

DE-ESCALATING INFORMATION TECHNOLOGY PROJECTS: LESSONS FROM THE DENVER INTERNATIONAL AIRPORT¹

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Abstract

Project failure in the information technology area is a costly problem, and troubled projects are not uncommon. In many cases, these projects seem to take on a life of their own, continuing to absorb valuable resources, while failing to deliver any real business value. While prior research has shown

that managers can easily become locked into a cycle of escalating commitment to a failing course of action, there has been comparatively little research on de-escalation, or the process of breaking such a cycle. Through de-escalation, troubled projects may be successfully turned around or sensibly abandoned. This study seeks to understand the process of de-escalation and to establish a model for turning around troubled projects that has both theoretical and practical significance. Through a longitudinal case study of the IT-based baggage handling system at Denver International Airport (DIA), we gathered qualitative data on the de-escalation of commitment to a failing course of action, allowing us to inductively develop a model of the de-escalation process as it unfolded at DIA. The model reveals de-escalation as a four-phase process: (1) problem recognition, (2) re-examination of prior course of action, (3) search for alternative course of action, and (4) implementing an exit strategy. For each phase of the model, we identified key activities that may enable de-escalation to move forward. Implications of this model for both research and practice are discussed.

Keywords: Information systems (IS) project management, escalation, de-escalation, IS project failure, systems implementation, field study

ISRL Categories: EE, EE0101, EE0504, EL0201, EL0202, FD05

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Introduction

Twice the size of Manhattan, the Denver International Airport (DIA) at 53 square miles was designed to be the USA's largest airport. By 1992, there was a growing realization that baggage handling would be critically important in an airport of this size and that this issue could not be off-loaded to the airlines that would be operating out of DIA. Consequently, commitment began to grow for the inclusion of an airport-wide, information technology (IT) based baggage handling system that could dramatically improve the efficiency of luggage delivery. BAE Automated Systems, Inc., a world leader in the design and implementation of material handling systems, was commissioned by the City of Denver to develop the system. An information system composed of 55 networked computers, 5,000 electric eyes, 400 radio frequency receivers, and 56 barcode scanners was to orchestrate the safe and timely arrival of every suitcase and ski bag at DIA. Problems with the baggage system, however, kept the new airport from opening as originally scheduled in October 1993. Soon the national and international media began to pick up the story, and the DIA came under investigation by various federal agencies. By the time the airport opened in late February 1995, it was 16 months behind schedule and close to \$2 billion over budget. Additionally, DIA might never have opened at all if Mayor Webb had not found a way for the City of Denver to abandon its previous commitment to build an airport-wide automated baggage handling system. When DIA did eventually open, it did so with two concourses served by a manual baggage system and one concourse served by a scaled-down semi-automated system.

Although dramatic in terms of its size, complexity, and visibility, the multi-million dollar IT-based baggage handling system at DIA is but one of

many such IT project failures that occur each year (Gibbs 1994). Project failure in the IT area is a costly problem, and troubled projects that seem to take on a life of their own are not uncommon (Keil and Mann 1997). Escalation literature has been suggested as a promising theoretical base for understanding how managers become entrapped in a failing course of action on certain IT projects (Keil 1995; Newman and Saberwal 1996).

While escalation of commitment is a general phenomenon that can occur with any type of project, the literature (e.g., Abdel-Hamid 1988; Brooks 1975; DeMarco 1982; Zmud 1980) suggests that IT projects may be particularly susceptible to this problem. The intangible nature of software makes it difficult to obtain accurate estimates of the proportion of work completed, which may promote escalation of commitment by giving a false perception that successful completion of the project is near. To add to the difficulty of measuring progress, IT projects are dynamic and tend to have volatile requirements (Abdel-Hamid and Madnick 1991; Zmud 1980) that cause project scope to change frequently. Almost certainly, projects that exhibit such volatility are especially difficult to manage and control. For these reasons, it is not surprising that escalation occurs with high frequency among IT projects. Keil and Mann report that 30% to 40% of IT projects exhibit some degree of escalation.

This paper takes a broad view of the process of de-escalation, which we define to include project redirection as well as abandonment. De-escalation occurs whenever there is reduced commitment to a failing course of action. While such a reduction in commitment *may* manifest itself as project abandonment, it may also manifest itself as a significant movement away from some previous course of action (i.e., redirection). While redirection cannot guarantee that the project will be successful, it does signal a reduction in commitment in response to a failing course of action. Thus, we consider redirection (which can include a radical rescoping or redefining of the project) to be a form of de-escalation.

While an analysis of what went wrong at DIA (i.e., the escalation of commitment to build an airport-wide computerized baggage handling system)

would be interesting in itself, this is *not* our aim here. The primary purpose of this study was to gain a better understanding of the *de-escalation process*, whereby commitment to the airport-wide computerized baggage handling system was reduced, allowing the airport to be opened using an alternative baggage handling system. There are at least two important reasons for studying the DIA case. First, the computerized baggage handling system at DIA was one of the largest IT failures of the decade. For this reason alone, the case is worth studying to determine if there are any de-escalation lessons that can be learned and applied to other cases. Second, since we know that managers can (and will continue to) become overly committed in some instances, it is important to identify strategies and tactics that can be used to break the escalation cycle, allowing such projects to be redirected if possible or abandoned if necessary.

In this paper, we use the DIA case as the basis for developing a process model of de-escalation. To motivate the need for such a model and to provide some additional context for our work, we begin with a review of the existing literature on de-escalation. Next, we describe the research approach used to study the DIA case to inductively develop a process model of de-escalation. We then present the de-escalation process of the computerized baggage-handling system at DIA organized around the phases that were observed and incorporated in our model. In the following section, we further develop the model by discussing the key de-escalation triggering activities that occurred within each phase. Here, we draw upon our analysis and interpretation of the case data, as well as prior literature, to explore the key activities of the de-escalation process. We conclude with a discussion of the implications of our model for both research and practice, followed by a brief summary.

Background

While prior research has shown that managers can easily become locked into a cycle of escalating commitment to a failing course of action (see, for example, Brockner 1992), there has been comparatively little research on de-

escalation, or the process of breaking such a cycle. As a starting point for our research, we undertook a review of this literature aimed at identifying triggering activities or conditions that might be useful in building a process model of de-escalation. Research on de-escalation of commitment is relatively limited. In fact, we identified only about a dozen studies that are relevant to the de-escalation of IT projects, which yield factors that could potentially be used to explain this phenomenon. Two of these are case studies (Keil 1995; Ross and Staw 1993), one is a field survey (Keil and Robey 1999), and the others are all laboratory experiments (most frequently conducted with student subjects). Table 1 summarizes the de-escalation triggering activities or conditions we identified from this review and provides references to relevant studies.

The results of our review revealed that there has been comparatively little research on de-escalation, and that which does exist has not generally been grounded in actual organizational settings.² The review also underscored the fact that prior research has followed a factor-oriented, or variance theory, approach in seeking to understand de-escalation.³ Process theories, which complement variance theories, are less commonly found in the literature and have yet to be developed for explaining de-escalation. Process theories focus on sequences of activities in order to explain how and why particular outcomes evolve over time (Abbott 1983; Markus and Robey 1988; Mohr 1982; Newman and Robey 1992; Shaw and Jarvenpaa 1997). Ideally, a good process theory should go beyond simply naming the phases that occur in a process. It should also include some notion of the triggering activities that drive the movement from one phase to another (Mohr 1982).

²While there are a few other published studies on de-escalation, they tend to manipulate treatments (e.g., self-awareness training) that have little connection to an IT context (e.g., Nathanson et al. 1982). We have therefore excluded these studies from Table 1.

³A variance theory deals with variables and seeks to explain the variance in some dependent variable (Mohr 1982).

Table 1. Triggering Activities and Conditions That Can Promote De-escalation

Triggering Activity or Condition	Description of Why the Triggering Activity or Condition Can Promote De-escalation	Relevant Studies
<i>Changes in top management or project championship</i>	For a variety of psychological, social, and organizational reasons, top management may sustain its commitment to projects that are deeply troubled. Changes in top management or in project championship may allow a fresh appraisal of the project and a chance to reconsider how resources should be allocated.	Keil 1995; Ross and Staw 1993
<i>Publicly stated limits</i>	A way to promote de-escalation is to state limits beyond which a project will cease to receive support, especially to state such limits publicly.	Brockner et al. 1979; Heath 1995; Keil and Robey 1999; Simonson and Staw 1992
<i>Availability of alternative investments</i>	Project escalation carries potentially high opportunity costs: the inability to apply allocated funds to other projects that may enjoy higher return on investment. Several laboratory experiments provide evidence that the availability of alternative investments or consideration of alternative uses of the funds supporting a project (i.e., opportunity costs) can promote de-escalation.	Keil et al. 1995; McCain 1986; Northcraft and Neale 1986
<i>Setting minimum target levels</i>	One explanation for escalation is a lack of clarity about what constitutes success and failure. When minimum target levels are established as threshold criteria for success, troubled projects are more likely to be de-escalated.	Keil and Robey 1999; Simonson and Staw 1992
<i>Making negative outcomes less threatening</i>	Reducing the threat posed by negative outcomes has been found to be a useful de-escalation strategy. By not imposing severe punishment for failures, it is argued, organizations can encourage de-escalation.	Keil and Robey 1999; Simonson and Staw 1992
<i>Regular evaluation of projects</i>	Many escalating projects proceed with little monitoring or review. Where regular project reviews and evaluations are conducted, de-escalation of commitment to failing projects is likely to be encouraged.	Drummond 1995; Keil and Robey 1999
<i>Separation of responsibility for initiating and evaluating projects</i>	Escalation studies have demonstrated that escalation tendencies are heightened under conditions of high personal responsibility. To combat this tendency, responsibility for initiating projects should be separated from responsibility for evaluating projects.	Barton et al. 1989; Keil and Robey 1999
<i>Appeals to stakeholders</i>	Large projects that extend outside the organization's boundaries and involve external constituencies may appear to present obstacles to de-escalation. However, de-escalation studies have shown that external parties can play a significant role in the de-escalation process by helping to make the economics of withdrawal more favorable.	Ross and Staw 1993
<i>External pressure on the organization</i>	External events, perhaps unrelated to a particular troubled project, may also trigger a general reassessment of resource allocation and allow de-escalation to proceed.	Keil 1995; Ross and Staw 1993

Table 1. Continued

Triggering Activity or Condition	Description of Why the Triggering Activity or Condition Can Promote De-escalation	Relevant Studies
<i>Unambiguously negative feedback</i>	IT projects may be particularly prone to escalation because software is invisible and intangible. Problems associated with such projects may remain unknown for long periods of time, or there may be a tendency to discount their severity. De-escalation will not occur until the gravity of the problem manifests itself unambiguously.	Garland et al. 1990
<i>Visibility of project costs</i>	In laboratory experiments researchers have found that de-escalation was more likely when information about costs was more salient. Field settings may hide or distort knowledge of problems and associated costs.	Brockner et al. 1979
<i>Efforts to de-institutionalize the project</i>	De-escalation can be facilitated when an organization de-institutionalizes a project, removing it from the core of the firm, either by moving it physically away from the central location of the company or by emphasizing its peripheral nature.	Ross and Staw 1993

Table 2: Formal Interviews

Institution	Number of people interviewed three times	Number of people interviewed two times	Number of people interviewed one time
City of Denver	2	4	3
DIA project	2	3	6
DIA consultants	-	1	5
BAE, Inc.	2	2	3
Airlines	3	2	4
TOTAL	9	13	21

While a handful of temporal models have been proposed to explain how *escalation* of commitment builds up over time (see, for example, Staw 1997; Staw and Ross 1987), our review did not identify a single process model of de-escalation.⁴

Indeed, the prevailing wisdom seems to be that de-escalation occurs almost instantaneously upon receipt of feedback that is unambiguously negative and that it takes the form of project abandonment. Based on an analysis of the events that

⁴While Staw and Ross (1987) articulate a "withdrawal prototype" that depicts de-escalation as a process, their conceptualization of de-escalation is somewhat different from ours. They envision de-escalation as a process that is driven by the receipt of increasingly negative feedback, "making it economically clear that persistence

is more costly than withdrawal" (p. 69). The phases of their process are not named and there is no clear sense of how or why the process unfolds in the manner depicted, other than the fact that feedback becomes increasingly negative.

transpired at DIA, we present a grounded process model of the phenomenon that reveals de-escalation to be a more complex and gradual process than previously described. Our model clearly shows that an escalated project is *not* simply abandoned or immediately de-escalated upon receipt of unambiguously negative information. Instead, our findings suggest that a project goes through several distinct phases along the road to de-escalation and that there are key triggering activities associated with each of these phases. This inductively derived model serves as our central contribution.

Research Approach

Consistent with the focus of our research, we followed an in-depth case research approach. Case research is particularly appropriate for exploratory research of this type. This approach allowed us to focus on studying de-escalation in a natural setting. Moreover, case research afforded us an opportunity to engage in theory-building in an area in which there has been relatively little prior research and theory (Benbasat et al. 1987).

From a site selection standpoint, the computerized baggage handling system at DIA proved to be an ideal case to study. The tremendous media coverage of this particular IT failure, the extensive documentation that was publicly available, and the fact that key actors could be located for interviewing all argued in favor of pursuing this particular case site. Moreover, since one of the researchers lived in close proximity to the case site, we were in a position to conduct a longitudinal case study at relatively low cost.

In following a theory-building approach, we tried to begin "as close as possible to the ideal of no theory under consideration and no hypotheses to test" (Eisenhardt 1989, p. 536). In accordance with the approach advocated by Eisenhardt, we formulated the research problem and reviewed the existing literature on de-escalation in order to "specify some potentially important variables," but we avoided "thinking about specific relationships between variables and theories as much as possible, especially at the outset of the process."

Throughout the study, we followed a strategy of assigning specific roles to the two researchers involved. All of the interviews were conducted by the first author, while the second author stayed out of the field altogether and played the role of devil's advocate (Eisenhardt 1989). This strategy enabled the second author to avoid becoming overly immersed in case details and to "bring a different and possibly more objective eye to the evidence" (Eisenhardt 1989, p. 538).

To begin our data gathering, we first consulted published reports on DIA and the baggage system. We found more than 100 articles published in national and local newspapers as well as numerous pamphlets, memoranda, and documents in the public domain. We negotiated research access with the City of Denver in August 1994; over the next 18 months we conducted field research (on-site observations, interviews, and further documentation reviews). A total of 74 interviews were conducted with 43 employees of DIA, the City of Denver, the airlines, BAE (the baggage system contractor), and several consulting companies that played a significant role in the project, as summarized in Table 2. Thus, the research involved a longitudinal study of the de-escalation period (1994-1995).⁵ The longitudinal focus allowed us to study the key activities and decisions that occurred during the course of the project, while the collection of multiple types of data from different sources provided triangulation and increased the reliability of the study. The appendix provides additional information on our methodology and discusses some of its limitations.

The Computerized Baggage Handling System at DIA

This section presents background information about DIA and the computerized baggage handling system. It highlights the process that Mayor Webb followed to extricate himself and the

⁵During the course of our research, we also undertook an historical reconstruction of the escalation period (1989-1994). This was useful because it gave us a deeper understanding of the project context prior to de-escalation.

City of Denver from a failing course of action and identifies the key decisions that punctuated the de-escalation process. First, the antecedent condition is introduced as a high level of commitment to a previously chosen course of action that has failed to produce the desired results (i.e., a condition of escalation). Then, the case facts are presented in four phases: problem recognition, re-examination of prior course of action, search for alternative course of action, and implementing an exit strategy. Finally, the consequence or outcome of the de-escalation process is discussed.

Antecedent Condition

In the early 1980s, plans began to take shape for construction of DIA. The new airport was to be financed through a combination of revenue bonds, federal grants, and a sizable investment by the City of Denver.⁶ Located 25 miles from downtown Denver, DIA was designed to grow without compromising efficiency and to maintain a steady air traffic flow in all weather conditions. The design included five parallel 12,000-foot runways on which as many as 1,750 planes could take off and land daily. The initial ground-breaking for the project occurred in late 1989 and the original plan called for completion by fall 1993.⁷ The initial project design did not incorporate an airport-wide baggage handling system; the airport planners expected the individual airlines to build their own systems as they did in most other American airports (Rifkin 1994). In 1991, United Airlines (one of the airlines to commit early to leasing gates at DIA) did exactly that, commissioning BAE Automated Systems, Inc., to develop an automated baggage handling system for its B Concourse.

By 1992, two years into the construction of the new airport and with BAE Automated Systems, Inc., already working on United's baggage system, the project's top managers began to recognize the potential benefits of an airport-wide IT-based baggage handling system. As a result, airport planners and consultants began to develop specifications for an airport-wide automated baggage handling system and the city sent out a request for a proposal. While 16 companies (both domestic and foreign) were contacted, only three responded. A consulting firm recommended against all three submitted designs on the grounds that the configurations would not meet the airport's needs. A member of the DIA management team commented, "All had the same response: 'there was not enough time to build such a system.'" BAE Automated Systems, Inc., was one of the 13 companies contacted that elected not to bid on the airport-wide system. Although BAE's Telecar system, with its laser barcode readers and conveyor belts, had been installed in other airports, the DIA request for proposal represented a system of much greater size and complexity than anything BAE had built before.

The consultant's report, BAE's failure to bid on the system, and the several analyses coming from other neutral observers—including the technical advisers to the Franz Josef Strauss Airport in Munich—represent what now appear to be obvious warning signs. Nevertheless, the City of Denver proceeded with its plan to build an airport-wide automated baggage system.

Since BAE had already begun constructing an automated baggage handling system to serve United and had an established reputation as a superior baggage system builder, the DIA project management team approached the company again about building an airport-wide automated baggage handling system. This time, BAE responded with a proposal to develop the "most complex baggage handling system ever built." The proposed system was to include 3,100 independent "telecars" to route and deliver luggage among the counters, gates, and claim areas of 20 different airlines. A total of 55 personal computers would be networked to one another and to 5,000 optical detectors, 400 radio receivers, and 56 bar-code scanners in a central

⁶The revenue bonds assumed the "Date of Beneficial Occupancy" (DBO) to be January 1, 1994, with bond repayments to begin on that date.

⁷The ultimate buildout, projected for the year 2020, was to include up to 12 full-service runways, more than 200 gates, and a capacity of 110 million passengers annually.

control system. The system would move a passenger's bag from any injection point to any destination in the airport in less than 15 minutes and would process more than 1,000 bags per minute—two to three times faster than a conventional conveyor belt. Faster baggage handling would translate into increased ground time efficiency, thus reducing enplanement turnaround time for hub operations and improving services to passengers (Bouton 1993). In April 1992, after viewing a prototype of the proposed system, Denver officials awarded BAE a \$175.6 million contract to build the automated baggage system for the entire airport.

First construction problems, then difficulties with the baggage system kept the new airport from opening as originally scheduled in October 1993. The national and international media began to pick up the story and the DIA project came under intense investigation by various federal agencies.

Phase 1: Problem Recognition

In late April 1994, as BAE was preparing the first test of the system, the City of Denver invited reporters to observe the test: 7,000 bags were to be moved to Continental's Concourse A and United's Concourse B. So many problems were discovered that testing had to be halted. Reporters saw piles of discarded clothes and other personal items lying beneath the telecar's tracks. After the test, Mayor Webb delayed the airport's opening for an indefinite period of time. "Clearly, the automated baggage system now underway at DIA is not yet at a level that meets the requirements of the city, the airlines, or the traveling public," the mayor stated. "There is only one thing worse than not opening DIA...[and] that is opening the airport and then having to shut it down because the [baggage] system doesn't work." Initially, Mayor Webb reconfirmed his commitment to the computerized baggage handling system by stating that that DIA would not open until "milestones are met and I have seen the baggage system operate successfully" (O'Driscoll 1994c).

After the failed tests in April 1994, however, city officials began to question whether the designer

and builder of the baggage system could get the system up and running. "The growing frustration in city people is due to the lack of a sense of steady progress being made," said one member of the project management team. Airline executives were also taking a pessimistic view at that time. "We used to be more naive," said an airline executive. "We would think, 'well, of course these guys know what they are doing and somehow, miraculously Di Fonso [who headed up BAE] and his merry men will pull this thing out.' Now, belief in miracles is waning."

Shortly after Webb's decision to delay the opening of the airport until the automated baggage handling system was fully operational, external pressure on the City of Denver began to mount as it faced investigations from multiple agencies within the federal government. A federal grand jury was conducting an investigation concerning the use of government funds for DIA. At the same time, the Securities and Exchange Commission (SEC) was investigating the sale of \$3.2 billion in municipal bonds used to finance DIA and the adequacy of the city's disclosure of information with respect to the automated baggage system and related delays in opening the airport. By congressional request, the Government Accounting Office (GAO) was investigating DIA construction cost growth (Flynn 1994b). The Federal Aviation Administration (FAA) had also initiated an investigation for fraud.

A letter sent by an FAA commission to a Denver official in May 1994 stated,

Rather than continuing to be part of a stampede mentality, the brakes need to be put on the funding stream because the American taxpayers are fed up with ...continuing the game even when there are red penalty flags all over the field.

The letter also called for a meeting with Denver officials to discuss problems with the project and to consider totally revamping the airport's management, "including placing the new airport under...an independent regional authority." In addition, DIA vendors were expressing interest in filing a class-action lawsuit against the city because of repeated delays in the new airport's

opening. One vendor told the *Rocky Mountain News*, "the delays have cost concessionaires about \$75 million in lost sales" (Flynn 1994a).

Decision 1: Hire outside consultants. In May 1994, under growing pressures from a variety of stakeholders, Mayor Webb announced that he was hiring the German firm Logplan to help assess the state of the automated baggage system. Logplan's report was "the first independent, outside opinion related to [BAE baggage] system design," according to the Denver Public Works director.

Phase 2: Reexamination of Prior Course of Action

Once the problems began to be recognized, Mayor Webb and the City of Denver re-examined for the first time their previous course of action. To evaluate whether the airport opening delays and added cost would materially affect the airport's ability to meet operating costs and debt services when it opened, Hickling Corporation, a consulting firm specializing in risk assessment for airport investment projects, was hired (GAO 1994). According to this consulting firm, keeping DIA closed was costing the city \$33.3 million a month, or a little more than \$1 million a day. Most of the money, about \$21 million, was needed to pay the interest on bonds that the city had issued to build the airport. As the Denver manager of revenue explained, "opening the airport as fast as possible and ending \$33 million a month in delay costs are what the investors care about." Moreover, since the airport was partially funded through federal grants, not only bondholders but also federal agencies like the FAA wanted assurances that the airport project could be put back on track.

To cope with the added costs, Mayor Webb and the City of Denver began to consider two alternative financing plans. The first involved dipping into emergency bond or capital improvement reserve funds, while the second involved adding the delay cost to a \$180 million bond issue that Denver had already planned for the summer of 1994. The bond rating agencies and analysts were watching closely to see how Denver was

planning to finance the delay. On May 2 1994, Moody's dropped its ratings of the bonds one grade to Baa, just one step above no-investment status (Svaldi 1994).

Ultimately, financial considerations led to a better understanding of the magnitude of the problem. With this came a growing realization that it was time to begin thinking about other options that would prevent further delays and allow the airport to open as soon as possible. Political considerations also played a role here in that Mayor Webb was expected to run for re-election the following year. Although he expected "to be judged on more than just DIA" (O'Driscoll 1994b), after delaying the opening of the airport four times, he was aware that his reputation was at stake. As he told the *Rocky Mountain News*, "Politically, how can you go out and tell people that you're going to delay the project by a year" (Flynn 1995).

Decision 2: Establish a task force. Mayor Webb created a high-level task force charged with finding a short-term alternative to the BAE system that would allow the airport to open as soon as possible. Led by Mayor Webb's chief of staff, the team included the chairman of the Denver Metro Chamber of Commerce, a consultant from the Denver engineering firm O'Brien-Kreitzber, Denver's manager of revenue, the assistant city attorney, the director of public works, and a DIA project engineer.

Phase 3: Search for Alternative Courses of Action

The task force immediately began the exploration of alternative courses of action. As the *Denver Business Journal* reported,

City officials and consultants decided to channel their energies toward devising Plan B—an interim baggage handling system—that could be in place for up to two years, while engineers continue to work out the bugs in the permanent system. (Steers 1994)

The move represented a significant point of departure in the management of the project. For the

first time since the automated baggage handling system had been conceived, the city acknowledged the existence of possible alternative courses of action and expressed a willingness to explore their feasibility. This was corroborated by the director of public works:

We believe that the success of the airport rests in efficient operations, not in the completion of the automated system....If BAE fixes [the baggage system's] problems while the alternative system is being built, that would be great. DIA could open with a combination of the two systems....We'd like to get the automated system working, but...it may not be possible to do that in a short enough time.

In July 1994, as the task force began to consider alternative courses of action, Logplan began evaluating the automated baggage system. To do so, Logplan isolated a loop of track that contained every feature of the automated baggage system, intending to run it for an extended period to test the reliability of the telecars, but jams on the conveyor belts and collisions between cars caused the test to be halted. The system did not run long enough to determine whether there was a basic design flaw or to analyze where the problems were. By August 1994, Logplan issued an 11 page report that characterized BAE's system as "highly advanced" and "theoretically" capable of living up to its promised "capacities, services, and performances," but acknowledged that software and mechanical problems "make it most improbable to achieve a stable and reliable operation." Logplan recommended constructing a conventional tug-and-cart backup baggage system that could be built in less than five months and opening DIA with it and whatever parts of the BAE system could be ready (Booth and O'Driscoll 1994).

Decision 3: Authorize construction of an alternative system. On August 4 1994, Mayor Webb announced a plan to develop "a temporary, low-tech alternative system for the Denver International Airport's high-tech baggage system." He also declared that it was "financially irresponsible" to continue delaying DIA's debut until

the automated system was operational. Webb concluded the announcement by asserting that "the alternative baggage system's role as future backup after BAE's system is running will boost DIA from a Grade A airport to an A-plus airport" (O'Driscoll 1994c). Just one week after Mayor Webb announced the plan to develop the alternative baggage system, the Denver City Council approved the hiring of the Michigan-based Rapistan Demag firm to design, engineer, and install a conventional baggage handling system.

At the same time, Mayor Webb notified BAE of a \$12,000-a-day penalty for not finishing the baggage system by DIA's original October 29, 1993, completion date. Webb also demanded that BAE pay for the \$50 million conventional tug-and-cart baggage system. Di Fonso, reviewing Mayor Webb's letter, summed up the situation as follows:

We have gotten to the point with the city that we are literally not talking to each other. Consultants recommended a backup baggage system, and the minute that the decision was made, the city had to defend it. We are left out in limbo.

Phase 4: Implementing an Exit Strategy

Immediately after Mayor Webb's decision to authorize the construction of an alternative manual baggage handling system, United and Continental Airlines as well as BAE geared up for protracted negotiations and possible litigation. Continental maintained that the Mayor's actions constituted a breach of contract for which it could sue the city or choose to cancel its lease of DIA gates. United urged the city to bring in mediators "because of the deteriorating relationship with BAE."

United Airlines objected to the manual system, saying it would not accommodate the airline's heavy schedule. A United Airlines official told a *Denver Post* reporter that, "Webb's choice would gridlock the DIA baggage movement disastrously." United feared that a traditional system would hurt

its huge Denver hub—with 284 flights a day—by slowing luggage transfers and lengthening the time needed to send bags from ticket counters to airline gates. As United's senior vice president for customer service put it, "the alternative-system plan will take us back 30 years" (Mark 1994). She suggested that the temporary system would double connecting times between flights.

Since the time that United signed to use DIA as its second-largest hub airport, it had understood the need for an automated baggage system to turn aircraft around quickly and it was committed to implementing such a system. That was why United had commissioned BAE to develop an automated system for its B Concourse even before the DIA planners had decided on including an airport-wide baggage system. Then, when the City of Denver made the decision to provide such a system, and the BAE-United Airlines contract was frozen, United included in its contract with Denver a clause requiring delivery of a functional baggage system. Therefore, it objected to the proposal to develop a manual system.

United's reaction led Mayor Webb, representing the City of Denver, to appeal to organizational constituencies. Specifically, a negotiation process was initiated that reopened the possibility of modifying, instead of withdrawing, the plan to open DIA with an operational automated baggage system. After three straight days of intense, closed-door talks among United, city officials, and BAE, an agreement was finally reached. On August 31, 1994, the *Rocky Mountain News* reported that, in an effort to avoid legal action, the City of Denver had proposed a "stand still" agreement whereby major parties (the city, United Airlines, and BAE) would waive certain previous agreements and rights until the new airport was opened and operational. "Of course," the reporter emphasized, "the legal departments of these parties are going to be busy until the end of this century with this case" (Amole 1994).

After the negotiations took place, Mayor Webb was quoted as saying:

It is my hope that United, as our largest tenant, would clasp my hand as I offered it today, and send engineers to help...I

believe, in that spirit, that they will send their technical people here, not their lawyers. (Leib and Mark 1994)

United replied with a plan to modify the automated system for transporting departing passengers' baggage to the planes while relying on traditional tugs and carts to deliver most of the baggage for arriving passengers.

According to George Dougherty, who served as Denver Airport director until June 1992:

[Throughout the project, United] applied significant pressure and had previously made contributions to [Mayor Webb's] political campaign and sponsored fund-raising events. He was not in a position to make a decision counter to their wishes. (Dempsey et al. 1997, p. 405).

Under the new agreement that was reached with United and BAE, city officials and the DIA project management team effectively relieved themselves of any responsibility for the implementation of the automated baggage system, which became the sole responsibility of United Airlines and BAE.

Decision 4: Restructure the baggage system contract. On September 1, 1994, the City of Denver, United Airlines, and BAE, following intensive talks, struck a deal to break the baggage system contract and implement two separate systems. As a result of these negotiations, the original contract was divided into two parts: United was left managing the implementation of a simplified version of BAE's automated system to serve its Concourse B, and the City of Denver was left managing the implementation of a traditional baggage system to serve other airlines operating on Concourses A and C. Under the new arrangement, airlines other than United would not have access to the automated system unless BAE installed new telecar track and United granted rights for access.

Consequence: The End of the Crisis

When the airport finally opened in late February 1995, it was 16 months behind schedule and

close to \$2 billion over budget. By this time, the airport-wide computerized baggage handling system had effectively been abandoned, leaving two concourses served by a manual baggage system and one concourse served by a scaled-down semi-automated system.

As a consequence of the fourth decision, two separate baggage handling strategies emerged: a semi-automated approach to serve United's concourse and a manual approach for the other concourses. The idea of a single automated baggage system to service the entire airport was no longer on the table. Instead, the City of Denver managed the implementation of an alternative baggage system designed around conveyor belts and propane-powered tugs and carts to serve Concourses A and C. In order to accommodate the alternative system, warning lights were installed in the baggage tunnels to guide the tugs and other airport modifications were made to address security and baggage sorting issues.

Meanwhile, United Airlines assumed full responsibility for managing the implementation of a simplified automated baggage system to serve its Concourse B. It used, at reduced speed, two loops of track that served Concourse C and it isolated its operations from the BAE equipment that had been installed to service Concourse A. United's goal was to salvage as much as possible from the work that BAE had completed and to construct a simpler automated baggage system that would be used only for handling baggage associated with United's outbound passengers. This goal represented a significant reduction in the scope and complexity of the project.

The relatively smooth opening of the airport meant that the immediate crisis concerning the automated baggage system was over. Along with the airport's opening came the possibility of political relief for Mayor Webb, as he was preparing his race for re-election that spring. The airport opened, however, with five runways and 88 gates (20 fewer than the old Stapleton airport that DIA was designed to replace), at a cost of \$5.2 billion (close to \$2 billion over budget), and with an \$18.80 average per-passenger airline fee (the nation's second highest). Additionally, significant sums in legal fees had to be spent to counter the lawsuits and related investigations, which led the city auditor to remark:

I didn't realize when everyone talked about DIA was going to mean full employment that what that would mean was full employment for lawyers. I never dreamed that when the airport was completed that we would exchange construction workers for lawyers. (Leib 1995).

Discussion: Revisiting the DIA Findings in Light of De-escalation Literature

Based on the DIA case study and the findings that emerged, we developed a process model of de-escalation, as depicted in Figure 1. Given that this model was inductively derived from the DIA case study data, it is appropriate to ask whether the existing literature on de-escalation corroborates the model and in what ways our model enriches our present understanding of de-escalation. To begin addressing these issues, we must revisit the case data in light of existing literature on de-escalation.

De-escalation as an Emergent Process

As noted earlier, most of the prior work on de-escalation has had a variance theory orientation and has been conducted in controlled laboratory settings. Much of this work has suggested that de-escalation occurs almost instantly when certain conditions, such as unambiguously negative feedback, are present (see, for example, Garland et al. 1990). Although one might expect de-escalation to occur instantly upon receipt of unambiguously negative information, the DIA case suggests it is difficult to change direction suddenly because of the build-up of commitment that occurs during the escalation process. Our research on DIA's computerized baggage handling system reveals that de-escalation is a gradual process rather than a sudden event. Thus, while there may be a turning point at which escalation can be retrospectively seen as having given way to de-escalation, there is no single point in time at which de-escalation magically occurs. Rather, it is a process that unfolds gradually over

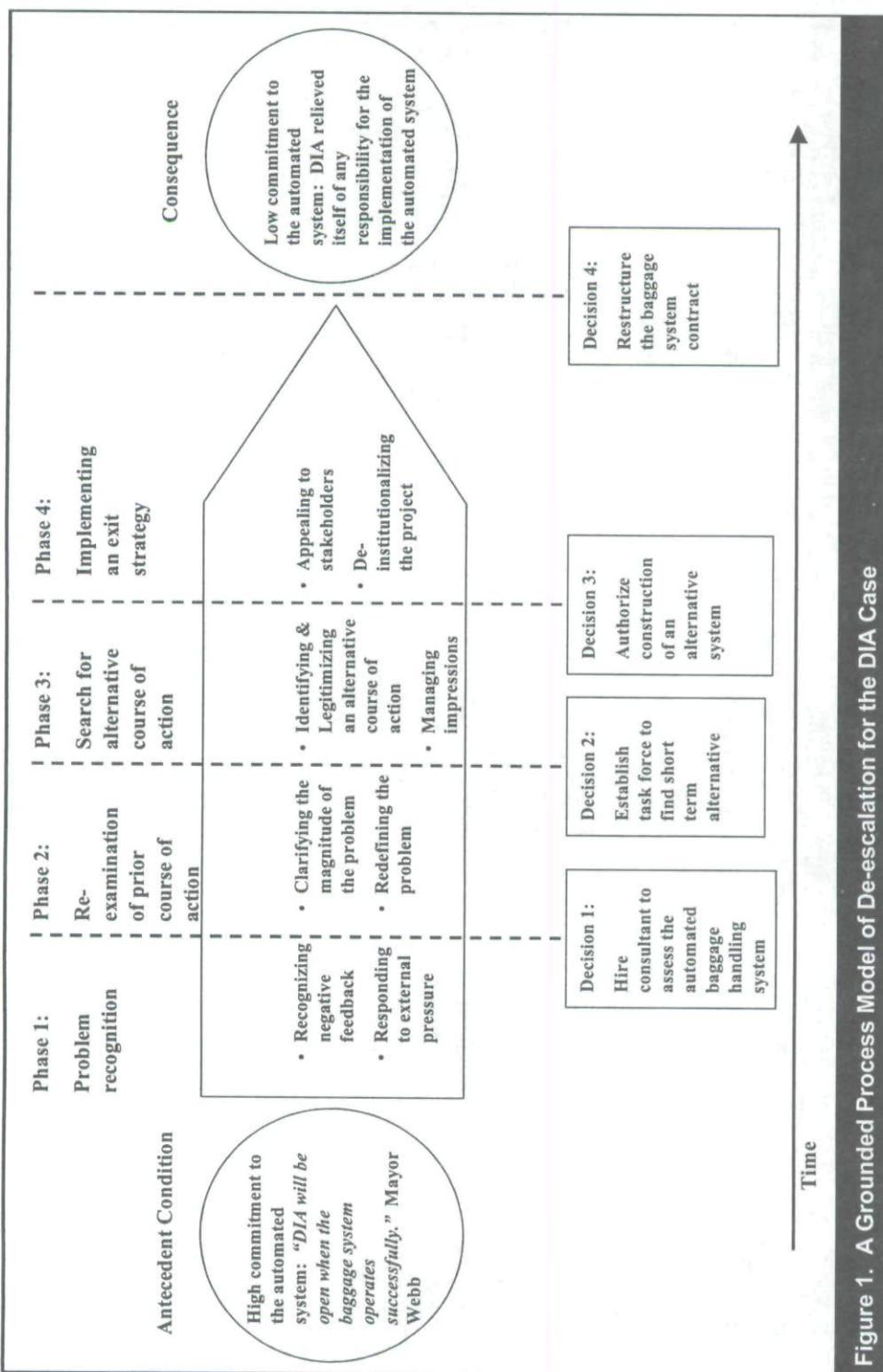


Figure 1. A Grounded Process Model of De-escalation for the DIA Case

Table 3. De-escalation of the Computerized Baggage System Project at DIA

Phases	Key De-escalation Triggering Activities	Key Decisions Along the Road to De-escalation	Outcomes
Phase 1. Problem Recognition	<p>Recognizing negative feedback. After the failed tests of the baggage system in April 1994, city officials began to question for the first time whether BAE could get the system up and running.</p> <p>Responding to external pressure. DIA faced investigations from multiple agencies within the federal government, including a federal grand jury, the Securities and Exchange Commission, the Government Accounting Office, and the Federal Aviation Administration. In addition, DIA vendors were expressing interest in filing a class-action lawsuit against Denver because of the repeated delays in the new airport's openings.</p>	<p>Decision 1. Hire outside consultant to assess the automated baggage system. May 1994, Mayor Webb announced that he was hiring a consulting company, Logplan, to assess the automated baggage system. This was "the first independent, outside opinion related to [BAE baggage] system design."</p>	<p>Logplan began an assessment of the automated baggage handling system in July 1994.</p>
Phase 2. Reexamination of Prior Course of Action		<p>Clarifying magnitude of problem. The DIA management team became aware that keeping DIA closed was costing Denver \$33.3 million a month after hiring a risk assessment consulting firm. In addition, Moody's dropped its ratings of the bonds that Denver had issued to build the airport one grade to Baa, just one step above no-investment status. As the financial situation became more visible, Mayor Webb grasped the magnitude of the problem and began, for the first time, to seriously reexamine the prior course of action.</p>	<p>Decision 2. Establish a task force to find short-term alternative. May 1994, Mayor Webb created a high-level task force charged with finding a short-term alternative to the BAE system.</p> <p>Redefining the problem. The mounting cost of servicing debt led Mayor Webb to redefine the problem. The original problem was "how to complete the automated system as originally planned." The new problem definition was to "how to make the airport operational so that it could be opened as soon as possible."</p>

Table 3. Continued

Phases	Key De-escalation Triggering Activities	Key Decisions Along the Road to De-escalation	Outcomes
Phase 3. Search for Alternative Course of Action	Identifying and legitimizing a new course of action. Logplan acknowledged that software and mechanical problems "make it most improbable to achieve a stable and reliable operation." Logplan recommended constructing a conventional tug-and-cart backup baggage system that could be built in less than five months.	Decision 3. Authorize construction of an alternative system. August 4, 1994, Mayor Webb announced a plan to develop a "temporary, low-tech alternative system for DIA's high-tech baggage system."	Rapistan Demag was hired to design, engineer, and install the conventional baggage system.
Phase 4. Implementing an Exit Strategy	Managing impressions. Webb used the consultant's report to place the blame for the baggage handling problems squarely on BAE. Webb positioned the manual tug and cart baggage system as a "temporary" fix, thus avoiding the embarrassment of admitting that the airport-wide system was a mistake.	Decision 4. Restructure the baggage system contract. September 1, 1994, the City of Denver, United Airlines, and BAE struck a deal to break the baggage system contract into two parts: a semi-automated system to serve United's concourse and a manual system for the other concourses.	Two separate baggage handling strategies emerged: United was left managing the implementation of a baggage system to serve Concourse B and the City of Denver managed the implementation of a baggage system to serve Concourses A and C. Reduction in the size and complexity of the project.

time, leading to a reduction in commitment to a previously chosen course of action, and the enactment of an alternative plan of action.

While some of the actions that were key in reducing commitment at DIA were deliberate and intended, others evolved as a response to unanticipated events. This does not mean, however, that actions to de-escalate a situation occur in a random fashion; there does appear to be a patterned sequence of phases and actions that occur along the road to de-escalation. Indeed, the DIA case revealed a pattern of phases to the de-escalation process in which contextualized actions and decisions made by DIA management proceeded over time with no pre-determined endpoint. What was observed in the DIA case is characteristic of an emergent process, the outcome of which is unpredictable.

As theory suggests, the de-escalation at DIA appeared to be promoted by a wide variety of decisions and actions that reduced the commitment to a failing course of action, making changes in project direction or withdrawal more likely. The general form of the model derived here represents de-escalation as a sequence of four distinct phases, each of which involves certain triggering activities that are associated with context-specific decisions that foster further de-escalation. The antecedent for de-escalation is, of course, escalation of commitment to some course of action. The model depicts de-escalation as a dynamic process that is simultaneously constrained by actions in the antecedent episode, yet capable of constructing new patterns of commitment to alternative courses of action. Triggering activities are the basic theoretical constructs of the model and are measured by observations of incidents. A phase consists of one or more triggering activities that stand apart from the others. The key decisions discussed earlier mark the end of one phase and the beginning of another. Like other process models, this one describes the phases associated with a complex phenomenon (in this case, de-escalation of IT projects), but makes no attempt to provide precise predictions concerning the outcome or time scale over which de-escalation will occur (Mohr 1982).

The categories and concepts that we developed from the case data and which form the basis for our model are shown in Table 3, which summarizes the case data presented earlier and provides a roadmap for the discussion of key de-escalation triggering activities that occurred in each phase.

Key Triggering Activities in Phase 1: Problem Recognition

Phase 1 of the model involves problem recognition. De-escalation requires a clear understanding that something is wrong with the present course of action. Nothing of consequence can happen until decision makers in positions of responsibility and authority recognize that there is indeed a problem. Often, what can appear to outsiders as an obvious case for withdrawal may not outweigh the accumulated commitment of those inside the organization, particularly those who have played a role in championing the project. Given the psychological, social, and organizational forces that can promote and reinforce escalation behavior, the literature suggests that de-escalation is more likely to occur in the presence of *unambiguously negative feedback* (Garland et al. 1990) and when there is *external pressure on the organization* (Keil 1995; Ross and Staw 1993). In the DIA case, these two conditions were both present and seemed to play a significant role in this phase, as we discuss below.

Recognizing negative feedback. IT projects may be particularly prone to escalation due to the invisible and intangible nature of software components (Abdel-Hamid and Madnick 1991). Problems associated with such projects may remain unknown for long periods of time or there may be a tendency to discount their severity. Under such circumstances, de-escalation will not occur until the gravity of the problem manifests itself unambiguously. In a laboratory experiment, Garland et al. (1990) found that subjects chose to de-escalate commitment when they received unambiguously negative feedback about project progress and the perceived costs of proceeding outweighed the benefits.

At DIA, the presence of unambiguously negative feedback marked a key turning point, leading the city to engage a consultant to evaluate the automated baggage system. Negative feedback on the automated baggage system was received throughout the project—even at its outset, the city had been warned by another municipality, as well as the contractor, that the deadline was not realistic for a project of such complexity. Although BAE had significant experience implementing this technology in smaller scale projects, it had never implemented a system at the level of complexity that was required for DIA. This fact, however, was never questioned by DIA planners. The aviation director, for example, told a luncheon forum at the Denver Press Club, "No one [in the DIA management team] realized the complexity of the technology as it relates to this baggage system" (O'Driscoll 1994a). A project manager for United Airlines recalled: "BAE told them from the beginning that they were going to need at least one more year to get the system up and running, but no one wanted to hear that." The City of Denver was getting the same story from the technical advisers to the Franz Josef Strauss Airport in Munich, but apparently chose not to listen (Rifkin 1994). The Munich airport had an automated baggage system far less complex than DIA's. Nevertheless, Munich's technical advisors had spent two years testing the system and the system had been running 24 hours a day for six months before the airport opened.

It is easy to argue (in 20/20 hindsight) that these signals, coupled with other warning signs, such as the constant changes in specifications, should have received some attention. As is typical of escalation cases, however, the negative feedback was either ignored or downplayed for a significant period of time. In fact, it was not until the baggage handling system test in April 1994 that unambiguously negative feedback became available, casting serious doubt on the wisdom of pursuing the project further.

Responding to external pressures. External events, perhaps unrelated to a particular troubled project, may also trigger a general reassessment of resource allocation and allow de-escalation to proceed. In a case study of a multi-million dollar software project that involved more than a decade

of development, Keil (1995) found that the decision to "pull the plug" was driven, in part, by external pressure. In this particular case, a sudden downturn in the industry created a financial crisis for the company, forcing managers to reevaluate priorities. Of course, external pressure can take many other forms as well. In the Shoreham nuclear power plant case described by Ross and Staw (1993), the growing popular opposition to nuclear power contributed to de-escalation. In that case, the accident at Three Mile Island on March 28, 1979, triggered an antinuclear demonstration directed against Shoreham on June 4, 1979, in which more than 15,000 people participated. While Ross and Staw do not explicitly include external pressure in their model of de-escalation, it appears clear that de-escalation of commitment would not have occurred in the Shoreham case without the increased pressure resulting from local and state resistance to the project. At DIA, outside pressures forced a closer examination of the course of action and appear to have been instrumental in prompting the city to conduct an independent examination of the computerized baggage handling system and its prospects for success.

Key Triggering Activities in Phase 2: Reexamination of Prior Course of Action

Phase 2 involves reexamining the previously chosen course of action. In the DIA case, this reexamination involved two key de-escalation triggering activities: *clarifying the magnitude of the problem* with the previously chosen course of action and *fundamentally redefining the problem*. During this phase in the process model, managers begin to question the wisdom of the previously chosen course of action, but their commitment has not dropped so precipitously as to dictate immediate withdrawal. Generally, what holds decision makers to the course of action is a lack of understanding of the true magnitude of the problem. During this phase, managers begin to analyze the extent of the problems associated with the current course of action and reframe the problem they are seeking to address.

Clarifying the magnitude of the problem. When costs are more visible or salient, they may promote de-escalation. In a laboratory experiment, Brockner et al. (1979) showed that subjects assigned to a condition in which continuation occurred *unless* a decision to terminate was made (self-sustaining condition) were more likely to escalate than subjects assigned to a condition in which continuation required an active decision (self-terminating condition). Their interpretation was that forcing subjects into an active decision made the costs of continuation more salient, thus reducing escalation behavior. These findings were judged to be consistent with an earlier study by Rubin and Brockner (1975) in which escalation was found to be more likely when information about costs was less salient. Unfortunately, field settings may hide or distort knowledge of problems and associated costs. Thus, an additional consideration is the visibility of project costs (Brockner et al. 1979).

At DIA, what highlighted the cost of escalation was the mounting cost of servicing the debt. It appears that the bond repayment schedule forced decision makers to confront the costs associated with a decision to escalate. It is unlikely that the City of Denver and Mayor Webb would even have looked at short-term alternatives if they had not been facing a million-dollar-per-day cost of delay—a cost that would not have appeared if the automated baggage system had performed as expected, allowing the airport to open on schedule.

Redefining the problem. While the notion of redefining the problem has not been discussed in previous studies of de-escalation, the concept of problem redefinition, or reframing, is a well-known aspect of prospect theory (Kahneman and Tversky 1984). Framing effects occur "when individuals alter their choice among decision alternatives in response to changes in the frame of reference of the alternatives" (Diamond and Lerch 1992, p. 1050). Various authors (e.g., Davis and Bobko 1986; Garland and Newport 1991; Whyte 1986) have invoked prospect theory and the effects of problem framing to explain escalation of commitment. Thus, it is not unreasonable to conclude that reframing, or redefining, the problem could be a useful tactic for promoting de-escalation.

Redefining a problem, however, is seldom easy, for it requires creativity and openness to new ideas. New ideas may emerge after intensive conscious wrestling with a problem (Arnheim 1954, Weisberg 1986). The key to problem redefinition, and creativity in general, is encouraging managers to consider a wide range of solution paths (Couger 1996).

In the DIA case, the mounting cost of servicing debt led to a fundamental redefinition of the problem, allowing de-escalation to proceed further. A critical reexamination of the prior course of action was suddenly made easier when it was recognized that the *real* problem was getting the airport open and that continued commitment to the IT-based baggage handling system would lead only to further delays. Before this point, the problem had been defined as "how to complete the automated baggage system as originally planned," whereas the new goal became "do whatever it takes to make the airport operational so that it can be opened as soon as possible." That is, the focus at DIA shifted from trying to repair the baggage system to finding an alternative that would allow the airport to open.

A key decision that occurred during this phase was the creation of a task force to find a short-term alternative that would allow the airport to open. It is interesting to note that no member of the baggage system task force assigned by Mayor Webb had been involved in the initial decision to construct the airport-wide automated baggage system, so task force members' reputations were not at stake in the decision to de-escalate commitment. The literature suggests that separation of responsibility for initial and subsequent decisions can be an important factor in promoting de-escalation (Barton et al. 1989). Thus, it is possible that Webb's creation of such a task force made it easier to accept a reframing of the problem and a search for alternative solutions.

Key Triggering Activities in Phase 3: Searching for Alternative Course of Action

With an increased understanding of the problems associated with the previously chosen course of

action, managers begin to search for an alternative course of action. The decision to embark on a new course of action can be a bitter pill to swallow. Not only does it require the decision maker to engage in face-saving behavior, but it also requires convincing other stakeholders (who may also have grown committed to the previously chosen course of action) of the need to change course. For the DIA case, this phase of the de-escalation process involved *identifying and legitimizing a new course of action*, along with *managing impressions* so as to allow Mayor Webb and the City of Denver to embrace the new course of action without losing face.

Identifying and legitimizing a new course of action. In the DIA case, the costs of delaying the airport opening prompted a redefinition of the problem and a search for alternative courses of action. In the process, an outside consultant (Logplan) was engaged to identify and legitimize an alternative course of action. Given that Mayor Webb had already reframed the problem as finding a means to open the airport as soon as possible, this independent third-party assessment made it easier for city officials to further reduce their commitment to the automated baggage handling system.

From the literature, we know that the salience of alternatives can play a role in promoting de-escalation of commitment. Laboratory experiments by Keil et al. (1995), McCain (1986), and Northcraft and Neale (1986) have shown that the presence of an alternative can greatly reduce the tendency toward escalation. These studies suggest that providing subjects with an alternative course of action encourages them to consider the opportunity costs associated with a decision to escalate, thereby raising the cost salience. Interestingly, in the case of DIA, cost salience occurred well before any alternative courses of action were seriously considered.

Managing impressions. Impression management theory posits that individuals aim to maximize social rewards and minimize punishments by influencing the perceptions that others form about them (Giacalone and Rosenfeld 1989, 1991; Leary 1995; Leary and Kowalski 1990; Schlenker 1980). The impression management

literature provides numerous techniques that can be used to help managers save face in the midst of a project fiasco (Iacobou and Dexter 1996). While impression management tactics have not surfaced in previous studies of de-escalation, the idea that individuals may pursue a failing course of action to avoid admitting their errors to others is a theme that is discussed in the escalation literature. As Staw and Ross (1987, p. 55) remind us, "One social determinant of commitment is the desire not to lose face or credibility with others." In theory, this suggests that decision makers are more likely to de-escalate their commitment to a failing course of action under conditions in which it is possible to save face. In a laboratory experiment, Leatherwood and Conlon (1987) suggest that diffusability of blame can have a significant impact on escalation behavior. Specifically, they found that when subjects were given an opportunity to blame problems (in this case, a labor strike) on a third party (in this case, the union), their tendency to escalate was lower than when blame could not be so easily diffused.

In the DIA case, the consultant's report allowed Mayor Webb to place the blame for the baggage handling problems squarely on the contractor, BAE, even though it was the city that had initiated and pursued the project so vigorously. Blaming the failure on BAE's own faulty management and lack of technical expertise was a recurring theme in public statements by city officials and members of the project management team. By using this and other impression management techniques, Mayor Webb was able to save face in dealing with the media and other stakeholders.

In public statements, Mayor Webb was always careful to label the alternative baggage system as a "temporary" fix. The alternative system was never labeled as a replacement per se, but rather as the "future backup system." This, too, was an impression management tactic because the manual baggage system implementation required modifications to physical spaces and equipment that would make it impossible to ever integrate it with the BAE's system, according to a United official. By never admitting (at least not publicly) that the alternative system would likely become permanent, city officials avoided admitting that a mistake might have been made in the original

decision to pursue an airport-wide automated baggage system.

The behavior observed in the DIA case is consistent with Iacovou and Dexter's investigation on patterns of communication behavior by IT managers to reduce, redress, or avoid damage to their credibility from perceived responsibility for IT project failures. While we have no definitive data on this point, we speculate that saving face through the use of impression management tactics may be easier in outsourced, as opposed to in-house, development projects. In the DIA case, for example, it appeared that the outsourcer (in this case, BAE) served as a convenient scapegoat, facilitating the de-escalation of the project. Such scapegoats may be harder to find in in-house development projects.

Key Triggering Activities in Phase 4: Implementing an Exit Strategy

Phase 4 involves implementing an exit strategy. In the DIA case, this involved *appealing to stakeholders* to reach a mutually agreeable implementation strategy and *de-institutionalizing the project*. This phase begins with operational plans that emerge as a way to resolve a perceived crisis, but subsequently provide a way to retreat from the failing course of action. On the surface, implementing the new course of action appears to simply be a matter of articulating and then executing a new project plan. However, in projects with external constituencies, implementing the alternative course of action is anything but simple. External stakeholders may have a vested interest in blocking implementation of the chosen exit strategy. Likewise, once a project is structurally embedded in an organization, it may be extremely difficult to change the previously chosen course of action.

Appealing to stakeholders. Large projects that extend outside the organization's boundaries and involve external constituencies can present greater obstacles to de-escalation. In a case study of the Shoreham nuclear power plant, Ross and Staw (1993) examined the decision by Long Island Lighting Company (LILCO) to abandon a 23-year-old project that cost an estimated \$5

billion. Their findings indicated that external parties (e.g., proponents of nuclear power within the federal government, representatives of the nuclear power industry, and the state of New York) played a significant role in the de-escalation process. Specifically, Ross and Staw suggest that LILCO was able to extricate itself from this failing course of action, in part, by appealing to external constituencies in an attempt to make the economics of withdrawal more favorable.

At DIA, external constituencies also had a powerful influence on the de-escalation process. United Airlines played an important role in attempting to prevent the City of Denver from abandoning the automated baggage handling system. This action on the part of United was consistent with Ross and Staw's (1993, p. 725) hypothesis that "when there is not ready replacement for the services or products of an organization, external parties...will attempt to prevent the organization's withdrawal." Ross and Staw (p. 726) go on to suggest that if "the consequences of persistence in a losing course of action are dire enough, there is room for the organization to negotiate with external constituencies," which is exactly what happened in the DIA case.

De-institutionalizing the project. Patterns of escalation are believed to be more difficult to break when projects become institutionalized. In the Shoreham nuclear power plant case, for example, Ross and Staw (1993) observed that the project was inextricably linked to LILCO's strategic plan for power generation, which called for building not one but several nuclear power plants on Long Island. Escalation theorists have argued (see, for example, Staw and Ross 1987) that de-escalation can be facilitated

when an organization de-institutionalizes a project, removing it from the core of the firm either by moving it physically away from the central location of the company or by emphasizing its peripheral nature .
(Ross and Staw 1993, pp. 727-728)

In the DIA case, city officials ceased to consider the automated baggage system as a defining characteristic of the new airport. In doing so, they

were able to de-institutionalize the project, effectively transferring all remaining responsibility for the automated baggage system to a committed third party, namely United Airlines. In effect, United's opposition to the alternative manual baggage handling system created an opportunity for Mayor Webb and the city to further distance themselves from the project.

Implications for Research ■■■

The de-escalation process model developed here has important implications for both research and practice. For researchers, this study is significant in that it represents one of the first in-depth case studies of de-escalation. While there are a handful of other case studies involving projects that have escalated (e.g., Keil 1995; Newman and Sabherwal 1996; Ross and Staw 1986, 1993), previous studies have tended to focus primarily on escalation rather than de-escalation processes. While there have been about a dozen or so studies of de-escalation, they have tended to follow a variance theory approach toward understanding this domain. The result has been that a number of factors are now believed to be causally related to de-escalation, but there is no overall model of how some of these factors fit together to influence the overall process. This study complements the existing variance research stream by showing how certain triggering activities help to promote the process of de-escalation. As corroboration for our findings, we note that the prior literature on triggering activities and conditions associated with de-escalation is largely consistent with what we observed in the case of DIA. Our contribution is in the development of a grounded model that adds a process perspective, allowing us to tie together a disparate set of factors into a more coherent framework that can serve as the basis for further investigation.

While the de-escalation model presented here is grounded in the processes that unfolded at DIA, we believe that aspects of this model will generalize to other cases of de-escalation. The decisions that we documented are obviously case specific, but the phases and activities that were observed may generalize to other cases of de-

escalation. Further de-escalation studies are clearly needed, however, in order to test the applicability of the model in other contexts. It may be the case that the de-escalation process unfolds differently in different circumstances, or that de-escalation is more difficult to achieve in certain types of projects (e.g., large projects with high levels of investment). Many natural settings contain a balance of forces that are neither simple nor unidirectional. Such situations produce behavior that is very unpredictable and can lead to complex patterns involving multiple cycles of escalation and de-escalation. We have provided a few of the most likely or feasible actions that can either enhance de-escalation tendencies or reduce preexisting forces for commitment. As our understanding of de-escalation grows, we may be able to provide a greater number of de-escalation tactics as well as more knowledge about when (i.e., what phases in the de-escalation cycle) specific tactics will be most effective. Both the IT project risk literature as well as the outsourcing literature may offer guidance in refining the model presented here.

Implications for Practice ■■■

By providing a better understanding of the sequence of actions/decisions associated with de-escalation, this study provides managers with useful insights on redirecting troubled projects so that they can be salvaged, sensibly abandoned, or successfully completed. For practitioners, the DIA case underscores the need for managers to be aware of the risks associated with project escalation and to avoid these risks where possible. Having said this, it is unlikely that managers will be able to avoid escalation in all cases. Hence, it is important that managers have some awareness of strategies and tactics that can be used to bring troubled projects back on track. The phases depicted in our process model provide the basis for a set of normative suggestions that managers could follow to promote de-escalation. These are discussed below and summarized in Table 4.

Although one might expect individual and organizations to flee from such a losing situation,

Table 4. Suggested De-escalation Strategies and Tactics for Practitioners

De-escalation Phase	Normative Suggestions	Pitfalls to Avoid
Phase 1. Problem recognition	<ul style="list-style-type: none"> • Be aware of existing biases in the interpretation of project feedback. • Engage the services of an outside consultant to evaluate a project whenever it is suspected that a project may be in trouble. • Get close to the project. 	<ul style="list-style-type: none"> • Ignoring or downplaying bad news. • Discouraging those who try to report the bad news. • Relying on filtered viewpoints.
Phase 2. Reexamination of prior course of action	<ul style="list-style-type: none"> • Form a task force to conduct a full-blown review of the project and the viability of the previously chosen course of action. 	<ul style="list-style-type: none"> • Intertwining the project with the future of the organization.
Phase 3. Search for alternative course of action	<ul style="list-style-type: none"> • Examine the root cause of the business problem (for which the IT project was the proposed solution) so that an alternative means of addressing the problem can be identified. • Legitimize the alternative course of action. 	<ul style="list-style-type: none"> • Fixating on the original problem definition or the original proposed solution path. • Viewing the original problem through technology-centric lenses.
Phase 4. Implementing an exit strategy	<ul style="list-style-type: none"> • Engage in a consensus building process with the various internal and external constituencies of the project. • Make direct appeals to internal and external constituencies in order to negotiate and implement an exit strategy with their help, if possible. 	<ul style="list-style-type: none"> • Surrendering to the influence of internal and external constituencies, instead of carefully managing them. • Assuming that a rational presentation of a new course of action by itself will prompt others to follow.

prior escalation research has shown that countervailing forces tend to build up over time, making it more difficult to withdraw than would be expected if only economic results were considered. As we noted here, the process of de-escalation is a gradual one in which the forces for commitment are progressively reduced.

This study suggests that actions that tend to hasten problem recognition tend to be most influential at the early phase of the de-escalation. To promote problem recognition, managers should be aware of their existing bias toward interpreting information. It is common for managers to

delude themselves into thinking that a project will pull through—that success is around the corner. This can cause managers to ignore or downplay “bad news,” a phenomenon that Keil and Robey (1999) call the “deaf effect.” Managers in authoritative positions must learn to be more receptive to bad news and they must exhibit a willingness to take corrective action. Many times they are not and turn a deaf ear to signs of trouble. To further aid in problem recognition, managers could engage the services of an outside consultant to evaluate a project whenever they suspect that a project may be in trouble. Managers should not initiate projects and then

leave it up to the IT department or outsourcer to monitor the project. Managers who want to recognize problems must get close to the project and avoid the temptation of relying on the view from the executive suite.

Once a problem has been identified, the challenge is to ascertain the extent of the problem and to reexamine the viability of the previously chosen course of action in light of this new information. Here, the manager should not hesitate to conduct a full-blown review of the project and should avoid perceiving the project as intertwined with the future of the organization. Forming an in-house task force to examine the problem and to begin formulating solutions will go a long way toward containing the damage.

In the search for alternative solutions, the manager must try to reframe the problem in a way that unfreezes commitment to the failing course of action, rather than fixating on the original problem definition or the original proposed solution path. The root cause of the business problem (for which the IT project was the proposed solution) must be examined so that alternative means of addressing the problem can be identified. It may be that the business problem can be addressed in an entirely different way. Reconceptualizing the problem space in this manner requires thinking outside the box. Managers will often have a tendency to think of technological solutions when the problem may be solved by other means. Finally, it should be remembered that legitimizing a new course of action may be facilitated if it has an outside stamp of approval from an independent third party.

In the final phase of de-escalation, once an alternative course of action has been selected, managers need to marshal support from internal and external constituencies. Managers cannot simply assume that by declaring a new course of action and presenting it in a rational way, all interested parties will necessarily want to follow. Given that people have almost an uncanny ability to bias facts in the direction of previously accepted beliefs and preferences, it is possible for various constituencies in the IT project environment to try to prevent an organization from de-escalating. Forces controlled by internal and external constituencies, especially those substantially

involved in the escalation episode, can turn the decision to move away from the present course of action into a political battle. Managers should not surrender to the influence of stakeholders, but carefully manage them. To help the various stakeholders overcome their commitment to the present course of action, managers should build consensus toward the alternative course of action. They should begin by asking the question: "Who will be disenfranchised or likely to exhibit resistance if I attempt to implement the proposed exit strategy?" Direct appeals to internal and external constituencies may be needed to negotiate and implement an exit strategy that all parties will find acceptable.

Summary and Conclusions ■

Given that escalation is a common and costly problem among IT projects (Johnson 1995; Keil and Mann 1997), there can be no doubt about the value of understanding how managers can *de-escalate* their commitment to failing courses of action. While there have been about a dozen or so studies of de-escalation, they have tended to follow a variance theory approach toward understanding this phenomenon. This study represents a contribution to research in that it articulates, for the first time, a process model that complements the existing variance research stream by showing how certain triggering activities can help promote the process of de-escalation.

In contrast to much of the existing literature, the de-escalation that occurred at DIA was neither sudden, nor in direct response to unambiguously negative feedback (although such feedback unquestionably played an important role at the outset of the process). The DIA case quite clearly shows that de-escalation is not a one act play staged by inefficient project managers who belatedly realize that they are pursuing a failing course of action. Rather, it is a drama in which managers struggle to demolish one view of reality and substitute another (Drummond 1996). In this struggle, there are no predefined scripts and choreographed moves; instead, actions and decisions emerge as the situation unfolds. This study has shown that de-escalation is a complex, emergent process.

In the DIA case, de-escalation was a gradual process in which solutions emerged as managers began to understand the magnitude of the problem and to enact changes in problem definition. This was not the end of the story, as an alternative solution path had to be identified and a significant effort was then required to shift the organization and its various constituencies to a new course of action. The model derived from this case suggests that de-escalation is a process consisting of four phases and that there is a temporal ordering of these phases. Moreover, the model suggests that there are certain triggering activities associated with these phases and that these also exhibit a temporal pattern. Actions that help to increase awareness about the problem (such as recognizing negative feedback and responding to external pressures) seem to contribute the most in the initial phase of a de-escalation process. Actions that help prompt an examination of the previously chosen course of action and the identification of alternative courses of action (such as clarifying the magnitude of the problem, redefining the problem, identifying and legitimizing alternative courses of action, and managing impressions) seem to contribute the most during the middle phases. Actions that enable the redirection or withdrawal to take place (such as appealing to project constituencies and de-institutionalizing the project) seem to contribute the most in the final phase of the de-escalation process.

The study also contributes to practice by providing normative suggestions to managers concerning tactics that may prove useful during the various phases of the de-escalation process. Further research into the process model described here holds the promise of providing even more meaningful guidance to managers who seek to turn around troubled projects. In this light, the DIA case study and the de-escalation model derived here represent a first step toward a better understanding of how managers can cope with and finally extricate themselves from a failing course of action. Further work is needed in order to understand more fully the dynamics of de-escalation and the extent to which the findings observed in the DIA case can be generalized. Thus, while this study represents an important step toward understanding de-escalation, addi-

tional research is needed to understand both how organizations are drawn into losing courses of action and, perhaps even more importantly, how they may be able to extricate themselves from these predicaments.

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Appendix

Additional Information on Methodology

Data Collection

Data collection began with an examination of publicly available documentation on the project including newspaper clippings and other articles appearing in the mass media, as well as historical information concerning Denver's political and economic environment (which was instrumental in understanding the decision to build a new Denver airport). By examining these data, we were able to reconstruct the project's history and to identify the key players in the project for subsequent interviewing. Data collection in the field began with a visit to the DIA public relations office to obtain additional documentation (memoranda and internal status reports) and archival records (organizational charts as well as lists of names and phone numbers of individuals associated with the project). By collecting multiple sources of evidence like this throughout the study, we were able to use one source of evidence to corroborate another (Yin 1989).

In visiting the DIA public relations office, by good fortune the first author happened to meet with a manager who appreciated the importance of documenting the project's history. This manager helped to put the researcher in contact with some of the individuals who were closely involved in the project and frequently mentioned in the newspaper articles that had been gathered. In this way, the visit led to an initial schedule of interviews with participants in the DIA project and informed observers.

On-site observations and interviews were conducted during an 18 month period that began in August 1994 and extended through December 1995. During this time, the City of Denver received the report from Logplan (the German firm hired to evaluate the progress of the automated systems) and decisions were made to construct an alternative manual baggage handling system and to restructure the baggage system contract. The time period during which interviews and observations were conducted included some of the key de-escalation decisions associated with the project, providing an opportunity to study the de-escalation process longitudinally. Interviews were arranged with individuals who either had been frequently mentioned in published reports or played a key role in choosing, designing, or implementing the baggage system.

Following the opening of the airport, additional interviews were conducted from March through December of 1995 to obtain detailed information from participants of the project who had been unavailable during the months before the opening. These interviews not only further illuminated the project, but also provided an opportunity to review the initial draft of the case study report with certain subjects, thus allowing us to validate our research findings. The interviews included discussions with the mayor of Denver, the director of aviation, the chief airport engineer, the president of BAE, the DIA project manager at BAE, and the Denver manager for United Airlines. In total, 74 interviews were conducted with 43 different people during the course of the study.

To manage this voluminous data we used a case study database, following the suggestion of Yin. The database was organized for easy storage and retrieval of documents, archival records, and interview data. One file, for example, stored newspaper articles, organized in chronological order. Another section of the database was devoted to the interviews, with a separate file for each individual, listing contact information, describing the role that s/he played in the project, and containing a dated, typed interview transcript. The actual interview tapes were also stored in the database, along with an index of who was interviewed and

when. Another section stored project documentation (including actual blueprints of the airport showing the location of the baggage handling system). Most of these documents were gathered during the interviews and stored in chronological order. Finally, the database included a separate file containing quarterly reports to bondholders (organized chronologically). As Yin notes, a case study database allows other researchers to review the data directly rather than being limited to a published paper based on inferences drawn from the data, thus increasing the reliability of the entire study.

Interview Methodology

Before each interview, we compiled a list of questions depending on the individual's position in the organization and his/her association with the DIA project in general and the baggage system in particular. The interviews were semi-structured, with a standard set of questions that were designed to help initiate and guide the interview process. Some typical questions were: "When did you become involved with DIA?" "What was the nature of your involvement?" "Was the automated baggage system initially a good idea?" and "When if at all, did it stop being a good idea?" The material discussed invariably stretched beyond these initial inquiries. All interviews were tape-recorded, and copious notes were taken during the interviews. Additional observations were noted immediately after each interview was concluded.

At the end of each interview, the subject was asked to suggest other individuals who would be important sources for understanding the implementation of the baggage system. There was a high degree of consensus among both baggage system advocates and opponents about who were the important actors.

Most individuals—especially those who had been associated with the DIA project during much of its life—were able to offer considerable historical information regarding the baggage system project. In some instances, individuals indicated that they were not well-informed, but were willing to speculate. When an interviewee prefaced his or her remarks with "I don't know for certain, but my sense is that this is what happened," the interviewee was asked to provide the names of individuals who might be better informed on the particular issue at hand. Additional interviews with these individuals provided corroboration.

Data Analysis

As Glaser and Strauss (1967) and Elsbach and Sutton (1992) recommend, we moved back and forth between the empirical data and possible theoretical conceptualization. First, we used publicly available information, background documents, and transcripts of interviews and meetings to create a detailed narrative history of the project. This narrative was then written up more formally in the form of two Harvard Business School teaching cases (Montealegre et al. 1996a, 1996b). Though the cases are descriptive in nature, they provided a mechanism for sorting the large volume of data and moving toward a more in-depth, within-case analysis (Eisenhardt 1989).

In both our case study database and our case write-up, we endeavored to create what Yin (1989, p. 84) calls a "chain of evidence" allowing others to "follow the derivation of any evidence from initial research questions to ultimate case study conclusions." Of course, in the case of DIA, the many publicly available reports on the implementation of the baggage handling system make it even easier for other researchers to examine the data for themselves and determine whether they would draw the same or different conclusions.

A key step in our analysis was to create an event listing, a technique that can provide insight into "what led to what, and when" (Miles and Huberman 1994, p. 110). From the event history, we derived a critical

incident chart (Miles and Huberman 1994) depicting the sequence of key activities and decisions associated with the de-escalation phases of the project. The key activities and decisions represent the researchers' interpretation based on evidence gathered from interviewees.

As a means of triangulation on the key decisions, we plotted the number of newspaper articles appearing each month in the *Denver Post* on the subject of DIA's baggage system, reasoning that the key de-escalation decisions would be associated with above-average media coverage. Figure A1 maps the decision points we had independently identified against this analysis. We also used follow-up interviews to check our perceptions of the key decisions against the perception of several individuals who were familiar with the project's history.

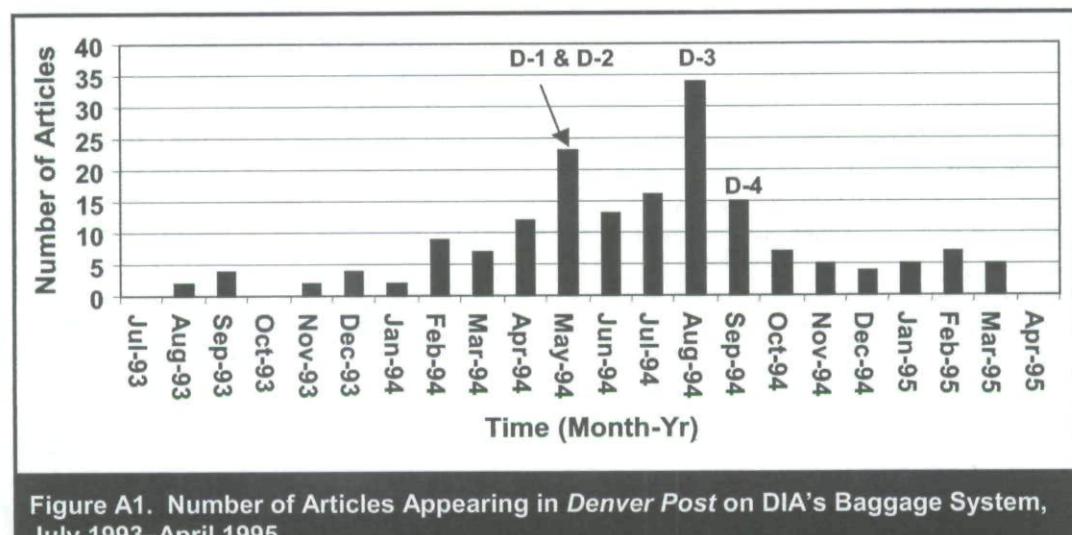


Figure A1. Number of Articles Appearing in *Denver Post* on DIA's Baggage System, July 1993–April 1995

The final step in our analysis involved a variation on qualitative pattern matching between theory and data (see Campbell 1975; Yin 1989). First, we compared and contrasted the activities that appeared to have influenced de-escalation at DIA with the array of triggering activities or conditions that have been discussed in the de-escalation literature. Before identifying a possible de-escalation triggering activity, we cross-checked interview transcripts to verify that at least two or more sources of evidence supported that activity as a trigger. We then mapped the sequence of activities and reviewed the map with several contacts at the case site.

The entire analysis was highly iterative and involved moving back and forth between the data, the existing literature, and the concepts that emerged as salient at the research site. This process continued until we had developed enough categories and associated concepts to explain what had been observed and no additional data were being collected, developed, or added to the set of concepts and categories—a situation Glaser and Strauss refer to as "theoretical saturation."

Limitations of the Research Approach Used Here

The most significant limitations of our approach concern generalizability and the impossibility of knowing what went on inside the heads of key decision makers such as Mayor Wellington Webb, Gene Di Fonso, and Walter Slinger (who managed the DIA project for the City of Denver). To compensate for our limited

access to key decision makers such as Webb, Di Fonso, and Slinger, we relied heavily on the observations and insights of other individuals who were closely associated with the project and in a position to comment on their motivations and behaviors. Extensive discussions with the managers who reported to them allowed us to develop a rich understanding of the de-escalation process. As a general rule, it is preferable to use a multiple case study design in which theoretical and/or literal replication is possible. Given the sensitivity that surrounds most failing projects, however, the researcher may have to settle for a single case study. Even a single case can be useful in theory building (Eisenhardt 1989).

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