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**Towards a Model for IS Research Methodology Selection: The Effect of
Epistemology Choice on a Consolidated Research Evaluation Tool**

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Master of Business Science
in
Information Systems

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Preface

I confirm that this research report is my own unassisted work. The Harvard style of referencing has been used to provide detailed citations of all sources that were consulted during this research project.

I would like to thank the following friends and colleagues for their contributions:

- My supervisor, Prof Mike Hart, for his advice, help, and support.
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Abstract

Information Systems research is, for want of a better word, inadequate. Whilst there is nothing wrong with the quantity of the output or the abilities of the researchers themselves, the irrelevance (to practitioners) of much of the research has rendered it largely incapable of serving and supporting the Information Systems industry, a task that should be considered its primary objective.

This dissertation aims to partially address this issue by analysing the role that methodology and epistemology has to play in the production and publishing of Information Systems research. It does this by analysing the different epistemologies (positivism, interpretivism, and critical research) and then estimates the effect their respective selections will have on Information Systems research by measuring their impact on a consolidated measure created in this research. This measure incorporates 17 different evaluative criteria, on 10 of which epistemology choice is deemed to have an impact. Through a thorough analysis of the theory, the respective effects of the different epistemologies are proposed and validated using 6 previous best paper winners published from 1993-1997.

Ultimately, the paper infers that there is indeed a lack of relevance in Information Systems research, and that widely accepted evaluative tools for Information Systems research and a model for Methodology Selection could go some ways to rectifying the situation. Ways in which these tools could be engendered are suggested. Finally, the paper contends that Critical Research most adequately accommodates the needs of Information Systems researchers with regards to serving the IS industry, and should be promoted and most widely used amongst students and researchers alike.

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1 – Introduction

1.1 – Overview

This introduction outlines some of the fundamental issues facing Information Systems research, in particular problems the discipline faces with regards to methodology and epistemology. It details the methodology debate, which has been ongoing for about twenty years with still no resolution in sight, and suggests reasons why this has been an ongoing issue in Information Systems. This is followed by a general discussion of the design of this research, and an explanation of what has been attempted in it.

1.2 – Research and Information Systems

Methodology has become a bugbear of Information Systems research (Jones, 2004). The lack of consensus over which methodology is best or most appropriate, and the emphasis placed on methodology in research, has rendered much of that research incapable of performing its primary objective: the servicing and support of the Information Systems industry (Galliers & Land, 1987, Bacon & Fitzgerald, 2001). Whereas other industries are sufficiently supported by their respective academics (e.g. the medical industry is well served by medical researchers), and in turn provide those academics with relevant problems and research areas, Information Systems research has become characterised by a Disconnect between practice and research (Moody, 2000) (see Figure 1). Simply put, the irrelevance, unsuitable nature, and poor timing of IS research has forced IS practice to perform its own (often poor) analysis of problem areas in Information Systems.

Part of the reason for this is the significant amount of pressure put on Information Systems researchers, by journals and peers, to publish overly rigorous and inapplicable research (Fitzgerald & Howcroft, 1998a), whilst practical areas of concern are ignored. This situation has arisen due to a number of factors, chief among which is the difficulty Information Systems has faced in establishing itself as an academic discipline in its own right (Khazanchi & Munkvold, 2000).

The lack of recognition with which the field of Information Systems had to deal has resulted in research that has become more focussed on the process and particulars of the research itself than any problems it may, or should, be trying to address. In particular, rigour has been adopted as the primary method for achieving recognition of IS as an academic discipline (Khazanchi & Munkvold, 2000).

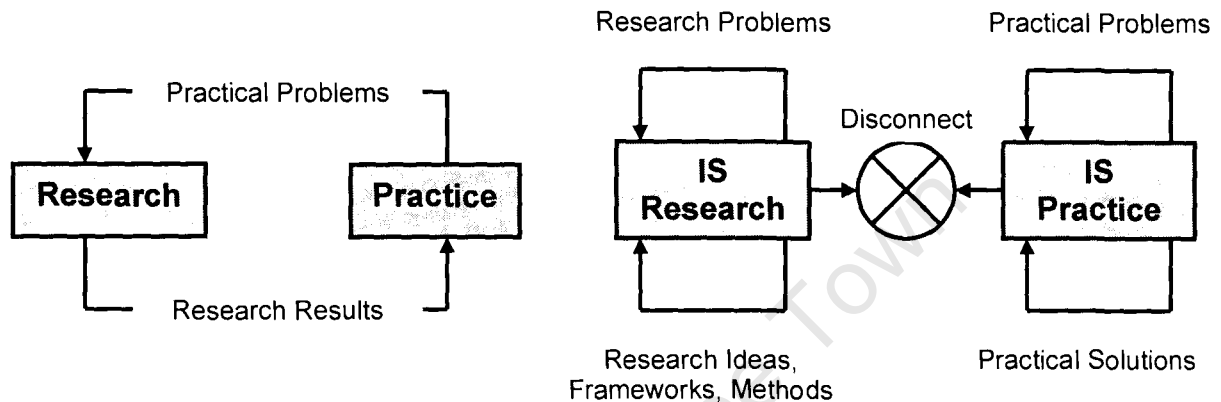


Figure 1: The disconnect in IS research (right), compared with how the situation should be (Adapted from Moody, 2000)

The academic nature of early Information Systems research was essential in helping Information Systems become regarded as a discipline by other scientific fields. This has helped engender the present situation whereby a vast amount of research has gone into research itself (Vessey, Ramesh & Glass, 2002); it has also contributed to the present situation in Information Systems where there is no single underlying framework in the field (Bacon & Fitzgerald, 2001), which in turn has led to a certain amount of confusion and lack of support from academia in Information Systems. From this multitude of research into research, one of the continuously recurring (the last twenty years at least) areas of interest has been the methodologies and epistemologies adopted by Information Systems researchers, and their respective pros and cons.

Despite all this research, after more than two decades of publications there is still just as much confusion and doubt in the methodology debate as there was in the beginning (Sørensen, C., Whitley, E.A., Madon, S., Klyachko, D.,

Hosein, G. & Johnstone, J. 2001). Indeed, the creation and addition of new methods, methodologies and epistemologies, coupled with new discoveries and revision in the established research methods has only served to make the situation more complex. So why has the methodology debate become so prevalent in Information Systems research, and what effect is it having on Information Systems research as a whole?

1.3 – The Methodology Debate

Essentially, the methodology debate has become so prominent in Information Systems research (although this debate is by no means unique to the Information Systems field) because it represents an argument that will almost certainly never be resolved (Fitzgerald & Howcroft, 1998a). Up until now, virtually all research into the benefits and disadvantages of various methodologies has been based on the individual subjective opinions of different researchers, generating a large mass of unrelated and differently presented literature on Information Systems methodology. There has been little or no attempt at any consensus within the field, and little has been done to make methodology choice easier, simpler, and more straightforward for the Information Systems researcher (Galliers & Land, 1987). This is evidenced by the current situation with regards to publishing research in Information Systems, which requires researchers to be ultra rigorous and systematic in the design of their research (often at the expense of the findings themselves), using (or wasting) time and resources that could be better spent solving current and rapidly developing problems (Grover, Linder, Mendelson, Senn & Sviokla, 1999). For new researchers (or students) particularly, this can be a daunting and odious task; the amount of time spent on learning and designing a research methodology substantially adds to the length of time it takes to complete and publish a paper (Heiskanen & Newman, 1997). In the high paced industry of Information Systems, this length of time can mean the difference between a practitioner receiving and utilising that research or not (Benbasat, Goldstein & Mead, 1987).

Unfortunately, this wasted time has become almost mandatory. Methodology can have a significant effect on the publishing possibilities of a researcher's

manuscript. Evaluators will have specific preferences and standards, and there is little or no pressure on these evaluators to be objective (barring the limits imposed on them by professional ethics). Indeed, their mere existence as evaluators implies that their opinions and positions have an inherent value attached to them that is vital in evaluating research. However, this subjectivity is a large weakness in the peer review system, and has been proven prone to failure in the past (Wood, Roberts & Howell, 2004). Researchers, in order to improve the chances of their research being published, have to spend valuable time and resources in satisfying and conforming to the reviewer's methodological requirements. Added to this inherent bias in reviewers is the fact that many evaluators are likely to be prejudiced against an article that has not demonstrated an extremely rigorous research design, regardless of the findings or other qualities of that paper. This is particularly true in the high level journals such as MISQ. Despite the fact that many researchers have bemoaned the over-emphasis on rigour in Information Systems research, it is still in many cases a primary benchmark of being published (Benbasat & Zmud, 1999).

The prominence of methodology and rigour in research is (or can be seen as) a distraction, detracting from the real issues of relevance and contribution (Khazanchi & Munkvold, 2002); this over-focus can even result in a decrease in value of the research being conducted. Information Systems is in need of a consensus of precisely what the stated goals of Information Systems research are, and what research methods would satisfy those goals. Current literature would seem to suggest that every effort should be made to make Information Systems research as relevant to business as possible. Having said that, it should not be considered strictly necessary to have real world applications in Information Systems research (Zmud, 1998, Dennis, 2001). Allowing Information Systems to assume the dual role of being both a pure and an applied discipline may allow for some resolution in the rigour/relevance argument, whilst at the same time allowing researchers the freedom to conduct their research according to their preferences. There is, however, the argument that Information Systems should remain an applied discipline only, using theory from other disciplines to solve real-world problems (Moody,

2000). Although this might render the research more relevant, relevance should not be considered all-important. It is vital that some balance be reached between the demands of the academic world and the needs of Information Systems practice. In this regard, the correct (or most appropriate) epistemology and methodology choice can play a big role in attaining this balance.

The methodology debate has primarily revolved around the respective advantages and disadvantages of quantitative and qualitative research (Fitzgerald & Howcroft, 1998a). This can be further broken down into the advantages and disadvantages of positivist research and interpretivist and critical research, the three most widely regarded epistemologies. Essentially, one of the foremost pillars of the methodology debate is whether or not Information Systems, as a discipline, should be concerned with numbers and hard data, or the softer, more humanistic side of research (Fitzgerald & Howcroft 1998a). Proponents of the former are more likely to prefer a positivist approach to research, whereas researchers who consider the latter more important are more likely to conduct interpretive studies. In a discipline conducted predominantly in the sphere of technology and technology-affected areas, can we afford to ignore the raw data and explicit findings that quantitative research provides us with? At the same time, however, is it not one of the primary goals of Information Systems to assess the impact of technology on the human, organisational, and social world (Khazanchi & Munkvold 2000)? How is it possible for us to do this if we insist on reducing human cognition to numerical statistics? The crux of the methodology debate thus lies in the dualistic nature of Information Systems itself, which in turn also allows us to see why a resolution to the debate is almost impossible without some redefining of what Information Systems is.

1.4 – Methodologies in Information Systems

It is easy to see why certain methodologies have been the foremost solutions employed by researchers in the past, as it is to see why there is such a vehement argument as to which methodology is 'correct'. Quantitative and qualitative research occupy two extremes of the research debate, and anyone

with leanings towards one side or the other is unlikely to retract their opinion on which methodology is better (Fitzgerald & Howcroft 1998a), regardless of what new evidence is unearthed or new theory proposed. It may be possible, however, to attain some resolution as to what effect the researcher's choice of epistemology will have on his or her research being published, widely read, and utilised by industry.

The initial purpose of this research is to consolidate the research that has been done on the effect that epistemology choice can have on Information Systems research. This will be done by first analyzing the different aspects that make up published research, followed by estimating the importance of each of these aspects to any particular piece of research (which allows us to enumerate aspects of the measure, thus creating a metric). This will afford us a consolidated measure for Information Systems research that will be referred to as Long-Term Use. Once this has been ascertained, Long-Term Use will be analysed to see which variables in it are affected by epistemology choice, after which the different epistemologies will be analyzed, so as to determine their effect on Long-Term Use. This will allow us to establish what the ramifications of our epistemology choices are, and thus aid us in determining what methodologies we use in the future. This is a vital step in realising the long-term goal of creating a model for methodology selection. The creation of such a model would act to make the selection and design of research methodology less central and time consuming than it currently is, allowing researchers to focus on serving the Information Systems Industry, and providing solutions to any practical problems experienced in that industry. Information Systems research can only start attempting to achieve its true potential when methodology becomes a background issue.

1.5 – The Design of this Research

This research takes the form of several iterative steps, each of which contributes in a different way to the conclusions that it reaches, as opposed to a more structured approach by which the chapters would follow on from each other. The literature review is, effectively, spread across these chapters, so as to support any inferences made in them, whilst at the same fulfilling the stated

goal of consolidating previous research into Information Systems epistemologies and methodologies. These chapters will be followed by an analysis of different articles in Information Systems literature that have been conducted according to the different epistemologies in order to validate or contradict the findings of this research. The most prominent among the findings is a table allowing for a consolidated view of the net effects that epistemology choice will have on Information Systems research, and in particular the different variables included in Long-Term Use.

In contrast to the stated goals and statements in this paper, this research will have little relevance to practitioners, although any consequences of the findings of this paper will, hopefully, result in Information Systems research of greater worth to the Information Systems industry. This research is primarily aimed at academics and researchers, particularly beginners and new researchers, as it provides a background to the problems and choices in Information Systems research, whilst at the same time facilitating and aiding in any research design and structure decisions that the researcher needs to make.

1.6 – Summary

Methodology, whilst perhaps not being the primary concern of Information Systems researchers or practitioners, is still an ongoing problem in the discipline, which should be resolved as soon as possible, so as to allow Information Systems research to better serve Information Systems practice. The problems with methodology have come about primarily through Information Systems academia's overly significant stance on rigour and methodology, and the problems Information Systems originally faced in establishing itself as a discipline in its own right. This has resulted in research being published that is not relevant to practitioners, and is not advancing the Information Systems field sufficiently.

This research looks at problems with regards to methodology in Information Systems, and suggests ways and methods that these problems can be combated and overcome.

2 – A History of Methodology in Information Systems research

2.1 – Overview

This chapter provides a literature review of methodology in Information Systems, detailing the different epistemologies that have been established in Information Systems, as well as describing the trends that have come and gone in Information Systems research. It also sketches the outline for a possible solution to the methodology debate, as well as detailing the problems with measuring Information Systems research, and the lack of high quality metrics available for such a purpose.

2.2 – The Nature of Information

Information Systems research has been the focus of a huge amount of attention in recent years (Fitzgerald & Howcroft, 1998b), with little of it providing a viable solution to the confusion present in Information Systems research. So much research has been done on research itself that it almost qualifies as a research area in its own right (Moody, 2000). This research focuses on Long-Term Use, a derived metric, as a measure for Information Systems research, and the effect that epistemology choice would have on it, as a means towards creating a systematic model for methodology selection, in order to aid researchers in their methodology choice and design.

The literature review will be somewhat stilted. On one side, so much research has previously been published on the merits and demerits of certain methodologies and epistemologies that to attempt to summarise them all would be counterproductive in terms of the goals of this dissertation. At the same time, there is little research on the evaluation of the effect that methodology choice has and can have on a certain subject. Up till now, the majority of research has focused on the benefits of methodology with regards to findings and data quality. These are contentious issues, as the quality of findings and data will often come down to personal opinion.

This research has been designed so as to isolate the variables of measurement that can be (both objectively and subjectively) evaluated with regards to the effect that epistemology choice will have on them. Through this it is possible to design a framework outlining the effects that epistemology choice will have on research; this will aid in the end goal of designing a model that will aid in epistemology and methodology selection. It is important to note that the effects that epistemology is deemed to have on research will by no means be hard and fast rules for epistemology choice, but should rather be viewed as guidelines to aid researchers in choosing an epistemology according to their specific preferences.

Along with epistemology and methodology, however, comes the question over ontology, defined in this research as being that which represents our fundamental assumptions regarding the nature of the world in which we live (Alexander, 2002). An epistemology flows from one's own personal ontology, and from there influences one's choice of methodology. Under these circumstances, a debate about epistemology and methodology choice would be largely irrelevant, as they would, by definition, have to flow from and conform to one's ontology. The reality of the situation is different, however, as one's ontology would not lead unerringly to a singular epistemology and methodology choice, and the advantages and methods associated with the different options may attract researchers with different ideas about information, but not necessarily different ontological points of view.

Should this research not then consider ontology in its analysis or research methods? Indeed, an investigation into the different established ontologies may aid researchers in deciding their own particular worldviews, but should not influence it. Whereas this research aims to guide and enlighten readers as to the respective features of the different epistemologies, ontology is largely a personal choice (or point of view), and would or should not be affected by the findings in this research. Therefore, discussions about ontology have been largely ignored, and instead the analysis of the different epistemologies and methodologies has been done in such a way as to maximise the possibilities and findings that a researcher's particular ontology will allow.

Discussions about ontology and epistemology are of course centred on research. It is important, therefore, to uncover the situation with regards to research trends and practices in Information Systems. This analysis will follow the general Information Systems convention of conforming to Chua's (1986) classification of epistemology into three areas: Positivism, Interpretivism, and Critical Theory. It is with these three epistemologies in mind that the history of Information Systems research will be analysed.

2.3 – Research Methodologies in Information Systems

Up until the 1970's, the predominant method of research in 'technical' disciplines (i.e. Computer Science, Medicine, etc.) was positivist studies (Wilson, 2003), most of them Lab Experiments (Galliers and Land, 1987). Interpretive research was restricted to social sciences such as psychology (and even in these areas there was still a lot of positivist study) (Myers, 1997). The other epistemology, Critical Social Theory, had been developed by the Frankfurt School (established in 1923), and was and is heavily influenced by philosophers such as Sigmund Freud, Max Webber, and Jürgen Habermas (Pather & Remenyi, 2004). Although it has not assumed a significant impact in terms of the number of research papers conducted according to its epistemology, there is growing support for it in Information Systems (Carlsson, 2003). That Information Systems has readily embraced Critical Theory more than other disciplines (Pather & Remenyi, 2004) is an indicator of the difficulties confronted by researchers when conducting research in the IS field, difficulties that have arisen due to the nature of Information Systems itself.

Information Systems, since its distinction in the 1960's as a separate 'discipline' to Computer Science and Information Science (in practice if not in name), has been at the centre of much debate as to whether or not it should be considered an academic discipline in its own right (Khazanchi & Munkvold, 2000). Information Systems has developed into an inter-disciplinary field of study, that touches on, amongst others, psychology, economics, statistics,

and computer science (Moody, 2000). It has been argued that this nature of Information Systems is what prevents it being considered a discipline of its own, whereas others have argued that it is this very aspect of Information Systems that makes it not only a discipline in its own right, but a valuable discipline as well. In the current global context of converging economies, cultures and media, it is potentially important that a field of study exists for the convergence of other disciplines as well. Regardless of the opinions over this debate, which is unlikely to be resolved in the near future (if ever), there exists a significant and ever-growing catalogue of peer-reviewed journal-published literature in Information Systems (Pather & Remenyi, 2004), and the discipline (or field, depending upon one's definitions of the word) looks set to continue.

It is largely the multi-disciplinary nature of Information Systems, however, that leads to the problems that have been encountered amongst IS researchers, and the vast amount of research conducted on methodology in Information Systems. Information Systems, despite starting out as a technological field, has gradually shifted to a more managerial and organisationally focussed field of study (Benbasat, Goldstein & Mead, 1987). Positivist research is more suited to the science disciplines, which tend to eschew personal and human issues in their primarily numbers-based studies. Interpretivism, conversely, is subjective in nature, and not only incorporates unquantifiable variables and measures into its research, but also willingly embraces the bias and preferences of the researcher himself (or herself). Critical Social Theory research differs from Interpretivism (both are qualitative epistemologies) in that its primary goal is the betterment of the human condition and modern society and incorporates both quantitative and qualitative tools in its epistemology, whereas Interpretivism is primarily qualitative in nature, and does not require solutions to problems or situations in its research, but rather aims to fully understand and comprehend the particulars of a situation (Myers, 1997).

These three different epistemologies represent the three primary epistemological choices available to the Information Systems researcher (Habermas' Theory of Communicative Action, should the reader consider it as

a separate epistemology, shall, for the purposes of this study, be considered a subset of Critical Social Theory [Alexander, 2002]). The research debate has thus revolved around which epistemology is best for Information Systems researchers. Epistemology choice, however, has been and is primarily subjective, and is likely to remain so far into the future. There is unlikely to be any agreement or conclusion to the epistemology debate, as any compromise on one's views about epistemology would almost always necessitate a significant change in one's ontology, something that is beyond the scope of a methodology debate.

If there is to be no resolution to the epistemology debate, then there can at least be a solution for reducing the effect it has on Information Systems research. There is too great a possibility that a researcher's work will be biased against or not achieve its potential based on the epistemology and methodology that that researcher has selected. The easiest solution would be the creation and realization of a Methodology Selection Model that would aid researchers (particularly inexperienced researchers or students) in choosing a methodology. This in turn would necessitate an evaluation of how epistemologies affect a paper, and to what degree. Unfortunately, no widely accepted significant metrics or normative standards exist for the measuring of quality and value of a research paper. In the past, reviews of articles and research have always fallen to peers and their subjective evaluation of them (Straub, Ang & Evaristo, 1994).

2.4 – A Possible Solution to the Methodology Debate

The first part of creating a model for methodology selection could be the creation of a consolidated metric for evaluating Information Systems research (in this research referred to as Long-Term Use). Once such a measure has been designed, a system for applying numeric measures to it must be created, followed by an evaluation of what effect epistemology choice will have on the different variables included in that measure. This will allow us to determine the effect of epistemology choice on Information Systems research, and the degree to which it affects that research. Following that, the different epistemologies must each be evaluated with regards to the new measure, to

determine the individual effect of the different epistemologies on the metric. This will then aid researchers in determining the effect of their chosen methodology on their research, and aid them in methodology choice in the future. Ultimately, the evaluation of the effect of epistemology choice on Long-Term Use will aid in the development of a model for methodology selection.

The first problem with this scenario is the lack of accepted metrics that can be used to measure and evaluate Information Systems research. The lack of these measures raises the possibility that no finding in any reviewed research can ever be trusted (Straub, 1989). Even given this situation, however, it is pointless to try and create an objective metric. There is not currently the computer intelligence available to evaluate research fairly and effectively, and having people evaluate research implies that objectivity is not possible. It could be argued that it is not desirable either, as personal perception of a piece of research is ostensibly more valuable than an objective academic evaluation of that same research. There is little point in producing a by-the-numbers piece of research that conforms to academic requirements, but is of little value or appeal to practitioner and academics alike (Benbasat & Zmud, 1999). Information Systems cannot afford to ignore opinions and preferences in favour of numbers and hard facts, therefore any attempts at creating a consolidated research evaluation metric should emphasize that subjectivity is unavoidable in the successful implementation of such a metric.

Of course, there has been a significant amount of research conducted on different epistemologies, but little research into quantifying the effect they have on research. This has created a situation whereby many opinions and contentions exist as to the benefits of different epistemologies, but little consensus as to any 'true' situation. The reasons for this are unclear, although it is clear that, whereas a multitude of research exists on the process and perceived benefits of different epistemologies, no research has provided other researchers with an implementable model for aiding in epistemology selection. It is thus necessary to uncover what has been written about the different epistemologies and their application in Information Systems research, whilst at the same time consolidating any research that has been

done on measuring Information Systems research, so as to be able to estimate any effects that epistemology choice might have on research.

2.5 – The Rise of Epistemology in Information Systems Literature

The decision to break the epistemological gamut into the three paradigms Positivism, Interpretivism and Critical Theory stems from Chua's (1986) research into the possibilities and consequences of performing non-positivist research, and his subsequent distinction of qualitative research as being either interpretive or critical. This view (slightly altered to include positivism in qualitative research as well) has been widely adopted by Information Systems researchers, following Orlikowski and Baroudi's (1991) adoption of Chua's suggestions (Myers, 1997). There had of course been research into different epistemologies in Information Systems prior to this, but the prominence of positivist research in Information Systems up to the mid-1980's rendered any debate relatively insignificant.

Galliers and Land (1987) first brought the debate into the realm of Information Systems by questioning the dominance of positivism in Information Systems research and illustrating that the nature of Information Systems had (by that stage) become more management and organisationally oriented than technology oriented; qualitative research was therefore advocated as a possible solution to the failings of quantitative research in non-quantitative arenas. This led to Kaplan and Duchon's (1988) conclusion that all epistemologies and methodologies are flawed in some way, and that Information Systems should be studied using a variety of approaches, so as to maximise the development of Information Systems as a field. Indeed, the pluralist approach is currently attaining widespread support amongst Information Systems researchers, and is viewed as a possible solution to the methodology debate. The selection of a standard research approach across all Information Systems research would have the advantage of bringing the methodology debate to a close, but would unnecessarily restrict and limit research scope and possibilities. Pluralism as a standard would also require more work and resources from the researcher, and would, at this stage, be

too costly and laborious a process to be considered a viable solution to the methodology debate.

Straub (1989) countered the development of qualitative research somewhat when he called for a renewed look at methodological rigour, and stressed the importance of validated instruments in positivist research, further emphasising the dominance of positivism in Information Systems research. He did, however, bring to attention positivism's inherent weakness of data vulnerability when it is collected or analysed using unvalidated instruments, thereby bringing into focus the advantages of interpretive findings. Lee (1989) also stressed the need for scientific research, and displayed how to achieve scientific rigour in research even in studies of few (or single) cases. Lee (1994) followed this with the assertion that interpretive and positivist methods could be integrated in Information Systems research, further strengthening the claims of pluralists. This came at a time when interpretive studies were gaining a stronger foothold in Information Systems research, and there was a general contention that any resolution to the methodology debate would have to include some kind of amalgamation of the different epistemologies. Orlikowski and Baroudi (1991) supported this contention with their own research that stated that positivism could no longer be viewed as the only option for scientific research, and that a plurality in research design and approach was needed if there was to be any truly effective investigation into Information Systems phenomena.

Alavi and Carlson's (1992) thorough analysis of twenty years of MIS literature found that positivism was the dominant epistemology in use. Conversely to this, however, was the identification of IS Management as a dominant research area, a field of study that positivism does not necessarily suit best. The methodology debate was well entrenched by the mid-90's, and there was seemingly little chance of a solution to the problem; this resulted in a further mass of research-related research, and little or no attention was paid to increasing the relevance or worth of Information Systems research. Fitzgerald and Howcroft (1998a) illustrated the methodology debate by providing two fictitious tales (the tales of P. 'O Sitivist and Ethna O. Graphy) that highlighted

the shortcomings of both positivism and interpretivism. They concluded that no resolution to the debate was foreseeable, and that certain measures, such as integration and pluralism, were more appropriate for the handling of the debate than selecting one epistemology over the other.

The rise of interpretivism in Information Systems research was documented by Walsham (a) in 1995, who touted interpretivism as a possible solution for many of the problems in Information Systems research, claiming that, even as late as the mid-90's, interpretive research was rare. Towards the end of the 90's, the comparative worth of the different methodologies became less important than the evaluation and comparison of studies conducted according to different epistemologies. Klein and Myers' (1999) research into evaluative measures for interpretive studies highlighted the shortcomings of using traditional (positivist oriented) evaluative measures on qualitative research, and proposed a different set of standards for the evaluation of interpretive research.

Further weakening the stance of positivists was Boudreau, Gefen, and Straub's (2001) work into the validation of research instruments, which displayed a lack of effective validation of positivist tools in Information Systems research over the previous five years, further casting doubt on positivist findings. Interpretivism was deemed not to suffer as unduly from these problems, as the subjectivity of the researcher was the prime source of validation, and thus no tool could be used to improve or worsen that validation.

Inevitably, these arguments led to a call for pluralism (or integrationism) in Information Systems research, a viewpoint that has become (comparatively) widely adopted in the past few years. Mingers (2001) advocated the pluralist approach due to the fact that, if nothing else, it would arguably result in better research than a singular paradigm would allow. The methodology debate has become disorderly and less defined than it was 15 years ago, with contributors to the debate hesitant to reproach the opposing side, and thus, an uneasy stalemate has occurred. Despite this arguably being a more

preferable state of affairs to those of the past, we are still left with a huge unresolved issue in Information Systems research that, if anything, is more complex and confusing than when it was first raised 20 years ago.

The methodology debate has taken place during a time when Information Systems research is steadily becoming distanced from Information Systems practice, and the academic concerns over rigour and methodology have done little to improve the situation. Most research on methodologies tended (and tends) to focus on theory, whereas it should have been focusing on methodology for practical purposes. This issue was formally recognised in 1999 when MIS Quarterly published a special issue on Relevance in Information Systems research (including Klein and Myers' work), which chronicled the decrease in relevance to practice that Information Systems research has assumed over the years. The debate over methodology and the subsequent time and resources that have gone into it (little of which has any practical application to practitioners) has in a small way contributed to the current disconnect between practice and academia. With the chances of a widely agreed on resolution to the matter being remote, it is vital that something be done to allay the (somewhat unnecessary) problems that the methodology debate has engendered.

2.6 – Measuring Information Systems research

A great deal of this dissertation focuses on evaluating and measuring research. Despite existing for more than thirty years, there are no reliable metrics or standard evaluative measures for Information Systems research. Metrics for IS research represents one of the most under researched areas in the Information Systems industry. Whereas much research has been done on what makes good research, and the different features that good research includes, very little has been done on how to measure those features. This is possibly because of the inherent difficulties associated with measuring research, or the inability to measure research meaningfully. There is also no consensus over what standards should be included when evaluating Information Systems research (Straub, Ang, & Evaristo, 1994), and thus a situation has occurred whereby different journals have different evaluative

processes and there is little or no agreement amongst researchers as to what exactly constitutes good research. Jones (2004) outlined four components of good research (Research should follow the Scientific Method, Research should fulfil certain criteria, Research should be relevant, Research should employ multiple methods), but these were of little use with regards to the actual measuring of them, and could only be used as subjective guides. Indeed, the inclusion of 'Research should fulfil certain criteria' is far too vague and broad a statement to be included as a measure for Information Systems research, and the general sentiment of the components are likely to be dismissed by interpretivists anyway.

This is not to suggest that measures for IS research must be numerical in nature, nor that all journals should have the same criteria for manuscript evaluation, but some degree of harmony must be achieved if Information Systems research is to become more relevant to practitioners. Whereas many researchers have outlined certain (somewhat obvious) characteristics that should be present in Information Systems research, and others have delved into more obscure measures of quality in research, there has been very little research into what factors of research should be considered when evaluating or conducting research. The scorecards used by different journals (Straub, Ang & Evaristo, 1994) seem to be of an ad-hoc nature, and there appears to be very little validation for the criteria they have chosen to include in their evaluations, due to the vagueness and similarity in many of the terms used..

Aside from this lack of consensus, there is also the difficulty surrounding the viewpoint from which research must be evaluated. Gosain, Lee and Im (1997) pointed out the differences in interest and focus of academic journals and the practitioner press, brought about by insufficient academic research, which has resulted in practitioners and academics having pointedly different views on what constitutes good research. Any measures that would be used would then have to take into account the preferences of the reader. This negates the possibility of having an effective objective measure for Information Systems research, as such a measure would have to decide which audience it is catering to. Thus, there is the need to embrace subjectivity in research

evaluation, and attempt to minimise the negative effects that subjectivity may place on these evaluations (i.e. bias).

2.7 – Summary

There is a great need for IS researchers to know what they should be achieving in their research, and how their research will be evaluated. This need is augmented by the needs of practice for relevant, applicable research. At the same time, the methodology debate, which has so much time and resources donated to it, needs to be resolved or set aside, so that these other problems can be addressed. This research aims to facilitate, and guide the way to, the addressing of these problems.

Methodology has a long, involved history in Information Systems research, and the diversity of researchers' tendencies with regards to research has acted to enforce the notion of a lack on consensus with regards to the 'correct' methodology. That there are no significant metrics to further facilitate the resolution of the methodology debate is a problem that needs to be addressed, and will be partly done so in this research.

3 – Information Systems Research Epistemologies

3.1 – Overview

This chapter provides a brief overview, including the benefits and disadvantages, of the different epistemologies used in Information Systems. It also provides a background to why the chosen epistemologies were selected, and why other methodologies were excluded.

3.2 – Epistemologies in Information Systems

Before the construction of Long-Term Use and identifying what variables in Long-Term Use are affected by epistemology choice, it is important to further analyse the different epistemology options to determine the effect their selection would (probably) have on Information Systems research.

Obviously, certain topics and research areas call for specific epistemologies (Benbasat, 1984, as cited in Benbasat, Goldstein & Mead, 1987). For the most part, however, many research options exist for any specific problem, and it is up to the researcher to decide which he or she would be most capable and comfortable with, and which research option would be best for that research.

This research now aims to determine, primarily through an analysis of the relevant literature, what the effect of the different epistemologies might be on one's research. In doing so, it may be possible to determine which epistemology would have the greatest net positive effect on the Long-Term Use of one's research, and thus possibly aid a researcher in reaching a decision over epistemology choice.

Previous research into epistemology and methodology choice has focused primarily on the advantages of the different methodologies in terms of the excellence and accuracy of the results that those specific methodologies would aid the researcher in obtaining. While much has been written of the respective advantages (and disadvantages) of the different research

approaches, it should be accepted that all have their own unique benefits, and that, with regards to findings and results, opinion over ideal methodology is likely to come down to personal preference (Noble 2002, Alexander 2002).

Whereas the argument over the quality of results is unlikely to be resolved anytime soon (if ever), a partial resolution can be achieved as to which epistemology is most likely to aid in improving the Long-Term Use (derived as that measure is) of Information Systems research. In order to establish this, the different methodologies (with their associated epistemologies) must first be analyzed.

Research can be generally classified according to two different methodologies: Quantitative and Qualitative. For the purposes of this research, the quantitative methodology will be represented by the positivist epistemology (Straub, Gefen & Boudreau, 2004) (henceforth, the two shall, effectively, be considered one and the same), and qualitative research by all three epistemologies (Myers, 1997). Interpretivist research differs from critical research (both are primarily qualitative in nature) in that it subscribes to an orderly view of society, and has as its goal enlightenment and the augmentation of knowledge (Alexander 2002), whereas critical social theory supports the supposition that society is continually in conflict, and has as its goal the bringing about of change (Pather & Remenyi 2004). Both, however, incorporate a subjective ontology into their approach (Khazanchi & Munkvold 2002, Alexander 2002), and are thus viewed as important subcomponents of qualitative research. This research will also examine the (somewhat limited) role of positivism in qualitative research.

Hermeneutics, phenomenology and ethnography are different research methodologies that incorporate aspects of both qualitative and quantitative methodology, as well as features specific to them only, but will, for the purposes of this research, be largely ignored with regards to the epistemologies (all three can be conducted according to any of the three epistemologies). They were considered for inclusion in this research, but were omitted due to their similarity to qualitative research (hermeneutics) (Moules

2002), their purely conceptual nature (phenomenology) (Boland 1985), and their fuzzy classification as a methodology (it is difficult to decide whether ethnography is a methodology or simply a research method) (Alexander, 2002). Perhaps the main reason for their omission, however, is their lack of widespread use (when compared to standard qualitative and quantitative research – even qualitative research is rare in comparison to the amount of quantitative research) (Khazanchi & Munkvold 2002, Alavi & Carlson 1992, Pather & Remenyi 2004). They also share many overlapping characteristics with each other and the primary research methodologies.

Thus, methodologies, despite numerous other opinions, can be broadly divided into two subsections – quantitative and qualitative. These methodologies are further divided according to the different epistemologies that support the theory inherent in them. Pluralist methodology, although more of a mindset approach than a methodology (Alexander 2002, Fitzgerald & Howcroft 1998a), will not be included as a separate epistemological option of its own.

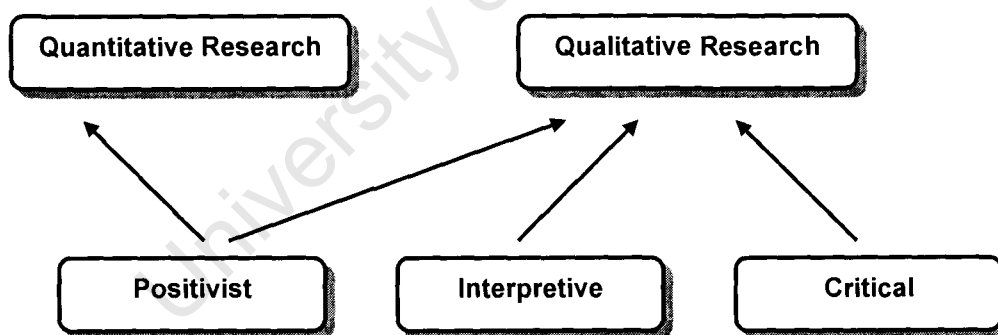


Figure 2: The Underlying Philosophical Assumptions of the different Methodologies
(adapted from Myers, 1997)

The above figure displays the constitution of the different epistemologies into the two primary methodologies. The result is that we get four different methodology/epistemology combinations. The selection of any of these four research approaches will have a large impact on a researcher's work, and the choice should not be made lightly (particularly for beginners or inexperienced

researchers). The following provides a background to the two major methodologies and their associated epistemologies.

3.3 – Quantitative Research

Quantitative research subscribes to an objective ontology, and depends primarily on unambiguous quantitative data for its findings (Alexander, 2002). Quantitative research is represented (almost) exclusively by research conducted according to the positivist epistemology, and thus will be the only epistemology considered for quantitative studies in this research. The adherence to the positivist philosophy is one of the two cornerstones of positivist research, the other being values and concepts being represented by numbers, and the subsequent interpretation of those numbers.

3.3.1 – Positivist Quantitative Research

The Vienna Circle of Positivists put forward a theory in the 1920's that the world has an objective reality that can be captured and translated into testable hypotheses, which in turn led to the positivist epistemology upon which quantitative research is based (Straub, Gefen & Boudreau, 2004). At the centre of this philosophy is deduction; the researcher must progress through the four steps of deduction in an attempt to falsify his or her theory. It is only upon failing to falsify one's theory that that theory can be temporarily assumed to be substantiated. The primary methods of conducting positivist research are descriptive or survey research, lab experiments, and field studies (Straub, Gefen & Boudreau, 2004).

- **Pros and Cons of Positivism**

Positivism, like any other research epistemology, has several advantages and disadvantages associated with it. The following all relate to positivism, and for the most part act in contradiction to Interpretivism (i.e. the weakness of one is the strength of the other and vice-versa).

Advantages

- Positivist research is empirically falsified before being accepted. Scientifically proven data is difficult to argue against, and most likely to be accepted by the public, regardless of the researcher's reputation. Objectivity is seen by positivist practitioners as the greatest advantage of quantitative research (whilst interpretivists view it as its largest shortcoming) (Straub, Gefen & Boudreau, 2004).
- Results can be projected universally. The rigour with which quantitative data is collected means that any replies obtained from the sample population would have been answered in the same manner by any other sample population, allowing for direct comparison between samples, and minimizing the effect of contextual and demographic factors (Chappell, 2003).
- Findings can be generalised to a larger population (Qualitative vs. Quantitative Analysis [No Date]).
- Statistical tests conducted on quantitative data allow us to determine whether an observation may be an isolated incident, or a frequent occurrence within a particular phenomenon (Straub, Gefen & Boudreau, 2004).

Disadvantages

- Large samples are needed for statistically accurate data, which increases the cost of conducting positivist research (Chappell, 2003).
- There is little scope for improvisation or further investigation of newly discovered variables once an investigation is under way. The research must be defined before being conducted (McCullough, 2003).
- Theory resulting from quantitative research often fails to take into account the variables and factors specific to an individual case (Qualitative vs. Quantitative Analysis [No Date]).

- Although not specific to quantitative research, numeric figures and data can be manipulated. Research bias can result in certain variables being ignored and certain statistics being used to inaccurately falsify or validate a theory (Edwards, 1998).

For all its advantages and disadvantages, positivist quantitative research has been the most common and the most popular form of research in Information Systems for some time (Mingers, 2001). It is widely accepted and understood, and is relatively immune to the vagaries of fashion and trends in research.

3.4 – Qualitative Research

Whereas quantitative research is primarily conducted according to one epistemology (positivism), qualitative research can be conducted according to three different epistemologies: Interpretivism, Critical Research, and Positivism (Myers, 1997). In general, qualitative research relies on qualitative data for its findings, i.e. interviews and participant observation data. The general shift away from quantitative research in the past 15 years has meant an increasing number of researchers adopting qualitative methods in their studies in Information Systems (Walsham, 1995a). The following analyzes qualitative research from the standpoint of the three different epistemologies associated with it, and the differences between them with regards to qualitative research and how it is carried out.

3.4.1 – Positivist Qualitative Research

Positivist data can be used to support qualitative research or provide a descriptive context for it (Alexander, 2002). Although it is generally viewed as an epistemology supporting quantitative research, a researcher converting data gleaned from interviews, relationships, speech acts and other qualitative research methods into numerical form would be viewed as a qualitative, positivist researcher (Myers, 1997). The positives and negatives of positivist quantitative research outlined above generally apply equally for positivist qualitative research. This epistemology is primarily used in qualitative research

only when conducting case studies with a small sample size (Habraken, 2005), as this allows for the rigour of quantitative research without requiring the necessary sample sizes needed for relevance. The consequences of this are that the research becomes less context independent, and more relevant to the context in which the research was conducted. Hence, the findings are generally difficult to project to a larger population, but are more likely to take into account the variables and factors specific to the specific cases being investigated.

3.4.2 – Interpretivism

Interpretive research operates on the assumption that access to reality is controlled through social constructions such as language, consciousness, and shared meanings (Walsham, 1995a). Interpretive studies generally aim to understand phenomena through the meaning that people assign to them and the context in which they exist. Interpretive researchers generally look to encapsulate the bigger picture in their research, and shun the use of predefined variables and goals (Myers, 1997).

▪ Pros and cons of Interpretivism

The subjective nature of Interpretivism (and the associated bias that comes with it) is commonly regarded as both its biggest strength and its biggest weakness (Fielden, 2003). Even uncompromising positivists are likely to admit that, from respected and capable researchers, the opinions and theories abstracted from interpretive research are both valuable and insightful. It will always be difficult, however, to obtain widespread support for interpretive research that has been conducted by a researcher deemed too inexperienced or incompetent to have produced worthwhile data, whereas that same researcher could find acceptance of his findings should they be empirically validated (Straub, Ang & Evaristo, 1994). The subjective nature of qualitative research is embedded in its core principle, and is likely to always be viewed as a contentious issue in IS research.

Having said that, there are several advantages and disadvantages, aside from subjectivity, in interpretive research.

Advantages

- Interpretive research allows for far more in-depth examination and study of phenomena (Qualitative vs. Quantitative Analysis [No Date]).
- Interpretive research is not limited by predefined variables and assumptions (Habraken, 2005, Myers, 1997).
- Questions that are too complex or too involved to be answered succinctly and appropriately in quantitative research can be answered in interpretive research (Key, 1998).
- It is easier to branch out into different areas of study using interpretive research. Precedents and previous research are not as important as they are in positivist research (Key, 1998).

Disadvantages

- Researcher bias is unavoidable. However, this ties in with the subjective nature of qualitative research, and is not always viewed as a drawback (Fielden, 2003).
- Replicability is difficult. Interpretive research tends to be context specific, rendering that research appropriate and validated for that specific case only.
- The in-depth nature of interpretive research limits the scope of the research, hence the generally small sample size in interpretive research.
- Expensive to conduct, very labour-intensive.
- Not understood well by 'classical' researchers. Whether this is a valid disadvantage or not could be debated, as Interpretivism has progressed to a stage advanced enough to warrant a certain level of knowledge about it from all researchers and Information Systems academics (The above four points are adapted from Key, 1998)

3.4.3 – Critical Research

Critical theory assumes that reality is constructed and reproduced by people. It has as the centre of its purpose the eradication of problems and difficulties, as opposed to the correction of those problems (Myers, 1997). The critical researcher, more so than the positivist or interpretive researcher, will attempt to critically evaluate and transform the social reality under investigation. In simpler terms, the positivist or interpretive researcher will be content to report the status quo of any given phenomenon, whereas the critical researcher will attempt to correct or improve it. Critical theory also expands on the interpretive theory by viewing everything as the result of and in the context of its relationships and environment (Khazanchi & Munkvold, 2002). A good example of Critical Information Systems research would be Ngwenyama and Lee's (1997) work.

- **Pros and cons of Critical Research**

Critical research is less easy to categorise in terms of advantages and disadvantages, as it is highly conceptual in nature and is likely to differ in application from case to case. There are, however, some facets of critical research that can reasonably be termed strengths or weaknesses.

Advantages

- Critical research allows the reader or researcher a broader, more complete scope of a topic under investigation, particularly with regards to its relationships and interactions with other subjects and society as a whole (Alexander, 2002).
- Critical theory resolves several theory-practice issues through its incorporation of a rich naturalist social science ontology based on ontological distinctions of what reality is and how it is constructed (Longshore-Smith, 2005).

- Encourages the researcher to use both qualitative and quantitative tools in his or her research. Provides for a far richer, in-depth investigation (Pather & Remenyi, 2004).
- Critical theory is more defined in its stated goals, and researchers conducting critical research will have a clear goal of improving the situation or phenomenon that they are studying (Pather & Remenyi, 2004).

Disadvantages

- The primary disadvantage of critical theory is the difficulty and uncertainty with which it is applied. Researchers with different standards, philosophies and backgrounds are likely to get completely different findings and results from their research, making the epistemology over-dependent on the quality of the researcher (Orlikowski & Baroudi, 1991).
- Critical research focuses on socio-economic class as the primary cause of poor social relations, and ignores other possible factors such as gender, race etc. (Orlikowski & Baroudi, 1991).
- Critical research, by its very nature, demands improvement in the area under investigation. This can lead to unnecessary research in that the researcher may be looking for solutions that do not exist, are not needed, or are not feasible at all.
- Requires the researcher to state his or her biases and preferences at the beginning of a paper, and preferably in the initial stages of research (Pather & Remenyi, 2004). This allows little leeway for flexibility, and potentially places the value of the research in direct proportion to the researcher's abilities and reputation, as the opinions of some researchers are likely to be more readily accepted than others.

3.5 – Summary

Qualitative research has become more and more prevalent in Information Systems research in the last 15 years, despite the historical tendency of IS research to be quantitative. The changing nature of IS (in particular the distinction between Information Systems and Computer Science) has allowed researchers to see the benefits of incorporating non-measurable variables in their research, whilst at the same time allowing themselves a broader, more complete view of a chosen subject (Orlikowski & Baroudi, 1991).

Having ascertained the respective benefits and drawbacks of the different epistemologies, we can now begin the construction of a measure against which these different epistemological features can be assessed. At this stage, however, it should be noted that no epistemology, purely on the strength of the philosophies behind it, stands out as a better option than the others. Regardless of the findings of this research, it seems certain that epistemology choice will (and should) remain subjective. It is therefore imperative that subjective concerns are allowed as strong an influence in the construction of the measure as objective ones. Ideally, this subjective input in the measure will facilitate the researcher in deciding what factors and variables are important to them when conducting research, and what their viewpoints are with regards to the nature of information. This will go a long way towards realising a model for methodology selection, and aiding in a partial resolution to the methodology debate.

4 – Research Methodology

4.1 – Overview of Methodology in this Paper

The adoption of a methodology or epistemology in this paper is a somewhat pointless process. Not only does this research focus almost exclusively on epistemologies, creating the possibility of bias or skewed results should any one epistemology be selected, but it also has no sample or real-world case that can be analysed (except perhaps the papers in Chapter 7). Hence, the paper itself shall be primarily theoretical, with any findings and inferences being based on the consolidation of the collected literature on epistemologies and methodologies in Information Systems.

4.2 – Methodology Process

This research aims to comprehensively evaluate the three different epistemologies in Information Systems and their effect on research. By doing so, it aims to aid in the partial resolution of the methodology debate, and contribute towards the creation of a model for methodology selection and the bridging of the disconnect between Information Systems research and Information Systems practice. This is to be achieved by doing two things; the first is the identification and in-depth analysis of the different epistemologies in Information Systems (collection), and the second is the creation of an evaluative tool against which to measure the effect of those epistemologies. The actual estimation of epistemology effect and any validation of the inferences of that estimation will take place once the initial (collection and selection) stages have been completed.

Stage 1, the initial gathering and establishing of the current status in Information Systems with regards to methodology and research, has already been completed in Chapters 1 and 2. From here, stages 2 and 3 are a dual process of an investigation into epistemology and the creation of a cumulative measure (as described above). Stage 4 is the evaluating of the epistemologies with regards to the measure, and Stage 5 is the validation of

those findings by analysing the effect of epistemology choice in a sample of published papers.

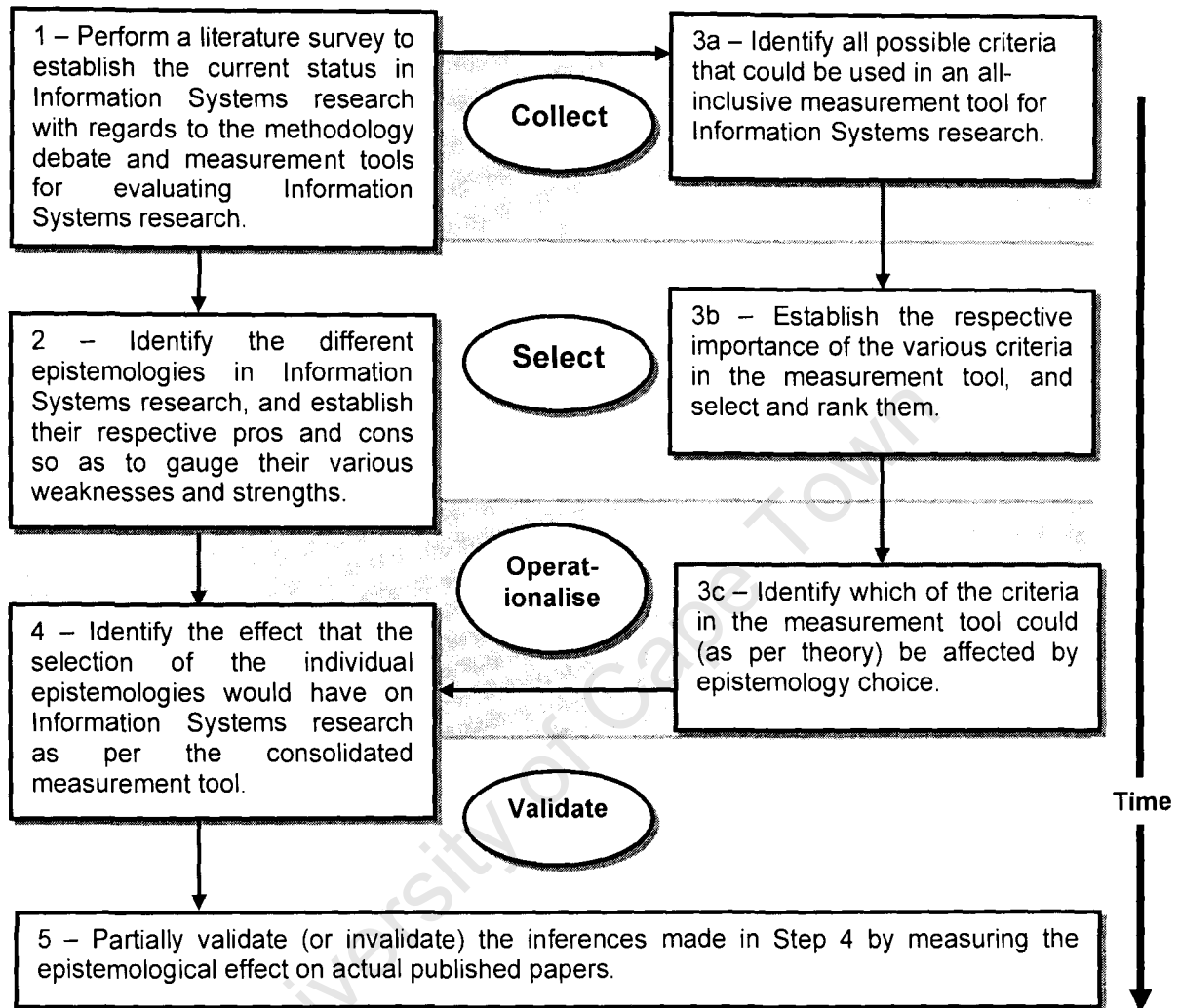


Figure 3: Overview of Methodology Used in this Dissertation (Adapted from the process used to report research methodology in Van Belle, 2003)

The above figure illustrates this process, with the four ovals in the middle representing the states of the research at different times. Collection comes first, which in this instance is the literature review and the identification of the different criteria that could be included in the measure, followed by selection, which is the choosing of the criteria that will be included, and the identification of the pros and cons of the different epistemologies. Operationalisation takes place in two steps, the first being the completion of the measure, and the second the evaluation of the epistemologies with regards to that measure.

The final stage is the partial validation that is to be achieved by an analysis of actual papers and compare them against the findings of the operationalisation.

4.3 – Information Gathering Process

All information and inferences on the different epistemologies and the different criteria for evaluating Information Systems research was obtained through a thorough analysis of the relevant literature and Information Systems journals. There is hence no defined research methodology utilised in this research beyond the critical analysis performed by the author.

The validation that takes place from the analysis of the papers also does not have a specific epistemology associated with it, other than the (partially) subjective opinions of the author, as informed by the inferences developed from the theory in Information Systems of the different epistemologies.

5 – The Construction of Long-Term Use

5.1 – Overview

This chapter details the construction of Long-Term Use, and explains what the term entails, and what is used in its design. It provides an in-depth background to the factors used in evaluating Information System research, and provides a weighting to the factors selected for inclusion in Long-Term Use.

5.2 – Long-Term Use of Research

Long-Term Use (in the context of this research) is a fairly involved term (it is, for the most part, an amalgam of several different concepts), and it is possible that it should have been presented before the analysis of the different epistemologies, so as to allow for the proper context in which to assess the analysis of those different epistemologies. Unfortunately, despite the brief backgrounds and analyses of the epistemologies already having been given, this necessitates an assumption of a certain degree of pre-knowledge about methodologies and research epistemologies on behalf of the reader. Although it would have been possible to include a more inclusive, in-depth chapter on methodologies and epistemologies, it is felt that such a chapter would have lengthened this research unnecessarily, and (more importantly) would have been redundant, given the multitude of high-quality, concise literature on the subject. Any reader requiring a primer on Information Systems methodologies and epistemologies (beyond that which has already been given) should familiarise themselves with (among others) Alexander's (2002) chapter on Information Systems research, Orlikowski and Baroudi (1991), and Whitman (2003). The following will provide a background to the need for a measure such as Long-Term Use, and will detail its construction and use as a measurement.

There are many different measures that have been used to evaluate and assess research, few of which involve a satisfactory metric or a truly reliable outcome or end result (Tijssen, 2003). Measures themselves can be seen as

somewhat unfashionable, as the vagaries and uniqueness of Information Systems research renders it ill equipped to conforming to a predefined measure. We must also be wary of limiting research through the implications of measures that are imposed on research (Jones, 2004). However, measures can play an important role in allowing us to compare different papers, and allowing us a framework against which research can be measured. If we bear in mind that any results or inferences derived from using a measure are guidelines only, and should only be used in conjunction with subjective evaluation, then measures and metrics can be of great use to Information Systems research.

The goal of this research is to measure the effect of epistemology choice on Information Systems research, which is too broad an objective to accomplish without the use of an evaluative tool. Unfortunately, no such tool exists (aside from personal preference and subjective opinion) (Wood, Roberts & Howell, 2004), and thus a measure or metric must be created to facilitate this goal. Long-Term Use is the term that will be used for that measure. Long-Term Use (derived as it is) is a collective measure for evaluating the overall quality of a paper, the likelihood of it being referenced and applied in the present and the future, and its worth as research. In the case of this research, it refers to the contribution to Information Systems that a specific piece of research makes over time, coupled with the widespread employment that that research receives. These in turn incorporate the quality (rigorousness and precision) of the research and the value (relevance and findings) the research has.

The name Long-Term Use may bring about the wrong impression as to exactly what Long-Term Use entails; essentially, it is a consolidated metric for measuring all subjectively and objectively measurable aspects of a research paper. Although it has been designed with Information Systems in mind, and been created to address research issues specific to Information Systems, there is little reason why it cannot be used or adapted to other disciplines. This definition allows us to determine what variables should be included in Long-Term Use, and indeed the structure and format it should assume. Although the creation of Long-Term Use is important in determining the effect

of epistemology choice on Information Systems research, and in determining the variables it will affect and the degree to which it will affect them, Long-Term Use is by no means advocated as a definitive evaluative tool that can be used for evaluating research. Theoretically, however, there would appear to be little reason why Long-Term Use cannot be used for evaluative purposes, particularly as a guideline for evaluators, although its use should be reserved strictly for journal article submissions and conference papers (and not for university or graduate papers), for reasons that will become apparent later.

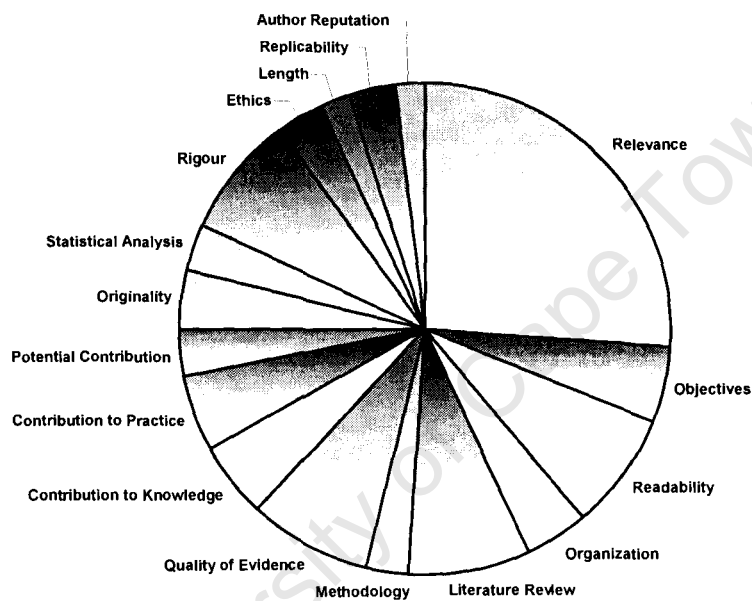


Figure 4: The Breakdown of Long-Term Use (with the weightings of the criteria)

It is difficult to apply metrics to these measures, although there are several ways in which this can be (partly) done (see *Measuring Long-Term Use*). The name Long-Term Use has been chosen in that it incorporates what is viewed as the two most important features of a research paper (Jones, 2004): the enduring quality that a paper proves to have over time (the present being as important as the future) due to its method, and the incorporation of that paper into solutions and suggestions for real world problems and situations. Ultimately, any paper that achieves these two things is likely to score highly in Long-Term Use, as it is likely to be considered research of high quality and value.

There is no (currently existing) measure that accurately encompasses precisely what is being measured in this research, although there are measures that, combined and adapted, make up a satisfactory classification for Long-Term Use. Ultimately, the goal of Long-Term Use, as a measure, is to combine all the important objective and subjective evaluative standards for Information Systems research, so as to be able to estimate the present and future worth that a paper assumes in the Information Systems industry. The purpose of creating Long-Term Use in this paper is to allow us to determine, to the best of our knowledge, the effect that epistemology choice will have on Information Systems research.

The best way to present the breakdown of Long-Term Use is to present the different measures that are used (mostly by IS journals and conferences) in the Information Systems field, and to describe which of these measures, and in what capacity, will be used in the construction of Long-Term Use. This will take the form of cataloguing different aspects of a paper that can be objectively or subjectively measured. Some of the variables presented may appear somewhat undefined or difficult to measure, and others even cynical in their inclusion; every attempt has been made, however, to create Long-Term Use as a measure appropriate for real world use. Long-Term Use is not a measure of the support and use a paper should receive, but rather an estimate of the support and use a paper, in all likelihood, shall receive. This is important in that it allows us to identify the reasons behind the success of some papers, and the failures of others. At the same time, it is more relevant to the investigation of this research in that it will outline the factors that are affected by epistemology choice, and highlight their true importance, as opposed to their theoretical importance.

5.3 – The Factors in Long-Term Use

MIS Quarterly has consistently been voted the number one journal in Information Systems literature. The following is a list of evaluation standards from *MIS Quarterly* that are used to evaluate submissions to the journal

(Straub, Ang & Evaristo, 1994), as well as a description of what each encompasses and implies:

- **Relevance**

Attaining true relevance with one's research is (currently) the Holy Grail in Information Systems (Benbasat & Zmud, 1999). For quite some time, there has been a separation between practitioners and academics in the IS field due to the former's need for applicable and up-to-date research and the latter's seeming inability to supply it (Moody, 2000). Relevance, simply, is the ability of research to address current or enduring challenges and problems in Information Systems practice by supplying applicable solutions to those problems (Dennis, 2001). Benbasat and Zmud (1999) further broke down Relevance into the following four categories:

- **Interesting**

A measure of whether the research addresses the problems of IS professionals, and whether or not that problem being addressed is topical or 'hot'.

- **Applicable**

Determines whether the solutions can be practically utilised by professionals, and the degree to which the research facilitates this.

- **Current**

The degree to which the research addresses current or ongoing (at the time of publication) issues and problems.

- **Accessible** (linked to Readability)

Measures the style and tone of the article, and whether IS professionals and academics would enjoy reading it.

- **Objectives**

'Objectives' is the degree to which a manuscript has its goals clearly and unambiguously stated, and the degree to which the research accomplishes those goals.

- **Readability**

Readability is simply a reference to the style of writing employed in the research, and the degree of accessibility that this style affords it. Logically, the more readable a paper is, the higher its perceived value will be (Benbasat & Zmud, 1999).

- **Organization**

This is a reference to the organizational context in which the research has taken place. It is a measure of the environment in which the research has taken place, and the degree to which the research has either nullified the effect of the context in which it was conducted, or assimilated the environment and context into its findings. Closely linked to relevance through its implications for practice.

- **Literature Review**

In order to be considered a true contribution to knowledge, a researcher must demonstrate a dynamic understanding of all research that has been conducted in the area before performing his or her own. This has the two-fold effect of reducing the possibility of research duplication, and allows for a more knowledgeable, rigorous platform from which to conduct research (Bourner, 1996, as cited in Tips for Conducting a Literature Review, 2003). The evaluation criterion of 'Literature Review' is closely related to the concept of theory, and therefore contributes to the overall rigour of a manuscript.

- **Methodology**

This is a measure of the research design and the rigour with which it is devised and carried out. In this context it refers to both the suitability of the methodology and epistemology choice, and the way in which it has been implemented.

- **Quality of Evidence**

Quality of evidence (or lack thereof) is at the heart of the methodology debate, and therefore represents one of the fundamental challenges of Information Systems research (Ekbja & Hara, 2004). Does one epistemology allow for a better quality of evidence than another? This criterion is a measure of the reliability of the evidence, as well as a measure of how logically the conclusions and surmises follow on from the data and findings.

- **Contribution**

Contribution encompasses both contributions to practice and to knowledge, which, in itself, is probably too broad a notion to be measured as a single aspect of a paper. It represents the importance and/or scale of a paper's contribution to both our understanding of issues and challenges in Information Systems, and the solutions presented for them (Straub, Ang & Evaristo, 1994). The separation of contribution into contribution to knowledge and contribution to practice is justified further on in the text.

- **Potential Contribution**

This is an important component of reviewing research, particularly in the context of Long-Term Use, as it measures the possible effects that a manuscript may have in the future. Papers must demonstrate an ability to donate to practice or knowledge in the future (Järvinen, 2005). Research that looks to provide solutions to relevant challenges and problems, and research that incorporates many variables and situations into its findings are likely to score highly in this regard. Potential Contribution is also highly dependent on any interpretations that researchers make from the data available to them, as it is mostly these inferences that will determine whether the research has been conducted with an eye to the future (Yates, 2003).

Furthermore, the following evaluation standards appear in the evaluation forms of other highly rated IS journals, apart from the ones that concur with those found in *MIS Quarterly*:

IS Research	CACM	Management Science
Significance of Contribution	Technical Content	Importance of Research
Technical Adequacy	Originality	Impact on Discipline
Appropriateness to Journal	Style & Organization	Impact on Practice
Clarity of Presentation	Overall Quality	Presentation

Table 1: Evaluation Standards for IS Journals (adapted Straub, Ang & Evaristo 1994)

This table allows for several inferences:

- There is a vast number of evaluation standards for IS research.
- There is little or no consistency with regards to what evaluation standards are applied and where.
- Many evaluation standards in IS are inherently difficult to assign metrics to, and will thus rely on subjective opinion for any points or rankings assigned to them.
- Many of the evaluation standards are ill defined and fairly indistinct, further increasing the difficulty of measuring them effectively.

Overall, the list of evaluation standards for *MIS Quarterly* represents a more rounded, more useful record for evaluating IS research. Most of the standards represent single concepts that are sufficiently different from the others to warrant their own category, whereas many of the standards from the other journals are more complicated terms that represent several concepts and are thus more difficult to assign values to (in their defence they are meant to be evaluated objectively by one person, and can thus include more than one concept in each standard). Having said that, there are several important contributions made by the lists in Table 1 that address issues that are neglected by *MIS Quarterly*:

- **Originality**, which is used by the *Communications of the ACM* as a criterion for evaluation, can be interpreted in different ways, depending on whether it signifies originality in research manner or research topic. Either can be potentially influential on the worth of research (Cryer, [No Date], Negishi, [No Date]) and its contribution.
- The criteria for Management Science make explicit the important distinction between **Impact on Information Systems as a discipline**, and **Impact on Information Systems Practice**. Merely measuring contribution is insufficient; there is (generally) a vast difference between what is considered valuable in academia and what is considered valuable in practice (Moody, 2000).

In addition to these, it is interesting to note that the only evaluative standard that is referenced explicitly in all four journals is the excellence of the presentation of the research, lending further credence to the contention that if no one wishes to read a paper due to its appearance, the worth of that paper, regardless of its content, drops to zero (Benbasat & Zmud, 1999).

There are, of course, other criteria that should be included in evaluating research, some of which would have been considered compulsory features of research in the past, and some of which have only come to prominence relatively recently. Despite the fact that academic and practitioner esteem towards certain types of evaluation criteria has waned over time (Khazanchi & Munkvold, 2002), it is still important that as many evaluative measures as possible are considered in constructing the concept of Long-Term Use. The evaluative criteria that will be included in addition to those previously recorded are:

- **Statistical/Mathematical Analysis**

Although mathematical analysis (by definition) would appear primarily in research adopting a positivist research approach, it is felt that it warrants inclusion in this research due to the inherent value that statistically proven data affords research (Kaplan & Duchon, 1988),

and the general high regard it is given by many researchers (Straub, Ang & Evaristo, 1994, Jones, 2004).

- **Rigour**

Rigour may be implied by the inclusion of Methodology and Literature Review as an evaluation criterion in the above list, but is important and prominent enough in its own right to warrant inclusion as a separate variable. Despite, in recent years, becoming somewhat of a scapegoat for researchers bemoaning the lack of relevance of IS research (Moody, 2000), rigour is still one of the primary evaluative measures when assessing the publishing potential of a manuscript (Boudreau, Gefen & Straub, 2001). Despite rigour not being quite so highly regarded in practice (Moody, 2000), poorly conducted research is unlikely to be considered of a high quality in academic circles, decreasing its chances of being published in the first place. A stringent research approach and design are needed to score highly in rigour.

- **Adherence to Ethics**

Although adherence to ethics normally doesn't have an effect on the quality of research, it is possible that research conducted with little or no regard for ethics will be criticized for being so (Andrews, [No Date]), and will thus find its value diminished or even nullified. Depending on the type of unethicity, it is even possible that the findings of research may be skewed or incorrect (e.g. leading subjects, falsifying results, or discriminating against certain groups) (Davison, Kock, Loch & Clarke, 2001).

Ethics is becoming more and more important; any research conducted outside the bounds of scientific morality will most likely be discarded, regardless of its findings or implications (Kock, Davison, Clarke & Loch, 2000).

- **Conciseness**

One can hardly declare that a manuscript is lacking in quality should it be considered too verbose; it is possible, however, that the length of a manuscript may sway potential readers to such an extent that they opt not to, or do not have the time to read it (Benbasat & Zmud, 1999). Conciseness is vital in order to attract readers with neither the desire nor the inclination to wade through an overly long research paper, thus increasing the value and relevance of that paper. Despite this, the 'quality' journals often expect longer articles, as their length implies greater rigour.

- **Replicability**

The desire of academia for replicability of research is easily explainable. Research that can be performed in many different places and at many different times, whilst at the same time providing consistent and reliable findings has a far greater value to Information Systems and the academic knowledge base than one-off research (Bacon & Fitzgerald, 2001). Practice, however, desires context specific research with clear unambiguous findings in order to utilise them professionally (Khazanchi & Munkvold, 2002), and will not consider Replicability to be necessary or of a high value. Having said that, findings that are widely generalisable can be of great value to practitioners. Thus, a paper's replicability may be key to its perceived value, depending on what sector it is (intended) to be utilised in.

- **Author Reputation**

Few would maintain that an author's previous work is a reliable indicator of the quality of his or her future research, but the fact remains that certain authors achieve a level of approval for their manuscripts before they have been published (Straub, Ang & Evaristo, 1994), based on their past writings and achievements. This is important, in that prominent authors and researchers are more likely to

achieve a greater impact with their work (particularly upon publication) than new or unknown authors.

Thus, we have identified 17 standards that should be included when estimating Long-Term Use (see Figure 4). There are other measures that could have been included, but these were, for the most part, measures that represent a combination of already established measures (e.g. Topic is a combination of relevance and objectives). There is, of course, the concern that several of these measures are similar as it is, or at the least have overlapping characteristics. Certainly, accessibility and readability would appear, at first, to have too much in common to be considered as separate components. In this instance, accessibility would refer primarily to the style and tone, or 'flow' of the research, whereas readability would refer more to layout and visual appeal. Nonetheless, it cannot be denied that the two are inherently similar in nature, which shall be kept in mind when determining the respective weighting and importance one should apply to either of the measures. Likewise, other measures that overlap or are similar in nature and application shall have the same regard applied to them.

Taken together, the criteria account for the quality, application and research worth of a paper. They determine whether the goals of a paper are important, the evidence collected in it is of high quality, the presentation and design are accessible and whether the paper contributes to both the academic and professional community.

Long-Term Use also measures the degree to which a paper can be applied in real life situations effectively and easily. Logically, this would require the paper to have certain suggestions and findings about real life problems and situations, and requires the paper to facilitate the incorporation of its suggestions as much as possible.

The technical aspects and correctness of procedure and flow that is required in academia are also gauged by Long-Term Use. This is not as important in practice as it is in academia, although any research that can prove that it has been carefully researched and investigated is likely to prove more valuable in

quality and application as well. Thus Long-Term Use can, at this stage be seen as an all-inclusive measure for Information Systems research.

It is important to note at this stage that, in measuring the effect methodology choice has on Long-Term Use, the actual research process and the way in which research is conducted is excluded from the evaluation process. This research aims to estimate the effect of the mere selection of a methodology (and the implications of that selection) on one's research.

5.4 – Measuring Long-Term Use

Information Systems, unlike many other disciplines, is about both numbers and people (Benbasat, Goldstein & Mead, 1987). Psychology is primarily about people and emotions, whereas scientific disciplines are (primarily) concerned with statistics and numbers. IS occupies the hypothetical middle ground; this is part of the reason why Information Systems is considered to be inter-disciplinary, as it must be concerned equally with people and with technology. This makes it particularly difficult to apply metrics to anything that needs to be measured in Information Systems. Measures that work well for research on software and hardware related issues cannot be expected to work at all on organisational and human resource issues; consistency is required for metrics to be effective, or they have no use at all (Stephens, 2005). Thus, the issues being addressed in IS research can exist independent of any need for their justification. In other words, an IS researcher may produce research in any area he or she wants without having to rationalize their topic choice, as there is no threat of scoring low on a particular metric or measure. We can measure rigour and research design fairly easily, and compare them to other research in different areas, but the true value of a piece of research is still difficult to estimate, at least numerically (Tijssen, 2003). Hence, we have been left with the current situation, whereby expertly designed and carried-out research is published, with little or no effect on the IS industry. There would certainly appear to be no problems with the channels of communication between academia and industry, thus the problem lies in the applicability of the research itself. Long-Term Use obtains its true value from the fact that it can be used as a measure (whether metrics and numbers

are used or not) to compare research in different areas of IS. Despite the fact that many of its sub-components are inherently difficult to estimate, the overall picture one may glean from a Long-Term Use measurement can be of great value.

Despite the fact that it is not an established metric, the purpose (or idea) behind Long-Term Use should be considered important. In order to achieve a high rating in Long-Term Use for one's research, that research must be relevant, insightful, original, and precise (Jones 2004, Aksnes 2003), hence insuring a certain degree of initial quality in the research itself. Although it is possible to publish research that is lacking in several (or all) of the above-mentioned features, it is unlikely that that research will achieve any notable Long-Term Use in academia and subsequent literature (Khazanchi & Munkvold 2002, Khazanchi & Munkvold 2000). The incorporation of a measure such as Long-Term Use into the standards for evaluating IS research would/should ensure a higher overall quality of research in Information Systems, and would help to safeguard against poor, irrelevant research. Most importantly, it would aid in bridging the divide between practice and academia by promoting more relevant and applicable research.

Long-Term Use (as defined in this research) can be measured or evaluated in several different ways, none of which are particularly satisfactory. Overall, it is possible that research can only be evaluated on a personal ad-hoc basis, as the value of information and relevance of information is extremely subjective and differs from person to person (Alexander, 2002), although there are several quantitative measures that can aid or support an evaluator in coming to a conclusion. The number of citations a paper receives is often a good indicator of its use, as this, at the very least, shows that it is being used to prove or disprove arguments in other research (Barrett & Walsham 2004, Aksnes 2003). This can, however, be misleading, as even poor research in topically significant (fashionable) areas tends to be highly cited (Aksnes 2003). At any rate, Long-Term Use needs to be evaluated at the date of a paper's publication, so as to best meet the needs of industry. Re-evaluations, based on the number of citations (which are largely focussed on academic re-

use anyway), can be performed in the future, but using citations as a basis for measuring Long-Term Use is, to a large degree, insufficient.

Another good indicator of a paper's use is the quality of the journal it is published in (Comer [No Date]), although journal ratings are contentious and rely on assumptions and past publications (Comer [No Date]). Despite the fact that the publishing of a paper in a high quality journal is normally a good indicator of the quality of a paper, the publication of a paper in a journal of lesser quality should not automatically preclude it from being of a high value.

The eminence of the author could (and, perhaps, should) be taken into account when evaluating research, although there is a danger of being so blindsided by an author's reputation that inadequacies within his or her research are overlooked or ignored (Straub, Ang & Evaristo 1994). Authors may also achieve prominence through their skill in a particular epistemology, but this could be considered the effect of the author on an epistemology, and not the other way around. At any rate, the effect of epistemology choice on an author's reputation is negligible, and thus can be excluded from this research.

The uniqueness, originality, or 'impact' of a paper is also seen as important in judging its value (Jones 2004). It is easy to understand why papers that reiterate or repeat what others have previously said are considered to be of low (or less) quality, regardless of their rigour or value in supporting or contrasting with existing research. Judging a paper from this perspective can be problematic, however, as the pursuit of originality can result in research being carried out in irrelevant areas, and other important areas not being investigated to a deep enough level (Khazanchi & Munkvold 2000, Mingers 2001). Nonetheless, should a paper be researched precisely and be original at the same time, it is difficult to argue against it being seen or evaluated as being of a high quality.

Having looked at those different measures, however, it is clear to see that none would satisfactorily encompass the scope of what Long-Term Use aims to evaluate. In all likelihood, the best way to establish the Long-Term Use of a paper is to evaluate it from the point of view of all 17 sub-categories,

assigning a measure to each one, and then combining them to get an overall view. Whether one assigns numeric metrics to these standards is subjective, and comes down to personal preference, although for the purposes of this research it has been decided that numeric ratings for Long-Term Use are preferable. This is primarily due to the fact that a numbered rating system allows us a scope of the importance and significance of certain variables when compared against each other. A numeric rating for Long-Term Use is also easier to understand, and allows for simpler comparisons with other personal evaluations of papers. One must also decide on the weightings he or she would apply to each different measure, as some would obviously be considered more significant than others.

This dissertation will attempt to incorporate all these things into the evaluation of Information Systems research, so as to be able to accurately assess the impact that epistemology choice has had and can have on Long-Term Use.

5.5 – Long-Term Use in Information Systems

Long-Term Use can be used as a measure for almost all types of empirical or academic research, but is particularly useful in Information Systems. IS has long been a changing, turbulent industry, a trend likely to remain in the near future (Benbasat, Goldstein & Mead, 1987, Moody, 2000), and the onus has been on researchers to provide timely, relevant research that can be applied in practice, something it has, to a large degree, failed to do (Benbasat & Zmud, 1999). Unlike academics, IS practitioners do not have the luxury of waiting for research on new areas to be published (Moody, 2000).

The typical research process is rendered fairly irrelevant by the needs of industry for fast, simple solutions to Information Systems problems, yet the academic world has stuck to its system of rigour and design over relevance and applicability (Jones, 2004). As much as this mindset has helped in (potentially) establishing Information Systems as an academic discipline, it has also contributed to the current divide existing between practice and research. Ultimately, the outcomes and results of research, and their ability to improve our knowledge to an extent that that improved knowledge can be

applied in practice are all-important (Galliers & Land, 1987), and epistemologies must be chosen to ensure the best possible results at the fastest possible speed. Speed forms part of relevance, in that the faster a paper is published in a certain research area, the more relevant it is likely to be to industry. Research with a high rating for Long-Term Use is likely to satisfy both the needs of practice and academia, and epistemologies must be chosen with this in mind, allowing the researcher the optimal balance between quality and speed.

5.6 – A Weighting System for Long-Term Use

Having established the variables that are included in the evaluation of Long-Term Use, it is then important to assign a weighting to each of them. Although this would appear unnecessarily positivist in nature, it is the best way to attain some form of consistency and comparability in the ranking of different papers. It cannot be denied that certain variables are more important than others (i.e. Relevance vs. Manuscript Length), thus the need to adjust the impact their evaluation will have on the end score for Long-Term Use. Coupled with this is the overlapping nature of some of the variables (i.e. Contribution to Practice and Relevance), the effect of which also needs to be minimized. Written evaluations of Long-Term Use would most likely be too long and verbose to be of any true value to readers, and comparisons between them would be almost impossible. A numbered system allows for quick easy comparisons of the opinions of different evaluators, and any major discrepancies in opinion between evaluators can then be expounded upon. It should be noted at this junction that Long-Term Use will always be a primarily subjective evaluation, and that there is no possibility of one being wrong or right in his or her assessment, only either different or similar to consensus opinion.

A weighting system, will, inevitably, lead to Long-Term Use (should it be used for evaluation) becoming a subjective metric. Despite this being unavoidable, it is not necessarily unfortunate, as many of the variables can only be measured subjectively (i.e. readability, methodology), and thus a structure and controlled framework in which to place these evaluations will work to support and reveal a reader's estimations, whilst at the same time acting to

nullify the effect of bias and personal preference. Being forced to assign a numeric value to variables in a piece of research will prevent an evaluator acting on impulse, as his or her estimations may be shown to be unreasonable or discriminatory in the aftermath of a paper's evaluation or publication. The number of different variables in the measure may also act to even out any discrepancies in evaluations, and overall scores should be relatively consistent between different evaluators (taking into account the averaging out of scores from evaluators that consistently give either very high or very low marks). The numbers of the weightings themselves may appear arbitrary, indeed, scores of 2 or 3 may indicate that certain components of Long-Term Use are irrelevant or unnecessary to gauge. It is exactly this level of detail, however, that will allow Long-Term Use to become a fuller, more in-depth metric, whilst at the same time partially negating the effect of reviewers overly biased towards certain aspects of research. The weightings have been derived from the frequency with which the specific metrics are measured in research and journals and the professed importance they have been assigned when being evaluated, as well as the reflective opinion of the author and previous researchers.

The following is the author's opinion of what the weighting should be (and hence the structure for Long-Term Use) of the different variables in Long-Term Use. The overall mark, it is felt, should be out of 100. Where possible, references have been provided to support the opinions, whereas others are based simply on previous knowledge, theory, and (objective as possible) opinion. This model will then be used for the subjective evaluation of the effect that different epistemologies have on Information Systems research. It should, however, be stressed that these weightings are just a suggestion for the breakdown of Long-Term Use, and are merely used for descriptive purposes to illustrate how Long-Term Use would/could be measured and incorporated.

Relevance

As previously described, relevance is divided into four different categories. It is also considered the single most important factor when measuring Long-Term Use, and is affected by more than the following four subcategories.

Variables that affect readership and enjoyment of a paper will inevitably affect its relevance, and for the purposes of Long-Term Use as a measure, part of the score given to those variables must be applied to Relevance as well. Due to the fact that relevance is considered the most important variable in measuring Long-Term Use, as well as the fact that many of the other variables impact directly on the relevance of a paper, Relevance shall be given a weighted value of 26 out of a total of 100. This number will be made up of the following:

- **Interesting:** To be relevant, research should be interesting, although the mere presence of an interesting topic is not enough to indicate true relevance of a paper.

Suggested Weighting: 5

- **Applicable:** Whether or not the findings or inferences of a paper can be applied in practice heavily influences a paper's relevance in the business world, but does not have a major impact on a paper's relevance in the academic world.

Suggested Weighting: 8

- **Current:** The topic being addressed by a paper must be a current or future issue of concern in order for the paper to be considered of any relevance at all. Academic exercises in obscure areas of research that are unlikely to ever become relevant are unlikely to be of any use to a lot of people.

Suggested Weighting: 8

- **Accessible:** There is a fine line to be judged in the writing and style and tone of a piece of research. The writing must be of a sufficient intellectual level to engage and earn the respect of academics, whilst at the same time being simple and comprehensible enough for (not necessarily highly educated) practitioners to understand. Writing that is too colloquial will (rightly or wrongly) affect a paper's relevance in academic circles, whereas overly academic and complicated grammar will disillusion practitioners, reducing its relevance in professional circles.

Suggested Weighting: 5

Overall Weighting: 26

Objectives

It is important that a piece of research has its goals clearly stated, and that those goals are accomplished to a satisfactory level. This affects the flow and presentation of a paper, as well as (more importantly) its overall achievement. Regardless of the findings of a paper, if they are in contradiction or do not support the stated goals of that paper, that piece of research cannot be considered of a high value.

Suggested Weighting: 5

Readability

Readability ties in heavily with accessibility in Relevance (see above). Therefore, the score given to this should be the same as or similar to that given to Accessibility. Despite their similarities, there are still some key differences between the two criteria; hence the overall value of something like readability and accessibility (in this dissertation 16) is halved to accommodate both as a separate criterion. This is necessary in that it will allow a high or a low score for readability to be outlined in evaluating Long-Term Use, whilst at the same time not prejudicing the score for Relevance to too significant a degree.

Suggested Weighting: 8

Organization

This is a measure of the context within which the research has been conducted, and the suitability and quality of the research with regards to that context. This is a highly subjective measure, and is dependent almost entirely on whether the evaluator agrees with the methods and research design employed by the researcher in the context that he or she is researching. Due to its subjective nature, and its limited effect on the Long-Term Use of a paper, the Organization score for a paper should not have a significant impact on Long-Term Use.

Suggested Weighting: 4

Literature Review

The perceived quality, depth, and rigour of the Lit Review are important in determining whether or not a paper has been researched adequately. Should it be determined that a paper has not been adequately researched, it will cast doubt on the validity of any findings and suggestions arising in the research. Conversely, it should be kept in mind that a long Literature Review is not necessarily a good one, and that certain subject areas remain relatively unexplored, rendering it difficult for the researcher to find much relevant information for his or her research. The evaluator, having read the research, must decide whether or not the topic under discussion has been researched deeply enough. The presence of Literature Review as a variable does not mean that research requires an explicit section dedicated to Literature Review, but rather refers to the depth and accuracy with which the researcher has incorporated appropriate writings and literature.

Suggested Weighting: 8

Methodology

The research design and the methodology/epistemology combination chosen by the researcher are entirely subjective in their evaluation. The onus is on the researcher to prove that his or her chosen research method is the most appropriate one, and that it was implemented and conducted meticulously and successfully. Evaluators should try to eschew personal methodology preference, and be as objective as possible when measuring methodology, although the evaluator has the right to impose his or her preferences on the ratings for the research.

Suggested Weighting: 3

Quality of Evidence

In this variable, the evaluator must decide whether the findings are reasonable given the evidence presented, and whether that evidence itself is reliable, well researched, and accurate. This in turn will have a large effect on the quality of findings of a paper, and hence the Long-Term Use of a piece of research.

Suggested Weighting: 8

Contribution to Knowledge

In this variable, the evaluator must decide whether the research is rigorous and has sufficient academic overtones to contribute to academic knowledge. This includes the existence of new (yet validated) ideas and suggestions, and sufficient detailing of the situation under investigation. This variable ties in with Rigour and Literature Review; each of them have a direct effect on the other.

Suggested Weighting: 5

Contribution to Practice

Evaluators must determine whether the findings and suggestions of a paper can be applied in the business world, and then determine to what degree the research facilitates that application. Merely having findings and suggestions is not sufficient; they need to be relevant to real-world business problems in Information Systems, and be produced in time to be helpful to the business community.

Suggested Weighting: 5

Potential Contribution

Generally, the criteria have been weighted according to the importance they can assume in the evaluation of a paper. However, potential contribution is difficult to evaluate, and hence its weighting is low enough to prevent any mistakes in evaluating potential contribution being too damaging to the overall score for Long-Term Use. The evaluator must decide, given the research and its findings, as well as the presence of any models and original suggestions, whether the paper is likely to make any contribution to either academia or practice in the future that it cannot make in the present. The capacity for contribution in the present must also be evaluated, so as not to hinder researchers looking to address current problems only.

Suggested Weighting: 3

Originality

The evaluator must decide whether any original aspects of a piece of research (be they in the design and conduct of the research or the topic itself)

are of significant value or of an off the cuff nature. Any good originality is likely to increase the Long-Term Use of a paper (particularly in terms of the number of citations it receives) (Cryer, [No Date]), whereas unnecessary attempts at originality, or research in novel yet pointless areas should score low in this variable. Indeed, papers with no innovativeness at all, despite their possible value and quality, will still have their Long-Term Use score adversely affected by the lack of imagination with which they are produced.

Suggested Weighting: 4

Statistical Analysis

Despite the fact that many evaluators may see the presence of Statistical Analysis as a key component of the quality of a paper, its absence should not necessarily affect the Long-Term Use of a paper to too large a degree. Whereas it is accepted (in this research) that any proven statistical analysis should always be viewed as a positive (or, more appropriately, cannot be viewed as a negative if the data are correct), the weighting of Statistical Analysis should be kept as low as possible.

Suggested Weighting: 3

Rigour

Research that has been well conducted and fully explored to a sufficient level will always be considered of a higher value than opinion based, little-researched papers. The design, logic and argument of a paper are under evaluation here, and papers that are well structured and can display a significant understanding, background, and depth to the topic under investigation are likely to score high in this variable.

Suggested Weighting: 8

Ethics

This is another subjective variable, and one that depends largely on the evaluator's view of what is considered ethical. Ethics are normally not a problem during an Information Systems research process and generally only become problematic after publication should the research be called into question. The evaluator must determine whether the conduct of the

researcher could be called into question in the future. Due to the uncertain nature of this variable, its weighting has been kept sufficiently low.

Suggested Weighting: 3

Conciseness

This should not be a simple matter of number of pages, but more a matter of layout and design, as well as unnecessary verbosity in a piece of research. Although garrulousness may disenchant some readers, it cannot be considered particularly important when measuring Long-Term Use, and thus has a low weighting attached to it.

Suggested Weighting: 2

Replicability

The Replicability of a paper is important, and it is also relatively easy to judge. The context and the methodology of a paper should make measuring its Replicability fairly simple. Despite the fact that it is an important attribute of a paper, it will normally have a rating of very high or very low (a paper is generally fully replicable or not); giving it a large weighting will unfairly skew the rating for Long-Term Use of a paper, and therefore its weighting has been kept low.

Suggested Weighting: 3

Author Reputation

Author Reputation can be viewed as a borderline inclusion in the variables of Long-Term Use. Objectively, the reputation of an author should have little to do with the worth of his or her research. Realistically, however, pre-eminent authors are more likely to enjoy more widespread and enduring use than other, lesser-known researchers. Author reputation is important subjectively speaking as well, as an evaluator can show his or her preferences by revealing their regard for the author in question, assuming the double blind peer review system is not being used. This variable also ensures a certain amount of expertise on behalf of the evaluator, as a fair knowledge of IS literature and researchers in Information Systems is needed in order to fairly

rate this variable. Despite all these, the weighting for Author Reputation shall be kept sufficiently low.

Suggested Weighting: 2

Thus, the makeup of Long-Term Use, along with its weighting, would (for example) be as follows:

Variable	Weighting
Relevance	26
- Interesting	(5)
- Applicable	(8)
- Accessible	(5)
-Current	(8)
Objectives	5
Readability	8
Organization	4
Literature Review	8
Methodology	3
Quality of Evidence	8
Contribution to Knowledge	5
Contribution to Practice	5
Potential Contribution	3
Originality	4
Statistical Analysis	3
Rigour	8
Ethics	3
Length (Conciseness)	2
Replicability	3
Author Reputation	2
Total	100

Table 2: The Weighting Breakdown of Long-Term Use

5.7 – The Effect of Epistemology on Long-Term Use

Having identified all of these evaluation criteria and constructed how Long-Term Use should be measured, it is then necessary to identify which of these variables will or could be affected by epistemology choice, and to what degree. This will allow us to determine which criteria should be included when evaluating the effect of epistemology on Long-Term Use of research. At this stage, it is important that the reader has a fair knowledge of different methodologies and epistemologies, so as to allow for a greater understanding of the proposed effects they would have on the different methodologies.

- **Relevance**

It is difficult to envisage that methodology would have an impact on the relevance of a paper, as significant and applicable research, regardless of how it was attained, will always be afforded a high regard (Tijssen, 2003). There are, however, ways in which methodology can influence relevance:

- Epistemologies that are faster to carry out, analyse, and report will aid a manuscript in attaining relevance, as they will allow research on 'current' problems to be published earlier, an important factor in a fast-moving industry such as Information Systems (Moody, 2000).
- Epistemologies that provide for more usable data and solutions will add relevance to research. In general, this means accessible numerical data and models that can be applied directly will be seen as more relevant, although there is the possibility that the wider scope afforded by (amongst others) qualitative-style research will provide a more detailed and richer picture to practitioners (Orlikowski & Baroudi, 1991).

- **Objectives**

It is unlikely that an epistemology can affect the clarity with which a paper's goals are stated, although it may aid in clarifying the goals themselves. Methodologies that are easier to implement and carry out

will allow for a higher degree of goal accomplishment. Ease of use, however, is subjective, and the personal preference of the researcher is a valid reason for selecting a methodology (Guba & Lincoln, 1994, as Cited in Noble, 2002); objectives will not be affected by inherent methodology design advantages.

- **Readability**

Epistemologies that inherently allow for a more readable and accessible format than others, whilst also providing succinct and understandable data, will afford a paper a greater degree of readability. Reader's preference is obviously an issue here, although most would opt for the clean graphic and table-heavy format that positivist research so often affords the researcher (Benbasat & Zmud, 1999). Readability can also include the presentation and layout of a paper, which, if bad, can reduce the desire of the reader to finish (or even start) reading it. For the purposes of this research, however, the presentation and neatness of a paper shall be left out of consideration, as there is no evidence suggesting that one epistemology would be better than another in this regard.

- **Organization**

Epistemology should have no effect on organization and context, although there is the possibility of an unsuitable methodology being chosen for a particular context. Having said that, however, it is important that research in the same context is conducted from as many different angles as possible (Mingers, 2001, Kaplan & Duchon, 1988), and thus the selection of any epistemology for a particular research problem is normally justifiable.

- **Literature Review**

The literature review, coupled with any theory drawn upon in one's research, is unlikely to (or should not) be affected by one's choice of epistemology. There is of course the possibility that, having selected an

epistemology, the researcher will draw upon previous research constructed exclusively according to that epistemology, but this is more poor research than epistemological effect.

- **Methodology**

It could be considered retroactive to contemplate the effect of epistemology on methodology, but there is certainly an effect on the overall perceived value (and therefore Long-Term Use) of a paper based on the epistemology choice and the way in which it is carried out (Mingers, 2001). There has always been the worry (particularly with students) that one's research submissions will be rejected or marked down because his or her methodology does not agree with the evaluator's personal views (Straub, Ang & Evaristo, 1994). Certainly, there is sufficient freedom afforded to evaluators to express their opinions when marking work, and readers may have their own particular preferences too (Moody, 2000). Thus, the mere selection of a particular methodology may have a positive or negative effect on the initial estimation of one's research, and therefore on its overall Long-Term Use.

- **Quality of Evidence**

The question over the quality of evidence and the effect that methodology has on it lies at the heart of the methodology debate (Ekbia & Hara, 2004), and is far too broad (and separate) in scope and controversy to be answered in this research. Suffice to say that the perception of the quality of evidence derived from one epistemology or another differs from person to person, and no final conclusion is currently (or ever) foreseeable. We can, however, observe general public opinion over the merits of certain methodologies over one another with regards to quality of evidence, and from this surmise the effect it will have on a paper's Long-Term Use. This, however, ties in closely with the previous criterion (Methodology) and will thus be ignored in this instance, so as to prevent double counting when

evaluating the effect of epistemology choice, and ignored in general due to the difficulty of estimating the effect that epistemology choice can have on quality of evidence.

- **Contribution to Knowledge**

The effect of epistemology on contribution can be estimated by gauging the degree to which a particular epistemology allows for easy to understand and interpret findings. It is unlikely that the scale of a paper's contribution will be related to the choice of methodology, but more likely to the choice of topic (Benbasat & Zmud, 1999). In the case of a paper's contribution to knowledge, one must determine how an epistemology delivers to meet the needs of academia (i.e. are the findings rich enough, broad enough, detailed enough, rigorous etc.) (Straub, Ang & Evaristo, 1994).

- **Contribution to Practice**

The same comments apply here as for the previous variable, except that the epistemology must allow for the needs of practice (i.e. accessible, easily understandable, easily implementable). Long-Term Use effectively becomes two different measures, depending on the needs of the person using it.

- **Potential Contribution**

Measuring potential contribution is difficult, as it is almost impossible to foresee a paper's value in the future (particularly in the industry of Information Systems) (Khazanchi & Munkvold, 2002). Epistemology choice, however, can have a large impact on this, as a methodology that accommodates papers that age well and is relatively independent of context is likely to aid in producing results that will be reliable for some time, and thus increase a paper's potential contribution. (Note: Potential Contribution refers to both the potential contribution to knowledge and practice).

- **Originality**

The originality of a paper is likely to be directly related to its perceived value, and thus its Long-Term Use. However, this relies more on the chosen topic and the disposition of the researcher than the choice of epistemology (Cryers, [No Date]). More obscure (rarely used) methodologies and epistemologies (such as ethnography) could add an atmosphere of originality to a paper, but this would, in effect, be only superficial.

- **Statistical/Mathematical Analysis**

Epistemology choice has an almost total effect on the existence of statistical analysis in a paper. Most epistemologies feature the inclusion or exclusion of mathematics as a defining feature, although there is scope for its inclusion in some pluralist methodologies. Choosing an epistemology that allows for statistical analysis may increase the perceived value of a manuscript, particularly with regards to potential contribution, as statistics and numbers have a timeless quality (Kaplan & Duchon, 1988), despite recent trends towards lowering the perceived importance of statistics in IS research (Mingers, 2003). Evaluators may also be swayed (or, possibly, dismayed) by the existence of statistical analysis as empirical (non-subjective) proof of findings and conclusions.

- **Rigour**

The definition of rigour can be confusing, and can vary from person to person (Niehaves, 2005). For some, rigour could imply the inclusion of numerical data and meticulous statistical analysis, although qualitative epistemologies can be just as (if not more) rigorously applied than quantitative ones. Rigour comes down to the dedication of the researcher, and methodology choice is unlikely to have an effect on it.

- **Adherence to Ethics**

The starting point for adherence to ethics is to ensure that one's research process is ethically correct at the time of publishing, which is relatively simple to achieve with all epistemologies. With regards to Long-Term Use, however, a researcher must guard against changing ethical standpoints and guidelines, as well as different ethical outlooks in countries around the world (Davison et al., 2001), so as to ensure that their research will be considered ethical regardless of the political or cultural environment. Epistemologies that encourage the eschewing of emotion and the involvement of people are more likely to be considered ethical in different environments than more involved, qualitative-style epistemologies.

- **Conciseness**

In order to minimize manuscript length, an epistemology could be chosen that is well suited to short and concise data and findings. Epistemologies that tend to demand long and complicated design and description may end up reducing the readership of a paper, thus reducing its Long-Term Use.

- **Replicability**

Replicability is related to potential contribution in that it is significant in gauging the future use of a paper. Some epistemologies allow for research that is inherently replicable, whilst others are more context specific and do not translate well to different environments (Alexander, 2002).

- **Author Reputation**

Although it is possible that an author may gain a degree of fame for being proficient in one or more research methodology, it is unlikely that he or she will gain that fame based on the epistemology they are proficient in. Epistemology choice should not impact on the reputation or skill of a researcher.

This analysis has thus allowed us to determine which evaluative standards are likely to be affected by epistemology choice, and therefore which standards to include when determining the effect of epistemology choice on Long-Term Use:

Evaluative Variables in Long-Term Use affected by Epistemology Choice

1 - Relevance; **2** - Readability; **3** - Methodology; **4** - Contribution to Knowledge; **5** - Contribution to Practice; **6** - Potential Contribution; **7** - Statistical/Mathematical Analysis; **8** - Adherence to Ethics; **9** - Manuscript Length; **10** - Replicability.

(Note: Quality of Evidence has been omitted due to the almost total impossibility of determining which epistemologies have the greater effect, although it is accepted that epistemology choice more than likely does have an effect on this variable. It is likely that this issue will continue to be debated for the foreseeable future.)

6 – The Effect of Epistemology Choice on Long-Term Use

6.1 – Overview

Having constructed Long-Term Use, this chapter now analyses the different epistemologies with regards to the measure, so as to determine the effect that each epistemology is likely to have on the different factors in Long-Term Use (theoretically).

6.2 – Analysis of the Epistemologies with Regards to Long-Term Use

Essentially, the debate as to what epistemology is best comes down to the particular ontological view to which a researcher subscribes (Alexander, 2002). This is not conclusive, however, as the researcher then has to be able to convey his or her findings and the justification for them to readers and other researchers who may not necessarily agree with such an outlook on the nature of information.

The intended reader is important too, as not only can it influence (or determine) the epistemology choice, but the style, tone, and length of the article too. Readership can be broadly divided into two subsections, practitioners and academics (Benbasat & Zmud, 1999). Researchers are (for the most part) academics, and thus apply rigid rigour and methodology to their research. Practitioners, however, have neither the time nor the desire to read lengthy tomes for the information they need, and are far more likely to get their information from trade magazines and periodicals, or simply develop solutions themselves (Benbasat, Goldstein & Mead, 1987). This creates a two-fold problem in that practice is not being served by the most qualified researchers (thus rendering the information they work on possibly incorrect) and researchers are getting trapped in a cycle whereby the only people reading their research are other researchers who will reinforce the need for rigour and science ahead of usability and relevance (Moody, 2000). The reputation of the journal a paper is published in may also have a significant effect on whether it reaches industry or not.

The decrease in rigour (or 'dumbing down' of information) to allow research to be more accessible may lead to researchers not getting published at all, as their articles are initially evaluated by other academics. Should IS research remain as inaccessible as it currently is, however, the disconnect between IS research and IS practice will continue.

For now (i.e. until there is a significant mind shift in the thinking of IS researchers and academics), one of the few weapons a researcher has at his or her disposal to make his or her research more readable and more widely read is the methodology and epistemology choice. Having analysed the different methodologies and their associated epistemologies, it is important to establish which one (if any) will (or can) result in the most accessible research, whilst at the same time not sacrificing academic validity. In doing this, important questions arise, such as:

- Which epistemology (and associated methodology and ontology) achieves the best balance of relevance and rigour? This, essentially, lies at the heart of this research, and is the reason for the creation of Long-Term Use as a variable. It is of utmost importance in building procedures that will eventually bridge the gap between practice and academia in Information Systems.
- Is there any epistemology that promotes inherently more accessible and readable findings?
- Is there any epistemology that is more in the public interest, or promotes greater good?
- Does any epistemology lend itself to speedy completion of research?

These questions must be answered with regards to each epistemology/methodology combination, and can (partly) be done by applying the measurement of Long-Term Use to each one, in order to establish any inherent benefits in selecting one particular epistemology for one's research.

As previously stated, there are 10 variables (out of 17) that are affected by methodology choice in Information Systems research; they are:

- Relevance
- Readability
- Methodology
- Contribution to Knowledge
- Contribution to Practice
- Potential Contribution
- Statistical/Mathematical Analysis
- Adherence to Ethics
- Manuscript Length
- Replicability

(Please refer to the Chapter on the Construction of Long-Term Use for a fuller explanation of these terms)

Each epistemology must be measured for the effect it has on these variables, which at the same time will address the questions raised above. In the following analysis, the effect of the epistemologies on the variables will be rated. No numeric figures will be applied to these ratings, as any numbers at this stage would be arbitrary, due to the fact that Long-Term Use, as a measure, would incorporate more than just methodological concerns. The following will thus simply measure the net effect that a particular epistemology would have on the particular variables.

6.3 – The Effect of Quantitative/Positivist Research on Long-Term Use

- **Relevance:** Depending on the tool used, positivist research can be quick to perform (especially surveys). Once data has been accumulated, it is fairly simple to apply statistical tests to it in order to confirm or counter one's findings. The tools themselves are also fairly easy to design and create (i.e. surveys, polls) and, thanks to the Internet, can even be administered with the researcher absent. The Internet has also allowed for access to a larger sample population, whilst at the same time potentially increasing the number of respondents and decreasing the time it takes to get the responses. As the research can be quick, it is safe to surmise that positivist

quantitative research will facilitate quick publishing of research, essential for the relevance of a paper in the world of Information Systems.

Practitioners are also more likely to appreciate the accessible, black-and-white nature of numeric data, given the inherent understandability of it coupled with the short amount of time it takes to grasp meaning from it. Graphs and tables are also prevalent in positivist research, further increasing accessibility and therefore relevance as well.

- **Readability:** Some readers may appreciate rigorous, involved research, but most readers, particularly practitioners, prefer succinct, accessible data. Positivist research allows for very accessible tables and figures, and is often shorter than other forms of research (even long positivist papers tend to hide the bulk of their data in appendices, allowing for better flow in the body of the paper) (Bharadwaj, 2000).
- **Methodology:** The positivist epistemology has enjoyed widespread support from researchers since its inception (Markus & Lee, 1999), and for many researchers, the objective, data-based nature of positivist research is what defines its value. Although attitudes are changing with regards to quantitative and qualitative studies, most academics, and the majority of practitioners, would be comfortable with the research they are reading being positivist in nature. Indeed, some readers may be, and certainly have been, overly supportive of the quantitative methodology to the point of excluding or disregarding other research methods. Most published IS research is still quantitative in nature (Mingers, 2001).
- **Contribution to Knowledge:** The positivist epistemology, properly executed, allows for probably the most rigorous and scientific findings possible. Academics looking for structured and mathematical research are more likely to prefer the positivist epistemology. There are some drawbacks, however, particularly in the restriction of findings and the

limitations in the richness of the research, which cannot compete with interpretive studies for broadness and completeness.

- **Contribution to Practice:** Statistics and numbers are (rightly or wrongly) frequently considered trustworthier by practitioners than thoughts and opinions. They are also easy to read and summarise, and creating plans and actions based on statistics is (arguably) easier than basing them on subjective points of view. Positivist research is also frequently shorter (or can be shortened) than interpretive or critical research. For these reasons, the majority of practitioners are likely to prefer quantitative research. Positivist research can, however, be too broad in scope to be successfully applied to a specific context, and the ambiguity by which much quantitative data must be applied may lead practitioners to be wary when using quantitative data in their businesses (Qualitative vs. Quantitative Analysis [No Date]).
- **Potential Contribution:** The positivist epistemology is (or can be) relatively context independent if the researcher wishes it to be. Most of the time, the sample measured is intended to be as large as possible (and as representative of the population), so the findings can be viewed as being as truthful as possible. The positivist epistemology is also old and well-established, and is unlikely to be substantially discredited in the future, so a paper is likely to retain its worth and contribution, as well as its usefulness, well into the future.
- **Statistical/Mathematical Analysis:** The positivist epistemology has, as its defining feature, the inclusion of statistical analysis in its philosophy. Many readers place a great deal of emphasis on the inclusion of statistical analysis (or a summary of that analysis) as a measure of a paper's worth and value (Straub, Ang & Evaristo, 1994). There is, however, a growing degree of scepticism (particularly amongst academics) over the value of statistics, and their ability to be manipulated and stage-managed to a desired effect (Johnson, 1997,

as cited in Chappell, 2003). For the purposes of this study, however, the existence of statistical data is considered a positive, and hence positivism fares well in this regard.

- **Adherence to Ethics:** Quantitative tools must be designed properly to ensure that they are not discriminative or insulting in any way. The rigid nature of positivist research would imply that once a survey or other research instrument has been distributed, that tool would later be discredited if it were deemed discriminatory in any way. Having said that, if a positivist research paper is deemed ethical enough for publication, it is unlikely that this will change in the future. There are of course other ethical concerns for positivist researchers, but none that are specific to the positivist epistemology and are affected by it.
- **Manuscript Length:** Positivist research has an advantage in that it can be tailored to be as long or as short as a researcher desires. Numerical data lends itself to being summarised in bullet-points or lists, and long descriptions and explanations can be eschewed.
- **Replicability:** Positivism has, as one of its main benefits, the inherent ability to replicate studies conducted according to its epistemology. Measuring tools are easily reused, often with little changing or manipulation required (and then only because of completely different cultures or other serious differences in demographics) (Alexander, 2002).

6.4 – The Effect of Qualitative/Interpretive Research on Long-Term Use

- **Relevance:** Interpretive studies are normally carried out in a limited scope or context amongst one or a few samples of a population (Alexander, 2002), making any findings from that research relevant for those samples only. Whilst this may be disadvantageous to

practitioners and researchers wishing to garner knowledge about large-scale market wide trends, it is useful to readers wishing to learn about those specific samples included in the study. The rich, inclusive nature of interpretive findings is likely to be of more value and relevance to readers than if the study was conducted quantitatively on the same samples (Walsham, 1995b, as cited in Sørensen et al., 2001). Interpretive research is, however, generally slower than positivist research. The broader, more inclusive scope of interpretive research renders it ill equipped for quick performance (Liebscher, 1998).

- **Readability:** Reader preference is the key to this measure (hence the subjective nature of evaluating Long-Term Use). Whereas some readers (most likely practitioners) prefer lists and bullet-points, many others (most likely academics) will prefer a fuller story with more details. Interpretive research facilitates this scenario better than quantitative does.
- **Methodology:** Although, in the past, there has been a distinct tendency to prefer quantitative research to qualitative research (Markus & Lee, 1999), there has been, in the past two decades, a growing tendency to accept interpretive research as the equal, if not the better, of positivist research (Walsham, 1995a, Fielden, 2003). Researchers conducting interpretive research are unlikely to suffer from discrimination due to their choice of epistemology.
- **Contribution to Knowledge:** There is much debate as to how rigorous interpretive research is. Generally, current Information Systems literature would suggest that interpretive research is more rigorous than positivist research; the findings themselves tend to be broader, richer, and more detailed than positivism (Orlikowski & Baroudi, 2001). The contribution to academic knowledge by interpretive studies has the potential to be excellent.

- **Contribution to Practice:** Practitioners are unlikely to be fond of interpretive studies, given their tendency to have their findings concealed in text, and their length, which is usually substantial. Interpretive studies have to be very cleanly designed and well presented in order to be accepted by practitioners as worthwhile. Practitioners themselves are also likely to have a problem with the concept that the findings are not as objective as possible, and will base their estimated worth of a paper heavily on their evaluation of the researcher himself (or herself). Interpretive studies are, however, more likely to be significant to practitioners if those studies are conducted in contexts relevant or related to them.
- **Potential Contribution:** Interpretive studies are more likely to suffer the effects of time than positivist studies. Interpretive studies are often only relevant for the context in which they were researched, and part of that context is the culture, opinions, and technology of that time (Alexander, 2002). This can have a positive effect on its future value, however, in that interpretive studies are a good indicator of how things were at a certain time, thus allowing us to contrast and portray those findings with findings today.
- **Statistical/Mathematical Analysis:** Any reader with a penchant for statistical data is unlikely to have any use for interpretive studies. Conversely, readers who have a dislike of the manipulatable nature of positivist data are likely to disregard numerical figures in favour of reasoned opinions and conclusions that interpretive research provides.
- **Adherence to Ethics:** Interpretive studies involve people, and thus any findings will rely heavily on the moral disposition of the researcher or any of his or her subjects. There is a broad scope for favouritism to leak into interpretive studies (Fielden, 2003), and should any part of a study be found or deemed to have been unethically conducted, then

that entire research, in the absence of any scientifically provable data, can be deemed irrelevant and incorrect.

- **Manuscript Length:** Interpretive studies, like studies conducted under any other epistemological assumptions, can be short or long. In general, however, interpretive studies tend to be on the longer side, but more damningly, their ability to be condensed and abbreviated is limited, due to the nature of the research, where the findings and research is in the middle of the text, and not in figures or tables.
- **Replicability:** Interpretive studies are context dependent, and therefore very difficult to replicate with any true value. Interpretive studies that are being replicated in different times and places need to be carefully controlled so as not to diminish their value. The majority of the time, however, any interpretive study replicated by a different researcher is likely to be disregarded for comparison purposes, as that new researcher brings with him or her many different opinions, emotions and goals (Key, 1998).

6.5 – The Effect of Qualitative/Critical Research on Long-Term Use

- **Relevance:** Theoretically, research conducted according to critical theory should be regarded as the most relevant research possible. Through its intent to change and improve situations and areas under research, any reader connected to that area under investigation stands to be heavily affected by whatever implications are in the research. The fact that critical research focuses on socio-economic factors makes it especially relevant for the business and social world too. Critical research will struggle to be current, however, as the involved process required in critical research (as in any qualitative research) is often slow (Lincoln & Guba, 1985, as Cited in Liebscher, 1998) and will take much time before it is published.

- **Readability:** The accessibility of critical research is heavily dependent on the researcher, but in general, critical research, despite the possible lack of quantitative data for easily understood summaries, is very structured and will have an easy to follow process.
- **Methodology:** Critical research suffers in this regard, in that it is probably the least practised, and least understood of the three different epistemologies. Evaluators may not like the apparent lack of rigour in the critical process, and the necessity for stated assumptions and beliefs could act to bias the evaluator against the researcher.
- **Contribution to Knowledge:** Critical research is not primarily concerned with the status quo of areas under research, and despite the necessity to establish the situation with regards to what is being researched, the primary goal of critical research is to change and improve the area under research (Pather & Remenyi, 2004). Thus, the contribution to academic knowledge is limited to the suggestions that the researcher makes about the area being researched.
- **Contribution to Practice:** Critical research is potentially a large contributor to practice in that it aims not to uncover reasons and relationships (which is of more concern to the academic world), but to improve and change situations (Orlikowski & Baroudi, 1991), which is vital to the high paced business world. Critical research, should it be embraced by industry, could facilitate the reconnecting of Information Systems academia and Information Systems practice.
- **Potential Contribution:** Given that any suggestions for improving a given situation are likely to be acted (or not acted) upon within a short time frame after a critical research paper has been read, the short-term potential contribution of critical research is high. The fast changing state of economies and (in particular) the Information Systems industry, however, render any suggestions in critical research

too context and time dependent to have any great future impact. However, this should not detract from the fact that the natural (present) potential contribution of critical research is inherently greater than that of any other epistemology.

- **Statistical/Mathematical Analysis:** Critical research theory encourages the use of both quantitative and qualitative tools, so there is no reason, despite the qualitative nature of critical research, to exclude statistical analysis from critical research (Pather & Remenyi, 2004). Indeed, the focus on socio-economic class can promote the use of numbers to support researchers' inferences. Having said that, any suggestions are still going to be based primarily on the researchers' own opinions, and there is the possibility that numeric data that does not support those opinions is not included in the research at all, rendering any statistical data in critical research highly subject to manipulation and influence.
- **Adherence to Ethics:** The qualitative nature of critical research renders it vulnerable to unethical behaviour. The inclusion of quantitative tools in critical research can have a tempering effect on this, however, as the presence of positivist data may decrease the chances of research being viewed as unethical in the future. As mentioned above, however, the possibility of data manipulation in this qualitative research could render critical research more open to unethical research.
- **Manuscript Length:** Although primarily dependent on the researcher's disposition, the theory of critical research tends to suggest that it is more disposed to producing long research papers. Not only does a subject have to be researched thoroughly, but solutions to improving that subject's situation need to be produced and validated as well. The encouragement of the researcher to use both quantitative and qualitative tools is likely to add length to the papers too.

- **Replicability:** Critical research is extremely time and context dependent, as well as being reliant on the researcher's penchants and preferences (Pather & Remenyi, 2004). Due to this, the replicability of critical research is almost zero. Similar studies may be conducted in similar areas, but comparisons between the two are virtually valueless.

6.6 – The Effect of Qualitative/Positivist Research on Long-Term Use

As there are many similarities between quantitative positivist research and qualitative positivist research, the following will only outline the differences in effect that qualitative positivist research will have on Long-Term Use. A general rule when estimating qualitative positivist research is to keep in mind that its primary use will be in case studies (Habraken, 2005). The following analysis should therefore be considered relevant to case study research only, as it is difficult to imagine another research method in which positivist qualitative research would be conducted.

- **Relevance:** Qualitative positivist research should take the same amount of time (or more) to conduct as quantitative positivist research; the smaller sample sizes, however, are likely to render any statistics (should there be any) less meaningful than they would be in quantitative positivist research.
- **Readability:** Qualitative positivist research is likely to be more interpretive (less concise) in its readability. It may, however, have the added benefit of including numerical data in its design to facilitate the needs of readers who prefer more positivist style research.
- **Methodology:** It is difficult to argue against qualitative positivism as it will incorporate features that attract both traditional positivists and interpretivists. The only drawback of this epistemology choice in this regard, however, is that the research will have no clear methodological

focus, and may not have enough positivism in it to appease positivists, and vice versa for interpretivists.

- **Contribution to Knowledge:** Although any findings from qualitative positivist research are likely to be rigorous and scientific in nature, the lack of a substantial sample size may render them difficult to generalise to the population. Validation aside, the qualitative nature of the findings allows for them to be expanded upon and, by implication, become richer and more detailed.
- **Contribution to Practice:** Having interpretivist findings based on positivist data can have a large impact on practice, particularly for practitioners involved with or affected by the context in which the research has taken place.
- **Potential Contribution:** The fact that positivism is well established does not help qualitative positivism, as it renders research too different in nature from traditional positivism to benefit from quantitative positivism's inherent trustworthiness. Although the statistics themselves are designed to be context independent, the limited sample sizes do not allow for this, and thus the potential contribution of qualitative positivism is limited.
- **Statistical/Mathematical Analysis:** Despite the existence of statistical analysis in qualitative positivist research, it does not have as large or significant an impact as it does in quantitative positivist research, due to the limited sample size in qualitative positivist research, and the lack of conclusions that lead directly from the statistical analysis itself.
- **Adherence to Ethics:** Very little difference to quantitative positivist research, although the qualitative nature of the findings may render

them vulnerable to unnecessary researcher bias. Whether this falls under ethics or not is debatable.

- **Manuscript Length:** Like quantitative positivist research, qualitative positivist research can be tailored for length. However, the research methods (i.e. interviews) may not lend themselves to easy summarising in numerical form, and the qualitative nature of the findings will generally render the length of qualitative positivist research longer than quantitative positivist research.
- **Replicability:** Since the positivist data is based on qualitative research techniques, the ability of qualitative positivist research to be replicated is fairly limited, as the research methods are context dependent. Having said that, there is an inherent value in comparing the numerical data from qualitative research methods.

6.7 – Summary

At this point, conventional wisdom would seem to suggest that quantitative research would be better suited to providing research with a better chance of scoring highly in Long-Term Use. The repeatability and unambiguity of quantitative data and findings allow for long-term comparisons and easily referenced results (Jones 2004). Numbers, however, do not necessarily provide the reader with the full story, as certain variables may be excluded from the analysis, and there is the (dangerous) possibility of research and findings being tailored to maintain suppositions that data may support (Qualitative vs. Quantitative Analysis [No Date]).

Qualitative research, conversely, provides the reader with a more complete story that incorporates many different variables into its findings (Kaplan & Maxwell 1994, as cited in Myers, 1997). It is also easy to adapt the initial stages of qualitative research to different situations, and it can be extended to focus on different aspects of any research. Qualitative research can, however, suffer from the perception that it is too subjective to be considered

scientifically meaningful (Fielden 2003), and the findings themselves tend only to be valid for the context in which they were found or applied (Kaplan & Maxwell 1994, as cited in Myers 2005, Fitzgerald & Howcroft 1998a), and therefore have little relevance in other situations around the world.

It is thus necessary to consolidate the findings of the previous chapters, so as to be able to directly compare the effects that the different epistemologies are deemed to have on Information Systems research. This will be done in the usual way by providing a summary of the findings of this research, as well as by performing an analysis of a small sample of Information Systems papers.

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7 – Analysis of IS Research

7.1 – Overview

This chapter uses Long-Term Use as a measure on six real life papers that have been conducted according to the three different epistemologies, and compares the findings of that analysis with what the theory would suggest the results would be.

7.2 – Long-Term Use in Analysis

Having established the creation of a measure for Information Systems research, and estimated the effects that epistemology choice will have on it (and research in general), it is potentially important to attempt some limited validation and application of the inferences made in the analysis. Full validation for Long-Term Use as a measure and a tool for Information Systems research evaluation is, at this stage, impossible. Suffice to say, the author feels that the criteria included in Long-Term Use are justifiable and (with a few possible exceptions) commonly seen as important facets of research. Whereas Klein and Myers' (1999) suggested principles for interpretive research are highly conceptual in nature and difficult to evaluate succinctly, and the standards for evaluating positivist research are diverse and ill defined (Straub, Ang & Evaristo, 1994), Long-Term Use incorporates well defined and (relatively) easily measured criteria that can (or should) apply to both quantitative and qualitative research. Therefore, it is felt that any verification of the inferences made about the effect of epistemology choice on Information Systems research can be made using Long-Term Use as a measure.

It should be borne in mind that, due to the untested nature of Long-Term Use as a measure, and the vagaries and inconsistencies of research, any applications of the principles of this research serve only to act for illustrative purposes, and will neither significantly corroborate nor contradict any conclusions that the theory has led to. The purpose of this literature analysis is thus two-fold: To demonstrate (partly) how Long-Term Use would be used,

and to impart a degree of reality on what has, up to this point, been a purely theoretical and speculative discourse.

The analysis will take the form of assessing the effect of epistemology choice on six different Information Systems papers (two papers conducted under each of the different epistemologies). In order to attain a degree of consistency in excellence and comparability, the papers have been selected from best paper winners or those cited as being excellent examples of research. This will allow us to (partially) negate the effect of different researcher abilities and general researcher regard. These papers will be analysed with regards to only the ten criteria that epistemology choice is deemed to have an effect on, and will further be measured only according to those facets of those criteria that epistemology choice directly impacts on. Since it is fairly pointless to apply numeric measures to these criteria, the analysis will take the form of a short written examination of the different results observed.

This begs the question of how to accurately (or, for want of a better word, meaningfully) measure the effect that epistemology choice has had on the different variables. Naturally, any purely abstract analysis based on the evaluator's judgement is too tainted by the possibility of bias to validate the inferences made in this research. At the same time, there is little possibility, given the construction of Long-Term Use, for any positivistic methods to be devised for the measurements. The sample size is too small to be significant, and any statistics used would be counterproductive in terms of what Long-Term Use is meant to achieve. Therefore, each one of the (relevant) criteria has been analysed for features that will appear in the research that can be (relatively) objectively evaluated, and are affected by epistemology choice (some features of long-term use will thus be excluded due to their subjective nature). This will allow for a consolidated scrutiny of whether or not the inferences are (theoretically) supported in real research or not.

7.3 – The Measurement Criteria

The measurement criteria that will be assessed to gauge epistemology effect in the ten different criteria are:

- **Relevance**

Relevance is affected by many different things, many of which epistemology choice will have no effect on at all. It is therefore prudent to assess only those things that have a bearing on relevance that are also directly affected by epistemology choice as well. Unfortunately, few objective criteria exist that aid evaluators in measuring relevance, and a lot of research's relevance will come down to the topic choice and the 'feel' of a paper. Nonetheless, there are a few features or factors of a paper that can be considered indicators of relevance. With regards to research, these are deemed to be:

- **The Practicality of Topic:** Although it can be accepted that research in relevant research areas can be conducted according to any epistemology, it is potentially illuminating to see the comparative relevance of topic choices by researchers prevalent in different types of research. Any distinct differences in the relevance to practice of the respective topic choices would suggest (albeit tacitly) that certain epistemologies are better suited to research of a more relevant nature than others.
 - **Implementation:** Although some might view the measuring of a paper's ability to facilitate its own incorporation into practice as highly subjective, it should be relatively simple to establish whether or not a paper, by the way it is written or the clarity and simplicity of its findings and suggestions (should there be any at all), can be used by Information Systems practitioners easily and effectively. This, in turn, would allow us to gauge the degree to which the epistemology choice aided in this.
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- **Readability**

As previously stated, certain epistemologies tend towards certain presentation and writing styles. With regards to this, the papers will be evaluated for clarity and ease of accessibility (i.e. simple to navigate, well highlighted findings and tables etc.). Although potentially contentious in terms of being evaluated, an attempt shall be made to see whether or not papers researched according to specific epistemologies tend to be more readable than others.

- **Methodology**

Evaluations of methodology with regards to epistemology choice are almost entirely subjective. It is therefore difficult to identify any specific features of a paper that would suggest that the chosen epistemology for that paper was the most appropriate one. The only factor worthwhile mentioning with regards to methodology is the general perception of the epistemology chosen, which has already been outlined earlier in this research. However, the number of citations a paper receives may have something to do with the epistemology a researcher employs, and these figures will be assessed for any significance. The citation figures themselves have been taken from the ISI Web of Knowledge. Despite the acknowledged (minor) inaccuracies of these figures (they are generally considered to be lower than the true figure), it is felt that they will still serve their purpose adequately, as any inaccuracies are assumed to cancel each other out.

- **Contribution**

Contribution encompasses contribution to knowledge, practice, and potential contribution. Contribution to knowledge and contribution to practice have been grouped together as this research has inferred that epistemology choice will have the opposite effect on one as it does on the other. Potential contribution is not examined separately due to the difficulty of isolating any particular feature of a paper as having an influence on potential contribution whilst being affected by epistemology choice (although subsequent citation trends and figures may aid in this area). It is included in this analysis for illustrative purposes only, so that all ten affected criteria are included. Papers

that have simply incorporated findings and conclusions in the research are generally considered to be more influential in terms of contribution to knowledge, whereas research featuring suggestions and outlining implications of research is likely to contribute more to practice.

- **Statistical Analysis**

This criterion is the easiest to measure with regards to the effect epistemology choice will have on it. Simply put, the presence of unambiguous and effective statistical analysis, and a clear explanation of the findings of that analysis will reinforce or directly contrast with any of the inferences made about the different epistemologies in this research.

- **Ethics**

The fact that research has been published implies that there are few serious concerns with it with regards to ethics. In terms of the long term effect epistemology choice can have on ethics, we will look for evidence of human involvement and opinion, as well as a general dependence on context in the research to evaluate if the ethics of the paper could possibly be called into question in the future.

- **Conciseness**

Relatively easy to evaluate, the evaluation of this criterion will take place by comparing the lengths of the different papers (excluding appendices), and evaluating any implications that these comparisons would suggest. The evaluation for conciseness will be two fold, and will be based on the number of words in the research, and the proclivity for the research to be summarised in an easy to understand and effective way.

- **Replicability**

A paper will be deemed to have a low level of replicability if it has been conducted in a specific context and does not feature any statistics or analysis that can be directly compared with similar analyses conducted elsewhere. The involvement of human subjects and the inclusion of subjective opinion will also render the replicability of a paper lower.

7.4 – The Papers

Six papers have been chosen, two conducted according to the positivist epistemology, two to the interpretive epistemology, and two to the critical epistemology. The exclusion of papers conducted according to (true) qualitative positivism is not a case of them being overlooked, but more indicative of the lack of widely regarded (and lack in general) Information Systems research papers that have been conducted according to qualitative positivism. Five of the papers have been sourced from Jones' (2004) appendix on IFIP Best Paper recipients and MISQ Paper of the Year recipients, whilst the other (Hirschheim & Klein) was sourced from Myers' (1997) identification of high quality critical research papers in Information Systems.

The six papers that are to be analysed are:

- Ngwenyama, O.K. & Lee, A.S. (1997) 'Communication Richness in Electronic Mail: Critical Social Theory and the Contextuality of Meaning' (1997 MISQ Paper of the Year Recipient, conducted according to the Critical epistemology)
- Hirschheim, R. & Klein, H.K. (1994) 'Realizing Emancipatory Principles in Information Systems Development: The Case for ETHICS' (1994, conducted according to the Critical epistemology)
- Lee, A.S. (1994) 'Electronic Mail as a Medium for Rich Communication: An Empirical Investigation Using Hermeneutic Interpretation' (IFIP Best Paper Winner 1993, conducted according to the Interpretive epistemology)
- Orlikowski, W.J. (1993) 'CASE Tools as Organizational Change: Investigating Incremental and Radical Changes in Systems Development' (1993 MISQ Paper of the Year Recipient, conducted according to the Interpretive epistemology)
- Hitt, M.L. & Brynjolfsson, E. (1996) 'Productivity, Business Profitability, and Consumer Surplus: Three Different Measures of Information Technology Value' (IFIP Best Paper Winner 1994, conducted according to the Positivist epistemology)

- Nelson, K.M. & Coopriider, J.G. (1996) 'The Contribution of Shared Knowledge to IS Group Performance' (IFIP Best Paper Winner 1993, published in MISQ 1996, conducted according to the Positivist epistemology)

7.5 – Analysis

The following is a breakdown of how the papers compared to each other in the different categories of measurement. When analysing relevance, it has been estimated the importance of the issue at the time of publication. Naturally, many of these topics are fairly irrelevant now, but at the time of print, most were (at least) fairly important to the Information Systems industry.

Length

This was a fairly easy aspect of the papers to measure; the length of the papers themselves tended to follow what the theory would suggest, and what has already been inferred in this paper. The two critical research papers, Ngwenyama & Lee and Hirschheim & Klein, were 10,439 and 10,262 words respectively. Although the average number of words per paper was approximately 10,000, these two papers were the 2nd and 3rd longest of the six analysed, which would tie in with what the theory and this paper has inferred. The longest (by quite some way) was Orlikowski's interpretive paper (15,235 words), and the 4th longest was Lee's paper at 8,316 words. Thus, the four qualitative papers were all longer than the quantitative papers (Hitt and Brynjolfsson's paper was 8,216 words and Nelson and Coopriider's 7,290 words). Somewhat surprisingly, this correlates fairly exactly with what epistemological theory would have us believe, although it must be said that in the case of Lee's paper, the difference is minimal, and Ngwenyama & Lee and Hirschheim & Klein's papers are only about 20% longer.

Ethics

Given that the papers were analysed for human involvement and context dependency to gauge the potential problems they may have with ethics in the future, the outcome of this part of the analysis is fairly easy to predict, even before it has been conducted. As it is, there was human involvement in all four

qualitative papers, and little or none in the two quantitative papers. Ngwenyama & Lee made extensive use of organisational actors in their paper, and incorporated their opinions and points of view. It was thus heavily context dependent. Hirschheim & Klein, conversely, featured very little human involvement, and was primarily (critical) theory based, illustrating the benefits that ETHICS (Effective Technical and Human Implementation of Computer Systems, a type of methodology) could bring to systems development, and was not context dependent at all.

Both the interpretive papers featured interviews, although Lee's paper did not base much of the findings of the paper on the interviews, but rather on a subjective analysis of documents and e-Mails. Orlikowski's paper, on the other hand, had its findings based primarily on interviews and opinions. Both papers did not place an exclusive focus on their findings, and were meant to be applied generally, although Lee's paper succeeds at this rather better than Orlikowski's, as the latter's paper is likely to be applicable only to the organisation in which the study was conducted.

Hitt & Brynjolfsson's paper featured no human involvement (opinions or otherwise) of any nature, and was based purely on economic figures and indicators. Barring the abolishment or invalidation of the economic equations used in the paper, there is little possibility of this paper being discredited in the future; it is (as far as can be seen) totally context independent. The other positivist study, Nelson & Coopridge, also featured numeric data and had statistical analysis of a more traditional type (i.e. No mathematical equations besides those used in statistics were incorporated), but was based primarily on surveys, thus creating the possibility of flawed data from either poor survey design or insincere respondents. Hence, it is possible that positivist studies could be just as susceptible to ethical concerns as interpretive or critical ones. One difference is that the positivist studies tend to use larger samples in their research, thus allowing for the (partial) negation of any effect that human involvement may have, through the averaging out of the many different responses.

Statistical Analysis

This is the simplest aspect of the papers to evaluate. Unsurprisingly, statistical analysis appeared in only the positivist papers (as previously mentioned, in Hitt & Brynjolfsson's paper, the statistical analysis took the form of fairly complicated economics equations). Given that, in this analysis, and as mentioned earlier, the existence of statistical analysis is viewed as a positive aspect of a paper, positivist studies assume an advantage in this regard. Other than that, there is little else to consider with regards to statistical analysis in these papers, other than the effect that it can have on replicability.

Replicability

The degree of replicability a paper is deemed to have is based on a combination of two features that have already been analysed: Context Dependency and Statistical Analysis. Ngwenyama and Lee's paper, despite being considered context dependent, has findings that aspire to a general audience, and the investigation in the paper is used primarily to illustrate the benefits that Critical Social Theory allows for. The replicability of the paper is therefore not particularly low, although it would be difficult to imagine this investigation being replicated with any true value. The same can be said for Hirschheim & Klein's paper, which, despite being theoretical in nature, and therefore replicable, analyses an issue (why ETHICS should be used in the systems development process) that is difficult to expand upon with any real value.

Lee's paper, which analysed the use of e-Mail in organisations at a time when e-Mail was relatively new (1993), is not particularly context dependent, and could be replicated, although any comparisons between the two would be pointless (due to the lack of any statistical analysis, and the subjective nature of the hermeneutical investigation), unless the new study was conducted by the same author. Orlikowski's study is certainly replicable (despite the fact that the topic is now somewhat dated), but the findings would not be comparable with the original study, and thus any findings of such an investigation would serve to act for illustrative or expanding purposes only.

The two positivist papers are both highly replicable, due both to their (almost total) exclusion of human opinion and independence of context. The inclusion of statistical data also allows for direct comparison between the original and any replicate study that might occur. Moreover, whether by coincidence or not, the two positivist studies would both be very valuable if replicated, due to the (practically timeless) subject matter they address (the value realised by a company from investment in IT). Thus, not only are the positivist studies inherently replicable, but also it would be desirable for them to be replicated.

Methodology

Evaluating general methodology preferences by analysing the number of citations a paper receives is mostly inaccurate, as a certain topic may be more researched than another, and certain writers may be deemed to be better (for referencing) than others. Nonetheless, should there be any major discrepancies between the papers in terms of the number of citations they receive, part of the cause for that could be the methodology under which they were conducted. To further support this, all six papers were published within a 5-year period (1993 – 1997), and the topics are neither niche topics (i.e. a small topic area that is unlikely to be researched by others) nor substantially different (all six papers address Information Systems changes in the workplace and ways of maximising the benefits that Information Systems can bring).

The following are the number of citations the papers received, as per the ISI Web of Knowledge (December 2005):

Authors of Paper	Number of Citations
Ngwenyama & Lee	64
Hirschheim & Klein	26
Lee	81
Orlikowski	132
Hitt & Brynjolfsson	54
Nelson & Coopriider	19

Table 3: Number of Citations per Paper (ISI Web of Knowledge)

As can be seen, the two interpretive papers received substantially more references than the papers conducted according to critical theory and positivism. Whether this supports the claims made by researchers that interpretivism is more and more being preferred to traditional research techniques is debatable, although current research would suggest that interpretive techniques are quickly gaining ground on positivism in the world of Information Systems research. The (relative) lack of citations that the two critical research papers receive could be explained by the general lack of both understanding and widespread use of critical research methods, although this is (in the author's opinion) likely to (and should) change in the future.

Overall, if any findings were to be made from these figures, they would be that interpretivism has become the preferred epistemology of Information Systems researchers, and that, despite the means and abilities that modern technology provides to positivist researchers, subjectivism is no longer viewed as a drawback in Information Systems research.

Readability

Readability is almost entirely subjective as a measure, and thus there will be no selecting of one presentation style as being better than another in this analysis. Instead, the unique aspects of the styles of the different papers will be analysed, and presented so as to illustrate the differences the three epistemologies can engender. The biggest difference between the qualitative and quantitative papers was the depth and length to which the authors explained and rationalised their research methodologies and designs. In the positivist papers, very little was written on the epistemology used, and comparatively little was written on research design, whilst the critical and interpretive papers went to great lengths to defend their choice of methodology, and also what their chosen methodology entailed. Whether this is indicative of a general lack of understanding (at the time of being published) of the qualitative methods being used or a genuine necessity when conducting such qualitative research is debatable. Either way, the two interpretive papers spent perhaps too long on describing their methodology, and did, at times, become too longwinded.

The only other readability feature of the papers that epistemology was deemed to have an effect on was the presence of tables and figures. As already mentioned, the inclusion of such items in a paper tends to improve that paper's flow and accessibility. Five of the papers featured tables, graphs and figures in them, with the two positivist papers (predictably) devoting the highest percentage of their papers to visual aids. Orlikowski's paper also featured extensive use of models and tables, whilst both critical papers had numerous tables and figures included in them; only Lee's paper was devoid of any tables or figures whatsoever. Thus, despite what theory would suggest, it would appear that there is no (large) epistemological effect on the inclusion of visual aids in a paper, although it would appear that positivist data more easily lends itself to reproduction in tabular or graphical form.

In terms of the flow and writing style of the papers themselves, no significant epistemological effect could be established. All six papers had different writing styles and techniques, none of which could be directly attributed to the epistemology being used. In fact, each epistemology pair featured contrasting degrees of readability (i.e. Ngwenyama & Lee's paper had a fairly easy flow to it, whilst Hirschheim & Klein's paper was complicated and overly academic in nature), so it should be safe to suggest that, despite its effect on the methodology chapter and on the inclusion of visual aids, readability will primarily rely on the proclivities and abilities of the author.

Contribution

A way of minimizing the subjectivity of measuring something such as contribution is to gauge what audience(s) the conclusions of a paper are addressing, and then to try and estimate how easily those conclusions can be understood and acted upon. The conclusions and recommendations themselves will, for now, be ignored.

The conclusions of both the critical research papers were fairly academic in nature, and neither made any explicit recommendations and suggestions based on what had been found in their research. Due to the nature of the

critical research itself, however, the recommendations and suggestions (i.e. emancipatory ideals) tended to be in the body of the paper itself, and not in the findings and conclusions sections. Nonetheless, a more succinct conclusion, and more overt suggestions should have been incorporated into both the papers. Ngwenyama & Lee's paper, despite having as its aim the improvement of communication in the workplace, provided little in the way of applicable guidelines and problem solutions for professionals. Hirschheim & Klein's paper, however, despite being academic in nature, was clearly aimed at professionals, and was (through its thorough presentation and explanation of the ETHICS methodology) directly accessible and usable by professionals.

The two interpretive papers both featured succinct conclusions, and had their implications separated into consequences for professionals and consequences for academics. Despite this, the papers suffered with regards to providing recommendations and solutions to professionals, and the limit of their contribution (as per theory) is a reporting of the status quo of the situations and cases that were researched. Having said that, both papers made significant findings for academia, and were most illuminating, if not particularly forthcoming with accessible advice that can be acted upon.

Hitt & Brynjolfsson's paper suffered many of the same drawbacks as the interpretive papers and was fairly inconclusive. Any suggestions that were made were vague, and, despite the wealth of important information in the paper itself, the conclusions were not of a particularly high value, and could have been more decisive. Nelson & Coopriider's paper, however, had conclusions that were primarily aimed at business, and had clear suggestions for improving performance. The only conclusions directed towards academia were possible areas for future research.

Thus the nature of the contributions generally correlated with what theory would indicate they would, although it should be noted that there is clearly no barrier to non-critical theory papers supplying solutions and recommendations to both business and academia, as can be evidenced by Nelson & Coopriider's paper. However, it should be noted that epistemology choice

does, at this stage, seem to have a clear impact on what the contribution of a paper will be, regardless of whether it is necessary that it do so or not.

Relevance

Estimating the relevance of certain topics and the way in which they are dealt with in comparison to others is a potentially perilous procedure. What one reader finds relevant, another may find irrelevant, and thus the adjudging of one topic as more relevant than another is highly subjective. Therefore, in this analysis, it has been attempted to estimate how wide reaching the topic of a paper is, and particularly how relevant it is for business and practice. A topic that focuses on fairly broad issues that are relevant to business will be deemed more relevant than niche issues that don't necessarily apply to business. As it is, and despite the contributions made by some of the papers, the relevance of the topics of the six papers is considerably high. Some of the papers (most notably the positivist ones) were possibly more directly focussed on meeting the requirements of Information Systems practice, but all of the papers had some relevance to business, without focussing on too small an area. The two critical papers had very relevant topics, that had implications for both practice and academia, while the two interpretive papers were both very relevant (at the time, both topics are largely defunct now) to practice, even if their topics were perhaps narrower in scope than the others. If one had to choose the most relevant pairing, however, then the two positivist papers (with their focus on IT value and productivity in the workplace) would most likely be selected. However, these small differences are, at this stage, considered negligible, and it would appear that epistemology does not, or should not, have an effect on the relevance of one's topic.

Gauging the relevance of the difference in time between a topic being raised in Information Systems and the time for a paper to be published may help us discover trends in the types of epistemology being used in certain areas. One would expect positivist papers to appear on a topic first, followed by interpretive and then critical. Of the six papers analysed, both critical papers were published 11 years after their chosen topics had first been raised (in Information Systems publications), whereas the two interpretive papers were

published 7 (Lee) and 6 (Orlikowski) years after their chosen topics were first raised. In Lee's case, however, the advent of e-Mail imparted a new spin on an older topic, and could thus probably be considered as being a topic more recent than 6 years old at the time of the publication. This opens up the possibility that epistemology can affect topic originality. Whereas it has already been established that epistemology should have little effect on the overall originality of a paper, it is possible that it can affect the originality of the chosen topic. The qualitative papers all feature topics that are somewhat original in their own right, whereas the two quantitative papers have researched a topic that is fairly old, yet always relevant (even now). It is possible that the replicable nature of positivist research renders it better equipped to encouraging research in already researched areas, whereas qualitative techniques, due to their lack of replicability, may tacitly enforce researchers to investigate newer areas of research.

The last concern with regards to relevance is the professional applicability of a paper, which has already been partly discussed in Contribution. Unlike the measurement criteria for Contribution, however, the conclusions of a paper are not the primary concern here, and thus the whole paper is given as much attention as its recommendations and solutions. As in other areas of this analysis on relevance, there is no clear outcome. Whereas Ngwenyama & Lee's paper has little applicability for professionals, Hirschheim & Klein's does. Both interpretive papers have strong implications for business, but have little in the way of guidelines and solutions for professionals to act upon. Hitt & Brynjolfsson's paper has a lot of interesting data for professionals to consider, but lacks any value further than reporting the status quo, whilst Nelson & Coopride's paper has explicit suggestions and guidelines for professionals, as well as a full summary of the situation as researched. There therefore seems to be no conclusive outcome to this analysis on professional usability, as there isn't for this analysis on relevance as a whole. One can only consider that the sample size of six papers is far too small to gauge any effects on relevance that epistemology choice might have, or that epistemology choice really does not have a significant effect on relevance.

7.6 – Summary

Given that (in this paper) relevance is considered to be the most important feature of a paper, the lack of a coherent outcome with regards to relevance in this analysis is potentially damaging to any inferences made about the effect epistemology choice can have on Information Systems research. Relevance aside, however, the analysis has revealed (albeit from a statistically insignificant sample) support for the inferences made in this research about Contribution, Readability, Methodology (partly), Replicability, Ethics, and Length (as well as Statistical Analysis, which was to be expected). At this stage then, and without the benefit of a greater analysis having been done, it would appear safe to assume that the effect of epistemology choice on Information Systems research (mostly) ties in with what has been suggested in this paper. Whether a larger sample will support or contradict this claim remains to be seen, but we can assume that if most of the suppositions made in this paper appear, at this stage, to be true, then the inferences made about relevance in this literature review of this dissertation (despite the lack of a conclusive outcome in the analysis) cannot be held to be false.

8 – Findings

8.1 – Overview of this Section

In adherence to the findings of this research, it has been decided to provide a brief summary of the findings and conclusions of this research to promote greater accessibility and usability to the reader.

- Information Systems research is not supporting practice the way it should (Moody, 2000). Every effort must be made to ensure that this is rectified.
- There is a great need in Information Systems for a consolidated, widely accepted evaluative tool for measuring Information Systems research. This paper has proposed Long-Term Use as such a solution, but recognises that there is still much scope for improvement.
- Overly long and complex methodology concerns needlessly increase the time and resources needed to publish a paper. An accepted model for methodology selection should be introduced so as to make this process shorter and simpler, whilst at the same time promoting more relevant and timely research.
- In the opinion of the author, Critical Research most fully accommodates the needs of Information Systems research and researchers. Promotion of the epistemology amongst students and researchers may aid in rectifying the problems prevalent in Information Systems research.

(These findings are repeated in greater detail further on in this chapter.)

Having analysed the different epistemologies with regards to their effect on Long-Term Use, it is important to determine what needs to be, or should be done with this information. The obvious question is whether or not to declare one epistemology as having a more favourable effect on Long-Term Use than the others. The selecting of a 'winner' would certainly aid beginning researchers in their decision-making, but would be counterproductive in terms of the greater issue at stake, which is the reduction of the methodology debate, as well as the minimizing of the overly large role methodology

currently occupies in Information Systems research. Any conclusion as to which epistemology choice has the greatest net effect on one's research would only result in further debate and might conceal any value that this research may provide. Conversely, there would be little point in this research if there were not at least some attempt to compare the different epistemologies with regards to their (alleged) respective effects on Information Systems research, as well as providing some guidelines on what epistemology may be most appropriate to Information Systems in certain situations.

This comparison will not be numerical in nature, as the application of numbers to the effects of epistemology choice will only result in one epistemology being viewed as preferable to the others, and place an unnecessarily positivistic bent on this research. We can, however, summarise the cumulative effects of the different epistemologies on the different criteria in Long-Term Use in basic, easy-to-understand terms, which will allow for easy comparison. It would then be up to the reader (or aspirant researcher) to decide what is most important in his or her research, and to then decide what epistemology most suits them or their particular ontological point of view.

8.2 – Summary of Epistemological Effect on IS Research

Table 4 represents the findings of the analysis of the theory of the different epistemologies, and their estimated effects on the different criteria in Long-Term Use. They are not influenced by the findings in the analysis of the six different papers, as the analysis was performed primarily for illustrative purposes, and the sample size was considered too small to be statistically relevant. The second column is a measure of the estimated amount (or degree) of effect that epistemology choice will have on that particular criterion, ranging from Very Low to Very High.

Table 4: The Overall Effect of the Different Epistemologies on Long-Term Use (L-TU)

The Following Criteria in Long-Term Use will not be affected by Epistemology Choice: Objectives, Quality of Evidence, Organisation, Author Reputation, Lit Review, Originality & Rigour

Criterion	Extent of Effect on L-TU	Epistemology & Net Effect			
		Positivism	Interpretivism	Critical Theory	Qualitative Positivism
Relevance	Low	Promotes relevance, practitioners enjoy it, quick to perform.	Context dependent, but very relevant for the context in which the research was conducted.	Extremely relevant for the context in which it is researched. Slow to perform.	Fairly quick to perform, but small sample sizes limit the value of the statistics. Relevant in context.
Readability	Average	Allows for succinct data and easy to read format. Very accessible.	Unlikely to attract practitioners. Potentially academic and garrulous.	Very structured, with an easy to follow process, but still more laborious than positivism.	Facilitates the preferences of both practitioners and academics.
Methodology	Average	Most popular epistemology. Widely accepted & understood.	Widely accepted, but not as well understood or practiced as positivism.	Not widely practiced or understood, and very difficult to conduct correctly.	Likely to be considered too interpretivist by positivists and too positivist by interpretivists.
Contribution to Knowledge	Very Low	Rigorous and scientific findings. Limited in scope and richness.	Very rich, broad and detailed findings. Excellent potential for academic contribution.	Focuses on knowledge creation, not transformation, and thus limited in this regard.	Findings may not be as rigorous as positivist, but will be richer and more detailed.
Contribution to Practice	Low	Structure is preferred by practitioners, but may be too context independent.	Difficult for practitioners to incorporate and utilise. May rely heavily on perceptions of author.	Facilitates the needs of practice well by suggesting strategies and solutions to problems.	Good balance for the needs of practitioners. May still be too context dependent.

Criterion	Extent of Effect on L-TU	Epistemology & Net Effect			
		Positivism	Interpretivism	Critical Theory	Qualitative Positivism
Potential Contribution	High	Well established & context independent.	Often only relevant to the time and context the research was conducted in.	Excellent short term potential, but too time and context dependent to have any future impact.	Too context dependent to have the same potential contribution that quantitative positivism has.
Statistical Analysis	Very High	Features statistical analysis as one of its key features.	Will not attract readers with a fondness for statistical analysis.	Can include statistical analysis, but is highly subject to manipulation and interference.	The statistical analysis in qual. positivism is not as valuable as in quant. positivism.
Ethics	Average	If approved for publication, positivist research is unlikely to suffer from ethical concerns in the future.	At the risk of being distorted by opinions and favouritism. If deemed unethical, the whole research could be discarded.	Similar to interpretivism, but can be tempered by the inclusion of positivistic methods.	Almost exactly the same as quantitative positivism.
Manuscript Length	Average	Can be tailored to become shorter. Lends itself to brevity.	Interpretive studies tend to be long, and are difficult to abbreviate.	Critical research is likely to be very long and verbose.	Should be longer than positivist research, as findings may not lend themselves to summarisation.
Replicability	High	Easy to replicate. One of the primary features of positivism.	Context dependent, and thus difficult to replicate.	Almost impossible to replicate with any value or purpose.	Inherently replicable, although qualitative research methods render replication imperfect.

8.3 – Consequences of Research

With the findings and inferences summarised, it is important to consider any consequences of this paper beyond the reporting of what has been presented. The first of these is Long-Term Use; no effective metrics exist for the objective evaluation of Information Systems research. Long-Term Use is by no means a perfect measure (it was designed with epistemologies in mind, although every attempt was made to exclude this fact biasing the construction of Long-Term Use), but it is still arguably worthwhile as a means of evaluating research, regardless of whether one agrees with the numeric weighting afforded the different criteria. There is a great need for explicit metrics and measuring tools in Information Systems research, and Long-Term Use (or measures like it) can be a helpful, relevant starting point.

The primary issue addressed in this paper is the methodology debate, and ways in which to resolve it. There is no possibility of one particular epistemology or methodology being selected as the standard way of conducting Information Systems research, yet if Information Systems research is to attain the level of relevance it should, it is likely that the overly long and academic process that currently characterises methodology design and reporting must be simplified and shortened. The selection of a well established epistemology for one's research should not require justification or lengthy description, yet at the same time, Information Systems academia cannot run the risk of producing careless, poorly supported research. Thus, there exists scope for a general model for methodology selection. Such a model must include the effects that epistemology choice can have on research (as per the findings of this paper) so as to inform the researcher of the consequences of his or her choice. At the same time, it must provide a simple, iterative process that will aid the researcher in choosing a methodology and epistemology most suited to their personal preferences, abilities, knowledge, and chosen topic and research sample (methodology should seldom be context independent). Ideally, the research question should (through the model) guide the researcher as to what epistemology and methodology to use. This would be of particular importance to inexperienced researchers, not necessarily in Information Systems, and students. Should

such a model exist and be widely accepted, the need for a lengthy methodology design and selection process would be negated, whilst at the same time going some way to ensuring that researchers are more cognitive of the research process and what it should entail.

The issue of relevance in Information Systems research must be addressed. There is a wealth of evidence to support the supposition that Information Systems academia are not supporting Information Systems practice in the way that they should, and this is largely due to the lack of relevance in the research that is published. It is too simplistic, and a poor excuse, to insinuate that the academic process is categorically flawed, as it is unlikely that a better, and widely accepted, method of producing and publishing research is to be established in academia. The challenge is therefore for academia to monitor industry trends and problems, and produce timely and accessible research addressing these problems. Information Systems is a fast moving industry, and therefore it is imperative that academia produce research that reaches practitioners quickly. The technical challenges of accommodating such a challenge are easily overcome, thanks to the Internet and a wealth of other technological options available to researchers; the true challenge is in identifying a problem area and producing research on it before the issue becomes irrelevant or industry has adopted its own solutions. A model for methodology selection can go a long way towards allowing for such a situation.

Despite the stated intentions of this paper, the different epistemologies should be ranked. It should be borne in mind that any suggestions here are subjective, but given the findings of this paper, the author feels that an indistinct solution with regards to methodology choice can be partially reached. Critical theory, despite being the least practiced and the least understood of the three epistemologies, has the potential to be a transformative force in Information Systems research. It has as its stated goal the betterment of the status quo, and is dismissive of neither qualitative nor quantitative methods, despite being generally qualitative in nature. It seldom applies to academic concerns, as it has its theory grounded in real world

practice and the solving of problems in that practice, and would therefore aid researchers in attaining much needed relevance in their research. There is the possibility of critical research being an overly long and involved process, but the advent of a model for methodology selection, and a growing understanding of critical methods on behalf of the Information Systems research readership should allow this to be reversed over time.

This discourse is not to suggest that either positivism or interpretivism do not have a place in research; indeed, their highly structured natures make them of great value to research and researchers in general. Their fundamental problem lies in the inherent inability of positivist or interpretive research to be emancipatory in its findings, and in an industry such as Information Systems, research that simply breaks down the status quo to explainable terms and definitions does not have the value attached to it of research that seeks to improve the situation and solve problems. As an aside to this, the proclivity for Information Systems research to produce clear, unambiguous and accessible solutions to problems is relatively low. Naturally, a researcher wishes for his or her paper to be read in its entirety, but a paper that provides short, simple suggestions and solutions to practitioners is of far greater value to industry than one that hides its findings in a mass of text.

Finally, if there cannot be a defined resolution to one's own personal proclivities when selecting an epistemology, should one not choose all of them? Pluralism has, to a large degree, been ignored in this research for several reasons. Firstly, it is possibly the most obvious solution to the various problems this research has identified. Should no particular epistemology be deemed suitable or comprehensive enough for a specific piece of research, why should the researcher not attempt to incorporate two or more into his or her methodology? This is the simplest, and possibly the most correct solution. It is difficult to argue against the use of several epistemologies in a research paper (provided they are understood and incorporated correctly). It can also possibly be taken as given that a well-constructed pluralist study would better a similar study conducted according to only one epistemology. For these reasons, and for the sake of brevity and lack of repetition in this paper, it can

be accepted that the pluralist approach is the best solution for one's research. The reason for its almost total exclusion from this paper is, however, twofold:

- Pluralism cannot be considered an epistemology, nor as a methodology in its own right. Combining two or more different epistemologies into one research design does no more make for a new, different epistemology than combining different news reports on the same sporting event make for a different end result (e.g. a game of football). Although one would undoubtedly obtain a more rounded, fuller, possibly less biased overview of the match from combining the details of the different reports, he or she would still be incapable of coming up with any new, original insight into what occurred in the game. Thus, pluralism is more of a consolidated mindset than a unique way of interpreting or measuring something.
- Pluralism places a logistical, time consuming, and, often, physical overhead on the researcher. The resources needed to conduct successful pluralist research are significantly greater than those needed for single epistemology research. Given that one of the prime uses of Long-Term Use is in aiding students or inexperienced researchers in quickly defining their research design and strategy, the inclusion of pluralism as an option would appear superfluous and too impractical for serious consideration in these situations.

9 – Conclusion

It is clear that there are problems in the relationship between Information Systems researchers and Information Systems practitioners. Researchers need to address how this issue is to be solved, something that up to this point they have largely failed to do (possibly due to the limitations imposed on them by their chosen epistemologies and methodologies). This research has attempted to isolate areas for improvement in academic output, and, through its focus on the effect that epistemology choice can have on one's research, proposes several ways in which these areas can be partially addressed. These include the implementation of a consolidated evaluation tool for Information Systems research and the creation of a model to aid in methodology design and selection.

The direct implications for practitioners from this research are very little, other than to inform practice that inadequacies in Information Systems research are being addressed by several researchers, and that there shall hopefully be solutions forthcoming in the near future. For researchers, however, this paper imposes a great responsibility to provide more relevant, more accessible research. It outlines the effect that epistemology choice can have on one's research, whilst at the same time providing a list of measurement criteria one should bear in mind when conducting research.

In addition to these, it is felt that there is a great scope for the creation of a model for methodology selection, which is a possible area for future research. The fact that there is a disconnect between Information Systems research and Information Systems practice is almost undeniable. Research now must focus on ways to address this issue, and methods for solving this ongoing problem.

10 – References

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