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Thesis

John B. Runnalls

Action Research and Occupational Health and Safety: An Exploratory Study

Abstract

This paper describes an exploratory study into action research and its potential application within the field of Occupational Health and Safety (OHS) in Australia. It argues, and looks to substantiate, the thesis that action research has a great deal to offer OHS practitioners - a research method that may be the foundation stone of 'true' OHS practitioner research, and the resulting continuous improvement of their practice into the future. It does this through the means of a literature and case study review, and through the application of action research principles to a 'real world' OHS problem.

Action research was found to be based on the principles of the emerging scientific paradigm termed 'human co-operative inquiry', which represents a move to participatory and holistic knowing, to critical subjectivity, and to the formation and grounding of knowledge 'in' and 'for' action, for the subsequent improvement of the situation researched, the people involved in the research, the research process, the practice of the researcher, and for the sharing of context specific lessons learned with peers, for their critical review and (where appropriate) as inputs to their own action research activities.

The origins and context of action research are discussed, a general definition of action research and a detailed summary of its features are provided, the historical development of action research is traced, a number of action research models are presented, and the 'practice' of action research is explored. A number of key criticisms of action research are also discussed, and existing safeguards are considered.

The study describes the role of the OHS practitioner, and provides a contextual overview of their practice in Australia - identifying and briefly discussing the factors which potentially impact OHS practice. This overview identifies the most pressing need of OHS practitioners as the need for a 'means' to facilitate the reliable development of context specific solutions to OHS problems, and to 'localise' and effectively imbed / implement, through and with the contributions of other workplace stakeholders, the things they know need implementing within the specific, complex and very challenging sociotechnical contexts of their organisations.

The content of the action research theory, and the OHS practitioner role definition / contextual overview sections of the thesis, are applied by the author to identify the potential benefits of action research application for OHS practitioners. Four key benefits identified are discussed in detail (i.e. a research method for practitioners; an alternative consultative / teamwork strategy; a mechanism for change, innovation, and continuous improvement; and a framework for practitioner personal and professional development).

A number of significant barriers to the successful introduction and application of action research to OHS are also identified

The paper documents, in an action research case study format, the author's application of concepts and principles of action research to a 'real world' OHS problem / improvement opportunity. Claims made within the literature, and within the main body of the thesis, are evaluated through a critical review of this case study, and the critical review of a recent Australian action research case study. The results of these evaluations are discussed, with the general finding that the case studies reviewed generally supported the claims within the literature and the body of the thesis.

The study concludes that the application of action research has the potential to significantly improve the effectiveness of workplace injury and disease prevention in Australia.

Recommendations are made relating to the future use of Action Research methodology within the field of Occupational Health and Safety.

Keywords

This thesis is submitted by John Runnalls in part fulfillment of the Master of Applied Science (Occupational Health and Safety). It has not been submitted for any other degree, and to the the best of the author's knowledge and belief, the thesis is his own work, except where due reference is given in the text.

Acknowledgments

> *"... a resource for practitioners, to assist them in their efforts to conduct inquiry and to hone their investigative skills so they might formulate effective solutions to the deep-rooted problems that detract from the quality of their professional lives. ... [an] approach to inquiry that will help practitioners explore systematically the real-life problems they experience in their work contexts and to formulate effective and sustainable solutions that will enhance the lives of the people that they serve [- Action Research]. "*

> Ernest T. Stringer (1996, p. xviii)

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1. Introduction

"Do not try to satisfy your vanity by teaching a great many things. Awaken peoples curiosity. It is enough to open minds; do not overload them. Put there just a spark. If there is some good inflammable stuff it will catch fire."

Anatole France
(cited in Kletz, 1990)

"There is an expectation in social life that trained professionals, applying scientifically derived expertise, will provide answers to the proliferating problems that confront people in their personal and public lives ... there is evidence to suggest that centralised policies and programs generated by 'experts' have limited success in resolving these problems."

Ernest T. Stringer (1996, p. 2)

"I relate these examples to you ... as illustrations of our quest for quality through the concept of learning organisations. In all of these initiatives, we come as partners not as teachers or donors. And this element of relationship building is crucial. Theory and practice alike, inform us that collaboration, and co-operation through genuine participation are absolutely essential characteristics."

Richard Bawden (1989)

'Thesis' has been defined as "an unproved statement put forward as a premise in an argument" (the *Collins English Dictionary and Thesaurus*, 1993, p. 1203). This paper is an exploratory study into action research and its potential application within the field of Occupational Health and Safety (OHS) in Australia. It argues, and looks to substantiate, the thesis that action research has a great deal to offer OHS practitioners - a research method that may be the foundation stone of 'true' OHS practitioner research, and the resulting continuous improvement of their practice into the future, for the benefit of all. It does this through the means of a literature and case study review, and through the application of action research principles to a 'real world' OHS problem. Action research has been defined as ...

- a spiraling research methodology consisting of cycles of planning, acting, observing and reflecting;
- systematic and self-critical implementation of each research phase;
- involvement of researcher and people close to the problem for investigation, through each stage of the research process;
- and collaborative control of the research process, for the improvement of social practice.

(Carr & Kemmis. 1986, pp. 165-166)

Action research is not a methodology based on the positivist world-view, defined as "the theory ... that every rationally justifiable assertion can be scientifically verified or is capable of logical or mathematical proof" (*The Australian Reference Dictionary*, 1991, p. 614). Positivism contends that the orthodox scientific method, with its focus on objectivity, experimentation and induction, is the only basis for (and source of) valid knowledge - natural and social (Parker, 1997, p. 9). Action research is founded on the principles of the new (emerging) scientific paradigm of human co-operative inquiry, and has the following features ...

- It honours "the generative, creative role of the human mind in all forms of knowing" (Heron, 1996, p. 13);
- It has at its foundation a move to participatory and holistic knowing, and to critical subjectivity (Reason, 1988, p. 10); and
- It is a move to the formation and grounding of knowledge 'in' and 'for' action, for the subsequent improvement of the situation researched, the people involved in the research, the research process, the practice of the researcher, and for the sharing of context specific lessons learned with peers for their critical review, and where appropriate, as inputs to their own action research activities (Reason, 1993, pp. 1259-1263).

The literature indicates that 'action research' is not a concept that the OHS community in Australia is familiar with, hence the need to provide a comprehensive picture of what action research is. The answer to the question 'what is action research?', is inextricably linked to the answer of another question - 'why action research?', and it is through the overview of its origins, and the context of its development, that the answer to this question is revealed. The origins and context of action research are therefore briefly discussed, a general definition of action research and a detailed summary of its features are provided, the historical development of action research is traced, a number of action research models are presented, and the 'practice' of action research is explored. A number of key criticisms of action research are also discussed, and existing safeguards are considered.

The term 'OHS practitioner' has been defined as a person who practices the prevention of injury and disease (illness) which can potentially result (and frequently does result) from the exposure of people to danger or risk associated with their work. In order to understand what action research has to offer the OHS practitioner, the study describes the role of the OHS practitioner, and provides a contextual overview of their practice in Australia. This role description and contextual overview identifies and briefly discusses the factors which potentially impact on OHS practice, and some of the relatively recent changes within the field of OHS that have contributed to increasing challenges for, and expectations of, the OHS practitioner role. The following key areas are addressed ...

- Organisations as sociotechnical systems;
- Organisational culture;

- Organisation management;
- OHS management and culture;
- External environmental factors;
- Changing roles of OHS practitioners;
- Behaviour based safety;
- Future directions of OHS in Australia;
- Innovation, quality, and continuous improvement; and
- Packaged solutions to organisational and OHS performance improvement.

This overview identifies the most pressing need of OHS practitioners as the need for a 'means' to facilitate the reliable development of context specific solutions to OHS problems, and to 'localise' and effectively imbed / implement, through and with the contributions of other workplace stakeholders, the things they know need implementing within the specific, complex and very challenging sociotechnical contexts of their organisations.

The content of the action research theory and the OHS practitioner role definition / contextual overview sections of the thesis, are then applied by the author to identify the potential benefits of action research application for OHS practitioners. Four key benefits identified are discussed in detail (i.e. a research method for practitioners; an alternative consultative / teamwork strategy; a mechanism for change, innovation, and continuous improvement; and a framework for practitioner personal and professional development). A number of significant barriers to the successful introduction and application of action research to OHS are also identified, with the term 'barrier' defined as "anything serving to obstruct passage or maintain separation, ... anything that prevents progress, ... [and] anything that separates or hinders union" (*Collins English Dictionary and Thesaurus*, 1993, pp. 91-92).

The paper documents, in an action research case study format, the author's application of concepts and principles of action research to a 'real world' OHS problem / improvement opportunity. The case study method has been defined as a research approach designed to investigate a "phenomenon within its real-life context" (Yin, 1994, p. 13), and which uses narrative to document and communicate the investigation process, analysis, and outcomes in written form (Yin, 1994, p. 135). Case study is one of the key models action researchers use to tell the 'story' of the action research project.

Claims made within the literature, and within the main body of this thesis, are evaluated through a critical review of this 'real world' case study, and the critical review of a recent Australian action research case study. The results of these evaluations are discussed.

The progressive findings of the thesis are compiled as a set of sub-conclusions, and the main conclusion of the thesis is identified and briefly discussed. Recommendations are made relating to the future use of Action Research methodology within the field of Occupational Health and Safety.

This work is justified on the following basis ...

- Kletz's (1990, pp. 246-247) observation that OHS practitioners don't lack for OHS knowledge, but require the means of implementing this knowledge in a real way within their workplaces;
- Viner's (1992, p. 348) observation that injuries and deaths continue to occur in situations for which knowledge detailing cost-effective prevention solutions is available;
- VIOSH Australia's (1999, p. 5) conclusion that "rather than continually pushing back the 'frontiers of knowledge', research should now be directed towards applying existing knowledge to the workplace, and in this way helping to prevent occupational illness and accidents, by facilitating the actual implementation of effective control strategies";
- Else's (1999) forecast for the need for a holistic approach to OHS, the need for innovative solutions to problems, and the need for Australian people to internalise OHS principles, as strategies for future OHS improvement in Australia;
- Thatcher's (1991, pp. 63&71) identification of the significant need of a support structure for OHS practitioners, that facilitates their control and influence of factors impacting their practice;
- Fuhrmeister's (1997, p. 35) recommendation regarding the need for further research into methods of bringing about organisational culture change in an Australian setting, for the improvement of OHS;
- Dine's (1997, p. 21) recommendation for further study of the professionalisation processes of other disciplines, as a guide and benchmark for the professionalisation of OHS practice in Australia;
- Popplewell's (1993) recommendation for further research into the potential application of action research to OHS in Australia - particularly in the areas of organisational, sociotechnical and workplace change / reform; and
- The author's own experience regarding the challenge of translating essential theory into practice, and the transfering of that knowledge to workplace stakeholders.

2. Aims and Objectives

The aim of this paper is to explore, by means of a literature and case study review, and the application of action research principles to a 'real world' OHS problem, the potential application of action research methodology within the field of Occupational Health and Safety, through meeting the following objectives ...

1. Provide an overview of action research, its origins, definition and features, historical development, and its validity as a research method.

2. Outline the role of OHS practitioners, and the context of their practice within Australia.

3. Consider potential applications of action research methodology within the field of Occupational Health and Safety, and identify potential benefits to OHS practitioners.

4. Identify potential barriers to the application of action research to OHS.

5. Apply the concepts and principles of action research to a 'real world' OHS problem / improvement opportunity, and document the research process, outcomes, and learnings using a case study format.

6. Evaluate claims made within the literature through a critical review of two historical case studies describing the application of action research in the OHS field within Australia.

7. Make recommendations relating to the future use of action research methodology within the field of Occupational Health and Safety.

3. Methodology

As indicated by its title, this paper is an exploratory study into the potential application of action research within the field of OHS in Australia. The study has been accomplished through the completion of an extensive literature review, and through the description and simple analysis of two Australian OHS action research case studies. The first step of the literature review was to determine the current status of action research application within the field of OHS in Australia, and, to a lesser extent, overseas.

The following table details the formal literature search process (utilising the resources of the University of Ballarat's E.J. Barker Library). The search was undertaken in January and October 1999 to identify the available literature relating to the application of action research within the field of OHS in Australia. The column category '# Useful' describes the number of records found specifically relating to OHS action research in Australia. A number of search words not specifically related to OHS were also used to additionally provide a very coarse indication of action research utilisation across all fields and disciplines within Australia, and across the areas of 'health', 'education', and 'workplace' on an global basis.

Table 1
Details of Literature Search Conducted 12/10/99

Database Searched	Search Words Used	# Records	# Useful
a) OHS ROM ... • HSELINE • NIOSHTIC • CISDOC • MH IDAS • RILOHS Index • SERLINE • MEDLINE	1. Action research & OHS 2. Action research & OH&S 3. Action research & Health & Safety 4. Action research & Safety 5. Action research & Australia 6. Action research & Health 7. Action research & Workplace	1. 0 2. 0 3. 22 4. 32 5. 5 6. 83 7. 21	1. ---- 2. ---- 3. ---- 4. ---- 5. 1 6. ---- 7. ----
b) OHS ROM ... • CINAHL • Psyclit • Austrom: ⇒ Family ⇒ Education	1. Action research & OHS 2. Action research & OH&S 3. Action research & Health & Safety 4. Action research & Safety 5. Action research & Australia 6. Action research & Health 7. Action research & Workplace 8. Action research & Education	1. 0 2. 0 3. 23 4. 28 5. 275 6. 685 7. 45 8. 1227	1. ---- 2. ---- 3. ---- 4. ---- 5. ---- 6. ---- 7. ---- 8. ----

Database Searched	Search Words Used	# Records	# Useful
c) OHS ROM ... • BAOD: IREL • BAOD: WORKLIT • BAOD: AIMMAT • Applied Sci & Technol Abst • Biological & Agric Index	1. Action research & OHS 2. Action research & OH&S 3. Action research & Health & Safety 4. Action research & Safety 5. Action research & Australia 6. Action research & Health 7. Action research & Workplace 8. Action research & Education	1. 0 2. 0 3. 1 4. 4 5. 10 6. 1 7. 2 8	1. ---- 2. ---- 3. ---- 4. ---- 5. ---- 6. ---- 7. ---- 8. ----
d) Online Databases ... • Business Source Elite • Academic Search Elite • Eric • World Magazine Bank	1. Action research & OHS 2. Action research & OH&S 3. Action research & Health & Safety 4. Action research & Safety 5. Action research & Australia 6. Action research & Health 7. Action research & Workplace 8. Action research	1. 0 2. 0 3. 5 4. 6 5. 109 6. 88 7. 31 8 2730	1. ---- 2. ---- ---- 3. ---- 4. ---- 5. 2 6. ---- 7. ---- 8. ----
e) First Search ... • Sociological Abstracts	1. Action research & Health & Safety	1. 3	1. ----
f) First Search ... • Worldcat	1. Action research & Health & Safety	1. 21	1. ----
g) First Search ... • WiBus Abstracts	1. Action research & Health & Safety	1. 20	1. ----
h) First Search ... • SIRS Researcher	1. Action research & Health & Safety	1. 0	1. ----
Total number of records found specifically relating to Australian OHS action research:			= 3

(Note: Refer Appendix A for an example of the search process documentation)

The following observations can be made from the search results ...

- The number of records found specifically relating to OHS action research in Australia was extremely low. Only three useful records were identified through the formal search process.

- The number of international records specifically relating to OHS action research was proportionally low. In the first four search word groups used, the results (already quite low) were significantly

exaggerated within each specific search word group, as well as across the four search word groups and the different database groups. This was due to the same documents appearing several times within a specific search word group as a result of searching multiple databases at the same time, the same documents turning up in different search word groups, and the same documents being listed within a number of database search groups.

- Action research has been significantly utilised within Australia in other fields and disciplines (note the 275 records found when searching against 'action research and Australia' within Table 1 above).

- Action research methodology has a considerable history of utilisation globally, and across a number of disciplines and fields.

- The literature search indicates that education, health, and to a lesser extent, the workplace, are all fields of significant historical application of action research methodology internationally. A search word group such as 'action research and organisation' is likely to have increased the number of records identified associated with 'workplace', based on the author's actual review of the literature.

Having established through the formal literature search process that there is very little evidence within the literature of the application of action research to OHS in Australia (or internationally for that matter), relevant information on action research and on OHS (as separate entities) were sourced from the results of the formal literature search, the University of Ballarat's E.J. Barker Library, from the VIOSH Australia information room within the University of Ballarat, the library of the author's workplace, and the author's personal library. The author's utilisation of this information and material has been the foundation of this paper - a paper which, given the evident paucity of OHS action research within Australia, and the OHS community's commitment to positivist research methodology and OHS 'science' (Dell, 1999; Viner, 1991; VIOSH, 1995), must look to break new ground in what may potentially be hostile territory. One of the features of methodology applied throughout this thesis to facilitate this 'breaking of new ground', is the liberal use of direct quotation. This strategy has been applied for the following reasons ...

- The thesis argues for an alternative to a positivist view of science that is very ingrained and powerfully supported - a condition which is true within the existing OHS community, as well as our society in general (Carr, 1995, p. 105). The thesis is structured to 'make a place' for action research within OHS through initially revealing to those who have been socialised into the positivist view of science, that the orthodox scientific method is not the best research method for every situation, and that it is, in fact, seriously flawed and inadequate for specific applications. The author has judged that his

own voice and expertise is not up to this challenging task on its own, and that through using the voices of significant others (e.g. the voices of the well respected Stephen Kemmis, Wilfred Carr, and Peter Reason), the door potentially held shut by a positivist mindset, might be pried sufficiently open for the seed of co-operative inquiry and action research to be planted.

- The author believes in action research, and believes it has something significant to offer OHS and its practitioners. He has, however, approached this study from an initial position of limited knowledge about action research, and limited experience in its application. This Masters thesis is truly an 'exploratory study', and in some respects the author shares with the reader a journey of discovery. While not an authoritative expert on action research, the author has looked to place before his peers a comprehensive overview of action research from the literature, and to let the 'experts' speak, where appropriate - hence the liberal use of direct quotations within the thesis.

From the viewpoint of positivist science, the discussion within the two bullet points above may possibly be considered inappropriate, subjective, or even damaging to the credibility and objectivity of the case argued. For the new scientific paradigm of 'co-operative human inquiry', however, the concept of 'critical subjectivity' (which incorporates the acknowledgment of 'the ground one is standing on') is a foundation principle ...

> *"This leads us to the second major change: the shift from an objective consciousness to a quality of awareness I have called critical subjectivity ... As I have argued before, the process of inquiry can be seen as starting in a naive inquiry based on our primitive subjective experience of the world. This kind of knowing, like the knowing of a small child, is very prone to distortions arising from our biases and prejudices, from anxieties, and from the pressure of the social world. But it also has a lot of good qualities because it is alive, involved, committed, it is a very important part of our humanity, and we lose a lot if we throw it out altogether ... Critical subjectivity is a quality of awareness in which we do not suppress our primary subjective experience; nor do we allow ourselves to be overwhelmed and swept along by it; rather we raise it to consciousness and use it as part of the inquiry process."*

Peter Reason (1988, p. 11)

In practice, every report, every paper, and every journal article documenting an action research project should apply the principle of critical subjectivity, and in fact much of the action research literature reviewed for this thesis begins with an explanation of the author's background and the factors which potentially impact the way he or she sees the world (Lomax, 1996; Carr, 1995; Hart & Bond, 1995; Reason, 1993). This is an important point for the reader to bear in mind when working through the two case studies towards the end of the paper. The auto-biographical and background information provided by the researcher contributes to the reader's capacity to critically evaluate the research.

The case study method, an approach designed to investigate a "phenomenon within its real-life context" (Yin, 1994, p. 13), and which uses narrative to document and communicate the investigation process, analysis, and outcomes in written form (Yin, 1994, p. 135), is one of the key models action researchers use to tell the 'story' of the action research project. There are numerous action research publications which contain quite a varied range of action research case study styles (Lomax, 1996; Whyte, 1991; de Koning & Martin, 1996; Hart & Bond, 1995; Kember & Kelly, 1993). The case study style used to describe / document the two case studies utilised for the purposes of this paper, is based on a combination of action research case study styles used by Loftus (cited in Lomax, 1996, pp. 83-95), and Kember and Kelly (1993).

The two Australian OHS action research case studies reviewed represent a variety of action research applications in different environments and contexts, and thus provide a window into the flexibility and dynamism of this methodology. The first case study reviewed (Popplewell, 1993), is reproduced in abbreviated / précis / paraphrased form, with only material relevant to this paper (as determined by the author) being incorporated within the case study description. The reader is referred to the full case study for additional information.

The second action research case study is the summary record of the author's own first application of action research principles and methodology. Ethical issues associated with this case study, and the sensitivity of subject, have made it necessary for the researcher to maintain the anonymity of the organisation and co-researchers (Streubert and Carpenter, 1999, p. 262), and to restrict access to supporting documentation. A comprehensive, numbered list of supporting documentation is held by the organisation involved, and questions relating to this documentation specifically, and the case study generally, may be directed to the author.

The case studies are individually critiqued and analysed in relation to the following questions (utilising theory documented in the body of the thesis), and the of results of this critique / analysis are discussed ...

- Does the case study meet the 'working definition of action research' produced by the participants at the International Symposium on Action Research held in Brisbane in March 1989 (Zuber-Skerritt, 1992, p. 14)?

- How does the case study match Hart and Bond's (1995, pp. 40-43) action research typology and associated elements?

- Is the style and form of the case study appropriate for an action research project (Winter, cited in Zuber-Skerrit, 1996, pp. 25-26), and is the principle of critical subjectivity addressed within the report (Reason, 1993, pp. 1262-1263)?

- Have appropriate validity processes and procedures been utilised to a level which enables context specific, meaningful conclusions to be

drawn with a reasonable level of confidence and accuracy (Streubert and Carpenter 1999, p. 261)?

- Were ethical issues adequately addressed (Streubert and Carpenter, 1999, p. 262)?

- What predicted barriers, problems, and improvement opportunities were identified / experienced?

- Were the potential OHS benefits predicted by the author, on the basis of the general action research theory content of the thesis, realised within the case study?

  ⇒ Actual and sustainable OHS improvement at coal face?
  ⇒ Valid practitioner OHS research useful to peers?
  ⇒ Effective consultation / teamwork strategy?
  ⇒ Professional development of the OHS practitioner, and the facilitation of an appropriate and effective OHS practitioner role?
  ⇒ Innovative OHS solutions produced?
  ⇒ Reconstruction of co-researcher reality, the internalisation of OHS principles and knowledge, and the associated empowerment of co-researchers?
  ⇒ Learnings identified to improve future application of the action research process?

The case study review is subject to significant limitations. While action research has been well tested over time as a methodology within other (arguably related) disciplines and fields (refer Section 6 below), the two case studies reviewed within this thesis represent but recent and initial attempts to seriously apply action research methodology to OHS problems in Australia. Using the analogy that 'one needs to crawl before walking, and walk before running', the status of action research within OHS in Australia (on the basis of the literature search results discussed above) is somewhat akin to an emerging awareness that others may be doing it and finding it useful, it might be something worth trying, and a few 'first attempts' at applying it ourselves - without the benefit of a comprehensive grounding in either the general theory and practice of action research methodology, or a specific action research epistemology developed for use within the field of OHS. There has been no systematic application of action research to OHS theory and practice in Australia. These first few case studies, while they may not provide the fully definitive answers to questions concerning the applicability of action research to OHS, do, however, provide the reader with an opportunity to do some initial exploring, reflection, and evaluation of their own - and to determine if action research, as argued within this thesis, has offered and demonstrated enough potential value for their OHS practice, that it is worth them beginning their own journey of discovery (and application).

4. The Origins of Action Research

I am a bigot in epistemology. To me, the chance of surviving with dignity on this planet hinges on the acquisition of a new mind. This new mind must be wrought, among other things, from a different epistemology which will inform relevant actions. Thus, over and above their intrinsic beauty, these epistemological meanderings are vital. Literally.

F.J. Varela (cited in Reason, 1993, p. 1258)

"What a reflexive action-research would offer ... is not 'theory' ... It would propose, rather, to subject the theories of common-sense and of professional expertise to a critical analysis of their located-ness within the practice whose intelligibility they serve. Action research thus proposes to move 'beyond' theories ... which prescribe and justify an interpretive basis for action towards a reflexive awareness of the dialetic which can sustain their mutuality while transforming both."

Richard Winter (cited in Carr, 1995, p. 103)

"... if British action research is to avoid the fate of its American predecessor then it has to concede that the present condition of educational action research will be misunderstood if we look for explanations of this condition only in action research's own internal history."

Wilfred Carr (1995, p. 107)

Action Research was (and still is being) born from the tension between theory and practice, and action and research (Hart & Bond, 1995, p. 21) - and from a growing dissatisfaction with the predominant scientific world-view based on the mechanical, reductionist, and material cause-and-effect fundamentals of positivism (Reason, 1988, p. 10). For Carr (1995, p.104), it is the tension between theory and practice that also actually spawned the positivist movement in the late 19th century, when the radicals of the day "were driven by a desire to liberate ordinary practical thought and action from the dogmatically imposed theories of 'authoritative experts'". They believed, with Bacon, that putting "Nature herself on the wrack and wrest[ing] her secrets from her" (cited in Reason, 1988, p. 11) would subject "authoritative forms of 'academic' theorizing" (e.g. scientific mysticism) to the realities of the real world (Carr, 1995, p. 106).

Positivism, which is the foundation of the orthodox scientific method, is defined as "the theory ... that every rationally justifiable assertion can be scientifically verified or is capable of logical or mathematical proof" (*The Australian Reference Dictionary*, 1991, p. 614). It purports that the orthodox scientific method, with its focus on objectivity, experimentation and induction, is the only basis for (and source of) valid knowledge - natural and social (Parker, 1997, p. 9). Positivism promised (and still promises), through the agency of neutral, objective observation and experiment, to deliver/reveal fact-based natural laws and universally applicable generalisations for the improvement of practice. As such, it is a method which separates the researcher from what is researched, and strives to sanitise/eliminate any influence of context (individual or environmental) in the search for indisputable truths. The

idea of knowledge revealed or produced outside of the systematic processes of the orthodox scientific method, through such means as everyday experience, democrative dialogue, or philosophical reflection/critique, is relegated to the ignoble position of fanciful dithering without validity (i.e. of no practical use) (Carr, 1995, p. 105; Carr & Kemmis 1986; Parker, 1997; Reason 1988). Values, beliefs, and moral concerns are also subjugated to 'quantification' through the application of the orthodox scientific method. Expertise becomes the skilled production or knowledge of facts, and associated 'universal' theories and generalisations. Experts are those who "grasp [and are in a position to grasp] ... a certain set of law-like generalizations with which to inform and justify his or her decisions" (Parker, 1997, pp. 10&17).

> *"The positive mind no longer asks why, ceases to speculate on the hidden nature of things. It asks how phenomena arise and what course they take, it collects facts and is ready to submit to facts, it subjects thinking to the continuous control of 'objective facts'."*

L. Kolakowski (cited in Carr, 1995, p. 100)

The application of this positivistic theory has subsequently brought tremendous benefits through technological and scientific development, and continues to do so. These benefits have, however, come at a cost. "Ecological devastations, human and social fragmentation, [and] spiritual impoverishment" are some of its negative outcomes according to Skolimowski (cited in Reason, 1988, p. 10). Without digging too deeply (or taking into account more subtle, insidious impacts), one can identify several serious, negative outcomes or problem-solving failures associated with positivist theory becoming the dominant scientific world-view (e.g. nuclear armament, severe environmental damage, the trivialisation of the arts, unemployment, the breakdown of the family, social and civil unrest, drug use, homelessness and poverty, etc.).

It is Wilfred Carr's assessment (together with a growing number of others) that positivism has failed on its initial promise to "liberate ordinary practical thought and action from the dogmatically imposed theories of 'authoritative experts'" - rather it has itself become an overbearing taskmaster of intellectual freedom and an effective restraint of (and impediment to) practical improvement at many levels (Carr, 1995, pp. 104&107, Carr & Kemmis, 1986). Over the last century, Carr believes that Positivism has been transformed from radical beginnings, in which critical examination and cultural subversion were key themes, to an orthodox methodology which has so permeated our world that it is generally uncritically accepted and overwhelming supported by the society we live in (Carr, 1995, p. 105).

'Paradigm' is defined by the *Collins English Dictionary and Thesaurus* (1993, p. 824) as "a pattern or model ... (in the philosophy of science) a general conception of the nature of scientific endeavour within which a given enquiry is undertaken". There is increasing evidence that the wheel is turning full circle, and that the once bright "new paradigm" of positivist scientific thought, which has even now aspired to replace the role of religion and custom within society (Parker, 1997, p. 10), is suffering symptoms very similar to those of its predecessor. There is a growing groundswell of criticism and discontent with

positivist theory and the dogmatic application of the orthodox scientific method (Carr & Kemmis, 1986), and a "new world-view ... is emerging through systems thinking, ecological concerns and awareness, feminism, education, as well as in the philosophy of human inquiry" (Reason, 1988, p. 3).

While it is not the intention of this paper to provided a detailed critique of positivism (the reader is referred to a selected list of some twenty critiques of positivism in Reason, 1988, p. 3), it is worthwhile identifying some of the key criticisms relating to human inquiry.

> *"Positivist science has made a shibboleth of 'truth' - as if it stood above social life, could be objectively ascertained, and could prescribe wise practice without understanding the human, social, economic, political, historical and practical constraints within which real practice occurs."*

Carr and Kemmis (1986, p. 145)

One of the key areas of criticism relates to the application of positivist principles and the scientific method to areas outside of the natural/physical sciences - to 'human phenomena' and the social sciences (Carr & Kemmis, 1986, p. 63). As the quote from Carr and Kemmis above implies, claims that the orthodox scientific method is "universally applicable to both natural and human phenomena" are significantly presumptuous. By aspiring to be unrelentingly objective, across both the natural and social sciences, the application of orthodox scientific method in the area of social science loses the richness of inquiry and the relationship to its source of data (the subjects of the research) required to enable it to inform its source with something of practical value. Instead "we are left with dead [neutered] knowledge, alienated from its source" (Reason, 1988, p. 12) - with limited capacity to produce genuine change (in the 'real world' context), yet meticulously focused on ensuring the facade of process 'integrity' and 'true objectivity' is maintained (as if this was somehow the undeniable goal). It is no wonder that practitioners (as distinct from researchers), from virtually all social science disciplines, decry the usefulness of research generated in this way - reflecting its limited influence on or relevance for their 'real world' practice (Carr, 1995, p. 101; Carr & Kemmis, 1986, p. 54; Robson, 1993, p. 433; Small, 1995, p. 952; Streubert &Carpenter, 1999, p 251). This lack of research impact on practice has been the conclusion of numerous studies as cited by Colin Robson (1993, p. 433), and include Barlow et al (1984), Cohen (1976; 1979), Stenhouse (1978; 1979), Nisbet and Broadfoot (1980), Argyris (1970), and Argyris and Schon (1974). Also contributing to the lack of impact by positivist research on practice is the linear, fragmentary approach required by the orthodox scientific method "because its relatively underdeveloped state leads to fragmentary and contradictory conclusions" (Nesbit & Broadfoot, cited in Robson, 1993, p. 433). Parker (1997, p. 38) argues that "detached, scientific and technical purity, symptomatic of the fear of contamination, is the principle reason why traditional research has proved to be an inadequate springboard for change".

A further criticism of the positivist approach is its very narrow definition of knowledge (i.e. an understanding of knowledge as the intellectual

and technical product of the orthodox scientific method - nothing more). Heron (cited in Reason, 1993, p. 1259) defines four types of knowledge ...

- the knowledge about something,
- knowledge of how to do something,
- knowledge expressed and gleaned from stories and images, and
- knowledge produced in and through encounter (e.g. experience).

He has labeled these "different kinds of knowing" as propositional, practical, presentational, and experiential knowledge. Carr and Kemmis (1986, p. 41) also describe different types of knowledge. For them, (with respect to the knowledge possessed by teachers in the context of exploring their professional development through critical reflection) ...

- commonsense knowledge,
- folk wisdom,
- skill-knowledge,
- contextual knowledge,
- professional knowledge,
- educational theory, and
- "social and moral theories, and general philosophical outlooks"

... make up the 'suite' representing a range of knowledge types more or less useful for critical reflection. Positivist research does not recognise the authenticity of these different 'kinds of knowing' or modes of reasoning. Habermas, informed by the work of Aristotle (cited in Carr & Kemmis, 1986, pp. 134-139), also identified three such modes - defining them using the categories of 'interest', 'knowledge', 'medium' and 'science' (see Figure 1 below).

Figure 1
Habermas' three-tiered model of 'interests', 'knowledge', 'media' and 'science'

Interest	Knowledge	Medium	Science
1. Technical	Instrumental (causal explanation)	Work	Empirical-analytic or natural sciences
2. Practical	Practical (understanding)	Language	Hermeneutic or 'interpretive' sciences
3. Emancipatory	Emancipatory (reflection)	Power	Critical sciences

(Carr & Kemmis, 1986, p. 136)

Only one of these modes is recognised by positivist thinking - the technical form of reasoning employed by "empirical-analytic science" (Kemmis cited in Carr, 1995, p. 12). Practical and (more particularly) the

critical/emancipatory modes of reasoning and 'ways of knowing' are not a part of the positivist framework. The 'knowing' associated with empirical-analytic science presents only one piece of the knowledge puzzle, and therefore is "fragmented knowing, or theoretical knowing that is separated from practice and from experience" (Reason, 1988, p. 11).

In some respects, this concept of multiple types of 'knowing' is closely related to Gardner's (1993) concept and appreciation of multiple intelligences. Gardner submits that different people possess different types of intelligence or 'frames of mind', and that each intelligence type has something distinctive and of unique value to contribute for the benefit of our world. If this is the case, recognising, relying on, valuing, or attempting to quantify intelligence through the measurement of just one intelligence type is imprudent and short sighted. Reason (1988, p. 11) uses Brody's example of the decision-making processes of an Inuit hunter to illustrate a type of 'thinking-in-action' intelligence - an intelligence which is incomprehensible to the Western world's very narrow understanding of what constitutes intelligence.

> *'Hunters make thousands of critical decisions each year. The processing of this information leads into the domain of spirituality and metaphor, where accumulated knowledge, intuition and the subtlest of connections with the natural world can generate choices on a basis that is quicker and surer than a narrow rationality. In this way, the decisions of hunters are close to the certainties of artists. By denying a reduction to a limited set of variables, the fullness of both culture and consciousness come to bear on each day's activities. The mobile and flexible behaviour of hunters is inseparable from this state of consciousness, this form of decision making."*

H. Brody (cited in Reason, 1986, p. 11)

If we rely on one researcher to design an investigation, and to collect and interpret data on phenomena (as tends to be the case in positivistic research) - then we are relying on the capacity of only one intelligence. To understand the richness of any phenomena, multiple intelligences are needed to research it - and to research it in a way that allows these different intelligences to operate and contribute. Researcher intelligence within a positivist framework is further likely to be significantly subverted and constrained by the application of the orthodox scientific method, through the required separation of researcher from what is researched. For Skolimowski (cited in Reason, 1988, p. 12), this is the outcome of the disciplined exercising of the 'yoga of objectivity' over a substantive period of time ...

> *"The yoga of objectivity consists of a set of exercises specific to the scientific mind. These exercises are practiced over a number of years, sometimes as many as fifteen ... The purpose of these exercises is to see nature and reality in a selective way. It takes many years of stringent training ... before the mind becomes detached, objective, analytical, clinical, 'pure'."*

Orthodox science, according to Maxwell (cited in Reason, 1988, p. 3), operates within a 'philosophy of knowledge' which is "primarily concerned with intellectual problems of knowledge and technology". The knowledge that Maxwell refers to here is 'factual' knowledge - knowledge that stems from the

empirical-analytic or natural sciences as for the first tier of Habermas' model (see above). Technology is defined by the *Collins English Dictionary and Thesaurus* (1993, p. 1190) as "the application of practical or mechanical sciences to industry or commerce ... [the] methods, theory, and practices governing such application ... the total knowledge and skills available to human society". Orthodox science is concerned with empirical, technical knowledge for the purposes of technological problem solving - knowledge and skills available for driving technological progress, not with knowledge and skills applied primarily for the benefit of creation (and in particular its people). For Maxwell, the primary concern of orthodox science is actually a stones throw from the main issues concerning humanity. In contrast, the aim of human inquiry, which according to Maxwell is based on a 'philosophy of wisdom' (rather than the 'philosophy of knowledge' of orthodox science), is substantially and markedly different ...

> *"The basic (humanitarian) aim of inquiry, let it be remembered, is to help promote human welfare, help people realize what is of value to them in life ... But in order to realize what is of value to us in life, the primary problems we need to solve are problems of action - personal and social problems of action as encountered in life."*

N. Maxwell (cited in Reason, 1988, p. 3)

Orthodox science's primary concern for empirical, technical knowledge corresponds with the modern definition of rationality, which stems from positivist principles and culture. This 'modern' "rationality is construed entirely as a process of divining the most efficient means of achieving some pre-established result or end" (Parker, 1997, p. 9), particularly in relation to 'fact-based', technical knowledge (hence the term 'technical-rationalist'). This type of rationality, however, does not involve itself with assessing the value or the appropriateness of the "ends" (in terms of human welfare), nor does it concern itself with assessing and moderating the 'means' in terms of 'moral rightness' (Parker, 1997, pp. 11&17). True to positivist principles, this rationality strives to remain objectively focused on facts. Values, beliefs, morality, and human rights and dignity just don't come into consideration, unless they have been scientifically quantified and validated. To introduce these things into the 'equation', without scientific quantification, is to behave irrationally. Termed as 'technical-rationalism', its "restrictive potency ... is manifested through its insistence that all social, moral, and educational questions are technical questions which require answer by technical means" (Parker, 1997, p. 43). From the viewpoint of Carr and Kemmis (1986, p. 133), this rationality is "exhaustively defined in terms of a conformity to the rules of scientific thinking, and, as such, [is] deprived of all creative, critical and evaluative powers". Critical thinking and creativity are not a part of the technical-rationalism package.

The worth of people operating in a particular technical-rationalistic framework, is measured quantitatively on the basis of their capacity to contribute to the 'efficiency' of meeting a defined 'end'. People within this framework have no intrinsic value, nor are they valued for their capacity to influence or develop new 'ends', or to influence or map out new 'means' -

except in terms of improving efficiency based on the outcomes of 'valid' orthodox scientific research. Their own personal interests, needs, desires, aspirations and responsibilities outside the technical-rationalist framework are of no consequence, except as factors to be manipulated to improve efficiency (MacIntyre, cited in Parker, 1997, p. 17). This has the effect of defining what is rational as "whatever stands the best chance of effectively achieving predetermined ends as efficiently as possible" (Parker, 1997, p. 17). Unfortunately, rationally efficient 'means' do not always serve the interests of all (or even the majority) of the people (Reason, 1988, p. 4).

For Heron (Reason, 1988, p. 4), the intentional and systematic separation of human subjects from research (i.e. the deliberate exclusion of subjects inputting into 'what' is researched, how it is researched, and the analysis / understanding of research outcomes) is the basis of another key objection to positivism. He argues that this separation of the subject and the researcher effectively strips from people that which distinguishes them from the rest of creation - the 'right' of self determination, "and the capacity to give meaning to their experience and to their actions" (Reason, 1988, p. 4). To separate the subject and the researcher is to significantly limit the power and richness of the actual research in the search for 'true' objectivity, and to contribute "to the impoverishment of our world, and to the quite frightening consequences of the mechanical world view, which in the end treats all living beings as things to be manipulated and exploited" (Reason, 1988, p. 4) - true to its technical-rationalistic character (and positivist foundations).

> *"The positivist idea that science is concerned with a quest for certainty and truth [is repudiated] ... [rather] it is only by acknowledging the impossibility of absolute knowledge and the fallibility of all beliefs that genuine scientific progress is possible".*

> Carr & Kemmis (1986, p. 121)

Carr and Kemmis (1986, p. 121) contend that "scientific 'objectivity' is not something that can be secured by mechanically applying some logical proof or by appealing to a realm of uninterpreted, neutral 'facts'". While going to great lengths to demonstrate the unquestioning impeccability of the orthodox scientific method at a micro level, the bigger picture influences on the research (e.g. what is researched, who's behind it, the value of the research, what's in it for the researcher, the researcher's background and preconceptions, why some things are not researched, the decisions about research method, the 'hidden' factors impacting the interpretation of data and the development of conclusions, etc.) are generally strangely silent (Carr & Kemmis, 1986, p. 10).

> *"Observations are always made in the light of the concepts and theories impregnated in the paradigm which they presuppose."*

> *"Knowledge is not, as positivism suggests, the objective, universal and value-neutral product of the 'disinterested' researcher. Rather, it is subjective, context bound, normative, and in an important sense, always political."*

> Carr and Kemmis on Thomas Kuhn (1986, p. 73)

One of the implications Carr and Kemmis see from the 'unspoken' subjectivity of observations emanating from the application of the orthodox scientific method, is the potential for these observations to artificially underpin the theoretical stance of the researcher - insulating it from critical evaluation, reinforcing the theoretical 'status quo', and thus stifling the production of the innovative and creative theory that could potentially be developed from the same observations, if the subjective influences on the 'facts' were identified and openly acknowledged.

The fact that research does not take place in a vacuum, but within the context and the expectations of the 'community of researchers', also has an impact on the objectivity of research. This community, through the exercise of its value and belief system and associated socialisation mechanisms, has influence on determining what is worth researching, which research method is appropriate, what variables are measured, and how variables are measured - subsequently influencing the theories that are produced (Heron, 1996, pp. 30-32). Socialisation is defined by Brim (cited in Clausen, 1968, p. 186) as "the process by which one learns to perform his [or her] various roles adequately". He goes on to define one of socialisations key elements ...

"In each instance of socialisation, a key element is the role prescription or expectation that someone else has for the person in question, which involves a change in, or addition to, that person's beliefs, attitudes, or behavior, or motives or values, with reference to some social situation."

Brim (cited in Clausen, 1968, p. 186)

As Carr and Kemmis (1986, p. 74) put it, "theories are [thus] always 'infected' by the beliefs and values of the research community and are, therefore, always social products". John Heron (1996, pp. 32-33), also acknowledges the strength of socialisation processes within the research community, further describing its impact on establishing positivist 'knowledge' as the only credible research outcome ...

"As well as universities sustaining a model of authoritarian intellectual control of students in education and subjects in research, they also sustain a strong Aristotelian bias in favour of propositional knowledge, that is, intellectual statements, both verbal and numeric, conceptually organised in ways that do not infringe the rules of logic and evidence. Propositional knowledge is regarded as pre-eminent and self-sufficient. It rules over other kinds of knowledge ... This bias has a huge influence on both the quantitative and qualitative research ... [and] rests on the unquestioned assumption that intellectual knowledge is the only valid and respectable outcome of systematic inquiry."

Another 'social' impact on orthodox scientific research is the influence of the societal structure in which research takes place. Given that research does not take place in a vacuum, but within the community of researchers, as well as the wider community within which the research takes place, there are significant political pressures and power struggles influencing the research (Carr & Kemmis, 1986, p. 122; Tandon cited in De Koning & Martin, 1996, p. 25). While according to John Heron (1996, p. 17), "the all-pervasive right of

persons to participate in any decision-making that effects the fulfillment of their needs and interests, the expression of their preferences and values ... is on an unidentified march throughout the world", generally (across the board) it is still those in privileged positions, in positions of power, authority, and those who have the 'means' that are able to substantially influence the research process - particularly in terms of what gets researched, but also in terms of the purpose and the practical outcomes of the research, thus disadvantaging those at the other end of the power and privilege scale (Small, 1995, p. 943; Parker, 1997, pp. 42-43).

Finally, many critics of the modern scientific world-view purport that positivism has become an ideology in itself, a religion (Carr & Kemmis, 1986, p. 132). The *Australian Reference Dictionary* (1991, p. 658) defines 'religion' as "belief in a superhuman controlling power ... a particular system of faith ... a thing that one is devoted to". Stephen Kemmis, in his prologue to Wilfred Carr's (1995, p.4) book, argues that " the preference for the view of human and social life as mechanical, as capable of being stripped of surface confusion and perplexity, is a product of a profound nineteenth-century faith in the power and possibilities of a certain kind of science". As with most ideologies and religions, positivism has developed and implemented an intricate set of induction and socialisation processes to ensure its ongoing and unchallengeable perpetuation and dominance.

> *"Although the theoretical frameworks incorporated in any paradigm may be acquired through a systematic introduction to its concepts, methodology and techniques of research, this does not alter the fact that paradigms are prescribed and settled ways of thinking that are transmitted across generations of researchers by a process of initiation."*

<div align="right">Carr & Kemmis (1986, p. 74)</div>

That Positivism's induction and socialisation processes have been most effective is well evidenced (Carr, 1995, p. 105; Parker, 1997, p. 15), and it is in these (generally tradition generating) processes that positivism, technical-rationalism, or the orthodox scientific world-view (whatever the term or label) show their face as ideology, as religion (Carr & Kemmis, 1986, p. 75). Kuhn (Carr & Kemmis, 1986, p. 73) describes the process of accepting a new scientific paradigm as one of 'conversion'. The socialisation processes acting for the perpetuation of positivism's orthodox scientific world-view result in just that - conversion to the one true way, the religion of technical-rationalism.

While the positivist scientific view was a vast improvement on its predecessor (Kemmis in Carr, 1995, p. 3), and has added (and will continue to add) enormous value (particularly in the resolution of technological problems and the production of empirical, technical knowledge), it is the idea of 'the changing, evolving paradigms of science' that is helpful in understanding the positivist view of science as but one form of science within science's long history. This is in contrast to the belief that positivism is 'the' form of science to be perpetuated, revered, and 'protected' for all time (Carr & Kemmis, 1986, p. 71). Kuhn (cited in Carr & Kemmis, 1986, pp. 71-75) and Skolimowski (cited in Reason, 1988, p. 10) both have developed similar comprehensions of this 'history' ...

"Skolimowski (1985) sees the history of knowledge in terms of a series of world-views or cosmologies, each of which has held sway for a while, to be replaced by one more adequate for its time."

Reason (1988, p. 10)

"A more realistic way of interpreting the development of scientific knowledge, he [Kuhn] argues, is by seeing it as a succession of 'revolutions' in which the dominant 'paradigms' are over-thrown and replaced."

Carr and Kemmis (1986, p. 71)

There is increasing evidence that it is time for a new scientific paradigm (see discussion above). There is significant evidence that this new paradigm already has its foot through the door, and that "the basic philosophical stance for a new approach to human inquiry has been established" (Reason, 1986, p. 3). The new paradigm of human inquiry is about "honour[ing] the generative, creative role of the human mind in all forms of knowing" (Heron, 1996, p. 13). It's about (among other things) a move to participatory and holistic knowing rather than the "piecemeal, atomistic, fragmentary, and fragmenting" pursuit of knowledge under the positivist paradigm (Skolimowski cited in Reason, 1988, p. 10). It's a move to critical subjectivity rather than 'impaired' objectivity, to knowledge in and for action, rather than "dead [neutered] knowledge, alienated from its source" (Reason, 1988, p. 12) - with limited potential for genuine change in a 'real world' context (Carr, 1995, p. 101; Carr & Kemmis, 1986, p. 54; Robson, 1993, p. 433; Small, 1995, p. 952; Streubert &Carpenter, 1999, p 251).

This new paradigm has been termed 'co-operative inquiry', or alternatively, 'new paradigm research' or 'action-orientated research'. It currently manifests itself in many forms. Small (1995, p. 942) identifies four forms of action-orientated research: action research, participatory research, empowerment research, and feminist research. Stringer's list (1996, p. xvi) includes community-based action research, practitioner research, action inquiry, action science, and community development. Other related manifestations of cooperative inquiry include co-operative experiental inquiry, experiental learning, and 'the learning organisation' (Bawden, 1989, pp. 33-43). Action research, which itself has many forms, is the manifestation of co-operative inquiry which is the focus of this paper.

5. Action Research - Definition and Features

Carr and Kemmis (1986, pp. 165-166) have provided the following definition of action research ...

> *"It can be argued that three conditions are individually necessary and jointly sufficient for action research to be said to exist: firstly, a project takes as its subject-matter a social practice, regarding it as a form of strategic action susceptible of improvement; secondly, the project proceeds through a spiral of cycles of planning, acting, observing and reflecting, with each of these activities being systematically and self-critically implemented and interrelated; thirdly, the project involves those responsible for the practice in each of the moments of activity, widening participation in the project gradually to include others affected by the practice, and maintaining collaborative control of the process."*

Important features of this definition include ...

- a social practice in need of improvement;

- a spiraling research methodology consisting of cycles of planning, acting, observing and reflecting;

- systematic and self-critical implementation of each research phase;

- involvement of practitioners through each stage of the research process;

- collaborative control of the research process.

Hart and Bond's (1995, p. 37) definition contains additional action research features (over and above those identified / detailed by Carr and Kemmis - though perhaps to some degree inherent in their definition), including ...

- the educative and empowering aspect of action research;

- its focus on problem-solving within a specific context (rather than a focus on problem description for the production of 'general knowledge');

- a clearer recognition of 'change intervention' to bring improvement as a critical component of action research;

- the interlinking, evolving relationship between the cycles of research, action and evaluation within the action research process.

They have developed a list of seven criteria which helps define 'action research', and looks to distinguish action research from other research methodologies (see Box 1 below).

<p align="center">**Box 1**</p>
<p align="center">**Hart and Bond's seven distinguishing criteria of action research**</p>

Action research:

1. is educative;

2. deals with individuals as members of social groups;

3. is problem-focused, context specific and future orientated;

4. involves a change intervention;

5. aims at improvement and involvement;

6. involves a cyclic process in which research, action and evaluation are interlinked;

7. is founded on a research relationship in which those involved are participants in the change process.

Source: Hart and Bond (1995, p. 37)

5.1. The Spiraling Cycles of Action Research

The action research spirals of cycles of planning, acting, observing and reflecting are perhaps best illustrated pictorially (see Figure 2 below). While action researchers and action research models differ around whether the research cycle is started with a reflection phase or a planning phase (Streubert & Carpenter, 1999, p. 256), cycles of planning, acting, observing and reflecting are common to action researchers and research models.

This does not mean, however, that the stages in the cycle are mechanically applied or are necessarily distinct phases. The stages in the action research cycle, rather, describe the basic process, and are used as guides. In reality, action research projects "often do not fit neatly into a cycle of planning, action, observation and reflection ... it is perfectly legitimate to follow a somewhat disjointed process if circumstances dictate ... planning is seldom perfect, action reveals the need for further planning, backtracking occurs, and so on" (Kember & Kelly, 1993, p. 7).

Figure 2
A spiral of action research cycles
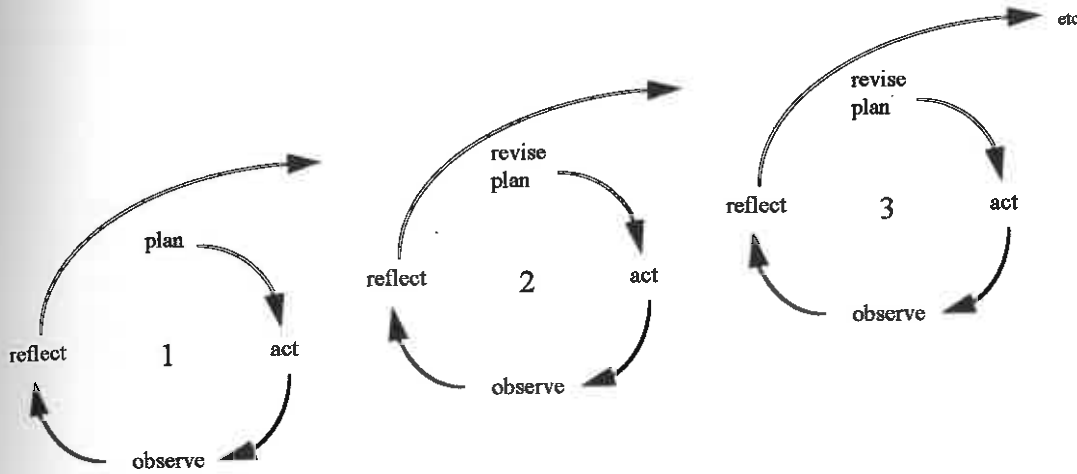
Note: The numbers 1, 2 and 3 represent progressive action research cycles.

Source: Zuber-Skerritt (1996, p. 100)

Kurt Lewin, credited in action research literature as its founder, and who first termed this collaborative research process 'action research' (Hart & Bond, 1995, p. 13), provides the following explanation defining each stage in the action research cycle ...

Box 2
Kurt Lewin's stages of action research

"Planning usually starts with something like a general idea. For one reason or another it seems desirable to reach a certain objective. Exactly how to circumscribe this objective and how to reach it is frequently not too clear. The first step, then, is to examine the idea carefully in the light of the means available. Frequently more fact-finding about a situation is required. If this first period of planning is successful, two items emerge: an 'overall plan' of how to reach the objective and a decision in regard to the first step of action. Usually this planning has also somewhat modified the original idea.

The next period is devoted to executing the first step of the overall plan.

In highly developed fields of social management or the execution of a war, this second step is followed by certain fact-findings [observing].

For example, in the bombing of Germany a certain factory may have been chosen as the first target after careful consideration of various priorities and of the best means and ways of dealing with this target. The attack is pressed home with and immediately a reconnaissance plane follows with the one objective of determining as accurately and objectively as possible the new situation. This reconnaissance or fact-finding has four functions: it should evaluate the action by showing whether what has been achieved is above or below expectation; it should serve as a basis for correctly planning the next step; it should serve as a basis for modifying the 'overall plan'; and finally, it gives

the planners a chance to learn [through reflection]; that is to gather general insights, for instance, regarding the strength and weakness of certain weapons or techniques of action.

The next step again is composed of a circle of planning, executing, and reconnaissance or fact-finding for the purpose of evaluating the results of the second step, for preparing the rational basis for planning the third step, and for perhaps modifying again the overall plan."

Kurt Lewin (cited in Carr & Kemmis, 1986, pp. 162-163)

One of the vital characteristics of action research evident in Lewin's explanation of the stages of the action research cycle above, is the expectation that there would invariably be multiple cycles of planning, acting, observing and reflecting within the action research process. There is not an expectation that one revolution of the cycle will deliver satisfactory research outcomes, in fact there is a general recognition that a 'spiral' of action research cycles is required to produce the richness of result that action research has to offer (Carr & Kemmis, 1986, p. 185). Zuber-Skerritt (1992, p. 15) has the following to say on this point ...

"The main benefits of action research are the improvement of practice, the improvement of the understanding of practice by its practitioners and the improvement of the situation in which practice takes place. In order to achieve the full potential of these gains, a single loop of action research (or 'arrested' action research) is not sufficient. What is needed is ... the use of a spiral of action research cycles by the learning community of action researchers."

The work of Kember and Kelly (1993, pp. 7-11), and Streubert and Carpenter (1999, pp. 256-262), defining each stage in the action research cycle has been captured in Table 2 below.

Table 2
An explanation of action research cycle stages: a guide to practice

Action research cycle	Explanation
1. Initial Reflection:	• Coarse identification of problem or concern; • Preliminary observation and critical reflection to produce a more refined problem statement or action theme to focus the research project, ensuring consistency with intent of the original concern; • Determine the suitability of action research methodology for problem investigation, and if considered suitable - ascertain the opportune 'timing' of the research project in light of problem context and resource factors; • Gain stakeholder endorsement, and pull together action research team if appropriate (this may actually be the first action step); • Analysis / review of the problem situation, collecting context specific data / information, and recording the existing situation; • Search for relevant information / data outside the boundaries of the specific environment, which may be valuable input for the action research team (i.e. research / network - don't reinvent the wheel).

Action research cycle	Explanation
2. Planning:	• Using the outcomes of the initial reflection stage, develop a detailed action or change intervention plan for this first action research cycle, including ... ⇒ defining the first action / change step, ⇒ developing an implementation strategy, ⇒ determining who is going to do what, and by when, ⇒ planning what observation tools will be used to provide feedback and data on, and to evaluate / critique the first action/change step; • Critique the proposed action plan and research project direction with the action research team (consider the impact on, and reaction of others; are the plans practical/achievable?, etc.).
3. Action:	• Implement the action or change intervention plan developed in the planning stage of the action research cycle; • Critique the implementation of the plan as it progresses; • Make deviations from the plan as necessary, but in consultation with team members - ensuring that any deviations and the reasons they were made are recorded; • Note / record any learnings or insights gleaned through the implementation process.
4. Observation:	• Apply planned observation tools, and provide detailed feedback and evaluative information / data on the first action / change step. • Encourage all participants to regularly record additional observations / insights on an ongoing basis (e.g. in a diary or journal); • Review the robustness of the observation process.
5. Reflection:	• Reflect critically, as individuals and as an action research team, on the planned observation outcomes, and on any additional observations / insights recorded about and through the action research process to date; • Use reflexive critique (which is based on the assumption that feedback and data provided by people not only describes their experience of the specific action or change step, but inherently describes all other experiences in each individual's life) to identify the various, valid explanations for the observation outcomes; • Use dialectic critique (which looks to probe the observations / data for internal contradictions) to identify, pursue and discuss any conflicts within the observation outcomes, and subsequently build the action research teams understanding of the nature of the action / change step, and the complex factors that influence(d) its implementation; • Consider the effectiveness of the action / change step taken, what facilitated and what hindered implementation, how to further improve the action / change step taken, how to improve the process so far in the future, whether to proceed with the next spiral of the action research cycle, etc..

Action research cycle	Explanation
6. Beginning the next action research spiral:	• Using the outcomes of the reflection stage, begin another action research cycle with the next planning stage (see '2.' above). • Where the action research project is now finished (i.e. enough spirals have been completed to meet the original objectives, or the action research project is terminated for another reason), complete the write up of the action research project and consider producing a working paper or journal article for the benefit of peers / colleagues, and for contribution to the associated field of practice.

Source: After Kember and Kelly (1993, pp. 7-11), and
            Streubert and Carpenter (1999, pp. 256-262)

5.2. Planning and Using Observations To Build Validity

There are many and varied observation tools and techniques which can be used to collect feedback and data during the observation stage of the action research cycle (Winter cited in Zuber-Skerritt, pp. 15-16). In the selection of observation tools and techniques in action research, consideration should be given to the perspective and needs of participants, and ease of use - "selecting [observation] methods with a high degree of face validity and practical utility" (Small, 1995, p. 943). The material for reflection and evaluation that these tools produce may include (after Kember and Kelly, 1993, p. 12; and Streubert and Carpenter 1999, pp. 261-262; Lomax & Evans, cited in Lomax, 1996, pp. 137-149) ...

- feedback from participants and stakeholders in the form of surveys, open and / or closed questionnaires, and interviews (tape or video recording of interviews and meetings is also an option which can provide a reasonably objective record which can be repeatedly accessed for further analysis);
- individual's diaries or journals which contain a record of the actions they have taken, their observation of the impact of actions taken and changes made, their personal reflections re the action taken and any subsequent reaction, any other personal observations or insights, etc.;
- records such as the minutes of action research team meetings and memos between team members, or memos between team members and stakeholders (or others involved or consulted);
- documentation used in the planning and action implementation stage (e.g. information bulletins issued, policies and procedures developed, training resources and materials, the results of formal audits and assessments, etc.);
- review of post research memory and reflections of practitioners;
- empirical qualitative and quantitative data appropriate to evaluation of the action / change step taken.

The use of more than one method of collecting observations is an important aspect of action research. Termed 'triangulation', it is defined by Winter (cited in Zuber-Skerritt, 1996, p. 16) as the "process by which, when a situation is investigated using a number of different methods, each method partly transcends its limitations, by functioning as a point of comparison with the others". The use of several (and preferably at least three) observation types and sources, which have been generally collected and recorded in a planned, systematic way, helps the action research team to ...

- build (through the reflection stage of the action research cycle) a comprehensive understanding of phenomena taking place (e.g. the impacts of the action stage of the research cycle);
- to develop and question multiple explanations for these phenomena;
- and to draw out context specific, meaningful conclusions with a reasonable level of confidence and accuracy (Streubert and Carpenter 1999, p. 261).

These conclusions are not, however, intended to be taken as 'absolute' (Streubert and Carpenter 1999, p. 262). They are, rather, the basis for the next planning stage of the action research cycle, an initiator of further dialogue, and inputs to the continuing process of local theory development.

5.3. Capturing Action Research In Written Form

As evident from the explanation column of Stage 6 within Table 2 above, there is a formal completion stage in the life cycle of all action research projects. It is at this stage that the project is 'written up' in an appropriate form for dissemination to participants, stakeholders, peers and colleagues, and potentially for communication to others working within the field of research. At times, particularly for large action research projects running over a period of several years, it may be valuable to produce a series of research reports through the life cycle of the project (e.g. a working paper part way through the project, followed by a full report on the formal completion of the project, and then perhaps a journal article) (Kember and Kelly, 1993, p. 18).

Winter (cited in Zuber-Skerrit, 1996, pp. 25-26) makes the following statement in relation to the 'form' of action research reporting ...

"Practitioners writing reports on their action research projects should not be overawed by the portentous format and rhetoric of academic journal articles. Instead we should accept and welcome the point that, since our writing emerges from a different set of relationships (collaborative and action-orientated, rather than authoritative and observation orientated) the format of our writing should be different ... Firstly, in view of the link between the social relationships of the research process and appropriate ways of writing, the narrative format can be seen as expressing and recognising the basis of action research - the sequence of practice and reflection. Secondly, the plural text advocated expresses both the collaborative relationships of the research process and the open-endedness of outcomes. Conversely, certain stylistic features of traditional academic writing

could be seen as inappropriate for action research reports ... [particularly] these are aspects of style, tone and vocabulary which seem to express the expert role, by suggesting a withdrawal from personal involvement and a sustained abstraction from concrete detail."

Parker (1997, p. 40) also supports the need for a 'new form of writing' for action research ...

"This epistemological and methodological shift from universalisation towards particularisation requires new forms of writing which are not restricted by the positivist academic codes that issue in the research report form of: literature review, methodology, data collection, conclusion. Suggested developments in this area include narrative writing and autobiography, each of which attempts to articulate stories that are faithful to the uniqueness, the rich particularity, of each ... context."

It is with these 'new forms of [scientific] writing' that action research looks to capture the depth of understanding, in relation to the nature of a specific phenomenon, that results from the action research process - "aspects of a phenomenon [that] are understood deeply because we know them in the context of our participation in the whole system, not as the isolated and independent variables of experimental science" (Reason, 1988, p. 11). Reason refers to 'descriptive and systemic' theory-building, citing Geertz's term 'thick description' to further illustrate the 'form' of co-operative inquiry (Reason, 1988, p. 11). 'Thick description' and narrative are the tools the action researcher uses to record the action research project - "to take the reader there" (Owens, 1995, pp. 268-270).

Narrative is defined by the *Collins English Dictionary and Thesaurus* (1993, p. 756) as "an account or story, as of events, [and] experiences". It is the 'story' of the action research project which is able to capture, reveal and communicate , through the personal and detailed description of a context specific and collaborative research process, the local knowledge and theory produced - knowledge and theory that may be valuable to others as they consider how best to approach a similar problem or situation within their local environment (Winter cited in Zuber-Skerritt, 1996, p. 26).

"The best stories are those which stir people's minds, hearts and souls and by doing so give them new insights into themselves, their problems, and their human condition. The challenge is to develop a human science that more fully serves this aim. The question then is not, 'Is storytelling science' but 'Can science learn to tell good stories?'."

Ian Mitroff (cited in Reason, 1988, p. 83)

The case study method, an approach designed to investigate a "phenomenon within its real-life context" (Yin, 1994, p. 13), and which uses narrative to document and communicate the investigation process, analysis and outcomes in written form (Yin, 1994, p. 135), is one of the models action researchers use to tell the 'story' of the action research project. There are numerous action research publications which contain quite a varied range of action research case study styles (Lomax, 1996; Whyte, 1991; de Koning &

Martin, 1996; Hart & Bond, 1995; Kember & Kelly, 1993). According to Yin (1994, pp. 151-152), the key to an effective case study report is a clear writing style that engages the reader, arousing their interest and thus ensuring their full attention to the end of the report. Yin (1994, pp. 132-133) identifies the major disadvantages of written case study reports as bulkiness and length, and encourages researchers using the case study approach to explore alternative or complimentary forms of case study presentation, based on the needs of the target audience. While perhaps all action research case studies do not have a mesmerising effect on their target audience, which (in addition to the size / length of some action research case studies) may to some degree be a result of their focus on local action and improvement, rather than the production of theory for outside use (Reason, 1988, p. 13) - the objective of action research case studies should be to write up the project in the way that is best able to stimulate others with knowledge and insight that they can critically apply to their own practice and environment.

5.4. Participation and Collaboration

The participative and collaborative relationship between researcher and other people involved in the research process (i.e. practitioners) is another important feature of action research. Unlike the researcher / subject relationship of the orthodox scientific method, where there is the intentional and systematic separation of human subjects from research (Heron cited in Reason,1988, p. 4), not only are participative / collaborative relationships a foundation of the action research process, the action research process inherently "precipitates collaborative involvement" (Carr & Kemmis, 1986, p. 199). While the depth of participation and collaborative involvement varies between action research types (Hart & Bond, 1995, pp. 40-43), the following explanation of the nature of participation and collaboration within action research by Grundy and Kemmis (cited in Zuber-Skerritt, 1992, p. 16) reflects the spirit of action research participation / collaboration ...

> *"Action research is research into practice, by practitioners, for practitioners ... In action research, all actors involved in the research process are equal participants, and must be involved in every stage of the research ... The kind of involvement required is collaborative involvement. It requires a special kind of communication ... which has been described as 'symmetrical communication', ... which allows all participants to be partners of communication on equal terms ... Collaborative participation in theoretical, practical and political discourse is thus a hallmark of action research and the action researcher."*

5.5. The Role of the Action Researcher

The role of the researcher in action research is therefore quite different to the researcher's role within the positivist research of the orthodox scientific method, and some very different skills are required. Kickett, McCauley and Stringer's (cited in Stringer, 1996, p. 23) description of a community-based

action researcher's role represents a model at one end of the collaboration scale (i.e. other action research models have inherently different degrees of collaboration and participation, and hence a somewhat modified role for the action researcher). A number of the functions, attributes and skill capabilities contained in their role description are, however, common to other action research models (see Box 3 below).

Box 3
The role of a community-based action researcher

- You are there as a *catalyst*.

- Your role is not to impose but *to stimulate people* to change. This is done by addressing issues that concern them *now*.

- The essence of the work is *process - the way things are done* - rather than the result achieved.

- The key is to *enable people to develop their own analysis* of their issues.

- Start where people are, not where someone else thinks they are or ought to be.

- Help people to analyse their situation, consider findings, plan how to keep what they want, and change what they do not like.

- Enable people to examine several courses of action and the probable results or consequences of each action. After a plan has been selected it is the worker's [read researcher's] role to *assist in implementing* the plan by raising issues and possible weaknesses and by helping to locate resources.

- The worker [read researcher] is not an advocate for the group for which he or she works.

- The worker [read researcher] does not focus only on solutions to problems but on *human development*. The responsibility for a project's success lies with the people.

Source: After Kickett, McCauley & Stringer (cited in Stringer, 1996, p. 23)

The action researcher also has to create the 'right' environment for participation and collaboration to take place (Small, 1995, p. 943). This is also true for ensuring the effectiveness of the action research process as a whole. Creating and sustaining an environment conducive to the action research process is critical to its success. Stringer has identified and characterised four elements that are key to producing the 'right' environment for community based action research (see Box 4 below): relationships, communication, participation and inclusion. Though a number of the 'working principles' Stringer uses to characterise these elements would not apply across the board to every action research model (i.e. conflict is generally regarded as an essential element of action research), like the role description in Box 3 above, there are some strong themes evident which are common to most models in some degree.

Box 4
Stringer's Working Principles of Community Based Action Research

Relationships in action research should

- Promote feelings of *equality* for all people involved
- Maintain *harmony*
- *Avoid [unhealthy] conflicts*, where possible
- *Resolve conflicts* that arise, openly and dialogically
- *Accept* people as they are, not as some people think they ought to be
- Encourage *personal, cooperative relationships*, rather than impersonal, competitive, conflictual, or authoritarian relationships
- Be *sensitive* to people's feelings

In effective *communication*, one

- Listens *attentively* to people
- *Accepts* and acts upon what they say
- Can be *understood* by everyone
- Is *truthful and sincere*
- Acts in socially and *culturally appropriate ways*
- Regularly *advises* others about what is happening

Participation is most effective when it

- Enables significant levels of *involvement*
- Enables people to *perform* significant, [meaningful] tasks
- Provides *support* for people as they learn to act for themselves
- Encourages plans and activities that people are able to *accomplish* themselves
- Deals *personally* with people rather than their representatives or their agents

Inclusion in action research involves

- Maximization of the involvement of *all* relevant *individuals*
- Inclusion of *all groups* affected
- Inclusion of *all* relevant *issues* - social, economic, cultural, political - rather than a focus on narrow administration or political agendas
- Ensuring *cooperation* with other groups, agencies, and organisations
- Ensuring that all relevant groups *benefit* from activities

Source: Stringer (1996, p. 38)

The role of the action researcher, while it is to create an environment conducive to genuine participation and collaboration taking place, is not in the position of playing a neutral or 'timid lily' role. On the contrary, the action researcher also has a responsibility to contribute his or her specific expertise,

knowledge, skill, experience, ideas, thoughts, concerns, and so on - just as all other collaborative members of the action research team.

> *"Our theory is that we intentionally and strongly influence content. We are always seeking to bring forth more self-managed forms of organization. Our experience indicates that, if we do not contribute ideas from sociotechnical systems thinking and organization design to the dialogue, then they tend not to appear in the results. Of course, this does not mean that these ideas necessarily are accepted. But elements from our initial framework usually appear in the resulting framework. What's important is that the arena for possible action has been enlarged because ideas from our framework have been seriously considered ... The contradiction between the outsiders responsibility for introducing new ideas and concepts and planning a learning process and the participants control and active influence in framing the new knowledge must always be resolved based on the participants' values and interests. The contradiction is necessary and is actually the core of the cogenerative dialogue ... the dialogue becomes an arena in which participation by insiders and outsiders enriches all phases of the research process because of the intermingling of at least two [if not more] sets of frameworks that contribute to creating a new, third framework or local theory."*

<div align="center">Max Elden and Morten Levin (cited in Whyte, 1991, pp. 136-137)</div>

While the action researcher is an active contributor of expertise, knowledge and ideas, great care must be taken to ensure that the expertise, knowledge, experience and contributions of others also get a 'fair go' and that the action researcher does not monopolise the role of expert (Elden & Levin, cited in Whyte, 1991, p. 141). As indicated by Eldin and Levin above, the action researcher does generally have carriage for the organisation and facilitation of the research process. Action researchers (as the person knowledgeable in the action research process) are also likely to have more responsibility in the area of guiding validation procedures - though all participants must be contributors in this function as well (Karlsen, cited in Whyte, 1991, p. 149).

5.6. Action Research and Ethical Issues

Another unique feature of action research are the ethical considerations it generates. Streubert and Carpenter (1999, p. 262) contend that due to the evolving, spiraling nature of the action research process, it is difficult to inform participants of what they are specifically signing up for 'up front'. The action research process is so flexible and dynamic that the direction of the project can potentially change with each cycle, or sub-processes can be initiated to work through areas identified during the research process as needing further investigation, areas which were not anticipated at the start of the project (Small, 1995, p. 942). In light of this, where consent forms are appropriate, any consent forms used need to broadly outline the objective of the project, the nature of the action research process (including its dynamism and flexibility), and the willingness of the participant to work with the members of the action research team through and for the life of the project (Streubert and Carpenter, 1999, p. 262).

Another area of ethical consideration for action researchers, is the question of whether the research project will actually benefit participants. This contrasts with positivist research, where while researchers are concerned that their 'subjects' are not harmed by their involvement, there is generally an element of exploitation. Positivist research is for the benefit of the researcher (and others), and there are few tangible benefits for subjects (Small, 1995, p. 950). In action research, researchers reflect on whether the project will potentially generate short and long term benefits for participants, on how the project can negatively impact participants, and they look to ensure that participants are not harmed or exploited through and by the research project (Small, 1995, p. 950).

Participants may be hurt through the action research process in several ways. As the action research process is a collaborative one in a 'team' environment, in which relationships are key, and are nurtured / encouraged to develop over the generally significant research project time period - participants share openly, frankly, and at times very personally their knowledge and experience. This may make them vulnerable should their contribution, their personal thoughts and views, be communicated outside the research team. It is very important from an ethical standpoint, that confidentiality and anonymity be maintained (Streubert and Carpenter, 1999, p. 262).

Action researchers do not pretend to be unbiased, rather they look to fully identify and acknowledge the influences on the research - beginning with the action researchers own motives and values. This is another contrast with positivist research where many "scientists firmly believe that as long as they are not conscious of any bias or political agenda, they are neutral and objective, when in fact they are only unconscious" (Namenworth cited in Small, 1995, p. 952). Maguire (cited in Small, 1995, p. 952) explains it like this ...

> "The researcher, consciously or not, is in quiet collusion with either those who have power or those who don't. Of course, many researchers never question the implications of their acceptance of the dominant paradigm research assumptions. Their acceptance of the status quo is unconscious. Many are well intentioned, caring and concerned people, attempting to live up to the standards of their discipline to produce knowledge useful to the solution of pressing social problems."

This is an important ethical consideration for action researchers, with the vast majority of action research reports (and other literature) referenced within this thesis dedicating a portion of their introduction to communicating who the researchers are (their background, values and biases), and the results of their investigation into influences on the research.

A final ethical consideration relates to writing up action research projects. Not only is it important that the report be written in a style that is appropriate to, and understandable by, participants (Small, 1995, p. 952), it must also reflect the varied and multiple reflections, explanations, and understandings of the members of the action research team, and any consensus findings (Winter cited in Zuber-Skerritt, p. 17). The report can not be written from the isolated viewpoint of a single action researcher. In order for the report to genuinely reflect the rich and collaborative nature of the action research process, the principles described in Box 5 below (after Winter, cited in Zuber-

Skerritt, 1996, pp. 16-17) should be ethically applied to the whole action research process, as well as the write up of the action research report.

<div align="center">

Box 5
Ethical principles guiding action research

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- Consult all relevant stakeholders - ensuring they understand and accept the principles guiding the research process.

- Ensure all participants have a genuine opportunity to influence the research, and respect the desire of those not wishing to participate or contribute.

- The action research process remains a visible and open one, with suggestions and input from others welcomed.

- Observation processes, and the accessing of historical records and data, need to be endorsed by the relevant stakeholder(s).

- Before descriptions of the work of others, or their explanations and understanding of a phenomena is published, their consent for this to occur must be negotiated. Confidentiality and anonymity must be maintained.

- *"The action researcher needs to follow a vigorous intellectual discipline, ensuring that the conclusions of the work are broadly based, balanced and comprehensively grounded in the perceptions of a variety of others."*

<div align="right">

After Winter (cited in Zuber-Skerritt, 1996, pp. 16-17)

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5.7. Action Research Contrasted With Positivist Research

Working through the definition of 'action research' and an explanation of its key features, there have been a number of contrasts with positivist research evident, including the discussion of ethical considerations above. Table 3 below (After Small, 1995, pp. 948-951) provides a brief summary of some main differences between action research and the positivist research model. While not a comprehensive list, the differences identified indicate how action research is a methodology which addresses a number of the criticisms of positivist research discussed in Section 4 above.

<div align="center">

Table 3
Contrasting features of action and positivist research

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Positivist Research	Action Research
1. Positivist research treats human subjects as objects of inquiry.	Action research treats people involved in the research process as active, self-reflective collaborators, who play a critical role in the identification and diagnosis of their own problems, and in the generation of relevant knowledge.

Positivist Research	Action Research
2. Positivist research is concerned with describing 'what is', not with proposing what 'should be'.	Action research is future directed, and concerned with creating change that will benefit those involved as participants and co-researchers.
3. Positivist research assumes the existence of a single, tangible reality that can be divided and reduced to independent parts, any of which can be independently studied.	Action research believes that systems involving humans are highly contextualised, and can only be understood by taking into account their personal history, and the systems in which they are embedded. Relationships between people, situations and events can change as the definition of the situation changes.
4. Positivist research assumes it is a value-free endeavour, with the researcher able to maintain objectivity and distance from the phenomenon under study.	Action research acknowledges that research cannot be value-free, actively looks to identify the research influences that must exist, and contends that judging the morality of proposed solutions to social problems cannot be avoided.
5. Positivist research is usually interested in research questions that produce generalisable knowledge and universally applicable findings, and contribute to theory development.	Action research is focused on the specific situation or context, and asserts that relationships between people, situations and events are a function of specific actors and the particular context in which they are embedded - relationships which, however, are often not invariant across contexts. As such, action research typically looks to address questions and problems raised by the people within a specific context, with the main objective of having immediate and direct implications for the situation in which the research is conducted.
6. Positivist research is inclined to study well structured problems that "tend to be solvable if the right sequence of steps is used in applying set principles ... the problem is viewed as the same from all perspectives and once solved, the solution is applicable to the problem whenever it is encountered" (Tolan et al cited in Small, 1995, pp. 948-949).	Action research is inclined to focus on 'ill-structured' problems - problems that do not have well-defined or reliable methods of determining the problem or the solution, problem definitions which vary as a function of the particular situational circumstance and the perspective of stakeholders, and problems related to the changing and understanding of human systems that are inherently dynamic and complex. It contends that "ill structured problems require regular but differing solutions depending on where and when they are encountered" (Tolan et al cited in Small, 1995, p. 949).
7. Positivist research contends and intends that subjects are unaffected by the research process.	Action research not only recognises that the research process will affect the individuals and systems involved, it is its objective to change / improve / develop both the individual and systems involved.
8. Positivist research has as its primary ethical concern, that the human subjects of the research are not harmed. It is less likely to adequately address this concern as it does not generally recognise that subjects are affected by the research process.	Action research looks not only to actively ensure that participants are not harmed, it looks to ensure they actually directly benefit from the research and the research process - both in the short and the long term. Action researchers are there to help, not exploit participants in the research.

Positivist Research	Action Research
9. Many positivist researchers have demonstrated a surprisingly naive understanding of the epistemological assumptions underlying their methods. This has resulted in the generation of "scientific paradigms that contain principles or assumptions with which many [positivist] researchers would disagree, if those principles and assumptions were made explicit ... It also creates a narrowly focused ... way of doing science, which precludes consideration of alternative metaphysical or epistemological assumptions" (Kingry-Westergaard & Kelly cited in Small, 1995, p. 950).	Action researchers exhibit a strong awareness of issues of epistemology and their implications for conducting research. As such, action researchers are less likely to limit themselves to existing methods and standard measures, and thus are more likely to use methods that are responsive to the special characteristics of the people involved, that are able to capture the depth and complexity of the situation under investigation, and that acknowledge that there are various sources and forms of knowledge that have value and legitimacy (e.g. experiential knowledge).
10. Positivist research is inclined towards empirical, quantitative methods. This is due, in part, to the limitations of qualitative methods to generalise to other situations, and produce universally applicable theories.	Action research is inclined toward qualitative methods due to the greater ability of these methods to actively involve participants, the belief that such methods are less exploitative, and the capacity of qualitative methods to capture the richness / depth and the complexity of the specific situation under study. Any limitation re the ability to generalise to other situations is of less importance to the action researcher, as their primary concern is improving the immediate problem situation.
11. In positivist research, the researcher is the sole possessor of knowledge about the research process, and has complete control over its design and implementation. The researcher is also the sole gatekeeper of knowledge, with decisions about whether, to whom, and how research findings should be disseminated rests entirely with the researcher.	The role of the action researcher is quite different. Action researchers recognise and value the expertise and knowledge of the research participants. The collaborative nature of the research process is maintained through the life cycle of the research process, and has as one of its aims the empowering of research participants.
12. The intended consumers of positivist research are not generally the research subjects. Positivist research is therefore reported in forms which are not easily understood by those without formal research training.	The intended consumers of action research are the research participants, other stakeholders, and to a lesser degree, practitioners outside the specific problem situation. Analysis / reporting forms and strategies tend to be descriptive, straightforward, and easily understood by people who do not have a formal research background.

After Stephen A. Small (1995, pp. 948-951)

5.8. Summary

While the above definition of action research, and the explanation of its key features is not an exhaustive one, it provides an insight and an initial understanding of this 'new paradigm research' methodology - a methodology which is a valid and genuine alternative to the orthodox scientific method in the area of human inquiry. Participants at the International Symposium on Action Research held in Brisbane in March 1989 (Zuber-Skerritt, 1992, p. 14), have developed a working definition of action research (see Box 6 below) which is a useful tool for identifying action research in practice, or for determining if action research is a methodology appropriate to a specific research context. A number of alternative action research models developed for specific research contexts are presented in Section 6 below, which traces the development of action research methodology and theory. A set of action research critiquing guidelines is provided in Appendix C.

<div align="center">

Box 6
Working definition of action research

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If yours is a situation in which

- people reflect and improve (or develop) their own work and their own situations
- by tightly interlinking their reflection and action
- and also making their experience public, not only to other participants, but also to other persons interested in and concerned about the work and the situation (i.e. their (public) theories and practices of the work and the situation)

and if yours is a situation in which there is increasingly

- data gathering by participants themselves (or with the help of others) in relation to their own questions
- participation (in problem-posing and in answering questions) in decision making
- powersharing and the relative suspension of hierarchical ways of working towards industrial democracy
- collaboration among members of the group as a 'critical community'
- self-reflection, self-evaluation and self-management by autonomous and responsible persons and groups
- learning progressively (and publicly) by doing and making mistakes in a 'self-reflective spiral' of planning, acting, observing, reflecting, replanning, etc.
- reflection which supports the idea of the '(self-) reflective practitioner'

then   yours is a situation in which ACTION RESEARCH is occurring.

Source: Zuber-Skerritt, 1992, p. 14

6. The Development of Action Research Theory and Methodology

"Action research as a concept, a philosophy and a methodology has arrived ...
What has been for many years a trickle of protest at conventional research and
learning methods has become a major stream of thought which is attracting a great
deal of attention in Australia and overseas ... The new operation of collaborative
individuals capable of bringing down the Berlin Wall was hardly likely to tolerate
the implacable imperatives of institutionalised education. They found an alternative
in the emancipatory processes of action research."

Limerick (cited in Zuber-Skerritt, 1992, p. 2)

6.1. Early Historical Development

Action research as a distinct and alternative research methodology has been around for more than fifty years (Carr, 1995, p. 100). Over this time, action research has gone through a significant process of evolution and development - something you would expect from a methodology that is based on a foundation steeped in critical reflection and continuous improvement cycles. In addition, action research's focus on the context of the research process has contributed to the development of many action research variations, which have been (and still are being) fine-tuned to improve its context specific effectiveness.

"Action research is evidently a huge field, with applications in all social sciences.
Within that field are enormously diverse practices, from those based on orthodox
models of experimental research, to those which would aim to radically revise our
notions of science and inquiry. At every point these practices raise questions about
epistemology, methodology, ideology, the nature of participation, building
networks, different levels of system, validity, the personal and political skills
required of action researchers, and on and on."

Peter Reason (1993, p. 1255)

It should not be a surprise then, that the history of the development of action research is a confused one, with several interpretations of its process of development recorded in the literature. According to Stringer (1996, p. xvi), Kemmis and McTaggart, Anderson, Herr, and Nihlen, and Reason, all provide diverse, disparate histories of action research. These different understandings of the history of action research development do, however, share common themes - including a postpositivist's conception of science.

"The majority of action researchers subscribe to a postpositivist conception of
social science. They reject such tenets of mainstream social science as the
objectivity and separation of researcher from what or whom is researched, the

superiority of the researcher as expert, and the ability of the research process to be value neutral."

Stephen A. Small (1995, p. 942)

"Four fundamental characteristics are common to action research:

(1) a search for solutions to practical practice problems,
(2) collaboration between researchers and practitioners,
(3) the implementation of changes in practice, and
(4) the development of theory."

Streubert and Carpenter (1999, p. 253), after Holter & Scwartz-Barcott

One historical account of action research history identifies Collier as first using "teams of researchers, administrators, and laypeople" to effect change / improvement in the area of race relations in the 1940s (Streubert and Carpenter, 1999, p. 252). Kurt Lewin (who first termed and used this alternative methodology 'action research' in 1944), is however, generally acknowledged as the 'founding father' of action research (Carr, 1995, p. 100; Stringer, 1996, p. xvi). There is recognition that, though he "distill[ed] the essence of an emerging idea so convincingly that his name becomes (sic.) inseparable from it", the ground had been well prepared (Hart & Bond, 1995, p. 13). Carr and Kemmis (1986), and Reason and Rowan (1981) have more recently picked up the action research baton with significant influence.

Lewin had such a significant influence across the discipline of social psychology (e.g. he is well known for his seminal work in the area of group dynamics and organisational change, as well as 'force field theory'), that "it is difficult to identify his greatest contributions" (Kemmis et al in Hart & Carpenter, 1995, p.13). He did, however, develop and promote action research as an alternative research methodology capable of "interacting with or participating in a system for the dual purpose of learning about and creating change in the system" (Streubert and Carpenter, 1999, p. 252).

Lewin's action research model (refer Figure 3 below) was based on the application of spiraling cycles of planning, acting, observing, and reflecting (Robson, 1993, p. 438) within a framework of "democratic decision-making and active participation of practitioners in the research process" (Kember & Kelly, 1993, p. 1).

Figure 3
The action research spiral
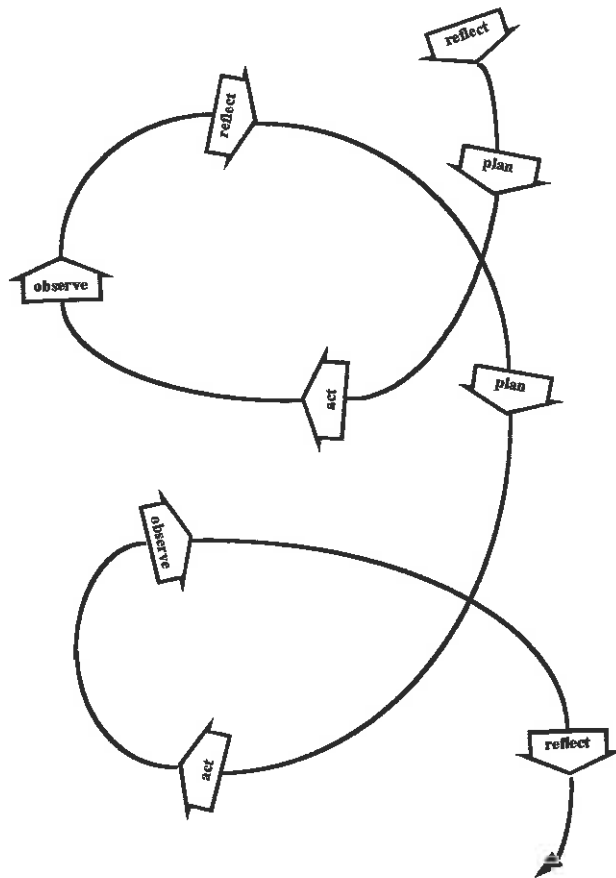
Source: Kember and Kelly (1993, p.6) after Lewin

Action research was seen as way of bridging the gap between theory and practice, and hence action and research (see Table 4 below). Closing this gap was considered necessary by social scientists who believed that developing theory and practice (and action and research) together, was the only way to find adequate solutions to social problems (Carr, 1995, p. 100).

Lewin was a Prussian psychologist who emigrated to the United States in 1933 to escape Nazi persecution, and it was this background of valuing democracy (and the context of events that took place during the Second World War) that contributed to his belief that an alternative research strategy was necessary (Hart & Bond, 1995, pp. 12-21).

> *"Both [Lewin and Dewey] agree that democracy must be learned anew in each generation, and that it is a far more difficult form of social structure to attain and maintain than is autocracy. Both see the intimate dependence of democracy on social science. Without knowledge of, and obedience to, the laws of human nature in group settings, democracy cannot succeed. And without freedom for research and theory as provided in a democratic environment social science will surely fail."*

G.W. Allport (cited in Hart & Bond, 1995, p. 14)

"The bomb has driven home with dramatic intensity the degree to which social happenings are both the result of, and the conditions for the occurrence of, physical events. Gradually, the period is coming to an end when the natural scientist thinks of the social scientist as someone interested in dreams and words, rather than as an investigator of facts, which are not less real than physical facts, and which can be studied no less objectively."

Kurt Lewin (cited in Hart & Bond, 1995, p. 20)

Lewin's democratic beliefs extended to the industrial environment, and he was involved in research which he believed demonstrated "that democratic participation [within the workplace] was far preferable to the type of autocratic coercion associated with scientific management" (Hart & Bond, 1995, p. 19). For Lewin, action research was a mechanism for creating democracy, and his vision for democracy included industry. Lewin, himself also defined action research as 'rational social engineering' (Bowling, 1997, p. 366). He was confident that democratic participation within the workplace would result in improved levels "of job satisfaction, output and morale" (Hart & Bond, 1995, p. 19). Unfortunately he did not live to see this 'truth' affirmed through action research projects in the late 1940s. Lewin died before the research was completed and a conclusion had been reached (Hart & Bond, 1995, pp. 13&15).

Table 4

The potential relationship between action and research cycles

Action Cycle		Research Cycle
1. Identify problems to solve and other opportunities, [identify] causal factors, environmental constraints and relevant practice.	←——→	1. Identify topic to study and review relevant knowledge.
2. Formulate proposed changes and the implementation plan.	←——→	2. Operationalize hypotheses.
3. Initiate change in targeted areas.	←——→	3. Select sample to observe.
4. Assess changes and implementation.	←——→	4. Select other research methods, gather data, and generate findings.
5. Deepen, institutionalize and diffuse change.	←——→	5. Derive and disseminate implications for theory and practice.

Source: Walton and Gaffney (Whyte, 1991, p. 123)

6.2. The Struggle For Freedom From Positivist Influences

It is Nevitt Sanford's belief (Carr, 1995, pp. 100-101) that the development of the action research methodology stalled in the years following Lewin's death because it "had allowed itself to become institutionalized in a way that which virtually ensured that it could not meet the challenges to which it was initially a response (the conservatism and elitism of academia, the theoretical orientation of conventional social research, the increasing technologization of social life)". Lewin's initial model of action research had still retained some ties to the orthodox scientific method, and these ties may have facilitated the 'institutionalisation' that Sanford refers to. Lewin's model had a relatively limited definition of 'participation', for it continued to emphasise the role of outside experts, even though these experts used a participatory framework and the planning, acting, observing, reflecting spiral in their research. Lewin's action research model also retained an experimental flavour (Carr & Kemmis, 1986, p. 163; Zuber-Skerritt, 1992, p. 13).

> *"Lewin's early work, though it emphasised field work, did not seek to abandon the scientific rigor of traditional research in the social sciences. Quite the reverse. What he was trying to do was make sure that research ended in real life applications rather than just written accounts of theory."*

Kember and Kelly (1993, p.3)

> *"In his conception of action research he arrived at the integration of theory and empirical (mainly experimental) research on the one hand and the direct application of the findings on the other."*

van Elteren (cited in Hart & Bond, 1995, p. 16)

Whether these retained links to the orthodox scientific method were substantively influential in the stall of action research's development, can be debated. It has also been suggested that action research fell from favour with the 'power brokers' of the day because of its somewhat 'naive' intention to be used as a tool for creating democracy (Hart & Bond, 1995, p. 19). Sanford (Carr, 1995, p. 100) presented a paper in 1970 to a group of American social psychologists titled *Whatever Happened To Action Research?*. In it he maintained that action research practitioners had succumbed to the positivist academic 'establishment', and had permitted action research to be 'knobbled' within the existing framework of social science methodology - a view supported by Carr.

> *"I would say now that action-research never really got off the ground, it never was widely influential ... After World War II the separation of science and practice was institutionalised and it has been so ever since ... I would say that we have separated - and institutionalised the separation - of everything that - from the point of action research ... belong together."*

Nevitt Sanford (cited in Carr, 1995, p. 101)

"Once action research had been taken over by the academic establishment, it was only a matter of time before it was reinterpreted from the perspective of the dominant positivist research paradigm and repackaged as little more than a set of practical problem solving techniques."

Wilfred Carr, (1995, p. 100)

It was not until John Elliott published a paper in Britain in 1978 titled *What is action research in schools?*, that action research began to significantly reclaim the promise of Lewin's model (Carr, 1995, p. 101; Robson, 1993, p. 439), however with some changes in emphasis. Positivist measurement and analysis techniques were rejected - replaced by "practical deliberation, focusing on human interpretation, negotiation and detailed descriptive accounts" (Kember & Kelly, 1993, p. 3). More flexibility was introduced to the process, rather than rigidly applying the planning, acting, observing, and reflecting cycle in a mechanical way. The role of the external expert was also de-emphasised, with the 'richer' concept of practitioner as 'researcher' introduced (Robson, 1993, p. 439). Elliott developed an 'improved' action research model, which reflected these changes in emphasis (see Figure 4).With the support of like-minded curriculum theorists such as Stenhouse, Schwab, and Skilbeck (Kember & Kelly, 1993, p. 3), Elliott re-ignited the torch of action research. Carr (1995, p. 101&102) has described the resulting impact of "an idea whose time had come" ...

"In the ensuing decade, action research was to become nothing less than a full blown 'movement' sustained by a large number of teachers, teacher educators and educational researchers and supported by numerous educational institutions and research agencies in Britain, Australia, continental Europe and the USA. As a result, the next ten years witnessed the emergence of local action research 'networks', the funding of several major action research projects and the publication of a steady stream of books explaining the action research method and offering teachers advice about how it can be used."

Carr and Kemmis (1986, p. 166) have suggested a number of reasons for the unprecedented level of response to Elliott's initiatives. These include ...

- the teachers, themselves, were eager to be involved in research as a part of their professional development;
- teaching practitioners did not perceive much of the contemporary (positivist based) educational research to be relevant to them;
- the work of Schwab on 'practical deliberation' had prepared the ground in which action research seeds could be planted;
- a 'new wave' of educational research and evaluation methods focused on and utilising participant feedback to shape educational practice was emerging;
- the 'accountability movement' had already initiated a type of individual self-reflection mechanism;

Figure 4
Elliott's action research cycle
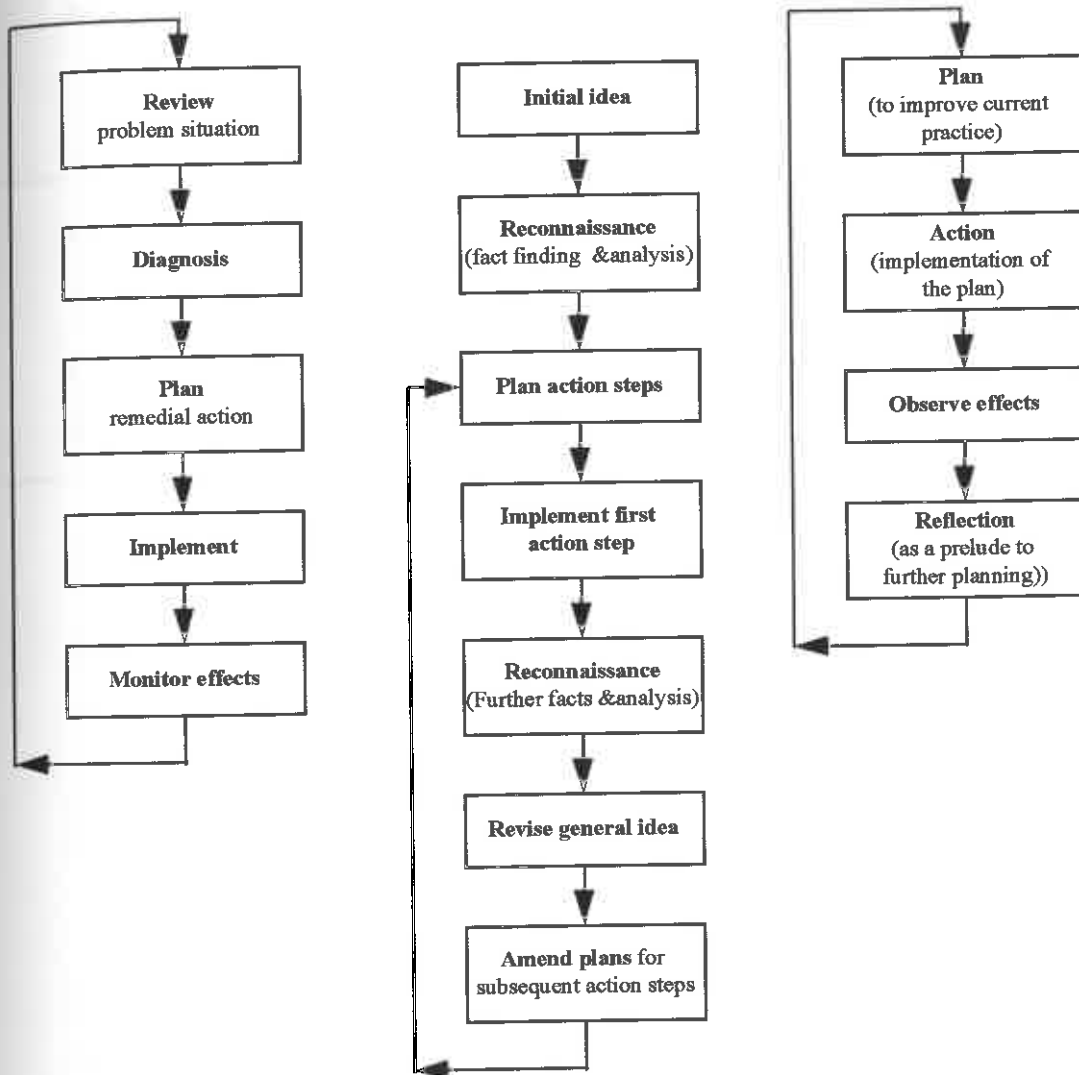
Source: Robson (1993, p. 440) After Elliott

- public criticism of the teaching profession had prompted teachers to 'close ranks' and develop support networks of professionals interested in driving improvement in educational practice;
- there was an increased awareness and understanding of action research throughout the teaching profession.

There were those, however, who found Elliott's shift away from a more positivist interpretation of action research threatening. They were particularly critical of the 'quality' of the research subsequently produced from the application of Elliott's model, as measured against standards maintained by the orthodox scientific method (Robson, 1993, p. 139&140). A number of action research's proponents were qualified in their support of Elliott's model - wanting "to see high quality action research" (Robson, 1993, p. 441). In their

experience, Elliott's model was too complex and too prescriptive, and an attempt was made to provide a simplified version (see Box 7 below). They appear to have been particularly concerned with the cyclic nature of Elliott's action research model - preferring a straight, four step approach.

Box 7
Hopkins's simplified action research model

1. *Data collection* and the generation of hypothesis.

2. *Validation* of hypothesis through use of analytical techniques.

3. *Interpretation* by reference to theory, established practice and practitioner judgement.

4. *Action* for improvement that is also monitored by the same research techniques.

Source: After Hopkins (Robson, 1993, p. 440)

Hopkins' simplified model was in turn criticised by Winter (Robson, 1993, p. 441) as incomplete for the following reasons ...

a   *"data gathering cannot begin without a perceived problem to give it relevance and direction;*

b   *validation of hypotheses and the adequacy of interpretations will be further tested in the action phase;*

c   *the action decided upon as a result of the enquiry will inevitably generate further issues which could well be the topic of further enquiry;*

d   *the process will inevitably by cyclical; any phase of data gathering and interpretation can only be one tentative step forward, not the final answer."*

Robson (1993, p. 441), when considering the simplified model of Hopkins in light of Winters criticism, determined that in answering Winter's arguments, one returned to a more complex model (i.e. a model very similar to Elliott's) - with one difference. That difference is Hopkins's inclusion of 'analytical techniques' (i.e. the integration of conventional social science methodological skills into the action research process), to shore up action research against criticisms leveled at the 'rigor' of its approach.

Carr and Kemmis (1986, p. 164), took the action research model to another level through further development and modification of three defining characteristics of Lewin's original model - "its *participatory* character, its *democratic* impulse, and its *simultaneous contribution to social science and social change"*. These further developments and modifications included ...

• Considering group decision-making as a foundation principle of action research, rather than seeing it only as a technique to get practitioner "buy in" to research findings;

• Reining in the 'democratic impulse' within the Lewin action research model, so that action research "can be seen as an embodiment of

democratic principles" rather than as a mechanism for achieving democracy.

- A rejection of the positivist links and influence within the Lewin's action research model - particularly where they tolerated or encouraged the use of positivist tools of analysis and measurement (e.g. field and laboratory experiments and mathematical/conceptual analysis).

6.3. Action Research Types

Through the process of transforming Lewin's initial action research model, Carr and Kemmis (cited in Zuber-Skerritt, 1992, p.12) identified three types of action research, based on Habermas' three tiered model, as reproduced in Table 5 below (Carr & Kemmis, 1986, p. 136). The first type, labeled 'technical', is closest to Lewin's original action research model. Technical action research is used to solve problems of a technical nature which would enable human beings to improve their management or control over technology.

The second action research type, which was termed 'practical', is an enhancement of the first, with the additional aims of contributing to the understanding of practitioners, providing them with an opportunity to 'transform their consciousness'. The role of facilitator also changed, with the facilitator performing a 'coaching' role within a co-operative framework of participants, and it is the type probably best suited to organisational contexts.

The third type, which Carr and Kemmis have called 'emancipatory' (meaning freeing) action research, is the action research type they believe to be 'true' action research (Zuber-Skerritt, 1992, p. 11). This type of action research has the very stretching aim of freeing participants, through a fully collaborative process, from oppressive conditions - be they environmental or self-imposed. Zuber-Skerritt (1992, p. 12) has incorporated the three action research types identified by Carr and Kemmis into a table (see Table 5 below) - including a description of the aims, the facilitators (those who assist the progress of the research), and the relationship between facilitator and participants (those who take part in the research).

Zuber-Skerritt (1992, p. 11) does not necessarily see these three action research types as distinct processes which are separate from each other. Rather, from her viewpoint, there can be a progression through these three types within the same research process ...

> "In my view the three types are developmental stages, and it is quite legitimate to start with technical enquiry and progressively develop through practical to emancipatory action research. However, the ultimate aim should be to improve practice in a systematic way and, if warranted, to suggest and make changes to the environment, context or conditions in which that practice takes place, and which impede desirable improvement and effective future development."

Table 5

Types of action research and their main characteristics

Type of action research	Aims	Facilitator's role	Relationship between facilitator and participants
1. Technical	Effectiveness / efficiency of practice Professional development	Outside 'expert'	Co-option (of practitioners who depend on facilitator)
2. Practical	As (1) above Practitioners understanding Transformation of their consciousness	Socratic role, encouraging participation and self-reflection	Co-operation (process consultancy)
3. Emancipatory	As (2) above Participants' emancipation from the dictates of tradition, self-deception, coercion Their critique of bureaucratic systematisation Transformation of the organisation and of the educational system	Process moderator (responsibility shared equally with participants)	Collaboration

Source: After Carr and Kemmis (Zuber-Skerritt, 1992, p.12)

6.4. Participatory Action Research

Participatory Action Research (PAR), a 'hybrid' of Carr and Kemmis's technical, practical, and emancipatory action research types, is an emerging action research model with the further aim of contributing to general scientific knowledge.

> *"PAR is a methodology in which the researchers and members of a social system collaborate in a process of data-guided problem solving for the dual purposes of (a) improving the system's ability to provide members with desired outcomes and (b) contributing to general scientific practice."*

Schurman and Israel (cited in Schurman, 1996, p. 374)

According to Schurman (1996, pp. 374-375), PAR's purposes are accomplished through a number of mechanisms inherent in the application of the PAR process (see Table 6 below).

Table 6
The PAR process and associated mechanisms

Effective Mechanisms	The PAR Process
1. Enhancing the system's ability to take action to meet identified needs;	A cyclic process of research and action, in which outside researchers and inside system members jointly: a) identify the aspects of the system that they wish to change;
2. Improving the system's ability to use data to guide actions and contribute to a body of knowledge;	b) develop a 'theory of the situation', and collect and interpret empirical data to test their theory; c) use their research findings to develop and implement interventions;
3. Increasing the system's capacity to learn from experience;	d) create a plan to monitor and evaluate the effects of their interventions; e) specify key learnings gained from their experiences of intervening;
4. Decreasing the power inequities among system members.	f) consolidate their learnings into revised action plans that directly benefit system members, and into general knowledge that benefits the broader public interest.

Source: After Schurman (1996, pp. 374&375)

PAR's aim to contribute to the body of general scientific knowledge (i.e. to be recognised as a valid research methodology by positivist standards), and the less 'emancipatory' relationship between 'outside' researcher and 'inside' participants, aligns it closely with the intent of Lewin's original model. PAR purports to meet "daunting standards of scientific rigor" (Hart & Bond, 1995, p. 26), and as such, is somewhat more disciplined in its structure, process and data collection / validation procedures than a number of other action research models. Participatory Action Researchers, recognising that "one way to help those working in this [the PAR] field is to strengthen their basic methodological competence" (Karlsen cited in Whyte, 1991, p. 144), have been working to collect and systemise PAR methods, practice and experience for the purpose of providing PAR methodologies which effectively and efficiently deliver actioned solutions to problems and valid research for extending general knowledge.

According to Whyte (1991, p. 21), PAR (particularly in terms of its application to organisational behaviour) was developed from the work of the

Tavistock Institute (a British industrial psychology organisation with strong links to Lewin psychologists), and Norwegian worker democracy research. Korrie de Koning and Marion Martin (1996, pp. 4-5), however, have traced the development of a more 'emancipatory' PAR model to very poor and oppressed countries in Latin America, Africa and Asia. Also called 'Participatory Research', the development and use of PAR in these settings was driven by the need for a research tool which helped empower underprivileged and marginalised people in their struggle to overcome / alleviate oppression and poverty. The balance between action and research in the application of PAR in this context (i.e. empowering oppressed people) is less focused on contributing to the body of general knowledge than PAR applications in the area of general organisational behaviour. The focus for PAR practitioners working in third world countries is weighted more positively towards outcomes for participants - particularly their education and empowerment through the research process (de Koning & Martin, 1996, p. 5).

6.5. Action Research For Everyday People

Stringer (1996, p. 16 &17), has more recently reworked Lewin's original model of spiraling cycles of planning, acting, observing and reflecting, into a new, 'simplified' form for the purposes of community-based action research (see Box 8 below).

Box 8
Stringer's Basic Action Research Routine

Look	• Gather relevant information (Gather data) • Build a picture: Describe the situation (Define and describe)
Think	• Explore and analyse: What is happening here? (Hypothesize) • Interpret and explain: How/why are things as they are? (Theorize)
Act	• Plan (Report) • Implement • Evaluate

Source: Stringer (1996, p. 16)

The language of 'look, think, act' in this model is perhaps easier for Stringer's target participants to initially grasp and understand, facilitating their transition to co-researchers. He does, in fact, consider the approach 'user friendly', providing people with a systematic research methodology that they can use to resolve specific problems. For Stringer (1996, p. 15), it is a deliberate departure from "the elaborate routines of traditional scientific research, which from the perspective of the practitioner, are often shrouded in the mists of technical language and mystified by complex statistical procedures".

Stringer also represents this model as a series of overlapping cycles (see Figure 5 below), used to illustrate that the action research process is not a linear one.

> *"As experience will show, action research is not a neat, orderly activity that allows participants to proceed step by step to the end of the process. People will find themselves working backwards through routines, repeating processes, revising procedures, rethinking interpretations, leapfrogging steps or stages, and sometimes making radical changes in direction."*

Ernest T. Stringer (1996, p. 17)

Figure 5
Stringer's Action Research Interacting Spiral
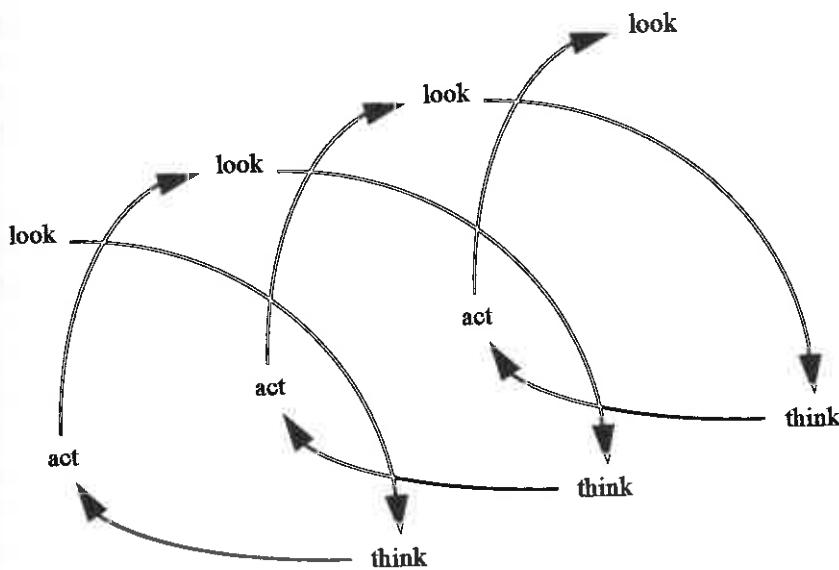
Source: After Stringer (1996, p. 17)

This is an important concept to grasp. Action research is a dynamic, fluid and flexible process, still subjected to the disciplines of collaboration and self-reflection at every step - though able to comprehend change and respond in a way that is appropriate for the research context and its aims. This is one of the characteristics of action research that enables it to be applied within a 'real world' environment, an environment which itself is dynamic - an environment which can be very complex and in a state of continual change.

6.6. Developing A Unifying Action Research Typology

One of the major criticisms of the action research movement has been the variation in action research types and associated standards, the lack of

consistency re language describing action research, and the lack of a unifying typology to pull all the threads (or streams) together under the one umbrella - providing some clarity and making it easier for people to understand (Hart & Bond, 1995, p. 39). Carr (1995, p. 102) noted that the increasing number of action research books being published contain a "multiplicity of views about the practical purposes of action research and interpret its meaning and significance in different, and sometimes incompatible, ways" - a point also highlighted by Hart and Bond (1995, p. 39).

While Carr and Kemmis went part of the way towards producing such a 'unifying' typology, their model is restricted to three action research types and defining characteristics. Hart and Bond have produced a typography (see Table 7 below) which defines four action research types (experimental, organisational, professionalising, and empowering) by seven distinguishing elements, and hence provides a more comprehensive typography covering what Reason (1993, p.1255) describes as a huge field. The additional action research type included in the Hart and Bond model is the 'professionalising' type - an action research type used by professionals to improve their practice, 'lift' professionalism, and empower practitioners (Streubert & Carpenter, 1999, p. 254; Hart & Bond, 1995, p. 44).

Hart and Bond's typography provides us with additional distinguishing elements which not only help identify different types of action research (and the commonality across types), but also assist with the selection of action research models, and the understanding of the complexity, variability and flexibility of action research. Intended to describe the four, broadly recognised 'ideal types' of action research as a 'guide to practice', Hart and Bond (1995, p. 44) acknowledge that their typography does not adequately capture the fluid, dynamic nature of action research, and that the four 'ideal types' described do not necessarily define actual models found in practice. In reality, while one 'type' of action research model may be selected for application in a particular context, through the life of the research project, the action research methodology will more than likely change and evolve as the process moves through various research cycles to meet the requirements of the specific research context (Hart & Bond, 1995, p. 46; Streubert & Carpenter, 1999, p. 255). There is the potential for variants of all four 'ideal types' to be utilised through the life cycle of the research project. This is one of the great strengths of action research, but also one of its challenges.

Table 7
Hart and Bond's Action Research Typology

Action Research Type: Distinguishing Element ...	*Consensus model of society* *Rational social management*		*Conflict model of society* *Structural change*	
	Experimental	**Organisational**	**Professionalizing**	**Empowering**
1. Educative base	• Re-education • Enhancing social science / administrative control and social change towards consensus • Inferring relationship between behaviour and output; identifying causal factors in group dynamics • Social scientific bias / researcher focused	• Re-education / training • Enhancing managerial control and organizational change towards consensus • Overcoming resistance to change / restructuring balance of power between managers and workers • Managerial bias / client focused	• Reflective practice • Enhancing professional control and individual's ability to control work situation • Empowering professional groups; advocacy on behalf of patients / clients • Practitioner focused	• Consciousness-raising • Enhancing user-control and shifting balance of power; structural change towards pluralism • Empowering oppressed groups • User / practitioner focused
2. Individuals in groups	• Closed group, controlled, selection made by researcher for purposes of measurement / inferring relationship between cause and effect • Fixed membership	• Work groups and / or mixed groups of managers and workers • Selected membership	• Professional(s) and / or (interdisciplinary) professional group / negotiated team boundaries • Shifting membership	• Fluid groupings, self-electing or natural boundary or open / closed by negotiation • Fluid membership

Action Research Type: *Distinguishing Criteria ...*	*Consensus model of society* *Rational social management*			*Conflict model of society* *Structural change*
	Experimental	**Organisational**	**Professionalizing**	**Empowering**
3. Problem focus	• Problem emerges from the interaction of social science theory and social problems • Problem relevant for social science / management interests • Success defined in terms of social science	• Problem defined by most powerful group; some negotiation with workers • Problem relevant for management / social science interests • Success defined by sponsors	• Problem defined by professional group; some negotiation with users • Problem emerges from professional practice / experience • Contested, professionally determined definitions of success	• Emerging and negotiated definition of problem by less powerful group(s) • Problem emerges from members' practice / experience • Competing definitions of success accepted and expected
4. Change intervention	• Social science, experimental intervention to test theory and / or generate theory • Problem to be solved in terms of research aims	• Top-down, directed change towards predetermined aims • Problems to be solved in terms of management's aims	• Professionally led, predefined, process-led • Problem to be resolved in the interests of research-based practice and professionalization	• Bottom-up, underdetermined, process-led • Problem to be part of process of change, developing an understanding of meanings of issues in terms of problem and solution
5. Improvement and involvement	• Towards controlled outcome and consensual definition of improvement	• Towards tangible outcome and consensual definition of improvement	• Towards improvement in practice defined by professionals and on behalf of users	• Towards negotiated outcomes and pluralist definitions of improvement: account taken of vested interests

Action Research Type: Distinguishing Criteria ...	Consensus model of society Rational social management			Conflict model of society Structural change
	Experimental	*Organisational*	*Professionalizing*	*Empowering*
6. Cyclic processes	• Research components dominant • Identifies causal processes that can be generalized • Time limited, task focused	• Action and research components in tension; action dominated • Identifies causal processes that are specific to problem context and / or can be generalized • Discrete cycle, rationalist, sequential	• Research and action components in tension; research dominated • Identifies causal processes that are specific to problem and / or can be generalized • Spiral of cycles, opportunistic, dynamic	• Action components dominant • Change course of events; recognition of multiple influences upon change • Open-ended, process driven
7. Research relationship, degrees of collaboration	• Experimenter / respondents [selected participants?] • Outside researcher as expert / research funding • Differentiated roles	• Consultant / researcher, respondent / participants • Client pays an outside consultant - 'they that pay the piper call the tune' • Differentiated roles	• Practitioner or researcher / collaborators • Outside resources and / or internally generated • Merged roles [between practitioner & collaborators]	• Practitioner researcher / co-researchers / co-change agents • Outside resources and / or internally generated • Shared roles

Source: Hart and Bond (1995, pp. 40–43)

6.7. Emerging Action Research Models and OHS

The process of improving and extending the knowledge of action research, how best to apply it in a specific context, and how to best explain and represent it to others, is an ongoing one (see Figure 6 for a recent addition to the growing selection of action research models). The action research model is one which is shaped through its application, and through the very cyclic, reflective principles at its core. Action research is also predominantly about people learning (Streubert & Carpenter, 1999, p. 252; Hart & Bond, 1995, p. 38): learning about themselves, learning about others, learning about problems, learning how to solve them, and learning how best to research in a specific context. It is not surprising then, that new or modified action research models continue to emerge. In time, another unique action research model may also be developed - a model representing the effective application of action research by OHS practitioners for the benefit of the people in the workplace, the practitioners themselves, and their peers within the wider field of OHS.

Figure 6
An eight step action research model

Action

Improved action

1. Defining the enquiry

8. Reviewing the change and deciding what to do next

2. Describing the situation

7. Collecting and analysing data about the change

3. Collecting and analysing the data

6. Monitoring the change

4. Reviewing and looking for contradictions

5. Tackling a contradiction by introducing change
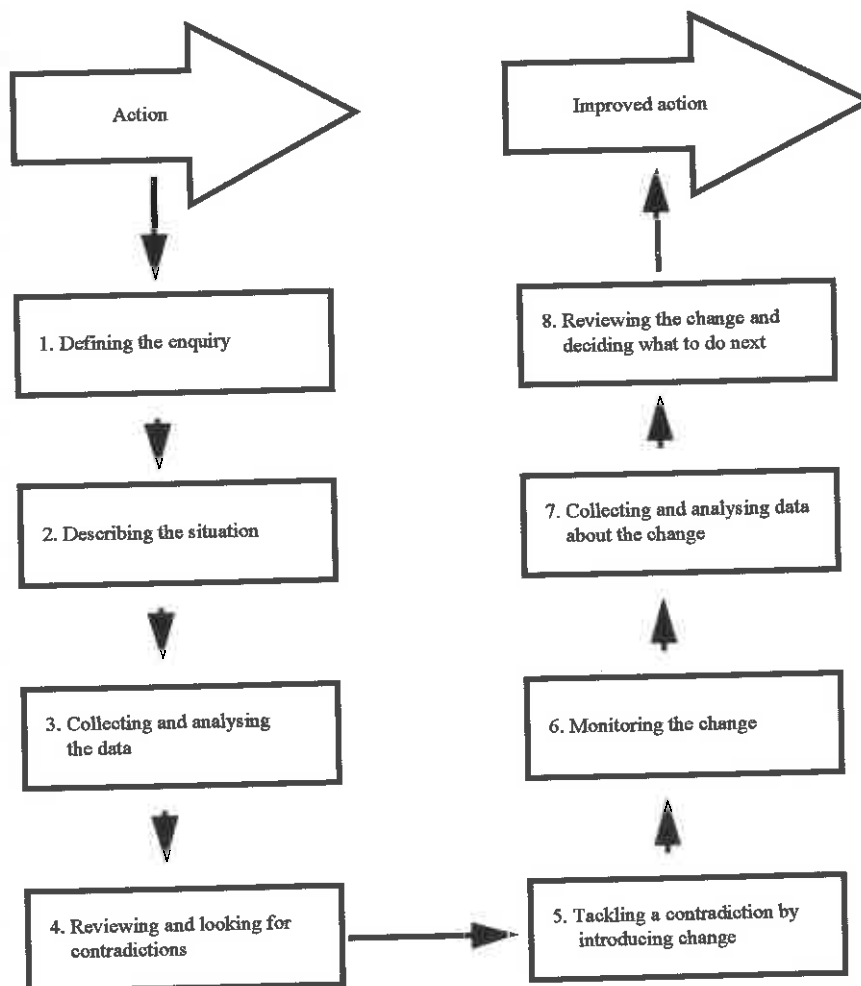
Source: Michael Bassey (cited in Halsall, 1998, p. 95)

7. Action Research: Criticisms and Response

"If researchers are going to be 'scientific', to do research within a participative, systemic, and emergent worldview, it behoves them to say what they mean by science and by research. If these questions about the nature of knowledge are not addressed, we are left with methodologies which break traditional canons of scientific methodology but which nevertheless appeal to 'science' for their justification, which simply does not make sense."

Peter Reason (1993, p. 1257)

7.1. Action Research Is Not A Positivist Research Methodology!

By far the greatest criticism of action research relates to its validity and reliability as a research method. According to Sekaran (1992, p. 171-172), "validity and reliability attest to the scientific rigor applied to the research study", with positivist science recognising many different types of 'validity' based on the various aspects of the research critically evaluated (e.g. content validity, predictive validity, construct validity, etc.). 'Epistemology' is defined by the *Collins English Dictionary and Thesaurus* (1993, p. 377) as "the theory of knowledge, esp. (sic.) the critical study of its validity, methods, and scope". At the core of the critical questioning of the scope of modern action research, its methods, and its validity, has been confusion and a lack of clarity with regards to the scientific basis for action research. This confusion and lack of clarity is due in part to a paucity of epistemological development and strength (Hart & Bond, 1995, pp. 36-37).

Confusion about the scientific basis for action research has its roots back in Lewin's original action research model, which "though it emphasised field work [action], did not seek to abandon the scientific rigor of traditional [positivist] research in the social sciences" (Kember and Kelly, 1993, p. 3). Elden and Chisholm (cited in Reason, 1993, p. 1257) confirm that "the researcher in the classical action research model acts as much as possible like a conventional scientist". It has been argued above that this tie with positivist, orthodox science contributed significantly to the subversion of action research methodology following the death of Kurt Lewin (Wilfred Carr, 1995, p. 100).

This same unhealthy coupling with positivist orthodox science has continued to impact action research in subsequent decades. Action researchers have struggled with what Karlsen (cited in Whyte, 1991, p. 144) has described as "the double challenge of action and research ... [creating] difficulties in meeting the standards of [positivist] scientific rigor". Many action research projects have been savaged when evaluated from a positivist perspective (Travers cited in Robson 1993, p. 439; Robson, 1993, p. 440). Many action researchers have either inadequately articulated the scientific basis for their research, or have looked to build within their action research projects, enough 'hard data' to ensure a level of credibility and acceptance when assessed from a

positivist scientific viewpoint, and have not delivered either quality action research or quality positivist research as a result (Mangham, 1993, pp. 1243-1251). Iain Mangham (1993, pp. 1250-1252), has said the following in relation to the action research submissions published in the Human Relations Action Research Special Issue, February 1993 ...

> "He [Levin] appears, like many of his peers in this special issue, to be more interested in scientific procedure than scientific substance. His paper is proudly offered as an example of "rigorous social science," a piece of "rigorous scientific analysis." Analysis here, however, is not concerned with the substance, the _what_ of action research - democratic dialogue and co-generation, the construction of social reality - but with 60 interviews before the project started, 20 in-depth interviews with "key actors," and three different surveys at the end. Dr. Levin concludes "Hard data on the number of projects and types of activities that resulted from the three phases of the development process were also recorded." Don't you just love that _hard_ data?
>
> On the whole, I found the papers disappointing ... As someone interested in the negotiation of reality, I wish the writers had shared more of this activity with me and had taken less time aspiring to be natural scientists."

That action researchers have struggled to justify their research from a positivist science standpoint is not surprising - one cannot use the rules of cricket to play football, or the standards of what constitutes 'good' cricket to judge the quality of a football match. Yet, this is in effect what has been occurring. Action research has been judged by the rules and standards of the positivist scientific paradigm, when it is (in fact) a 'new paradigm' scientific research method , and must be judged by the rules and standards of the new scientific paradigm (Reason, 1993, p. 1258; Owens, 1995, p. 271). This new scientific paradigm has been termed by Reason (1988, p. 9) as 'co-operative inquiry'.

What is perhaps more surprising at first glance, is that many action researchers have continued to be drawn to play by the rules of another, much older and quite different, research game. In doing so, they put at risk the very strengths / benefits that action research methodology offers their own research (Mangham, 1993, p. 1250), and they perpetuate the epistemological confusion which has prevented action research from being widely understood and embraced as a very different, but none the less valuable and valid research method (Reason, 1993, pp. 1256-1257; Carr, 1995, p. 102; Elden & Levin, cited in Whyte, 1991, p. 127). Further investigation, however, reveals that there are a number of factors that have contributed significantly to the persistence of this condition - factors which (to some degree) continue to support the status quo (i.e. the corrupting influence of positivism retarding the emergence of action research as a distinctly different methodology - genuinely validated from a different scientific paradigm) ...

- The failure of the classical action research model to make a 'clean' break with traditional positivist science as discussed above.
- The all pervasive influence of the positivist world-view (Carr, 1995, pp. 104-106; Carr & Kemmis, 1986, p. 60), and the strength of its

socialisation processes - particularly within educational and research communities (John Heron, 1996, pp. 32-33).

- The widely varying definitions of 'action research' associated with disparate streams of development (Stringer, 1996, p. xvi), and the high level of methodological diversity within what is the very large field of action research - which have both complicated and impeded development of a clear, defining action research typology / methodology / epistemology (Hart & Bond, 1995, pp. 36-39; Reason, 1993, 1255).

- The preoccupation of action research "with the [specific] settings in which research is done" rather than the development of action research epistemology or the refining of action research methodology (Gustavsen, 1993, p. 1361; Reason, 1988, p. 13).

- The timeframe necessary for the growth, development and maturation of action research as a research methodology (Gustavsen, 1993, p. 1362).

7.2. The 'New Paradigm' Scientific Basis For Action Research

Prominent proponents of action research, however, have identified that the time to comprehensively address issues of action research epistemology has well and truly arrived (Karlsen cited in Whyte, 1991, pp. 144-157; Hart & Bond, 1995, pp. 40-43; Carr, 1995, pp. 102-104; Reason, 1993, pp. 1256-1263) - though all would recognise the task is a formidable one. Action researchers need to understand, and clearly and confidently articulate the scope of modern action research, its methods, its validity, and its 'new paradigm' scientific basis, or action research is at risk of continuing to be generally regarded as (or potentially becoming) little more than "a sophisticated form of positivism" (Carr, 1995, p. 104), or "one way of excusing sloppy research" (Eden & Huxham, cited in Hart & Bond, 1995, p. 39). Without a comprehensive epistemology based on the new scientific paradigm, the important elements / features of modern action research, which are "in direct contradiction with the orthodox scientific view", may be prevented from effectively delivering on their promise (Reason, 1993, p. 1258).

For Karlsen (cited in Whyte, 1991, p. 154), there is at least one precedent for development of an alternate research strategy, independent from the classical experimental model of positivist science, with its own validity / design criteria and methodology, - case study research. It is a methodology which, while it does have features which clearly distinguish it from action research (e.g. the general reliance on a more positivist research process, with the traditional roles of outside researchers and subjects), none-the-less shares some common ground with action research.

Yin (1994, p. 13) provides the following definition of the case study, which when applied in a quality manner he clearly sees as delivering valid outcomes and knowledge ...

"1.   A case study is an empirical inquiry that

- *investigates a contemporary phenomenon within its real-life context, especially when*
- *the boundaries between phenomenon and context are not clearly evident.*

2.   *The case study inquiry*
- *copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as a result*
- *relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result*
- *benefits from the prior development of theoretical propositions to guide data collection and analysis."*

So what is the 'new paradigm' scientific basis for action research which will allow action researchers to confidently / successfully defend the validity of their research, and to boldly step out to capture the promise of the features outlined by Reason above - without bending the knee to the influence of positivist science? Table 8 below (after Reason, 1993, pp. 1258-1262) identifies some of the key principles of the 'new paradigm' scientific basis as they relate to the features of action research referred to above. Peter Reason (1993, p. 1263) recognises that these principles are only a beginning, and that there is much work yet to do in emphatically, comprehensively answering this fundamentally important question. Reason (1993, p. 1268) does, however, provide the following summary of a key validity criteria for action research ...

"When we engage in action research we are engaging in a human process of building communities of inquiry. We have moved away from attempts at rigorous external control which was the basis of traditional research, ... we put our trust much more in the human process of critical curiosity, on what I have called 'human inquiry'. One of the criteria of validity, or quality, of this kind of research is that it takes place within a community of inquiry which is capable of effective communication and self-reflection."

Given that a 'community of inquiry' with the capacity for quality communication and self-reflection is a key validity criteria for action research, it may be of benefit to identify some additional characteristics of an effective community of inquiry ...

- access to relevant information, freedom of choice, and internal commitment (Argyris cited in Reason, 1993, p. 1268);
- capacity to "reflect on the congruence between its purposes, strategies, behavior (sic.), and the outcomes of these" (Torbert cited in Reason, 1993, p. 1268);
- genuine participation and the potential for "the kind of learning that moves beyond and looks over the boundaries of frameworks ... and the taken-for-granted sense of self" (i.e. emotional competence) (Reason, 1993, pp. 1260 & 1268-69).

7.3. Action Research Validity Principles and Processes

Action research also applies multiple types of validation processes. Another key criteria for the production of valid knowledge through action research is the way that the interaction between research and action is organised (Karlsen, cited in Whyte, 1991, p. 154). Karlsen (1991, p. 155) believes (with Reason - see Table 8 below) that the features and characteristics of action research (one of which relates directly to the relationship between research and action) lend themselves to be used as key validation mechanisms. Karlsen (cited in Whyte, 1991, pp. 155-156) has grouped these mechanisms under three main headings (pragmatic validation and spiral design, consensus validation, and the need for reflection and design for the devil's advocate) ...

i. Pragmatic Validation and Spiral Design

The action research process, with its self-reflective spirals made up of cycles of planning, acting, observing and reflecting, is itself a validation mechanism - ensuring that the outcomes of the reflecting and planning stages are effectively tested and evaluated through the acting and observing stages. Kemmis and Carr (1986, p. 186) see each stage of the self-reflective spiral retrospectively interacting with the stage before it, and prospectively with the stage following it, thus linking "reconstruction of the past with the construction of a concrete and immediate future through action". Validity therefore improves at and with each stage of the action research cycle. (Elden & Levin, cited in Whyte, 1991, p. 139).

Getting the appropriate balance between reflection and action in the overall process is also an important factor when building validity (Heron cited in Reason, 1988, pp. 48-49). When there is significant unbalance at either end of the scale (i.e. lots of reflection and very little testing through action, or visa versa) the degree of validity is lowered.

That action research takes place in a 'real world' context "in which people are [often] absorbed with solving immediate and pressing problems ... [and where] the pressure to achieve results is great" (Karlsen cited in Whyte, 1991, p. 155), is also a factor which underpins validity. People involved in action research are acutely focused on delivering valid outcomes, and in particular, outcomes that are validated in the real world where results ultimately stand or fall, and where the consequences for getting it wrong can be quite immediate and significant.

Table 8

New Paradigm Principles By Action Research Element

Action Research Element	New Paradigm Principle
1. Action research as enhancing the system's capacity for self-study:	• Reliance on the *human person* and the *human community* as the basis for knowing. • A self-reflexive methodology which *embraces and aims to enhance the human capacity for critical understanding.* • An extended epistemology which moves between and seeks to integrate several different kinds of knowing - *a process which attentively and consciously cycles between action and reflection* (i.e. research cycling in the depth necessary to deliver levels of rigor appropriate to the research context).
2. Action research as social construction of reality:	• The research activity is *focused* on what might be, *on intentional and radical change of the situation* - and not only change within the existing systems parameters, but potentially change to key system parameters as well.
3. Engaging with large and diffuse systems:	• Action researcher practitioners look *to engage with very large systems and with networks of systems over very long periods of time,* and to engage in systems that are diffusely defined. • Action research looks to frame an *understanding from a systemic viewpoint,* and is concerned with patterns of behaviour and mutual causality in circuits of interaction. • Patterns of interaction can be identified in whole systems, and *the research process continues to the point of 'redundancy'* (i.e. until the patterns are 'saturated' to the point that ensures reasonable confidence that all evidence has been revealed and considered).
4. Insiders as co-researchers:	• Recognises that insider co-researchers possess *a rich store of knowledge about their own system and culture* and is information that is, however, forged from their perspective of the world, by their past and present experience - and is thus as biased and skewed as it is unique and distinctive. • *Operates in a state of critical subjectivity* where primary subjective experience is not suppressed, that accepts *all knowing is from a perspective, but that is actively, self-reflexively aware of that perspective* (of the ground on which all research participants are standing), and *articulates this awareness in out communications.*
5. High leverage:	• Emerging varieties of action research are applied in politically charged situations with high leverage and active diffusion of knowledge (i.e. situations where there may exist powerful interests which may potentially influence the research). *Researchers explicitly and continually explore their own political allegiances,* their perspectives based on class, gender, race, country of origin, and so on, *to identify and address, on an ongoing basis, the political influences on the research.*

After Reason (1993, pp. 1259-1263)

"The realization by action researchers that they will be judged first on relevance (by the world of action) and only later on elegance (by the world of knowledge) galvanizes their concern about the validity of their observations."

Walton & Gaffney (cited in Whyte, 1991, p. 124)

The testing of the outcomes of the reflecting and planning stages through the action and observation stages can also open the door to 'falsification', defined by Heron (cited in Reason, 1988, p. 51) as

"... resistance to noticing inadequacies in the idea [the plan participants have formulated to resolve a problem] that the experiential test throws up ... [through collectively] not noticing, or if they notice, in not mentioning, aspects of their experience that show up the limitations of their conceptual model ... [through] obscuring the false assumptions implicit in their leading ideas and/or in their ways of taking these ideas into action ... [through] lack of rigor in their inquiry methods and in applying vigorously the various validity procedures."

Falsification (sometimes referred to as 'group think') can occur intentionally or somewhat sub-consciously, but is bound up in the ownership that each co-researcher has developed for the problem, the consensus understanding of the problem and its context that they've helped to build, and for the plan that they have been an integral part of developing to resolve it. Each participant in the research needs a significant level of ownership of, and commitment to, the action research process, however each participant must, simultaneously remain "unattached to it, watchful for shortcomings, noticing more than belief in it entails, and holding alternative ideas available in the mind at the ready" (Heron, cited in Reason, 1988, p. 51). An internal 'devils advocate' mechanism can be an effective strategy to avert falsification, where anyone on the research team can take up the role to probe, challenge and confront rigorously any potential areas of collusion, and thus ensure validity concerns are addressed (Heron, cited in Reason, 1988, p. 51). Utilising an external devils advocate (see point iii below), will also provide a check in the system against falsification.

ii. Consensus Validation

The involvement of practitioners (i.e. the insider co-researchers as they have been termed by Reason in Table 8 above) in every stage of every spiral within the action research process, is another validation mechanism. Stringer (1996, p. 10) puts it like this ...

"Collaborative exploration helps practitioners ... and other stakeholding parties [i.e. co-researchers] to develop increasingly sophisticated understandings of the problems and issues that confront them. As they rigorously explore and reflect on their situation together, they can repudiate social myths, misconceptions, and misrepresentations and formulate more constructive analyses of their situation. By sharing their diverse knowledge and experience ... stakeholders can create solutions to

their problems and, in the process, improve the quality of their community life."

With each individual genuinely participating and contributing - each bringing unique 'ways of knowing', their own distinct knowledge and understanding of the specific problem and its context, different types of intelligences, quite divergent histories and experiences, and diverse value and belief systems - they as a team produce / build a consensual understanding of a problem, and a plan of how best to move forward in action to resolve it and effect change. They together implement the action, they together observe and evaluate the action, and together they reflect on and interpret the action outcomes, the effectiveness of the action research process as a whole, and their own role / practice.

It is the quality of co-researcher participation that gives consensus validation, referred to by Reason (1988, pp. 10-11) as participatory and holistic knowing, its strength as an authentic "source for corroboration" (Karlsen, cited in Whyte, 1991, p. 155).

The following two quotations from Whyte et al (cited in Whyte, 1991, p. 54) also relate to the concept of consensus validation ...

> *"Practitioners [co-researchers] often bring the pursuit of irrelevant or ill-conceived lines of inquiry to a rapid halt, correcting or refining the questions asked in ways that lead to sharper formulation and more productive research."*

> *"Active involvement with practitioners struggling to solve important practical problems is highly likely to open up researchers' minds to new information and new ideas, leading to advances in theory as well as practice."*

iii. The Need for Reflection and Design for the Devil's Advocate

While the need for reflection is inherently addressed within the action research process, the requirement for reflection as a validity mechanism referred to here by Karlsen (cited in Whyte, 1991, p. 156) is one that must be built into the action research project design. It involves the action research facilitator taking and making the time to discuss the research with someone outside the 'system', as a means of maintaining an adequate perspective. The individual(s) involved should have an understanding of action research methodology, and therefore be able to effectively play the role of 'devil's advocate', ensuring that the research process, and the practice, actions and assumptions of the action research facilitator are scutinised, challenged and tested. This mechanism of peer review, through the life cycle of the action research process, also contributes to the validity of the research.

7.4. Reflexive Critique, Dialectic Critique, and Triangulation

Three additional validation mechanisms have previously been highlighted within the section of this paper titled "Action Research - Definition and Features". Two of these mechanisms - reflexive critique, and dialectic critique, are considered by Richard Winter (cited in Carr, 1995, p. 103) to have the capacity to provide, on their own, the foundation of action research validity (see discussion below). Triangulation, the third mechanism which is also a feature of case study research (Yin, 1994, pp. 90-94), is the use of more than one method of collecting observations, and is also an important contributor to the validity of action research outcomes. Triangulation is defined by Winter (cited in Zuber-Skerritt, 1996, p. 16) as the "process by which, when a situation is investigated using a number of different methods, each method partly transcends its limitations, by functioning as a point of comparison with the others". The use of several (and preferably at least three) observation types and sources, which have been generally collected and recorded in a planned, systematic way, helps the action research team to ...

- build (through the reflection stage of the action research cycle) a comprehensive understanding of phenomena taking place (e.g. the impacts of the action stage of the research cycle);
- to develop and question multiple explanations for these phenomena (facilitates the application of reflexive critique);
- and to draw out context specific, meaningful conclusions with a reasonable level of confidence and accuracy (Streubert and Carpenter 1999, p. 261).

That these conclusions are not, however, intended to be taken as 'absolute' (Streubert and Carpenter 1999, p. 262) is also an important factor in answering questions of validity. The outcomes of action research are not intended to be 'law-like generalisations' that may be universally and uncritically applied. They are, rather, the basis for the next planning stage of the action research cycle, an initiator of further dialogue, and inputs to the continuing process of local theory development - local theory which practitioners confronted with similar problems in other contexts may also value as inputs into their own action research process. For action researchers, there is never one single, final, complete and certain conclusion or interpretation that can be applied universally (Winter cited in Zuber-Skerritt, 1996, p. 19). Action research does not, therefore, need to meet the validity criteria of positivist science - which does purport to produce, through the agency of neutral, objective observation and experiment, fact-based natural laws and universally applicable generalisations.

Reflexive and dialectic critique are reflection techniques which action researchers use to concentrate reflection for the purpose of identifying underlying influences (Streubert & and Carpenter 1999, p. 260). Action researchers recognise the potential for "the distorting effects of ideology, custom, habit, tradition, coercion, authority and institutionally imposed and maintained definitions and expectations" on each research participant, to

impact on the action research process and outcomes (Parker, 1997, p. 54). Reflexive technique (which is based on the assumption that feedback and data provided by people not only describes their experience of the specific action or change step, but inherently describes all other experiences in each individual's life) is a mechanism used to identify the various, valid explanations for the observation outcomes. The active application of this technique ensures the action research team thoroughly explores the influences on observations / data, digging to reveal as many explanations for the observation outcomes as possible. The identification and consideration of these multiple explanations assists the action research team to draw out context specific, meaningful conclusions with a reasonable level of confidence and accuracy (Streubert and Carpenter 1999, p. 261) - thus building valid knowledge on which to build the next stage within the research cycle.

Dialectic critique (which looks to probe the observations / data for internal contradictions) is used to identify, pursue and discuss any conflicts within the observation outcomes, and subsequently build the action research team's understanding of the nature of the action / change step, and the complex factors that influence(d) its implementation. The disciplined application of this technique ensures opportunities to extend the action research team's knowledge and understanding of a phenomenon, through the identification and exploration of contradictions within observations / data, are not passed over. Increased knowledge and understanding, then improves the quality / validity of the next stage within the action research cycle (Streubert and Carpenter 1999, p. 261).

Reflexive and dialectic critique are mechanisms which allow action researchers to achieve a state that Reason (1988, p. 11-12) refers to as 'critical subjectivity' - a "quality of awareness in which we do not suppress our primary subjective experience; nor do we allow ourselves to be overwhelmed and swept along by it; rather we raise it to consciousness and use it as part of the inquiry process". Reason (1988, p. 13), in fact, argues that in meeting the standard of critical subjectivity to a high level, action research is actually a more rigorous and demanding methodology than the orthodox scientific method.

> *"What is important, in this transition to post-positivism, is that we keep hold of and develop this quality of critical knowing. We are not in the business of lapsing back into naive inquiry, nor of resting with objective consciousness with all its epistemological errors; rather we are seeking ways to move forward to a new form of integrated consciousness and critical awareness."*

Reason (1988, p. 13)

A final feature of action research that enhances validity is generally the length of the action research process - which in many cases has continued for periods in excess of twelve months (Elden & Levin, cited in Whyte, 1991, p. 129). Where the process 'lives' over a lengthy period, the action research team generally has more opportunity to develop an understanding of the problem and its context through a number of 'seasons', and to evaluate and fine tune their action (Owens, 1995, p. 267). Related to the number of action research cycle spirals that an action research team works through, observations and data

collected over a longer period will tend to build research validity - particularly through the disciplined application of reflexive and dialectic critique.

7.5. Summary

That action research is a kind of 'naive inquiry' (e.g. merely subjectivism) is one of the key criticisms leveled against it (Reason, 1988, p. 228). The discussion above, however, comprehensively demonstrates that this is not the case - far from it. There are, however, varying qualities of action research - just as there are varying qualities of case study and positivist research, and not all research labeled 'action research' actually falls within the bounds and definition of action research (Hart & Bond, 1995, p. 39). When assessing the quality of action research, however, as when assessing the quality of case study research, it is obviously critical to assess apples by the quality criteria for apples - and not bananas - otherwise we run the risk of rejecting, out of hand, what may be a very nutritious and delicious fruit (i.e. judge action research on the standards and criteria of the new scientific paradigm - not on the standards and criteria appropriate to a research methodology based on a totally different scientific paradigm).

A further criticism of action research is that it tries to be all things to all people (Hart & Bond, 1995, p. 29) - a universal remedy for every situation. Action research is not "a panacea for all ills and does not provide solutions to all problems" (Stringer, 1996, p. 16). Prominent proponents of action research recognise that it is a case of 'horses for courses', and that what is to be researched, the purpose of the research, and the context of the research are all factors in the choice on an appropriate research methodology (Susman and Evered cited in Hart & Bond, 1995, p. 22). Prominent proponents of action research also acknowledge the contributions, both historical and future, of positivist research within the physical / natural sciences (Reason, 1988, p. 10; Carr & Kemmis, 1986, p. 131). Hart and Bond (1995, p. 4) ...

> "In the following pages we present an argument for action research to be considered as an option by practitioners and researchers in health and social care agencies wishing to improve professional practice and standards of service provision, and by educators teaching research methods to students on health and welfare courses. We do not pretend that action research is ever easy or unproblematic, and we do not ignore its critics. Nevertheless, we do believe that the current ideology of reform and improvement in the health and social care services, along with other related developments, points almost inevitably in the direction of action research."

Gustavsen (1993, p. 1364), in the spirit of critical subjectivity, makes the following points in relation to some of the key validity criteria and mechanisms discussed above, and the adequacy of these criteria / mechanisms for the validation of action research ...

> "Do these ... lines, when taken together, constitute a full answer to the question of what is to count as knowledge in a subject-subject [action research] situation? Can we say that we have solved the problem of a new epistemology, at least to our own

satisfaction, and leave it to others to pursue their version of the problem? I think we could, but I do not think we should. The comments by Peter Reason have reinforced the view that there are some quite important issues left [to deal with] ...."

Karlsen (cited in Whyte, 1991, p. 157) provides the following list of areas needing further attention ...

- *a further development of the basis of scientific theory,*
- *a corresponding development of a research ethic,*
- *an elaboration of the role of researcher, and related training in it,*
- *development of a store of theory, even though one of the most exhilarating aspects of this field is the eclectic and broad approach, and, finally,*
- *the need for design and method development ... [as] it is important for recruitment and for bringing new research workers into the field. Good knowledge and methods imbue confidence.*

Winter (cited in Zuber-Skerritt, 1996, p. 17) also poses four practical epistemological problems for action research in Box 9 below. The satisfactory answering of these four questions will accelerate the emergence of action research as a valid and valued research methodology with tremendous potential for practitioners across many disciplines - and in particular, the field of Occupational Health and Safety.

Box 9
Four Practical Epistemological Problems For Action Research

1. *How can we formulate a method of work which is sufficiently economical as regards the amount of data gathering and data processing for a practitioner to undertake it alongside a normal workload, over a limited time scale?*

2. *How can action research techniques be sufficiently specific that they enable a small-scale investigation by a practitioner to lead to genuinely new insights, and avoid being accused of being either too minimal to be valid, or too elaborate to be feasible?*

3. *How can these methods, given the above, be readily available and accessible to anyone who wishes to practice them, building on the competencies which practitioners already possess?*

4. *How can these methods contribute a genuine improvement of understanding and skill, beyond prior competence, in return for the time and energy expended - that is, a more rigorous process than that which characterises positivist research?*

Richard Winter (cited in Zuber-Skerritt, 1996, p. 17)

8. The OHS Practitioner: Role Definition / Contextual Overview

In order to understand what action research has to offer the OHS practitioner, it is important to define what an OHS practitioner is, to have a basic understanding of the overall context within which their 'practice' generally takes place, and to briefly identify some of the relatively recent changes within the field of OHS that have contributed to increasing challenges for, and expectations of, their practice. The key words within the term 'Occupational Health and Safety (OHS) Practitioner' have been defined by the *Collins English Dictionary and Thesaurus* (1993, pp. 524, 785, 1019, 893) as follows ...

- Occupation: *"a person's regular work or profession; job."*

- Health: *"the state of being bodily and mentally free from disease."*

- Safety: *"freedom from danger or risk of injury ... a contrivance designed to prevent injury."*

- Practitioner: *"a person who practices a profession or art."*

From these four definitions, it is possible to construct a single (albeit simple) definition of the term 'OHS Practitioner'. An OHS Practitioner is one who practices the prevention of injury and disease (illness) which can potentially result (and frequently does result) from the exposure of people to danger or risk associated with their work.

8.1.   Organisations as Sociotechnical Systems

Work is generally performed in a workplace, and encompasses (among other things) interaction and relationships between people, materials, machinery, work methods, the natural/physical environment, the organisation and structure of the work, and energy - energy that has the potential to damage people if it is not effectively controlled (Viner, 1991). Work is social in nature (Owens, 1995, p. 293), as it involves people - but it also involves technology and its associated systems. Technology has been defined as "the application of practical or mechanical sciences to industry or commerce, ... [and] the methods, theory, and practices governing such application" (*Collins English Dictionary and Thesaurus*, 1993, p. 1190). Whyte (1991, p. 11) refers to 'sociotechnical systems' to bring these two principles together - the workplace as the "integration of social and technological factors". Improving performance in the workplace, whether it be related to the efficiency of the work, the quality of the work or the resultant product, the profitability of the work, or even the elimination of workplace injury / illness, is therefore not just a 'technical' matter - but importantly, also a social one.

Most 'work' within modern society takes place within 'organisations' (Mukhi et al, 1988, p. 65). An organisation, according to Owens (1995, p. 294), is a group of people (a human social system) with the following characteristics ...

- *They are specifically goal-orientated;*
- *The work to be done so as to achieve goals is divided into subtasks and assigned as official duties to established positions in the organisation;*
- *These positions are arranged hierarchically in the formal organisation, and authority relationships are clearly established;*
- *General and impersonal organisational rules govern, to a large extent, what people do in their official capacity and also, to a large extent, shape and delimit the interpersonal interactions of people in the organisation.*

Muhki et al (1988, p. 68) have further defined organisations as "a relatively enduring group of people in a structured, evolving system whose coordinated efforts are meant to reach goals in a dynamic environment" - the key additions here being the evolving nature of organisations, and the dynamic environment in which they exist.

8.2. Organisational Culture

Factors impacting on an organisation's environment and its dynamism can be internal to the organisation or external to it. A key internal environmental impact is the culture of an organisation. This 'culture' is related to organisations being constructed of and by people. Greenfield (cited in Owens, 1995, p. 297) purports that organisations are not living entities (i.e. that they are not 'real'), but that "'they are invented social realities' that actually exist only in the minds of people, rather than as tangible, independent realities ... [and that] it is human beings that populate the organisation: it is they who choose, act, and behave, even if in their own minds they reify [make real] the organisation as they do so". What the people within an organisation choose (based on what they value as important), how they act (as determined by how they believe things work), and how they behave (which is forged by what they perceive is 'normal' conduct) are the essence of an organisation's culture (Shaw & Blewett, 1996, p. 186). This culture exists both formally (as demonstrated through an organisation's documented structure, systems, policies, procedures, and rules), and informally (as through the choices, actions, behaviours, relationships, and underlying assumptions of the organisation's people) (Fuhrmeister, 1997, pp. 14-15; Scholtes, 1998, p. 180).

> *"Culture is the collective programming of the mind which distinguishes the members of one group or society from those of another. Culture consists of the patterns of thinking that parents transfer to their children, teachers to their students, friends to their friends, leaders to their followers, and followers to their leaders. Culture is reflected in the meanings people attach to various aspects of life; their way of looking at the world and their role in it; in their values, that is, in what they consider as 'good' and as 'evil'; in their collective beliefs, what they consider as 'true' and as 'false'; in their artistic expressions, what they consider as*

'beautiful' and 'ugly'. Culture, although basically resident in people's minds, becomes crystallised in the institutions and tangible products of a society, which reinforce the mental programs in their turn. Management within a society is very much constrained by its cultural context, because it is impossible [even when it comes to the prevention of workplace injury and disease] to coordinate the actions of people without a deep understanding of their values, beliefs and expressions".

Geert Hofstede (cited in Mukhi et al, 1988, pp. 76-77)

Organisational culture is therefore an extremely important environmental factor for the OHS practitioner. Peterson (cited in Fuhrmeister, 1997, p. ii) states that "employees become what their environment is and act in ways their environment reinforces". Fuhrmeister (1997, p. 32) contends that to achieve significant improvement in OHS (i.e. sustainably changing OHS performance for the better) "efforts to change must be consistent with the values or assumptions of the culture or be part of a systematic approach to change the defined values and assumptions". What choices the people within an organisation make in relation to the prevention of workplace injury and disease (based on what they value as important), the actions they take to identify, assess and control hazards (as determined by how they believe things work), and the commitment to OHS they demonstrate through their behaviour (which is forged by what they perceive is 'normal' conduct) are the essence of an organisation's 'OHS' culture. OHS practitioners must have the means to significantly influence organisational culture if they are to significantly, sustainably improve OHS performance through their practice (Quinlan & Bohle, 1991, pp. 392, 396-397; Schurman, 1996; Thatcher, 1991, pp. 83-84; Fuhrmeister, 1997, p. 32).

8.3. Organisational Management

In considering the role of the OHS practitioner, both internal organisational environmental factors (e.g. culture, management), and external factors (e.g. a changing environment) need to be discussed. These environmental factors may affect the capacity of OHS practitioners to carry out their role. Another key internal environmental impact on organisations, is the way an organisation is managed. As will be discussed below, organisational management is a major determinant of organisational culture, and thus also significantly impacts OHS performance. The people at the top of the organisational hierarchy are generally charged with 'managing' the organisation. Organisational management has been defined as the application of 'planning', 'organising', 'leading' and 'controlling' processes to facilitate organisational effectiveness and efficiency (Mukhi et al, 1988, p. 20). It has been alternatively defined as "working with and through other people, individually and in groups, to achieve organisational goals" (Owens, 1995, p. 295). The main goal of most organisations is either to maximise returns to shareholders (i.e. profit making), or to provide a service within a budget (i.e. non-profit) - either way, "organisations depend upon the talent and effort of people who work in them ... [and] every organisation must obtain these

contributions and other resources and convert them into some outputs that yield sufficient rewards to keep the organisation alive and functioning" (Mukhi et al, 1988, p. 65).

People managing organisations may exercise a number of different approaches to 'obtaining contributions' from the organisation's people in order to achieve organisational goals. The approach used to manage an organisation impacts heavily on an organisation's culture, and subsequently on how an organisation views and manages its OHS performance (Fuhrmeister, 1997, p. 1). Douglas McGregor (cited in Muhki et al, 1988, p. 43) termed two such approaches, at very contrasting ends of the management 'style' scale, Theory X and Theory Y. Theory X is grounded in the principles of 'scientific management' as introduced and promoted by the work of Frederick Taylor (Stone, 1991, pp. 228-229), and of Frank and Lillian Gilbreth (Owens, 1995, pp. 39-40). Based on some fairly negative assumptions about the nature of people (see Appendix B below), scientific management strives to identify the 'one' most efficient method for performing a particular task, and then motivate people through monetary rewards and discipline to mechanically apply this method - virtually without thought (Pfeffer, 1994, p. 126-128).

As it is built on the premise that people innately have a significant aversion to work (and are on whole self-seeking), scientific management is very much a stringent process of directing, motivating, controlling (and ultimately manipulating) people through the application of both 'the stick and the carrot' - punishment and reward (Stone, 1991, p. 231; Scholtes, 1998, p. 298). It is also a process that separates the actual 'doing' and 'doers' of the work, from the planning, organising and the ongoing improvement of the work (Pfeffer, 1994, p. 124-126). Scientific management purports that most organisational people (i.e. those who are not 'managing' the organisation) at worst have nothing to contribute to activities that require creativity and thought, and at best, if they did have the potential to contribute, would be unlikely to do so in a way that was constructive or good for the organisation (Stone, 1991, p. 231).

> *"We will win and you will lose. You cannot do anything because your failure is an internal disease. Your companies are based on Taylor's principles. Worse, your heads are Taylorized too. You firmly believe that sound management means that executives on the one side and workers on the other, on the one side men who think and on the other side men who only work."*

> Konosuke Matsushita (cited in Seddon, 1997, p. 18)

According to Pfeffer (1994, p. 127), "the separation of planning from doing became institutionalised in a profession, industrial engineering, in practices associated with work and plant design, as well as in an ideology that made it unthinkable ... to actually ask those doing the work to participate in its design and control". This approach to management is still prevalent - despite growing evidence that the type of control inherent within this style of management is illusory, and can actually deliver significant competitive disadvantage (see Pfeffer, 1991; Whitford, 1992; Deming, 1982; Owens,1995; Scholtes, 1998). The application of the scientific management approach founded on Theory X assumptions has been described as self-fulfilling, self-sustaining, and self-defeating (Owens, 1995, p. 76; Scholtes, 1998, p. 300).

"Theory X assumptions foster managers who are very directive, narrow and control-oriented in their treatment of employees. Passive, dependent and reluctant subordinates are the result".

Raymond Stone (1991, p. 232)

McGregor's Theory Y is based on much more positive assumptions about the nature of people in relation to their work (see Appendix B), as defined by Elton Mayo and the human relations movement (Mukhi, 1988, pp. 40-43; Stone, 1991, p. 231). The application of Theory Y produces management approaches composed "primarily of creating opportunities, releasing potential, removing obstacles, encouraging growth and providing guidance" (McGregor cited in Stone, 1991, p. 232). Theory Y, while still acknowledging the necessity for organisational control, recognises that this control is best achieved when it is willingly exercised by the people themselves (Owens, 1995, p. 71) - people who want to contribute, people who want responsibility, people who want to see their organisations achieve and succeed, and people who are capable of exercising "a high degree of imagination, ingenuity, and creativity in the solution of organisation problems" (Scholtes, 1998, p. 298). Where organisational people do not display these characteristics, a Theory Y management approach would generally see this as symptomatic of dysfunctional systems, policies and procedures - rather than as an inherent condition of human nature (Mukhi et al, 1988, p. 43; Scholtes, 1998, pp. 299-304).

"Theory Y orientation fosters managers who will delegate authority, encourage employee participation in decision making, and grant greater job autonomy and task variety. Highly productive employees with initiative and commitment to the organisational goals are created by the satisfaction of these higher-order needs".

Raymond Stone (1991, p. 232)

McGregor's Theory X and Theory Y describe approaches to managing organisations at either end of the spectrum. In reality, organisational management generally falls somewhere in between - though it would be fair to say that many organisations are yet to experience 'Theory Y' approaches to management. Appendix D outlines Rensis Likert's theory of four management styles, beginning with the least effective (termed as "System 1: Exploitative Authoritative"), and ending with the most effective ("System 4: Participative Group"). System 1 and System 4 bear significant resemblance to Theory X and Theory Y, with Systems 2 and 4 representing progressive steps or stages between ineffective and effective management styles (Owens, 1995, pp. 74-76&103-109).

8.4. OHS Management and Culture

Other theories and approaches to management also exist (Muhki et al, 1988; Stone, 1991). Some management styles (particularly those at the Theory X and System 1 end of the spectrum) may not only impact negatively on the 'practice' of OHS, they may actually contribute to workplace injury and illness by their very application (Quinlan & Bohle, 1991, pp. 390-392). Certainly the way an organisation is managed (which incorporates the philosophies, assumptions, values, actions and behaviours of an organisation's management), frames and forms the organisation's culture - and the organisations 'OHS' culture (Labram, 1999, pp. 16-18; Erickson, 1997, pp. 29-33; Fuhrmeister, 1997; Kelly, 1993, p. 31). Improving OHS performance within organisations in a sustainable way, may therefore also involve and require changes to the way in which an organisation is managed (Quinlan & Bohle, 1991, pp. 392, 396-397; Schurman, 1996; Thatcher, 1991, pp. 83-84; Fuhrmeister, 1997, p. 32).

8.5. External Environmental Factors

Some of the 'external' environmental factors that impact on an organisation, and illustrate the increasing complexities that organisations must manage, are depicted in Figure 7 below. These environmental factors are in a constant state of change (Stone, 1991, pp. 180-181). The speed of change has been accelerating - particularly in the area of technology, where the rate technological development has brought (and continues to bring) the need for significant transformation to the workplace (Mukhi et al, 1988, pp. 70-75) - transformation that in many cases is crucial to survival (Stone, 1991, p. 181).

Mukhi et al (1988, p. 72) contend that "the impact of more complex and rapidly changing environments on organisations renders the task of [organisational] management much more challenging than it would be in simpler and more placid conditions". These "more complex and rapidly changing [organisational] environments" present new and manifold challenges to the OHS Practitioner, who is both part of the environment - and practicing the prevention of workplace injury / disease within (and hopefully through) it.

Figure 7
An organisation and its environment

After Mukhi et al (1988, P. 69)

8.6. Changing Roles of OHS Practitioners

The field of OHS itself has gone through significant change over the last thirty years, and a brief overview of these changes will provide additional context important to the understanding of what action research has to offer today's OHS practitioner. OHS has emerged as an area of importance for all workplace stakeholders - people performing work, employers, unions, governments and the community at large (Quinlan & Bohle, 1991, p. xiii). The rising profile of OHS has brought with it a drive for improved OHS performance, knowledge, methods, legislation, and OHS training and education. Gone are the days of primarily prescriptive legislation, where the OHS practitioner was the holder, communicator, and enforcer of the rules an organisation had to meet to ensure compliance (Dine, 1997, p. 11). Current OHS legislation is performance based (modeled after OHS legislation introduced into Britain in 1974 - developed by a committee chaired by Lord Robens), broadly outlining what results are expected to be achieved, but

providing employers, together with other workplace stakeholders, the responsibility of developing and implementing systems to deliver expected performance (Brooks, 1993, pp. 273-276, 281; Creighton, 1986, p. 6; Keenan, 1997, p. 7).

Going are the days when someone is given the position of OHS practitioner due to their poor accident record, as a part-time add on to another already busy role, or because they are unlucky enough to be found standing still too long in one spot (Dine, 1997, p. 14). OHS is increasingly being recognised as a critical part of a business and its 'bottom line' performance (Oxenburge, 1991; Else, 1993, No. 9). There is an accelerating demand for OHS practitioners to hold tertiary level OHS qualifications (Dine, 1997, pp. 13&17-18), to have knowledge and skills across a wide range of disciplines (Quinlan & Bohle, 1991, p. 110; Thatcher, 1991, pp. 82-85), to have the capacity to think and facilitate the solution of complex problems, and to be "deeply involved in the management system and organisational culture" (Petersen cited in Dine, 1997, p. 11). Practitioner associations such as the Safety Institute of Australia (SIA), are further striving to establish an identifiable sub-set of the existing group of OHS practitioners in Australia - an OHS occupational group of 'certified' professionals (i.e. "Chartered Fellows"), who will meet the growing demand for practitioners possessing the knowledge, skills and capacities to meet these higher level expectations (Safety Institute of Australia Federal Secretariat, 1999, pp. 32-33). These developments reflect significant change in the role of OHS practitioners, and a 'ramping up' of practitioner competencies, accountabilities and responsibilities.

Also coming to an end (perhaps not quickly enough for some of us), are the days when OHS is more about a 'safety' religion - personal protective equipment, slogans and motherhood statements, incentive schemes, the 'unsafe acts' of people, incident investigations concluding with the recommendation to 'take more care in future', and a great deal of hair pulling, head shaking, and general astonishment when these strategies fail to prevent someone getting seriously injured or ill from unmanaged exposure to workplace hazards (Viner, 1991, p. 12). OHS today is much more 'scientific' in its approach, and has developed knowledge and tools to assist the demystification of workplace injury and disease, and their prevention (Viner, 1991; Matthews, 1985; Hammer 1989; Quinlan & Bohle, 1991). OHS educational and training opportunities now abound, with TAFE and tertiary level courses available Australia wide (Taylor, 1999, p. 6).

There is, however, still work to be done. People exposed to workplace hazards are still being killed, injured or developing illnesses at an unacceptable rate and cost - despite the increased profile of OHS over recent years, and the improvements in OHS knowledge about hazards and their identification, assessment and effective control (NiS, 1998, p. 1). Much of this 'newer' knowledge is rightly focused on the 'scientific / technical' aspects of hazard control, such as the design and modification of the physical work environment to eliminate hazards or reduce risk to an acceptable level (i.e. provision of a 'safe place' rather than expecting 'safe person' strategies to prevent workplace injury and illness) (Viner cited in Fuhrmeister, 1997, p. 25). There is, however, growing recognition that this strategy on its own will not deliver the OHS

performance improvement stakeholders are after (Piscioneri, 1999, p. 6; Labram, 1999; Quinlan & Bohle, 1991).

8.7. Behaviour Based Safety

A number of those frustrated by the rate of improvement in their OHS performance, or concerned with the practicability of 'safe place' strategies, are turning to 'Behaviour Based Safety' (Piscioneri, 1999; Labram, 1999; Lean, 1999) - a strategy targeted on changing individual behaviour, based on psychologist B.F. Skinner's work in the 1940's with rats and pigeons (Labram, 1999, p. 14). Skinner's findings identified a link between behaviour and external factors, and found that this link was of such strength that behaviour could be reliably predicted by these external factors. Skinner's work initially became one of the foundations of the scientific approach to management (i.e. Theory X as discussed above), and its associated system of performance appraisal (Scholtes, 1998, pp. 295). In the late 1970's, Komaki combined Skinner's behavioural modification theory with the research of Heinrich (which purported that the majority of accidents were due to the 'unsafe acts' of people) - resulting in the theory that improving OHS performance was primarily about modifying / improving the behaviour of individuals through repetitive reinforcement using positive and negative consequences (Labram, 1999, pp. 14-15).

Behavioural based safety has both its supporters and critics. Critics question the applicability of Skinner's research to human beings (Labram, 1999, p. 14), as Kohn (cited in Scholtes, 1998, p. 297) states - "B.F. Skinner could be described as a man who conducted most of his experiments on rodents and pigeons and wrote most of his books about people". Critics see human beings as quite a different and more complex 'kettle of fish' than rats and pigeons. They also argue that the behavioural safety approach has not been implemented successfully in practice due to its perception as 'management manipulation' by people at the coalface - potentially as a result of inappropriate application by 'management' (Labram, 1999, p. 14). Inappropriate application is a significant risk, as behavioural based safety can easily degenerate into a total focus on managing the 'unsafe worker syndrome' at the expense of developing and effectively implementing strategies to eliminate or appropriately manage hazards (Quinlan & Bohle, 1991, p. 397) - something that supporters of behavioural based safety themselves recognise as unethical (Piscioneri, 1999, p. 6). Most supporters of behavioural based safety now insist that it is just one piece of an effective OHS management puzzle, albeit an important one (Piscioneri, 1999, p. 6).

Else (cited in Lean, 1999, pp. 28-29) informs the appropriate application of behavioural based safety by suggesting it be focused on measuring and establishing behaviours that drive the effective implementation of risk control systems, rather than attempting to measure and establish the 'safe' behaviour of each individual. This advice has also been extended by others, with Sundstrom-Frisk (1998, p. 37) contending that the "decisions, mistakes, and risk-taking behaviour [of managers, designers, instructors and

risk analysts] create the underlying risk level in the work situation and together their behaviour set the agenda for the safety culture of the company".

Some proponents of behaviour based safety also assert that behavioural based safety is misunderstood, and that in fact there have been a number of approaches to its application developed. Matt Piscioneri (1999, p. 7) identifies two 'macro' approaches which (like the suggestions of Else) look to target 'big picture' controls, and one 'micro' approach (which appears to draw the bulk of the criticism) focused on applying consequences to individuals to modify their behaviour ...

- *"One [approach] focuses on organisational culture - changing the core values of an organisation to cultivate desired attitudes and behaviours ...;*
- *One [approach] suggests long term behavioural change can only be achieved by focusing on, and changing personal values and attitudes ...;*
- *The last approach suggests that values and attitudes will change as a result of positive reinforcement and making individuals accountable for their actions ..."*.

Both 'macro' approaches (the first two dot points above) look to use the results of behavioural measurement as indicators of where to target broad based cultural or attitudinal change strategies.

The third 'micro' approach is more in line with Komaki's application of Skinner's original theory. While it was Skinner's belief that the modification of behaviour through repetitive reward and punishment would lead to "a change in the underlying belief system", in practice, once the reward / punishment was removed, old behaviours returned (Labram, 1999, p. 16). Critics of behaviour based safety are strongly of the view that, while the application of this 'micro' approach to behaviour based safety may achieve some short term results, it will not deliver sustainable OHS performance improvement.

> *"The Behaviour Based Safety Approach does not provide a long term solution for changing employee behaviour. This approach showed that safe behaviour can be improved using reinforcement over short periods of time. However, once the reinforcement was removed, the behaviour returned to normal. Thus behaviour was based on an extrinsic motivation, not an intrinsic motivation. It is important, therefore, when ensuring the continuity of safe performance by employees that behaviour is the result of intrinsic motivation. This can be achieved by improving the safety culture of an organisation and altering the values and attitudes of employees. Once a safety culture exists, and is supported by management, employees will be motivated to behave in a safe manner, as they have internalised the importance of safety."*

Carole Labram (1999, p. 19)

One of the interesting things about Labram's statement above, is that its language of 'intrinsic motivation' and the development of a 'safety culture', on the face of it, sounds a lot like the two 'macro' approaches to behaviour based safety outlined above. Here we have both the critics and the supporters of behaviour based safety apparently agreeing on the following ...

- There is the need for something more than improved 'scientific' and 'technical' OHS knowledge about hazards and their identification,

assessment and effective control if there is to be a paradigmatic change in the level workplace injury and disease in Australia.

- That 'something' has a great deal to do with organisational culture, and the values, beliefs and attitudes of people at work.

This has significance for today's OHS practitioner, as it reinforces the need for practitioners to have the necessary knowledge, skills and tools to effect changes to organisational culture, and to facilitate (provide opportunity for) the 'enlightenment' of organisational people (i.e. to create an environment where people can safely and willingly explore / examine their own values, beliefs, attitudes and experiences in the light of new information, and the values, beliefs, attitudes and experiences of others - and thus have opportunity to see things in a new way). Some refer to this process as the reconstruction or negotiation of reality (Mangham, 1993, pp. 1247&1251; Whiteley, 1995, p. 69), - a key feature of action research.

8.8. Future Direction of OHS in Australia - Holistic Innovation

As it is not only the past and present status of OHS in Australia that will impact the OHS practitioner, it is also worth briefly considering the future direction OHS may take in Australia. Dr. Dennis Else (1999), who is the Chair of the National OHS Commission, recently made a presentation at a seminar titled *Creative Workplaces and OHS*. He explored during his presentation the evolution of OHS regulation against changes in organisation type (see Table 9 below).

Table 9
Eras of OHS Regulation

	Early Industrial	Late Industrial	Early Knowledge
Type of Regulation	Prescriptive	Performance Based	Systems Based
Type of Organisation	Proprietorships	Steep Hierarchies	Human Networking

After Else (1999)

It is his view that we are entering an era of OHS regulation that he labels 'Early Knowledge', where regulations are becoming systems based (rather than the performance based legislation of the Robens model), and organisations are moving towards a 'human networking' organisational type rather than a hierarchical one associated with the 'Late Industrial' era. Else contends that what is driving organisations to move in this direction is the need for innovation - the foundation stone of the next step change in organisational

performance and competitiveness. Muhki, Hampton, and Barnwell (1988, p. 572) predicted this development more than a decade ago ...

> *"The bureaucratic structures of the past will continue to give way to more adaptive structures. The classical industrial bureaucracy, with its hierarchical, mechanistic design, was well suited to repetitive jobs and decision making in a stable environment. These structures are being complemented and sometimes replaced by flatter and more adaptable structures, with more emphasis on managers acting as facilitators rather than as controllers. There will be more emphasis on the free flow of ideas up and down, as well as across the structure. The formation of temporary task forces and teams to achieve specific objectives will become more common. Project team leaders will act as coordinators rather than as traditional managers setting standards. This type of structure is more suited to innovation and the generation of new ideas, both critical factors in the success of corporations in the future."*

For Else, the development of mechanisms to facilitate innovation is a key not only for the improvement of orginisational performance generally, but also specifically for the improvement of OHS performance. Else, in his presentation, asked the question "Whither or wither OHS in a post-Robens era?". In answer to this question, Else proposes the following ...

- A recognition by the OHS community that OHS is not an organisation's "highest priority and never will be!";
- The need for a 'holographic' approach to OHS;
- The need for innovative problem solvers and problem solving;
- The need to "embed OHS principles as part of the problem solving skills of all Australians".

After Else (1999)

Holographic thinking has been defined as "viewing the problem in three dimensions, at many different levels of detail and from every angle" (Tucker cited in Owens, 1995, p. 254). It is the thinking of co-operative human inquiry (as outlined in Table 8 above) - the opposite of the positivist, reductionist thinking of orthodox science, and the technical, rationalistic thinking prevalent in organisations under scientific management - particularly those at the Theory X end of the spectrum. Just as for the changes needed in some types of organisations to release the innovation and the creative potential of the organisation's people in the drive to improve organisational performance generally, the holographic approach to OHS problem solving that produces innovative solutions also requires new systems, processes and tools. Labram (1999, p. 14) describes such an OHS system as a "Human Activity System", and defines it as follows ...

> *"Human Activity Systems ... focus on people and organisations by applying a holistic and systemic approach. They address formal procedures, hazard identification and risk control as well as culture and learning."*

OHS Human Activity Systems, for all the promise of the words contained in this definition, still require processes, tools, and mechanisms with the capacity

to deliver innovative solutions to OHS problems - as well as developing / improving organisational and OHS culture, and teaching the organisation and its people not only about the specific problem solving lesson learned, but also about OHS principles and how to practically apply them to produce sustainable / continuous OHS improvement. It is important that the process, tool, and or mechanism employed by an 'OHS Human Activity System' is able to be comprehended and applied by organisational people, facilitates their genuine participation, and is critical, systematic, and rigorous enough to allow participants to develop effective (in practice), context appropriate solutions and outcomes to OHS problems. This paper argues that action research is such a process / tool / mechanism.

8.9. Improving the Quality of Innovation

The definition of 'innovation' in the context of the above discussion is key to the expectations people (and in particular organisations and OHS practitioners) have of 'OHS Human Activity Systems'. For western organisations, operating predominantly under the principles and assumptions of 'scientific management' - innovation is "coming up with bold new ways of doing things, such as new technology, new systems, and so on", and is generally the job of a few specialist people (Owens, 1995, p. 245). Most people in the organisation are not involved in innovation, as it is not seen as part of their jobs - they're the 'doers' and 'maintainers' not the 'thinkers' (see discussion of organisational management theory above). Typically, innovation (or the driving of improvement in performance through change) within these organisations is characterised by the following descriptors ...

- A "silver bullet" approach that focuses on "breakthrough invention" delivering entirely different solutions to problems;
- An activity intensive, short term attack designed to achieve the 'quick turnaround' with the minimum of time and resources;
- An unambiguous, quick, clear cut change process and improvement outcome - no messy loose ends or question marks on the success of outcome: its an unequivocal winner!

After Owens (1995, p. 245)

Japanese organisations, based on the ideas of W. Edwards Deming (1982) (founder of the 'quality' movement), have, however, looked to involve their people not only in 'innovation' as defined above - but also in a continuous improvement process they term "kaizen", defined as "making the process better" (Owens, 1995, p. 246) ...

"In practice, kaizen uses low technology which is inexpensive, involves everyone in collaborative group efforts, focuses on small improvements, and maximises use of conventional knowledge. Everyone is a player; administrators play the role of coaches rather than bosses; the focus is on adaptive, small, low-cost improvements;

and employees are valued highly as knowledgeable and helpful partners ... A key element in the difference between 'kaizen' and innovation is time. Those who practice 'kaizen' must be patient, persistent, constant in purpose, to use Deming's phrase, and realize that it takes time to work out the vision that the group has for itself. Those who seek innovation tend to be impatient, seek a powerful one-shot opportunity, and expect to see clear results in short order."

Japanese organisations believe their people not only have a role in 'doing' and 'maintaining' work, they also believe that each of their people has an integral role to play in the ongoing improvement of it. It's not just lip service - organisations are structured, and systems and processes are in place, to facilitate and support what is an expected outcome of each persons worklife - the gradual improvement of 'work' and the workplace over time.

While many organisations in the western world have more recently looked to apply a version of Deming's quality principles as a matter of necessity (Scholtes, 1998, pp. 7-9), and have a grasp on the 'language' of quality, organisational cultures steeped in 'scientific management' have generally struggled to come to terms with the application of quality principles in practice (Scholtes, 1998, p. 10; Bawden, 1989, p. 35). There have, however, been exceptions. Organisations genuinely embracing and applying Total Quality Management (TQM), a packaged 'quality' management system incorporating quality principles such as consultative problem-solving, continuous improvement, and customer focus, have reported significant improvement in performance (Else, 1993, No. 9, p. 9). Consultative problem-solving techniques of the quality movement, for example 'Quality Circles' (Deming, 1982, p. 47), have also been applied by some organisations to deliver OHS performance improvement with some success (Weimer, 1984; Kelly, 1993, pp. 26).

For organisations in the grip of 'scientific management', the ways of Deming and the ways of the very successful Japanese organisations, among other things, were (and are) considered too slow. Deming advised the leaders of Japanese industry in the early 1950's, that it would take five hardworking, dedicated years to transform Japanese industry (Scholtes, 1998, p. 7). This time frame is much too long for many of the 'power brokers' of western industry, who are still looking for the 'silver bullet' - that one breakthrough that will quickly turn things around. Their impatience and drive for short term results makes them vulnerable to the many 'packaged' solutions which periodically saturate the market place.

These 'packaged' solutions usually fit well with the assumptions and principles of scientific management, as many of them are based either on ramping up the management control function, or on reducing people numbers in the guise of improving efficiency (Hurst, 1997). 'Re-engineering', 'downsizing', 'management by objectives', 'zero-based budgeting', 'restructuring', 'performance-based pay' - are some of the terms related to these packaged solutions. Brynjolfsson et al (1997, p. 38) contend that up to seventy percent of "business process reengineering" initiatives fail to reach their objectives. Beer et al (cited in Zuber-Skerrit, 1992, p. 92), through their lengthy study of large corparations, "found that the greatest 'fallacy of programmatic change' is the textbook idea that corporate revitalisation and renewal processes come about through company-wide change programs ... [involving] a mission statement by top management, the employment of human

resource managers, a new organisational structure, a performance appaisal system, and training programs to turn managers into 'change agents'". Hurst (1997, pp. 8&9) not only confirms the lack of long term success of processes such as reengineering, he also highlights the significant damage it does to people in the organisation, and its impairment of "the organisation's ability to innovate and learn".

> *"So it has come to this: You've automated the factory, decimated the inventory, eliminated the unnecessary from the organisational chart, and the company still isn't hitting on all cylinders - and you've got an awful feeling you know why."*

> Dumaine (cited in Whiteley, 1995, p. xi)

> *"It is time to stop reengineering and other change techniques when they start to result in behaviours that contradict the fundamental beliefs and values of the firm [i.e. 'we value our people']. Of course, it helps greatly if you have a clear consensus on what these values are, because that may prevent you from embracing inappropriate techniques in the first place. But sometimes initiatives adopted for the very best reasons end up generating behaviours that violate common decency, and then, no matter how strong an organisations heart, these initiatives can be dangerous to its health."*

> David Hurst (1997, p. 12)

8.10. Packaged OHS Systems or Genuine Participation?

The frequent failure of 'packaged' solutions to sustainably improve organisational performance in other areas (Zuber-Skerrit, 1996. p. 93), may reflect what occurs when organisations look to packaged OHS solutions for rapid OHS improvement. A proliferation of packaged OHS solutions are being offered by 'experts', many professing to have the 'silver bullet' of effective OHS management - sure to radically improve organisational OHS performance (Piscioneri, 1999, p. 6). Else (1999) identified a number of organisations that have implemented 'off the shelf' OHS solutions to an apparently exemplary standard, yet have suffered OHS outcomes which have been nothing short of disastrous. Quinlan and Bohle (1991, p. 398), in their book *Managing Occupational Health and Safety in Australia*, also caution against the use of packaged programs. They cite varying quality, failure to consider local legislative, industry and organisational context, and contend that many 'packaged' products are based on an inaccurate and potentially naive understanding of workplace injury and disease and its prevention - frequently emphasising "policies and practices that the consultants believe management will readily accept" (Quinlan & Bohle, 1991, p. 398). Rather than waste resources on an 'off the shelf' program which is unlikely to deliver sustainable OHS performance improvement, Quinlan and Bohle recommend that organisations utilise / involve their greatest resource - their people, in the planning and implementation of initiatives to improve OHS performance. Box 10 lists the reasons why they think this is a good idea.

Box 10
Planning and Implementing OHS Initiatives
- Reasons For Worker Involvement

- They are the people closest to the work process and therefore more knowledgeable about actual work practices.

- They are often most aware of the problems associated with using machinery and safety equipment, and the pressures that encourage non-compliance with safety practices.

- Awareness of the reasoning behind health and safety policies, and a genuine opportunity to participate in their development, can also increase worker commitment to health and safety programs.

- Workers become more knowledgeable about hazards and preventative measures, and consequently become less suspicious of the motives behind interventions like monitoring, and feel greater confidence that they will not be blamed or penalised for reporting illness or injury.

- Involving workers in day-to-day decision-making regarding occupational health and safety may potentially lead to improvements in industrial relations, health and safety management, economic viability, and better design of new technology.

After Quinlan and Bohle (1991, p. 398)

If innovation is, as Dr. Dennis Else has suggested, one of the keys to future improvements in OHS performance in Australia, clearly innovation of the 'rapid breakthrough' kind is only one side of the 'innovation' coin required. OHS needs the kind of continuous improvement process referred to as 'kaizen' above - the relatively slow and incremental change that comes from organisational people at every level identifying OHS improvement opportunities that are important to them, working together to understand the complexities which frame these opportunities, and how best to address these, being exposed to new information and ways of looking at things, producing outcomes effective for their specific environment, building relationships, continually learning not only how to do things better - but also how to better learn how to do things better, and recreating an organisational reality that values people and their health and safety - and demonstrates this value through action. There are those who would see the above as a utopian vision - not practically achievable in the real world. Yet there is an abundance of evidence available that sustainable, paradigmatic and ongoing change has been achieved in other areas of organisational performance, and across a number of fields, disciplines and environments, through the genuine, patient and persistent

application of 'co-operative human inquiry' and employee participation (Whyte, 1991; Stone, 1991, p. 481).

In his paper *The Quest For Quality: An Experiential Approach*, Richard Bawden (1989) argues for co-operative human inquiry, the pursuit of an experiential, participative, holistic, and systemic approach to continuous improvement, and the development of "learning organisations". He does not only argue for these things, however, he describes the process of their actual evolving, sustainable and successful application over a long period in the very challenging field of Australian agriculture. Co-operative human inquiry (of which action research is a type), can and has delivered sustainable, paradigmatic, and ongoing improvement in a very problematic and complex socio-technical field in an Australian setting. While the road to OHS 'utopia' may be a never ending path of continuous improvement, here is a philosophy, a process, a tool, and / or mechanism with the potential to facilitate the involvement of organisational people in the life long learning about the prevention of workplace injury and disease, and the lifelong development and implementation of effective, context specific OHS solutions.

8.11. Summary Comments

The discussion above has defined the term 'OHS Practitioner' as one who practices the prevention of injury and disease (illness) which can potentially result (and frequently does result) from the exposure of people to danger or risk associated with their work. It asserts that work encompasses (among other things) interaction and relationships between people, materials, machinery, work methods, the natural/physical environment, the organisation and structure of the work, and energy - energy that has the potential to damage people if it is not effectively controlled. It has demonstrated that work is sociotechnical in nature, and generally takes place within evolving and dynamic human social systems called organisations - organisations which must contend with and successfully manage increasingly complex and rapidly changing environments if they are to achieve their goals. It has also briefly outlined some of the internal and external factors that make up an organisation's environment, and has highlighted that the way in which an organisation is managed is key to its performance (and potentially its survival). A brief overview of the changing field of OHS in Australia, and potential future directions in OHS, has also been presented.

Given the discussion above, the author contends that improving organisational performance requires sociotechnical solutions - solutions which may actually require paradigmatic change in the way that an organisation's people and their work are managed - paradigmatic change in organisational culture. The author maintains that this holds just as true for improving OHS performance as it does for the improvement of other areas of organisational performance. The OHS Practitioner requires tools that will facilitate sociotechnical / organisational improvement and change (Thatcher, 1991, p. 81; Fuhrmeister, 1997, p. 1) if significant, sustainable improvement in OHS

performance is to be realised. Action Research is such a tool - a research method that offers the OHS Practitioner a mechanism for improvement on several fronts.

9. What Does Action Research Potentially Offer the OHS Practitioner?

9.1. A Research Method For Practitioners

"I am sure that most of you would, like me, be appalled at the pitifully low level of funding available in Australia for OHS research. If we look to the other professional disciplines we find that those who have made quantum advances in the last century, such as Medicine and Engineering, have done so through widespread, independent, high quality [read positivist], adequately funded research and development. In contrast, there has been little advance in OHS ideology in the last 30 years".

Geoff Dell, SIA President (1999, p. 1)

"Thus ... every [OHS] practitioner has an obligation to contribute, within their capacity, to the development of knowledge and to question without fail the paradigms put forward by experts. There is little opportunity here to simply spend a lifetime of work applying what has been taught ... nevertheless, even a cursory glance at the contents of the refereed journals in the field cannot fail to impress the reader with the paucity of philosophical argument and the abundance of papers counting morbidity and mortality ... as though counting for its own sake has some inherent interest or value."

Derek Viner (1991, p. 11)

Geoff Dell, Federal President of the Safety Institute of Australia, made the first statement above within a written announcement introducing the creation of the SIA College of Fellows - a group of 'super' safety professionals (experts) within the SIA whose functions will include the following ...

- Advisory role to the National Occupational Health and Safety Commission (NOHSC);
- Conduct of colloquia to discuss emerging issues in OHS;
- Engaging OHS bodies from overseas in debate on emerging OHS issues;
- Running advisory forums for other professional groups;
- Encouraging development of OHS science within the Institute and across the OHS profession in Australia by engaging SIA members at all levels, and the public, in the ideological debate;
- Conduct of research based, peer reviewed scientific seminars to encourage Australian Tertiary Research Institutes to engage in OHS research and publication; and
- Development of a peer reviewed scientific OHS journal.

(after Dell, 1999, p. 2)

The SIA are to be commended for the work they are doing in the area of lifting the profile, and growing the influence of OHS practitioners in Australia. While not taking away from the need for more positivist research in the field of OHS, or the need for an SIA high level advisory body, perhaps the field of OHS needs something else as well. The questions to be asked here, are who (apart from those OHS practitioners in the 'expert' category - those who see themselves as researchers or potential researchers) will produce and contribute research based, peer reviewed, scientific papers (in the positivist tradition), and does the 'scientific' OHS research that is produced actually significantly impact workplace injury and disease prevention at the coalface?

The answer to the first question is likely to be that few OHS practitioners will produce or contribute research based, peer reviewed, scientific papers (in the positivist tradition), outside of those papers generated to fulfill the requirements of an academic award. Why is it that, though 'significant others' of the OHS community, such as Viner above, recognise the need for (and the critical value of) OHS practitioners thinking, questioning, and contributing to the body of OHS knowledge in the form of research - there is such an apparent dearth of involvement? Why is it, when some of the most respected OHS educational institutions in the land have as one of their key objectives the production of "good researchers and people who can publicly comment on occupational health and safety issues" (VIOSH Australia, 1999, p. 11) - an objective supported by a curriculum which has been heavily weighted in terms of positivist research methodology and statistics (VIOSH, 1995, pp. 13-14), that many of their graduates appear not to follow through and contribute formally to the body of OHS knowledge (or indeed seem to refrain from entering public debate on OHS issues)? The author believes that the following factors (though not an exhaustive list) contribute to this result ...

- The largest percentage of OHS practitioners work within an organisational environment which would not support their application of positivist research methods, as a matter of both choice, and the failure of the environment "to meet most quantitative requirements for representativeness and sufficiency of sample size to allow statistically meaningful results" (Berg, 1989. p. 9).

- The education and training that OHS practitioners receive, even within tertiary level OHS award courses, does not appear to 'lift' the majority of participants to the level of competence (as a researcher) that is needed to have confidence in one's own research ability.

- Positivist research methodology is generally not an appropriate tool for use by practitioners to manage OHS or solve OHS problems within an organisational context, for all the reasons discussed in Section 4 above. Workplaces are human social systems and require research methods which not only address, but also make the most of their social nature. Positivist research is not action oriented or

context specific - OHS practitioners in the field are measured on the outcomes of their actions in terms of effectiveness and efficiency, not on the production of a piece of generalist OHS knowledge.

- Even if positivist research methodology was a useful tool, OHS practitioners in the field generally are under resourced and inadequately supported (Thatcher, 1991), and are fully employed in effectively implementing existing knowledge re the prevention of workplace injury and disease. OHS practitioners do not have the time or resources to resolve the OHS problems they face in the workplace through the application of the positivist scientific method.

- Anecdotal evidence suggests that OHS practitioners have generally found positivist research of limited value for their 'day to day' practice. If this is the case, they are very unlikely to be inclined to apply positivist research methods themselves.

This last point also potentially answers question two above - does the 'scientific' OHS research that is produced actually significantly impact workplace injury and disease prevention at the coalface? Viner (1991, p. 12) states that "[OHS] conferences are swamped with papers offering glib solutions, methods and philosophies with few offering fundamental research ... Small wonder that despair and frustration is the common experience of many practitioners". As briefly discussed in Section 4 above, practitioners from virtually all social science disciplines, decry the usefulness of positivist research - reflecting its limited influence on or relevance for their 'real world' practice (Carr, 1995, p. 101; Carr & Kemmis, 1986, p. 54; Robson, 1993, p. 433; Small, 1995, p. 952; Streubert &Carpenter, 1999, p 251). This has been the documented experience of overseas OHS practitioners (Schurman, 1996, pp. 373-374), and the author has found no reason to believe that Australian OHS practitioners, in general (who also work predominately in the social science area - refer Section 8 above), feel any differently.

"Teachers, health workers, and human service practitioners often find that the theoretical knowledge of the academic world has limited relevance to the exacting demands of their everyday professional lives."

Stringer (1996, p. 6-7)

Positivist OHS research does not answer questions of judgement and value, of the weighing up of conflicting priorities, of how best to spend a limited bucket of resources, of what to do about the twenty-five percent of people that will suffer irreversible damage to their hearing from a decade of exposure to workplace environments with noise levels at 85dBA (Quinlan & Bohle, 1991, pp. 376-377). Positivist research, because it is generally focused on historical events, may not have the answers when it comes to identifying, assessing and controlling the hazards of new technology. Positivist research is also not available to answer some of the critical questions relating to the risk assessment of specific hazards. Some of these questions have been around for

decades (i.e. how far can legionella bacteria travel within cooling tower aerosol, and still present a significant risk to the health and safety of exposed people - refer Case Study Two below). There are not enough resources to fund the positivist research needed to provide clear cut (black and white) answers to all the OHS problems that practitioners face. Some problems are also just not suitable for positivist research methodology (Small, 1995, pp. 948-951). Practitioners need ...

- a methodology that allows them to successfully manage problems without black and white answers;
- a methodology that facilitates the negotiation of 'risk' perceptions and the making of value judgements;
- a methodology which facilitates the development and implementation of responsible management of the hazards posed by new technology; and
- a methodology to help them resolve problems of increasing complexity (Stringer, 1996, pp. 1-8), involving large, diffusely defined systems (Reason, 1993, pp. 1259-1263).

Action research is such a methodology.

While the author accepts and supports the need for positivist research into OHS, there are significant signs that there is almost a more urgent need for a different kind of research methodology - one that is able to take inputs such as the results of positivist OHS research, existing / emerging OHS principles, systems, processes, tools, injury and disease prevention knowledge, and 'local' knowledge, experience and culture, and convert them into something that then (through the use of the methodology) is able to be effectively and sustainably implemented in the real world of the workplace.

The quotations in Box 11 below confirm what is the most pressing need for OHS practitioners today. It is not the 'silver bullet' offered by 'experts' touting slickly packaged OHS solutions (see discussion in Section 8 above). It is not an extension of the 'frontiers' of 'scientific' OHS knowledge, or a different legislative framework. The most pressing need is not behaviour-based safety, higher levels of innovation, or even a 'best practice' OHS management systems approach. The principle here is that outside inputs, expert advice, and centrally developed systems and solutions (however right and good the information, ideas, or strategies), are of little actual value in the prevention of workplace injury and disease unless they are genuinely implemented to a level where they become a 'piece of reality' for people in the organisation (Stringer, 1995, p. 2; Fuhrmeister, 1997, p. 25, 32; Quinlan & Bohle, 1991, pp. 397-398, 403).

Box 11
The most pressing need for OHS practitioners today

"The safety profession does not lack for ideas on how individuals can be protected or how mechanical processes should be guarded ... What is not so clearly understood is the means by which we should manage our affairs to get the organization to do what we know must be done".

Trevor Kletz (1990, pp. 246-247)

"It is particularly distressing to observe very serious injuries and fatalities occurring in circumstances in which risk control technology is cheap and well understood (by specialists) but not applied."

Derek Viner (1992, p. 348)

"The research activities of VIOSH Australia have a practical orientation towards solving occupational health and safety problems. One of VIOSH's "philosophical" principles is that great benefits can be derived from "closing the gap" between what is already known and what gets applied widely in the community. Rather than continually pushing back the "frontiers of knowledge", research should now be directed towards applying existing knowledge to the workplace and in this way helping to prevent occupational illness and accidents, by facilitating the actual implementation of effective control strategies."

VIOSH Australia (1999, p. 5)

This principle has been recently and tragically demonstrated through the fire and explosion at Esso's Longford facility on the 25th of September, 1998 (Knowles, 1999). The event killed two men, injured eight, cut gas supply to most of Victoria for a two week period, destroyed a gas plant, and will ultimately cost Esso Australia dearly in terms of damaged relationships and reputation, fines, civil suit settlements, ramped up regulatory activity (Australian Safety News, 1999, pp. 50-54), and potential changes to gas supply arrangements in Victoria. Esso had the commitment and foresight to develop and implement a "worlds best practice" OHS management system in the early 1990's, the Operations Integrity Management System (OIMS) (Information Australia, 1999, p. 1), and their Longford facility had been benchmarked by other large organisations due to the quality and apparent effectiveness of this management system (author's personal knowledge). The Royal Commission, however, found significant shortcomings in the 'field' implementation of OIMS (Borys & Knowles, 1999; Knowles, 1999).

"The Royal Commission found [that] a failure to effectively implement the requirements of the system was ultimately responsible for the blast."

(Information Australia, 1999, p. 1)

"Even the best management system is defective if it is not effectively implemented."

<div align="right">

Sir Daryl Dawson, Longford Royal Commission Chairman
(cited in Information Australia, 1999, p. 1)

</div>

"You simply cannot put some occupational health and safety system into place in a nominal way and not back it up with resources and commitment from senior management and expect to have a safe workplace ... Management has got to go beyond simple solutions like adopting things like Safety Map [another OHS management systems approach] and saying 'we have met our responsibilities; we don't have to do any more'. You have to be very serious in terms of having a genuine commitment by management to produce a safe workplace, to put resources behind your decisions, to train people, to make sure the culture in the enterprise is one of respecting safety."

<div align="right">

Bill Mansfield, ACTU Assistant Secretary,
on the Longford Commission Findings
(cited in Information Australia, 1999, p. 1)

</div>

Borys and Knowles (1999, p. 5), in their paper titled *"Preventing Another Longford Disaster"* argue that "greater control of hazards can be found in: a well designed and maintained physical work environment, and well designed and maintained equipment, within the context of a proactive, systematic management approach". This is quite true, but not necessarily as helpful as intended. Esso did have a best practice OHS management system in place which (as far as content went) covered off on the foundation stones of excellent OHS management in a comprehensive, systematic way. The issue is, as per the discussion above, how the hell do we imbed these things in the very fabric of our organisations, in the values, hearts, minds, wills, behaviours and actions of all people in the organisation? This is the crux of the OHS practitioner's practice, and presumably most OHS practitioners struggle with delivering this very thing, day in and day out, in organisations and workplaces across Australia and beyond. Yet there is so little 'real world' (Viner's word may be 'fundamental') research on the 'practice' of OHS - the 'how' to implement the things we know need implementing within the specific, complex and very challenging sociotechnical contexts of our organisations. Stringer (1995, pp. 2-3) argues the following ...

"If there are answers to these proliferating social problems [including the unacceptable frequency and severity of workplace injury and disease], it is likely that centralized policies will need to be complemented by the creative action of those who are closest to their sources - the service professionals ... [and those] who face these issues on a daily basis. Unfortunately, the technical skills that professionals acquire in the course of their training are usually inadequate to provide practitioners with the means to work at this level ... Centralized policies, programs, and services, I suggest, should allow practitioners to engage the human potential of all people who contribute to the lives of the specific contexts in which they work. Policies and programs should not dictate specific actions and procedures, but should provide the resources to enable appropriate action to be taken ... This new vision rejects the mindless application of standardized practices across all settings and contexts, and instead advocates the use of contextually relevant procedures formulated by inquiring and resourceful practitioners."

The author contends that the words of Stringer above ring true - OHS practitioners "need the means" to facilitate the reliable development of context specific solutions to OHS problems, and to 'localise' and effectively imbed / implement, through and with the contributions of other workplace stakeholders, the things they know need implementing within the specific, complex and very challenging social contexts of their organisations. Action research is such a 'means'.

OHS practitioners, however, do not only require the 'means', they need to learn to apply it, need to evaluate and improve their application of it in a self-reflective, rigorous, and critical way, and they need to share their 'learnings' in terms of both actual solutions developed, and the process of developing and implementing these solutions, with their peers.

> *"Due to the dynamic nature of industry, it becomes imperative to maintain current knowledge, to be self-critical of your practice, and the practice of your peers, in order to progress your practice. The issues of today are no longer about the method of acquiring knowledge or the number of disasters survived, but an integration of ideas."*

> Karina Dine (1997, p. 17)

We have taught practitioners (more or less) reasonably well in relation to the 'scientific' and 'technical' aspects of OHS, and the principles of OHS management (Quinlan & Bohle, 1991, p. xiv). We have taught them how to understand / interpret / critique, and in some cases, to perform positivist OHS research. We have taught them how to access and research existing OHS information, and emphasised the importance of networking. We have recognised the need to provide them with knowledge of, and insight to, a number of other disciplines which enhance or critically impact their practice - including disciplines such as organisational management, psychology, computing and law (VIOSH, 1995, p. 13). **But have we provided OHS practitioners with a process / mechanism / tool with the capacity to reliably bridge the gap between theory and practice, to convert research into effective action at the coalface, to sustainably improve OHS performance, and to share the lessons they have learned with others?**

What OHS practitioners do within their organisations when faced with the resolution of a complex OHS problem, or the implementation of an OHS management system, is considered by some as 'naive inquiry'. Action research offers OHS practitioners the opportunity to build on the OHS management and problem solving knowledge and skills which are already a key component of their practice, and to take them to the standard, status and rigor of critical, applied research activities - with subsequent improvement in the effectiveness of solutions developed and systems implemented, and the ongoing improvement of their practice. A combined list of some of the key principles and features of action research bears this out ...

Box 12
Action research - a research methodology for OHS practitioners?

- A social practice in need of improvement;

- focused on 'ill-structured' problems - problems that do not have well-defined or reliable methods of determining the problem or the solution, problem definitions which vary as a function of the particular situational circumstance and the perspective of stakeholders, and problems related to the changing and understanding of inherently dynamic and complex human systems;

- future orientated, participatory problem-solving within a specific context (rather than a focus on historical problem description for the production of 'general knowledge');

- a research process that takes and tests action, is outcome focused, and delivers actual, local / coalface improvement in the short and long term (action research is not just about measuring a problem and making recommendations);

- treats people involved / participating in the research process as active, self-reflective collaborators, who play a critical role in the identification and diagnosis of their own problems, and in the generation of relevant knowledge;

- involvement of collaborators through each stage of the research process - maintaining the collaborative control of the research process;

- a mechanism for ongoing education, enlightenment, and empowerment of researchers / participants / collaborators;

- a clear recognition of 'change intervention' to bring local improvement as a critical component of action research - the action research process will not only affect the individuals and systems involved, it is the objective of the action research process to change / improve / develop both the involved individuals and systems;

- a spiraling research methodology consisting of cycles of planning, acting, observing and reflecting - with an interlinking, evolving relationship between the cycles of research - this is not a 'silver bullet' methodology, but a continuous improvement one;

- systematic and self-critical implementation of each research phase;

- the use of varied (and preferably at least three) observation types, tools, techniques, and sources to collect and record feedback and data during the observation stage of the action research cycle - generally in a planned, systematic way, to facilitate triangulation and enhance validity);

- the capacity to build (through the reflection stage of the action research cycle) a comprehensive understanding of phenomena taking place, with the development and questioning of multiple explanations for these phenomena, and the drawing out of context specific, meaningful conclusions with a reasonable level of confidence and accuracy;

- the recording of the 'story' of the action research project in a way which is able to capture, reveal and communicate , through the personal and detailed description of a context specific and collaborative research process, the local knowledge and theory produced - knowledge and theory that may be valuable to others as they consider how best to approach a similar problem or situation within their local environment.

After Carr and Kemmis (1986, p.), Hart and Bond (1995, p.), Streubert and Carpenter (1999, p. 261), Small (1995, pp. 948-954), and Winter (cited in Zuber-Skerret, 1996, p. 26)

Practitioners are on about the very important work of 'practice', its effectiveness and its improvement. While they might use the results of positivist research as inputs into their practice, expecting OHS practitioners, in general, to perform and contribute positivist scientific research, is like asking a practicing nurse, social worker, or country general medical practitioner to perform and contribute positivist research to identify whether a defective chromosome is a significant predetermining factor for a well known communicable disease. All three people are qualified practitioners who are potentially involved in the treatment and / or prevention of this disease, yet as individuals, would be unlikely as full time practitioners to be performing positivist research in this area. All three, however, may be interested in performing and contributing to action research associated with the disease as it relates to their practice, and their improved management of its treatment and prevention.

Practitioners from a wide range of disciplines use action research to improve their practice, to solve problems, to implement change, and to share the lessons they've learned with their peers through publication in peer reviewed 'scientific' journals (McNiff et al, 1996, pp. 2-3; Schmuck, 1997; Small, 1995, p. 942; Stringer, 1996; Zuber-Skerritt, 1996, Zuber-Skerrit, 1992, p. 16) – why not OHS practitioners? Action research has a great deal to offer OHS practitioners – a research methodology that may be the foundation stone of 'true' OHS practitioner research, and the resulting continuous improvement of their practice into the future.

9.2.   An Alternative OHS Consultative and Teamwork Strategy

The performance-based legislation of today (founded on Roben's model) requires Australian workplace stakeholders to work together in the development of context appropriate strategies, systems, procedures, and hazard control solutions to achieve regulatory compliance and, more importantly, to prevent workplace injury and disease (Brooks, 1993, pp. 273-276, 281; Creighton, 1986, p. 6; Keenan, 1997, p. 7). OHS regulatory authorities in Australia are intent on "facilitating compliance with occupational health and safety legislation ... [utilising] the consultative arrangements within the workplace to create an environment that is conducive to the principles of self regulation", believing that hazard control solutions developed and implemented through consultative processes are more likely to deliver effective and sustainable prevention and compliance, than those driven through the force of external regulation (Keenan, 1997, p. 7). This is another area where action research offers the OHS practitioner an alternative (and potentially more effective) model of delivering continuous improvement of an organisation's OHS performance through a consultative / participatory mechanism.

Many OHS practitioners agree with the intent of the Roben's model, and its principle of self-regulation through consultation, however there has been increasing recognition that the mechanisms within the model designed to deliver a consultative approach to the management of workplace injury and disease, are frequently inadequate, ineffective, and in some cases counter-productive (CCH, 1987, PP. 28-29; Dell, 1999, p. 1; Burgess, 1993, p. 19; CCH, 1997, P. 3; Borys, 1997, p.11; Matthews, 1985, p. 585). While the Roben's report emphasised that the statutory consultative mechanisms (i.e. health and safety committees and representatives) were not intended as the only (or even the best) mechanisms of consultation and participation (Borys, 1997, p. 10), in Australia, regulatory authorities, employers and unions have generally considered or driven these mechanisms as strict requirements for compliance - rather than as a starting point or minimum standard (Burgess, 1993, p. 19). The intent of the Roben's Committee (Brooks, 1993, p. 275), however, was to open up the way for much more flexible, context appropriate, and inclusive forms of consultation and participation ...

"Safety representatives and joint safety committees are not the only methods of seeking to increase the involvement and commitment of workpeople."

"The form and manner of such consultation and participation would not be specified in detail, so as to provide the flexibility needed to suit a wide variety of particular circumstances".

"Some firms have arrangements whereby all employees in a particular working unit meet periodically for discussions about safety. This approach, sometimes referred to as 'total involvement', lays stress on participation by every individual employee."

The Roben's Committee (cited in Borys, 1997, p. 10)

The intent of the Roben's Committee for flexibility and creativity in consultative, participatory arrangements does not generally appear to have been delivered by its legislation. It has been the author's experience that more flexible, context appropriate, and inclusive forms of consultation and participation have been the exception, rather than the rule. The legislated forms of consultation have been considered a potential barrier to the development and implementation of more effective mechanisms, particularly in organisations where resources are at a premium, and are not sufficient to support multiple forms of consultation and participation.

"There is no guarantee that mandating a particular form of consultation (for example, committees) will necessarily lead to effective consultation ... It is important that legislative provisions for health and safety committees do not inhibit other forms of consultation ... Restricting the form of legally sanctioned participation to employee health and safety representatives would be counter-productive if it deterred active participation by other employees."

Industry Commission (1995, p. 64)

'Committee' is defined by the *Collins English Dictionary and Thesaurus* (1993, p. 217) as a "group of people appointed to perform a

specified service or function". Team is defined as "a group of people organised to work together ... a group of players forming one of the sides in a sporting contest" (*Collins English Dictionary and Thesaurus*, 1993, p. 1189). A key difference between these two definitions is the idea of working together, of playing on the same side. The consultative arrangement of Roben's model legislation, the 'joint safety' committee, is generally not about working together on the same side to produce the best possible solution (i.e. teamwork), it's about conflict, confrontation, negotiation, and compromise, between people appointed to represent potentially opposing viewpoints (Dell, 1999, p. 1; Matthews, 1985, pp. 575-585). The very necessity of rules requiring equal committee representation from both sides of the 'us and them', 'management verses employee' fence (Creighton, 1986, p. 1003), underlines the confrontational nature of the joint safety committee concept, and the unhealthy foundation of distrust and divisiveness at its core.

Another criticism of some OHS committees is their perceived lack of results. An 'occupational health and safety committee' has been defined as "a group of people at a workplace who investigate, discuss and make recommendations about health and safety matters" (CCH, 1987, p. 105). The author's experience suggests that it is the experience of many committees (to their frustration and the frustration of other workplace stakeholders), that committees produce a little investigation, plenty of discussion, some recommendations, and very little action. This may be due in part to a combination of factors, including ...

- the confrontationalist basis of committees (see discussion above);
- the conflicting agendas that may be brought to the committee by members representing groups with different needs and priorities;
- inappropriate make up of the committee in relation to the mix of knowledge types, skill sets, experience, and influence;
- the upper level focus on policy making rather than action (Matthews, 1985, p. 579);
- the expectation that management is responsible for action (Matthews, 1985, p. 581);
- the way committees can be misused as a dumping ground for OHS problems that are better solved elsewhere (CCH, 1987, p. 32);
- poorly structured meetings and time constraints slowing rate of progress (Matthews, 1985, p. 585);
- shiftwork arrangements interrupting consistent participation;
- a lack of support from organisational management (CCH, 1987, p. 28).
- the open ended life cycle of the committee; and
- inadequate training of members.

The experience and the perception of some in relation to the ineffectiveness of committees as a consultative, participatory mechanism to facilitate the improvement of organisational OHS performance, as well as the influence of the quality movement and Theory Y principles of organisational management, have contributed to the trialing of 'team' approaches to drive

improvement in the prevention of workplace injury and disease as an alternative (Borys, 1997; Weimer, 1984; Kelly, 1993, pp. 26). Teams, however, are also not without problems to manage (GOAL/QPC & Joiner Associates Inc., 1995, pp. 135-160) - some of them quite similar to problems experienced by committees. A number of the characteristics and attributes of a 'team' approach, however, arguably facilitate the development of a healthier, more co-operative environment, and provide teams with a higher probability of meeting their objectives (Katzenback and Smith, 1993, p. 9). A recent Commonwealth Government Industry Commission inquiry into OHS (1995), recognised team-based approaches as 'best practice' strategies for delivering organisational OHS performance improvement. Team based approaches spawned by the quality movement (e.g. Quality Circles) have also been applied by a number of Australian organisations to deliver OHS performance improvement with some success (Weimer, 1984; Kelly, 1993, pp. 26, Borys, 1997).

Borys (1997, p. 51), however, describes "a dearth of research in the area of team work in general ... and also specifically in relation to team work and health and safety". The conclusions of his case study research indicated that while team based OHS approaches appeared to be generally effective, performance was variable (Borys, 1997, p. 96). He also found that the variables purported to be associated with effective team based approaches, as identified within the literature, ranged widely, and that these models (or one unifying model) had not been systematically applied to the implementation of OHS team based approaches, or the measurement of OHS team performance to target / drive improvement of team effectiveness (Borys, 1997, pp. 96-97). In order to facilitate the effective implementation and ongoing improvement of future team based approaches to managing organisation OHS performance, Borys has consolidated existing theory on variables associated with effectiveness into a single model (see Figure 8 below). The model Borys has produced comprehensively highlights critical success variables associated with 'organisational context', 'team design', 'team process', and 'team effectiveness', as well as identifying the need for 'team development over time'.

Action research offers the OHS practitioner a very flexible consultative, participative, collaborative, team-based approach to solving problems, providing a defined / tangible structure and methodology incorporating much of the 'team work' theory described by Borys's model. Action research has a long history of application within a wide range of organisational contexts and disciplines (Hart & Bond, 1995; Lomax, 1996; Stringer, 1996; Whyte, 1991; De Koning & Martin, 1996; Small, 1995; Zuber-Skerritt, 1992 & 1996). Action research methodology has been evolving and improving over this substantial period, and though there is still work to do in relation to the epistemology of action research, action research has a richness and depth of theory, process and procedure, dynamism and flexibility, borne out of and proven through real world practice, with which to inform the concept and emerging application of team-based OHS initiatives (refer Sections 5 & 6 above).

The spiraling cycles of planning, acting, observing, and reflecting of the action research process, provide focus, direction and structure to a team - and the process itself leads the team to collaboratively, systematically and critically work through a problem, and develop, forge, implement, evaluate, and

continuously improve context appropriate solutions (over time). It is a process that recognises the complex nature of sociotechnical problems, the need for multidisciplinary and coal face input, and the challenges of achieving real and sustainable change and improvement within an organisational context and culture - allowing for realistic expectations and objectives to be negotiated and set, and the moderating of an organisation's generally ill-advised drive for 'the quick fix'.

Action research facilitates the development and the continuous improvement of not only the specific solutions to OHS problems, but also the development of each participant, the team, and the team's effective, efficient application of the action research process. It has the potential to lift the standard of consultative and team based approaches to OHS performance improvement (i.e. the process of resolving complex OHS problems, and of developing and implementing effective OHS management systems through consultation and teamwork) from 'policy making', 'simple problem-solving' and 'team work' (that would be considered by many as shallow, 'naive inquiry') - to a place where consultative / team OHS problem solving and system implementation processes are (in reality, and in the perception of 'significant others') rigorous, critical, applied research activities (producing effective solutions and sustainable improvement). It looks to lift these OHS consultative / team processes to a place where participants in the action research process are transformed (in reality and in their own perception) into genuine, capable, and empowered co-researchers.

Action research is about developing genuine collaboration (not just consultation) in an environment of trust - it's about honouring and soliciting the knowledge, experience, thinking and contribution each participant brings to the team, and bringing it to bear on the research process. That people genuinely collaborate is not to say that there are not different points of view, conflicting ideas and substantially diverse types of knowledge, experience and thinking. To the contrary, the action research process is built around a recognition and a valuing of these things, and it in fact looks to unearth and consider all the different ways of understanding a particular problem in order to build a participatory, comprehensive, holistic picture of the problem / opportunity in question (an 'OHS hologram').

It is the reflective and critical aspects of action research methodology (i.e. the application of reflexive and dialectic critique, and the process of democratic, co-generative dialogue) that allow the action research team (and individual team members) to form from a number of diverse understandings, knowledges, experiences, thinkings, and realities, an agreed new way forward to be tested in action - the opportunity to create a new reality for themselves and their organisation. This is the purposeful and intended richness of the action research process, its collaboration and team work. It is the mechanism that allows teams to not only develop culture appropriate and context specific solutions and strategies, but also (where necessary) to develop and implement solutions and strategies which impact / change the choices the people within an organisation make in relation to the prevention of workplace injury and disease, the actions they take to identify, assess and control hazards, and the commitment to OHS they demonstrate through their behaviour (i.e. to

paradigmatically impact / change the essence of an organisation's 'OHS' culture and management).

Figure 8
Borys's Model for the Development of Effective Team-based Approaches for Improving Health and Safety

- Health and safety vision
- Health and safety goals
- Commitment to teams
- Guidelines for teams
- Feedback

1. Organisational Context

Influences

Desired Output:
Risk Control

Team Boundary

Target of intervention:

Health and Safety

2. Team Design

- Training
- Resources
- Boundaries
- Roles
- Authority
- Leadership
- Problem Solving Skills

4. Team Effectiveness

Measures of Effectiveness
- Team member preceptions
- Output satisfactory to customers
- Time taken to solve health and safety problems
- Audit results
- Number of risk control improvements implemented
- Reduced frequency and severity of injuries
- Reduced costs

Influences

3. Team Process

- Leadership
- Communication
- Energy
- Purpose
- Planning
- Organising
- Goals

Team development over time

David Borys (1997, p. 93)

Action research, as a methodology, looks to produce, through the application of the validity procedures of co-operative human inquiry (see Section 7 above), context specific, meaningful conclusions with a reasonable level of confidence and accuracy, and to record the 'story' of the action research process in a way which is able to capture, reveal and communicate the local knowledge and theory produced - knowledge and theory that may be valuable to others as they consider how best to approach a similar problem or situation within their local environment. This 'recording' of the research is valuable from an organsational perspective as reference for the future. Without documentation of the team's research process, the comprehensive learnings about the problem, the reasons for the development of specific interventions, the results of evaluations testing the effectiveness of the action taken, and the

indicators within the research of areas needing further investigation and continuous improvement, may all be lost (GOAL/QPC & Joiner Associates Inc., 1995, p. 120). The risk here is that the organisation over time loses its memory of what it has learned, and either through making uninformed changes at a later date, or allowing interventions to lapse because the importance and validity of them has been eroded in the absence of an adequate 'stake in the ground', ends up relearning the lessons it had already secured - sometimes at great cost. Action research thus potentially brings another important discipline to team based approaches to OHS performance improvement.

The capturing and communicating of validated local knowledge and theory through OHS action research teams, has the potential to provide much needed (dare it be said) 'quality' research on team based approaches to the improvement of OHS performance - enabling the OHS community to explore, continually improve and, where appropriate, drive flexibility in the use of team based approaches to OHS performance improvement, as a complement, or an alternative, to legislated forms of participation and consultation.

9.3. A Mechanism for Change, Innovation and Continuous Improvement

As discussed in Section 8 above, Dr. Dennis Else has communicated the following picture of what is likely to be needed in the future, if OHS is to successfully meet the challenge to significantly improve the prevention of workplace injury and disease.

- A recognition by the OHS community that OHS is not an organisation's "highest priority and never will be!";
- The need for a 'holographic' approach to OHS;
- The need for innovative problem solvers and problem solving; and
- The need to "embed OHS principles as part of the problem solving skills of all Australians".

After Else (1999)

From the review and dicussion of the literature, and in particular, the detailing of action research theory in previous sections (e.g. refer Table 8 after Reason,1993, pp. 1259-1263; and Table 3 after Small, 1995, pp. 948-951), and in reference to literature relating to innovation and change, action research offers the OHS practitioner a methodology with the potential to deliver in these four areas for a number of reasons, including the following ...

- Action research is a tool which allows people in the organisation to explore organisational realities, their underlying influences, and to reconstruct a more accurate personal and organisational reality in the process.

- Action research is a methodology which not only allows for, but has at its foundation, a holographic approach to solving complex, real world problems.

- Action research is focused on achieving radical improvement in the problem situation, and has the capacity for solution development outside normal parameters (i.e. the potential to facilitate paradigmatic change) - it is "not just testing or reformulating theoretical propositions or ideas" (Karlsen cited in Whyte, 1991, p. 150). It does this through not only developing a context appropriate solution, but through creating the environment in which sustainable change for improvement can take place.

- Action research is not a 'silver bullet' approach to innovation. It is an approach based on the deliberate, disciplined, and ongoing utilisation of the organisation's human resources, bringing 'different ways of knowing' to bear on the resolution of the problems it faces, and is compatible with the principles of innovation (of the continuous improvement type) discussed in Section 8.8 - 8.10 above.

- Action research was initially developed and utilised for the purpose of organisational change and workplace reform to improve productivity and profitability, and has historically been heavily associated "with private industry and organisational development" (Small, 1995, p. 942). Action research has been used to facilitate the development of such innovations as autonomous work groups and multiskilling (Karlsen cited in Whyte, 1991, p.153), and to radically change, restructure and improve the competitiveness of Norwegian shipping industry (Walton & Gaffney, cited in Whyte, 1991, pp. 99-126), and organisations such as Xerox (Argyris & Schon, cited in Whyte, 1991, pp. 87-88).

- The utilisation of cross-functional teams is seen within change literature as an indicator of 'network organisations' - a more recent organisational style with the capacity to effectively manage unstable / changing environments, and with "a premium on innovation" (Brynjolfsson et al, 1997, p. 51). Action research is a methodology which promotes a multidisciplinary approach to problem solving.

- Action research has been used to successfully improve OHS interventions within a large overseas organisational environment over a six year period (Schurman, 1996, pp. 373-377).

- Action research is very consistent with principles and practices of 'quality' (Deming, 1982; Seddon, 1997;), with the core methodology of the total quality movement (i.e. the 'plan, do, check, act' process), a sub-version of action research methodology (Schurman, 1996, p. 376).

- Action research is a methodology that meets the criteria of a successful change initiative as described in current literature on organisational theory, management, and change (Whiteley, 1995; Scholtes, 1998; Whitford, 1992; Pfeffer, 1994). An action research strategy is in fact described and recommended by Scholtes (1998, pp. 187-231) as the key to "breakthrough improvement". Whiteley (1995, pp. 67-71) also recommends action research strategies for managing change.

Bawden (1989) advocates the development of the 'learning organisation'. Some of the implications for organisations not understanding how to learn, develop and improve are presented in Box 13.

Box 13
Vulnerabilities of not understanding how to learn, develop, and improve

- Not understanding the difference between change and improvement, managers introduce and allow others to introduce interventions that are illusions of progress and create only a temporary infusion of optimism, not real improvement.

- Leaders are plagued by thought without action or, more commonly, action without thought.

- Problems remain unsolved. At best they disappear for a while only to reappear. People don't know why the problems disappeared or why they reappeared.

- The organisation that doesn't know how to learn doesn't know how to improve, how to improve learning, or how to improve improvement.

- The organisation becomes a victim of the current fad, whatever management program du jour is currently in vogue. People become cynical, having learned that this fad will come and go only to be replaced by another. Thus, they take none of them seriously.

After Peter Scholtes (1998, pp. 36-37)

Changing and improving OHS is not necessarily an easy or glamorous process. Action research has been presented as a tool for OHS practitioners to utilise to initiate continuous and innovative change and improvement in workplace injury prevention over time. Organisations and practitioners would be wise to consider the implications of the following list of change principles, as they look to understand and implement effective organisational change processes.

Box 14
Assumptions for those wishing to initiate change

1. Don't assume that your version of what the change should be is the one that could or should be implemented. You have to exchange your reality of what should be through interaction with others concerned.

2. Change involves ambiguity, ambivalence and uncertainty about the meaning of change. Effective implementation is a process of clarification.

3. Some conflict and disagreement are not only inevitable but fundamental to change.

4. People need pressure to change (even in directions they desire) but it is only effective under conditions that allow them to react and interact. Re-socialisation is the heart of change (otherwise you need to replace the people involved!) (sic.).

5. Effective change takes time. It is a developmental process that takes at least two years.

6. Lack of implementation isn't necessarily because of rejection or resistance. There are many other reasons, including insufficient resources or time elapsed.

7. Don't expect all, or even most, people or groups to change. Progress occurs by increasing the number of people affected.

8. You need a plan based on these assumptions and underpinned by a knowledge of the change process.

9. Change is a frustration (sic.), discouraging business. If you are not in a position to make the above assumptions, which may well be the case, don't expect significant change, *as far as implementation is concerned.*

Source: After Fullan (Robson, 1993, 443)

9.4. A Framework for Practitioner Personal and Professional Development

"*[People in the professional service occupations] ... often struggle to balance increasing demands on their time and energy as workloads continue to expand, and they are routinely confronted by problems rarely encountered 30 years ago. The pressures experienced in professional practice reflect the tensions that exist in modern society. The complex influences that impinge on people's everyday social lives provide a fertile seed bed for a proliferating host of family, community, and institutional problems. Professional practitioners ... are increasingly held accountable for solutions to problems that have their roots in the deeply complex interaction between the experience of individual people and the realities of their social lives ... Although adequately prepared to deal with the technical requirements of their everyday work, practitioners face recurrent crises that are outside the scope of their professional expertise*".

Stringer (1996, p. 5)

The increasing complexity of the social and technological context of OHS practice (refer Section 8 above), provides an enormous challenge to, and can place huge stresses on OHS practitioners - even to the point of impacting practitioner health and well being (Thatcher, 1991). Thatcher (1991, p. 1) identified the lack of organisational support and influence, and the need for a wide span of multidisciplinary knowledge and skill, as significant OHS practitioner stressors. There has been a general recognition for nearly a decade now that OHS practitioners can not 'go it alone' - that achieving significant, continuous, and sustainable improvement in OHS performance (including the resolution of many complex OHS problems) in many instances requires a multidisciplinary approach beyond the capacity of any one individual, no matter how broadly based their expertise (Quinlan & Bohle, 1991), and the 'buy in' and participation of all workplace stakeholders (Kelly, 1993, p. 26-27). Thatcher (1989, p. 63) identifies the following OHS practitioner need ...

> "Perhaps the single most important intervention strategy would be the introduction of a clear support structure for the OH&S officer whereby the 'lone role' perception can be dissipated".

The 'lone role' factor referred to by Thatcher is also experienced by other 'service' professionals (Stringer, 1996). Thatcher (1989, p. 71), in his study of occupational stress and OHS practitioners, identified that the level of personal control exercised by individual practitioners was a significant stress variable. Action research offers the following in this regard ...

> "... a resource for practitioners, to assist them in their efforts to conduct inquiry and to hone their investigative skills so they might formulate effective solutions to the deep-rooted problems that detract from the quality of their professional lives. ... [an] approach to inquiry that will help practitioners explore systematically the real-life problems they experience in their work contexts and to formulate effective and sustainable solutions that will enhance the lives of the people that they serve"

> Ernest T. Stringer (1996, p. xviii)

Action research methodology, while it is not without its OHS practitioner stressors (e.g. knowledge and skill requirements associated with its effective application, and the input of OHS knowledge, principles, processes, and tools), provides practitioners with a tool which encourages and facilitates multidisciplinary contributions, and cultivates the 'buy in' and participation of workplace stakeholders (refer to Section 5 above). OHS practitioners using action research methodology share the ownership of the problem, all aspects of the action research process (planning, acting, observing and reflecting) - including the contribution of knowledge, and the responsibility for (and success of) the research outcome, with the action research team. The application of action research methodology, particularly where it has been accepted, is valued, and is structurally supported and resourced by the organisation, allows OHS practitioners to play a much healthier and effective role within the organisation's drive to manage OHS performance.

Action research can also be utilised, and has been utilised extensively, as a professionalising tool by individual practitioners (Hart &, Bond, 1995, pp. 40-43) and also by defined practitioner groups (e.g. nurses, teachers, and social workers) to improve the overall status of the practitioner group (Hart & Bond, 1995, Carr & Kemmis, 1986; Zuber-Skerrit, 1992; Zuber-Skerrit, 1996; Stringer, 1996; Parker, 1997; Schmuck, 1997; Streubert & Carpenter, 1999; Lomax; 1996). As discussed in Sections 8.6 and 9.1 above, there is currently a significant drive to lift the professional status of OHS practitioners. Dine (1997, pp. 20-21) recommends that the process of professionalisation utilised by other professions by studied to improve understanding of the professionalising process, as a guide to the professionalising of Australian OHS practitioners, and as a benchmark against which to measure progress.

While the author believes this has been worked through by those leading the professionalisation charge, the professions potentially benchmarked (e.g. accountants, occupational hygienists, etc.) may have been using an alternative approach - that is an 'expert' approach focused on establishing high standards of qualification, and "allow[ing] entry only through a recognised and tested system of training and examination ... regulated through a code of ethics and a means for its enforcement" (Considine, 1994, p. 97). The author concurs with this approach, and it is also consistent with the professionalising processes of nurses, teachers, and social workers. These groups, however, (to name a few), have also extensively applied action research as a professionalising strategy, to increase the 'real world' professionalism of their individual and collective practice. A study into the effectiveness of various methods of professional development, as rated by higher education professionals (Zuber-Skerrit, 1992, p. 74), found that, "on average, this group of academics rated 'Action Research' as by far the most effective method of professional development". While the study also found that there were difficulties in applying action research as a professionalising mechanism across the board, Zuber-Skerrit (1992, p. 78) has the following to say in relation to its effectiveness ...

> *"My observation has been that real change in attitude and teaching behaviour is likely to occur not when imposed from outside, but when academics are actively involved in systematically reviewing their own practice."*

Action research is also a strategy recommended within the literature for organisational managers (Whiteley, 1995, pp. 66-80; Scholtes, 1998, pp. 378-387), and is worth exploring further as a complementary approach to the current professionalising process for OHS practitioners. Box 15 below simply outlines the basic principles of action research as a professionalising strategy. Broad and Fletcher provide the following prespective on practitioner research and professionalism ...

> *"The rationale of practitioner research is that of continuous reform by professionals who have insights and influence in a democratically accountable practice ... Practitioner research is both a defensive and developmental relationship with professionalism. Practitioner-researchers want to make the most of both realism <u>and</u> idealism, to be beyond cynicism but not as far as utopianism."*

Broad and Fletcher (cited in Hart & Bond, 1995, p. 218)

Box 15
Zuber-Skerritt's CRASP Model

Action research is:

Critical (and self-critical) collaborative enquiry [by]
Reflective practitioners [who are] being
Accountable, and making the results of their enquiry public,
Self-evaluating their practice, and engaged in
Participative problem-solving, and continuing professional
development.

Source: Zuber-Skerritt, 1992, p. 15

10. Potential Barriers To Action Research OHS Application

A brief summary list of some potential barriers to the application of action research by Australian OHS practitioners is provided below, as identified from discussion within previous sections of this thesis.

- The powerful influence of positivist socialisation processes on practitioners, their organisations, and the 'significant others' of the OHS community (i.e. professional bodies and academic institutions) (Carr, 1995, p. 105). There exists within the Australian OHS community (and this is not necessarily a bad thing in itself), a very strong drive to be rigorously 'scientific' (Viner, 1991; Dell, 1999; VIOSH Australia, 1999).

- The impact of organisational management styles. It is likely that organisations heavily influenced by scientific management principles, particularly those at the 'Theory X' end of the spectrum, will not immediately warm to the prospect of collaborative problem solving through action research (Stone, 1991, p. 232), and be accepting of either the resources required or the speed at which action research methodology develops and implements solutions (Owens, 1995, p. 245).

- The need for further development of action research epistemology, to provide a clear and user friendly process for use by practitioners (Winter, cited in Zuber-Skerritt, 1996, p. 17).

- The existing level of action research knowledge and skills of OHS practitioners. Action research is a challenging research methodology, and requires specific knowledge, skills, and understanding (Schmuck, 1997, p. 31). Currently, from the results of the literature search (refer to Section 3), few OHS practitioners have first hand knowledge, skill or experience in action research and its application.

The term barrier is defined as "anything serving to obstruct passage or maintain separation, ... anything that prevents progress, ... [and] anything that separates or hinders union" (*Collins English Dictionary and Thesaurus*, 1993, pp. 91-92). The barriers listed above collectively present a formidable challenge for the future application of action research within OHS in Australia. The influence of positivism alone, stalled the effective introduction and utilisation of action research with the area of education for more than two decades (Carr, 1995, pp. 100-101). Elliott re-ignited the torch of action research in the areas of education. Carr (1995, p. 101&102) has described the resulting impact of "an idea whose time had come" ...

> "In the ensuing decade, action research was to become nothing less than a full blown 'movement' sustained by a large number of teachers, teacher educators and educational researchers and supported by numerous educational institutions and research agencies in Britain, Australia, continental Europe and the USA. As a result, the next ten years witnessed the emergence of local action research 'networks', the funding of several major action research projects and the publication of a steady stream of books explaining the action research method and offering teachers advice about how it can be used."

This history of action research application within education suggests, that though the obstacles may be formidable, they are not insurmountable. Carr and Kemmis (1986, p. 166) have suggested a number of reasons for the unprecedented level of response to Elliott's initiatives. These include ...

- the teachers, themselves, were eager to be involved in research as a part of their professional development;
- teaching practitioners did not perceive much of the contemporary (positivist based) educational research to be relevant to them;
- the work of Schwab on 'practical deliberation' had prepared the ground in which action research seeds could be planted;
- a 'new wave' of educational research and evaluation methods focused on and utilising participant feedback to shape educational practice was emerging;
- the 'accountability movement' had already initiated a type of individual self-reflection mechanism;
- public criticism of the teaching profession had prompted teachers to 'close ranks' and develop support networks of professionals interested in driving improvement in educational practice; and
- there was an increased awareness and understanding of action research throughout the teaching profession.

Those looking to facilitate the timely and effective introduction of action research within the field of OHS, would be wise to consider the implications of its successful introduction within the field of education.

11. OHS Action Research Case Study Review

11.1. Introduction

The case study method, an approach designed to investigate a "phenomenon within its real-life context" (Yin, 1994, p. 13), and which uses narrative to document and communicate the investigation process, analysis, and outcomes in written form (Yin, 1994, p. 135), is one of the key models action researchers use to tell the 'story' of the action research project. There are numerous action research publications which contain quite a varied range of action research case study styles (Lomax, 1996; Whyte, 1991; de Koning & Martin, 1996; Hart & Bond, 1995; Kember & Kelly, 1993). The case study style used to describe / document the two case studies utilised for the purposes of this paper, is based on a combination of action research case study styles used by Loftus (cited in Lomax, 1996, pp. 83-95), and Kember and Kelly (1993).

The two Australian OHS action research case studies reviewed represent a variety of action research applications in different environments and contexts, and thus provide a window into the flexibility and dynamism of this methodology. The first case study reviewed (Popplewell, 1993), is reproduced in abbreviated / précis / paraphrased form, with only material relevant to this paper (as determined by the author) being incorporated within the case study description. This abbreviated form has also been presented, for reasons of consistency, in the action research style discussed above. The reader is referred to the full case study for additional information.

The second action research case study is the summary record of the author's own first application of action research principles and methodology. Ethical issues associated with this case study, and the sensitivity of subject, have made it necessary for the researcher to maintain the anonymity of the organisation and co-researchers (Streubert and Carpenter, 1999, p. 262), and to restrict access to supporting documentation. A comprehensive, numbered list of supporting documentation is held by the organisation involved, and questions relating to this documentation specifically, and the case study generally, may be directed to the author.

The case studies are individually critiqued and analysed in relation to the following questions (utilising theory documented in the body of the thesis), and the of results of this critique / analysis are discussed ...

- Does the case study meet the 'working definition of action research' produced by the participants at the International Symposium on

Action Research held in Brisbane in March 1989 (Zuber-Skerritt, 1992, p. 14)?

- How does the case study match Hart and Bond's (1995, pp. 40-43) action research typology and associated elements?

- Is the style and form of the case study appropriate for an action research project (Winter, cited in Zuber-Skerrit, 1996, pp. 25-26), and is the principle of critical subjectivity addressed within the report (Reason, 1993, pp. 1262-1263)?

- Have appropriate validity processes and procedures been utilised to a level which enables context specific, meaningful conclusions to be drawn with a reasonable level of confidence and accuracy (Streubert and Carpenter 1999, p. 261)?

- Were ethical issues adequately addressed (Streubert and Carpenter, 1999, p. 262)?

- What predicted barriers, problems, and improvement opportunities were identified / experienced?

- Were the potential OHS benefits predicted by the author, on the basis of the general action research theory content of the thesis, realised within the case study?

  ⇒ Actual and sustainable OHS improvement at coal face?
  ⇒ Valid practitioner OHS research useful to peers?
  ⇒ Effective consultation / teamwork strategy?
  ⇒ Professional development of the OHS practitioner, and the facilitation of an appropriate and effective OHS practitioner role?
  ⇒ Innovative OHS solutions produced?
  ⇒ Reconstruction of co-researcher reality, the internalisation of OHS principles and knowledge, and the associated empowerment of co-researchers?
  ⇒ Learnings identified to improve future application of action research process?

In practice, every report, every paper, and every journal article documenting an action research project should apply the principle of critical subjectivity. This is an important point for the reader to bear in mind when working through the following case studies. The auto-biographical and background information provided by the researcher contributes to the reader's capacity to critically evaluate the research.

11.2. Case Study One ...

Popplewell, A. 1993, Occupational health and safety in the workplace reform environment: Striving for best practice occupational health and safety in the Email Washing Products Division, Masters thesis, Ballarat University College.

11.2.1. Background

Email Washing Products Division (EWPD), is a white goods manufacturer based in South Australia. It produces a variety of quality accredited products for local, national, and export markets, and employs approximately 550 people from very different cultural backgrounds across three geographical locations. People are employed through a wide range of occupations, with a prevalence of blue collar jobs such as die casting, press operation, component manufacturing and assembly, painting, and maintenance.

EWPD embarked on a five year program of workplace reform in the early 1990's, based on a socio-technical systems approach. The socio-technical approach to workplace reform is based on the principle that the way in which work is organised and jobs are structured will determine the culture of the organisation and the way people behave. Job design must, therefore, address both the technical and the social aspects of the organisation if work systems are to produce greater employee productivity and higher personal fulfillment for organisation members.

The socio-technical systems approach was seen as a tool for organisational change to address factors identified with the general decline in the Australian manufacturing sector, rather than as an end in itself. A vision for the future was developed and documented in consultation with all people in the organisation (with the support of the main union organisation), and a timeframe of five (5) years was set to bring that vision to reality. The principles for change applied in this context were ...

- Combining tasks.
- Forming natural work units.
- Establishing client (internal and external) relationships.
- Vertical loading.
- Opening feedback channels.

The process of workplace reform was well underway by early 1992, with the following initiatives taking form ...

- The formation of semi-autonomous and cross-sectional teams;
- The implementation of effective mechanisms of communication, including a system of daily briefings involving all organisational levels, the development of an electronic billboard to facilitate the provision of a constant and varied flow of information, and the production of a monthly newsletter;
- Extensive training in workplace reform processes, adult literacy, and job skilling;
- Work team focus on 'lean manufacturing', quality standards, and customer satisfaction.

EWPD Corporate Health and Safety Manager identified the opportunity for the organisation's OHS practices to be re-examined and improved in conjunction with (and consistent with) the workplace reform program already underway, and through utilisation of a cross-sectional team approach. The objectives and timeframe of this proposed initiative were provided by an 'exempt employer' audit by the South Australian Workcover Corporation, which was scheduled to take place in April 1993.

Exempt employers in South Australia were permitted to 'self-insure' their workers compensation risks and liabilities, and were granted administration levy reductions on the basis of their performance against a set of 'Injury Prevention', 'Rehabilitation', and 'Claims Administration' performance standards. The Injury Prevention Performance Standards (which will be referred to as 'the Standards') outlined requirements in the following OHS performance areas ...

- Management Commitment
- Policy and Procedures
- Consultation
- Hazard Control
- Training
- Administration

Organisations were audited using these performance standards on a regular basis, and a score of one (1) to five (5) was awarded for each performance, as well as for the level of overall performance standard (with Level 5 being best, and Level 1 representing loss of exempt status). The length of the audit cycle, the amount of administration levy rebate, and the retention of exempt employer status hinged on the level of overall performance awarded. EWPD had already achieved exempt employer status, and were focused on retaining this status, and possibly improving their rating, in light of the significant financial benefits at stake, and the perceived link between a notable audit score and the company's 'best practice' status.

The main aim of the proposed project was to ensure that EWPD would meet at least Level 2 of the Exempt Employer Injury Prevention Performance Standards.

EWPD Corporate Health and Safety Manager selected Participatory Action Research (PAR) as the appropriate research methodology on the following basis ...

- PAR was a recognised and valid research methodology, especially in the study of socio-technical, organisational change involving active participation and decisionmaking by low ranking people in the organisation;
- PAR was about improving existing systems with recognised deficiencies, or resolving problems that people who work for the organisation face;
- The role of the researcher in PAR was coaching, team building, and ensuring the right mix of skill, knowledge and experience is mobilised - rather than as an 'expert'. PAR was a learning strategy for empowering participants:
  - ⇒ Participants discover specific insight, new understandings and new possibilities to create better explanations of their social world;
  - ⇒ Participants learn how to learn;
  - ⇒ Participants learn how to create new possibilities for action;
  - ⇒ Learning provides ongoing benefits to the individual and the organisation beyond the life of the project;
- PAR enables the study of the major changes generated by and through the project;
- PAR was a methodology which allowed the researcher to generate general theory and findings that could be communicated in scientific papers, books, and journals.

11.2.2. Action Research Spirals

While defined spirals of the action research cycles of planning, acting, reflecting and observing are not specifically signposted or defined within Case Study One, spirals of the action research cycle can be creatively and approximately identified throughout the report ...

Action Research Spiral 1

The upcoming South Australian Workcover Corporation exempt employers audit of EWPD presented the organisation and its Corporate Health and Safety Manager with a significant OHS systems

improvement and financial improvement opportunity on which to reflect. During this reflection stage, the potential benefits of linking an initiative to maintain or improve EWDP's exempt employer status with the existing program of workplace reform, through the use of cross-sectional teams, became evident.

A general PAR project proposal was then planned and designed, based on the establishment of several OHS action teams, with one co-ordinating team to facilitate and monitor the overall project. A twelve month timeframe for completion was proposed. Mechanisms for the recording of the project progress and researcher observations were also planned (i.e. minutes of meetings would be kept, and a diary would be maintained by the Corporate Health and Safety Manager to record observations made within meetings, conversations with team members outside meetings, and relevant interaction with stakeholders outside the teams).

Action was then taken to communicate the proposal to key stakeholders (i.e. management and the organisation's three safety committees) for their review and endorsement.

The outcome of this action step was the unanimous support of both senior management and the safety committees. The project teams were empowered by senior management to meet as they desired to develop and implement systems that would improve OHS, and the Corporate Health and Safety Manager was appointed as team facilitator / OHS consultant to all teams (referred to in the case study as 'the researcher').

Reflections on the first action research spiral include:

- The unanimous support for the proposal from senior management, was based on the recognition of the need to improve OHS as part of the workplace reform process, and the need to meet the specific requirements of a Best Practice Demonstration Agreement.
- The unanimous support of the proposal from the safety committees occurred despite the potential for the project to be perceived as an initiative that may possibly usurp their role and function.

Action Research Spiral 2

In preparation for the initiation of the project, the management team, in conjunction with the researcher, considered a number of factors as inputs to their planned selection of members of the project co-ordinating team. These factors included:

- Divisional representation
- Hierarchical diversity
- Position or role in the company
- Demonstrated positive attitude to OHS improvement (considered as essential criterion for team selection)

The project co-ordinating team was then selected, and the twelve month PAR project was initiated in May 1992.

Action Research Spiral 3

The co-ordinating team, after reflecting on the overall aims and objectives of the project, planned to establish a specific OHS action team for each of the six Standards, as well as the provision of an additional team to address the imminent requirements of draft hazardous substances legislation.

The co-ordinating team then selected team leaders for the OHS action teams from their own membership - with two additional members assigned as co-leaders to the teams thought to have the greatest workload.

Action Research Spiral 4

The co-ordinating team assigned the responsibility for the selection of specific OHS action team members to their nominated team leaders, however, the following factors were considered important selection criteria:

- It was considered essential to include all health and safety representatives in the total project membership.
- Hierarchical diversity.
- Cross-divisional representation.
- Inclusion of people Non-English speaking background (NESB).
- Inclusion of both genders.
- Specific skills and / or interests.

The co-ordinating team also developed a set of requirements for each OHS action team to meet, and processes for them to apply:

- Each team was required to select a suitable title, and having named the whole project 'The WAIT Project' (WAIT being an acronym of WorkCover Audit Improvement Team), the individual teams were titled 'WAIT (read specific area of focus) Team'.

- Each team was required to provide the team's specific aim (though the target of achieving a rating of at least a Level 2 in their specific area of focus was required to be retained within this aim).
- Each team would initially audit existing systems against the Standards to produce a gap analysis.
- With gap analysis complete, the teams would then be required to concentrate on the development and implementation of appropriate improvement strategies.
- Teams would then audit each other after the first five months of the project to measure progress.
- Teams were required to use a comprehensive sweep of feedback mechanisms to ensure the whole organisation was kept informed of the progress and outcomes of the project (e.g. team minutes displayed on notice boards, verbal briefing at daily work team meetings, monthly divisional newsletter articles, and verbal briefings to all health and safety committees).
- Cross team meetings to share problems and co-ordinate solutions were recommended on an 'as needed' basis.
- The researcher was requested to make a formal presentation to each team on the specific aim of the project, and to provide specific information and guidance for each team in relation to their specific area of focus.

OHS action team members were then selected, and the action research process of each individual team initiated.

Observations on this action research spiral include the noted range of team membership (three to five members per team), a total of thirty people were involved directly in the WAIT Project (5.5% of the total workforce), and the team leader from the WAIT Consultation Team also participated in the Hazardous Substances Team.

Action Research Spiral 5

Each individual team's action research story was recorded separately within the case study under its title, and the headings of ...

- Scope
- Team Membership
- Leadership
- Action Outcomes
- Conclusions

Minutes of team meetings, and the progressive observations and reflections of the researcher were utilised to construct these action research stories.

Over the twelve months of the project, it could be expected that each team would have worked through multiple spirals of the planning, acting, observing, and reflecting action research cycle. Consistent with the action research spirals described above, these multiple cycles were not specifically signposted or defined - rather implied. Within the section of the case study report recording the life of the WAIT Policy and Procedure Team, for example, several action research spirals can be identified. It is of importance to note that the main / final action outcomes of each team were not tested and evaluated in the field, and therefore the effectiveness or 'real' impact of these outcomes at the coalface is an unknown.

For the purposes of this thesis, the action research spirals of each team are not reproduced. A number of the significant outcomes and learnings from each team's experience are captured below, however the reader is referred to the detailed record of each teams action research process within the original case study for area specific insights and learnings.

Action Research Spiral 6

Once the formal WAIT Project was complete (i.e. April 1993), a semi-structured interview format was developed to measure / gauge / address the following factors ...

- Background of participants;
- Suitability of appointment to project and the specific action team;
- Strengths and weaknesses of the team;
- Main achievements of the team;
- Overall effectiveness of the project;
- Future role of a team approach to OHS; and the
- Role of the researcher / OHS consultant.

Eight of nine team leaders, and four of twenty-one team members, were interviewed utilising the semi-structured interview format in June 1993.

A number of survey results, and reflections on results, are presented in the Appendix E.

Reflections on the survey of team leaders and team members highlighted the limitations of the completed survey, and identified a number of factors that may have coloured the conclusions drawn from the survey results - in particular ...

- the low level of team member representation;
- the four 'highly committed' team members interviewed may not have captured feedback from members less satisfied with their involvement;
- the survey was not extended to the end users of the teams' output;
- a union perspective was not captured by the survey;
- the survey was not structured to identify differing opinions between divisions - a reality that most teams had to work through on occasion; and
- ten of twelve respondents came from one of the three divisions - one of the divisions was not represented.

The results of the survey were also seen to have broadly coincided with the observations and conclusions reached by the researcher (based on the researchers involvement with each team, the minutes of team meetings, the researcher's diary records, and the researcher's reflections on these data sources).

Overall reflections on the WAIT Project from the survey results, as recorded in the case study, included ...

- WAIT Project was seen in a very positive light by respondents, though improvement opportunities were identified;
- Key achievements / benefits of the project were the action outcomes of each team, the excellent WorkCover audit result, and the personal experience and development of participants;
- The role of the OHS consultant satisfied the description detailed in PAR theory (Whyte, 1991); and
- Respondents gave clear support for a future team approach to OHS in EWPD.

11.2.3. Outcomes

EWPD scored a Level 3 rating across all Injury Prevention Performance Standards from the WorkCover Audit, and a Level 3 rating overall (a rare result). The significance and uniqueness of this achievement, was underlined by the subsequent awarding of the annual WorkCover "Top in Safety Award" in October 1993.

As discussed above, the action outcomes of the individual teams were considered their main achievement. The field effectiveness of each team's action outcomes was, however, not evaluated - nor were the

reflections of the end users and other stakeholders captured and utilised to gauge the 'real' impact of the WAIT Project at the coal face.

11.2.4. Conclusion

The conclusion section of this case study contains / incorporates the overall reflections and conclusions drawn from the survey results, from the observations made during the researcher's involvement with each team, the minutes of team meetings, the researcher's diary records, and the researcher's reflections on the content of these data sources.

The following bullet points capture some of the additional reflections and conclusions not already highlighted in the survey results detailed in Appendix E ...

- The workplace reform process was implemented from 'the top down', and was in relative infancy when the WAIT Project commenced. Production level WAIT Project team members were not as convinced re the positive empowerment of any team in the WAIT Project as were other Wait Project team members.

- The production level WAIT Project team members initially voiced cynicism at the ability of the WAIT teams to fulfill the aim and objectives of the project due to management resistance. This cynicism dissipated over the life of the project as a result of the progress of workplace reform changes and the successes of most WAIT teams.

- Production supervisors, having not yet internalised the workplace reform processes, subjected production level team members to frequent negative comments relating to time spent away at WAIT meetings and activities.

- These supervisors, along with a number of other employees, were displaced from positions of traditional authority during the period of the WAIT project. These people generally were not receptive to the needs of the WAIT teams. This was particularly true with members of the training group, who in effect singlehandedly prevented the integration of the WAIT Project into everyday workplace reform activities.

- An internal management review of the effectiveness of special purpose teams conducted in early 1993, assessed effectiveness of the WAIT Project Teams positively. This internal review resulted in a deliberate move to the formation

of dedicated teams (i.e. team members were freed from normal duties for the duration of the team's activities), and addressed what was seen as one of the main weaknesses of the WAIT Project (i.e. factors around team member availablity).

- The general lack of written literacy skills in the membership of the WAIT teams posed a significant burden on the few members who had adequate skills in this area - in particular, the OHS consultant. The literacy level may also have had an impact on the quality of team review of draft material, with draft formats consistently accepted without any suggested alterations anywhere in the consultative processes.

- The sophistication of the Standards, the lack of written literacy skills, and the general low level understanding of OHS management systems within the teams, created an over reliance on the OHS consultant.

- Teams with management representatives appeared to fare better, this likely due to their greater knowledge and understanding of the workplace reform process, superior literacy skills, deeper understanding of current OHS principles, and their inherent or learned management skills. These teams were more independent of the OHS consultant, and more creative and far reaching in their outcomes.

- Though many of the WAIT Project activities were facilitated by the workplace reform process, the WAIT Project ran parallel to the workplace reform process rather than being fully integrated.

- The design of the WAIT Project allowed the researcher's role of team facilitator / consultant to develop in line with the PAR theory proposed by Whyte (1991), and deeply enhanced the researcher's understanding of the workplace reform process and the dynamics of team work.

- The lack of quantitative measurement of the effectiveness of the action outcomes of the project was seen as a significant limitation. A mechanism for measuring the effectiveness of action outcomes was considered possible and beneficial after a suitable period of time, rather than during the life of the project.

- The OHS needs of the whitegoods environment were considered to be potentially different to the OHS needs of other workplaces, however , it was contended that a properly

structured PAR project should inherently address the needs of other similar organisations - without necessarily mimicking the action outcomes of the WAIT Project.

- It was concluded that the EWPD PAR OHS project allowed the development of general theory that could be accessed by the OHS professional community actively involved in OHS improvement in the workplace reform environment.

A comprehensive set of recommendations were also produced, based on the conclusions drawn (see Appendix F). These recommendations may represent the development of 'general theory' referred to above.

11.2.5. Analysis / Critique

Table 10
Does Case Study One satisfy the working definition of action research?

Specific Question	Assessment
Is this a situation in which – people reflect and improve (or develop) their own work and their own situations – by tightly interlinking their reflection and action – and also making their experience public, not only to other participants, but also to other persons interested in and concerned about the work and the situation (i.e. their (public) theories and practices of the work and the situation)?	• While the WAIT Project was initiated at the management level, with the main aim of delivering a result from a bottom line business perspective (i.e. a successful WorkCover Audit result), there is evidence within the case study of people working through an action research cycle to deliver improvement to their own situation. The survey results indicated that all respondents had identified the action outcomes of their teams as the projects main achievement - these action outcomes being directed at improving the OHS systems impacting their work. Whether actual OHS improvement was delivered by these action outcomes (beyond the general lift in OHS profile across EWDP) was not determined by the survey, and remains a critical unknown. • There is evidence within the case study of a collaborative interlinking of reflection and action. A number of action research cycles could be identified within the study, however, the case study description did not specifically define the reflection / action cycle. This may indicate a less disciplined application of this technique. • The use of a WAIT Co-ordinating Team ensured that team leaders were kept informed of each team's progress as well as the overall status of the project - information they brought back to their own team members. It is likely that the researcher was also able to contribute to communications between teams, given the researcher's membership of all teams. A cross-team auditing mechanism was also initiated, and teams were encouraged to share problems and develop integrated solutions. (continued below)

	• The progress of the project was well communicated through the organisation by the posting of meeting minutes, electronic billboard stories, monthly newsletter items, and verbal briefing mechanisms involving work teams and health and safety committees. • Individual action teams also consulted with stakeholders re their specific areas of focus, associated problems, and proposed solutions.
Is this a situation in which there is increasingly – data gathering by participants themselves (or with the help of others) in relation to their own questions – participation (in problem-posing and in answering questions) in decision making – powersharing and the relative suspension of hierarchical ways of working towards industrial democracy – collaboration among members of the group as a 'critical community' – self-reflection, self-evaluation and self-management by autonomous and responsible persons and groups – learning progressively (and publicly) by doing and making mistakes in a 'self-reflective spiral' of planning, acting, observing, reflecting, replanning, etc.	• Each team was required to perform a gap analysis against the applicable Standard through an audit process. There is also evidence of individual teams collecting data on problems and proposed solutions related to their area of focus. The WAIT Policy and Procedure Team for example, conducted a NESB survey to determine the main non-English speaking languages used at EWPD, and met with groups of NESB employees to evaluate the effectiveness of the existing translated documents. • While there were different levels of member contributions identified, there is reasonable evidence within the case study of powersharing and collaboration. The level of collaboration as a 'critical community', however, was not obviously high within the case study. There were few disagreements within teams documented, and an indication that the generally low level of written literacy skills may have dampened critical debate on the draft documentation - with draft formats accepted without any suggested alterations. • The WAIT Teams were basically autonomous and self-managed. Cross-team auditing, and the role of the co-ordinating team were mechanisms used for project wide evaluation and reflection. The use of the survey tool was also a mechanism for self-evaluation and reflection. The level of self-reflection and self-evaluation within each individual WAIT team was not evident, though the supplement of team membership on a number of teams early on is an indicator that a level of self-reflection and self-evaluation did take place. • A number of improvement opportunities were identified and acted on to improve the action research process throughout the lifecycle of the project (i.e. the supplementing of team membership, and a move to dedicated team members). Deficiencies in team selection and make up were identified (e.g. literacy skills, lack of management representation), and while teams improvised and adapted to overcome these deficiencies on the run, lessons were learned for future application. The WAIT Project, while getting some benefit from the workplace reform process, was not able to maximise the potential returns in this area due to a number of factors - a result which has lead to recommendations for the future. (continued below)

reflection which supports the idea of the '(self-) reflective practitioner'?	• Again, it is worth commenting that the case study reader does not come away with the sense that a 'self-reflective spiral of planning, acting, observing, reflecting, and replanning' was rigorously applied. The failure of the project to 'test through action' the main action outcomes of the WAIT teams indicates perhaps a less than full understanding of the action research process, and the need for the WAIT Project to have worked through additional action research cycles. • The observations, reflections, and conclusions made by the researcher, and the comprehensive set of recommendations made, attest to the self-reflective application of the OHS consultant.
Is this then a situation in which action research is occurring?	The overall assessment, in light of the discussion above, is that Case Study One was definitely a situation in which action research was occurring.

Source: Zuber-Skerritt (1992, p. 14)

Table 11
How well does Case Study One apply critical action research theory?

Key Questions	Assessment
1. How does the case study match Hart and Bond's (1995, pp. 40-43) action research typology and associated elements?	Based on the assessment detail in Table 10, Case Study One is best described as an 'organisational' action research type, which generally has the following characteristics ... **Educative base:** • Re-education / training • Enhancing managerial control and organizational change towards consensus • Overcoming resistance to change / restructuring balance of power between managers and workers • Managerial bias / client focused **Individuals in groups:** • Work groups and / or mixed groups of managers and workers • Selected membership **Problem Focus:** • Problem defined by most powerful group; some negotiation with workers • Problem relevant for management / social science interests • Success defined by sponsors

	Change Intervention: • Top-down, directed change towards predetermined aims • Problems to be solved in terms of management's aims **Improvement and involvement:** • Towards tangible outcome and consensual definition of improvement **Cyclic Process:** • Action and research components in tension; action dominated • Identifies causal processes that are specific to problem context and / or can be generalized • Discrete cycle, rationalist, sequential **Research relationship, degrees of collaboration:** • Consultant / researcher, respondent / participants • Client pays an outside consultant - 'they that pay the piper call the tune' • Differentiated roles (Hart and Bond, 1995, pp. 40-43) Some overlap with professionalising and empowering action research types does take place, however, the case study generally fits the oganisational action research profile above in the author's view.
2. Is the style and form of the case study appropriate for an action research project (Winter, cited in Zuber-Skerrit, 1996, pp. 25-26)?	The case study, while still utilising a traditional structure (i.e. introduction, aims and objectives, methodology, etc.) was documented using a narrative style and language which could be understood by the lay person with reasonable literacy skills. The case study comprehensively detailed not only the overall research story, but the story of each individual team, and as such, was a very detailed and lengthy document. It is unlikely that the written format used would be appropriate for dissemination to most team members, given the general low levels of written literacy noted during the study. The detailed description of collaborative processes at work, differences of opinion being aired, explored and resolved, the use of reflective techniques, and the negotiation and reconstruction of social reality were also not captured by the style and form of the case study. The use of the validation procedures of co-operative human inquiry were implied rather than clearly defined. It is the author's assessment, however, that the style and the form of the case study report does facilitate the communication of the overall research process and lessons learned to the OHS practitioner group.
3. Is the principle of critical subjectivity addressed within the report (Reason, 1993, pp. 1262-1263)?	The researcher adequately frames the research in terms of the organisational context, but does not share with the reader the researcher's background, influences or potential biases (e.g. the fact that the researcher was producing the case study as an academic award requirement, and the potential influences on the researcher and the

	project associated with this factor were not discussed). While the definition of PAR is provided, the reader does not receive an explanation of the researcher's personal reasons for the choice of methodology, or the level of experience in its application. It is the author's assessment that the principle of critical-subjectivity is not fully addressed.
4. Have appropriate validity processes and procedures been utilised to a level which enables context specific, meaningful conclusions to be drawn with a reasonable level of confidence and accuracy (Streubert and Carpenter 1999, p. 261)?	The case study does not fully, comprehensively address the validity processes and procedures of action research, though validity processes and procedures have been applied within the study to the extent that builds / delivers, in the author's assessment, a reasonable level of 'trustworthiness'.

There is a level of triangulation implied, with the researcher identifying the results of the survey as broadly coinciding with observations and conclusions reached by the researcher (based on the researchers involvement with each team, the minutes of team meetings, the researcher's diary records, and the researcher's reflections on these data sources). The survey, however, was identified as having some significant limitations. There was also no explanation or example of how the researcher utilised the different sources of observations to enhance validity. A sample of the minutes of team meetings, or an extract from the researchers diary, to facilitate reader assessment of the quality of these inputs into the triangulation process, would have contributed to the building of validity.

As discussed above, while the quality of communication appeared high, the level of self-reflection within the teams (as a feature of 'critical communities'), was not obvious within the case study. There were few disagreements within teams documented, and an indication that the generally low level of written literacy skills may have dampened critical debate on the draft documentation - with draft formats accepted without any suggested alterations. The reader is informed on what the team found, decided, and agreed on, but there is significantly less on the path to reaching a decision or agreement. The project proposal itself was unanimously accepted by key stakeholders.

The use of spiral design to build validity was not visibly deliberate. The case study reader does not come away with the sense that a 'self-reflective spiral of planning, acting, observing, reflecting, and replanning' was rigorously applied. While the spirals of the action research cycles are not specifically signposted or defined within the case study; spirals of the action research cycle can be creatively and approximately identified throughout the report. They appear, however, to be confined to the process of examining the problem and building an appropriate solution, with the main action outcomes not tested or evaluated in the field.

This failure of the project to 'test through action' the main action outcomes of the WAIT teams indicates perhaps a less than full understanding of the action research process. The completion of the project appears premature - to have worked through a few more action research cycles, and in particular, to have tested and evaluated the main action outcomes in the field would have greatly enhanced the scope and validity of conclusions reached, and the recommendations made. |

The fact that research did take place in the 'real world', and that participants were focused on delivering 'real' solutions and outcomes - that would eventually have to stand (or fall) before their peers and end users, makes a significant contribution to the pragmatic validation of the case study.

There was no 'devils advocate' mechanism in evidence to curb the potential for 'group think' and 'falsification'. The cross-team auditing initiative, however, may have contributed to the building of validity in a way similar to the use of a 'devils advocate' tool.

The level of consensus validation achieved, hinges on the quality of the participation. While the quality of participation (if the results of the survey in the areas of team member commitment, endorsement of the team approach, and overall effectiveness of the project are representative) appears to have been reasonable, there are some indications within the case study that the participation may also have been less than ideal (e.g. production level WAIT Project team members were not as convinced re the positive empowerment of any of the teams as were other team members). There is also no indication that the researcher's documentation of the research project within the case study report was validated by any WAIT Project team members - a consensus validation technique that would also have significantly enhanced the validity of the case study report.

The deliberate use of reflexive and dialectic critique was not distinctly evident. Different viewpoints (most of which were identified through the end of project survey) did, however, appear to be comprehensively recorded within the case study, usually together with an explanation or defining background. This additional information relating to different viewpoints seemingly comes from the observations and reflections of the researcher, rather than from the deliberate use of reflexive critique in a team environment to identify / explore the underlying influences on data and observations, or the deliberate use of dialectic critique by teams to probe observations / data for any conflicts. None the less, the limitations of the survey, the alternative views expressed within the survey, as well as those documented within the conclusion section of the case study from the direct observations of the researcher, all contributed to a level of critical subjectivity allowing the reader to reasonably assess the validity levels achieved for themselves.

In some respects, the outcome of the WorkCover Audit was also a validation mechanism. The WAIT Project not only delivered on its aim and objective, but surpassed expectation. The team approach associated with the project was also subjected to an internal management audit, and this is also an input to the validity of team work findings.

Generally, the conclusions and recommendations made in the case study report have a logical basis within the observations documented and the survey results.

Overall, it is not a question of whether the case study was valid or not, it is a question of the level of validity relating to the conclusions drawn and recommendations made. There is arguably enough information provided within the case study for the reader to reasonably judge the level of

validity. In the author's assessment, the level of validity reached (through the application of the validity processes of co-operative human inquiry) was adequate to provide ...

- a very positive overall result - including a significant improvement in profile of OHS at EWDP;
- the basis for the next planning stage of the OHS action research cycle at EWPD;
- an initiator of further local dialogue in the areas of workplace reform, the place of teams in the organisation's OHS management strategy, and the areas of specific team focus;
- inputs into the development of local theory relating to these areas - a process which is well underway as evidenced by the conclusion and recommendation sections of the case study;
- an excellent and potentially very valuable resource and record of learnings for the wider OHS community to use as inputs to their own action research processes, and to the development of general theory - particularly in the areas of OHS and workplace reform, and the use of action research teams to improve organisational OHS performance; and
- the basis for the WAIT Project and associated findings to be documented and recognised as valid, valuable and 'scientific' research - communicable in scientific papers, books, and journals.

The author does not believe that the level of validity reached supports the acceptance of the conclusions reached and recommendations made, as 'law-like generalisations' that may be universally and uncritically applied. In this point, the author is at odds with the case study conclusion that the project allowed the development of general theory. It is the author's view that the case study conclusions and recommendations may be used as inputs to the development general theory, but could not appropriately be recognised as general theory on a 'stand alone' basis. From a general action research perspective, this is not a failure, but an expectation. Though PAR methodology may specifically (and possibly ambitiously) target the production of general theory from individual action research projects, action research on the whole is focused on the improvement of the local situation, processes and people, and the generation of valid local theory which can be utilised critically and beneficially by others in similar circumstances. Though the researcher also acknowledges this principle when suggesting in the conclusions section that the OHS needs of other organisations are likely to require different solutions, the researcher makes claim to development of general theory.

5. Were ethical issues adequately addressed (Streubert and Carpenter, 1999, p. 262)?	Ethical issues were actively considered through the practical application of the survey tool, with interviews conducted in a private and confidential setting, and verbal permission to audio tape interviews requested and received. The researcher's academic supervisor was utilised to handle sections of the interview process that may have been coloured by the presence of the researcher. Confidentiality and anonymity ethical issues look to have been well managed in the report.

The use of the survey allowed some participants the opportunity to provide their varied and multiple reflections, explanations, understandings and assessments, and to have them reflected in the content of the case study report - another ethical consideration for action research. The views of the respondents were captured in the report, however, a significant number of participants did not have this opportunity, nor is there evidence of participant review of the draft case study report - both weaknesses in the management of the ethical issues associated with the project.

Members of the WAIT Project were selected and appointed, rather than volunteering for involvement. As such, there were a few team members who displayed a less than ideal level of commitment to the project, and according to the survey results, this had an impact on team performance. There is little information within the case study report to indicate that this issue was effectively and ethically managed during the project, however, the conclusions / recommendations sections of the case study report reflect the acknowledged need to address this issue more effectively in the future.

For action research, the importance of the research process actually benefiting participants through improving their situation and themselves, is also an important ethical consideration. There is reasonable evidence that participants did benefit personally through knowledge / skill development and the personal satisfaction generated, more generally through the overall lift in the OHS profile at EWDP, and potentially through the main action outcomes of the individual teams.

Table 12
Were predicted OHS benefits realised within Case Study One?

Predicted Benefits	Assessment
1. Actual and sustainable OHS improvement at coal face?	If the WorkCover Audit results, and the assessment of all survey respondents re the success of the overall project and the action outcomes of the individual teams, are indicative of the level of actual and sustainable OHS improvement at the coal face, then the answer to this question would have to be a positive one. As discussed above, however, the failure of the project to 'test through action' the main action outcomes of the WAIT teams, or to gauge end user perspectives on the projects outcomes, poses some valid questions re the level of actual and sustainable OHS improvement achieved.
2. Valid practitioner OHS research useful to peers?	It is the author's assessment and experience, that Case Study One is valid practitioner OHS research which provides an excellent and potentially very valuable resource and record of learnings for the wider OHS community to use as inputs to their own action research processes, and to the development of general theory - particularly in the areas of OHS and workplace reform, and the use of action research teams to improve organisational OHS performance.

3. Effective consultation / teamwork strategy?	The WAIT Project achieved and surpassed its main objective within the set timeframe, with the endorsement and support of the organisation's management and health and safety committees. There is also reasonable evidence within the case study report to suggest that the quality of the project's outcomes were the result of collaborative teamwork. According to the survey results, all respondents had identified an organisation wide lift in the profile of OHS through the use of this strategy - supporting the contention within the theory that action research has the potential to positively impact organisational culture. Knowledge and commitment levels of participants were also improved through this process.

The internal management audit of special purpose teams positively assessed the team work within the WAIT Project, an assessment that led to even further support of the use of teams from EWPD management. The success of the action research team strategy has lead to the recommendation to review the appropriateness of existing consultative mechanisms at EWPD (i.e. health and safety committees). Many of the WAIT Project teams identified an ongoing team role after the completion of the project, and this was welcomed and supported by the health and safety committees. Given the above, in the author's assessment, the WAIT Project was generally an effective consultation and teamwork strategy.

That is not to say, however, that the consultative / teamwork strategy applied by the WAIT Project was ideal. As discussed above, a high standard / quality of the collaboration, democratic dialogue, critical subjectivity, and the application of reflexive and dialectic critique within action research teams was not evident within the case study. |
| 4. Professional development of the OHS practitioner, and the facilitation of an appropriate and effective OHS practitioner role? | The case study concluded that the design of the WAIT Project allowed the researcher's role of team facilitator / consultant to develop in line with the PAR theory proposed by Whyte (1991), and deeply enhanced the researcher's understanding of the workplace reform process and the dynamics of team work.

The survey results also serve to reinforce the very positive impact the WAIT Project had on the organisation's perception and recognition of the OHS consultants value, role, commitment, skills, knowledge and experience. No doubt through the project, the OHS consultant was able to establish influential relationships with OHS leaders through out the organisation, relationships which will pay ongoing dividends for the consultant's OHS practice and the organisation's OHS management.

The overall success of the project in terms of exceeding its main aims, significantly raising the profile of OHS within the organisation, the action outcomes of the individual teams, the personal development of participants, and the formal recognition of the quality of the outcome through the WorkCover award, would all have built up the credibility and professional standing of the OHS consultant both inside the organisation, and in the wider OHS community. The case study report was also the key assessment criteria for the awarding of the Master of Applied Science (Occupational Health and Safety) through the University of Ballarat. |

		As importantly, however, are the significant learnings for improved OHS practice identified by the OHS consultant during the action research process, and comprehensively documented within the conclusion and recommendation sections of the case study report. Though the WAIT Project generally facilitated the development of an appropriate and effective role for the OHS consultant, there were also areas where the OHS consultant's role was less appropriate (e.g. the over reliance on the OHS consultant for the production of meeting minutes and written material produced as action outcomes for individual teams).
5.	Innovative OHS solutions produced?	A number of the WAIT Project teams produced innovative solutions to the specific OHS challenges they faced in their area of focus. The WAIT Policy and Procedure Team, for example, worked closely with stakeholders to develop a unique policy and procedure format which would be user friendly for people within the organisation from non-English speaking backgrounds, and varying literacy levels.
6.	Reconstruction of co-researcher reality, the internalisation of OHS principles and knowledge, and the associated empowerment of co-researchers?	According to the survey results, all respondents had identified an organisation wide lift in the profile of OHS as one of the key outcomes of the WAIT Project - supporting the contention within the theory that action research has the potential to positively impact organisational culture. Knowledge and commitment levels of participants were also improved through their involvement and participation. In particular, the survey results showed: • The mean rate for OHS knowledge before the project by team leader respondents was 7.1 - increasing to 8.6 after the project. • The mean rate for OHS knowledge before the project by team member respondents was 7.0 - increasing to 9.5 after the project. • The mean rate for OHS commitment before the project by team leader respondents was 8.9 - increasing to 9.1 after the project. • The mean rate for OHS commitment before the project by team member respondents was 7.6 - increasing to 10 after the project. While the quality of participation (if the results of the survey in the areas of team member commitment, endorsement of the team approach, and overall effectiveness of the project are representative) appears to have been reasonable, there are some indications within the case study that the participation may also have been less than ideal (e.g. production level WAIT Project team members were not as convinced re the positive empowerment of any of the teams as were other team members). Respondents of the survey listed a variety of personal benefits related to their involvement / participation which indicate that reconstruction of co-researcher reality, the internalisation of OHS principles and knowledge, and the associated empowerment of co-researchers did occur (though perhaps to different degrees according to the individual experience).

	Personal benefits listed include: • heightened awareness of the difficulties in implementing OHS; • ability to contribute; • people now raise problems with them (i.e. empowerment); • extended OHS knowledge; • improved skills; • open communication channels through the development of cross-divisional relationships; and • personal growth and satisfaction.	
7.	Learnings identified to improve future application of action research principles and process?	The conclusion and recommendation sections of the case study report contain a comprehensive list of learnings identified through the project to improve future application of the action research process.

11.3. Case Study Two

Delivering effective, risk based, control of legionella hazards within a large industrial workplace through the application of action research principles (Runnalls, unpublished).

11.3.1. Background

Case Study Two documents the author's (i.e. the OHS practitioner / researcher's) initial application of action research principles and methodology to the improvement of legionella hazard control within a large industrial workplace. The case study report was developed using three sources of data ...

- a series of eighty-two chronologically ordered, inter-company Email memos documenting aspects such as historical background, the activities, events and discussions which initiated the formal review and improvement process, the process and the progress of the review, meeting minutes, the observations and reflections of the OHS practitioner / participants / co-researchers and stakeholders, democratic / collaborative dialogue between the researcher / participants / co-researchers, and the communication of progress and results;
- a set of forty-four relevant documents grouped according to action research cycles, including test results, residual chlorine measurements, existing / developed procedures, corporate standards, water treatment contracts, expert audit reports, pre-review historical documentation, due diligence reports, incident investigations, shift logs, maintenance records, networking material used, project scope documents, training course curriculum, correspondence with the state health commission and local council, draft and final review reports, and formal communication documents; and
- the observations, reflections, diary notes (not a systematic collection), and the memory of the OHS practitioner (Lomax & Evans, cited in Lomax, 1996, pp. 137-149).

In late 1995, the OHS practitioner accepted a position with a new employer in a different industry and a different state. There were similarities in the size of the organisation and the twenty-four hour operating environment. The practitioner had been working in the field of OHS within a large industrial workplace for close to a decade. Over this time, in addition to the significant amount of practical experience accumulated, the practitioner had also pursued formal education and

qualification in the OHS field, for his own personal development and for improving the effectiveness of his practice. He received excellent results for his academic work, and was awarded a Diploma of OHS Management, a tertiary level Certificate in OHS, a Graduate Diploma of Occupational Hazard Management from the University of Ballarat, and the "Safety Institute of Australia Award For The Most Significant Contribution To Industry" for the dissertation produced as a key assessment component of the GRAD Dip (OHM). He began the Master of Applied Science (Occupational Health and Safety) in 1995, but due to work and family commitments, deferred the completion of the course for several years (this thesis is one of the key assessment components of this course of study). The practitioner found the study quite valuable for his personal development, particularly appreciating the opportunity to extend his technical OHS knowledge and understanding of OHS philosophy, but also the exposure to / education in other disciplines now considered vital to effective OHS practice (e.g. law, psychology, organisational management, statistics and positivist research methods).

In the practitioner's assessment, the effectiveness of his practice had improved through the educational process, however, one of the areas that he felt quite challenged by, was the translation of the very good and essential theory he had learned into practice, and the transfer of that knowledge to workplace stakeholders. In his experience, the 'real world' situation was not a neat one, and the development of effective solutions to OHS problems was rarely a simple 'one shot' affair - rather a progressive and complex process. While the statistical and positivist research knowledge he had received was, on a few occasions, useful for understanding, interpreting, and assessing relevant research studies, and had likely contributed to his capacity to be professionally critical, 'scientific', and systematic in his practice, this knowledge was rarely applied at any real depth for the improvement of organisational OHS performance. The practitioner did not find the statistical and positivist research methodology heavily represented in the OHS course curriculums identified above, an appropriate tool for solving local OHS problems, or improving his day-to-day practice (see discussion in Section 9.1 above). In his view, the courses of study he had worked through did not provide OHS practitioners with a process / mechanism / tool with the capacity to reliably bridge the gap between theory and practice, to convert research into effective action at the coal face, and to build into an organisation's culture the foundations of sustainable OHS performance improvement.

It was, however, during an 'on campus' Masters study block discussing the differences between quantitative and qualitative approaches to research, that the practitioner was introduced to the concept of research as a complex, spiraling (inductive) process - a credible alternative to a simple, linear (deductive) one (VIOSH Australia, 1999). This concept correlated with the practitioner's 'real world' experience, and it was

through pursuing this theme as a research methodology for his thesis, that the practitioner became aware of the existence of action research.

As he read about action research (its origins, history of development, theory and features, and its past and current applications within many (and similar) fields, disciplines, and countries), and through the review of a recent Master's thesis which documented the use of participatory action research (PAR) methodology to successfully deliver a broad-based, organisation wide, OHS improvement strategy (Popplewell, 1993), the practitioner began to recognise the significant potential of action research for his own practice and the practice of other OHS practitioners. The collaborative basis of action research, the holistic knowing, and the recognition and honouring of each individuals uniqueness, expertise, potential contribution, and inherent value, fitted well with the practitioner's Christian beliefs. The prospect of a methodology which facilitated the education, ownership and empowerment of people in relation to resolving the OHS issues important to them, was also an appealing feature - particularly within a leanly resourced organisation which traditionally had relied on the very small occupational health and safety group to 'manage its safety'. When asked by his organisation to conduct a comprehensive review and investigation into the management of site legionella hazards, and to improve the level and reliability of control measures, it seemed a natural progression to test through 'real world' application, the principles of action research that offered so much in theory.

Legionella is bacteria which can grow in and colonise water based systems, and becomes a potential hazard to people when aerosols produced from contaminated water systems are present in their breathing zone (Standards Association of Australia, 1995, Part 1, pp. 4-7). Legionnaires disease was named after an outbreak of a significant pneumonia-like respiratory disease, associated with exposure to aerosol from contaminated air conditioning systems, at a convention of war veterans in the United States in 1976 (Worksafe Australia, 1989, p. 1). While the risk of contracting this disease when people are exposed to contaminated aerosol is considered low , the mortality rate of exposed people developing the disease is significant (Standards Association of Australia, 1995, Part 1, p. 5). According to the Standards Association of Australia (1997, p. 4), there have been no reported outbreaks (i.e. multiple case occurrences) of Legionnaires disease reported for large industrial type cooling towers, with the most outbreaks associated with smaller cooling towers, and evapourative condensers used to heat, ventilate, and air-condition private and public buildings (Worksafe Australia, 1989). The most common control measure for managing the growth of legionella bacteria within cooling towers is the regular or continuous dosing of the water with a biocide (e.g. chlorine), which acts to kill the bacteria within the water (Standards Association of Australia, 1995, Part 1, p. 10).

In the early 1990's, a site employee had contracted Legionnaires disease, though the state health commission had determined that it was not related to an 'on site' exposure. This, however, was not accepted by the majority of the people working at the 'coal face'. The site had two very large industrial cooling towers, one of which was in close proximity to the affected employee's work area. Documentation from this period revealed a great deal of concern expressed in relation to this event, and significant pressure to ensure site management of legionella was of the highest standard.

A project was initiated and implemented to provide an automatic back-up chlorine supply, as one of the issues raised was the difficulty in identifying, in a timely manner, when the chlorine drums feeding the cooling tower automatic chlorine dosing equipment were due for replacement. This had led, very occasionally, to short periods when the drum was empty - resulting in the 'tailing off' of residual chlorine levels in the cooling water (one of the key control measures for managing legionella bacteria). In addition to this engineering control, continuous monitoring of the residual chlorine levels in cooling water was initiated, with 'real time' results fed back to a central control room screen which was monitored around the clock. This was backed up by a manual measurement taken by the utilities process technician every six hours. A testing regime was put in place to regularly check the cooling tower water for the presence of legionella bacteria, as a measurement of the ongoing effectiveness of control measures.

With the above control measures in place, and one of the process engineers assigned ongoing oversight of these systems (where they specifically related to the two large industrial cooling towers on site), the concerns re the potential for legionella hazards in the workplace to impact the health of workplace people dissipated. The profile of legionella hazards within the organisation all but disappeared until early 1996, when an interstate sister facility communicated an incident in which a contract worker had developed Legionnaires disease - potentially from exposure to aerosol generated by a small air-conditioning cooling tower containing legionella bacteria on that site (as judged by that state's health commission).

The state health commission was satisfied with the standard of the facility's cooling tower maintenance and testing systems, however recommended continuous biocide dosing rather than the periodic dosing regime in place for this tower, and a move to chlorine as the dosing agent. The interstate facility took action to improve the rigor of their system, however did not change the dosing agent to chlorine. In light of this incident, a corporate standard for legionella management was developed and reviewed with people at all facilities. An audit of the practitioner's facility was initiated by facility management, and was conducted by the responsible process engineer. No improvement opportunities were highlighted.

Several months later, another contract person working at the interstate facility developed Legionnaires disease. This incident resulted in significant industrial action at that facility, with a major construction project being delayed for many weeks, and a resultant substantial impact on the facility's financial performance. This was despite the interstate facility having ...

- rigorous systems in place which exceeded regulatory compliance requirements (having improved those systems in conjunction with the state health commission as a result of the previous incident);
- records of independent / comprehensive testing of cooling tower water for the presence of legionella bacteria over the period revealing no detectable levels of bacteria present; and
- having the support of the state health commission who advised contractor management that the site was regarded as not posing any increased risk of Legionnaires disease.

Management of the interstate facility kept sister facilities updated on the lessons they were learning. A particularly important lesson communicated indicated that being technically correct, and having all the 'right' things in place were sometimes not enough - a factor they referred to as 'outrage', was a very challenging part of managing the issue. This latest incident prompted the corporate OHS manager to require each site to perform an internal 'due diligence' audit of their legionella management systems - the results of which would be tabled at the organisation's board of directors due diligence review. The practitioner's facility performed well in the audit - this second review of site legionella management systems assigned to the senior process engineer responsible for the area.

Approximately a month after the second incident, the interstate facility recorded a positive legionella result in one of their smaller cooling towers associated with an air-conditioning unit, resulting in further grief for this facility. The interstate site formed a team to fully investigate this event, and to consider corrective actions - including moving to continuous chlorine dosing of the smaller cooling towers on their site. At the practitioner's facility, a brief audit conducted by a visiting corporate OHS adviser and the facility's environmental co-ordinator found that the systems in the field looked robust, but they needed to be backed up by better documentation of these systems, and further clarity of roles and responsibilities.

A number of months later, a third contract person working at the interstate site developed Legionnaires disease, resulting in escalated industrial action on the site, and the halt to work on the major construction project (it is important to note that all three people contracting Legionnaires disease, though seriously ill for a period,

recovered). Outside expertise was called in to comprehensively audit the interstate facility's systems - including other potential sources of legionella exposure (e.g. lagoons). A full range of recommendations were made in the resulting report. The expert auditor found the large industrial cooling towers were in good shape and not the problem, however, identified improvement opportunities in this area as well as a number of other potential exposure sources. The state regulatory authority now became involved, and looked to drive the interstate facility to shutdown their large industrial cooling towers every six months on the basis of an Australian Standard (Standards Association of Australia, 1995, Part 2) designed to manage bacterial hazards associated with smaller cooling towers, and evapourative condensers used to heat, ventilate, and air-condition private and public buildings. While the organisation corporately, and the interstate facility management specifically, were genuinely committed to providing a safe and healthy work place, from a hazard control, risk management, and business performance perspective, this position was untenable, given ...

- there was no evidence that the large industrial cooling towers were a problem (due in part to their size, continuous flow of water, and continuous chlorine dosing);
- the independent auditor had assessed these systems as in remarkably good condition for their age, and as satisfying the criteria defining well-managed and clean systems;
- the six monthly cleaning requirement would not improve the existing level of hazard control;
- the independent auditor's assessment that this requirement was not appropriate or suited to large industrial cooling water systems; and
- the requirement to shutdown these large industrial cooling towers every six months represented an annual cost of hundreds of thousands of dollars to an industry facility struggling to maintain their competitiveness against the influx of foreign imports.

These latest developments coincided with a minor but none-the-less positive legionella test result in one of the large industrial cooling towers within the practitioner's facility, due to a problem with the automatic chlorinator and an empty chlorine drum. It was at this point that the practitioner was asked by his organisation to conduct a comprehensive review and investigation into the management of site legionella hazards, and to improve the level and reliability of control measures as necessary. How this was to be accomplished was left up to the practitioner, though a 'devil's advocate' role was performed by the practitioner's manager. This initiative was subsequently communicated and endorsed by the site health and safety committee, who were also very concerned about the site's management of legionella hazards given the communication updates from interstate.

11.3.2. Action Research Spirals

Action Research Spiral 1

The first cycle of this action research process began with a search for and review of available information on legionella, its management, and historical information relating to its management on site. This was followed by a preliminary review of site cooling tower legionella management systems involving the responsible process engineer and the site water treatment contractor. The practitioner used the review not only to produce an initial assessment of the systems in question, but also to set in place the collaborative process which would be used for the duration of the project.

During the review, a number of issues were identified for immediate action. In particular, it became evident through the team's review of data detailing residual chlorine results over the previous months, that there were several occasions when the levels of residual chlorine in the cooling towers tapered off significantly. A number of explanations for this were explored by the team in conjunction with process technicians responsible to monitor chlorine levels, and take corrective action if levels dropped below the lower control limit. Through this exploration process it became evident that one of the explanations presented an opportunity to implement a control that would provide interim management of the tapering off problem, while other areas were investigated further. The team agreed that the lower control point for residual chlorine levels (i.e. the point at which process technicians were required to take corrective action) was too low. Once residual chlorine had tapered off to this lower control level, the process technicians found it very difficult to turn the situation around quickly, and often the tapering continued for a period after corrective action was initiated. The lag created contributed to these periods of less than ideal residual chlorine levels.

Also identified in this investigation was the upper level variability in chlorine levels after corrective action was taken. Corrective action appeared to eventually drive the residual chlorine levels significantly higher than necessary, costing the organisation in terms of chlorine usage and potential corrosion problems. The team decided to raise the lower control point, as well as provide a staged corrective action response to improve the quality of control and to reduce variability in residual chlorine levels. After a period of discussion and negotiation, a trial set point was determined and a draft plan was developed, with the engineer taking ownership of communicating, implementing, and monitoring the success of the trial set point, and the water treatment contractor developing the staged corrective action response. The

practitioner's role was developing as a facilitator of the collaborative, reflective process, and as a provider of OHS knowledge and skills.

Some key practitioner observations and reflections during this action research spiral were ...

- The failure of the previous system audits performed that year to identify these improvement opportunities. In the practitioner's view, this was related in part to a generally apparent, unhealthy respect for, and seemingly unquestioning reliance on, 'professional' expertise and judgment - rather than recognising the limitations of individual endeavor, and the value of multidisciplinary and team approaches to investigating and solving problems. The culture of the organisation was very focused on individual status, performance, accountability, and rewards.

  Within this focus, engineers, and in particular, process engineers, were afforded a high level of inherent status and professional respect. The facility recruited only the cream of process / chemical engineering candidates, and the facility was considered by candidates as a premium employer. A great deal was thought of these engineers, and much was expected of them. Recruited engineers were generally very self-confident, self-reliant, and motivated. A high percentage of upper management positions within the facility were filled by engineers, and most of these were process engineers. Process engineers were rapidly rotated through positions in the organisation to broaden their knowledge and experience, and to facilitate their development and prospects for advancement. Multidisciplinary and team approaches were, in the practitioner's view, undervalued, and considered less accountable and more inefficient mechanisms in comparison to a single 'high achieving' individual with the intelligence, talent, drive, ambition, and accountability to successfully manage any problem or area.

  In some respects, this is how the practitioner perceived the organisation's unspoken expectation of his role - to apply superior OHS skills, knowledge and experience (i.e. expertise) to the problem of reviewing and significantly improving the OHS performance of the facility (in this case its system of legionella management), and to achieve this single handedly as a 'high achieving' individual through application of the 'expert' model of problem solving (i.e. I understand the problem and I know best how to solve it).

The practitioner has included these legitimate but sensitive reflections within the case study, not to denigrate the capabilities, expertise, potential, and value of engineers (or of OHS practitioners for that matter), or to suggest that every problem requires a multidisciplinary or team approach. These reflections identify an area of potential learning and improvement for the organisation, and for the practitioner's own practice. OHS practitioner's are not immune to the potential to develop a practice which builds an unhealthy reliance on their expertise alone. In the practitioner's experience, this can actually be both easier and politically expedient, and though while at times necessary and appropriate, generally does not lead to an overall and sustainable improvement in organisational OHS performance.

In this instance, though the process engineer involved was very intelligent, talented and committed - the management of the large industrial cooling towers were only a very small part of total workload, the engineer was relatively new to the site (only recently completing university), had no previous experience with cooling towers, and had received no training in the area of legionella and its effective management. This had implications for the facility in a number of areas.

- Other factors potentially related to the failure of previous audits to highlight improvement opportunities were identified. The capacity for the facility to learn lessons from the experience of others, and to generate an appropriate level of energy to systematically apply those lessons was also considered by the practitioner as a potential contributor. The first three incidents impacting the interstate sister facility were not sufficient enough to drive the standard of review necessary to confirm the robustness of the systems in question, or in this case, to identify improvement opportunities. It was not until the fourth interstate incident, and the timely positive legionella test result within one of the facility's own cooling towers, that the facility drove the comprehensive review of its legionella management systems, with the committed intent to take the actions necessary to deliver a very robust system.

In the practitioner's view, this had implications for both the facility and the practitioner. At least three reviews of the facility's legionella management system took place in the previous twelve months - one of these generating a due diligence report reviewed by the organisation's board of directors. Not only did these audits not capture the 'real' performance of the management system, they represented a

significant cost in time and resources, and a period when (though the risk would still be considered to be generally quite low) the performance of the facility legionella management system was less than optimum. It also begged the question in the practitioner's view, of the robustness of the facility's existing audit processes. For the practitioner, the challenge of how to facilitate the translation of external inputs into genuine facility learning and action was highlighted as a personal improvement opportunity.

- The contract covering water treatment for cooling towers specified residual chlorine control parameters for the water treatment contractor. While the contractor was responsible for delivering control, he had failed to do so. The reasons for this failure were also explored sensitively during team discussions, and a number of contributing factors emerged, including ...

  ⇒ the focus on the contractor and facility people on the coarse indicator of effective management - the testing of the water for the presence of legionella bacteria. Through the discussion, this test was identified as a lag indicator, taking at best more than a week to get a result. If the result was positive, it indicated the management system had not been operating at the optimum level and allowed corrective action to be taken, however it also indicated that for a period of time the water in the cooling tower contained legionella bacteria, and people may have been exposed to aerosol containing legionella within cooling tower drift.

  While no positive legionella results were recorded, facility people felt quite comfortable that control was effective. In team discussions it emerged that it was conceivable that despite the records showing a twelve month period without legionella being found at detectable levels, legionella bacteria may have been present between tests during periods of low residual chlorine levels. There was agreement that profile of the residual chlorine levels needed to be raised.

  ⇒ the limited capacity for the contractor to influence facility personnel responsible for the day-to-day management (e.g. the process technicians) within a shift work environment, and a culture where the contractor had little status or authority to improve processes involving other facility people.

- The failure of the team to follow a formal 'management of change' procedure contributed to the team's failure to have the water treatment contract modified to reflect the new control parameters for residual chlorine levels. This resulted, at a later date, in the lessons learned relating to the appropriate set points for residual chlorine levels, not being handed over to the next contractor when the contract changed hands.

- The process engineer was responsible for the large industrial cooling towers only. The small evapourative condenser providing air-conditioning to the main administration block was under the pseudo oversight of the environmental co-ordinator and an air-conditioning contractor. Other potential sources of legionella did not appear to have a person responsible. This was at odds with the corporate legionella standard which required the appointment of a legionella management co-ordinator.

Action Research Spiral 2

Reflecting the outcomes of the first spiral, the reliability of the automatic chlorine dosing facility emerged as an area of concern. Team discussions with the process technicians had questioned the functionality of the back-up system to provide an alternative supply of chlorine once the drums were empty. There was still no reliable way provided within the design of determining whether either the drum or the back up system were empty, and on occasion, this resulted in both drum and back-up system being empty at the same time - and a subsequent reliance on manual slug dosing of an alternative biocide (a process not without its own set of hazards requiring management).

The automatic dosing system dosed automatically, however was limited to dosing relatively large amounts of chlorine six-hourly. In the team's assessment, this was not ideal, and contributed to the variability in residual chlorine control. The team considered the possibility of modifying the system to enable it to dose with less chlorine more frequently, and as an alternative, a system of continuous dosing tied to the continuous monitoring of residual chlorine levels.

A concern about the safety of the chlorine facilities from a chlorine exposure viewpoint was being pursued by the practitioner with another team, and this team had organised for the chlorine facilities to be audited by the supplier. The results of this audit indicated the need for a number of engineering improvements, which included either the elimination or the modification of the chlorine back-up system. The practitioner, with the endorsement of the legionella team, was able to

input the findings of the legionella team into this process, leaving the legionella team free to pursue other improvement opportunities.

The chlorine facility team picked up the ownership of these concerns, and worked to develop an integrated solution, finally proposing (in addition to other upgrade recommendations) the elimination of the back-up system in favour of a weigh cell under each chlorine drum - tied to a local, 'fail to safe', visual alarm. The alarm was proposed to activate when the drum had approximately three days supply of chlorine left, and remain activated until change over. This, in theory, would allow process technicians adequate time to have a replacement drum delivered, and to change it out without any resulting change in residual chlorine levels in the cooling towers. It also removed a significant manual handling hazard associated with the provision of the back-up system, and allowed the facility to institute a 'just in time' strategy in relation to chlorine drums - significantly reducing the inventory of chlorine stored on the site.

A formal engineering project was eventually initiated and a project engineer assigned to evaluate the proposed solutions, consider alternatives, and work with the team to select, design and implement the best option.

While the chlorine facility team had come to an agreement re the scrapping of the back-up system, it had not resolved what to do about the automatic chlorine dosing system. Some team members thought the resolution of this issue might slow the implementation of the project, which had implications for other areas of hazard exposure. Others thought it best to do the job once, in a fully integrated project, fearing that not to capture this opportunity to improve the dosing system could mean a long wait for the next one. This issue was resolved through the outcome of another action research spiral.

Some key practitioner observations and reflections during this action research spiral were ...

- The failure of the original design of the back-up system to deliver the intent of the initiative, had implications for the facility's project management processes.

- The difficulties in resolving the issues relating to the potential upgrade of the automatic chlorine dosing system, were in some ways reflective of a culture very focused on individual status, performance, accountability, and rewards as discussed above, with the engineer assigned to the project very attuned to efficiently achieving the initial intent of the chlorine facility upgrade, at the expense of the effective integration of a solution to the automatic chlorine dosing system. The engineer was quite frustrated with the need to work through

the resolution of this complex problem, and powerfully expressed a view that it was best to get on with doing what they already knew needed to be done.

The implication in this for the practitioner, was the challenge to critically explore and evaluate with the engineer and the team, through the use of reflexive and dialectic critique, the alternative viewpoints presented - enabling the team to come to an informed consensus decision on the path forward. It is the practitioner's assessment that introducing the team to the concept and principles of co-operative human inquiry / action research, and its associated tools and techniques, before this point in the team's life, would have facilitated a healthier discussion.

- A further implication from this exercise, was the need for the practitioner to better understand the risk posed by the legionella hazards on the site, relative to other OHS risks (i.e. the risk of chlorine exposure), and to develop a broader knowledge base in relation to legionella and the cost-effectiveness of recommended hazard control measures.

Action Research Spiral 3

Reflection on the first two spirals of the action research process, the review of the interstate facility's independent audit report, and a recommendation from interstate facility to use the same expert to perform an audit of legionella management systems of the practitioner's facility, indicated the need for the practitioner to source some training in the area of workplace legionella management. A local one day course was identified covering the following subjects ...

- Australian Standard AS 3666 (Standards Association of Australia, 1995);
- Legionella and total bacteria testing;
- Chemical control;
- Health commission and local council requirements for Legionnaires' disease control; and
- Cooling water system corrosion and scale control.

The practitioner planned, in the spirit of collaboration and co-researcher empowerment, which are key features of action research methodology, to also involve the process engineer in this training. Before the training took place, however, the process engineer who had been involved in the team process up to that point, moved out of the role, and was replaced by another process engineer who had no previous experience with cooling towers or legionella management.

The practitioner met with the new engineer for the purpose of communicating the background material, the practitioner's current knowledge about legionella, its management and associated issues, the content of relevant Australian Standards, and the investigation process and results so far. The practitioner took this action before the training course so that the process engineer would be in a reasonable position to benefit from the training, and to reset the collaborative process by ensuring the practitioner was not perceived to be in possession of all the technical knowledge on the subject - thus avoiding taking on the role of 'expert'.

In subsequent discussions over the information communicated, and a review of the interstate facility's independent audit report, the practitioner and engineer confirmed the need for further training in the area, particularly as there appeared to be little empirical data defining the hazard parameters and the relative risk associated with exposure to aerosol containing legionella bacteria. There also seemed to be a tendency within the audit report, while positive in its recommendation of a risk-based approach, to target the one hundred percent application of control principles for the elimination of the risk, and to make a number of unrealistic, impracticable recommendations which, though very costly, appeared to add little to the control and prevention strategy. This was not to say the audit report didn't contain what appeared to be some very good recommendations and information. To the contrary, it was a very comprehensive report and provided an excellent base for further investigation. It did not, however, appear to be entirely balanced given the context. Both practitioner and engineer felt they needed to be in a better position themselves, as far as understanding the hazard, the risk, the cost-effectiveness of control measures, and the regulatory climate of the state, before initiating an expert audit.

The training was completed, and evaluated, with the following key outcomes noted ...

- The relevant Australian Standards were at this stage guidelines only, within the facility's state.
- The state health commission was developing a standard for the control of legionellosis which would have force in regulation - this standard being due to be issued within the next twelve to eighteen months.
- A copy of the draft state standard was procured.
- The state health commission was aware of the impracticalities of applying the six monthly shutdown requirements within the relevant Australian Standards targeting smaller cooling towers and evapourative condensors, to large industrial cooling towers such as those at the practitioner's facility. The health commission was open

to a risk-based approach to managing cooling towers, provided other control measures were implemented and maintained to a high standard. This would, however, be on the basis of formal exemption, rather than an appropriate mechanism built into the standard applying specifically to the management of large industrial cooling towers.

- The state health commission had a strong relationship with the expert auditor used at the interstate facility, and the expert auditor had in fact been significantly involved in developing the draft standard.
- The local council had authority under legislation to monitor the management of cooling towers in the state.
- The training provided further information and understanding relating to the impact of general cooling tower management and control of associated parameters on the colonisation of legionella bacteria, and the biocidal effectiveness of chlorine (e.g. pH control, sediment and biofilm build-up, scale, corrosion, water make-up and blowdown, cycling of salt concentrations, etc.).
- Additional reference materials covering both the management of cooling towers and the control of legionella were sourced.
- The training did not provide any further assistance in relation to detailed assessment of the relative risk, or empirical data on the hazard, such as how far legionella would effectively travel within aerosol from a contaminated source in a concentration that would pose a significant risk. The training also did not adequately cover potential sources of legionella exposure other than cooling towers, though a number of these were mentioned (e.g. hot, warm, and cold water systems, showers, spas and whirlpools, potting mix, etc.).

Some key practitioner and co-researcher observations and reflections during this action research spiral were ...

- The complexity of the problem and its resolution were identified by both the practitioner and the engineer. No black and white answers were in evidence. It was recognised that it was going to take some time, and a number of additional steps to get to a point of appropriate resolution. The solution would likely be very multifaceted in nature, and require an integrated approach with other systems and processes (i.e. the effective management of other cooling water system parameters).
- While the improvement of the facility's legionella management systems were, and continued to be, the main focus of the investigation, additional objectives identified, discussed, and agreed to, were the need to ensure that the systems put in place made a significant difference to the

prevention effort, and to work to develop a solution that delivered both effective control of legionella hazards, and an exemption to the six monthly requirement to clean the large industrial cooling towers on site - a requirement that given their current understanding, was considered unnecessary and prohibitively costly.

- Concerns were raised and discussed in relation to using the expert who had audited the interstate facility, to audit the practitioner's facility. This was based around the questions relating to the cost-effectiveness and practicability of a number of his recommendations, and given his strong relationship with the state health commission, the potential to be backed into a corner if similar recommendations were made in the audit report of the facility's legionella management systems.

- The effect of pH on the biocidal effectiveness of residual chlorine was identified as possibly a significant factor. Once the pH rises above a certain point, the effectiveness of the chlorine drops off rapidly. The engineer identified that pH control was quite poor within both large cooling towers.

Action Research Spiral 4

The team (a term which now related to the practitioner and the engineer), reflecting on the outcomes of the third spiral, reviewed the background and qualifications of the expert, and found that his credentials and references were impeccable. His experience, however, was mainly in the area of smaller cooling towers and evapourative condensors - though in this area he had done much to improve the understanding of legionella and its control, and was regarded as an international expert. Despite this factor, and the concerns relating to the practicableness of a number of the expert's recommendations within the interstate audit report, through discussion it was decided to proceed with the expert audit on the basis of ...

- The recommendation of the interstate facility. It would have been a difficult decision politically to choose a different auditor;
- The expert, from his profile, appeared to be genuinely interested in the effective control of legionella for the prevention of Legionnaires' disease;
- The expert's background, qualifications, and the wider recognition of his expertise within Australia and internationally;
- The expert's demonstrated understanding of the lower risk associated with large industrial cooling towers, and openness

to, and support of, a risk-based approach to their management;

- The expert's relationship with the state health commission. While it was recognised this could be a double edged sword, the team believed if the auditor was genuine and open to reason, an effective but more balanced set of recommendations could be developed.

- Given the expert's great influence in this area, it was an opportunity to work through the questions the team had in relation to the recommendations made, and the inappropriateness of the existing Australian Standards being applied to the area of large industrial cooling towers. The objective here was to identify a need for an additional Australian Standard which provided a more appropriate, but none-the-less effective set of management and control guidelines, with someone who had influence with, and was actually involved in the development of Australian Standards in this area.

This was not an easy decision, and both the practitioner and the engineer were somewhat uneasy as the arrangements for the audit were completed. It was communicated to the expert that the audit would have a similar scope to the interstate audit, though would need some tailorising for the practitioner's facility. It was planned to spend the first two hours of the audit confirming the localised changes. Several days before the audit, the team met and mapped out (based on the content of the interstate audit report, and additional areas of concern identified by the team) a detailed audit scope. The scope required the audit to cover the following areas ...

- Both large industrial cooling towers on the site;
- Process technician testing procedures;
- The water treatment program for these towers;
- The evapourative condensor servicing the main administration building;
- Water system dead-legs;
- Safety showers;
- Fire water system;
- Laboratory water baths;
- Evapourative coolers;
- Cutting fluids;
- Lagoons - particularly those with aeration systems;
- A review of site legionella management systems; and
- Recommendations in relation to the development of a risk-based management strategy.

It was agreed that the practitioner would play an overseeing / facilitating role for the audit, and the engineer would manage the field

portion, with a debrief planned at the end of each day. The needs of other stakeholders were also considered, and a combined debriefing session of relevant stakeholders was organised for the end of the audit. In particular, those people were invited who would likely have a role to play within an integrated strategy for the improved management of legionella on the site, as well as several key managers whose support would be needed to drive the implementation of appropriate audit recommendations.

The audit was held over a two day period. The team found the expert to be, in fact, very genuine and very knowledgeable in the area of legionella management. Through the audit process, the team learned a great deal, however, it was obvious that there were not answers available to some of the more difficult questions in relation to risk assessment and the nature of the hazard. For example, it was not known how far legionella traveled within aerosol associated with cooling tower drift in levels that posed a significant risk - and there was not a lot of clarity around the difference between drift and aerosol (i.e. if you felt the drift from the large industrial cooling towers hitting your face, were you exposed to aerosol - or was aerosol much lighter in nature and dispersed quickly after leaving the tower?).

Anecdotal evidence provided by the expert in relation to an overseas outbreak of Legionnaire's disease, indicated that in cool moist conditions at night, aerosol from the contaminated unit (a small cooling tower providing air conditioning to a building complex) had infected several people approximately two kilometres away. The expert indicated that variables such as sunlight, temperature, and humidity could also play a role in the life of the bacteria within the aerosol, but the role they played had not been quantified. These 'unknown' factors were a particular concern, given that on many days, depending on conditions such as wind direction, a significant number of people came into contact with cooling tower drift. Cooling tower drift traveled far enough to 'fall out' on cars in one of the main 'on site' carparks. Given the lag indication provided by the legionella testing regime in place, if the control systems failed and legionella did begin to colonise a cooling tower, the task of quantifying the risk was almost an impossibility. In light of the emotion around the issue of legionella (i.e. the 'outrage' factor), not knowing or being able to clearly define and communicate the risk with clarity was a problem.

The major outcomes of the audit communicated during the debriefings were as follows ...

- The large industrial cooling towers were found to be clean, indicating the overall effectiveness of the chlorine dosing strategy, in good condition, and a review of the total bacteria and legionella test results revealed a reasonably robust system of microbial control.

- The expert, however, did recommend the upgrading of the drift eliminators to meet the requirements of AS/NZS 3666 (Standards Association of Australia, 1995). The existing drift eliminators allowed a 0.2% drift escape, against the Australian Standard's requirement of 0.02% which the expert predicted would be lowered further. The interstate facility was in the process of upgrading their drift eliminators to a type reducing drift to a minimum of 0.005%. Significantly reducing the amount of drift was considered to be a good secondary control measure should primary systems breakdown.

- One of the towers had pump screens with quite a coarse grid pattern - designed to keep large pieces of material from damaging the pump. These pump screens had not been cleaned in some time (? years), and had a build up of dirt and other material. They were considered by the expert to provide a significant mechanism for control of suspended solids and organic contaminants, and a main means of cleaning the water. The other cooling tower had no pump screens to perform this function. The expert recommended the regular cleaning of the pump screens in the one tower, and the provision of pump screens or sidestream filters on the other tower, as an alternative to the shutdown for six monthly tower cleans.

- Recommendations were made to upgrade the water treatment program for the cooling towers (e.g. tightening performance parameters of water treatment contract), and some associated equipment (e.g. automatic blowdown and pH control).

- A recommendation was made to consider changing the mode of cooling tower chlorination from the use of gaseous chlorine to sodium hypochlorite, which the auditor considered to be a much safer method. The team's findings in relation to the low set point for, and the wide variation in, the residual chlorine levels within the large cooling towers, were confirmed. A move to a continuous measurement and dosing system was recommended, in line with the team's conclusions within the action research spirals one and two.

- The evapourative condensor servicing the main administration building was identified as by far the largest risk of legionella exposure on site - poorly maintained units of this exact type had been responsible for a number of outbreaks of Legionnaire's disease in Australia and overseas. The evaporative condensor was currently being dosed manually at monthly intervals. It was recommended that this be upgraded to a continuous dosing system, and given the unit was nearing 'end of life', that consideration be given to replacing the unit with an air cooled model - subsequently eliminating the risk entirely. As an interim measure, it was

recommended that the unit be shutdown over the winter months if not needed, fully cleaned out, and left in a drained state.

- The development of a risk management plan as a basis for improving the documentation of the legionella management systems in place was also recommended for improving clarity around roles, for documenting the system improvements generated by the audit, and as a basis for an exemption to the six monthly cleaning requirements of the Australian Standard.

Minor recommendations were discussed briefly but were not reviewed at the stakeholder debrief. The debriefing with stakeholders was relatively successful in terms of lifting the profile of the issues that needed consideration, for the preliminary highlighting of potential resourcing requirements, and for generating support for the next steps in the process. The expert was a very credible presenter, handled stakeholder questions well, and was able to procure from the stakeholders, a level of consensus in relation to the importance of addressing the issues raised.

The draft audit report was received approximately a week later. It contained fifteen recommendations. The team individually reviewed the draft report, then got together to work through their assessment of it. Discussion of the draft report revealed that both the practitioner and engineer found that while the report contained some good information and recommendations, it still attempted to apply an unrealistic, one hundred percent approach to eliminating the risk, rather than an approach which delivered a series of recommendations to provide excellent, practicable risk control appropriate to the very low level of risk involved, and relative to the other hazard control priorities of the facility.

Some key practitioner and co-researcher observations and reflections during this action research spiral were ...

- The team found the lack of empirical research supporting the recommendations disconcerting. The approach of the expert to apply AS / NZS 3666 to the large industrial cooling towers did not make sense to the team. This approach led the expert to make a number of recommendations, which though appropriate to smaller cooling towers and evapourative condensors, did not appear to have validity for large cooling towers given their different design and mode of operation - and particularly given that the large cooling towers were found to be clean, in good condition, and to have a reasonably robust microbial control system.
- The team were also disappointed with the lack of answers to the more difficult questions relating to quantifying the risk,

and understanding some of the key characteristics of the hazard. A number of the answers provided by the expert were 'in the expert's judgment', not something one could logically reason, or explain on the basis of 'scientific' fact. An example of this was the quantifying of the risk around the lagoons. Two of the waste water treatment lagoons had aerators, which were used to raise the level of oxygen in the water. The aerators (large, horizontal, surface mounted fan-like devices within the lagoon), in the fulfilling of this function, produced significant amounts of aerosol. Process technicians regularly accessed the area adjacent to the lagoons in the performance of their duties. In the expert's judgment, people on the bank of the lagoon would not require respiratory protection, while those working in very close proximity to the aerators (i.e. servicing operating aerators) would require respiratory protection. Drift from the aerators did travel past the banks of the lagoons, however, and the question of what risk this presented to those people in contact with drift outside the perimeter of the lagoon, was not adequately answered. While the test results on the lagoons indicated no or very low levels of legionella present (low levels were expected from time to time as bacterial action within the waste water lagoons was actually a key factor contributing to their effectiveness), this question was not all that important. It became an important question during a later action research cycle when the test results showed a significant presence of legionella bacteria within the lagoons.

- In addition to recommendations specifically relating to legionella management systems, a number of recommendations related to potential safety concerns with access to the top of the large industrial cooling towers. For example, the top wooden hand rail around the top of one of the towers (approximately ten metres from grade) was designed so it actually leaned out over the edge of the tower. Anyone losing their balance would be relying on the integrity of the top rail to take their full weight to prevent a fall. The stairway system on the other tower was found not to generate feelings of confidence, and a structural review was recommended. This in particular, had been a concern of the process technicians for some time. The team was very open to the inclusion of the safety related concerns within the audit report.

- The team, after reviewing the audit report, wondered whether they had made the right decision in going with the expert auditor. While they had both learned a lot through the process of working with the auditor, and the report had, what they considered to be, a number of very good recommendations and useful information, there were a

number of the recommendations that were not considered appropriate or valid - many of these were being actioned by the interstate facility at great expense. The team considered whether the interstate facility was actually implementing a number of the recommendations, not on the basis of improving prevention, but on the basis of managing the 'outrage' factor, and in order to achieve an exemption to the six monthly cooling tower requirement now being heavily pushed by the state health commission and regulatory authority (given recent events). There was also a questioning of the interstate facility's motives for encouraging the practitioner's facility to use this auditor - were they entirely pure, or was there an element of political maneuvering involved? The team considered how they could have better managed the expert audit. Ideas that surfaced included the development of a much tighter audit scope, which required recommendations to be adequately supported, and evaluated on the basis of risk reduction benefit, and an initial 'up front' critique of the interstate audit report with the expert auditor, to specifically work through the questions and concerns the team had in relation to this report - before proceeding with the facility audit.

- The team also reflected on the timeframe for completing the task. The audit took place approximately six months from the point of the practitioner being asked to investigate and upgrade, as necessary, the facility's legionella management systems. Both team members had very challenging core roles to maintain during the research process, and this significantly impacted the rate of progress. The organisation was showing signs of becoming impatient, and the belief that the solution should be as easy as 'cutting and pasting' the interstate facility's outcomes was prevalent. The team, however, particularly in light of actions taken in the first two spirals of the research cycle (i.e. there was a reasonably robust interim control system in place), and the audit's confirmation that the management of the large cooling towers was reasonably robust, were committed to continuing to work through the process. Both were of the opinion that the 'hard yards' had to be done to come up with an integrated, cost-effective improvement strategy, and that this would take some time yet.

Action Research Spiral 5

Reflecting on the information gained and the issues generated from action research spiral five, the team worked through the question of what to do next. The decision was taken to shutdown, drain, clean and 'mothball' the evapourative condensor servicing the main

administration building - given it was early winter, and air conditioning would not be essential until the spring. This was seen to provide enough time to raise a project and gain funding for its replacement with an air cooled system, and thus eliminate what the audit had found to be the greatest legionella exposure risk at the facility. The team rejected the idea of keeping this unit, but upgrading the dosing system, as the unit was considered to be at the end of its useful life anyway - and if the control system failed for any reason, there was significant historical precedence of outbreaks of Legionnaire's disease associated with this exact unit.

The answer to other issues and questions was not as easy. Eventually it was decided that the best path forward was further evaluation / validation of the recommendations through ...

a) A site visit to the interstate facility to investigate the reality of their approach first hand, and to gain as much information as possible about the specifications of their improvement activities, and the justification for their implementation; and

b) The networking with overseas affiliates to compare approaches.

While it would have been valuable for both team members to audit the interstate facility, the organisation was prepared to send just one. The practitioner, again in the collaborative and empowering spirit of action research (though this was also a decision based on workload factors), suggested the engineer perform this activity. Before the trip was made, the team met and 'flushed out' a comprehensive written list of questions to be asked, and material / information to be sourced, as the basis of the scope for the visit. The engineer also actioned the networking initiative with overseas affiliates.

Following the visit and networking activities, the team met to discuss the outcomes. The interstate facility audit and the networking initiative had produced some worthwhile material with which to better assess the validity of the audit recommendations made. Through discussion, a number of themes emerged, and a general direction was agreed. The engineer then took on the task of producing a comprehensive draft proposal incorporating the audit report findings, the results of the interstate facility visit, the networking outcomes, and the general consensus reached by the team in relation to the integration of these inputs, for the team's review.

The engineer, on the completion of the draft proposal, sent a copy for the practitioner's review. Once the practitioner had reviewed the proposal, the team met to work through it in detail. The proposal examined each expert audit recommendation, and detailed supporting and opposing evidence and arguments, cost-benefit estimates, and the proposed 'team' recommendation for each expert audit

recommendation. This analysis was summarised in table form, with each expert audit recommendation being assessed against the following criteria ...

- Capital project or maintenance expense?
- Cost estimate;
- Economic benefits associated (high, medium, low);
- Importance to state health commission (high, medium, low);
- Team recommendation (must do, should do, reject); and
- Supporting comments.

The practitioner was impressed with the quality of this draft document, however, disagreed with a number of the 'team' recommendations proposed. This was not unexpected, as the engineer had been encouraged by the practitioner to incorporate into the draft document, the engineer's detailed assessment, as well as the general directions agreed to as a team. Through discussion, the team identified that the reason for the conflicting conclusions reached in relation to team recommendations, was the absence of a systematic rating on OHS importance. The team agreed to work through each recommendation together and assess the OHS importance of each recommendation, and then use the combined assessment to reach consensus on the specific team recommendation for each item. This process was worked through and a consensus was reached. The engineer modified the draft proposal to reflect the agreed changes, and the table to include the OHS importance rating. The practitioner and the engineer both had confidence in the quality and validity of the result. In their assessment the implementation of the team's recommendations would further improve the control of legionella hazards on site and significantly reduce the risk to facility people, would comply with the intent of the impending state legislation and existing Australian Standards, and would provide a firm foundation for a request for exemption from six monthly cooling tower cleans once this came into force.

The final report, which represented a complete assessment of the audit recommendations and proposed a combination of responses (i.e. 'do', defer / further investigate, and reject), was then circulated to the 'significant others' within the facility, and a summary presentation made to the site health and safety committee. The proposal was endorsed, and a project was raised to action the 'do' recommendations made by the team. The process to this stage (representing the end of the case study for the purpose of the thesis) had taken approximately fifteen months.

Some key practitioner and co-researcher observations and reflections during this action research spiral were ...

- The interstate facility's information had not identified issues relating to the practicability of the expert auditor's

recommendations. The interstate facility visit had confirmed the team's concerns in this area, with interstate people acknowledging that a number of recommendations were being implemented not because they believed they would improve prevention, but in response to the 'outrage' factor, and to enable the interstate facility to negotiate an exemption to the six monthly cleaning requirement (a significant business driver), which was being driven through regulatory application of an arguably inappropriate Australian Standard, in a very difficult environment.

- Towards the end of the project, the practitioner, though understanding the benefits, had not found it easy to allow or encourage the engineer to take greater ownership within the collaborative process. A factor in this was the practitioner's own high levels of ownership, and a recognition of the organisation's reward structure. By encouraging the engineer to make the interstate visit and to draft the proposal, the practitioner was placed in a position of vulnerability in relation to the organisation's focus on 'individual contributors'. The organisation did not have the capacity to recognise or understand the fullness of the practitioner's contribution to the process. In the practitioner's view, from the perspective of achieving the best result for the engineer, the organisation, for the effective management of facility legionella hazards, and for testing the benefits of action research in practice, the decision was a successful one.

- Though a number of the expert auditor's recommendations were rejected, many of the recommendations had made it to the 'do' list. The expert audit, though producing some significant issues to work through, had provided a good framework and generated the energy for the next cycle of the action research process. The team believed that through the process, they had developed an understanding (though there were still questions left to answer) of the issue, and that they could confidently defend the major recommendations made, not only to their own organisation, but also to outside bodies.

- A number of further areas still required attention. The questions relating to the aerators within the lagoons needed further exploration, and a comprehensive documentation of the facility's legionella management system, in a risk management plan format, remained to be completed. The outcomes of the legionella systems upgrade project required evaluation once complete. A submission for exemption to the six monthly cleaning requirement to the state health commission would also be required once this regulation came into force.

- It is of interest to note, that the Standards Association of Australia (1997) have since released an interim standard

(AS/NZS 3666.3), designed to provide a performance-based approach to the maintenance requirements of large industrial cooling towers, without the necessity for six monthly cleaning requirements.
- The process engineer involved was moved to a different role towards the end of the action research process. The replacement engineer had no previous experience with cooling towers or legionella management.

Spin Off Action Research Spiral

Though there were several 'spin off' action research spirals initiated from the action research process above, it is worth briefly summarising the spin off spiral relating to the potential for exposure to aerosol (containing legionella) generated by the lagoon aerators. As indicated above, this became a particular problem once a relatively high test result was recorded, indicating the presence of legionella bacteria within the lagoon at levels that may potentially have resulted in exposure to contaminated aerosol at hazardous levels (previous results had been either non-detectable or very low and not a significant concern). The validity of the expert advice that the banks of the lagoon and beyond were not a significant risk was then thoroughly tested. A high level of concern was generated within facility people working in the area when the result was communicated. The practitioner met with a team (which included the new process engineer responsible for the large industrial cooling towers, and the supervisors responsible for the area) to discuss the high result, consider the potential reasons for the result, attempt to quantify the risk, to map out a path forward in terms of short term control, and to begin to explore a long term solution.

The team had a great deal of difficulty assessing the risk. The team's short term control was to require anyone exposed to drift from the aerator in the contaminated lagoon to wear respiratory protection. The team recognised this was not an appropriate long term solution in light of the hierarchy of controls, and the difficulties with maintaining the integrity of this control in a semi-remote location. The long term solution was not an obvious one given that there was no expectation that the lagoons could be subject to dosing with biocide, due to their function, size, and the amount of organic material within them. It was agreed that team members would individually consider the issue of a long term solution.

Not long after this meeting (i.e. several days), it was reported by one of the process technicians at one of the work team morning meetings that a contractor who had been working in the vicinity of the lagoon (though beyond the bank), had been admitted to hospital suffering from a pneumonia-like respiratory illness. The report indicated the doctors were testing for Legionnaires' disease (this is, in fact, a regular part of

investigating cases of pneumonia according to the practitioner's personal investigation). This report galvanised the concern in relation legionella hazards associated with the lagoon aerators.

The practitioner immediately approached the environmental co-ordinator and worked through a series of questions, beginning with the question of 'are the aerators really necessary?'. The outcome of this discussion was the potential for the lagoons to be aerated by a device below the surface which did not generate any aerosol. The practitioner also identified that a current upgrade of one of the aeration facilities was nearing the implementation stage (the design having been basically completed). The practitioner initiated a 'hold' on the project (the engineer was within days of placing an order for a replacement aerator), and brought the team and other stakeholders together (including the project engineer responsible for the project), to discuss the potential to modify the project at this late stage for the purpose of trialing this new type of aerator. Needless to say the idea received a great deal of support.

The practitioner and the project engineer, then worked through several action research cycles to determine the feasibility of the concept, and to explore the alternatives - again through a collaborative process, though the engineer did the bulk of the 'leg work'. Eventually the process produced a recommendation for the installation of a fully shrouded aerator (normally used as a noise control measure for aerators close to built up areas). The fully shrouded aerator cost only marginally more than the unshrouded aerator in the original design. The under water alternatives were found to be significantly more costly, and less reliable (thus more expensive to maintain). This recommendation was brought to the team for their review. There were a number of questions in relation to the actual performance of this aerator in reducing aerosol, as there was no empirical data to support its performance in this area (not having been used previously for this purpose). The team came to a consensus to trial this potential solution (despite the preference for some 'real' data on its performance), as the project could not be held up further for other business reasons, and the project engineer confidently communicated the view that the solution would be successful.

The fully shrouded aerator was recently installed, and has proved to virtually eliminate the production of aerosol from the lagoon. Without aerosol being generated, there is no risk to people even when there is legionella bacteria present in the waters of the lagoon. There are now plans to transfer (e.g. retrofit) this solution to the aerators in the other facility lagoon.

Some key practitioner and co-researcher observations and reflections during this action research spiral were ...

- The need to ensure that the review of OHS implications of a project are fully imbedded in the facility's project review processes.
- The noted quality of the drive that is generated to fix systems when faced with the 'real' prospect of someone becoming seriously ill or dying as a result of workplace exposure. As it turns out, the individual hospitalised was suffering from pneumonia - not Legionnaires' disease. Though according to the expert auditor, there had been no known cases of Legionnaires' disease associated with contaminated lagoons, the OHS practitioner will sleep much better when all aerators are fitted with full shrouds, and the generation of aerosols from lagoon water is eliminated. This has implications for OHS practice.
- Experts, though they may be genuine and have 'real', recognised, and demonstrated levels of expertise, do not necessarily have full or context appropriate answers to local problems.

11.3.3. Outcomes

The following list provides a summary of the physical outcomes of this action research process (representing an investment of approximately four hundred thousand dollars) ...

- The upgrading of the drift eliminators of both large industrial cooling towers;
- The replacement of the evapourative condensor with an air cooled unit;
- The covering of the top deck of one of the cooling towers to prohibit the entry of sunlight;
- The cleaning of the existing pump screens on one of the large industrial cooling towers;
- The provision of automatic pH control for the cooling towers;
- The provision of continuous chlorine dosing to both cooling towers;
- The removal of the chlorine back-up system and its replacement with a weigh cell and 'fail safe' alarm system (note: the chlorine facilities have also been upgraded from a chlorine hazard perspective through a separate but integrated process);
- The replacement / refurbishment of cooling tower stairways and emergency ladders;
- The modification of the perimeter handrail around the top of one of the cooling towers;
- The successful trialing of a fully shrouded aerator.

11.3.4. Conclusion

Some of the key context specific conclusions from this action research case study are listed below ...

- The quality of the organisations's auditing processes is a factor vital to the maintenance of critical hazard control measures.
- The focus on individual expertise at the expense of utilising team approaches where appropriate, can be an organisational vulnerability.
- More work is required to ensure that key lessons can be effectively learned from incidents / experiences occurring outside the facility, and that actions are developed / applied in an appropriate depth, and in a timely fashion.
- The capacity of contract personnel to influence facility people, where this influence is a critical to the successful fulfillment of their core role, should be considered when setting contract conditions. Mechanisms to facilitate this 'influence' should be developed where contractors retain this responsibility.
- The importance of focusing on, and raising the profile of, the maintenance of residual chlorine levels in cooling tower water as the key indicator of a healthy system, rather than focusing on the lag indictor of the legionella testing regime. Legionella test results should be considered the last line of defence.
- The importance of utilising 'management of change' procedures to ensure all of the implications of a change are considered, and actions are taken to address vulnerabilities where appropriate.
- The facility's project management systems need to be reviewed to ensure they are robust enough to measurably deliver their intended objective, and to ensure that the OHS implications of projects are systematically considered during project design processes.
- The case study confirmed the complexity of the 'real world' problems faced by the OHS practitioner and the people in the organisation.
- The case study supports the value of positivist, empirical data in the answering of OHS problems in the workplace, but also confirms that this data is not available for many of the key questions needing to be answered in the 'real world' resolution of these problems.
- The need to ensure that the project or audit scopes relating to the work of OHS experts and consultants, are of sufficient

quality and detail to deliver what the organisation and its people require.

- The timeframe and resourcing of the action research process was an issue from the organisation's perspective. It is important for the practitioner to work to build the organisation's understanding of action research and its valuing of associated benefits.

- Recommendations from affiliates or sister facilities are not always what they seem. While the facility should be grateful for the highlighting of potential problems, advice and the sharing of information and tools, the 'real world' picture of an affiliate / sister facility situation, is at times best explored first hand.

- While the practitioner facilitated genuine participation and collaboration within the action research team, the practitioner found it difficult to relinquish ownership of the problem and its solution where it related significantly to an area of practitioner expertise, particularly in a culture focused on individual achievement. The practitioner was convinced, however, that the decision to encourage the empowerment of the co-researcher improved the quality of the result in many areas, and contributed substantially to co-researcher development.

- The team concluded that, through the process, they had developed a significantly more comprehensive understanding of the problem and its context, and that the recommendations were sound and defendable within their organisation and to outside bodies. The team were confident that the implementation of the recommendations would deliver a significant improvement in legionella management on site, with the subsequent reduction in the risk to people, would deliver compliance with the intent of the impending legislation and existing Australian Standards, and would provide a firm foundation for exemption from the six monthly cooling tower cleaning requirement, once this came into force.

- The action research team (and in particular the practitioner) would benefit from targeted training in action research principles, techniques, and processes.

- Experts, though they may be genuine and have 'real', recognised, and demonstrated levels of expertise, do not necessarily have full or context appropriate answers to local problems. Their expertise and efforts, however, can be excellent inputs to the action research process.

- The rapid rotation of process engineers through positions of significant responsibility, has implications for the ongoing maintenance and integrity of critical systems.

In addition to, and in light of, the above list, the practitioner concluded that this initial application of the action research process (however raw), had provided significant benefit to the people at the coal face, and the organisation generally, through the quality, context appropriate, and cost-effective improvement of the facility's legionella management systems. The practitioner maintained that the co-researchers involved in the action research process also benefited through their personal development, their exposure to OHS knowledge and skills, and the personal recognition received for their involvement in producing a successful outcome. The practitioner also learned and developed through this initial application of the action research process. The practitioner has already begun to put a number of the lessons learned into practice. It is obviously the practitioner's hope, that peers also find this record of the action research process, as applied within this context, useful to the improvement of their own practice.

11.3.5. Analysis / Critique

Table 13
Does Case Study Two satisfy the working definition of action research?

Specific Area Of Question	Assessment
Is this a situation in which	There is sufficient evidence within the case study to answer this question in the affirmative.
– people reflect and improve (or develop) their own work and their own situations	Cycles of reflection and action can be readily identified. There is a reasonable balance of reflection and action, and the improvement process is seen to benefit from the deliberate cycling between these two activities.
– by tightly interlinking their reflection and action	There is evidence of communication and consultation mechanisms (e.g. health and safety committee presentations, stakeholder debriefings, and Email communications), however, more frequent up dates may have been of benefit - particularly in managing the organisation's impatience re the time taken for solution development.
– and also making their experience public,	
– not only to other participants, but also to other persons interested in and concerned about the work and the situation (i.e. their (public) theories and practices of the work and the situation)?	There is also a need to more widely share the learnings in relation to legionella, its effective management, and the facility's own legionella management systems. This will help to build a reasonable perception of the risk, and increase confidence in the level of control provided.

The development of the action research case study is seen by the practitioner as a means of communicating the action research process, and the learnings associated with its application, within the organisation, and with the wider OHS community. |

Specific Area Of Question	Assessment
Is this a situation in which there is increasingly – data gathering by participants themselves (or with the help of others) in relation to their own questions – participation (in problem-posing and in answering questions) in decision making – powersharing and the relative suspension of hierarchical ways of working towards industrial democracy – collaboration among members of the group as a 'critical community' – self-reflection, self-evaluation and self-management by autonomous and responsible persons and groups – learning progressively (and publicly) by doing and making mistakes in a 'self-reflective spiral' of planning, acting, observing, reflecting, replanning, etc. – reflection which supports the idea of the '(self-) reflective practitioner'?	Co-researchers were heavily involved in the gathering of data (e.g. residual chlorine results, legionella test results, interstate site audit, etc.). There is significant evidence of genuine collaboration, power sharing, and participatory decision making within the case study, to the point that the practitioner found it difficult to relinquish his own levels of ownership of the process for the purpose of empowering co-researchers. Co-researchers took on the performance of critical tasks (e.g. the implementation of set point changes for residual chlorine levels, the facilitation of the field portion of the expert audit, and the development of the draft of the final proposal), and their knowledge, skills and experience were effectively employed (and improved) throughout the research process. Participation in the action research process could have been wider, although the team expanded and contracted as seen naturally appropriate to ensure the ongoing effectiveness of the action research process. The generally small size of the team, however, did act to limit the exposure and subsequent development of others through the 'first hand' experience of the process and its associated learnings. The team was generally autonomous, and responsible for the process and its outcomes. There is a reasonable level of self-reflection and self evaluation in evidence within the case study, and overlapping cycles of planning, acting, observing, reflecting, and replanning are distinctly identifiable. There was greater opportunity to be more systematically self-critical - particularly from a perspective of improving the professionalism of the OHS practitioner's practice. A number of mistakes made during the action research process provided opportunities to learn for the future (e.g. the failure to apply a 'management of change' process when changing the set points; the failure to adequately manage the known issues associated with the expert auditor, the lack of urgency in the resolution of the legionella exposures related to the aeration of the lagoons). Coming to consensus was not always an easy process, with significant exploration of alternative explanations, and the working through of each person's observations and reflections, a feature of the process. The concepts of reflexive and dialectic critique were used by the practitioner, however the depth and systematic application of these processes were assessed as immature. (continued below)

	Co-researcher's were not trained in the application of action research principles or methodology, though key co-researchers were made aware of the general concept. As such, there was a reliance on the practitioner's capacity to facilitate the genuine application of the action research process and principles. The quality of the process, and the application of action research principles, would likely have been significantly improved with the training of co-researchers in the principles and the process of action research.
Is this then a situation in which action research is occurring?	The overall assessment, in light of the discussion above, is that Case Study Two was definitely a situation in which action research was occurring.

Source: Zuber-Skerritt (1992, p. 14)

Table 14
How well does Case Study Two apply critical action research theory?

Key Questions	Assessment
1. How does the case study match Hart and Bond's (1995, pp. 40-43) action research typology and associated elements?	Based on the assessment detail in Table 13, Case Study Two, though it is a case study which overlaps several action research types, is most adequately described as an 'empowering' action research type, which generally has most of the following characteristics ... **Educative base:** • Consciousness-raising • Enhancing user-control and shifting balance of power; structural change towards pluralism • Empowering oppressed groups • User / practitioner focused **Individuals in groups:** • Fluid groupings, self-electing or natural boundary or open / closed by negotiation • Fluid membership **Problem Focus:** • Emerging and negotiated definition of problem by less powerful group(s) • Problem emerges from members' practice / experience • Competing definitions of success accepted and expected (Continued below)

	Change Intervention: • Bottom-up, undetermined, process-led • Problem to be part of process of change, developing an understanding of meanings of issues in terms of problem and solution **Improvement and involvement:** • Towards negotiated outcomes and pluralist definitions of improvement: account taken of vested interests **Cyclic Process:** • Action components dominant • Change course of events; recognition of multiple influences upon change • Open-ended, process driven **Research relationship, degrees of collaboration:** • Practitioner researcher / co-researchers / co-change agents • Outside resources and / or internally generated • Shared roles
2. Is the style and form of the case study appropriate for an action research project (Winter, cited in Zuber-Skerrit, 1996, pp. 25-26)?	The case study 'tells the story' of the action research process in some detail, uses language understandable by lay people with reasonable literacy skills, and reasonably captures the sequence of reflection and action, the collaborative relationships, and 'the open-endedness' of outcomes. The reader is provided a window into the understanding of the problem, its context, the action research process, and the practice of the OHS practitioner. The outcomes and conclusion sections are perhaps the only features of traditional research reporting that remain. The style and form of the case study for an action research project is assessed as appropriate. Consideration should be given to question of case study size, in relation to attractiveness to target audiences.
3. Is the principle of critical subjectivity addressed within the report (Reason, 1993, pp. 1262-1263)?	The researcher adequately frames the research in terms of the organisational context, and shares with the reader the researcher's background, and the researcher's influences and potential biases. The reader is provided with an explanation of the researcher's personal reasons for the choice of methodology, and the level of the researcher's experience in its application. It is the author's assessment that the principle of critical-subjectivity is adequately addressed within the case study report.
4. Have appropriate validity processes and procedures been utilised to a level which enables ...	Triangulation is achieved using three sources of data, with a comprehensive set of inter-company Email memos, a large range of relevant documentation and data, and the practitioner's own observations and reflections, forming the basis of the case study. While three sources of data are used, the use of a formal or semi-formal participant (and ...

context specific, meaningful conclusions to be drawn with a reasonable level of confidence and accuracy (Streubert and Carpenter 1999, p. 261)?

perhaps stakeholder) feedback mechanism would have contributed to the quality of triangulation, and built further levels of 'trustworthiness'. Feedback of this nature, unprompted, was contained within the historical Email notes, and the mark-ups of a number of documents.

Pragmatic validation and spiral design are strong features of this case study, contributing to its levels of validity. Working through distinct spirals of planning, acting, observing, and reflecting, the action research team was able to progressively improve their understanding of the problem and its context over time, and to subsequently progressively frame and develop an effective, context appropriate, and increasingly valid solution.

The fact that research did take place in the 'real world', and that co-researchers were very focused on delivering 'real' solutions and outcomes that would eventually have to stand (or fall) before the organisation's management, those working in areas of close proximity to cooling towers, and outside bodies, makes a significant contribution to the pragmatic validation of the case study.

The timeframe of the case study has not captured future action research spirals which will test the main action outcomes of the action research process. As with Case Study One, the documentation of subsequent action research cycles would raise the validity of the study and its findings in the eyes of the reader. The action research process had not been completed at the time the case study was documented, with a number of the main action outcomes having only recently been engineered and implemented. The action research process is expected to continue until the robustness of these outcomes has been established, the full risk management plan has been developed, and the risk management plan has been successfully presented to the state health authority as a basis for an exemption to six monthly tower cleans.

A 'devil's advocate' role was fulfilled by the practitioner's manager. This was not a planned mechanism. With the manager's overall responsibility for the outcome, the manager was very motivated to test (on an ongoing basis) the validity of the process used, and the progressive conclusions reached - particularly in light of the need to 'manage' the impatience of the organisation. The role that the manager played was a reasonably rigorous one, and though not documented in the case study, is evident in a number of Email communications. The networking initiative also provided the action research process with a 'reality' check.

As discussed in Case Study One, the level of consensus validation achieved hinges on the quality of the participation. The quality of co-researcher participation in Case Study Two is quite high, with the co-researcher taking on critical tasks which the practitioner may have felt a significant level of ownership of, and contributing by the end of the process as an equal partner / owner. The participation was also of quality due to the capacity of participants to openly share and work through different points of view - a feature which improved the understanding of the problem, the other person, and arguably improved the quality of the solutions developed. The breadth of participation, however, was fairly narrow - with the action research team generally relatively small through

most of the process. Broader participation would have improved the level of consensus validation achieved, however, the organisation was operating with a minimum of people, and this somewhat limited participant availability.

Reflexive and dialectic critique were used (though immaturely) to explore the underlying influences on the data, action outcomes, and observations. For example, a number of underlying factors were identified through discussing the reasons for low residual chlorine levels. Underlying influences relating to the expert auditor and the information received from the interstate facility were also identified using these techniques. The contradictions within the data were also explored. A key contradiction identified and explored related to the application of AS / NZS 3666 to large industrial cooling towers - with on one hand, the recognition that large industrial cooling towers had not been found responsible for any Legionnaires' disease outbreaks on record, while on the other, people were looking to inappropriately apply the same standard required of smaller cooling towers and evapourative condensors. The exploration of this contradiction, and its associated influences on the data and information, helped the team to develop a more appropriate, cost-effective solution to the problem. The application of reflexive and dialectic critique could have been a great deal more systematic, and the practitioner, without having actually been instructed in these techniques, or having seen them modeled, was not fully confident in the 'how to' of effective application.

The length of the action research process also played a part in building validity. The process to the end of the case study had taken approximately fifteen months. Over this period, the team was able to build a comprehensive understanding of the problem and its context. The team was able to experience 'first hand' a number of incidents involving the cooling towers and the facility's management of legionella over this period, which enlightened the team to aspects of the problem not previously identified. It enabled the team to also see and evaluate the interstate facility's solution at a more mature stage, in perhaps a more representative environment. In some ways, the interstate facility tested in action a number of recommendations made within the expert audit of the practitioner's facility, and thus provided a window through which to assess these recommendations in the 'cold light of day'. This also contributed to the validity of action research outcomes. The team was also able to step back and reflect between spirals (and the pressures of their core role duties), and this quality reflection time, as individuals and then as a team, was a key contributor to framing the way forward.

Overall, as for Case Study One, it is not a question of whether Case Study Two is valid or not, it is a question of the *level* of validity relating to the conclusions drawn and recommendations made. There is arguably enough information provided within the case study for the reader to reasonably judge the level of validity. In the author's assessment, the level of validity reached (through the application of the validity processes of co-operative human inquiry) was adequate to provide ...

- a reasonably sound solution to what was a very complex problem, with competing objectives to satisfy.
- a level of understanding and confidence in the facility's legionella management systems - a means for educating people and managing the 'outrage' factor.

	- a solid foundation for the completion of a risk management plan, and a subsequent exemption to the six monthly tower cleaning requirements of AS / NZS 3666. - the basis for the next action research planning stage. There were a number of spin off action research spirals generated, as well as the main action research process to complete. - inputs into local theory development in a number of areas, with future improvement opportunities identified for systems and processes, the organisation, as well as the practitioner. - a helpful resource and record of learnings for the wider OHS community to use as inputs to their own action research processes, and as an initial example of the application of action research to OHS in Australia. - for the case study and associated findings to be documented and recognised as valid, valuable and 'scientific' research - within the framework of this thesis, and as part of this thesis, to be communicable in scientific papers, books, and journals. The author, as with Case Study One, does not believe that the level of validity reached supports the acceptance of the conclusions reached and recommendations made, as 'law-like generalisations' that may be universally and uncritically applied. It is the author's view that the case study conclusions and recommendations may be used as inputs to the development of general theory - particularly in relation to the appropriateness of applying the regulatory requirements for smaller cooling towers and evapourative condensors to large industrial cooling towers, and the application of action research to OHS in Australia, but could not appropriately be recognised as general theory on a 'stand alone' basis. From a general action research perspective, this is not a failure, but an expectation.
5. Were ethical issues adequately addressed (Streubert and Carpenter, 1999, p. 262)?	Permission was obtained from the practitioner's manager for the investigation and subsequent upgrade of the facility's legionella management systems, to be documented as a case study for the purpose of this thesis. Ethical issues associated with this case study, and the sensitivity of subject, have made it necessary for the researcher to maintain the anonymity of the organisation, co-researchers, and other 'players' (Streubert and Carpenter, 1999, p. 262), and to restrict access to supporting documentation. A comprehensive, numbered list of supporting documentation is held by the organisation involved, and questions relating to this documentation specifically, and the case study generally, may be directed to the author. The major co-researchers were made aware of the intended use of the investigation as a case study within the author's thesis. Permission was specifically requested of the main co-researchers for communications, discussions, and joint outcomes to be utilised within the case study. The research was very much focused on benefiting participants and co-researchers, not only in terms of problem resolution, but also in terms of personal development. This is a key ethical feature of action research. Participant's were all basically committed to being involved in the action research process, on the basis of the ownership of the problem associated

	with their roles, or their personal concern for the issue. Hence, having team members who didn't really want to be involved, wasn't a problem ethically. The investigation assisted them in their work, or promised to improve the safety of their environment, so there was potentially real benefits for them through their involvement. One of the risks with exposing participants to an action research process within an organisation which is not fully supportive of team problem solving processes taking a substantial period of time, is the potential damage done to participants' reputations as efficient, effective problem solvers and decision makers. Within the case study, this risk was balanced against the risk of developing a quick, shallow, low quality solution to the problem - also a risk with significant implications for participant reputations, and for the organisation and the health of its people. While the 'voices' of participants are present within the case study, and the study reflects the varied and multiple reflections, explanations, and understandings of the members of the action research team (another ethical action research principle), the report is perhaps somewhat unbalanced in terms of the degree to which the practitioner's perspective / reflections are represented. The use of a formal or semi-formal feedback / evaluation mechanism would have addressed this ethical weakness of the case study, allowing the direct voice of participants to be heard and represented. As for Case Study One, there was no participant review of the case study report prior to the completion of this thesis. This mechanism would also have helped ensure that the 'voices' of participants were adequately represented by the case study. The changing membership of the team made this mechanism problematic, with the main co-researcher's role changing hands at least three times during the action research period, and the main water treatment contract changing hands once. Overall, the ethical considerations were reasonably well addressed for the nature of the application, however, more formal mechanisms for documenting participant consent, feedback, and case study review, could be considered as potential improvements to the quality of ethical management in the future. There may be a balance to strike, however, between formal and informal ethical procedures, with enough controls in place to protect people, without making the process too onerous or bureaucratic, and potentially creating an artificial environment.

Table 15
Were predicted OHS benefits realised within Case Study Two?

Predicted Benefits	Assessment
1. Actual and sustainable OHS improvement at coal face?	From the list of outcomes within the case study, there is significant evidence that 'coal face' OHS improvements were made - a number of which (due to their 'safe place' design - e.g. the elimination of the

	evapourative condensor, the upgrading of the drift eliminators, the hand rail and stairway modifications and upgrades, the shrouded aerator), will deliver sustainable improvement. There were, however, a number of actions that remain to be tested for their effectiveness, and evaluated / monitored to determine the sustainability of their promised improvement.
2. Valid practitioner OHS research useful to peers?	The case study could be considered a helpful resource and record of learnings for the wider OHS community to use as inputs to their own action research processes, and as an initial example of the application of action research to OHS in Australia. The 'story' of the action research process as it relates to the management of legionella in the workplace, may be of value to practitioners facing a similar situation. It is the author's view that the case study conclusions are also components of the case study some practitioners will find useful for critical consideration, and for the continuous improvement of their practice. Readers of the case study will contribute to the answering of this question. The author would welcome and value reader feedback.
3. Effective consultation / teamwork strategy?	The action research team in Case Study Two was not set up to compete with the site health and safety committee. It was, however, a successful teamwork strategy that consulted with stakeholders on an 'as needs' basis. The action research methodology did provide the practitioner with a team design and process which was able to progressively build an understanding of the organisational context of the problem, and which was arguably effective. Certainly the timeframe of the action research process was a concern, though this was somewhat addressed by the initial actions of the team which put in place interim control measures, and the quality of the main action outcomes. The action research team's key proposals were endorsed by the management team and the facility health and safety committee, and a significant investment was made by the organisation on the basis of the team's work. The action research process noticeably developed the team and its members over time.
4. Professional development of the OHS practitioner, and the facilitation of an appropriate and effective OHS practitioner role?	The action research process, particularly the more disciplined approach to reflection, provided the practitioner with a mechanism to identify some of the key learnings within the process for the future improvement of OHS practice (refer case study conclusions). The practitioner's role within the action research team was a reasonably healthy and effective one. The practitioner valued the contribution of participants, and the multidisciplinary approach that was brought to bear on the problem. The practitioner was able to facilitate and guide the action research process, as well as input OHS knowledge and principles, and coach the team in their use. The practitioner, who was subject to a very heavy workload in a challenging organisational environment, was able to share the load with co-researchers in many ways, and encourage them to use and develop their talents and skills.

		The practitioner received significant satisfaction through the team process, development, and achievements, and learned a great deal from individuals in the team, and about the action research team process.
		The case study report, as a part of this theses, also contributed to the key assessment criteria for the awarding of the Master of Applied Science (Occupational Health and Safety) through the University of Ballarat.
5.	Innovative OHS solutions produced?	In the author's assessment, the action research process contributed innovative solutions in a number of ways.
		It was not a blind acceptance of expert advice or the blind application of prescriptive legislation. Though the organisation made a significant investment to provide an effective solution to the problem (solutions which had a number of side benefits for the organisation - good pH control prevents corrosion and saves on biocides; drift eliminators reduce water consumption, etc.), by working through the problem, and building a holistic understanding of the problem and its context, the team was able to justify the organisation not investing significant additional capital for little 'real world' gain in terms of prevention.
		A number of the solutions were innovative in their own right. The use of the weigh cells to manage chlorine supply, and the trialing of a fully shrouded aerator to eliminate aerosol generation from lagoons, are a couple of the innovative solutions identified within the case study.
6.	Reconstruction of co-researcher reality, the internalisation of OHS principles and knowledge, and the associated empowerment of co-researchers?	The first process engineer involved in the team had audited the facility's legionella management systems, and had identified no areas of concern or significant improvement. The action research process revealed to the engineer the deeper reality of the situation. For subsequent engineers involved in the process, there was also a process of coming to terms with the reality that not all problems had straight forward, linear solutions. For all members of the action research team, it was a critical journey of discovery, where the 'reality' of the situation was progressively constructed (though not ever entirely) through the spiraling of action research cycles.
		The practitioner was able to present basic OHS principles (e.g. the hierarchy of controls; the 'safe place' concept; the energy damage model, human error ideas, risk assessment tools, and risk perception theory, etc.), and the understanding and application of these principles is evidenced by the physical outcomes of the action research process.
		There is significant evidence within the case study of co-researcher development and empowerment.
7.	Learnings identified to improve future application of action research principles and process?	Reflections within each action research spiral, and the conclusion section of the case study report contain a number of learnings identified through the project to improve the future application of action research principles and methodology within OHS in the practitioner's facility, and the wider OHS field in Australia.

12. Discussion

The two case studies represent quite different applications of action research methodology. Case Study One is a broad scale, organisation wide application of action research, using multiple teams - each looking to improve a distinct area of the organisation's OHS performance. Case Study Two is an application of action research focused on improving the organisation's management of a specific hazard. Case Study One was assessed as generally fitting the 'organisational' type of action research, while Case Study Two was assessed as generally fitting the description of an 'empowering' action research type. These differences in application have, in turn, contributed to somewhat different case study styles, and a number of different strengths and weaknesses. The evaluation of both studies, however, concludes that in each case, action research was being genuinely applied.

Case Study One provides a valuable record of the key events, outcomes, and identified learnings in the life cycle of a large, broad based action research project. By the project's very size, this in itself would have been a very challenging task (e.g. the full Case Study One document was over one hundred pages in length). Describing the detailed application of action research methodology, and the richness of the action research process (e.g. the use of reflexive and dialectic critique, co-generative dialogue, the negotiation of reality, and the spiraling application of the planning, acting, observing, and reflecting action research cycle, etc.) for each action research team, would have been an enormous undertaking. A number of the improvement opportunities identified by the author within the case study evaluation, may therefore have also been a function of the project's size, rather than necessarily an actual deficiency in the application of action research methodology in the field. Certainly, as discussed in Section 7.1 above, large participatory action research (PAR) projects in the past have attracted similar criticism (Mangham 1993, pp. 1250-1252). A descriptive example of the 'rich' application of action research methodology for one of the teams, may have been enough to more adequately demonstrate to the reader the researcher's committed utilisation of action research validity processes and procedures. Case Study Two, with its focus on the application of action research methodology for the improved management of a specific hazard, was able to arguably provide a 'thicker' description of the action research process, and therefore more easily satisfy the reader that action research validity processes and procedures were applied to a reasonable standard.

The case studies utilised narrative to tell the 'story' of the action research process, and the language of both studies was assessed by the author as understandable by the lay person with reasonable literacy skills. Case Study One, however, was more traditional in its structure - a characteristic which may have been related to the case study's need to satisfy the format requirements of an educational institution, for which the case study was a key assessment component of an academic award. The length and descriptive detail of the case studies may be questioned by those who are familiar with more concise, traditional research report styles, and the very size of action research case

studies may be a deterrent to some target audiences. While Yin (1994, pp. 132-133), a proponent of the case study model, identifies the major disadvantages of written case study reports as 'bulkiness and length', Yin encourages researchers using the case study approach to explore alternative or complimentary forms of case study presentation, based on the needs of the target audience. This may be an area for further investigation and development. OHS action research case studies need to be presented in a form which captures the richness that the action research process has to offer, and still remain attractive to OHS practitioners as a valuable and usable source of information for the improvement of their practice.

The principle of critical subjectivity was deliberately and obviously applied within Case Study Two. Case Study One, however, while framing the organisational context of the project, communicating the limitations of the survey, and sharing alternative explanations for observations and findings, did not share with the reader the researcher's background, influences, and potential biases - nor the researcher's personal reasons for choosing participatory action research as a methodology. This may to some extent have been related to the different style of the case study report, but none-the-less is an important feature of action research methodology which is not obvious within Case Study One. Both case studies, however, were assessed by the author as delivering a level of critical subjectivity enabling the reader to reasonably judge their validity.

The application of action research validity processes and procedures across the two case studies varied. The use of the survey tool in Case Study One, despite its limitations, did provide a standard of participant feedback which was not evident in Case Study Two. Both case studies had a number of main action outcomes that required additional applications of the action research process to confirm / improve their effectiveness. Further testing of these main outcomes through action would have enhanced, in the author's assessment, the validity of case study findings in the eyes of the reader.

Consensus validation was a feature of both case studies. The breadth of participation in Case Study One was much greater than that evident in Case Study Two. The depth and quality of the participation in Case Study Two was, however, arguably more significant. This may be due in part to the increased intimacy in a smaller team. The application of defined validity processes and procedures were also more clearly apparent in Case Study Two (i.e. the use of reflexive and dialectic critique, democratic dialogue, the negotiation of reality, and the spiraling application of the planning, acting, observing, and reflecting action research cycle, the use of a 'devil's advocate', etc.). As discussed above, this may have been a function of action research type, or alternatively, the result of differences in the level of researcher exposure to action research theory. Both action research processes did, however, take place in a 'real world' environment, and had to satisfy the expectations / demands of 'real world' customers and stakeholders. This significantly contributed to the level of pragmatic validation within both case studies.

The case studies used several sources of data and information to achieve triangulation. The assessment of the quality of triangulation achieved, was however difficult, as in both case studies, the actual detail of the process of triangulation (i.e. the amount of concurrence between these different sources on a given point) is not made obvious. The use of multiple data / information

sources to build a trustworthy action research 'story' through triangulation is confirmed, more or less, by the general advice of the authors. An example of how the actual process of triangulation was applied, would enhance the reader's level of confidence in the quality of triangulation achieved - contributing to the overall validity level of the case studies. Certainly the participant review and endorsement of the completed case studies would also have improved the level of case study validity.

The timeframe was also a factor contributing to the validity of both case studies. The lengthy action research processes allowed multiple spirals of the action research cycle to take place, and the teams to progressively build an understanding of the problem and its context, and to progressively improve the quality of solutions. The overall outcomes of the case studies contributed to case study validity, with the action research process for the most part delivering the intended objectives. The conclusions and recommendations made within both case studies flowed reasonably logically from the observations and reflections documented, though the claims for the development of general theory within Case Study One, were not validated through the case study in the author's view.

As discussed within the evaluation sections of the case studies above, it is not a question of whether the case studies are valid or not, it is a question of the *level* of validity that is achieved. There is arguably enough information within both case studies for the reader to reasonably judge the level of validity, though there is no doubt that the validity levels of both case studies would have significantly improved with a more disciplined (and in some ways, a more visible) application of action research validity processes and procedures. Formal training in action research methodology and techniques by individuals who are already experienced in their use in 'real world' applications, would facilitate improvement in this area. In the author's view, the level of validity achieved by the case studies (through the application of the validity processes of co-operative human inquiry) was adequate to provide ...

- reasonably sound and valuable outcomes for the organisations, the participants, and the practitioners.
- the basis for the next action research planning stage. There were a number of spin off action research spirals generated, as well as the main action research processes to complete.
- inputs into local theory development in a number of areas, with future improvement opportunities identified for systems and processes, the organisations, as well as the practitioners.
- a helpful resource and record of learnings for the wider OHS community to use as inputs to their own action research processes, and as initial examples of the application of action research to OHS in Australia.
- the basis for Case Study One and associated findings to be documented and recognised as valid, valuable and 'scientific' research that is communicable in scientific papers, books, and journals, and as inputs to the development of general theory - particularly in the areas of OHS and workplace reform, and the use

of action research teams to improve organisational OHS performance.

- for Case Study Two and associated findings to be documented and recognised as valid, valuable and 'scientific' research within the framework of this thesis, and as part of this thesis - to be communicable in scientific papers, books, and journals.

Ethical issues were generally reasonably well addressed by both case studies, however, the importance of some level of participant case study review is an area not only for improving validity, but is also a significant ethical consideration for both researchers in the future. The need for formal consent processes is a question that could be explored further. Certainly the author felt that the formalisation of participant consent had the potential to impact on the action research environment, and that the low key approach for Case Study Two was a reasonable one given the application. The anonymity of participants and stakeholders was maintained, and in Case Study Two, due to the sensitivity of the subject, the anonymity of the organisation and outside stakeholders was also preserved. The action research processes of both case studies were seen to directly, and relatively immediately, benefit the participants, another key ethical consideration for action researchers.

An unpredicted ethical consideration was identified in Case Study Two. The potential to damage the reputation and credibility of participants and co-researchers involved in applying action research within unsupportive organisational environments, was clearly a consideration during the reflection stage of at least one action research spiral. Should action research become an accepted and valued OHS practitioner tool, strategies will need to be developed to 'sell' the benefits of action research methodology to organisations focused on individual rather than team performance, and on quick, black and white solutions to problems, rather than context appropriate / effective solutions which take longer to develop.

Between the two case studies, despite their reasonably undeveloped application of action research methodology, there is reasonable evidence of the predicted benefits of applying action research within the field of OHS in Australia (as discussed in Section 9 above). Both case studies achieved actual OHS improvement, with a significant number of 'safe place' initiatives within Case Study Two delivering sustainable improvement into the future. Both case studies had a number of outcomes that required further testing through action, testing which will determine the reality and sustainability of their improvement. Both case studies had subsequent impact on improving the profitability of the organisations by reducing costs, an excellent result in terms of 'selling' the benefits of pursuing future OHS improvement opportunities through the application of action research. Both case studies contributed to the personal development of participants, and exposed them to (and involved them in applying) OHS principles and knowledge, outcomes which should also pay dividends in the future.

It is the author's assessment that OHS practitioners will find both case studies useful inputs to the improvement of their practice - particularly if faced with similar problems / opportunities within their specific organisational contexts. The case studies are valid examples of practitioner research. That is

not to say they are perfectly objective models of positivist research which have produced 'law-like' general theory - they are not. They are, however, credible, critically subjective models of co-operative human inquiry, and as such, provide the level of validity outlined in the bullet points above - local theory which practitioners confronted with similar problems in other contexts may value / use as inputs to their own action research processes.

Case Study One, in particular, demonstrated the promise action research has as a potential alternative / complement to existing broad based consultative or teamwork mechanisms. This was validated within the case study, not only by the successful outcomes, but also through the results of stakeholder audits and feedback. Case Study Two has demonstrated, in the author's assessment, the potential value of utilising action research teams focused on the improvement of specific workplace hazards, and the increased quality of process and outcomes that action research methodology potentially offers teams in comparison to a more general teamwork approach.

The professional development of both practitioners is evidenced within both action research case studies, but particularly through Case Study One. The broad based OHS action research process contributed to the professional development of the practitioner in many ways (refer Case Study One evaluation above), though it particularly improved the practitioner's professional standing within the organisation. This somewhat contrasts the practitioner's experience in Case Study Two, where the resulting practitioner's professional development was perhaps a more personal professional development outcome. This may be due in part, not only to the differences in action research type, but also to the different organisational environments the practitioners worked within. The practitioner involved in Case Study One was operating in an organisation working through a sociotechnical systems approach to workplace reform, which provided a support mechanism for the introduction of a broad based action research initiative. Both researchers were able to establish, in the author's assessment, reasonably appropriate and effective OHS practitioner roles within the action research teams.

The case studies both produced a number of innovative solutions through the progressive development of a holistic picture of the specific problem or opportunity, and the continuous improvement of the proposed solution through the application of multiple spirals of the action research cycle. Both case studies demonstrate the potential of action research as a tool for the reconstruction of co-researcher / participant reality, the internalisation of OHS principles and knowledge, and the associated empowerment of co-researchers and participants. Practitioners in both case studies were able to identify some significant learnings for the improvement of future action research processes.

The discussion above generally confirms the claims made within the literature, and within the main body of this thesis, in relation to action research and its potential application within the field of OHS in Australia. That is not to say that these case studies together represent overwhelming evidence supporting OHS action research in Australia. They do not. These case studies contain reasonably valid local theory, however, their use as a proof for general theory is limited by a number of factors, including ...

- the very nature and scientific basis of action research and co-operative human inquiry as discussed above;
- the limitations of the survey tool used in Case Study One;
- the author's evaluation of his own action research case study, which, while in some ways may have improved the depth / quality of the evaluation, also potentially introduced a significant level of bias;
- the two case studies reviewed within this thesis represent but recent and initial attempts to seriously apply action research methodology to OHS problems in Australia - without the benefit of a comprehensive grounding in either the general theory and practice of action research methodology, or a specific action research epistemology developed and tailored for use by practitioners within the field of OHS; and
- the review and critical evaluation of just two Australian OHS action research case studies does not provide a sample size large enough to produce a general theory with a reasonable level of statistical confidence.

These first few Australian OHS action research case studies, while they may not provide fully definitive answers to questions concerning the applicability of action research to OHS, do, however, provide the reader with an opportunity to do some initial exploring, reflection, and evaluation of their own - and to determine if action research, as argued within this thesis, has offered and demonstrated enough potential value for their OHS practice, that it is worth them beginning their own journey of discovery (and application).

13.   Conclusion

"Finally, what is important is that human inquiry is a process of human experience and judgment. There are no procedures that will guarantee valid knowing, or accuracy, or truth. There are simply human beings in a certain place and time, working away more or less honestly, more or less systematically, more or less collaboratively, more or less self-awarely to seize the opportunities of their lives, solve the problems which beset them, and to understand the things that intrigue them. It is on this basis that they should be judged."

Peter Reason (1988, p. 231)

In many respects, Peter Reason's statement above sums up what this study has discovered about action research - it's about people, people trying to solve the complex, 'real world' problems that they are confronted with. Reason's statement is also able to effectively describe what action research does and doesn't look like in practice. It is not something 'warm and fuzzy'. It is not just a collection of fine words and ideology. It is not a neat, linear, or perfect process, free from errors, conflicts, or frustrations - rapidly delivering the 'final' solution to important problems. It does not pretend to be an easy process or unproblematic. It is the researcher / practitioner and co-researchers working together to understand complex issues, and through the relatively systematic and self-critical, collaborative application of spiraling cycles of planning, acting, observing, and reflecting, developing context appropriate and effective solutions to these issues over time.

The following section contains the progressive findings of this thesis, leading to a main conclusion of this exploratory study into action research and OHS in Australia.

13.1. Sub-conclusions

This study, in its exploration of the origins of action research, has found that the positivist research methodology of the last century, a methodology still dominant today, is seriously limited in its attempted application to the improvement of sociotechnical systems, and 'real world' practice.

A new scientific paradigm is emerging, termed 'co-operative human inquiry'. It honours "the generative, creative role of the human mind in all forms of knowing" (Heron, 1996, p. 13), and has at its foundation a move to participatory and holistic knowing, and to critical subjectivity. Co-operative human inquiry manifests itself in many forms. Action research, which itself has many forms, is a methodology with its origins in this new scientific paradigm.

Action research has been defined, and its features, processes, and procedures have been described. A comparison of action research to positivist

research methodology has revealed that action research, is, in theory, a method suited to the resolution of sociotechnical problems, and the improvement of 'real world' practice.

An overview of the historical development of action research, covering a span of approximately fifty years, has been provided. This overview identified a range of diverse, disparate histories and action research development streams, a plethora of action research models, and a unifying action research typology.

This typology defined four main ('ideal') action research types (experimental, organisational, professionalising, and empowering), providing a comprehensive list of distinguishing features for each type. The variety of action research models, and the dynamic, fluid, and flexible nature of action research processes were identified as great strengths, but also as significant challenges.

The overview of the historical development of action research also revealed strong links with industrial and organisational environments. Kurt Lewin, recognised as the founder of action research, believed that democratic participation in the workplace would result in improved levels of productivity, job satisfaction and morale. Lewin was not only a theorist, but actively pursued the testing of this concept in practice, facilitating a number of broad based action research projects which had not concluded before his death. Participatory Action Research (PAR), a particularly disciplined action research type, has continued to be used as a tool for industrial and organisational reform overseas.

Criticisms of action research have been identified within the literature and discussed. By far the greatest criticism of action research relates to its validity and reliability as a research method. The study has found that the foundation of this criticism has been confusion about the scientific basis for action research, and the influence of the positivist world view.

Action research is not a positivist research method, and as such has quite a different scientific basis. The key principles of this 'new paradigm' scientific basis, as they relate to the features of action research, have been identified, and associated action research validity principles and processes have been described. There were, however, significant practical, epistemological problems and issues requiring resolution also identified.

The review of the literature also revealed that action research outcomes are not intended to be 'law-like generalisations' (as expected of positivist research methodology) that may be universally and uncritically applied. They are, rather, the basis for the next planning stage of the action research continuous improvement cycle, an initiator of further dialogue, and inputs to the continuing process of local theory development - local theory which practitioners confronted with similar problems in other contexts may also value as inputs into their own action research process.

The role of OHS practitioners was defined, and the context of their practice overviewed. Generally, OHS practice was found to take place within sociotechnical systems termed organisations. Key internal and external environmental factors impacting an organisation, and thus potentially affecting the capacity of the OHS practitioner to perform an effective role, were identified (i.e. organisational culture, organisational management, and the rate and complexity of change within external environmental factors).

It was determined from the literature that OHS practitioners must have the means to significantly influence organisational culture if they are to significantly, sustainably improve OHS performance through their practice. The way an organisation is managed (which incorporates the philosophies, assumptions, values, actions and behaviours of an organisation's management) was found to frame and form the organisation's culture - and the organisation's 'OHS' culture. Improving OHS performance within organisations in a sustainable way, would likely therefore also involve, and require, changes to the way in which an organisation is managed. This was identified to be particularly true of organisational management styles which may not only impact negatively on the 'practice' of OHS, but actually contribute to workplace injury and illness by their very application.

An overview of the changing face of OHS was provided, with brief discussion on the impact of performance based regulation, the growing expectations of the OHS practitioner role, current professionalising initiatives, and the development of a 'scientific' approach to OHS. It was found that despite these initiatives, levels of workplace fatalities, injury and disease were still unacceptably high.

A number of those frustrated by the rate of improvement in their OHS performance, or concerned with the practicability of 'safe place' strategies, were found to be turning to 'Behaviour Based Safety' for improved OHS performance. The philosophy and background of behavioural based safety was discussed, and the views of both supporters and detractors were presented. It was noted that both proponents and critics of behaviour based safety had identified the need to effect change in organisational culture, and in the values, beliefs, and attitudes of people, as a critical strategy for future OHS improvement. This finding supported earlier conclusions regarding the importance of organisational culture, but also highlighted the need for OHS practitioners to acquire the knowledge, skills and tools necessary to facilitate the 'enlightenment' of organisational people. This concept is referred to within the literature as the reconstruction or negotiation of reality, and was found to be a key feature of action research methodology.

The future directions for OHS were explored, with a number of predicted strategies for future OHS improvement identified. The need for a holistic approach to OHS, the need for innovative solutions to problems, and the need for Australian people to internalise OHS principles, were three key areas of future focus revealed in the literature.

Innovation, as a specific concept, was also briefly discussed. A type of innovation through participatory and continuous improvement, based on the Japanese application of 'quality' movement principles, was identified and described. The generally gradual and incremental nature of this innovation model was thought unlikely to meet the expectation for rapid results. The 'breakthrough invention' approach to innovation, generally utilised by western organisations operating predominantly under the principles of 'scientific management', was discussed, and compared with the continuous improvement model.

It was found that the drive for 'breakthrough' invention, made organisations vulnerable to 'packaged' solutions. The literature indicated that the success of packaged solutions in delivering sustainable improvement was limited, and that the attempted implementation of packaged solutions often damaged the organisations and their people. The study also revealed a general failure of packaged OHS solutions to deliver sustainable improvement. The genuine involvement of organisation people in the planning and implementation of initiates to improve OHS performance was identified as a preferred alternative, and theory supporting this approach was described.

In light of the conclusions already reached, and the review of the literature, the study identified a number of significant benefits that action research potentially offers OHS practitioners. Four key areas of benefit were discussed in some detail: a research method for practitioners; an alternate consultative and teamwork strategy for the improvement of OHS performance; a mechanism for change, innovation and continuous improvement; and a framework for practitioner personal and professional development.

The study queried the effectiveness and 'real world' impact of positivist OHS research, noted the limitations of its historical perspective (by design), and the failure (and unrealistic expectation) of positivist research to answer all the critical OHS questions that OHS practitioners must address. The study found that positivist research is generally not an appropriate research methodology for OHS practitioners, and identified the need for an OHS research methodology for: resolving problems without black and white answers; facilitating the negotiation of risk perceptions and the making of value judgements; identifying, assessing and controlling the hazards of new technology; and for the resolution of complex issues involving large, diffusely defined systems.

The study found that existing OHS knowledge (including the results of positivist OHS research, and existing OHS principles, systems, processes, tools, and injury and disease prevention information / strategies), is not consistently applied in practice to the level that it delivers acceptable and sustainable standards of workplace injury and disease prevention at the coalface. The most pressing need for OHS practitioners identified by the study, was the need for a process / mechanism / tool with the capacity to reliably bridge the gap between theory and practice, to convert research into effective action at the coalface, to sustainably improve OHS performance, and to share

the lessons they have learned with others. The study found that action research, on the basis of action research methodology, principles, features, and its historical application across a wide range of disciplines and contexts, has significant potential to provide OHS practitioners with such a process / mechanism / tool.

The consultative mechanisms of Roben' s style OHS legislation, and the emerging use of teams to drive improvement in organisational OHS performance, were explored. It was found that health and safety committees, as generally required within the performance-based legislation of today, are increasingly being recognised as being frequently inadequate, ineffective, and in some cases, counterproductive. The potential of legislated consultative mechanisms to restrict or impede the use of more flexible, context appropriate, and inclusive forms of consultation and participation (a flexibility that was the documented intent of the Roben's Committee), was also noted. Action research was considered as an alternative or complementary consultative workplace strategy.

The differences between team and committee based OHS consultative / participatory mechanisms were discussed. Team mechanisms were identified as having characteristics and attributes that may facilitate the development of a healthier, more co-operative environment, and provide teams with a higher probability of meeting their objectives. The study identified a number of arguably successful historical applications of OHS teams within the literature, however the level of research in the area of teamwork, both generally, and specifically relating to OHS teamwork, was found to be quite low.

One researcher into OHS teamwork highlighted that existing general theory relating to effective team based approaches, had not been systematically applied to OHS teamwork approaches, and identified the need for a unifying model to facilitate systematic implementation, and ongoing improvement of OHS team based approaches. This researcher developed a comprehensive model consolidating existing theory on the key variables associated with team effectiveness.

The study found that action research provided OHS practitioners a proven consultative, participatory, team based, collaborative methodology (integrating much of general teamwork theory), with the potential to elevate the standard of consultative and team based approaches to OHS performance improvement from 'policy making', 'simple problem-solving' and 'team work' - to a place where consultative / team OHS problem solving and system implementation processes become rigorous, critical, and recognised applied research activities (producing effective solutions and sustainable improvement), and participants in the action research process are transformed (in reality and in their own perception) into genuine, capable, and empowered co-researchers.

The study, in considering the forecasted needs for the future improvement of OHS in Australia (i.e. the need for a holographic approach to OHS, the need for innovation in problem solving, and the need to imbed OHS

principles into the problem solving skills of people), found that action research offered OHS practitioners a means of fulfilling these needs. A reasonably comprehensive list of action research principles, features, and historical applications, as well as references from literature relating to innovation and change were presented in support of this finding.

The study identified that growing expectations of the OHS practitioner role provided significant challenges to practitioners, and had the potential to produce stress to the point of impacting practitioner health. Action research was considered to offer OHS practitioners a mechanism to share the ownership of OHS problems, and all aspects of the action research process (planning, acting, observing and reflecting) - including the contribution of knowledge, and the responsibility for (and success of) the research outcome, with workplace stakeholders. The application of action research methodology, particularly where it has been accepted, valued, and structurally supported and resourced by the organisation, was found to potentially allow OHS practitioners to play a much healthier and effective role within an organisation's drive to manage OHS performance.

The study also found that action research was not considered as "a panacea for all ills and does not provide solutions to all problems" (Stringer, 1996, p. 16). Prominent proponents of action research recognised that what is to be researched, the purpose of the research, and the context of the research are all factors in the choice of an appropriate research methodology. Prominent proponents of action research also acknowledged the contributions, both historical and future, of positivist research within the physical / natural sciences

The study identified a number of significant barriers to the future application of action research to OHS in Australia ...

- The powerful influence of positivist socialisation processes on practitioners, their organisations, and the 'significant others' of the OHS community, evidenced by a very strong drive to be rigorously 'scientific'.

- The impact of organisational management styles. It is likely that organisations heavily influenced by scientific management principles, particularly those at the 'Theory X' end of the spectrum, will not immediately warm to the prospect of collaborative problem solving through action research.

- The need for further development of action research epistemology, to provide a clear and user friendly process for use by OHS practitioners.

- The existing level of action research knowledge and skills of OHS practitioners.

The concepts and principles of action research were applied to a 'real world' OHS problem / improvement opportunity, and the research process, outcomes, and learnings were documented using an action research case study format. Claims made within the literature, and within the main body of this thesis, were evaluated through a critical review of this case study, and a recent Australian action research case study identified within the literature. **The discussion stemming from the case study evaluations generally confirmed the claims made within the literature, and within the main body of this thesis, in relation to action research and its potential application within the field of OHS in Australia.** There were, however, significant limitations to this general confirmation identified.

Recommendations were made relating to the future use of action research methodology within the field of Occupational Health and Safety.

13.2. Main Conclusion

"In my experience as one strongly identified with this emerging paradigm, I have lectured and discussed the ideas with very diverse groups of people. I have noticed three kinds of response.

First there are those who hear and receive the ideas with what appears to be uncritical joy. These are often people who hold humanistic values and feel strongly the dehumanizing influence of mechanical science.

Second there are those who reject the ideas with either incomprehension or hostility. These are usually people who are working as scientists in a traditional mode, or who have been educated within a scientific profession. The proposal for a co-operative research paradigm does not fit with, or threatens the ideas of, objective knowledge on which their work is based.

The third response, which usually only comes about after some immersion in the new paradigm ideas and acquaintance with them in use, is a critical acceptance of the new paradigm. People are then able to integrate the ideas with their own field of activity, and to develop the methods to fit within their own personality and inquiry needs."

Peter Reason (1988, pp. 13-14)

This exploratory study of action research and OHS in Australia, concludes that the application of action research has the potential to significantly improve the effectiveness of workplace injury and disease prevention in Australia.

The author contends that the most pressing need of OHS practitioners today, and into the future, is not the 'silver bullet' offered by 'experts' touting slickly packaged OHS solutions. It is not an extension of the 'frontiers' of 'scientific' OHS knowledge, or a different legislative framework. The most pressing need is not behaviour-based safety, higher levels of innovation, or even a 'best practice' OHS management systems approach. The principle identified is that outside inputs, expert advice, and centrally developed systems

and solutions (however right and good the information, ideas, or strategies), are of little actual value in the prevention of workplace injury and disease unless they are genuinely implemented to a level where they become a 'piece of reality' for people in the organisation.

The author contends that the most pressing need of OHS practitioners today, and into the future, is for a mechanism / methodology with the capacity to take inputs such as the results of positivist OHS research, existing / emerging OHS principles, systems, processes, tools, injury and disease prevention knowledge, and 'local' knowledge, experience and culture, and convert them into something that (through the ongoing use of the methodology) is able to be effectively and sustainably implemented in the 'real world' of the workplace.

The author concludes that action research offers OHS practitioners "the means" to facilitate the reliable development of innovative, context specific solutions to OHS problems, and to 'localise' and effectively imbed / implement, through and with the contributions of other workplace stakeholders, the things they know need implementing within the specific, complex and very challenging sociotechnical contexts of their organisations.

The author concludes that action research offers OHS practitioners the opportunity to build on the OHS management and problem solving knowledge and skills which are already a key component of their practice, and to take them to the standard, status, and rigor of critical, applied research activities - with subsequent improvement in the effectiveness of solutions developed and systems implemented, and the ongoing improvement / professionalisation of their practice, and the practice of their peers.

The author concludes that action research provides OHS practitioners with a proven consultative, participatory, team based, collaborative methodology (integrating much of general teamwork theory), with the potential to elevate the standard of consultative and team based approaches to OHS performance improvement from 'policy making', 'simple problem-solving' and 'team work' - to a place where their OHS problem solving and system implementation processes become rigorous, critical, and recognised applied research activities (producing effective solutions and sustainable improvement), and where participants in the action research process are transformed (in reality and in their own perception) into genuine, capable, and empowered co-researchers.

"Do not try to satisfy your vanity by teaching a great many things. Awaken peoples curiosity. It is enough to open minds; do not overload them. Put there just a spark. If there is some good inflammable stuff it will catch fire."

Anatole France
(cited in Kletz, 1990)

The author, in the spirit of critical subjectivity, has reflected on the words of Reason and France above. Certainly, the author's Christian beliefs have led him to feel strongly the dehumanising influence of mechanical science - particularly within organisational contexts, and have attracted him to a research methodology founded on collaboration, holistic knowing, and the recognition and honouring of each individual's uniqueness, expertise, potential for contribution, and inherent value.

The author has, however, also investigated action research from the critical perspective of a practitioner, who himself has been challenged by the translation of theory into practice, action into research - the genuine implementation of effective OHS interventions to a level where they become a reality for people in the organisation, and actually, sustainably improve the organisation's prevention of workplace injury and disease.

This exploratory study of action research and OHS has been a journey of discovery. The author's intention to refrain from 'teaching (sic) a great many things', and to avoid information overload, in reality, have been difficult to achieve given the enormity of the task. The author trusts, however, that the material, is in fact, highly flammable, that curiosity has been awakened, that minds are opening, and the fuse has been lit.

Action research has a great deal to offer OHS practitioners - a research methodology that may be the foundation stone of 'true' OHS practitioner research, and the resulting continuous improvement of their practice into the future, for the benefit of all.

The important questions now relate to the response of the OHS community to the conclusions of this thesis. Is the application of action research within OHS in Australia 'an idea whose time has come', can we create the environment in which the idea of OHS action research can grow and flourish, or can we afford to wait another couple of decades for conditions conducive to the successful introduction of action research within the field of OHS to develop without our intervention?

> *"In particular I wish to honour the attempts to take the spirit of inquiry into a variety of social worlds, to establish and sustain dialogue with very diverse groups of women and men over long periods. For I believe that the process of democratic participative inquiry - inquiring together - may be the primary gift that our Western culture has to offer to the wider processes of cultural and planetary development. We need to learn how to take the value and spirit of inquiry into economic, political, personal, and spiritual life as a counterweight to narrow-mindedness, authoritarianism, and chauvinism. We need participative action research as one way to re-invent our society and democracy in the face of political, economic, and maybe most importantly environmental crises."*

Peter Reason (1993, p. 1255)

14. Recommendations

The following recommendation are made on the basis of the author's exploratory study of action research and its application to OHS in Australia. The scope for recommendations was quite broad. The author has looked to make formal recommendations in line with thesis objectives - the future use of action research methodology within the OHS field in Australia.

The author recommends that ...

1. The Australian OHS community reflect on the need to provide OHS practitioners with the 'means' to facilitate the reliable development of context specific solutions to OHS problems, and to 'localise' and effectively imbed / implement, through and with the contributions of other workplace stakeholders, the things they know need implementing within the specific, complex and very challenging sociotechnical contexts of their organisations.

2. The Australian OHS community consider and evaluate the potential of action research as a valid and valued practitioner research methodology, and as a process / mechanism / tool with the capacity to reliably bridge the gap between theory and practice, to convert research into effective action at the coalface, to innovatively, sustainably improve OHS performance, and to share (in a 'scientifically' recognised way) the lessons learned with others.

3. Applied research be undertaken by organisations and institutions involved in the provision of OHS leadership, education and training, to further explore / validate the potential benefits of action research application within the OHS field in Australia.

4. Organisations and institutions involved in the provision of OHS leadership, education, and training, consider the development and implementation of a specific lecture / training module introducing the concepts and principles of action research methodology, and the potential benefits of its application for OHS practitioners and their organisations.

5. Organisations and institutions involved in the provision of OHS leadership, education, and training, network with experienced action researchers from other disciplines, and develop and field test a draft framework (i.e. epistemology) for the performance of OHS action research - a framework which addresses the four practical epistemological problems for action research posed by Winter (cited in Zuber-Skerritt, 1996, p. 17; refer Box 9), including a recommended format for comprehensively documenting and effectively communicating the research process.

6. OHS practitioner professional organisations research and evaluate the application of action research methodology as a professionalising strategy within other disciplines, and if appropriate, develop and implement an action research professionalising strategy with the potential to improve the standard of OHS practice individually and collectively.

7. OHS practitioners consider / explore action research methodology for themselves, and evaluate / test through action, its potential as ...

- an effective research and change / improvement methodology for OHS practitioners - for both broad scale and hazard specific problems and opportunities;
- a creative, flexible, and rigorous form of collaborative OHS inquiry - a potential alternative or complement to existing consultative processes, and a methodology for the ongoing improvement of team effectiveness, process, and outcomes;
- a mechanism for change, innovation, and continuous improvement; and
- a framework for practitioner personal and professional development - including the sharing of lessons learned with peers for the reflective and critical improvement of their practice, and ultimately the improved prevention of workplace injury and disease.

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16. Appendices

Appendix A
Example of Literature Search Process Documentation

WinSPIRS 2.0

No.	Records	Request
1	26539	ACTION
2	114930	RESEARCH
3	536	OHS
4	0	ACTION RESEARCH AND OHS
5	26539	ACTION
6	114930	RESEARCH
7	536	OH&S
8	0	ACTION RESEARCH AND OH&S
9	26539	ACTION
10	114930	RESEARCH
11	278233	HEALTH
12	156970	SAFETY
13	22	ACTION RESEARCH AND HEALTH AND SAFETY
14	26539	ACTION
15	114930	RESEARCH
16	156970	SAFETY
17	32	ACTION RESEARCH AND SAFETY
18	26539	ACTION
19	114930	RESEARCH
20	13145	AUSTRALIA
21	5	ACTION RESEARCH AND AUSTRALIA
22	26539	ACTION
23	114930	RESEARCH
24	278233	HEALTH
25	83	ACTION RESEARCH AND HEALTH
		Searches and records above from: Selected Databases
26	29916	ACTION
27	236092	RESEARCH
28	62	OHS
29	0	ACTION RESEARCH AND OHS
30	29916	ACTION
31	236092	RESEARCH
32	62	OH&S
33	0	ACTION RESEARCH AND OH&S
34	29916	ACTION
35	236092	RESEARCH
36	234151	HEALTH
37	19240	SAFETY
38	23	ACTION RESEARCH AND HEALTH AND SAFETY
39	29916	ACTION
40	236092	RESEARCH
41	19240	SAFETY
42	28	ACTION RESEARCH AND SAFETY
43	29916	ACTION
44	236092	RESEARCH
45	51677	AUSTRALIA
46	275	ACTION RESEARCH AND AUSTRALIA
47	29916	ACTION
48	236092	RESEARCH
49	234151	HEALTH
50	685	ACTION RESEARCH AND HEALTH
51	29916	ACTION
52	236092	RESEARCH
53	210869	EDUCATION
54	1227	ACTION RESEARCH AND EDUCATION
55	29916	ACTION
56	236092	RESEARCH
57	7737	WORKPLACE
58	45	ACTION RESEARCH AND WORKPLACE
		Searches and records above from: Selected Databases
59	12903	ACTION
60	148244	RESEARCH
61	205	OHS
62	0	ACTION RESEARCH AND OHS
63	12903	ACTION
64	148244	RESEARCH
65	205	OH&S
66	0	ACTION RESEARCH AND OH&S
67	12903	ACTION
68	148244	RESEARCH
69	20840	HEALTH
70	44704	SAFETY
71	1	ACTION RESEARCH AND HEALTH AND SAFETY
72	12903	ACTION
73	148244	RESEARCH
74	44704	SAFETY

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75          4    ACTION RESEARCH AND SAFETY
76      12903    ACTION
77     148244    RESEARCH
78      82963    AUSTRALIA
79         10    ACTION RESEARCH AND AUSTRALIA
80      12903    ACTION
81     148244    RESEARCH
82      20840    HEALTH
83          1    ACTION RESEARCH AND HEALTH
84      12903    ACTION
85     148244    RESEARCH
86       4419    WORKPLACE
87          2    ACTION RESEARCH AND WORKPLACE
88      12903    ACTION
89     148244    RESEARCH
90         44    ACTION RESEARCH
                 Searches and records above from: Selected Databases

91      26539    ACTION
92     114930    RESEARCH
93      29551    WORKPLACE
* 94       21    ACTION RESEARCH AND WORKPLACE
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Appendix B
Assumptions of Douglas McGregor's Theory X and Theory Y

Theory X	Theory Y
1. *The average human being has an inherent dislike of work and will avoid it if possible.* 2. *Because of this characteristic dislike of work, most people must be coerced, controlled, directed, threatened with punishment to get them to put forth adequate effort toward the achievement of organisational objectives.* 3. *The average human being prefers to be directed, wishes to avoid responsibility, has relatively little ambition, wants security above all.*	1. *The expenditure of physical and mental effort in work is as natural as play or rest.* The average human being does not inherently dislike work. Depending on controllable conditions, work may be a source of satisfaction (and will be voluntarily performed) or a source of punishment (and will be avoided if possible). 2. *External control and the threat of punishment are not the only means for bringing about effort toward organisational objectives. People will exercise self-direction and self-control in the service of objectives to which they are committed.* 3. *Commitment to objectives is a function of the rewards associated with their achievement.* The most significant of such rewards, e.g. the satisfaction of ego and self-actualisation needs, can be direct products of effort directed toward organisational objectives. 4. *The average human being learns, under proper conditions, not only to accept but to seek responsibility.* Avoidance of responsibility, lack of ambition and emphasis on security are generally consequences of experience, not inherent human characteristics. 5. *The capacity to exercise a relatively high degree of imagination, ingenuity and creativity in the solution of organisational problems is widely, not narrowly, distributed in the population.* 6. Under the conditions of modern industrial life, the intellectual potentialities of the average human being are only partially utilised.

After Douglas McGregor (cited in Mukhi et al, 1988, p.44)

Appendix C
Streubert & Carpenter's Action Research Critique Guidelines

Planning ...

1. Does the study begin with an analysis of the practice situation or does it begin with implementation of action?
2. Analysis of the practice situation:
   a) Is the practice setting described in sufficient detail?
   b) What methods of data generation are used to describe the practice situation?
   c) Are procedures for selecting participants described?
   d) What is the extent of collaboration between researchers and participants during the analysis of practice phase?
   e) Are strategies for data analysis described?
   f) Are participants involved in the interpretation?
   g) Does the description reflect understanding of the practice situation?
3. Action Planning:
   a) Is the planned change described in detail?
   b) Are methods of implementing the planned change described?
   c) Are methods for evaluating the planned change described?
   d) Are participants included in action planning?

Acting ...

4. Is the planned change implemented in the practice setting where the problem occurred?
5. Is the period for implementation specified?

Reflecting ...

6. Are the methods for facilitating reflection specified?
7. Are the results of reflection described?

Evaluating ...

8. Are strategies for evaluating the change described?
9. Are the process for implementing change and the outcomes of the change evaluated?
10. Are data evaluation methods appropriate to the factors evaluated?
11. Are participants included in the evaluation?
12. Are appropriate methods used to analyse evaluation data?
13. Does the research address validity and reliability of quantitative findings and trustworthiness of qualitative findings?

Conclusions, Implications, and Recommendations ...

14. Do the conclusions reflect the findings?
15. Is a theory formulated from the findings?
16. Are implications described in sufficient detail?
17. Has the researcher discussed ethical and moral implications of the study?
18. Are recommendations for research and practice included?
19. Does the researcher describe the benefits participants gained from the study?

Source: Streubert & Carpenter, 1999

Appendix D
Likert's Four Management Systems

System 1: Exploitive Authoritative

Motivational Forces
Taps fear, need for money and status, ignores other motives, which can cancel out those tapped. Attitudes are hostile, subservient upward, contemptuous downward. Mistrust prevalent. Little feeling of responsibility except at high levels. Dissatisfaction with job, peers, supervisor and organisation.

Communication Pattern
Little upward communication. Little lateral communication. Some downward communication, viewed with suspicion by subordinates. Much distortion and deception.

Interaction-Influence Process
No cooperative teamwork, little upward influence. Only moderate downward influence, usually overestimated.

Decision-Making Process
Decisions made at top, based upon partial and inaccurate information. Contributes little motivational value. Made on man-to-man basis, discouraging teamwork.

Goal-Setting Process
Orders issued. Overt acceptance. Covert resistance.

Control Process
Control at top only. Control data often distorted and falsified. Informal organisation exists, which works counter to the formal, reducing real control.

System 2: Benevolent Authoritative

Motivational Forces
Taps need for money, ego motives such as desire for status and for power, sometimes fear. Untapped motives often cancel out those tapped, sometimes reinforce them. Attitudes are sometimes hostile, sometimes favourable toward organisation, subservient upward, condescending downward, competitively hostile toward peers. Managers usually feel responsible for attaining goals, but rank and file do not. Dissatisfaction to moderate satisfaction with job, peers, supervisor and organisation.

Communication Pattern
Little upward communication. Little lateral communication. Great deal of downward communication, viewed with mixed feelings by subordinates. Some distortion and filtering.

Interaction-Influence Process
Very little cooperative teamwork, little upward influence except by informal means. Moderate downward influence.

Decision-Making Process
Policy decided at the top, some implementation decisions made at lower levels, based on moderately accurate and adequate information. Contributes little motivational value. Made largely on a man-to-man basis, discouraging teamwork.

Goal-Setting Process

Orders issued, perhaps with some chance to comment. Overt acceptance, but often covert resistance.

Control Process

Control largely at the top. Control data often incomplete and inaccurate. Informal organisation usually exists, working counter to the formal, partially reducing real control.

System 3: Consultative

Motivational Forces

Taps need for money, ego motives, and other major motives within the individual. Motivational motives usually reinforce each other. Attitudes usually favourable. Most persons feel responsible. Moderately high satisfaction with job, peers, supervisor and organisation.

Communication Pattern

Upward and downward communication is usually good. Lateral communication is fair to good. Slight tendency to filter or distort.

Interaction-Influence Process

Moderate amount of cooperative teamwork. Moderate upward influence. Moderate to substantial downward influence.

Decision-Making Process

Broad policy decided at top, more specific decisions made at lower levels, based on reasonably accurate and adequate information. Some contribution to motivation. Some group-based decision making.

Goal-Setting Process

Goals are set or orders issued after discussion with subordinates. Usually acceptance both overtly and covertly, but some occasional covert resistance.

Control Process

Control primarily at the top, but some delegation to lower levels. Informal organisation may exist and partially resist formal organisation, partially reducing real control.

System 4: Participative Group

Motivational Forces

Taps all major motives except fear, including motivational forces coming from group processes. Motivational forces reinforce one another. Attitudes quite favourable. Trust prevalent. Persons at all levels feel quite responsible. Relatively high satisfaction throughout.

Communication Pattern

Information flows freely and accurately in all directions. Practically no forces to distort or filter.

Interaction-Influence Process

A great deal of cooperative teamwork. Substantial real influence upward, downward and laterally.

Decision-Making Process

Decision making done throughout the organisation, linked by overlapping groups and based upon full and accurate information. Made largely on group basis encouraging teamwork.

Goal-Setting Process

Goals established by group participation, except in emergencies. Full goal acceptance, both overtly and covertly.

Control Process

Widespread real and felt responsibility for control function, informal and formal organisations are identical, with no reduction in real control.

After Bowers (cited in Owens, 1995, pp. 105-106)

Appendix E
Case Study One Survey Results

Factor Surveyed	Key Result	Reflection On Result
1. Background data	• 66% of respondents had been employed with the company for over five years. • 66% of respondents were currently or previously involved in formal health and safety roles within the company - either as a health and safety representative or committee member. • 25% of respondents currently held shop steward roles. • 83.3% of respondents were from the division with 75% of EWPD employees.	• Distribution of length of service provided a good basis for consideration of service outcomes by both short and long serving employees. • Balance between participants trained and experienced in OHS, and participants first exposed to OHS area, provided good mix of ideas / responses. • Union role and perspective not defined or highlighted by the project or survey, but a union perspective and input existed.
2. Suitability of appointment to project and team	• The majority of respondents positive about their appointment. • Position with company slated by most respondent team leaders as the reason for their appointment. • All respondents considered they were adequately skilled for their roles. • 83.3% of respondents considered that prior knowledge of OHS systems was an important performance factor.	• Appropriate team leader attributes were identified. • Appropriate team member skills were identified. • The need for better literacy skills was identified by two respondents as an improvement opportunity. • Most respondents believed that extra knowledge in the specific OHS area their team tackled would have been useful, but that this knowledge was subsequently developed through their participation in the team.
3. Team strengths and weaknesses	• Inappropriate team membership relating to lack of commitment of some members, and the general lack of literacy skills identified as a significant weakness. • All leaders of teams without management representation noted that their teams would have benefited from management involvement. • Four respondents recorded the need for greater shop floor representation. • Seven respondents stated that the role of the researcher / OHS consultant compensated for membership deficiencies.	• Recognition by other respondents of the opportunity to supplement team membership early on in the project - an opportunity that had been taken by most teams. • The WAIT Training Team respondents all believed the position responsible for general training needed to participate. • Greater shop floor representation was seen as a means of sharing a valuable exercise rather than a need to bolster team membership. • The team leader list of weaknesses was developed through reflection on the question of how the team would

- Team leader lists of the strengths and weaknesses of the team structure were compiled.
- Team member lists of the strengths and weaknesses of the team structure were compiled.
- On a scale of 1-10, the mean rating of overall commitment for team leader respondents was 8.1 compared to 10 for team member respondents.
- All team leader respondents believed that the WAIT Co-ordinating Team was effective.
- Only 25% of respondents found the Exempt Employer Injury Prevention Standards were able to adequately present and communicate requirements.
- All respondents acknowledged the excellent attendance rate by most members, but also noted inconsistent and poor attendance by a few.
- All respondents saw some team members as contributing more than others.

be structured if given the chance again.
- Team members identified few weaknesses.
- Team member respondents displayed high levels of personal commitment to the team, and this may have reflected in their rating.
- Team leader respondents made comments such as "gave unity", "gave direction", "gave overall view of the project", "helped in monitoring progress of own team", and "received good information to take back to own team", when referring to the effectiveness of WAIT Co-ordination Team.
- The OHS consultants role was considered by all respondents to have overcome the difficulties inherent in the Standards.
- The differences in team member contribution levels was not presented as a concern, but as a positive recognition of the value of having a mix of people within the team with different skills, knowledge and experience to contribute.

4. Main achievements of the Team
- All respondents identified the action outcomes of their teams as the main achievements.
- On a scale of 1-10, the mean rating of team achievement by team leader respondents was 8.75, and by team member respondents was 9.5.

- The lack of achievement of the WAIT Training Team was identified by this team's respondents as due to factors outside the team - in particular, the resistance of the workplace reform staff training group to OHS becoming integrated with the workplace reform initiative.
- Overall ratings of team achievement were diminished by the ratings of WAIT Training Team respondents.

5. Overall effectiveness of the project
- On a scale of 1-10, the mean rating of team overall project effectiveness by team leader respondents was 9.25, and by team member respondents was 9.75.
- All respondents had difficulty naming the main benefit to themselves, to OHS, and to the company.
- Every respondent cited the raised

- A number of benefits were listed by respondents, including:
  ⇒ heightened awareness of the difficulties in implementing OHS;
  ⇒ ability to contribute;
  ⇒ people now raise problems with them (i.e. empowerment);
  ⇒ extended OHS knowledge;

- profile of OHS in the workplace as the single, most outstanding OHS benefit of the project.
- Two respondents identified a need for the teams to be debriefed after the WorkCover Audit.
- Eleven of twelve respondents considered that the workplace reform activities had enhanced the effectiveness of the project - and moreover, vice versa.
- The mean rate for OHS knowledge before the project by team leader respondents was 7.1 - increasing to 8.6 after the project.
- The mean rate for OHS knowledge before the project by team member respondents was 7.0 - increasing to 9.5 after the project.
- The mean rate for OHS commitment before the project by team leader respondents was 8.9 - increasing to 9.1 after the project.
- The mean rate for OHS commitment before the project by team member respondents was 7.6 - increasing to 10 after the project.

⇒ improved skills;
⇒ open communication channels through the development of cross-divisional relationships;
⇒ personal growth and satisfaction.

- The main benefit to the company was identified as a healthier and safer work environment, and the high level of achievement in the subsequent WorkCover Audit.
- Main weaknesses of the project identified were the timeframe of the project, and the negative pressures from work demands or peers.
- Some negative impacts of the workplace reform activities on the project were recorded.
- The marginal improvement in the OHS knowledge and commitment ratings for team leader respondents was considered due to their initially higher levels at the beginning of the project as a result of the roles within the company.
- The more significant improvements in the team member respondent ratings were considered as good indicators that valid involvement begets commitment.

6. Future role of a team approach to OHS

- All respondents considered that the team approach to OHS was more effective than the existing health and safety committee approach.
- Four of seven teams continued to have an ongoing role with the ongoing participation of team member respondents.
- Nine of twelve respondents considered that members of future teams should be volunteers rather than conscriptees.
- Most respondents considered that future teams could operate through, and be monitored by the health and safety committees.
- Four team leader respondents believed that the existing WAIT Co-ordinating Team was still needed.

- Reasons for team approach preference included:
  ⇒ closer focus on the issues;
  ⇒ improved cross-divisional representation;
  ⇒ higher OHS profile;
  ⇒ higher efficiency.
- The following suggestions were made re future team structures:
  ⇒ WAIT Project should be ongoing;
  ⇒ replace team members progressively;
  ⇒ use short life teams to address current issues.
- Reasons given for continuation of the WAIT Co-ordinating Team include:
  ⇒ health and safety committee too large to

focus;
⇒ there is still a need to focus across divisions;
⇒ it works well;
⇒ health and safety committees workload already too high.

7. Role of researcher / OHS consultant

- The role of OHS consultant was defined by respondents as:
  ⇒ co-ordinator;
  ⇒ goal identifier;
  ⇒ provide information;
  ⇒ guide and coach;
  ⇒ pull project together;
  ⇒ provide (as required) technical knowledge;
  ⇒ steering person;
  ⇒ making sure teams worked;
  ⇒ liaise with managers and feedback to teams;
  ⇒ supporter.
- Respondents universally agreed that the OHS consultant had fulfilled the role as defined.
- Most respondents were unable to identify a differing or additional role for the OHS consultant.

- Benefits of the OHS consultants role were identified, including:
  ⇒ teams would not have functioned effectively without OHS consultant;
  ⇒ OHS consultant enthusiasm;
  ⇒ good organising skills;
  ⇒ excellent knowledge base;
  ⇒ able to pass on knowledge to others;
  ⇒ good leadership;
  ⇒ kept focused;
  ⇒ addressed adversarial situations effectively;
  ⇒ energy, drive and perseverance;
  ⇒ high commitment;
  ⇒ availability to senior management.
- Improvement opportunities were defined:
  ⇒ as organising more team interaction activities;
  ⇒ more significant, prior explanation of the project;
  ⇒ more initial training for teams;
  ⇒ more support of OHS consultant needed.

Appendix F
Case Study One Recommendations

Category	Recommendations

Category

Recommendations

1. Workplace reform

- Ensure government policies and strategies for micro economic reform clearly address OHS.
- Ensure OHS expertise is present in the team charged with identifying and facilitating workplace reform activities within the organisation.
- Provide relevant OHS training for all members of the team charged with identifying and facilitating workplace reform activities within the organisation.
- Provide relevant OHS training to all employees to enable them to have valid input into the OHS action outcomes of the workplace reform changes.
- Incorporate OHS improvement in workplace reform activities, where relevant.
- Review all workplace reform changes to ensure that OHS has not been disadvantaged by those changes.
- Establish a specific project with diverse teams to review and improve OHS management systems and strategies.

2. OHS PAR projects

- Establish management, health and safety committee, and union support for the project.
- Appoint a dedicated resource person to develop and co-ordinate the project. Preferably, this resource person should have considerable and innovative expertise in OHS management systems, a deep understanding and knowledge of the workplace, a demonstrated commitment to workplace reform, and be credible to all levels of the organisation. Alternatively, an external resource with similar expertise and commitment could be engaged and given extensive insight into the organisation before the project commenced.
- Establish a co-ordinating team for the project with a view to the members becoming team leaders. Good leadership skills and a demonstrated commitment to OHS improvement should be essential criteria for membership to this team.
- Provide specific training to the co-ordinating team members to reinforce leadership skills and a strong commitment to workplace reform.
- Provide extensive OHS training for the co-ordinating team members. This may take several months prior to the commencement of the project and should also include familiarisation with existing OHS systems in the organisation.
- Benchmark OHS 'best practice' in similar organisations or otherwise establish specific aims for the teams to strive for.
- Identify the number of teams required for the project after consideration of the tasks involved and the given time frame.
- Allocate a specific area of focus for each team. The focus could reflect the OHS needs of the organisation or models such as the South Australian Exempt Employer Injury Prevention Standards.
- Identify the essential skills, knowledge, and experience that must be present within the team membership. The distribution of necessary skills, knowledge, and experience would include OHS knowledge or involvement, written literacy skills, communication skills, problem solving skills, team work skills, and current and previous positions held in the organisation. Management representation on each team should be considered essential.
- Identify preferred membership representation based on other criteria such as gender, NESB, work area and, even, absence of previous involvement in OHS or other dedicated workplace reform teams.
- Consider the appropriateness of establishing dedicated teams against casual team membership around existing job placements.

- Establish a reasonable but tight time frame for the project based on the decision taken on the above recommendation.
- Advertise a call for volunteers to membership of the teams - across all levels and work areas of the organisation.
- Consider all responses to the call for volunteers and establish a draft structure of the teams based on a compatible mix of the essential and preferred criteria. It may be necessary to interview respondents if too many nominations are received.
- Target specific employees to nominate for the teams if the draft structures are considered inadequate.
- Establish appropriate feedback mechanisms.
- Establish monitoring role of co-ordinating team. For example, co-ordinating team review meetings and cross audits.

3. OHS consultant role in PAR projects

- Familiarise all team members with the aim of the overall project.
- Provide team building and problem solving training for individual teams.
- Provide extensive training in the specific OHS area to be addressed by the individual teams.
- Establish meeting frequency, if relevant, and availability of meeting venues.
- Allow each team to review benchmarking outcomes or other material that represents 'best practice' in the area of concern. Further benchmarking by the team may be necessary during the life of the project.
- Ensure each team establishes a clearly identified aim(s).
- Facilitate early development of a specific plan to achieve the aim(s) of each team.
- Provide OHS expertise, as required.
- Facilitate team activities and outcomes, as required.
- Seek organisational recognition of the teams' activities.
- Ensure the identification of ongoing review mechanisms beyond the life of the project. Consideration could include the continuation of the teams, a recall of the teams at set intervals or use of the existing health and safety committees.

4. Other research

- Further investigate the use and benefits of PAR in OHS improvement strategies of organisations undergoing socio-technical, organisational change.
- Examine the Federal Governments policy making determinants for micro-economic reform to allow the development of recommendations that will ensure appropriate inclusion of OHS.
- Quantify the longer term OHS benefits for companies actively addressing OHS in the workplace reform environment. Consideration could be given to the 'productivity model' proposed by Oxenburgh.
- Determine the impact of written literacy skills on the participatory and decision making forums of workplaces undergoing reform.
- Examine the legislative framework for the role and function of health and safety committees to determine effectiveness in the workplace reform environment.
- Evaluate the appropriateness of the South Australian Exempt Employer Injury Prevention Performance Standards for the wide range of industries respondent to them and, in particular, enterprises undergoing workplace reform.