The use of Total Systems Intervention in an action research project: Results and implications arising from practice.

John Molineux

Department of Management

Monash University

molineuxjandk@bigpond.com

8 Churchill Close,

Murrumbeena, Victoria, Australia. 3163.

B.H. (03) 9285-1320

A.H. (03) 9570-2347

Tim Haslett

Department of Management

Monash University

thaslett@bigpond.net.au

B.H. (03) 9429-8616

John Molineux has a degree in Business, a Graduate Diploma in Management and a Master of Management in Organisational Systems. He recently submitted his PhD thesis, titled Systemic Strategic Human Resource Management Enables Organisational Cultural Change: An Action Research Study. John is a full-time Human Resources Manager employed in the Australian Public Service. His main areas of research interest involve the application of systemic thinking to management situations, especially in the use of human resource management.

Dr. Tim Haslett has a PhD from Monash University. He is currently a Senior Lecturer at the Department of Management, and for several years has coordinated an action research cohort of PhD students. He has published and presented widely in the areas of systems thinking and theory, especially in system dynamics. He is keenly interested in the application of systems theory to real-world management problems.

The use of Total Systems Intervention in an action research project: Results and implications arising from practice.

Abstract:

The paper outlines the use of Total Systems Intervention (TSI) to select appropriate systems methodologies as part of an action research project in a large public sector organisation. It outlines the reasons behind the selection of Soft Systems Methodology and System Dynamics for the project, and confirms Lane's view that Flood and Jackson's assessment as simple-unitary is misjudged. The paper describes how both tools were used in a pluralist complex context to deepen understanding. Implications for TSI are explored.

Introduction

The paper discusses the use of Total Systems Intervention (TSI) to select appropriate systems methodologies as part of an action research project in a large public sector organisation. The TSI approach was used by the first author to determine the most appropriate systems interventions for particular change strategies in a large action research project. The project involved the building of a systemic strategic human resource management intervention to bring about organisational cultural change.

Total Systems Intervention

Total Systems Intervention (TSI), developed by Flood and Jackson (1991), is a meta-methodology that brings together a range of systems metaphors, a framework of systems methodologies, and various systems approaches to enable creative problem solving. In a process of TSI, systems metaphors are used to encourage creative thinking about organisations and the issues confronting managers. These issues are then linked through a framework so that an appropriate systems intervention, or set of systems interventions, could be deployed. Total Systems Intervention (TSI) is an organisational intervention process that "proposes a 'system of system methodologies' intended to facilitate the complementarist selection of different system approaches", according to Lane (1994: 114). Hames (1994:172) claims that TSI "allows for the examination of every dimension of strategy, the surfacing of all significant issues and the design of appropriate interventions" and Attwater (1999:301) refers to TSI "as a critical basis for considering the assumptions underlying the range of systems methodologies". Flood (1994:235) believes that TSI is "an approach to problem solving in any organisation that stands firm with the original holistic intent of systems thinking".

The driver for Flood and Jackson's (1991) creation of TSI was the understanding that any manager wishing to use a systems methodology is faced by a plethora of systems approaches, with a difficulty of choosing an approach that was relevant to the problem

context that the manager faced. One reason for the difficulty in choosing an approach is that "systems approaches are based upon different metaphorical understandings and different views of reality" (Flood and Jackson, 1991:32), which "conditions the way each advises seeking to intervene in and change organisations". Flood (1994:236) explains that TSI:

> is in its essence a process that enables the problem solver to employ a range of different methods, by first thinking creatively about the kind of issue an organisation faces and then choosing a method or methods most likely to tackle those issues effectively.

There are three phases in the TSI process: creativity; choice; and implementation. In the first phase, different metaphors "focus attention on different aspects of an organisation's functioning" (Flood and Jackson, 1991:51), and "a dominant metaphor which highlights the main interests and concerns" emerges. The task of the second phase is to choose one or a set of methodologies "to suit particular characteristics of the organisation's situation" as revealed in the first phase. The final phase is involved in employing the methodology into generating "specific proposals for change" (p52).

To enable a manager to make an informed decision, Flood and Jackson (1991) put forward a grouping of problem context situations in a matrix as shown in Figure 1. The matrix consists of two dimensions; one related to the level of complexity of the problematic system, and the other relating to the relationships of the participants involved in the problem context. Jackson (1994:214) explains the relationship dimension as follows:

> Thus, people can be in a unitary relationship if they share values and interests; in a pluralist relationship if their values and interests diverge but they have enough in common to make it worthwhile for them to remain members of the coalition that constitutes the organisation; and in a conflictual or coercive relationship if their interests diverge irreconcilably and power comes to bear so that one group gets its own way at the expense of others.

	Unitary	**Pluralist**	**Coercive**
Simple	Simple-Unitary	Simple-Pluralist	Simple-Coercive
Complex	Complex-Unitary	Complex-Pluralist	Complex-Coercive

Figure 1. <u>An "ideal type" grouping of problem contexts (Flood and Jackson, 1991:35).</u>

Flood and Jackson then put forward a recommendation as to which systems methodologies would be appropriate given the relevant problem contextual situation. They title this a 'system of systems methodologies', which was developed from earlier work by Jackson and Keys (1984).

The action research project, i.e. the implementation of a systemic human resource management intervention, can be used as an example of how this works. A complex project in a large organisation would be most clearly aligned to the complex-pluralist context in Figure 1, due to the large number of people involved, the complexity of the systems and change required, and the varying worldviews and attitudes of the participants. Although some coercive behaviour may exist in such an organisation, it would not be widespread, otherwise the organisation would be quite dysfunctional. An appropriate choice is made amongst the methodologies to suit the problem context best. The recommendations of Flood and Jackson (1991:42) are outlined in the Table 1.

The resulting assessment and choice of systems methodology, Flood and Jackson (1991:42-3) warn, "should be informed" by the process of system of systems methodologies, not "determined by it". They go on (p43) to inform that TSI "combines creative thinking about the nature of problem situations", by using "systems metaphors, with informed choice of systems methodology", and "based upon knowledge of the strengths and weaknesses of different methodologies".

Table 1. A grouping of systems methodologies based on the assumptions they make about problem contexts (Flood and Jackson, 1991:42).

	Unitary	**Pluralist**	**Coercive**
Simple	Operations research Systems analysis Systems engineering System dynamics	Social systems design Strategic assumption surfacing and testing	Critical systems heuristics
Complex	Viable system diagnosis General systems theory Socio-technical systems Contingency theory	Interactive planning Soft systems methodology	?

There is a need to take care in the choice of methodologies, as Jackson and Keys (1984:477) note that difficulties are "almost certain to occur when methodologies suited to particular problem contexts are transferred and adopted for use in problem situations for which they were not designed."

Sinn (1998:436) believes that TSI's proponents favour a pluralist view of methodology that sees "the different methods as complementary rather than contradictory". He adds that "pluralists believe that the different approaches are directed at different types of problems and therefore support the diversity of methods" and that "the methods do not compete because they occupy distinct niches". This pluralistic view of system methodologies can be useful, and Fielden and Jacques (1998:108-109) remark: "But of course, elements of a number of these methodologies are not only compatible but can be combined to achieve a powerful multi-disciplinary attack on the problem".

The Choice made in this Action Research Project

The choice made in this action research project was also pluralistic. System Dynamics (Forrester 1961) and Soft Systems Methodology (Checkland, 1981) were found to be more appropriate techniques for the organisation, due to the cultural nature of the project. The methodologies were used as techniques in line with Mingers and Brocklesby

(1997:491) definition that "*A technique* is a specific activity that has a clear and well-defined purpose within the context of a methodology".

There were two reasons for the choice of the two systems techniques. The first is in accordance with Jackson's (1997:354) suggestion that each technique "is chosen on the basis that its strengths make it suitable to address the main issues and problems identified". The second reason is much more pragmatic, in that the choices were culturally appropriate.

Systems dynamics (SD) was already in use in the organisation through the dynamic systems modelling of workforce projections, of business systems, and national financial systems. It was also in use in systems mapping and causal loop diagramming, looking at causality and leverage within the strategic human resources management of the organisation. Wolstenholme (2004:342) explains that "to formulate, test and demonstrate the advantages of systemic solutions" using SD, he uses "a mix of qualitative and quantitative ideas…since each is complementary to the other". In the organisation, SD techniques had been used in both qualitative and quantitative approaches, so this methodology seemed flexible and contextually relevant.

Soft systems methodology (SSM) had also been used in the organisation, and seemed appropriate as it is a human systems intervention designed specifically for human activity systems (Checkland, 1981). As outlined by Flood and Jackson (1991), it therefore seemed more closely aligned to a project involving a cultural intervention.

Comments made about the use of SD and SSM

In this action research study, the first author used System Dynamics models and Causal Loop Diagrams to help understand social and political factors associated with issues in the change process. The first author interviewed a number of project leaders involved in the implementation. One commented about the SD techniques:

They mapped whole-of-systems stuff for the first time. It started from a theoretical sense of the system. It was good practice in HR thinking. It looked at how the system was working, the interrelationships involved. We mapped the whole system and each of the sub-systems. It was a journey of discovery – we saw connections we wouldn't have seen otherwise.

Another project leader noted that "the systems map was crucial in understanding the systemic approach that everything was connected. It was breakthrough thinking". A further project leader commented "It helped understanding, and is one of the things that remained in people's minds. There were some dynamic presentations around it. Others could identify that".

The use of SSM also proved valuable. One project leader commented:

SSM was useful for getting buy-in and understanding about the complexity and connections of all the elements of the system. SSM and business processes were needed to understand and design the various levels of system.

Another project leader stated:

[A client] referred back to one of our workshops as a great example of involving stakeholders and getting other opinions. I enjoyed running them. It was not just a fun two days. Really valuable data came out of them. It gave people permission to be creative and have some fun doing it, and at the same time doing real work. In relation to stakeholder management, SSM was something new – and better than running meetings. Lots of stuff was generated and we took it away. SSM is a structured process to move on from, otherwise we can keep revisiting problems. An invitation to SSM might even be a carrot – it was a chance to experience something different.

The first author found that both SSM and SD proved valuable in the process of the implementation of the HRM project. The results of the action research project are reported in Molineux (2005).

The Pluralistic Nature of SD

As SD was chosen in this complex pluralistic project, then a question arises as to Flood and Jackson's (1991) placement of it in the simple-unitary box as represented in Table 1. However, not all theorists agree with Flood and Jackson's assessment and placement of the methodologies as described in Table 1. In a strong critique about the assessment and placement of system dynamics in the simple-unitary box, Lane (2001:109) believes that SD "is frequently misjudged as being an approach that conceptualises the social world as a machine". He claims that the criticisms of system dynamics, such as that is a 'grand theory' and 'deterministic', and is without regard for human social factors "are, essentially, false".

A good example of SD's use in a complex-pluralist situation is outlined by Lee et al (2005:69). They demonstrate the use of SD in understanding complex interactions in relation to proposals to establish a new Korean capital. They develop models that take into account the "need to understand the political, economic, and social structure", which "help to anticipate the people's responses to the government's decision and incorporate them into policymaking" (p70). The broad pluralistic understanding of the political and social factors involved in this proposal demonstrate the usefulness of SD in this type of situation.

In fact, SD was designed to explore the dynamic and complex. Lane (2000:4) describes a system dynamics study as "focused around a 'dynamic hypothesis' – the idea that a certain causal structure explains a certain dynamic behaviour" and, more succinctly, "system dynamics helps people to think about the logical consequences of certain assumptions". It is this intention to explore complex issues and encourage others to learn about causality, which is not necessarily closely related in time and space to system

outcomes, that sets SD apart from other management techniques. Lyneis et al (2001:238) note that "Traditional tools and mental models are inadequate for dealing with the dynamic complexity of projects". However, SD is able to deal effectively with dynamic complexity, and this should be applicable across the Flood and Jackson (1991) taxonomy.

Lane (2000:17) notes that "It may seem paradoxical but the results of a quantitative system dynamics study are qualitative insights". This occurs as "policy changes that are seen to be beneficial are taken back into the real world and used as the basis for further experimentation", arising from a system dynamics study's aims "to improve the mental models of decision makers".

Causal Loop Diagramming (CLD) was one of the primary SD techniques used in the course of the action research project. It is a technique used in system dynamics (Forrester, 1961) to understand the dynamic complexity of organisational behaviour. The term *dynamic complexity* is understood as the characterisation in a system of "the extent to which cause and effect are distant in space and time" (Senge and Scharmer, 2001:246). CLDs are described by Rego (1999):

> It simply consists of words, that indicate the different parts of the system, and a network of arrows that, inter-linked, represent the direction and sign of the influence of each part on the others.

Such CLDs are a technique of qualitative modeling, as Coyle (1998:351) notes, but does not involve simulation. He notes that such qualitative forms of system dynamics have "proved to be popular with clients", and "have been effectively combined with other techniques, such as the soft system methodology".

One of the purposes of using Causal Loop Diagrams is "to capture the dynamic cycles of influence that would serve to pinpoint where leverage points in the system exist" (Burns and Musa, 2001). Lyneis (1999:40) states that "causal loop diagramming is an effective means of conceptualising the cause-effect structure of the system believed to create the

behaviour". The main use of these diagrams, as noted by Homer and Oliva (2001:349), is the intention to "improve the process of thinking about the structure underlying a problem", which may include "feedback loops and perhaps time delays, accumulations, and nonlinear effects". Warren (2004:339) notes that causal loop representations of management challenges "are both straightforward to generate, and able to provide powerful and actionable insights".

In this action research, CLDs were used frequently by the first author throughout the project, particularly as key tools to enable systemic thinking by project teams. They were also used to enhance thinking around the links between sub-systems, and the possible causal impacts of policy changes, as well as to gain insight into complex systems and probable causal structures. In particular, they were used to understand the behavioural implications of particular strategies. This information was then used to discover key points of leverage in various sub-systems to help determine the appropriate strategies for implementation. These discoveries proved very enlightening for the project teams engaged in the change process, and helped shape the strategies that were implemented successfully in the project.

Conclusion and Recommendations

We found that in the practical operation of an action research project, SD is a methodology that can operate effectively in a complex-pluralistic situation. Evidence from literature notes that SD is not only designed for complex contexts, but in practice operates effectively in these contexts.

While the Flood and Jackson (1991) taxonomy is superficially appealing, it is probably a gross simplification in that very few organisational problems would fit in the simple-unitary context. In the course of the action research, nearly all issues associated with the implementation of the change projects would be categorised as complex-pluralistic. This is because of the complex nature of human activity systems and the diverse views of key stakeholders in large organisational change projects. Also, Flood and Jackson's (1991)

taxonomy does not include a model of learning or recognition of the fact that all of the methodologies can also be used as learning tools. For the project teams, insight and learning were critical outcomes from the use of SD in the action research project. This enabled effective strategies to be implemented.

In choosing an appropriate systems methodology or technique, cultural appropriateness should also be considered. Some methodologies will be more acceptable than others due to cultural and experiential reasons. Experience with the methodology is an important consideration. If a methodology has proved successful in an organisation, it has already gained some credibility and may be more acceptable. The culture of an organisation should also be considered. A methodology such as SD may be more acceptable in an organisation with a focus on figures and models. Alternatively, a methodology such as SSM may be more acceptable in an organisation with a focus on creativity and ideas.

Agreeing with Lane (2001), the view of this paper would be that SD is capable in being used either as a simple-unitary approach or in various combinations up to complex-pluralist, depending on the skill of the practitioner and the scope of the problem situation.

It is recommended that Table 1 be amended to include SD as a methodology suitable in all combinations of simple, complex, unitary and pluralistic. A practitioner would need to assess each problem context in relation to the proposed use of SD.

It is further recommended that an additional criterion be added to Flood and Jackson's (1991) taxonomy for methodology selection. The selection process should also include an assessment of cultural 'fitness' in relation to the organisation. The additional assessment should be based on the prior experience of the methodology in the organisation, combined with an assessment of its potential cultural acceptability.

Inclusion of the latter recommendation should enable selection of methodologies to be more successful, as the TSI approach would then align methodology selection more closely to the organisation's contextual situation and culture.

References:

Attwater, R. 1999. Pragmatist Philosophy and Soft Systems in an Upland Thai Catchment. Systems Research and Behavioral Science, 16 (4): 299-309.

Burns, J.R. and Musa, P. 2001. Structural Validation of Causal Loop Diagrams. Proceedings of the 19th International Conference of the Systems Dynamics Society. Atlanta, GA.

Checkland, P.B. 1981. Systems Thinking, Systems Practice. John Wiley & Sons, Chichester.

Coyle, G. 1998. The practice of system dynamics: milestones, lessons and ideas from 30 years experience. System Dynamics Review, 14 (4): 343-365.

Fielden, D. and Jacques, J.K. 1998. Systemic Approach to Energy Rationalisation in Island Communities. International Journal of Energy Research, 22 (2): 107-129.

Flood, R.L. 1994. I keep six honest serving men: they taught me all I knew. System Dynamics Review, 10 (2-3): 231-243.

Flood, R.L. and Jackson, M.C. 1991. Creative Problem Solving: Total Systems Intervention. John Wiley & Sons, Chichester.

Forrester, J.W. 1961. Industrial Dynamics. MIT Press, Cambridge, MA.

Hames, R.D. 1994. The Management Myth. Professional & Business Publishing, Sydney, NSW.

Homer, J. and Oliva, R. 2001. Maps and models in system dynamics: a response to Coyle. System Dynamics Review, 17 (4): 347-355.

Jackson, M.C. 1994. Critical systems thinking: beyond the fragments. System Dynamics Review, 10 (2-3): 213-229.

Jackson, M.C. 1997. Pluralism in Systems Thinking and Practice. In J.Mingers and A. Gill. (Eds.), Multimethodology: The Theory and Practice of Combining Management Science Methodologies: 347-378. John Wiley & Sons, Chichester.

Jackson, M.C. and Keys, P. 1984. Towards a system of systems methodologies. Journal of the Operations Research Society, 35 (6): 473-486.

Lane, D.C. 1994. With a little help from our friends: how system dynamics and soft OR can learn from each other. System Dynamics Review, 10 (2-3): 101-134.

Lane, D.C. 2000. Should System Dynamics be Described as a 'Hard' or 'Deterministic' Systems Approach? <u>Systems Research and Behavioral Science</u>, 17 (1): 3-22.

Lane, D.C. 2001. Rerum cognoscere causas: Part I- How do the ideas of system dynamics relate to traditional social theories and the voluntarism/determinism debate? <u>System Dynamics Review</u>, 17 (2): 97-118.

Lee, H., Choi, N-H. and Park, M. 2005. The New Administrative Capital in Korea: A systems thinking approach to the new administrative capital in Korea: balanced development or not? <u>System Dynamics Review</u>, 21 (1): 69–85.

Lyneis, J.M. 1999. System dynamics for business strategy: a phased approach. <u>System Dynamics Review</u>, 15 (1): 37-70.

Lyneis, J.M., Cooper, K.G. and Els, S.A. 2001. Strategic management of complex projects: a case study using system dynamics. <u>System Dynamics Review</u>, 17 (3): 237-260.

Mingers, J. and Brocklesby, J. 1997. Multimethodology: for Mixing Towards a Framework Methodologies. <u>Omega: International Journal of Management Science</u>, 25 (5): 489-509.

Molineux, J. 2005. <u>Systemic Strategic Human Resource Management Enables Organisational Cultural Change: An Action Research Study</u>. Unpublished PhD thesis, Monash University.

Rego, J.C. 1999. After 40 years, has System Dynamics changed? <u>Proceedings of the 17th International Conference of the System Dynamics Society and the 5th Australian and New Zealand Systems Conference</u>. Wellington, NZ.

Senge, P. and Scharmer, O. 2001. Community Action Research: Learning as a Community of Practitioners, Consultants and Researchers. In P. Reason and H. Bradbury (Eds.), <u>Handbook of Action Research: Participative Inquiry and Practice</u>: 238-249. Sage, London.

Sinn, J.S. 1998. A Comparison of Interactive Planning and Soft Systems Methodology: Enhancing the Complementarist Position. <u>Systemic Practice and Action Research</u>, 11 (4): 435-453.

Warren, K. 2004. Why Has Feedback Systems Thinking Struggled to Influence Strategy and Policy Formulation? Suggestive Evidence, Explanations and Solutions. <u>Systems Research and Behavioral Science</u>, 21: 331-347.

Wolstenholme, E. 2004. Using generic system archetypes to support thinking and modelling. <u>System Dynamics Review</u>, 20 (4): 341–356.