



SOFT SYSTEMS METHODOLOGY

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Soft Systems Methodology (SSM) was developed by Peter Checkland in the late 60's at the University of Lancaster in the UK. Originally it was seen as a modelling tool, but in later years it has been seen increasingly as a learning and meaning development tool. Although it develops models, the models are not supposed to represent the "real world", but by using systems rules and principles allow you to structure your *thinking about* the real world. The models are neither descriptive or normative, though they may carry elements of both.

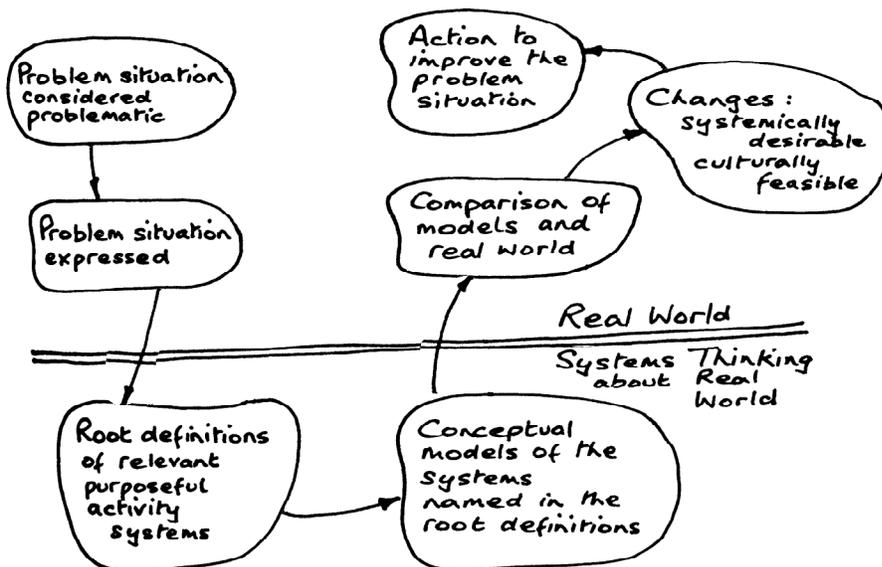
One of the interesting things about SSM is that it *constrains* your thinking in order for you to expand your thinking. Thus blowing away the idea that system thinking is always expansive.

Like many other systems approaches the heart of SSM is a comparison between the world as it is, and some models of the world as it might be. Out of this comparison arise a better understanding of the world ("research"), and some ideas for improvement ("action").

In classic SSM the researchers begin with a real-world problem (or perhaps "situation" is a better word).

They study the situation in a fairly unstructured way. Following this, they develop some models of that situation. The particular strength of SSM for evaluators is that it can be used to untangle the evaluative lessons from programs with multiple goals and multiple perspectives on these goals. It does so by developing specific perspectives on the program, rigorously constructs some models based on these perspectives and then compares these with real life.

The classic SSM inquiry has seven stages. Some of them address the "real" world, and some of them – perhaps the most important parts – address a conceptual world.



THE SEVEN STAGES OF SOFT SYSTEMS METHODOLOGY

STAGE ONE AND TWO – THE SITUATION DEFINED



The first step, very much in the real world, is to acknowledge, explore and define the situation in some way. Peter Checkland talks about the “problem situation” since his original purpose of developing SSM was a problem solving one. This workbook uses some of Peter’s original illustrations and thus uses the problem situation phrase, but it could be equally “program”, “issue” or the kinds of words we use in evaluation.

So first we decide what it is we are actually exploring. At this stage we don’t define the problem but assess the general area that interests us. Take an example of something called the Sustainable Food Collaboration. The primary activity of this collaboration is developing and sustaining a method of “Sustainable Food” labeling on foodstuffs. Its activities are supported by labeling and auditing fees (ie assessing farms for their “sustainable” practices), and a grant from a major Foundation.

This is an arbitrary starting point and it may shift – for instance at some stage we may choose to open out the boundary of the situation to sweep in more aspects of the situation. It could be sustainable food production in general, or working in businesses that support environmentally sustainable products [Churchman’s Critical Systems Thinking – see later - places much greater stress on this issue]. A bit like goal free evaluation, we are not particularly constrained by any formal definitions or organisational boundaries. We collect as much data as we can, qualitative, quantitative, by whatever method seems appropriate - survey, observation, measurement.

In Stage Two the issue is “expressed” in some way. Checkland calls this a rich picture for two reasons.

Firstly the situation needs to be expressed in all its *richness*.

Checkland provides some guidelines as to what should be included. These are

- Structures
- Processes
- Climate
- People
- Issues expressed by people
- Conflicts

Secondly, Checkland suggests that the best way of doing this is in a *picture* form. Here is an example from one of his books that expresses the rich picture of a distance learning situation.

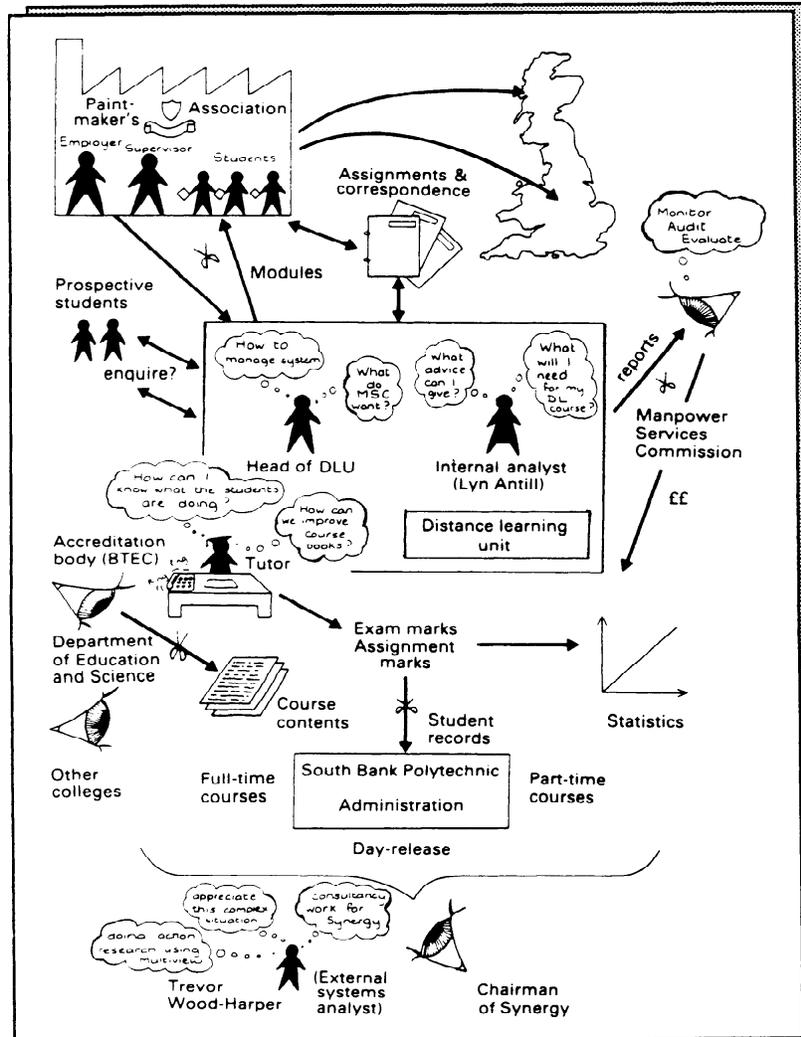


Fig 5.4 - The Distance Learning Situation (courtesy: Wood-Harper et al, *Information Systems Definition: The Multiview Approach*, Blackwell Scientific Publications 1985)

Evaluation questions :

What are the key :

- Structures
- Processes
- Climate
- People
- Issues expressed by people
- Conflicts
- How can the situation be expressed in an "unstructured" form ?

STAGE THREE – ROOT DEFINITIONS OF RELEVANT SYSTEMS

Root definitions
of relevant
purposeful
activity
systems

Stage Three moves out of the “real” world and into the world of systems. This is the Stage out of which everything else grows. That is why Checkland called it the “root definition” stage, and is the unique and most challenging part of the methodology.

The first step is to understand the concept of different perspectives that are possible to draw out of the rich picture. Checkland calls them *holons* - plausible relevant purposeful perspectives that can describe the real world activities. This is why SSM is fundamentally evaluative. Each *holon* provides a separate value base by which to evaluate the situation.

Here are some possible Sustainable Food Collaboration holons.

Note : For the purpose of this workshop we are using set of collaborative activities as the “situation”. In real life you would generally identify the particular situation that is of interest rather than a specific institution that is of interest (see Stage One)

- Ensuring consumers can be confident about the sustainable practice used to grow the product
- A lever for the Foundation to pursue a broader agenda of social and economic change.
- A means of treating growers more fairly
- A means of treating the ecosystem more fairly
- Employing food specialists.
- Providing structured opportunities for people to feel more closely connected to food, cultural and local richness of sustainable produce
- Providing inspiring stories about sustainable agriculture that influence policy
- Providing greater informed food choices for consumers
- Translating the theory of sustainable agriculture into practical observable and auditable processes and features.
- A “safe” way of attracting big food processors, users and retailers to the practice of sustainable agriculture
- Helping small farms, producers and retailers maintain sustainable agriculture practice
- Creating a point of difference for specialist producers and retailers
- The Foundation fulfilling the legal obligations for dispersal of its capital
- Creating a community where innovation is valued
- Delaying the death of dying communities
- Salving the conscience of affluent town dwellers
- Sustaining careers for farm development workers
- Providing additional income for auditing consultants

All these are perfectly valid purposeful perspectives. Although they may be undiscussible within The Sustainable Food Collaboration, or not recognised by senior management within the organisation, they are still valid perspectives held by those affected by the situation and will affect the relevance and success of any intervention. For instance, it is very common that service integration designed to improve client outcomes actually increases the cost of the service because it identifies unmet needs that were previously hidden by “gaps” in service. So if one unspoken aim of the integration was to save money, then from some stakeholders’ perspectives the project has been a failure and they may even work against it working well.

The basis of SSM is that trying to address all these perspectives as a whole is too complex an endeavour. Clarity is gained by addressing key perspectives separately, understanding their implications and then using those understandings when seeking to reintegrate these perspectives into a set of evaluative conclusions and suggestions for future action.

What you do now is to select a particular perspective and put it through a very structured and rigorous model development process. Checkland developed the mnemonic CATWOE to help you.

The starting point is a Transformation (T). From this particular perspective, what is actually transformed from input to output ?

Once you have identified the Transformation, you then proceed to identify other key elements of the system.

- *Customers* who (or what) benefits from this transformation
- *Actors* who facilitates the transformation to these customers
- *Transformation* from “start” to “finish”
- *Weltanschauung* what gives the transformation some meaning.
- *Owner* to whom the “system” is answerable and/or could cause it not to exist
- *Environment* that influences but does not control the system

In constructing CATWOE it is important for everything to flow from the transformation. One way of ensuring this is to construct the CATWOE in the following order :

1. Transformation
2. Weltanschauung (ie this transformation is relevant because ...)
3. Customer
4. Actors
5. Owners
6. Environment

It is worth noting here that in recent years, some associated with Critical Systems Thinking who use SSM have made two very significant changes to CATWOE. ¹

1. They have replaced C with two concepts; B for Beneficiaries, and V for Victims (BATWOVE)
2. B and V can include *ideas* as well as *people*

These are highly significant changes that open up new domains for SSM – although similar issues could be identified in the political and social analysis described in Step 6.

Whichever version you use, you use it to form a statement of a relevant system. Checkland suggests that one way of structuring this statement is :

A system to do X, by Y in order to do Z

For example, using one of the above perspectives here is a possible CATWOE and Root Definition :

Holon : *Providing inspiring stories about agriculture rather than depressing stories about agriculture.*

CATWOE :

Customers = sustainable agriculture lobbyists

Actors = project evaluators, farmers, retailers, Sustainable Food Collaboration staff

Transformation = preponderance of bad stories replaced by a preponderance of good stories

Weltanschauung = stories bring about pressure for social change

Owner = The Foundation

Environment = established practice, isolated area, poverty and lack of investment capital

[Consider what reforming this as BATWOVE might achieve]

Description of a Possible System

Foundation sponsored activities by the Sustainable Food Collaboration and their stakeholders create a set of good news stories about consumer use of sustainable agricultural products that allow lobbyists to use as part of their policy development levers.

Of course (and this is critical to the entire SSM approach) even the same perspective can have different CATWOE components. What would happen to CATWOE or the Root Definition is we identified “service consumers” as the “customer”, or “funders” as the “owner”. We might end up with very different CATWOE, different root definitions and ultimately a different model. This is why SSM is a very iterative approach – you keep trying things out and see how that changes your assessment of the situation.

Checkland recommends keeping the elements of CATWOE roughly in scale. For the same *holon* an “owner” could be a particular individual, part of an organization, an

¹ My thanks to Martin Reynolds and Gerald Midgley for bringing this to my attention

organization as a whole or perhaps an entire sector). These different levels of scale need to be matched throughout the CATWOE – so for instance the Transformation will be quite different at the level of a “worker” than the level of an entire industrial sector. Getting the scale appropriately balanced (ie a relevant system) is one of the arts of SSM.

Evaluation questions :

What different ways are there to comprehend this situation ?

Within that perspective who could be doing what for whom with what assumptions in which kind of environment ?

STAGE FOUR – DEVELOPING THE MODEL

Conceptual models of the systems named in the root definitions

Using the “root definition” you draw up a conceptual model using systems conventions.

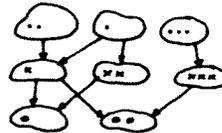
There are lots of ways of doing this, but Checkland recommends that beginners follow the process below:

1. Using verbs in the imperative write down activities necessary to carry out the Transformation (T in CATWOE). Aim for 7 ± 2 activities that are at the same *scale*.
2. Select activities which could be done at once (i.e., not dependent on others) :



3. Place these activities in a line, and then those that are dependent on these first activities in a line; continue until all are accounted for.

4. Indicate the dependencies



5. Rearrange to avoid overlapping arrows where possible. Add a means of assessing performance and include the aspects of the environment identified in CATWOE.
6. Finally check whether your model demonstrates the following systems properties :
 - An ongoing purpose (that may be determined in advance – purposeful, or assigned through observation - purposive)
 - A means of assessing performance
 - A decision taking process
 - Components that are also systems (i.e., the notion of sub-systems)
 - Components that interact
 - An environment (with which the system may or may not interact)
 - A boundary between the system and the environment (that may be closed or open)
 - Resources
 - Continuity

So how might this look in the case of the Sustainable Food Collaboration ?

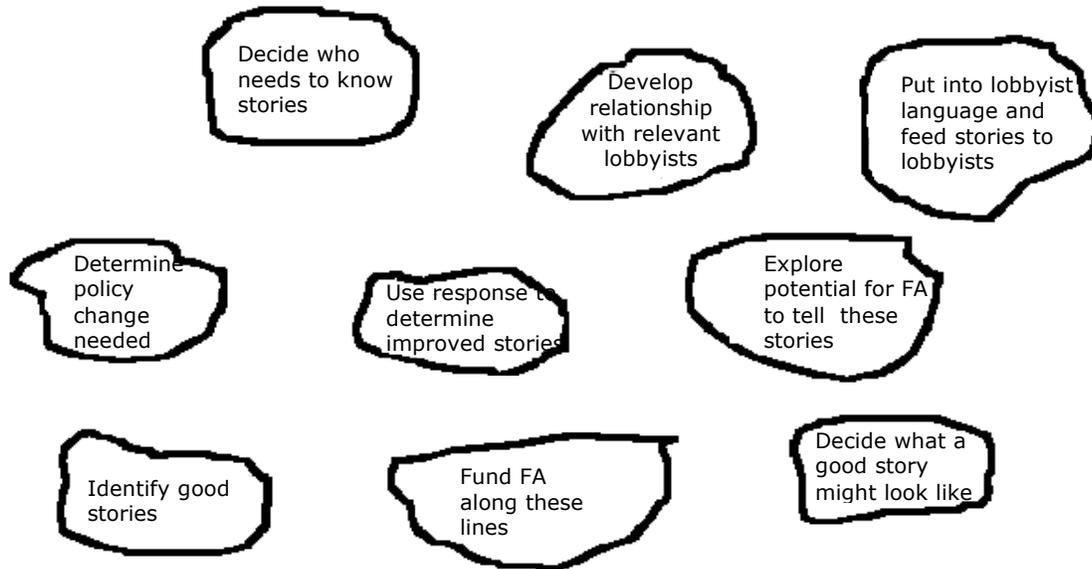
Here again is the “holon”, the relevant perspective, I chose to explore :-

Providing inspiring stories about agriculture rather than depressing stories about agriculture.

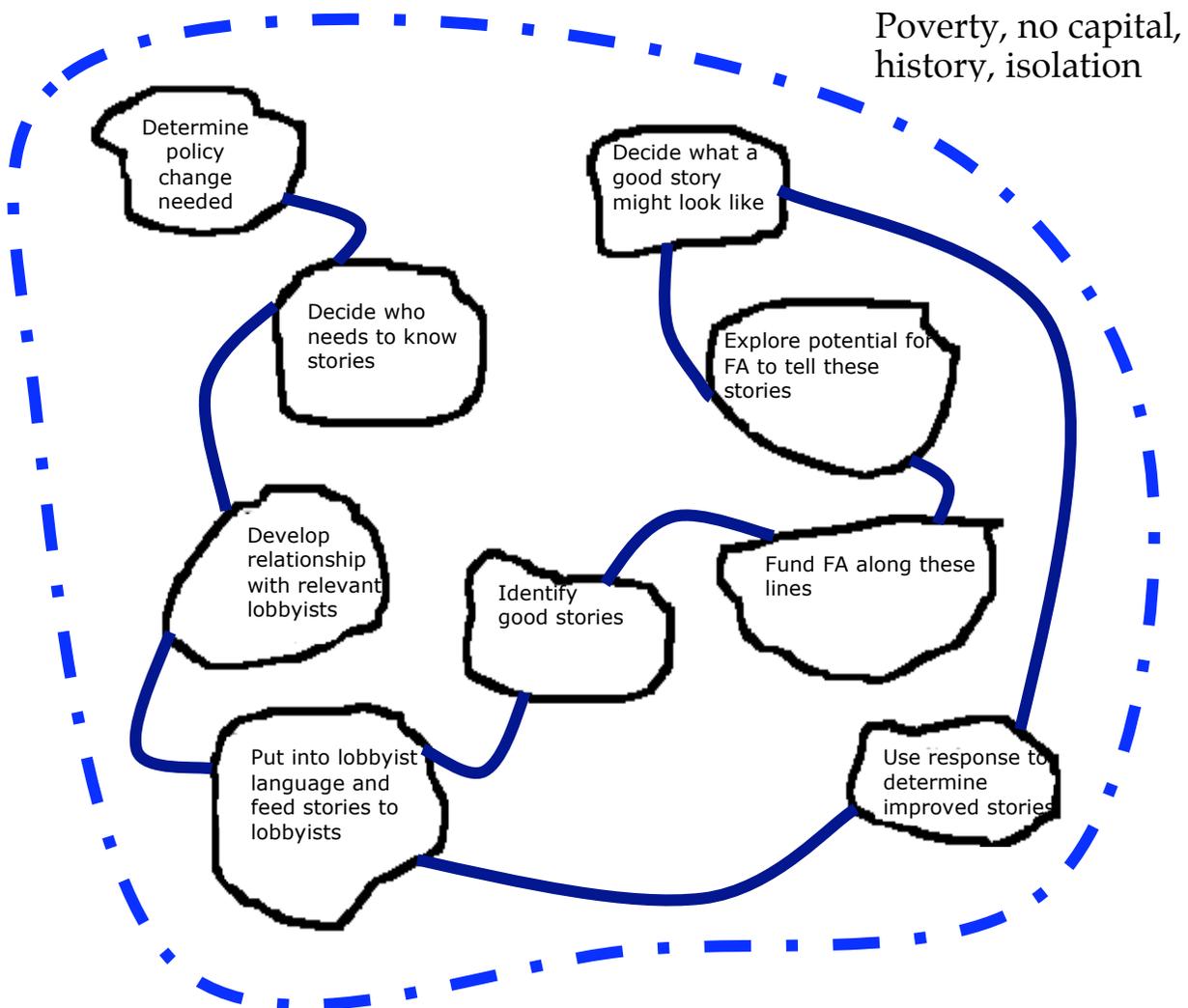
With a root definition of a relevant systems taken from the “holon” being :

Foundation sponsored activities by the Sustainable Food Collaboration and their stakeholders create a set of good news stories about consumer use of sustainable agricultural products that allow lobbyists to use as part of their policy development levers.

From this I've identified the following list of core relevant activities:



Applying the process recommended by Checkland, and then double checking again the list of essential properties of a system I ended up with the following model :



Checkland recommends you don't spend much time in initial model building. I spent about twenty minutes from root definition to model. He considers it better to undertake the comparison stage, have the discussions, gain insights, and return to the model, rather than spend a long time on the initial model building. This reinforces his belief that the SSM process is about cycles of discussion, debate and learning rather than producing the "ideal" solution first time. However, the speed is not at the cost of rigour. Indeed he recommends the model to be closely inspected in ways that increase the rigour of the overall inquiry. However, others consider that the debates and discussions that surround model building are in some ways more important than the model itself. In other words similar to the debates that surround Program Logic.

For instance :

- Does the diagram come wholly from the root definition and CATWOE and no other extraneous features and ideas added ? The rigor of the method depends on this. The modelling process is *not* an idea generation process but a logical process of excluding all factors not logically flowing from the definition.
- Is the “model” a “system” or a collection of boxes with lines between them ? Does the model include all the features that make it describe a system ? Does the system in particular have a means of monitoring, assessing and responding to its own performance ?
- For those CATWOE that include multiple items (eg multiple Owners) how would the model and definition look if only one was used ?
- What alternative or additional W’s are there, and what implications does that have for the defined system and model ?
- Have you confused “context” (ie a description of the particular state of system or its environment) with “environment” (factors that interact with the system but are not part of it) ?

Evaluation Question

What are the minimum critical components needed to bring about the desired impact for each relevant perspective ?

Once you have asked yourself these questions and modified the model you may think you can move on to the next stage; comparing the model with reality.

BUT.....

But that would be to miss one of the really powerful parts of soft systems methodology. It is wise to do one more thing before moving on. Run through process again using different CATWOE (eg identify a different “owner”), different perspectives (holons), different scales (ie sub-systems of the model you have just developed). This is where you start getting real insights into the complexity of the situation.

By running through several different CATWOE and models will help us explore what recurring themes might emerge, or what contradictions might be between the models. Alternatively if you have multiples in any component of CATWOE what are the implications for the model of having only one. What happens if you select another “owner” or “Weltanschauung” ?

You don’t have to produce multiple models, but SSM really comes into its own when you do. Although ideally they should be developed, like all models, collaboratively with a range of stakeholders, there are times when it is useful to do them just yourself.

For instance, in a recent evaluation, my colleague and I developed six models each representing a different way of seeing the program. We did all six in just under an hour. We did them because we needed to get some clarity around what we were doing at a particular stage of the evaluation. It was a complex evaluation and we were getting

a bit lost. The client never saw them although it allowed us at the reporting stage to defend a viewpoint on the program that the client initially resisted.

So in terms of the Sustainable Food Collaboration here is how a workshop explored the following possible holons. I've deliberately left out the systems model diagrams so that you can have a go drawing your own. Remember is must develop solely from the root definition and CATWOE. No other extraneous things can be introduced. That is the rigor of SSM – it is a systems method that constrains your thinking in order for you to expand your thinking.

Perspective #2

The Foundation fulfilling its legal obligations for dispersal of its capital

C = Sustainable Food Collaboration, other grantees,

A = PA, PDs, Foundation Finance department

T = Achieve annual payout obligations

W= Payout achieves the Foundation's existence

O = The Foundation's Board

E= IRS, Annual Goal Area Budget

Description of a Possible System (Root Definition)

Foundation approved funding allows for effective grant making to help people help themselves as well as sustaining the Foundation's existence

[Draw your own soft systems model here. Consider using BATWOVE]

Perspective #3

Providing additional income for food process auditing consultants

C= Auditors

A = Sustainable Food Collaboration

T = Lower income for auditors to higher income for auditors

W= Auditing is a valuable activity

O = The Foundation or Sustainable Food Collaboration (they might decide to stop the auditing part of their activities)

E = Demand for formal stamp of quality, food producers “pretending” to have sustainable produce

Description of a Possible System (Root Definition)

The actions of the Sustainable Food Collaboration generate demands for audit transactions that increases the overall income of process quality auditors

[Draw your own soft systems model here. Consider using BATWOVE]

Perspective #4

Salving the conscience of affluent town dwellers

C = Affluent town dwellers

A = Retailers, farmers

T = Dissatisfaction with current social situation about food production to satisfaction with current situation with food production

W = People will purchase "sustainably produced" labeled food if available

O= Retailers

E= Public attitudes towards sustainably produced food; social desirability

Description of a Possible System (Root Definition)

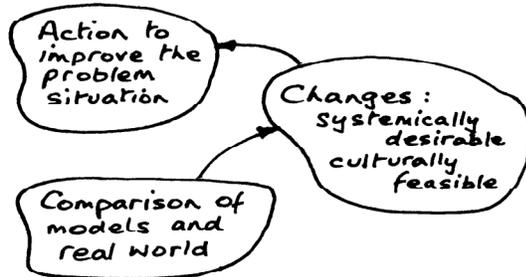
A system that allows affluent townies to buy sustainably produced food in order to feel good about themselves when that food is readily available and clearly visible.

[Draw your own soft systems model here. Consider using BATWOVE]

Again for each model you ask yourselves the questions about the model described on page 11

Steps Five to Seven – Back in the Real World

Now the model is compared with reality, insights drawn from that comparison, and ideas for improvements determined. This is the real powerhouse of the methodology.



Step 5 Compare Model And Real World. Gain Insights

Checkland suggests four ways of doing this :

1. Unstructured discussions
2. Structured questioning of the model using a matrix approach
3. Scenario or dynamic modelling
4. Trying to model the real world using the same structure as the conceptual model

The second is the most common – often using a matrix that looks at each component of the model and asks :

- Does it exist in the real world ?
- How does it behave ?
- How is its performance identified and measured ?
- Is this process any good ?

So in the Sustainable Food Collaboration example we would look at the above model and the basis of that model (ie CATWOE and the root definition) and consider what actually does happen in the real world. What is present, and what is missing. What behaves similarly and what does not.

The biggest and most common mistake you can make at this stage is to *confuse* reality with the model. Indeed the clients I mentioned earlier looked at a holon and say “but it is not the purpose of this program to do this”. They confuse the point. A holon is a perspective on the system; it is a way in which some people might see the program. The purpose of this stage is to develop *insights*; in this case into the way in which the change program worked, even if breaking reducing patch protection was not an explicit aspect of the program.

Step 6 Develop desirable and feasible interventions

At this point the methodology tends to stop being sequential and starts swinging back and forth through all seven stages of the methodology in order to gain the greatest leverage. On the basis of this analysis possible interventions are explored. Assessing the feasibility of these interventions are an important aspect of the methodology, and Checkland suggests several ways of doing this.

1. Run through the model again using different CATWOE/BATWOVE, different perspectives, different scales (ie model sub-systems)
2. Undertake different systems based analyses (eg system dynamics, CAS, CHAT)
3. "Owner" analysis. Who fundamentally has the authority to take action ?
4. "Social system analysis" How do the various roles, norms and values present in the real world relate to the conceptual model ?
5. "Political analysis". How is power expressed in the situation being studied ?

Run through the model again using different CATWOE/BATWOVE, different perspectives, different scales (ie model sub-systems)

As I have already shown, comparing the models of all four possible systems with "reality" may start to reveal areas of contradiction and synergy that suggest possible strategies.

Undertake alternative systems based analyses

Checkland never regarded his methodology as exclusive. Depending on the particular situation surrounding the Sustainable Food Collaboration situation you could use a variety systems based approaches. I've seen SSM combined with System Dynamics and Critical Systems Heuristics for instance.

The owner, social and political analyses

The Owner, Social system and Political analyses were early additions to the original methodology and a response to initial criticism that the methodology neglected the really soft (but of course exceptionally hard) factors that determine implementation. Checkland argues that these analyses should run parallel to the entire investigation, informing each step, not just the later ones as described here.

Whilst the playing with models and comparison with what is actually going on creates a large range of possibilities, the real whiff of reality comes from the application of the owner, social and political analyses. These are to some extent the make or break analyses that test the feasibility of the ideas.

Clearly The Sustainable Food Collaboration activities have a wide range of potential "owners", in the SSM sense. I can imagine as "owners" being ratepayers, managers, case workers, and elected representatives depending on the *holon*. The owner analysis would explore this in much more detail, depending on the possible strategies for action that emerge.

Similarly the full application of soft systems to the Sustainable Food Collaboration change process would also look at the prevailing political, societal and commercial norms, attitudes values, and histories that impinge on the situation being investigated. [Similar in some ways to the kind of analysis that takes place during a Cultural-Historical Activity Theory based inquiry]

Step 7 *Action to Improve the Situation*

This is where the methodology comes full cycle, and maybe starts a new cycle (rather like the cycles of expansive learning in Cultural-Historical Activity Theory)

Evaluation Questions

To what extent does the actual situation match the logic models ?

How important are the similarities and the differences ? To whom ?

From the important similarities and differences, what conclusions can we draw about the value or worth of the actual situation and the processes and procedures that brought about that situation within this context and environment ?

How did social, political and cultural factors assist the similarities and accentuate the differences ? What were the consequences of that ? To whom ?

What impact did those with power have within the situation ? What conclusions can we draw about their behaviour ?

What does this mean for future action ?

SO WHAT FOR EVALUATION ?

Soft Systems Methodology is useful when rigor and deep insights are needed under these circumstances:

- Multiple goals
- Different views and perspectives
- Different assumptions
- Different logics
- Different stakeholders
- Very entangled

REFERENCES

Books

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Systems Thinking, Systems Practice : a 30 year retrospective.
Chichester: Wiley.

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Practical soft systems analysis.
London: Pitman.

INTERNET

<http://users.actrix.co.nz/bobwill/Resources/ssm.doc>

Lessons learned

Strengths of soft systems methodology: when would I use it?

Weaknesses of soft systems methodology: why might I not use it?

Possible uses of soft systems methodology in evaluation

Things to try when I return home