Chapter VI

Rigor In Grounded Theory Research: An Interpretive Perspective on Generating Theory From Qualitative Field Studies

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ABSTRACT

This chapter presents a set of principles for the use of Grounded Theory techniques in qualitative field studies. Some issues and controversies relating to rigor in Grounded Theory generation are discussed. These include: inductive theory generation and emergence, how theoretical saturation may be judged, the extent to which coding schemes should be formalized, the objectivist-subjectivist debate, and the assessment of quality and rigor in interpretive research. It is argued that Grounded Theory is often criticized for a lack of rigor because we apply positivist evaluations of rigor to research that derives from an interpretive worldview. Alternative assessments of rigor are suggested, that emphasize reflexivity in the inductive-deductive cycle of substantive theory generation.

INTRODUCTION

Grounded theory research involves the generation of innovative theory derived from data collected in an investigation of “real-life” situations relevant to the research problem. Although grounded theory approaches may use quantitative or qualitative methods (Dey, 1999), the emphasis in this chapter is on qualitative, interpretive approaches to generating grounded theory, as it is this area that is most criticized for its lack of rigor. I will discuss some reasons for this and suggests some solutions. The chapter starts with an introduction to the grounded theory research approach. Some issues and controversies relating to rigor in grounded theory generation are then discussed, including: inductive theory generation and emergence, how theoretical saturation may be judged, the extent to which coding schemes should be formalized, the objectivist-subjectivist debate, and the assessment of quality and rigor in qualitative, grounded theory research.

The chapter concludes with a set of principles for the appropriate use of grounded theory techniques in qualitative field studies.

A BRIEF INTRODUCTION TO GROUNDED THEORY RESEARCH METHODS

Grounded theory approaches to research are so called because contributions to knowledge are not generated from existing theory, but are *grounded* in the data collected from one or more empirical studies. In this chapter, I have described grounded theory as an approach, rather than a method, as there are many alternative methods that may be employed. In Figure 1, a guiding process for grounded theory is presented, adapted from Lowe (1995), Pigeon & Henwood (1976), and Dey (1999). The process model of grounded theory given in Figure 1 is presented as a *reflexive* approach because this process is centered around surfacing and making explicit the influences and inductive processes of the researcher.

The grounded theory approach (Glaser & Strauss, 1967, Glaser, 1978, 1992; Strauss, 1987; Strauss and Corbin, 1998) is designed “to develop and integrate a set of ideas and hypotheses in an integrated theory that accounts for behavior in any substantive area” (Lowe, 1996, page 1). In other words, a grounded theory approach involves the generation of *emergent* theory from empirical data. A variety of data collection methods may be employed, such as interviews, participant observation, experimentation and indirect data collection (for example, from service log reports or help desk emails).

The uniqueness of the grounded theory approach lies in two elements (Glaser, 1978, 1992; Strauss & Corbin, 1998):

1. Theory is based upon patterns found in empirical data, not from inferences, prejudices, or the association of ideas.
2. There is constant comparison between emergent theory (codes and constructs) and new data. Constant comparison confirms that theoretical constructs are found across and between data samples, driving the collection of additional data until the researcher feels that "theoretical saturation" (the point of diminishing returns from any new analysis) has been reached.

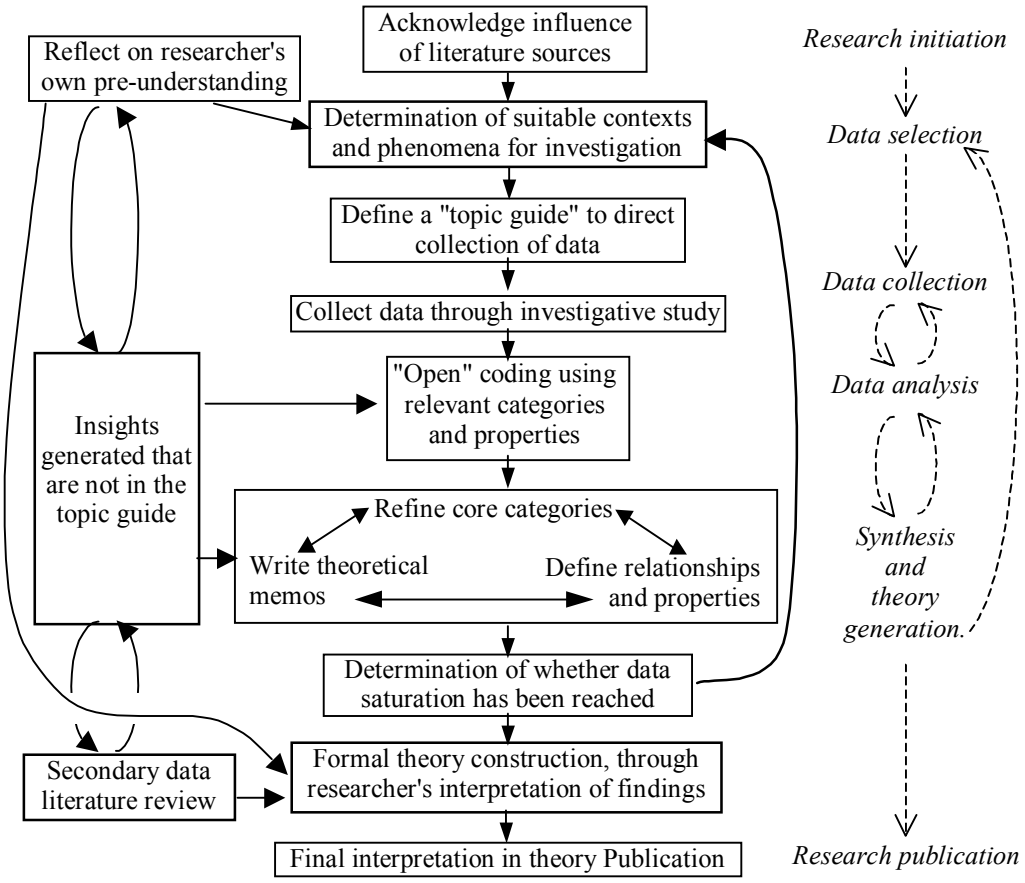

Figure 1: A Reflexive, Grounded Theory Approach

In the context of this chapter, there is not space for a thorough introduction to all of the many techniques for grounded theory analysis. The grounded theory approach is complex and is ultimately learned through practice rather than prescription. However, there are some general principles that categorize this approach and these are summarized here. For further insights on how to perform a grounded theory analysis, some very insightful descriptions of the process are provided by Lowe (1995, 1996, 1998) and Urquhart (1999, 2000). Most descriptions of grounded theory analysis employ Strauss's (1987; Strauss and Corbin, 1998) three stages of coding: open, axial and selective coding. These stages gradually refine the relationships between emerging elements in collected data that might constitute a theory.

Data Collection

Initial data collection in interpretive, qualitative field studies is normally conducted through interviewing or observation. The interview or recorded (audio or video) interactions and/or incidents are transcribed: written in text format, or captured in a form amenable to identification of sub-elements (for example, video may be analyzed second-

by-second). Elements of the transcribed data are then *coded* into categories of what is being observed.

Open Coding

Data is "coded" by classifying elements of the data into themes or categories and looking for patterns between categories (commonality, association, implied causality, etc.). Coding starts with a vague understanding of the sorts of categories that might be relevant ("open" codes). Initial coding will have been informed by some literature reading, although Glaser and Strauss (1967) and Glaser (1978) argue that a researcher should avoid the literature most closely related to the subject of the research, because reading this will sensitize the researcher to look for concepts related to existing theory and thus limit innovation in coding their data. Rather, the researcher should generate what Lowe (1995) calls a "topic guide" to direct initial coding of themes and categories, based upon elements of their initial research questions. Glaser (1978, page 57) provides three questions to be used in generating open codes:

1. "What is this data a study of?"
2. "What category does this incident indicate?"
3. "What is actually happening in the data?"

For example, in studying IS design processes, I was interested in how members of the design group jointly constructed a design problem and defined a systems solution. So my initial coding scheme used five levels of problem decomposition to code transcripts of group meetings: (i) high-level problem or change-goal definition, (ii) problem sub-component, (iii) system solution definition, (iv) solution sub-component, (v) solution implementation mechanism. I then derived a set of codes to describe how these problem-level constructs were used by group members in their discussions. From this coding, more refined codes emerged, to describe the design process.

The unit of analysis (element of transcribed data) to which a code is assigned may be a sentence, a line from a transcript, a speech-interaction, a physical action, a one-second sequence in a video, or a combination of elements such as these. It is important to clarify exactly what we intend to examine, in the analysis, and to choose the level of granularity accordingly. For example, if we are trying to derive a theory of collective decision-making, then analyzing *parts* of sentences that indicate an understanding, misunderstanding, agreement, disagreement (etc.) may provide a relevant level of granularity, whereas analyzing a transcript by whole sentences may not. A useful way to start is to perform a line-by-line analysis of the transcribed data and to follow Lowe (1996), who advises that the gerund form of verbs (ending in -ing) should be used to label each identified theme, to “sensitize the researcher to the processes and patterns which may be revealed at each stage” (Lowe, 1996, page 8). Strauss (1987) suggests that the researcher should differentiate between *in vivo codes*, which are derived from the language and terminology used by subjects in the study and *scientific constructs*, which derive from the researcher’s scholarly knowledge and understanding of the (disciplinary, literature-based) field being studied. This is a helpful way of distinguishing constructs that emerge from the data from constructs that are imposed on the data by our preconceptions of what we are looking for.

Axial Coding

Axial coding is the search for relationships between coded elements of the data. Substantive theories emerge through an examination of similarities and differences in these relationships, between different categories (or subcategories), and between categories and their related properties. Strauss (1987) suggests that axial coding should examine elements such as antecedent conditions, interaction among subjects, strategies, tactics and consequences. Strauss and Corbin (1998) liken this process to fitting the parts of a jigsaw puzzle together. They argue that, by asking the questions Who, When, Where, Why, How and With what consequences, the researcher can relate structure to process. Glaser (1978) suggests applying the "six C's": causes, contexts, contingencies, consequences, covariances and conditions. Whichever approach is taken (we are not limited to just one), we should carefully note the emergence of insights and explicitly reflect on how these insights are bounding the research problem through selecting some categories and not others. This can be achieved through the generation of theoretical memos.

Theoretical Memos

Theoretical memos “are the theorizing write-up of ideas about codes and their relationships as they strike the analyst while coding” (Glaser, 1978, page 83). They reflect emerging ideas concerning relationship between data categories, new categories and properties of these categories, cross-category insights into the process, mention of relevant examples from the literature and many other reflections. They provide a way to capture those insights that we want to explore further and should be treated as a resource, triggering further constant comparison. Glaser (1978) recommends that a researcher should *always* interrupt coding to memo an idea that has just occurred to them. But constructs and relationships noted in theoretical memos must be related to other data, in other samples, for verification. At the end of the day, theoretical insights must be supported by further data analysis, or there is no theory - just speculation.

Selective Coding

"Selective coding is the process of integrating and refining categories" (Strauss and Corbin, 1998), so that "categories are related to the core category, ultimately becoming the basis for the grounded theory" (Babchuk, 1996). Glaser emphasizes the importance of "core" categories: categories which lie at the core of the theory being developed and “explain most of the variation in a pattern of behavior” (Glaser, 1992, page 75). The grounded theory analysis process often involves moving up and down levels of analysis, to understand one core category at a time (Lowe, 1996). It is important to *explicitly state the research analysis objectives before and during coding*. Detailed objectives of the analysis - as distinct from the overall research problem - may well change as emerging insights become significant. A search for different types of theoretical model will lead to different category structures. For example, a process model involves stages of action, so the core categories would reflect these stages, with sub-categories and properties reflecting elements such as process stage-triggers, or states by which it is judged that the process is ended. A factor model, on the other hand, would focus on cause and effect: core categories that reflect antecedent conditions, influences on, and consequences of the construct being explored.

Research Iteration and Constant Comparison

Unlike more pre-designed research, data collection and analysis are interrelated: the analyst “jointly collects, codes and analyzes his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges” (Glaser & Strauss, 1967, page 45). This process is referred to as "theoretical sampling" (ibid.). Grounded theory generation is highly iterative, constantly cycling between coding, synthesis and data-collection. The generation of theory is achieved through *constant comparison* of theoretical constructs with data collected from new studies. Constant comparison lies at the heart of the grounded theory approach and differentiates a rigorous grounded theory analysis from inductive guesswork. The researcher must continually ask whether the analysis of new data provides similar themes and categories to previous data, or whether other patterns emerge. Constant comparison requires continual research into the meaning of the developing categories by further data collection and analysis. The researcher may interview new respondents or study the situation in a different group of people, or observe the same group over a different period of time. As the analysis proceeds, new themes and relationships emerge and the researcher will find themselves recoding earlier data and reconceptualizing relationships between data elements. Urquhart (1999) provides an especially useful description of how codes and categories evolve and change, to reflect reconceptualizations of core theoretical elements. It may be found that some of the ideas or relationships that constitute a part of the theory may originate from other sources, such as insights from readings, or a 'eureka' flash of inspiration. Strauss and Corbin (1998) also suggest that literature (such as reports of other studies) may be used as a source of data for analysis. Whatever the source of the inspiration, Glaser and Strauss (1967) note that:

> " The generation of theory from such insights must then be brought into relation with the data, or there is great danger that theory and empirical world will mismatch." (Glaser and Strauss, ibid., page 6).

Grounded theory closure is guided by the concept of saturation. Theoretical saturation is reached when diminishing returns from each new analysis mean that no new themes, categories or relationships are emerging and new data confirm findings from previous data. At this point, it should be possible to abstract a formal theory from the findings.

The Progress From Substantive To Formal Theory

Glaser & Strauss (1967) differentiate *substantive* theory from *formal* theory by associating substantive theory generation with empirical research, whereas formal theory is associated with theoretical or conceptual work. Substantive theories are seen as emergent - by saturating oneself in the analysis of appropriate data, where the direction and quantity of data collection is driven by emerging patterns in the data, rather than by predetermined research ‘design’, one can generate original theories concerning human behavior (Glaser & Strauss, 1967). The ultimate end of grounded theory research, however, is to generate formal theories: theories that may be generalizable at an abstract level. **A formal theory can only emerge from sufficient data analysis,**

in sufficient cases, for the researcher to be sure that they are not merely describing the case in a single situation. A single grounded theory research study would not be expected to generate formal theory. Formal theory emerges over time (Glaser, 1978) and with reflection (Strauss and Corbin, 1998). It derives from the conceptual abstraction of a substantive theory across multiple research studies.

So the process of grounded theory analysis moves:

- from an open coding of data to axial coding through the identification of core categories of the data,
  - through the use of theoretical memos to capture insights on how categories are related,
    - to the analysis of "networks" of interactions between categories (and their properties),
      - to the construction of substantive theory, through a rigorous analysis of how core categories (and network models) fit with new data.

Over a period of time (often years), enough studies may be conducted to justify the proposal of a formal theory.

SOME ISSUES, CONTROVERSIES AND PROBLEMS OF GROUNDED THEORY

Inductive Theory Generation and Emergence

One of the major criticisms of grounded theory is that it is not "scientific" (deductive) in its analysis of the data, but based on inductive conclusions from a superficial analysis of collected data. But research in psychology tells us that all human reasoning is a balance of deductive and inductive reasoning (Simon, 1957). It is through inductive inference, based on our experience of the world that we survive. If we put our hand on the stove and it is burned, we learn that hot stoves will burn us. But then it is through deduction from empirical evidence that we can identify and avoid hot stoves (this is the expected shape for a stove and it is turned on). Learning depends upon inductive-deductive cycles of analytical thinking.

So inductive research techniques are not indefensible *per se*. In fact they form the basis for most of the qualitative coding methods used, for example, in qualitative case study analysis. Inductive analysis is treated as suspect because it introduces subjectivity into research and so the findings can be challenged, from a positivist perspective, as not *measured from*, but *subjectively associated with* the situation observed. Strauss and Corbin (1998) recognize the role of inductive reasoning in grounded theory generation and deal with it as follows:

> " We are deducing what is going on based on data but also based on our reading of that data along with our assumptions about the nature of life, the literature that we carry in our heads, and the discussion that we have with colleagues. (This is how science is born). In fact, there is an interplay between induction and deduction (as in all science). … **This is why we feel that it is important that the analyst validate his or her interpretations through constantly comparing one piece of data to another.**"
>
> *(Strauss and Corbin, 1998, pp. 136-137)*

The use of constant comparison, between emerging theoretical constructs and new data, can be used to switch from inductive to deductive thinking, to "validate" our constructs. But, as Glaser (1992) observes, there are two parts to constant comparison.

The first is to constantly compare incident to incident and incident to theoretical-concept. The second is to ask the "neutral" coding question: "what category or property of a category does this incident suggest?" (Glaser, 1992, page 39). From the use of the word "neutral", Glaser obviously views this as a deductive process. But Pigeon (1996) questions the assumption that qualitative researchers can directly access their subjects' internal experiences and so derive an objective coding scheme from the subjects' own terms and interpretations. He observes that some inductive use of *existing* theory is required, particularly at the beginning of analysis, to guide the researcher's understanding of the situation and so to guide them in what data to collect. The 'emergence' of theory thus results from the constant interplay between data and the researcher's developing conceptualizations - a "flip-flop" (Pigeon, 1996) between new ideas and the researcher's experience (deductive ↔ inductive reasoning). This process is better described as theory *generation* than theory *discovery*. Although the issue of familiarity with the literature in one's field is contentious, Dick (2000) makes an interesting point. In an emergent study, the researcher may not know which literature is relevant, so it is not always feasible to read *relevant* literature until the study is in progress. In acknowledging the emergence of findings, it is important to understand that most non-grounded-theory approaches are not as planned and linear as they would appear when their findings are published. Many researchers are highly critical of any approach that is not "guided" by a planned schema (a research instrument). But an incredibly useful insight on research in general is best summarized by a quote from Walsham (1993):

> " The actual research process did not match the linear presentation of this book whereby theory is described first, empirical research happens next, results are then analyzed and conclusions are drawn. Instead, the process involves such aspects as the use of theoretical insights at different stages, the modification of theory based on experience, the generation of intermediate results that lead to the reading of a different theoretical literature and the continuing revision or new enactment of past research results." (*Walsham, 1993, page 245*).

Judging Theoretical Saturation

One of the consequences of employing a highly iterative (and sometimes recursive) approach to data analysis and synthesis is the inability to judge when to stop. In the generation of grounded theory, data analysis is not an end of itself (as in other research approaches), but drives the need for further investigation, instigating new research questions and directions. It is very easy to fall into a state of hopeless confusion or, paradoxically, to terminate data collection and analysis before any rigorous support for theoretical insights have been obtained (in which case, the approach provides inductive insights, rather than grounded theory). The point at which *theoretical saturation* (Glaser and Strauss, 1967) is achieved is best described as the point at which diminishing returns are obtained from new data analysis, or refinement of coding categories. The point of diminishing returns comes when (and only when) theoretical constructs fit with existing data and the comparison of theoretical constructs with new data yields no significant new insights. Grounded theory is continuing to gain acceptance in the IS field. But criticisms and suspicions of grounded theory are often well-deserved. Many

analyses appear to have been terminated because of publication deadlines, boredom, or exhaustion. Such studies only serve to undermine efforts to formalize rigor differently, for qualitative research.

The Formalization of Data Coding and Analysis

At the core of the debate between Glaser (1992) and Strauss (1987; __ *and* Corbin, 1998) is the notion of whether theory emerges from flexible, inductively-guided data analysis, or whether theory is derived as the result of applying structured, analytical methods. Glaser (1992) argues that the generation of grounded theory emerges from categories and patterns suggested by informants and by socially-constructed realities. Glaser views Strauss' method of applying a specific coding method (the categorization of causal conditions, context, action/interactional strategies, and consequences) as "forcing" theoretical constructs and challenges the resulting theories as being more descriptive than processual or structural. Strauss emphasizes "canons of good science" (Babchuk, 1996) to data analysis and coding, while Glaser argues that the codes should emerge from the data. To be fair to Strauss' position, Strauss (1987) does argue that his procedures should be considered as rules of thumb, to be used heuristically. He advises researchers to modify the scheme as required. But Glaser (1992) makes the point that, in an endeavor to make grounded theory "rigorous", the researcher may well filter out elements within the data that might lead to a theory that would change the way we view the world.

Both authors appear to agree that the emergence of theory from data is central to employing a grounded theory approach. So the two authors are not diametrically opposed: the issue appears to be one of how to ensure rigor in the process of data analysis and selection. Glaser emphasizes the emergent, inductive nature of grounded theory generation and recommends constant comparison with the data and self-reflection (reflexivity on our role and influences in the research process) as a way of ensuring quality. Strauss emphasizes the need to apply rigorous, repeatable methods to data selection and analysis, and recommends the structuring of method around formal coding schemes as a way of ensuring consistency and quality. The debate appears to boil down to whether the researcher believes that their work should be *defended* from a positivist or interpretive perspective. This is discussed in the next section.

The Objectivist-Subjectivist Debate

To employ grounded theory rigorously, it is important to understand that, like the case study method, this approach may be used successfully to support both positivist and interpretive research. The main area of debate between the positivist and interpretive positions lies in their respective definitions of "reality" - the objectivist-subjectivist debate (Burrell and Morgan, 1979; Walsham, 1993). The positivist position argues that reality is "out there", waiting to be discovered and that this reality is reflected in universal laws that may be discovered by the application of objective, replicable and "scientific" research methods. The interpretive position argues that the world is subjective and reality is socially-constructed (Lincoln and Guba, 2000). The phenomena that we observe are only meaningful in terms of individual experience and interpretation: one person's shooting star may be another person's alien spacecraft. "Truth" is constructed

within a community of research and practice interests, across which "knowledge" is defined and valued (Latour, 1987). This "consensus theory" thus reflects a shared reality (Lincoln and Guba, 2000). The distinction between the two worldviews of positivism and interpretive research is particularly critical when deriving *grounded* theory, as it is based in empirical data collection and analysis. In Glaser and Strauss (1967), the authors talk of the "discovery" of grounded theory. The authors clearly view these laws as "out there", waiting to be discovered (a positivist perspective). But it is apparent from both authors' later work that they have questioned and modified this view, to some extent. Strauss and Corbin (1998, pp. 157-8) give an example where one of the authors found that "something seemed awry with the logic" of her theory concerning the management of high-risk pregnancies by mothers-to-be. The researcher realized that she was defining risk from her perspective as a health professional, and understood that she needed to define risk intersubjectively, from the point of view of her subjects, in order to understand their behavior. Her research subjects perceived their level of risk differently than her own assessment, and often assessed the same risk differently, at different times during their pregnancy. This understanding reflects an interpretive research position: that a phenomenon (or research "variable", to use positivist language) cannot be defined objectively, according to a set of absolute criteria, but must be defined from a *specified* point of view. Phenomena need to be understood both externally and internally to a situation, for a theory to be internally consistent. This distinction is critical for the grounded theory researcher performing interpretive, qualitative field studies and forms the basis of the reflective, inductive-deductive research cycle that is required for learning (Schön, 1983).

The existence of *multiple* perspectives is an important issue for interpretive research (Klein and Myers, 1999). We must be sensitive to different accounts of "reality" given by different participants in the research, rather than trying to discover universal laws of behavior by fitting all the accounts to a single perspective. Often, the interesting element of social theories derive from accounting for differences between accounts of a process, rather than from similarities. Strauss and Corbin (1998) stress the importance of internal consistency. A theory should "hang together" and make sense, not to an "objective" external observer, but to an observer who shares, intersubjectively, in the meanings of phenomena as perceived by the research subjects. To achieve this, we must report our findings in context, consistently and with sufficient detail to allow our readers to share the subjects' experiences of the phenomena that we report.

Grounded theory involves the generation of theory from an analysis of empirical data. We need to be absolutely clear, as researchers, about our beliefs about the nature of those theories, to guide appropriate data collection and analysis. If we use the positivist criteria of external validity to guide an qualitative study, we must apply "objective" definitions of the phenomena under study: this will exclude subjects' own perceptions of the phenomena. But if we abandon positivist criteria, we must substitute alternative notions of rigor that are equally demanding and that reflect the same notions of quality as those used in positivist research.

The distinction between positivist and interpretive worldviews represents two extremes of a spectrum, that may be considered *incommensurable*: people experiencing one of these 'life-worlds' can never understand the perspectives of the other. Different researchers strive in different ways to overcome the incommensurability of the two philosophical positions.

But it must be said that there are some very muddled or unexamined views concerning the nature of grounded theory research to be found in the IS literature. By abandoning a positivist research method, many researchers appear to believe that they can abandon the rigorous application of method completely. Many "grounded theory" studies appear to report loosely-associated, inductive insights that cannot be justified by any notion of rigor or evidence. The interpretive, grounded theory researcher must consider the defensibility of their work more deeply than the positivist researcher, as interpretivism does not yet have a body of knowledge and tradition, embedded into formalized procedures for how to perform rigorous, interpretive research.

Quality and Rigor in Qualitative, Grounded Theory Research

Lincoln and Guba (2000) argue that qualitative research cannot be judged on the positivist notion of validity, but should rather be judged on an alternative criterion of trustworthiness. This assertion is justified on the basis that the positivist worldview is incommensurable with the interpretive worldview. Thus different criteria of rigor and quality need to be developed to reflect the very different assumptions that interpretive researchers hold about the nature of reality and appropriate methods of inquiry. Interpretive alternatives to the four traditional quality measures used in positivist research are developed and summarized in Table 1, developed from those suggested by Miles and Huberman (1994) and Lincoln and Guba (2000). The criteria for rigor discussed here do not constitute an exhaustive set, but are selected on the basis of agreement across some reputable, knowledgeable and reflective references on qualitative research.

The substitution of alternative criteria for rigor in interpretive studies is not intended to imply that rigor is to be abandoned, in favor of "interpretation". On the contrary, the interpretive criteria of confirmability, auditability, authenticity, and transferability become paramount to making any claim to rigor. At every stage of the process, the researcher should subject their findings to both personal and external view, on the basis of these criteria. Each of these issues is taken in turn, to discuss criticisms of the grounded theory approach when it is used in qualitative field studies and to understand how quality and rigor may be maintained in interpretive, qualitative grounded theory generation.

Objectivity vs. Confirmability

We have discovered that the generation of grounded theory is not, and cannot be, totally objective. An important question to ask, therefore, is whether this makes theory generated in this way more or less **confirmable** (and therefore useful) than that generated by deductive, hypothesis-based research methods. One response is that, while the weakness of qualitative, inductive approaches to research lie in the data-analysis stage of the research lifecycle, quantitative, hypothesis-based approaches are weakest in the research initiation and data selection stages. Even if the quantitative researcher is rigorously objective in their application of a consistent coding scheme and in the statistical analysis of data, inductive reasoning is involved in the selection of the research instrument and the selection or design of an appropriate coding or measurement scheme to operationalize the research instrument.

Table 1 : Quality And Rigor Related To The Stages Of A Theory-Building Research Life-Cycle

Issue of Concern	**Positivist Worldview**	**Interpretive Worldview**
Representativeness of findings	Objectivity: findings are free from researcher bias.	Confirmability: conclusions depend on subjects and conditions of the study, rather than the researcher.
Reproducibility of findings	Reliability: the study findings can be replicated, independently of context, time or researcher.	Dependability/Auditability: the study process is consistent and reasonably stable over time and between researchers.
Rigor of method	Internal validity: a statistically-significant relationship is established, to demonstrate that certain conditions are associated with other conditions, often by "triangulation" of findings.	Internal consistency: the research findings are credible and consistent, to the people we study and to our readers. For authenticity, our findings should be related to significant elements in the research context/situation.
Generalizability of findings.	External validity: the researcher establishes a domain in which findings are generalizable.	Transferability: how far can the findings/conclusions be transferred to other contexts and how do they help to derive useful theories?

As Silverman (1993) observes:

> " No hypotheses are ever 'theory free'. We come to look at things in certain ways because we have adopted, either tacitly or explicitly, certain ways of seeing. This means that, in observational research, data-collection, hypothesis-construction and theory-building are not three separate things but are interwoven with each other." *(Silverman, 1993, page 46)*

The claims to truth and knowledge provided by prior literature are socially constructed and so remain unquestioned (Latour, 1987). Overall, qualitative, inductive approaches are no more subjective than quantitative, deductive approaches. Subjectivity is merely introduced at a later, more visible stage of the research life-cycle than with hypothesis-testing research approaches. The formalized ways by which we manage subjectivity are only problematic as they are based on positivist assessments of rigor. We need to substitute reflexive self-awareness for objectivity.

Reliability vs. Dependability/Auditability

Let me pose a question:

> *If two researchers are presented with the same data, will they derive the same results if they use the same methods, applied rigorously?*

To answer this question, it is important to question our assumptions about reality. If we understand reality as being "out there" - that what we see and measure, when we collect "data" is what exists, independently of our interpretation of the situation (or of the influence that our presence imposes) - then we would naturally answer "of course they would". If we understand reality as being socially constructed - that what we see is our interpretation of the world and that what others report to us is their interpretation - then we would answer "of course they would not". In that "of course" lies the internal conflict that we all tussle with, as researchers. *Because the problem is that all of us understand the world in both ways at once*.

So far, I have treated positivist and interpretive worldviews as though they are opposing and

incompatible. Intellectually, they are incommensurable. The problem is that humans are subjective, inconsistent beings, who are quite capable of taking different positions at different times, on different issues, without realizing the inherent contradictions. So, to ensure **dependable and authentic findings,** we need to establish *clear and repeatable procedures* for research and to *reflect on the position that we take* as we perform them. In that way, we can at least minimize the impact of subjectivity on the process. This does not mean that we have to have highly-structured procedures, based on inflexible, pre-existing theoretical frameworks. But we do need to understand (and to be able to define) what our data selection, analysis and synthesis procedures actually are. We need to constantly reflect on, and record, the means by which we reach our theoretical constructs and the detailed ends that these means achieve.

Internal Validity vs. Internal Consistency

It is probably in a rejection of the notion of internal "validity" that interpretive research garners its most virulent critics. Validity in deductive, hypothesis-based research is ensured by statistically testing correlations between data variables and by ensuring a statistically-significant sample population. Such notions of mathematical proof have no equivalent in qualitative, interpretive research, because (a) collected data represent social constructs, rather than measurable physical phenomena, and (b) data analysis is recognized as subjective and inductive-deductive, rather than as deductively objective. However, the idea of *internal consistency* may be used instead (Strauss & Corbin, 1998), to ask "do all the parts of the theory fit with each other and do they appear to explain the data?". As a way of answering this question, the criteria of credibility and authenticity may be substituted for internal validity (Miles and Huberman, 1994).

While rigor is viewed as a quality to be desired in positivist research, the interpretive position on positivist views of rigor can be summarized by the Webster dictionary definition of the term: "the quality of being unyielding or inflexible". It is important to avoid just falling into a hierarchical coding scheme by default, as this type of scheme is too often used to fit the data to an individual's preconceived notions of how it should relate (see Alexander, 1966, for a fascinating discussion of this tendency in architectural planning). Additionally, Urquhart (2000) reinforces (with feeling) the Glaser and Strauss (1967) observation that lower level categories tend to emerge relatively quickly, with higher level categories emerging much later through the integration of concepts. A hierarchical coding scheme discourages the reordering of concepts and tends to act as a disincentive to think radically about reconceptualization of the core categories previously identified.

To achieve **credible** research, we need to constantly question where the theoretical constructs that we have adopted have come from. Whichever approach to we take to the coding and analysis of data, we need to implement it reflectively and to reexamine it critically. We need to employ representational techniques that permit an explicit examination of the relationships between data elements, on a periodic basis and to constantly question the assumptions that led us to search for those relationships.

External Validity vs. Transferability

Eisenhardt (1989) comments that the objective of hypothesis-testing (positivist) research is to randomly

test samples from a large population, while the aim of grounded theory research is to deliberately select specific samples (cases) that will confirm or extend an emerging theory. So it should be understood that grounded theory claims to generalizability do not even reside in the same universe, never mind reflect the same worldview, as those of deductive, hypothesis-based research. Taking an interpretive grounded theory approach leaves us with a significant question of how widely our theory can be applied, given that the process is interpretive and, as we saw above, subjective. How can we can make a claim to be generating generalizable theory from an external reality that we do not believe exists independently of ourselves? One of the best resolutions of this issue lies in understanding the detailed objectives of our analysis, for which Lowe (1998) provides a wonderfully comforting description:

> " The social organization of the world is integrated. This means that everything is already organised in very specific ways. The grounded theorist's job is to discover these processes of socialisation. There is no need for preconceived theorising because all the theoretical explanations are already present in the data."
>
> (Lowe, 1998, page 106).

As interpretive researchers, we reject the "universal laws" (positivist) notion of reality in favor of discerning socially-constructed norms and relationships that are located in a particular culture or context. Claims for **transferability and fit** between contexts must therefore arise through identifying similarities in factors that are part of the theoretical model, that are consistent between different contexts for which the theory fits. Ultimately, we need to recognize that interpretive researchers cannot make the same claims to generalizability as positivist researchers and that to do so opens our research to attack, because then we defend our research from a different worldview than that which governed the way in which it was performed. In using the language of positivism (e.g. claims to "triangulation" of findings, making claims for validity or universal generalizability), we lay ourselves open to criticisms of not following positivist methods to ensure these criteria are met. Positivism and interpretivism have no common language of quality or rigor. The findings from multiple data samples may be compared across contexts (for example, using multiple case studies for which contextual factors are similar). However, once any part of the method is admitted to be inductive, it becomes difficult to make claims for generalizable findings without investigating *very* large numbers of samples (case studies) across which findings can be compared statistically. But this may take years with such labor-intensive studies. Statistical correlations between intersubjectively-defined constructs are also meaningless, from both a positivist and an interpretive perspective. This issue is often fudged in publication: the generally-acceptable minimum number of case studies for comparison appears to be four, which is indefensible from either worldview on any grounds except pragmatism (or a *huge* number of quantitative samples for each study, which is rarely the case). As a replacement for external validity, in qualitative research we could substitute the notion of external consistency. We need to adopt the discourse of *transferable* findings, rather than that of generalizable results.

SOLUTIONS AND RECOMMENDATIONS

Objectivity vs. Confirmability

Core Issue: Findings should represent, as far as is (humanly) possible, the situation being researched, rather than the beliefs, pet theories or biases of the researcher.

Rather than focusing on repeatable surveys or experiments, interpretive grounded theory research approaches focus on reflexive self-awareness, to acknowledge (and guard against) implicit influences, biases and prejudices:

> " Positivist scientists favour objectivity - the putting aside of the researcher's own views and values in order to establish objective truths. … Interpretive social scientists … acknowledge that a researcher's findings will be influenced by their own values and outlook, and instead promote the idea that the researcher should explore and acknowledge them. The self-knowledge will still be imperfect because the researcher is too close to the subject, but at least contemplation is encouraged with the notion of reflexivity."
>
> (*Mallalieu et al., 1999, page 42)*

The mechanistic application of constant comparison will not remove inductive bias (subjectivity) from our findings. The selection of data as significant to our theory (or the exclusion/filtering out of data), is an inductive process, driven by a researcher's understanding of what is relevant to the theoretical constructs that we expect to find. This understanding is often influenced by experiences outside of the research study (see Figure 1). The only way to deal with subjectivity is through constant, *explicit* processes of reflexivity. Reflexivity is a more active form of self-reflection: a conversation with oneself. The reflexive focus can be on the researcher, the participant, or both (Smith, 1999). There are two elements to reflexivity that are relevant here:

(1) Self-awareness as part of a social context, affecting the phenomena under observation.

(2) Self-awareness as someone who applies biases, prejudices, cognitive filtering and bounded rationality to the collection, analysis and interpretation of data.

We can minimize the effect that these "distortions" have on our interpretation of data by making our assumptions and frameworks explicit. As new models and conceptualizations emerge, they should be written down and justified, so that we can examine their implications. For example, we may perceive a need for exploration of a new area of literature, a need to collect data from a different situation for comparison with our emerging constructs, or a need to change an inappropriate coding scheme. We should ask questions such as:

- Where did this concept come from - the literature, my experience, or the analyzed data?
- Does this concept or category apply to other data?
- What sort of theory do these relationships and categories represent?

Subjectivity sometimes yields wonderful insights. But we must acknowledge where our insights come from, rather than pretending that they all came from "the data". We must be able to understand *how* we arrived at our findings, at all stages of the research process and what sensitized us to examine certain

patterns, so that we can defend ourselves from the accusation that we just found what we set out to look for. This understanding should be recorded at the time that the research is performed. Lowe (1995), suggests the preparation of a "topic guide" for data selection and initial analysis (open coding). This topic guide *explicitly* recognizes our influences, detailed objectives and pre-understandings (see Figure 1). Other ways of ensuring reflexivity during grounded theory analysis are (a) writing memos to yourself about the rationale underlying your constructs, (b) explaining what you are doing and why, to someone outside of your field, or (c) presenting your intermediate research findings to a group of very critical colleagues.

Finally, we must *demonstrate* self-awareness to the reader. Any approach involving subjective assessment is indefensible in positivist terms and so we need to develop our own vocabulary and understanding of how we communicate rigor. We must justify our research method, in terms of what we were trying to discover and we must explain the analysis in such a way that the reader may confirm to themselves, *how* the theory emerged from a sequence of analysis and insights and understand that this theory is consistent with the data, because the data is presented to them. By following this discipline, we avoid any accusation that we have fabricated a theory which is not grounded in the data.

Reliability vs. Dependability/Auditability

Core Issue: The way in which a study is conducted should be consistent across time, researchers and analysis techniques.

To ensure dependable and authentic findings, we need to establish *clear and repeatable procedures* for the way that we perform our research. The decision whether to use a formal (predefined) coding scheme, or to let the coding be guided by categories that emerge from the data should be made on the basis of whether we perceive a need to defend our research on the grounds of reliability, or on those of dependability/auditability. If we take the interpretive view that rigorous procedures cannot ensure reliability (because we recognize that we apply and interpret social constructions of reality, rather than an objective reality that can be reproduced in further studies), then a useful way of ensuring the dependability of our findings is by *making explicit the process through which they were derived*. To achieve dependability and auditability, we need to (a) define the procedures that we employ to collect and to analyze data, (b) understand the ends that these achieve in detail, and (c) ensure that these procedures are recorded so that others can understand them. We must ensure that we leave behind an "audit trail" of detailed analysis. When you reflect that you probably cannot remember what you had for dinner a week ago, what hope do you have of remembering how and why you merged two categories during data analysis? As qualitative researchers, we cannot defend our findings on the basis of objective data collection and analysis. We must be able to defend our findings by making explicit what we did and how we arrived at our conclusions. Whether we use a formal, initial coding scheme or let this emerge, we must constantly reflect on, and *record* where our ideas and influences came from. We should make explicit what we did at all stages of our analysis and provide enough information to permit others to see how our findings followed from our analysis of the data. Keeping a research journal is essential. We

should save records of <u>all</u> analyses (including early and intermediate analyses). Describing how our findings emerged (if only to ourselves) is a critical part of rigorous research. Using network diagrams is an excellent way of articulating emergent theoretical concepts and so making them accessible, for fitting (or discovering an absence of fit) with new data. An example of part of a network diagram is given in Figure 2. Network diagrams permit *explicit* comparison of emerging constructs with new data analysis and expose constructs that do not fit with new data very quickly.

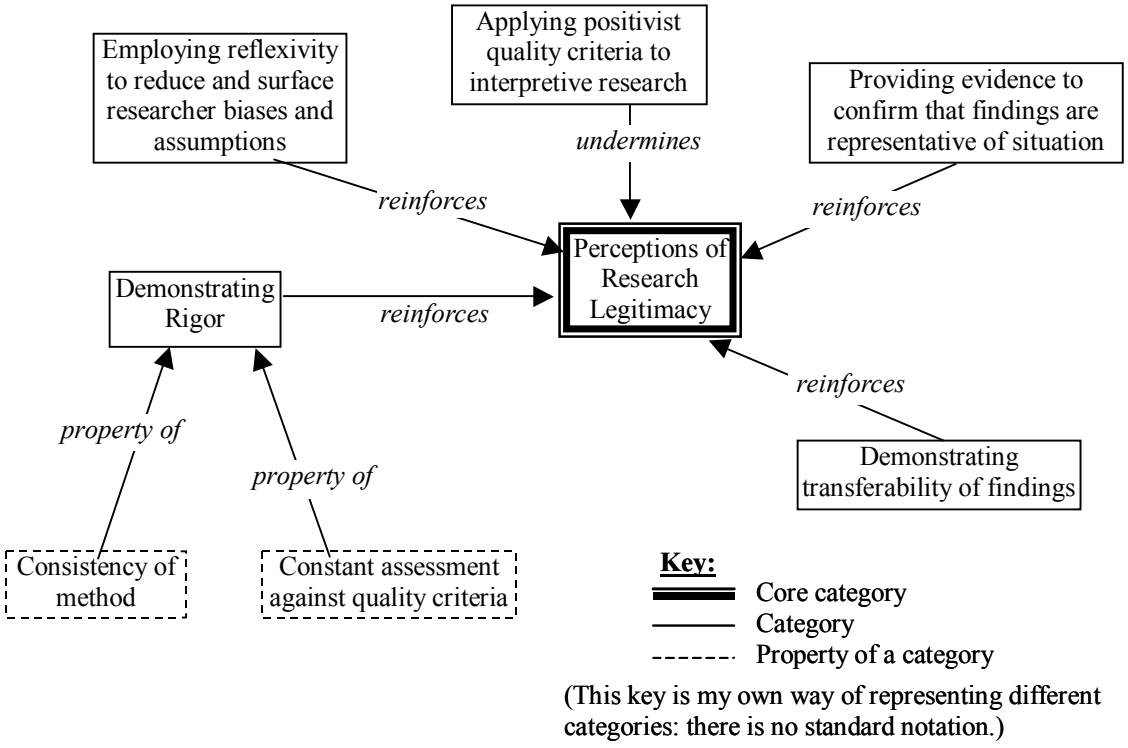

Figure 2: An Example of A Partial Category Network Diagram

(the key is my own way of representing different categories: there is no standard notation)

Network diagrams are models that makes explicit the relationship between various categories, sub-categories and category-properties. Multiple network diagrams can be used to understand different parts of a theory. Relationships may indicate causality, association, process-sequences, or any pattern that the researcher finds useful. One of the dangers of inductive research is that emerging models remain poorly-articulated and therefore implicit and untested against new data. Network diagrams allow the development of fluid, hierarchical and non-hierarchical models that explain the data and make these models explicit, to our readers and to ourselves.

Internal Validity vs. Internal Consistency

Core Issue: How we ensure rigor in the research process and how we communicate to others that we have done so.

To achieve internal consistency, we need to explain how and from what data we derived our theoretical constructs and whose perspective these constructs reflect. Just as the data-flows into and out of different "levels" of a data-flow diagram must agree, for the data-flow model to be internally consistent, so must

different views of our data agree. We must describe the source data in sufficient detail to demonstrate a fit between the theory and the data. We must also describe the process by which we performed a constant comparison between theoretical constructs and new data. Constant comparison is critical to research credibility (as well as confirmability) because it is only by constant comparison of theoretical constructs with the data, across multiple sites and situations, that we can detect systematic biases and distortions in our analysis. For example, some participants may describe their work processes in terms of formal work procedures, rather than what they actually do. This can be very difficult to detect without using constant comparison, because the results appear to be consistent between informants. It is only when the findings are compared with findings from another company that we start to realize that a minority-perspective of work-processes could fit better with the new data than the majority perspective. This realization could drive new data collection: revisiting the previous company and asking participants about informal work-processes, or performing an observation study.

We must be explicit in explaining how data collection was driven by emerging constructs. In making claims for the authenticity of theories produced by grounded research, we should consider how to explain our assessment of data "saturation" (sufficient data collection and analysis for the theory to be considered substantively usable). Constant comparison can be performed using data from new informants (or subjects), new sites, new periods of time (as in a longitudinal study), or new situations that are comparable to previous situations in terms of the *core analytical categories* that we have identified as significant. The selection and collection of new data should be justifiable on analytical terms - i.e. driven by the emerging categories, properties and relationships that result from the analysis. For example, collecting data samples over time (as for a longitudinal study) is justifiable if the core categories provide an explanation for *why* behavior changes with time. Figure 3 shows an example from my own research.

First, a behavioral, factor model was developed from the data (this is a very simplified version of the model, for illustration). Then the model was compared to meeting transcripts and informant interviews, to identify elements of the model that were constant or changed over time. Through a process of constant comparison with additional data (I tape-recorded and observed design meetings over a period of eighteen months, and I performed regular interviews with the core team members), I was able to interpret changes over time and to modify my original factor model. The factor model was then compared with earlier meeting data, to confirm that it fitted with these. But if open coding had started with categories that defined the ‘stages’ of behavior shown in diagram (4b), using data samples from different time periods would not have provided an authentic way of analyzing the data. I would probably just have been sensitized to the data that fitted with these stage-categories, because these stages would have been what I was looking for, in the data. I may well have missed evidence that defined these stages differently.

To guide data selection for constant comparison, we need to understand the detailed *ends* of our research. Some elements of reflexivity again come into play:

- Reflecting on the influence of our own background, in forming perceptions of what may be important in the research problem.
- Acknowledging the influence of various literatures pertaining to the research problem.

- Clarifying and recording the detailed objectives of the research study (not just the overall aim) and how theoretical concepts achieving these objectives emerged from the data (recognizing that detailed research objectives are also emergent).
- Authenticating the research by explaining the process by which diminishing returns (theoretical saturation) were perceived and how this affected our data collection and analysis strategy.

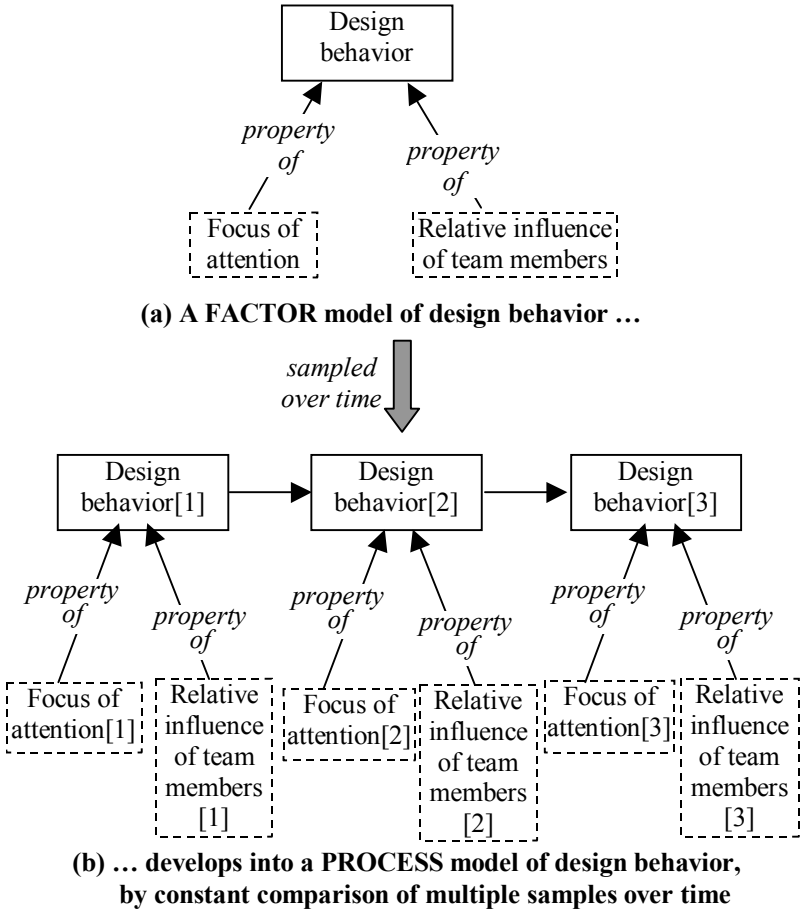

Figure 3: How A Process Theory May Develop Through Constant Comparison Over Time

External Validity vs. Transferability

Core Issue: How far a researcher may make claims for a general application of their theory.

Claims for **transferability and fit** depend on identifying similarities or differences in the context in which the theory is to be applied. This involves employing the constant comparison method to determine whether a substantive theory fits new data and how the context in which the new data was collected is similar to (or different from) the contexts in which previous data were collected. In this way, we can extend the theory to include contextual factors. For example, if we develop a substantive theory of how developers investigate new IS requirements and then discover that the theory fits with new data from one company, but not another, we could ask what is different about the two companies. Are they both of

comparable size? Are developers in both companies similarly trained and educated? Do they use similar methods? By using constant comparison in this way, we not only extend the substantive theory, to include new factors such as size of firm, or developer education, but we also provide a basis to generalize between firms that are comparable in these factors. We must also, however, recognize the limits of generalizability that our sample-size imposes and be quite honest about the extent to which our theories may be generalizable, or just constitute an interesting direction for future research.

Ultimately, claims for generalizability cannot be made using the same constructs as those used for positivist research, as dissimilar techniques to ensure application between contexts and different criteria for assessment are applied. Rather, claims for *transferability* may be made on the basis that constant comparison between data sets has yielded similar findings, or that differences have enabled the researcher to extend their theory.

FUTURE TRENDS: ADVANCES IN GROUNDED THEORY CONSTRUCTION

A significant trend in IS research is the employment of multiple methodologies to generate deep or multi-layer theoretical models. Many specific research methods can be used in information systems research but an interpretive approach requires methods which deal carefully with context and process (Walsham, 1993). To obtain an holistic view of any research question, multiple approaches must be employed, which reflect (and thus question) differences between assumptions concerning the nature of the research problem and the generalizability of the data obtained for analysis. In the words of Cavaye (1996):

> " It is widely accepted that the selection of a research strategy entails a trade-off: the strengths of the one approach overcome the weaknesses in another approach and vice versa. This in itself is a powerful argument for pluralism and for the use of multiple research approaches during any investigation."
>
> (Cavaye, 1996, page 229).

It is possible to use multiple methods for data collection and analysis in grounded theory generation and this may lead to much deeper insights than the mechanistic application of inductive coding. Eisenhardt (1989) comments on the richness of insights that the use of multiple methods can bring to data analysis in grounded theory generation. Gasson (1998) employed multiple methods such as hermeneutic analysis, discourse analysis, soft systems modeling, process modeling and inductive categorization.

An increasingly common trend is the use of a software package for qualitative data analysis. This may be particularly helpful for grounded theory research, because the constant comparison of data requires the researcher to constantly revise and evaluate emerging theoretical constructs on many different data sets. Category codes, property-codes, theoretical memos and network diagrams can be associated with to transcripts and multimedia files, using a software package for qualitative data analysis. Be sure to select a package that does not force you to use hierarchical coding structures (many older packages do), as you will certainly wish to change your initial coding structures: emergent (and therefore changing) theoretical constructs are fundamental to the grounded theory approach. Some of the newer packages even

automate code-generation, using natural language recognition and association, to suggest category codes from the transcript. Many researchers argue that software packages constrain the free flows of thought and insight that are required for deep, analytical coding of qualitative data. I would argue that, at the end of the day, your theory should be just that: *your* theory. If you have used a computer package to generate it, you have played a very small role in its generation. Computers are excellent to automate the repetitive and labor-intensive tasks of data analysis and theory-recording. But they are not capable of the inductive-deductive cycle that is integral to grounded theory generation.

CONCLUSION

Each of the issues discussed above resulted in a specific recommendation for the way in which grounded theory is performed, but notions of quality and rigor in interpretive, grounded theory research are probably best explained using the metaphor of total quality management. Each of the quality mechanisms suggested will not guarantee quality or rigor. They must be considered as part of an holistic research approach and must be employed reflectively rather than mechanistically. In this spirit, I present the following guidelines for conducting qualitative, grounded theory research:

1. Make the process of research data collection and analysis explicit, both to yourself and to others, through your writing. Provide enough information to permit others to see how your findings followed from our analysis of the data.
2. Provide an "audit trail", through the maintenance of research journals and by saving all analysis documents (including early and intermediate analyses).
3. Explicitly acknowledge and integrate influences provided by literature sources, your own prior understanding, and theoretical insights generated through serendipity.
4. Write formal memos, question theoretical constructs, employ category network diagrams and employ explicit (written) theory justification, as ways of making the implicit explicit.
5. Continually define and redefine detailed objectives for the theory that you seek. As a staring point, this can be phrased in terms of "I am trying to generate a theory that explains how/what/why a, b, c, because I believe that d, e and f are important in this situation."
6. Understand the requirements for constant comparison and theoretical saturation, to ensure sufficient and rigorous iteration between data collection, data analysis and data selection, and to avoid superficial, inductive conclusions.
7. Regularly justify emerging constructions, to friends *and* to critical colleagues.
8. Constantly use a research journal and explicit self-questioning, to encourage and make explicit the role of self-reflexivity.
9. Understand the limits of validity and generalizability that you can claim, when using a qualitative, grounded theory approach to research.
10. Recognize that no research process is ever as planned as the literature would lead one to believe. Freed from the need to defend your research according to its ability to proceed as planned, you can apply the tenets of grounded theory freely and reflectively.

Klein et al. (1991) suggest that knowledge is achieved in the struggle between positivism and antipositivism, through the competing claims of those who advocate their chosen approach. A synthesis of the two approaches arises from this struggle, which creates a new dominant approach, to which emerges a new opposition, … and so on. This paper has attempted to represent the current state of this struggle and to present qualitative, grounded theory as a way of differentiating and making explicit the different aims of antipositivist research. But a grounded theory approach is not recommended unless you are *really* enthusiastic about your topic. It demands a great deal more energy, time and commitment than any other method I know. One must be constantly critical and realistic about the theoretical application of one's research: sometimes it is better to settle for Walsham's (1995, page 79) "contribution of rich insight" than to make ill-founded claims that are pitifully easy for a knowledgeable reader to deconstruct.

An interpretive, grounded theory approach is only relevant to research questions that are not well-explained by existing theoretical constructs. Grounded theory is a way of deriving theory from data; it does not provide the deductive validation required to "prove" or to rigorously extend existing theory in positivist terms. It is best suited to the investigation of what theory might apply in a specific type of situation.

I have found it useful to observe the limitation that "any claim to truth is always at risk and subject to revision as one learns from the arguments of one's opponents" (Klein et al., 1991, page 7). Through my research and reflection for this chapter, I have gained a deep insight into the fundamental differences between interpretive and positivist approaches to research. I have understood that it is not possible to justify either approach using the discourse of the other. Finally, I have appreciated that self-reflexivity is an essential part of understanding whether one has accomplished what one set out to do, because one's own prejudices and biases creep in unawares! I have tried to remove those biases where I could and to declare them where I felt that they were an essential part of the explanation. This reflects the hermeneutic circle of inquiry, analysis, reporting and reflection that is central to rigorous research.

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