

A CASE STUDY OF NASA'S *COLUMBIA* TRAGEDY: AN ORGANIZATIONAL  
LEARNING AND SENSEMAKING APPROACH TO  
ORGANIZATIONAL CRISIS

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No other government agency receives as much attention as the National Aeronautics and Space Administration (NASA). The high-profile agency frequently captures attention of the media in both positive and negative contexts. This thesis takes a case study approach using organizational learning and sensemaking theories to investigate crisis communication within NASA's 2003 *Columbia* tragedy. Eight participants, who in some capacity had worked for NASA during the *Columbia* tragedy in a communication centered position, were interviewed. Using a grounded theory framework, nine themes emerged pertaining to organizational learning, leadership, structure, and organizational culture. The results of the study aid in understanding how high risk organization's (HROs) can learn from previous failures and details how organizational culture can hinder organizational change.

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## CHAPTER 1

### INTRODUCTION

The National Aeronautics and Space Administration (NASA) is a unique, almost mythic, organization. It is one of the largest organizations in the United States, both in terms of employees and contractors, is extremely high-profile within the news media, and is expected to be transparent to the American taxpayer (Tompkins, 2005). NASA's rich and well-documented history not only provides researchers the opportunity to learn from its experiences, but for the organization itself to uncover organizational problems. While NASA has many achievements and can be proud of its technological prowess, the organization is also familiar with crisis. NASA has experienced three significant and historical crises dating back to 1967. The first tragedy was from the *Apollo 1* Spacecraft. Almost two decades later in 1986, the tragic explosion of the *Challenger* space shuttle off the coast of Florida stunned the world. Most recently, in 2003, the space shuttle *Columbia* disintegrated over East-Texas and Louisiana. My purpose in this study is to examine how NASA, as an organization, learned from previous crises. In this study, I analyze components of the organization that influence organizational change. Taking a case study approach, I address NASA's leadership, culture, and structure and their impact on the most recent crisis, the *Columbia* tragedy. To fully understand organizational crisis, I begin with a historical examination of research surrounding organizational crises.

#### Crisis

Before delving into NASA's crises, it is important to understand the scope of organizational crisis. Crisis, defined by Seeger, Sellnow, and Ulmer (1998), is "a specific, unexpected and non-routine organizationally based event or series of events which creates high levels of uncertainty and threat or perceived threat to an organization's high priority goals" (p.

233). Organizational crises come in a variety of forms, including industrial accidents (Beamish, 2002; Crichton, Lauche, & Flin, 2005; Johnson & Sellnow, 1995) corporate fraud (McBarnet, 2006; Savage, Dunkin, & Ford, 2004), natural disasters (Littlefield & Quenette, 2007; Spence, Lachlan, & Griffin, 2007; Tolentino, 2007; Waymer & Heath, 2007), unfair hiring and wage practices (Goetz & Swaminathan, 2006; Robinson, 2004), racism (Coombs & Schmidt, 2000; Hoger & Swem; 2000; McLane, Bratic, & Bersin, 1999), and sexual harassment (Dougherty & Smythe, 2004; Murphree & Rogers, 2004). Crisis is pervasive regardless of organizational size, and all crises have the potential to damage an organization's reputation. Wendy's infamous "finger in the chili" scare of 2005, for example, demonstrates that even when an organization is the victim of a criminal prank, its reputation can suffer significant harm ("Police call Wendy's," 2005). Furthermore, crises are often ambiguous events, which cause a great deal of uncertainty within the focal organization and for its stakeholders (Ulmer, Seeger, & Sellnow, 2007). For this reason, crises represent salient opportunities for communication scholars interested in understanding the role of communication in alleviating uncertainty. The following section details the ubiquitous nature of crisis and details how communication can help explain this phenomenon.

Organizational crises routinely occur in a wide variety of contexts. Scholars have examined crisis and crisis responses in a myriad of settings, ranging from franchise restaurants (Chin, Naidu, Ringel, Snipes, Bienvenu, & Desilva, 1998; Salvá-Ramirez, 1995) to tobacco companies (Metzler, 2001). Most notably, scholars consistently have revisited Johnson and Johnson's (the makers of Tylenol) 1982 crisis (Benson, 1988; Birch, 1994; Shrivastava, Mitroff, Miller, & Miglani, 1988). Another high profile case involves the Exxon-Valdez oil spill. Nearly two decades after the original oil spill, Exxon has remained the "anti-model" of crisis

communication for its handling of the 1989 disaster off the coast of Prince William Sound, Alaska (Davidson, 1990; McCoy, 1989; Seeger et al., 1998). Aside from these well-documented incidents, organizational crises occur on a regular basis (Seeger et al., 1998). By studying crises, and particularly the role of communication within crises, practical and theoretical contributions can be made to crisis communication literature.

On the most fundamental level, studying crisis can help save lives. Having clearly defined plans of action can promote environments less prone to chaos when crises occur. Reporters and scholars alike have admitted that NASA's culture contributed to several less than ideal decisions that ultimately led to human loss (Kauffman, 2005; Tompkins, 2005). Human life is routinely lost in other organizational crises as well. In 2003, for example, 96 people perished in a pyro-technical malfunction fire at a Great White concert in Rhode Island. While reports indicate that the exit signs were well lit, many people rushed for the main door they first entered, creating mass-panic. This factor, when combined with questionable fire codes and highly flammable foam, led to a situation that resulted in a massive number of fatalities (Waddell, 2003). Effective communication in this situation may have saved lives.

Crisis communication scholars can help develop a complete understanding of the relationship between all stages of crisis. Not only can scholars studying crisis allow for the possibility of saving human lives and assisting with post-crisis impression management, but communication scholars can also begin to understand more of the theory and praxis of crisis communication. The benefit for organizations is clear. A more solid understanding of crisis from a communicative standpoint will allow further exploration and development of crisis-related theories and practical, effective responses to organizational crises. Ideally, organizations and scholars can mutually learn from each other about crisis communication and theory. To

further explore organizational crisis within NASA, I utilize two prominent organizational communication theories, sensemaking theory and organizational learning theory (OLT).

### Sensemaking Theory

Organizational crises cause uncertainty for employees, their family members, neighbors, the public-at-large, and a host of other stakeholders. In times of uncertainty, people try to make sense of situations in several ways. One of the most commonly accepted frameworks for approaching organizational crisis is Weick's (1988) sensemaking theory. Sensemaking theory illustrates how in times of uncertainty, individuals attempt to determine reality, typically through communication with others. Because so much ambiguity surrounds crises, organizations have difficulty understanding what is happening (Ulmer et al., 2007). Weick (1993) described such large-scale events that are macroscopic as "cosmology episodes." A vast amount of uncertainty is associated with crisis (Coombs, 2004). NASA's catastrophic crises fall under Weick's definition of cosmology episodes. Weick indicated that with such significant events, an individual's sensemaking ability falters. Working closely with organizations, communication scholars may be able to discover proactive strategies to remove ambiguity or uncertainty from the situation and begin to effectively "make sense" of the crisis.

Once an organization returns to a state of normalcy, previous crises can affect the future of the organization (Coombs, 2004). Scholars have utilized stage models to depict this processual nature of crises. For example, Seeger et al. (1998) identified three stages of crisis. In the first stage, pre-crisis planning, organizational members formulate and discuss potential "what if" scenarios. The planning group generally includes individuals representing all levels of the organization, including leadership personnel. The second stage begins when the crisis occurs. So much can be going on at this point it is difficult to determine the specific starting/ending stage.

The onset of the crisis is often characterized by the highest levels of uncertainty. The final and longest lasting stage, is the post-crisis stage. The last stage includes the public relations campaigns and efforts to rebuild legitimacy as an organization moves forward (Seeger et al., 1998).

The post-crisis phase is on-going and can continue to affect an organization for years, sometimes decades. After the onset of a crisis, every aspect of an organization's maneuverings during the event can resurface. Coombs (2004) noted if an organization is subject to more than one crisis, the public and the media can revisit an earlier crisis with critical attention paid to what, if any, changes were enacted. Coombs discussed an organization's ability to learn from the past and make sense of what happened as retrospective sensemaking. Because of NASA's unfortunate multiple crises, researchers have the opportunity to apply sensemaking theory to the organization's previous crises. Particularly, it might be beneficial to understand how NASA members "made sense of" the *Challenger* crisis, and how this process affected their interpretation of the *Columbia* crisis. In addition to sensemaking theory, I use organizational learning theory (OLT) to explore NASA's ability to learn from itself.

### Organizational Learning Theory

Organizational learning theory attempts to explain how organizations learn. OLT first gained popularity in the late 1970s through the pioneering work of Argyris and Schon (1978). OLT separates individual learning from organizational learning (Argyris & Schon, 1978). Additionally, Argyris and Schon (1978) identified two types of learning: single-loop learning and double-loop learning. Single-loop learning focuses on surface level items that many organizational members may take for granted. Real learning, as indicated by Argyris and Schon

(1978), occurs at the double-loop level. Double-loop learning begins when organizational members become critical of current ways of doing business and begin to question their options.

When the error detected and corrected permits the organization to carry on its present policies or achieve its present objectives, then that error-and-correction process is single-loop learning. Single-loop learning is like a thermostat that learns when it is too hot or too cold and turns the heat on or off. The thermostat can perform this task because it can receive information (the temperature of the room) and take corrective action. Double-loop learning occurs when error is detected and corrected in ways that involve the modification of an organization's underlying norms, policies and objectives. (Argyris & Schon, 1978, pp. 2-3.)

Because it entails multiple levels of learning, Argyris and Schon indicate that double-loop learning is more beneficial for organizations.

OLT can help explain the process NASA went through when it attempted to learn from previous failures. Specifically, researchers employing OLT can help assess specific areas within the organization that influence organizational learning. Understanding NASA's barriers to learning can assist in overcoming obstacles preventing organizational change.

### *Rationale*

Research about NASA is abundant (Cagle, 2006; Martin & Boynton, 2005; Tompkins, 2005). While the great space race of the 1960s ended long ago, the US government feels pressure to maintain a sophisticated space program to demonstrate to the rest of the world that the US is still technologically powerful. Crisis within NASA reflect poorly on American science and technology. NASA and the astronauts who staff space missions engage in a certain amount of calculated risk with each launch into and return from space. For this reason alone, crisis

communication planning with NASA may be different from other organizations that do not deal with as much calculated risk. Despite being a unique organization, other organizations can benefit from NASA's experiences. Therefore, in this study I address several crisis communication phenomena that are applicable to multiple organizations.

Organizational scholars have often discussed crisis in terms of how satisfactory or how poorly an organization handles itself in times of uncertainty or crisis. While an organization's response to a crisis is important, taking a broader perspective and examining the events leading to a specific crisis may likewise be informative. Scholars are beginning to acknowledge the inherent relationship between pre-crisis and post-crisis communication (Coombs, 1999; Seeger, Sellnow, & Ulmer, 2003; Ulmer, 2001). NASA offers a singular opportunity for communication scholars because, unlike many other organizations, NASA has experienced at least three major crises in the past 40 years. NASA is unique among organizations because of its long history and the intense public scrutiny the organization has endured. Because of its position within the US government, NASA's decisions and communications are well-documented and accessible to the public. Communication scholars can gain access to many of these documents directly through NASA's Website. In addition to easily accessible press releases and corporate communications, communication scholars can gain valuable qualitative data through conversation with former and current NASA employees and contractors.

Scholars and business-minded professionals need to understand fundamental crisis strategies. Textbooks and articles detail a wide variety of crises from Johnson and Johnson's Tylenol crisis (Benson, 1988; Birch, 1994; Shrivasta, Mitroff, Miller, & Miglani, 1988) to franchise restaurants (Chin et al., 1998; Salvá-Ramirez, 1995). However, researchers have not sufficiently addressed the full spectrum of crisis from the planning and evaluation stages. Such

research can provide practical information for individuals attempting to create plans for crises, and can expand the existing literature by exploring critical contextual factors and their relationship with established strategic crisis communications. A wealth of information can be gained through an extensive analysis of the *Columbia* tragedy using an investigative lens that highlights some re-occurring issues within NASA's core. NASA's crisis communication surrounding the *Columbia* tragedy is arguably their most successful communication campaign, particularly when it is compared with the previous two major crises. What changed in NASA's crisis response/communication strategies that allowed them to effectively manage the *Columbia* disaster?

My purpose in this study is to explore the issues of organizational learning in a particular crisis case. I examine how members of NASA's crisis communication team made sense of the *Columbia* disaster in light of the *Challenger* disaster. Specifically, I seek to understand what NASA learned from the *Challenger* disaster with regard to its culture, structure, and leadership, and how these organizational elements operated during the *Columbia* tragedy. This case study sheds light on sensemaking theory and OLT's usefulness in determining how NASA learns from previous crises and attempts organizational change. This thesis proceeds through four chapters. First, I examine the historical events and research associated with NASA. Second, drawing from previous crisis research and theory, I analyze documents and interview data from NASA addressing how the organization learns from previous events. In the final chapter, I explore implications for future research and discuss what organizations can learn from NASA's attempts to implement change after crises.

## CHAPTER 2

### REVIEW OF LITERATURE

#### Overview of NASA History and Crises

Before proceeding through the literature surrounding organizational crises, I provide a brief history and chronology of NASA's crises. NASA's history can be traced to 1915 with roots embedded in its ancestral organization, the National Advisory Committee for Aeronautics (NACA). NACA promoted flight and the study of aeronautics. At the start of World War I, the US ordered NACA to help "catch up" with other countries whose flight technology was superior (Suckow, n.d.). The organization quickly grew, and, by 1940, NACA added two additional laboratories, the Ames Aeronautical Laboratory and the Aircraft Engine Research Laboratory. NACA tested new aircraft designs that increased velocity with less wind-resistance (Suckow, n.d.). Just prior to 1960, NACA proposed plans for human space flight.

The Soviet Union launched the world's first satellite in 1957. Responding to public fear that the US was lagging behind the rest of the world, the US Congress responded to pressure from the American public for space exploration and passed the National Aeronautics and Space Act in 1958. NASA became an umbrella organization and consumed NACA (Suckow, n.d.). Many individuals from NACA continued to work for NASA in leadership positions (Suckow, n.d.).

#### February 20, 1962 - Human Space Flight

In 1962, John Glenn became the first American to orbit the Earth. The flight was successful and included three orbits around Earth (NASA, 2007). Several years later, NASA introduced the Apollo program. The goals of Apollo were as follows:

To establish the technology to meet other national interests in space.

To achieve preeminence in space for the United States.

To carry out a program of scientific exploration of the Moon.

To develop man's capability to work in the lunar environment. (NASA, 2000)

The series of Apollo missions paved the way for future space flight. Seven years after John Glenn became the first American in orbit, NASA approached another milestone.

#### July 21, 1969 – First Steps on Earth's Moon

On July 21, 1969, Neil Armstrong spoke those famous words “one small step for man, one giant step for mankind” as he took the first step on the moon. Americans witnessed the pinnacle of their relatively new space program. The 1960s witnessed myriad technological advances within the space program. Across the world, the public witnessed a significant technological advancement that would ultimately redefine the parameters of human invention. With this achievement, NASA established itself as one of the most influential and inspirational government organizations. With such success also came powerful, symbolic messages not only to Americans, but to the entire world; no task should be considered too difficult for humankind to overcome. Americans continued to push technological boundaries and the public's expectations of NASA grew.

While the lunar landing and early accomplishments of NASA were great successes, NASA also has had several crises amidst its technological advances. The next few sections detail the specifics of NASA's three largest crisis, *Apollo*, *Challenger*, and *Columbia*. I begin by addressing the *Apollo 1* tragedy.

#### January 27, 1967 – *Apollo 1* Tragedy

NASA encountered its first full-scale tragedy on January 27, 1967. News headlines read “3 Apollo Astronauts Meet Death Sealed in Blazing Space Capsule” (Hill, 1967). Command

Pilot Edward White, Commander Virgil "Gus" Grissom, and Pilot Roger Chaffee perished in the accident. The spacecraft was undergoing a "plugs-out" test simulating countdown. Fire broke out in the space capsule and because the door to the spacecraft operated with a series of ratchets and opened inward, it was impossible to reach the astronauts in time. NASA later determined that a spark from under a seat ignited highly flammable material and was fueled by the rich-oxygen environment. NASA conducted a thorough investigation and the tragic events led to new safety precautions and protocols (Williams, 2007).

#### January 28, 1986 – The *Challenger* Explosion

The space shuttle *Challenger* exploded 73 seconds after liftoff, killing teacher Christa McAuliffe, Payload Specialist Greg Jarvis, Mission Specialist Ellison Onizuka, Mission Specialist Ron McNair, Mission Specialist Judy Resnik, Commander Dick Scobee, and Pilot Mike Smith. Little was known about the events leading up to the explosion. NASA did not enact a clear crisis communication plan. In fact, NASA had not appointed a crisis spokesperson (Seeger et al., 2003). Congressional hearings first revealed the initial cause to the public. Hearings before congress revealed that the "O" rings in the shuttle required the right temperature or they would be vulnerable to malfunction. The abnormally cold temperatures in Florida in January 1986 made the "O" rings more susceptible to failure. The tragedy had a lasting impact on the reputation of NASA. The last NASA tragedy had occurred in 1967, therefore after almost two decades of safe flight, the public considered space flight relatively safe by 1986. The events that transpired in Florida in 1986 shocked the public. NASA lost a lot of faith from the public because of the way the crisis was "mis-handled" (Seeger et al., 2003). In addition to the specific technological failure, a problematic decision making structure also took blame (Tompkins, 2005). Additionally, individuals responsible for the final launch decision did not have all the

necessary information regarding the potential problem with the “O” rings. Individuals from NASA contractor Thiokol discussed the potential hazard with NASA officials, but NASA officials did not consider the risk too great.

#### February 1, 2003 – The *Columbia* Accident

The *Columbia* space shuttle exploded on February 1, 2003, during re-entry. The shuttle and all seven of its crew were lost. As soon as *Columbia* exploded, the media arrived in large numbers outside Johnson Space Center (JSC). In three days, 1879 media outlets converged on JSC in Houston (James, 2006). Unlike the events immediately after the *Challenger* explosion, NASA was purposeful and strategic with their communication surrounding *Columbia*. NASA held daily press conferences and used the media to communicate a clear message to the public about the accident.

NASA was careful to send an immediate lucid message to the public. There was a huge push to not only communicate externally, but internally as well (James, 2006) since the nearly 30,000 employees of JSC, civil employees and contractors, would also be hearing media reports. NASA faced months of hardship following the tragedy. While the Columbia Accident Investigation Board (CAIB) was formed only six days after the *Columbia* tragedy, a comprehensive final evaluation did not come for almost seven months. During this time NASA communicated with the media/public while the investigation proceeded. Being a large, public organization, NASA was under intense scrutiny from the media.

While NASA did an excellent job handling the crisis from an operational standpoint (James, 2006), several important mistakes were made when dealing with the media. Negotiating against what Seeger et al. (2003) described as a critical downfall of organizations during crisis, NASA was too quick to rule out certain possibilities. NASA claimed early on that the protective

foam from the left wing was not capable of significant damage. Later, the investigation discovered the foam played a critical role in the tragedy. Seeger et al. (2003) argued the rhetoric an organization uses to describe the crisis must deliver a clear and consistent message, avoiding speculation. Coombs (1999) argued that an organization must respond quickly, but avoid speculation. NASA made an early basic crisis communication error by prematurely dismissing the foam as a potential cause without sufficient evidence. A headline from *The New York Times* read “NASA now doubts tank foam debris doomed *Columbia*” (Broder, 2003) and several days later a headline in *The Houston Chronicle* indicated “Debris definitely from left wing” (Carreau, 2003).

Indeed, NASA did have a clear crisis communication plan, but the organization had not fully prepared for a re-entry explosion that left a debris field throughout much of east Texas and western Louisiana (James, 2006). Fortunately for the organization, NASA received a substantial amount of support from east Texas residents who assisted with recovery efforts, thereby providing NASA officials with much information in the immediate aftermath of the tragedy. NASA sent officials to east Texas towns to keep the public informed about the situation. Rather than meeting the citizens with resistance, NASA was appreciative of the overwhelming support and empathy from local residents (James, 2006). The fact that NASA had planned for a variety of different crisis scenarios allowed NASA to apply a crisis plan to the situation successfully.

#### August 26, 2003 – The CAIB Report

When the CAIB report was released on August 26, 2003, NASA officials paid close attention. The report concluded that *Columbia* exploded because falling foam had damaged the space shuttle’s wing on lift-off. The CAIB noted that NASA failed to meet three of the fifteen safety protocols already in place. The evaluation offered suggestions for improvement. For

example, the CAIB noted the lack of high speed cameras at the lift-off site prevented NASA engineers from accurately assessing the damage after launch. Additionally, the report noted a fundamental flaw with NASA's organizational "safety" culture (Columbia Accident Investigation Board (CAIB), 2003).

While the CAIB did not necessarily exonerate NASA, it generated a number of critical questions for consideration. For example, the report discussed a flawed communication pattern between NASA engineers and managers. The report described the necessity for both management and engineers to communicate more effectively. The CAIB suggested that an independent company or organization monitor and control safety hazards assessed during the launch to prevent biased decision making.

Ironically, the CAIB report created another crisis for NASA. In its 247 page report, the CAIB detailed a problematic organizational culture that was harmful to the organization's long term goals. The report was highly critical of NASA's culture and decision making. Sean O'Keefe, the NASA Administrator, publicly accepted all recommendations made by the CAIB. Internally, NASA felt that it had a cohesive "pro-space exploration" culture but did not believe that the NASA culture was "broken" (James, 2006). However, the CAIB report was not stating that priorities were in the wrong place or that the current culture was completely negative. The report attempted to illuminate the need for NASA to implement organizational change in order to promote a safer organizational environment.

NASA grappled with pressure from the media and the CAIB. Careful not to dismiss the claims, NASA continued to accept the suggestions publicly. For the next few months, NASA attempted to implement change. The space shuttle program was indefinitely grounded, and rumors of NASA abandoning human space flight ran amuck on the Internet and through media

outlets (Easterbrook, 2003). Still, NASA officials took the CAIB report seriously and looked into each specific issue.

#### January 14, 2004 – New Call for Space Exploration

In 2004, President George W. Bush made a public address about the future of the space program and the need for space exploration. The President detailed NASA's new missions, with safety at the forefront. Bush declared that the space program would continue, contingent upon the implementation of the recommendations of the CAIB report.

The primary focus of President Bush's speech was an increased focus on safety.

To accomplish this goal, NASA will return the Space Shuttle to flight consistent with safety concerns and the recommendations of the Columbia Accident Investigation Board.

The Shuttle's chief purpose over the next several years will be to help finish assembly of the Station, and the Shuttle will be retired by the end of this decade after nearly 30 years of service. (Bush, 2004)

The tone of President Bush's speech was overwhelmingly positive and optimistic. Instead of dwelling on the *Columbia* tragedy, NASA officials and President Bush presented new, ambitious plans for space exploration. After Bush's speech, NASA released computer simulations of humans returning to the Moon and even traveling to Mars (National Aeronautics and Space Administration, 2006).

#### July 26, 2005: Liftoff of the Space Shuttle *Discovery*

Almost 2.5 years after the *Columbia* disaster, NASA finally cleared the space shuttle program for launch. The space shuttle *Discovery* launched to orbit and returned successfully on August 9, 2005. A new era of NASA began without problems. NASA portrayed the momentous occasion as celebratory and themed it "return to space" with interactive Websites, press friendly

interviews, and increased openness with the media (James, 2006). NASA continues successful space exploration. Most recently, the space shuttle *Endeavour* returned after a successful mission to the International Space Station (National Aeronautics and Space Administration, 2007).

### Research Surrounding NASA

NASA's history of manned space flight is marred by three high-profile organizational crises. After each tragedy, the organization has been publicly criticized because it is a large, highly visible government agency. Almost immediately after the *Challenger* explosion, researchers pointed out a flaw in NASA's communication structure (Garner, 2006; Tompkins, 2005). Many of the communications surrounding *Challenger* came across as vague and uninformative by the public (Marshall, 1986). To most crisis scholars, NASA's response to the *Challenger* explosion was deemed inadequate (Gouran, Hirokawa, & Martz, 1986; Marshall, 1986; Tompkins, 2005).

Several scholars have viewed NASA's management of the *Challenger* tragedy as a crisis communication faux-pas (Gouran et al., 1986; Marshall, 1986; Tompkins, 2005). Not only was the organization's response to the tragedy slow and uninformative, the organization's culpability with regard to the tragedy was greater than they admitted (Marshall, 1986). NASA revealed that officials pressured the launch decision despite several safety protocol violations (Gouran, Hirokawa, & Martz, 1986). The country was devastated by the tragic loss of life and mourned the victims' sacrifice. However, adding fuel to the frustration was NASA's inability to communicate clearly with an increasingly interested public and media. To make matters worse, NASA failed to appoint a crisis spokesperson (Seeger et al., 2003). Finally, hearings before Congress revealed that the "O" rings in the shuttle required the right temperature or they would be vulnerable to malfunction, further indicating NASA internal operations.

NASA's handling of the *Columbia* tragedy demonstrates that the agency learned from previous failures pertaining to crisis communication. Researchers have identified NASA culture and NASA's approach to decision making as oppositional to the organization's long-term goals (Kauffman, 2005; Mason, 2004; Tompkins, 2005). The Columbia Accident Investigation Board's (CAIB) report (2003) also detailed the difficulty in achieving organizational change.

[NASA's organizational culture] acted over time to resist externally imposed change. By the eve of the *Columbia* accident, institutional practices that were in effect at the time of the *Challenger* accident – such as inadequate concern over deviations from expected performance, a silent safety program, and schedule pressure – had returned to NASA. (p. 101)

While NASA may have attempted to learn from the *Challenger* accident, components of NASA's culture are difficult to change.

Garner (2006) used structuration theory to investigate how certain power relationships within NASA hindered the organization's ability to change. Specifically, Garner indicated how the organization relied on its inter-organizational communication, which ultimately hindered the flow of information. Additionally, Garner suggested that crises can change the hierarchical structure of an organization. While Garner did not use first-hand accounts of the *Columbia* crisis in arriving at his conclusions, he nevertheless revealed a problematic structure within the organization.

NASA has survived multiple, high-profile, crises. Consequently, the organization provides scholars a unique vantage point from which to examine not only the stages of organizational crisis, but how an organization attempts to change. While many studies of organizational crisis focus on a single event, NASA's history allows researchers to understand

how one major crisis affects organizational members' perceptions of another major crisis. A historical examination of NASA provides researchers the opportunity to understand how organizational members make sense of cosmology episodes (Weick, 1993). Weick described cosmology episodes as those typically novel and large-scale events for which individuals are unable to form a frame of reference; these typically include disasters and tragedies.

Organizational learning theory reveals how organizations learn from past events and adapt to new environments and contingencies (Argote, 1999). Currently, organizational scholars know little about how organizational members use knowledge of a previous high-profile crisis to make sense of cosmology episodes. A case study analyzing NASA members' sensemaking of the *Columbia* tragedy, framed with their knowledge of *Challenger*, would contribute to crisis communication scholarship by revealing how organizational members frame new crises in relation to past events and how this framing affects crisis response.

### Organizational Learning Theory

I utilize OLT to analyze the extent to which NASA learns and evolves from previous crises. In the following paragraphs, I detail how organizational scholars currently use OLT and list some of the main concerns with the theory. Finally, I provide an explanation on why OLT is a useful lens of analysis for examining NASA.

Early models of OLT focused on how organizations and organizational members learn. However, much of the OLT literature separates "organizational" learning from "individual" learning (Duncan & Weiss, 1979; Shrivastava, 1983). Crossan, Lane, White, and Djurfeldt (1995) concluded that organizational learning is a growing area of research but more research must be conducted on an "inter-organizational" level. Additionally, Crossan et al. (1995) argued the need for more inquiry into the connection between learning and performance. Yuthas,

Dillard, and Rogers (2004) described ways to combat unethical behavior within accounting firms from an organizational learning perspective. The researchers concluded that more rigid learning structures must be implemented before any real type of change in ethical behavior would take place. Coombs (2004) argued that any exposure to a prior crisis event can hold a wealth of information for an organization as it prepares for other crises. Stead and Stallman (1999) used OLT to demonstrate how several different businesses managers were unable to learn from previous mistakes and routinely made the same errors. They cited the *culture* of the organization as a main cause for continued failures.

Scholars have recognized OLT as a fundamental organizational communication theory, but are quick to note that most OLT models are inconsistent with one another (Marlene-Fiol & Lyles, 1985). Still, OLT provides insight on how organizations attempt to learn from failures. As organizations across America grow older and experience new, unfamiliar situations, organizational scholars have discovered new interest in OLT (Egan, Yang, & Bartlett, 2004; Ortenblad, 2002; Perkins, Bess, Cooper, Jones, Armstead, & Speer, 2007; Piaskowska, 2005). Because OLT attempts to describe how organizations learn and eventually enact change, researchers have the ability to analyze the progression or decline of organizations. Free, Macintosh, and Stein (2007) discussed how Enron's history was partially at fault for the company's demise. They examined the history of the organization to show how the learning of Enron's culture factored into the company's demise. While interest in OLT continues, researchers have utilized OLT on a limited basis to study organizational crises. The review of literature did not yield any examples of scholars studying crisis and OLT.

OLT assists in analyzing how NASA attempts to learn from critical past mistakes and provides a contextual lens of analysis to determine how NASA can overcome a problematic

organizational culture. NASA's several crises provide context to determine how significant an impact past incidents influence a future crisis like *Columbia*. While OLT is a foundation for organizational change, it is not all encompassing. Therefore, I combine OLT with sensemaking theory to provide a more detailed understanding of how NASA employees make sense of their organizational reality.

### Sensemaking

Sensemaking theory provides an explanation for why people act the way they do in certain, typically novel, situations (Weick, 1988). Weick's (1988, 1993) sensemaking theory provides an opportunity to examine NASA at a more detailed, micro-level. Sensemaking theory is built on the idea "that reality is an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs" (Weick, 1993, p. 635). Weick (1993) determined that sensemaking is integral to the success of an organization and, without sensemaking, an organization's collapse is inevitable. Sensemaking is critical to understanding how NASA employees act in times of crises.

Researchers have routinely examined sensemaking in organizational contexts (Gephart, 1997; Mullen, Vladi & Mills, 2006; O'Connell & Mills, 2003; Seeger, Sellnow, & Ulmer, 1998; Wahlberg, 1996). Weick (1993) asserted that social construction is easier with a partner and allows for a larger amount of data to be considered by both individuals. Individuals will have a much easier time comprehending what is happening through open discourse with another individual. For example, when sexual harassment scholars at a large public university became victims of harassment, they were unable to realize what was happening until talking about their experiences with one another (Dougherty & Smythe, 2004). Sensemaking is a practical theory

with high heuristic value that enables scholars to understand details about different types of crises.

Weick (1993) also revealed how in times of uncertainty, sensemaking and decision making can result in life or death. Weick described the role of sensemaking in the tragic deaths of 13 “smokejumpers” (firefighters who parachute into wildfires) in the Mann Gulch wildfire of 1949. Weick described the event as an organizational phenomenon, discussing how the fire fighting crew had a clear set of roles and routines, clear signs of supervision, and a clearly defined rule system. As the fire raced towards the smokejumpers, the leader, Wagner “Wagg” Dodge, told his men to drop their tools and burn out an area of ground around them. Dodge’s order did not make sense to the firefighters and, instead of following orders, they attempted to outrun the fire. Dodge was one of only three survivors, who knew that by burning out an area, the larger, more powerful forest fire would not have fuel to burn so intensely around him. Dodge’s actions, and the actions of his fellow firefighters, can both be explained through a sensemaking framework. In organizational settings, sensemaking sheds light on employees’ rationales and actions. Because sensemaking is closely allied with decision making scholars have used it to explain group decision making processes (Henningsen, Henningsen, Eden, & Cruz, 2006). Additionally, the process of sensemaking within organizational leadership can assist organizations in finding more adept leaders with strong sensemaking ability (Seiling & Hinrichs, 2005).

Human beings naturally seek out large amounts of information before making a decision. Leaders within organizations are no different. Many organizations observe strict protocols before enacting changes. However, in times of high-uncertainty or crisis, sensemaking scholars have identified several significant areas of concern within leadership. Theus (1995) discussed the

tendency of leaders to cluster together and to cease communications with outside sources in times of uncertainty, therefore hindering the flow of communication. Theus (1995) described this phenomenon as a “biased” version of sensemaking. Often leaders look to previous experiences and, if appropriate, respond in a similar manner. Weick (1979) identified retrospective sensemaking as the attempt to understand past experiences. In brief, Weick asked "How can I know what I think until I see what I say?" (p. 5). In no other context is such hindsight more valuable than in organizational crisis communication.

Another important component to sensemaking is what Weick (1993) described as cosmology episodes. When an event is too complicated or out of the ordinary, humans have difficulty processing the information,

[cosmology episodes] occur when people suddenly and deeply feel that the universe is no longer a rational, orderly system. What makes such an episode so shattering is that both the sense of what is occurring and the means to rebuild that sense collapse together. (p. 633)

Cosmology episodes are the large-scale events where sensemaking is essential. NASA’s crises each constitute “cosmology episodes” because of their magnitude. Understanding how individuals process cosmology episodes will aid in understanding how NASA employees work in times of crisis.

Sensemaking theory may be useful for examining the *Columbia* tragedy from the perspective of NASA employees. Researchers need to examine how NASA employees’ knowledge of previous crises informed their sensemaking efforts during the *Columbia* tragedy. Indeed, such insight from previous crises can reveal how organizational history influences current views of large-scale crises. In addition to looking at individual sensemaking, researchers

must also examine organizational, or group, sensemaking. In doing so, researchers must analyze what is valued and important in order to understand an organization's motivation behind acting in a certain manner towards any crisis event. To explore such underlying assumptions, researchers must delve into an organization's culture.

### Organizational Culture

Researchers addressing organizational culture consistently identify Schein's (1985) work as foundational. Schein based his description of organizational culture on social construction. According to Schein (1985), leaders are responsible for the construction of culture. However, Schein also argues that organizational members help facilitate an organizational culture.

The term 'culture' should be reserved for the deeper level of basic assumptions and beliefs that are shared by members of an organization, that operation unconsciously, and that define in a basic "taken for granted" fashion an organization's view of itself and its environment. (p. 6)

Organizational culture generally refers to the norms or values of a particular group. However, because the definition is so vague, scholars often have difficulty conceptualizing and operationalizing culture. The term has been used to describe everything from anthropological issues to sports psychology. Some organizations have even promoted a "productivity culture" that aims at increasing worker motivation to work harder. However, any signs of imparting long-term change are minimal (Gordon & DiTomaso, 1992). Consequently, scholars (Bean & Eisenberg, 2006; Schein, 1990, 1992) have refined their explanations of the nature of organizational culture. Schein (1990) revamped his definition and explained that culture was a byproduct of experience. In the quest to solve problems, groups begin to rely on internal cues and, through the use of inherent communication, inadvertently begin developing culture.

Leadership also influences an organization's culture. Schein (1992) posited that when a group encounters a problem and the group's identity is at stake, someone will take charge and attempt to solve the situation. When this happens, the group is likely to appoint this member as an organizational leader. As long as the leader does not impede old values and norms, this new organizational leader helps promote the organization's culture. According to Schein (1990), leadership functions to make certain that the organization's culture is not driven by the need for results or financial gain. Rather, understanding an organization's culture can be beneficial when attempting organizational change. Leaders can use organizational culture to discover many elements often overlooked within organizational life and to begin to implement change.

The founder of an organization is considered the first true leader of the organization. This individual or group of individuals lay the groundwork for an initial organizational culture. While some leaders consciously select a culture they would like to promote, others let it evolve naturally. Culture arises from the simple process of making decisions. In his work on retrospective sensemaking, Weick (1995) illustrated how individuals in high-pressure situations tend to make sense of their experiences by drawing on past events to determine reality. An organization's norms and values all become a factor in sensemaking. Organizational culture is not only comprised of the norms and values, but also by the more subtle areas of an organization's composition.

Cultural identity is also contingent upon communication structures within an organization. Schein (1990) detailed the importance of artifacts within organizations. As defined by Schein, organizational artifacts include the manner in which employees dress, the physical makeup of the building, superior-subordinate communication, peer communication, and emotional intensity. Such artifacts permit researchers to look past espoused values and examine

latent meanings and values. Schein (1990) discussed the difficulty researchers have interpreting these artifacts if they do not have a clear idea of the assumptions upon which the artifacts are based. To understand an organization's cultural identity, researchers seek to understand the organization's artifacts and assumptions.

Basic assumptions are often difficult to uncover within organizations. Ruth and Eisenberg's (1987) study of root-metaphors within Disneyland highlighted the importance of studying culture. To understand the culture, Ruth and Eisenberg conducted interviews with Disneyland employees and noted each metaphor the employees used. The analysis allowed researchers to decipher the fundamental assumptions of the organization. Researchers must understand the basic assumptions of an organization to uncover an organization's true values. Ruth and Eisenberg noted, for example, that no employee at Disneyland used common business language. Instead, they used the metaphor "Disneyland as a drama"; they called customers "guests" and uniforms, "costumes." These values were handed down from management. Even outside the presence of managers, employees did not volunteer any metaphors not previously identified by management (Ruth & Eisenberg, 1987). Organizations such as Disney depend on this type of script to maintain its culture. Communicative discourse, evident at each level of an organization's structure, helps explain how culture is structured. Additionally, such discourse allows researchers to examine the subtleties that most organizations overlook. Understanding basic organizational assumptions also allows for a more comprehensive explanation of what happens when organizations undergo crises.

Reviews of several recent crises in the corporate world listed organizational culture as a cause. For example, Free, Macintosh, and Stein (2007) described how the early exponential growth and financial success of Enron created a strong sense of invulnerability within the

organization's management. Additionally, Free, Macintosh, and Stein (2007) noted how the incentive bonuses rewarded certain employees based on individual accomplishments. Enron's employees were obsessed with its stock price. Having such values and norms contributed to an organizational culture that promoted employees that would do anything in their power to raise the stock price. An analysis of these cultural components reveals how Enron encouraged some of the leaders' more unscrupulous dealings. The next section details how scholars have historically approached organizational crises.

### Rationale for Research

Seeger et al. (1998) defined crisis as "a specific, unexpected, and non-routine event or series of events that create high levels of uncertainty and threaten or are perceived to threaten high priority goals" (p. 233). Scholars have explained that crisis is an organizational phenomenon that can either take place on a small scale or a large scale (Seeger et al., 1998). The public tends to learn only about large-scale tragedies through the media, but communication scholars routinely focus on the post-crisis communication of both large and small types of crises. Ulmer (2001) showed the intricacies of leadership and crisis at Malden Mills, a small textile company located in New England. Furthermore, scholars have detailed high profile cases to highlight specific communication behaviors that either positively or negatively impact organizations (Benson, 1988; Davidson, 1990; McCoy, 1989). Through critical research, scholars have questioned the underlying reasons for crises and/or the communication associated with crisis response. As a result, organizations have the necessary information to assess appropriate steps for organizational change and to prepare for new crises. This information can be an effective tool for a variety of different organizations, but especially for government agencies.

Many government agencies share the bane of visibility. In no other time does the phrase “choose your words carefully” carry as much weight as immediately following a crisis, especially for government agencies. The media and researchers critique each action, both verbal and nonverbal, and the assumptions begin to flow. For example, during the aftermath of Hurricane Katrina in New Orleans, the media was highly critical of FEMA’s handling of the crisis. The media showed how FEMA made several broad over-simplifications that cost several individuals their positions. FEMA director Michael Brown lost his position after several emails surfaced showing Brown downplaying the severity of the disaster (Sayre, 2006). Brown’s sentiments reflected poorly on the organization as a whole. Leaders must be careful to adequately represent the agency (Seeger et al., 1998). Immediately following the *Columbia* tragedy, 1879 media representatives swarmed NASA’s Johnson Space Center in Houston (James, 2006). Within hours after the *Columbia* explosion, NASA was at the forefront of all media and public attention.

The bulk of research examining post-crisis communication efforts do not typically assess organizational factors that influence crises. Because NASA has experienced three different crises, it provides communication scholars an opportunity to explore how an organization learns from its history. NASA is unique not only because it is a government agency, but also because of the amount of attention it receives from the public. Scholars can examine how these two factors influence NASA’s ability to learn from its crises. Scholars have the opportunity to stray away from traditional crisis communication research and can focus on more latent problem areas that impede NASA’s ability to change and/or learn from previous crises.

In my review of literature, I did not find studies that examined the influence of past events on future organizational crises. Typically, crisis scholars have focused on the aftermath of

crises, specifically, the public relations area (Benson, 1988; Birch, 1994; Chin et al., 1998 Ulmer, 2001; Ulmer et al., 2007). Few crisis studies use OLT to understand crises. The gap in literature may result from the lack of opportunity for scholars to gain entry to organizations that have experienced multiple crises. In this study, I use OLT and sensemaking theory to examine how NASA learned from previous crises. Specifically, I seek an understanding of NASA employees' perceptions of how the organization's culture changed after the *Challenger* disaster and the effect of those changes on the *Columbia* disaster. Additionally, I discuss NASA leadership, structure, and culture and their impact on the *Columbia* tragedy. To accomplish these goals, I pose the following research questions:

RQ1a: What do former and current NASA employees report are key lessons learned from the *Challenger* disaster that influenced the organization's response to the *Columbia* disaster?

RQ1b: What inherent components of NASA culture influence organizational change?

RQ2a: How do former and current NASA employees rate how the organization's leaders functioned and performed their duties during the *Columbia* crisis?

RQ2b: What effect does NASA's structure have on its crises?

## CHAPTER 3

### METHOD

In this study I utilize a case study method to analyze crisis communication during the aftermath of the 2003 *Columbia* tragedy. I collected data using a variety of qualitative research methods as detailed below.

#### Data Collection

I collected data with a qualitative approach employing a triangulation method. Triangulation involves using two or more comparisons of data to address research questions (Lindlof & Taylor, 2002). Preliminary data collection started in July 2006. In my early research, I focused on NASA's crisis response to *Columbia*. I examined NASA culture and wrote an additional research paper on the topic for a crisis communication graduate class. During this time, I also conducted interviews with current and past NASA employees. Along with personal interviews, I analyzed the CAIB report (2003), to address the research questions. The interview questions aimed to elicit responses regarding specifics about NASA's leadership, structure, and culture and their role in the *Columbia* crisis. The interview script contains two sections (see Appendix A). The first section included open, innocuous questions designed to build a sense of rapport with the interviewee. The second portion asked for specifics about the tragedy. For example, one question asked about the specific role of leadership during a crisis. Another question asked if the participant generally agreed with the CAIB report or felt that it left out anything of significance.

#### Participants

Because of the limited number of potential participants who worked directly with the *Columbia* mission, I implemented snowball sampling. All participants worked with NASA

during the *Columbia* tragedy working closely with communication teams. Snowball sampling provides an opportunity for researchers to investigate unique populations (Lindlof & Taylor, 2002). Generally, researchers use snowball sampling to reach difficult groups of people to track and identify. For example, Vervaeke, Korf, Benschp, and van den Brink (2007) used snowball sampling to identify potential ecstasy users. Other researchers have used snowball sampling to target specific ethnic groups (Barrios & Egan, 2002; Phan, 2005). Snowball sampling allowed me to find individuals who may have direct experience working with the *Columbia* tragedy. I interviewed eight (N=8) participants who worked in some capacity for NASA in a communication centered position during the 2005 *Columbia* mission that resulted in tragedy. Because I targeted a highly specialized and inimitable group of participants for this study, the interviews were in-depth and covered a wide variety of crisis communication questions. At the end of the interview session, each respondent was asked for the names and contact information of other individuals who might be willing to discuss their experiences related to the *Columbia* tragedy. I included participants from a variety of positions, including both subordinate and leadership positions who all worked for NASA during the *Columbia* tragedy. All respondents received a verbal information notice, fulfilling the University of North Texas' Institutional Review Board (IRB) approval. All participants understood that their names would not be used in the study to ensure their anonymity. Any identifying information was kept confidential.

The interviews took place via telephone and were tape recorded. To assure confidentiality, I was the only one who had access to the data recordings. Recording the interview provided me the ability to transcribe the data for future analysis (Lindlof & Taylor, 2002). The interview data remained in a locked filing cabinet when not being used. Because of the distress and obvious emotional hardship associated with the *Columbia* tragedy, the

participants understood that they did not have to answer each question and could stop the interview at any time. Respondents also had the opportunity to receive a copy of the report at the culmination of the project. Transcriptions of the interview data yielded 105 single-spaced typed pages of data.

I also analyzed the 247 page CAIB report (2003) for additional second-hand data. Press releases and other NASA documents came directly from NASA using the Freedom of Information Act. All press release information regarding *Columbia* is still available on the Website that NASA created for the *Columbia* tragedy. Therefore, this study used a case study approach utilizing a thematic analysis of both first-hand and second-hand sources as a means of triangulation (Lindlof & Taylor, 2002).

### Coding

Implementing a grounded theory-type analysis (Strauss, 1987; Strauss & Corbin, 1990), I analyzed the interview data along with the second-hand data and coded it into emergent categories. Grounded theory analysis provided a framework from which I continually looked for relationships throughout the project (Lindlof & Taylor, 2002). Because constant-comparison involves isolating data into categories, I re-arranged categorical information at all stages of the process. I took an open-coding approach to provide a detailed analysis of different examples within the categorical areas. Open-coding provided the freedom to quickly place data in categories. If data was deemed inappropriate for a category it was removed (Lindlof & Taylor, 2002). Similar to Banks, Louie, and Einerson's (2000) coding techniques of holiday letters, I placed similar responses and themes into the same category. Lindlof and Taylor (2002) described the process of categorization and taking pieces of information and placing each into "bins."

## CHAPTER 4

### RESULTS

A number of pertinent themes emerged through the open coding of the data surrounding the research questions (see Table 1). I address each research question below starting with RQ1a which asked what are the key lessons learned from the *Challenger* disaster that influenced the organization's response to the *Columbia* disaster and RQ1b which asked what inherent components of NASA culture influence organizational change.

#### Learning and Organizational Culture

All of the respondents agreed that NASA, to some degree, does indeed learn from previous failures which helped it better respond to the *Columbia* disaster. However, when asked for specific examples illustrating the nature of how NASA learned from the past, the respondents' answers varied. The data revealed many areas of focus and of concern as they relate to organizational learning. In fact, the responses suggest that while NASA has learned to better respond to crisis, its learning capacity is limited by problematic structures and routines. Themes related to RQ1a include knowledge management, falling back into routine, and a problematic information sharing structure. I begin by discussing knowledge management.

#### Knowledge Management

Knowledge management refers to NASA's ability to preserve and successfully negotiate data from previous incidents. Several participants noted the increased emphasis on NASA's Knowledge Management Team and its ability to enhance learning in several different areas. One participant stated that the organization learned on multiple fronts from the technological side to the organizational communication aspects. When asked to describe what NASA learned from

previous crises, Carlton<sup>1</sup> discussed a new position created to “keep track” of information pertaining to specific safety matters. With special attention to electronically capturing the data, NASA’s knowledge management team ensures that information is captured and is easily accessible. Similar types of programs, which focus on keeping the most relevant information organized through ontological development that focuses on new ways to categorize information making it more readily available for an organization, are in place within organizations like Intel (Edgington, Choi, Henson, Ragu, & Vinze, 2004). Carlton described the complexity of NASA’s knowledge management program.

Knowledge management isn’t just about technology, but where technology is today can really help knowledge management. And so one of the things I worked on before I left Johnson Space Center was helping to develop a proposal to staff it and to start working on, you know, a knowledge management person at Johnson Space Center. (Be)cause some individual groups were doing it but we weren’t doing it as a center and this program might do it a little bit but this program didn’t so you weren’t capturing that information. They’re responsible for taking a look at the organization and working with the different offices and programs, first identifying what’s useful to save and then figuring out a system so that not only do you save it, but it’s accessible, people can get to it, you know, because if it’s not easy to get to, people won’t use it. So you’re talking about databases, you’re talking about repositories; if you’ve got reports and white papers, where do you hold them electronically that people can get to ‘em, it goes beyond the technology, like I was saying, it goes into how do people, how do you facilitate people talking about these

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<sup>1</sup> Names were changed to protect confidentiality; the following names were used: Byron, Carlton, Gwyneth, Higgins, and Michelle (not all participants’ responses appear)

lessons and keeping them alive and doing things in real time so that the younger folks learn and understand.

Despite this new focus on knowledge management, a fundamental problem with NASA's current system is rooted within the organization's structure. Appendix B shows the dispersion of NASA centers throughout the US. The issue of structure is discussed in more detail later in this chapter, however its affect on knowledge management was prevalent.

And one of our centers, Goddard Space Flight Center in Maryland, has a real good [knowledge management] program... they're using them and developing them... and the agency as a whole is moving in that direction, but like most things, there's one or two centers that are a little bit ahead of the agency on something like that.

The response indicates that while knowledge management is important to NASA, because of NASA's geographically scattered location, some centers lag behind with their development of such programs.

Firestone and McElroy (2004) described the unique relationship between OLT and knowledge management as "intimate." One of the main tenets of organizational learning theory discusses how an organization can learn from previous events. Theoretically, if an organization had access to as much information as possible about previous crises, it would be more apt to learn from its mistakes. NASA has started further developing its knowledge management system by keeping adequate, accurate information available about previous incidents. The difficulty for NASA, however, is making the information readily available throughout all of its major sites across the US.

## Falling Back Into Routine

“Falling Back Into Routine” describes the difficulty NASA has with its attempts to change or learn. Several participants identified “routine” as making change difficult at NASA. This theme reveals how aspects of the organizational culture continue to influence organizational change, often in a limiting way. The most pervasive discussion within this theme surrounded the *Challenger* tragedy. Indeed, many participants admitted a problems in the handling of the *Challenger* crisis. However, several participants highlighted the role of leadership in preventing the same mistakes from happening again with *Columbia*. In fact, three participants remembered specific instances of NASA personnel discussing the potential impact a post-*Challenger* crisis could have on the organization before the *Columbia* accident. Higgs remembered hearing of a *Challenger* archived report from a colleague:

An old-age NASA guy brought me the Challenger Investigation Report and was saying you know, take a look at it, because this kind of thing could happen again, and he was right, I had not read it, I had it there on the shelf and I wish I had but uh, we did not really prepare specifically for this event [*Columbia*].

While the reports were available, the emphasis was rarely on looking back. Rather the organization apparently continued looking ahead to the next mission. Higgs’ statement reflects how, despite having reports available, NASA members did not place emphasis on the historical data. Therefore, while NASA learned to make all of the information available, it did not seem to encourage organizational members to spend adequate time reviewing the information unless addendums were made. Michelle detailed the importance of some of the manuals NASA created for safety protocols.

There were documented next steps that NASA would take and they were all documented in manuals that we all knew where they were in the Public Affairs Office. And being that we were Public Affairs, one of the first places that the media, the public, that people would go to for information, of course our team, and our group, and our division, I want to say that we had drills... but we did always have reviews. Monthly reviews, if not more frequently, so if ever there was an addendum to one of the manuals, it was all passed around and shared and we all knew where it was.

Countless reports documenting NASA's many mistakes during *Challenger* are accessible to NASA officials, including transcripts from the US House Committee on Science and Technology *Challenger* debriefing from 1986. Despite such readily available information regarding past incidents, the informants suggest organizational members paid insufficient attention to previous reports on crises. Such inattention to previous failures hinders attempts at organizational learning as organizations tend to fall back into routine ways of completing tasks.

Early OLT scholars have distinguished between individual learning and organizational learning (Argyris & Schon, 1978; Hedberg, 1981; Shrivastava, 1983). Specifically, organizational learning cannot take place on the individual level. Collectively, members of the organization must fully understand their roles within the organization. Additionally, for organizational learning to take place, organizations must promote atmospheres for collaboration (Argyris & Schon, 1978). Due to NASA's technology-rich environment and its hierarchical structure, opportunities to share information are not always possible. Byron explicitly blamed NASA culture:

The culture of NASA is an interesting one in terms of a combination of individuals and teams. I would say there's an almost equal balance of, and I'm going to characterize it a

complete cliché, but it's kind of the old gunslinger mentality. There's a saying in Texas, you're probably familiar with it, "One riot, one ranger." People working for NASA, they are brought up in such a way... I think this is typical of the engineering profession, but I think it's kind of accentuated in NASA for whatever reason, and that is they tend to work alone. They tend to do their thing alone. They sit at a computer or they sit, many years ago at a drafting table with a slide rule in their hands, and they do their part of it. But NASA has always been able to draw people together and have them work effectively as team members, particularly within centers. And there is, and one of NASA's flaws and has been recognized for years, it was brought up in the *Challenger* report, it was brought up in the CAIB report on the *Columbia* accident, and that is NASA employees by and large do not work well across center lines.

Such an autonomous working environment can be detrimental to information sharing. Despite efforts to change working environments, autonomous behavior seems deeply rooted in the NASA culture. As employees attempt to make sense of their realities, they would benefit from a support network for collaboration. Such "gunslinger" attitudes can hinder collaboration efforts, foster a situation in which organizational members fall back into old routines, and in turn, make organizational change a difficult, if not impossible, task.

Complex, large organizations may have increased difficulty in achieving organizational change. Perrow (1984) defined a high reliability organization (HRO) as an organization that has fewer than the normal number of accidents. Perrow admitted that organizational accidents were indeed routine, but some organizations were more skilled at avoiding them. The categorization of NASA as a HRO is debatable. However, in terms of full-scale tragedies to successful manned missions, the ratio is 3:118 (NASA, 2007), suggesting NASA is indeed a HRO. Weick (1991)

indicated that individuals who were part of HROs were more apt to fall back into old, familiar routines. Carlton discussed a similar phenomenon within NASA:

Carlton: I think NASA has shown, and this is a challenge with any organization... that people move around...and they change roles...and so sometimes you'll see a cycle where an organization will repeat the same mistake.

Interviewer: Just because they have different people in different roles?

Carlton: Well, and it's hard to remember after *Challenger*. Bunch of changes, bunch more oversight. Ten years goes by and now you've got budget considerations and the people that are running those programs weren't around for *Challenger* and politically, you know, *Challenger* was so long ago that you can't throw *Challenger* out there on the table...

Carlton highlighted a phenomenon common in many organizations. As people move around within an organization and new employees come in, critical information is lost or is not shared. NASA is especially challenged because so much valuable information is not shared with the appropriate individuals that it promotes favorable conditions for "falling back into routine." Indeed, NASA is unique because it has a massive volume of information which it must maintain. While many technological advances assuredly took place since *Challenger*, the data corroborates the 2003 CAIB report, which described how many similar organizational problems continually plague NASA.

Espedal (2006) examined how changing experiences affect organizational routine. Espedal noted that at times experience can positively affect routine, but other times it can negatively impact routine. The researcher also noted that experience positively affected routine more at the individual level than the organizational level. OLT accounts for how the organization

as a whole adapts and learns collectively rather than learning at the individual level (Argyris & Schon, 1978). While individual learning may occur, organizational learning is stymied by an absence of sharing information across units. Within NASA, falling back into routine, fostered partly by a culture which stymies information sharing, is apparently a barrier to organizational learning.

### Problematic Information Sharing Structure

Several participants disagreed about the details of pre-crisis planning. Carlton discussed what NASA did to prepare for a potential catastrophe occurring on re-entry rather than take-off. We'd thought about hitting the station and so when you're in public affairs and you're going through that mission, you've got these periods when you're docking with the station, when you're doing things like that where you're, you're kind of nervous and you know, you watch with expectation and, and then when it's successful, whew, you know, you let out your breath and you going back to doing, you know, you're still working the mission but it's more normal...never in any of our discussions did we talk about something happening on landing and actually, it wasn't landing, it was re-entry and so it was disbelief, it was shock, it was realizing that little of the planning around specific things that we had done was going to be useful. However, despite such an adamant claim about the importance of both launch and re-entry, Byron described the emphasis differently:

But it was clear, very clear to me, the two phases of the shuttle mission that received the most attention and that people thought were most dangerous were launch and re-entry. Great deal of concern, I mean people really, really held their breath during re-entry. I would tell you as many people were concerned about re-entry as were concerned about the launch phase. I think actually, by that time, we probably thought because we had spent

so much time looking at *Challenger* and the problems of *Challenger* and fixing those problems, we probably thought by that time that we knew more about the problems with launch than re-entry, because we hadn't had a failure.

Such differing statements from members within the organization highlight how separate teams within NASA may have discussed different situations, but more importantly reveal a shortcoming in intra-organizational information sharing. Seemingly complex, large organizations tend to struggle with intraorganizational information sharing (Perrow, 1984). In fact, one year prior to the *Columbia* tragedy, a report from the US House of Representatives boldly titled *Better Mechanisms Needed for Sharing Lessons Learned* outlined "they [NASA] have not targeted some of the more fundamental problems hampering NASA's ability to share lessons, such as persistent cultural barriers" (p. 5). The difficulty is not identification of potential problems, but in the curbing of potentially counterproductive behaviors. Turner (1976) listed decision making and information sharing at all hierarchical levels within an organization as a potential means to bring matters of attention to upper-management. The disconnect between organizational learning and decision making remains an issue, especially within HROs. Carroll, Hatakenaka, and Rudolph (2006) identified a barrier to organizational learning within the decision making process. They noted how members within different hierarchical levels of a HRO can learn or interpret phenomena differently. Therefore, the need to make certain messages are clear and interpreted correctly by all members of an organization is essential. Cross-unit sharing is necessary for conveying clear and consistent messages through leadership.

#### Leadership, Structure, and Organizational Culture

RQ2a and RQ2b addressed issues of leadership and structure specifically during organizational crises. The role of NASA leadership during times of crises was thoroughly

documented by the participants. Two themes, transparency and application of crisis planning, characterized the role of leadership within crises.

### Transparency

The data illuminated the pivotal role of leadership, specifically, how individuals took responsibility and directed a team during the *Columbia* tragedy. Respondents indicated leaders learned from previous failures, specifically from the mishandling of *Challenger*, and assumed responsibility for enhancing NASA's visibility during post-crisis *Columbia* communication. Such accounts support the notion of organizational learning as demonstrated by NASA.

I think the primary thing was my administrator knew about what had happened with *Challenger* in the silence and almost cover up by the leaders, NASA leadership and he decided right from the very beginning we were gonna be wide open and let everybody see all of our warts and we were gonna, you know, we were not going to try to cover up anything and we were gonna let people in on what we were doing and it really made him a dartboard for a lot of people throwing darts, but I think that really helped everybody, we opened up our doors to the Columbia [Accident] Investigation Board and used all of our engineering skills to help them in the investigation, we didn't resist anything. The public was aware they had daily briefings on what was going on, and so I think that was a big improvement over *Challenger*, and we were very transparent.

The decision to shift from closed-door to open-door policies was the most evident shift in leadership philosophy from the *Challenger* crisis to *Columbia*. The relationship between organizational learning and transparency is critical. Prokesch (1997) claimed that the more open and forthcoming an organization, the more the public and its stakeholders can learn about the company, and the company can learn from itself. One investigation into organizational learning

suggested that more open organizations are more effective at collective learning (Snell, 2002). Within NASA, the move towards a more transparent process signals growth within the organization.

Following the communication team's leadership, NASA's crisis communication team maintained a level of transparency throughout the entire *Columbia* investigation. Careful to avoid speculation in times of crisis, the organization was never afraid to state what it did not know what was happening. Coombs (1999) listed speculation as a major downfall to organizations during times of crises.

The media started speculating... 'was it like *Challenger*? How did it happen? Here's what we think is true or false'...and a lot of the senior NASA leaders just said 'We don't know.' And they didn't say 'yes' or 'no,' they just literally said 'We don't know.' And I don't know, in previous crises, you know...how often...this is before *Columbia*, I guess it would have been done during 9/11, but just how often do you go in front of a television nation and say "We don't know what happened." But I think it showed a lot of courage. According to Michelle, NASA leaders including Ron Dittmore, the NASA space shuttle program manager, were not afraid to tell the media that they did not know what had happened. Additionally, the CAIB report noted NASA leadership's openness during its own investigation.

Our aim has been to improve Shuttle safety by multiple means, not just by correcting the specific faults that cost the nation this Orbiter and this crew. With that intent, the Board conducted not only an investigation of what happened to *Columbia*, but also – to determine the conditions that allowed the accident to occur – a safety evaluation of the entire Space Shuttle Program. Most of the Board's efforts were undertaken in a completely open manner. By necessity, the safety evaluation was conducted partially out

of the public view, since it included frank, off-the-record statements by a substantial number of people connected with the Shuttle program. (p. 6)

The transition from a more closed communication style to an open style indicates growth. The transparency was noteworthy not only to employees, but to the external investigation team as well. NASA leadership's directive to be transparent and open throughout the crisis made the post-crisis stage less prone to failure because NASA did not have to habitually retract statements. Moreover, the arduous task of planning for a potential organizational crisis helped the organization's response.

### Application of Crisis Planning

The ability of leadership to implement a crisis communication plan (CCP) successfully was evident. While Michelle noted that NASA had "backup plans of backup plans," no potential crisis plan can be all-encompassing (Coombs, 1999). Numerous scholars have adamantly claimed the necessity for strong CCPs (Bierck, 2002; Klann, 2003; Sandman, 2006), however, few have emphasized the critical component of planning. Coombs (1999) stressed the importance of keeping a crisis communication plan (CCP) as a "living document." The CCP should be updated frequently and reflect any organizational changes. Carlton addressed NASA's take on communication planning and specifically connected NASA's leadership to its heightened importance.

The plan, as we've seen, may not be as useful as the planning. Occasionally you get lucky and your plan has a lot of good stuff in it. But the key is the planning and the communications and having the tools on your belt that you can pull off and use when something happens. And then having the leadership that knows, I've got to use those tools.

The plans were not necessarily beneficial for their content, but for the process individuals went through while developing the plans. The respondents indicated that the planning stage yielded many tools that better equipped them for the crisis. Michelle described how NASA made plans for a wide variety of scenarios, including many contingency plans for contingency plans.

Unfortunately, I was with NASA when we had 9-11 as well, and so there were some because we were a government permanent defense center, and so there were some responses that we had to do, and take care of that we...uh...that I was a part of. And then NASA also had a hurricane threat, where we actually were in a mission and we had to move mission control. ...NASA has a backup plan for everything...They even have backup plans for backup.

Specific leaders developed evacuation plans and emergency plans that contributed to the organizations preparedness for the *Columbia* tragedy. Several participants mentioned the routine nature of discussing and examining crisis communication manuals with leaders in the public relations office. However, as detailed and as precise as such manuals were, the real benefit, according to Carlton, was planning for the unthinkable. Developing a contingency plan for every potential crisis is impossible, however the process of crisis planning provided helpful information to leaders that could be applied to any type of crisis. OLT researchers have explained that organizations cannot have clear cut plans of for each emergency. Therefore, the importance for studying “norms” in times of crisis become important and researchers can begin to identify more consistent themes and expand upon the theory behind crises (Becheler, 1995).

Weick (1991) described a collapse in sensemaking that can yield deadly results in times of crisis. The discursive act of planning for a crisis and discussing potentially tragic events assists in the sensemaking process. Planning gives teams a point of reference in times of chaos.

Several participants noted that they “just knew what to do” in the few minutes after they knew something was wrong. Michelle remembered specific details about that Saturday morning:

It was just instinctual. So pretty soon, here I am in the newsroom in my Saturday clothes. Its not like I dressed appropriately for work and went over there....I literally threw on my jeans, went over to the newsroom, and I was one of the earliest ones there, other than the people who were there already staffed. But at this time the images on the screen were just starting to come in of *Columbia* breaking up over the sky. Of course there wasn't a lot of communication internally, because as you know, mission control was trying to [make] contact...from the moment that we at NASA knew then, that we had lost *Columbia*, and then from the moment that we had the President confirm that we had lost it over the United States...

Many members who were not previously in leadership roles were able to step into leader-type positions to complete tasks pertaining to the tragedy. Another participant noted how many members of his team emerged as leaders through delegating tasks among each other and assuming more responsibilities not commonly associated to them.

#### Organizational Culture and Structure

Questions designed to illicit responses about the specific structure of NASA and its effect on crises revealed a surprisingly, strong connection to organizational culture. Therefore, I combined the two categories to allow for more overlap between the coded themes.

#### Military Background

Gwyneth discussed the difficulty in trying to describe NASA. She stated that is simply unlike any other organization. However, many participants described the complex, ubiquitous

structure of NASA, which is located throughout the U. S and the world. However, the overwhelming majority of participants likened NASA to the military.

It's got a strong connection to the military...I mean the early astronauts, most of them were military and a lot of them still are. For a lot of the 90's, late 80's and...well, actually *Challenger* was taking military satellites to space ... so there's been a big connection.

Such a hard-lined hierarchical structure also has a downside. For example, Michelle stressed frustration with infrequent visitation from members of the federal government. Such an example demonstrates the difficulty NASA has with such a geographically dispersed structure.

Prior to *Columbia*, our President, our current President Bush, had never been to the Johnson Space Center. Never. And so now he's the President that will give us the new directive to say that we are going back to the moon and beyond? Isn't it....don't you find that odd?

According to Carlton, a military background fosters a "can do" attitude that enabled NASA to accomplish what was able to accomplish a number of achievements.

I think the 'can do' attitude, there is a hierarchy, it's fairly strongly adhered to, it's not a flat organization, and it's not avante gard like Google or someplace like that.

Despite the positive connotation of the "can do" attitude, other participants remarked on the lingering effects of enormous success:

When I look at the Johnson Space Center in particular, and I look at the program culture and the flight operations culture, the people who are most revered and celebrated are those who established an operations culture in the 60s based on technologies that existed at that date. It's a culture that represents....I mean they represent a culture of tremendous

success, of um...tremendous accomplishment, and overcoming adversity...but it is one because of the technologies that were available and the lack of knowledge in this business was based on very, very rigid operating paradigms and control. And, when you have a highly disciplined control environment like that, there's a lot of reticence to do anything new or different...you gotta pound everything flat. Every undertaking is an *Apollo 13* mission. I mean, holy cow, can surround the simplest engineering issues with an army in a heartbeat. I mean, you know, if you've got something that you've got to get resolved, you can raise an army pretty quickly to go get all over it. And that's a strength. I mean it really is a strength. But um....what we haven't developed is an ability to trust smaller, more autonomous groups of experts. We're learning....we're learning the hard way over the years to allow the singular voice, the minority voice, to be heard with some level of credence.

The difficult time the organizational members have trusting non-hierarchical sources is problematic to the foundation of OLT. Organizations do not need to be reliant on outside sources, but must be willing to learn from the exterior as well as interior workings. OLT requires organizations to look at past events and acknowledge mistakes. Because the organization is always attempting to move forward, NASA often finds it difficult to spend sufficient time learning from the past. During the few months prior to a mission date, the entire organization is focused on the next mission. Michelle discussed this perpetual cycle and explained that NASA always has the "next mission around the corner" and how each task centers around the next mission. Mills (2005) described a new theory of sensemaking focusing on incorporating future-driven sensemaking through discursive practices noting the high efficacy of revisiting past failures. NASA's knowledge management department has an important responsibility to ensure

that such information is readily available. However, looking to the past can be antithetical to NASA's militaristic, "can-do" structure and culture. Because of its ambitions, relying on the past may be frowned upon in NASA's culture. In order to facilitate organizational learning, NASA must find a way to reconcile its forward-looking approach with one that learns from its past.

### Thrown Together

Despite NASA's complex nature, respondents indicated that the structure of NASA may have occurred through happenstance. Higgens labeled the organization as "thrown together."

But NASA is a unique organization that, like I say, I use the word "thrown together" but I don't know how else to describe it and it's very complex and very unique. And even the centers themselves are unique. They're very, you know the Johnson Space Center is a very complex organization the way it sort of grew out of the ground and had these different departments that basically were organized to take care of different functions for different space flights and then they all came under the center director and I don't think anyone had a great plan for the thing and there it is, and so that's part of the very complex NASA organization.

In the early days of NASA, the organization struggled to define a core purpose. Carlton stated that while the ties to the military are strong, former President Dwight D. Eisenhower was responsible for making sure the program had other interests as well.

So Sputnik goes up and Eisenhower still made a great call. Eisenhower, lot of clamoring for the military to run the space program, Eisenhower said, 'nope, you know I don't want it to be for military purposes, it should be for peaceful purposes, but we're gonna beat the Russians, if we're gonna catch up to the Russians we've got to have an agency dedicated

to that.' I think he took all of NACA [National Advisory Committee for Aeronautics] and pieces from other places and put them into NASA.

Understanding the origins of NASA helps illustrate the emergence of NASA's culture. The majority of the participants in this study held leadership roles within NASA and had military backgrounds. Researchers have discussed how the dominant culture within an organization is closely related to the values/philosophies of leadership (Martin, 1992; Schein, 1985). Therefore, part of the NASA culture stems from military connections. However, Eisenhower attempted to place NASA attempted to affect a different culture.

A video (NASA, 2006) explaining NASA's current goals for space exploration is reminiscent of Eisenhower's original plans for NASA. The new stage of space exploration, detailed by President George W. Bush in 2005, after *Columbia*, includes "new journeys to the worlds beyond our own." The message from Bush is clear and remains true to Eisenhower's original wishes as evident in the ambitious goals for spaceflight within the next several years. However, as Coombs (1999) noted, continued discussion of moving forward without sufficient analysis of lessons learned can be harmful to an organization. While scholars identified positive attributions with organizations that are able to learn interorganizationally (Nathan & Kooor-Misra, 2002), NASA is at a disadvantage because it has such a unique culture and structure. Thus, the organization has a difficult time learning from any organization but itself. Members of HROs learning "vicariously" through other organizations have an advantage in responding to complex environments and can better utilize shared experience (Nathan & Kooor-Misra, 2002).

Additionally, the constant influx of leadership at both the political and organizational levels suggests another way that NASA is "thrown together" and takes a toll on the organization. Even the hiring process that each NASA employee must go through is complicated and time-

exhausting process. Michelle mentioned how every four years the government puts a freeze on funding and NASA has to work around it in order to keep functioning:

It was the end of December when I had found the opportunity, and when I had started the application process I had only 5 days to complete it, and in the old days...like 7 years ago, you couldn't do everything online, and of course NASA gets tons of paperwork, and I would think that writing your thesis was less work than my application. (*Laugh*). Yeah, it was crazy. So I called one of my best friends, and I said I need your help. I need you to just write, and write, and write to help me get this application done before Friday!

While Michelle's narrative is humorous, it highlights a serious issue. With such a dramatic fluctuation in leadership and funding each year, organizational members have a difficult time developing trust and adequately planning for the future. Wilson candidly explained that such a structure only helps in the "here and now" stages.

I don't think the structure of NASA is as big a challenge to its ability to communicate across department boundaries and across center boundaries and between the field centers and NASA headquarters *as* the practice...the current accepted political practice of firing and re-hiring all the top leaders at the agency every time there is a change in the administration...On top of all this, every time there's a change in administration, or a major change in administrative policy in Washington, you get a new NASA administrator, he names new associate administrators, he names a deputy administrator; you come in with a whole new set of strategic leadership that has a whole different agenda. Right now, the leadership at NASA is focused on the next year and a half; that's all they care about. What can we get done before we're thrown out of office? And so there's a lack of loyalty, there's a lack of commitment, and a lack of trust that exists

between the career civil servants and the political appointees. That makes it very, very difficult to do long range career planning, long range program programming and renders NASA's programs extremely vulnerable to the political ties.

Using a sensemaking framework, Wilson's description is troublesome. If members push to accomplish short-term goals before the next administration change the organization cannot be true to any long-term goals. In fact, NASA's goals are "thrown together" every 4-8 years preventing organizational members from having a consistent compass to guide their behaviors. This action is evident with the many responses suggesting that NASA was only concerned about the next mission. However, such claims contradict NASA's "Return to Flight" campaign of 2004 when President Bush outlined a detailed plan to re-visit the Moon and even space exploration of Mars by 2030. Focus on the future without proper attention paid to the past can result in habitual mistakes. In order for OLT to occur, an organization must give credence to the past as the organization plans for the future. Additionally, a goal-minded future aids in learning specifically what is important from the past.

### Competition

The structure of NASA tends to breed an inadvertent competitive atmosphere, which confounds organizational learning processes. When discussing structure, Higgins described the competitive atmosphere when vying for funds:

They were all these individual centers who were always very aggressively independent of one another. Always vying for funds in a zero sum game you know if Langley got additional funding them somebody else got less. You had that kind of competition for funding between the different centers, and in the agency itself you had several major components that were always competing with each other, you had the aeronautics part,

you had the human space exploration, you had the space science and then you had the earth science. There was a very strong component of people, you know we put up satellites to study earth, the mountains were very strong, all those different components were always competing for resources to do more of what they wanted to do. And that sort of kept NASA, in some ways you know it's healthy to have competition, but in an organization like that, particularly after it had been there for 40 years which it had been there since its time [with] Apollo, congressional delegations get involved and you have the congressional delegations from California and Alabama and Florida and Texas all competing for money earmarked you know to get more to go to their center in their state.

The discussion of healthy competition also continued with Michelle. She had an overwhelmingly positive outlook on what she considered the healthy aspects of competition within NASA.

The Johnson Space Center is the manned space flight center, then we've got the Cape which is really supporting landing and launches. So because we are defined separately, by some of the things that we focus on only, that is helpful...if we had two centers that both did launch and landings, then there would definitely be some competition. Now, having said that, there's also some times where there's a lot of just healthy interest in competition. If someone is working on a project that's getting all the attention, of course...I don't want to say jealousy, but there's that healthy feel of saying wow, look at what Jet Propulsion Laboratory (JPL) is doing or gosh, I really wish I could work on that project' and 'darn, that its going to another center.'

Several respondents adamantly claimed that competition thrived within NASA and promoted a healthy working environment. However, one participant remembered details about losing

funding to another center and in other instances, respondents indicated that no such “competition” existed.

Lobuts and Pennewill (1989) described competition as potentially counter-productive in a workplace. Oftentimes, when groups of individuals within an organization are competing, the atmosphere is ripe for deceit. Without hesitation, many participants stated that competing for funds between sites was evident. Applying the competition element into organizational learning models is incompatible. OLT requires members of an organization to stand together and share information (Wahl, 2003). With different teams competing for funding, an organizational environment is potentially conducive to a breakdown in information sharing. Indeed, several participants noted the healthy nature of competition to get projects completed, however few detailed the potentially negative outcome. Still, competitive environments limit information sharing, a problem noted in the CAIB report that contributed to the *Columbia* disaster. Because of the inconsistent responses regarding competition, and even with the CAIB’s findings that competition was indeed a factor at NASA, it is unclear to what extent competition impacts NASA based on the polarized responses.

#### Risk versus Safety

This theme characterizes a value-split in NASA’s culture, with some factions of the organization privileging “risk” and others privileging “safety.” The proverbial “safety culture” of NASA outlined by many scholars and researchers is a phenomenon routinely criticized in the media and by researchers alike. The 2003 CAIB report was highly critical of NASA’s culture.

Given that today’s risks in human space flight are as high and the safety margins as razor thin as they have ever been, there is little room for overconfidence. Yet the attitudes and decision-making of Shuttle Program managers and engineers during the events leading up

to this accident were clearly overconfident and often bureaucratic in nature. They deferred to layered and cumbersome regulations rather than the fundamentals of safety. The Shuttle Program's safety culture is straining to hold together the vestiges of a once robust systems safety program. (p. 177)

McCurdy (1992) described NASA's culture as a by-product of NASA's origins. Because NASA is made up of several different conglomerations and each separate entity is, to some extent, independent of the others, a mixture of cultures are evident. The overarching "safety culture" is most palpable when examining the differing goals each team works to attain. For example, Carlton discussed a rigged "friction" between two opposing forces that hindered efforts to have a successful mission.

The terrible friction between making sure everything is absolutely safe and sound versus schedule and getting the thing into space on time and that's hard that a, an ever-present, tug-of-war...Not the way the shuttle's designed, that'll never be fixed. And you know the only time you'll have a safe shuttle is when it's in the building not going anywhere. Each respondent discussed the inherent risk aspect of space flight. However, the extent to which each discussed risk at NASA and the ways each discussed risk was different. Higgens portrayed the discussion of risk as a difficult topic that was discussed in detail, but not necessarily labeled as a "risk discussion."

It [risk] didn't really serve, this is my amateur assessment, because I'm not a research scientist, but I would say it didn't really serve a purpose to talk about it, everybody in NASA knew there was risk, because constantly, from the whole time I was there, we were finding things wrong, and when you stand and, when you go back and look at the newspaper stuff over those three years, two and a half three years, we had the shuttle, the

fuel flow liner crack that we had to fix, we had the ball bearing that cracked on the transporter that transported the shuttle, we had some wiring problems, and we would go back and fix some things and mitigate others, so risk was, risk was in the conversation but it wasn't a risk conversation per se.

Higgins' statement correlates with what McCurdy (1992) described as a "normalization" of risk. McCurdy suggested that risk is always present, perhaps in the back of everyone's mind, but with NASA, risk is discussed so frequently that it is not necessarily explicitly addressed.

It [risk] came up in the natural flow of, if we don't fix this, here's the risk...then we better fix it so we're not flying for two, three months till we fix it. That actually happened, you know there were several of those occasions between the time I got there in the summer of 2000 and *Columbia* where we stood down the Shuttle program and that's again, that's where some of that pressure was because we were behind on the space station assembly schedule because of the problems the Shuttle was having. Because we had stood down, because people had said well, the risk is unacceptable, we can fly with knowing there could be cracks in more of these flow liners, so we broke down the shuttle and went in and fixed the cracks we found on the flow liners because those risks were unacceptable. So again, it's never on the agenda, you know...But when you, somebody said, hey, engineers have found this wiring problem, what's the risk? Well, the risk is we could short out the power system on orbit and not be able to land it. Oh, ok well, that's not acceptable; we've got to go address that. So yeah, it was talked about but I don't ever remember it being an agenda item on itself, just, "risk." Or overall program risk. Now, we did have, and I'll tell you the other, well I should take that back. No, I think that it's still accurate. Each of those individual things would be talked about in our safety

meetings and each of those individual things was on a chart that showed the risk, relevant to the severity, in other words, if you cut your finger, the risk that it's gonna bleed is pretty high. But the possibility you're gonna die from it is very low. It was like, here's something that's high risk to get worse, but it's not going to bring down the shuttle. And so there were other things that were, and that might be a five for risk but a one for severity.

Many HROs are forced to negotiate the tension of "risk versus safety." Murphy (2001) revealed that the original purpose of flight attendants was to distract passengers so that each passenger would forget about the potential dangers of flying in a metal tube some 30,000 feet in the air. Mainly, the flight attendants purpose was to occupy the passengers with beverages and friendly conversation. Within high-risk prone organizations risk is rarely the conversation of choice.

Higgins remembered risk more in terms of probability:

So it would be a five on the potential damage, so you might stop the Shuttle program for that one because the risk of catastrophic failure was too high. Because it might only be a 50/50 chance it would happen, but if it did happen it's a bad day. So the safety guys did go through those things to try and classify the incidents and assign risk to them and assign a probability you know, its high risk but its low probability, it was a talked about probability....Probability that this would happen is very high, but the risk it would bring the Shuttle down is very low. Or, probability is only 30% chance, but if this happens, we lose the crew and that's I don't want to fly on a 30% chance. I might fly on a 3% chance so that went on a lot.

Quinn, Hildebrandt, Rogers and Thompson (1991) illustrated the importance of multiple value-laden messages when working with team-members who have differing values. The

researchers noted that if leadership refuses to cater to all potential values, subordinates could potentially tune-out messages pertaining to values they feel unimportant. NASA is unique because team-specific leadership possessed inherently competing goal-oriented values. With respect to sensemaking, members of NASA and its contractors begin to shape organizational reality through their experiences.

In an industry with an inherent amount of risk someone has to determine whether the nominal amount of perceived risk is “acceptable.” However, when one tries to isolate the specific level, the task becomes much more difficult. Cox and Cox’s (1991) model describing organizational attitudes towards safety shed light on the potential way to frame discourse surrounding organizational safety. Cox and Cox reported that organizational members’ beliefs about safety arrive from either hardware (technology) knowledge and or potential hazards, specific software, co-workers, and/or perceived risk. The safety culture at NASA is perpetuated through all four of these areas, but seem to be exacerbated because of NASA’s high-profile status.

### Summary of Results

In summary, the results yielded several interesting points of discovery through the thematic analysis. RQ1a asked what NASA learned from previous crises and RQ1b asked what inherent components of NASA culture influence organizational change? The results revealed areas within NASA’s Knowledge Management team that were in place to aid in organizational learning. Additionally, the themes of “falling back into routine” and “problematic information sharing structure” highlighted the difficulties NASA has with learning from itself due to the organization’s culture and structure. Specifically, the results demonstrated NASA’s difficulty in

positioning itself to learn from the past when organizational members are constantly pressured to focus on the next mission.

RQ2a and RQ2b asked how leaders functioned and performed their duties during the *Columbia* crisis and questioned the effect of NASA's structure on its response to crises. The results demonstrated a shift towards transparency within the organization enhanced the handling of the *Columbia* crisis. Additionally, specifics of the application of crisis planning showed how the act of planning for different scenarios assisted with the organization's response.

Furthermore, because organizational culture was prevalent within the structure themes, I combined structure and culture. Within this category I discussed NASA's connection with a military background and the lingering effects of that connection on the present-day organization. Through the "thrown together" theme I discovered how NASA's origins contribute to its current structure. Additionally, I described the competitive nature within the organization, specifically when members attempt to procure funding. In analyzing the last theme, "risk versus safety," I discovered a strong influence from organizational culture.

## CHAPTER 5

### DISCUSSION

My chief purpose in this study was to discover why NASA finds it difficult to learn from previous failures. To determine root causes, I posed four research questions concerning learning, organizational culture, leadership, and structure. Data was collected via telephone interviews and official reports. Data was analyzed using a qualitative thematic analysis. Indeed, it is evident that NASA does learn from mistakes; however, the case study provided evidence detailing the extreme difficulty in achieving the degree of organizational change that would prevent future, major crises. Building from organizational learning theory (Argyris & Schon, 1978) and sensemaking theory (Weick, 1988), this study detailed the salient roles of leadership, structure, and culture, and how each affect NASA during and between organizational crises. While this study utilizes a case study approach of one organization, other organizations can benefit from analyzing NASA's crisis communications.

The study supports claims from organizational learning scholars that an increasingly clear, concise and uniform model of organizational learning would provide a more coherent framework from which organizations can attempt to learn (Marlene-Fiol & Lyles, 1985). Only through more case study approaches can scholars have an increased understanding of how organizations learn. With more case studies applying an organizational learning theory perspective, scholars can develop a historical database of cases detailing how specific organizations learn or attempt to learn. This study illuminates issues of organizational learning and sensemaking that may be beneficial to other organizations and organizational scholars as they attempt to learn from crises. NASA's history is helpful in this endeavor because of three

major crises that illustrate specific lessons from organizational learning and sensemaking theories.

### Implications for Other Organizations

As one of the major themes of this study revealed, NASA continues to make itself as transparent as possible. Larsson, Bengtsson, Henricksson, and Sparks (1998) noted that organizations can achieve higher levels of interorganizational learning from more open cultures. With such readily available information on NASA, other organizations have a unique opportunity to learn interorganizationally, especially with NASA's incoming transparency. Interorganizational learning is gaining popularity as technologically rich industries work together to discuss partnerships or knowledge sharing. Dixon (2000) explained how organizations such as Ford, Texas Instruments, and even the US Army benefit from sharing information. While some of the themes uncovered within this study may not be useful for every organization, several are applicable to a variety of organizations.

### Leadership

As the data suggested, certain individuals rise to the occasion to carry out duties and even assume unfamiliar roles in times of crises. Several NASA personnel told vivid stories of a strong sense of "togetherness" and how leadership acted in a unified manner in the aftermath of the *Columbia* tragedy. Each member of NASA knew that they were the object of public scrutiny, and even team members who had little or no crisis experience instinctually recognized the importance of their participation as part of the crisis response/communication team. The willingness of NASA leadership, within the first few hours after the *Columbia* tragedy, to state boldly "we do not know what happened" proved the most appropriate response. This response demonstrated a critical lesson learned after the *Challenger* explosion, a crisis response that

created a closed, suspicious climate within and around NASA. The organization obviously learned the importance of transparency as they considered the mistakes made in their second tragedy. As a result, the organization gained the trust of the media and the public. The ability of the organization's leaders to shift towards a more open communication style assisted in the handling of the crisis. Because of the organization's strong sense of openness, all participants felt like their opinions and actions were trusted by other members of the organization throughout the duration of *Columbia's* crisis stages.

The degree of openness within organizations is difficult to negotiate. For example, an organization's public relations team may want to release information that the legal department might advise against. Reber and Gower (2006) analyzed press releases during the corporate scandals of World Comm and Enron and concluded that while public relations and legal teams may historically have had opposing goals, they discovered a "blurring" of these two teams' communication strategies. Their findings are instructive for this study, because they demonstrated how quickly an organization can meet its demise based on poor organizational planning. NASA received a lot of pressure to speculate in the immediate hours after *Columbia* but refused to do so. Consequently, the organization appeared more honest to the media and the CAIB, and it conveyed a truthful message to the public without speculation or hearsay.

Additionally, leaders utilized previous training that aided in their preparedness for an actual crisis. While the specific crisis plans were helpful, several respondents indicated the *process* of crisis planning was more beneficial than the actual plans produced. Scholars (Coombs, 1999; Seeger et al., 1996) all have detailed the power of a crisis plan, but have not explicitly heralded the significance and the efficacy of the planning. Time spent in preparation

for crises provides leaders valuable experience in considering contingencies that arise during crisis situations.

Obviously, NASA's leadership was met with criticism during and after *Columbia*. Indeed, my analysis of the data revealed a problematic area within NASA leadership. The consistent, four year shifts in leadership hinder long-term progress. Based on early models of organizational culture, Schein (1985) remarked the innate ability of leaders to establish the organizational culture. When politically-appointed leaders come and go, it is often difficult to *change* the culture. What remains with an organization, as is evident in this analysis of NASA, are the tattered remnants of a problematic culture which perpetually hinder organizational change. Other organizations can learn from NASA's experience and allow leaders to stay in positions for durations that are sufficient to fulfill long-term goals.

#### Culture

While organizational scholars have disagreed on the precise definition of organizational culture, researchers have agreed that attempts to change a pre-existing culture are typically difficult (Mason, 2004; Schein, 1985). Argyris (1982) noted that "It's not easy to alter engrained behavior even when that behavior is clearly counterproductive — but, fortunately for the health of our organizations, it is possible" (p. 5). Identifying a troublesome organizational culture is not difficult. Scholars had discussed the inherently negative components of NASA culture well before *Columbia* (McCurdy, 1991, 1992; Pidgeon, 1998; Vaughan, 1998). As the data suggested, NASA's culture continues to be a topic of concern. However, attempts to change the culture have failed. The change presenting a more transparent front demonstrates what Schein (1985) labeled "espoused values." These are values or goals an organization is aware of and making an

effort to exert, but does not qualify as the organization's true cultural value because it is acted out as a goal, and not yet a basic assumption of the organization's culture..

The connection between OLT and organizational culture is becoming more clear to scholars. Stead and Smallman (1999) remarked that more credence must be given to organizational culture in OLT. Bechler (1995) emphasized the significance of learning the history and the roots of an organization in understanding its crises. Schein (1985) suggested that leadership has a strong role in changing an organizations culture. However, with the constant in-flux and political changes that occur effecting NASA, it will take many years before change can occur. The paradox that is created with the political fluctuation and in-flux of administrators is troublesome. To a certain extent, the organization must remain static for an extended period of time to begin developing or altering its culture. However, with the current system in place, NASA is forced to go through a forced change when leadership changes. Although the new leaders may have a vision of what they want the culture to become, the remaining, long-term employees often continue to operate utilizing the basic assumptions which drive organizational culture (Schein, 1985). Such a phenomenon also contradicts Schein's (1985) view that leadership promotes and assists in the maintaining of organizational culture. Within NASA, it is evident that the change in leadership does not bring about measurable cultural change.

It is clear that the NASA culture is responsible indeed counterproductive to the organization's long-term goals. The media often finds a problematic organizational culture guilty for all of NASA's faults. While NASA's culture is problematic, an analysis of that culture reveals why the organization has difficulty learning. As many respondents suggested, organizational change is almost impossible because the culture is so static. Understanding Schein's work with culture helps explain NASA's current culture and why that culture is nearly

impossible to change. Because of this difficulty, organizational researchers can begin to understand why NASA has issues with learning from itself. Therefore, instead of simply blaming NASA culture, scholars and researchers can focus on ways to change culture and discover ways to produce organizational change.

Early reports after the *Challenger* tragedy detailed the problematic safety culture within NASA. The *Challenger* tragedy, as discussed earlier, showed how teams working towards safety and teams working against a short launch window yielded deadly results. However, similar problems were still evident during *Columbia*. The CAIB recommended that NASA employ more outside sources to help monitor safety and assess risk. The results of this study support the CAIB's recommendation. NASA must give more credence to external agencies to assist with safety monitoring. Michelle discussed the strong sense of "moving forward" within NASA on almost every issue. However, without sufficient attention to past events, an organization will not be able to learn from mistakes and apply knowledge to future events. Agencies must keep an updated knowledge management system with relative, useful data from not only successful missions, but also failures. An external agency would also enhance the learning process and aid in changing organizational culture by reducing what one participant called, the "gunslinger" mentality evident within NASA.

#### Structure and Competition

The data suggested many inherent organizational flaws from NASA were deeply-rooted in the organization's origins. Several participants discussed how certain elements of NASA seemed "thrown together." For such a large and technology-driven organization to be categorized as such is disconcerting. In order for OLT to take place, each facet of the organization must have complementary goals. While the success of the mission is undoubtedly

the goal of every team at NASA, the tension between risk and safety impacts teams differently. However, what makes the process even more difficult is NASA's unique structure.

While organizations often are geographically spread out, NASA's rigid hierarchy and dispersed locations often promotes a competitive atmosphere. As several respondents mentioned, different space centers often compete for funding. Such competition can be harmful to the organizations long term goals and can be counterproductive to the organization (Lobuts & Pennewill, 1989). NASA's original structure established several barriers that hinder organizational change. To understand why NASA's organizational culture is resistant to changes, scholars must first understand the organization's origins.

When attempting to describe how the organization is similar to another organization, one respondent mentioned brought up a literary illusion. The respondent stated, "It's like you are blind man reaching out and holding on to an elephant." The parable of the blind man and the elephant describes the perplexing nature of NASA and emphasizes how many individuals' perceptions of NASA may not be correct. NASA is such a unique organization that members cannot fathom the size and complexity of the organization. Such a complex organization is naturally going to have a hard time re-positioning itself after remaining static for such a long period of time. However, scholars looking at a comprehensive review of NASA's structure and reorganizing knowledge management techniques could aid in overcoming certain obstacles to organizational learning. One respondent claimed that some centers are ahead of the other centers in terms of knowledge management. The fact that each center is at a different place in terms of technology and systems management is troublesome. NASA should position itself to promote a collective organizational learning environment through more centralized and open-sharing systems.

## Theoretical Implications

Marlene-Fiol and Lyles (1985) suggested the lack of uniformity within OLT is a major concern for researchers. As the results demonstrate, organizations, specifically HROs, have difficulty learning from their past. However, the lack of consistent terms and descriptions of models create confusion. In future studies, researchers should build upon historical frameworks rather than starting new with each study and use consistent terminology.

Additionally, scholars must distinguish more differences between individual learning and organizational learning in order to more fully understand the collective learning process. When attempting to discover if NASA learned from previous failures, I had difficulty addressing who specifically was in a position to learn. Because of employee turnover, researchers have difficulty determining whether the organization retains the information or whether it is lost in the transfer. A more comprehensive distinction between individual and organizational learning would assist in understanding the effectiveness of OLT. Research focusing on successful organizational change could highlight potential differences and benefits between individual and organizational levels of learning.

Sensemaking theory helps explain the significant implications of the tensions between risk and safety in the organization. As stated earlier, members of NASA make sense of their job functions based upon the risk versus safety frameworks. Individuals that view the organization from a risk perspective interpret the risk as an acceptable part of the HRO. Individuals with a safety focus have a more difficult time maintaining balance. Sensemaking theory helps explain the process these individuals go through, and also helps explain the frames of thought within their organizational routine.

From a practical perspective, NASA can interpret sensemaking theory as a means to understand how to build more complementary teams. Having a system of checks and balances is beneficial, but each team-member must have complementary goals. Contradictory goals can inhibit the organization's progress. A move towards incorporating more outside agencies to assist with everyday tasks not only paves the way towards even more transparency, but ensures that the organization is not engaging in counter-productive efforts by maintaining a neutral stance. The CAIB (2003) also gave such a recommendation. However, it is important to note that this move should not be seen as a panacea. In fact, a shift towards including more agencies does not necessarily assist in changing the problematic culture and could have adverse affects.

Researchers have applied sensemaking theory to a wide variety of contexts, but its usefulness in crisis communication is unmistakable. Understanding the process that individuals and teams go through when entering the decision making process is critical to developing a rationale for behavior. Without understanding the rationale behind behavior, researchers would not have understood how "groupthink" overcame NASA during the *Challenger* tragedy. Each component of an organization must be examined, even the motives and driving forces behind each organizational member's actions in order to achieve full understanding of the organization.

The heuristic value of sensemaking theory remains evident. The results of this study revealed that individuals at NASA go through an organizational sensemaking regiment when working in an HRO. Just as individuals are subject to their own sensemaking, organizations are susceptible to large-group sensemaking. More research focusing on how HROs can utilize sensemaking theory in the decision making process would aid in the development of organizational leadership and team-development.

## Limitations

The primary concern for this study is the limited number of participants who agreed to discuss their experiences at NASA. The snowball sampling method provided a substantial number of potential participants, but few felt comfortable participating. Despite claims of an increasing agenda of openness, numerous telephone requests for interviews with several current NASA members were unreturned. Despite the difficulty in gaining access to NASA, the CAIB report added more perspective to the study.

Another limitation of the study is generalizability. My goal was to provide a concise case study of NASA that would be useful to other organizations as well. Because of the uniqueness of the organization, some information may not be applicable to the broad spectrum of organizations. However, other HROs may find several topics applicable as a basis for interorganizational learning.

## Conclusion

Examining how a large organization like NASA learns from previous crises illuminated a complex process of learning and highlighted several areas of concern. While NASA receives less than 1% of the Government's yearly budget, the organization represents an ideology that nothing is beyond the grasp of humankind. Because NASA is focused on the future, the organization has difficulty learning from past failures. I have uncovered partial reasons for such difficulty, but models of organizational learning theory were not all-encompassing and could not account for NASA's uniqueness. Sensemaking theory provided adequate discussion on why NASA is so unique and offers valuable insight on how NASA and other HROs make sense of their organizational realities.

Organizational learning is a relatively new field of study. Because of the lack of congruence in the learning models, researchers and theorists should work to create more consistent and all-encompassing models (Marlene-Fiol & Lyles, 1985). While organizational learning will not eliminate organizational crises, OLT can help organizations prepare more adequately for the next crisis. HROs also need to work on inter-organizational information sharing to learn from each other. In the information age, new technologies and better techniques of knowledge management are available. NASA's teams within Goddard Space Station lead the way with their push for knowledge management, but each site must continue to push for more growth within knowledge management. The information an organization has is only as good as how readily available it is to its members.

The findings of this study highlight the difficulty of organizational change. Specifically, components of culture, structure, and leadership each hold a salient responsibility. NASA is moving in the right direction but more emphasis is needed to change behaviors not conducive to organizational learning. Addressing the difficult task is one of the only ways the organization can continue to be at the pinnacle of modern technology and continue to explore areas new to mankind.

Table 1

*A Summary and Description of the Thematic Categories as Discussed in Results*

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| Thematic Category              | Description   |
|--------------------------------|---|
| Application of Crisis Planning | Responses indicated the efficacy of using a crisis-communication plan and carrying out a strategy throughout the crisis. The theme also describes how leadership evolved during the crisis and assumed more responsibilities. |
| Competition                    | NASA's teams frequently competed against one another, especially for funding. Responses detailed the competitive nature of NASA with both positive and negative examples.   |
| Falling Back Into Routine      | Part of NASA's culture includes a habitual routine. Organizational change is difficult because of the nature of the high risk organization.   |

Table 1 (continued)

| Thematic Category                                    | Description  |
|--|--|
| Knowledge Management                                 | <p>To prepare and learn from the past, NASA’s Knowledge Management team compiles reports and works to keep much-needed information available to everyone in the organization. Many respondents listed “Knowledge Management” as answer for how the organization attempts to learn from itself.</p> |
| Military Background                                  | <p>NASA’s structure, while noted as unique, stems from a military background. Many of the procedures in place today are reminiscent of a strict hierarchical structure frequently associated with the military.</p>  |
| <p>Problematic Information<br/>Sharing Structure</p> | <p>Different teams within NASA focused on different scenarios in terms of crisis planning. The notable differences suggest a problem with the way teams share information intraorganizationally.</p>   |

Table 1 (continued)

| Thematic Category  | Description   |
|--------------------|---|
| Risk versus Safety | <p>A pervasive component of NASA culture that details the difficulty of balancing two opposing forces. Many of NASA's teams are designed to highlight safety, while others must analyze risk. The forces contradict each other and reinforce contradictory goals.</p> |
| Thrown Together    | <p>A large portion of NASA's structural problems stem from its origins. The organization stepped into the spotlight as a military organization, and has since switched gears to facilitate more scientific research.</p>  |
| Transparency       | <p>The organization attempts an open-based communication campaign. The strategy includes communicating more frequently and candidly to the public and media.</p>  |

APPENDIX A  
INTERVIEW QUESTIONS

## **A crisis communication study**

### **Information Notice**

This questionnaire is part of a research project aimed at understanding organizational crisis communication at NASA during the Colombia tragedy. In this interview I will be asking a series of open-ended questions. If at anytime you wish to terminate the interview, you may.

This research study received approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects. Participation in this project is voluntary. Although it is important to have all questions answered for purposes of analysis, you may decline to answer specific questions.

There are no known risks associated with this interview **All information you provide will remain confidential, and in no case will individual names or any information that identifies specific individuals be used in either reports or any academic publication of information.**

The interview generally lasts 30-45 minutes. I will tape record the interview to be transcribed at a later date. By agreeing to proceed, you are indicating consent to participate. Once again, thank you for your time and remember if you feel uncomfortable at any point you may end the interview.

#### **Stage 1**

How long did you work at NASA?

What was your position?

Did you enjoy working at NASA?

What was a typical day like for you?

What are some of your best memories while working at NASA?

Let's talk about the *Columbia* tragedy and NASA's response to it.

Describe your role at NASA at the time of the *Columbia* tragedy.

What do you recall about the *Columbia* tragedy that continues to stand out to you?

## **Stage 2**

In your opinion, what roles do leaders play during a major crisis? In your opinion, how well did NASA fulfill this role during the *Columbia* disaster?

What specific instructions were given to you by leaders at NASA concerning communication with the public? The media?

What (if any) specific training sessions discussed previous crises at NASA and how similar situations could be handled differently?

What is it about NASA that makes it difficult to prepare for new crises?

In your mind, does NASA learn from previous failures (both in terms of technology and communications).

What types of other organizations are similar to NASA?

What were your thoughts on the CAIB report? What type of information did you feel was left out of the report?

Did any specific leaders stand out during the crisis and provide more guidance to you or your team? Why?

How is NASA similar to other organizations / how is it different?

How does the structure of NASA effect inter-departmental communication within the organization?

How did NASA's structure (having space centers all across the country trying to coordinate with one another) effect the crisis response to *Columbia*?

Explain to me a little bit about the organizational culture associated with NASA? (Organizational culture is a term used to describe an organization's norms and values) Can you compare it to anything else you have encountered?

What was the effect of NASA's culture on the response to *Columbia*?

What suggestions would you have for how leaders should behave during crises at NASA?

What do you recall specifically about what was expected of you in your role immediately following the tragedy?

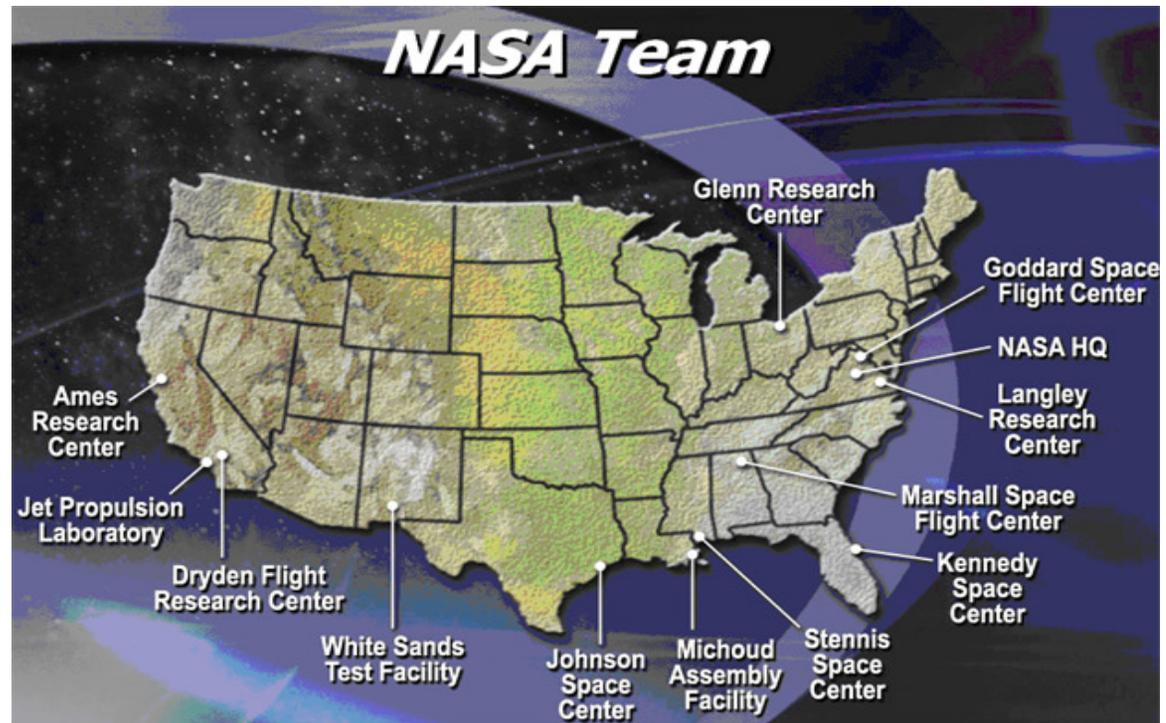
What lessons were learned from the *Challenger* tragedy that, in turn, affected NASA's response to *Columbia*?

In what ways did NASA fall back into any old routines which hampered its response to *Columbia*?

How did previous crisis communications about the *Challenger* tragedy change the internal communication among NASA employees surrounding *Columbia*?

Thank you for your time. I really appreciate your willingness to talk about this.

APPENDIX B  
MAP OF NASA LOCATIONS



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