

A Hermeneutic Analysis of the Denver International Airport Baggage Handling System

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Abstract

This paper attempts to demonstrate the principles of hermeneutics in an effort to understand factors affecting Information Systems (IS) projects. As hermeneutics provides a systematic method of interpreting text from multiple information sources, thus, Information Systems being prima facie defined and documented as text documents, are eminently suited for this mode of investigation. In this paper, we illustrate hermeneutics by analysing a sample case study document describing a well known project of Denver International Airport (DIA) Automated Baggage Handling System, which was extensively reported in IS and management press and studied by Montealegre and his colleagues (Montealegre, Nelson, Knoop, & Applegate, 1999, p553-554). As a result of the hermeneutic approach to the analysis of this document, a new “flexibility” factor has been discovered to play an important, yet unreported, role in the DIA system demise. In the DIA case, the observed flexibility factor influenced the quality of the interaction between the actors, the prevailing environment and the information systems.

Introduction

Although there are several reported Information Systems projects, which have in the past applied hermeneutics (Boland, 1991; Klein & Myers, 1999; Myers, 1994a), there are very few publications which explain the actual hermeneutic process taken by IS (and in fact, also non-IS) researchers. What this paper strives to do is close the methodological gap and to present one potential framework for the adoption of hermeneutics to the study of Information Systems.

In addition, hermeneutics is often viewed as an “obscure” tool in the IS community because it is perhaps not particularly well understood. To that end, this research collects and focuses attention on making sense of hermeneutics and its philosophy.

Making Sense of Hermeneutics

The Oxford dictionary defines hermeneutics as “of interpretation”, taken from the original Greek *hermeneutikos* (Turner, 1987, p284). Hermeneutics as a philosophy of enquiry has been well documented with its roots already evident in the late antiquity where “the Greeks, the Jews and the Christians had been reading and re-reading their vital texts, namely the Homeric epics, the Torah, Tamud and Midrashim, and the Holy Bible, respectively. In the process of their textual labour, these people revised their own idiosyncratic sets of rules for doing interpretation” (Demeterio, 2001).

Demeterio gives a useful definition of *hermeneutics* as “a theory, methodology and praxis of interpretation that is geared towards the recapturing of meaning of a text, or a text-analogue, that is temporally or culturally distant, or obscured by ideology and false consciousness” (2001).

Thus, the understanding that is sought is found within texts and text-analogues – records that have been created by authors. These records might be as prosaic as a report, or as interesting as a series of captured electronic mails (Lee, 1994), or even as a set of transcripts of interviews and case study notes (Montealegre & Keil, 2000; Montealegre et al., 1999). In any event, these documents purport to represent some sort of reality or truth.

This search for understanding is influenced by several interesting factors that rely on some assumptions that may or may not be all present and at work at any given time.

Firstly, understanding can be viewed as an interpretive oscillation between several layers or perspectives. This is often referred to as the “hermeneutic circle or cycle”, where one examines a small fragment of knowledge and seeks to understand it, then looks at the “whole” (whatever that means to the enquirer), and seeks understanding there as well – the smaller fragment being part of the whole, and the whole being composed of many smaller fragments. Understanding, then, is achieved when there is a consistency between the whole and all its component parts and vice versa. Or, as stated by Myers (1994b, p191): “This hermeneutic process continues until the apparent absurdities, contradictions and oppositions in the organization no longer appear strange, but make sense”.

Secondly, if understanding can be described as a stable oscillation between the parts of a whole and each individual part exhibiting consistency, then the very act of “searching for understanding” would be the actual oscillation or (hermeneutic) cyclic action. As one searches for understanding, one acquires a small new piece of knowledge or a minor fact, seeks to understand this new piece in itself and also in the context of the already acquired knowledge and existing understanding of the whole.

Thirdly, how does one know that understanding has been achieved? The repeated cycling between the parts and the whole will eventually yield consistency that is driven by the sum of knowledge or data in front of the researcher. Should that knowledge be incomplete, the researcher would actually have no way of knowing that fact. The only really useful test would be to introduce yet more data or facts and test by hermeneutically cycling through again. If the number of resulting cycles are sufficiently small (or even none), then one could say that there is understanding, or as Myers (1994b, p191) would have simply said – it “makes sense”.

But understanding and the processes of its acquisition must be something more than just the end product of a process. Kidder (1997, p1196) cites the seminal philosopher Hans-Georg Gadamer on understanding:

“If I am an English language speaker learning German, for example, I will very likely pursue a course of study in which I learn a linguistic apparatus that is neither spoken English nor spoken German. I will learn patterns of verb endings, noun cases, systems of adjective and noun agreement, and such – categories I may never have applied to language before, although I had been speaking language all my life. This apparatus is a third thing, a bridge to understanding a language that is not the same as understanding that language. When the understanding actually occurs, I recognize it because suddenly the apparatus falls away and I simply speak German. So it is with hermeneutic: the interpretive process creates something that is neither my horizon nor the others. This third thing is a necessary medium; but it is just as necessary that this medium fall away. At this point in transcending the apparatus we can say that understanding occurs. There is still, however, the quality of a kind of third horizon here; one has not dissolved into the other

culture; one has not erased one's own horizon; but one's horizon has become entwined with another in a unique instance of fusion." (Kidder, 1997, p1196).

So it can be reasonable to assume then that understanding comes from applying an apparatus (or tool) repeatedly over some data until the apparatus or tool becomes superfluous – that is to say, some understanding has been reached – because the apparatus is no longer needed.

Using the Gadamerian analogy, successfully engaging in a conversation with a German would validate one's understanding of the newly learnt language – i.e., testing the understanding with new untried data. If the conversation is unsuccessful, by whatever criteria, then the apparatus is reapplied, learning restarted, and then another test. This is the hermeneutic cycle in its simplest form. The act of understanding flows from understanding the whole to understanding all the little bits that make up the whole. Then when confronted by a new "little bit" that purports to be part of the whole under consideration, if understanding has been achieved, then a consistency between the new knowledge and the context of the existing whole will be maintained without any conflict (Myers, 1994b, p191).

Practical Hermeneutics

The apparatus that is so critical to achieving/acquiring understanding in Gadamer's case (see above) is specially designed to create a bridge between zero understanding and the final goal of complete understanding. The apparatus itself is specific to the task at hand. In the use of critical hermeneutics in the interpretation of texts (and text analogues), Harvey and Myers (1995, p20) quote Paul Ricoeur:

"In critical hermeneutics the interpreter constructs the context as another form of text, which can then, of itself, be critically analysed so that the meaning construction can be understood as an interpretive act. In this way, the hermeneutic interpreter is simply creating another text on a text, and this recursive creation is potentially infinite. Every meaning is constructed, even through the very constructive act of seeking to deconstruct, and the process whereby that textual interpretation occurs must be self critically reflected upon." (Ricoeur, 1974)

This research will create, analyse and seek to understand these additional texts on the original texts under investigation.

There are already additional issues to consider. There is a substantial cultural difference between an English speaking Californian (say) and a German speaking Berliner. What if we are engaging with text rather than a person? What if the text was written 200 hundred years ago about things that were important at the time, but have become obscure in the twenty first century?

This "distance" between the hermeneutist (the enquirer) and the author (and text) under investigation is referred to as "historicality" by researchers such as Myers (1994b, p189).

"Critical hermeneutics does emphasize the fact that social reality is historically constituted. And one of the key differences between a purely interpretative approach and critical hermeneutics is that the researcher does not merely accept the self-understanding of participants, but seeks to critically evaluate the totality of understandings in a given situation.¹ The researcher analyses the participants' own understandings historically, and in terms of changing social structures. The hermeneutic-dialectic perspective, therefore, as an integrative approach, emphasizes both the subjective meanings for individual actors

¹ This relates to our later issue on the actual nature of the dialectic whereby we must actively seek all the issues – both those that are in favour of the argument and those best ones that are against.

and the social structures which condition and enable such meanings and are constituted by them (Myers, 1994b, p189)

This concept of historicity has also been called “contextualization” where Klein and Myers (1999, p73) refer to Gadamer’s (1976, p133) observation: “... the hermeneutic task consists, not in covering up the tension between the text and present, but in consciously bringing it out”.

The distance of the investigators from the source text can be manifold. It might be combinations of :-

- time:* the months or years or even millennia since the original text was written;
- language:* where the language of the text is no longer in day to day use or has been substantially modified;
- culture:* where the original text was created by an author within a cultural context alien to the investigator;
- intention:* where the original text’s author set out intentionally to mislead, omit or twist events and facts to serve their own ends;
- social milieu:* where the prevailing social norms and accepted behaviours of that time and place of the text’s creation have become forgotten or have changed.

It is the investigator’s responsibility to acknowledge that they have a historicity factor to account for and that the text under investigation may well be a puzzle of many dimensions.

In addition to burdens that come with the text (historicity), there are burdens already surrounding the investigator – their prejudices that will colour their own interpretations of the text. These prejudices are actually “pre-judgments”, expectations of understanding. Butler (1998, p288) extends the notion of prejudice by including a reference to Heidegger’s (1976) notion of “tradition” and suggesting that prejudice is actually a combination of lived experiences, tradition and a sort of socialized comfort zone he refers to as “das Man”. Butler (1998, p288) acknowledges the powerful influence exerted on individuals:

“According to Gadamer (1975), Tradition influences a social actor’s attitudes and behavior through authority, and such authority is transmitted through time and history via cultural mechanisms. Heidegger (1976) argues that it is the quiet authority of das Man (roughly translated as “the they” or “the anyone”) which provides reassurance in the face of existential turbulence. The state of being ‘situated’ or ‘tuned’ under the sway of das Man, (e.g. as operationalized through public opinion or group norms), provides one with familiar and comfortable surroundings; self-reflection precipitated by existential turbulence (a ‘breakdown’) shatters this tranquility and brings about an ‘unhomeliness’ (Unheimlichkeit) of existence.” (Butler, 1998, p288).

The suggestion espoused by Gadamer that prejudices are a natural attribute of individuals and should be accepted and dealt with has been thoroughly demonized by Wolin (2000, p45) although the basis for that vitriol is not the philosophical aspect.

Kidder (Kidder, 1997, p1194) on the other hand takes up the issue of the investigator’s prejudice as being a useful starting point for the enquiry. He quotes from Augustine that one should “identify the clear and obvious meanings first and then use this understanding to make sense of the more obscure and confusing passages” (Augustine, 427). Kidder (1997, p1194) goes on to state that “what is clear and obvious to one in reading a text is likely to be a

function of one's own cultural orientation and one's own prejudices rather than the function of some given accessibility of the text". He goes on to say:

"So where does one begin? If one cannot begin with the obvious, are we to somehow begin with the obscure? The answer is that either option is more or less viable, but the crucial thing is that one avoids allowing the starting point to control the enquiry. False assumptions can be excellent roads to genuine understanding, but only if one is open, in the course of interpreting, to the clues that reveal the inadequacy of those assumptions and point the way to needed revisions. Thus hermeneutic properly manifests a circular or cyclic pattern in its unfolding: the progress of the enquiry returns one to the beginning, and the new beginning sets a new course of progress; the interpretation of parts yields a conception of the whole, but that conception brings new meaning to the parts, whose reinterpretation may again require reconception of the whole, and so on, in a circle that would be merely vicious were it not propelled by concrete and cumulative acts of genuine understanding (Dilthey, 1990; Schleiermacher, 1819)" (Kidder, 1997, p1194-5).

Critical hermeneutics is often called the hermeneutic-dialectic. There is the dictionary definition of "dīaē'ct īc": the art of investigating the truth of opinions, testing of truth by discussion, logical disputation (Turner, 1987, p284). The accepted usage of this term is taken from the original Socratic dialogues. Kidder's (1997, p1197) explanation of dialectic is eloquent:

"In an ideal Socratic dialogue, no one is in it to win the debate, but everyone is engaged together in the search for the very best arguments in support of whatever opinion is being considered, along with the very best objections that can be set against those arguments. If in the context of a Socratic dialectic, I propose an argument to which no one can respond with a substantial objection, it may fall to me to become the objector (and Socrates is often put into this situation, particularly with his younger interlocutors). If I discover that my objection is more reasonable than my argument than I do a virtuous thing, from the point of view of the dialectic, if I immediately abandon my original opinion and seek a new one. This sort of reasoning process, then, has everything to do with persuasion, but it is not one person persuading another to hold a particular opinion; it is rather a matter of putting persuasion into a larger context of enquiry and discovery, allowing the power of argument to sway oneself along with the others, and in a way that is open and deeply attuned to the reasoning on all sides of an issue." (Kidder, 1997, p1197).

Critical hermeneutic philosophy of enquiry will be brought to bear on the selected case study into Denver International Airport (DIA) Baggage Handling System (Montealegre et al., 1999, p553-554) to develop better understanding of the event itself through the supporting documents under investigation. The case study is commonly used in Information Systems departments to teach issues related to project management, risk assessment, information systems strategy, etc. The case is so well known that numerous prejudices and preconception about the DIA project have firmly established in the Information Systems community. By re-analysing the case using critical hermeneutics, we were hoping to reveal, to ourselves but also to our colleagues and our students, the new horizons of understanding in the roots of the DIA project failure.

Research Method

In this investigation, we initially reviewed the source document – BAE Automated Systems (A): Denver International Airport Baggage-Handling System (Montealegre et al., 1999) and subsequently we performed its analysis focussing on the identification of actors, events, environmental factors and some of the authors' possible intentions in leading the readers to

reach the specific conclusions in the case study. In the process a number of iterative passes (cycles) through the document were made.

1. First cycle is the preliminary reading and developing of the first layer of document (and its case) understanding.
2. Second cycle identifies all the principal actors described in the document. During this cycle, the deepening understanding of the case study is documented with each actor insights. By actors we consider the people actively engaged in the phenomena described in the case study. Actors are instrumental in the outcomes of events, which are of special interests to the researchers studying information systems projects.
3. Third cycle looks at documenting everything that could be considered as background, or existing environment surrounding the events under investigation. Understanding of these existing environmental factors further reinforce (and in some cases negate) the researchers' understanding.
4. The fourth cycle examines the decisions that were made by actors within their respective environments, and the impact of these decisions. The actors' decisions indicate the actors' intentions in influencing the events pertaining to the information systems development.

The cycles 1-4 were conducted by one of this article's authors and it resulted in a very thorough factual horizon of the DIA case study understanding. Three additional text documents were created in the form of tables that summarised and cross referenced the original case study.

The second author at this point of time joined in to provide a completely different view of the case, thus developing an alternate horizon, which complemented and in some cases contrasted the views and conceptions of the first investigator. The ensuing process of *collaborative hermeneutics*, as we call the use of multiple hermeneutic investigators, introduced into the study a richness of views and insights, which then were clashed, deconstructed and eventually fused.

5. The fifth cycle introduces the second investigator's perspective of the events reported in the DIA's case study (Montealegre et al, 1999), to bring some new and independent insights. In contrast to the first investigator's approach who immersed himself in the events surrounding the DIA case, the second investigator focused on the communicative intentions of the case study authors and on documenting his particular interpretations of each "event" described. This approach brings in the dialectic perspective to this research by questioning the motivation, bias and prejudice of the case study authors.
6. Finally, another DIA centered document (Montealegre & Keil, 2000) was introduced and its contribution to the overall understanding then analysed. The analysis proceeds from the classical approach of Gadamer (1976) whereby the movement of understanding is from the particular to the whole then back again.

In the following sections, each of the cycles is described in some detail and examples from the DIA case study provided to illustrate the process.

First Cycle

The researchers took the approach of reading the Denver International Airport Baggage-Handling System document (Montealegre et al., 1999) “quickly”, as one would when trying to determine a document’s suitability for a more intensive read. This initial reading created an immediate impression and started off the cycles of understanding.

It is at this early phase of understanding development that the value of critical hermeneutics emerges when considering the power and impact that “simple” texts can have. Demeterio (2001) wrote about the potential impacts of text...

“[...] textuality can be infiltrated with power and forces that are formally considered extraneous to it and practically innocuous. Specifically, Marx argued that textuality can be warped by capitalist and class-based ideologies; Nietzsche, by cultural norms; and Freud, by the unconscious. These extraneous powers and forces are capable of penetrating deep into the text, by weaving into its linguistic fabric. Thus, even without the cultural and temporal distances that made romanticist hermeneutics anxious, or even without the differences of life-worlds that bothered both phenomenological and dialectical hermeneutics, there is no guarantee for the reader to be brought side by side with the truth/meaning of a text, because textuality can be veiled by ideology and false consciousness. The goal of this hermeneutic system is to diagnose the hidden pathology of texts and to free them from their ideological distortions.” (Demeterio, 2001)

In the DIA case study, the initial reading takes the reader into a summary of the case and which also prepares the preliminary understanding.

The introduction to the case study commences with a summary of the project, describing it as being beset by risks: “the scale of the large project size; the enormous complexity of the expanded system; the newness of the technology; the large number of resident entities to be served by the same system; the high degree of technical and project definition uncertainty; and the short time span for completion” (Montealegre et al., 1999, p546). The bylines at the head of the case study say that “No airport in the world is as technologically advanced as the Denver International Airport” (Montealegre et al., 1999), and then almost as an aside in the same headline of the case study – “It’s dramatic. If your bag [got] on the track, your bag [was] in pieces”.

So before even the preliminary reading has commenced, the reader has already scanned enough of the first page of this study and already the mindset has been seeded with notions of a highly complex project whose technological demands were so complex that it all went off the rails (sic). The mind of an “experienced reader”² by now is thinking about what classic project management problems have lead to this disaster.

The understanding that exists at this preliminary cycle is already deeply prejudiced and biased. Questions have already been (subconsciously) set into the researcher’s mind about what specific failure points will be identified and where blame might be allocated. After all, thinks one researcher, “were appropriate project management controls in place and effective, then this disaster simply would not have occurred”.

It is clear in hindsight now that the power of the initial read (or should we say – scan) of the main document has set the mood for the interpretation of the remaining document. Thus if the authors’ original intent was to create a negative atmosphere leading to a classical

² The term “experienced reader” is used to describe someone who is moderately well versed in project management methodologies and who has seen or read about enough project failures to know of standard failure patterns.

investigation and identification of project management failure, then it was achieved before even the first page was turned.

An initial prejudice had now been set in place.

Second Cycle

Here the researchers sought to clearly document and identify each actor in this document, noting who they were, what their function/purpose was in the scheme of things, and what in particular they did that was of note. As a later exercise we also mapped the number of times they were quoted/cited/mentioned in the document.

This second reading really focused on people and institutions. During this reading we highlighted individuals and organizations then transcribed this data into a table. In this table we identified dates, who these actors were, and what, if anything, they did on their first appearance in this table. Obviously some entries appear regularly throughout the paper so only their first appearance and what they did was noted. An example appears in Table 1.

What is notable in this second cycle is that the researchers decided to formally document all actors that could be identified and to note who they were and what they were involved in at first glance. This new text, a table of actors, is just our “apparatus” as described by Gadamer (Kidder, 1997, p1196). It is an aid in the hermeneutic cycle. An interesting side effect of this process has been the disciplined examination of the original text from the viewpoint of documenting all identifiable actors.

Ref	Who	When	Who is it?	What happened
Act01	BAE Automatic Systems Inc.	1992	Engineering consulting and manufacturing company based in Carrollton Texas	Awarded contract
Act02	Shareholders	1994/05	Applied pressure on Denver Mayor Wellington Webb to intervene in project	
Act03	Denver Business Community	1994/05		Applied pressure on Denver Mayor Wellington Webb to intervene in project
Act04	Denver Residents	1994/05		Applied pressure on Denver Mayor Wellington Webb to intervene in project
Act05	Federal Aviation Administration	1994/05		Applied pressure on Denver Mayor Wellington Webb to intervene in project
Act06	Tenant Airlines	1994/05		Applied pressure on Denver Mayor Wellington Webb to intervene in project
Act07	Concessionaires	1994/05		Applied pressure on Denver Mayor Wellington Webb to intervene in project
Act08	Wellington Webb	1994/05	Denver Mayor	Called in German firm Logplan to assess situation
Act09	Logplan	1994/07	German (consulting?) firm	Issued an 11 page report on the system
Act10	Gene Di Fonso	1983	BAE President	
Act11	Monte Pascoe	1983	Mayoral candidate and prominent Denver attorney	Brought airport issue in as an election issue
Act12	Dale Tooley	1983	Mayoral candidate	Unsuccessful
Act13	Frederico Pena	1983	Mayoral candidate	Successful mayoral candidate – agreed to commit to continued expansion of DIA
Act14	Colorado Forum	1983	Lobby group of 50 of Denver’s senior executives	Urged the continuing commitment to the DIA
Act15	Local voters	1989/05	Denver and Adams counties	Voters supported the DIA by a margin of 62.7% for versus 37.3% against
Act16	Gail Edmond	1989/05	DIA Administrator	Claimed referenda passed on the basis of economic benefits, jobs etc
Act17	Chamber of Commerce	1987	Their leadership	Promoting airport relocation
Act18	Frontier Airlines	1986		Bought by Texas Air

Table 1 Actors (extract)

The outcome of the development of the table of actors is a better understanding of the history of this project and how it came about, its political basis (the Mayoral elections), its economic basis (the importance of Denver as a hub), and a fair amount of negative references to BAE and the “work ethic” (as reported by Stone and Webster).

A number of issues became evident and remained unresolved at this phase. Why were United Airlines clearly committed to the new airport and their own baggage handling system and Continental seem an almost disinterested party? Were the authors of the document trying to create an impression that the US airline industry was in disarray? If, as is implied in the document, it is a tradition in the USA that each airline looks after its own baggage handling system, why did DIA push for a single integrated automated baggage handling system?

The understanding developed after this cycle has deepened considerably. It is evident that project controls and coordination were simply not in place, externally imposed deadlines and political imperatives were running roughshod over the management team, and interpersonal conflict was surfacing. The overall impression is one of chaos.

During the creation of this first derivative text document, the researchers became aware of deeper factors at work. It was clear that these extra things would reveal themselves during the next few cycles. It was like a growing suspicion that there was definitely more to come.

Third Cycle

Here the researchers read again through the document extracting and tabulating everything that could be construed as environmental facts. The definition of an environment fact used when this table was constructed was “any thing or context that would have influence on an actor when making their decisions or any thing or context that would force a decision to be made”.

An example of this part of the analysis is provided in Table 2.

The result of this forced cycle enabled the researchers to develop the table of environmental factors that could be identified. It became abundantly clear that social, political and economic factors played an enormous part in this project.

Because of the detailed examination of the document, a number of hitherto seemingly insignificant factors emerged. Because of the hub nature of the old Stapleton Airport, a local storm could congest all air traffic across the United States. Predictions about increases in travel demand for the local area appear to have been wrong. Because this was a public works program, the local laws stated that there must be 30% of minority owned firms and 6% women owned forms participate in the project. And, curiously, the authors gave a detailed history of BAE appearing to emphasise its list of failures (e.g. San Francisco Airport baggage handling system) while still describing them as the pre-eminent baggage handling developers.

During the creation of this second derivative text document we found ourselves constantly referring back to the first document as a reference. A feeling emerged that the environment in which this project was living was quite delicately balanced with considerable demands being made on the project by a variety of key stakeholders. What was becoming evident was that it appeared that each environmental factor was quite fixed and immovable.

Ref	Date	Environment	Actors
Env35	1992	The City did not get the airlines together to ask them what they wanted or what they needed to operate. The approach was more along the lines of "we will build the apartment building, and then you come in and rent a set of rooms".	Gene Di Fonso
Env36	1992	The direct relationship with BAE was delegated to Working Area 4, which also had responsibility for building design efforts such as the people mover, airside concourse, passenger bridge, parking garage etc.	
Env37	1992	BAE had to change its working structures to conform to DIA's project management structure.	Gene Di Fonso
Env38	1992	At the time of BAE commencing work, substantial construction work had already been done necessitating in some instances to have the already completed work demolished.	
Env39	1992/05	Head of the DIA project team resigns.	
Env40	1992/10	Chief engineer Walter Slinger dies.	Walter Slinger
Env41	1992/10	Gail Edmond takes over the job of chief engineer	Gail Edmond
Env42	1992/10	City council did not give Gail Edmond the same autonomy and power as Walter Slinger – they tied her hands and everybody knew it.	
Env43	1992/10	Just after Slingers death, access to BAE employees to side wide access deteriorated as their access was ignored or restricted.	
Env44	1992	City of Denver had denied BAE's original contract because it did not comply with minority employment requirements. BAE engaged outside contractors instead of their own employees.	
Env45	1992	The City of Denver was unable to supply clean power to the airport baggage handling system.	
Env46	1992	The management team had no prior baggage handling competence or experience. They treated the baggage handling system as a public works project – like pouring concrete. Access was difficult with contractors out on their own – almost anarchy.	Di Fonso
Env47	1992	BAE simply did not respond to the obvious incredible workload that they had. Their inexperienced project management vastly underestimated their task. Their work ethic was deplorable.	"Project Manager" from Stone and Webster, consultants to PMT.

Table 2 Environments (extract)

The local laws about the desired mix of minority owned and female owned firms involved in public works contracts was flagged as being very inflexible given that BAE was forced to change its working structures to conform.

In addition, the researchers noted that the airport Chief Engineer Walter Slinger seemed to be something of a champion of the project and the one who was convinced by BAE that it was indeed possible. It seems that Slinger was also instrumental in making the actual construction work of the project operate – "He had a lot of autonomy and could get things done". The researchers have interpreted this statement as meaning that Slinger was able to make substantial decisions alone directly related to the project without reference to higher authorities. This was changed once Slinger died and his job was taken over by Gail Edmond who was stripped of that autonomy by the Denver City Council and forced to validate all her decisions with them.

By this stage of the hermeneutic cycle, the researchers had created two new texts and were evaluating their contributions to the understanding of this case. It was becoming evident that the next text, the fourth cycle, would reveal even more about the understanding of the whole from its component parts.

As a reflection it was at this point of the investigation, the creation of this second derived text, that the first researcher "suddenly" realised how important Walter Slinger was to the whole project. The news of his death, previously overlooked, now had a profound impact from this point onwards on the investigation. What was now becoming clearer was that Slinger's previous autonomy and flexibility stopped at his death and that Edmonds did not inherit these managerial freedoms.

Fourth Cycle

This cycle examines the decisions that have been identified in the document. Along with these decisions the individuals making the decisions, the decisions themselves, and the outcomes are documented.

Table 3 shows what the decision documentation table looks like.

Surprisingly, the actual number of documented decisions by the case study's authors only numbered 23 odd cases.

This hermeneutic cycle revealed quite forcibly that Denver started building the airport before any airline had officially committed to it. United, in fact, committed to the project in December 1992, at the same time as they commissioned BAE to build their own baggage handling system. It would appear that when both Continental and United committed to the project, there was sufficient flexibility available to make major construction changes to airport design.

Ref	Date	Decision	Actor(s)	Outcome/impacts
Dec-11	1992	DIA decided to seek bids to build an airport-wide baggage system	DIA PMT	They contacted 16 companies and of the three who responded, neither were considered suitable.
Dec-12	1992	DIA approaches BAE to bid directly for the airport-wide baggage system.	DIA PMT	BAE developed a proposal for the most complex and innovative baggage handling system for the entire airport.
Dec-13	1992/04	BAE awarded contract for the building of an airport-wide baggage handling system.	DIA PMT	\$175.6M contract signed. BAE required no changes in design, and that they would need unrestricted access to any place in the airport.
Dec-14	1992/08	United altered plans for a transfer system for bags changing planes	United Airlines	System redesign necessitated.
Dec-15	1992/09	Continental requested that an automated baggage sorter be added.	Continental	Implemented at a cost of \$4.67M.
Dec-16	1992/09	Addition of extra maintenance tracks for servicing of baggage carts.	DIA PMT	Additional cost of \$912,000.
Dec-17	1993/02	Projected opening of airport delayed from Oct 1993 to December then later to March 9 1994.	Mayor Webb	Panic set in.
Dec-18	1993/09	BAE loses maintenance contract for baggage handling system.	DIA PMT	Industrial action by millwrights and electricians over BAE's proposal for a lower than union endorsed payment. BAE loses maintenance contract.
Dec-19	1993/09	Projected opening again delayed until May 15, 1994.	Mayor Webb	
Dec-20	1994/04	Reporters invited to witness the opening	Mayor Webb	Disaster - everything broke.
Dec-21	1994/04	Opening delayed indefinitely.	Mayor Webb	Delay costs set at \$330,000 per month.
Dec-22	1994/05	LogPlan engaged to review the baggage handling system and airport.	Mayor Webb	LogPlan report recommended a backup system be implemented.
Dec-23	1994/08	Back up baggage handling system announced.	Mayor Webb	\$50M project.

Table 3 Decisions (extract)

This cycle also highlights the gaps in communications between the major stakeholders (DIA, Continental and United), with the assumption made by DIA that each airline is responsible for its own baggage handling system. It is noted that United proceeded to take responsibility for its own system because "... They concluded that the schedule had gotten completely out of control from the standpoint of baggage, and they acted to serve their own needs" (Montealegre et al., 1999, p553-554).

What has been revealed to the researchers by now was that there was a substantial change in the project environment with the death of the Chief Airport Engineer Slinger and the succession of Gail Edmond with the attendant loss of autonomy and flexibility and (evidently) project management skills.

Fifth Cycle

In this fifth hermeneutic cycle, the second researcher developed another text based on the case study document and sought to interpret the text in terms of key stakeholders and the intentions of their communicative actions, and the opinions expressed by the authors. The researcher then includes his interpretation of the authors' intentions and opinions.

Table 4 provides an extract of authors' intentions.

Ref #	Intention of Communicative Action	Stakeholder	Opinion	Phenomena	Researcher's Interpretation / Findings
M1	Background	United Airlines 1992	"integrated system would improve time efficiency, reduce close-out time for hub operations, and decrease time-consuming manual baggage sorting and handling."	Objectives	Operational efficiency is an important objective. However, efficiency alone cannot be driving large projects.
M2	Setting expectations	Authors Hindsight	"There were, however, a number of risks inherent in the endeavor: the scale of the large project size; the enormous complexity of the expanded system; the newness of the technology; the large number of resident entities to be served by the same system; the high degree of technical and project definition uncertainty; and the short time span for completion."	Risks: scale, complexity, newness, granularity	Projects of huge size and complexity need well tested methods. Novelty is usually incompatible with scale.
M3	Fact Setting expectations	Authors Hindsight	"In August 1994, Mayor Webb approved the construction of a backup system. At the same time, he notified BAE of a \$12,000-a-day penalty for not finishing the baggage system by DIA's original October 29, 1993, completion date."	Non-delivery, breakdown of communication, start of hostilities	Legal means such as penalties are not advisable in situations which require cooperation. Whenever there is still some chance of problem resolution, communication and negotiation should be used instead.
M4	Novelisation Setting expectations	Gene Di Fonso, President of BAE 1994	"He wondered whether he should just cancel the contract and cut his losses, or attempt to negotiate with the city the support required to finish the system as specified, despite the severe deterioration in communication and rising hostility."	Rigidity, lack of communication, hostility	If all fails project cancelling the projects may be the only option. Negotiating project outcomes in face of hostility is also an option.
M5	Setting expectations Leading Appeal to technical prowess	Authors Hindsight	"Could the problem with the automated system be overcome with the dedication of additional resources? Given that the system represented a significant departure from conventional technology, would reducing its size and complexity facilitate resolution of the problems that plagued it?"	Hypothesis: smaller size and complexity, additional resources	By offering a hypothetical reason for the project collapse early in the teaching case, the authors are likely to lead the reader towards these as a conclusion.
M7	Motivation Setting expectations	Denver 1980s	"An aging and saturated Stapleton Airport was increasingly seen as a liability that limited the attractiveness of the region to the many businesses that were flocking to it. Delays had become chronic."	Perceptions and expectations of stakeholders. Strong motivation for the project.	External pressures could provide positive project motivation, it may however also lead to unduly strong stakeholder expectations, while haste could cause project's major problems.
M8	Colorising Politics	Frederico Peña 1986	"The airport was to become a grandiose project to revive the Colorado economy and a master showcase for the Public Works Department."	Perceptions and expectations	Project overselling can elevate stakeholder expectations beyond common sense.

Table 4 Flexibility Factors (extract)

The revelations from the fifth cycle show that *collaborative hermeneutics* can yield substantial benefits. In this case, two researchers develop independent derivative texts with completely individual approaches to their interpretations.

The curious result of this textual analysis has been the revelation that a considerable amount of the case study seems to be directed at colorizing and novelisation of the reported events, at setting the reader's expectations and, from the very beginning, at leading the reader to reach very specific conclusions at the end of the case - mainly that the project should have been de-escalated before its ultimate failure. While many of these writers' strategies can be attributed to the intended use of the text in teaching IS students, the selectivity of the text and its clear omissions may hint at yet another agenda. In particular, the majority of the case study text seems to rely on an interview with the then President and Project Manager for BAE, Gene Di Fonso. Much of the substance of Di Fonso's statements seem to be a defence of the BAE involvement in the project and an attempt to lay blame for various aspects of the failure on everyone else. If the authors' intentions were to direct the reader to sympathise with a wronged BAE then that goal has definitely been achieved.

In the process of "peeling off" the layers of authors' intentions and prejudices, and by reconciling the two distinct horizons of understanding as developed by both investigators, new observations started to emerge. In particular, we were struck at a large number of issues hinting on the inherent rigidity in the project administration and management.

Fusing the horizons lead further to re-evaluating all the findings collected thus far. In particular, in cycles 1 and 2, rigidity and/or flexibility seemed quite irrelevant and nearly all observations could have been explained with the violation of the basic laws of project management. In cycle 3, gender parity, work practice conformity, imposition of authority and autonomy reduction have now been rediscovered, and seen by the researchers as a serious decrease in flexibility.

While some of the inflexibilities could have been attributed to the very nature of the project, such as its size, complexity, relative novelty and task granularity, other inflexibility factors, such as inflexible business processes, state and project policies, hiring policies, staff and contractor duties, schedules and expected deliverables, relationships and alliances, finances and contracts, designs, coordination and communication modality, could all only be explicated by the inexperienced and unwilling project management.

The 4th hermeneutic cycle has further enhanced the understanding of the case and revealed that while initially there was considerable flexibility in the system as a whole, that flexibility was taken away in the later stages of the project - when it was needed most! And that seemed to be inextricably linked to the death of Chief Engineer Slinger.

Sixth Cycle

In the last project phase, the researchers sought to include additional documents that were substantively about the DIA project and to apply the hermeneutic principle of adding new knowledge into an existing system of understanding that has already been developed, and using Myers notion of making sense (1994a, p191), to either confirm understanding, or to extend the understanding to accommodate the new knowledge.

The new text document was by Montealegre, titled "De-escalating Information Technology Projects: Lessons from the Denver International Airport" (Montealegre & Keil, 2000). The goal in the introduction of this new document was to determine if there was any new knowledge about the DIA project that has not been previously revealed, and whether this knowledge maintains consistency with the understanding built to date.

The focus of the document was to analyse the project failure from the standpoint of de-escalation. The first new piece of knowledge was the fact that several government agencies (Federal Grand Jury, SEC, Government Accounting Office and the Federal Aviation Administration) had started or requested investigations into the project (2000, p424). There was no inkling of government dissatisfaction in the original case study.

This new fact caused us to reassess our understanding about the amount of public concern that existed during the latter days of the project. In particular, it made us aware that there must have been considerable pressure brought to bear on the management of the project. The consequences of this pressure could have been to panic, or take some other course of action. The original document describes the Webb administration bringing in external consultants to look at the baggage handling system in an almost 'matter of fact' way. There was no indication of weight of pressure present at the time.

The second new piece of knowledge that emerged from the document was that Moody's, the credit rating agency, reduced the DIA bonds to level Baa, just one level short of "no-investment status". This added pressure of dried up funds sources again served to add the words "crisis" and "panic" to the prevailing atmosphere.

The third new addition was that Mayor Webb established a task force to look at alternatives that could be deployed with the express purpose of opening the airport as quickly as possible. There was no mention of this task force in the case study, even though it preceded the report tabled by the Logplan company. This was truly the first piece of evidence of high level flexibility being brought to bear on the problem – if a problem becomes intractable, try to get around it.

The news horizons added by this new knowledge provided a relief to the tension that developed around what appeared at first sight to be an inflexible administration and management.

Reflections

It was not until the researchers actually engaged with the original case study document in such detail that the real benefits of the hermeneutic investigative process became apparent. The detailed creation of the derivative texts that focussed on one perspective at a time forced us to review and in a way to confront our own prejudices.

Each hermeneutic cycle as evidenced by the different perspectives and subsequent derivative documents enhanced the understanding. It was as if each text created its own horizon and in that process this fusion occurred very quietly.

The introduction of the second hermeneutic investigator who created another derivative text from a completely different perspective allowed an almost three dimensional view of the problem. This contribution had the potential to create a conflict not unlike a debate, where one seeks a winner. But when the principles of dialectics were enforced, rather than a debate ensuing, it seems that fusion occurred, leading to an even broader understanding.

Another interesting side effect of this *collaborative hermeneutics* was that each of the researchers again had another view of their own prejudices, as well as what turned out to be a quite stimulating debate, not on the respective validity of these perspectives, but on the sheer value and importance of dialectics.

The first researcher then wanted to locate and feed every possible available document on the Denver International Airport into the investigation just to make sure that nothing had been left unchecked and that there were no more hidden reasons for the events that occurred.

Conclusions

This article presented a case for the use of critical hermeneutics to the study of IS development projects. In particular, the paper used the infamous case study of Denver International Airport (DIA) and its Baggage Handling System to illustrate the hermeneutic process, its numerous cycles of understanding and the insights gained and recorded as new text that could be further analysed and reconciled.

The approach demonstrated the hermeneutic approach as eminently suited the task of analysing IS processes, environment, actors and events - the truly factual aspects of recorded project information. The example also showed that the pre-existing text could also be screened for prejudices and biases, which may hide the richness of new insights and information.

In the case of DIA, the hermeneutic approach led to the discovery of new factors, such as those related to project inflexibility, which could explain the downfall of the DIA development project, but which seem to have eluded the original project investigators, either due to unintentional omission, educational objectives of the case, or possibly due to the political pressures imposed on the authors by various project stakeholders.

On reflection, in the course of our study, we came to the conclusion that critical hermeneutics can be effectively employed in IS research to determine IS project characteristics, to identify the associate project events and their actors. It is also a very useful approach to assist IS researchers in sifting through the secondary data of biased and prejudiced project reports and in peeling off these biases to reveal and interpret the true nature of project events.

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