Metrics and Viable Systems

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Introduction

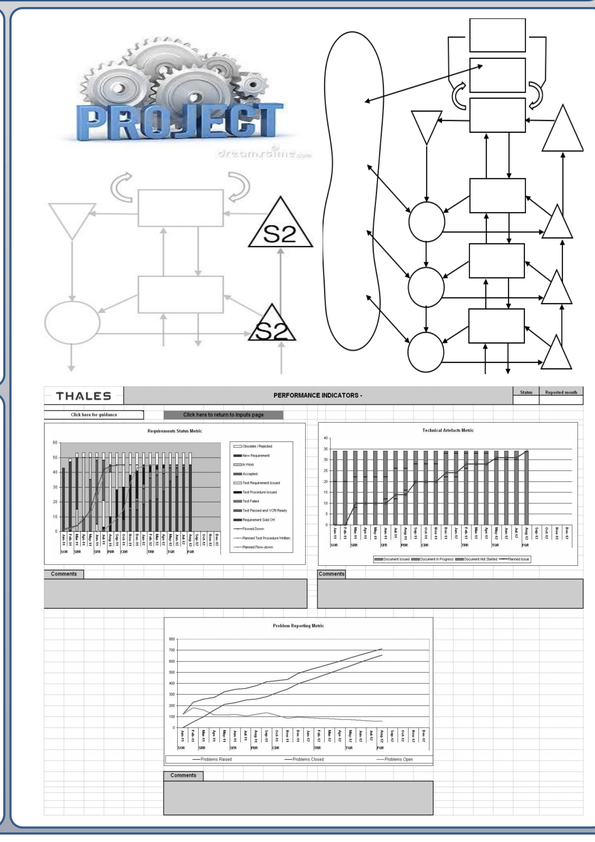
Thales have been developing a technical metrics program in an attempt to: i) better understand technical progression of projects; and ii) avoid the apparent sudden failure of projects. Previous research has focused on developing an effective analysis process, and this work looks to further this understanding from a whole system point of view. Building upon the ideas of the Viable System Model (VSM) established by Beer, and using the essence of Checkland's Soft Systems Methodology (SSM) [1], we compare and contrast the existing elements and communication channels of the technical metrics program to a theoretically viable model. This forms one case study of a wider research program.

Research Questions

I. Can we develop an understanding of the requirements for a successful metrics program at an organisational level?
II. Can we explore this through the Viable Systems Model?
III. What are the theoretical elements and communication channels required?
IV. Can we understand how these manifest in underlying features?

Research Approach

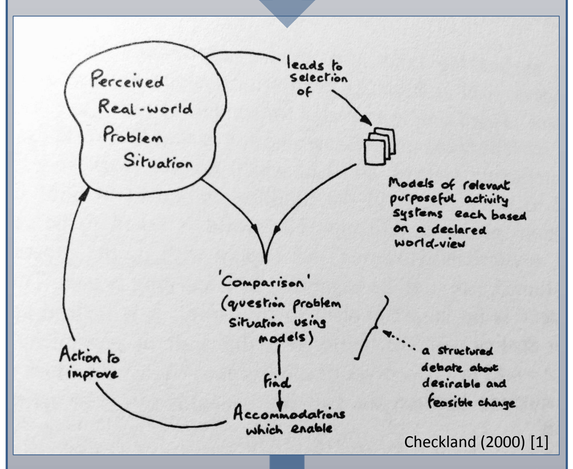
This used an SSM-like framework [1] to develop a theoretical model based around the VSM. This model identifies the required underlying phenomena for a theoretically successful System 2. To create these phenomena the theoretical underpinnings of the VSM as outlined by Beer (models of purposeful activity) are analysed in reference to the System 2 and metrics (perceived real-world problem situation). This is combined with analysis from a viable knowledge perspective to create a series of phenomena.



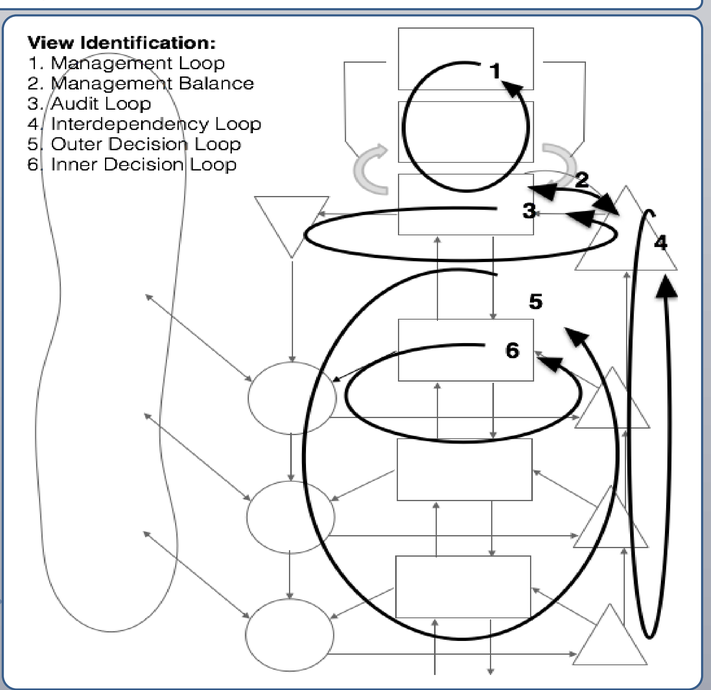
Metrics as a Viable System

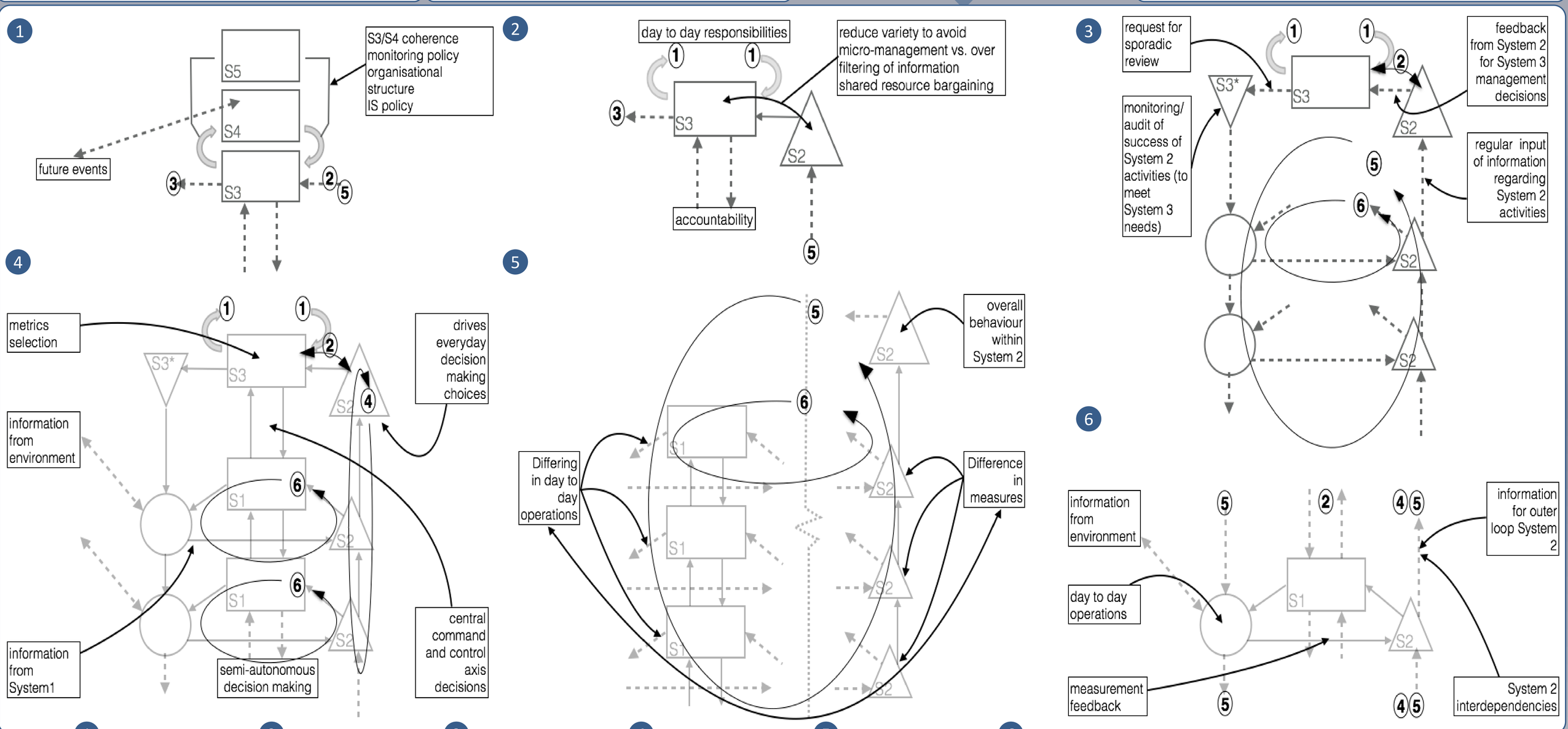
The VSM originates in the field of cybernetics. The VSM depicts the organisation as homeostatic, i.e. capable of maintaining independent existence in response to changes in their environment [2], and each VSM is characterised by the principle of recursion, i.e. that every viable system both contains and is contained within other viable systems which share a generalised system structure [2,3,4,5]. Initial observations proved that metrics themselves could not fulfil the role of a Viable System. However, they are suitable for investigation as a System 2, responsible for: coordination activities of a VSM; attenuation of any system oscillations; and providing feedback to recursive systems.

1. Checkland, P. (2000). Soft Systems Methodology : A Thirty Year Retrospective *Systems Research and Behavioural Science*, 58, pp 11–58.
2. Beer, S. (1981). Brain of the firm: The managerial cybernetics of organization. New York: John Wiley & Sons.
3. Beer, S. (1984). The Viable Systems Model: Its Provenance, Development, Methodology and Pathology. *The Journal of the Operational Research Society*, 35(1), pp 7–25.
4. Dominici, G., & Palumbo, F. (2013). Decoding the Japanese Lean Production System according to a Viable Systems perspective. *Systemic Practice and Action Research*, 26, pp 153–171.
5. Hoverstadt, P., & Bowling, D. (2002). Modelling Organisations using The Viable System Model.



Checkland (2000) [1]





1 Management Loop

System 5 decides on goals and then passes policy, and organisational structure to System 3. System 3 enables on going management, partly through System 2 activities. This is affected by the organisational structure and the Information Systems.

2 Management Balance

Management balance is then required to decide on the level of decisions the metrics can be utilised for, and the decisions that require System 3 attention. This is based on a summary of the goals to be met, and expected performance for System 1.

3 Audit Loop

A tool to enable review of System 2 activities in order to assess the management balance. This must take into account the on going operations of each of the System 1, and the decisions made as a result of the measurements taken by System 2.

4 Interdependency

System 2 activities need to be flexible enough to allow the System 1 to work in differing ways . The Outer Loop Decision making must allow appropriate changes to occur in the individual Inner Decision Loops. This requires learning from individual System 1.

5 Outer Decision

The Outer Decision Loop absorbs the decisions and outputs made by the Inner Decision Loops and reports these into System 3. This aids with the Audit Loop and Management Balance. Adapts behaviour depending on output from inter-dependency loop.

6 Inner Decision

The Inner Decision Loop provides the bulk of the anti-oscillatory activity for the System 1. It takes its goals and purpose from System 1, and System 2 measurement requirements to set measures that allow System 1 to remain semi-autonomous.

Biography; Acknowledgements; and Contact Details

Thomas Walworth graduated with an MEng (Hons) Civil Engineering from the University of Bristol, and then studied for an EngD in Systems with the Systems Centre at the University of Bristol in conjunction with support from Thales UK. The theme of this research was the use of novel problem structuring methods to support change in a complex engineering environment. He has since been employed in a full time capacity by Thales UK providing support to the UK Engineering Team. The research presented was supported by the EPSRC funded Industrial Doctorate Centre (IDC) in Systems (Grant EP/G037353/1) and Thales UK. Email: thomas.walworth@bristol.ac.uk or thomas.walworth@uk.thalesgroup.com.