INCORPORATING SYSTEMS THINKING IN ORGANIZATIONAL CHANGE PROJECTS USING ACTION RESEARCH BY PRACTITIONERS CONDUCTING ACADEMIC RESEARCH

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ABSTRACT

This paper explores the use of systems thinking in action research projects. It will describe two 'real' action research projects, where soft systems methodology was used by managers who introduced change in their own organizations. It elaborates how applying this methodology supported the application of action research. Both managers who used action research have successfully completed their doctorates in programs conducted by an Australian university. The paper discusses the relationship between soft systems methodology and action research, examines the problems faced in using this methodology in action research and discusses how systems thinking could be effectively applied by management researchers planning to conduct academic research.

Keywords: Systems Thinking, Action Research, Soft Systems Methodology, Organizational Change, Management Research.

INTRODUCTION

This paper starts with a brief explanation of action research (AR) and soft systems methodology (SSM) and then describes a doctoral program conducted by an Australian university where AR is often used by practitioners conducting academic research. Two AR projects are then described in which SSM was used. Next, a discussion on the use of systems thinking in action research projects is presented. The paper concludes with some suggestions on how to embed systems thinking approaches in action research projects carried out by practitioners who are taking part in research projects in an academic environment.

ACTION RESEARCH

Although several varieties and versions of action research (AR) exist (Brooks and Watkins 1994, Raelin 1999, Reason and Bradbury 2001), the action research process described in this section is the one frequently adopted by practitioners conducting academic research in the university where the research projects described in this paper were carried out.

According to Dick (2001), you pursue both action (change) and research (understanding) while conducting AR. AR incorporates critical reflection on the action to gain better understanding that results in more informed action. AR is also usually participative and qualitative although quantitative methods have been used by some of the researchers when the situation demanded it.

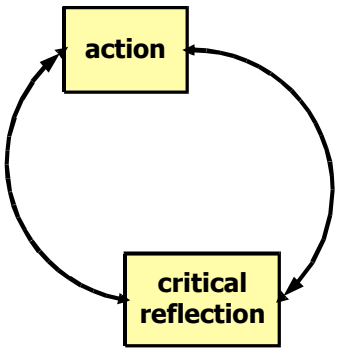


Figure 1 General model of action research

Often AR is carried out in a cyclical or spiral fashion. The most common form used by researchers in the programs used the Deakin cycle (Kemmis and McTaggart 1988) of plan-act-observe and reflect and then the cycle repeats itself. So often we start with a 'fuzzy' problem and as you take action, observe and reflect on the situation you converge through iterative cycles to a better understanding of the situation. This leads to better actions.

What methods can you use to conduct research? It is often said that in AR data drives the research. As an action researcher you should show some scepticism about what you found in order to disconfirm the findings. The more you try to disconfirm the findings the more rigorous the research will be. Therefore, it is quite common to find a mixture of methods being used in AR that offer different perspectives of the research problem at hand. The use of different methods also serves to triangulate the findings by helping to confirm/disconfirm the findings.

Typical methods used by the researchers in the programs were:

- Interviewing
- Large group intervention processes such as search conferences, open space meetings.
- Focus groups.
- Surveys.
- Project evaluation exercises.
- Soft systems methodology.
- Journal writing.
- Story telling and narrative analysis.

SOFT SYSTEMS METHODOLOGY

SSM was developed through the work of researchers and practitioners from Lancaster University in the 70's who found that the methods developed through the 'hard' systems approaches were inadequate to address ill-structured, complex, real-world problems faced by managers. While initially it was thought that 'hard' systems thinking was good to address well defined problems such as those that arose in 'systems engineering' and the 'soft' systems approach was for fuzzy problems Checkland (1999: A10) clarifies that the difference came from how systemicity is attributed to a system. Checkland (1995: 10) clarifies that 'SSM has shifted the concept of systemicity from assuming that it can be the process of inquiry into the world to take action'. Thus hard' refers to the world containing systems while 'soft' refers to systematically organized learning about the world.

New users of this methodology often use Checkland's (1999: 163) seven-step model proposed in 1975 which involves considering the problem situation in both the 'real' world and the 'systems thinking' world where system language could be used to develop models.

Essentially, the seven steps are:

1. The problem situation 'unstructured'
2. The problem situation 'expressed'
3. 'Root definition' of relevant systems
4. Build 'conceptual models'
5. Compare the 'conceptual models' with the 'real' world.
6. Think about feasible, desirable changes
7. Take action to improve the problem situation.

Stages 3 and 4 were in located in the 'systems thinking' world and - line separated the two worlds. As SSM started being used limitations were found and a 'two strands (streams) model' (Jackson 2003: 189) developed. One stream called the logical stream followed the path of the original seven-step model but a new stream called the stream of cultural analysis was introduced in the 80's that includes three types of analysis – analysis about the intervention, social systems analysis and political systems analysis. Social analysis considered norms and values while political analysis provided information on power issues.

According to Checkland and Scholes (1999: 251-252) the seven step model of SSM grew out of a group of University staff helping organizations outside the university to address ill-structured problems. Therefore a consultancy framework using the seven-step model was required to intervene into problems occurring in the real world. As SSM started being applied to day–to-day work by practitioners like Scholes it became a mental model to think about problematical situation. The thinking or sense-making mode of SSM came to be called Mode 2 SSM while the stage-by-stage application of SSM is now known as Mode 1 SSM.

In a recent book by Checkland and Poulter (2006: 11) a basic version of SSM is presented using the following activities:

- A problematical real-world situation demanding action to improve it.
- Creation of models of purposeful activity *relevant* to the situation describing it expressing different worldviews
- A process to explore the models as devices to explore the situation
- A structured debate about desirable and feasible changes including a discussion on power issues and considering social norms and values
- Taking action to improve the situation.

Even though a simplified version of SSM is shown in the latest book the process of analysis includes the various components described in the earlier more complex versions.

Figure 2 shows a basic simplified process of SSM (Checkland and Poulter 2006: 12).

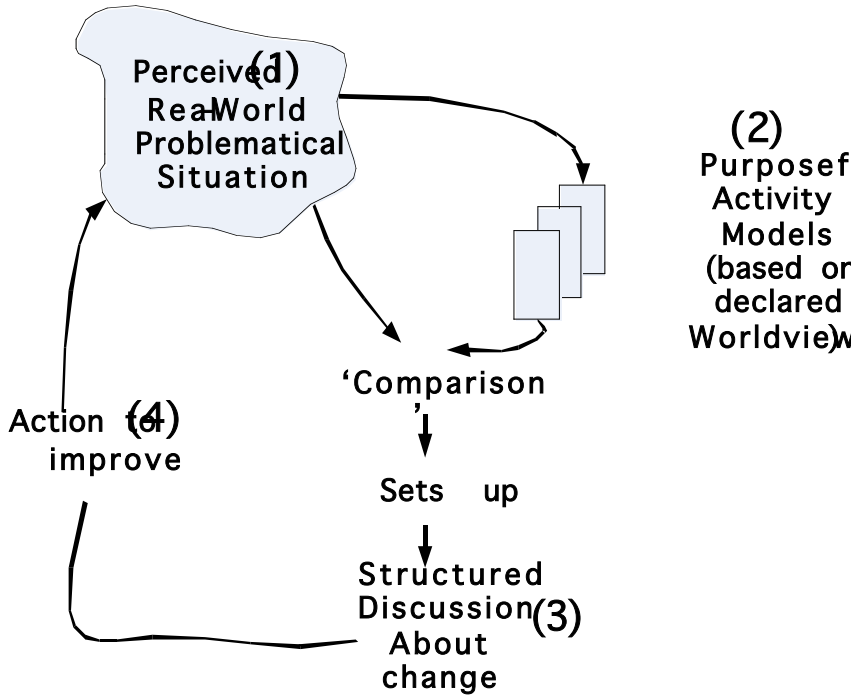


Figure 2 Basic SSM Process (Source: Checkland and Poulter 2006: 13)

The Dialectical Model of SSM

The doctoral researchers at the Australian university often used a dialectical version of SSM model based on Dick (2000).

Dick (2000) has considered SSM as progressing through four dialectics.

- 1st dialectic – Between immersion (rich picture) and essence (root definition) where researchers try and experience the problem situation as fully as possible and then stand back and define its essential features.
- 2nd dialectic – Between the essence (root definitions) and the ideals (conceptual model) where researchers try to find an ideal way to achieve the same transformation of inputs into outputs.
- 3rd dialectic – Between ideals and reality where researchers think about improvement to the ideals or the actual situation.
- 4th dialectic – Between plans and implementation where the plans are implemented and differences between plans and reality can be monitored through which further improvements can be carried out.

Dick's proposed way of using soft systems thinking using the seven steps of SSM is more 'action' driven than 'concept' driven and seems to have been easier to adopt while putting soft systems thinking into practice by the researchers.

THE DOCTORAL PROGRAM

The two research projects selected for discussion in this paper were from two different doctoral programs conducted by the university. The first project was carried out by a PhD candidate from Singapore (Sankaran et al. 2006). The second project is from a Doctor of Business Administration (DBA) Program conducted mainly from Australia but the researcher was from New Zealand where the university had a partnership with a local Institute of Technology. AR was one of several methodologies students used for their DBA theses. The two projects were selected as they incorporated SSM in different ways into AR.

A DIAGNOSTIC EXPERT SYSTEMS FOR AN INDUSTRIAL ENVIRONMENT

This project was carried out by the Technical Director of a Research and Development firm in Singapore for a PhD program (Tay 2003). The project involved the development of a diagnostic expert system for military vehicles that changed the way in which the software development firm designed and implemented software solutions.

Thematic Concern

The primary intention of this study was to solve logic faults that were occurring when the modelling software was being developed. The three primary questions that were asked to address the thematic concern of the research were:

- How to derive an (effective) inquiry process (to carry out the modelling)?
- How to refine the modelling techniques used?
- How to detect missing content?

Choosing Action Research

AR was selected as the research methodology as the researcher wanted to pursue action outcomes and research outcomes at the same time to address a problem that was a real concern to his firm. The project required active participation of designers and modellers developing the system, making AR useful. Due to its responsive nature AR also helped due to the generation of situation-specific knowledge. AR helped keep the project on schedule as project work and research work could be carried out simultaneously. The researcher used AR as a meta-methodology to embed other methodologies that helped in the investigation. SSM was one such methodology used.

Figure 3 shows the dialectic nature of AR moving between 'thought' and 'action' while going through the AR cycle of planning, acting, observing and reflecting.

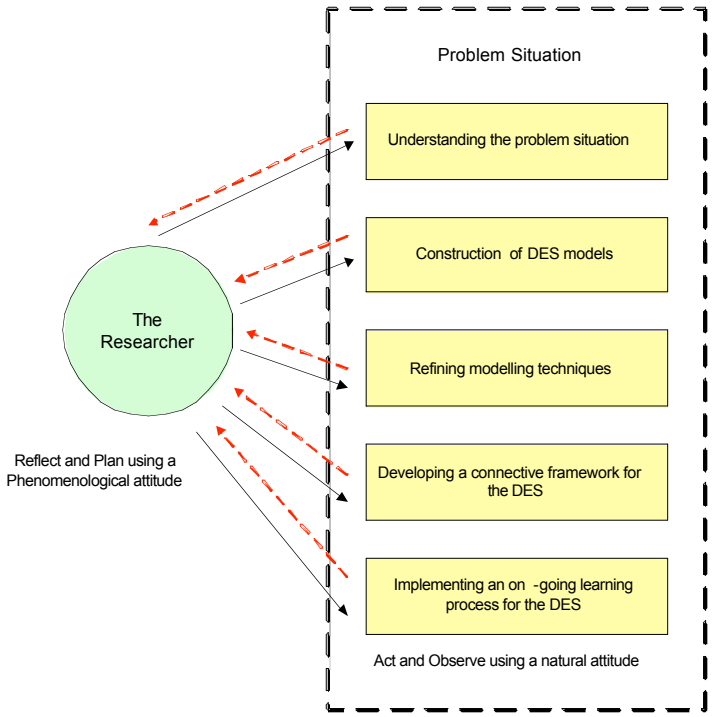
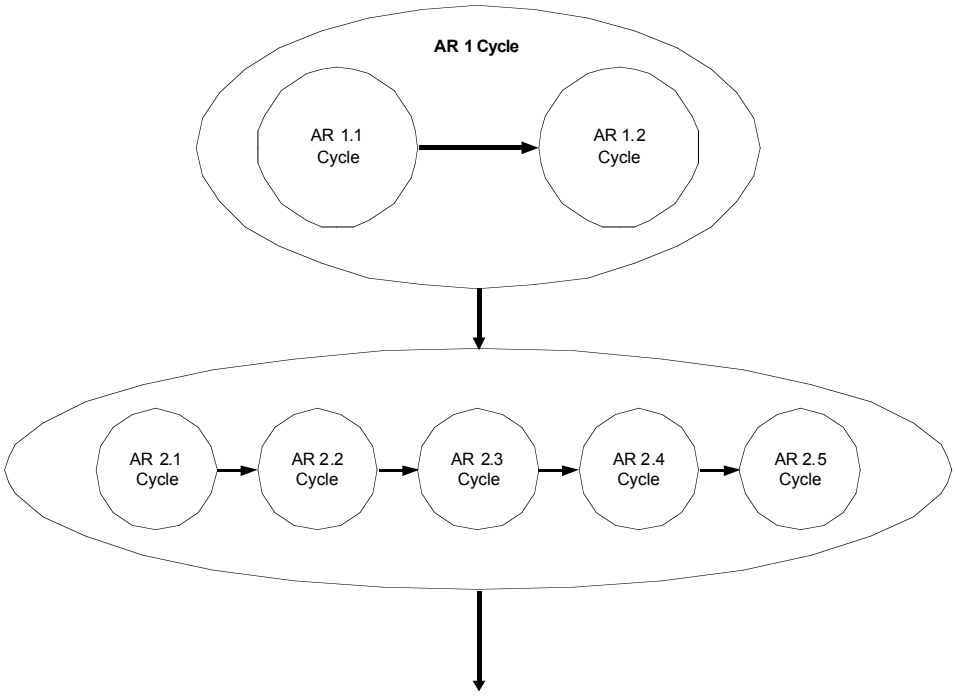


Figure 3 Dialectic nature of AR used in the research (Tay 2003: 87)

Incorporating Soft Systems Methodology

SSM was used in this research as an initial approach to understand the problem situation based on reading the works of Wilson (1984), Checkland and Scholes (1990), Dick and Swepson (1994), Mirijamdotter (1998), Checkland (1999), Dick (2000) and Curtis and Cobham (2002). Initially, the seven-step model proposed by Checkland (1993: 163) was used to set up the investigation. Setbacks were encountered and an inquiry process using Dick's version of Checkland's SSM was designed to fit the investigation (Dick and Swepson 1994; Dick 1993, 2000). This dialectic form of investigation is not a new form of Checkland's SSM. It uses the same seven stages but it is presented from a different perspective A trial was carried out using the four-stage Diagnostic Expert Modelling (DES) inquiry process. This process was then applied to several vehicles for which the diagnostic systems were required. Figure 4 shows how the inquiry process developed through two AR cycles.



Cycle	Activity
AR 1	Understanding the problem situation
AR 1.1	Applying Checkland's SSM
AR 1.2	Analysing setbacks in using Checkland's SSM
AR 2	Constructing DES models
AR 2.1	Deriving four-stage DES inquiry process using Dick's version of Checkland's SSM
AR 2.2	Adopting Reliability-Centred Management as the content guideline
AR 2.3	Using Jung's psychological types as decision-making preferences
AR 2.4	Trialling the four-stage DES inquiry process
AR 2.5.	Refining the diagnostic models for a new vehicle after using the model for three more vehicles

Figure 4 The first two action research cycles (Tay 2003: 99.)

Results From Applying A Structured SSM Process

The justification for adopting an SSM model was based on Curtis and Cobham's (2002) five (philosophical) assumptions for its use. SSM is useful to deal with problems that are not 'out there'. Thus, when one of the modellers started developing the diagnostic model his main problem was that different people associated with the diagnosis had their own views about what the model should be doing. Secondly, the solution to the problem to be modelled had to be intellectual constructs. Thirdly, the problem was not a single problem but a set of interrelated problems. Fourthly, a detailed analysis was required prior to making any decisions on how the systems were to be modelled. Finally, the modeller could not be divorced from the system or its participants. The modeller had to work in collaboration with others.

Although Checkland (1999: A15) states that the seven-step model is somewhat rigid and does not allow a more flexible use of SSM, the researcher was new to the concept of SSM

and followed the modified seven-step model (Checkland and Scholes 1990:29) which was easy to understand. A rich picture representing the problem was created to stimulate understanding of the problem situation. Using the CATWOE mnemonic (Customers, Actors, Weltanshauung (worldview), Transformation, Ownership and Environmental constraints) a root definition was formulated. At this stage, the researcher carried out a role analysis, social system analysis and political analysis. The role analysis clarified the roles of the client, problem solver and problem owner. The social analysis established the norms and values. The political analysis identified formal authority, intellectual authority, personal charisma (or lack of) and reputation. Based on the problem analysis three conceptual models were developed. The latter models included control structures to meet the criteria of efficacy and efficiency. Two reviews were conducted with the modeller with the conceptual model. During the first review it became evident that the modeller was still lacking information and this was attributed to the lack of the modeller's capability to persuade team members involved in the modelling project to provide the required information. A second review with the team involved in modelling suggested further issues but a third review indicated that the modelling team had started working together well. Unfortunately for the modeller, the client rejected his solution for the model and this resulted in the modeller leaving the organization.

This experience caused the researcher to reflect on the setback and he realized that there was a lack of a declared-in-advance intellectual framework of ideas suggested in the SSM process (Checkland and Holwell 1998). Such a framework was needed to define and express what could be construed as knowledge about the situation. While the reviews of the work using the seven-step model helped in improving the team work it failed to address the real problem. The client rejected the model as it did not represent the reality, i.e. how it represented the 'real' vehicle for which the system was being built.

Based on this analysis, a set of criteria for evaluating the effectiveness of the inquiry process was established. These included:

- Frequent visits to the physical situation (the vehicle) to ensure that any important features were not missed.
- One or more wholeness purposes – One 'wholeness' purpose was insufficient to capture the situation completely. For example the focus on team work had diverted the attention of the team from building an accurate model.
- Achieve a shared sense of understanding and familiarity especially when modellers and designers were working in teams.
- Frequent review and verifications to establish coherence among team members and the client (stakeholders).

Developing A Four-Stage DES Process

Dick and Swepson (1994) and Dick (1993 and 2000) take a different perspective on how SSM is approached by progressing through four dialectics. The dialectics have a win-win intent to focus on disagreements with a view to turn them into agreements.

Based on a study of Dick's dialectic SSM process and discussions with Dick, the researcher developed a four-stage inquiry model as shown in Figure 3.

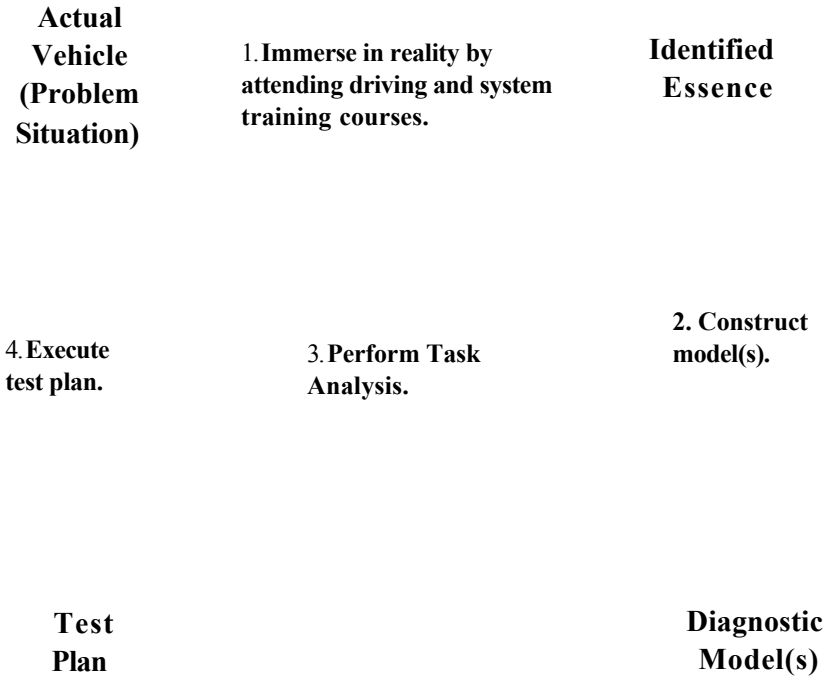


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Figure 5 The four-stage DES inquiry process (Tay 2003: 114)

In the first AR cycle the modeller immerse herself/himself in the problem situation. This was done through attending a driving course and a maintenance course for the driving vehicle. This helped the modeller to capture the essence of the vehicle and its various operations.

In the second cycle the modeller constructed a DES for a specific vehicle operation. This is the dialectic between the essence of the vehicle and the model. The modeller is encouraged to forget about the vehicle and focus on the derivation of the DES model.

In the third cycle the modeller performs task analysis – analysing how people do a task, how they act and what things they need to know. This is the dialectic between the constructed DES model and the real vehicle. This cycle is repeated until all the mandatory inspection and repair tasks are completed.

In the final cycle the test plan is verified against the real vehicle. Differences are noted down to take care of differences encountered. This is the dialectic between the test plan and the real vehicle.

THE IMPLEMENTATION OF AN ELECTRONIC HEALTH KNOWLEDGE MANAGEMENT SYSTEM

This project was carried out for a District Health Board in New Zealand to implement a series of electronic health knowledge management systems (Orr 2006). The objective of the projects was to increase the capacity of the Board to bring together and have clinical

information from multiple distributed resources to provide better integrated care and health outcomes. It included implementing several interrelated projects:

1. A single login interface from which all key individual patient demographic information, investigation results, clinical documents and referrals, past treatment events and warnings could be viewed.
2. A patient tracking system for emergency care providing real-time information on a patient's location, investigation and treatment status.
3. An electronic medical document repository including the migration of a large number of historical clinical documents.
4. Electronic clinical audit facilities focusing first on surgery and helping the provision of clinical outcome measures.
5. Referral status messaging and electronic discharge summaries enhancing real-time information sharing across primary and secondary care environments.

Thematic Concern

The main aim of the research was to utilise an AR process of planning, acting and critical reflection to develop conceptual models to enhance the implementation of Information and Communications Technology (ICT) based health knowledge management systems. While New Zealand has one of the highest rates of ICT enabled healthcare provision it has also experienced significant project failures. So one of the reasons for adopting a different process to implement the ICT systems was the belief that the process developed through this research would help in implementing successful technology-based healthcare projects.

Choosing of Action Research

The research was carried out in teams utilising an AR and reflective learning approach. AR was selected as the methodology due its focus on change and learning, its qualitative, exploratory and theory-building nature, its emancipatory emphasis, its capacity to accommodate researcher participation and its responsiveness and flexibility in complex changing situations (Dick 2001; Reason 2006).

Relevance to Soft Systems Methodology

Although SSM was not explicitly used as a methodology within AR in this thesis, a number of parallels between Checkland's evolving understanding and development of his own work and the researcher's conceptualisation of the research process using mnemonics and a concept-reality gap model were observed. Thus SSM was used in the sense-making mode (Mode 2) in this research,

The researcher is a psychiatrist by profession and recorded the parallels between Checkland's 30 years of development of SSM and the essence of psychotherapeutic practice in one of his papers that formed part of his thesis (Orr and Sankaran 2007). This thesis was submitted as a set of publications that the researcher published during the course of his doctorate. During the initial stages of his research the researcher was under the impression that the focus of his AR would be to resolve some technical integration and configuration issues. He also thought that a structured use of the seven-step model would support the initial focus of the research.

The researcher's initial expectation was that AR would form the key project stages and would somehow be separated from the daily work of the project. However, as the research progressed, the focus of the AR narrowed to deal with psychological process issues, and

capability development and AR became integrated with the daily fabric of the project to aid reflective practice.

As the researcher read the works describing the development of SSM (Checkland 1999, 2000a, 2000b, 2005 and 2006) he felt that the broad approach that he and his team took embraced many of the principles that Checkland now identifies as the essence of SSM.

The researcher points to two observations from the paper by Checkland and Winter (2006: 1435):

- That SSM provides a set of principles for intervening in human problem situations in order to bring about improvement.
- SSM is relevant to both the content of the perceived situation (SSMc) and the process dealing with that content (SSMp)

According to the researcher, these two statements echo the essence of psychotherapeutic practice.

Checkland's SSM evolved to focus on human dynamics, relations, needs, aspirations, perceptions and assumptions to bring about group accommodation of a process. By using the iterative creation of shared models relative to their perceived and current reality SSM facilitates to improve the situation or world they live in.

Psychotherapeutic practice also has similar aims by intervening in human situations to bring about positive change. The goal of the practice is to form an empowering therapeutic alliance that seeks to understand, accept and meet the patient, client or group where they are in terms of their worldview. A key goal of psychotherapy is to help build an agreed model about the factors that have led the person or group presenting in this way, at this time, including identified strengths. This helps to build an agreed plan of required action to move forward which takes into account what is feasible and what is desirable, perceived priorities, preferences and cultural values aiming to minimise weaknesses or vulnerabilities and build on strengths, maximise empowerment, motivation and self-efficacy weighing risks and benefits and recognising potential conflicts and interests. This is an iterative process that has many similarities to the principles of SSM.

The reality-concept gap model that resulted from this research is an example of building a conceptual model to support the AR process. In fact, it could be considered as the framework of language used for this research supported by the SAFE mnemonic. Figure 4 shows the concept-reality gap model.

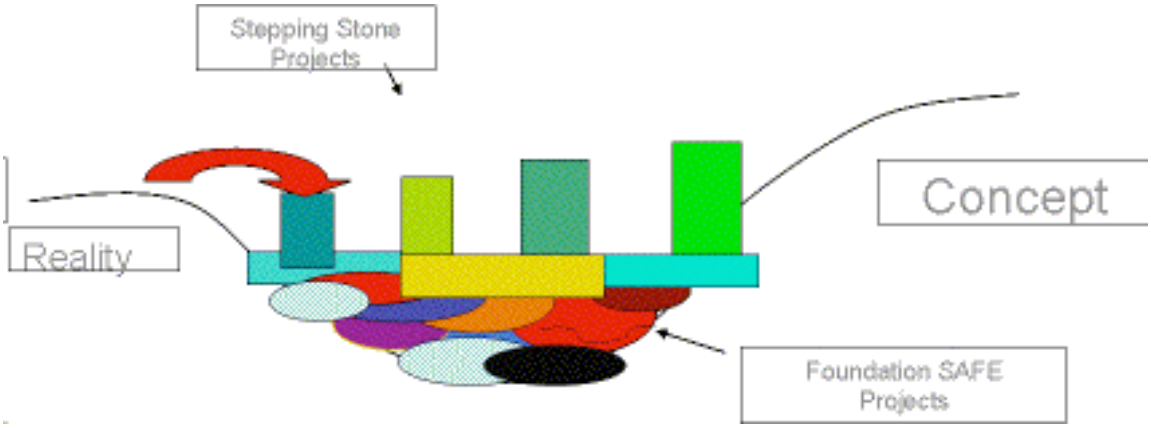

Figure 6 Reality – Concept Gap (Orr 2006: 109)

During the AR cycles used to implement the electronic health knowledge management system a central metaphor used throughout the project was the concept-reality gap shown in Figure 4. This resulted from a visual representation that when an individual or system faces a stressor or change there may be an initial drop in the functioning before a hopeful reorganisation, improved resilience and capability to return to the baseline. This phenomenon can be observed in concepts such as the reengineering curve, the death valley of change, crossing the quality chasm or moving through a grief process (Committee for Quality of Healthcare 2001; Elrod and Tippett 2002, Kelly and Tucci 2001).

While an initial drop in performance may be acceptable in a business process reengineering process with a belief that it will lead to increased productivity it may be detrimental to patient safety in a healthcare situation. This may result in the abandonment of the new process to return to the original trusted process. Failure to appreciate the magnitude of this 'acceptance' gap could lead to full or partial failure of ICT implementation in a healthcare system (Glouberman and Mintzberg 1996; Heeks et al. 1999, Orr 2000).

While you could try to jump from reality to concept in one go it might result in a crash-and-burn situation in a healthcare scenario. Therefore, an incremental process is needed to move from reality to concept using a stepping stone approach as shown in Figure 4. But the stones need a firm foundation and this was provided in the research through the use of mnemonics such as S.A.F.E. (**S**calable **A**ffordable **F**lexible **E**quitable) projects. The combination of a metaphor and a mnemonic was very useful to implement the change processes required in this project. Using AR cycles helped to support the incremental nature of the implementation.

DISCUSSION

Greenwood and Levin (2007: 59) state that a 'systems approach necessarily underlies AR in all its manifestations. Both rely on an interconnected and holistic view of the World'. They add that AR also tries to transform society into more open systems.

The principal author of this paper has also used open systems approaches such as 'search conferences' in his own doctoral work using AR. Greenwood and Levin (2007) also

advocate the use of search conferences within a pragmatic AR process. A search conference fits in with the democratization goals of AR.

Flood (2001) differentiates between systems thinking and systemic thinking by arguing that while systems thinking takes an objective stance, systemic thinking takes a subjective stance. He argues that SSM is a form of systemic thinking as reality is perceived through people's interpretation of their experiences. Flood also states that 'Action research carried out with a systemic perspective in mind promises to construct meaning that resonates strongly with our experiences within a profoundly systemic world' (Flood 2001: 143).

SSM and AR have a close connection as SSM itself was developed through an interpretative AR project looking into situations existing in the real world. Checkland and Holwell (1998: 22-23) refer to the version of AR proposed by Argyris et al (1982) where the crucial elements of the AR are 'a collaborative process between researchers and people in the situation; a process of critical inquiry; focus on social practice; and a deliberate process of reflective learning'. But they feel that conventional AR misses 'a desired-in-advance intellectual framework of ideas, a framework in terms of which what constitute knowledge about the situation researched will be defined and expressed'. They feel that without this framework AR might lose its rigour.

Researchers in a doctoral program conducted by Monash University (Sarah et al 2002) have utilised systems thinking methodologies in conducting AR. The first batch of candidates who used systems thinking in their AR set up their research using the FMA (framework, methodology and action) model advocated by Checkland and Scholes (1990). They adopted the suggestion by Checkland that a desired-in-advance intellectual framework is required in AR projects. Figure 7 shows the FMA concept.

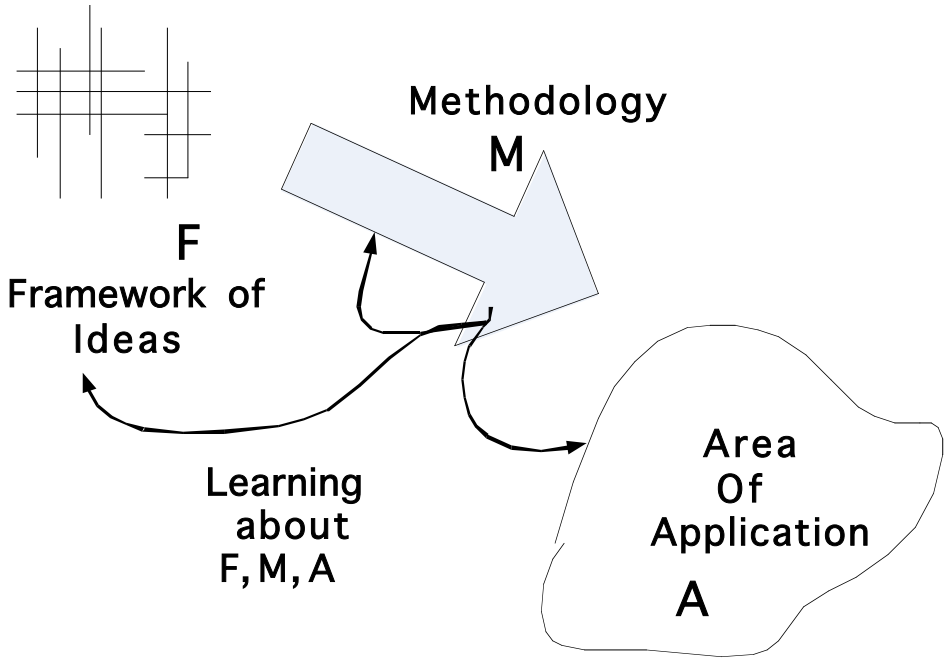

Figure 7 Elements of research (Source: Checkland 1975: 3)

Table 1 shows a comparison between a general AR process and the SSM process.

Table 1 Comparing SSM and AR

SSM	Action Research
Problematical situation	Fuzzy problem
Taking purposeful action	Taking action to observe and reflect on the situation
Strategic questioning	Questioning as part of the reflective process
Participatory	Mostly participatory
Taken into account people affected	Empowerment

The main difference seems to be that SSM advocates the use of a declared-in-advance intellectual framework while AR may not always take this approach. There are also other 'administrative' reasons why such a framework would be useful to doctoral researchers in academia. When research is conducted for academic purposes it is mandatory to seek ethics approval for the research. In these situations a declared-in-advance framework would be very useful to help in the approval of AR as the research methodology. It also helps candidates who are often required to declare details of their methodology by the administrative processes that are adopted by universities who often use the scientific model of research administration. In the university where the principal researcher is now situated the doctoral assessment process which acts a gateway to confirm candidature would pose significant problems to candidates who use AR in more flexible ways.

From the expert systems case described in the paper it was evident that the lack of an intellectual framework resulted in initial setbacks with the modelling, and the development of a four-stage DES inquiry process that served as the intellectual framework in the second round of applying SSM helped to structure the research better. In the knowledge management case described in this paper the metaphor of the 'reality-concept' gap could be considered as the declared-in-advance or developed framework that guided the research.

Although systems thinking and AR go hand in hand there are some limitations in applying SSM in management research where a solution is expected from the research. Checkland and Morris (2006: 1435) state that SSM is a 'methodology that provides a set or principles for intervening in human problem situations in order to bring about what would be judged to be "improvements"'. If the aim of practitioner research is to make the practitioner into a better researcher then processes such as SSM would be very helpful. However, when the motive of the research is to find solutions or develop a product questions could be raised as to the effectiveness of a process like SSM as well as AR. Another issue that is often faced by researchers using AR and SSM is when do you stop? You can go on learning endlessly with these methodologies. When these are adopted to do a doctoral thesis there are time and resource limitations limiting the duration of the project. This issue is out of the scope of this paper but has been discussed in detail by West and Stansfield (2001). Their paper is also shows how structuring action research projects using the FMA model is useful in many respects.

The two research projects described in this paper used SSM in different ways. The first project which was carried out by a systems engineer took a different view of applying systems thinking to software development but essentially the researcher was looking for a solution to minimise the number of logic faults occurring in a modelling process. The application of SSM helped not only in solving his problem but also contributed to better practice where the dialectic model of SSM he adopted resulted in a process of ongoing

learning in his practice. Thus, it also fulfilled the aims of SSM being a learning process in human activity systems. The second project carried out by a psychiatrist did not directly include SSM but recognised parallels between SSM and his own practice. SSM became a sense-making system. One can say that there are philosophical similarities between SSM and AR as applied in a therapeutic practice environment. It is interesting that the researcher thought of SSM as a process to implement an information systems project but in the end realised that it is a process that promotes better understanding. SSM, like AR, can also be used as a meta-methodology to help thinking about the research problem and gain better understanding before other methods are adopted.

CONCLUSIONS

Although there are many similarities between the principles of AR and systems thinking (especially soft systems thinking) the process might take long and may not be goal seeking. However, incorporating systems thinking approaches such as search conferences or soft systems methodologies could be powerful when they are used in an AR project to improve the researchers' practice, enable stakeholder buy-in into the changes being proposed as a result of the AR intervention and incorporate a declared-in-advance framework of ideas to pursue AR more effectively. Some more practical versions of SSM such as the dialectical model described in the expert systems project could help researchers use a systems approach more effectively towards achieving a solution in an AR project. The expectation from dialectical SSM approach is that a content engineer (or a modeller) should be able to appreciate the fact that knowledge acquisition is both an opportunity and a constructive modelling process that enables him/her to gain a better insight of a domain via the process of articulating, structuring and critically evaluating the model for that domain. The FMA concept to undertake any research advocated by Checkland could come in handy for action researchers to structure their research.

REFERENCES

Argyris, C., Putnam, R. and Mclain Smith, D. (1982). *Action Science: Concepts, Methods and Skills for Research and Intervention*, Jossey-Bass, San Francisco.

Brooks, A. and Watkins, K.F. (1994). *The Emerging Power of Action Inquiry Technologies*, Jossey-Bass, San Francisco, CA.

Checkland, P. (1993). *Systems Thinking, Systems Practice*, John Wiley, Chichester.

Checkland, P. (1995), Soft systems methodology and its relevance to the development of information systems, in F.A. Stowell (ed.) *Information Systems Provision: The Contribution of Soft Systems Methodology*, McGraw Hill, London, pp. 1-15.

Checkland, P. (1999). *Soft Systems Methodology: A 30-year Retrospective*, John Wiley, Chichester.

Checkland, P. (2000a). The emergent properties of SSM in use: A symposium by reflective practitioners, *Systemic Practice and Action Research*, 13 (6):799-823.

Checkland, P. (2000b). New maps of knowledge and some animadversions (friendly) on science (reductionist) social science (hermeneutic), research (unmanageable) and universities (unmanaged), *Systems Research and Behavioural Science*, 17(S1):S59.

Checkland, P. (2005). Webs of significance: The work of Geoffrey Vickers, *Systems Research and Behavioural Science*, 22(4):285-90.

Checkland, P. (2006). Reply to Eden and Ackermann: The future of problem structuring methods? *The Journal of Operational Research Society*, 57(7):769-71.

Checkland, P. and Holwell, S. (1998). *Information, Systems and Information Systems: Making Sense of the Field*, John Wiley, Chichester.

Checkland P. and Poulter, J. (2006). *Learning for Action: A Short Definitive Account of Soft Systems Methodology and its Use for Practitioners, Teachers and Students*, John Wiley, Chichester.
Checkland, P. and Scholes, J. (1990). *Soft Systems Methodology in Action*, John Wiley, Chichester.
Checkland, P. and Winter, M. (2006). Process and content: Two ways of using SSM, *The Journal of the Operational Research Society*, 57(12):1435-41.
Committee on Quality of Healthcare in America (2001). *Crossing the Quality Chasm: A New Health System for the 21st Century*, National Academy Press, Washington DC.
Curtis, G. and Cobham, D. (2002). *Business Information Systems: Analysis, Design and Practice*, 4th edn., Pearson, Essex.
Dick, B. (1993). *You Want to Do an Action Research Thesis?*, [Online], Available at http://www.scu.edu.au/schools/gcm/ar/art/arthesis.html.
Dick, B. (2000). *Soft Systems Methodology. Session 13 of Areol- Action Research and Evaluation Online*, [Online], http://www.scu.edu.au/schools/gcm/ar/areol/areol-session13.html.
Dick, B. (2001). Action research: action *and* research, in S. Sankaran, B. Dick, R. Passfield and P. Swepson, (eds.) *Effective Change Management Using Action Learning and Action Research* , Southern Cross University Press, Lismore, 21-27.
Dick, B. and Swepson, P. (1994). *Appropriate Validity and its Attainment Within Action Research: An Illustration Using Soft Systems Methodology*, [Online], http://www.scu.edu.au/schools/gcm/ar/arp/sofsys2.html.
Elrod, P. and Tippet, D. (2002). The death valley of change, *Journal of Organisational Change and Management*, 15 (3): 273-291.
Flood, R.L. (2001). The relationship between 'systems thinking' to action research in P.Reason and H. Bradbury (eds.) *The Handbook of Action Research*, Sage, London, 133-134.
Glouberman, S. and Mintzberg, H. (1996). Managing the care of health and the cure of disease. Part 1: Differentiation, *Healthcare Management Review*, 26 (1):56-59.
Greenwood, D. and Levin, M. (2007). *Introduction to Action Research: Social Research for Social Change*, 2nd edn. Sage, Thousand Oaks.
Heeks, R., Mundy, D. and Salazar, A. (1999). Why healthcare information systems succeed or fail ?, *Information Systems for Public Sector Management*, Working paper series, Paper No. 9, Institute for Development Policy and Management, Manchester, UK.
Jackson, M.C. (2003) *Systems Thinking: Creative Holism for Managers*, John Wiley, Chichester.
Kelly, M.A. and Tucci, J.M. (2001). Bridging the quality chasm, *BMJ*, 323:61-62.
Kemmis, S. and McTaggart, R. (1988). *The Action Research Planner*, 3rd. edn., Deakin University, Geelong, Vic.
Mirijamdotter, A. (1998). A Multi-modal Systems Extension to Soft Systems Methodology, PhD Thesis, Department of Informatics and Systemic Science, Lulea University of Technology, Sweden.
Orr, M. (2000). Implementation of Health Information Systems, MBA Dissertation, Southern Cross University, Lismore, NSW.
Orr, M. (2006). The Implementation of Electronic Health Knowledge Management Systems, DBA Thesis, Southern Cross University, Lismore, NSW.
Orr, M. and Sankaran, S. (2007). Mutual empathy, ambiguity, and the implementation of electronic knowledge management within the complex health system', *Emergence: Complexity and Organization*, 9(1-2):41-52.
Raelin, J.A. (1999). Preface: Special Issue, *Management Learning*, 30(2):115-25.
Reason, P. (2006). Choice and quality in action research practice, *Journal of Management Inquiry*, 15(2):187-203.
Reason, P. and Bradbury, H. (2001). *Handbook of Action Research*, Sage, London.

Sarah, R., Haslett, T., Molineux, J., Olsen, J., Stephens, J., Tepe, S. and Walker, B. Business action research in practice- A strategic conversation about conducting action research in business organizations, *Systemic Practice and Action Research,* 15 (6), pp. 535-546.

Sankaran, S., Hase, S. Dick, B. and Davies, A. (2006). Reflections on Developing an Offshore Action Research/Learning Based PhD Program, *Action Learning: Research and Practice*, 3(2):1-15.

Tay, B.H. (2003). Using Action Research to Develop a Social Technical Diagnostic Expert System for an Industrial Environment, PhD Thesis, Southern Cross University, Lismore, NSW.

West, D. and Stansfield, M.H. Structuring action and reflection in information systems action research studies using Checkland's FMA model, *Systemic Practice and Action Research*, 14 (3), 251-281.

Wilson, B. (1984). *Systems: Concepts, Methodologies and Applications*, John Wiley: Chichester.