

Becoming Aware of the Unknown: Decision Making During the Implementation of a Strategic Initiative

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This qualitative study analyzes the decision-making process involved in adapting preconceived courses of action during the implementation of a strategic initiative. We observe that the type of decision-making process hinges on the nature of managers' emerging awareness of future events. When managers become aware of new uncertainty, the process involves selectiveness, deliberateness, and diligence. By contrast, when managers become aware of new certainty, the process conforms to the problem-solving adhocism and decision-making messiness emphasized in prior literature. We summarize our findings in a framework, proposing that decision-level differences in awareness and uncertainty can explain the observed variation in strategic decision-making processes during implementation. We also discuss implications for theory on procedural rationality and analytical comprehensiveness.

Key words: strategic decision making; decision-making processes; strategic initiatives; implementation; uncertainty; awareness

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Introduction

Strategic initiatives are special types of projects on which organizations stake their future success. A strategic initiative constitutes a concerted effort toward “creating or appropriating economic value from the environment, which is organized as an independent project with its own profit and loss responsibility” (Lovas and Ghoshal 2000, p. 881). Ambitious, uncertain, complex, and consuming a significant portion of organizational resources, strategic initiatives offer an interesting setting for the study of strategic decision making (Kaplan 2008, Lovas and Ghoshal 2000, Pitsis et al. 2003).

Decision making here entails the challenge to create appropriate courses of action in order to achieve the stated goal of an initiative. Determining courses of action up front offers some administrative control and efficiency (Wiltbank et al. 2006), but not all information useful for decision making is available from the outset. Adaptations during implementation become necessary to align resource allocation plans with an evolving set of available information. Strategic decision making is thus a recurrent phenomenon, not a one-off exercise (Brown and Eisenhardt 1997, Langley et al. 1995, Lewis et al. 2002).

Empirical studies show that strategic decision making during implementation is an important factor in determining project outcomes (Dvir and Lechler 2004, Lewis et al. 2002), with managers trying to strike a balance between following and adapting preconceived courses of actions. Some particularly uncertain initiatives rely

almost entirely on adaptive decision making (Pitsis et al. 2003). However, despite its apparent significance, surprisingly little is known about how managers actually make individual adaptation decisions and how the process of adapting during implementation differs from up-front strategic decision making.

The context of adaptive decision making differs from that of initial decision making in that implementation activities make strong demands on managerial attention and increasingly lock in commitments (Quinn 1980, Simon 1997). Prior research thus suggests that adaptive decision making displays less procedural rationality than decision making that precedes implementation. Adaptations to original plans are often viewed as comparatively ad hoc, serendipitous, and/or messy decisions (Cyert and March 1992, Langley et al. 1995). In fact, more comprehensive decision making might be altogether impossible, unless organizations invest significantly in its facilitation by establishing an explicitly incremental mechanism for resource allocation decision making (Grant 2003, Pitsis et al. 2003). Beyond these general insights, we have limited knowledge of how managers decide to adapt and how they effect an efficient middle course between sticking to plans and learning by doing as they implement strategic initiatives (see Lewis et al. 2002).

This theoretical gap matters in view of the fact that key debates in the literature on strategic decision making remain unresolved. One of the most important of these debates concerns the role of environmental uncertainty in determining the relationship between

procedural rationality/analytical comprehensiveness and performance (Atuahene-Gima and Li 2004, Miller 2008). Here, a study of adaptive decision making may provide important insights. Greater environmental dynamism, characterized by unpredictable markets, rapid technological development, and competitive ambiguity (Davis et al. 2009, Hough and White 2003), makes it more likely that a significant portion of strategic decision making will occur during implementation, given the risk of premature up-front commitments to any particular courses of action.

By neglecting adaptive decision making, or ignoring the ways in which it differs from strategic decision making prior to implementation, the comprehensiveness debate may be missing something important. For instance, up-front decision making occurs within a compact period of time, but adaptive decision making occurs intermittently (Dvir and Lechler 2004). Strategic decision making during implementation is also constrained by more irreversible commitments (Miller and Lessard 2008). Also, strategic decision-making styles during implementation may display strong variation, with each decision situated in a distinct evolving context (Lewis et al. 2002, Pitsis et al. 2003). Research designs that permit exploration of decision-making processes during implementation at the decision level may therefore reveal new insights into when and how procedurally rational/comprehensive decision-making processes can or cannot be employed.

Our aim is to address this research opportunity through qualitative analysis of multiple decision episodes during the implementation of a single strategic initiative. The setting is conducive to analyzing strategic decision making, because single initiatives are bounded in time and scope, and individual resource allocation decisions, as well as their determinants, are more readily demarcated. For these reasons, prior studies of separate initiatives have been useful in generating theory of strategic decision making (Kaplan 2008, Lewis et al. 2002, Lovas and Ghoshal 2000, Pitsis et al. 2003).

Following best practice in qualitative research (Eisenhardt and Graebner 2007), we chose the particularly informative case of ALPHA, a very large initiative launched by a group of companies. ALPHA was conceived as a foray into the burgeoning telematics market, and its immediate purpose was to establish an electronic road-tolling solution. Concepts of interest to strategic decision-making dynamics are particularly salient in this case, including extensive planning horizons, capital outlays, stakeholder complexity, and technological and environmental uncertainty. ALPHA also represents a conservative choice for the study of adaptation during implementation; to prepare for the launch, the companies' best managers considered a wide range of scenarios in their efforts to devise courses of action for implementation so as to reduce as much as possible the need for corrective decision making during implementation.

Among the 121 decision-making episodes we observed at ALPHA, we identified three types of decision situations that managers faced during implementation. In the first, managers responded to the resolution of uncertainty that they had been aware of *a priori*. In the second, they became newly aware of future events that they perceived to be certain to occur, and in the third, they became newly aware of future events that they perceived as uncertain to occur. Across these three situations, we observed variation in the degree of selectiveness, deliberateness, and diligence with which ALPHA made adaptation decisions. For instance, when ALPHA managers became aware of a new event that they were confident would happen, episodes displayed the better-known dynamics of problem solving and trouble shooting. This was often an unstructured and messy process. However, we discovered that the opposite was true in situations when managers became newly aware of a future event that they perceived to be uncertain. Here, the decision-making process was more selective, deliberate, and diligent, not unlike the process common in up-front decision making. In situations where managers became newly aware of possible future events, certain and uncertain, ALPHA engaged in more substantial decision-making processes than when additional information arrived concerning future events of which they were already aware.

These insights are consolidated in a framework illustrating how managers switch between decision-making styles during implementation. We propose that variation in selectiveness, deliberateness, and diligence—key aspects of procedural rationality and analytical comprehensiveness—is contingent upon whether managers become newly aware of certain or uncertain future events. We thus extend the concept of awareness to strategic decision-making theory. We go on to suggest that the common preference in this literature for aggregate constructs of uncertainty and units of analyses above the decision level is unlikely to render conclusive results, given that awareness and uncertainty of a decision-specific future event determine the decision-making style used. Finally, we argue that during implementation, flexibility does not continuously decline as previously suggested. The rationale for creating additional courses of future action continues to be based on managers' cost-benefit considerations of flexibility, even though decision making is more constrained than prior to implementation.

We begin by describing our qualitative methodology and the focal strategic initiative. We then discuss multiple strategic decision-making episodes that occurred after managers had become aware of new event possibilities. From these we infer our main theoretical propositions regarding variability in decision-making processes during implementation. We conclude by considering the theoretical implications.

Methods

Research Design

We motivate our research with the divergent results of previous studies of core concepts such as rationality in strategic decision making under uncertainty. In particular, we aim to address the lack of theory about how organizations arrive at adaptation decisions during implementation. An in-depth qualitative inquiry into how such decisions are made seems appropriate to our theory-building objective (Pratt 2009). Our setting is a single organizational undertaking that we use to study multiple embedded cases of decision making. This research design enables us to harmonize the organizational context while allowing for useful variation in the process of strategic decision making. Studying multiple decision episodes permits replication where episodes are treated as experiments, with each further episode serving to confirm or reject inferences drawn from previous episodes (Eisenhardt 1989, Yin 1994). This approach tends to provide more robust and generalisable theory than single-observation inquiries (Eisenhardt and Graebner 2007). Our unit of analysis is at the level of individual decisions, and we distinguish between everyday decisions and strategic decisions, the latter being the focus of our study. Strategic decisions involved substantial and nonroutine resource allocations made by the highest level of decision makers, creating waves of lesser decisions (Dean and Sharfman 1996).

We chose to analyze decision making within the clearly defined boundaries of a project initiative rather than at firm level, where the strategic process is less constrained. At the initiative level, timing and scope are more clearly defined, and the overall objective is given. Hence, decisions refer to the means to accomplish a given goal, not the goal itself. Our choice is consistent with recent studies that adopt single strategic initiatives as a context for the study of strategic decision making (Kaplan 2008, Lovas and Ghoshal 2000, Miller and Lessard 2008, Pitsis et al. 2003).

Strategic initiatives are more independent, novel, complex, and uncertain than the typical project an organization might conduct (Loch et al. 2006, Lovas and Ghoshal 2000). They constitute the kind of high-stakes environment that allows for observation of senior-level decision making with far-reaching strategic implications. To qualify as such, our sample project needed to be set against an uncertain market environment, contain novel approaches and technologies, and be sufficiently large scale to provide a series of significant resource allocation decisions made over a longer period of time.

The ALPHA Initiative

The sample initiative ALPHA is the rollout of an electronic road-tolling scheme. ALPHA was founded as a joint venture with three principal stakeholders (a mobile

telephony provider, an automotive company, and an infrastructure firm) striving to enter the rapidly developing telematics market in the first few years after the turn of the millennium. ALPHA trumped two rivals in a competitive tender for the delivery of a nationwide road-tolling system. The tender specified that the system cover efficiently more than 10,000 km of motorways and process nearly 1.5 million commercial vehicles. The system was to assess each vehicle, collecting information including the distance traveled, time of travel, emission class, and number of axles, and to process these data in a central monitoring and billing center. Other strategic and technological decisions were left to the proposing organizations.

The electronic road-tolling scheme was a critical strategic initiative for ALPHA, designed to put its parent organizations in a leadership position for future road-tolling initiatives and for sales of add-on telematics products such as fleet management and other logistics solutions. To facilitate this, ALPHA proposed an ambitious technological solution for collecting the road toll: the first large-scale linking of the satellite-based global positioning system (GPS) and the global system for mobile communication (GSM).

The initiative's capital expenditure was projected to be \$1.1 billion. The outlays for the stakeholding businesses were equivalent to an average of 28% of their respective annual investments, spread over three years. Although seen primarily as a stepping stone into the telematics market, ALPHA's direct revenues were substantial in itself, anticipated as \$550–\$600 million per year, shares of which constituted between 5% and 8% of annual revenue at the relevant business units of the stakeholding companies. ALPHA engaged approximately 500 personnel, excluding contractors. In addition, it collaborated with 19 major partners, supplying parts of the in-vehicle hardware and software, booth installations, enforcement gantries, and information technology (IT) administration. In total, ALPHA spent two years planning the resource allocation for one year of implementation. Planning and implementation overlapped by three weeks.

The rollout of a novel technology on an unprecedented scale in a new market entailed high unpredictability, making ALPHA an ideal candidate for the study of strategic decision making under uncertainty. Although the replicability of the setting itself is limited, the nature of the decision-making challenges faced by ALPHA is comparable to that of other strategic initiatives in uncertain markets. Most organizations with such goals as introducing a new platform or suite of products, targeting a new market, or entering new partnerships need to balance the competing demands of efficiently stable delivery and the flexible adaptation of resource allocation plans to changing environments (Eisenhardt et al. 2010, Klingebiel 2010, Lewis et al. 2002). Strategic

decision making is a central element in all of these initiatives, as is the danger of failing to recognize the entire scope of future developments.

The focal decision-making body, herein referred to as the planning and management group (PMG), consisted of seven main members, three of whom changed during the course of implementation. The PMG included the chief operating officer and directors overseeing various functional entities during implementation, including finance, development, quality assurance, technology, program management, and procurement and logistics. All had held director-level positions at the parent companies and had a good understanding of ALPHA's organization. Realizing its strategic importance, departments had sent some of their most respected managers to lead the initiative. Most had worked in related business areas such as fleet management or business network communications. Three had also had exposure to GPS and GSM technologies. However, few had experience of implementing a large-scale toll collection initiative, because ALPHA was the first undertaking of its kind in the telematics market. Such incomplete knowledge is common to strategic initiatives rolled out in unknown terrain (Loch et al. 2006, Mosakowski 1997). In its weekly meetings, PMG made a series of strategic decisions with implications for resource allocation during implementation.

Data Collection

Our study tracks strategic decisions made during the 12 months of implementation, which demarcated the context of adaptive decision making. Prior to that, ALPHA had started out with a two-year period of extensive deliberation of the courses of action that could be taken during implementation. Whereas up-front decision making devised resource allocation from scratch, adaptive decision making revised and added to preconceived courses during implementation. We thus define adaptive decision making as managerial choices to reallocate resources, or to allocate additional resources, during implementation (Quinn 1980). This definition is consistent with recent empirical observations in this area (e.g., Pitsis et al. 2003) and provides a distinct but sufficiently broad lens to generate a rich and longitudinal understanding of adaptation. It allows for a variety of reasons for adapting prior plans: managers may learn, for example, of new customer preferences, market potential, technological feasibility, or operational difficulties.

Before starting full data collection, the lead author spent four months with a professional services firm that provided ALPHA with risk management advice. Gathering contextual data and talking to these consultants helped us develop an initial understanding of the particular nature of decision challenges associated with the road-tolling initiative. Subsequently, we relied on two sources of primary data: documents and interviews from inside and outside ALPHA.

Internal documents included detailed accounts of resource allocation decisions, generally in the form of minutes, reports, and presentations. We complemented these internal accounts with three major reviews conducted by different advisory firms. In addition, we regularly searched for media reports about topical management challenges, using the name of the organization as the keyword in Factiva. In total, we accessed 4,700 pages of documents (see Table 1).

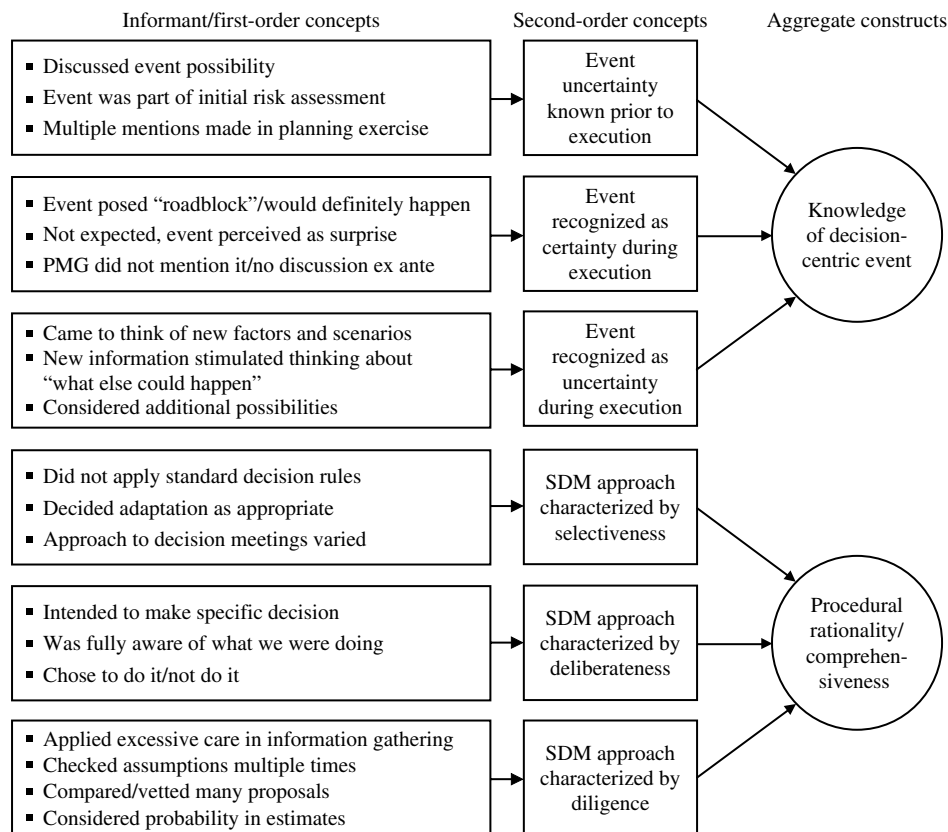
We used this extensive archival material to catalogue developments that could impact implementation of the ALPHA initiative. The catalogue provided the initial structure for systematic decision-specific inquiry. For example, we determined when decision makers started to consider responding to developments and how long it took them to decide to make or not make changes. Documents also allowed us to track such boundary conditions as the composition of the decision-making team and the volume of issues arising at any one time. We then looked at how decision making was conducted. Reports, presentations, and minutes elucidated, for example, the range of decision alternatives that PMG considered and the amount of search effort commissioned. Interviews corroborated such documentary information and added further detail on managerial perceptions of likelihood and impact of decision-centric developments.

To gain access to informants, we contacted two members of ALPHA's main decision-making board, the PMG. They helped to identify informants with insight into emerging decision-making challenges. Our main interviewee selection criteria were continued involvement throughout the initiative and direct exposure to the particular decision challenge. We sought to obtain a variety of perspectives by interviewing staff from different functions and hierarchies. In addition, we interviewed external informants, including former employees, competitors, contractors, and industry experts (see Table 1 for informants' backgrounds and the typical number of informed respondents per decision episode). We used multiple informants to limit the risks of perception bias, retrospective sensemaking, and impression management (Gibbert et al. 2008). Multiple informants provided a richer understanding of phenomena, as individuals focused on complementary aspects of major decision challenges (Eisenhardt 1989).

Each interview lasted between 45 and 150 minutes. Interviews were semistructured and began with open-ended questions about the background to each decision challenge. We then focused on facts, events, and direct assessments, including decision chronologies and the rationale employed. Finally, we triangulated archival information with interviewee interpretations, for example, of the relative importance of new developments in the environment. The content of the interview questionnaire evolved iteratively (following Eisenhardt and Graebner 2007); the responses of initial interviewees

Table 1 Overview of Data and Selected Sample Decision Challenges

	Informants		Documents	
	Internal	External	Internal	External
Sources				
PMG members		Competitors	PMG presentations	Risk reviews
Program leaders		Former employees	Budget worksheets	Media reports
Heads of work streams		Contractors	Gantt charts	Regulatory reviews
Risk managers		Industry experts	Milestone reports	Analyst briefings
Others			Risk reports	
			Workstream agendas	
Quantity				
31 hrs		11 hrs	187 docs/3,800 pages	65 docs/900 pages
Episode	Sample vignettes of selected decision challenges		Sources relating to each challenge	
			Informants	Documents
F	ALPHA identified and evaluated a large number of risks prior to start of execution. One related to potential hiccups in the integration of in-vehicle electronics, roadside enforcement equipment, mobile communications, and central data management. PMG set aside significant human resources for the possibilities of integration disruptions. During implementation, heads of work streams reported to PMG, mounting delays resulting from component integration.		17	31
E	After seven months and increasing delivery ramp-up of project elements, PMG received an urgent communiqué from one of ALPHA's foreign suppliers of onboard unit equipment. It revealed that there had been financial difficulties for some time and that insolvency was imminent. Supplier default would have meant significant disruptions to testing and installation schedules.		8	9
D	Midway through execution, there was increasing indication that an electronic element of the in-car transponder could be prone to overheating. This was in addition to numerous other technical risks anticipated prior to execution. An unfavorable scenario included the media picking up on reports of some few failed onboard units (out of millions delivered), denting ALPHA's quality image. This could have endangered both contract extension and follow-on projects in neighboring markets. ALPHA considered these possibilities after a testing team reported the risk of overheating to PMG.		6	11
C	Seven months into implementation, growing public concern over data security became the source of a new uncertainty. ALPHA had anticipated that a road-charging scheme could give grounds for consumer resentment, including legal charges, and had taken pains to address these concerns through a public relations team. PMG did not, however, expect extensive press coverage of data security concerns. Haulage unions now had another argument on the grounds of which to threaten boycott. Two PR assistants reported this issue to PMG, who then considered this uncertainty during its weekly meeting. The downside scenarios included transport firms ignoring electronic tolling, using the manual booths instead. The system could not serve all drivers through manual tollbooths. A boycott would have caused severe slowdowns or a complete stop of traffic flow.		12	28
B	In an effort to make electronic road-charging systems interoperable across neighboring countries, transport departments discussed the creation of a common standard. This diverged from ALPHA's prediction that the advanced GPS system would crowd out older alternatives, i.e., microwave-based technologies. GPS allows governments to price their entire road infrastructure seamlessly while being able to distinguish more fairly between different usage characteristics. However, an unanticipated delay in the launch of the European Galileo satellite network, which would have reduced bottlenecks in the availability of U.S.-run GPS services, had the potential to tilt regulators' technology preference. If neighboring countries adopted microwave technology, ALPHA's competitive advantage would diminish. PMG started to discuss such scenarios after a lobbyist reported back about this uncertainty.		9	23
A	Shortly after implementation plans were finalized and execution began, the runner-up bidder for the road-charging contract launched legal proceedings on grounds unanticipated by ALPHA. While ALPHA had made some provision for covering penalty threats, for example, over system design, a court suit over the fairness of the government's awarding procedure had not been part of any planning scenarios. Concerns were raised over the fairness and transparency of grant allocation procedures. One PMG member, who was also part of the steering group, was in regular contact with the ministry over the implementation progress. He was the first to hear that lawyers representing a rival bidder had filed an information request in preparation for a court suit. In the PMG meeting that followed, the probability of a substantially negative court ruling was discussed formally for the first time. An unfavorable court decision could have meant penalty payments on the grounds of ALPHA's alleged involvement.		8	17

Figure 1 Emerging Concepts

allowed us to sharpen our emphases in subsequent interviews. Whereas there were differences of opinion, there was a consensus on factual matters across these different data sources. Informants, especially external ones, also often revealed complementary information, which allowed us to construct richer histories of focal decision-making episodes.

Overall, our study of internal and external documents and interviews provided detail on 121 decision episodes. Each episode comprised a series of activities pertaining to a decision challenge. As in prior works (Langley et al. 1995, Simon 1997), episodes included a decision-making process with stimulation and framing, information gathering, sensemaking, design of alternatives, and choice, although these varied in character and intensity. Processes often overlapped, and an episode could last from 1 week to 38 weeks, the average duration being 6 weeks and the median being 5 weeks.

Analysis

We began by analyzing each individual episode, concentrating on aspects of our research question: How do managers make adaptation decisions during implementation? We started with few prior theoretical hypotheses or preferences. The purpose was to identify constructs, relationships, and patterns, which we abstracted in tables and graphs to facilitate analysis (Miles and Huberman 1994).

Thus, we developed an understanding of the decision-making process for adaptation, occasionally going back to informants for clarification. We then moved to open coding, based on informant narratives. We identified first sets of salient concepts in the data and grouped them into categories. Simple summary phrases of the central concepts are depicted in Figure 1. Moving from discovery to enrichment and validation, we searched for relationships among our categories and ordered them into second-order concepts. These were grouped into overarching dimensions that are central for our emergent theoretical framework. We engaged in recursive, rather than linear, analysis, using additional interviews for potential disconfirmation until we had a clearer grasp of the emerging constructs.

We then conducted cross-case analysis to identify variation across episodes in different situational contexts (Eisenhardt and Graebner 2007). We started with paired comparisons and added episodes to check for the robustness of each proposed construct relationship. We used a simple ranking system (1 = low to 5 = high) to gauge the extent to which episodes displayed evidence of the constructs, applying it to both interview and documentary material (see Tables 3–5 for detail on distribution). Analyzing theoretical constructs across these categories, we cycled between emerging theory, data, and literature to clarify our contributions. The analysis period lasted

Table 2 Decision Episodes and Timeline

Ep.	SDM situation	Description	Event	Timeline	Coding samples	Decisions identified
F	Known uncertainty	Future event was recognized as possibility prior to strategy execution	Component/partner integration problems		"Our risk management was well aware of the potential teething problems...given more than 20 contributors to the IT platform."	84
E	New certainty	Future event was recognized during strategy execution	Supplier solvency crisis/delivery interruption		"I guess you could say uncertainty, but not really...look: our time frame was one wee k...and it was almost certain to happen...a full-blown crisis."	18
D	New uncertainty	Future event was recognized as a possibility during strategy execution	Overheating of onboard unit component		"This risk was unexpected. ...It was the contracting authority that may have behaved unfairly ... Why should we be accountable? It was hard for us to understand." <i>— Episode A</i> "The sudden fuss about data security at the Computech Conference [name changed] gave troublemakers an unexpected lift. ...This new angle...had a chance of becoming serious." <i>— Episode C</i>	19
C			Consumer threat over data security			
B			Change in regulatory preference of technology			
A			Court suit over irregularities in awarding procedure			

Event awareness: O = Recognized as uncertainty ● = Resolution of uncertainty
 Strategic decision: N = No change F = Flexibility C = Change

Table 3 Sample Quotations and Rating of Selectiveness

Decision situation	Resolution of uncertainty that was known up front	New certainty realized during implementation	New uncertainty realized during implementation
Sample quotation	<p>“We didn’t have endless resources. ... If our risk people wanted something, they had to show it’s worthwhile. ... Doing something in case the supplier [integration] got messy ... was an obvious one.” — <i>Episode F</i></p> <p>“The general tendency was to play it safe. ... We kept our options open ... wish we would have been able to do more [in preparation for uncertainties] further down the priority list.” — <i>General comment</i></p> <p>“It varied ... because preparing for more and more eventualities ... costs money. ... When push came to shove, we either acted on elaborate plans or ... we used lots of resources to come to terms with what could have been taken care off earlier.” — <i>Other episodes</i></p>	<p>“I don’t think there was a choice. ... This thing was too ... big. We just had to act.” — <i>Episode E</i></p> <p>“Look, the rapid response is always the same ... XXXX and YYY do nothing but manage away each and every one of these glitches.” — <i>Other episode</i></p> <p>“Things hit you as you run, [I] guess that’s unavoidable. ... Troubleshooting becomes easy. ... All you need to decide is [whether] you close your eyes and hope for the best ... or whether you make everyone work their ass off ... to avoid disaster. Guess it depends on your company.” — <i>Other episodes</i></p>	<p>“In theory, everything was planned long ago ... but this [government directive] could potentially affect the majority of our operations. ... So, we made an exception. ... We searched for possible ways to prepare in advance. ...” — <i>Episode B</i></p> <p>“Many times we didn’t do much ... guess it all depended on how [PMG] decided ... rejigging the project plan is quite disruptive.” — <i>Other episodes</i></p> <p>“Nobody believed anything could be left to chance ... to be sorted out later. ... The project plan details ran over thousands of pages. ... But we chose to make exceptions when necessary.” — <i>Episodes A–C</i></p>
Average rating — Documents — Interviews — Total	<p>4.50 4.56 4.53</p> <p>Δ***</p>	<p>1.61 1.33 1.47</p> <p>Δ***</p> <p>Δ n.s.</p>	<p>4.21 4.58 4.39</p> <p>Δ***</p>
Detail	<p>Rating</p> <p>Known uncertainty (n=84)</p> <p>Ordered decision episodes</p> <p>New certainty (n=18)</p> <p>New uncertainty (n=19)</p> <p>□ Interviews ■ Documents</p>		

Note. Ratings 1–5 indicate the average extent to which interview and documentary material for the episode in each category displayed evidence of selectiveness in decision making (1 = low; 5 = high).
*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Table 4 Sample Quotations and Rating of Deliberateness

Decision situation	Resolution of uncertainty that was known up front	New certainty realized during implementation	New uncertainty realized during implementation
Sample quotation	<p>“[Risk management] was a regular item on the [PMG] agenda... possibly the most dwelled-over issue.... We really want to prepare where we could.” <i>— General comment</i></p> <p>“Four people had to sign off on [the risk management plan]. Many times it had been a no.” <i>— Other episode</i></p> <p>“Six colleagues were [primarily] tasked with sorting out integration problems.” <i>— Episode F</i></p>	<p>“Not sure who said what.... We all started looking for new partners.... There wasn’t much else [to be contemplated].” <i>— Episodes E</i></p> <p>“In the end, no one could tell... how the new testing anchor came about... it was certainly necessary.” <i>— Other episodes</i></p> <p>“My former organization had more than its fair share of people who shot from the hip.... And to be honest, in a crisis, you need either a general... or a crazy genius.” <i>— Other episodes</i></p>	<p>“YY put all options on the table.... He had had 15 days for research.... and he knew what to recommend.... Everyone in PMG knew the stakes.” <i>— Episode A</i></p> <p>“As you can imagine, this [decision] wasn’t taken lightheartedly. [The head of PMG] kept pushing it out till he let us start [complementing the test efforts].” <i>— Episode B</i></p> <p>“With these eventualities..., we tried to get as full a picture as possible... only then we tried to make the best decision for the organization.” <i>— Episodes A–D</i></p>
Average rating — Documents — Interviews — Total	<p>4.57 4.17 4.35</p> <p>Δ ***</p>	<p>1.38 1.50 1.42</p> <p>Δ ***</p>	<p>3.84 3.32 3.58</p> <p>Δ ***</p>
Detail	<p>5 —</p> <p>Rating 1 —</p> <p>□ Interviews ▲ Documents</p>	<p>Ordered decision episodes</p>	<p>New certainty (n=18)</p> <p>New uncertainty (n=19)</p>

Note. Ratings 1–5 indicate the average extent to which interview and documentary material for the episode in each category displayed evidence of deliberateness in decision making (1 = low; 5 = high).
 *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

Table 5 Sample Quotations and Rating of Diligence

Decision situation	Resolution of uncertainty that was known up front	New certainty realized during implementation	New uncertainty realized during implementation
Sample quotation	<p>“Can’t remember any initiative [for which] we spend more time and resources on risk management. ... Clever people, ... bubble diagrams, ... prioritizations, and reprioritizations ... I mean endless.” — <i>Other episodes</i></p> <p>“It wasn’t just us ... we also had these consultants look at it ... I’d say we had many eyes on it.” — <i>Other episode</i></p> <p>“You weigh up ... how much could it be worth hedging against this.” — <i>Episode F and others</i></p>	<p>“It was an overnight decision. ... Too much impact on immediate project delivery.” — <i>Episode E</i></p> <p>“Imagine you have only an hour to look at these hundreds of considerations ... you have to be crude.” — <i>Other episode</i></p> <p>“This obliterated choice. ... There were no maybes. ... It was obvious ... rapid emergency action was needed. Too much was at stake too soon.” — <i>Episode E</i></p>	<p>“Risk experts assessed the impact ranges and likelihoods ... and variabilities ... and compared that with the cost to preemptively prepare for the possibility [of an unfavorable court ruling].” — <i>Episode A</i></p> <p>“These things are tricky ... but [the PMG] insisted on gauging [the likelihood] of scenarios ... their impact, and what we can do ... I guess the discipline did help.” — <i>Episode B</i></p> <p>“We looked at the positives and negatives of investing in [future] responsiveness.” — <i>Episode C</i></p>
Average rating	<p>— Documents 3.76</p> <p>— Interviews 3.48</p> <p>— Total 3.62</p> <p>Δ***</p>	<p>1.33</p> <p>1.39</p> <p>1.36</p> <p>Δ***</p> <p>Δ n.s.</p>	<p>3.79</p> <p>3.84</p> <p>3.82</p> <p>Δ***</p>
Detail			

Note. Ratings 1–5 indicate the average extent to which interview and documentary material for the episode in each category displayed evidence of diligence in decision making (1 = low; 5 = high).

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

eight months and led to the development of theoretical propositions regarding strategic decision making (SDM) during the implementation of an initiative. Our findings are illustrated with qualitative detail from six exemplarily well-documented decision episodes (see Tables 1 and 2). Sample quotations, rating distributions, and simple summary statistics for the 121 decision episodes are displayed in Tables 2–5. This approach allows readers both to appreciate the qualitative richness of the data and to view it in context of the entire sample of decision episodes.

Results

Our data suggest that the character of strategic decision making during implementation differs across three types of situations. In situations where uncertainty¹ resolved around particular events of which managers were previously aware, ALPHA's strategic decision-making response was as predicted in the existing literature. For most critical uncertainties known *ex ante*, up-front planning had prepared contingencies that were later used when needed. Although constrained by the usual stakeholder dynamics, the PMG made decisions to adopt preconceptualized alternative courses of action in a straightforward manner, operating within preconstructed frames of mind; only moderate modifications were made to predeveloped action scenarios.

The opposite was true for decisions made in response to newly perceived barriers to implementation. When ALPHA's decision makers perceived future events, *i.e.*, new certainties, of which they had previously been unaware but which could significantly impact delivery, they responded through problem solving, trouble shooting, and crisis management. Awareness of a new certain event often halted or suspended some ongoing implementation activities because these would be directly impacted by any impending plan change decision. The sense of urgency and pressure this created for decision making led to relatively hectic consideration of alternatives and less comprehensive adaptation decisions.

A third pattern of decision making prevailed when the PMG became aware of new events that were still uncertain. When decision makers became aware of new uncertainty, they embarked on a more procedurally rational process to decide whether they ought to create further alternative courses of action. Although newly recognized uncertain events tended to be more distant than newly recognized certain events, it was more the fact that potential plan changes would not directly alter ongoing implementation activities that allowed for an analytically comprehensive approach to adaptation. Here, strategic decision making was selective, deliberate, and diligent.

In the following sections, we detail how selectiveness, deliberateness, and diligence vary across decision situations. We focus particularly on situations where managers become aware of either a new certainty or a

new uncertainty. Each description is framed with a brief overview at the beginning and a theoretical contextualization at the end.

Selectiveness

Overview. We observed variance in how selective managers went about adaptation. Here, the concept selectiveness encompasses the ability to distinguish and discriminate amongst decision situations, designing decision-making responses accordingly. Such selectiveness in adaptation indicates contingency; selective adaptation means that the strategic decision-making approach varies with the decision challenge at hand, rather than following a preprogrammed organizational tendency to always accept or reject adaptation.

From our data, we infer that when management becomes newly aware of certain roadblocks to delivery, they have a limited array of choices; staff tend to engage in troubleshooting efforts to save implementation. Conversely, when managers become aware of new uncertainty, they investigate and selectively decide whether or not to change implementation plans. Managers' responses to the resolution of uncertainty known up front are also selective.

Description. Prior to implementation, ALPHA had conducted extensive risk management and scenario refinement exercises: several rounds of environmental screening identified and prioritized a set of uncertainties and scenarios. One respondent noted,

Can't remember any initiative [for which] we spend more time and resources on risk management... Clever people, ... bubble diagrams, ... prioritizations, and reprioritizations... I mean endless.

In preparation for uncertainty resolution, the PMG decided on a number of alternative courses of action. For example, ALPHA anticipated potential failures in the harmonization and system integration of the various partner deliveries (Episode F). In preparation, the PMG increased the resources dedicated to integration testing and devised parallel plans for a system start with partially integrated features. In other cases, the PMG decided that either the probability of occurrence or the magnitude of impact were too insignificant to justify the preemptive creation of alternative courses of action.

Extensive scenario reviews and preparation were intended to reduce the scope for hitches during implementation. This was alongside a proactive effort in public relations and stakeholder negotiations to create a generally favorable implementation environment and reduce the spectrum of surprises along the way. Nevertheless, despite the concerted effort, not all contingencies could be foreseen.

Several short-term crises arose. For example, in Episode E, a foreign supplier of parts for the onboard

unit announced it was going into administration because of a liquidity impasse. The news of the impending delivery shortage now started to perturb implementation activities even before the supplier finally ceased deliveries. Ramifications for ALPHA were such that the new event could not be ignored and implementation plans had to be adapted, either through savings or by switching suppliers. A PMG member recalled,

I don't think there was a choice.... This thing was too...big. We just had to act.

In most of the episodes reported by interviewees and recorded in documents in which decision makers became aware of new certainty, adaptation was a quasi-automatic event. Not so, however, when managers realized the existence of additional uncertainty.

ALPHA's management learned of a pending court case (Episode A) through a PMG member who had informal links to the contracting authority. Once this possibility was identified, the PMG discussed the issue at its weekly meeting and assigned two employees—one with a legal background and the other with a project management background—to search for information and to assess potential impact scenarios. This complemented a parallel analysis conducted by risk consultants. Managers felt that the court ruling could have significant financial implications for implementation and were anxious to assess its likelihood and find ways to minimize negative performance implications. The following statement from a project associate is typical of many of the comments received from system experts:

[M]anagement felt that the possible loss through [a] court [ruling] had to be reduced. After all, it could affect 10 years of operations.... [R]isk consultants' assessments of impact ranges and likelihoods indicated that the impact could be dramatic. So, there was an active search for possible ways to restructure the partner portfolio and to renegotiate existing service contracts [for mobile communication transmission].

In this case, the PMG decided to incur the costs of reopening some contract agreements to put in place half-yearly opt-out clauses. This simplified compliance with a possible court ruling that would allow services to be subcontracted, instead of paying fines. In another example (Episode C), new uncertainty emerged at a late stage of implementation. A number of haulage associations announced their intention to boycott the electronic payment system and use manual payment facilities instead, creating lengthy traffic jams. Their action would lead to an elegant collapse of the system, without the truckers breaking the law by not paying road tax. The threat gained unprecedented weight as data security worries were publicized, jeopardizing the launch of the system. A risk analyst summed up the situation:

Towards the end, there was a lot of [public] frustration about the increase in road transportation costs.

The haulers in particular would not stop complaining about data security, although [ALPHA] had no influence on the real issue, the [road usage] pricing level.... Many contingencies were explored, but...it was not possible to change the tollbooth layouts. So, just in case, legal efforts and data security preparations were stepped up.

Toward the end phase of the rollout, many resource commitments had become indivisible and irreversible. However, the search for information and the exploration of alternative courses of action led to an eventual decision to change data transfer and storage specifications. Minimal additional investments in hardware and software infrastructure provided the flexibility to convert data-handling mechanisms at more acceptable costs if and when consumer protests required it.

Awareness of new uncertainties did not always result in plan adaptation. When increasing evidence from the on-track testing team showed that a small but potentially significant number of onboard units were prone to overheating, the PMG made no alterations in anticipation of this potential problem. The new uncertainty had been discussed in the weekly PMG meeting and further investigated by a team of two engineers and a risk manager. The head engineer from the onboard unit team stated,

The consensus was that...unless we know for sure that these hot circuit boards made a sizable impact on system performance...we'd rather not cause disruptions to the delicate network of technology suppliers.

The PMG board decided to act and create alternative courses of action on 8 of the 19 occasions when they became aware of new uncertainty. On 11 occasions, the PMG decided to wait and see before adapting implementation plans. See Table 3 for further sample quotations on selectiveness and on the respective ratings of decision episodes. A simple *t*-test shows that the mean rating of selectiveness was significantly lower in situations where new certainty was recognized than in situations where uncertainty was recognized.

Interpretation. In sum, our observations of ALPHA's responses to newly recognized uncertainty suggest that adaptive decision making does not follow a predetermined pattern of adapting or sticking to plans. Instead, new developments are considered on a case-by-case basis. Awareness of new uncertainty appears to trigger a decision-making process specific to the emerging challenge.

If ALPHA had consistently relied on up-front decision making, we would have expected managers, once they had recognized additional uncertainty, to wait for its resolution or respond through problem solving and possibly crisis management (e.g., Cyert and March 1992). Conversely, if ALPHA's decision-making behavior had been strongly adaptive, planning only short term and on the fly, we would not have seen as much evidence of prior up-front planning (Pitsis et al. 2003, Wiltbank

et al. 2006). Instead, we observed managers making selective decisions to amend strategic plans in some instances but not in others.

ALPHA also did not engage in institutionalized planning reviews or other regular routines that could point toward a decision-making approach of planned emergence (Grant 2003). There is little indication that ALPHA introduced a priori measures that paralleled activities or allowed for specific experimentation, as it could have done in expectation of future uncertainty recognition (Sommer et al. 2009). ALPHA picked and chose decision-making tactics depending on the challenge at hand, rather than favoring a single predominant approach. This points to greater selectivity in adaptive decision making than is currently suggested in the literature. Although we did not have reliable information to assess and compare the degree of available resource slack and managerial attention across the decision contexts, these factors may have influenced the selectiveness of adaptation and could inform the design of future research in this area.

Concluding our analysis of selectiveness, we offer the following proposition.

PROPOSITION 1. *Selectiveness in adaptive decision making is higher when managers become aware of new uncertainty than when they become aware of new certainty.*

Deliberateness

Overview. In addition to our finding that decision makers were more selective about adaptation in some decision-making situations than in others, we also found variation in the degree to which decisions to adapt or not to adapt were deliberate. Here, deliberateness means intentionality in decision making with managerial consciousness of decision consequences. If decision makers become aware of new certainty, our data indicate that responses tend to be reflexive or to develop their own crisis management dynamic. In cases where decision makers become newly aware of future events that are still uncertain and sufficiently distant, our data reveal that responses in the form of designing additional courses of future action result from a conscious choice to consider the advantages and disadvantages of adaptation. The deliberateness exerted in such decision situations seems comparable to that observed during ALPHA's up-front planning exercise.

Description. For Episode A, interview testimonies and documentary material suggest that management carefully considered the potential costs and benefits of altering plans to allow for a switch of telecommunications service providers, preferring this alternative to mitigation (increased legal and lobbying effort) or immediate plan corrections (seeking an out-of-court settlement by

offering a GSM contract share). The costs of adaptation were the negotiation of flexible opt-out clauses, achieved through somewhat higher compensation for reduced purchasing volumes and shorter contract periods. These change costs were more transparent and less daunting than they might have been, because the original supplier of choice for mobile telecommunication services was part of the holding organization of one of ALPHA's main shareholders. These costs were discussed in the PMG meeting and compared to the potential costs of reversing commitments at a later stage and a court fine. A decision was reached within three weeks of the point of uncertainty recognition. A member of the PMG chairman's team stated,

Subcontracting was not accidental...XX and YY, in particular, underlined its purpose...to open up avenues to deal with the [judicial] decision efficiently [at least] compared to the alternatives at the time.

Willful and directed decision making was also evident in the response to realizing a shifting regulatory preference for internationally interoperable technologies. This statement from a representative of an ALPHA supplier is indicative of the deliberateness of the decision making and its prior assessment of decision alternatives:

We imagined the majority of our business as eventually coming from extensions [to the current system] and from abroad... Around half of our profits for the next decade were in jeopardy [as a result of the pending legislation]. Our contractor [ALPHA] slowly expanded the supplier network with specialist companies, in order to start exploring microwave technologies. We hoped that a proportion of our expertise could still be leveraged onto that platform...in time.

Building interoperability into the system at this stage in the strategic initiative life cycle was not the only alternative available. ALPHA could have accepted the risk of an unfavorable regulatory recommendation. This would have implied bidding for future awards without microwave functionality in its existing system, upgrading its system at a later point, or bidding for awards in countries not governed by the ruling. ALPHA used internal and external expertise to assess the range of probable revenue impacts resulting from an unfavorable ruling. The PMG came to the conclusion that to protect its future revenues, conditions for the potential sourcing of microwave-based onboard units from an outside supplier should be agreed upon, and small-scale tests should be started. This relatively swift information-gathering and decision-making process was a small step toward a potentially significant modification of resource allocation plans, which required enhanced relationship management with several stakeholders.

In this situation, ALPHA could also have used emergency slack resources, as it did when dealing with

the challenges arising from the supplier's failure to deliver in-vehicle equipment. It could have used additional resources to step up its lobbying efforts to influence regulatory technology preferences or transferred resources from the development of GPS technology to building expertise in the microwave area. The last alternative in particular, however, would have meant serious cost implications at a time when future developments were unclear.

Much less deliberate were a number of responses to the realization of new certainty. Smaller problems relating to the positioning of manual tollbooths and initial difficulties with video-based enforcement solutions were dealt with before news even reached the PMG. Similarly, the strategic decision to switch an onboard unit supplier in response to its pending insolvency was an obvious or only-sensible-option adaptation that involved no additional degree of deliberation. The employee responsible for the onboard unit work stream noted,

Of course, a formal decision of this magnitude rested with [PMG], but no one really believed they could make us try something else.

Sometimes, for example, when the media uncovered an internal management dispute, mitigation was a relatively chaotic affair; actions were taken that with more careful consideration would not have been chosen. In sum, both interviews and documentary materials were consistent in showing that the strategic decision-making style in response to new certainty was measurably less deliberate than that in response to new uncertainties. For more sample quotations and ratings, see Table 4. Comparable to situations with uncertainty known a priori, decision making in situations where new certainty was realized has a significantly lower mean deliberateness than decision making in situations where new uncertainty was realized.

Interpretation. Our observation that strategic decision making is triggered by the recognition of new uncertainty deepens our understanding of how adaptation occurs in reality. In situations such as Episode E (new certainty), decision making is messy, intuitive, and ad hoc, as suggested in the literature (Langley et al. 1995). However, when uncertainty emerges sufficiently in advance of a potential event, organizations may opt to conduct searches to establish probabilities of occurrence and to assess decision alternatives. This process is somewhat constrained by limited managerial attention, a lack of information, and a general stakeholder preference for stable implementation. Despite these constraints, ALPHA's deliberate assessments of adaptation possibilities suggest procedural rationality in decision making. This finding complements research that stresses the haphazard nature and serendipity of adaptation (Langley et al. 1995, Mintzberg et al. 1998). Decision makers often learn of the potential of future events before they

are certain to occur, which means that decision-making processes start in advance of the troubleshooting that scholars have suggested as the principal mechanism for adaptation. Such early-stage recognition triggers a more deliberate decision-making process.

Concluding our analysis of deliberateness, we offer the following proposition.

PROPOSITION 2. *Deliberateness in adaptive decision making is higher when managers become aware of new uncertainty than when they become aware of new certainty.*

Diligence

Overview. In addition to selectiveness and deliberateness, we investigate a third aspect: diligence. Diligence here refers to a careful, assiduous, and conscientious effort to establish the information that underpins strategic decisions. Our case data confirm that in times of crisis, adaptation often constitutes ad hoc decision making. When decision makers become aware of certain acute problems, there is limited room for maneuvering, and pressure mounts as implementation activities start to expect plan changes. Strategic decision making here lacks the diligence displayed in the planning period prior to implementation. There are, however, frequent incidences in which strategic decision making is contemplative and conscientious—namely, when decision makers recognize uncertain events of which they were previously unaware. In response to new uncertainty, managers consider the costs and benefits of creating additional courses of future action that provide flexibility for eventual uncertainty resolution. They thus modify resource allocation plans without committing to definite changes. These modifications are less directly disruptive to ongoing implementation and decided upon relatively diligently, in an attentive, careful, and assiduous manner.

Description. For example, in Episode A, the PMG was confronted with the new possibility of a change in regulatory preference for technological standards that would be interoperable across borders (Episode B). The PMG could opt either to wait and see the outcome of the regulatory working group's recommendation or to prepare for a still uncertain outcome. One likely negative outcome was the nonbinding recommendation for a rival technology based on microwave transmission. To assess whether it was worth preparing for this scenario in advance, given its potential for disruption to ongoing activities, PMG commissioned staff to conduct basic Excel-sheet assessments. These estimated the difference between the impact of late plan changes and the probability-weighted impact of early preparation. The PMG ultimately agreed that the costs of advance preparation (exploration and tests of add-on components to

the onboard unit, allowing for technological compatibility) would be lower than a probability-adjusted cost figure for a future ad hoc accommodation of an unfavorable resolution of uncertainty. The PMG chose to develop compatible components in advance and to negotiate better prices for potential supplies early on, because the need for supplies then was less pressing and evident to potential suppliers. In arriving at this decision, managers considered possible consequences, such as stakeholders' impression that the ALPHA leadership was not fully committed to the technology it had touted. The PMG made a conscious attempt to compare the costs of early contingency planning with the potential price of a delayed response.

Although PMG could not accurately predict the value of the additional flexibility provided by dual-technology tests, an expert commented on the implicit rationale of the decision process:

An endorsement of DSRC [i.e., microwave technology] would be huge, but who knows if this is to come true. . . . Our guys are assessing it. . . . Chances are high enough to justify the extra expenditure [on complementing technological search]. [ALPHA] is in a much better position to secure follow-on deals with it than without it.

Similar strategic decision-making diligence was evident when the PMG responded to other new uncertainties. These included an episode in which the PMG decided to make additional investments in hardware and software infrastructure to provide the flexibility to convert data-handling mechanisms at more acceptable costs if consumer protests increased (Episode C). PMG considered the certain costs and uncertain benefits of preparing for additional courses of future action before deciding to alter plans at this stage of delivery. Three people spent two weeks exploring various decision alternatives. When the PMG finally opted to increase data-handling capacity, most members felt this option would address public concerns more effectively than the other decision alternatives.

Less diligence was visible in the handling of the supplier insolvency. The certainty of this event created a sense of urgency for decision making because implementation activities depended on any impending plan changes. Similarly, an unexpected delay in the delivery of an IT component led the PMG to send emergency reinforcements to its internal supplier unit, with little diligence spent in the process (see Table 5 for sample quotations and ratings). ALPHA routinely used previously allocated slack resources to patch over or circumvent such unexpected turbulence.

Decision making involving the realization of new uncertainty, such as in Episodes A, B, and C, followed a different mechanism. Here, the PMG justified additional resource allocations to create flexibility; it anticipated better performance if it prepared early against the consequences of unfavorable uncertainty resolution. Different

combinations of internal and external expertise in legal, risk, and change management were used to prepare arguments for plan adaptations. In the case of the pending court ruling, the preparatory change influenced close-knit implementation activities more than the change following recognition of the potential switch in regulatory preference in Episode B. For the latter, ALPHA established a separate unit to explore microwave technology that, for the time being, allowed all other implementation activities to proceed as normal, although indirect costs accrued through the need for intensified stakeholder management. The three uncertainties also differed in resolution time. The uncertainty linked to litigation was resolved during implementation, but regulatory and consumer uncertainties were resolved only later. These differences, however, seemed to matter only insofar as they required different strategic considerations. In the basic spreadsheet analysis, the PMG used estimates for direct and indirect flexibility costs to varying parts and time frames of the initiative and employed ratios to capture the relationship between probable flexibility benefits and the collective adaptation effort required.

For example, in the case of potential litigation, the PMG anticipated a negative ruling in 60% of the cases. The forecasted impact would exceed the cost of creating a contingency by a factor of 3. The variability of the impact cost—a fine—was seen to be within reliable boundaries. Although the major factors considered in the flexibility assessment did not allow for exact quantification of cost–benefit trade-offs, such analyses guided the final decisions in the three focal episodes where uncertainty was newly realized. Across the sample, the mean rating for diligence in such situations is significantly higher than in situations involving new certainty.

Interpretation. The data indicate that when assessing the merits of plan adaptation, decision makers not only consider the pros and cons of change but also prepare for possible plan changes at a later stage. The choice between change and no change is largely a choice between costs incurred sooner or later—although early preparation may be cheaper, the event itself is an uncertain future occurrence. This behavior is consistent with the existing view that early preparation for possible future change reduces the eventual cost of change (Brown and Eisenhardt 1997, Schoemaker 1993). As commitments become increasingly irreversible, this has been thought to occur predominantly in early planning phases (Miller and Lessard 2008).

ALPHA appreciated the cost of incorporating additional flexibility into plans that were generally expected to remain frozen for implementation. However, despite commitments that became increasingly expensive to modify as implementation proceeded, ALPHA considered possible plan alterations to allow preparation for emerging uncertain events. To arrive at a decision,

managers weighed the costs and benefits of creating additional managerial flexibility. For example, ALPHA assessed future payoff scenarios in deciding whether to change, remain unchanged, or incorporate flexibility in the face of the pending court ruling (Episode A). This served to gauge the expected net benefit of creating the possibility of switching supplier. Methodical ranking of decision alternatives seems characteristic of ALPHA's selectiveness and deliberateness in emergent strategic decision making.

Concluding our analysis of diligence, we offer the following proposition.

PROPOSITION 3. *Diligence in adaptive decision making is higher when managers become aware of new uncertainty than when they become aware of new certainty.*

Summary and Propositions

We depicted strategic decision-making processes occurring during implementation. A high proportion of these involve adopting preconceived alternative courses of action—namely, in response to the resolution of uncertainty that managers were aware of prior to implementation. Beyond this, however, we observed that managers also deal with two different types of situations that require the rethinking of initial plans during implementation, influencing in turn the decision-making process adopted. In situations of the first type, managers become newly aware of an implementation-relevant future event that appears certain to occur. They then embark on a problem-solving, crisis management-like process, making definite changes to implementation plans. In the second type, managers become aware of a future event that is an uncertain possibility. Awareness of future events that are recognized when still perceived as uncertain can trigger a more structured and sophisticated decision-making process. The central decision question here is not whether to commit to changes in implementation plans, but whether to create additional courses of future action. Both types of decision situations were reported with similar frequency, and their differences in the mean ratings for our concepts of interest are all significant. Table 6 provides an overview of these findings.

Although selectiveness, deliberateness, and diligence are conceptually distinct features of decision making that can occur in any combination, they covary across our observed decision situations: known uncertainty (high),

new certainty (low), and new uncertainty (high). On a decision-episode level, the three concepts correlate positively.² Because they capture important dimensions of higher-level conceptualizations of procedural rationality and analytical comprehensiveness, our findings lead us to the following summary proposition.

PROPOSITION 4. *Procedural rationality/analytical comprehensiveness in adaptive decision making is higher when managers become aware of new uncertainty than when they become aware of new certainty.*

Discussion

Adaptive Decision Making

We provide a detailed study of the decision-making processes that occur during the implementation of a strategic initiative. Our insights contribute to theory of adaptive decision making, revealing how managers actually make individual adaptation decisions, how this process varies in procedural rationality, and how differences in awareness and uncertainty provide some explanation for this variance.

We go beyond the notion of strategic decision making during implementation as less structured and comprehensive than preimplementation decision making and planning (Cyert and March 1992, Langley et al. 1995). Our results confirm that there are incidents of less sophisticated problem solving but that this is generally restricted to situations in which managers have to newly accept certain facts. The insight is that many of ALPHA's decision situations were instead of a different nature and involved a surprisingly structured decision-making process. In these instances, the levels of selectiveness, deliberateness, and diligence were comparable to those displayed in up-front decision making where attention was not constrained by ongoing delivery.

A good part of decision makers' time is taken up by the mundane task of responding to the resolution of uncertainty conceived prior to implementation. Here, adaptation involves the relatively straightforward adoption of alternative courses of action designed during the initial planning period. By contrast, crisis-like problem solving prevailed when managers became newly aware of certain future events. More importantly, however, we uncover a third type of decision-making process that has generally been overlooked in the literature. This process occurs when managers become aware of

Table 6 Decision Situations and Decision-Making Process Characteristics

Decision situation	Resolution of uncertainty that was known up front	New certainty realized during implementation	New uncertainty realized during implementation
<i>Mechanism</i>	<i>Contingent action</i>	<i>Problem solving</i>	<i>Contingency planning</i>
Selectiveness	High (discriminate)	Low (indiscriminate)	High (discriminate)
Deliberateness	High (intentional)	Low (automatic)	High (intentional)
Diligence	High (conscientious)	Low (cursory)	High (conscientious)

new uncertainty. We discover that this process differs from that triggered by the realization of new certainty. If managers become aware of the possibility, rather than the inevitability, of a relevant future event, they employ comparatively selective, deliberate, and diligent decision-making processes. Both new certainty and new uncertainty require decision makers to rethink implementation plans more substantially than in other decision situations during implementation. However, new certainty often requires direct plan adaptations, whereas new uncertainty allows for exploration of potential ways of adapting plans.

The upshot is that not all strategic decision making during implementation lacks the procedural rationality of up-front decision making. Intermittent episodes of adaptive decision making in response to becoming aware of new uncertainty display patterns similar to those associated with up-front planning. One difference is, however, that during implementation, decision makers take into account the increasing costs of reversing commitments. Future researchers may find it worthwhile to investigate the extent to which factors such as managerial attention, time to uncertainty resolution, and organizational routines and norms make strategic decision making in response to becoming aware of new uncertainty more or less selective, deliberate, and diligent.

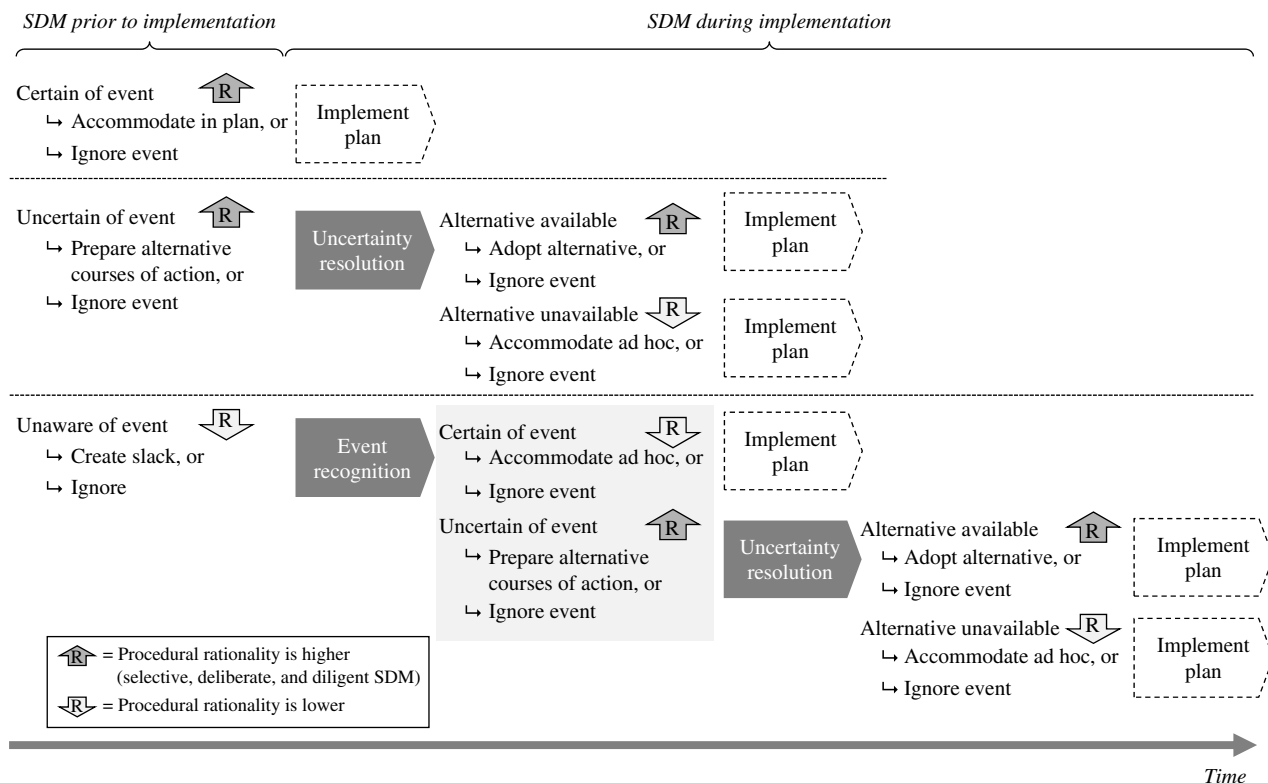
We summarize in Figure 2 the extent to which strategic decision-making processes during implementation

are characterized by procedural rationality. The key theoretical contingencies of this framework are awareness of, and uncertainty about, a decision-centric event. When managers are initially unaware, decision making during implementation is relatively comprehensive in confronting an uncertain future event—and less so in confronting a certain event.

More broadly, the paper's findings add to our understanding of how decision makers “transcend styles” (Quinn 1980, p. 90) during implementation of strategic initiatives in uncertain environments; demands for flexibility require a decision-making style of frequent plan adaptations, whereas demands for reliability require stable implementations plans (Lewis et al. 2002). We observed the covariance of managers' awareness of a future event with levels of comprehensiveness/rationality (summarized in Figure 2). Although at the level of the strategic initiative it looks as if ALPHA steered a middle course, our analysis at the decision level reveals how managers alternate between adapting and maintaining plans.

Through a comprehensive process of ex ante strategic decision making, ALPHA aimed to define appropriate courses of action to prepare for a range of important future events. Managers were nevertheless obliged to make strategic decisions during implementation. They switched between decision-making styles in response to becoming aware of previously unforeseen future events. When the newly realized event was certain, decision

Figure 2 Procedural Rationality in Evaluating Strategic Decision Alternatives



makers displayed lower—and when the event was uncertain, higher—levels of selectiveness, deliberateness, and diligence. Faced with certain events, ALPHA devised short-term changes to resource allocation plans. Faced with uncertain events, ALPHA devised future courses of action intended to accommodate new ranges of future event possibilities. Decision-making styles thus varied on a case-by-case basis.

Awareness in Strategic Decision Making

Our observation of how structured decision making punctuates constrained ad hoc decision making during the implementation of a strategic initiative provides some empirical clarification of the ways in which awareness changes decision-making dynamics. The concept of awareness has found application in economic models (Dekel et al. 1998, Modica and Rustichini 1994), and management scholars stress its theoretical importance: “The number of considerations that are potentially relevant to the effectiveness of an organization design is so large that only a few of the more salient of these lie within the circle of awareness at any given time” (Simon 1978, p. 8). Instead of being aware of an event with a perceived probability of zero, the organization’s main decision makers can be completely unaware of a future state of the world, although it may be knowable or known to some other member of the organization (Lampel and Shapira 2001, Mosakowski 1997). By depicting how decision making follows awareness, we extend previous research efforts that showed how effective preparation for potential future surprises involves setting aside slack resources for experimental or parallel problem solving (Pich et al. 2002, Sommer et al. 2009). Because decision makers do not only become aware of new certainty that would trigger problem solving, they do not always respond by drawing on contingent slack resources. Instead, when they become aware of new uncertainty, managers selectively design new contingency plans, deliberately allocating resources to alternative future courses of action.

The microprocesses of decision making that occur when managers recognize new uncertainty, including the deliberate analytical assessment of decision-making alternatives, resemble those traditionally associated with prescriptive up-front decision making (see Wiltbank et al. 2006). ALPHA displayed rational behavior in seeking to reduce new uncertainty to risk and then deciding on mitigation (cf. Miller 2007, based on Knight 1921). When new event possibilities were identified (Knightian uncertainty), organizational search efforts established probabilities of occurrence (Knightian risk) and provided the basis for establishing decision alternatives and the ensuing procedurally rational decision making.

Comprehensiveness and Rationality

Our findings also contribute to research on procedural rationality and analytical comprehensiveness. Procedural rationality in strategic decision making refers to the overall process of gathering and using information to identify and select sensible means to reach a stated goal (Cyert and March 1992, Dean and Sharfman 1996, Simon 1997). Similarly, analytical comprehensiveness is understood as systematic and targeted scanning and analysis in the process of arriving at particular decisions (Fredrickson and Mitchell 1984, Miller 1987). Selectiveness, deliberateness, and diligence capture important dimensions of both concepts (Figure 1).

We contribute three insights to the debate about the relationship between performance in dynamic environments and rational/comprehensive decision making, where research has found positive (Atuahene-Gima and Li 2004, Goll and Rasheed 1997, Miller 2008), negative (Fredrickson and Mitchell 1984, Hough and White 2003), or insignificant (Elbanna and Child 2007) correlations. First, the aforementioned studies use aggregate measures for environmental turbulence/uncertainty/dynamism (except for Elbanna and Child 2007, who complement this with a decision uncertainty construct). We show that this practice ignores variation in awareness and uncertainty surrounding individual future events that impact strategic decision making. It is a manager’s knowledge of particular decision-centric events, as opposed to aggregate dynamism in a firm’s environment, that determines the strategic decision-making style employed. Greater aggregate levels may increase the need for adaptive decision making during implementation, but they do not necessarily affect the ratio of new certainty to new uncertainty perceived by managers during implementation. In other words, the aggregate level of uncertainty does not determine whether managers apprehend new events as certain or uncertain. We would therefore expect rational/comprehensive decision making to increase performance in dynamic environments only when managers perceive a high proportion of uncertainty. Conversely, firms in uncertain environments should deprioritize rationality/comprehensiveness if managers apprehend most events only once they are certain.

This brings us to our second insight. Previous analyses, which have focused on the organizational level, disregard the potential for decision-specific variation in chosen decision-making processes (exceptions include Dean and Sharfman 1996 and Hough and White 2003). Our observations suggest that looking at central tendencies may be insufficient to explain decision-making effectiveness in uncertain environments. Instead, we would expect better performance from organizations that competently switch between styles of decision making, depending on managerial awareness and uncertainty about future decision-centric events. If future research

confirms this conjecture, it will inform theory on when and how to complement rational and intuitive modes of decision making (Dane and Pratt 2007, Langley et al. 1995).

Finally, studies of procedural rationality/comprehensiveness rarely distinguish between decisions made before and during implementation. However, in more unpredictable environments, more information emerges only after the start of implementation, leading to more adaptations of initial resource allocation plans. Occurring frequently but fragmentally in evolving contexts and with increasingly irreversible commitments, such decision making deviates from the model described in the studies referred to above.

Flexibility in Implementation

With the possible exception of organizations with extremely incremental approaches to planning, as observed by Pitsis et al. (2003), earlier research tends to assume that plans for executing strategic initiatives remain flexible for a limited time only before becoming fixed. This fixity is often implicitly viewed as a point of no return. Miller and Lessard (2008) argue that, following several iterations of generating alternatives for future action, there comes a point when no further flexibility should be created. At some point during implementation, reductions in strategic thrust, stakeholder friction, and other costs of introducing additional flexibility outweigh the expected benefits (Ghemawat and Costa 1993, Klingebiel 2010).

Our case analysis suggests that there are alternatives to this view. Although the probability distributions of known uncertainties narrow, requiring less flexibility as implementation progresses, managers continue to become aware of new uncertainties that may warrant the creation of additional flexibility. The episodes we observed suggest that the decision to create additional flexibility varies from case to case, depending on the new uncertainty in question and the expected costs and benefits of potential plan modifications. ALPHA decided to create costly additional flexibility when it renegotiated a key supplier contract, because those costs were still lower than the probability-weighted outlay required by a potential court ruling. Late into implementation, ALPHA also decided that it would be economical to create additional flexibility by upgrading its data-handling capacity, because this would impact only a small part of the operation.

Our findings confirm that flexibility creation decreases in intensity as project delivery approaches its target; the costs of modifying planning commitments do indeed rise with time (with varying intensity). However, our data suggest that this reduction is not continuous. Managers occasionally find that some emerging uncertainty renders the benefits of creating additional flexibility greater than its costs.

We also contribute by depicting the managerial rationale for creating additional courses of action during ongoing implementation, which resonates with a growing body of research into managers' appreciation of the value of flexibility for decision making (Bowman and Hurry 1993, Trigeorgis 1996). At ALPHA, the process was triggered by emerging awareness of additional uncertainty surrounding future events. The PMG's relatively diligent cost-benefit analyses were informed by probabilistic estimates of the costs of a wait-and-see approach versus preparation for uncertainty resolution. ALPHA made selective decisions to incorporate additional alternatives for future courses of action, cognizant of the (potentially unnecessary) costs associated. Consistent with prior findings, we observed that the costs of creating flexibility rise as implementation progresses, because stakeholder commitments are increasingly irreversible (Miller and Lessard 2008). This does not imply, however, that managers cease to recognize value in flexibility; rather, it becomes increasingly unlikely that the benefit of additional flexibility will exceed its costs.

Managerial Implications

Strategic initiatives such as ALPHA's entry into the telematics market are crucial undertakings intended to secure future income streams. Because few such initiatives are successfully realized (Morgan et al. 2008), our findings may provide helpful insights for executives charged with determining courses of action for implementation.

We confirm that the ever-present possibility of encountering new risks and problems requires scope to extend original plans. The good news is that adaptation may not always require regular replanning processes or extensive buffers. Managers can be economical about adaptation without compromising the benefits of planning stability, such as strategic thrust, resource utilization, and sourcing economies of scale. A policy of planning as much as possible, in part by creating contingencies for known uncertainties, and adapting as much as necessary, by accommodating contingencies for newly recognized uncertainties, leads to more efficient implementation. The effectiveness of this policy hinges on an organization's capacity to identify and evaluate the varying costs and benefits of creating new alternatives for future courses of action. This enables management to respond to emerging uncertainties only when necessary. Many organizations make use of this capacity for risk management during the initial planning phases of projects; the imperative is to ensure that it can also be tapped during implementation.

The expectation is improved average long-term performance. Implementation costs, running costs, and revenue all benefit if an organization responds effectively to the recognition of new uncertainty. This advantage reduces the need for large lump-sum slack allocations to guard

against future surprises; organizations can be more selective in matching resources to replanning needs. In addition to allocating slack funds for crisis response, firms could also establish a budget for emergent strategic decision making in response to new uncertainties. Pairing a leaner main budget with selective increases in available funds made available on a case-by-case basis would enable managers to make provisions (only) when new uncertainty has been recognized and deliberated. Fewer resource demands per initiative will allow managers to undertake more, or more uncertain, project initiatives, because increased numbers of emerging opportunities can be exploited and threats contained.

Limitations and Future Research

Our research naturally has limitations that should be addressed through future research. First, we limited ourselves to the study of a single strategic initiative. To extrapolate, comparative work is needed on a greater number and diversity of organizational undertakings, including ventures with strategic objectives that are in flux. Although we expect emergent managerial awareness of critical future events, certain or uncertain, to be a common phenomenon across initiatives such as new product introductions and market entries, ALPHA's high levels of overall uncertainty, organizational complexity, and publicity may have had an influence on the observed managerial decision-making processes that might not be observed in smaller, less constrained, or less scrutinized initiatives.

Second, we encourage examination of factors that might moderate strategic decision-making responses to new certainty and new uncertainty. Although difficult to measure, the time elapsed between event recognition and adaptation might affect levels of selectiveness, deliberateness, and diligence. Variation in the availability of managerial attention during implementation could also have a leveling effect on the observed differences in the characteristics of strategic decision-making processes.

Finally, by moving beyond our present decision-level focus, future research might isolate the effects of organizational heterogeneity. Interesting variations include the extent to which firms institutionalize incremental decision making or provide slack resources. We also suggest exploring variation in the degree to which resources are irreversibly committed to ongoing implementation activities.

Conclusion

Our goal was to gain a greater understanding of strategic decision making during implementation. We uncovered a decision-making process ensuing when managers become aware of new uncertainty, which is more procedurally rational than that ensuing when managers become aware of new certainty. The model we offer suggests that (un)awareness of the (un)certainly of future decision-centric events can explain managerial switch-

ing between styles of adaptive decision making during implementation.

By focusing on individual decision episodes, we unpack patterns of adaptation and extend the concept of awareness to strategic decision-making theory. Decision-level variation in the level of awareness and uncertainty raises questions about the use of aggregate constructs for empirical research. We also offer detail on the non-continuous decline of flexibility during implementation and illuminate the ways in which managers consciously weigh up the costs and benefits of creating additional courses of future action. Together, these findings provide ample scope for future research on the managerial reality of strategic decision making under uncertainty.

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Endnotes

¹This is understood as Milliken's (1987) perceived state uncertainty, which is managers' incomplete understanding of future change in components of the environment. Conversely, certainty here indicates PMG managers' confidence that a future change will or will not take place.

²An increase of 1 in selectiveness is associated with an increase of 0.34 in deliberateness and of 0.46 in diligence. An increase of 1 in deliberateness is associated with an increase of 0.38 in diligence, all at the 0.05 confidence level.

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