SOFT SYSTEMS METHODOLOGY

Ricardo A. Rodríguez-Ulloa
President and Senior Researcher, Andean Institute of Systems - IAS, P.O. Box 18-0680, Lima 18-Peru

Keywords: Actor, client, environment, change, methodology, hard problem, soft problem, problem content system, problem solving system, transformation process, real world, conceptual model, root definiition, weltanschauung, rich picture, positivism, phenomenology, hermeneutics, problem owner, system, ontological description, epistemological despcription, problem situation

Contents

Summary

Soft Systems Methodology - SSM is a intellectual systemic tool to orchestrate and implement change in the real world in topics concerned to human affairs.

SSM was created by Prof. Peter B. Checkland and his colleagues, from Lancaster University, U.K., in the early 80's, after a long period of action research. It is a framework composed by seven steps organized in a special manner that leads to the implantation of culturally feasible and systemically desirable changes in human

organizations of any king (churches, clubs, business, enteprises, ministeries, a country, a region, a state, etc.). One key concept in SSM is that of human activity system (HAS), a description of human beings since the epistemological perspective instead of the ontological one.

It may be said that the appearing of SSM makes a cornerstone in the way how organizations should be analyzed and studied in the aim to propose and implement a strategic or operational change in it. Instead of applying positivistic problem solving hard systems techniques like operations research, decision analysis and the like unconsciously, SSM asks for paying full attention under which weltanschauung the analyst(s) is (are) doing his/her (their) observations on the problem situation, because depending on this, the analysis, conclusion and proposals for change can vary. This way of work creates then the conditions for a holistic analysis, due to the fact that SSM is interested in seeing the problem situation under diverse worldviews (where is possible to apply hard systems techniques within each one) and seeing the situation under an hermeneutic perpective as well, leading to a very complete understanding of what is happening in that situation and creating the conditions for the proposal of integrated systems "solutions" to the situation encountered.

1. Introduction

Soft Systems Methodoloyg - SSM has been the outcome of a large and serious research work made by Prof. Peter B. Checkland and its colleagues from Lancaster University, U.K. to create a general framework able to tackle ill-structured problems that human beings usually face in most of their interrelationships with their fellows.

To enter to its way of working and application, it is necessary to explain which is the arena where it lays on. This is the area of management, which means, in words of Kenneth Boulding, one of the founders of systems thinking, to be tackling problem situations concerned to the 6^{th} level of complexity onwards, within his informal catalog of 9^{th}. levels of complexity existing in the real world.

In this sense management must be understood in its broad sense, thus it can be related to varied situations where a person or a group of persons need to implant a transformation process (a change) in the real world, in order to "improve" in some way a problematic situation that they would be living in. By problematic situation it is meant, a situation were someone(s) perceive that somethings are going "wrong" in it and need to be "improved". As the reader can notice, the words *wrong and improved* are in parenthesis. This is like this because following SSM, any perception of the observer(s) about the real world is subjective and depends of the weltanschauung (i.e. cosmovision) the observer(s) adopt to perceive the phenomenon in the real world. So that, which for someone can be "wrong" for another the same thing can be "correct" or "adequate". It all depends under which perspective or wetanschauung it is being observed. More things about this subjectivity will be mentioned later on.

2. Problemology

Problemology is the cornerstone for starting any systemic study. Problemology is

concerned to the correctdness in problem situations' definitions. There have been several systemists who has brought about the importance of a good problem situation's definition and solving procedure of it, using a systemic approach in searching of the adequacy of its definitions.

In consequence, one of the important issues which is needed to analyze in this section is precisely the problem which consists on that usually decision makers adopt decisions under the belief that the problem to be solved has previously been adequately defined by someone. This asumption creates the cultural conditions in the solver, to believe that the problem has been adequately understood and defined and it only needs to be solved correctly.

Instead of that, Checkland, the author of SSM, is very cautious on this when he says "the problem consist in defining the problem". Very important steps of SSM are dedicated to understand, in a holistic manner, all the problematic issues and their interrelationships concerned to a specific problem situation, because, according to Checkland, problems, in the real world, are not defined. They are events that occur in it, but human beings are who add their respective meaning, making them "problematic" or "not problematic". Thus, affirmations like "good performance", "bad results", "excellent person", "worse situation", etc, are mere appreciations made by someone on events occurring in the real world. These appreciations are product of the observer's interpretations on this. In this sense, observers define problems guided by certain conditionants which influence in their interpretations of real world situations. A specific interpretation on what is the problem situation, guides the way about what "solution" should be done and which should be the way to "solve" it.

Thus, the way the observer defines the problems depends closely on the mental images that he/she could have about the evolution of events which are happening in a portion of the real world he/she is examining at that particular moment. In consequence, problems are not defined in the real world, they need to be defined, arising, then, several questions: will the problem be adequately defined?, will analyst be considering all the relevant variables from the situation?, will the reference system (the situation in focus) and its environment be adequately defined?, which are the environmental's variables to be considered under study and what are their interrelationships?, in which manner environmental variables affect the system?, how was the system's behaviour and its environment in the past?, how will be the system's behaviour and its environment in the future?. All these questions are part of the field of Problemology.

2.1. Problemology as a Systemic Attitude

To start this section, one question needed to answer is about what is a problem?. A problem is a situation which brings to the person who lives it an ache, a pain, an uneasiness, a sorrow, a disconformity. On the other hand, the difference between the situation he/she is living or experiencing at that moment and the situation he/she would like to live, will push him/her to change that situation. But another problem arise then, which is concerned with whether the direction to "solve" or "alliviate" the problem is the adequate.

In reality, human beings do not face problems, they face problematic situations. A problematic situation, is one where the person who is involved in it perceives not only one problem to face but several problems at the same time. This is the most common situation that any human being face in his/her daily routine. We, as human beings, usually are facing problem situations composed by issues that comes from the side of the economy, health, family, work, personal aspirations, internal personal conflicts, the environment, etc.

Thus Problemology is an important field concerned to the art and methodology to properly define problems and problematic situations. This process is so important for any systems study, that if it is not well done, it will cause that the solutions proposed will be erratic, out of the context, inadequate and most of the times will not solve or alliviate the situation, but on the contrary, will contribute to increment the difficulties on it.

There are another aspects inherent to the study of Problemology. These are concerned for example to the constraints and limitations the solvers could have to define the problem situations and to propose solutions for it. Solvers must be conscious of their proper limitations (intellectual, emotional, physical) as well as of their bias in appreciating specific real world problem situations and their approach to alliviate them.

2.2. The Problem Solving System and The Problem Content System

Checkland proposes two important concepts which help the understanding of issues concerned to the problem situation and its adequate definition and alleviation: The Problem Solving System (PSS) and the Problem Content System.(PCS).

PSS is that condition in which there exists a person or group of persons who have a problems' solving vocation. They have a predisposition to be problem - solvers, and, in some manner, they get in agreement among themselves, in order to use a predetermined conceptual framework which is or will be used in order to "solve" or "alliviate" the problem - situation.

On the other hand, PCS is that context in the real world, in which there are some people who have the "vocation" to live the problems, this means, the predisposition to live a determined problematic situation. We have mentioned earlier that a problematic situation is that condition in which many problems and needs to change are presented to the people involved in that situation, at the same time. people conforming the PCS are varied, live different personal problems and have diverse aspirations and desires on what should be or not should be done in order to "improve" or "alliviate" the problem situation they are facing at that PCS.

The relationship between the PSS and PCS is commonly not so armonious and there exists certain occasions where the PSS can be converted into another PCS due to the fact of the kind of "solutions" it proposes to implant at the PCS, increasing the problems in it instead of solving them. This is because of by some reasons (and interests) the "solutions" set up by the PSS are biased, proposing "irrational" changes at the PCS. If that happens in a concrete situation, then, it is the time to examine the PSS, in order to

delucidate the reasons about its behaviour. This is the situation where the PSS is considered another PCS.

According to experience it can be argued that there are several factors that bias the purpose and the way the PSS proposes the "solutions" in the PCS, these are as follows:

- Educational level and professional careers of the PSS's members
- The particular interests of the members of the PSS
- The reducionistic point of view of the PSS's members when they analyze the problems at PCS
- The mental images that members of the PSS have in relation to what is happening in the PCS
- The influence of their ignorance in the construction of the mental images of the PSS's members
- The ignorance of the ignorance that PSS's members can posses, which not allow them to realize about the weaknesses of their approach to comprenhend, in the required dimension, the situation existing at the PCS.

Problemology must consider all of these factors, in order to verify if the problems are well defined or there exists some biases made by the members of the PSS, as a consequence of the influence of some of the factors indicated previously.

Figure 1, indicates the relationship between the PSS and the PCS, and the importance of the weltanschauung in proposing/accepting some kind of action to transform the situation encountered at the PCS.

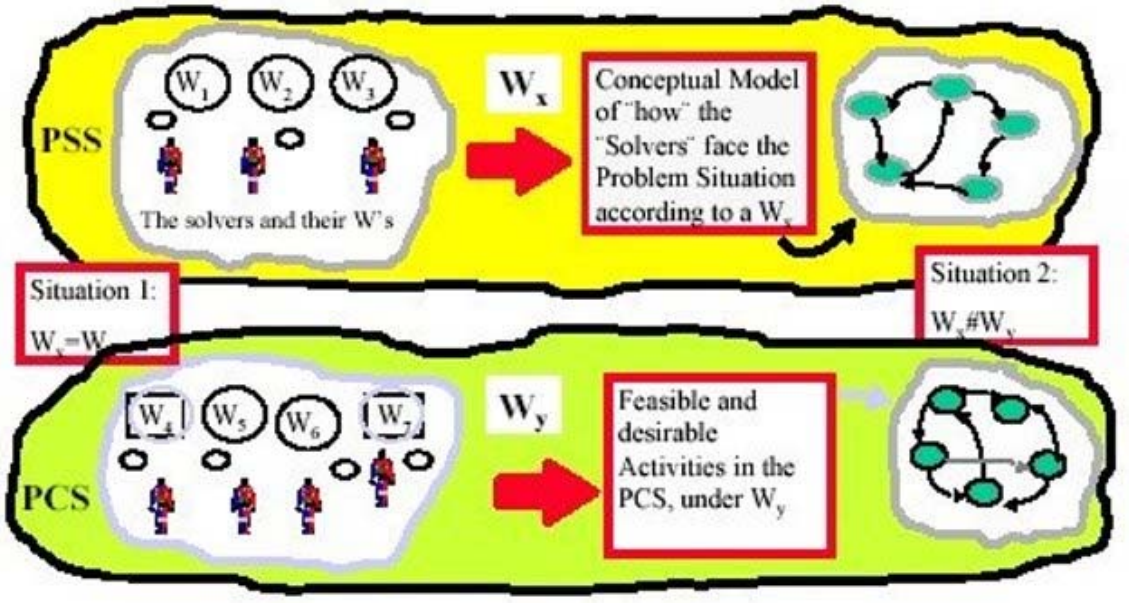

Figure 1. Relationship between the Problem Solving System (PSS) and the Problem Content System (PCS) (After Rodriguez Ulloa, 1988).

Three things are recommended in order to practice a good methodology to define

problems correctly:

1. Recognize the multiple causes of the problem
2. Recognize the multiple effects that the situation has or could have in the future
3. Recognize the diverse sectors of the real world that could be affected or influenced positively or negatively by the diverse and posible "solutions" of the problem.

2.3. Tipology of Problems

There exists diverse categories of complexity in the real world, generating a diversity in the tipology of problems human beings face. This fact also forces to ask to the academic community for new intellectual techniques to tackle them.

It has been said, on the other hand, that Scientific Method, with its reductionism, replication and refutation, works well at lower levels of complexity, but it has problems for upper levels of it.
According with this, the systems movement has been working in the development of diverse methods and methodologies oriented to 'solve' different kind of problems that arise in complex categories of the real world.

For the sake of clarifying the work made by the systems movement, it is necessary to classify the kind of problems human beings usually face, establishing a range of them. Considering this range, problems vary in between two extremes: "Hard Problems" and "Soft Problems" (see Figure 2)

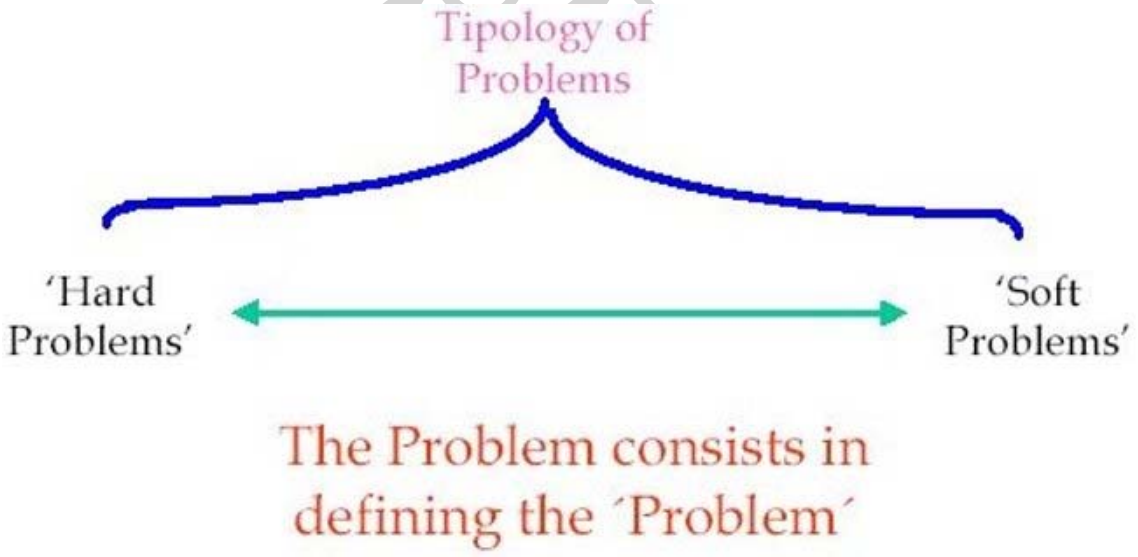

Figure 2. Tipology of Problems.

2.3.1. Hard Problems

At the beginning of the systems movement, in the late 50's of the last century, one of the main achievements was the creation, by Prof. Arthur Hall in the USA, of the systems engineering methodology. A similar research work was done in England by Prof.

Gwelyn Jenkins. Then both research works lead to know a general framework oriented to tackle and bring about "solutions" to hard problems. The same happened with Operations Research, Decisions Theory and Systems Analysis created the latest one by the Rand Corporation from the USA. The firs two were considered as techniques and methods for the support of the decision making process and the last one as a methodology to "solve" hard problems. It is important to mention that although all these techniques and methodologies were under the umbrella of the systems movement, which on the other hand, arose to refute the scientific reductionistic method, all of them were impregned of the philosophical framework which has influenced all the last century in human mankind: the positivistic view of the real world.

Prof. Checkland made a critical analysis of these and related approaches, which on the other hand, support all the quantitative background of Management Sciences until nowadays.

A hard problem can be defined as a situation where the "what" (i.e. what is the problem) is clearly defined and the "how" (i.e. how to "solve" the problem) is also clear and there are not doubts about their definition. Examples of hard problems can be:

- "Maximize the enterprise's profits"
- "Minimize the production costs of the company"
- "Built up an accounting system"
- "Change the tyre of my car"
- "Prepare a chocolate cake"
- "Built up a brigde" and so on.

As it can be seen, hard problems are very well defined and the "solution" of them can be relatively easily elaborated, depending on whether the person who intends to solve the problem is expert or not on the field.

2.3.2. Soft Problems

Difficulties and failures of the systems engineering methodology, decision analysis techniques, operations research and the systems analysis methodology of the Rand Corporation's kind, developed in the 60's and oriented, all of them to tackle hard problems in human and socio-cultural systems; lead the conditions for Checkland and his colleagues at Lancaster University to start, ending the 60's, an action research programme aimed to develop a methodology able to face soft problems that a manager (understood in its broader sense) frequently tackles in rutinary real world situations in organizations of any kind (families, clubs, enterprises, non government organizations, state organizations, etc.).

After about 25 years of action research, Chekcland and his colleagues arrived to a methodology they called Soft Systems Methodology - SSM. The philosophical roots of SSM are phenomenlogy and hermeneutics, which replace the positivistic vision underlined in the hard techniques explained above.

The main difference in this approach in contrast with the hard methodologies and

techniques is that SSM postulates, based on its philosophical roots, that human beings, the observers, can not perceive "objectively" the real word, so that it is impossible for the observer to propose a unique and "true" definition of a "problem situation" and unique and "true" "solution" to that "problem situation".

Instead of that, hard techniques and methodologies based on positivism, suppose that they can operate with issues that are happening in the real world and which can be objectively perceived, and thus modeled rigorously, using a formal language (i.e. Mathematics), obtaining a 'solution', usually the "best" one, which can, hopefully, be implemented in the real world.

With SSM the possibility that a human being operates not with events occurring in the real world but with mental images of them reconfigurates the way of doing a problem situation's analysis, arising diverse 'images', all of them valid, about the phenomena occurring in a portion of the real world.

The existence of varied images about what is happening in the real world, generates an increment of the complexity in the understanding of the situation under study, arising a complex structure of the problem situation that usually lies in the category of being facing a "soft" problem situation. And this is understanble because it is usually the condition of the situations that human beings face oftenly. *(See. The System Sciences in Service of Humanity)*

A soft problem is that where the "what" (i.e. what the problem is) is very difficult to define and the "how" (i.e. how to 'solve' the problem) is even more difficult to achieve. This is like this because each problem definition and its 'solutión' depends on particular interpretations the observer can apply in understanding and 'solving' the problem situation, which is based as well in the weltanschauung or worldview adopted.

One of the outcomes of Checkland's work has been the confirmation that most of the hard techniques and methodologies start their case study analysis, supposing that the problems they are intending to solved, are previously defined by someone. When a study has this advantage, half of it has been solved!, however most of the problems human beings face are precisely problematic, because real problem situations do not give any clear signal to the observer about which should be the real problems that are happening there, even more, it is less clear how to 'solve' that situation.

As examples of soft problems, it can be mentioned the following:

- "Define the enterprise's mission"
- "Solve the poverty problem of the country"
- "Implant a TQM program in the company"
- "With whom may I get marry?"
- "It would be good if I follow systems engineering as a career?"
- "Change the culture of the organization"
- "Develop an information system for the decision making"
- "Can the patient be operated from the kidneys?"
- "Implant a transparent and confident election process in country X"

- "Change the behaviour of that drug addiction person"
- "Implant a strategic change in the corporation"

As it can be observed each of this problems are of great complexity and its "solutions" require a lot of effort and systemic thinking in order to understanding the viable gates to "solve" or "alliviate" the situation, but first of all, it is necessary to understand the problem situation.

-
-
-

Bibliography

Checkland, P.B.; 1981: Systems Thinking, Systems Practice, John Wiley and Sons, Chichester [A work where SSM is presented with its philosophical foundations and applications. Dense and not ease to understand at the first time]

Checkland, P.B. and Scholes, J.; 1990: Soft Systems Methodology in Action, John Wiley and Sons, Chichester [A most recent review of SSM with a more practical examples of its use. It presents some new variations of its use considering special issues like culture and power as a key aspects of organizational change]

Checkland, P.B. and Holweel S.; 1997: Information, Systems and Information Systems: Making Sense of the Field, John Wiley and Sons, Chichester [Here soft systems thinking is applied to understand the meaning of information and how a new conception of information management can arise under a soft systems view of the real world, creating the basis for a radical shift in this field]

Jackson, M. C.and Flood R., L.; 1991: Creative Problem Solving: Total Systems Intervention, John Wiley and Sons, Chichester [This work presents a view of diverse systemic methodologies and approaches, being SSM one of them. The interesting point of this work is that at the final of each approach or methodology, the authors present an example of its use and a critique to the approach]

Rodríguez-Ulloa, R.A.; 1988: "The Problem Solving System: Another Problem Content System", in Systems Practice, Vol. 3, Nr. 1, pp. 243-257, Plenum Press, New York [A paper in which it is established the importance of the relationship between the Problem-Solving System and the Problem-Content System and the influence of the Weltanschauung]

Rodríguez-Ulloa, R.A.: 1990: "Methodology to Define Weltanschauung (M-D-W): An Intervention in a Peruvian Problem - Situation" in Sistémica, Vol. 1, Nr. 1, (pp. 65-90, Spanish version; pp. 63-87, English version), Andean Institute of Systems - IAS, Lima [A paper which explains a overall methodology to define people's weltanschauungen]

Rodríguez-Ulloa, R.A.; 1992: "Cultural Systems, Strategic Management and Organizational Change", in International Systems Science Handbook, pp. 222-241, edited by the International Systems Institute (ISI) and the Spanish Society for General Systems (SESGE), Systemic Publications, Madrid [A work where it is seen the relationship between the culture, power, their consequences in strategic management and change of organizations]

Rodríguez-Ulloa, R.A.: 1994: La Sistémica, los Sistemas Blandos y los Sistemas de Información, 1ra. Edición, Biblioteca Universitaria, Universidad del Pacífico, Lima [This work presents a suscint view of SSM and its application to management and information systems. It has been written for those who are not familiar with systems thinking and SSM]

Rodríguez Ulloa, R.A.; 1999: Soft System Dynamics Methodology - SSDM: A Tool for Social Systems Analysis and Design, Proccedings of the 43th. Annual Meeting of the International Society for the Systems Sciences - ISSS, Asilomar, EE.UU / Proceddings of the 3rd. International Working Conference of the Andean Institute of Systems - IAS, Lima, Peru. (in press) [In this recent work it is presented SSDM, which arises as a product of the fusion of SSM and System Dynamics (SD)]

Wilson, B.; 1984: Systems: Concepts, Methodologies and Applications, John Wiley and Sons, Chichester [A well done work which presents the practical uses of SSM, clarified with diverse example through the book's content. There are several case-studies at the final of it, where SSM can be applied]

Websites related to SSM:

http://www.bf.rmit.edu.au:81/~andrewf/ssm-res.html [a place with papers, examples and links related to SSM and related approaches]

http://www.lums.lancs.ac.uk/mansci/HandlingStrategicProblems/m_s_3frs.htm [good place to complement the knowledge on SSM with exercises and examples of its stages]

http://www.nutech.com.hk/issaclam/ssm.htm [a place where it can be find diverse links on SSM]

http://www.concytec.gob.pe/ias/index.htm [a place where can be found bibliography in English and Spanish as well as courses, seminars, links, papers, consulting and conferences on SSM and related methodologies and systemic issues]

http://www.softsystemsmethodology.co.uk/index.htm [a place for training and consultancy in SSM applied to organizations]

Biographical Sketch

Ricardo A. Rodríguez-Ulloa: Industrial Engineer, National Engineering University (UNI), Peru, M.A.in Systems in Management, Lancaster University, England; Postgraduate Studies in System Dynamics, MIT, USA.; Diploma in Industrial Projects, University of Bradford, England; Postgraduate Course in Interactive Management, George Mason University, USA. Founder, President and Senior Researcher of the Andean Institute of Systems-IAS, Peru; Director of the Latin American Society for Strategy (SLADE), Brasil. More than 15 years of experience in using SSM in the Latin American context. Senior and Visiting Lecturer in several Latin American Universities.