

Systems Thinking for Integrated Operations: Introducing a Systemic Approach to Operational Art for Disaster Relief

**A Monograph
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Abstract

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In the wake of Hurricane Katrina, a national debate emerged regarding the ability of the federal government to coordinate the actions of multiple departments and agencies. Obstacles to effective interagency cooperation include cultural differences, organizational biases, personality conflicts, budget disputes, and, most significantly, processes, procedures, and the way each agency approaches problem solving.

While the Hurricane Katrina response is considered by many to be an anomaly, there is ample evidence that the problems within the interagency process experienced in Katrina are not isolated phenomena. The inability to coordinate across organizational boundaries is a common complaint by those who have engaged in the process. This study proposes that much of the difficulty in dealing with other agencies is about how each organization approaches problem solving and subsequently how they design operations based on how they understand the problem. The crux of the issue in interagency tension is not how the agencies are organized or run, but how they think.

Doctrinally, the military distinguishes between a strategic, an operational, and a tactical level of war. The operational level links tactical action to strategic aims. The purpose of this level is to ensure that the military expends its resources on those things that are most important and relevant to ensuring the attainment of strategic goals as set forth in national policy.

There is little evidence that the organizations working disaster response or recovery have any construct similar to the operational level the military uses. Every federal agency has some form of doctrine, whether it is as formalized as the military or not. Difficulty arises when the agencies must work together, and the doctrine is not compatible. There appears to be a gap in the thought processes in the interagency that does not account for translating national policy objectives to tactical action. It is the lack of this level of thought that is a significant source of tension in the interagency process.

Since all human systems are, by nature, complex adaptive systems, any attempt to operate within these systems requires systemic thinking. The events of Katrina revealed a significant lack of systemic thinking. Systemic Operational Design (SOD) offers a methodology that has tremendous potential for alleviating some of obstacles to effective integrated operations, reducing tension between agencies, and improving interagency cooperation. Introducing operational art through systems thinking may bridge the gap in interagency cooperation, and would benefit interagency operations both domestically and overseas.

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INTRODUCTION

Hurricane Katrina was one of the most devastating storms in U.S. history. The federal and state response to the hurricane exposed the challenges the national response community faced in mobilizing and integrating the vast resources required to respond to a catastrophic event. While the extent of the national response was massive, it received much criticism for being slow and uncoordinated. The difficulties the response community experienced during the response phase foreshadow the imbroglio the recovery and rebuilding phase will likely exhibit. The failures of the disaster response community during Katrina were largely due to the lack of synchronization, the absence of operational art, and a failure to think systemically.

Since the National Response Plan (NRP) calls on all departments and agencies to contribute to catastrophic disaster relief, a study of the response to Hurricane Katrina offers insights into how the federal government integrates operations across departmental jurisdictions. The lessons of Katrina apply to more than disaster response. The lack of compatible doctrine and an integrating methodology for problem solving contribute to the difficulties in conducting integrated operations wherever multiple agencies interface.

This monograph relies on first-hand observations of the federal response to Hurricane Katrina, and seeks to explore the viability of a systems approach to integrated operations. It is divided into four sections. The first section focuses on the Hurricane Katrina response and the NRP, and identifies some of the cognitive failures inherent in the system as it is currently structured. Section two describes operational art, complexity, systems, and hierarchy theories with a view to how these theories apply to the Katrina response. Section three introduces a methodology, Systemic Operational Design (SOD), that could potentially aid in the implementation of operational art and the aforementioned theories. The final section discusses potential implications for disaster response and recovery, other interagency operations, and implications for the Army.

A Look Inside the Response to Katrina

On August 29, 2005, Hurricane Katrina made landfall on the United States Gulf Coast region. This Category Four hurricane caused extensive damage across the region from Florida to Louisiana, encompassing more than 90,000 square miles. The damage caused by the hurricane was exacerbated by the subsequent levee failure in New Orleans, resulting in massive flooding of a significant portion of the city. Local and state emergency response resources were quickly overwhelmed and federal response capacities were soon challenged to perform more response tasks than was anticipated in the National Response Plan (NRP). The situation became even more challenging on September 24, 2005 when Hurricane Rita made landfall in Texas and southwest Louisiana, adding an additional 30,000 square miles of damaged area to a region already overwhelmed. The Federal Emergency Management Agency (FEMA) estimates that over 400,000¹ people were evacuated from the region to all parts of the United States, and that over 1.5 million people will require financial Individual Assistance.² The socio-economic impact of this vast exodus from the region spread throughout the nation, resulting in federal emergency declarations in 47 states to offset the cost of temporary care and housing of displaced civilians, and to recoup expenses incurred by states that sent first-responders to assist in the disaster area.³

Over 14,000 federal employees deployed to the region over the ensuing months from over 30 different governmental departments and agencies, excluding the Department of Defense (DoD). The U.S. military response was greater than 70,000 personnel (50,000 National

¹ Federal Emergency Management Agency, "FEMA Helping Families into Long-Term Housing," *FEMA News Release HQ-05-373*, [news release online]; 15 November, 2005; available from <http://www.fema.gov/news/newsrelease.fema?id=20607>; Internet; accessed 26 December, 2005.

² Individual Assistance Programs. Assistance for Individuals and Households: this program, which may include cash grants of up to \$26,200 per individual or household, includes housing and other needs assistance. For more information see <http://www.fema.gov/rrr/inassist.shtm>.

³ Federal Emergency Management Agency, "2005 Federal Disaster Declarations," [webpage online]; available from <http://www.fema.gov/news/disasters.fema#em>; Internet; accessed 26 December, 2005.

Guardsmen and 22,000 active-duty troops).⁴ Although the federal response was massive, it was widely criticized as being “slow and uncoordinated.”⁵

The federal government turned quickly to the military for resources and leadership. Active duty and National Guard troops arrived and started “solving problems.” When U.S. Army Lieutenant General Russel Honore, commander of Joint Task Force Katrina and First Army, arrived in New Orleans, the change was immediate. New Orleans Mayor Ray Nagin, who was very vocal regarding his negative opinion of the federal response, praised the arrival of the military commander. “He came off the doggone chopper, and he started cussing and people started moving.”⁶ Within two weeks of the emergency declaration, U.S. Coast Guard Vice Admiral Thad Allen replaced the civilian leader in charge of the disaster response, FEMA Director Michael Brown. Besides the large number of people and equipment, why was the military able to solve the short-term (response phase) problems when the established bureaucracy whose job it is to do this could not? What is it about the military approach to problem solving that makes it capable of acting so decisively?

In the wake of Hurricane Katrina, a national debate regarding the role of the armed forces in disaster response emerged. The nature of such endeavors requires many agencies of the government to work closely together to coordinate their efforts. While on the surface this appears to be a reasonably simply task, there are significant obstacles related to interagency operations. Cultural differences, organizational biases, personality conflicts, budget disputes, and, most significantly, processes, procedures, and the way each agency approaches problem solving all

⁴ Department of Homeland Security, “Hurricane Katrina: What Government Is Doing,” [webpage online]; available from <http://www.dhs.gov/interweb/assetlibrary/katrina.htm>; Internet; accessed 26 December, 2005.

⁵ Congress, House of Representatives, Committee on Energy and Commerce, *Hurricane Katrina's Effect on Gasoline Supply and Prices: Hearing before the Committee on Energy and Commerce*, 109th Cong., 1st sess., 7 September 2005.

⁶ New Orleans Mayor Ray Nagin during a 1 Sep, 2005 radio interview. CNN, “Lt. Gen. Honore a 'John Wayne dude'” [online newspaper]; available from <http://www.cnn.com/2005/US/09/02/honore.profile/>; Internet; accessed 14 November 2005.

contribute to tension between governmental agencies making integrated operations difficult to accomplish.

The National Response Plan

The U.S. Government uses the NRP to guide its actions during emergencies. In December 2004, all departments and agencies of the federal government endorsed the NRP. The implementation plan called for a four-month transition period before full implementation. Following the initial transition and modification period, implementation and testing of the NRP was scheduled for December 2005. Assessments and refinements of the plan were to continue for a year, with a final version to be implemented thereafter for a four year review and issuance cycle. Hurricane Katrina struck the Gulf Coast region before the completion of the planned development period, thus catching the federal response agencies in the midst of change.

The NRP is a robust response plan which applies to nearly every conceivable disaster. The NRP provides guidance to the federal government in the response, recovery, mitigation, and prevention phases of disaster response. For each type and category of disaster, the NRP identifies which federal departments and agencies are responsible for responding, either as a primary or a supporting agency.

Specifically it:

- Establishes a comprehensive, national, all-hazards approach to domestic incident management across a spectrum of activities.
- Is predicated on the National Incident Management System (NIMS). The NIMS is a nationwide template enabling government and nongovernmental responders to respond to all domestic incidents.
- Provides the structure and mechanisms for national-level policy and operational coordination for domestic incident management.
- Does not alter or impede the ability of federal, state, local, or tribal agencies to carry out their specific authorities.

- Assumes that incidents are typically managed at the lowest possible geographic, organizational, and jurisdictional level.⁷

The general concept for dealing with Incidents of National Significance (INS) is for local and state emergency response functions to react to the incident until their capacity is overwhelmed. Federal resources are then applied to the incident under the direction of a lead federal agency with other agencies contributing specific assistance. The lead agency differs depending on the type and scope of the incident. In the case of a natural disaster such as Hurricane Katrina, FEMA is typically the lead agency and *all* other departments and agencies provide support.⁸

Hurricane Katrina: Breaking the Model

Despite the comprehensive nature of the NRP, the combination of storms and floods challenged the standard response, and showed that the model for disaster response failed to stretch to the scale of the disaster. The approach to national disasters prior to Hurricane Katrina was based on several key assumptions. Figure 1 depicts a notional disaster response profile. The figure indicates the assumption that before the disaster event occurs, demands on the emergency response system are low and within the sum total of the federal and state capacity to address

⁷ Department of Homeland Security, *National Response Plan* (Washington, D.C. 2004), 2. Summary of the NRP provided by SAMS Planning Group – Katrina, a student-populated temporary planning group established at the School of Advanced Military Studies (SAMS), Fort Leavenworth, KS, to support FEMA and Joint Task Force-Katrina in long-range planning. This brief summary of the NRP was used in an annex to an unpublished monograph produced by SPG-Katrina in October, 2005. The author served as the final editor of two unpublished documents produced by the SPG: *Weathering Katrina: the Debate for an Operational Level Framework for Domestic Incident Management*, and *Lessons Learned: SPG-Katrina After Action Report*. The author also served as a contributing editor for a third unpublished report: *Beyond Katrina: Establishing A Regional Long-Term Planning Capability for Federal Disaster Recovery*, and presented “Filling The Void: Introducing Operational Art to the National Response Plan” during a Katrina Lessons learned panel at Fort Leavenworth, Combined Arms Center, (December 5-6, 2005). References to or quotations from any of the above documents may have been originally written by the author, or by any member of the planning group, and are therefore formally referenced to the SPG in order to avoid confusion or an inadvertently false impression of authorship

⁸ The NRP specifically calls on thirty-two different federal departments and agencies to respond to catastrophic events. In reality as many as one hundred separate federal, state, and local agencies responded to Hurricane Katrina.

demands. State capacity includes that of the state-level government, local governments, and private institutions.

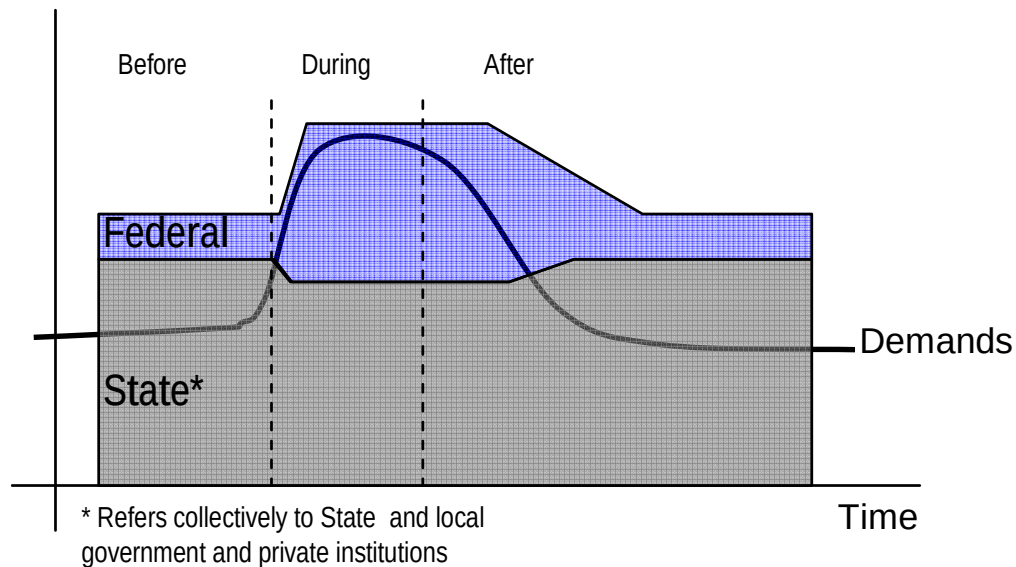


Figure 1. NRP Disaster Model⁹

During a typical disaster event, demand for response resources increases, but the sum total capacity of the federal and state resources to respond remains at a level above that required by the disaster. State and local agencies provide immediate response, but federal resources are added to meet the initial surge requirement, and to meet the long-term financial burdens of recovery. At some point in the process, the immediate response requirements decline and both federal and state agencies return to their pre-disaster levels of readiness. A transition in efforts from response to recovery occurs at this point with efforts reorienting on long-term recovery planning and mitigation.

Hurricane Katrina represented a dramatic departure from the normal disaster model (see Figure 2). This event overwhelmed a large portion of the state capacity for emergency response

⁹ SAMS Planning Group – Katrina, *Beyond Katrina: Establishing A Regional Long-Term Planning Capability For Federal Disaster Recovery* [Unpublished report]; (School of Advanced Military Studies: Fort Leavenworth, KS, 2005), Annex A.

while it simultaneously created a historically unprecedented need. As a result, efforts to surge federal capacity in the face of state shortfalls appeared confused and poorly coordinated.

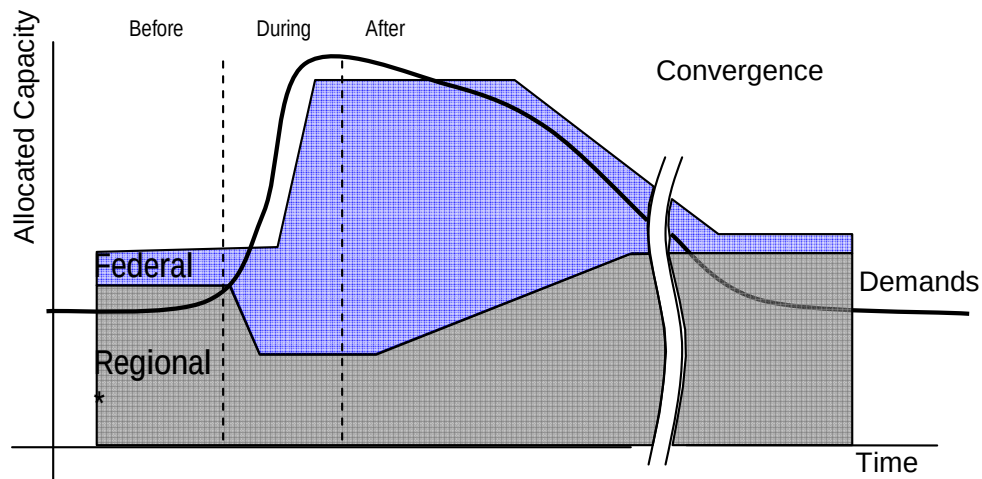


Figure 2. Hurricane Katrina – A Unique Event?¹⁰

The hurricane, and the additional effects of the flood on the New Orleans area, quickly and significantly degraded state- and regional-level institutions' ability to operate. The drop in the notional capacity graph depicted in Figure 2 illustrates this point. This steep decline in regional and state-level capacities is important to understanding the extraordinary nature of the Hurricane Katrina disaster. With local and state resources overwhelmed, the federal government's requirements were dramatically increased. The NRP calls on local and state-level emergency response systems to identify requirements. In many cases throughout the region, these emergency responders were among the victims. The storm degraded or destroyed many of the systems in place prior to August 29th, and there remained little means of identifying and communicating response requirements to the federal-level response planners. While this bottom-up requirements identification is a key characteristic of the NRP, it is also a large contributor to

¹⁰ Ibid. Since 1993 no other natural disaster required or received the level of federal response that Katrina received. This assessment is derived from numerous documents from the FEMA home page. Available from <http://www.fema.gov/>; accessed 24 September 2005.

the initial failures in the response phase, and will likely be the cause of large systemic failures during the recovery phase.

The SPG-Katrina assessment of the extraordinary character of Hurricane Katrina was later echoed by a U.S. House of Representatives Select Bipartisan Committee report that stated, in part, “In essence, we found that while a national emergency management system that relies on state and local governments to identify needs and request resources is adequate for most disasters, a catastrophic disaster like Katrina can and did overwhelm most aspects of the system for an initial period of time.”¹¹

The Cognitive Failure of FEMA

The bottom-driven process used by FEMA and other supporting agencies in disaster response leads to multiple conflicting demands, or demands triggering multiple resource allocations simultaneously (e.g. on at least one occasion five helicopters arrived from a variety of agencies to rescue a single person).¹² These effects are a result of FEMA’s reductionistic approach: divide the problem into smaller parts, and then solve the parts individually. Each problem is identified by a lower-level agent in the system, and then solved piece-meal. There is no identifiable means of deconflicting or prioritizing competing demands. This reductionism leads to an oversimplification of the problem and a “tendency to fragment analysis efforts into individual pieces, [resulting in] a loss of holistic analysis that deliberately considers the [problem] as a complex whole.”¹³

¹¹ House Select Bipartisan Committee, *Failure of Initiative: Final Report of the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina*, report submitted by Rep Tom Davis, 109th Cong., 2nd sess., 2006, 1.

¹² Major General John M. White (USAFNG), quoted during Whitehouse Briefing. *Transcript of Whitehouse Briefing 25 September 2005*, [online press release]; available from <http://www.whitehouse.gov/news/releases/2005/09/20050925-2.html>; Internet; accessed 30 December 2005.

¹³ Jay Kreighbaum, *Force Application Planning: A Systems-and-Effects-Based Approach* (Maxwell Air Force Base, Alabama: Air University Press, 2004), 19.

In *The Logic of Failure*, Dietrich Dörner, a leading theoretical psychologist, introduces many ideas about why people and organizations that believe themselves to be acting rationally often fail.¹⁴ Many of Dörner's premises were evident in the FEMA efforts in Louisiana. FEMA is a bureaucracy, and is designed to be process oriented. Each cog in the bureaucratic wheel is responsible for a part of the process. While this is an acceptable organizational structure for an industrialized process in a static environment, it is less effective in a rapidly changing environment. The reductionistic bureaucratic system allows each group or section to focus solely on their piece of the problem. The problem for any given sub-group is not necessarily linked to the overarching problem facing the larger organization. With each individual sub-group focused on their tactical-level task, there needs to be someone focused on the operational-level problem, and ensuring that the synthetic relationship of the different components of the organization is producing something greater than the sum of the parts.

Failure to see problems in their proper context leads people to “apply the familiar to the unfamiliar.” As such, the sub-groups will expend institutional energy regulating the process, not the situation. Lacking the ability to see the problem in the context of other problems, and to see the situation holistically, organizations tend to apply “overdoses of established measures.”¹⁵ Such was the case for FEMA during the response to Hurricane Katrina. Separate Emergency Support Functions (ESF) focused solely on their assigned functions with little regard to how their actions impacted other ESFs, or how their piece fit into the overall puzzle. With their heads down, workers forged ahead on their track, neither looking left nor right to determine if the work they were accomplishing was contributing to the overall goal. “We’re feeding the monster,” one worker quipped as they processed paperwork designed not to solve a problem, but to “answer the

¹⁴ Dietrich Dörner is a professor of psychology at the University of Bamberg. Dörner's area of expertise involves cognitive failure and human response to complex systems.

¹⁵ Dietrich Dörner, *The Logic of Failure: Why Things Go Wrong and what we can do to make them Right* (New York: Metropolitan Books, 1996), 33.

mail.”¹⁶ The marriage of worker to task was nearly ritualistic, and there was little regard for whether or not a task was urgent, important, or even necessary.

This “methodism” as Dörner describes it, is the “unthinking application of a sequence of actions we have once learned.”¹⁷ This sequence of actions is applied without total regard for the uniqueness of the situation, and ignores the possibility that “tried and true” processes may be insufficient under certain unique or extreme conditions. These unique conditions require the formation of an overall framework for operating. “If particular actions are not informed by an overall conception, behavior will respond only to the demands of the moment.”¹⁸ This leads to immediate response activities that solve short-term problems that do not necessarily contribute to solving larger, more important problems. Avoiding this dynamic requires a method for distinguishing the urgent from the important. The method used by FEMA to prioritize many kinds of requests is a process that requires little to no thought: a phone log. When a request for support arrives, it is answered in the order it arrived. There is no systematic means of ensuring that the request is not already being answered somewhere else in the system.¹⁹

Dörner describes the failure to break down complex goals as “repair service behavior.”²⁰ While the response phase shows ample evidence of repair service behavior, multiple competing demands, and solving the wrong problems (the urgent solved at the expense of the important), the recovery (rebuilding) phase is showing few signs of being different. In stressful, time-constrained environments, people tend to solve what they are competent at solving. While this is understandable, it is not a necessary dynamic of disaster response. In the disaster recovery phase,

¹⁶ Personal notes of the author dated 20 September, 2005, FEMA’s Joint Field Office (JFO), Baton Rouge, Louisiana.

¹⁷ Dörner, 170-171.

¹⁸ Ibid., 53.

¹⁹ Author’s personal notes: during the early response phase, an incident was reported where a well-connected local businessman in Orleans Parish called several agencies for assistance in securing his business from looters. Because of the numerous input nodes to the system, this businessman was able to get state troopers, local police, National Guard, and federally-funded security forces to secure his business. It took hours to sort out the situation. Many of the forces could have been used in assisting the evacuation of New Orleans, which was flooding at the time.

²⁰ Dörner, 58-64.

though, this is less forgivable. Despite media attention and political pressure, the stress and time constraints of rebuilding the region are largely self-imposed tensions.

Rebuilding the Gulf Coast is truly a complex goal. President Bush's directive to the federal government was to "help the citizens of the Gulf Coast overcome this disaster, put their lives back together, and rebuild their communities." He concluded that, "when communities are rebuilt, they must be even better and stronger than before the storm." This suggests a requirement for federal agencies to translate the national objectives into a coherent, long-term disaster recovery plan. This plan should define a common understanding of goals and objectives across the relevant agencies of the federal government as well as among the various local and state efforts. This further suggests the consideration of possible organizational constructs, roles, and responsibilities within FEMA to nest strategic objectives at all levels—federal, state, and local—in a way that creates unity of effort and a regional perspective in planning and executing local and state disaster recovery efforts.

Competing Goals

Conducting disaster relief across five states simultaneously is clearly a complex problem. "If we want to deal rationally with a complex problem, the first thing we do (tentatively, at least) is define our goals clearly."²¹ The concept of forming goals is essential to producing unified action. While goal setting is not a novel concept for FEMA, the source of the goals as currently structured is contrary to most planning models. While most planning models implement a methodology that ensures an integrated system of decisions, FEMA's doctrine of bottom-up goal setting promotes disintegration with respect to decision making.

FEMA uses the Incident Command System (ICS) for coordinating the actions of the various agencies. ICS acknowledges that

²¹ Ibid., 153.

Because each agency will bring its own set of objectives and considerations to the response, the [Unified Command] must decide upon a collective set of incident-specific objectives — to identify what the Unified Command as a whole needs to accomplish — before an overall response strategy can be developed. To be effective, these objectives should be specific, measurable, assignable, reasonable, and time-related.²²

The method FEMA uses to determine goals is to consolidate and (attempt to) deconflict the various goals of each agency. State and local agencies communicate most of these goals either directly to FEMA or through the various agencies cooperating with FEMA. In this sense, the goal setting is bottom-up, and there is no authoritative means of prioritizing competing goals.

Our system of federalism wisely relies on those closest to the people to meet immediate needs. But faith in federalism alone cannot sanctify a dysfunctional system in which DHS and FEMA simply wait for requests for aid that state and local officials may be unable or unwilling to convey.²³

One of the greatest challenges responders faced in Katrina was that the many of the local “goal setters” were incapable of functioning.²⁴

After an initial period of confusion, a multitude of local and state goal setters emerged, many accompanied by professional disaster recovery contractors who were skilled at manipulating the bureaucratic systems that govern disaster recovery. Each entity approached recovery planning as an exercise in self interest, competing to introduce their demands into the system in order to preempt the other agents in the system. This dynamic will invariably produce multiple goals that will require federal agencies to satisfy several criteria simultaneously. The relationship between goals is of particular interest as they relate in one of several ways: positively linked, negatively linked, or neutral.²⁵ Positively linked goals are the simplest to deal with: if multiple parties are interested in the same criteria, a single action or program may satisfy the

²² Federal Emergency Management Agency, National Response Team, *Incident Command System/Unified Command (ICS/UC) Technical Assistance Document* (Washington, D.C.), 21.

²³ House Bipartisan Committee, x.

²⁴ There were a variety of causes for this incapacity, not least of which was the damaged communications infrastructure. It is beyond the scope of this monograph, however, to attempt to identify causes for every failure in the system, but to explore aspects of cognitive failure during the operation.

²⁵ Dörner, 51.

collective agents. Neutrally linked goals rarely cause conflict, particularly when resources are plentiful. Negatively linked goals within the system, however, make planning and execution most difficult. Dörner offers three possible solutions to dealing with negatively linked goals: solve one problem at the expense of the other, solve half of each problem so that nobody gets what they want, or reshape the system to reverse (or at least neutralize) negative relationships.²⁶ Unfortunately, in Katrina the most dominant criteria that appears to be applied in deconflicting negatively linked goals is to determine which goal-setter has the most media coverage.

The post-disaster system lacks a design that sets valid criteria for deconflicting competing goals and ensures that state and national agencies spend federal recovery dollars in accordance with national policy objectives. The military uses campaign design to link strategic ways and means to strategic goals, and then translate those goals into tactical action. The current post-disaster system links tactical goals with strategic means, resulting in the aforementioned negative linkages. A recovery campaign design would ensure that the tactical (local and/or state) goals that rely on strategic (federal) means comply with mutually beneficial criteria that link positively and that they relate to national strategic objectives. Therefore, the purpose of a campaign design is to ensure that agencies use federal resources in a manner commensurate with national policy objectives, and that local and state plans and policies do not use federal resources in such a manner as to contradict national objectives or inhibit recovery efforts elsewhere in the region.

Organizational Challenges

In order to establish goals and create a design for an organization to implement, it is important to understand that organization's components and structure. However, an organizational wiring diagram of the federal response during Katrina is difficult, if not impossible, to construct. One of the challenges in undertaking such a task is that the structure of the organization is constantly changing as different federal and state agencies enter and exit the

²⁶ Ibid., 57.

system. While the most common way to describe the organizational structure of any organization is to construct a hierarchical organizational chart, this was extremely difficult to accomplish during Katrina's early response phase. Organizational charts were frequently updated. Some charts had only brief life-spans as the organization's member agencies rapidly changed, or relationships between agencies were altered. Further complicating things, many personnel serving throughout the organization were only assigned to positions temporarily. As people and organizations moved in and out of the system, the relationships between different parts of the system changed making it extremely difficult for anyone to understand fully the structure and composition of the federal response.

While the organizational charts produced at the Joint Field Office (JFO) in Baton Rouge, LA were in constant flux, the usefulness of such charts was never questioned. How else would and organization's leaders understand their own structure? In reality, it appeared that nobody in the JFO or elsewhere completely understood the magnitude or structure of the federal response. This was evident when Hurricane Rita threatened the response force. On September 19th, 2005, the planners at the JFO began making plans to protect response workers in New Orleans from the threat of another hurricane either by evacuation or shelter.

While members of various ESFs worked on their individual evacuation or sheltering plans, there was a significant challenge in determining what resources would be necessary to evacuate New Orleans. The greatest challenge was that nobody knew how many people would require evacuation. The military had stated that they would evacuate or shelter their own response personnel, but did not share their plans with the JFO. Local and state response agencies were responsible for evacuating their personnel, as well as any civilians who had remained in the area after Hurricane Katrina, but failed to produce any plan of evacuation. FEMA planners could not discern how many federal workers were actually in New Orleans since no means of tracking workers from supporting agencies existed, nor could they determine how many state and local response workers or civilians would require federal assistance for evacuation since the state was

either unwilling or unable to share that information with FEMA planners. While disparate sub-organizations made independent plans, there was no synchronization of the overall system. The fact that FEMA had no overall mechanism for controlling the supporting agencies added an additional challenge. While FEMA could produce a contingency plan for protecting response personnel from the effects of Hurricane Rita, it had no authoritative means of implementing such a plan. This was recognized by planners in the JFO who included, “Emergency Support Function personnel will act in accordance with this plan,” as an *assumption* in their planning process.²⁷

Frequent attempts by planners to gain necessary information from federal assets in New Orleans and from state-level emergency response organizations in Baton Rouge were unsuccessful. FEMA planners eventually published its contingency plan without specifics about how it would be implemented, but, rather, offering broad guidance to all response levels equally. Without specific information about their own system, FEMA planners began attempting to prepare for massive evacuation of the New Orleans area, contracting over three hundred buses to stage outside of New Orleans in the event that a massive evacuation would be necessary. Broad guidance for response personnel who were determined to remain in New Orleans was issued.

A specific piece of guidance issued in the contingency plan is illustrative of the lack of situational understanding and coordination. The Rita Contingency plan called for workers who were determined to weather the storm and any additional flooding to seek shelter in third floor concrete structures throughout the city.²⁸ Without knowing how many structurally sound three-story concrete buildings remained in New Orleans after Hurricane Katrina had devastated the area, or how many workers would be seeking shelter in said buildings, FEMA’s contingency plan accepted a significant amount of unnecessary risk as multiple organizations could potentially rely on the same buildings for shelter. FEMA was potentially poised for another disaster as it offered

²⁷ Federal Emergency Management Agency, “Continuity of Operations Plan for Louisiana” (Baton Rouge, LA, 19 September, 2005). Emphasis added. This implies that FEMA planners were aware of their lack of control over the other agencies involved in the response effort.

²⁸ Ibid., 2.

guidance without an understanding of the context. Fortunately for response workers and the remaining civilians in New Orleans, Hurricane Rita's course did not bring its devastating force to New Orleans, but shifted westward towards Southwest Louisiana and Texas.

Controlling a Network

The military's acronym "C2" means "Command and Control," the exercise of authority and direction over assigned and attached forces. Military organizations exercise C2 through a chain of command, which is essentially a way of determining who works for whom in a hierarchical structure. Unfortunately, hierarchical structures have difficulty dealing with entities that are outside of their wiring diagram. The military tends to solve this problem by combining all units dealing with an operation under a single headquarters (for example, a Joint Task Force [JTF] assigned the responsibility for directing all the military assets assigned to a particular mission).

The idea of C2 has a different meaning to the civilian agencies involved in this process. The NRP does not use the term Command and Control. Instead, the two Cs are "Coordinating Agency" and "Cooperating Agencies." The NRP calls for the Department of Homeland Security to be the "Coordinating Agency" for Catastrophic Incidents. In the case of a natural disaster, FEMA typically becomes the lead agency for coordinating the efforts of all the federal agencies that are participating. Additionally, FEMA is required to coordinate with each of the effected states. The NRP also calls on all federal departments, agencies, and other organizations to become Cooperating Agencies for Catastrophic Incidents.

In civilian organizations operating in disaster response, the C2 structures derived from the Stafford Act and the NRP do not account for the need to synchronize efforts across state borders. The doctrine essentially ends with one Federal Coordinating Officer (FCO) working with one State Coordinating Officer (SCO), the latter being responsible for synchronizing and

prioritizing within the state *if necessary*.²⁹ While the NRP assigns leadership responsibility to a single official, it does not provide the PFO with statutory authority to accomplish his task. The PFO derives all influence from his or her relationship to the President and speaking on the President's behalf in the aftermath of a disaster.

One cause of friction is that Cooperating Agencies' chains of command do not feed into the interagency chain of command below the secretarial level (e.g. Secretary of Defense to the President). For DoD units assigned to Katrina the interagency chain of command went from the operating units to the Secretary of Defense to the President to Secretary of Homeland Security to the delegated PFO—a position which has no statutory, directive, or budgeting authority.

One of the principles that make hierarchical organizations effective is *unity of effort*.³⁰ Unity of effort ensures that all components of an organization are working towards the same end. Without the clear, authoritative lines of control that hierarchies possess, networked organizations have difficulty achieving unity of effort beyond a generalized abstract vision. While every organization responding to Katrina was behind the vision of “saving people,” there was little consensus or coordination on the best way to accomplish this. The government lacked unity of effort.

The structural problems with response agency chains of command significantly detract from unity of effort. Those who wrote the existing laws and doctrine for disaster relief have thus far avoided some of the tough questions, such as “who is in really in charge?” Existing statutes may require further review if there is an expectation of competent and effective action by the federal government following extraordinary disasters. Despite the holism implied by the NRP, interconnection does not imply unity.

²⁹ Emphasis added. The language in the NRP implies that synchronization and prioritization is considered optional.

³⁰ The elements of unity of effort are coordination, cooperation, consensus, and common focus. Unity of effort is distinguished from unity of command, a military principle that addresses formal command structure. It is possible to achieve unity of effort when unity of command is not possible through the adoption these elements.

With no statutory authority to direct other agencies' efforts, FEMA has the daunting task of coordinating the federal government's response. Unfortunately for FEMA, the American public expects that the government will perform like a hierarchical organization with unity of command, which tends to be more decisive, straightforward in its approach, and more effective at solving short-term problems. This is an unrealistic expectation given the current disaster response doctrine and structure. The collection of agencies responding to disasters does not form a centrally controlled hierarchy, but a network with countless nodes and interactions that fits the formal definition of the term complexity in every sense. This complex network operates under the lead of FEMA in an ad hoc organizational structure with no authority to direct its actions. It is not surprising that political leaders turned to the military, an organization that is the epitome of hierarchical structure, to garner some fashion of order from the chaos.

With the transition to the recovery phase, unity of effort will be an even greater challenge. The unifying idea of saving lives now transitions to rebuilding the Gulf Coast Region. If there were disagreements on the best way to achieve unity of effort during the response phase, one can imagine the diversity of ideas and directions the various entities involved in recovery will pursue.

There is not a need for the government to create a strict hierarchical organizational structure in order to achieve unity. In fact, the benefits of networked structures can vastly improve the effectiveness of the government's efforts if the network is engaged in a manner that takes advantage of synergistic effects in the system as a whole, producing an effect where "the whole is greater than the sum of its parts." This does not require strong, centralized control, but decentralized autonomy working towards a common goal. It is possible to control parts of a complex system for a period of time, to achieve unity of effort to accomplish specific goals, but it is not only impossible to completely control a complex adaptive system, but undesirable. The benefits of a networked organization for long-term success in a changing environment outweigh the short-term capabilities of a hierarchy.

Complex adaptive systems are particularly sensitive to initial environmental conditions. Where multi-layered response activities is the expectation, Katrina provided the responding national assets with initial conditions that were unexpected, and where bottom-up goal setting was not occurring. The system was unable to adjust to this dynamic, at least in the short term.

The problem is indicative of what is happening and what will continue to happen during the long road to regional recovery. Bottom-up goal setting will produce conflicting directions for the system, and most of the institutional energy (and a lot of taxpayer dollars) will be spent deconflicting competing demands. The system requires a unifying vision that leads to unity of effort.

The need for a unifying vision does not inhibit communities and states from determining their own future. The designers of the Stafford Act authored it to assist communities in disaster response and recovery, and there was no intention of infringing upon the rights of the communities to self-determine their path to recovery. The unifying vision, therefore, cannot be dictatorial. The vision can provide a framework within which each community can plot their own course, and can do so with the understanding that federal funding will support those efforts within a framework that is beneficial to the system as a whole. This framework can help ensure that reconstruction funding is used to accelerate regional recovery instead of simply helping numerous independent communities. In this fashion, the federal government has the opportunity to make the most efficient use of its resources with the most expeditious results by designing relationships that produce asymmetric results.

Rapid, efficient results are only part of the goal in disaster recovery. The underlying purpose of recovery is to promote sustainable development. Sustainable development, in FEMA doctrine, considers a more holistic approach to recovery:

In its broadest context, sustainable development “meets the needs of the present without compromising the ability of future generations to meet their own needs.” This definition was established by the World Commission on Environment and Development (the Brundtland Commission) in 1987. Essentially, sustainability

means that decisions made today should not reduce the options of future generations, but pass on to them a natural, economic, and social environment that provides a high quality of life.³¹

The goal of achieving sustainable development, particularly at a regional level, is not achievable without a unifying vision expressed in a design that ensures that resources are committed to those recovery efforts that meet systemic requirements of sustainability. Without a design that unifies regional sustainable development, the recovery effort will revert to the methodism that Dörner tells us will ultimately lead to failure.

Failure is a subjective term, though, and those policy makers whose primary metrics relate directly to funding will declare the methods adopted for Katrina successful. Since disaster recovery “has always been done this way,” reductionist methods of distributing cash will continue. Indeed the Federal Coordinator for Gulf Coast Rebuilding 6-month progress report showed that nearly half of the metrics used were fiscal in nature.³² The Office of the Federal Coordinator’s mission and objectives indicate that a regional approach that could create non-linear relationships by design, exploit market forces, and rapidly accelerate sustainable recovery is not part of the plan.³³ Instead of taking a systemic approach to the Gulf Coast region, the federal government will continue to apply the reductionist method of dealing with each community as a separate entity.

³¹ Federal Emergency Management Agency, *FEMA Report 36: Rebuilding for a More Sustainable Future: An Operational Framework* (Washington, D.C., 2000), 1-3.

³² Department of Homeland Security Office of Federal Coordinator for Gulf Coast Rebuilding, *Progress Made: A 6-Month Update on Hurricane Relief, Recovery and Rebuilding* (Washington, D.C., 2006).

³³ Department of Homeland Security Office of Federal Coordinator for Gulf Coast Rebuilding, *About the Office of the Federal Coordinator for Gulf Coast Rebuilding* [on-line]; available from http://www.dhs.gov/dhspublic/interapp/editorial/editorial_0817.xml; Internet; accessed 13 March 2006.

Theory, Operational Art, and Disaster Response

While many people consider the Hurricane Katrina response an anomaly, there is ample evidence that the problems within the interagency process experienced in Katrina are not isolated phenomena. The inability to coordinate across organizational boundaries is a common complaint by those who have engaged in the process. Much of the difficulty in dealing with other agencies is less about political differences, budget fights, and personalities, and more about how each organization approaches problem solving; and subsequently how they design operations based on their traditional approaches. The crux of the issue in interagency tension is not how the agencies are organized or run, but *how they think*. There is a significant difference in the way different agencies establish goals, set problems, and derive solutions. One of the most significant aspects of the cognitive process that should take place is the recognition of guidance issued from decision makers who are supposed to be in charge. During Katrina, however, there was little evidence that the people planning the recovery effort made any acknowledgment of the strategic guidance issued by the President. Former Speaker of the House Newt Gingrich has seen the same phenomenon throughout the federal government: “I think [the President’s] policy directions are overwhelmingly correct. But I think there’s a gap between what the President says and what implementation is like.”³⁴

With a gap between policy and execution, people will resort to solving problems in the manner they are most familiar with. This gap will also allow agencies to focus on solving only those problems they feel competent at solving, often ignoring problems that are more important or that are advocated by higher levels of authority.

“Implementing policy effectively,” Speaker Gingrich said, “is ultimately as important as making the right policy.” The Select Committee first convened on September 22, 2005, understanding, like Speaker Gingrich, that a policy that cannot be implemented effectively is no policy at all. The Select Committee was

³⁴ Newt Gingrich, *Katrina at the Crossroads*, [recorded speech]. (Newt.org); available from http://newt.accrisoft.com/media/iNewt_102005_KatrinaCrossroads2.mp3; accessed on 21 November 2005.

created because, in the tragic aftermath of Katrina, America was again confronted with the vast divide between policy creation and policy implementation. With the life-and-death difference between theory and practice.³⁵

The Military Approach

The military uses a systematic approach to problem solving. Doctrinally, the military distinguishes between a strategic, an operational, and a tactical level of war. This construct, doctrinally, applies to all operations, including those that do not involve actual warfare, such as stability and reconstruction operations, humanitarian assistance operations, and Military Support to Civil Authorities (MSCA).

Joint doctrine defines the strategic level as:

The level of war at which a nation, often as a member of a group of nations, determines national or multinational (alliance or coalition) security objectives and guidance, and develops and uses national resources to accomplish these objectives. Activities at this level establish national and multinational military objectives; sequence initiatives; define limits and assess risks for the use of military and other instruments of national power; develop global plans or theater war plans to achieve these objectives; and provide military forces and other capabilities in accordance with strategic plans.³⁶

The tactical level of war is defined in Joint Doctrine as:

The level of war at which battles and engagements are planned and executed to accomplish military objectives assigned to tactical units or task forces. Activities at this level focus on the ordered arrangement and maneuver of combat elements in relation to each other and to the enemy to achieve combat objectives.³⁷

The operational level of war is the essential level that links these two. It is, in short, the way the military translates national level policy into tactical action, and “ensures the logistic and

³⁵ House Select Bipartisan Committee, ix.

³⁶ U.S. Joint Chiefs of Staff, Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms* (Washington, D.C.: U.S. Government Printing Office, 12 April 2001), [as amended through 31 August 2005], 509.

³⁷ *Ibid.*, 526.

administrative support of tactical forces, and provides the means by which tactical successes are exploited to achieve strategic objectives.”³⁸

...campaigns and major operations are planned, conducted, and sustained to accomplish strategic objectives within theaters or other operational areas. Activities at this level link tactics and strategy by establishing operational objectives needed to accomplish the strategic objectives, sequencing events to achieve the operational objectives, initiating actions, and applying resources to bring about and sustain these events.³⁹

The military uses this construct to ensure that tactical actions support strategic aims. The purpose of this construct is to ensure that the military expends its resources on only those things that are important; relevant to ensuring the attainment of strategic goals as set forth in national policy. Proper application of the systematic process ensures that operations are *nested* in such a manner as to ensure national policy directives are accomplished.⁴⁰ DoD is the only federal department or agency that operates with such a construct.⁴¹ It is, perhaps, one of the primary reasons the military is viewed as the most responsive entity in the federal government.

Every federal agency, indeed every organization, has some form of doctrine, whether it is as formalized as the military or not. Doctrine is, by definition, a system of principles that is “presented for acceptance or belief.”⁴² DoD defines doctrine as “fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives.”⁴³ These doctrines describe the logic (defined as the principles that guide reasoning within a given field or situation) that each organization follows towards its aim.⁴⁴ During interagency operations, multiple agencies endeavor to work together, presumably towards the same goal, but there is seldom any cognitive effort to ensure the logic of each organization is

³⁸ Ibid., 391.

³⁹ Ibid.

⁴⁰ The term “nested operations” is borrowed from computer programming and indicates a sub-process that works within a larger process. In military terms it indicates tactical actions or smaller operations that occur within a larger operation that directly or indirectly contribute to overall success.

⁴¹ The exception to this statement is the US Coast Guard that, while not a member of the Department of Defense, is a military organization.

⁴² The American Heritage Dictionary of the English Language (2000), s.v. “doctrine.”

⁴³ Joint Publication 1-02, 168.

⁴⁴ The American Heritage Dictionary, s.v. “logic.”

compatible. When separate organizations with incompatible or conflicting logics interact, tension exists, and unity of effort becomes elusive. Through force of personality, differences can co-exist, or work together to achieve an additive effect, but the interdependency that leads to intentional non-linear effects remains elusive.

The concept of operational art arrived in U.S. Army doctrine in the mid-1980s, emerging from a century of warfare dominated by industrial-age, mechanistic thinking. Recognizing the increased complexity in warfare, operational art provides a linkage between the often abstract and ambiguous national-level policy goals and the “relatively mechanical, straightforward, and scientific execution of tactical actions. It is called art because it demands creativity and vision.”⁴⁵ Operational art requires one to think differently: to step outside the tactical-level mindset to view the operation as a whole; to avoid becoming fixated on the battle, but to see it in its entire context. From this viewpoint, the operational commander can see the opportunities inherent in the situation and take advantage of them.

Operational Art in the Interagency

The operational art is the habitat of Jointness and interagency.⁴⁶ It is the combining of efforts, the synthesis of a myriad of efforts and organizations that produces the greatest results, and it is essential to harness the potential inherent in the moment. The operational commander uses operational design to translate the artist’s visualization into plans, providing subordinate commanders with objectives and end-state. Subsequently, the tactical commander translates these into tactical action through a systematic process.⁴⁷

⁴⁵ James J. Klingaman, “Teaching the Operational Art Using Reflective Practice” (Masters Thesis, U.S. Army Command and General Staff College School of Advanced Military Studies, 2004), 2.

⁴⁶ Brig Gen (Res) Shimon Naveh, interview by author, personal notes, Fort Leavenworth, KS, 18 January 2006.

⁴⁷ Tactical commanders use a variety of techniques to create their plans, typically based on industrial age engineering problem-solving models. The Military Decision Making Process (MDMP) is one such technique.

The difference between tactical-level problem solving and operational-level thinking is significant. The cognitive skills required of operational artists are quite different from the tactical commander: it is a different logic. According to Shimon Naveh, a leading military scholar, operational art is all about synthesis and hybridizing; bringing together disparate entities (often very different) to create something unique.⁴⁸ When components combine into a system for an operation (or campaign) it is different every time. The system is singular, unique, and temporal. The Operational Commander lives in a virtual world: the view of the battlespace is visualization.

Tactical thinkers that move up to the operational level often try to repeat their earlier (tactical) successes writ large, which rarely proves to be successful. Tactics are not scalable in the manner, and tactical-level, mechanistic thinking at the operational level denies the uniqueness of a given ecology. Systematic planning processes tend to work well in environments where conditions are relatively familiar to the planners, and where complexity is minimal or nonexistent. When dealing with linear problems, mechanistic approaches provide fairly comprehensive solution sets that produce adequate answers. The operational-level commander, on the other hand, deals with complexity and visualizations in unique environments and is only hampered by applying mechanistic thinking. In order to translate national policy objectives into action, the operational commander needs to take a systemic approach to designing operations.

There is little evidence that the organizations working disaster response or recovery have constructs similar to the operational level the military uses. There appears to be a gap in the thought processes in the interagency that does not account for translating national policy objectives into tactical action, and this difference in logic manifests itself as one of the most significant sources of tension in the interagency process. This tension contributes to the existing

⁴⁸ Naveh interview 18 January 2006. Naveh, a retired Israeli Defense Force general officer, is the developer and leading proponent of Systemic Operational Design (SOD) and author of *In Pursuit of Military Excellence: The Evolution of Operational Theory*.

distrust between agencies and organizations. “We just don’t think the same way,” is a common assertion when discussing interagency operations.

This difference in logic between agencies seems to be less palpable at the tactical level where operators in the field focus on mission accomplishment. A variety of first-responder teams organized in ad hoc relationships were able to function well together during Katrina despite organizational differences. Since they were focused on a single task (saving lives), it was easier to achieve unity of effort, at least at the local level. This suggests that interagency cooperation at the tactical level is not only possible, but occurs naturally when clear, compatible goals are established for actors at the tactical level, regardless of departmental affiliation. This is an example of a natural system (in this case a *subsystem* of the larger response system) self-organizing. Military operators experienced with working with other agencies at the tactical level support this assertion: “On the ground those ‘other agency’ guys were great to work with. The problems occur when you get higher up.”⁴⁹

The interagency at the strategic level appears to operate (roughly) as intended as well.

Washington interagency is a very effective organization at doing what it was designed to do within law, and what it is charged to do, which is to develop policy recommendations for the president. It operates at the grand strategy and strategy level and promulgates plans. The US government is organized to operate at that level and at the tactical level down in the ambassador’s residence where they have the ambassador and a DCI and an attaché. That’s how our government is organized. DoD is the only organization within the government that has an operational echelon.⁵⁰

FEMA’s participation at the strategic level occurs within the Interagency Incident Management Group (IIMG). “The IIMG is a Federal headquarters-level multiagency coordination entity that facilitates strategic Federal domestic incident management for Incidents

⁴⁹ U.S. Army Special Forces Major who worked with other agency partners in a variety of operational assignments; interviewed by author, September 2004, Fort Leavenworth, KS.

⁵⁰ John T. Fishel, “Fishel and Benson Question and Answer Session” in *Turning Victory Into Success: Military Operations After the Campaign*, Brian M. De Toy, ed. (Fort Leavenworth: Combat Studies Institute Press. 2004), 206.

of National Significance.”⁵¹ Among the specified duties of the IIMG is to “maintain ongoing coordination with the PFO,” develop strategies for implementing existing policies, and provide incident information to DHS and the White House to facilitate policymaking.⁵² Once established, this group functioned as expected, although there was much criticism regarding the timeliness of its establishment.⁵³

With tactical-level actions being executed in the Gulf Region by the various response agencies, and strategic policy being established at the various interagency groups in Washington, the link between the two becomes the domain of the PFO/RFCO and each of the state-focused FCOs. These officials, then, are the operational commanders, and, therefore, must be able to think operationally in order to translate the strategic guidance into tactical action. In a regional effort, the Regional FCO must practice operational art.

In the absence of an operational level, leaders who should focus on translating policy into action often become fixated on tactical matters, and lose sight of the bigger picture. This is too often the case, especially when strategic-level actors impose tactical directives. Often this imposition is a response to tactically-centered media attention that affects decision-makers who are politically motivated.⁵⁴ Even an apolitical operational commander may feel the pressure of media attention, particularly in cases where the operation has significant political importance, since the operational commander ultimately reports to elected civilian leaders.

During Katrina, dealing with tactical level details became a common duty for operational commanders and their staffs. The PFO’s staff once spent hours determining the reason FEMA contractors hired an out-of-state contractor in lieu of a local one for a specific job. The media reported the incident as an example of how the federal government was unconcerned with

⁵¹ NRP, 22.

⁵² Ibid.

⁵³ See House Report on Katrina, pp 131-135.

⁵⁴ This is not a pejorative statement. It is a reality of the US political system that the strategic-level decision-makers are elected officials that are subject to public opinion. Since low-level activity can have enormous political consequences, political actors are often drawn into tactical decision-making.

rebuilding the local economy. Only after the PFO's staff spent several hours investigating the allegation were the facts revealed: the local contractor bidding on the assignment was not legally licensed to operate the required machinery. Instead of focusing on operational matters, the limited number of personnel available to the PFO spent much of their time dealing with these and similar matters.

The tendency for operational commanders to focus their attention on tactical matters is not merely a product of media attention. Often, the operational commander is "drawn into the tactical" of his own volition. This often occurs when the information processed by the commander focuses on tactical data. The metrics reported at the operational level will drive the level of cognitive thought at that level. For example, if the information reaching the operational commander is predominately tactical in nature, he tends to focus his attention tactically at the expense of operational thinking.

Complexity

The myriad of federal, state, and local entities assembled in the Gulf Coast Region clearly represent a system. While each of the entities has, within itself, some form of hierarchical organizational structure, the interaction between each entity and another occurs at a variety of levels within those structures. In the rapidly changing environment of disaster response, these interactions are not only difficult to determine, they are nearly impossible to control. In a system where new entities enter the system daily, and other entities depart, gaining a clear understanding of the structure of the system is extraordinarily difficult. Complexity, however, does not simply concern the difficulty in understanding a system's structure. A systems possessing a great number of agents with different components are merely *complicated*, not necessarily *complex*. It is the interaction of these agents within the system and with the environment, and the subsequent emerging properties that result from these interactions that denotes a level of complexity that

makes understanding the system extraordinarily challenging for people accustomed to dealing with purely mechanical systems.

A system is said to be complex if the variables within the system are interdependent. The links (relationships) between variables ensure that any change (an action or event) in one part of the system has an effect on another part of that system. This effect, in turn, may be the causal event or action that affects some other (or multiple) variables within the system. The complexity within a system obliges planners to attend to a great many features simultaneously, making it difficult or impossible to commit to singular action or expect singular results.⁵⁵ The nature of the relationship between variables is also important. While complicated systems may contain many relationships, these relationships remain linear, producing an additive quality to the system, thus lending themselves to reductionist methods of inquiry. Complex systems, however, are distinguished by non-linear relationships that defy reductionist methods since the nature of the interaction between entities is neither proportional nor subject to the principle of superposition. Complexity in a system makes determining causal relationships extraordinarily difficult to establish: a single action may elicit a response in multiple variables, or even multiple reactions within a single variable after a delay.

Systems Thinking

Most human endeavors involve complex systems that are bound by interrelated actions that have effects on each other. As complex systems, the study and understanding of human endeavors requires a different way of viewing them. While mechanistic, linear thinking is useful in comprehending simple (non-complex) systems, the complexity of the modern world requires a more robust means of pursuing understanding. “Systems thinking is a conceptual framework, a body of knowledge and tools that has been developed over the past fifty years to make the full

⁵⁵ Dörner, 38.

patterns clearer and to help us see how to change them effectively.”⁵⁶ The concepts of systems thinking require that the collection of actors comprising a system be understood in the context of their interrelationships with each other and with the environment in which they exist and not simply in linear cause-effect chains.

In this sense, systems thinking takes a holistic approach to visualizing the environment, its actors, and the relationship between the actors. Since no single part of the system can be understood in isolation, systemic thinkers must consider not only each part of the whole, but also the whole itself. In *Systems Thinking*, Jamshid Gharajedaghi describes five characteristics and behaviors of systems: openness, purposefulness, multidimensionality, emergent property, and counterintuitiveness.⁵⁷

Openness refers to fact that living systems constantly interact with their environment. In terms of energy, systems require interaction outside its structure in order to maintain itself. Since energy is required to stabilize a system, living systems constantly import energy, and expend the byproducts of the energy transformation process. “The energies are continually used to maintain the relationship of the parts and keep them from collapsing in decay. This is a dynamic state, not a dead and inert one.”⁵⁸ The system consumes this energy, and more is required in order to continue maintenance. Only through an understanding of the system’s interaction (i.e. the transmission of energy) with the environment can the behavior of the system be understood. The federal response system’s interaction with the physical environment serves as a useful example. It is difficult to understand the federal response without understanding the extent of the devastation it was dealing with in responding to Katrina. However, understanding the effects of

⁵⁶ Peter M. Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization* (London: Random House, 1999), 7.

⁵⁷ Jamshid Gharajedaghi, *Systems Thinking: Managing Chaos and Complexity* (Boston: Butterworth-Heinemann, 1999), 29. Gharajedaghi is a leading scholar on systems thinking, and the founder and CEO of Interact, the Center for Interactive Systems Design.

⁵⁸ Ervin Laszlo, *The Systems View of the World: A Holistic Vision for Our Time* (New Jersey: Hampton Press, 1996), 32.

Hurricane Katrina, is not enough. The physical environment existed and FEMA interacted with it prior to September 2005. To understand the context in which FEMA operated during Katrina, the observer must be familiar with the conditions prior to the disaster, as well as how the federal response system dealt with other changes in the environment (e.g. other disasters).

Human systems also have *purpose*. To truly understand a system, it is necessary to learn why it behaves the way it does. As an active, purposeful system, the State of Louisiana's emergency response system behaved in certain ways: sometimes in response to changes in the environment, and at other times out of autonomous impetus. To understand this system, it is necessary to determine not only what it did, but *why*. People typically do not act without reason, and regardless of how irrational a behavior appears to the observer, the rationale of the actor must be explored and understood if the observer is to comprehend the system.

The principle of *multidimensionality* suggests that variables in the system have multiple characteristics, some of which may appear to be contradictory. In understanding multidimensionality, it is possible to accept seemingly contradictory assertions only when the observer realizes that not every set of propositions is a zero-sum game. "Multidimensionality maintains that opposing tendencies not only coexist and interact, but also form a complementary relationship."⁵⁹ This was evident in Katrina when Mayor Nagin insisted on returning New Orleans residents to the city prior to Hurricane Rita's landfall at the same time demanding the safeguarding of that returning population. Meanwhile, FEMA desired to register residents for Public Assistance in order to ensure returning residents were able to obtain aid. While FEMA planners viewed this as a zero-sum game (residents could return, be safe, *or* register with FEMA) they eventually determined a way to accomplish all three by establishing registration centers only near areas where it was safe to return.

⁵⁹ Gharajedaghi, 39.

Emergent properties are a product of the interrelationships within the system. Since these properties are not a sum of the parts, but a product of interaction, these properties do not lend themselves to analysis, do not yield to causal explanation, and are often unpredictable. This is the characteristic that gives systems the ability to be “greater than the sum of its parts.” When interacting parts are compatible, the interactivity between them is reinforcing, and the resulting energy produced is significantly greater than either part could produce on its own. Conversely, when interacting parts are incompatible, the product produced by their interaction is less than either part could produce independently. In a disaster response system, it is clearly desirable to take advantage of positive interaction with the participating agencies. This desired emergence is a result of unity of effort, and has tremendous potential to create significant positive effects. Helicopter rescue operators working in conjunction with ground forces, for example, were able to rescue more people during Katrina than either force could rescue separately. If, however, the parts are incompatible the results are less impressive than if each part acted independently.

Finally, Gharajedaghi addresses *counterintuitiveness*. “Counterintuitiveness means that actions intended to produce a desired outcome may, in fact, generate opposite results.”⁶⁰ This characteristic is present in nearly every human system, but seems to manifest itself in greater magnitude during crisis situations. Delays and multiple effects are two primary reasons counterintuitiveness is so prevalent. Delays occur when time and space separate cause and effect. An action taken at a given time and place may have a non-immediate impact, and the delay gives the actor or observer the impression that either nothing happened, or that the effects were singular. In complex systems effects are rarely singular and second or greater order effects may initially go unnoticed if they occur at a different time or place. For example during Katrina, security personnel planned on reducing the number of forces involved in executing the mandatory evacuation as the operation progressed. As the number of citizens requiring security and

⁶⁰ Gharajedaghi, 48.

transportation decreased, the number of National Guard soldiers and police officers was reduced symmetrically. They later discovered that a larger number of police were required as more people were evacuated since the opportunity for lawlessness increased, not decreased as residents departed. This fact was not immediately obvious as there was a delay in the manifestation of the effect of having fewer security forces in the area.

Hierarchy Theory

Since complex systems, by their nature, contain interrelationships that produce asymmetric products, an observer of a complex system must address multiple levels of analysis simultaneously in order to understand the system. Hierarchy theory is a “dialect of general systems theory” that uses the idea of hierarchical levels to subscribe order to asymmetric relationships in order to promote understanding.⁶¹

In order to create an understanding of a system through measurement, the observer must determine what scale he will use to observe the system. *Grain* and *extent* determine the characteristics the observer measures within the system. Grain refers to the level of detail or resolution of the measurement, while extent refers to the spatial and temporal limits. The more fine-grained the observation, the more data the observer accumulates. The wider the extent of sampling is, the broader (in time, space, or both) the area under observation. There is a tradeoff between grain and extent: fine-grain measurement over a large extent will quickly overwhelm the observer with data. Conversely, a fine-grain measurement with a small extent may not provide enough data to truly understand the subject. The observer must determine what aspects of the system are most important to his observation, and what granularity these aspects require.

A key concept to hierarchy theory is *level of observation*. In a simple system, occurrences at a lower level are typically inconsequential at higher levels. The behavior of low-level entities

⁶¹ Timothy F. Allen, *A Summary of the Principles of Hierarchy Theory* [on line]; available at <http://www.iss.org/hierarchy.htm>; accessed 3 March 2006.

emerges to higher levels as an average behavior representing that level. Once the observer determines what level in the hierarchy requires observation, the observer adjusts the grain and extent of his measurements to focus on what is necessary to understand that level. In a complex system, though, low-level details exert disproportionate influence over high levels, and can impact the behavior of the entire system.⁶² This characteristic of complex systems makes determining the appropriate measurements difficult to determine since it adds a dimension to the system.

The observer of simple systems may concentrate observation on the particular level of study; the observer of complex systems needs to be aware of behavior at all levels. When former FEMA Director Michael Brown, for example, admitted ignorance of the fact that thousands of people had evacuated to the Superdome in New Orleans and were waiting there without food, water, or transportation, his career as the director of FEMA was all but over. The tactical-level details amplified by global media attention had strategic consequences.

A common mistake in observing hierarchies is confusing levels of observation with *levels of organization*. Levels of organization refer to the structure of the system as ordered by definitional entities, while empirical entities order levels of observation. By divorcing measurement tools from definitional entities, hierarchy theory allows the observer to reorder the model of the system to account for the significance of behavior at different structural levels.

There is a limit to the amount of data that humans can process, with or without computer assistance. While complex systems require the observer to be aware of the fact that lower-level activity can have high-level effects, hierarchy theory does not suggest that the observer must know everything that happens at all levels within a system. Comprehensive knowledge regarding every aspect of the system at all levels is infeasible, and would interfere with the operational commander's ability to remain focused on pertinent levels of inquiry. Instead, the observer must

⁶² Valerie Ahl and T.F.H. Allen, *Hierarchy Theory: A Vision, Vocabulary, and Epistemology* (New York: Columbia University Press, 1996), 30.

filter the information flow that enters into his thought processes based on the new understanding of the system.

Filters

High-levels of hierarchy operate at a low frequency; they take fewer actions and make fewer decisions than lower levels. Low-level parts of the organization take action much more frequently, hence they are referred to as high-frequency. Observations made at the high levels are made using a low-frequency filter: they attempt to observe only that activity within their level, and filter out high-frequency activity in order to do so. As such, much of the activity taking place at the lower level is filtered out, and the observer is unaware of its taking place. In simple systems, this allows entities at each level to operate within their level without the distraction of the background noise of other levels. In complex systems, though, that “distraction” may occur in such a manner as to have asymmetric results. With the low frequency filter in place, the observer at the higher level remains unaware that something has occurred at a lower level that will cause the behavior of the system to change.

Since it is impossible to consider simultaneously all activity at all levels of a system, it is necessary to filter information flow. The observer must carefully consider the nature of the filter, however, if he is monitoring a complex system. During complex operations such as disaster relief, the kinds of filters used to determine what information passes through to the next higher level (and what information flows to lower levels) must be carefully selected. The abstract concept of filters becomes something more concrete when the observer determines which and how activities will be measured.⁶³

⁶³ In *Hierarchy Theory*, Valerie Ahl and T.F.H Allen describe the idea of surfaces that isolate entities within levels and are generated by context, constraints, filters, response rates, characteristic frequencies, and size. While this concept is useful in developing a better understanding of systems using hierarchy theory, it is beyond the scope of this monograph.

During the Katrina response efforts, a variety of metrics were used to filter the information to the higher levels. While aggregating low-level, high-frequency activity into high-level, lower-frequency reports is necessary, the specific metrics tracked by the various agencies was often difficult to determine. At the FCO level, where the synthesis occurred, the primary metrics reported were typically high-frequency in nature (number of rescues, gallons of water removed from flooded areas, numbers of refugees in shelters, etc.). Knowing the specific number of gallons of water removed from an area is not necessarily useful information at the operational level. The military commander practicing operational art, however, designed his filter to provide him knowledge that he needed in order to make operational-level decisions:

1. Where and in what numbers are major concentrations of displaced civilians and casualties requiring evacuation within the JOA?
2. What is the condition of major assets and degradation of critical infrastructure that is required for the JTF Katrina relief mission? (DoD sites, airports, seaports, bridges, interstates and rail lines, water distribution and sewage centers, electric/telephone/radio/TV stations, internet service providers, hospitals, fire and police departments, shelter facilities)
3. Where and what type of toxic or CBRNE/HAZMAT contamination has been released and what is the impact?
4. Where has lawlessness/criminal activity in the JOA resulted in the commitment of additional law enforcement and/or military assets?
5. Report any formation of adverse weather to include tornados in JOA with location, time and effect that would cause us to divert assets.⁶⁴

During the recovery phase, the metrics reported to FEMA are all measures of performance, as opposed to measures of effectiveness (see Fig. 3). With performance measures, the organization is capable of understanding only one thing: how well they are doing at executing their process. Given these metrics, it is impossible to determine if the process itself is producing

⁶⁴ JTF Katrina, "Priority Intelligence Requirements" from author's personal notes from JFO, Baton Rouge, LA 13 September 2005.

any real benefits at the local level, much less whether the federal programs are spawning non-linear effects across the region.

INDIVIDUAL ASSISTANCE	
Registrations	Number of People
Housing Assistance Approved	Dollars
Other Needs Assistance Approved	Dollars
Disaster Recovery Centers	Number of Centers
SBA LOANS APPROVED	
Home Loans	Number of Loans and Dollars
Business Loans	Number of Loans and Dollars
HOUSING	
Ready for Occupancy	Number
Occupied	Number
PUBLIC ASSISTANCE	
Requests for PA	Number of Requests
Eligible Applications	Number of valid Requests
Project Worksheets Entered	Number of request processed
Federal Share Obligated	Dollars
COMMUNITY DISASTER LOANS	Number of Applications, Dollars
CLEAN UP OPERATIONS	
Debris (cubic yards)	
(USACE/App/Waterway/Demolition)	cubic yards
Fire Arms (units) & Ammunition (lbs.)	units and lbs
White Goods (units)	units
Electronic Goods(units)	units
Hazardous Waste (lbs.)	lbs.
HHW(lbs)	lbs.

Figure 3: Recovery Phase Metrics

A Systemic Approach to Operational Art

Operation: (Lit. operari, to work) any act, mental or physical, constituting a phase of the reflective process, and performed with a view to acquiring knowledge or information about a certain subject-matter.

-- A. Cornelius Benjamin⁶⁵

Since the operational commander is dealing with complex systems, it is natural that a systemic approach to operational art should emerge. Applying operational art requires the acceptance of the vision set forth by the senior decision maker, the “strategic sponsor,” and formulating ways to accomplish this vision using the resources available. The art requires that the commander maintain a larger perspective, and formulate operations that give tactical action meaning. When painting, an artist must begin with a design for his masterpiece in order to give his brush strokes meaning. In operations, the commander must first establish a framework for his operation in order to give tactical action meaning. This framework is produced through operational design, and is necessary for the commander to communicate his vision. Design precedes planning, and, in fact, is a necessary component for coherent planning. Design is not a substitute for planning, but a complement. It is a way to ensure that the planners and the subsequent execution of that plan are efforts that are compatible with the logic of the system.

Design versus Planning

“Designers seek to create rather than predict the future.”

-- Jamshid Gharajedaghi⁶⁶

At the campaign level, an overall design guides planners’ actions. Shimon Naveh uses the metaphor of an architectural design to illustrate operational design.⁶⁷ Consider thinking of the Gulf Coast recovery process as a construction project. The idea of the project is suggested by the project (strategic) sponsor: a group or person that conceives the idea, and funds the project. In

⁶⁵ Dictionary of Philosophy (1942), s.v. “operation.”

⁶⁶ Gharajedaghi, 23.

⁶⁷ Brig Gen (Res) Shimon Naveh, interview by author, personal notes, Fort Leavenworth, KS, 21 January 2006.

Katrina, this group represents the federal and state agencies that determine the overall concept of the project.

The sponsor does not design the building: it is the architect that offers a design for the approval of the sponsor. This occurs through a discourse between the sponsors and the users aimed at deconflicting competing desires for the final product. While representing the interests of the user, the architect (in the Katrina case, the Principle Federal Official / Regional Federal Coordinating Official) works for the strategic sponsor, and has an obligation to use the sponsor's resources in a manner that is most beneficial: providing the best product for the least cost.

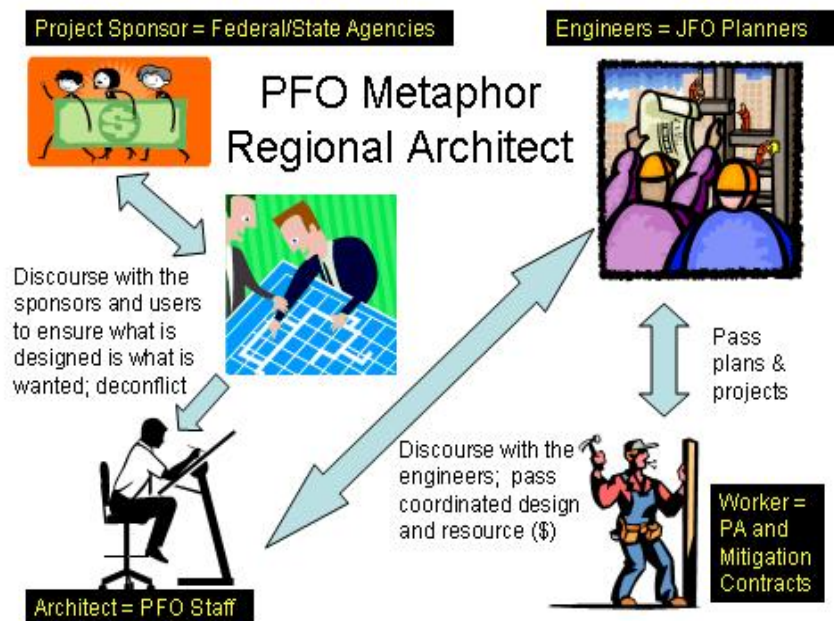


Figure 4: The Architect Metaphor⁶⁸

The design process is essential. If the engineers begin breaking ground on a project that has incomplete or frequently changing designs, significant effort and resources are wasted. Both the sponsor and the engineer scrutinize the concept through a series of discourses. This is a

⁶⁸ *The Architect Metaphor* was adapted by COL Mark S. Inch from a lecture by Shimon Naveh, and used by SPG-Katrina to communicate the idea of design to the PFO's planners at the JFO, Baton Rouge, LA.

practical matter: regardless what design concept was agreed upon, the practical engineer must ask, “How do I make my concept stand up?”⁶⁹

The engineers then create the specific plans that a construction contractor uses to implement the design. Engineers are free to determine how to construct the building, and may make incremental changes to the design based on emerging conditions, as long as the engineers remain within the architectural concepts (framework) outlined by the design.

The engineering plans have many different facets: there are plans for foundation, structure, electrical, plumbing, landscaping, etc., that are integrated into a master plan. The master plan synchronizes the various functional plans with regard to time, resources, and purpose in such a manner as to produce the completed project most efficiently. It would be counterproductive if the landscaper finished the shrubbery before the foundation was dug, or the walls completed before electricity and plumbing was roughed in. Likewise, it is pointless to rebuild schools, for example, in areas of Plaquemines Parish where neighborhoods will not be rebuilt. If the people of Louisiana decide to replace a residential area with an industrial park because of flood plain issues, there is no sense in building a school where nobody will attend it. If the engineering plans do not follow a design framework, the workers will forge ahead in whatever direction is most expedient.

Systemic Operational Design⁷⁰

A method of using systems thinking to deal with complexity is emerging. Systemic Operational Design (SOD) seeks to employ systems thinking to the operational art. The purpose of a systems approach is to discover a model that considers the wholeness of a human system; a

⁶⁹ Thomas J. Verell, interview by author, personal notes, Fort Leavenworth, KS, 8 March 2006. Major Verell is a graduate of University of Miami School of Architecture and an officer in the U.S. Army Corps of Engineers.

⁷⁰ Systemic Operational Design originates from research conducted by Israel Defense Force’s Operational Theory Research Institute (OTRI), and is a subject of study at the U.S. Army School of Advanced Military Studies. Its chief developer is Brig Gen (Res) Shimon Naveh.

model that is cognizant of the structure, purpose, and functions of the system, and the interactions and emergent properties that characterize the system's behavior.

While SOD is in the early stages of consideration in the US Army, it offers great potential in assisting operational level commanders and planners in developing appropriate designs by applying systemic thinking. Moreover, the elements that comprise SOD methodology have significant potential for operations that have little to do with lethal military action. Since the methodology examines the system as a whole, the designers identify relationships and tensions within the system that are exploitable. Designers further recognize those characteristics that are susceptible to influence, and attempt to identify the kinds of influence likely to be most effective. The designers, aware of the characteristics of systems behavior, inject "energy" into the system in order to learn more about the relationships within the system, how the system self-regulates, and how to exploit this new knowledge.⁷¹ The nature of this energy is indeterminate: designers are not limited to military action. Any leverage that influences the system can be applied, including the capabilities of other agencies or coalition partners.

This aspect of Systemic Operational Design lends the methodology to interagency operations. Only the availability of resources limits the types of military and non-military energy available to the designers. If the designers only have military energy available, the kinds of interaction with the system will be limited. If, on the other hand, the entire federal government is contributing to the operation, as in Catastrophic Disaster Response, domestic rebuilding, or Stability and Reconstruction Operations, the possibilities vastly expand. "The bottom line of systems thinking is leverage – seeing where actions and changes in structures can lead to significant, enduring improvements."⁷²

⁷¹ The term *energy* is used theoretically, and can imply any form of input into a system. Forms of energy include kinetic, non-kinetic, information, economic, diplomatic, etc. The purpose of injecting energy is to create an emergence in the system that will reveal more about the nature of the system.

⁷² Senge, 114.

During Systems Framing, the design group creates a cognitive frame that describes the understanding of the system. The development of this frame resembles cartography in the sense that it maps out the logic of the system as the designers discover it. By exploring the characteristics, relationships, tensions, and potential of the system and its many relationships, the designers discover a view, a picture, a map of the system and its characteristics. They create a model of their perceived reality. The critical aspect of this model is that it is incomplete: it is admittedly impossible to understand completely or to comprehensively model a natural system in its entirety.

The designer who has properly framed a system within the current context and has a comprehensive understanding of the system the strategic sponsor desires (or at least the defining attributes of the ideal system) can then use the cognitive model of the existing system to determine the differences between the current model and the ideal one. In effect, the designer creates a model and identifies differences between it and reality: a reality whose ecology, relationships, actors and artifacts continuously evolve. This evolution is susceptible to influence, and the designer looks for ways to manipulate this evolution in order to guide the system towards the ideal.

The designer creates a visualization of the ideal. “A revolutionary designs the model of the city that must be built; a soldier sets out the plan of war to be followed; an economist decides on the growth curve to target; and, all of them, whatever their respective roles, operate in a similar way. Each projects upon the world an ideal plan that will then have to be incorporated into factual reality.”⁷³

It is the recognition of two important features regarding the “reality” and “ideal” model comparison that is essential. First, the ideal model is imperfect. Secondly, the model of reality is wrong. The imperfection of the ideal model is a manifestation of our humanity. Any system

⁷³ Francois Jullien, *A Treatise on Efficacy: Between Western and Chinese Thinking* (Honolulu: University of Hawaii Press, 2004), 3.

designed by humans will be flawed in some way, regardless of the individual genius that contributes to its design. The desired characteristics of the systems we wish to create will have flaws that make it incompatible with some aspect of reality. Even if it were possible to create a perfect model, the evolution of the ecology would eventually erode the efficacy of that model.

The other aspect that must be recognized is that the model of reality is wrong in the sense that our understanding of reality is flawed, or, at least, incomplete. This factor stems from our inability to completely comprehend complex adaptive systems. The sheer number of variables defies comprehension, despite advances in computer technology. The fact that humans are involved in the system makes it immune to predictive scientific methodologies. There are variables (relationships, actors, artifacts, etc.) that we are incapable of completely comprehending, or that are unknowable. The reality model itself is a manifestation of our understanding, which is not only incomplete, but carries with it the fingerprints of our biases. It is a hypothesis that will be inevitably proven wrong by an emergence in the real world.

These two characteristics are not new. The Greek philosopher Plato understood that our views of reality are inherently flawed (if only because they are incomplete), and that we are incapable of designing perfect systems. What is different about the SOD approach is that the designer remains cognitively aware of and admits that these flaws exist, and acts in order to discover a better understanding of these shortcomings. “The model is good enough” is not an attitude that is accepted. The model must be consistently challenged in order to discover a better understanding of the system, and how it is changing. Discourse, the vehicle used in SOD to develop understanding, is not just about pursuing truth: it is about discovering the logic of the system, and uncovering our misconceptions about it.

While the process follows a prescribed logic, it is not dogmatic in its approach. There is no doctrinal methodology that provides the designer with a checklist of required steps towards understanding. While the current practitioners have a collection of design questions intended to stimulate discourse, these are understood to be temporal in nature, and can be omitted or changed

to fit the uniqueness of each context. This characteristic of SOD addresses Dörner's methodism: it acknowledges the uniqueness of the situation, and allows for metacognition throughout the discourse. Throughout the design process, indeed throughout the entire operation, the designers question the cognitive approach to the understanding of the system. While traditional mechanistic doctrinal methodologies give planners form and structure, the logic of the plan is derived from a single cognitive approach. SOD challenges the notion that any single way of thinking about the problem is correct. Indeed, it challenges designers to think about how to think about the problem each and every time they address the subject; the discourse even challenges *itself* throughout the design process.

This characteristic of a "self-challenging" methodology manifests itself throughout the discourse as designers even question the methodology itself. The cognitive challenging of how the discourse should proceed is itself a discourse: the group seeks to achieve a consensus of how to approach the discourse; a sort of "meta-discourse" aimed at determining the appropriate cognitive approach to the uniqueness of that particular problem in that particular context.⁷⁴

Discourse

In *The Fifth Discipline* author Peter Senge promotes the idea of learning organizations. He describes a learning organization as one that is "continually expanding its capacity to create its future."⁷⁵ According to Senge, in order to understand and be able to coherently act within a system, the organization must transform its learning behavior beyond "survival learning" into something that combines "adaptive learning" with "generative learning," and that divests itself of its learning disabilities.⁷⁶

⁷⁴ "Meta-discourse" is a term borrowed from David Bohm's *Dialogue: A Proposal* where Bohm advocates a meta-dialogue "aimed at clarifying the process of dialogue itself."

⁷⁵ Senge, 14. Dr. Peter Senge is a business strategist who advocates systemic approaches to management. He holds a masters degree in social systems modeling and a PhD in Management from MIT.

⁷⁶ Ibid.

Senge describes “learning disabilities” that interfere with the organization’s ability to truly learn. These disabilities, often undetected, are obstacles that keep organizations from making the transformation to a learning organization. The list of disabilities Senge postulates are all symptoms of individuals and groups that fail to think systemically.⁷⁷ Part of the problem, as described by Senge, is attitude: what view of the world an individual takes vis-à-vis the organization. When a worker becomes fixated on “his lane” at the expense of seeing the larger organization as a whole, he will act a certain way towards accomplishing the task at hand with little regard for the importance or nestedness of that task. While this worker may perform his job well, if the effort he makes does not complement or combine with other efforts towards the organization’s aim, it is just a task. This task may have additive value in the process, but it is an effort that will likely never contribute to a synergistic effect. The worker who thinks systemically will pursue a greater impact for his action. He seeks relationships within the system that lead to disproportionate results. With such a view of the world and the organization, the worker is less apt to blame others for failure, become fixated on short-term events, or place undue stock in causality.

SOD uses a series of discourses to pursue an understanding of the system, and to design a framework for planning operations. The discourse is truly about discovering knowledge as a group; reaching consensus. The purpose is to achieve an understanding that is not obtainable individually. Senge refers to “team learning” when he discusses the development of a learning organization.⁷⁸

Discourse is not simply conversation or debate, nor is it brainstorming. Discourse is a structured means of integrating the cognitive capabilities of a group in order to produce a

⁷⁷ Senge’s seven learning disabilities are: “I Am My Position,” “The Enemy is Out There,” “The Illusion of Taking Charge,” “The Fixation on Events,” “The Parable of the Boiled Frog,” “The Delusion of Learning From Experience,” and “The Myth of the Management Team.” See Senge, 18-25.

⁷⁸ Senge, 236.

synthetic intelligence that is greater than any single member of the group. The manner in which discourse is used in SOD is akin to David Bohm's *Dialogue*.⁷⁹

A key difference between a dialogue and an ordinary discussion is that, within the latter people usually hold relatively fixed positions and argue in favor of their views as they try to convince others to change. At best this may produce agreement or compromise, but it does not give rise to anything creative.⁸⁰

Senge's two facets of openness in discourse are participative openness and reflective openness. Participative openness is essentially the ability to speak one's mind openly, without fear of repercussion. While this is easy to discuss on the surface, there are a variety of obstacles to establishing a climate within the organization that produces participative openness. One must be forthright about assumptions, vision, and biases, and has to be able to admit that "I don't know," and understand that it is an acceptable answer. Moreover, "I will find out" does not necessarily follow "I don't know." There is a point during discourse where the group achieves the understanding that some things are, in fact, unknowable. This point is crucial. A systems thinker is comfortable with the idea that some things are unknowable. "I don't know" becomes, in itself, a piece of knowledge. If a properly explored inquiry reveals that the answer is, in fact, unknowable, that revelation is a certainty that can be used for an understanding of the system.

The second type of openness Senge advocates is reflective openness. This begins with a willingness to question our assumptions, a "willingness to challenge our own thinking, to recognize that any certainty we ever have is, at best, a hypothesis about the world. No matter how compelling it may be, no matter how fond we are of 'our idea' it is always subject to test and improvement."⁸¹ The kind of honesty required to conduct discourse requires both kinds of openness, which cannot be achieved without a significant level of trust. To truly be "open" in

⁷⁹ Dr. David Bohm (1917-1992) was a highly respected theoretical and quantum physicist and philosopher who challenged accepted views of science and the world. See David Pratt's *David Bohm and the Implicate Order* at <http://www.theosophy-nw.org/theosnw/science/prat-boh.htm>.

⁸⁰ David Bohm & David Peat, *Science Order, and Creativity* (Oxford: Routledge, 2000), 241.

⁸¹ Senge, 277.

discourse, each participant must “suspend their certainty” in the presence of the others.⁸² This is an exceptionally difficult thing to do, especially in organizations that, by their very nature, are internally competitive. This includes hierarchical organizations, where unchallenged knowledge is linked to authority, and networked organizations where political clout is linked to a perception of infallibility. In either organization, ignorance is viewed as vulnerability.

The political nature of disaster response is clearly an obstacle to productive discourse. “Blame-storming” sessions during and after the Katrina response are indicative of the kind of cultural characteristics that must change if we want to progress past “one-stage thinking.”⁸³ Six months after his resignation, Michael Brown, former director of FEMA, testified before congress that “somebody else” was to blame for federal response shortcomings. Homeland Security Secretary Michael Chertoff, Louisiana Governor Kathleen Blanco, New Orleans Mayor Ray Nagin... this list of people who seek to cast blame appears endless. The public “blame game” is happily reported by the press who find such controversy utterly delicious.

Given that the national response apparatus operates in this politically-charged and publicly transparent environment, it is clear that the system as it exists makes systemic design through open discourse by political leaders quite challenging. The “openness” and “suspension” required to conduct discourse appears to be at odds with the political climate that permeates the federal disaster response community. Instead of fixing blame, the response community needs to concentrate on fixing the problem.

There is no blame. We tend to blame outside circumstances for our problems, ‘Someone else’ – the competitors, the press, the changing mood of the marketplace, the government – did it to us. Systems thinking shows us that there is no outside; that you and the cause of your problems are part of a single system. The cure lies in your relationship with your ‘enemy.’”⁸⁴

⁸² Ibid., 284.

⁸³ Thomas Sowell, *Applied Economics: Thinking Beyond Stage One* (New York: Basic Books, 2004), 4.

⁸⁴ Ibid., 67.

In order to operate within the system, the political climate must be considered part of the ecology. It is essential to acknowledge that different agents within the system have different logics. In fact, the designers must consider themselves (their past and present actions or logic) as a rival if they discover that their actions are counterproductive to obtaining their goals. It is in this sense that the political realities of operating in the interagency may lead designers to consider the politics of the context as a potential rival. The inability to set aside (internally subdue) political affiliation in order to participate in the interagency defies the spirit of openness required for effective discourse. On the contrary, designers participating in the discourse must “suspend” their beliefs so all can see them: the hidden agendas indigenous to political organizations will otherwise undermine the discourse, and the consensus understanding of the system will elude the group.

This “suspension” is likely the most difficult piece to understand or put into practice. Again, it requires a level of trust that often eludes groups, especially ad hoc organizations, and particularly those with political connections outside of the group (such as an interagency group assembled for a specific operation). David Bohm describes the idea of suspension:

Suspension involves exposing your reactions, impulses, feelings and opinions in such a way that they can be seen and felt within your own psyche and also be reflected back by others in the group. It does not mean repressing or suppressing or, even, postponing them. It means, simply, giving them your serious attention so that their structures can be noticed while they are actually taking place. If you are able to give attention to, say, the strong feelings that might accompany the expression of a particular thought - either your own or another's -- and to sustain that attention, the activity of the thought process will tend to slow you down. This may permit you to begin to see the deeper meanings underlying your thought process and to sense the often incoherent structure of any action that you might otherwise carry out automatically. Similarly, if a group is able to suspend such feelings and give its attention to them then the overall process that flows from thought, to feeling, to acting-out within the group, can also slow down and reveal its deeper, more subtle meanings along with any of its implicit distortions, leading to what might be described as a new kind of coherent, collective intelligence.⁸⁵

⁸⁵ Bohm, *Dialogue: A Proposal*, 2.

The practical application of a Systemic Operational Design approach for disaster response must include a mechanism for achieving suspension during discourse. The political and departmental biases inherent in the interagency must be overcome. “The ideal of combining inquiry and advocacy is challenging. It can be especially difficult if you work in a highly political organization that is not open to genuine inquiry.”⁸⁶

Systems Framing

The universe is itself a system made up of many sub-systems; a hierarchy of nested systems. In any context, it is infeasible to attempt to reach a comprehensive understanding of all things. Even the global system contains too many variables to attempt to “map out” an understanding of all the possible actors and interactions. It is necessary, therefore, to focus the study of a system and its context to that which is feasible: to frame the system in such a way that an understanding is possible. Once a system is framed, it is possible to explore the interactions within that portion of the greater system, keeping in mind that the system frame is an artificial construct.

To reduce the focus of exploration designers must determine which portions of the framed system constitute actors, and which are simply part of the environment in which the system exists. Jamshid Gharajedaghi’s *Systems Thinking* offers us a way to determine which entities are components of the system, and which are part of the environment:

The system... consists of all the interactive sets of variables that could be controlled by participating actors. Meanwhile, the environment consists of all those variables that, although affecting the system’s behavior, could not be controlled by it. The system boundary thus becomes an arbitrary subjective construct defined by the interests and the level of the ability and/or authority of the participating actors.⁸⁷

The designers embark on a journey of discovery as they explore the system. Using the discourses, the designers “discover” not only the attributes in the system, but how it is evolving.

⁸⁶ Senge, 200.

⁸⁷ Gharajedaghi, 30.

The results of the discourse are transformed into plans, much like the architect's designs are translated by engineer planners at the beginning of the metaphorical construction project. Since the system continues to evolve, designers and operators must continuously assess whether the understanding of the system frame remains valid. SOD uses a process of "reframing" to account for emergences in the system that conflict with the understanding of the logic of the system. Reframing allows the designer to achieve a richer understanding of the dynamics of the system since it explores the discovered differences in what he thought he knew (the institutionally accepted paradigm) and what has emerged in reality. While operating towards the idealized model of a system, the discovery of new phenomenon inconsistent with the accepted model offers the designer an opportunity to redefine the characteristics of the ideal model to fit the change in context.

A paradoxical, but perhaps realistic, view of design goals is that their function is to motivate activity which in turn generate new goals...It is also beside the point to ask whether the latter stages of the development are consistent with the initial one – whether the original designs were realized. Each step in the implementation creates a new situation; and the new situation provides a starting point for fresh design activity...⁸⁸

While traditional campaign planning requires planners to predetermine a series of operations that achieves a discrete end state, SOD seeks to understand the nature of the system in order to transform the characteristics of the system into something that is acceptable to the strategic sponsor (see Figure 5). SOD is an iterative process that recognizes that every action in the system will change it in some unpredictable manner, and that each step towards achieving the acceptable model requires new learning. This requires the operator to consider that the initial impression of the correct way to proceed may no longer be valid since his understanding of how the system would respond was flawed. Through reframing, the operator achieves a new understanding, built upon the previous understanding, but enhanced with the new knowledge of

⁸⁸ Herbert Simon, *The Science of the Artificial* (Boston: MIT Press, 1996), 111-138 quoted in Shimon Naveh, *The Depth Structure of Systemic Operational Design* (Operational Theory Research Institute), 10.

how the system functions. With this new understanding, the operator can see new ways to exploit the rival system in order to transform it. The commander may proceed in a new direction with the intent of learning even more about the system.

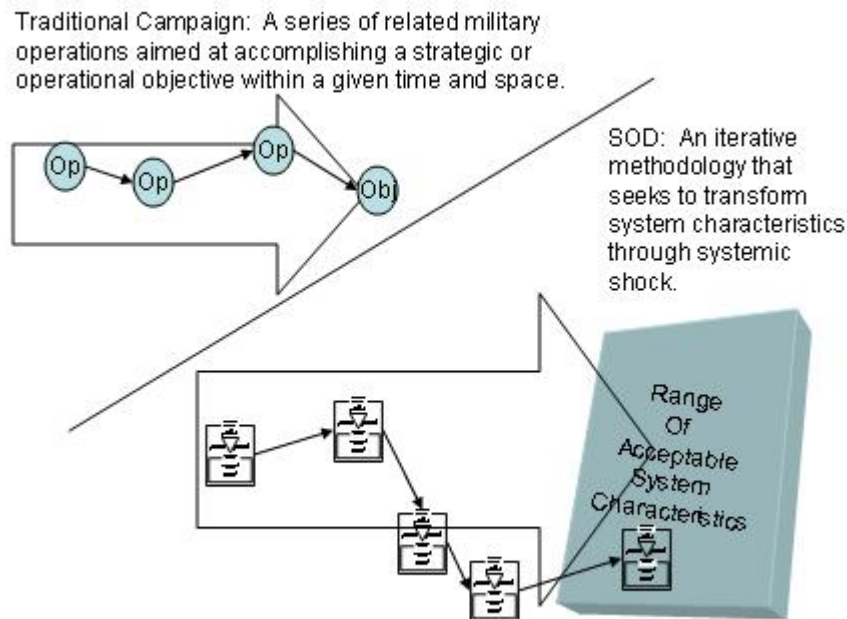


Figure 5. A Systems Approach

Populating the Design Team

The forming of a systemic design team is a critical aspect in creating an atmosphere where discourse can take place. Members of the design team must be able to suspend political, departmental, and personal biases in order to pursue a common understanding of the system in question. There are numerous obstacles to creating the environment where discourse will flourish. Group size and composition, sub-group dynamics, culture, and personality traits play a large role in how meaningful the discourse can become.

The size of the group depends on many factors. Familiarity with the process allows for larger groups to work, while smaller groups tend to facilitate more participation in newly formed design groups. Regardless of these considerations, it is important to populate the design team with the appropriate expertise. A design group whose members populate a single discipline is

likely to limit the discourse to matters within their expertise. A multidiscipline approach to forming a design team allows a variety of expertise to influence the discourse, and results in a more holistic understanding of the system. This benefit must be balanced with the tendency to overpopulate the group to the point it becomes unwieldy; the size of the group requires balancing intimacy and interdisciplinary expertise.

The presence of subgroups within the design team must also be managed. While several members of the team may be from the same organization, it is important to ensure that the presence of like-minded people from the same bureaucratic culture do not reinforce biases within their peer group at the expense of suspension. Likewise, several members of the team may form (self-organize) into subgroups in order to forward a specific agenda or idea at the expense of openness. Since the purpose of the discourse is to reach a level of understanding about a problem, the forming of subgroups in order to defend or promote a viewpoint or project will stymie the pursuit of understanding.

Organizational cultures may also present an obstacle to effective discourse. If an organization is very politically oriented, or if the hierarchical nature of the organization is very strict, openness and creativity are at risk. While SOD enhances learning for the commander, the process of discourse in achieving learning defies hierarchy and rank.

The personality traits of the participants are likewise important. Members of a systemic design team must be able to consider multiple points of view and articulate contrary positions without being abrasive. This does not imply that a member of the discourse should politely acquiesce, but that they should challenge ideas, thought processes, and hypotheses with honest inquiry. "What is essential here is the presence of the spirit of dialogue, which is in short, the ability to hold many points of view in suspension, along with a primary interest in the creation of

common meaning."⁸⁹ Members of the design team must be able to pursue the systemic characteristic of multidimensionality in order to find creative solutions without compromise.

⁸⁹ Bohm, *Science, Order, and Creativity*, 247.

SOD and Interagency: Efficacy for Integrated Operations

While SOD is about designing military operations, its systemic approach to operational art has benefits that range beyond military application. By introducing a systemic approach to extra-military operations, the coalescing benefits of discourse, the holistic view of systems, and the ability to take advantage of synergistic interdependencies makes SOD an attractive approach to interagency operations.

A SOD methodology would benefit disaster response and recovery, particularly in cases where the scale of the disaster exceeds the capacity of the combined state and federal response systems. The recovery phase of disaster relief would benefit from a holistic approach to rebuilding communities, making sustainable development easier to achieve. These benefits would also extend to other operations where multiple agencies work together towards a common goal such as Stability and Reconstruction Operations.

Implications for FEMA et al during Disaster Response and Recovery

During Katrina, one of the obstacles to jointly designing a recovery framework was the perception that every action by a governmental agency needed to be a political issue. The federal agencies suspected each other, and the states suspected the federal agencies and the other states.⁹⁰ Many of the organizations SPG-Katrina interacted with viewed other organizations as rivals, instead of considering the system as an integrated whole. The failure to frame the system in a manner that included the larger context (regionally) suggests that reconstruction will proceed in a systematic fashion, and will pit each stakeholder against the others as they vie for finite resources.

⁹⁰ Author's personal notes JFO Baton Rouge, LA 17 September 2005. During an executive meeting a member of the FEMA planning staff suggested that they must act decisively or "we will be preempted by DoD again!" During a FEMA planning session a representative for the State of Louisiana refused to discuss the concept of a regional (Gulf Coast) reconstruction design stating that he did not care what happened in Mississippi, and that regardless of the President's policy and the advantages of leveraging market forces to decrease recovery costs he would not support any approach that would reduce the potential gain to the state he was hired to represent.

Based on an operational-level examination of multi-agency operations in FEMA's Joint Field Office in Louisiana, SPG-Katrina offered several recommendations to various Emergency Support Functions that were involved in planning. Among the recommendations SPG-Katrina made to the Principle Federal Official (subsequently the Regional Federal Coordinating Officer [RFCO]) was the establishment of a Regional Plans and Policy Section (RPPS) that would work directly for the RFCO. SPG- Katrina further recommended that:

The RPPS should adopt a long-term recovery planning framework that identifies the following: the facets of the regional recovery problem; the regional, state, and local desired end-states of the disaster recovery; the scope and duration of the recovery effort; the general role key agencies and institutions will have throughout the recovery effort; and a framework that enables state, local, and nongovernmental agencies to synchronize their efforts with the federal response.⁹¹

Ideally, the RPPS would consists of a variety of experts familiar with a systems approach to design, as well as disaster recovery, economics, and the capabilities and limitations of governmental organizations as the local, state, and national level. The RPPS would be capable of producing an overarching planning analysis and assessment framework to address regional recovery in a holistic way, focused on the long-term. The framework would not address immediate response efforts. Rather, it would develop a structure for organizing regional, long-term, sustainable community recovery and mitigation efforts. This planning framework would neither dictate nor supplant state and local recovery plans; it would meter state and local plans to ensure that the national policy goals are accomplished alongside good stewardship of federal resources.⁹²

When SPG-Katrina was established, there was no RFCO, nor was there a RPPS. In the absence of a regional planning capability, SPG-Katrina offered a draft framework for long-term recovery. Critics of the regional approach suggested that the Stafford Act did not authorize such an approach, and that a regional design produced at the federal level would, in spirit if not in fact,

⁹¹ SPG-Katrina, *Beyond Katrina*, iii.

⁹² SPG-Katrina. *Weathering Katrina*, 18.

impinge upon state sovereignty. This view demonstrates a misunderstanding of operational design. A unifying design at the operational level does not limit the freedom of subordinate elements, but ensures that actions at the sub-operational (tactical) level can produce non-linear effects. As Naveh points out, “design is about giving the tactical commander maximum freedom.”⁹³ In a regional approach, the state and local agents concerned in recovery efforts are the tactical commanders. This is in keeping with the strategic directive outlined by President Bush on 15 September, 2005, where he stated that “the federal government will be fully engaged in the mission [of recovery], but Governor Barbour [of Mississippi], Governor Blanco [of Louisiana], Mayor Nagin [of New Orleans], and other state and local leaders will have the primary role in planning for their own future.”⁹⁴

The proposed federal framework for reconstruction allows states to design their own reconstruction, but attempts to enhance regional efficacy through shared resources, catalyst industries, and market forces. Since adaptive systems self-regulate (i.e. the Gulf Coast will rebuild with or without federal assistance), the framework seeks to accelerate self-regulation through open communication and stimulating relationships that will produce positive non-linear effects.

Certainly the SPG-Katrina-produced framework has flaws. There were no economic, healthcare, social, or infrastructure experts involved in its design. It is, however, a framework based on FEMA’s own methodologies for distributing reconstruction funding. As such, it may be a good starting place for a regional design team to beginning designing a model for the reconstructed system. Most importantly, it introduces the operational level to the interagency environment.

⁹³ Naveh, 21 January 2006 interview.

⁹⁴ George W. Bush, “President Discusses Hurricane Relief in Address to the Nation” (presidential address to nation from New Orleans, Louisiana, 15 September, 2005), available at <http://www.whitehouse.gov/news/releases/2005/09/20050915-8.html>; accessed on 24 SEP 05.

Implications for Other Interagency Operations

A systems approach to designing operations is clearly not limited to disaster recovery. Nearly every endeavor the United States undertakes requires the use of multiple elements of national power.⁹⁵ With the increased recognition of the importance of integrating operations across departmental boundaries, a systems approach to integration offers a methodology that synthesizes the efforts of each contributing organization, and offers interagency partners an opportunity to design at the operational level.

US Joint Forces Command (USJFCOM) promotes the Joint Interagency Coordination Group (JIACG) concept in order to bridge the gap between DoD and the other departments and agencies in the U.S. government. “The JIACG concept seeks to establish operational connections between civilian and military departments and agencies that will improve planning and coordination within the government.”⁹⁶ While the JIACG concept potentially fills a void in integrated operations coordination, it has not yet developed to the point where it addresses the lack of operational level thinking. Early experimentation with the JIACG concept has lead USJFCOM towards developing the concept as “a coordinating organization between the strategic and operational levels” instead of an opportunity to infuse operational level thinking into the interagency process.⁹⁷ USJFCOM’s conclusions also suggest the need for technological solutions to integrating operations: “Undeniably, a crucial enabling concept for the JIACG is CIE [Collaborative Information Environment] which has not reached full operational capability.”⁹⁸ “For the JIACG to be effective, a friendly and reliable CIE must to be accessible to each participating agency or organization. (Policy-makers may not be as comfortable with virtual

⁹⁵ The elements of national power are the means of projecting influence in pursuit of national objectives. The military considers the elements of national power to be Military, Information, Diplomacy, Law Enforcement, Infrastructure, Financial, and Economic.

⁹⁶ U.S. Joint Forces Command, *Joint Interagency Coordination Group (JIACG)*, [on line]; available from http://www.jfcom.mil/about/fact_jiacg.htm; Internet: accessed 21 March 2006.

⁹⁷ U.S. Joint Forces Command, *The Joint Warfighting Center Joint Doctrine Series Pamphlet 6: Doctrinal Implications of the Joint Interagency Coordination Group (JIACG)*, (USJFCOM: 2004), 21.

⁹⁸ Ibid., 22.

communication, preferring ‘face to face’ interaction that allows a personal “handshake” to consummate agreement.)”⁹⁹

While technology can be an enabler for integrated operations, it is not “crucial.” More important than the technological realm is the logical one; organizations with incompatible logics will find creating synergistic effects difficult at best. If, however, an integrated group of designers develops the logic of an operation together through the use of discourse and a systemic approach to design, the opportunity exists to minimize the tension inherent in interagency operations.

USJFCOM’s analysis of JIACG efficacy exposes the greatest obstacle to effective integration: a lack of trust. “The level of trust within the interagency community will be crucial to the quality of information the JIACG can provide...”¹⁰⁰ In systems terms, this lack of trust is the emergent property of the negative interaction between two entities in the system. In order to change the nature of this emergence, the nature of the interaction must change. SOD’s structured discourse is a vehicle by which the nature of interagency interaction can be transformed into a complementary relationship. The process of systemic design facilitates communication between entities, and acts as an “engine for socialization” among the participating agencies.¹⁰¹

The JIACG concept is a viable mechanism for integrating multi-agency operations. The concept can be greatly enhanced through the structured application of systemic thinking, such as the methodology proposed in SOD. Whether the executive branch adopts the JIACG concept or some other form of multiple-agency working group, the need for structured discourse and systemic thinking at the operational level is a necessity. Through such a vehicle, interagency cooperation can transcend interoperability to reach interdependency and produce reliable synergistic effects.

⁹⁹ Ibid., 21.

¹⁰⁰ Ibid.

¹⁰¹ Naveh, 18 January 2006 interview.

Implications for the Army

The Army recognizes that the contemporary operating environment requires interagency cooperation.

The instruments of national power—diplomatic, informational, military, and economic—complement and reinforce each other. Army forces enhance their effectiveness through close coordination with interagency partners. By understanding the capabilities of other agencies, senior- and midlevel commanders can add diplomatic, informational, and economic depth to their military efforts. Conversely, U.S. military capabilities allow other agencies to interact with foreign powers from a position of strength and security. Synchronizing military power with other instruments of national power substantially improves the joint force's strategic capabilities.¹⁰²

What remains in question is how to best integrate the various capabilities available in the various departments and agencies. Again, interconnectedness does not imply unity. A mechanism for creating interdependent relationships that lead to nonlinear emergences is needed if the power inherent in the complexity of the interagency system is to be harnessed. Systemic Operational Design has the potential to facilitate such effects.

In describing the National Security Environment in Field Manual 1, the Army recognizes the need for systemic thinking. "...an adversary's power is... now assessed more comprehensively, in terms of its interconnected political, military, economic, social, informational, and infrastructure systems."¹⁰³ The implication is that in order for the Army to maintain its relevance, it must adopt methods of systemic thinking.

While the Joint Force explores methods of integrating interagency partners through the JIACG and other concepts, the Army should continue to explore methods of educating the force in systemic thinking in order to facilitate this integration. The Army's initial exposure to Systemic Operational Design shows that the methodology has promise as a vehicle for developing the operational art, integrating other agencies, and for designing operations in complex environments.

¹⁰² *The Army*, 3-2.

¹⁰³ *Ibid.*

The similarities between disaster response and recovery for Hurricane Katrina and Stability and Reconstruction Operations (SRO) are numerous. The failure to adequately integrate federal agencies, the failure to think operationally, and the failure to apply systemic thinking to a complex problem are all failures the government can potentially repeat wherever it operates. The complexity of the challenges the U.S. faces globally requires innovative solutions that account for that complexity. SOD offers an opportunity to transcend traditional, linear thinking and to adopt a holistic approach that integrates systems theory with an engine for socialization of interagency partners at the operational level.

While SOD has significant potential for the U.S. Army, there are several obstacles the Army must overcome if it pursues this methodology. Egalitarian discourse, where openness sometimes requires criticizing other's ideas, would challenge Army culture and tradition. The role of the commander as a central member of the design team would require a significant time investment that most commanders do not have in excess. Most significantly, SOD would challenge the teleological approach to designing operations that is prevalent in current practice.

CONCLUSION

Hurricane Katrina is not an anomaly. While the specific aspects of the storms and flooding are unique, the potential for natural or man made disasters to strike populated areas of the U.S. remains high. The causes of Incidents of National Significance are less relevant than the response to them. The nature of the response will require interagency cooperation.

Current methods of integrating operations were shown to be inadequate for the scale of operation that Katrina required. Effectively integrating operations requires a unifying vision; a design for conducting the operation and achieving unity of effort. With the absence of an operational level in most agencies, achieving unity is difficult. A vision that is not adopted by those responsible for planning operations will not bring the federal response mechanisms together as a unified whole. Many of the problems evident in the Katrina response remain in place during the reconstruction phase of the operation. A lack of unity, the failure to adopt the strategic vision, and a failure to approach the problem systemically pervades the reconstruction effort.

The military uses operational art to link strategic goals to tactical action. By nesting operations within this construct, the military ensures that tactical action has meaning. This nesting occurs through the use of design. The current processes the military uses to design operations do not necessarily lend themselves easily to operations other than war, and do not facilitate integrating interagency partners.

While the military is not significantly involved in the reconstruction effort in the Gulf Coast, the implications for Stability and Reconstruction Operations is significant. The complexity of the interrelated sets of problems in both Katrina and ongoing SRO missions requires complex solutions. The nature of these solutions transcends military capability, and requires integrated operations. Operational level thinking is required for both domestic recovery and SRO.

Systemic Operational Design is a viable method of designing complex solutions through the application of systems theory. By relying on a rich set of discourses, SOD facilitates a deeper understanding of the problem set, and acts as an engine of socialization among disparate groups working towards a common goal. SOD facilitates the implementation of operational art in a manner that makes integrating operations more feasible. By adopting Systemic Operational Design as a methodology for designing operations, the Army would gain a powerful tool for dealing with complex adversaries in complex environments and for integrating interagency partners.

APPENDIX

The purpose of this appendix is to introduce further the concept of Systemic Operational Design. It contains a series of products from SOD training and application conducted at the School of Advanced Military Studies. The second section of the Appendix shows a sample of a planning framework designed through a systems approach. While SOD was not used in producing the design, it is indicative of the comprehensive design a systemic view can produce.

OTRI Products

Cognition At Tactical Versus Operational Level¹

Tactics as a method of analysis (thought) serving command agents who execute action –

Operational art as a method of synthesis (thought) serving agents who structure/systemize

learning (the praxis of rational thinking-operational action).

Tactics (OODA Looping)

1. Tactical warfighters think within an existing paradigm;
2. They employ existing contents (doctrinal formula), manifested in organizational structures (molds), forms of functioning (templates), and modes of command (plan);
3. They never question the existing method of thought they utilize in order to solve components of a problem that an external observer has set for them;
4. They compete with random situational combinations, while obeying the general principles of physical logic;
5. While acting, they are expected to produce systemic interpretations on functional components (parts of a system) in an emerging operation, from a forward positioning.

Operational art (Systemic Operational Design)

1. Operational artists think between (difference) an existing paradigm (reference) and an emerging paradigm;
2. In order to fulfill their unique function they are living in an “institutional box”, but thinking outside it;
3. Employing a systemic approach and utilizing a design methodology, they ask critical questions (inquire), both about the way of thinking (thinking about thinking), and the conceptual contents (materials) that are used in the process of thought;
4. They compete with emergent contextual complexities through the design of artificial system-models, and the operationalization of institutional learning systems;
5. They develop novel paradigms, structure relevant learning processes, conceptualize new patterns, and formulate new conceptual contents.

¹ Shimon Naveh, “Questions of Operational Art 1” [unpublished paper], (OTRI, 2005), 5.

What are the Cognitive Characteristics of SOD as a Unique Method of Thought Enabling Operational Architects to Perform their Command Function? What is the Organizing Logic of SOD as Unique Practice of Operational Command Agents?

1. Design is a thinking & learning methodology utilized by agents who are functioning in the median between strategic sponsors and tactical artisans (it systemizes the learning discourse between NCAs, COM.COMM., and Warfighters).
2. Design is heuristic not deterministic, discursive and not autocratic, multi-dimensional and multi-disciplinary
3. SOD enables operational artists to examine critically the tension between the existing institutional paradigm and the relevant strategic emergence.
4. Design is a methodology enabling operational command agents (operational architects) to create singular operational artifacts.
5. Design is a system of thought/learning enabling the construct of system-models.
6. SOD guarantees coherent planning (it complements rather than substitute planning).
7. As a methodology combining brain storming (discursive creativity) with structuring, design reflects the systemic traits of communication and control.
8. Design is a cognitive system enabling operational observers to think about "the world" outside themselves.
9. Design questions not only the utilization of existing conceptual contents but, first and foremost, the cognitive conditions that affect thinking and learning in the relevant context.
10. SOD enables the development of novel paradigms, the structuring of relevant learning processes, the conceptualization of new patterns, the formulation of new conceptual contents and formal templates.
11. Design enables both, the systemic rationalization of an emergent strategic complexity, and the development of an operational framework to maneuver this complexity into a desired state.
12. Design enables the fabrication of a narrative reflecting the logic of the context.
13. As a methodology based on the rival's synthesis, SOD guarantees coherent intelligence analysis.
14. SOD is a methodology (system of systems) enabling the conception of singular command systems, logistical systems, and maneuver systems.
15. Since design is holistic but incomplete it depends on action (operation) to push learning forward.
16. The design product is an exact reflection of the design process.
17. Design is the prerogative of the operational commander. The only consideration for selecting the other members of his (design) team is their ability to contribute to a rigorous discourse.

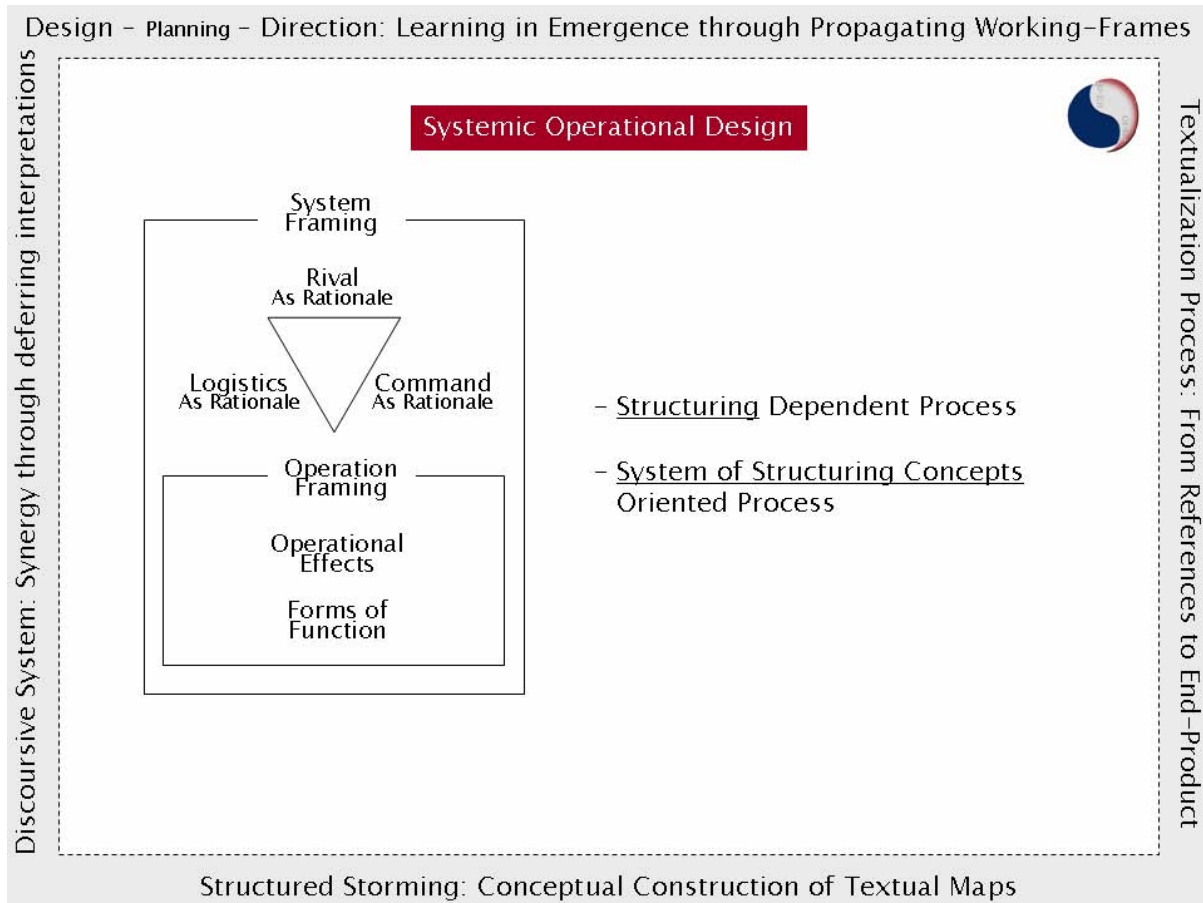
² Ibid., 11.

The Difference between Operational Design and Operational Planning as an Engine for Systemic Complementary Functioning

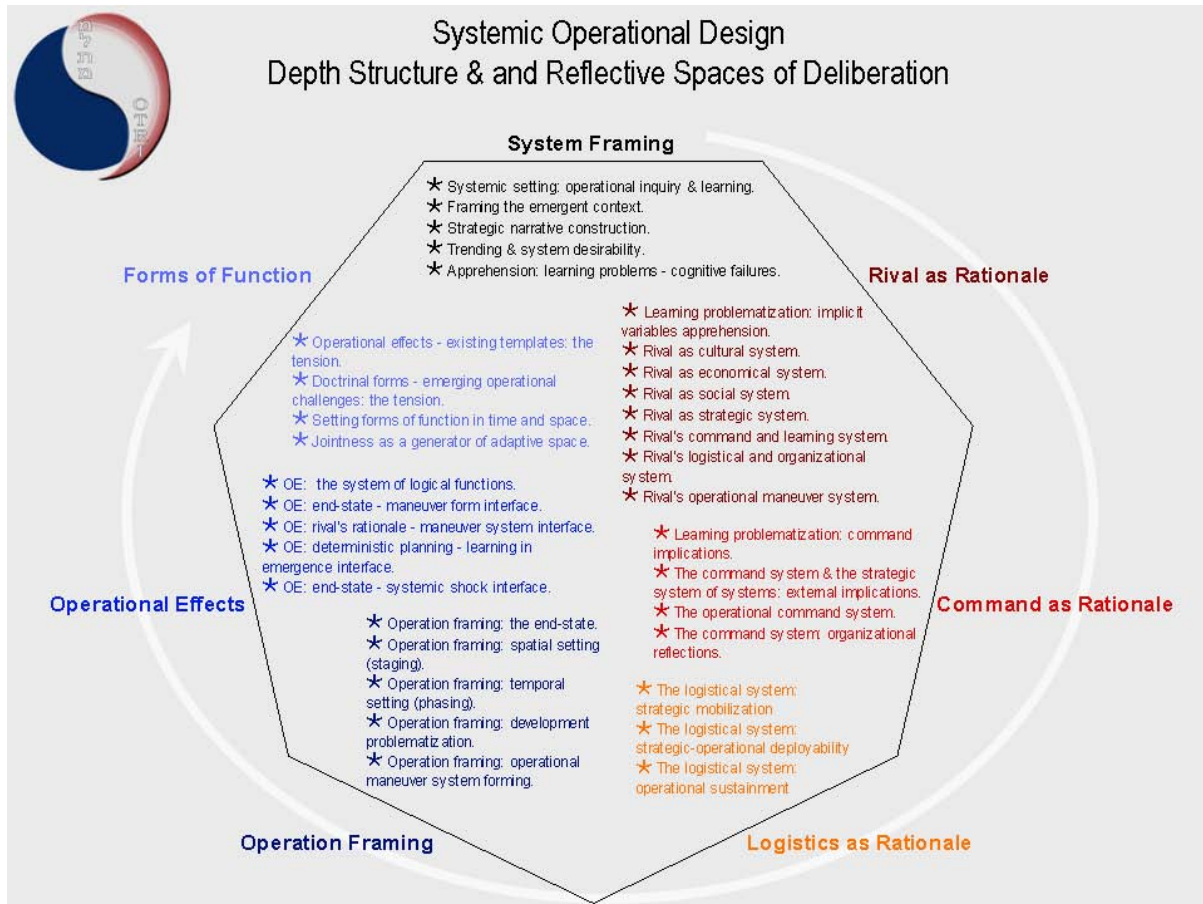
- **Design is about learning – Planning is about action**
- **Design is a referential framework for re-design – Planning is a working-frame for action**
- **Design relates to context – Planning relates to situation**
- **Design centers on discourse – Planning centers on decision making**
- **Design is about creation of the new – Planning is about adaptation of the existent**
- **Design is about problem setting – Planning is about problem solving**
- **Design functions in the virtual – Planning functions in the actual**
- **Design focuses on the exploitation of difference – Planning focuses on the exploration of similarity**
- **Design rationalizes complexity through the construction of systems – Planning competes with randomness by relating to units, patterns, and templates**
- **Design creates new patterns – Planning utilizes existing templates**
- **Design initiates paradigm-shifts (deconstruction) – Planning functions within the boundaries of an existing paradigm**
- **Design is holistic but incomplete and un-detailed – Planning is complete but partial**
- **Design is an open construct – Planning is a closed construct**
- **Design is about generation of critical questions and rigorous thought – Planning enables adaptive action**
- **Design is multi-disciplinary – Planning is uni-disciplinary**
- **Design embodies both methodology and content – Planning depends exclusively on content**

³ Ibid., 13.

SOD Concept¹⁰⁷



¹⁰⁷ Shimon Naveh, “Systemic Operational Design” [unpublished PowerPoint presentation], presented to School of Advance Military Studies, Fort Leavenworth, KS, January 2005, 12.

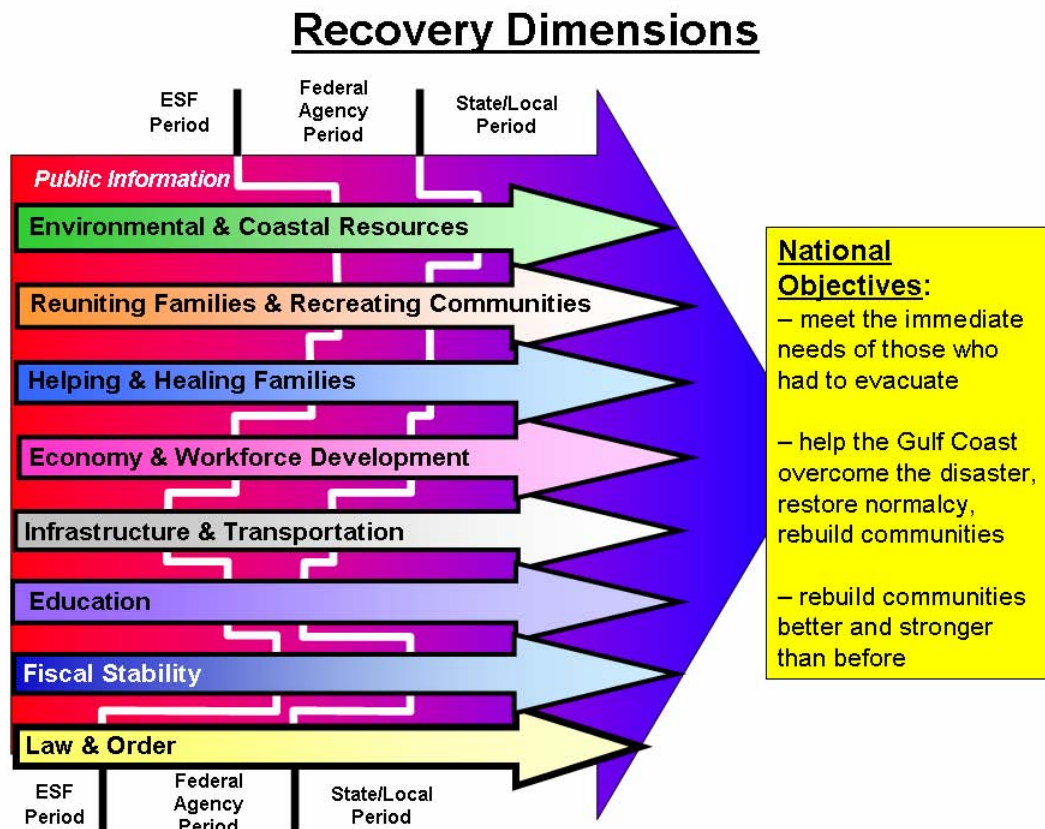


¹⁰⁸ Ibid., 13.

SPG-Katrina Products

The following products were created by SPG-Katrina during their support of FEMA in September, 2005. While SOD was not formally employed to produce this framework, the SPG employed a systems approach for designing the framework.

Recovery Dimensions Framework¹⁰⁹

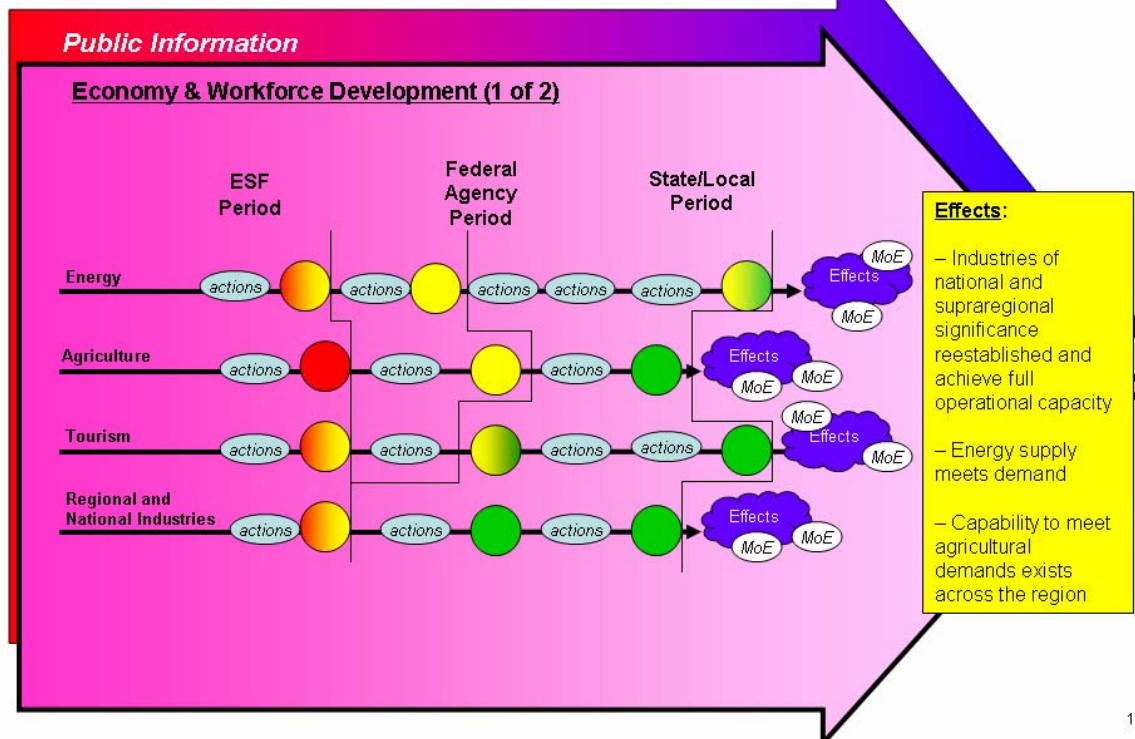


¹⁰⁹ SPG-Katrina, “Gulf Region Long Term Planning Framework Brief” [unpublished PowerPoint briefing] (School of Advanced Military Studies, Fort Leavenworth, KS, 2005), 9.

Recovery Dimension Details¹¹⁰

The following slides show a sample of the detailed recovery dimensions.

Recovery Dimension: Economy and Workforce Development

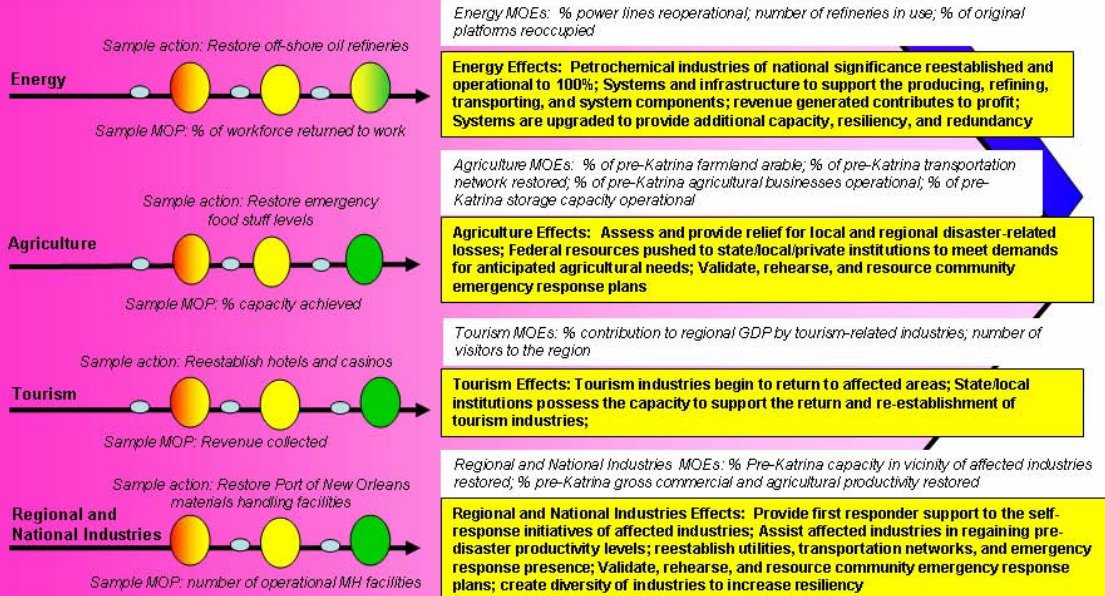


¹¹⁰ Ibid., 17-19.

Recovery Dimension: Economy and Workforce Development

Public Information

Economy & Workforce Development (2 of 2):



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