

Principles of canonical action research

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Abstract. *Despite the growing prominence of canonical action research (CAR) in the information systems discipline, a paucity of methodological guidance continues to hamper those conducting and evaluating such studies. This article elicits a set of five principles and associated criteria to help assure both the rigor and the relevance of CAR in information systems. The first principle relates to the development of an agreement that facilitates collaboration between the action researcher and the client. The second principle is based upon a cyclical process model for action research that consists of five stages: diagnosis, planning, intervention, evaluation and reflection. Additional principles highlight the critical roles of theory, change through action, and the specification of learning in terms of implications for both research and practice. The five principles are illustrated through the analysis of one recently published CAR study.*

Keywords: canonical action research, meta-analysis, research frameworks, interpretivism, organizational change, organizational learning

INTRODUCTION

In recent years, the publication of action research (AR) articles in the information systems (IS) domain has become more frequent, with a number of theoretical and applied contributions. In addition to single articles (e.g. Baskerville & Wood-Harper, 1996; 1998; Avison *et al.*, 1999; Baskerville, 1999; Olesen & Myers, 1999; Vreede & Bruijn, 1999; Davison & Vogel, 2000; Salmela *et al.*, 2000; Simon, 2000; Davison, 2001), entire journal issues have been devoted to AR (Kock & Lau, 2001: *Information Technology & People*; Baskerville and Myers, in press: *MIS Quarterly*). The application focus of AR involves solving organizational problems through intervention while at the same time contributing to knowledge. Despite these lofty aims, AR has been criticized for its lack of methodological rigor (Cohen & Manion, 1980), its lack of distinction from consulting (cf. Avison, 1993) and its tendency to produce either 'research with little action or action with little research' (Dickens & Watkins, 1999, p. 131).

This article addresses these criticisms by developing a set of interdependent principles and associated criteria that researchers and reviewers can use both to ensure and to assess the rigor and relevance of canonical action research (CAR) – one of the more widely practised and reported forms of AR in the IS literature. The term ‘canonical’ is used to formalize the association with the iterative, rigorous and collaborative process-oriented model developed by Susman & Evered (1978) that has been widely adopted in the social sciences and hence which has gained ‘canonical’ status. In so doing, it responds to the call ‘to discuss explicitly the criteria for judging qualitative, case and interpretive research in information systems’ (Lee *et al.*, 1995, p. 376) and follows the recent publication (Klein & Myers, 1999) of a set of principles for evaluating and conducting interpretive field studies of a hermeneutic nature (cf. also Avison, 2002). It further responds to Klein & Myers (1999) who hope that principles for non-hermeneutic forms of interpretive research will be advanced, and to Avison *et al.* (1999, p. 96), who contend that ‘although there are examples of action research . . . there is still a lack of guidelines . . . in terms of design, process, presentation, and criteria for evaluation’. Indeed, it is remarkable that many popular books on social science research methods (cf. Frankfort-Nachmias & Nachmias, 1996; Crano & Brewer, 2002) do not even mention AR.

We seek to provide principles and associated criteria that are readily applicable to the practice and review of CAR. However, neither do we intend to suggest, nor do we desire, that adherence to these principles should be blind, inflexible, deterministic and/or dogmatic: to do so would undermine the emergent nature of much contemporary CAR and indeed erect unrealistic barriers for aspiring action researchers, thereby detrimentally affecting the development of CAR itself. Rather, the spirit of the principles and criteria is that they facilitate the clear and systematic presentation of ideas and findings, at the same time helping researchers to justify their choices of action, their contributions to knowledge and their conclusions. In this way, the rigor and relevance of CAR may be enhanced, which is of course an important issue for reviewers who assess the execution and presentation of CAR. Before considering the principles and criteria themselves, we firstly juxtapose rigor and relevance in the context of AR and secondly situate CAR in the broader AR context.

RIGOR AND RELEVANCE

While AR in general has been praised for the relevance of its results (e.g. Baskerville & Wood-Harper, 1996), it has also been criticized as lacking rigor (e.g. Cohen & Manion, 1980). Consequently, it is useful to clarify the meaning and importance of both rigor and relevance. Merriam-Webster’s Collegiate Dictionary (<http://www.m-w.com>) defines rigor in various ways, the most relevant to our purpose being ‘strict precision’ and ‘exactness’. Rigor has also been referred to as ‘the correct use of methods and analyses appropriate to the tasks at hand’ (Benbasat & Zmud, 1999, p. 5), which implies the existence of a context that will enable one to determine what is correct and appropriate.

Furthermore, rigor needs to be informed by principles that both embody a sound theoretical base and are accepted by a research community that supports their reflective and appropriate

application in problem contexts (Benbasat & Zmud, 1999; Davenport & Markus, 1999). Similarly, Lewin (1945, p. 135) observed that there is 'nothing so practical as a good theory'. This does not refute the criticism that AR has been insufficiently rigorous, but it does identify the need for practical guidelines to encourage rigor in AR.

Relevance also depends on context, as it is essential to identify to what or whom a study is relevant. Benbasat & Zmud (1999, p. 5) mention that relevant research will 'focus on concerns of practice [and] provide real value to IS professionals', but it is also appropriate to consider the relevance to the research domain and researchers. At least two factors, the nature of the selected topic and the implications of the results, can be used to assess the relevance of a study.

Remarkably, the irrelevance of much IS research has been criticized (Robey & Markus, 1998, p. 8) for its 'arcane explanations, advanced statistical analysis, extensive mathematical notation, excessive references to other published work, and [perhaps most damningly] shortage of practical advice'. Meanwhile, Zmud (1996, p. xxxviii) characterizes 'strong relevance' as an attribute of research that 'not only surfaces findings relevant to practice but also reveals both how the findings would be implemented in practice and the validity-in-practice of those findings. Thus, essentially any research effort claiming strong relevancy would by definition possess an action research component.'

Rigor and relevance have been perceived to have an inverse relationship, thereby encouraging an either/or perspective: "Either we change our standards and give up our methods" (to meet the demands of practice) or "we preserve our intellectual integrity" (Senn, 1998, p. 26; cf. Robey & Markus, 1998). This perspective is 'most unfortunate and naïve' (Senn, 1998, p. 26), as producing research that is rigorous *and* relevant is both desirable and practical: these two attributes need not be mutually exclusive, although they can be hard to achieve in a single CAR project.

AR AND CAR

The origins of AR can be traced to the work of Lewin (1947a,b) and researchers at the Tavistock Clinic (e.g. Trist & Bamforth, 1951). The evolution of AR is detailed in Baskerville & Wood-Harper (1998) and Baskerville (1999). A seminal contribution to the AR literature was made by Susman & Evered (1978) with a formally expressed cyclical process model. In this article, we extend their work in an explicit and prescriptive fashion.

Several classification schemes have been suggested to introduce the various forms and orientations of AR (e.g. Baskerville & Wood-Harper, 1998; Avison *et al.*, 1999; Baskerville, 1999). Around a dozen forms of AR have now been identified, each characterized by different models, structures and goals. Baskerville & Wood-Harper (1998) clearly identify and describe the unique characteristics of 10 forms: Canonical Action Research, Information Systems Prototyping, Soft Systems, Action Science, Participant Observation, Action Learning, Multiview, ETHICS, Clinical Field Work and Process Consultation. More recently, two emerging forms have been documented: Reflective Systems Development (Mathiassen, 1998) and Collabora-

tive Practice (Mathiassen, 2000). For each of the 10 forms identified by Baskerville & Wood-Harper (1998), key characteristics and assumptions are identified according to the process model (iterative, reflective or linear), structure (rigorous or fluid), researcher involvement (collaborative, facilitative or experimental) and primary goals [organizational development, system design, generation of (scientific) knowledge or training].

Klein & Myers (1999) observe that the underlying epistemological assumptions for AR may be positivist, interpretivist or critical in nature. We contend that it is impractical to develop principles and criteria that will guide all epistemological positions and indeed all forms of AR. Our more modest intention is to improve the quality of CAR studies by providing practical guidance for both researchers and reviewers. Nevertheless, we do not wish to establish CAR as the preferred or pre-eminent form of AR. We encourage researchers working in other areas of the AR field to develop appropriate principles and guidelines for other forms of AR in the future.

CAR is unique among all the forms of AR in that it is iterative, rigorous and collaborative, involving a focus on both organizational development and the generation of knowledge. Its iterative characteristic implies a cyclic process of intervention, with the conduct of (rarely) one or (more usually) several cycles of activities that are designed to address the problem(s) experienced in the organizational setting. The rigor of CAR has two key components. First, by iterating through carefully planned and executed cycles of activities, so researchers can both develop an increasingly detailed picture of the problem situation and at the same time move closer to a solution to this problem. Second, by engaging in a continuous process of problem diagnosis, so the activities planned should always be relevant to the problem as it is currently understood and experienced. This relevance thus becomes an essential component of rigor in CAR. The collaborative characteristic of CAR implies that both researchers and organizational clients must work together in roles that are culturally appropriate given the particular circumstances of the problem context. It does not suggest that researchers dominate the whole process with minimal client involvement. Akin to other forms of AR, CAR involves the combination of theory and practice 'through change and reflection in an immediate problematic situation within a mutually acceptable ethical framework' (Avison *et al.*, 1999, p. 94), with the dual intention of improving practice and contributing to theory and knowledge both within and beyond the immediate confines of the project (cf. Eden & Huxham, 1996). A CAR project may take weeks, months or even years to complete (cf. Clark, 1972). This time is necessary both to build a relationship with the client and then to plan, execute, observe and reflect upon the actions. The client may be an organization (whether commercial, not-for-profit, governmental or some other form) as a whole, or a subset of an organization (whether a specific unit, level or individual within it). Moreover, as CAR takes place with organizational actors and in emergent organizational circumstances, the researcher seldom has complete control over interventions (cf. Davison & Vogel, 2000; Mumford, 2001). Therefore, it is generally impossible to draw up definitive plans for intervention. Instead, the intervention technique must be adaptable to the infinite variety of circumstances, rather than simply following predetermined techniques and styles of inquiry (cf. Descola, 1996). Nevertheless, a successful CAR project would be expected to obtain an intimate view of a specific problem situation, to track the 'warts and all' evolution of an organizational change process, including organizational constraints and idiosyncracies, and

so to produce findings that are relevant to clients and that inform knowledge (cf. Elden & Chisholm, 1993).

PRINCIPLES OF CAR

CAR aims to address organizational problems while at the same time contributing to scholarly knowledge. A set of principles would be useful to achieve these potentially conflicting aims and thus promote the rigor and relevance of CAR. The principles presented here are drawn from the AR literature as it has developed since the late 1940s in the social sciences and our own extensive experience with CAR.¹

By elaborating a set of principles that we have found to be effective in our own CAR practice, we are not only responding to Lee *et al.* (1995) and Avison *et al.* (1999), but also trying to encourage existing and would-be action researchers everywhere. It should be noted that these principles are designed to be specific to CAR. They do not address issues such as ethical conduct of the researcher that are important for all research, irrespective of the method used or the epistemological position of the researcher. In addition to the principles, we identify specific criteria to help assess if each of the principles is being upheld in a particular CAR project. These criteria may be used by action researchers as they plan and conduct a project, and by reviewers (and readers) to assess a CAR project report. Each criterion is expressed in the form of a question of the type 'Has something been done?'. The criteria are designed to be practical and prescriptive – for researchers and reviewers alike. Following the discussion of the principles and their respective criteria, we illustrate their application in a critique of one recently published article.

We propose the following five principles for CAR:

- 1 the Principle of the Researcher–Client Agreement (RCA);
- 2 the Principle of the Cyclical Process Model (CPM);
- 3 the Principle of Theory;
- 4 the Principle of Change through Action; and
- 5 the Principle of Learning through Reflection.

The Principle of the Researcher–Client Agreement (RCA)

The RCA is the guiding foundation for an AR project (Foster, 1972). However, in order for the RCA to be effective, it is necessary that the client understands how CAR works and what its benefits and drawbacks are for the organization. Achieving this understanding may require a process of knowledge transfer (from researcher to client). The agreement should contain mutual guarantees for behaviour in the context of the project. A well-constructed RCA should provide a solid basis for building trust among the various stakeholders and contributes to the internal validity of the research. The agreement helps to promote a spirit of shared inquiry, by

¹See author biographies for details.

having clients contribute as the researcher determines goals, plans actions, implements changes and assesses the outcomes of those changes. Adherence to the Principle of the RCA may be assessed using the criteria listed in Table 1. Ideally these criteria will be met before a project is formally initiated, i.e. during preproject discussions between researcher and client. However, in reality they may well be more emergent, with variations in procedures developing as the project progresses.

The researcher and the client must agree that CAR suits the organizational situation (1a). This mutual agreement should be informed by an understanding of the cyclical approach to CAR, with reference to the Principles of Theory, Change through Action and Learning through Reflection. The potential threat to the organizational status quo must be recognized, as inadequate preparation for change can hinder improvement efforts.

A second criterion (1b) relates to the specification of the research focus. This is important because the researcher needs to be aware of organizational constraints that may hamper a justifiable intervention. Focus here refers not only to the problem context, but also to the expected duration of both the immediate project and the commitment to implemented changes. Mumford (2001) describes how a project was 'successfully' completed with immediate clients, but then observes that the planned changes were never implemented as the organization closed the entire division. Prior knowledge of impending organizational changes can usefully inform the RCA, even to the point of not starting the project at all.

Even with this knowledge, our experience suggests a common need to adjust the focus of a project as it proceeds. The boundaries of the AR project must coincide with the boundaries of the problem as diagnosed. If part of the problem context (or part of the solution) falls outside the project boundaries, it is necessary to expand the research focus to encompass a new problem context or else abandon the entire project. This flexibility will be facilitated by a researcher's genuine desire to improve the organizational situation (rather than merely studying it) and a client's willingness to share the details of and lessons learned from the AR experience with the readers (and reviewers) of the scholarly literature.

This highlights the need for client commitment (1c). The commitment, which builds on the notion of negotiating consent (Lincoln & Guba, 1985), may be explicitly formalized in a written contract or based on a word-of-mouth agreement. The precise form of this commitment will depend strongly on local norms and cultural preferences for codification (Martinsons, 1991). Protocols and mutual guarantees may be developed to specify how the researcher functions

Table 1. Criteria for the RCA

1a	Did both the researcher and the client agree that CAR was the appropriate approach for the organizational situation?
1b	Was the focus of the research project specified clearly and explicitly?
1c	Did the client make an explicit commitment to the project?
1d	Were the roles and responsibilities of the researcher and client organization members specified explicitly?
1e	Were project objectives and evaluation measures specified explicitly?
1f	Were the data collection and analysis methods specified explicitly?

in the organization and the sanctions that may apply if protocols are violated. Meanwhile, the researcher will need to ensure the co-operation of organizational members in the project by obtaining the client's explicit consent. Subsequent reporting of the project should reflect the particulars of this consent.

Both the researcher and client can have multiple roles and responsibilities. Although these may change during a project, it is essential to specify the initial set at the outset of the project (1d) in order to prevent conflicts of interest and perceived threats to personal or positional prerogatives. Researchers typically guide the overall process, but their scope of responsibility on content issues is a common topic of negotiation. Concerns that CAR participants may be manipulated under the guise of collaboration and empowerment should also be addressed at this point (cf. Davison & Martinsons, 2002).

Because CAR is a co-operative and collaborative process, a 'lapse into individualism is to destroy the critical dynamic of the group' (Kemmis & McTaggart, 1988, p. 15). Thus, the researcher must account for the values, beliefs and intentions of the client employees, and treat them as collaborators rather than mere research objects (Peters & Robinson, 1984). The researcher must also get 'close to the action' in order to gather rich data, but avoid 'going native', whereby objectivity is sacrificed through over-identification with the organization and its members.

The action researcher serves at least two demanding masters – the client and the academic community (Kock *et al.*, 1999). Therefore, the objectives (1e) of a CAR project will cover not only the particular organizational situation, but also the development and/or application of theory and the dissemination of findings to the research community. It is important that there is an agreement in advance on the objectives of the project, even if revisions are required as it progresses. The level of editorial control that the client may wish to exert over report writing, including delayed release dates and protection from disclosure of confidential information, should also be addressed ahead of time. Clearly specified evaluation measures for each of these objectives (1e) are needed. The research project is complete when the objectives have been achieved. AR proposals commonly fail to consider how it will be determined whether the project is successful or not. Emergent, or even *post hoc* measures of success might be politically desirable from the organizational perspective, but these are unlikely to be viewed positively by an academic audience. Nevertheless, given the difficulties associated with project closure and researcher withdrawal (see criterion 2g), success measures are valuable.

Both the type of data to be gathered and the methods that will be used for collection and analysis (1f) should be specified based upon the objectives of the project. Client support for the proposed data collection and analysis underpins the action researcher's involvement. The collection and analysis of the data that are relevant to the problem context will raise the prospects for a beneficial intervention (Dickens & Watkins, 1999) and subsequently assure reviewers that the intervention was based upon a complete diagnosis. The triangulation of data from different sources (e.g. interviewing multiple participants) and different approaches (e.g. qualitative and quantitative methods) can help to address validity concerns.

The Principle of the Cyclical Process Model (CPM)

When an initial RCA has been established, it is appropriate for the action researcher to commence work on the project. His or her activities will typically be informed by and designed to follow a CPM. Susman & Evered (1978) originally proposed a model with the following five stages: diagnosis, planning, intervention, evaluation and reflection. Subsequently, Kemmis & McTaggart (1988) suggested that the model should take the form of a spiral, not a cycle, with the intervention moving ever closer to the core of the organizational problem with each iteration. More recently, McKay & Marshall (2001) outline a model that includes two cycles running in tandem: one addresses the client's problem solving interest while the other addresses the researcher's scholarly interest. The CPM presented in Figure 1 builds upon these various perspectives. The extent to which the Principle of the CPM is reflected in a project can be described by the adherence to seven criteria (see Table 2).

Progressing through the CPM in a sequential fashion will help to ensure that a CAR project is conducted with systematic rigor, a defining characteristic of CAR. Sometimes it is possible to complete a project satisfactorily in a single cycle, but very often additional cycling through the stages is appropriate. The cyclical nature of the CPM suggests a unidirectional flow, with diagnosis followed by planning, intervention, and so forth. While this is desirable, our experience suggests that some iteration between stages may be needed. For example, supplementary planning may be necessary if an intervention cannot be completed as intended. Therefore, the first criterion (2a) suggests that variations from a unidirectional flow through each of the five stages should be justified and mentioned explicitly in the project report.

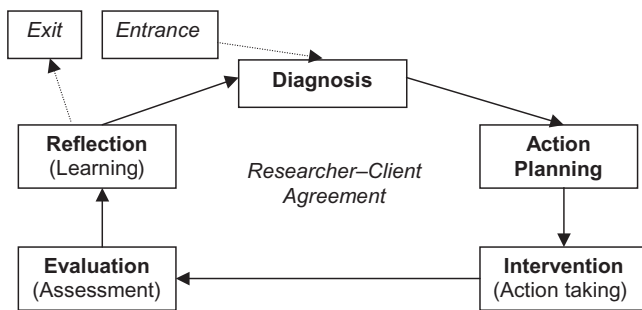


Figure 1. CAR process model.

Table 2. Criteria for the CPM

2a	Did the project follow the CPM or justify any deviation from it?
2b	Did the researcher conduct an independent diagnosis of the organizational situation?
2c	Were the planned actions based explicitly on the results of the diagnosis?
2d	Were the planned actions implemented and evaluated?
2e	Did the researcher reflect on the outcomes of the intervention?
2f	Was this reflection followed by an explicit decision on whether or not to proceed through an additional process cycle?
2g	Were both the exit of the researcher and the conclusion of the project due to either the project objectives being met or some other clearly articulated justification?

The next four criteria (2b–2e) relate to specific stages of the cyclical model. The researcher starts the process with a thorough diagnosis of the current organizational situation. While the client may identify one or more problems, the researcher has a responsibility to conduct an independent diagnosis not only so as to confirm the nature of the problem(s), but also to determine its/their causes. A detailed understanding of not only the problem but also the surrounding environment is a prerequisite to the determination of an appropriate intervention. The diagnosis will directly inform the planning of actions. Here, the intended sequence of actions needs to be specified. The objectives of the intervention should be consistent with the RCA. If they are not, the RCA must be revised and updated. Action plans in subsequent cycles will reflect the extent to which underlying theories are refined and/or intermediate goals are achieved.

The planned actions will subsequently be implemented and evaluated. The intervention might require the assistance of catalytic change agents, for example: a project champion who helps to initiate proceedings; a process or content expert who helps to empower or reassure project members; or an external stakeholder who can shed light on how potential changes will affect other parties. The data collection techniques employed before, during and after the action-taking stages should ensure a rich pool of data for subsequent analysis. Researchers and clients may share the responsibility for data gathering, with the role of each party specified in the RCA. After the planned actions are completed, the intervention needs to be evaluated with outcomes being compared to project objectives and expectations. If key performance measures have improved, it is useful to consider to what extent and through what mechanisms the intervention, rather than other factors, caused the improvement.

The fifth stage provides an opportunity to reflect explicitly on the activities and outcomes of the project so far. It should enable the action researcher to reach a decision as to whether or not to proceed through an additional process cycle (2f). Eventually, the action researcher has to exit the project (2g). Getting in and staying in may be difficult, but getting out has problems of its own (Mumford, 2001). The exit of the researcher should be related to the achievement of the specified objectives or to another explicit justification. Such a justification can be contentious if it involves, for example, an irreconcilable breakdown in the researcher–client relationship or a client's unilateral decision to abandon a project. Nevertheless, the exit circumstances should be clearly and comprehensively described in the project report. Before withdrawing entirely, the researcher should make a final commitment to the ethical guarantees exchanged with the client by asking them to review the content of any written reports that are intended for publication.

The Principle of Theory

McKay & Marshall (2001) contend that AR without theory is 'not research'. They insist that a clearly articulated theoretical framework must be imposed on the phenomenon of interest. Others disagree, believing that the application of theory, particularly at the very start of a project, may be counter-productive (cf. McTaggart, 1991; Bunning, 1995). As Cunningham (1993, p. 61) cautions: 'it is highly unlikely that the researcher can know definitely and in advance the exact theory that will be used or developed'.

With respect to theory development, Heller (1993) observed that 'there are still very many social issues for which no paradigmatic model and no appropriate evidence exists. In those circumstances, a research phase, wherever possible with the people who experience the problems, has to precede action' (cf. Pasmore & Friedlander, 1982). Our third principle highlights the role of theory in CAR. We acknowledge that a CAR project may begin with theory-free action learning. However, akin to the traditional scientific method, the diagnostic stage provides a starting point of comparison for the post-implementation evaluation. Our experience strongly suggests that if a 'grounded' theory (cf. Baskerville & Pries-Heje, 1999) does not emerge from the diagnosis, then explicit theorizing is necessary as part of the planning stage. CAR theory commonly takes the following form: in situation S that has salient features F, G and H, the outcomes X, Y and Z are expected from actions A, B and C. Changes to theory typically take place in the reflection stage of the CAR process and lead the project into an additional process cycle. The essential role of theory in CAR, which helps to distinguish it from action learning, is reflected in the criteria that appear in Table 3.

The first two criteria (3a–3b) suggest that action researchers need to rely on one or more theories to guide and focus their activities. Theory offers at least two significant advantages for CAR. First, it avoids what has been referred to as the 'irrelevant subject' failure (Avison *et al.*, 2001), whereby a client convinces the researcher to conduct a study that is perceived to be irrelevant or insignificant by the research community, even though it is relevant and significant to the client's interests. The presence of a theoretical framework considerably diminishes this danger, although it may lead the researcher to be overly selective in accepting topics for investigation (Kock *et al.*, 1999).

A thorough review of the existing literature is useful, not only to inform both the focus and process of the research, but also to help position research reports within the cumulative tradition of scholarly knowledge. Davison (2001, p. 62) asserts that 'problems for which previous research has provided valid theory are considered particularly appropriate for the application of AR'. Such theory can illuminate particular facets of the focal situation and/or suggest specific actions that may be effective.

Second, theory prevents the action researcher from getting lost in a rich and voluminous 'sea of data' (Rapoport, 1970). In essence, theory provides a basis for delineating the scope of data collection and analysis. This helps to ensure that a CAR project is manageable, although it raises the possibility of overlooking relevant information.

Criteria 3c and 3d reflect the need for a theoretically based model to play two distinctive roles in a CAR project: to frame the focal problem(s) and to guide the intervention. Criterion 3e con-

Table 3. Criteria for the Principle of Theory

3a	Were the project activities guided by a theory or set of theories?
3b	Was the domain of investigation, and the specific problem setting, relevant and significant to the interests of the researcher's community of peers as well as the client?
3c	Was a theoretically based model used to derive the causes of the observed problem?
3d	Did the planned intervention follow from this theoretically based model?
3e	Was the guiding theory, or any other theory, used to evaluate the outcomes of the intervention?

siders how research outcomes are evaluated, specifically in terms of either the guiding theory identified in 3a or any additional theories that may be identified during the course of the project (cf. also criterion 5f) (Arnold, 1982; Miles & Huberman, 1994; Yin, 1994).

A theoretical model can also serve as a communication tool that helps to resolve Rapoport's (1970) initiative dilemma by framing the focus of the CAR project in a way that is acceptable to the research community as well as the client organization. For example, reference to the grounded theory developed by Markus (1983) can highlight the political aspects of the problem while socio-technical systems theory (Kelly, 1978) can be used to justify an investigation not only of technological factors, but also of social factors and the factors influencing how people interact with technology.

The Principle of Change through Action

The essence of CAR is to take actions in order to change the current situation and its unsatisfactory conditions (cf. Curle, 1949; Hult & Lennung, 1980; Eden & Huxham, 1996). The fourth principle reflects this essence and the indivisibility of action and change, with intervention seeking to produce change. A lack of change in the unsatisfactory conditions suggests that there was no meaningful problem, that the intervention failed to address the existing problem(s), or that the existing situation could not be altered because of political or practical obstacles that were neglected when the RCA was established.

The criteria related to the Principle of Change through Action are shown in Table 4. In order for meaningful action and change to occur, the researcher and the client must have a common understanding of the organizational situation which doubles as the research context (cf. Cunningham, 1993). Both parties must be motivated to improve the existing situation. Unfortunately, our experience suggests that it is difficult to translate this into a criterion that can be reliably assessed (4a). More tangibly, it must be agreed that the intervention is appropriate for the diagnosed problem (Baskerville & Wood-Harper, 1996).

Diagnosis of the organizational situation should produce a clear understanding of the problem and specification of its causes (4b). It is important to consider the problem in terms of its context or natural environment (cf. Foster, 1972). Hult & Lennung (1980, p. 245) elaborate on this perspective by asserting that 'in action research, a deliberate attempt is made not to divorce phenomena from the environment which gives them meaning ... The researcher using action research will be studying interconnections, interdependencies and the dynamics of a total functioning system rather than isolated factors.'

Table 4. Criteria for the Principle of Change through Action

4a	Were both the researcher and client motivated to improve the situation?
4b	Were the problem and its hypothesized cause(s) specified as a result of the diagnosis?
4c	Were the planned actions designed to address the hypothesized cause(s)?
4d	Did the client approve the planned actions before they were implemented?
4e	Was the organization situation assessed comprehensively both before and after the intervention?
4f	Were the timing and nature of the actions taken clearly and completely documented?

The planned actions must be designed to address the observed problem and its specified causes (4c). The action researcher should be able to explain each action and justify it as a remedy to part or all of the diagnosed problem. Such explanations and justifications should be offered to the client before the intervention stage, so that he/she can approve the planned actions before they are enacted (4d).

Changes may operate at both personal and organizational levels. Individuals in the organization may experience changes in roles and responsibilities, and be required to develop new skills. An intervention will also commonly transform the structure and systems of the organization rather than merely performing a few half-hearted actions or 'tinkering' with the environment (Dickens & Watkins, 1999). This implies a need for a comprehensive assessment of the organizational situation both before and after the intervention (4e). A comparison of critical and measurable dimensions of performance is essential but not sufficient to determine the outcome of the actions that were taken.

Although the enacted changes are rooted in the diagnostic stages of the CAR cycle, they may well be experimental in nature (Clark, 1976). Consequently, action researchers should not become overly committed to a particular course of actions: flexibility is needed so that the plan of action can be adapted to emerging or changing circumstances.

A thorough analysis of the outcomes will be needed to inform both general knowledge and future interventions (Dickens & Watkins, 1999). Learning is thus not only a goal of the project, but also part of the cyclical process – the changes are evaluated, the resulting organizational system is rediagnosed, new plans are drawn up, and fresh interventions are performed in order to produce further changes (Martinsons, 1993). The adaptive nature of CAR and its reporting requirements make it comparatively more important to document the timing and nature of each action (4f), than with other traditional forms of (scientific) research, which have less adaptive methods. It is essential to know what was actually done in practice as well as what actions were envisioned in plans.

The Principle of Learning through Reflection

Lau (1997) asserts that the explicit specification of learning is the most critical activity in AR. The rationale for our Principle of Learning through Reflection stems from the multiple responsibilities of the action researcher: to clients *and* to the research community. This is consistent with the common call for research reports to specify the implications for both practice and (further) research. Clients will focus on practical outcomes while the research community will be interested in the discovery of new knowledge. Practical progress and the advancement of knowledge both result from considered reflection and learning.

The first criterion listed in Table 5 reflects the action researcher's responsibility to keep the client and other organizational members informed of the project's progress on a timely basis (5a). We have found email, websites and online bulletin boards to be effective vehicles for such communication. Both researchers and clients must reflect on the outcomes of each intervention and determine whether the project should be continued (5b). Responsibility for writing up the project is typically shared by the researcher and the client. The researcher will need to write

Table 5. Criteria for the Principle of Learning through Reflection

5a	Did the researcher provide progress reports to the client and organizational members?
5b	Did both the researcher and the client reflect upon the outcomes of the project?
5c	Were the research activities and outcomes reported clearly and completely?
5d	Were the results considered in terms of implications for further action in this situation?
5e	Were the results considered in terms of implications for action to be taken in related research domains?
5f	Were the results considered in terms of implications for the research community (general knowledge, informing/re-informing theory)?
5g	Were the results considered in terms of the general applicability of CAR?

up one or more academic papers that explain how the project and its findings contribute to knowledge. Facts should be related to judgements, but kept separate from them (Cady & Caster, 2000), so that readers can make their own assessments and interpretations (5c). The client meanwhile will need to write up an organizationally focused report that provides both an executive summary and a more detailed set of practical implications and suggestions for change in the organization.

Learning from the CAR project should involve both the internal and external environments. First, learning enables the restructuring of organizational norms to reflect the new knowledge gained during the research. Second, it informs further interventions within the current project. Third, it contributes to the advancement of knowledge by generating new theory or informing/re-informing existing theory. It is useful to consider various theoretical alternatives that may illuminate different facets of the research. Fourth, it enables lessons to be elicited for wider application of the methodology.

Consequently, the reflection and learning should encompass the implications for each of the following: further action in the focal context (5d); action in similar research domains (5e); and knowledge in the general domain (5f). It is also useful to comment on the suitability of the CAR methodology (5g), particularly in terms of its benefits and limitations in the project context. The latter perspective addresses the implications of the project for the community of AR practitioners and scholars.

Many published AR reports inadequately specify what has been learned, especially in terms of re-informing theory. This helps to justify criticisms that AR makes a limited scholarly contribution (cf. Dickens & Watkins, 1999). Fulfilling the dual responsibilities of the action researcher and reporting to two different sets of stakeholders are not easy, but they are essential. Gerring (2001, p. 251) suggests that not every study needs to have 'a policy lesson, but that every study should reflect upon something that (people) care about, or might care about'. Both the CAR process and the outcomes of the intervention can be considered in these terms.

Researchers need to generalize their findings appropriately and honestly, evaluate the value of the theoretically based model(s) they employed, and, to the extent that it is possible, consider the transferability and applicability of relevant theories and models (Baskerville & Wood-Harper, 1996; cf. Eden & Huxham, 1996). Existing theories and models may need to be refined, revised or replaced in order to advance knowledge.

The specification of learning is not only essential, but it must also be undertaken continuously in order to avoid the problem of retrospective reporting bias. Every aspect of the project, from the initial creation of the RCA, through the diagnosis of the organizational situation, and on to the intervention and its evaluation, is an opportunity for learning. The need to account for (and perhaps reconcile) the experiential and cognitive perspectives of different parties in the project (cf. Bartunek & Louis, 1996) is part of the learning process. It is advisable for the action researcher to specify the learning as soon as possible after it occurs throughout the project. This helps to ensure that all the lessons learned have been documented both clearly and comprehensively by the end of the CAR project.

APPLYING THE PRINCIPLES

The principles and associated criteria developed in the previous section are intended to be practical and measurable. However, we expect that action researchers may adopt them in the interpretivist spirit that informed their development, i.e. their adoption should be sensitive to prevailing local norms, cultures and values. Given this expectation, it is unrealistic, even inappropriate, to identify a single, seminal published report of CAR that precisely follows all five principles and 31 criteria. The emergent nature that is characteristic of much contemporary CAR mitigates against such a deterministic approach to exemplifications of the method. Nevertheless, in the spirit of demonstrating how the principles and criteria could be used both to assess and to conduct CAR, we now apply them in an analysis of a single, recently published, CAR paper, namely Olesen & Myers (1999). This application takes the form of a constructive critique, identifying how well the paper conforms to the principles and criteria, and suggesting how the paper could be improved. The spirit of this critique is thus one that is intended to engage the readers of the *Information Systems Journal* in a constructive debate about the value of principles such as those that we have developed, as well as their applicability in practice. The critique is primarily based on the material published in the article itself, and therefore what is in the public domain. After completing our analysis, we asked Myers to assess how fairly we had interpreted the article. His response follows our critique.

Olesen & Myers (1999)

By way of a synopsis, Olesen & Myers (1999) discuss the use of the groupware product 'Lotus Notes' to facilitate communication and collaboration among members of the senior management team in a tertiary education institution in New Zealand. While the senior managers strongly supported the project on the basis that it would enable radical changes in co-ordination, these changes did not come to fruition because of a preference for maintaining the status quo among the personal assistants (PAs) of the senior managers.

Principle 1

In the paper, the first author is identified as being an employee of the focal organization. This has implications for some of the criteria, notably those relating to entering and exiting the project, as the author continued to work for the organization after the project was completed. The client in this paper is somewhat hard to pin down, as the project was undertaken for both the senior management team and their PAs, but no single point of contact or project owner is identified in the paper. The term 'client' is used in this critique to refer to one or more of these senior managers and their PAs.

From the evidence available, the RCA appears to be weakly developed at best (whether before the project was initiated or during the course of the project), with little explicit attention to criteria 1a–1f. There is no evidence of RCA on the appropriateness of using CAR (1a) – it seems that the researcher decided this unilaterally. Although it is apparent that the senior managers demonstrated commitment to the project (1b), there is little information as to the researcher's commitment. It may be implicitly assumed that such a commitment existed given the first author's/researcher's status as an employee of the focal organization. The project objectives are described briefly (1e), but there is little information on project scope (1c), researcher/client responsibilities (1d), evaluation measures (1e) and data collection methods (1f). This lack of attention to the criteria that inform the Principle of the RCA is problematic from a CAR perspective, as these criteria address fundamental issues associated with ensuring that there is a clear shared understanding between the client and the researcher in terms of how the project will proceed. If this shared understanding is not achieved, it is likely that disagreements will occur between researcher and client during the course of the project, which may then not be concluded successfully.

Principle 2

Considering the Principle of the CPM, the first five criteria are all explicitly addressed in the paper, with only the last two criteria lacking evidence. A CPM was used (2a), although it is unclear how many cycles took place. (The authors, when contacted, indicated that there were five cycles.) The researchers engaged in diagnosis of problems (2b), action planning based on the diagnosis (2c), action taking and evaluation (2d) and reflection (2e). Given the lack of clarity in the paper on the number of process cycles (the project write-up is essentially acyclic), it is impossible to identify a precise decision to proceed through additional process cycles (2f). The first author, as an employee, did not exit the project, yet it was not clear what criteria were used to reach the decision that the project had been completed (2g). Indeed, the resistance of the senior managers' PAs to the intended project goals and the consequent strengthening of the PAs' power through the use of the Lotus Notes software that was supposed to have diminished that power suggest that the intended organizational change did not occur, and so that the completion of the project should be considered as a form of project failure.

Principle 3

For the Principle of Theory, the researchers followed DeSanctis (1993) in applying Structuration Theory, which she identifies as a 'collectivist'-based theory, as a guide to their intervention (3a). The researchers go to some lengths to identify trends in current research on groupware technologies (which is important as it is this research that suggests the appropriateness of a collectivist-based theory) and reflect on these trends in the light of their own work (3b). With respect to criteria 3c and 3d, a theoretically based model was developed out of previous work on structurational dynamics (including Orlikowski & Robey, 1991; Lyytinen & Ngwenyama, 1992; Orlikowski *et al.*, 1995). This model was used so as to understand the ways in which groupware technology might (or might not) improve patterns of collaboration and communication in the specific organizational context of this paper. However, it is not evident how the model was used to derive the causes of the observed problem, nor indeed how the researchers planned their intervention strategy with the help of the model. Furthermore, the lack of detail surrounding the separation of activities planned by the authors for the five process cycles that occurred (2f) compounds the general lack of clarity here. Finally, for criterion 3e, the authors revisit the theoretical model in the light of their findings, noting that previous research into groupware applications that employed individualistic-based theories must now be questioned, and suggesting that caveats be applied to previous theoretical contributions.

Principle 4

The research, as presented in the paper, strongly adhered to the Principle of Change through Action. The researchers expressed their desire to effect change and improve the organizational situation and noted the initial enthusiasm of the various client stakeholders (4a). The researchers believed that they had a thorough understanding of the problems as a result of the diagnosis (4b), although subsequently it emerged that unrecognized institutional forces (as exerted by the PAs) modified the changes and ultimately prevented the project from achieving its intended objectives. Despite this failure, the planned actions (4c) seem appropriate for the specific problems. Client approval for actions (4d) appeared to be obtained, but the difficulties associated with identifying precisely who the client was mean that it is hard to assess whether approval was obtained from all the clients or only some of them. The precise timing and nature of these actions are rather superficially described (4f). This issue is associated with the lack of specificity surrounding the number of cycles that occurred and the different activities that took place within each cycle (2f). The organizational situation was qualitatively described and measured before and after the intervention (4e), although precise measurement criteria were not specified in advance (1e).

Principle 5

Finally, all of the criteria in the Principle of Specifying Learning were fully or partially addressed. The change in the organizational situation was evaluated by the researcher and communicated

to the client (5a), the researcher and the client reflected upon the results of the project (5b), which appear to be reported completely (5c), and the results were explicitly considered in terms of their implications for the applicability of CAR (5g). To a certain extent, the results were considered in terms of their implications for further action in the organizational situation (5d) – notably the difficulties that would be associated with implementing similar groupware-based process changes in the future. The results were also considered in terms of future actions that might be taken in related research domains (5e), notably the unintended consequences of human action (or inaction) and the way in which a researcher may inadvertently contribute to a project's demise and in terms of implications for the research community in general (5f) with the identification of future research opportunities. Here, the value of AR is highlighted (even a project that fails can still generate valuable knowledge), as is also the power of the status quo in a social (organizational) environment to prevent process change.

Myers' response to the critique

While recognizing that the critique above is intended to be illustrative of how the principles and criteria can be used to assess CAR, we believed it appropriate to solicit feedback on our critique from the authors,² given the potential for ambiguity in any text. Consequently, we sent a copy of our paper to Michael Myers with the request that he assess the fairness of our interpretation. His response follows:

Overall, I think it is a fair assessment of our paper as per the principles outlined for CAR. . . . I do have one comment, however. Basically all of the issues you raise as being insufficiently discussed in the article were in fact discussed in Karin Olesen's thesis (she was my student). Therefore we do have the answers to your questions. The reason these details were left out is quite simple: (a) a journal article, by definition, is quite short; (b) the reviewers did not ask for these details. If the reviewers had asked for them, we would have been more than happy to provide them.

We are gratified to note that our interpretation of Olesen & Myers (1999) is perceived to be fair. Furthermore, we entirely accept Myers' explanation for why some issues appear to have been insufficiently addressed in the article. This is an issue that we discuss further below.

DISCUSSION

Action research, as a method of inquiry, is founded on the assumption that theory and practice can be closely integrated by learning from the results of interventions that are planned after a thorough diagnosis of the problem context. The five principles elicited here are intended to help assure the quality of CAR practice, reporting and reviewing. Adherence to these principles will help canonical action researchers to balance their commitments to organizational and

²We are grateful to one of the anonymous reviewers for suggesting that we contact the authors.

research community stakeholders and to address the previously mentioned criticisms of AR by improving both its rigor and its relevance. These two attributes are critical because they confirm the validity-in-practice of the investigation as well as the validity-in-application of knowledge that informs and emerges from the investigation. Therefore, it is useful to consider how the five principles of CAR contribute to rigor and relevance.

The Principle of the RCA provides a solid foundation for a CAR project. This principle helps to assure both the rigor and the relevance of the study by establishing the protocols to govern researcher and client involvement, co-operation and collaboration. An explicit RCA enhances rigor by specifying the research objectives, data collection methods and evaluation measures for the project. Involving key stakeholders in its creation will increase the likelihood that the CAR project is relevant to all their interests. This is not to say that the RCA and its various protocols must be set in stone: it may be amended through stakeholder negotiations to reflect the project's dynamic environment.

The Principle of the CPM enforces rigor by encouraging systematic inquiry. Its explicit structure requires the project to be conducted in a precise and sequential manner unless there are clearly justified reasons for not doing so. The rigorous application of the CPM, especially over a number of cycles, will facilitate a deep understanding of the organizational problem context and of the theories applied to it. Meanwhile, deviations from the CPM should be justified in terms of an alternative series of actions that are more appropriate to the task at hand.

The Principle of Theory makes a critical contribution to the rigor of the project by relating the interventions and changes to a theoretical framework that is appropriate to the task at hand. This principle acknowledges a variety of perspectives on 'theory', including the value of background and explanatory theories that may be employed in the diagnosis and learning stages respectively. Meanwhile, the evaluation of theory-based interventions represents an assessment of validity-in-practice and thus helps to ensure strong relevance (cf. Zmud, 1996).

The Principle of Change through Action most clearly demonstrates that rigor and relevance need not have an inverse relationship. It contributes to both attributes by ensuring not only that planned actions follow from the hypothesized causes of the diagnosed problem(s), but also that they are intended to improve the organizational situation. Recommended changes will not only be grounded in the rigor of theory but will also be relevant to the realities of the situation.

Finally, the Principle of Learning through Reflection also contributes to both the rigor and the relevance of AR. This principle ensures that both researchers and practitioners examine what they have learned in an explicit, systematic and critical manner. Researchers will focus on how existing theories may have to be modified or reconsidered and how future studies should be planned and executed. In contrast, practitioners will focus on how the application of both theory and tools in this problem context may be relevant to future work in similar problem contexts. In the spirit of continuous improvement, action researchers should also consider how AR in general should be refined as a result of their experiences.

The reporting of the one CAR study that we critique could have been improved by adhering more closely to the principles and criteria presented here, although as the authors point out, while they could have achieved that adherence, they were not asked to do so by their reviewers. This does not in any way imply that Olesen & Myers (1999) paper is flawed (fatally or oth-

erwise) – simply that, like all research, it is less than perfect and so is improvable. Our intention in proposing these principles and criteria is to improve the quality of contemporary CAR. A CAR paper need not adhere to all of the principles and criteria in order to be publishable, but a failure to follow any of them should prompt reviewer and editor concern. We recommend that CAR proponents follow these principles and criteria and, where necessary, justify any deviation from them. Deviations might involve either not following some principles and/or criteria, or following different principles and/or criteria. In this way, not only will the practice of CAR become more thoughtful and reflective, but CAR itself as a method will be enhanced. In the course of time, the principles and criteria that we have proposed in this paper may well be augmented or superseded by more appropriate principles and criteria. In this regard, it is entirely appropriate to observe that the principles and criteria proposed here are but one view: there is essentially an infinite variety of circumstances where AR in general and CAR in particular may be an appropriate method of inquiry. Consequently, application of the principles and criteria proposed here may vary considerably from context to context. Such variations are an important component of the problem context, as it is experienced by the various actors, and should be faithfully reported in any AR write-up.

CONCLUSIONS

The growing use of AR by scholars in IS makes it imperative to assure the quality of such studies. This paper has addressed this imperative by presenting a set of principles that apply to the conduct and review of CAR. CAR seeks to bridge the gap between scholars and practitioners by advancing scholarly knowledge as it addresses complex, real-world problems. However, this mode of inquiry has suffered from shortcomings and inconsistencies in its conduct, reporting and reviewing. CAR has a unique potential to be both rigorous and relevant. The principles elaborated here are intended to address its shortcomings and inconsistencies. We believe that the application of the criteria based upon these principles will help to ensure that CAR is conducted, reported and reviewed in a way that realizes its unique potential.

The desirability of using principles to encourage the standardization of CAR outputs can be debated. Nevertheless, we contend that adherence to a certain set of standards for conducting and reporting research in most (if not all) scientific disciplines has helped to establish their legitimacy and credibility. Notwithstanding our contention, and in the spirit of interpretivist inquiry, we encourage researchers to test the validity-in-practice of these principles and criteria, and to extend, amend or otherwise recommend how they can be improved or why they are inappropriate. We hope that more researchers will be encouraged to engage in CAR, as well as to explore AR in its myriad of forms.

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