CHAPTER THIRTEEN: ORGANIZED FOR SUCCESS

The excuse we have heard from some government officials throughout this investigation, that Katrina was an unforeseeable ultra-catastrophe, has not only been demonstrated to have been mistaken, but also misses the point that we need to be ready for the worst that nature or evil men can throw at us. Powerful though it was, the most extraordinary thing about Katrina was our lack of preparedness for a disaster so long predicted.

This is not the first time the devastation of a natural disaster brought about demands for a better, more coordinated government response. In fact, this process truly began after a series of natural disasters in the 1960s and into the 1970s. One of those disasters was Hurricane Betsy, which hit New Orleans in 1965. The similarities with Katrina are striking: levees overtopped and breached, severe flooding, communities destroyed, thousands rescued from rooftops by helicopters, thousands more by boat, and too many lives lost.

Katrina revealed that this kaleidoscope of reorganizations has not improved our disaster management capability during these critical years. Our purpose and our obligation now is to move forward to create a structure that brings immediate improvement and guarantees continual progress. This will not be done by simply renaming agencies or drawing new organizational charts. We are not here to rearrange the deck chairs on a ship that, while perhaps not sinking, certainly is adrift.

This new structure must be based on a clear understanding of the roles and capabilities of all management agencies. It must establish a strong chain of command that encourages, empowers, and trusts frontline decision-making. It must replace ponderous, rigid bureaucracy with discipline, agility, cooperation, and collaboration. It must build a stronger partnership among all levels of government with the responsibilities of each partner clearly defined, and it must hold them accountable when those responsibilities are not met.

Senator Susan Collins
Opening Statement
Committee on Homeland Security and Government Affairs
Hurricane Katrina: Recommendations for Reform
Washington DC, March 8, 2006

We are Doomed to an Unacceptable Future - Unless …

What do the following accidents have in common? Torrey Canyon tanker (1967) and the Exxon Valdez tanker (1989); the U.S.S. Greeneville (2002) and the U.S.S. San Francisco (2005); the Challenger Space Shuttle (1986) and the Columbia Space Shuttle (2003); the Piper Alpha Platform (1988) and the Petrobras P36 Platform (2001), Herald of Free Enterprise (1987) and the Estonia ferry (1994), and failure of the NOFDS in the wake of hurricane Betsy (1965) and hurricane Katrina (2005).

In each case someone, somewhere, understood that organizational and system processes were as much the cause of the accident as were engineering design, construction and maintenance errors (Appendix F). In each case this knowledge failed to prevent a second disaster from happening in the same industry. This record suggests that we are doomed to a future in which increasingly complex organizations and systems of organizations fail causing unnecessary death and injury, large scale economic disruption, political haggling, and years of rebuilding.

We are doomed to this future despite growing evidence that preventing disasters is always cheaper than recovery. We are doomed to this future despite the fact that we know that technological failures virtually always occur within the context of management failures, and there is a growing body of literature that describes management implementations designed to reduce large scale failure (e.g. Roberts and Bea 2001a; 2001b; Dekker 2002; Weick and Sutcliffe 2001).

As an example of what doesn't happen, the National Incident Management System (NIMS) Integration Center issued this alert (Department of Homeland Security 2006):

> *All federal, state, local, tribal, private sector and non-governmental personnel with a direct role in emergency management and response must be NIMS and ICS trained. This includes all emergency services related disciplines such as EMS, hospitals, public health, fire service, law enforcement, public works/utilities, skilled support personnel, and other emergency management response, support and volunteer personnel….*

In mid March, 2005, Donald Hiett, Jr, Principal, Organizational Strategic Solutions Group, was asked by Louisiana State University (LSU) to develop a NIMS training program directed to the senior executive leadership in New Orleans to take place before June, 2006. On March 28, 2005 he was informed there was no interest by these officials in taking this training program (Hiett, personal communication).

We are doomed – unless. This chapter deals with "unless." It first discusses the assessment of safety, and the usual engineering responses to risk. It then asks that the reader adopt a new perspective regarding the USACE and the contextual issues it needs to consider. It then discusses preventing the "next Katrina", and offers recommendations.

13.1 How Safe is Safe Enough?

The hurricane Katrina catastrophe exposed a technological failure of inadequate defenses against a predictable, risky and potentially lethal event. Recent studies have tended to focus primarily on death and destruction from flood waters released by collapse of the NOFDS. Studies of cause acknowledge the extreme forces of nature, but also cite human and organizational errors (HOE) that now occur more conspicuously because the engineering parameters are fairly well understood. HOE failures far exceed mechanical sources in the overall Katrina catastrophe.

Because protection against human weaknesses is more art than science, the study of the causes and remediation of HOE require a context for risk analysis. Non-specialists with policy and management responsibilities should be helped by a perspective that points to the systems-based and interdisciplinary requirements for the NOFDS. Such a perspective can help us answer the enigmatic question, "How Safe is Safe Enough?" In other words, what level of risk is acceptable when making decisions about public safety and security?

Risk is usually defined as a condition in which either an action or its absence poses threats of socially adverse and sometimes extreme consequences. Risk happens from acts of nature, from weaknesses of human nature, and from side effects of technology, all situations that mix complex technical parameters with the variables of social behavior. Although each risk event is unique, all display commonalities that permit systemic analysis and management. These recurring properties lead to certain principles.

To begin, the acceptability of risk cannot be extracted from science or mathematics; it is a social judgment. The spectrum of risk thus embraces both the physical world defined by natural laws, and the human world loaded with beliefs instead of facts, and with values, ambiguities and uncertainties. Among other features, the physical world may be thought of as a mechanism whose behavior follows principles of cause-and-effect. The human world performs more like an organism whose components are not fixed but may grow, and which may be altered by the thrust of events and their interplay with other elements.

Following a notion that what you can't model you can't manage, a systems model is needed to represent the processes by which both physical and societal factors are defined, interconnected and interact. Such technology-based human support systems are labeled by their intended social functions: food production, shelter, military, homeland security, etc. In our modern era, these and other functions are enormously strengthened by applications of scientific knowledge, applied through engineering.

It helps to think of technology as more than the hardware of planes, trains and computers. Rather, it is a social system comprising many organizations, synchronized by a web of communications for a common purpose. It is energized by forces of free market demand, of popular demand for security and quality of life, and by forces of scientific discovery and innovation. It is best understood as a *Technological Delivery System* (TDS) that applies scientific knowledge to achieve society's needs and wants.

Technology then acts like an amplifier of human performance. Like the water wheel, the steam engine and the bomb, it amplifies human muscle. With the computer it amplifies the human mind and memory. It also amplifies social activity, mobility, quality and length of life.

A paradox arises when technologies introduced for specific benefits also spawn side effects. These can induce complexity, conflict and even chaos. Most of these are unwanted by some sector of stakeholders, now or in the future. This paradox is dramatized when technologies are introduced to defend against violence of nature, or against human and organizational error, but themselves spring unintended and possibly dangerous consequences.

The investigation of risk and of measures to contain it within safe limits requires both hindsight and foresight. The past can illuminate failures, their causes and their control as lessons for engaging new issues and threats. The future commands the exercise of foresight, an imaginative preparation of scenarios stirred by such questions as, "what might happen, if ?" or "what might happen, unless?" Those inquiries should then examine the timing of impacts (immediate or hibernating), the identities of players on the risk horizon who may trigger risk, and those parties responsible for risk abatement and those who may be adversely affected now or in the future.

Modeling then becomes essential to represent a full cast of stakeholders and their inter-relationships, including both the private and the public sectors. The concept of a technology delivery system (TDS) is simply an attempt to model how the real world works.

The responsibility to manage risk stems from the American Constitution, from custom, and from a growing body of public law. Federal, state, and local governments are heavily involved in all of the technologies previously discussed and many more. With waterways, for example, the Army Corps of Engineers (USACE) has a predominant statutory responsibility. That accords with the historic federal stewardship of national infrastructure, from roads, shipping channels, harbors and canals to airplane routes and the Internet.

That achievement carries significant but subtle implications. For one thing, safety costs money. The federal budget is constantly challenged to meet a rainbow of different demands, the total of which always exceeds Congressional appropriations. The mismatch must then be reconciled through tradeoffs at the highest policy levels stretching all the way to the President of the United States and the Congress.

Often, a focus on power of the Federal Government misses a major premise of democratic governance. As the Declaration of Independence states, *those who govern should do so only with the consent of the governed*; we would say the informed consent. This notion is reflected in such regulatory legislation as the National Environmental Policy Act (NEPA), Section 102(2) c. It requires estimates of harm that could result from technological initiatives, along with alternatives to accomplish the same goals but with less harm. After preparation, these environmental impact statements (EIS) are made available for public comment and possible amendment. The point is that this process makes every citizen a part of government process to negotiate the question of how safe is safe enough and thus provide citizens the levels of safety and security that they desire.

Implied is a prospective national policy that those put in harm's way have a voice in what otherwise could be involuntary exposure to risk. This principle leaves implementation of the concept to the responsible federal agencies, subject to Constitutional safeguards. Despite a tendency to flare the sensational, the media can enrich understanding with a backstory because disasters so agitate a functioning system as to reveal the full cast of stakeholders, their roles in increasing or decreasing risk and their degree of injury.

In this modern era, society demands better protection against threats to life, peace, justice, health, liberty, lifestyle, private property and to the natural environment. These challenges are not new, but two things have changed—the increased potency of technology and increased media coverage. Technological factors are more robust in speed of delivery and in potential harm. Media covers events live, 24/7, and worldwide. Events anywhere have repercussions everywhere. The better informed public tends increasingly to be risk averse. Apprehension and fear peak after a calamity with demands for better protection through better governance. Higher expectations are legitimate because so many threats just itemized are due to human and organizational errors either in catering technologies to meet market demand or in guarding against hazards. This current study shows that the Katrina event fits that pattern. Government at all levels failed to provide security to citizens before and during the catastrophic flooding. Victims are justified in asking how this pathology of a mundane levee technology developed; How can that knowledge be applied to prevent a reoccurrence?

13.1.1 The Engineering Response to "How Safe is Safe Enough?"

The engineering profession has long practiced social responsibility by a technique of over-design, to compensate for uncertainties in loading, in materials, in quality of construction and maintenance, etc. This may be accomplished by adopting some multiple of loading as a margin of safety ranging from 1.4 to 5.0 and even greater. How these margins are set, and by whose authority, is of critical importance; especially where tradeoffs with cost or other compelling factors such as deadlines may compromise the intended reduction of risk.

This method of safety assurance is more applicable to design of mechanisms not subject to human and organizational errors. The term "errors," incidentally, is shorthand for a broad spectrum of individual and societal weaknesses that include ignorance, blunder, folly, mischief, pride, lack of competence, greed and hubris. Protecting structures against violence of nature such as with earthquakes, volcanic eruptions, tsunamis, floods, landslides, hurricanes, pestilence, droughts and disease may utilize the concept of over-design, based on meteorological, hydrological, seismic and geophysical data of past extreme events.

Learning from documented failures is a powerful method for reducing risks of repeated losses. Another method is to learn from close shaves. Many dangerous events fortunately culminate in only an incident rather than an accident, but the repetition of similar incidents can serve as early warnings of danger. Indeed, the logging and analysis of such events on the nation's airways partially accounts for commercial aviation's impressive safety record. A system for reporting close encounters of aircraft was installed decades ago. Anticipating the possibility that perpetrators of high risk events might be reluctant to blow the whistle on themselves, many years ago the Federal Aviation Administration arranged for NASA to collect incident data and to sanitize it to protect the privacy of the incident reporter. NASA also screened reports to identify patterns as early warning of dangerous conditions. Similar systems are in place for reporting nuclear power plant incidents.

With the growing recognition of human factors in accidents or in failures to limit damage, a class of situations entailing uncommonly high risks but conspicuously good safety records was examined. In the Navy, for example, high risks are a part of daily operations of submarines and aircraft carriers. Yet accident rates are paradoxically low. Careful analysis of these situations showed that certain qualities of leadership and organizational culture foster integrity, a sense of responsibility among all participants, a tolerance by authority figures for dissent, and consensus on common goals of safe performance. High safety performance is associated with an institutional culture that is bred from the top of the management pyramid. The most critical element of that culture is mutual trust among all parties (e.g., Roberts 1990).

Long experience with military and paramilitary organizations such as first responders proves the value of rehearsals to reduce risks and control damage. Of special virtue is proof of satisfactory communications. Evaluation of dry runs has repeatedly turned up serious problems in communication. So has post-accident analysis of real events when delays or blunders in communication of warnings and rescue operations cost lives.

13.1.2 Insights from Addressing These Issues

To sum up, the context for analyzing the levee failures from Hurricane Katrina illustrates several realities. The most compelling imperative of life is survival. Yet the experience of living teaches that there is no such thing as zero risk. Some exposures must be tolerated as "normal," whether in rush hour traffic or when coping with nature, with human nature or with unintended consequences of technology. The preceding situation analysis opens a window on a number of issues treated in more detail in subsequent sections and Appendix H, including the following:

- The design of precautionary measures requires inspired foresight, to imagine or foresee alternative futures.
- Tradeoffs are inevitable between short- and long-range events and consequences, between safety and cost, between special interests and social interests, between who wins and who loses, and who decides.
- All human support systems entail technology, and all technologies project unintended consequences.
- Society embraces a spectrum of values that often conflict, as with the goals of efficiency in the private sector and of sustainability and social justice in the public
- Key decisions regarding citizen safety and security are made by government through public policies to manage risk. These policies dominate the legislative agenda.
- This mandate imposes a heavy burden on the President and on Congress, both bodies requiring access to authentic and immediate information.
- Making decisions and assuring implementation draws on political capital in the structure of authority by the exercise of political power and political will.
- In our democracy, this authority should flow from citizens following the principle that those who govern do so at the informed consent of the governed.
- The quality of risk management can best be judged by the effects on future generations.
- The geography of risk crosses boundaries between federal, state and local entities, and also between the United States and other nations.
- Different cultures have different risk tolerances, including attitudes distinguishing voluntary from involuntary risk.
- Analysis of risk and its control extracts lessons from past failures, although the most catastrophic events are so rare as to often frustrate projections.

This portfolio of issues illustrates the anatomy of risk and the complexity of its management. They sound a wake-up call for deeper understanding by those responsible for risk management, and by those attentive citizens who are exposed and are entitled to a voice in the decision process.

13.2 Maximizing How Safe is Safe in the U.S. Army Corps of Engineers (Context)

We know a finite number of precursors lead to major disasters. But in order to understand what they are we must place a focal first responder organization into its context. For example, the Corps of Engineers (USACE) is nested within a large number of organizations that should be interdependent with one another. The social science literature addresses this problem by using such concepts as *interstices* (Grabowski and Roberts 1999), "interdependencies" (Heath and Staudenmayer 2000) or the "space between" (Bradbury and Lichtenstein 2000; Buber 1970). Failure to consider the processes that operate both within any one unit and across multiple units is failure to be ready for the next large scale catastrophe. This discussion focuses on contex,t and asks the reader to take a new perspective of the Corps of Engineers.

Hurricane Katrina provided an interesting, if devastated setting for understanding what not to do in a quickly changing potential disaster. The organizational liquefaction that occurred after the Hurricane (the heart of the disaster as opposed to the storm), laid bare the skeletons of the organizations that should have had flesh and muscle to respond. It laid bare for the public to see, not only skeletons, but complete organizational disregard for the interdependences so necessary to a coordinated response. As Houck (2006) observes:

> *So What Do We Do? Here is what we know. It is not just the tire, it's the car. And it's not just the car, it's the driver. Nothing in the system has made a numero uno priority either of protecting New Orleans from hurricanes or to restoring or even hanging onto - the Louisiana coast. We have a flood control program, a navigation program, a permitting program, a coastal management program, a flood insurance program, a coastal restoration program - just for openers - and they do not talk to each other. They are riddled with conflicts, basically headless, basically goal-less, weakened by compromises and refuse outright to deal with first causes and first needs.*

The key phrases here are "and they do not talk to each other" and "They are riddled with conflicts, headless, basically goal-less…and refuse outright to deal with first causes…."

In reaction to the organizational liquefaction that developed during hurricane Katrina the Senate Committee on Homeland Security and Governmental Affairs recommended (2006):

> *The Corps and local levee sponsors should immediately clarify and memorialize responsibilities and procedures for the turn-over of projects to local sponsors, and for operations and maintenance, including, but not limited to procedures for the repair or correction of levee conditions that reduce the level of protection below the original design level (due to subsidence or other factors) and also emergency response. It must always be clear - to all parties involved - which entity is ultimately in charge of each state of each project. The Corps should also provide real-time information to the public on the level of protection afforded by the levee system. A mechanism should be included for the public to report potential problems and provide general feedback to the Corps.*

13.2.1 The Office of the President, the Congress, and the Corps

Other things happen at interstices. Figure 13.1 shows the Presidential and Congressional budget requests and Congressional recommendations for Corps of Engineer funding for 1975 through 2005 for the Lake Pontchartrain and vicinity hurricane flood defense projects.

Several hypotheses can be gleaned from this information. First, it appears that while the president was trying to reduce Corps funding Congress was trying to protect Corps funding. With the Lake Pontchartrain projects only about sixty percent complete as of 2005 (40 years after authorization) it may be that Congress, in its wisdom, decided to fund only what it thought needed to be completed. The graph shows other interesting issues about interdependencies. The Corps of Engineers is interdependent with both the Office of the President of the United States and Congress. Congressional members bring pressure to bear on the Corps for new large projects. Faced with these pressures the Corps, then, defers maintenance. For over a decade Congress has funded the Corps at higher levels than recommended by the President. The Corps, then, has to devote time to currying favor with Congress. Currying favor with Congress is not supposed to be a main task of the Corps.

Yet another interesting hypothesis can be derived from these data. When multi-year projects are funded annually an interesting dilemma is created for the funded organizations. The funding oscillation level is at one level, but organizations struggling under that oscillation oscillate at a higher frequency. It is hypothesized that this is because the funded organization operates under a considerable amount of ambiguity and uncertainty. This suggests that the unpredictability of the Congressional process creates unintended and negative consequences for its funded agencies. The processes and responses to them are both schizophrenic.

This is almost surely the same as the case for NASA. The Columbia Accident Investigation Board (CAIB) report said (Columbia Accident Investigation Board, 2003):

> *The White House and Congress must recognize the role of their decisions in this accident and take responsibility for safety in the future.… Leaders create culture. It is their responsibility to change it.… The past decisions of national leaders – the White House, Congress, and NASA Headquarters – set the Columbia accident in motion by creating resource and schedule strains that compromised the principles of a high risk technology organization.*

Diane Vaughan reports that both economic strain and schedule pressure still exist at NASA. She notes that it is unclear how the conflict between NASA's goals and the constraints upon achieving them will be resolved but that one lesson from Challenger and Columbia is that system effects tend to reproduce (Vaughan 2005). This also happens to military installations every time a Base Reallocation and Closing (BRAC) list is formed. From the day of its publication until the day of decisions, the installations on this list spend considerable time trying to get off the list, distracting them from their principle tasks.

In the Katrina case, will Congress and the Office of the President take a sweeping look at their own behaviors in concert with those of the Corps of Engineers? They probably will not because there is not yet a stated strong incentive for them to do so. One incentive might be that the cost of cleanup is always more than the cost of prevention. Money is not limitless. But since we've observed many costly past disasters that were not prevented, and many instances in which they could have been mitigated or prevented, the reality is they probably will do nothing. Thus, the challenge is to find incentives that will encourage both disaster prevention and emergency response organizations, from the President on down, to examine their own organizational skeletons, muscle, and flesh, as well as to look at the "spaces between."

13.2.2 Additional External Interstices for the Corps

Three additional sorts of interfacing between the USACE and its constituents need to be thought about. The first are the interfaces mandated by Emergency Support Function # 3 of the National Response Plan - NRP (Department of Homeland Security, 2004a).

> *ESF #3 is structured to provide public works and engineering-related support for the changing requirement of domestic incident management to include preparedness, prevention, response, recovery and mitigation actions. Activities within the scope of this function include conducting pre- and post-incident assessments of the public works and infrastructure; executing emergency contract support for life-saving and life-sustaining services; providing technical assistance to include engineering expertise, construction management, and contracting and real estate services; providing emergency repair of damaged infrastructure and critical facilities; and implementing and managing the DHS/Emergency Preparedness and Response/Federal Emergency Management Agency (DHS/EPR/FEMA) Public Assistance Program and other recovery programs.*

To accomplish these goals, USACE can draw on the resources 15 federal government agencies. In addition, state, local and tribal governments are "fully and consistently integrated into EFS #3 activities." (Department of Homeland Security, 2004a). All of this occurs, of course, when an incident or potential incident overwhelms state, local, and tribal capabilities.

The NRP concept of operations states that the DOD/USACE is the primary agency for providing ESF #3 technical assistance. It further states that close coordination is to be maintained with federal, state, local, and tribal officials to determine potential need for support. In addition it spells out the organizational structures for providing support, naming the Interagency Incident Management Group (IIMG) as the resource for providing on-call subject-matter experts to support IIMG activities.

Regional and field level mechanisms of support are clearly defined. ESF #3 activities are also spelled out and include such processes as:

> *coordination and support of infrastructure risk and vulnerability assessments, participation in pre-incident activities, such as pre-positioning assessment teams,… participation in post-incident assessments of public works and infrastructures to help determine critical needs and potential workloads, implementation of structural; and non structural mitigation measures, including deploying protective measures to minimize adverse effects or fully protect resources, prior to an incident.*

In the wake of hurricane Katrina, neither the USACE nor any other agency was fully successful in rolling out the NRP. If the integration required by this plan is too difficult for agencies to implement, then it is the duty of the agencies and their oversight agencies (e.g.: DOD, DHS, HHS, etc.) to indicate this and to develop strategies to revise the NRP to create a workable plan and document. Lee Clarke (1999) discusses at length "fantasy plans" and that looks to be exactly what we have here. Thus, a last word on integration across agencies (Lakoff 2006*)*:

From the vantage of preparedness, the failed response to Hurricane Katrina did not undercut the utility of "all-hazards" planning. Rather, it pointed to problems of implementation and coordination. This suggests that in the aftermath of the event, we are likely see the redirection and intensification of already-developed preparedness techniques rather than a broad rethinking of the security question.

Given our experiences with accident response, without substantial leadership and reorganization it is this team's conclusion that neither comprehensive technical nor social reforms will likely soon be developed to address future natural or man made catastrophes.

The second set of interfaces that need to be thought about are those created by the Corps' needs to "outsource" (the hiring of outside, private firms and/or individuals to perform work, including engineering design and construction.) The requirement for the Corps to do this has been imposed by the federal government; specifically through the White House Office of Management and Budget and through Congressional actions. Input from current Corps of Engineers personnel in multiple settings and private briefings with our team, clearly has indicated that through outsourcing and diversion of efforts the USACE has lost "engineering" (Figure 13.2). Core engineering (practicing, research, development) competencies have been sacrificed to pressures to outsource, to improve project management, and to develop environmental restoration and mitigation capabilities, all within a finite overall budget and resources.

Partnering has a number of advantages and disadvantages. Some operational benefits accrue from partnering. One can learn new things from partners, perhaps through access to best-of-class processes. Perhaps partnering competitors can learn technology secrets from one another. Where industry benchmarks aren't well known, partnering with a competitor can offer insights on a company's productivity, quality, and efficiency.

But there are also obvious disadvantages. Lack of control is a critical disadvantage. The demise of ValuJet, for example, happened because the company outsourced cargo handling to a company it had no control over in terms of quality standards. In another form of outsourcing, competitors learn from each others' operations, which may be detrimental to one or more partners. Or a "coopetition" (combination of cooperation and competition) may self-destruct before the renewal option dates arrive. A new company board for one of the partners may not approve of the other partner. The strategic aims of partners may change mid-stream, causing failure. These are just some of the reasons for outsourcing failures. (Roberts and Wong, 2006). The Corps needs to examine its partner relationships, asking itself if it has lost too much.

One of the Corps sister agencies in time of chaos, FEMA, has also created problems through outsourcing its disaster response efforts (Perrow 2005):

For example, when the Nisqually earthquake struck the Puget Sound area in 2001, homes that had been retrofitted for earthquakes and schools with FEMA funds were protected from high-impact structural hazards. The day of that quake was also the day that the new president, G. W. Bush, chose to announce that Project Impact would be discontinued (Holdeman 2005). Funds for mitigation were cut in half, and those for Louisiana were rejected. Disaster management was being privatized, with the person who was to be promoted to head the agency, Michael Brown, saying at a conference in 2001, "The general idea—that the business of government is not to provide services, but to make sure that they are provided—seems self-evident to me" (Elliston 2004). The administration tried to *cut federal contribution for large-scale natural disaster expenditures from 75 percent to 50 percent.*

13.2.3 The Corps Internal Interstices

Two other organizational processes also result in lost institutional memory and loss of control. They are downsizing and retirements. Table 13.1 shows that in recent years the USACE has lost employees. Figure 13.3 shows that the Corps is also losing employees through retirements. Recently, we were told by a high ranking official of the Corps that during the next 5 years, the Corps expects to loose approximately 40 to 50% of its civilian workforce through retirements.

In 2002, between 35 and 40 percent of architecture and engineering work was outsourced to private firms, while all construction projects were outsourced (U.S. Army Corps of Engineers 2002). The simultaneous operation of the three processes (outsourcing, downsizing and retirement) have been and will be disasters for the Corps. Retirements, downsizing, and outsourcing are interdependent in terms of the problems they cause for organizations. Again, the causes are probably buried in not only the Corps activities, but in the Corps' relationships with its external constituencies.

New approaches to looking at organizational failure examine the degree to which organizations are internally stove-piped. Figure 13.4 shows that the Corps organizational structure might lend itself to this. It appears regions and districts act pretty autonomously.

In addition Houck (2006) observes:

…restoring coastal Louisiana is a national issue and will require remedies beyond this state. We lie at the receiving end of a large watershed, and some of what we need has been turned off and other stuff that is hurting us has been turned on. The Corps districts need to talk to each other. The EPA has to step up to the plate, upstream states have to change some habits too. If the nation's taxpayers are going to be asked to spend more money than America spent on the Marshall Plan to fix all of post-war Europe, then they have a right to expect a national effort.

McCurdy (1993) discusses how stove-piping existed when NASA was created. Today the adverse results of NASA's stove-piping are excessive unit independence, specialization and neglect of mutual coordination in a situation that should be characterized by just the opposite (Roberts et al., 2005).

All in all, the Corps ability to do its job has been organizationally handicapped. It has lost engineering and research and development muscle and flesh, it has lost its ability to maintain old projects, it fails to be appropriately interdependent with various constituencies, and it fails to act effectively on issues of internal interdependence. **And, it cannot get well on its own.**

13.4 Preventing the Next Katrina

In virtually all human affairs, risk is normal. The consequences of neglect may be grave, if not now, in the future. As we indicated in the beginning of this chapter we are skeptical that those with power and resources to prevent the next Katrina will take the steps necessary to do so and we provided evidence for this assertion

From our larger discussion about defining safety and including all stake holders in definition and response, three recommendations emerged:

- Responsibilities for vigilance and decision making at the tip of the authority structure should be clarified and strengthened to enhance management of all modes of risk.
- Additional technical Congressional staff should be appointed to assure adequate revenues to manage risk and to monitor performance of the Executive Branch in its duties of care.
- New processes should be authorized at a local level to foster informed consent and dissent, and to function as early warnings in disaster-prone areas, and to reflect that citizens at risk are entitled to information regarding their exposure and opportunities to participate in governance.

One central purpose should animate all the entities involved, separately and in tandem. They should address the question, “How Safe is Safe Enough?” That investigation demands foresight in the spirit of the injunction, “Without vision, the people perish.”

In addition to this larger purview, specific attention needs to be given to the Corps and the organizations with which it is interdependent. We know a great deal about how to fix problems of this nature, and there are growing bodies of engineering, legal, public policy, organizational, and other literatures that address such issues. There is also a growing body of experts from different areas who know how to talk about such issues. The problem is that stakeholders have huge incentives not to pay any attention to this. They are no more likely to fix this problem than they were likely to prevent the Challenger problem from becoming the Columbia problem or the Betsy problem from becoming the Katrina problem.

Fixing the problem will require a set of processes that affected stakeholders do not want to engage in:

- They must come together to decide exactly what they want (clear and consistent goals) in a politically complex and charged world.
- They must be willing to spend many years addressing such problems in a world in which incentives result in attention spans that more typically run the gamut of minutes to weeks.
- Agencies must work together and trust one another.
- They must recognize the interdisciplinary nature of their problems.
- They must be willing to spend money and make recipients of that money accountable for their spending.
- They must develop oversight programs and agencies with real teeth.

13.5 Re-Engineering the USACE

Fixing the USACE's technical problems will have only limited impact unless we also fix the organizational problems. The USACE must strive to become a High Reliability Organization - HRO (emulating the Rickover Navy; see Appendix G). Four recommendations that would go a long way toward repairing the Corp's ability to design and build effective flood control projects:

- Rebuild the USACE's engineering and R&D capability,
- Restructure the federal/state relationship in flood control,
- Develop a National Flood Defense Authority,
- Create effective disaster planning.

Three years before Katrina, the National Research Council concluded that the "Corps' more complex planning studies should be subjected to independent review by objective, expert panels." (National Research Council 2002). This is an obvious point – which makes it all the more urgent to implement. Although the need for independent project review has been apparent for years, none of the past proposals have yet been implemented.

13.5.1 Rebuilding USACE Technical/Engineering Capacity

The USACE's engineering and R&D capabilities were degraded over the past twenty years as a result of streamlining and budget cuts (downsizing and outsourcing). As a nation, we cannot afford the loss of this expertise. Although outsourcing can be efficient in some instances, it cannot be allowed to deplete USACE's own core expertise. As the National Research Council concluded, "Shifting analytical tasks to the private sector, however, has its limits, as core, "in-house" competence is necessary for the Corps to commission, manage, and comprehend the advice of external experts." (National Research Council, 2004)

The Army Corps of Engineers must be, first and foremost, the nation's premiere expert in flood control engineering. Through no fault of its own, the Corps has been stripped of much of what it needs to perform this role. Congress must adopt a plan and allocate the necessary funds to "put the 'engineers' back into the Corps of Engineers." It must remake the Corps into the organization that new, "wet behind the ears" civil engineers will want to join to sink their teeth into their new profession. It must retain and perform sufficient challenging engineering work as to encourage these engineers to develop their careers within the USACE. It must define and perform sufficient R&D work to help support the activities of these engineers. And it must pay them adequate salaries as to be suitably competitive with private industry.

The Working Group for Post-Hurricane Planning for the Louisiana Coast has advanced some complimentary recommendations for Corps staffing in their report *A New Framework for Planning the Future of Coastal Louisiana after the Hurricanes of 2005* (2006):

> *An essential element in enhancing the credibility and soundness of planning and implementation is an agency's internal staff capabilities. The Corps of Engineers is facing a significant loss of staff numbers and capability through retirement, just at the time that the demands for its skills are increasing. Indeed, the integrated planning process will demand a wider array of skills form the engineering, hydrologic, geological, biological and social sciences than is currently available in the agency or in federal or state agencies generally. Also, the effectiveness of*

the long-term program requires the institutional memory that develops within a permanent and professional staff..

13.5.2 Restructuring the Federal/state Relationship in Flood Defense

The USACE's relationship with local flood control entities in Louisiana is dysfunctional. Some of the issues relate to the fragmentation of the local entities, which the state has begun to address. However, a number of the issues are broader.

Often, water planning activities involve not only multiple federal agencies, but also state and local governments. In the blunt words of one observer, "The first consequence is that flood defense has no head . . . . Whatever the merits of this diffusion of authority, it does not produce coherent flood control." (Houck, 2006). One useful model may be what has been called "modularity" -- a concept which involves provisional and functional rearrangement of units in terms of alternative configurations of tools, structures and relationships. (Freeman and Farber, 2005).

13.5.3 Developing a National Flood Defense Authority

A National Flood Defense Authority (NFDA) might be instituted and charged with oversight over the construction and maintenance of flood control systems. Each state would have an equivalent organization that could foster cooperation and developments between and within the states. The Corps of Engineers, state flood control authorities, and technical advisory boards would work with the NFDA to foster application of the best available technology and help coordinate development and maintenance efforts and planning. Federal and state governments would provide reliable and sustainable funding for the life-cycle (design, construction, operation, maintenance) of specific flood defense systems. To facilitate coherent funding, Congressional authorization and financing would be separated from the traditional Water Resources Development Act process.

The Corps of Engineers, in cooperation with other qualified agencies and industrial partners, would have the responsibility to design and construct, and if directed and authorized, operate and maintain flood defense systems. The NFDA would be based on a continuous and integrated process of flood risk assessment and management for specified flood defense systems, with each of these systems being integrated with other allied flood defense systems. Flood risk assessment and management processes would include proactive, reactive, and interactive (adaptive) approaches based on the best available proven technology. Flood defense system planning and development would engage public and industrial stakeholders and responsible federal and state agencies in a cooperative and vigilant Technology Delivery System.

The Interagency Floodplain Management Review Committee in 1994 advanced similar concepts as a result of their in-depth evaluation of the performance of existing floodplain management programs following the disastrous 1993 Midwest flooding. The Working Group for Post-Hurricane Planning for the Louisiana Coast has advanced similar recommendations for organization and funding in their report *A New Framework for Planning the Future of Coastal Louisiana after the Hurricanes of 2005*. This group observed (2006):

Organizational and funding barriers that have inhibited the adoption of an integrated planning and adaptive decision making process persist. Both new organization and funding reforms are needed to support coastal planning and project implementation by the Corps and the State.

This group proposed a model that involves proposals for Federal Intragovernmental Coordination, development of working processes with the new Louisiana Coastal Protection and Restoration Authority, the development of a Coastal Assessment Group and Coastal Engineering and Science Program. This model includes recommendations for programmatic authorization and funding including formation of a new Louisiana Coastal Investment Corporation and major revisions in the Water Resources Development Act appropriations process.

13.5.4 Creating Effective Disaster Planning

Research on organizational learning finds that practices and routines in organizations develop incrementally through feedback from the organization's environment. Organizations generally tend to be inert, adapting less than perfectly to and falling in and out of alignment with their environments (Nelson and Winter, 1982).

This stagnation is especially dangerous for organizations that deal with major emergencies such as floods, fires, and other natural and manmade disasters. Organizations that await major failures before adapting tend to enter crisis mode and find learning and response even more difficult (Staw et al., 1981; Turner, 1976). For example, following the demise of the space shuttle Challenger, NASA faced political pressures, inertia, and resource constraints that expedited some organizational changes but made other structural and cultural adjustments more difficult (McCurdy, 1993). Furthermore, in the absence of a significant environmental change or destabilizing event, lessons learned in organizations often tend to be forgotten or misapplied (de Holan and Phillips, 2004; March et al., 1991).

Even worse, because of the infrequency with which major disasters occur, trial and error organizational learning processes may lead organizational members to forget lessons from past disasters. Levitt and March (1988) argue that in the case of disaster preparedness, trial and error processes lead to "pernicious learning" – organizational leaders conclude that resources designated for disaster preparedness are left idle and should be applied elsewhere. Disaster preparation calls for a different form of learning in which organizations draw on not only their own experiences but also those of other organizations. Such network effects exist for a variety of learning processes (e.g. Argote et al., 1990; Baum and Ingram, 1998; Beckman and Haunschild, 2002).

Over the past few decades, scholars from many disciplines have advocated relational or systems approaches, as opposed to reductionist approaches that study particular events and entities in isolation (Miller, 1972; Wolf, 1980; Kastenberg et al., 2003). Taking a relational approach will help us identify and examine learning processes as they affect and are influenced by organizations responding to major catastrophes. The issues we discuss may occur at several different levels in organizations – the interpersonal level, the sub-unit level, or the inter-organizational level.

Fortunately, we have learned a great deal about how to overcome these organizational barriers. What is needed is to instill "mindfulness" toward risks. We suggest three ways of doing so:

- Create a National Disaster Advisory Office in the White House.
- Create a Catastrophic Risk Office in Congress.
- Make FEMA into a High Reliability Organization (HRO).

13.5.4.1 Creating a National Disaster Advisory Office in the White House

No one in the White House has the job of disaster response. Yet, federal disaster response requires action by many agencies – not just FEMA but also DOD, EPA, CDC, and others. White House coordination of these executive branch activities is crucial. Just as the White House has a National Security Advisor, it needs to have an official charged with national disaster oversight. This official would also be in charge of monitoring organizational problems in the line agencies in charge of disaster response. Moreover, a natural part of the official's portfolio would be disaster prevention efforts, where the aim should be to avoid ever again being taken unawares by a "predictable surprise" like Katrina.

13.5.4.2 Creating a Catastrophic Risk Office in Congress

An integrated approach to catastrophic risk is lacking. One lesson from Katrina is that disasters are not just engineering failures, they are social system failures and failures of government. Societal and physical infrastructures can collapse. Consequently, disaster prevention cannot be considered in isolation from disaster response, mechanisms for compensation and risk spreading, and reconstruction planning. All of these issues are tightly coupled, yet the linkages receive little attention.

Under the Constitution, Congress bears the primary responsibility for developing national policy and setting national priorities. Congress authorizes and controls FEMA, the Army Corps, flood control projects, the flood insurance program, and other aspects of our nation's response to catastrophic risks. Yet Congress lacks the expertise needed to accomplish these tasks in a systematic way.

13.5.4.3 Making FEMA an HRO

Some organizations cannot afford to fail (Appendix F). Accidents can be disastrous on nuclear submarines, aircraft carriers, in air traffic control, and in hospital emergency rooms. Successful organizations of these kinds have learned to attain high reliability. By studying these organizations, experts have learned the ingredients to creating a High Reliability Organization (HRO). And there is a growing body of research on high reliability organizations (Weick 1987; Roberts 1990; Madsen et al., in press) and on high reliability systems of organizations (Roberts and Grabowski, in press; Roberts et al. 2005). Until organizations representing various aspects of disaster preparedness and disaster management seriously see themselves as systems of organizations, they cannot adequately address the problems they face.

13.6 Recommendations – Organizing for Success

The primary requirement for reconstitution of a Technology Delivery System that can and will provide an adequate and acceptable NOFDS is mobilization of the 'will' to provide such a system. If the United States decides that the catastrophe of Katrina will not be repeated, then the necessary leadership, organization, management, resources, and public support must be mobilized to assure such an outcome. One of the primary challenges is time; the clock is ticking until this area of the United States is again confronted with a severe challenge of flooding.

Recommendation 1: Seriously consider defining risk within the framework of federal, state, and local government responsibilities to protect their citizens.

Recommendation 2: Exploit the major and unprecedented role that exists for citizens, who should be considered part of governance in the spirit that those who govern do so at the informed consent of the governed. This is the population exposed to catastrophic risks, and the people that will be protected by the NOFDS. Authorities for catastrophic risk management should ensure that those vulnerable have sufficient and timely information regarding their condition and a reciprocal ability to respond to requests for their informed consent especially regarding tradeoffs of safety for cost. The public protected by the NOFDS need to be encouraged to actively and intelligently interact with its development.

Recommendation 3: Intensify, focus, and fund Corps of Engineers modernization efforts; increasing in-house engineering capabilities and project performance, increasing in-house research and development capabilities, increasing in-house engineering performance of technically challenging projects, developing an organizational culture of high reliability founded on existing cultural values of Duty, Honor, Country, and developing a leadership role and responsibility for technical and management oversight of all phases of development of a NOFDS. Technical superiority must be re-established. Outsourcing must be balanced with in-sourcing to encourage development and maintenance of superior technical leadership and capabilities. This will require close and continuous collaboration of federal legislative, executive, and judicial agencies. This will require that the Corps of Engineers re-conceptualize itself as a pivotal part of a modular organization developing partnerships with other federal agencies, state and local governments, enterprise interests, and private stake holders.

Recommendation 4: Restructure federal/state relationships in flood control. One possible model is what has been called "modularity" -- a concept which involves provisional and functional rearrangement of units in terms of alternative configurations of tools, structures and relationships. Enhancing cooperation and collaboration, reducing confusion as to overlapping areas of operation and responsibility, and mutually supportive cross-checks and communication should all be advanced.

Recommendation 5: Develop a National Flood Defense Authority (NFDA) charged with oversight over the design, construction, operation and maintenance of flood control systems. Each state would have an equivalent organization that could foster cooperation and developments between and within the states. The Corps of Engineers, state flood control authorities, and technical advisory boards would work with the NFDA to foster application of the best available technology and help coordinate development and maintenance efforts and planning. In cooperative developments, federal and state governments would provide reliable and sustainable funding for the life-cycle of specific flood defense systems. This development should be accompanied by development of an integrated and coherent Louisiana Flood Defense Authority representing state, regional, local, city, and public stakeholders that can focus and prioritize stakeholder interests and requirements and collaborate with the Corps of Engineers in development of a NOFDS.

Recommendation 6: Because of the importance of emergency response in the NOFDS, FEMA should be developed as a high reliability organization (HRO) and returned by the executive branch to Cabinet level status. A new Council for Catastrophic Risk Management should be appointed within the White House and given oversight of disaster preparation and response. A similar body should be appointed within Congress. Incentives must be created to encourage all levels of government to deal proactively and effectively with potential national, regional, and local catastrophes.

13.7 References

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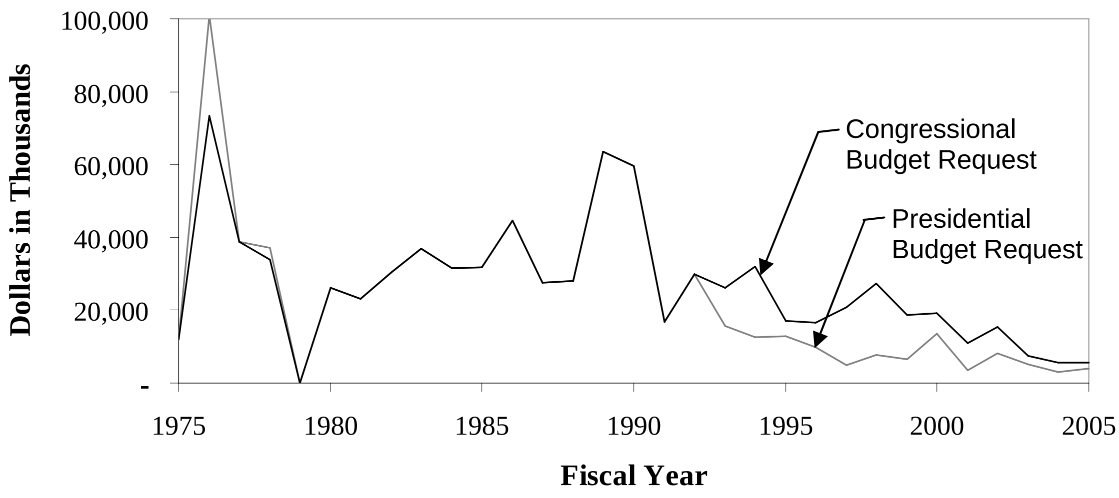

Figure 13.1: Lake Pontchartrain and Vicinity Project Construction Appropriations Over the Past 30 years [2005 dollars]; President's Budget Request (grey) and the Amount Recommended by Congress (black).

Figure 13.2: Artwork by Jan Fitzgerald illustrating the debate surrounding President Bush's initative to streamline the federal government (Tate and Halford 2002).

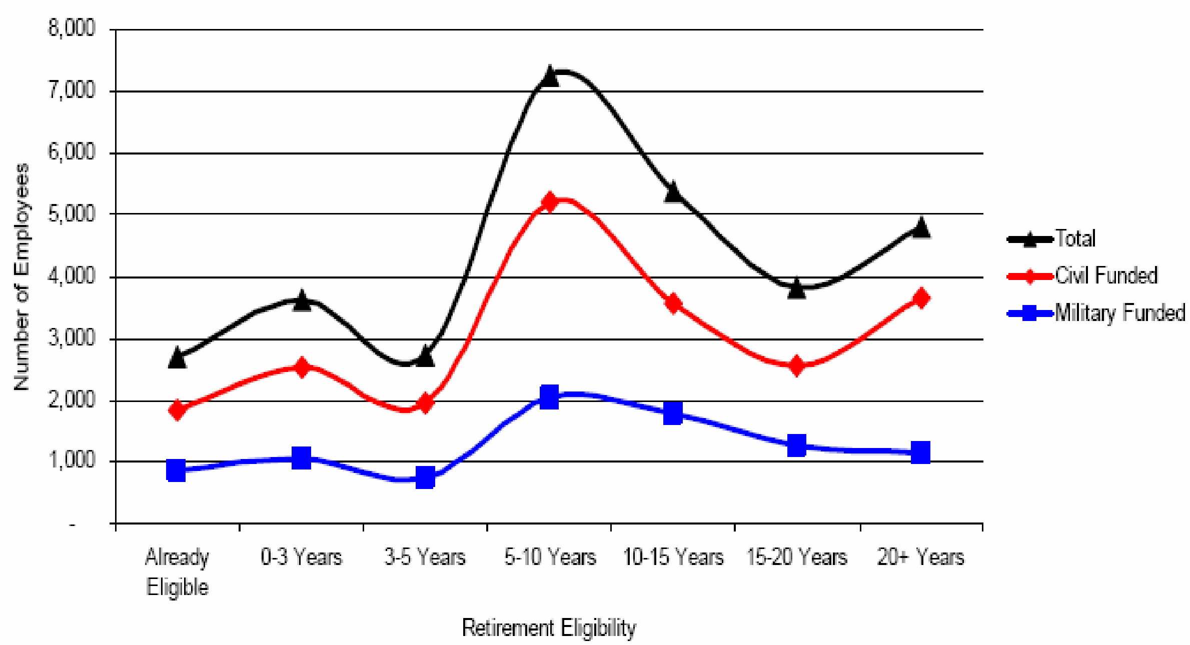

Figure 13.3: Human Capital Planning Projected Retirement (USACE 2002).

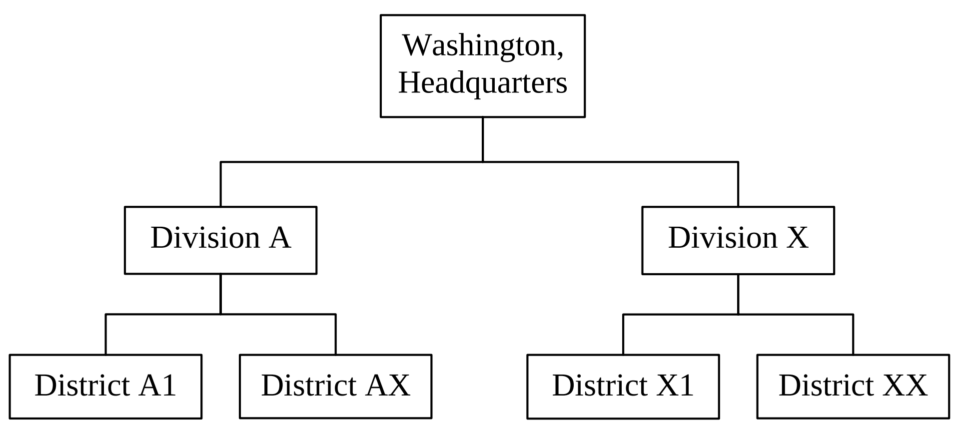

Figure 13.4: Conceptual Organizational Chart of the U.S. Army Corps of Engineers Civil Works Program.[1]

[1] The Corps Civil Works Program is composed of 8 Divisions and 38 subordinate districts. Prime Power, ERDC, Centers, and FOAs are not shown for clarity. In addition, a 9th provisional division with four districts was activated January 25, 2004, to oversee operations in Iraq and Afghanistan. A more complete organizational chart is available in *USACE 2012 – Appendix G, Resource Analysis*, page 1.