# A Systems Thinking Approach To Investigating Delayed Discharges In The UK

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## Abstract

Outlined is the systems based process used to investigate delayed discharging, which combines parts of the Soft Systems Methodology (SSM) with Systems Dynamics (SD).At the early stages use of hard system approaches were inappropriate to investigate this type of complex problem. SSM was used to consider the soft problems present, expressing the problem situation as a rich picture. This informed construction of a SD model to investigate policy interventions for reducing delayed discharges. This process had practical implications for structuring qualitative data to inform the SD methodology.

## Introduction

The aim of this paper has been to outline the systems based process used to investigate delayed discharging in the NHS in the UK.

Delayed discharging happens when patients that are medically fit to return home become stuck within hospital through no fault of their own. There are numerous causes of delayed discharge, such as the lack of social care provision and insufficient numbers of social workers to carry out patient assessments. This research has focused on delayed discharging of elderly patients, within hospital concerning the NHS and Social Services. Delayed discharges are multi-faceted occurring at different stages of the patient process.

The NHS and social care system has large amounts of dynamic complexity, involving large amounts of information, stakeholders and technology. This arises because the system changes over time and is governed by feedback, dominant structures. The system is adaptive and characterised by tradeoffs. This was seen when social services used an informal policy of prioritisation to cope with large patient backlogs (Sardiwal, 2009). Patients waiting for social service provision to be set up downstream along the patient process were prioritised over patients that needed initial social service assessments.

Given the dynamic complexity that exists there has been a need to use systems thinking. Systems thinking focuses on the whole system and the relationship between its parts, rather than on the individual parts. Having a holistic view of the problem situation has been extremely important given the increased conflict, pressure from different areas and policy resistance from stakeholders. It has been important to consider the perspectives of different stakeholders and not to make any assumptions about what things are like in practice. MacDonough (2010) argued that social worker practitioners felt that their roles were fulfilling despite the pressures such as targets on managers, which can be a different view portrayed by the public.

**Soft System Dynamics Methodology**

The systems based process used to investigate delayed discharge has been highlighted in figure 1. The methodological process has combined stages 1, 2, 5 and 7 of the Soft Systems Methodology (Checkland, 2000) with System Dynamics (Forrester, 1968). The process incorporated three main aspects. These were firstly to find out about the problem situation in the real world (stages 1 and 2), secondly to use systems thinking to devise a suitable intervention (stages 3 to 5) and thirdly to take action (stage 6 to 7). A key focus of the process was on gaining a practical insight into the issue of delayed discharges.

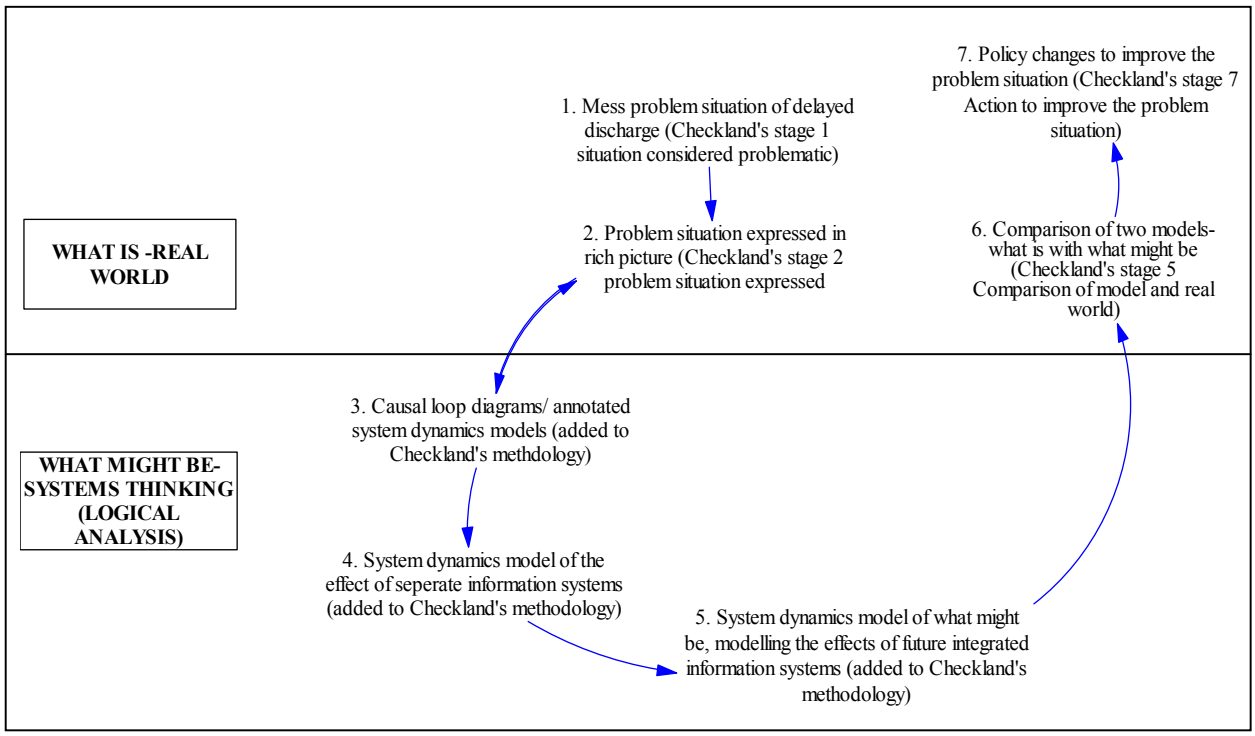


**Figure 1: Soft System Dynamics Methodology**

The soft systems methodology and system dynamics methodologies have been previously integrated in different ways. Rodriquez-Ulloa and Paucar-Caceres (2004) presents a ten stage approach that incorporates all the stages of the soft systems methodology. For example the use of stage 3 the problem orientated root definitions and stage 6 determining the cultural and desirable change needed.

The main reason that the soft systems methodology was combined with system dynamics was to help understand the problem situation that has lead to the reference mode of increased delayed discharges among elderly patients. This would aid in the formulation of a systemic structure, the annotated system dynamics models to start the system dynamics process. The process of combining system dynamics with the soft systems methodology was devised to reflect this, and only the essential stages were incorporated.

**Application of the Soft System Dynamics Methodology**

At the early stages of research the use of hard system approaches were inappropriate to investigate this type of complex problem. Delayed discharges had not been well-defined. It was necessary to use Soft Systems Methodology to consider the soft problems present in the problem situation (stage 1) and to express the problem situation in the form of a rich picture (stage 2).

The Soft Systems Methodology helped to devise a mental construct for perceiving the problem situation, capturing the richness of information. The rich picture (see figure 2) was based on the qualitative data collected from interviews with stakeholders and reflected issues, structures and processes in the NHS and Social Services system. It was drawn to capture the problem situation holistically and systemically.

Human activity systems have been captured, such as the social workers that are waiting to go to the ward to carry out the assessments. They are important as human activity systems can create purposeful action that can elevate the problem situation.

The rich picture served several purposes. The views of different stakeholders were incorporated into the rich picture, illustrating divergent views about the problem situation of delayed discharging. This has been important as often the mental models of stakeholders have been limited to small areas of the problem situation. It helped to make decisions such as what levels of aggregation should be used and what states should be included.

The rich picture concerned capturing soft variables such as the socio-technical aspects that had the characteristics of being objectionable, changeable and loosely measurable. These were variables that could not be seen in the real world as they had no physical substance. Not all the variables were quantifiable and as a result could not be transferred into the annotated stock and flow diagram. For example it was highlighted that staff did not always understand the importance of having an integrated information system on service provision

There was a need to move from the real world to the virtual systems thinking world. The rich pictures expressed informed the constructing of the causal loop diagrams in stage 3 (see figure 3). This was moving from the impossibility non-deterministic complexity to carry out experiments to stimulating and experimenting with a computer model. In stage 4 annotated system dynamics models informed the construction of a formal system dynamics model which was used to replicate the reference mode behaviour of delayed discharges.

Continuing in the systems thinking world in stage 5 the system dynamics model provided a virtual environment to test the effect of policy interventions for reducing delayed discharges, in a rigorous way without experimenting with the real system. The proposition that integrated information systems (what might be) could make a difference in reducing delayed discharges was tested.

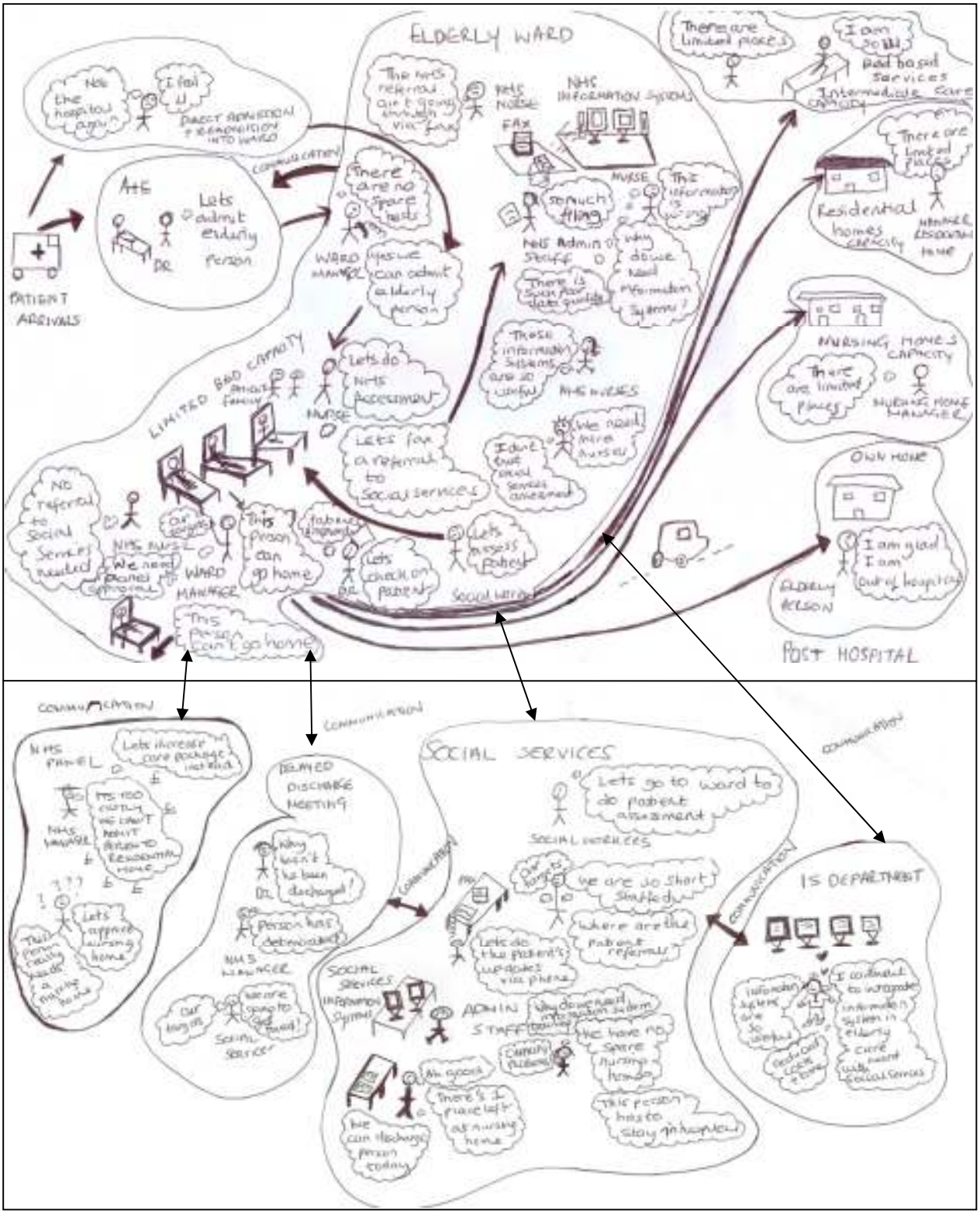


**Figure 2: Rich Picture Of The Health And Social Care System**

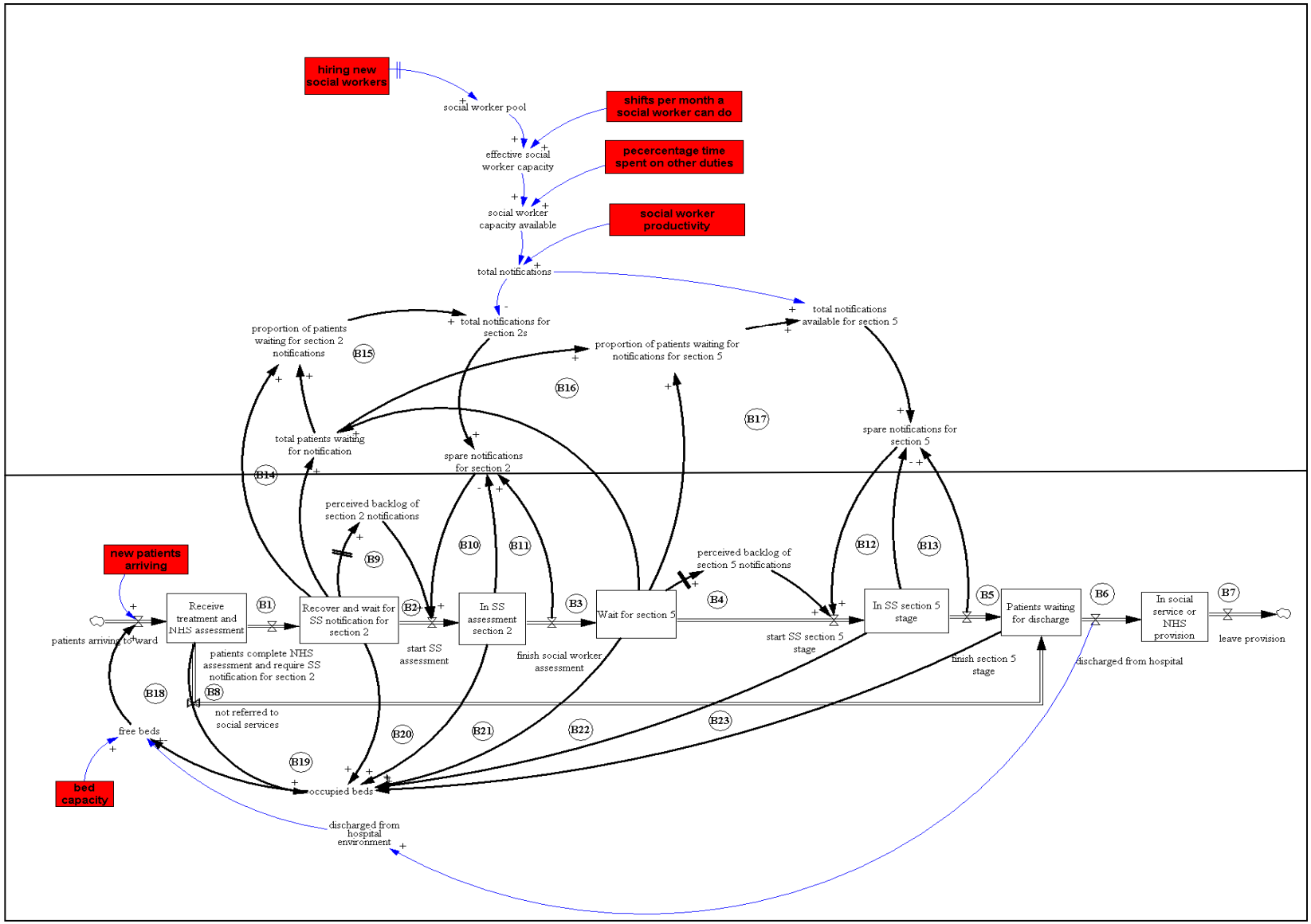


**Figure 3: Annotated Stock And Flow Diagram Illustrating The Balancing Loops Present**

There was a need to compare the conceptual system dynamics model with the real world and incorporate stage 5 of the Soft Systems Methodology. This has helped to reflect on the systems thinking process.

Education and debate has taken place with the case study at stage 7 of the Soft System Dynamics Methodology.

**Discussion**

The soft system dynamics methodology reduces the limitations of each separate methodology, soft systems methodology and system dynamics as they are combined together.

Using the soft system dynamics methodology helped to create a separation between the real world and the systems world. This has not always been clear with the system dynamics approach, as it has been outlined within the soft systems methodology.

The interviews were extremely important in carrying out the process of inquiry to help provide qualitative data about the problem situation that could be structured. For example in determining the boundaries of the problem situation within the health and social care sectors. The interviews helped to discover the causes of the problems rather than the symptoms of the problems. This has been important as often what occurs in practice is very different from what managers think are happening. The use of rich pictures helped to capture the information relationships that existed. The soft system dynamics methodology provided a flexible approach to structuring data.

Although the soft systems methodology has helped towards constructing a mental construct, there has been a lack of dynamic coherence between the behaviour and structure of the problem situation expressed within this methodology (Lane and Olivia, 1998). There has been a lack of understanding towards the intuitive behaviour of complex systems incorporated in the soft systems methodology. This goes further than the soft systems methodology, as an inability of the human mind to have the capacity to handle complex problems in this way. Given this the system dynamics methodology is extremely valuable, as system dynamics addresses the issue of how the behaviour of the system is controlled by its structure.

System dynamics helped to provide a useful insight into the effects of integrated information systems on delayed discharges. It has been important not to assume that system dynamics is solely a hard systems approach. Hard system approaches suggests that there is an end goal. System dynamics methodology is both quantitative and qualitative. What was evident in applying the soft system dynamics methodology was the importance of qualitative system dynamics.

The system dynamics methodology was flexible to receiving the input of the rich picture from the soft systems methodology to inform the annotated system dynamics model. The results of the system dynamics model showed that integrated information systems had a significant difference

in reducing delayed discharges (Sardiwal, 2009). It was recognised that implementing integrated information would not be the end goal to eliminating delayed discharges. It has been important to continue from stage 5 of building the system dynamics model by working in the real world and applying the soft systems methodology. With the soft systems methodology the goal is not reached, as the process leads to action in a continuous learning cycle. This has implications for ensuring the process is not goal orientated.

**Contribution to Operational Research**

The systems thinking methodology of combining stages of the soft systems methodology with the system dynamics (seen figure 1) has been documented in previous literature. This paper extends the literature by highlighting a practical example of this multi-methodological approach.

This methodological approach proved to have some significant impact on the case study concerned. The rich picture was used as a communication tool with stakeholders, which helped to create buy in to the system dynamics model. The Social Services and the NHS trusts concerned with had a greater awareness of what the model was based on. They gained understanding of what were the most important issues in the situation. Use of the soft system dynamics methodology helped to open these methods to a wider audience.

A more feasible solution for reducing delayed discharges was devised by considering the different perspectives of stakeholders within the situation and involving stakeholders in the model building process.

The multi-methodological process has involved moving between the real world and the systems thinking world at different stages of the process. Application of this process has shown to have practical implications for aiding the structuring of the qualitative data and helping to represent interactions in complex systems in a clear way, which has been used to inform the system dynamics process. The rich picture helped to focus on key variables, and the feedback loop structure in place that could be used to inform the annotated system dynamics model.

Through structuring of the qualitative data it can help modellers early on in the research identify what strategies could be used to improve the performance of the NHS and Social Services system. This could be particularly helpful to inexperienced modellers.

Outlining this has potential benefits to a wide range of stakeholders. This research framework can be used to investigate other similar complex problems as it is very accessible. This helps to improve the communication of these systemic methods to other fields.

## Conclusion

The process behind the soft system dynamics methodology has shown to be very useful. The value of the soft system dynamics methodology has largely been to help explore and understand the problem situation given the large socio-technical issues present with the problem situation.

The information systems between the NHS and Social Services are very much separate systems. It is recommended that further research should be carried out to investigate how in practice the NHS and Social Services can move from having separated to fully integrated information systems.

## References


Checkland, P (2000) *Systems thinking, Systems practice*. John Wiley & Sons, New York, NY

Forrester, J.W (1968) *Industrial Dynamics*, Massachusetts Institute of Technology, The M.I.T Press

Lane, D.C. and Olivia, R. (1998**)** The greater whole: towards a synthesis of system dynamics and soft systems methodology**.** *European journal of operational research*, 107 (1). pp. 214-235.

MacDonough, J (2010) Can I practice the social work I believe in within the Statutory Sector? *Neo-Liberalism verses Social Justice*, 17th February 2010 [Lecture], London, London South Bank University

Rodriqez-Ulloa, R, Paucar-Caceres, A (2004) *Soft System dynamics methodology (SSDM): A combination of soft systems methodology (SSM) and system dynamics*, System Dynamics Society Conference, 25th-29th July 2004, Keble College, Oxford

Sardiwal, S (2010) *Coping Policies within Social Services in the UK,* System Dynamics UK Chapter Conference, 11th-12th February 2010, London South Bank University

Sardiwal (2009) *Evaluating the Effect of Integrated Health and Social Care Information Systems on Delayed Discharging of Patients*, The 27th International System Dynamics Conference, 26th – 30th July, 2009, Albuquerque, New Mexico, USA