thinking within the attempt to use system concepts to solve problems.

Hard systems thinking is identified within Systems Engineering (as the traditional research strategy or design approach for engineers and technologists) and Systems Analysis (as the systematic appraisal of the costs and other implications of meeting a defined requirement in various ways).

> SE [Systems Engineering] is the totality of an engineering project in the broadest sense of that term; SA [Systems Analysis] is a type of appraisal relevant both to the decision-making which ought to proceed the setting up of any engineering project and to the early stages of such a project once it is started (SSM, 81, p. 138)

Hard systems thinking has the starting point in 'structured' problems and the assumption that the objectives of the systems concerned are well defined and consistent.

> [A]t the core of both SE and SA, is the single idea which links them, the idea that an important class of real-world problems can be formulated in the following way: there is a desired state, S_1, and a present state, S_0, and alternative ways of getting from S_0 to S_1. 'Problem solving', according to this view, consists of defining S_1 and S_0 and selecting the best means of reducing the differences between them. Thus, in SE, (S_1 - S_0) defines the

> 'need', or the objective to be attained, and SA provides an ordered way of selecting the best among the alternative systems which could fulfil that need. *The belief that real-world problems can be formulated in this way is the distinguishing characteristic of all 'hard' systems thinking*, whether it emerges from SE or SA. (SSM, 81, p. 138)
>
> All problems ultimately reduce to the evaluation of the efficiency of alternative means for a designated set of objectives. (Ackoff, 57[1] quoted from SSM, 81, p. 155)

Soft systems thinking has the starting point in 'unstructured' problems within social activity systems in which there is felt to be an ill-defined problem situation.

> It became clear that the present research was to be concerned not with problems as such but with *problem situations* in which there are felt to be *unstructured* problems, ones in which the designation of objectives is itself problematic (SSM, 81, p. 155)

Checkland refers to hard systems thinking as the 'optimization paradigm' while soft systems thinking is referred to as the 'learning paradigm' (SSM, 81, p. 258).

The core of SSM is to use and apply systems ideas developed within hard systems thinking in "soft" situations: in problem solving in the typically situation where management in an organization wants to improve a situation and the problems and the situation itself only can be stated in very general and vague terms. Hence SSM is an approach which in a systematic way tries to establish and structure a debate concerning actions for improving the problem situation.

> A main outcome of the work [...] emerges from research experiments as a system-based means of *structuring a debate*, rather than as a recipe for guaranteed efficient achievement. (SSM, 81 p. 150)

SSM is seen as a general problem-solving approach appropriate to human activity systems, where the starting point of the methodology does not take a problem or a need as given (SSM, 81, p. 191).

SSM 1981

SSM was in Checkland's book from 1981 (SSM, 81) summarized in a diagram with 7 stages which later literature often has referenced, see figure 1.

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1 Ackoff, R. L. (1957): "Towards a Behavioural Theory of Communication", in Buckley, W. (Ed.): *Modern Systems Research for the Behavioural Scientist*, Chicago: Aldine. 1968.

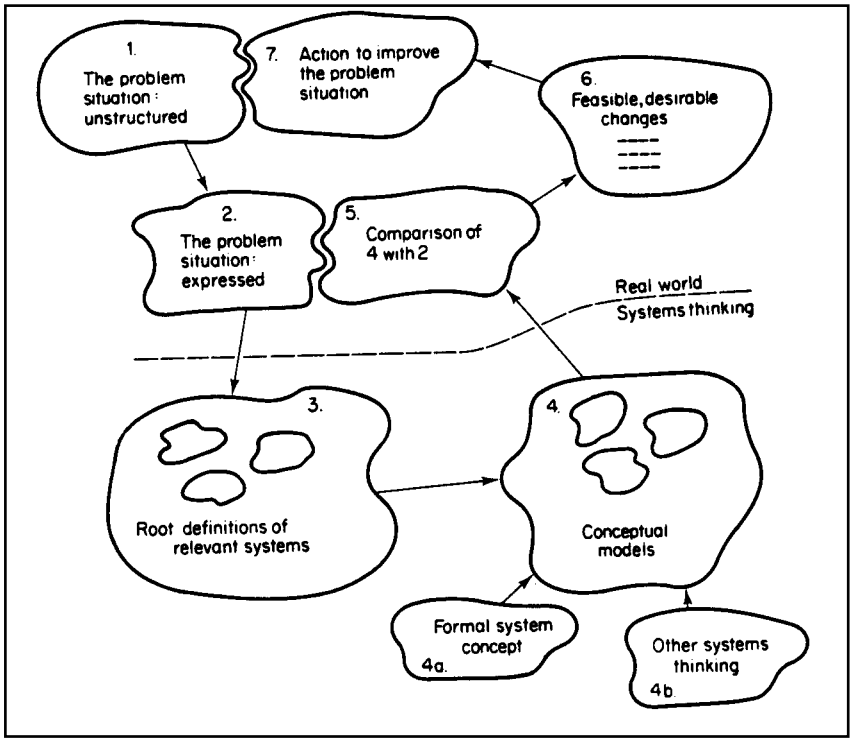

Figure 1: The methodology in summary (SSM, 81 p. 163)

It is emphasized, though, that SSM should not be treated as a technique (in terms of a recipe) or a method, but as a methodology.

> My sense of the word [methodology] here is that the outcome of the research is not *a method* but set of *principles of method* which in any particular situation have to be reduced to a method uniquely suitable to that particular situation. (SSM, 81 pp. 161f)

As indicated in figure 1, SSM deals with two kinds of activity, 'real-world' activities involving people in the problem situation and 'systems thinking' activities where the analyst (in some way) tries to abstract from the real world doing his systems thinking and where people from the problem situation may or may not participate.

In the following each of the 7 stages are described as an ideal stage by stage process. The person doing (or in charge) of the methodology is referred to as 'the analyst' even though this could involve people from the problem situation.

Stage 1 and 2

In stage 1 and 2 the analyst tries to develop the richest picture possible of the problematic situation. The function of these 2 stages is "*to display the situation so that a range of possible and, hopefully, relevant choices* [of relevant systems to be described in the following stages] *can be revealed*" (SSM, 81 p. 166).

Checkland does not provide any examples or descriptions of rich pictures in the book from 1981. Rich pictures are later (e.g. in SSM, 90) known as some kind of informal drawings (together with describing text).

Focus in stage 1 and 2 is recommended to be on relatively stable (slow-to-change) structures and on continuously-changing processes and the relationship between structure and process.

> 'Structure' may be examined in terms of physical layout, power hierarchy, reporting structure, and the pattern of communications both formal and informal. 'Process' may frequently be examined in terms of the basic activities of deciding to do something, doing it, monitoring both how well it is done and its external effects, and taking appropriate corrective action. (SSM, 81, p. 166)

Stage 3

In stage 3 the analyst moves from the real world to systems thinking.

Following the development of rich pictures of the problem situation the analyst now *chooses* one or more short descriptions (typically 3-10 lines of text) of the real world to model in the succeeding stage. This is referred to as 'root definitions' of relevant systems (SSM, 81 pp. 166ff).

As a guideline for making the root definitions Checkland present the mnemonic 'CATWOE', which describes 6 elements that the root definition ought to include (SSM, 81 pp. 224ff):

- C: the Customers of the system referring to the interest groups who are the beneficiaries or victims within and/or without the system and who are affected by the systems activities.
- A: the Actors within the system who carry out or cause to be carried out the main activities of the system.
- T: the Transformation process by which the inputs to the system are transferred into defined outputs.
- W: the Weltanschauung or perspective from which the root definition is seen.
- O: the Owners of the system who have the ultimate power to cause the system to cease to exist.
- E: the Environmental constraints on the system that to a large extent has to be taken as 'given' and difficult to influence, affect, and change.

The CATWOE guideline has a logical connection to the formal systems model in stage 4a that is used as a checklist to the model of the system.

Stage 4

For each root definition the analyst makes a conceptual model. The conceptual model "is simply the structured set of activities which logic requires in a notional system which is to be that defined in the root definition." (SSM, 81 p.170).

> [I]t may be described in terms of its 'state' by describing the elements which comprise it, their current condition, their relationships with external elements which affect the system, and the condition of these external elements.
>
> Alternatively we may provide a systems description by regarding a system as an entity which receives some inputs and produces some outputs; the system itself *transforms* the inputs into the outputs. (SSM, 81 p.169)

The description of the conceptual model takes the form of a drawing with each activity described in a few words depicted in a 'bubble' and with arrows connecting the bubbles showing logical relationships. An order of the activities may be indicated with numbers in the bubbles. As a technique it is suggested to base the activities in the conceptual model from the verbs which could be used to describe the system.

> Because the conceptual model is a model of an *activity* system its elements will be *verbs*.
>
> The 'technique' of modelling is to assemble the *minimum* list of verbs covering the activities which are *necessary* in a system defined in the root definition (SSM, 81 p. 170).

Stage 4a checks that the conceptual models are not fundamentally deficient, checking the model against a general model of any human activity system, Checkland's 'formal system' model. This could thus be regarded as Checkland's definition of a human activity system[2].

The components of the model are as follows (SSM, 81 pp. 173ff). S is a 'formal system' if, and only if:

1 S has an on-going purpose or mission.

2 S has a measure of performance.

3 S contains a decision-taking process.

4 S has sub-systems.

5 S has components which interact and shows connectivity.

6 S exists in wider systems and/or environments.

7 S has a boundary (from 6).

8 S has resources.

9 S has some continuity, and will recover stability after some degree of disturbance.

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[2] This model extends the 'summary of properties of systems' which Jenkings (1969) [G. M. Jenkings, "The systems approach" in *Journal of Systems Engineering*, 1 (1), 1969] proposed for systems defined as groupings of men and machines with an overall objective and characterized by an economic criterion which measures performance; and it follows the Antonomy of Systems Teleology' which Churchman (1971) [C. W. Churchman: *The Design of Inquiring Systems*, New York: Basic Books, 1971] presents as a definition of that sub-class which are 'teleological things, i.e. things some of whose properties are functional'. (SSM, 81 p.173)

Stage 4b. indicate that the analyst may use other system concepts (e.g. developed later than the description of Checkland's methodology) as a 'checklist'. The stage is thus meant to "make use of whatever systems concepts have by then been developed in order obtain further reassurance that the conceptual models are, if not strictly 'valid', at least defensible." (SSM, 81, pp. 176f)

The conceptual model(s) is the main product to use in the succeeding stages as the result of the systems thinking to structure the following debate concerning desirable and feasible changes. "Their purpose is *only* to generate a high quality discussion with concerned participants in the problem situation." (SSM, 81 p. 236)

Stage 5

In stage 5 the analyst leaves the systems thinking and initiates the debate concerning desirable feasible changes by setting up discussions which compares the models build in stage 4 with the problem situation expressed in stage 2.

> [...] parts of the problem situation analysed in stage 2 are examined alongside the conceptual models: this should be done together with concerned participants in the problem situation with the object of generating a debate about possible changes which might be introduced in order to alleviate the problem condition. (SSM, 81 p. 177)

Checkland describes the comparison as an confrontation of 'whats' with 'hows'[3]. The system models are abstract descriptions and describes activities which logically have to be performed in the system (whats) while the real world activities always will be one way of doing things, "one particular *how* related to a *what* which is usually implicit rather than explicit." (SSM, 81 p. 228). The purpose of the models is to question whether the activities from the models can be located in the real world, how well they are performed, if alternative ways of doing them could be suggested, etc.

Checkland presents 4 different ways of carrying out the confrontation (SSM, 81 pp. 178f):

1) Informal discussion.

2) Formal questioning.

3) Scenario writing based on 'operating' the models ("[...] reconstructing a sequence of events in the past [...] and comparing what had happened in producing it with what would have happened if the relevant conceptual models had actually been implemented").

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[3] This is comparable to Yourdon's distinguishing between 'physical' and 'logical' modelling (Yourdon, E.: *Managing the System Life Cycle*, Yourdon Press, New York, 1982) and Kensing and Munk-Madsen's distinguishing between 'concrete' and 'abstract' knowledge (Kensing Finn, and Andreas Munk-Madison: "Participatory Design; Structure in the Toolbox", in *Communications of the ACM*, no. 36, Vol. 4, 1993, pp. 78-85.)

4) Trying to model the real world in the same structure as the conceptual models (and hence compare).

Stage 6 and 7

Stage 6 and 7 concerns the implementation of the changes to improve the problem situation. In practice SSM is not as 'linear' as described here, as an ideal stage by stage process. Often iterations are done and the debate generated in stage 5 thus draws the attention back to the initial analysis and root definitions. Nevertheless the outcome of SSM should be the implementation[4] of 'desirable' and 'feasible' changes.

> [The defined changes] must be arguably systemically *desirable* as a result of the insight gained from selection of root definitions and conceptual model building, and they must also be culturally *feasible* given the characteristics of the situation, the people in it, their shared experiences and their prejudices. (SSM, 81 p. 181)

Checkland describes the possible changes within 3 categories: changes in (organizational) structures, in procedures (activities), and in 'attitudes' including e.g. changes in influence, expectations, roles, etc. (SSM, 81 pp. 180f).

SSM 1990

In the book by Checkland and Scholes (1990) an updated description of SSM is given based on "several hundred applications of the approach by a wide range of people and groups in many different countries" and "SSM is no longer perceived as a seven-stage problem-solving methodology" but "is now seen as one option in a more general approach" (SSM, 90 p. xiv) as outlined in fig 2

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4 By 'implementation' Checkland refers to carrying out the recommended changes in general. In IS-literature 'implementation' often refers to the construction, installation, and taken into use of information systems.

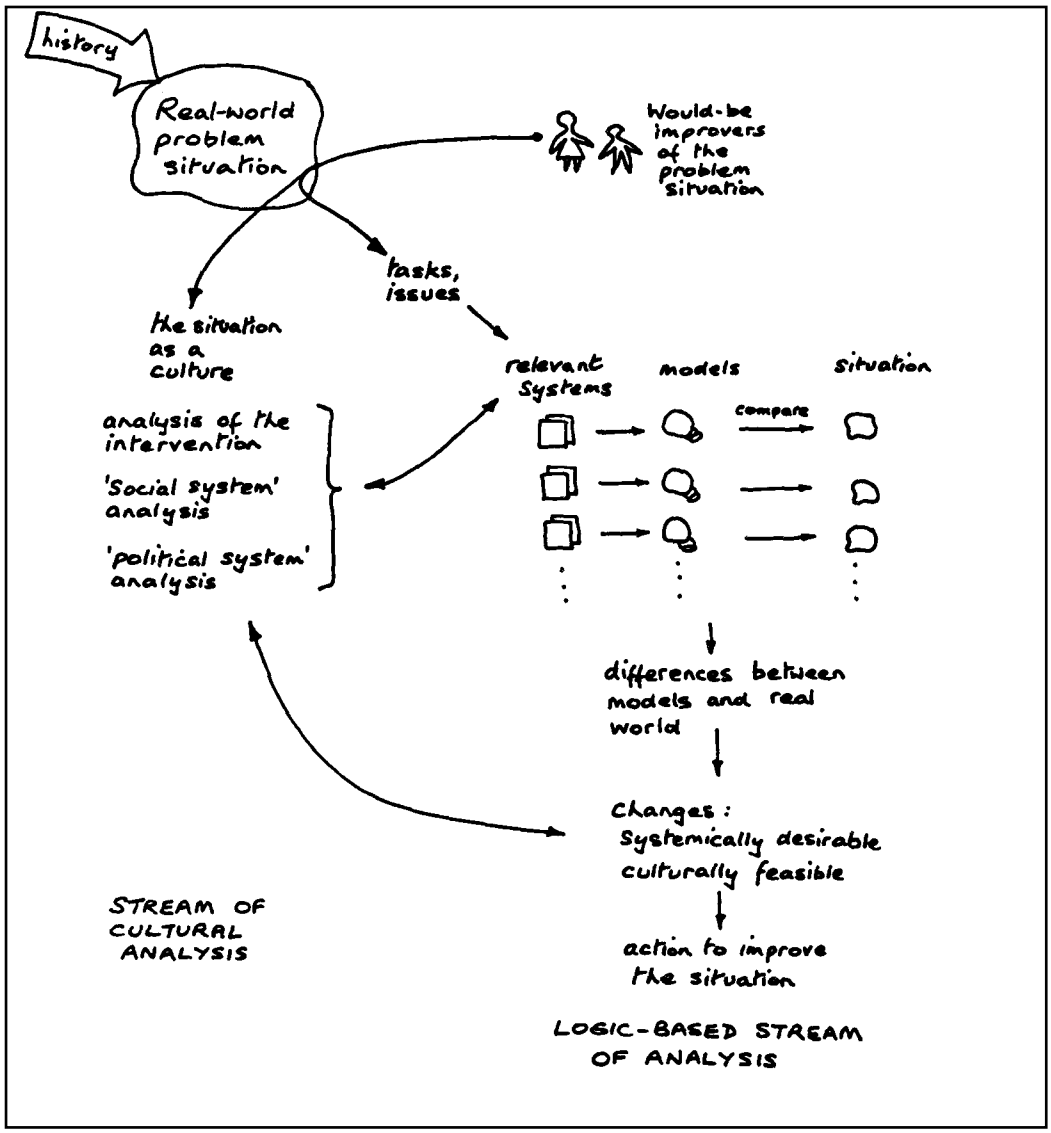

Figure 2: The process of SSM (SSM, 90 p. 29)

The initial real-world problem situation is viewed as a product of a particular history which it is essential to pay attention to and SSM is now described as two 'streams' of enquiries.

> Given the situation and the would-be improvers of it, there follow two interacting streams of structured enquiry which together lead to the implementation of changes to improve the situation. Both may be regarded as stemming from both the perception of various purposeful actions in the situation ('tasks' in Figure 2.6) and various things about which there are disagreements ('issues' in Figure 2.6). (SSM, 90 p. 28)

The logic-based stream of analysis could be seen as a revised form of the 7 stage SSM, described above, while the stream of cultural analysis could be seen as an addition to the methodology.

The rich pictures is no longer recommended for any particular stage (stage 1 and 2 in the 7 stage description of SSM) but "will continue to be drawn and amended throughout any use of SSM" (SSM, 90, p. 48). Rich pictures are described as informal drawings.

> There is no formal technique or classic form for this [drawing rich pictures], and skill in drawing is by no means essential (though it's not a hindrance!) in the production of pictures which are found to be very helpful. (SSM, 90 p. 45)

SSM is claimed to be used in two different 'modes'. Mode 1 is the 'traditional' way of using SSM as a particular study and intervention while in Mode 2 SSM is used by individuals as an adapted way of thinking in managing and interaction in the daily work (SSM, 90 pp. 280ff). In the following the 'new' SSM is described in mode 1 as referred to in fig 2.

The Stream of Logic-Based Enquiry

Concerning the selection of relevant systems Checkland and Scholes mentions two kinds of choice, 'primary-task system' and 'issue-based system'.

> The distinction between primary task and issue-based relevant systems is not sharp or absolute, rather these are the ends of spectrum. At the extremes, primary task systems map on to institutionalized arrangements; issue-based systems, on the other hand, are relevant to mental processes which are not embodied in formalized real-world arrangements. (SSM, 90 p. 32)

Examples on issue-based systems are e.g. "'a system to resolve disagreements on resource use' or 'a system to define information flows to and from the management committee'" (SSM, 90 p. 32).

The starting point for the logic based enquiry is still the root definition of the selected system(s) but now the focus on the transformation process within the system is particular emphasized.

> A root definition expresses the core purpose of purposeful activity system. That core is always expressed as a transformation process in which some entity, the 'input', is changed, or transformed, into some new form of that same entity, the 'output'. (SSM, 90 p. 33)

The CATWOE technique is used to express the root definition and further, as mentioned earlier, the use of this technique has eliminated the checklist provided by the formal system model from stage 4b: "However, its [the formal system model] use has declined in the last decade, CATWOE has virtually eliminated it [...] .and it can probably now be cheerfully dropped" (SSM, 90, pp. 41f).

The number of activities in the conceptual model is later recommended to be between 5 and 9. "The guideline is: aim for 7±2 [activities]" (p. 37, SSM, 90).

The conceptual models within the new SSM has been enhanced with a 'standard' addition of monitor and control systems in 2 levels adapted to the 'core'-system describing the transformation process. An example is given in figure 3 based on the (sample) root definition: "A householder-owned and manned system to paint a garden fence, by conventional hand painting, in keeping with the overall decoration scheme of the property, in order to enhance the visual appearance of the property" (SS, 90 p. 36).

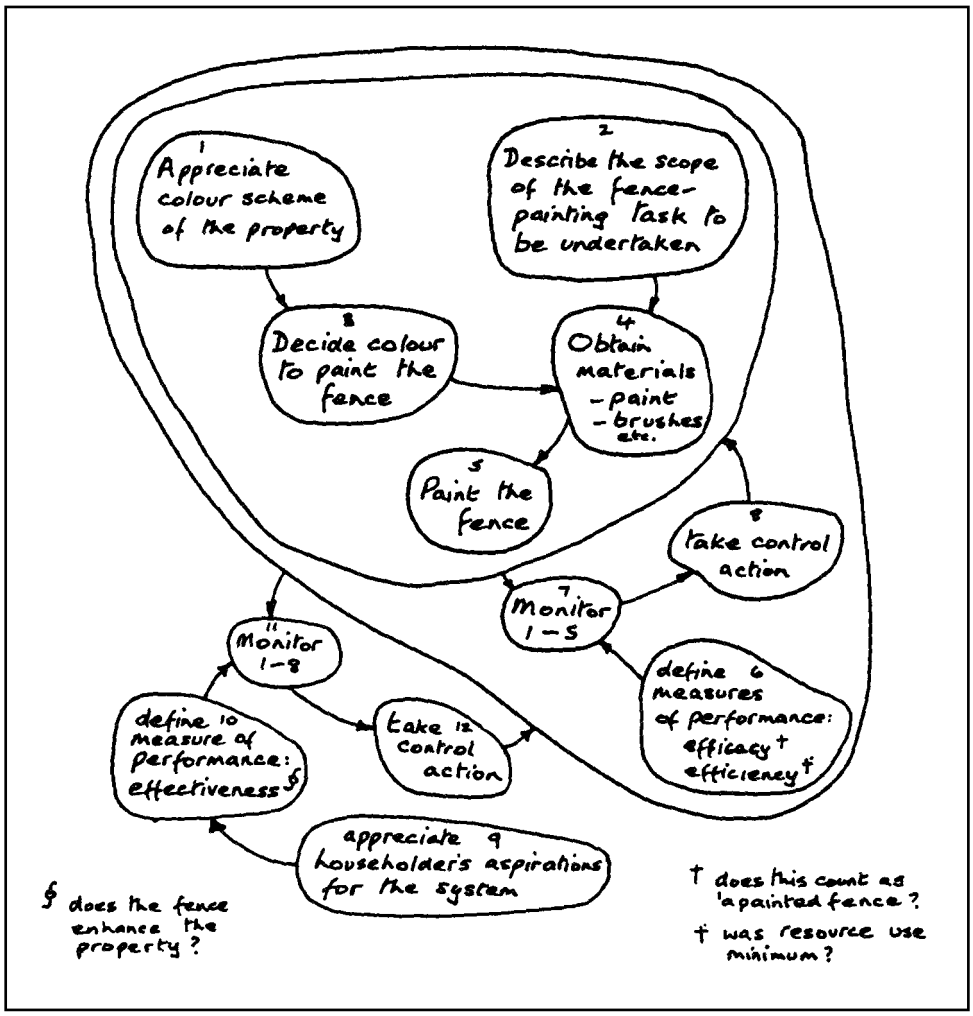

Figure 3 (SSM, 90 p. 40)

The core system describing the transformation process is outlined in the circle comprising activities 1 through 5. The first level of monitor and control system enhance this system with activities 7 through 8. The second level of monitor and control system finally enhances the transformation system and the first level of monitor and control system with activities 9 through 12.

> Logical analysis of the notion of a transformation shows that any conversion of input to output would be judged successful or unsuccessful on three different counts [...] A first dimension checks whether the means chosen actually works in producing the output. A second then consider whether the transformation is being carried out with a minimum use of resources. Finally, a transformation which works and uses minimum resources might still be regarded as unsuccessful if it were not achieving the longer term aim, the aim expressed by *Z* in: do *X* by *Y* in order to achieve *Z*. (SSM, 90 p. 39)

The tree criteria is named 'the three Es':

> efficacy (for 'does the means work?')
>
> efficiency (for 'amount of output divided by amount of resources used')
>
> effectiveness (for 'is T [transformation process] meeting the longer term aim?') (SSM, 90 p. 39)

CATWOE and the three Es now forms the basic standard techniques in the model building.

> The value sets of models of the type shown for the fence-painting system, based on different worldviews and different Ts, is now well established in SSM. Only occasionally have other types of systemic model been used. (SSM, 90, p. 40)

The experiences with SSM shows that in the comparison of the models with real world (stage 5 in SSM, 81) 2 of the four suggested ways of carrying out the confrontation have been used in most situations: formal questioning (2) and operating the models (3).

> Of these the second [formal questioning] has emerged as by far the most common. The models are used as a source of questions to ask of the real world; answering those questions initiates debate, which may be conducted in any way which seems appropriate to the particular situation. (p. 43, SSM, 90)
>
> The second most common way of setting models against perceived reality [...] consist of notionally operating a model, doing its activities either mentally or on paper, in order to write a scenario which can then be compared with some real-world happenings. (pp. 43f, SSM, 90)

The Stream of Cultural Enquiry

The cultural stream comprises three analysis (analysis one, two, and three) each done via a simple and general model. "To be usable 'on the hoof' throughout a study, a model has to be very simple indeed" (SSM, 90, p. 49).

> The 'cultural stream', on the left-hand side [of figure 2], consist of three examinations of the problem situation. The first examines the intervention itself, since this will inevitably itself effect some change in the problem situation. The second examines the situation as a 'social system', the third as a 'political system'. In both cases the phrases within inverted commas are used as in everyday language, rather than as technical terms. And in the case of all three 'cultural' enquiries, general models are used which relate respectively to problem solving, the social process and the power-based aspects of human affairs. (SSM, 90 p. 30)

Analysis One. The analysis of the intervention (because of the SSM study) is structurally thought of as entailing three roles, 'client' (who is the client of the study and what is his reasons for causing the intervention to be made), 'would-be problem solver' (who wishes to do something about the situation in question) and 'problem owner' (this includes the client, the problem solver, and possible other interest groups). (SSM, 90, pp. 45-48).

> This role analysis, now known as 'Analysis One' in SSM, is always relatively easy to do and is very productive, especially through the list of possible problem owners [...] this list [including problem owners and client] is the best source of choices of relevant systems in the logic-driven stream of enquiry" [...] How to use models deriving via relevant systems from these systems from the choices of problem owner would depend upon who was undertaken the study and who caused it to occur: the client. (SSM, 90, p. 48)

Analysis Two. Social System Analysis, known as Analysis Two in SSM, is done through the support of a simple model of social systems: the model describes the social system as consisting of three elements, where each element defines, and is defined by the others: Roles, Norms, and Values.

> By 'role' is meant a social position recognized as significant by people in the problem situation [...] A role is characterized by expected behaviours in it, or *norms*. Finally, actual performance in a role will be judged according to local standards, or *values*. These are beliefs about what is humanly 'good' or 'bad' performance by role holders. (SSM, 90, p. 49)

Checkland and Scholes suggest that the SSM user has a file labelled 'Analysis Two' open, and "Subsequent to every conversation, interview, or perusal of documents, etc., the exchange experienced needs to be reviewed for what the analyst can infer with regard to roles, norms and values" (SSM, 90, p. 50).

Analysis Three. Political System Analysis is known as 'Analysis Three'.

> [...] politics is taken to be a process by which different interests reach accommodation [...] the accommodations which are generated, modified or dissolved by politics will ultimately rest on dispositions of power. So politics is taken to be power-related activity concerned with managing relations between different interests.
>
> In Analysis Three, political analysis is made practical by asking *how power is expressed* in the situation studied [...] we ask: What are the 'commodities' (meaning the embodiments) through which power is expressed in this situation? How are these commodities obtained, used, protected, preserved, passed on, relinquished? Through which mechanisms? [...] Examples [of commodities] include: formal (role-based) authority, intellectual authority, personal charisma, external reputation, commanding acces (or lack of access) to important information, membership or non-membership of various committees or less formal groups, the authority to write the minutes of meetings, etc. (SSM 90, pp. 50f)

Analysis One (analysis of the intervention) obviously should be done in participation with the people involved in the SSM-study, and results from it will typically be drawn in rich pictures. Analysis Two (analysis of social system) seems more as a private tool for the analyst and Analysis Three (analysis of political system) is even recommended to be used with circumspection: "delicate judgements are usually required concerning the public visibility of Analysis Three" (SSM, 90 pp. 51).

SSM and the Construction of IS

Though SSM is not specifically designed in order to develop information systems (IS) it is obvious that the methodology could be applied to the early phases of a IS development project. This purpose of SSM has been recognized widely within the IS community and SSM is often referred to in the literature from this field[5].

> In recent years there has emerged a particular area of application for SSM to which it is well suited: we refer to its use in the creation of information systems [...] SSM has a major contribution to make in tackling a crucial question which is prior to this, a question neglected in much of the literature of information systems, namely: which of the huge number of information systems that we could put together, should we? (SSM, 90, p. 53)

Checkland suggest to use SSM in the construction of IS by transforming the activities from the conceptual models from SSM into information flow models that subsequently can serve as input to more traditional methods within IS design.

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5 see e.g. Wilson, Brian: *Systems: Concepts, Methodologies and Applications*, 2nd edition, John Wiley & Sons, Chichester, UK, 1990 (1st edition from 1984); Andersen, Niels Erik, et al: *Professional Systems Development: Experience, Ideas and Action,* Prentice-Hall, New York, 1990; Mathiassen, Lars, et al: *Rapid Systems Modelling: The Soul of a New Methodology*, The University of Aalborg, (R 91-16), Aalborg, Denmark, 1991

> Once an agreed 'truly relevant' system has emerged, it may be treated in the following way. Ask of each activity in the model: What information would have to be available to enable someone to do this activity? From what source would it be obtained, in what form, with what frequency? Similar ask: What information would be generated by doing this activity? To whom should it go, in what form, with what frequency? In this way an activity model may be converted into an information-flow model. (SSM, 90 p. 56)
>
> When iterations of the process of [SSM] produce models which are *widely agreed* to be *relevant* in a company situation, then such consensus activity models can be converted into information flow models and the more traditional methods of information system design can be initiated. (SSM, 90, p. 313).

Table of Key Concepts and Techniques/Guidelines

Key Concepts	Techniques/Guidelines
Hard/Soft Systems Thinking	Rich Picture
System	CATWOE
Real World - Systems Thinking	Conceptual modelling
Methodology	Activities from verbs in root definition
Structure and Process	7±2 activities
Root Definition	4 ways of doing stage 5
System/Conceptual Model	The three Es'
Logic-Based Analysis	Analysis One, Two, and Three
Cultural Analysis	SSM and IS: Information for each act.

The Philosophy of SSM

Checkland claims[6] that systems thinking in general relies on two pairs of ideas: 'emergence and hierarchy' and 'communication and control'.

Emergence and hierarchy refers to a general model of organized complexity describing the complexity as a hierarchy of levels, "each more complex than the one below, a level being characterized by emergent properties which do not exist at the lower level" (SSM, 81 p. 78). An example from biology is the levels cell organelles, cells, organs, organisms, and ecosystems.

Maintenance or survival of the hierarchy entail "a set of processes in which there is *communication* of information for purposes of regulation or *control*" (SSM, 81, p. 83).

> The hierarchically organized whole, having emergent properties, may in principle be able to survive in a changing environment if it has processes of *communication* and *control* which would enable it to adapt in response to shocks from the environment. (SSM, 90, p. 19)

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6 In the paper: Atkinson, C. J., and P. B. Checkland: "Extending the Metaphor 'System'", in *Human Relations*, 41 (10), 1988, pp. 709-725, Atkinson and Checkland examines a range of accounts of basic systems ideas from the literature. The conclusion in this paper is, that "all authors draw on the same cluster of ideas and that the image underlying all accounts can be expressed in the two pairs of ideas: emergency and hierarchy, communication and control, as suggested by Checkland in 1981" (SSM, 90, p. 19).

This makes the basic philosophy of SSM close to the functionalistic tradition in sociology. A traditional functionalistic position is that you in principle are able to study social structures by isolating or demarcating structures into systems, in which causal relations are dominating, forming some kind of boundary to the environments of the system. You can describe the function, that the system has in proportion to its environments as well as the function of the coherence within the system. The point of functionalism is that systems can be described as teleological or functional in a sense where they preserve themselves - they have a superior purpose. The superior principle of the system is its own maintenance, or survival, and events within the system can be described as having a function towards this principle.

Checkland agrees that there are similarities but opposes and strives against to be labelled "functionalist".

> There are similarities, certainly, as there are bound to be given the holistic framework of structural functionalism, but the aims of the social scientist and the systems-oriented problem solver are different, and this makes an application of the methodology different from a functional analysis. The social scientist wants the most accurate possible, testable account of what a social system *is*. The systems man using the methodology wants improvements in what is taken to be a problem situation. Given these aims, the functionalist sociologist wants the richest possible model he can get, including manifest and latent functions; the systems analyst wants his systems thinking to be as clear and coherent as possible, leading to clear-cut *debate*, and hence he makes his systems models models of possibilities. (SSM, 81, p. 237)

Checkland's argument against SSM being classified as located in the structural-functional tradition of sociology seems to be rather simple[7]:

1) The accusation rest on the early fact, that there was only one root definition and conceptual model. Now you can have several conflicting root definitions reflecting different weltanschauungen, and the debate is then intrinsically concerned with conflict and change (which the structural-functional tradition of sociology didn't pay enough attention to). (SSM, 81, pp. 251f)

2) SSM models the real world as if it were a system but does not claim that it *is* a system. To view the world through system terms makes a difference from declaring that there *is* systems in the world. " [...] it is perfectly legitimate for an investigator to say [as an example] 'I will treat education provision *as if it were* a system', but that is very different from declaring that it *is* a system. This may seem a pedantic point, but it is an error which has dogged systems thinking and causes much confusion in the systems literature. Choosing to think about the world as if it was a system can be helpful. But this is a very different stance from arguing that the world *is* a system, a position which pretends to knowledge no human being can have." (SSM, 90, p. 22)

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7 In (SSM, 81, pp. 251f) he refers to this discussion mentioning a claim from Prévost that SSM is located within the structural-functional tradition of sociology (Prévost: "Soft" systems methodology, functionalism and the social sciences, in *Journal of Applied Systems Analysis* 5, 1976), and an answer to this claim by Naughton (Naughton, J: "Functionalism and systems research" in *Journal of Applied Systems Analysis* 6, 1979).

Especially the argument presented as 2) emphasizes SSM to be a 'learning system'.

> This is a very different perspective [...]: systemicity is no longer assumed to be in the outside world (which is regarded as problematical): it is in the process of enquiry. This is a fundamental shift, a shift from the idea of optimizing [from hard systems thinking] to the idea of learning the meanings by which people sharing a human situation seek to make sense of it. The significance of this shift is sometimes obscured because of the complication that SSM is in fact doubly systemic. It is, as a whole, *a learning system*; and it is one that happens to make use of *system models* (though other kinds of models could in principle be inserted). The important point is that the models are *not* would-be descriptions of parts of the world. They are abstract logical machines for pursuing a purpose, defined in terms of declared world views, which can generate insightful debate when set against actual would-be purposeful action in the real world. (SSM, 90 p. 311).

Indeed, Checkland argues that SSM is closer to the phenomenological tradition within social science, referring to process of stage 2 and 5, which he claims "a formal way of elucidating, comparing, and contrasting different individuals' typifications of real-world events and structures, very much in the phenomenological manner" (SSM, 81 p. 279).

Further, Checkland finds a "significant compatibility between critical theory and soft systems methodology" (SSM, 81, p. 283) referring to a paper by Mingers[8].

> Habermas' communicative competence would enable social actors to perceive their social condition in new ways, enabling them to decide to alter it; Checkland's methodology aims at consensual debate which explores alternative world-views and has as criteria of success 'its usefulness to the actors and not the validity for the analyst'. (SSM, 81,p. 283)

Thus the nature of social reality implicit in SSM is stated as "the ever changing outcome of a social process in which human beings continually negotiate and renegotiate, and so construct with others their perceptions and interpretations of the world outside themselves and the rules for coping with it. These rules are never fixed once and for all" (SSM, 90 p. 311).

This view of social reality, combined with the perspective of SSM as a learning process with the (taken implicit) relevance of viewing an organization in systemic and functionalistic terms, is very beautifully expressed in this final quotation:

> [The description of the process of SSM] can be seen [...] as a learning system: a process which learns its way to the meanings which characterize an organization. In this process an organization is perceived as entailing readinesses on the part of its members to conceptualize it and its internal and external relationships in a particular way. Those *readinesses* are in a real sense the condition for the existence of that abstraction: the organization. Of course, the change through time, sometimes incrementally, sometimes in a revolutionary way, as perceptions and membership change. (SSM, 90, p. 311)

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8 Mingers, J. C.: "Towards an Appropriate Social Theory for Applied Systems Thinking: Critical Theory and Soft Systems Methodology", in *Journal of Applied Systems*, 7, 1980.

The Work Analysis' Critique of SSM

SSM (as described in SSM, 81) are commented and criticized by Kjeld Schmidt and Peter Carstensen in a report describing the Work Analysis[9]. The following presents their main argumentation in a condensed form.

SSM deals with "[...] *problem situations* in which there are felt to be *unstructured* problems, ones in which the designation of objectives is itself problematic" (SSM, 81, p. 155). Kjeld Schmidt and Peter Carstensen claims that this statement is blurred: problems are per definition unstructured, otherwise they are not problems but just a task. What Checkland really want to say is that in the decision process concerning the development of political and organizational policies (strategic conceptions), you do not have any clear defined objective or goal. The different involved parties (or interest groups) have different perspectives corresponding to their functions and interests. Such decision processes involves 1) to clarify whether you are in a problematic situation or not, 2) to clarify what is the substance of the problematic situation, 3) to state the goal, and 4) to draw up plans to meet the problematic situation.

In SSM you chose a "relevant system" and state it in a root definition. This system is not a system "in the real world" but a notional system. Checkland does not state exactly what kind of system the root definition refers to. This is problematic:

- The problematic situation under question in stage 1 and 2 in SSM is itself a system of interests, perspectives, conflicts, etc.

- The problematic situation is attached to and experienced by a social system (the human activity system), e.g. a firm, an office, or an authority. It is this social system that the different viewpoints on the problematic situation is referring to and interpreting. The social system is the *subject* where the problematic situation is the *predicate*. The social system exists in various levels and dimensions and it is from the problematic situation that you should chose the social system relevant as focus for the analysis: e.g. the firm, a department within the firm, the corporation that the firm is a part of, or the local society that the firm is located in.

- The system chosen in SSM is neither the social system nor a system distinct from this. It is both a perspective on the problematic situation, and the social system seen in the light of this perspective. To chose a "relevant system" in SSM is to chose a perspective in changing the situation and the root definition thus states the social system in a notional (and changed) form under this perspective.

In stage 4 in SSM you investigate the consequences of the chosen perspective by asking the question: "If we accept the perspective as described in the root definition, which functions should the social system perform; which

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9 Schmidt, Kjeld, and Peter Carstensen: *Arbejdsanalyse, Teori og praksis*,[Work Analysis, Theory and practice], Risø National Laboratory, (Risø-M-2889), Roskilde, Denmark, 1990, pp. 28-34.

requirements should it fulfill?" Checkland suggests that this evaluation take place through a construction of "conceptual model". Conceptual modelling in SSM is neither modelling concepts from the domain nor the development of concepts. Rather it is using your common sense, practical experiences, and systems theory in systemizing a hypothetical construction, a supposition: this in the shape of a "conceptual model" given from the description in the root definition.

In stage 5 the hypothetical construction is compared with "reality", which means both the real-world problem situation and the social system in its current state.

The central and critical points in SSM are 1) the choice of "relevant system", i.e. perspective, and 2) the investigation of the implications of this chosen perspective by a hypothetical construction.

1) Even though Checkland suggest that you test several "relevant systems" from different root definitions - possibly by many iterations - you finally *have to* chose one perspective[10]. This final choice could introduce an inappropriate bias in the analysis. Also, this will intervene in the diverging interests and conflicts. It can of course be necessary to intervene in the existing constellations of alliances and conflicts, but Checkland totally underplays this issue.

   Choosing one perspective eliminates other (relevant) perspectives. Instead you should strive to develop one "united perspective": this could be developed by analysing the social system in a "bird's eye view".

2) The use of general system theory, common sense, and practical experiences are far too inadequate in the development of strategic conceptions. Such conceptions are domain-specific and must be developed and expressed in concepts from the domain in question, not by concepts from general systems theory. Systems theory can only serve a heuristic function. Also, you need knowledge about the means available, e.g. knowledge about possible information technologies.

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10 This was a demand in the early SSM but Checkland claims that *is* possible to have several conflicting root definitions reflecting different weltanschauungen in the analysis (SSM, 81 pp. 251f). In the examples, though, given in (SSM, 81) and (SSM, 90) the typical situation is an analysis with one root definition.