



Soft Systems Methodology (SSM)

as practised by Brian Wilson, Founding member of Dept of Systems Engineering at University of Lancaster.

PLEASE READ THIS GUIDE IN PAGE NUMBER ORDER

- All organisations are complex.
- Organisations are inhabited by people and this also makes them messy and unique.
- SSM is about thinking about complexity and messes, and it provides a language for making that thinking explicit.

Basic Approach.

Accepting the distinction between “reality” and the intellectual processes of “thinking about reality” the analyst can use an iterative approach, which allows the analyst to learn about the most useful concept to adopt for further investigation.

These may include:

- Business management for process improvement
- Information requirements derivation
- Strategic formulation
- Organisation structure design
- Etc.

The Approach in Essence

Given the variety introduced by the potential multiple perceptions of purpose related to various stakeholders, the analyst is choosing to view the organisation in a number of ways. Each Root Definition (see page 3) represents an expression of purpose that the analyst believes will turn out to be useful and, through the construction of a Human Activity System, the utility of this assumption can be explored. (see fig. 3).

“Enterprise” model building

It is useful to have a single model representing the assumption.

What are the crucial aspects of SSM that must be adopted and why?

It is the presence of people that complicate matters. If we were to ask a number of managers to tell us what their organisation is trying to achieve, we would receive different answers.

As an extreme example, suppose we were interested in measuring value for money in the prison service (this is a real example). Assessing costs is not too difficult, but value requires us to know what a prison is for.

Answers to this question ranged from:

- Removing rights and privileges (punishment).
- Controlling interaction between offenders and the public (security).

to:

- Instilling society’s norms and values (rehabilitation), with many mixtures in between.

In most organisations these differences are more subtle, but they are nevertheless highly significant.

In SSM the words in brackets in the above example are given the variable **[W]**.

The implication of taking this variable seriously is that it is not possible to state the purpose of an organisation with confidence and without contention.

Thus the first feature of SSM that must be adopted is to make a distinction between the “real world” and the processes of “thinking about the real world”.

The thinking is aided by the production of a concept based upon the notion of a “Human Activity System” which is derived from a “Root Definition”.

This is a statement of purpose based upon a particular **[W]** and by capturing the essence (root) of the organisation seen from that **[W]**.

Root Definition (RD)

This is a **statement of purpose** that tries to capture the Essence of the specific situation. The structure of a RD can be described by the following mnemonic:

CATWOE

[C] - The Customer. The individual(s) on the receiving end of the output from the transformation.

[A] - Actors. Those individuals who would “DO” the resultant activities if the system were to map onto reality.

[T] - The transformation (purpose not achieved transformed into **purpose achieved**).

[W] - “Weltanschauung”, literally World View. It is the “belief” that makes sense of the RD.

[O] - Owner. A wider system decision taker, with concern for the performance of the system.

[E] - Environmental constraints; i.e. Those things outside the system boundary that are of particular significance to the system.

The RD is a single sentence with the main verb describing the transformation.

E.G. (a security-oriented view of a prison).

An **establishment [O]** owned system to **control the interaction [T]** between **offenders and the public [C]** by overseeing permitted contact and acting accordingly, both inside and outside the prison within **Home Office constraints [E]**.

The **[W]** in a RD is the statement of belief in the words chosen.

Thus:

[W] - Overseeing permitted contact and acting accordingly **WILL** control interaction.

The CATWOE analysis represents the minimum structure for a root definition. All the elements do not need to be specified. It is up to the analyst which elements are specified except **[T]** and **[W]** must be present. In the above example “Actors” have been omitted. They could have been specified as “prison officers”. It is customary to use additional words in the RD to capture the richness aimed for. In the above RD the words “both inside and outside the prison” do not feature in CATWOE, but add richness to the RD.

Conceptual Model

The conceptual model is derived by using logic only to answer the question: "What activities and their relationships have to exist within the system in order to achieve the purpose as described by the words in the root definition?"

The above root definition, relevant to a security-oriented purpose, leads to the following model at a particular level of detail.

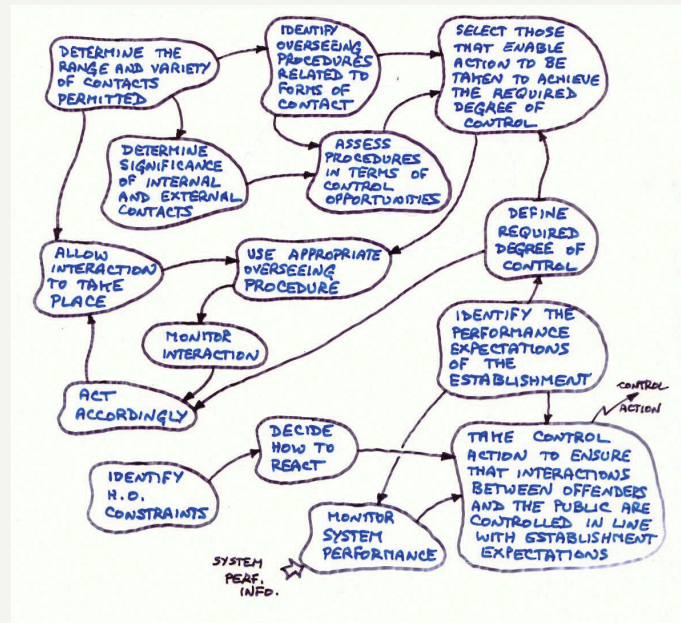


fig. 1

“Enterprise” model building

It is useful to have a single model representing the assumption; this is what we (the analysts) assume that organisation is required to do. This model is derived from a set of root definitions rather than a single definition and it is usual for the analysts to get some sort of “buy-in” from selected stakeholders as to their relevance and acceptability as definitions of the organisation “Vision”, “Mission”, etc.

A simple meta model is used to structure the set of root definitions. This is taken to be a model of any “Enterprise”.

“Enterprise” Meta Model

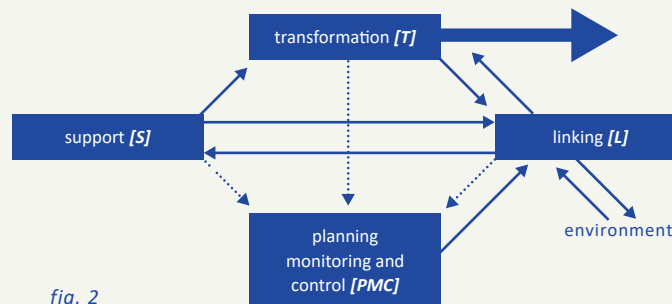


fig. 2

More advanced (and more useful) applications of SSM use the Enterprise Model.

An example of a set of partial RDs for a “Healthcare” enterprise: [T1] A System to make healthcare advice and services available to the total population to promote a healthy lifestyle in order to reduce susceptibility to a range of conditions requiring treatment.

[T2] A System to execute discrete episodes for the treatment of specific individual conditions.

[S1] A system to ensure that the human resource capabilities available to the NHS, in association with others as appropriate, match the requirements of all activities.

[S2] A system to ensure that the physical resources match the requirements of all activities.

[S3] A system to develop and maintain a current knowledge base to support all activities.

[L1] A system to bring together individuals requiring treatment and the necessary levels and range of medical resources.

[L2] A system to assemble classified intelligence about the healthcare needs of the total population as it changes in response to demographic and personal conditions.

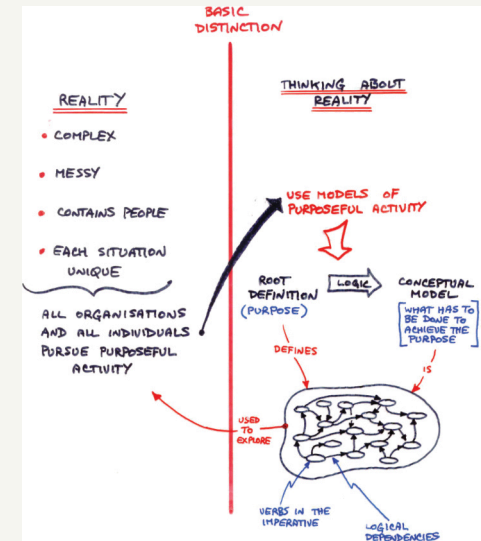
[L3] A system to accommodate current and anticipated Government initiatives and developments in legislation.

[PMC] A Government owned system to plan the development of healthcare provision and associated services in order to match the provision of healthcare to the population to continually meet their needs.

...while reacting to standards of provision, health legislation safety requirements and the total finances available.

An “Enterprise” model resulting from such a set of RDs typically contains 200-300 activities and is a useful source of information requirements (based upon the requirements of each activity within the model). It may be used to explore different organisation structure options, to use as the comparison device in a Strategic review etc.

Approach in Essence



About This Z Guide

This leaflet is intended as an introduction to the basic concepts of Soft Systems Methodology. For further information, advice and links to helpful websites, go to: www.ifse.org.uk

See also Wilson – “Soft Systems Methodology conceptual model building and its contribution”, Wiley 2001

Download copies of this leaflet and other Systems Engineering resources online at: www.ifse.org.uk

For more information about the worldwide Systems Engineering professional community, go to: www.incose.org

Leaflet prepared and published by INCOSE UK / The Institute for Systems Engineering (IfSE).

Lead author: Brian Wilson

www.ifse.org.uk

enquiries@ifse.org.uk

Institute for Systems Engineering (IfSE)