

**ADDRESSING THE GAP BETWEEN THEORY AND PRACTICE:  
IT PROJECT DESIGN****ANDREW MARTIN, Warwick Business School**University of Warwick, Coventry, CV4 7AL, UK, URL: <http://www.warwick.ac.uk/~bsral>,E-mail: [Andrew.Martin@wbs.ac.uk](mailto:Andrew.Martin@wbs.ac.uk)**ABSTRACT**

*Information systems (IS) is a fertile field for bringing together theory and practice, yet there is often felt to be a bifurcation between the academic and practitioner communities and their world views. This paper explores the separate roles of theory and practice and the interactions and tensions between them, using existing literature, recent empirical evidence from case interviews and the author's experience, with a focus on the design of information technology projects. It explores reasons why certain considerations experienced by practitioners are under-represented in theory. It generates a classification of such 'pragmatic considerations' and relates this to the field of contingency theory. The paper also addresses a concern about how to bridge the gap between theory and practice in general. It reviews existing mechanisms for interaction between the communities of theory and practice, and suggests that academic, practitioner and governmental stakeholders should be continually developing and exploiting such opportunities. In summary, the paper argues that, whilst theory and practice have independent roles and contributions, they are also interdependent, and deserve greater mutual recognition.*

---

**INTRODUCTION**

By its nature, the subject of information systems (IS) is not only interdisciplinary but also applied, influenced by both practice and theory (Backhouse, Liebenau and Land 1991, Avison 1997, Mingers and Stowell 1997). It is therefore a fertile field for researching the relationship of theory and practice. We

distinguish the terms information systems, information technology (IT) and information management (IM) within the general function or discipline of information systems according to Earl (1989). IT project design and development is seen as a core element of the IS function, and is itself informed and influenced both by theory of computer science and management, and by the practical

Mike Metcalfe acted as senior editor for this paper.

experience of developers (e.g. Pressman 1997, Sommerville 1996, Gilb 1988). Theory and practice are in many ways complementary perspectives, yet they are frequently felt to be in conflict, not least with respect to IT. This paper explores the relationship between theory and practice, especially the tension that exists between them. It focuses particularly on the design of IT projects, but also draws on topics from IM and wider disciplines. A particular concern is about the apparent under-representation of 'pragmatic considerations' in theoretical models, and a broader concern is how to bridge the gap between theory and practice in general.

After introducing its methodology, the paper presents a discussion of the nature of theory and practice, which establishes and illustrates the tension between them in relation to the general literature. This discussion adopts an applied academic perspective; for a more philosophical perspective the reader is advised to refer to other papers in this special issue of *JITTA*. Having established their separate roles and their interaction, the paper examines the tensions and gaps between theory and practice, as perceived by researcher and practitioners. It does this in three ways; first, by referring to general literature on theory and practice; second, considering an example from the literature relating to IM, and third, using empirical data from research into the design of IT projects. The latter leads to a classification of pragmatic considerations, and similarities are found with factors commonly discussed in contingency theory. The use of this association may help to legitimize and standardize the treatment of pragmatic considerations in theoretical models and discussions, not least within the area of IT.

The paper then briefly discusses a number of existing opportunities that potentially help to bridge the gap, and positions them in the context of the earlier discussion. It argues that, whilst theory and practice have independent roles and contributions, they are also interdependent and deserve greater mutual recognition. It argues that academic, practitioner and governmental stakeholders should be continually developing and exploiting

opportunities to further integrate theory and practice. Finally, the paper identifies areas for further research.

## **METHODOLOGY AND SOURCES OF DATA**

The paper adopts a subjective / argumentative approach (Galliers 1991), referring to the general literature concerning theory and practice. The literature is used to present definitions of theory and practice and

## **CONTRIBUTION**

The paper contributes a theoretical / argumentative exposition of the roles of theory and practice and the tensions between them. The argument is essentially general but is firmly applied to IS, and is specifically related to recent research in the area of IT project architecture design. As well as expressing specific tensions that are not often explicitly identified, the paper contributes ideas about how to address the tensions. It addresses in particular the apparent under-representation in theory of considerations that practitioners believe influence IT project design decisions. It proposes a taxonomy of pragmatic factors that, by linking to contingency theory, helps to bridge the gap between theory and practice. The paper will be of value to stimulate our understanding of the relationship between theory and practice and to remind us of need for greater efforts to bridge them. It also opens up an opportunity for a potentially rich stream of research into the connections between contingency theory, IS, and theory and practice.

The paper is expected to be of interest to academics, consultants and reflective practitioners, particularly but not exclusively in the area of information systems, who are concerned about tensions between theory and practice. Since it adopts a generally theoretical argument however, it is likely to be of most interest to the academic reader. Its breadth of sources and quotations also allow it to serve as a teaching and reference paper for students and researchers, again not necessarily restricted to IS students.

to discuss their inter-relationships. It also uses empirical evidence to illustrate the discussion, sourced from over 40 different cases in two related studies that were concerned with the design of IT projects. The first study used structured interviews with senior IT/IS managers in ten 'mini-cases' (Martin 2003a). The second study took the form of a survey of IT architects/project managers from thirty-one companies (Martin 2004a,b). Almost all the companies were medium-large in size and based in the UK. The studies identify a number of pragmatic considerations that influence the design of projects, yet which paradoxically are not always represented in the theory. These considerations are discussed and illustrated using comments from respondents, and the paradox is addressed by examining the nature and method of theory formulation and by identifying links with contingency theory. The discussion on bridging the gap in general is informed by the literature and general knowledge.

## THEORY OF THEORY AND PRACTICE

### The distinct natures of theory and practice

The tension between theory and practice is no better expressed than the two phrases below, one of which was used in the call for papers for this special issue (Peffer 2003).

*In theory, there should be no difference between theory and practice; in practice, there is. (A)*

(Attributed variously to L.P. 'Yogi' Berra, Roger Moore and Jan LA van de Snepscheut)

*There's nothing so practical as a good theory.*

(Attributed to K. Lewin.)

These intriguing quotations invite us to examine the fundamental definitions of theory and practice in order to fully appreciate their import.

**Practice** is '*The action of doing something; performance, execution...*' (Oxford English Dictionary online). This includes the observable behaviour of individuals, groups, organisations and societies in the domain of 'purposeful human activity' (Checkland and

Holwell 1998), doing things that change the state of the world. Argyris (1985 p.79) considers practice to be 'the implementation of a set of ideas in order to achieve intended consequences in a world of practical affairs.'

**Theory** is: '*A scheme or system of ideas or statements held as an explanation or account of a group of facts or phenomena; a hypothesis that has been confirmed or established by observation or experiment, and is propounded or accepted as accounting for the known facts...*' (Oxford English Dictionary online). Sutton & Staw (1995) concur with this definition, arguing that research outcomes can only be called theory if they include an explanatory causal model for an observable phenomenon, answering the question 'Why?' Yin (1994) considers that 'finding out' makes acceptable, though different, research – perhaps at an earlier stage of theory building, addressing the question 'What?' Burgoyne and Reynolds (1997 pp. 3-4) describe four types of theory: normative theory (answering the question 'What should be done?'), descriptive theory (finding out), interpretive theory (answering the question 'Why?') and critical theory (questioning the claims, contradictions, assumptions and value judgments that are built into normative, descriptive and interpretive theories). This paper uses the term 'theory' in a relatively general sense, but occasionally referring specifically to the normative, descriptive and interpretive types listed above. In this general sense theory is typically perceived to present an abstract representation or model of part of the 'real world', that can be applied to inform and shape an understanding of a practical situation, or solve a practical problem.

Quotation A above plays on the words 'theory' and 'practice' recursively to express a difference between them. In the light of the definitions, we see that the quotation achieves its effect by suggesting that 'theory' (in the normative sense) considers theory (in the general sense) and practice to be indistinguishable. In fact this is not the case, and the quotation misleads as much as it intrigues and amuses. Further, the gap between theory and practice is not for want of good theory, for good theory by its nature and purpose stands aloof from practice. 'Scientific theories, even those stemming from empirical

research, are by virtue of their very purpose and structure not suited to providing immediate guidance for activity' ... 'We may be certain that practical knowledge differs substantially in structure and content from theories' (Bromme and Tillema 1995 p. 262).

The distinction between theory and practice clearly applies to IT in particular. As a specific and simple example: in theory (again in the normative sense), Javabeans are portable; in practice they are not - because server machines differ in what features they support (Dorda, Robert and Seacord 1999). Similarly, in theory IT standards can be used to minimise the extent of these differences, but Dorda et al recognise that in practice it is difficult, if not impossible, to limit a development effort to use only those properties that adhere to core standards.

Theory and practice *are* different, but they are complementary and mutually interdependent. The next section looks at their fundamental interactions, based on the definitions above.

**Interaction of theory and practice**

'Practice, at the end of the day, needs theories to shape it. Theory, on the other hand, is tested and developed through practice' (Burgoyne and Reynolds 1997 p.1). Theory (in its general sense) is also applied back into practice: 'Research can be used to help organization members envision new courses of action, to expose them to new realities, to

convey past experiences, and to provide warnings and checklists of issues to consider before taking action' (Cummings, Mohrman, Mohrman Jr. and Ledford Jr. 1985 p.288). It is not always the case that theory is *ahead* of practice, although it is agreed that there is a time-lag between them. 'In some areas we find that theory needs to catch up with practice, and in other cases vice versa. Theory and practice are thus out of step, providing an opportunity to generate fruitful debate' (Ward and Grundy 1996 p.322). Lawler (1985 p.5) agrees: '... advances in theory and practice are likely to come about not necessarily as a result of theory leading practice or practice leading theory. Either of these can happen'.

It is worth examining these interactions in more detail; figure 1 (Martin 2003b, adapted from Seashore 1985 p.65) helps to examine systematically the most fundamental interactions between theory and practice. The model should be read '<Actor (*shown at the bottom of each cell*)> <vertical dimension heading (*verb*)> <horizontal dimension heading (*noun*)>'; thus clockwise from bottom left: practitioners practise practice, researchers theorise practice, philosophers theorise theory and consultants practise theory. We now look briefly and critically at each of these interactions in turn, in order to appreciate the synergies as well as the gaps between theory and practice, and we make applications to the IS world.

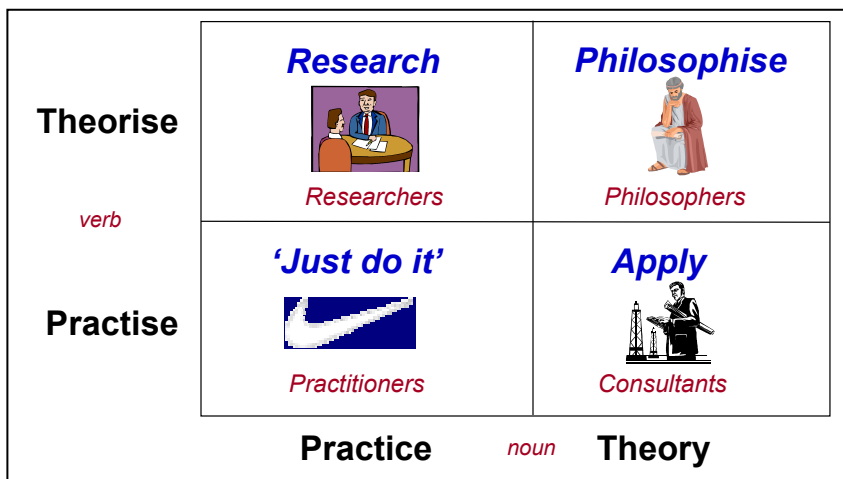


Figure 1. Interaction of Theory and Practice

*Practise of Practice*

Unofficially termed the ‘Just do it’ approach, this is the simplest, least reflective stance to adopt. The practitioner or business person may either dismiss theory as irrelevant or infeasible, or may simply be ignorant of its potential to contribute to their practice. An example within IT project development is an unreflective a-methodological approach to systems development that corresponds to Level 1 of the Capability Maturity Model (Paulk, Curtis, Chrissis and Weber 1993, Fitzgerald 1997, Truex, Baskerville and Travis 2000).

*He who loves practice without theory is like the sailor who boards ship without a rudder and compass and never knows where he may be cast.*

(Attributed to Leonardo da Vinci 1452-1519, quoted in Kline, M., “Mathematical Thought from Ancient to Modern Times”, Oxford University Press: New York, 1972).

Pure ‘practise of practice’ is rare however, beyond the novice; to an extent everyone has to be somewhat reflective about any non-trivial practical activity. Even to drive a car to work, one has a mental model (map) of the route; to drive well, certainly in difficult conditions, one needs some level of abstract understanding about the way the vehicle functions; to pass a driving test (in the UK at least), one has to pass a ‘theory’ examination. ‘All human beings ... need to become competent in taking action and simultaneously reflecting on this action to learn from it’ (Argyris and Schon 1974 p.4). Professionals and managers bear a particular responsibility to conceptualise their practice in order to manage, learn, improve and pass on their knowledge and experience (Schon 1983, Burgoyne and Reynolds 1997, Fook 2002).

The practitioner typically relies on their knowledge and experience where possible; when new situations are encountered from outside their experience, they may apply relevant theory from first principles themselves or they may call on consultants’ expertise. If the practitioner consults theory it is not for its own sake, but in order to be applied to achieve a desired objective.

‘Hundreds of thousands of managers have read Theory Z or In Search of Excellence’ (Goodman 1985 p.329) yet, wise in ‘street knowledge’ and experience, many practitioners eschew deeper or more formal academic knowledge. Such professionals can be criticised where they are found to be neglecting theory that could help them to improve their performance (Martin and Chan 1996).

*Practise of Theory*

By its definition theory needs to be general to an extent, and requires to be tailored to each specific situation. The application of theory is therefore a vital process, in which consultants have a significant role to play, particularly where the situation or the process is complex or new. Consultants recognise the potential of theory to increase the efficiency and effectiveness of applied work assignments. ‘*There’s nothing so practical as a good theory*’ succinctly explains the position of the consultant, who performs a specialist skilled role: ‘The transformation of an element of theory into a piece of applicable knowledge is not reducible to deduction.’ (Bromme and Tillema 1995). Consultants *practise* (or *apply*) theory in order to make practice more successful. However, ‘The paradox of theory is that at the same time as it tells us where to look, it can keep us from seeing’. (Vaughan 1992, quoted in Walsham 1995). Experienced consultants (and researchers) have to be aware of the limitations of individual theoretical models, and of the practical need to choose, customise and communicate appropriate theories in ways that are meaningful to the client organisation. They have a range of theories at their disposal, as well as the skill and experience to choose and apply the most appropriate one(s) to a given situation.

*Theory of Practice*

Theory is frequently constructed from practice, as discussed above. In IS in particular, a significant amount of theory comes from identifying ‘best practice’, at either operational, management or strategic levels, e.g., (Willcocks and Lacity 1998). ‘Researchers theorise practice’ in order to understand the world (including human activities), aiming to build an increasing understanding of observed phenomena over

time. For example ‘Can an ERP experience be an early failure yet a later success? ... And how often do organizations push through initial failure to achieve an ultimate measure of success? These are empirical questions’ (Markus, Axline, Petrie and Tanis 2000 p.246). One of the privileges and strengths of the academic researcher is the ‘ability to cross organisational boundaries’ (Jennex 2001), and thus synthesise an understanding of the issues experienced and managed in different contexts of practice.

### *Theory of Theory*

At the other extreme from ‘Just do it’ is the purest theory of ‘Just think about it’ (where this time ‘it’ refers to theory), or *philosophy*. ‘Philosophy generally proceeds by argument rather than, say, experiment’ (Mingers 2002b p.352). The role of philosophy includes guiding the academic researcher and the consultant, particularly in terms of methodology, to apply theory appropriately, and to establish, debate and develop theoretical paradigms. Research questions, designs and publications are frequently examined in terms of their philosophical assumptions regarding ontology, epistemology and methodology. Mingers (2002b p.352) also makes a practical justification of the philosophical approach: ‘Practice necessarily depends on some sort of, often implicit, theory, and good theory in turn requires an underlying philosophy’.

However, even the philosopher recognises the importance of practical issues, so much so that ‘pragmatism’ has become a recognised theoretical position. ‘Pragmatic’ means ‘Practical; dealing with practice; matter-of-fact’ (Oxford English Dictionary online) to the point of becoming a deep seated chosen philosophical stance rather than an approach to one-off events. Pragmatism is based on ‘What works’ (Tashakkori and Teddlie 1998) and a method that examines ideas and debates according to their practical consequences (James 1975). Mingers (2002a p.296) reports that pragmatism is ‘a view about the purpose of science – that it is essentially a practical activity aimed at producing useful knowledge rather than understanding the true nature of the world’. Tashakkori and Teddlie (1998) discuss the

research ‘paradigm wars’ and discuss the idea of a ‘pragmatic paradigm’ as a resolution of the struggles between positivism, post-positivism and constructivism. Rice (2000), relating to literary theory, asserts the practical influence of power on theory (and vice versa) thus: ‘Theory is thus shaped by the practices of organizing, asserting, and controlling power in society, which means, just as importantly, that it in turn shapes the very bodies that such power engages’. Mingers (2002a p.296) reports a sociological view (amongst others) of science thus: ‘In practice science works like any social activity in terms of power and influence rather than pure access to the truth.’ Thus, even the ‘theory of theory’ is not independent of practice!

### **Tensions between theory and practice; closing the gap**

The above discussion establishes the complex and distinct, yet interdependent roles of theory and practice, and helps to identify their synergies. Practitioners practise practice, and philosophers theorise theory, but theory and practice have a dynamic and fruitful ‘continuous mutual influence’ (Burgoyne and Reynolds 1997, p.6), and thereby shape each other. The discussion also demonstrates a legitimate gap between theory and practice, yet their distinction is frequently felt as a tension, and there is a belief that their potential synergy is sub-optimal. Fook (2002 p.38) considers that ‘the relationship between theory and practice is a much more complex and intermingled one than a simple split construction of them suggests’, citing in particular the ‘dominance of researcher over practitioner view and professional over service user perspectives’. Schon (1983 p. viii) identifies a ‘widening rift between the universities and the professions, research and practice, thought and action’ and points out that ‘there is a disturbing tendency for research and practice to follow different paths’ (p. 308). In particular he asserts (p. 44) that ‘Driven by the evolving questions of theory and technique, formal modelling has become increasingly divergent from the real-world problems of practice’ and that ‘[Practitioners] may become selectively inattentive to data that fall outside their categories’. The ‘academic’ and ‘real world’ communities, respective ‘owners’ of theory and practice, are so

constrained by their own short term objectives, pressures, limited resources and cultures that there is a danger that each community becomes solely self-referencing, especially the academic community (McGaughey 2001). Theories can 'tend to be abstracted to the point of diminishing relevance to the real situations we wish to understand as researchers and influence as practitioners' (Seashore 1985 p.50). The gap can particularly frustrate practitioners, especially novices, as they attempt to relate it to their experience: 'Quite often novices perceive a dichotomy between stated knowledge and actual performance in which the relevance of the former becomes questioned' (Bromme and Tillema 1995).

An awareness of the rift motivates initiatives to 'close the loop between theory and practice' (Carmines and Zeller 1979). The rest of this paper therefore focuses on some of the tensions and gaps between theory and practice, and how they might be bridged. First we address a concern that certain issues that are perceived as relevant by practitioners are under-represented in theories. Initially we term these 'pragmatic considerations'; we classify them and subsequently associate them with the idea of contingent variables and constraints. Second, we look more broadly at how the gulf between theory and practice can be bridged at an organisational level.

### **REPRESENTING 'PRAGMATIC CONSIDERATIONS' IN THEORY**

We now look at two examples that illustrate the under-representation of pragmatic considerations in theory. Both are drawn from the IS field; the first relates to IM; the second relates specifically to IT design. As well as highlighting the issue, we identify some reasons why it may arise.

#### *An example from information management*

A specific example from IM illustrates the gap by identifying an interpretive theoretical paper that appears to ignore a key practical issue. In Waarts, van Everdingen and van Hillegersberg (2002) for example, despite the fact that 'a large-scale empirical study was carried out among medium-sized companies in a variety of European countries and industries concerning the adoption of Enterprise

Resource Planning (ERP) software', the 'Year 2000' issue is never mentioned as a motivator. This is very surprising, since it is known that many ERP implementations were indeed motivated by this need (ComputerGram International 1998, Badrinathan 1999, Markus and Tanis 2000 p.175, 179). Why then is there no mention of the Year 2000 issue? Surely this omission could lead the reader to be uninformed about the topic?

There are at least three possible explanations for this situation. First, we have identified the apparent incompleteness of an individual paper, rather than of theory in general (other publications *do* mention Year 2000 related to ERP implementations, as indicated above). This need not be a problem as long as a) the researcher does not claim to have presented a comprehensive theory, and b) the reader of the work is mature enough to consult multiple sources. Waarts et al state that they wanted 'to demonstrate changes in the effects of variables, rather than to provide an exhaustive set of variables that might influence adoption decisions' (p. 413), so perhaps the omission of the Year 2000 issue could be excused. So the first point is that no individual paper or model is likely to represent the whole theoretical picture. Second, temporal issues such as Year 2000 are likely to be unique in their nature and impact, and are therefore unlikely to generalise to other times. Therefore temporal issues such as Year 2000 are likely to be omitted from general theories, unless they can be represented as a more abstract concept. This could also account for its lack of attention from Waarts et al. Third, it might also be the case that 'pragmatic' considerations such as simple cost-benefit economics or the Year 2000 issue are perceived by the theorist as being primitive constructs with insufficient richness or depth to justify their inclusion or further exploration.

#### *An example from IT project Design*

Now we turn our attention to the design of IT projects, to elicit further reasons for the apparent lack of recognition of pragmatic considerations in theory. First however, we note that the design activity itself sits very tightly between theory and practice, and therefore serves as a rich field for studying their interaction. 'Theory constitutes the

"why" of a discipline in that it questions the reasons behind practice ... Theory and practice are intricately intertwined, and the greatest designers have an intimate understanding of both' (Hartwig 2001). The creative nature of the task of design means that it tends to evade full prescription either in theory or in practice; this makes it a particularly interesting area of study. Other writers agree that both theory (especially in the normative sense) and practice are both brought to bear on design: 'the process by which the model is developed combines intuition and judgment based on experience in building similar entities, a set of principles and/or heuristics that guide the way in which the model evolves, a set of criteria that enable quality to be judged, and a process of iteration that ultimately leads to a final design representation' (Pressman 1997 p.357). 'Design is a creative process requiring insight and flair on the part of the designer. It must be practised and learnt by experience and study' (Sommerville 1996 p.210). Macro and Buxton (1987 p.164) state that 'the general approaches to design ... have emerged from practical problems'. Finally, design can be seen as 'a reflective conversation with the situation' (Schon 1987 ch. 3).

We now refer specifically to respondents' comments and analytical findings in recent research into IT project design by Martin (2003a, 2004a,b). Figure 2, adapted from Martin (2003a) shows the context of this work, and its methodology was discussed earlier. Respondents in this research demonstrate a clear awareness of the gap that is perceived to exist not only between pure theorists and practitioners, but even between consultants and practitioners. For example Project #8<sup>1</sup> observed that in their experience consultants are "*great in theoretical design, but most lack practical experience of real implementations within a budget conscious industry*". Project #26 observes directly that "*Pragmatism is key, therefore many elements of architectural output are at the discretion of the architect ... thoroughness and communication are viewed as being more*

*important than rigidly following a formal methodology.*" A set of pragmatic considerations that are identified by practitioners as being neglected is discussed more fully below; first we consider a key reason why they might escape representation in the theory.

Whilst some pragmatic considerations such as local organisational politics are perceived by individual respondents to be factors that influence individual project design (Martin 2004a), it is less evident that they significantly affect project *performance* on aggregate (Martin 2004b). By their nature, pragmatic influences, though strongly felt, are likely to be inconsistent from situation to situation in terms of both their *direction* and their *effect*. In one company, for example, local political forces may favour a design that fits in with other architectural constraints and leads to a successful development; in another they may constrain a design in such a way that its chance of development within time and budget are seriously hampered. On aggregate, the impact on success of local organisational politics between different projects may balance itself out. Local organisational politics will therefore merely come out in the error term where a statistical model based on multiple cases is used to build a theory concerning the success of project design. Local organisational politics, and similar pragmatic considerations, despite being felt strongly in individual situations, may therefore in general not appear to play a part in theory of successful IT design. Thus it depends on the level and nature of the data analysis; such situational pragmatic considerations may emerge in general descriptive theory or individual case studies, but are less likely to feature in interpretive theory based on formal models from multiple cases.

More generally, we must accept that theory does not explain the whole of a phenomenon, particularly in the social sciences. Unexplained variance can frequently account for over 85% of phenomena, suggests Greiner (1985), in an insightful critique of the research process. Tashakkori and Teddlie (1998) agree that although there may be causal relationships that govern a (social) situation 'we will never be able to completely pin them down'. In these ways, certain theoretical

---

<sup>1</sup> Project #s refer to Martin (2004a); Company letters refer to Martin (2003a).

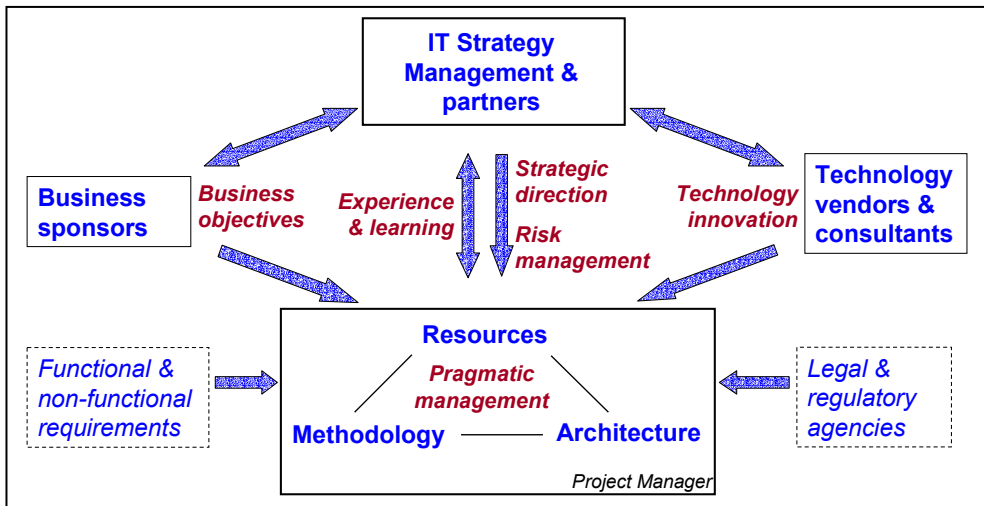


Figure 2: Drivers of IT project design

analyses can justifiably dismiss practical issues as error, noise or ‘contingency’, and this point reflects a significant gap between theory and practice. Perhaps the earlier quotation (A) could be adapted to say ‘In theory, theory explains all of practice; in practice, it doesn’t’.

In addition to the pragmatic considerations that inform IT project design decisions, design is a highly pragmatic process that for instance resolves trade-offs between conflicting influences and constraints (van Vliet 2000 p.293). As an example reported by respondents, there is pressure within IT providers and internal IT units alike to offer staff experience with new technologies, but this is potentially in conflict with delivering low-risk solutions to clients. *“Internal staff would love to be using the latest technologies, contractors love to use the latest technologies. But ... management just want to get the product out of the door.”* (Company A) *“There is a trade-off between skill requirements and education needs.”* (Company B). Design typically involves such trade-offs in a process of ‘exploration of alternative software architectures’ (Ince and Hekmatpar 1988) and of making choices within constraints (CCSE 2003), where ‘attributes determine solutions’ (Gilb 1988 p.162). *“You always end up with pragmatic solutions, compromises, workarounds.”* (Company B). Figure 2 represents ‘pragmatic management’ explicitly in its general model of the process of project design, and Martin

(2003a) argues that it makes the theory more complete to explicitly acknowledge the existence and potential strength of these pragmatic considerations that are felt so strongly by practitioners. Unfortunately the implication of that argument is that ‘pragmatic considerations’ or ‘pragmatic management’ would become a generic appendage to many applied theoretical models. In such general terms this practice would quickly lose its impact and become redundant. Further, ‘pragmatic management’ makes a relatively weak contribution to the model, since although it recognises that pragmatic management *does* influence design, it does not show *how* it affects project design.

#### Overall

To summarize this section, we have suggested that reasons why ‘pragmatic considerations’ appear to be under-represented in theory may include:

- adopting a selective research focus may exclude important issues
- temporal issues may not generalise
- factors with strong local influence may nevertheless have inconsistent impacts in different contexts
- pragmatic considerations may appear to add only superficial value to interpretive theories.

The issue is partly about what sort of theory is being claimed, and partly about whether the researcher recognizes and acknowledges the influence of pragmatic considerations that might account for any unexplained variance, particularly at the local level. It is acknowledged from the above discussion that such detail may be more appropriately addressed in the discussion section of papers, perhaps in the form of contingency arguments, than in formal models. However it is suggested that pragmatic considerations deserve particular attention on the part of researchers and authors, given that by their nature such factors may ‘escape’ representation in formal causal models.

It would appear so far that pragmatic considerations have little chance of representation in theory. The next section offers some hope by beginning to list and classify some of the pragmatic considerations of IT project design, using specific comments from respondents in the same research project.

### **Classifying pragmatic considerations - a contingency theory perspective**

The respondents in the above work identify a number of considerations that can be considered ‘pragmatic’; these are listed, sourced and classified below. For now the classification is considered to be exploratory in nature, and restricted to the topic of IT project design. By classifying the pragmatic considerations it is hoped that they may become more readily recognised in theoretical arguments.

- 1) **Economic and resource constraints.** Company A chose to develop a bespoke application for a relatively standard application, because although packages existed with the required functionality, they contained much *more* functionality than was required, yet were not commercially available in smaller modules. Similarly Company H desired a package, but the business driven project timescale of 90 days was too short even to configure a package; instead, again, an essential sub-set of the package was developed by bespoke methods. Project #22 reports that *“Many of the design decisions were driven by the client desire for solutions that were not available in the*

*COTS software; this led to the need for bespoke (costly) solutions that both extended timescales and cost; the resolution involved debating the benefit case for the bespoke solution, versus the cost and timescale increase.”* Project #32 notes directly that *“Availability and reliability were key requirements – it is necessary to be pragmatic to achieve these at sensible costs.”* Company I asks *“If this is an off the shelf product, fits this particular business hook line and sinker, what’s the point in forcing that supplier to change their database engine from Ingres and their hardware from RS6000 to Oracle or Sun, on which they have no experience?”*. Project #5 reported that a component design was too theoretical, and that *“flexibility for unknown requirements added too much complexity for the real benefit.”* The comments from Project #8 above also apply here.

- 2) **Organizational politics:** *“SAP was not necessarily the best choice, but was the most politically simple to get through.”* (Company D). Technology projects are by no means immune from political interference. In project #4 an outsourcing provider reported that client politics severely constrained the ability of the architecture to meet requirements. Project #19 reported resistance to the new technology from the IT infrastructure department, and the team in project #7 worried about a potential veto by the ‘official’ IT dept. Project #14 experienced *“political pressures from senior managers to consider the solutions prevalent in their own areas for the company standard.”* Project #22 (another outsourcing provider) reported that *“In some cases internal client political pressure led to the client making what it knew to be the wrong decision benefit and cost wise.”* In project #24 a politically weak technical architect function was *“unable to withstand senior mgmt pressures”*, and project #28 observed that *“Project management as a non technical entity ... can get caught between various conflicting interests without an ability to command the right decisions.”*

- 3) **Legal and regulatory constraints.** Martin (2003a) identified legal and regulatory constraints as something of an afterthought in Figure 2. In the more recent work they have again not appeared to be a consistent factor, although they were reported as strong influencing factors by one government project (#3) and one financial services organisation (Project #7), and are mentioned in other studies, e.g., (Pressman 1997, Wexelblat and Srinivasan 1999). The argument remains that they should be considered as potential factors that would affect some (by no means all) projects directly.
- 4) **Management style.** In projects of any size, the behaviour of management can play an important role in the process and particularly in its success, and so can be seen as a relevant but general influencing factor. Project #4 emphasised the need for a management style that gives the chosen team room to perform their design task, especially to create innovative architecture solutions. It recommends a leadership style that shows confidence and enthusiasm, and notes the need for the management of third parties as well as the internal team. Project #3 reported a high level of teamwork and communication, and in particular learned to “*never underestimate the amount of client engagement required.*”

Practitioners recognise that it is essential to manage such factors well in order to succeed in the project. Yet we are suggesting that since they show their influence differently in each particular situation, they are difficult to represent in theory (especially quantitatively based interpretive theory). In other words, they are *contingent* variables. They can also be seen as *constraints*, and as such they often help to resolve the trade-offs between conflicting requirements. It is noted that classes 1-3 above fall quite neatly into the ‘PESTLE’ framework (adapted from Hitt, Ireland and Hoskisson 1995), commonly used to assess the contingent impact of Political, Economic, Socio-Cultural, Technological, Legal and Environmental issues on business situations. That is not entirely surprising, since these generic contextual factors implicitly informed the original research

questions. However their emergence as explicit pragmatic considerations suggests that contingency models such as PESTLE can be seen as a way to formally represent pragmatic considerations, and in so doing partially bridge the gap between theory and practice. Contingency theory (Burns and Stalker 1961, Lawrence and Lorsch 1967) is an approach that rejects the notion of ‘one best way’. It applies particularly to organisation structures, but parallels this work in that it recognises pragmatic considerations that act non-uniformly in different situations, which has been the concern of this paper. The position of contingency theory in relation to theory and practice is discussed by Dawson (1996 p.139): ‘For the practitioner, however, one must conclude that contingency theory provides a (limited) basis for diagnosis and prescription’ (parentheses added). Some teachers include *management style* as a contingent variable, e.g., (Knutsen 2003), and this is reflected in class 4 above. Further, some writers include *size* as a contingent variable (Burnes 1996 p.60); size is briefly mentioned with respect to IT project design in Martin (2003a) and found to be an issue in Martin (2004b) and perhaps could be assimilated into this classification. Arguably, temporal issues are covered by the same PESTLE model, albeit implicitly; for example the Year 2000 issue could be classified in the ‘Technological’ category.

These classes of factors pertain not only specifically to IT project design, but also generally to IS and more widely within business and social science. By linking in this way with the already established PESTLE model and contingency theory, there is a legitimate route for the expression of pragmatic considerations in discussion and in some theoretical models. Further work will focus more strongly on the relationship with contingency theory, and the extent to which its application can be justifiably transferred from organisation studies to areas such as IT project design (and to more general topics in IS), to deal with pragmatic considerations. It is expected that other examples and possibly even classes of pragmatic considerations and constraints would be needed, to represent a wider range of areas of practice. Further, it is noted that these perceptions on the gap between theory and practice arise principally

from the practitioner viewpoint. This invites a further area for research that investigates comparative perceptions from academics and consultants in addition to practitioners – and that might usefully include novices as well as more experienced players.

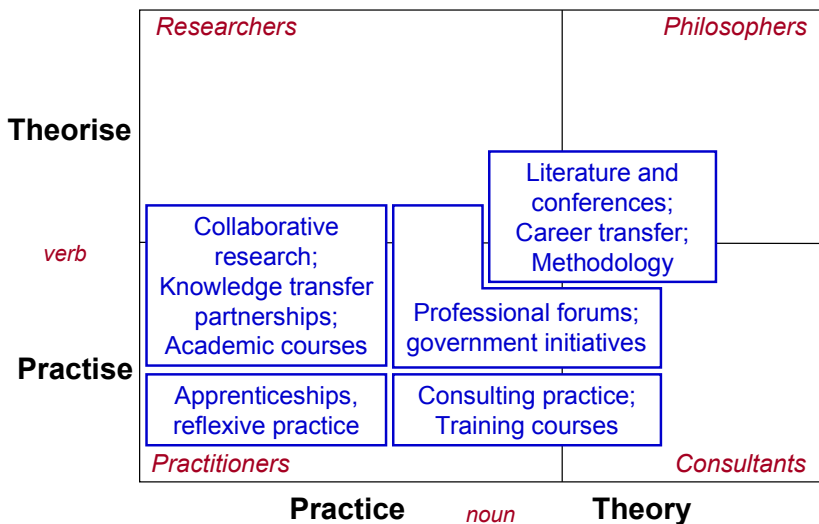
We have addressed above a detailed issue that arises between theory and practice. The next section reviews ways in which the perceived gap between theory and practice can be addressed in more general organisational terms.

**BRIDGING THE GAP IN GENERAL**

Theory and practice are at once both independent and inter-dependent. Although the specialist interests and objectives of practitioner and academic can appear to drive efficiency within their own sector, and there is a legitimate gap between theory and practice, it is argued that both communities benefit from cross-fertilisation of people, work and ideas. Although Burgoyne and Reynolds (1997) support Bromme and Tillema (1995) by arguing that the gap between the theoretical and the practical in the field of management learning is a sign of *maturation* academically, nevertheless they acknowledge that the effort necessary to keep theory and practice

connected has to be greater. Similarly Bromme and Tillema (1995) themselves accept the need to bridge the gap: ‘the fact that a combination of theoretical and practical components of education and training prevails in the most different nations and professions shows that forming professional competence requires both theoretical knowledge and practical experience’...‘It is therefore imperative to clarify the mechanisms and correspondence rules between professional action and theoretical knowledge especially because the professional acts in a field of tension between the two’.

Much cross-fertilisation is already achieved, but more encouragement is needed to cross the divide between theory and practice, to recognise and exploit their interdependence. We therefore discuss briefly and in turn, a range of activities that actually or potentially bridge this gap, including technical, personal, social and institutional initiatives. The activities are sourced from general knowledge rather from the empirical research, but Figure 3 adds value by using the same framework as Figure 1 to position them in the light of the earlier discussion, showing how they represent interactions between practitioners, consultants, researchers and philosophers.



**Figure 3: Bridging the gap**

*Literature and academic conferences, career transfer and methodology*

These three elements make connections between all the actors, and so present a good opportunity for interaction (in theory!). First, the literature has great potential to support interaction between all areas of research and practice. Although a number of academic journals aim explicitly for a practitioner as well as academic audience, in many cases they seem destined to be read only by academics. Further, academic institutional reward structures tend to value practitioner-oriented publications as second rate (Jennex 2001) and thereby discourage academics from contributing in this way. Practitioners cannot by themselves be expected to find time to conform to the rigours of academic publication in order to share their insights, although this issue might be addressed through greater editorial support and greater collaboration with academics. By its nature, sometimes theory has to be abstracted from practice and an independent stream of academic thought has to be maintained. The result is a separation between academically-oriented and practitioner-oriented publications. In order to bridge this element of the gap, academic writers should be encouraged to give greater acknowledgement to pragmatic considerations, as argued above; likewise, practitioner publications could do more to point the reader to relevant theoretical sources. Academic conferences sometimes promote special practitioner streams, but still do not always attract many practitioners to attend. There remains an opportunity and a need for highly regarded intermediary publications that explicitly recognise and demonstrate the interdependence of theory and practice. The literature will increasingly be internet-mediated, and this should encourage the dissemination, discussion, development and application of ideas between researchers, philosophers, consultants and practitioners. Without specific policies and initiatives however, this will not be sufficient to bridge the theory-practice divide.

Second, individuals can carry their experience from one of the four domains across into another, but reward structures and values inhibit career crossover (Borchers 2001, Heart 2001, Jennex 2001). Ormerod (1996)

confirms that the task of individuals who seek to cross the boundary between theory and practice is difficult and frustrating. Such individuals have to be conversant with both worlds in order to establish credibility with practitioners on the one hand (relevance), and academic reviewers on the other (rigour). Nevertheless Ormerod believes that 'there is synergy to be obtained between consultancy and academic activities' and hopes for a practical resolution: 'Life is full of reflexivity and paradox that cannot theoretically be resolved. However, in practice the problems can be ignored and progress made.' (Ormerod 2002 p.356). Governments and employing institutions should support flexible appointment systems that do not penalise career progression and rewards for those who contribute to cross-fertilisation in this way.

Third, some research methodologies are more cognisant of the role of practical issues than others, and explicitly address the interdependence of theory and practice. Action Research, for example, recognises the potential conflict of interest between the advocate (consultant) and non-advocate (researcher) roles for those who would attempt to draw research findings from engagements with practice. Schon (1983 pp.319-320) suggests a similar term of 'Action Science', which has the potential to balance the conflicting demands of relevance and rigour. Action Research in particular has become a recognised approach whereby 'the boundaries between research, theory, and practice are blurred' (Goodman 1985 p.325). Such approaches have their own difficulties, but are to be commended for addressing the gap between the worlds of theory and practice.

*Collaborative research; knowledge transfer partnerships; academic courses*

These three elements make potentially very strong connections between academic researchers/teachers and practitioners. Regarding collaborative research, Greiner (1985) and Seashore (1985) suggest that managers could cooperate in research projects, undertake placements in academia, and sit on editorial boards of major journals. This happens to an extent, but Martin (2004a) for example regrets the lack of readiness of practitioners to participate in research.

Greater encouragement, incentives and flexibility should be given to cross-institutional initiatives such as 'Knowledge Transfer Partnerships' (<http://www.ktponline.org.uk/research/>) which involves government support for applied research collaborations between universities and industry. de Corte (2003 p.50), concerning the example of mathematics education / teacher training, asserts that 'the idea of partnership between researchers and practitioners is also crucial in view of the necessary research-practice reciprocity. Whereas practitioners can help in translating theory into practice, and thus in making classroom teaching more research-based, their partner role can also contribute to make research more practice-driven.'

Although academic courses have great potential contribution to current or future practitioners they are not without criticism. Many years ago Argyris and Schon (1974) advocated the integration of clinical practice into the curriculum to confront espoused theory and teaching with the reality of practice. Schon (1983) goes as far as to claim that 'What aspiring practitioners need most to learn, professional schools seem least able to teach' (Schon 1987 p.8). He is convinced (1983 p.vii) that universities are committed for the most part to 'a view of knowledge that fosters selective *inattention* to practical competence and professional artistry' (emphasis added). 'Polytechnics' differentiate themselves from 'Universities' by adopting a more applied focus (and vice versa) and can make a virtue of it e.g., Worcester Polytechnic Institute – 'A Tradition of Theory and Practice' (<http://www.wpi.edu/About/Intro/introtrd.html>). Mulhaney, Sheehan and Taylor (2001) claim merit for a course 'where academic theories are evaluated against their practical usefulness in each specific situation'. The current debate in the UK concerning the desirability of the government's target of 50% of young people graduating through university, as opposed to gaining vocational qualifications reflects a resurgence of interest in this issue (BBC News online 2004). The involvement of practising craftspersons, professionals and consultants in such courses, in roles of both participant and presenter, is to be encouraged, and Rollier (2001) advocates two-way

periodical internships and exchange programs for staff.

#### *Professional forums and government initiatives*

Institutions such as professional computing societies and governments play a useful role in resourcing and facilitating professional development amongst practitioners, and they frequently also involve consultants and academics. Examples include schemes such as the British Computer Society special interest groups (<http://www1.bcs.org.uk/link.asp?sectionID=574>), standards-setting bodies, e.g., (<http://standards.ieee.org/>, <http://www.w3.org/>) and UK Government funded Knowledge Transfer Partnerships (as mentioned above) are examples of their already significant role.

#### *Consulting practice; training courses.*

The important role of consultants has already been discussed; clearly they have a critical role in knowledge transfer. This can take the form of formal training programmes, or informal and custom knowledge transfer during specific application development or support. Perhaps consultants could be further encouraged to exploit and develop links with theory in terms of literature, methodology, career transfer and applied courses, both contributing and receiving, in order to further facilitate the dissemination of theory into practice.

#### *Apprenticeships and reflexive practice*

Training programmes serve practitioners with specific knowledge, and in part use consultants as mediators between theory and practice. However, there is particularly strong support from the theorists of theory and practice for individual personal partnership arrangements to facilitate individual learning. Schon (1983, 1987) powerfully presents the strengths (as well as some weaknesses) of the master-apprentice coaching role. Such a relationship and process fits the 'socialisation' sector of Nonaka's 'Socialization-Externalization-Combination-Internalization' knowledge conversion model (Nonaka 1995 p.62, after Polanyi 1967). Although apprenticeships and reflexive practice primarily serve the practitioner segment of the model in Figure 3, Schon

advocates the use of a 'reflective practicum' involving this approach as part of university courses in order to 'bridge the worlds of university and practice' (Schon 1987 p305).

Reflexive practice is the 'self-help' solution to bridge the gap. Each individual is increasingly seen as being responsible for developing their own learning: 'All human beings ... need to become competent in taking action and simultaneously reflecting on this action to learn from it' (Argyris and Schon 1974). Rolfe (1997 p.95) also encourages this reflection-in-action / reflexive practice to bridge the gap: 'Informal theory and practice are mutually dependent, however, and follow a circular process, with practice generating theory, theory modifying practice, which generates new theory and so on as mentioned above. The practice emerging from this process will be referred to as reflexive practice, as it not only generates new theory, but is itself reflexively modified by that theory'. Rolfe goes as far as to suggest (p.97) that such an approach can even eliminate the gap between theory and practice. 'Because the theory is reflexive to subsequent changes in the clinical situation, there is no hint of a gap between theory and practice. Indeed, they are two sides of the same coin, and as such, are impossible to separate. Theory and practice are one, and the reflexive practitioner is both researcher and theory-builder.'

#### *Overall*

These areas and mechanisms for interaction between theory and practice are quite general in application, and all can be used to facilitate the learning cycle (Kolb, Rubin and Oslad 1991, Boisot 1995) that itself represents a process of bridging the gap between theory (concepts) and practice (experience). The discussion above shows that a number of mechanisms for interaction already exist, and identifies some of the opportunities and difficulties that they present (though it is beyond our current scope to formally evaluate their contribution towards bridging the gap). It is an obvious point that representation of stakeholders from each sector is likely to add value to any of these mechanisms, in terms of integrating theory and practice. In particular, the framework lends support to initiatives whereby academics are

involved in facilitation of reflexive practice and apprenticeship schemes and practitioners are involved in academic courses. Further, inasmuch as consultants hold a key role in bridging the gap, they need to maintain interactions with theory and the academic world as well as their engagement with client assignments. To be effective, such initiatives need to be embedded in organisations where the culture is receptive to making connections between theory and practice. From a pragmatic point of view, it might be useful for an organisation or individual to try to establish and maintain a balance of inputs and opportunities from across the portfolio.

Although Figure 3 makes the opportunities look like tidy blocks, significant architectural design and building work is required to construct a well-balanced edifice! The framework is presented in general terms, but initiatives can be directed specifically to help develop IS theory and practice, including IT project design; it is recognized that such initiatives are easier to theorise than to practise! There is room for further work to evaluate the extent and the effectiveness to which the IT community currently exploits such mechanisms, perhaps on a regional comparison basis, and to identify opportunities for new initiatives.

## **CONCLUSIONS AND FURTHER WORK**

*Theory without practice is sterile; practice without theory is blind.*

(Attributed variously to Albert Einstein, Mao Tse Tung, Karl Marx, Joseph Stalin, Vladimir Ulyanov (Lenin) and others).

By considering the individual identities and interactions between theory and practice, the paper has refreshed the meaning of each. From a theoretical as well as a practical point of view, it is established that there are clear and legitimate differences between theory and practice. The differentiation exists in most disciplines, not least in the area of IS, and examples have been discussed to make the issue explicit. Both academics and practitioners accept the gap between theory and practice as a 'fact of life', but it is argued that both academics and practitioners should recognise the complementary roles of theory and practice more explicitly and

sympathetically, and reduce the tensions where appropriate. Theoreticians should be careful not to dismiss practical issues as merely the 'error term', and should acknowledge important practical issues that are related to their focus. Journal editors and conference organisers should redouble their efforts to encourage and include practitioner contributions. Consultants, practitioners and professional institutions should recognise the contribution of theory and support its development through participation in research projects wherever possible. Despite being temporal, inconsistent in impact from case to case or lacking in conceptual richness, such issues may be highly relevant to local application of theory. It is suggested that pragmatic considerations for business situations can be classified into politics, economics and resources, legal and regulatory constraints and management style, and may be better expressed as contingency variables according to the 'PESTLE' model. Such an approach may help to legitimise the role of pragmatic considerations and to represent

them more fully and explicitly in theoretical models. The paper has identified areas of potential cross-fertilisation between the worlds of theory and practice, and noted the need for practitioner, consultant, academic and governmental institutions to facilitate, strengthen, enrich and expand these areas. Further work could research more systematically into the gap as perceived by practitioner, consultant, researcher and philosopher. It could apply the ideas for bridging the gap more specifically to IS, and compare with wider disciplines and contingency theory.

Using a variation of quotation (A), we conclude by hoping for a reduction in the perception that

*'In theory, the difference between theory and practice is due to practical considerations that theorists find impractical to fit into their theories'.*

(Huggins, 2003)

## REFERENCES

- Argyris, C. and D.A. Schon, *Theory in Practice: Increasing Professional Effectiveness*, Jossey-Bass, 1974.
- Argyris, C., "Making knowledge more relevant to practice: Maps for Action", in Lawler III, E.E., A.M. Mohrman Jr., S.A. Mohrman, G.E. Ledford Jr., T.G. Cummings, and Associates (eds.) *Doing Research that is useful for theory and practice*, Jossey-Bass, 1985, pp. 79-115.
- Asrlihant, B., *Decision Support and Strategic Project Management in the UK Upstream Oil and Gas Sector*, Unpublished PhD Thesis, University of Warwick, UK, 2001.
- Avison, D., "The 'Discipline' of Information Systems: Teaching, Research, and Practice", in Mingers, J. and F. Stowell (eds.) *Information Systems: An Emerging Discipline?* Maidenhead: McGraw-Hill, 1997, pp. 113-136.
- Backhouse, J., Liebenau, J. and Land, F., "On the discipline of information systems", *Journal of Information Systems*, 1991, 1:1, pp. 19-27.
- Badrinathan R., "Looking beyond the year 2000", 1999, Available at: <http://www.timescomputing.com/19990415/erp1.html>: Times Computing, last accessed April 2004.
- BBC News Online, "Student target wrong – businesses", Available at: <http://news.bbc.co.uk/1/hi/education/3643949.stm>, 2004, last accessed April 2004.
- Boisot, M. H., *Information Space: A Framework for Learning in Organizations, Institutions, and Culture*, London: Routledge, 1995.
- Borchers, A., "Relevance: another thought", ISWorld e-mail, Sat 17 Feb 2001. Available at: <http://www.commerce.uq.edu.au/isworld/research/msg.22-02-2001.html>, 2001, last accessed April 2004.
- Bromme, R. and H. Tillema, "Fusing experience and theory: The structure of professional knowledge", *Learning and Instruction*, 1995, 5, pp. 261-269. Also available at <http://wwwpsy.uni-muenster.de/inst3/AEBromme/web/veroeff/1995/Bromme1.htm>, last accessed April 2004.
- Burgoyne, J. and M. Reynolds, (eds.) *Management learning: integrating perspectives in theory and practice*, London : Sage, 1997.

- Burnes, B., *Managing Change: A strategic approach to organisational dynamics*, (2-Ed.), London: Financial Times, 1996.
- Burns, T. and G.M. Stalker, *The Management of Innovation*. Tavistock: London, 1961.
- Carmines, E.G. and R.A. Zeller, *Reliability and Validity Assessment* (1st ed.) University of Iowa: Sage Publications, 1979 (quoted in Asrilhant 2001, op. cit.).
- CCSE (Computing Curriculum Software Engineering), “Software Engineering Education Knowledge (SEEK) Areas”, 2003, Available at: <http://sites.computer.org/ccse/known/KADescriptions.htm>, last accessed April 2004.
- Checkland, P. and S. Holwell, *Information, Systems and Information Systems: making sense of the field*. Chichester: Wiley, 1998.
- ComputerGram International, “ERP market won't slacken after year 2000”, 1998, Available at: [http://www.findarticles.com/cf\\_dls/m0CGN/n157/20997537/p1/article.jhtml](http://www.findarticles.com/cf_dls/m0CGN/n157/20997537/p1/article.jhtml), last accessed April 2004.
- Cummings, T.G., S.A. Mohrman, A.M. Mohrman Jr. and G.E. Ledford Jr., “Organization Design for the Future: A Collaborative Research Approach”, in Lawler III, E.E., A.M. Mohrman Jr., S.A. Mohrman, G.E. Ledford Jr., T.G. Cummings, and Associates (eds.), *Doing Research that is useful for theory and practice*, Jossey-Bass, 1985, pp. 275-305.
- Dawson, S., *Analysing organisations*, 3-Ed., Houndmills: Macmillan, 1996.
- de Corte, E., “Intervention research: a tool for bridging the theory-practice gap in mathematics education”, in Rogerson, A. (ed.), *Proceedings of the International Conference: The decidable and the undecidable in Mathematics Education*, Brno, Czech Republic, September 2003 (The Mathematics Education into the 21st Century Project), pp. 45-55.
- Dorda, S.C., J. Robert, and R. Seacord, “Theory and Practice of Enterprise JavaBean Portability”, Technical Note CMU/SEI-99-TN-005, Pittsburgh: Carnegie Mellon Software Engineering Institute, 1999. Also available at: <http://www.sei.cmu.edu/pub/documents/99.reports/pdf/99tn005.pdf>, last accessed April 2004.
- Earl, M.J., *Management Strategies for Information Technology*, Prentice Hall, 1989.
- Fitzgerald, B., “The use of systems development methodologies in practice: a field study”, *Information Systems Journal*, 1997, 7, pp. 201-212.
- Fook, J. *Social Work: Critical Theory and Practice*, London: Sage, 2002.
- Galliers, R.D., “Choosing Appropriate Information Systems Research Approaches: A Revised Taxonomy”, in Nissen, H-E., H.K. Klein and R. Hirschheim (eds.), *Information Systems Research: Contemporary Approaches and Emergent Traditions, Proceedings of the IFIP TC8/WG 8.2 Working Conference*, Copenhagen, Denmark, 14-16 December, 1990, North-Holland, Amsterdam, 1991, pp. 327-345.
- Gilb, T., *Principles of Software Engineering Management* (edited by Susannah Finzi). Wokingham: Addison-Wesley, 1988.
- Goodman, P.S., “Critical Issues in Doing Research that contributes to theory and practice”, in Lawler III, E.E., A.M. Mohrman Jr., S.A. Mohrman, G.E. Ledford Jr., T.G. Cummings, and Associates (eds.), *Doing Research that is useful for theory and practice*, Jossey-Bass, 1985, pp.324-345.
- Greiner, L.E., “Response and Commentary to Pettigrew”, in Lawler III, E.E., A.M. Mohrman Jr., S.A. Mohrman, G.E. Ledford Jr., T.G. Cummings, and Associates (eds.) *Doing Research that is useful for theory and practice*, Jossey-Bass, 1985, pp. 249-259.
- Hartwig, G.A., “Thoughts on Design Theory and Practice”, 2001, Available at: [http://www.gunthar.com/gatech/design\\_theory-practice.html](http://www.gunthar.com/gatech/design_theory-practice.html), last accessed April 2004.
- Heart, T., “Re: IS Relevance (maybe we're asking the wrong questions)”, ISWorld e-mail, Thu. 15 Feb 2001, Available at: <http://www.commerce.uq.edu.au/isworld/research/msg.22-02-2001.html>, last accessed April 2004.
- Hitt M.A., R.D. Ireland and R.E. Hoskisson, *Strategic Management: Competitiveness and Globalization*, St Paul Minnesota: West, 1995.
- Huggins, J. “Some Humorous Stories”, 2003, <http://www.kettering.edu/~jhuggins/humor/theory.html>, last accessed April 2004.
- Ince, D.C. and S. Hekmatpar, “An Approach to automated software design based on product metrics”, *Software Engineering Journal*, March 1988, pp. 53-56.

- James, W., *Pragmatism*, Cambridge, Mass: Harvard University Press, 1975.
- Jennex, M., "Re: IS Relevance: Beyond the business of business", ISWorld e-mail, Fri. 16 Feb 2001, Available at: <http://www.commerce.uq.edu.au/isworld/research/msg.22-02-2001.html>, last accessed April 2004.
- Knutsen, L.A. "Organisation Theory and Design lectures", Aarhus School of Business, 2003, Available at: <http://www.org.hha.dk/org/ha/Spring2003/OT&D%20-%20lecture%202.pdf>, last accessed April 2004.
- Kolb, D. A., I.M. Rubin and J. M. Osland, *Organizational Behaviour: An Experimental Approach*, 5<sup>th</sup> Edition, Englewood Cliffs, New Jersey: Prentice Hall, 1991, p. 59.
- Lawler III, E.E., "Challenging Traditional Research Assumptions", in Lawler III, E.E., A.M. Mohrman Jr., S.A. Mohrman, G.E. Ledford Jr., T.G. Cummings, and Associates (eds.) *Doing Research that is useful for theory and practice*, Jossey-Bass, 1985, pp. 1-17.
- Lawrence, P. R. and J.W. Lorsch, *Organization and Environment*. Boston, USA: Harvard Business School, 1967.
- Macro A. and J. Buxton, *The Craft of Software Engineering*, Wokingham: Addison-Wesley, 1987.
- Markus, M. L. and C. Tanis, "The Enterprise Systems Experience – From Adoption to Success," in Zmud, R. W. (ed.), *Framing the Domains of IT Research: Glimpsing the Future Through the Past*, Cincinnati, OH: Pinnaflex Educational Resources, 2000, pp. 173-207.
- Markus, M.L., S. Axline, D. Petrie, and S.C. Tanis, "Learning from adopters' experiences with ERP: problems encountered and success achieved", *Journal of Information Technology*, 2000, 15: 4, pp. 245-265.
- Martin, A., "What drives the configuration of Information Systems Development projects? Exploratory Research in ten organizations", *Journal of Information Technology*, March 2003, 18, 2003a, pp. 1-15.
- Martin, A., "Is practice just an error term, in theory?", in Levy, M., A. Martin and C. Schweighart (eds.), *Proceedings of UKAIS 2003, Eighth Annual Conference of the United Kingdom Academy for Information Systems*, University of Warwick, 9-11 April 2003, CD-ROM, (2003b).
- Martin, A., "What factors determine the configuration of IT projects? Results from a UK survey", Warwick Information Systems Research Paper 2004/12. Information Systems Research Unit, Warwick Business School, 2004a.
- Martin, A., "IT project configuration: success through maturity", Warwick Information Systems Research Paper 2004/13. Information Systems Research Unit, Warwick Business School, 2004b.
- Martin, A. and M. Chan, "Information Systems Project Redefinition in New Zealand: will we ever learn?", *Australian Computer Journal*, Feb 1996, 28:1, pp. 27-40.
- McGaughey, R., "Re: IS Research Relevance", ISWorld e-mail, Fri 9 Feb 2001, Available at: <http://www.commerce.uq.edu.au/isworld/research/msg.22-02-2001.html>, last accessed April 2004.
- Mingers, J. and F. Stowell, "Information Systems: An Emerging Discipline? – Introduction", in Mingers, J. and F. Stowell, (eds.), *Information Systems: An Emerging Discipline?* Maidenhead: McGraw-Hill, 1997, pp. 1-15.
- Mingers, J., "Real-izing Information Systems: Critical Realism as an Underpinning Philosophy for Information Systems", in Applegate, L., R. Galliers and J. I. DeGross (eds.), *Proceedings of the Twenty-Third International Conference on Information Systems*, Barcelona: December 15-18 2002a, pp. 295-303.
- Mingers, J., "Reply to Ormerod – the importance of being real", *Journal of the Operational Research Society*, 2002b, 53:3, pp. 351-354.
- Mulhaney, A., J. Sheehan and M. Taylor, "Closing the Gap Between Theory and Practice", *Business Education Support Team conference*, Windermere 2001. (Learning and Teaching Support Network), Available at: <http://www.business.ltsn.ac.uk/events/BEST%20conference/papers/mulhaney.pdf>, last accessed April 2004.
- Nonaka, I. and H. Takeuchi, *The Knowledge-Creating Company: how Japanese companies create the dynamics of innovation*, New York; Oxford: Oxford University Press, 1995.
- Ormerod R.J., "Combining management consultancy and research", *Omega* 1996, 24, pp. 1-12.
- Ormerod, R.J. "Viewpoint - Response to Mingers - An overarching philosophy for OR/MS-Sed Quis Custodiet Custodes?", *Journal of the Operational Research Society*, 2002, 53:3, pp. 354-357.

- Paulk, M.C., B. Curtis, M.B. Chrissis and C.V. Weber, "Capability Maturity Model, Version 1.1", *IEEE Software*, 1993, 10:4, pp. 18-27.
- Peppers, K., "There Is Nothing So Practical As Good Theory: Exploring the Conjecture," *Journal of Information Technology Theory and Application (JITTA)*, 2003, 5:3, pp. v-vi.
- Polanyi, M., London: Routledge and Kegan Paul, 1967.
- Pressman, R. S., 4th Edition, McGraw-Hill, 1997.
- Rice, R., "Written on the Body : Literary Theory and Critical Practice", 2000, Available at: <http://www.umpl.maine.edu/~ricer/theory/theory.htm>, last accessed April 2004.
- Rolfe, G., "Beyond expertise: theory, practice and the reflexive practitioner", *Journal of Clinical Nursing*, 1997, 6, pp. 93-97.
- Rollier, B., "Re: Practical Work Experience", ISWorld e-mail, Sat. 17 Feb 1002, Available at: <http://www.commerce.uq.edu.au/isworld/research/msg.22-02-2001.html>, last accessed April 2004.
- Schon, D.A., *The Reflective Practitioner: How Professionals Think in Action*. London: Temple Smith, 1983.
- Schon, D.A. *Educating the Reflective Practitioner: Toward a new design for teaching and learning in the professions*. San Francisco: Jossey-Bass, 1987.
- Seashore, S.E., "Institutional and Organizational Issues in Doing Useful Research", in Lawler III, E.E., A.M. Mohrman Jr., S.A. Mohrman, G.E. Ledford Jr., T.G. Cummings, and Associates (eds.) *Doing Research that is useful for theory and practice*, Jossey-Bass, 1985, p. 50.
- Sommerville, I. *Software Engineering*. 5th Edition, Addison-Wesley, 1996.
- Sutton, R.I. and B.M. Staw, "What Theory is Not", *Administrative Science Quarterly* 1995, 40, pp. 371-384.
- Tashakkori, A. and C. Teddlie, *Mixed Methodology: Combining Qualitative and Quantitative Approaches*, Sage, 1998.
- Truex, D., R. Baskerville and J. Travis, "Amethodical systems development: the deferred meaning of systems development methods", *Accounting Management and Information Technologies*, 2000, 10, pp. 53-79.
- Van Vliet, H., *Software Engineering: Principles and Practice*, (2-Ed.), Chichester: Wiley, 2000.
- Vaughan, D., "Theory Elaboration: the Heuristics of Case Analysis", in Ragin, C. and H. Becker (eds.), *What is a Case?*, Cambridge University Press, Cambridge MA, 1992, pp. 173-202.
- Waarts, E., Y. M. van Everdingen and J. van Hillegersberg, "The dynamics of factors affecting the adoption of innovations", *The Journal of Product Innovation Management*, 2002, 19, pp. 412-423.
- Walsham, G., "Interpretive case studies in IS research: Nature and method", *European Journal of Information Systems*, 1995, 4:2, pp. 74-81.
- Ward, K. and T. Grundy, "The Strategic Management of Corporate Value", *European Management Journal*, 1996, 14:3, pp. 321-330. (Quoted in Asrilhant 2001, op. cit.).
- Wexelblat, R.L. and N. Srinivasan, "Planning for information technology in a federated organization", *Information and Management*, 3 May 1999, 35:5, pp. 265-282.
- Willcocks, L.P. and M.C. Lacity, *Strategic Sourcing of Information Systems: Perspectives and Practices*, Wiley, 1998.
- Yin, R.K. *Case Study Research: Design and Method*, 2nd Edition, Sage Publications, Beverly Hills, CA, 1994.

**AUTHOR**



**Andrew Martin**; MA (Cambridge), Dip Management Studies, MBCS is a Lecturer in Computing and Information Systems at the University of Warwick, UK. Formerly a Systems Project Leader with Lucas Girling Ltd, he

joined Warwick Business School in 1986. His academic interests include: design, development, evaluation and facilitation of business simulations for education, training and team building; theoretical and practical issues in information systems development and management including project design, project management, project success and failure, and e-business; and the development of desktop and internet-based support systems for creative exploitation of IT.