White Paper

Soft Systems Methodology Stages 2-4: Building Understanding

WP0178 | March 2015

Ceri Williams

Ceri has thirty years in the IT industry, originally delivering complex control systems and subsequently broadening focus to Enterprise Architecture, Governance and transformation of the IT function. Working as a chief architect, consultant and coach, he enables FTSE 250 organizations to make medium and long term decisions on the shape of the Enterprise Architecture and positioning of the IT function.

He advocates putting people at the heart of technology and business change with focus on the human enablers and constraints. His work deals with the way in which rigorous engineering and architecture disciplines are integrated with the cognitive and behavioral capabilities of the people who practice them.

The previous white paper in this series [Ref 1] focused in detail on the first Soft Systems Methodology (SSM) process step – entering the problematic situation – and illustrates it through scenarios regularly encountered by the Enterprise Architect. It explored the structured approach that the Soft Systems Methodology provides to guide practitioners, and the way in which this affords integration points for blending with engineering disciplines and frameworks.

This white paper deep-dives into the SSM process steps that are concerned with understanding the problematic situation:

- **Stage 2:** express the problem situation (Analysis)
- **Stage 3:** Formulate root definitions of relevant systems of purposeful activity (Definition)
- **Stage 4:** Build conceptual models (also Definition)

There's no substitute for reading the papers themselves, but for readers short of time, the next section is an extract taken from Papers 1 and 5. It provides a very short outline of the Soft Systems Method - what it is, where it came from, and why it is significant. Readers wishing to deepen their background in the topic before embarking on this Paper can read the previous papers [Ref 1]. Readers already familiar with these papers can skip the next section.

A (very) Short History of Soft Systems

In a nutshell - the Soft Systems Methodology (SSM) is a systemic approach for tackling real-world problematical situations. Soft Systems provide a framework for users to deal with the kind of messy problem situations that lack a formal problem definition. Enterprise Architecture deals with “real-world problematic situations” and routinely encounters “messy problem situations that lack a formal problem definition” – this is why a re-imagining of Enterprise Architecture as a blend of Soft Systems and Systems Engineering disciplines is now needed, and provides us with a complete set of concepts and tools with which to operate in a complex, people-centric environment.

The Soft Systems Methodology originally emerged in the 1960s in response to problems encountered in tackling management and organizational problems using a systems engineering approach. From Ref [3]: “…the pattern of activity found in Systems Engineering – namely, precisely define a need and then engineer a system to meet that need using various techniques – was simply not rich enough to deal with the buzzing complexity and confusion of management situations”. I would add that the Systems Engineering approach also makes a number of (usually unstated) assumptions. Specifically that:

1. The problem and solution space can be modeled as a single definitive version of ‘the truth’ that is common to all stakeholders
2. A stable snapshot of the environment (people, process, material) can be baselined and persists largely unchanged during engineering analysis and solution delivery.
3. The time taken to assemble the baseline and develop a solution is short enough that the solution is still relevant, the best option and valuable at the time it is implemented.

Every movement has its gurus, and Soft Systems is no exception. The first mainstream work to encode and specialize the knowledge around Soft Systems centered on Lancaster University, UK in the mid-1960s pioneered by Professor Gwilym Jenkins and subsequently by Dr Brian Wilson, before reaching the mass market through the work of Professor Peter Checkland. A number of references are included at the end of this white paper.

Despite the name, the Soft Systems Method does not differentiate between ‘Soft’ and ‘Hard’ systems. It does not even treat ‘Hard’ and ‘Soft’ as features of the problem under consideration – they are features of the relationship between the problem and the person interested in it. They relate to the way in which the problem analyst perceives and interacts with the situation. For this reason it provides the best reference point for Enterprise Architecture and an inclusive, systematic framework for integrating Engineering and Soft Systems approaches. For the sake

of convenience in this series of papers, provided we accept that we construct our viewpoint to represent a ‘system’ and that ‘Hard’ and ‘Soft’ are not intrinsic to the system, we shall refer to ‘Hard’ and ‘Soft’ Systems.

For further reading and a very concise and complete account, see [Ref 2].

For the purpose of this series of white papers and in line with the general consensus in the field, Soft Systems and Hard Systems are treated as views of a system, rather than features of the system itself. Hard Systems are generally well suited to treatment with a Systems Engineering approach, soft systems with Soft Systems Methods. These viewpoints can be differentiated as described in Figure 1.

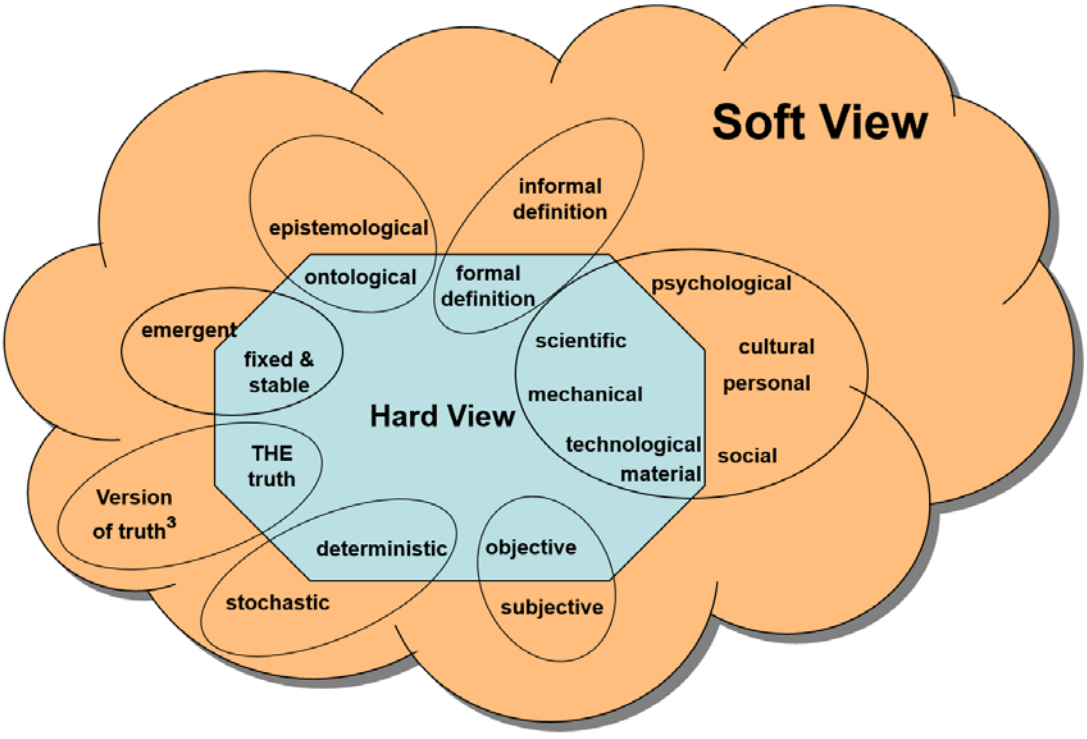

Figure 1 – The Relationship between Soft and Hard System viewpoints

Figure 2 provides an outline of the principal SSM 'Stages' that help the practitioner organize the work involved in following an SSM approach.

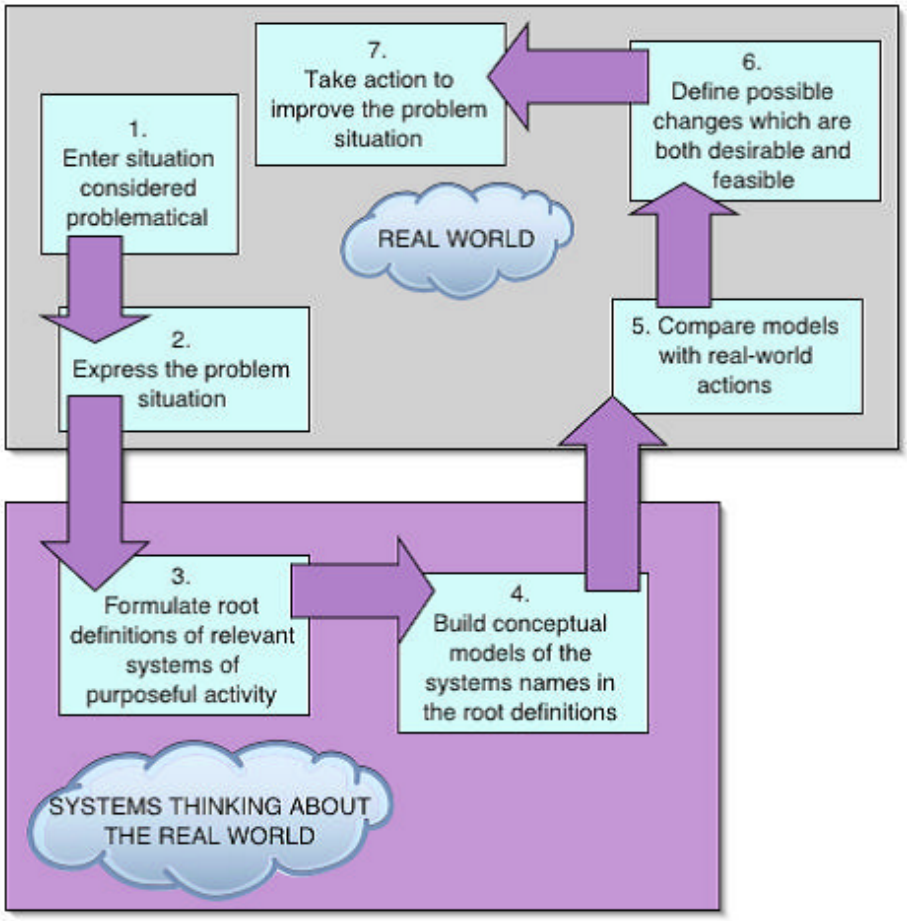

Figure 2 – SSM Process Stages

This white paper focuses on the SSM Stages concerned with understanding the situation and places them in the context of the Enterprise Architect: Stages 2, 3 and 4.

Figure 2 above represents an early incarnation of the SSM Process that was found useful as a memorable reference point for practitioners. As it evolved, practitioners overlaid a set of types of analysis on Stages 2, 3 and 4 to help better structure the finding out, development of Root Definitions (RDs) and shaping the conceptual models to be rich enough that feasible and beneficial interventions could be defined. Imaginatively, in SSM-speak, these are known as Analysis One, Analysis Two, and Analysis Three. They provide a structured response to a couple of densely packed questions:

1. What resources are deployed in what operational processes under what planning procedures, within what structures, in what environments and wider systems, by whom?
2. How is resource deployment monitored and controlled?

Analysis One is recognizable to most consultants and project-centric stakeholders, as the mobilization phase of an engagement. Analysis Two and Analysis Three are really quite different and have no similar

manifestation in other disciplines that may be familiar to an Enterprise Architect and associated stakeholders, although they have close links with Anthropology:

Analysis One (aka. "The Intervention"): refers to the 'inciting event' for the initiating the SSM project. It considers the motivation for undertaking the activity, sponsorship, positioning of stakeholders and the design of the SSM project, including adaptation of the standard SSM (rather like TOGAF makes specific provisions for tailoring as part of the Tailored Architecture Framework). One interesting, but slightly obscure use of SSM (as it is a Methodology) is the use of SSM itself to design the SSM intervention – a sort of 'Meta' SSM. Again, there are parallels with TOGAF here in that TOGAF Part VII Establishing an Architecture Capability uses the TOGAF Architecture Development Method itself to shape the Architecture Capability – creating an interesting 'bootstrap' challenge.

Analysis Two (aka. "Social Texture"): focuses on answering the question "What kind of culture is this?" through consideration of Roles, Norms and Values.

- Roles are social positions which mark differences between members of a group or organization. They can be formal (e.g. heads of department, senior managers and case workers, and are assigned formally by an authority) or informal such as role-models, and are associated to certain people due to their personal characteristics
- Norms are the expected behaviors associated with a role. For example, a CIO could be associated with dressing, talking, smiling or sitting in a certain manner
- Values are the criteria by which "behavior-in-role" is judged, and an expression of the priorities and objectives of stakeholders and organizations involved.

This is quite different from anything else in the Enterprise Architecture world. No framework makes any allowance for these key characteristics of an Enterprise, even though they are pivotal in enabling an Enterprise Architect to gain traction in implementation of target architectures. Paper 4 in this series [Ref 1] considers this subject in more detail and proposes modeling these features based on Jean-Jacques Rousseau's ideas – summarized in Figure 3 below.

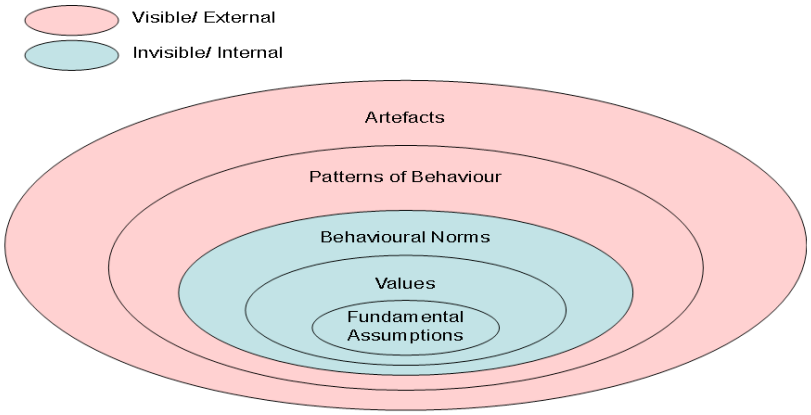

Figure 3 – Rousseau's Layers of Culture

Roles are covered to a limited extent by most modeling languages and frameworks as an aggregation of actors in the context of activity. However, they are principally used to capture formal Roles that have job titles associated with them. However, with small adjustment in concept, the same language and framework features can also be used to capture informal roles. Extensions would be needed for standard Role attributes to facilitate codification of role features, as there are still recurring themes to be covered, such as the degree of respect/deference to an informal role, the extent to which the informal role subverts formal Roles and the extent to which an informal role is associated with an individual or an ongoing position in an organization.

The use of the concepts of Principle and Objective as embodied in a framework such as TOGAF and highly structure Views such as the ArchiMate Motivation View go some way toward providing hooks for expression of Values, although the adoption rate is low, as is their exploitation to express meaningful relationships with more structural Architectural characteristics such as processes. They provide containers for useful statements of value and norms, however, their placing into context is (and may always be) more art than engineering. In this area, the Enterprise Architecture world is playing catch-up with the Goal Orientated Requirements Engineering (GORE) and Goal-Question-Metric movements that have been running since the early 2000s, primarily focused on Software Engineering as a means of providing context for Model Driven Architecture (MDA) and Model Driven Development (MDD). A context that is non-prescriptive, descriptive rather than definitive and provides for the sort of 'fuzziness' that intensive structural modeling does not facilitate. There has even been some recent interest in integrating GORE specifically with the ArchiMate Motivation View [Ref 4].

In the MODAF world, as long ago as 2007, significant work was done to try and extend the more engineering views with specialized views focused on addressing the specifics of the human dimension of technical systems [Ref 5]. Conceiving of typical systems as 'socio-

technological', the work based itself on the core concepts of MODAF (and consequently IEEE42010/1471) to define highly structured views for representing mainly formal, but also some informal characteristics of the Human component in a way that could be integrated with technological components. Human Views specialize the generic MODAF views to provide models of current or future socio-technical systems to facilitate generation of people-related design requirements. Figure 4 illustrates the key concepts.

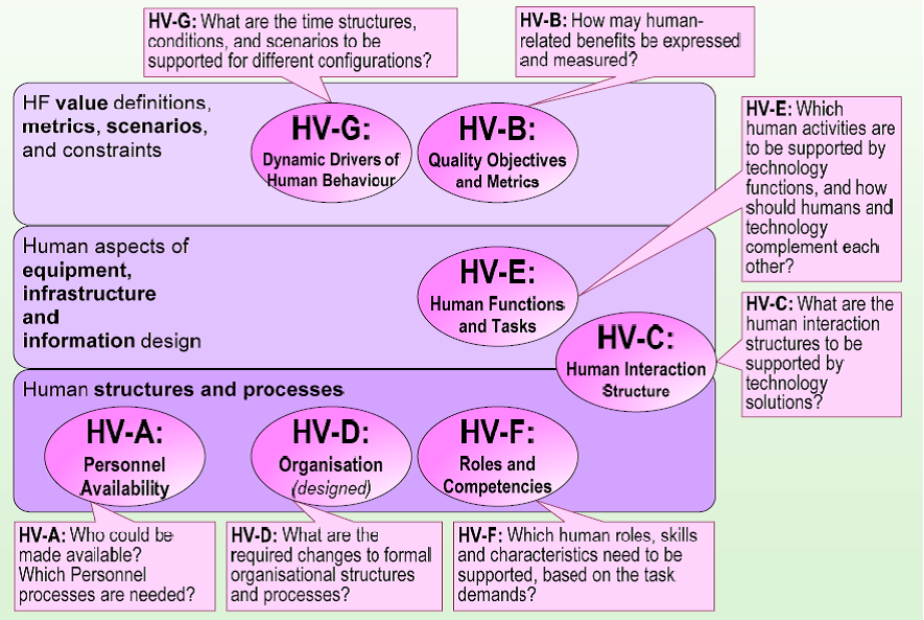

Figure 4 – Human Views in MODAF

While this undertaking was principally focused on an equipment-intensive military environment, with some further extension and adaptation it has the potential for use more broadly within Enterprise Architecture on a large scale and bridging to the SSM world.

Analysis Three (aka. "Politics"):

Analysis Three focuses on three lines of enquiry:

1. What is the disposition of power and the processes that regulate it?
2. How is power expressed in this situation?
3. How the 'commodity' of power is obtained, used, defended, passed on, relinquished?

Understanding power is a critical enabler for an Enterprise Architect because it:

1. Determines whether/how resources are acquired or appropriated to energize the Enterprise Architecture initiative
2. Determines whether and the speed with which EA requirements and proposals are translated into reality by stakeholders
3. Informs the EA on the 'art of the possible', both in terms of the shape, role and growth of the EA function as well as implementation of the programs and projects it proposes or governs

4. Directs the EA on where to focus on associating with, enhancing or diminishing agents of power within stakeholder groups

Analysis Three addresses what is 'culturally feasible'. SSM takes an Aristotelian view on the significance of politics and power – that for a society (or an Architecture community) to endure and remain continually coherent, differing and conflicting interests have to be accommodated. The need for Accommodation rather than Consensus is a critical position of SSM - Paper 4 in this series considers it in more detail [Ref 1]. Accommodating these interests is the business of politics. In chemistry, control of any high-energy chemical process that transforms materials, either by breaking them up or synthesizing new ones, needs containment. High energy human processes that transform the Enterprise also need containment, not least to moderate any destructive power-plays by stakeholders and promote sustained movement in an intended direction.

To help structure the analysis and sensitize the participants to the relevant lines of enquiry, SSM conceives of power as a 'commodity' – i.e. a tangible thing that embodies power, and can be located, sensed and transferred. This is a really helpful metaphor as it opens up the possibility of considering power as having a life-cycle – a concept familiar to most Architects and technologies. It can also be considered as having associations to entities (e.g. authority vested in an individual) as well as different presentment and manifestations dependent on the environment (rather like services wrapping a capability). The power commodity also has 'operations' that can be performed on it such as: acquired, exercised, protected, defended, transferred and relinquished.

SSM recognizes that many commodities of power arise from the granting of denying of access to information – although this language implies willful intention. A more regularly encountered implication of this effect is where the absence of good enough quality information disempowers an Enterprise Architect - for example when trying to make a case for being tolerant to heterogeneity rather than dogmatic technological convergence.

For Example:

An IT function of a large supply chain organization is responsible for full life-cycle management of supply chain systems. It includes business capabilities that aspire to develop strategy, design services and systems, transition them into service and operate them. It has outsourced the majority of systems operation and infrastructure to a single supplier. Things are not going well – the elapsed time to implement changes requested by the business sponsors has been unacceptable for a number of years, and the trend is down. The senior management brings in the management consultants who, without seeing the need for much groundwork, pronounce that the 'Change Process' is broken and the

solution is a top-down business process re-engineer of the end-to-end change process. Co-incidentally, this requires the mobilization of a team of half a dozen external consultants. This is not the first time – a similar approach has been attempted under different leadership on at least three occasions in the previous five years. After several months of brainstorming and workshopping the change process, a change process is announced, complete with internal PR, lovely graphics, a few newsletters and top-down briefings.

Six months later, nothing has changed.

Just like last time.

What might have been different if a Soft Systems approach had been taken – starting with Analysis One, Analysis Two and Analysis Three?

Analysis One: rather than conceiving of the intervention as a 'process' problem, Analysis One would have done a mini version of Analysis Two and Analysis Three to ensure that the framing and scope of the intervention are inclusive of cultural, social, relational and psychological factors. It would also have recognized that there is something to be learned from previous failed attempts to diagnose and fix the problem. The process of commissioning the work would have been quite different and very likely required the services of a quite different type of management consulting firm. SSM would have been declared as the process by which the discovery and improvement work would be conducted and the plan would have looked much less linear (design, build, implement) and much more iterative.

Analysis Two: would have actively explored the Roles, Norms and Values of the stakeholders and of the emergent equivalents of the organization as a whole. Exploration of Roles would have discovered that almost no-one spends more that 50% of their time performing their defined role. The other 50% is performing someone else's defined role, to fill a perceived gap. This in turn means that they are not trained and equipped for 50% of their daily business. As they are only operating at 50% capacity, someone else steps in to do the other 50%. And so on. The SSM practitioners identify this cultural acceptance of 'stepping in' to someone else's role as a defined norm and include it as a defined feature of the model. Giving it a name legitimizes discussion on the topics that until then had been hidden from view, and opens the norm up to challenge.

Analysis Three: notices that very little power is exercised through any defined processes, even though a number are defined, some even with instruction manuals available. It notices that power is generally exercised in two ways:

- From higher in the defined organization, by more senior staff intervening directly into the workings of the organization several

levels below them, subverting the process and disrupting any attempts to systematically plan and implement organizational responsibilities. The SSM practitioners notice that this 'long handled screwdriver' behavior has the effect of legitimizing this norm and sets the example for all to follow. This feeds in directly to behaviors as well as having the side effect of undermining the motivation to systematically plan and credibility of the plans themselves.

- From lower in the defined organization, by more junior staff in adopting a resistant position to their tasking from above. A number of very effective devices are deployed to do this without requiring overt and declared opposition. This passive aggressive behavior manifests itself as indirect expression of hostility, such as procrastination, stubbornness, learned incompetence, creation of artificial dependencies, creativity with excuses and the assertion of completion even though work is still in-progress.

Following the rapid completion of Analysis Three the SSM consultants play their findings back to the sponsor and associated stakeholders. They propose that the current defined change processes are good enough and probably have been for some time. They also propose that even if the change process was a significant part of the problem, for a new process to have any chance at all of succeeding, the identified Norms will have to be significantly changed. The SSM practitioners challenge the sponsor to decide whether he is interested in creating a real change in behavior that improves efficiency and effectiveness, or he wants to commission yet another BPR initiative to be able to demonstrate that he is doing something. Fortunately, as the sponsor has only just been appointed, he is in a good position to take an objective view on the past and plans to be around to realize the benefits of improvements in the future. The SSM initiative is commissioned.

White Paper #8:

White Paper #8 takes the next couple of steps in SSM – into the building of Purposeful Activity Models. These steps take the Enterprise Architect into more familiar modeling territory, but with a few interesting extensions in preparation for the designing and implementation of feasible and valuable change in the Enterprise environment. It also considers in more detail the ways in which standard EA frameworks could be adapted and extended to incorporate key SSM features.

I hope you have enjoyed this white paper. Please get in touch if you have views to offer on the topic and feedback on the series, either direct to Orbus or via my e-mail at: ceri.williams@theintegrationpractice.co.uk.

References:

[1] Enterprise Architecture meets Soft Systems Series, Papers 1-6. Orbus: http://www.orbussoftware.com/resources/authors/ceri-williams/

[2] Checkland, P & Poulter, J: learning for Action – A Short Definitive Account of Soft Systems Methodology and its use for Practitioners, Teachers and Students. ISBN: 9780470025543

[3] Vickers, Geoffrey: Human Systems are Different

[4] Victorio Albani de Carvalho et al: Towards a Semantic Alignment if the ArchiMate Motivation Extension and the Goal-Question-Metric Approach.

[5] Bruseberg, Anne: The Human View Handbook for MODAF

Orbus Software
3rd Floor
111 Buckingham Palace Road
London
SW1W 0SR
United Kingdom

+44 (0) 870 991 1851
enquiries@orbussoftware.com
www.orbussoftware.com

orbus software