

# Soft System Methodology

In this course we are primarily tackling Hard Systems Engineering, but it has only been known as 'hard systems' since the popularisation of a methodology known as 'soft systems'. The aim of this lecture is to very briefly outline soft systems, so you understand its applicability and draw some wider lessons on validation.

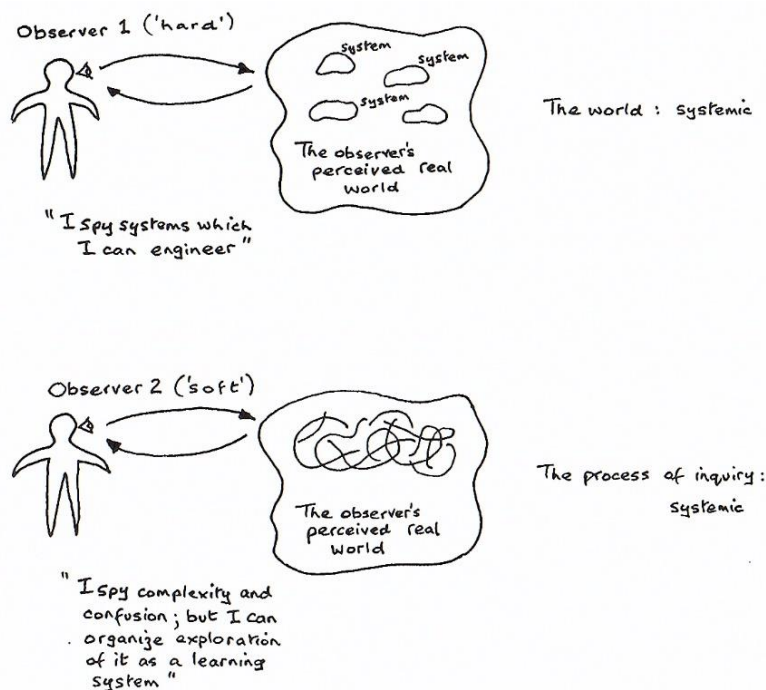
*"Soft Systems Methodology attempts to foster learning and appreciation of the problem situation between a group of stakeholders rather than set out to solve a pre-defined problem. The complexity of many organisational/social problem situations defeats attempts at defining a problem: in many such situations the problem is 'what is the problem?'"*

*University of Cambridge*

Soft Systems methodology was developed at the Department of System Engineering at Lancaster University in the 1970s. The first major work outlining the subject was by Peter Checkland, Emeritus Professor of Systems in a book called *Systems Thinking, Systems Practice*, Wiley, 1981.

## What is the Difference between Hard and Soft Systems?

Peter Checkland's diagram to explain the difference between the approaches.



Note the emphasis on the word "systemic" which means considering something as a system, rather than "systematic" which means undertaking something with a process that is a system.

The starting point premise is that the real world problem is so complex and (more important) stakeholders and players cannot agree on an overall system model that simple application of the system model and consequent "hard" methodologies

will not work. So soft systems are not an alternative to hard systems they are intended for different applications.

**Hard systems is best when the problem is a well defined technical problem.**

**Soft systems is best when the problem is fuzzy and not well defined such as organisation management.**

Thus for building aircraft and spacecraft etc. people expect hard systems; for organisational problems people expect soft systems. So why include it on this course?

- 1) Hard systems is conducted within a complex organisation that can lead to fuzzy ill defined issues so it might be good to have soft systems in your back pocket.
- 2) When Civil Engineers got hold of the idea they embraced it as the complexity in what they produce is low and normally there is no need for a systems approach. However the impact on society, environment etc. can be very high leading to fuzzy ill defined issues.

But this highlights that there is a balance between the hard and soft issues in all engineering activity and soft systems can possibly help with validation.

## **The Seven Stage Model**

When Checkland first outlined the soft systems approach he focused on a “Seven Stage Model” as a route map to how the methodology should work.

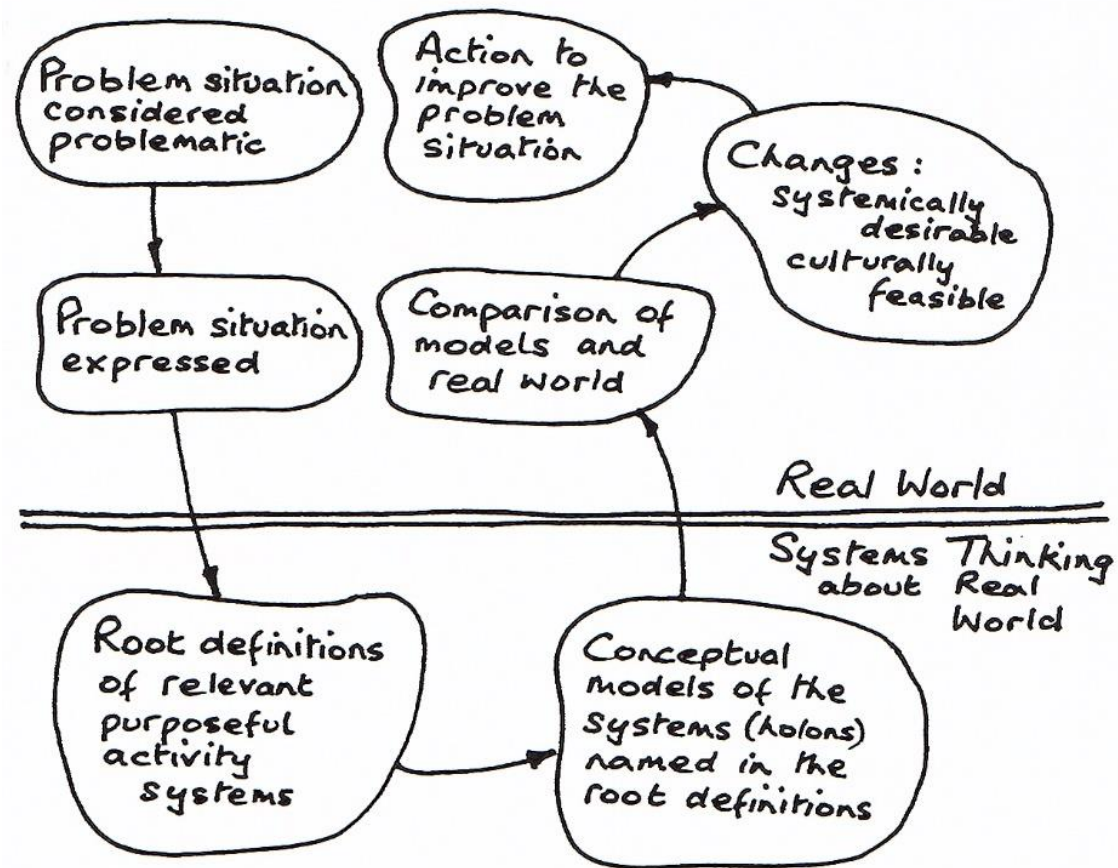
This model’s major critic was Peter Checkland himself. It is a linear progression and looks like a set of rules and Checkland is trying to get across a holistic approach to enquiry which should be adapted on a case by case basis.

My (Hempsell) criticism of the criticism is that there is in danger of soft system thinking degenerating to just advice to get a clever bloke (or gal) who can think holistically to look at your problem. That hardly needs multiple text books and decades of academic work.

Either way when soft systems is taught the starting point is this Seven Stage model. So that is what we are going to do.

## Seven Stage Representation of SSM

This is Checkland's diagram of the 7 stage Soft System Methodology.



Note the use of the word 'Holon' I briefly touched on this in lecture 2 "What is a System?" It is just another word for System. Checkland was the person who introduced this and acknowledges it is the same as a system.

### Stage 1. Express the Problem Situation

The first step is to identify and acknowledge the problem areas to be examined - a process that involves all stakeholders.

This is then followed by an exploration of the problem areas by gathering information on the situation and organisations involved. This can mean interviews, workshops and other interactions with stakeholders as well as understanding organisation structure and procedures.

The aim is to be as wide and holistic as possible and capture different viewpoints.

## Stage 2 Examine the Situation Considered Problematical

Having collected the information about the problem the next stage organises it and analyse it to identify the issues from the differing viewpoints.

During this stage the team considering the problem area should crystallise their ideas about what the real world situation is and communicate that to the stakeholders for validation.

The aim to prepare for the transfer from the real world into the system worlds and the generation of “root definitions.”

### Rich Pictures

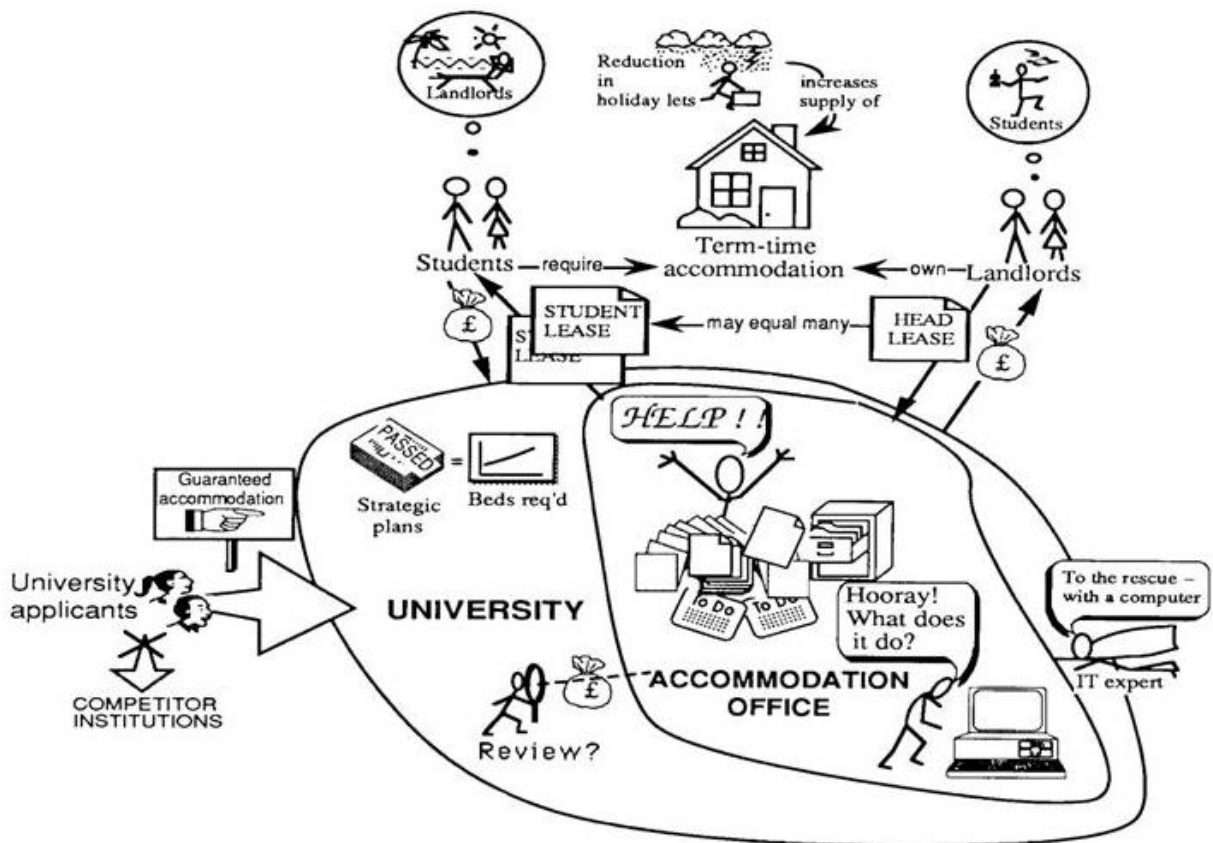
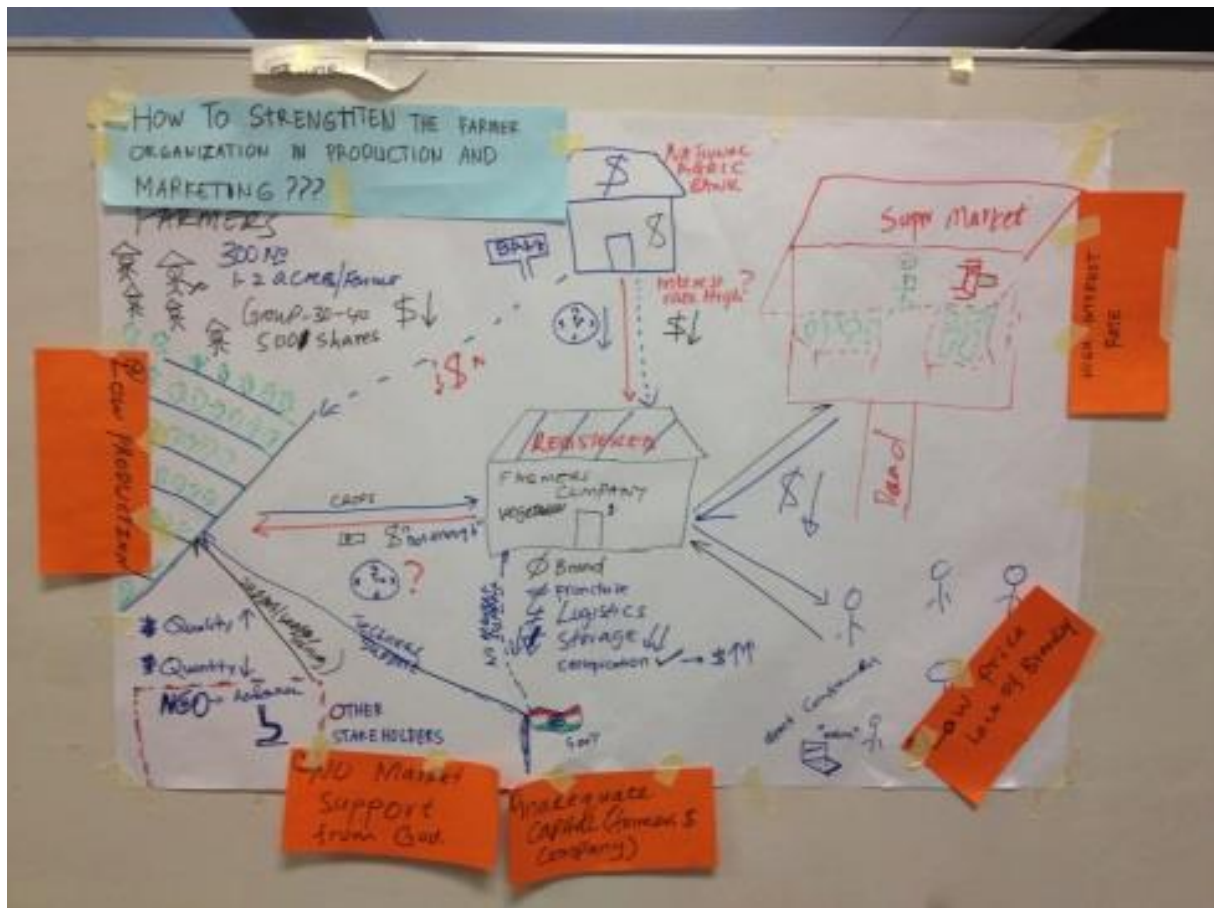
There are many tools that can be used at this stage but the key technique developed by Checkland is the “Rich Diagram.”

These are not set out to any formal rules, nor do they have any standardised symbolism or nomenclature but are almost doddles modelling the situation under consideration.

It is not necessary for these to be an individual effort. They are often better produced by teams, facilitating a common understanding within the team. And there should be more than one: for example Checkland suggests at least these three

1. The *intervention* (analysis process) and your role in it: why are you performing the analysis? for whom? with whom? what does your client want to achieve from the analysis (this is *very* important: what are the goals of your system?) - this information informs your decisions about what to leave in and what to exclude from your system
2. The *social context*: who are the people involved in the situation being analyzed and how do they relate to each other?
3. The *political context*: who holds power? over whom? how is power exerted? how is it resisted? is the person "in charge" the person who makes things happen?

It is also common for them to be hand drawn on flip charts or white boards – goggling “Rich Diagrams Examples” shows many types and interpretations but the intention is working rich diagrams should be more like the first of the two examples I show rather than the second.



### 3. Formulate root definitions of relevant systems of purposeful activity

We are now in the System analysis world and just as in hard system we start with a 'purpose' in soft systems we have "Root definitions."

These are statements (there can be more than one) that are a structured description of a situation that capture the problematic situation. It is a clear statement of activities which take place (or might take place) in the organization being studied.

#### CATWOE

Customers - Actors - Transformation Process - Worldview - Owner - Environmental Constraints

A researcher in Checkland's department, observed that SSM was most successful when the Root Definition included certain elements. These elements, captured in the mnemonic CATWOE, identified the people, processes and environment that contribute to a situation, issue or problem that required analysing.

This is used to prompt thinking about what the organisation is trying to achieve. organisation perspectives help the analyst to consider the impact of any proposed solution on the people involved. There are six elements of CATWOE

**Customers** - Who are the beneficiaries of the highest level business process and how does the issue affect them?

**Actors** - Who is involved in the situation, who will be involved in implementing solutions and what will impact their success?

**Transformation Process** - What is the transformation that lies at the heart of the system - transforming grapes into wine, transforming unsold goods into sold goods, transforming a societal need into a societal need met?

**Weltanschauung (or Worldview)** - What is the big picture and what are the wider impacts of the issue?

**Owner** - Who owns the process or situation being investigated and what role will they play in the solution?

**Environmental Constraints** - What are the constraints and limitations that will impact the solution and its success?

In soft systems the differing perspectives of the various stakeholders and players can lead to different root definitions. Unlike a hard system 'Purpose' where there

is a single goal, soft systems methodology can be addressing multiple issues and not be looking for a single optimised outcome.

## **Examples of Root Definitions**

(Nicked from other people's lectures on soft systems)

A company owned system to market the products and services of the company to existing and future clients by the most appropriate cost-effective means.

A System owned by O to do W by A by means of T given the constraints of E in order to achieve X for C.

A system owned by 'o' in which actors 'a' perform transformation 't' for the benefit of customers 'c' within the Weltanschauung 'W' and the environmental constraints 'e'.

For example, the Olympic Games could be seen as any of the following:

- A system to bankrupt self-selecting cities on a four year cycle
- A system to institutionalise a global celebration of sporting prowess and cooperation amongst nation states.
- A system to provide inputs into a global capitalist system in which there are limited number of beneficiaries.
- A system to allow sports ministers to extract money from treasuries for the development of a national sporting competence.

## **Stage 4. Build conceptual models of the systems named in the root definitions**

A last we get to some systems!

In this stage system models are created to address the inherent functions defined by the Root Definitions.

These system models should be ideals of how best to do this independent of the real world situation. They are also known as conceptual models.

## **Stage 5. Compare Models with Real World Situations**

We now move those ideal system models back to the real world to compare them with the real world situation.



The examples I have seen (e.g. below) do this on an element by element basis which I think is simplistic. If the model really is a system it should have emerging properties that cannot be captured by an element by element treatment.

Conceptual Model Activities	Real World	What could we do
Identify potential/ Current customers & understand their needs	Performed on an <i>ad hoc</i> basis by the partners. No real systematic approach to identifying potential customers and elicitation of needs	1. Design develop and implement a more systematic approach
Review current product/service portfolio	Portfolio developed on an as requested basis. No overarching strategy for product or service offerings	2. Establish a formal review process with in each business area and across the company as a whole
Create marketing material of products and services	Created on an as required basis. No consistent format, approach or message.	3. Agree a standard format for marketing material and develop materials for all current products and services
Develop new products and services	Performed on an as required basis for prospective customers	4. Establish business area planning for new products and services
Define unique competitive advantage for Company	Endless debates about what is unique about the company. It clearly is unique as our client base comprises mainly large multi-national companies or government organizations	5. Seek advice and guidance on how to define and agree our unique competitive advantage
Assess Competition	No systematic analysis performed	6. Establish a process

## Stage 6. Define Possible Changes which are Both Possible and Feasible

From the comparison changes are defined which could move the real world situation closer to the idealised system model.

This is not expected to be a complete move the idealised model rather find the things that are do-able – i.e. are possible within the financial and other constraints and feasible in terms of acceptance by the stakeholders who are supposed to enact them.

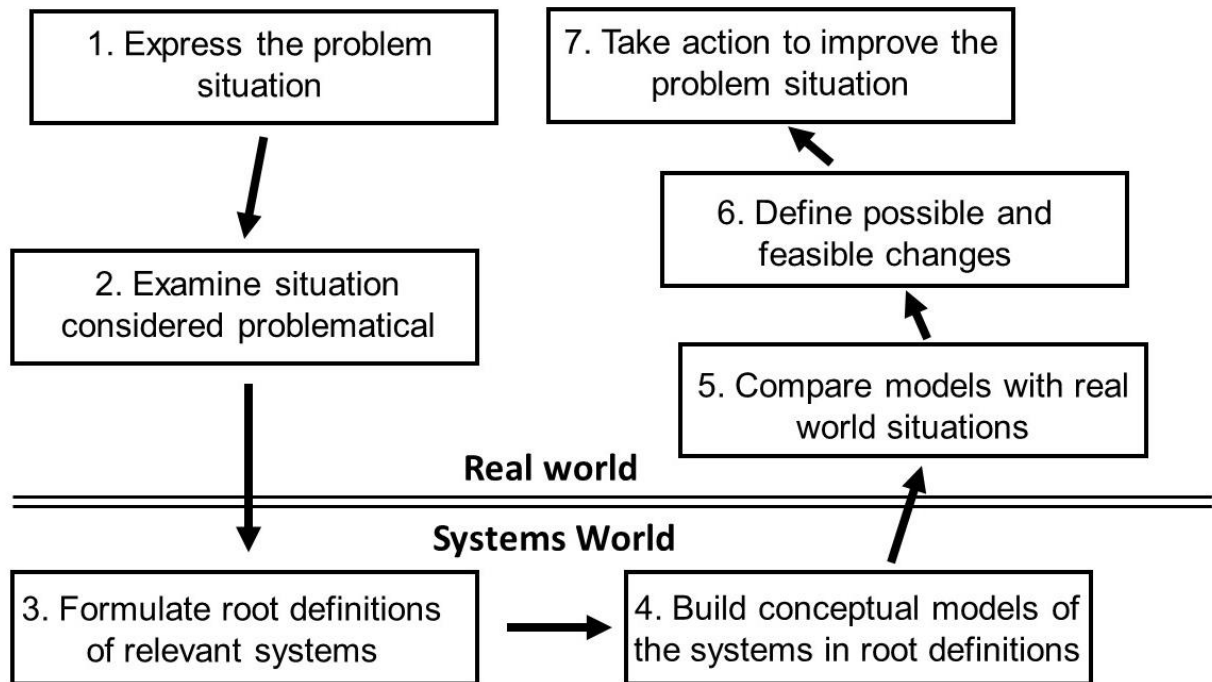
## Stage 7. Take Action to Improve the Problem Situation

Then apply the changes to the real world situation.

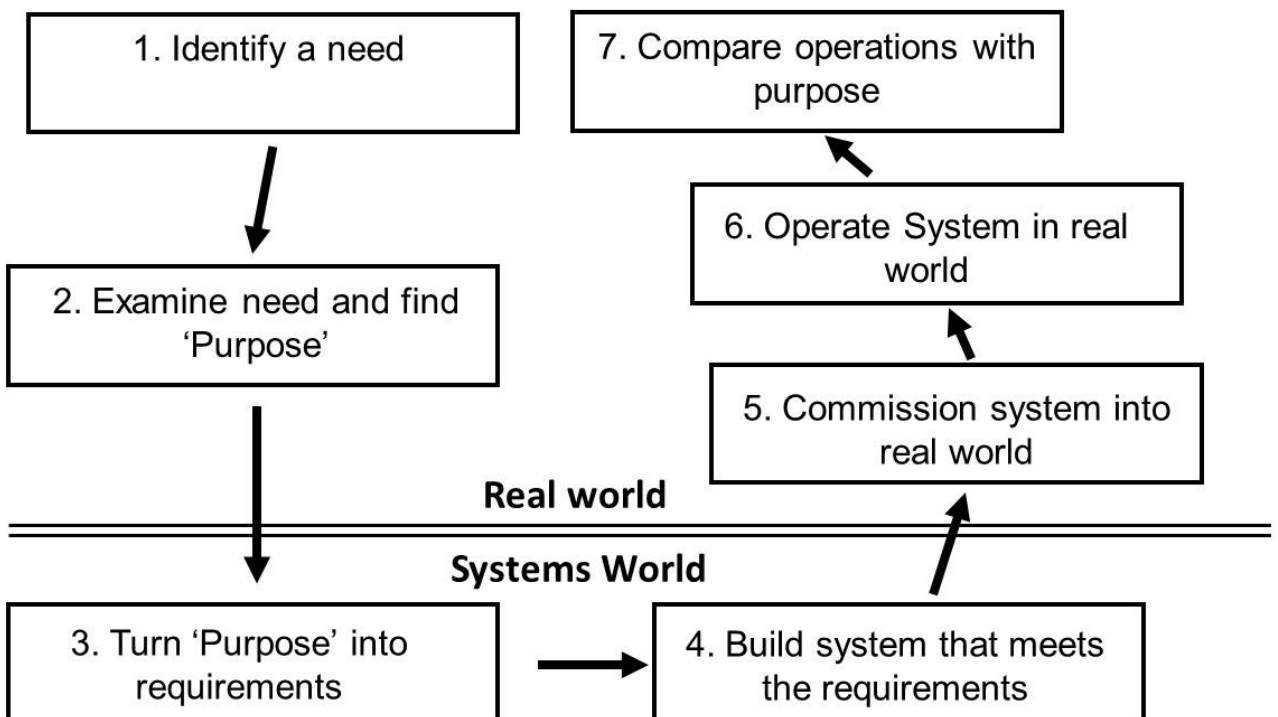
If the process has worked then the problem situation should be less of a problem – as least to some stakeholders. Given then the approach specifically embrace the differing viewpoints the resulting action is bound to only partially improve things



## Soft Systems



## Hard Systems



## **THOUGHTS ON VALIDATION**

Traditional Hard systems:

Validation is an activity performed after the system is operational  
– too late

Traditional Soft Systems:

Validation is an activity performed before the system is introduced  
– there no check it does what is intended

(Although some outlines of Soft System methodology do link the seventh stage back to the first.)

The lessons that I think soft systems does have, is the emphasis on real world and system world and the sort of activities in the real world that could make validation more effective.

A vision of Hard Systems with a Soft Systems shell?