

MAKING THE CASE FOR CRITICAL REALISM:
EXAMINING THE IMPLEMENTATION OF AUTOMATED
PERFORMANCE MANAGEMENT SYSTEMS

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Abstract

Although there have been a number of calls for an increased use of critical realism in Information Systems Research this approach has been little used to date. This paper seeks to address the dearth of practical examples of research in the area by proposing that critical realism be adopted as the underlying research philosophy for enterprise systems evaluation. We address some of the implications of adopting such an approach by discussing the evaluation and implementation of a number of Automated Performance Measurement Systems (APMS). Such systems are a recent evolution within the context of enterprise information systems. They collect operational data from integrated systems to generate values for key performance indicators which are delivered directly to senior management. The creation and delivery of these data are fully automated, precluding manual intervention by middle or line management. Whilst these systems appear to be a logical progression in the exploitation of the available rich, real-time data, the statistics for APMS projects are disappointing. An understanding of the reasons is elusive and little researched. We examine a number of such implementations and seek to understand the implementation issues involved. We describe how critical realism can provide a useful "underlabourer" for such research, by "clearing the ground a little...removing some of the rubbish that lies in the way of knowledge" (Locke, 1894, p. 14). The implications of such an

underlabouring role are investigated. Whilst the research is still underway the paper indicates how a critical realist foundation is assisting the research process.

Keywords: Critical realism, automated performance measurement, enterprise systems implementation.

1 INTRODUCTION

Many recent articles from within the Information Systems arena present an old-fashioned view of realism. For example, Iivari, Hirschheim and Klein (1998) see classical realism as seeing “data as describing objective facts, information systems as consisting of technological structures (“hardware”), human beings as subject to causal laws (determinism), and organizations as relatively stable structures” (p. 172). Wilson (1999) sees the realist perspective as relying on “the availability of a set of formal constraints which have the characteristics of abstractness, generality, invariance across contexts”(p. 162).

Fitzgerald and Howcroft (1998) present a realist ontology as one of the foundational elements of positivism in discussing the polarity between hard and soft approaches in IS. Realism is placed alongside positivist and objectivist epistemologies and quantitative, confirmatory, deductive, laboratory-focussed and nomothetic methodologies. Such a traditional view of realism is perhaps justified within the IS arena as it reflects the historical focus of its use, however, there now needs to be a greater recognition of the newer forms of realism – forms of realism that specifically address all of the positivist leanings emphasised by Fitzgerald and Howcroft (1998). A particular example of this newer form of realism is critical realism. This modern realist approach is primarily founded on the writings of the social sciences philosopher Bhaskar (1978, 1979, 1986, 1989, 1991) and is peculiarly European in its origins.

Critical realism is becoming influential in a range of disciplines including geography (Pratt 1995), economics (Lawson, 1997; Fleetwood 1999), organization theory (Tsang and Kwan 1999), accounting (Manicas, 1993), human geography (Sayer, 1985), nursing (Ryan & Porter, 1996; Wainwright, 1997), logistics and network theory (Aastrup 2002) and library science (Spasser, 2002). Critical realism has been proposed as a suitable underlabourer for IS research (Dobson, 2001, 2002; Mingers, 2001, 2002) yet there have been few practical examples of its use in IS research. The application of critical realism within the IS field has

been limited to date. Mutch (1999, 2000 and 2002) has applied critical realist thinking in the examination of organizational use of information. In so doing he comments how difficult it is to apply such a wide-ranging and sweeping philosophical position to day to day research issues. Mingers (2002) examines the implications of a critical realist approach particularly in its support for pluralist research. Dobson (2001, 2002) argues for a closer integration of philosophical matters within IS research and suggests a critical realist approach has particular potential for IS research. Carlsson (2003) examines IS evaluation from a critical realist perspective. This paper seeks to address the dearth of practical examples of critical realist use in IS by proposing the review of APMS implementation from such a perspective.

2 THE CASE EXAMPLE

The Sarbanes-Oxley Act was introduced in 2002 to address high profile accounting scandals in the US. The Act requires that senior executives must advise stockholders immediately of any issues that are likely to affect company performance. This liability is personal and thus makes senior executives liable for the effectiveness and immediacy of their internal measurement systems and reporting. Similar legislation has been introduced in many other countries including Australia where the Corporations act was implemented earlier in 2001. The development of effective performance reporting and management tools is one necessary consequence of the Sarbanes-Oxley act and similar legislation. The resulting requirement for executives to have unimpeded, unmediated access to organizational data suggests that such tools require minimal or no human intervention in the analysis and collection of the data. This automated component in corporate performance management systems will lead to the growth of a new class of monitoring system distinct from traditional business intelligence (BI) and business activity monitoring (BAM) tools – these so-called Automated Performance Management Systems (APMS) can be argued to ultimately rest on a lack of trust or confidence in traditional reporting tools and management structures. The research described in this paper seeks to understand the

issues involved in implementing such performance measurement systems and proposes the adoption of critical realism as a basic underlying philosophical grounding for the research.

3 REALIST REVIEW AS A FOUNDATIONAL PLATFORM

The lack of practical examples of critical realist use is perhaps not difficult to understand given the philosophy provides little real methodological guidance. Contemporary realist examination requires precision and contextualized detail, this contextualization being a necessary consequence of an underlying, ontologically bold philosophy (Outhwaite 1987, p. 34). Along with most realist approaches, critical realism encompasses an external realism in its distinction between the world and our experience of it. This assumption necessarily implies that any knowledge gained of an external world must typically be provisional, fallible, incomplete and extendable. As Stones (1996) suggests, realist methodologies and writings need to reflect a continual commitment to caution, scepticism and reflexivity.

In contrast to traditional realist approaches critical realism also suggests a so-called depth realism and argues for a stratified ontology. This concept suggests that reality is made up of three ontologically distinct realms – first, the empirical, that is experience; second, the actual, that is events (i.e. the actual objects of experience); and third, the transcendental, non-actual or deep, that is structures, mechanisms and associated powers. Critical realism argues that “the world is composed not only of events and our experience or impression of them, but also of (irreducible) structures and mechanisms, powers and tendencies, etc. that, although not directly observable, nevertheless underlie actual events that we experience and govern or produce them” (Lawson, 1997, p. 8). The deep structures and mechanisms that make up the world are the primary focus of such an ontological realism. The realist seeks a deep knowledge and understanding of a social situation. It argues against single concentration on observed events and requires an understanding of the deeper structures and mechanisms that often belie the surface event level observation.

Bhaskar (1979) presents fundamental difficulties with the way that prediction and falsification have been used in the open systems evident within the social arena. For the critical realist a major issue with social investigation is the inability to create closure - the aim of "experiment" in the natural sciences. Bhaskar argues that this inability implies that theory cannot be used in a predictive manner and can **only** play an explanatory role in social investigations since:

*in the absence of spontaneously occurring, and given the impossibility of artificially creating, closed systems, the human sciences must confront the problem of the direct scientific study of phenomena that only manifest themselves in open systems – for which orthodox philosophy of science, with its tacit presupposition of closure, is literally useless. In particular it follows from this condition that criteria for the rational appraisal and development of theories in the social sciences, which are denied (in principle) decisive test situations, **cannot be predictive** and so must be **exclusively explanatory**.* (Bhaskar, 1979, p. 27).

As Mingers (2002) suggests such an argument has specific ramifications with respect to the use of statistical reasoning to predict future results. Bhaskar (1979) argues that the primary measure of the “goodness” of a theory is in its explanatory power – from Bhaskar’s perspective, predictive use of theories is not possible in open social systems and therefore predictive power cannot be a measure of goodness.

As Sayer (2000) suggests the target for realist research is not the determination of an “objective” or generalisable truth but the achievement of the best we can do at the time i.e., "practically adequate" explanations. This practical focus within critical realism sees knowledge as existing in a “historically specific, symbolically mediated and expressed, practice-dependent form” (Lawson 1997) that is potentially transformable as subsequent deeper knowledge is gained. The realist denies easy generalisability and requires a heavy focus on context.

4 IMPLICATIONS FOR APMS EXAMINATION

The APMS examined in this study were founded on large-scale data warehousing applications that form a part of various Automated Business (or Corporate) Performance Measurement

Systems. All projects were based on SAP's Business Warehouse product and the data warehouses sourced their data from SAP's R3 Enterprise Resource Planning (ERP) systems as well as a myriad of other non-SAP production systems. The organisations ranged from a large Government Business Enterprise to a mixture of global commodity companies.

The data warehousing systems had the common objective of producing automatic performance measurement management reporting via a mixture of Microsoft Excel spreadsheets and Web based reports. The objective of the APMS was for performance measures to be presented directly to senior management in a form that precluded any manual manipulation. In most cases this was achieved through implementing new security/authorisation layers to protect the reporting document.

Most of the systems examined are languishing as implementation and process change management failed to get traction. Generally these systems have not become embedded within the various organizations as meaningful tools. They are generally used in an ad hoc fashion and are seen by some as just "expensive toys".

In contrast to the general failure, however, two of the APMS are in fact producing useful outcomes with over 60% of managers and information analysts using the tool throughout the business with production benefits being realised. A cursory examination of the different systems has not produced any easy explanation for the differences in implementation success. Given that such systems are expensive and difficult to produce, the organizations were understandably interested in determining the possible reasons for the patchy success.

This widely felt concern prompted a doctoral research study to be conducted by an experienced IS industry consultant. A discussion group involving two academics and the researcher was then formed to analyse and review the critical realist approach being utilised, resulting in this paper.

Figure 1 reflects the approach adopted in the research.

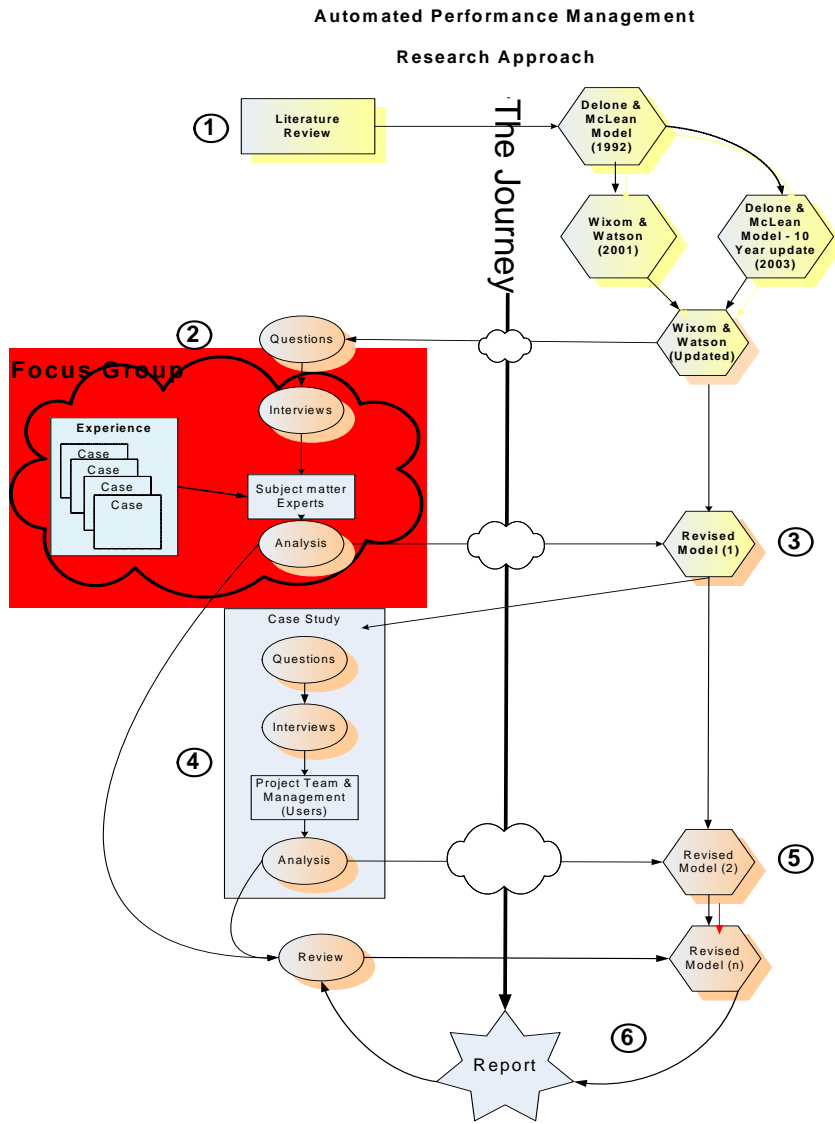


Figure 1 Research Approach

The research stages illustrated in Figure 1 are described below. Each stage number corresponds to the number in a circle on the figure.

1. A literature review was conducted based on the DeLone and McLean I/S Success Model (DeLone & McLean, 1992) by contrasting the DeLone and McLean Ten Year review (DeLone & McLean, 2002) and the Wixom and Watson Data Warehousing Success model (Wixom & Watson, 2001). A consolidated model was proposed based on the information systems literature. This literature review also concentrated on available Operations Management literature where there have been a number of recent

research publications. Through a process of review and consolidation by comparing and contrasting the different domains, a model for Performance Measurement System success was proposed.

2. This model was then used as the basis for defining a set of questions for semi-structured, qualitative interviews.
3. Once refined the questions were used in a set of interviews utilising a focus group (Krueger, 1988). This focus group was composed of I/S industry experts, active in the performance measurement system area. Given the level of organizational interest in the perceived failure of the APMS, recruiting participants was not difficult. Against this data, the results were further analysed and a revised model was produced (Model 1).
4. Model 1 is being tested against a case study (Yin, 1989) with further refinements to the model being made as required. This will result in an updated model (Model 2).
5. Through a number of reviews and case interviews, more refinements to the model will occur (Model 3 & 4).
6. A final model will be synthesised and is to be included in the Doctoral thesis to be submitted for examination.

The approach is based upon continual comparison of the data collected in each stage with the developing model. Constant, iterative comparison of the data with the developed model and conceptual categories leads to a continuously refined explanatory model.

Throughout the study, critical realism provided a foundational platform for developing the research. The following realist elements were important in the study development:

4.1 The realist focus on context and setting

Pawson, Greenhalgh, Harvey and Walshe (2004) describes realist review as “a relatively new strategy for synthesizing research which has an explanatory rather than a judgemental focus. It

seeks to unpack the mechanisms of how complex programmes work (or why they fail) in particular contexts and settings” (p. 21). Such methods are becoming more prevalent in the analysis of the effectiveness of social programs. It is the contention of this paper that a similar approach can be effective in examining the heavily social and contextual nature of complex APMS implementation. Critical realist evaluation moves from the basic evaluative question - *what works* - to *what is it about this implementation that works for whom in what circumstances*.

In the context of the APMS research it became evident that contextual issues were paramount in explaining the success and failure of the implementations. With the focus group interviews and individual case follow-up, the fundamental discussion is always around the particular circumstances of the implementation. This emphasis on context impacted the underlying research focus. The critical realist focus on retroductive propositional type questioning lead to a contextual basis for the study seeking to answer “Under what conditions might APMS implementation prove successful?” rather than “What are the (predictive) critical success factors for an APMS implementation?” A simplistic critical success factors approach tends to deny the heavy contextuality and complexity of large scale systems implementation.

4.2 Realist emphasis on explanation and ex-post evaluation

The realist focus on explanation rather than prediction necessarily encourages an emphasis on ex-post evaluation. The realist would suggest that ex-ante or predictive evaluation is difficult given the highly complex nature of the implementation environment. Ex-post evaluations after the event are more in keeping with the underlying realist focus on explanation rather than prediction.

The critical realist focus on explanation rather than prediction suggests that the critical realist method involves "the postulation of a possible [structure or] mechanism, the attempt to collect evidence for or against its existence and the elimination of possible alternatives". The realist

agrees that we have a good explanation when (i) the postulated mechanism is capable of explaining the phenomenon (ii) we have good reason to believe in its existence (iii) we cannot think of any equally good alternatives. (Outhwaite, 1987). Such an approach has specific impacts on the research process in that it argues for research heavily oriented towards confirming or denying theoretical proposals. For the realist the initial explanatory focus may be on proposing (i.e. transcending or speculating) non-experienced and perhaps non-observable mechanisms and structures that may well be outside the domain of investigation. As Wad (2001, p. 2) argues:

If we take explanation to be the core purpose of science, critical realism seems to emphasise thinking instead of experiencing, and especially the process of abstraction from the domains of the actual and the empirical world to the transfactual mechanisms of the real world.

For the APMS study the case examples were of previously implemented systems and the focus was on confirming or denying a postulated model. The model developed from the focus group interviews is being further refined by examining an actual case study.

4.3 The realist need for an “analytical dualism”

The original Delone and McLean model (1992) of IS success in Figure 2 is realist in focus, as it emphasizes causal factors – however the critical realist would have difficulty agreeing with the simplistic notion that organizational impacts are solely pre-determined by individual factors. The realist argues for a deeper multi-level analysis that recognizes that individual agency (micro) level impacts are only one of the components - such an analysis ignores the duality of structure in that agency actions are both constrained and enabled by pre-existing structures.

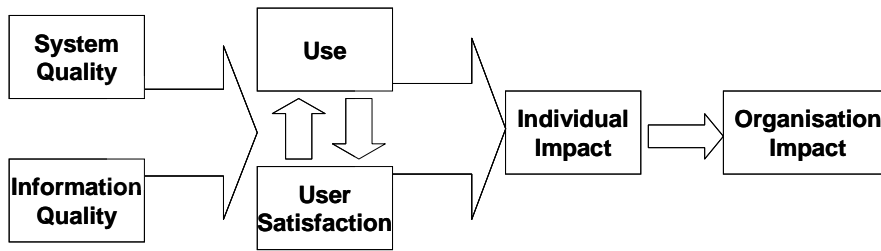


Figure 2 : Delone and Mclean Model (1992)

Any research study founded on critical realism needs to reflect this duality of structure and agency. Archer (1995) proposes that such a duality is difficult to properly examine in social situations and therefore argues for an “analytical” or artificial dualism whereby structure (macro) and agency (micro) are artificially separated in order to properly examine their interaction. Hedström and Swedberg (1998) propose three basic mechanisms:

1. Situational Mechanisms (macro-micro level)
2. Action-Formation Mechanisms (micro-micro level)
3. Transformational Mechanisms (micro-macro level)

The typology implies that macro-level events or conditions affect the individual (step 1), the individual assimilates the impact of the macro-level events (step 2) and a number of individuals generate, through their actions and interactions, macro-level outcomes (step 3). Such a critical realist perspective on technology is presented by Smith (2005) when he suggests that “technology introduces resources and ideas (causal mechanisms) that may enable workers to change their practices, but these practices are also constrained and enabled by the structures in which they are embedded...Thus, ...a researcher must try to understand how the generative mechanisms, introduced by the technology into a particular context of structural relations that pre-existed the intervention, provided the resources and ideas that resulted in changes (or not) to individual practices that then either transform or reproduce those original structural relations” (p. 16). Such a representation highlights the historicity of IT implementation and argues for a

consideration of the environment prior to IT initiation. The framework also suggests that any study of APMS implementation would need to view the implementation as fundamentally a change of pre-existing *social* practices.

The original Delone and McLean model emphasizes the micro-macro interaction when it suggests individual impacts aggregate to organizational impacts. However from a realistic perspective it has no recognition of the macro-micro and micro-micro level interactions.

The 2002 changes made to the original Delone and McLean model (see Figure 3) were the introduction of Service Quality and two dimensions, Organisational and Individual impact, being combined into one dimension called Net Benefits (Delone and McLean, 2002). From a realist perspective this again moves the model further away from a realist position in that the organizational and individual impacts are conflated. Archer (1995) argues against such conflation when she suggests that “structure and agency can only be linked by examining the interplay between them over time, and that without the proper incorporation of time the problem of structure and agency can never be satisfactorily resolved” (p. 65). The static simplistic representation of Delone and McLean is inconsistent with such a view.

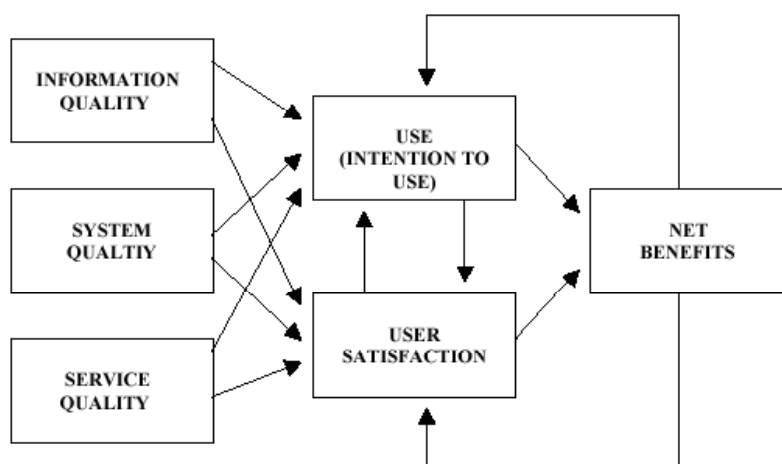


Figure 3: The Reformulated I/S Success Model (DeLone & McLean, 2002) p9

The models did however provide guidance as to the various categories that might be used in the grounded theory analysis.

An extension of Delone and McLean’s original model developed by Wixom & Watson (2001) to model data warehousing success provided further depth to the analysis. The new model (Figure 4) helped to identify the various levels of analysis needed and associated impacts at each level. The increasing richness of the model suggests a more subtle and differentiated interaction between its elements and reduces the dependence upon a few “critical” success factors.

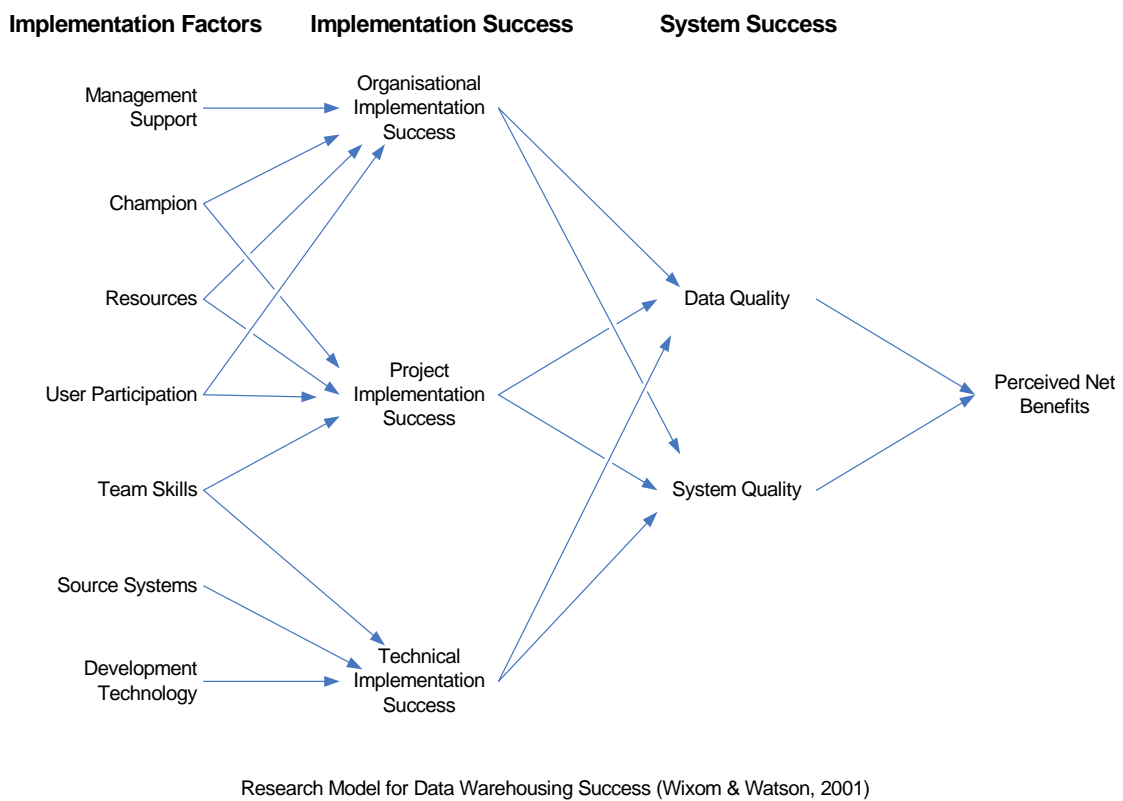


Figure 4: Research Model for Data Warehousing Success (Wixom & Watson, 2001)

4.4 An emphasis on the social nature of IT implementation

The defining characteristic of APMS is that it is the automated communication of key performance indicators. As such the implementation and operation of such a system can be

highly political and sensitive. Performance measurement can be defined as the process of quantifying the efficiency and effectiveness of action and a performance measurement system as the set of metrics used to quantify both the efficiency and effectiveness of actions (Bourne, Neely et al. 2003). The development of any performance management system must adhere to the following definite stages:

- define the performance to be measured
- determine and agree on appropriate performance metrics
- implement systems to monitor performance against these metrics
- implement systems to communicate these metrics to concerned stakeholders

Each such stage in the development of a performance management system can be expected to be personalised, potentially highly political, possibly controversial and affect the acceptance of the final management system.

The final communication of performance figures is inherently social. As Pawson et al (2005) suggest this collection of performance figures is usually followed by public disclosure of underperforming sectors. Such a public disclosure ideally leads to “sanction instigation” whereby the broader organizational community act to “boycott, censure, reproach or control the underperforming party”. The final phase is termed “miscreant response” in which “failing parties are shamed, chastised, made contrite and so improve performance in order to be reintegrated”. As Pawson et al (2005) argues these social processes are all fallible and can all lead to unintended outcomes. The initial performance metric may be inappropriate or measuring the wrong problem, the dissemination may be inappropriate, public reactions may take the form of apathy or panic rather than reproach thus leading to attempts to “resist, reject, ignore or actively discredit the official labelling” (p. 22). The potential for active resistance seems more likely given the automated nature of an APMS system. Automated communication may be seen to imply a lack of trust in intervening management structures and could lead to active resistance.

Organizational goals are set by management; high level requirements are set by management, as are timelines, resources and objectives. The design solution of APMS, its overarching principles and objectives, depend upon the ideologies, requirements and principles of these decision makers. These principles are based upon a normative threat (the Sarbanes-Oxley legislation and similar such acts) as well as the drive to maximise productivity through control and early intervention. The ideology of industrialization, that increasing labor productivity is the foundation of increasing wealth and the improvement of social and economic conditions, also makes rational resistance difficult. The solution of APMS is therefore conservative, preserving the power *status quo* and serving the needs of those who need to control, measure and manipulate. Here we can observe a structure of legitimated management and regulation interacting with the agency of individual and idiosyncratic leaders and subordinates. Critical realism allows that these structures have a causative function, derived from the ontological commitment of protagonists. These causal events may have elements which can be generalized, but their universality needs to be understood in the context of agency and individualism.

Conversely, where there is an emphasis on authority and control, this is antithetical to knowledge commitments and the hostages one gives to fortune, when one gives away knowledge. One of the complicating factors in systems design in particular, as indeed it is in any form of innovation, are the implications of change for participants involved in and stakeholders affected by the change. Innovation of any kind is knowledge intensive and controversial, 'uncertain, fragile, political and imperialistic' (Kanter, 1996). It crosses boundaries, redefines job descriptions and requires close communication. This leads inexorably to the fact that:

'Information systems development is also a political process in which various actors stand to gain or lose power as a result of design decisions' (Robey and Markus, 1984)

New divisions of labour and requirements for cooperation, a transcendence of current work processes, will break down existing divisions of labour and require extensive cooperation. Particularly in organisations with command and control management paradigms and Fordist

conceptions of the structure of work, boundary spanning and the unimpeded flow of information will be perceived as threat to those whose authority is based upon the existence of boundaries and fiefdoms. The adjustment and threat to power structures defined through knowledge is a high risk area for projects whose focus and objective is to codify knowledge and ways of doing things and make them freely available. The case of APMS is particularly interesting because it is managers whose knowledge is being codified and commoditized and whose ability to intervene and manage production figures is being withdrawn. It is managers whose fiefs are becoming subject to a super-Panopticon, accessed by the CEO himself, who may ring up at 8:00 a.m. and complain about the previous day's poor production quality. The stance of critical realism can sensitise researchers not only to the collision of conflicting structures, but also to the motivations of the protagonists who inhabit those structures and have careers to build or mortgages to pay.

People in organisations are usually aware of the importance of their knowledge to their position, status and remuneration and any reduction may well be met with lack of full cooperation. The implementation of APMS moves this to the next level. Martin (1988) state that 'the major resource distribution by technological change is knowledge: groups with knowledge of the old system may lose control of knowledge under the new system'. Scarbrough and Corbett (1992) assert that the higher the levels of autonomy and job specialisation, the greater the power of the job holder. If this is correct, then if these two parameters are reduced by technological change, it is more than likely that the change will be resisted at some stage of the technology change project: either in design, implementation or use. This resistance is a denial of the legitimacy of the technological solution – and may have nothing to do with whether the solution is 'the best for the company' or even represents a best possible reorganisation of work processes. Critical realism recognises the role of individual agency in the withdrawal of support and legitimation for the normative and regulative structures implied by the 'organisation as machine' metaphor in which APMS finds its validation. The *automated* aspect of an APMS has implications for the

autonomy of the manager in that the APMS is intended to by-pass the manager's intervention. The performance management aspect of the system has implications derived from surveillance and control and the concomitant power structures.

The diverse range of stakeholders – subordinate to the accountable managers are line staff, whose actions have already been 'informed' by the implementation of an operational information system. They are responsible for data entry (which must be timely and accurate for the APMS to succeed). There are the technical personnel who set up and maintain the APMS. They must understand the needs of the other 'culture' and be competent in the execution of the technology. There appear to be quite different purposes and value orientations within these groups.

There is a requirement for a high degree of structure and order in the interaction between systems and the delivery of meaningful outcomes. The derivation of a few key numbers from highly complex ERP systems requires the correct functioning of many software and hardware systems and types of components, as well as standardised (highly 'structured') rules, processes and meta data definitions.

4.5 The ontological depth of critical realism

In line with the recognition of continuing micro/macro interaction and the social implications of IT implementation, Carlsson (2003) proposes a multi-levelled investigation of the research situation. As Figure 5 indicates, the framework includes macro phenomena, like structural and institutional phenomena, as well as micro phenomena, like behaviour and interaction. The framework highlights the importance of wider macro level issues on individual situated activity. As Carlsson suggests (p. 13) the self and situated activity focus concentrates on "*...the way individuals respond to particular features of their social environment and the typical situations associated with this environment.*" (Layder, 1993).

H I S T O R Y	Element	Focus
	CONTEXT	Macro social forms, e.g. gender, national culture, national economic situation
	SETTING	Immediate environment of social activity, e.g. organisation, department, team
	SITUATED ACTIVITY	Dynamics of face to face interaction
	SELF	Biographical experience and social involvements

Figure 5: A Realist Research Map (Carlsson (2003) p.13 adapted from Layder (1993))

Critical realism is ontologically bold in the sense that it not only encompasses an external realism in its distinction between the world and our experience of it but it also suggests a stratified ontology and a so-called depth realism in defining the objects that make up such a world. This concept suggests that reality is made up of three ontologically distinct realms – first, the empirical, that is experience; second, the actual, that is events (i.e. the actual objects of experience); and third, the transcendental, non-actual or deep, that is structures, mechanisms and associated powers. The deep structures and mechanisms that make up the world are thus the primary focus of such an ontological realism, *events* as such not being the primary focus. An important element within critical realism is that these deep structures and mechanisms may, in fact, be only observable through their effects and thus a causal criterion for existence is accepted:

Observability may make us more confident about what we think exists, but existence itself is not dependent on it. In virtue of this, then, rather than rely purely upon a criterion of observability for making claims about what exists, realists accept a causal criterion too (Collier, 1994). According to this a plausible case for the existence of unobservable entities can be made by reference to observable effects which can only be explained as the products of such entities.... A

crucial implication of this ontology is the recognition of the possibility that powers may exist unexercised, and hence ...the nature of the real objects present at a given time constrains and enables what can happen but does not pre-determine what will happen. (Sayer 2000, p. 12)

Realist researchers need to be able to account for the underlying ontological richness they implicitly assume and also need to reflect the belief that any knowledge gains are typically provisional, fallible, incomplete and extendable. Realist methodologies and writings, thus, must reflect a continual commitment to caution, scepticism and reflexivity.

5 DISCUSSION

The focus group meetings with previous APMS project participants confirmed the importance of many of the factors identified in the various models. The study is still ongoing with the in-depth examination of the case study yet to be completed. In the case study, the organization had previously tried to implement automated performance management on at least 5 occasions with very little success. The final attempt was however successful in that system is being used to report meaningful data. One of the key aspects being identified is that the successful APMS appears to have a degree of sustainability that other systems did not have. According to Backström et al. (2002) a sustainable work system can be described as a work system that consciously strives towards simultaneous development at different levels: Individual, group/firm, and region/society. The term sustainability is also referred to as corporate sustainability (Liyanaage & Kumar, 2003) and may convey a difference in meaning to many, but generally it consists of external influences that are not commonly referred to within the information systems discipline. They can include economy and technology; ecology and demography; and governance and equity.

The notion of timeliness also emerges as an underlying structure. It addresses how quickly, when, or by what date an enhancement or change can be applied to affect the automated performance reporting. The ability to react to a new measure within a reporting cycle is very

important. Governments, external regulators and other *ex machina* bodies do not necessarily wait for a business to be ready to report a particular measure. Sometimes these measures are driven internally due to a need to correct or enhance a particular business process.

From the ongoing study it is becoming evident that external structures and the constraints and mandates they impose have severely affected APMS implementations. Such a conclusion is consistent with the critical realist view, in that it reveals the evident analytical duality in the way that agents are both constrained and enabled by pre-existing internal and external structures that they transform and reinforce through their ongoing actions.

6 CONCLUSION

APMS implementation is highly complex, socially and technologically. In a sense, such systems are the pinnacle of enterprise information systems, relying upon the technological success of base systems, the adequacy of their own technology, and the organisational coherence and commitment of a wide range of affected stakeholders. In line with Pawson et al (2004) the use of critical realism as an underlying philosophy for the APMS research appears to offer some particular benefits:

- a) It has firm roots in the social sciences and allows one to identify and make salient the external, objectified, social structures which function as causal elements in the success and failure of implementation. Using this paradigm, one is allowed to explore in depth the social aspects of systems use and implementation;
- b) It is grounded in the rigor of structured, analytical philosophy and one can be reasonably confident in its reliability and consistency as a base paradigm for research development;
- c) It is not a prescriptive method or formula for developing research but provides a logic of enquiry that is “inherently pluralist and flexible”, embracing both ‘qualitative’ and

‘quantitative’, ‘formative’ and ‘summative’, ‘prospective’ and ‘retrospective’, perspectives – it suggests but does not prescribe which ‘rocks to look under’;

- d) It seeks not to judge but to explain, and is driven by the question ‘What works for whom in what circumstances and in what respects?’ - it supports the pragmatic realization, after many years of information systems failure, that ‘there is no silver bullet’;
- e) It learns from (rather than ‘controls for’) real-world phenomena such as diversity, change, idiosyncrasy, adaptation, cross-contamination and ‘programme failure’ – its outcomes therefore make a good fit within the context of organisational learning and professional reflection;
- f) It engages stakeholders systematically, as experienced but nevertheless fallible experts whose ‘insider’ understanding of historical reasoning and action needs to be documented, formalised, reflected upon and validated within complex, multi-level explanatory models.

Realist review does however have a number of limitations:

- a) It is not an easy foundation on which to build in that it recognizes complexity in social research and requires a pluralist and innovative development process. It is an approach that requires experience, both in research and in subject matter. As Pawson et al (2004) suggest, realist review is not for the novice.
- b) The research generated cannot be taken to be reproducible and has therefore limited generalizability. Expressed differently, this is an honest recognition of the fact that social systems, whilst they contain real structures, are in fact open-ended and informed with individual agency and situational specificity.
- c) Research based around critical realism cannot provide easy answers, as much as users or researchers would like this to be the case. Conclusions reached are always

provisional, fallible, incomplete and extendable and rely upon the reader to draw conclusions about transferability and reuse.

Perhaps the greatest benefit of adopting a critical realist underlabouring is the emphasis on deep understandings and context. The emphasis throughout the study has been to try and understand why particular APMS implementations succeed whereas others did not. The underlying contextual emphasis is always on “what works for whom in what circumstance”.

7 REFERENCES

- Aastrup, J (2002), Networks producing intermodal transport, Ph.D. dissertation, Copenhagen Business School.
- Archer, M. (1995), *Realist social theory: The morphogenetic approach*, Cambridge University Press, Cambridge.
- Backström, T, Eijnatten, F.M. van, & Kira, M. (2002). A complexity perspective on sustainable work systems, Docherty, P., Forslin, J., & Shani, A.B. (eds.), *Creating sustainable work systems: Emerging perspectives and practice*, 2002, London: Routledge
- Bhaskar, R. (1978) *A realist theory of science*, Harvester Press, Sussex.
- Bhaskar, R. (1979) *The possibility of naturalism*, Harvester Wheatsheaf, Hemel Hempstead.
- Bhaskar, R. (1986) *Scientific realism and human emancipation*, Verso, London.
- Bhaskar, R. (1989), *Reclaiming Reality: A critical introduction to contemporary philosophy*. London: Verso.
- Bhaskar, R. (1991), *Philosophy and the idea of freedom*. Oxford: Blackwell, 1991.
- Bourne, M., A. Neely, et al. (2003). "Implementing performance measurement systems: a literature review'." *Int. J. Business Performance Management* 5(1): 1-24.
- Carlsson, S (2003), *Advancing information systems evaluation (Research): A critical realist approach*, *Electronic Journal of Information Systems Evaluation* Volume 6 Issue 2 (2003) 11-20.

- Collier, A. (1994), *Critical realism: an introduction to the philosophy of roy bhaskar*. London: Verso.
- DeLone, W. H. and E. R. McLean (1992). "Information systems success: The quest for the dependent variable." *Information Systems Research* 3(1): 60-95.
- DeLone, W. H. and E. R. McLean (2002). *Information systems success revisited*. Proceedings of the 35th Hawaii International Conference on System Sciences - 2002, Hawaii, IEEE.
- Dobson, P. (2001), *The philosophy of critical realism - An opportunity for information systems research*, *Information Systems Frontiers*, July 2001.
- Dobson, P. (2002), *Critical realism and is research - why bother with philosophy?*, *Information Research*, January, 2002, [Available at <http://InformationR.net/ir/>]
- Fitzgerald, B. and Howcroft, D. (1998), *Towards dissolution of the IS research debate: from polarization to polarity*, *Journal of Information Technology*, vol. 13, 313-326.
- Fleetwood, S. (ed.), (1999), *Critical realism in economics: Development and debate*. London: Routledge.
- Hedström, P., and Swedberg, R. (1998), *Social mechanisms: An introductory essay in: Social Mechanisms: An Analytical Approach to Social Theory*, P. Hedström and R. Swedberg (eds.), Cambridge University Press, New York, 1998, 1-31.
- Iivari, J, Hirschheim, R. and Klein, H.K. (1998), *A paradigmatic analysis contrasting information systems development approaches and methodologies*, *Information Systems Research*, Vol: 9, Iss: 2, pp: 164-193.
- Kanter, R. M. (1996). *When a thousand flowers bloom: Structural, Collective, and social conditions for innovation in organizations*, in P. S. Myers, (ed.) *Knowledge Management and Organizational Design*, Butterworth-Heinemann, Newton, MA.
- Krueger, R. A. (1988). *Focus Groups: A Practical Guide for Applied Research*. Newbury Park, California: Sage Publications.
- Lawson, T. (1997), *Economics and reality*, Routledge, London.

- Layder, D. (1993), *New strategies in social research: An introduction and guide*, Polity Press, Cambridge.
- Liyanage, J. P. and Kumar, U. (2003), Towards a value-based view on operations and maintenance performance management, *Journal of Quality in Maintenance Engineering* 9(4): 1355-2511.
- Locke, J. (1894), *An essay concerning Human Understanding*, A.c. Fraser (ed.): Vol. 1, Clarendon, Oxford.
- Martin, R. (1988). *Technological Change and Manual Work*. In D. Gallie (Ed.), *Employment in Britain* (102-127). Oxford: Basil Blackwell.
- Manicas P. (1993), Accounting as a human science, *Accounting, Organizations and Society* 18:147- 161.
- Mingers, J. (2001), Combining IS research methods: towards a pluralist methodology, *Information Systems Research*, Vol: 12, No: 3, 240-259.
- Mingers, J. (2002), Real-izing information systems: Critical Realism As An Underpinning Philosophy For Information Systems, *Proceedings Twenty-Third International Conference on Information Systems*, p. 295-303.
- Mutch, A., (1999), Critical realism, managers and information, *British Journal of Management*, 10: 323-333.
- Mutch, A., (2000), Managers and information: agency and structure, *Information Systems Review*, 1.
- Mutch, A., (2002), Actors and networks or agents and structures: Towards a realist view of information systems, *Organization*, 9(3): 477-496. ISSN 1350-5084.
- Outhwaite, W., (1987), *New philosophies of social science: realism, hermeneutics, and critical theory*, New York: St. Martin's Press.
- Pawson R, Greenhalgh T, Harvey G and Walshe K. (2004), *Realist synthesis: an introduction*, RMP Methods Paper 2/2004. Manchester: ESRC Research Methods Programme, University of Manchester.

- Pawson, R., T. Greenhalgh, Harvey G and Walshe K. (2005), Realist review – a new method of systematic review designed for complex policy interventions., *Journal of Health Services Research & Policy* 10(1): 21–34.
- Pratt, A., (1995), Putting critical realism to work: The practical implications for geographical research, *Progress in Human Geography* (19:1), 1995, 61-74.
- Robey, D. and Markus, M.L. 1984, Ritual in information systems design, *MIS Quarterly*, vol 8, 5-15
- Ryan, S., and Porter, S. (1996), Breaking the boundaries between nursing and sociology: a critical realist ethnography of the theory-practice gap, *Journal of Advanced Nursing*, 24, 413-420.
- Sayer, A. (1985), Realism in geography In R. J. Johnston (Ed.), *The future of geography* (159-173), London: Methuen.
- Sayer, A. (2000). *Realism and social science*. London, Sage Publications Ltd.
- Sayer, R.A. (1992), *Method in social science: A realist approach*, Routledge, London.
- Scarbrough, H. and Corbett, J. M. (1992), *Technology and organization: Power, meaning and design*, Routledge, London.
- Smith, M. L. (2005), *Overcoming theory-practice inconsistencies: Critical realism and information systems research*. Unpublished manuscript, Department of Information Systems, London School of Economics and Political Science, Working Paper 134.
- Spasser, M.A. (2002), Realist activity theory for digital library evaluation: Conceptual framework and case study, *Computer Supported Cooperative Work* 11: 81–110, Kluwer Academic Publishers, Netherlands.
- Stones, R. (1996), *Sociological reasoning: Towards a post-modern sociology*, MacMillan.
- Tsang, E., and Kwan, K., (1999), Replication and theory development in organizational science: A critical realist perspective, *Academy of Management Review* (24:4), 759-780
- Wad, P. (2001), *Critical realism and comparative sociology*, draft paper for the the IACR conference, 17-19 August 2001.

- Wainwright, S. P. (1997). A new paradigm for nursing: the potential of realism. *Journal of Advanced Nursing*, 26, 1262-1271
- Wilson, F. (1999), Flogging a dead horse: The implications of epistemological relativism within information systems methodological practice, *European Journal of Information Systems*, Vol: 8, Iss: 3, pp: 161-169.
- Wixom, B. H., and Watson, H. J. (2001). An Empirical Investigation of the Factors Affecting Data Warehousing Success. *MIS Quarterly*, 25(1), 17-41.
- Yin, R. K. (1989). *Case Study Research: Design and Methods* (Vol. 5). Beverley Hills, California: SAGE Publications Ltd.