NetAge Reports

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Reorganization

How to Create Smarter, Better, Faster Organizations without Moving the Boxes Around

Jeffrey Stamps and Jessica Lipnack

NetAge

NetAge Reports are white papers that bring our network expertise to bear on the enveloping global crisis and on how more networked organizations lead to people finding better solutions to their enterprises' challenges more quickly. This report focuses on reorganization, which is now underway everywhere. It points out the opportunity this moment presents for improving performance, reducing costs, and addressing pressing new problems while minimizing the traditional means of restructuring, known as "physical reorganization."

> *Done well, reorganization is a low-cost, high-yield performance improvement strategy.*

We propose four interrelated actions, each with its own benefits that lead to smarter and more sustainable reorganization:

1st, **visualize** in order to see the whole organization as it is and how it might be;

2nd, **analyze** the organization's positions to identify "hotspots" and reveal unexpected patterns ingrained in the system;

3rd, **apply principles** to better fit the organization's purpose and hierarchy's need to both communicate faster and make more complex decisions; and

4th, **reorganize virtually**, by quickly and intelligently drawing lines where none existed before, reorganizing physically only where necessary.

To illustrate what we're talking about, we've compiled an organization chart of the Executive Branch of the US government, mapping 715 of the most senior positions. You can view the chart live in your browser by clicking on this link: US Government Map. In situations like the government, where adding, deleting, moving, and merging boxes of the existing organization is extremely difficult, virtual reorganization becomes the means to adapt to changing needs and respond quickly to crisis. All you need is a good reason to connect the existing boxes into new configurations.

The virtual reorganization strategies that we describe here are:

1. Implement e-Government, Externally and Internally
2. Institute Coordinating Councils and Communities of Practice
3. Stimulate Collaboration with Virtual Teams of Leaders

Background: Jeffrey Stamps and Jessica Lipnack are management consultants with 30 years of experience working on networks, collaboration, and building trust with organizations around the world. Co-authors of six books, including Networking*,* The Age of the Network*, and* Virtual Teams*, we've been online since 1979 and on the web at www.netage.com since 1994.*

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Prologue:
Memo to the Obama Administration

We recommend creating a “digital organization chart” of the US government, publicly available and online, that maps the Executive Office of the President, Cabinet Departments, and independent federal agencies. Such a map would extend down through every sub-organization to each position, identifying office holders, position titles, locations, and links to other critical information and affiliations.

An accurate organizational map will improve understanding inside and outside government; provide transparency and trust; and guide reorganization for improving performance, reducing costs, and addressing pressing issues.

TO: Obama Administration

FROM: Jeffrey Stamps and Jessica Lipnack

SUBJECT: Digital Organization Chart for US Government

***What We Recommend*:**

Create a publicly available, online “*digital organization chart.*” The chart maps every position in the government, beginning with the President and extending all the way down from the Executive Office and Cabinet Departments to the lowest positions. In effect, every office and its current occupant become visible online, indicating how they connect to all the rest. As a public service, we have started a first draft of the Executive Branch, mapping top down (Figure 1a; also see our browser-based dynamic US Gov map).

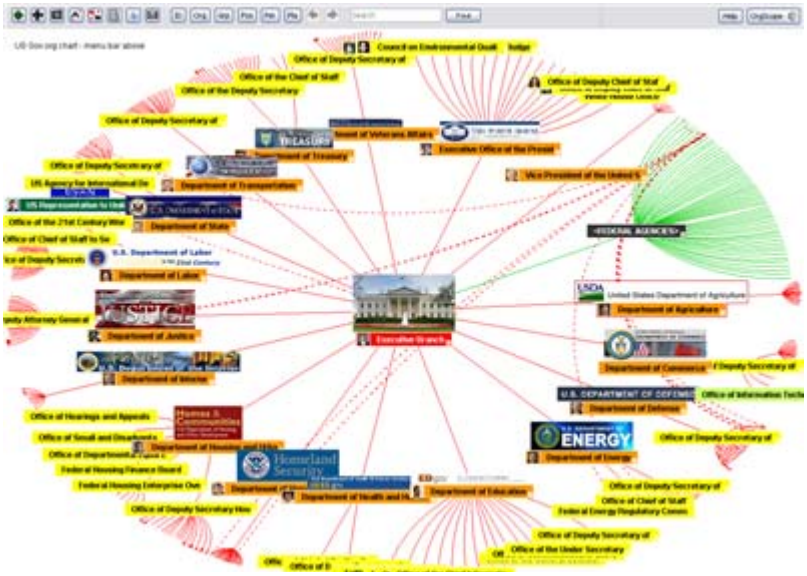


Figure 1a: Executive Branch Org Chart

Why This Is Important: As a practical matter, transparency requires revealing both specific detail and overall context. The US government is so vast that people who’ve worked in it for decades still don’t

understand how it works. We believe that "Google for Government" (e.g., www.USAspending.gov) with its searchable databases of funding and policy-making documents are critical first steps but they're not enough. For real transparency in the highly-connected, complex 21st century, we need maps—clear interconnected "roadmaps" to our very complicated government. Searches pinpoint detail but, without connections among specific bits of information, the context remains invisible or at least heavily shrouded.

We propose combining dynamic maps of the *entire* government within an interconnected, comprehensive picture of the whole. Such a "digital org chart" can identify who's in which position, what that position is responsible for, how much money is in its budget, and where that money goes—along with how all the pieces fit together. Of course, classified information and organizations, for security reasons will not appear on public web maps, but the same approach to support cross-agency cooperation can be used within the security zones.

> Why does mapping our government matter? With a visible, shareable picture of our common organizational whole, we can rebuild trust, hold one another accountable, and have the ability to bring more minds to bear in service of finding solutions.

How We Started This: Over the past five years (and originally with the help of a long-term client, Royal Dutch Shell), we developed OrgScope, software that maps networks, including formal ones like organizational hierarchies. Think of it as organizational topography that allows you to visualize and navigate as you can with Google Earth. Onto that base, you can add layers of detail and connections. Our first such maps were of Shell's European Exploration and Production unit, which we wrote about in a general way in "The Virtual, Networked Organization: How One Company Became Transparent," a chapter in a longer book on virtual teams. Subsequently, we've used OrgScope to sketch a network map of the Boston healthcare system, the Army's Combined Arms Center Knowledge unit at Fort Leavenworth, and a number of other private organizations.

TARP in OrgScope: Shortly after the Troubled Assets Rescue Program was put in place, we began to track, as a public service, the Office of Financial Stability, mapping both its internal organization and its disbursements. For example, as consulting contracts are let, we attach them to the OFS structure; as transactions are made, we enter the names of recipients and the network of grows.

To map TARP, and then later rescue efforts, we used publicly available sources such as the org chart of the Treasury Department. To that, we linked its press releases, contracts to awardees as published on its site, and media reports. As the crisis continued and rescue programs proliferated (up to $3 trillion in spending and $8.5 trillion in commitments by the end of 2008), we created additional links. We've been publishing all of this to our website section on "Economic Crisis" and blogging about it here. This is an example of a network "layer" on top of the hierarchical "topography" (click on this link to run the map that includes the "Economic Rescue Network")

How to Map the Obama Administration: Since November 4, 2008, we've been plugging in the new Administration's staff appointees and cabinet nominees, along with the top-level org charts of those departments. Here's a snapshot of the US Gov map, with the completed table of people nominated to cabinet-level positions (Figure 1b).

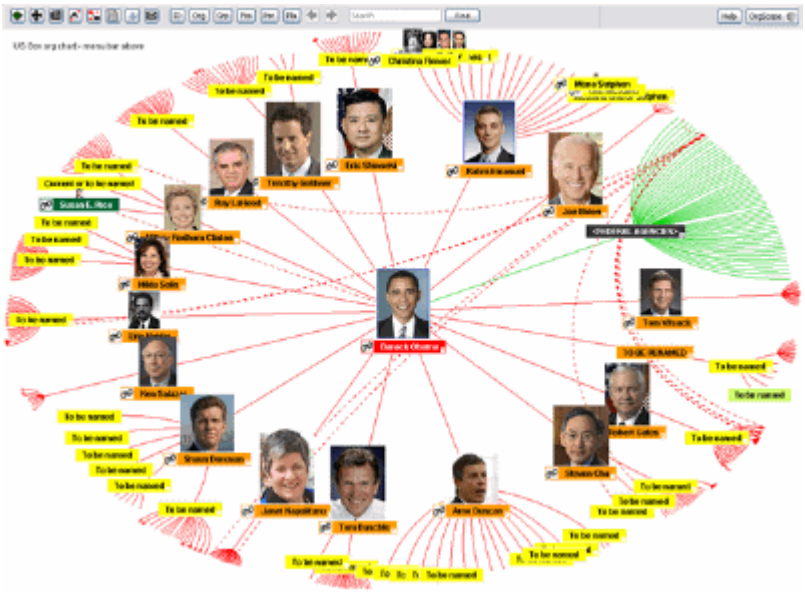


Figure 1b: Executive Branch Org Chart with People

It's not that difficult to build on our initial attempts and create an open network map of government. At the top, departmental org charts, which now are all in disconnected pieces within agencies, detail a few thousand positions. With comparatively few relevant lines, it's easy to connect them. Then just add two million more positions.

Although it sounds like a monumental job to construct this "digital org chart of the US government," our experience working with the commercial and military sectors indicates that most of the information needed is just sitting there in federal financial systems. The Office of Management and Budget, headed by Peter Orszag, has the budgets and headcount for each agency and sub-agency, likely with detail down to the level of every job. Such information also presumably lies in the many human resource and information technology systems that run the government payroll and cut the checks. Hooking the whole thing together is mostly a one-time expense of time and IT resources. Similarly, the process that refreshes the basic data is relatively straightforward.

Benefits: For new leaders, a comprehensive view of their entire department provides immediate and invaluable insight into the organization. Responsible change begins with an accurate view of the "as-is" organization of government.

We can complement a top-down mapping with a bottoms-up approach by following the money we already spend. Start with the OMB spending database to reverse-engineer the underlying organizational network and its budgetary impact along the lines of the economic rescue network idea described above. Each government award/grant/deal has been generated by some front-line team with a supervisor who reports to someone who reports to someone in a chain up to the Secretary of Something, an agency like HHS, Homeland Security, or Defense.

Track the money up the reporting chains of jobs and you map much of the federal bureaucracy—and spending—from the bottom up. The result is a single, navigable network of government agencies with links to where our precious annual trillions are spent.

By mapping the government network top-down and bottom-up, everyone can see the same thing. What we can see we can understand, use, and change in an open, adaptive fashion.

We just need to connect the dots and much becomes clear. When our public organizations are open and visible, they provide the basis for rebuilding trust—priority one for enabling all the hard stuff to come. People in government are more likely to act responsibly when the results of their work are visible to all, not just to their supervisors.

Finally, with a shared view of the whole, we naturally engage many more minds. Truly, in the face of such monumental complexity as this moment presents, the whole is smarter than any of us individually.

The Digital Reorganization Chart

They were words you don't soon forget. "Bureaucracy has committed murder here in the greater New Orleans area," Aaron Broussard told Meet the Press's Tim Russert a few weeks after Hurricane Katrina devastated the Gulf coast. The president of Jefferson Parish, Louisiana, Broussard sobbed on national television as he recounted his mother's drowning in a nursing home because, after five days of promises, no one rescued her or the other residents.

The catastrophic failure of government at all levels that Katrina left in its wake has become the emblem of systemic collapse and functional incompetence. It sharply underscores the need for large-scale reorganization. Poor organization carries great risks: it can lead to poor results, the inability to adapt to change, chronic proneness to instability, and, in some cases, complete collapse.

Good organization designs offer largely untapped resources for productivity that are keys to unlocking performance potential trapped in the structures of our big hierarchy-bureaucracies. At a time when the web is nearly ubiquitous—as is information technology in general—organizations have the capacity to reorganize in ways that lead to their being collectively smarter, better, and faster in meeting challenges and seizing opportunities in the tumult of change.

> *Virtual reorganization is a low-cost, high-yield performance improvement strategy.*

Today we're witnessing a global economic Katrina, unfolding in the continuing news of catastrophic failure of financial organizations around the world. Here in the US, at the epicenter of the crisis, parts of the federal government—such as the Treasury department, the SEC, and the Federal Reserve—are as implicated

as public sector institutions—like Fannie Mae and Freddie Mac—as are commercial enterprises—Bear Stearns, Lehman Brothers, AIG, Madoff, and the banks in general, just to name a few.

The collapse of so many institutions at the same time screams out for reorganization, now unavoidable and now underway in all sectors. But before you whip out your organization chart and start crossing off boxes or stripping out layers, you would be well advised to remember this: simplistic reorganization often makes things worse.

After years of study of enterprises in many sectors, with varying missions, and of widely-divergent imperatives, we've developed an approach to smart reorganization. We recommend three interrelated actions, each with its own benefits that lead to smart and sustainable reorganization: visualize, analyze, and reorganize, both physically and virtually.

Visualize the Digital Organization Chart

To start the process of smart reorganization, first the enterprise needs an accurate picture of itself. Ask anyone in an organization for its org chart and typically you're handed a piece of paper—or sent to a website—with a box-and-wire diagram showing a few dozen positions. Whether the organization in question has fifty employees or 50,000, the charts generally look the same—and the request for one rarely, if ever, produces an accurate map of the whole thing.

What this means is that the vast majority of people in control are running organizations whose true size, shape, and structure they never really see. Thus, the initial act is to create and maintain an accurate digitized organization chart that represents the entire reporting structure, one that is visible, navigable, and analyzable (see live example). With such a chart in hand, the organization then can:

- Publish public versions to the web so that anyone can access the map, leading to improved transparency, trust, and cross-organization collaboration;
- Overlay reporting relationships with additional matrix, team, process, and information connections that intersect positions regardless of who holds them, making for more cohesive, better "networked" organizations and providing greater insight into the complexity of each job;
- Attach missions, goals, and budgets to each organizational unit, making purposes and resource allocations visible; and
- Link public data related to each position, including physical location, wiki pages, websites, physical and virtual contact information.

Analyze the Organization as a Network

Simultaneously, analyze the map of the organization's reporting structure using simple tools from network management science. Even rudimentary analysis

allows an organization to quickly determine the management load of each position, pinpointing which jobs have the most potential for performance improvement and which are at greatest risk for burnout. With these results in hand, management is then in a position to:

- Better match people to the requirements of each position and understand its impact on the organization as a whole;
- Design internal communication strategies that allow leaders to reach everyone very quickly with key messages and information, thus avoiding the traditional communication cascade that is prone to message distortion;
- Craft individual development plans that reflect people's true leadership responsibilities;
- Allocate HR and IT resources to support those with the greatest need and potential to contribute to overall organizational improvement;

Virtual Reorganization to be Smarter, Better, Faster

From the beginning of the mapping process, the development of org charts at all levels itself engages discussion about the purposes, roles, relationships that touch each executive, supervisory, and staff position along with their associated organizations. In many cases, this will naturally stimulate local improvements and sets the stage for cross-organizational reorganization using both physical and virtual strategies. With transparency, organizations can:

- Develop issue-based coordination councils and task forces that connect the fixed positional boxes in new configurations to meet reorganization goals;
- Support cross-organizational collaboration with virtual teams of leaders and make the network of teams visible for better end-to-end results;
- Experiment with different designs to see how the analytic metrics affect communication and decision-making capability;
- Grow communities of practice to engage the wisdom and leadership of everyone in the organization; and
- Use the "reorganized" map to help people understand the changes and gain a view of the organization as a whole, thus enabling them to make better local decisions that fit the global purpose.

Physical Hierarchy, the Topography of Government

Regardless of the organizational design or reorganization strategy, it is important, as we said above, to first establish a realistic depiction of the "physical" organization, to get an accurate chart of its topography. This is the starting point for a "digital organization chart."

Put on "network glasses" and you can see the hierarchy as just a special case of a network, replete with nodes (positions) and links (relationships). Hierarchy's

role, however, is changing. It increasingly is becoming a framework on which organizations weave a much richer and ever-changing tapestry of working networks.

A box on a formal organization chart represents a concrete job, the conjunction of a position and a person. Usually, that job is located somewhere. If it's a management job to which other people report—executive or supervisory—the box also represents an organization, large or small. For example, Barack Obama ran for the job of president, a position that leads the Executive Branch of the US Government, and comes with an Oval Office located in Washington, D.C. (see Figure 2).

Figure 2: Box on Org Chart

The basic organizational unit is the position, not the person. These two "node" types, and thus two network types, overlap in the job. Each new cabinet secretary brings his or her own personal, social network to their new jobs. Indeed, their personal networks are primary considerations and qualifications for their positions. They will step into positions that themselves have myriad links to other positions, relationships that would be there regardless of who holds the office.

A position—one job fit for one person—is the concrete, mutually-exclusive smallest unit of the organization. It obeys the organizational equivalent of the Pauli Exclusion Principle in quantum physics, which says, essentially, that two things can't be in the same place at the same time.

Things are mutually exclusive—and so are people. No matter how many ways a person may be connected and interrelated, he or she is only one entity, one singular human being. Similarly, the position a person holds may be tied to a variety of organizational roles but there is only one HR record of the position, one authorizing paycheck link.

A primary function of hierarchy is to provide the complete classification system for the organization as a whole. Hierarchy makes a place for every job as a category of work and provides every*body* a place as a job-holder. These intersecting categories—people, positions, organizations, and places—provide the core nouns for the organizational language, the linguistic medium for internal communication.

Hierarchy also functions as the "end-of-the-day" accountability structure, the responsibility pathways of solid-line leadership making hard decisions. Thus, the hierarchy as a whole is a decision-making network that may perform poorly or well.

As a combined classification-responsibility system, hierarchy forms the organization's explicit mental model of its internal and external worlds, the basis of its collective intelligence and coordinated action—or lack of it.

Hierarchy has a role, and it is not going away. But its role in the whole structure is radically changing and, in the overall scheme of things, is diminishing because of the rise of other working relationships and organizational structures.

As we look to reorganize, it is critical to see the two types of hierarchy at work, one organizational and one social. Both represent barriers and opportunities in the positional and people networks that cross-hatch the enterprise in every job.

Organizing and Ranking Hierarchies

We often conflate two different types of structure, organizing hierarchies and ranking hierarchies. Organizing hierarchies reflect a cross-domain principle from systems science, while ranking hierarchies reflect social and cultural principles.

The organizing hierarchy is a set of nested parent/child relationships that follow a general principle of physical, biological, and social structure. In abstract systems language, organizations are whole systems that have parts that are wholes themselves composed of parts that are wholes… and so on.

A rank may be related to but is distinctly different from the level of the position held. Rank and level have the same logical formulation, a superior-subordinate relationship, but rank is a social concept. It carries a value judgment, a pecking order, where up is "better than" down, and the higher you are the better you are. Indeed, the word "hierarchy," meaning "Bishop [hierarch] rule," was first used around 1880 for ecclesiastical purposes, to establish a ranking system with God at the top with authority flowing down through the Church organization.

Both types of hierarchies exist. People have ranks in social hierarchies while positions have levels in organizational hierarchies.

It is easy to see this difference in the military. There, people have a rank they earn and hold individually, and even carry into retirement. At the same time, over the course of their careers, they rotate through a variety of organizational positions at different levels within the chain of command. Similarly, career government employees carry a civil service ranking, their "pay grade." Members of the Senior Executive Service carry top civil service grades equivalent to generals and admirals in the military. These are the levels right under the political layers in the federal structure. People carry their pay-grade, while the institution holds the job.

Hierarchy, as a near-universal organizing principle of nature, is here to stay. Hierarchy as a ranking system, however, is really a social and cultural issue. In the 21st century, ranking structures are shaking everywhere. At the roots, quite

literally, of so much of the economic disaster lie personal prerogatives of rank taken without regard for organizational responsibility—e.g., inflated CEO salaries for atrocious leadership performance.

Given the complexity and elegance of these aspects of organizational design, we issue this strong warning: *Don't throw out the organizing baby with the ranking bathwater of hierarchy.*

Visualize the Networks

Hierarchy is the infrastructure of the networked organization. Each position has a level, an "elevation" in organizational terms. It is equivalent to a physical topography, like an organizational Google Earth. In physical mapping systems, the earth-as-it-is is stitched together at different resolutions corresponding to an "eye altitude." This enables you to zoom out to the planet as a whole or in to scales of detail in some places down to close to a square meter, about the size of a person standing or sitting. As the planet as a whole is our common root of physical existence, so the root position of an organization encompasses it as a whole, representing the highest eye altitude.

On top of the actual physical topography of the earth, at any altitude, you can add layers of location-related information and associations, whether networks of roads or networks of McDonalds, that you can click on and off in any number of combinations. Government boundaries, how the human world has divided up the earth, quite literally the dirt beneath our feet, come into view then disappear as you fly down from the global view to national, state, and local scales of resolution.

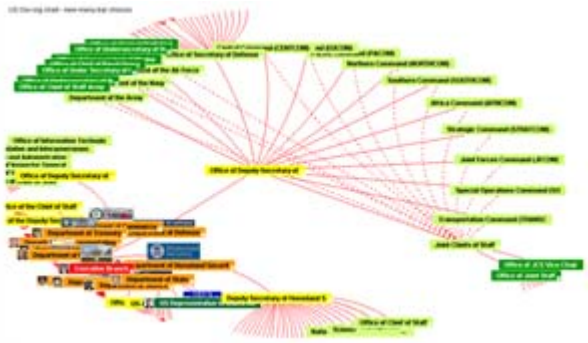


Figure 3: Matrix of Joint Chiefs of Staff

In organizations, network layers reveal additional patterns of real working relationships between the fixed positional units of hierarchy. These include matrix reports, council, committee, task force and team memberships, and process flows. These observable, relatively objective relationships are those that are written down, officially recognized as taking chunks of people's time, and often associated with budget items. On top of these relationships, there are all the layers of relatively subjective informal and social relationships that connect people to people.

We can see a simple example of a network layer at the top of the Defense Department, the most complex of the cabinet group of org charts (see Figure 3, the DoD org charts, and/or run our interactive US Gov Map). The Office of the Chairman of the Joint Chiefs of Staff has a few headquarters functions reporting

directly in, then an overlay of matrix reports from the Service Chiefs and Combatant Commanders whose direct bosses are elsewhere in the Defense structure.

These overlays serve the purpose of being "virtual reorganizations." You don't have to move around boxes or delayer or do anything else that's hard to do by drawing new lines among existing boxes. Matrix organizations are early, primitive forms of virtual reorganization that make of fixed hierarchies to more adaptable. They are precursors, really, of the 21st century networked organization now emerging.

Dotted-line reports are valuable when used sparingly. Each introduces a natural point of conflict in the accountability function of hierarchies, while improving the "small world" communication function with built-in cross-links. It shortens communication paths from the fixed up-and-down-the-chain hierarchy route between positions. However, when organizations become too heavily matrixed, they risk becoming chaotic and even self-destructive.

Today, non-hierarchical relationships are moving into and between the bureaucratic boxes of specialized functions, creating more flexible, adaptive, and faster results required in the information economy. Formalized process, team, and information relationships are increasingly used to supplement reporting hierarchies. Singular positions are connected by multiple links representing multiple roles within the whole organizational network.

In the Age of the Network, "virtual reorganization" through multiple relationships will become the alternative to and precursor of physical reorganization.

Analyzing the Organization as a Network

If, in this difficult, resource-strapped, and uncertain environment, you have just been hired, elected, nominated, or appointed to lead a large, complex organization of hundreds, thousands, or, in Barack Obama's case, millions of people, you face considerable challenges. You must get up-to-speed very quickly, putting names to faces and matching those to responsibilities, become familiar with each of the sub-units and what their special missions are, and getting an overall feeling for the spirit and meaning of the whole organization. At the same time, you, as the one in charge, will certainly start thinking about how to improve things—by reducing expenses, improving performance, setting priorities (which also can mean considerable triage), and ultimately reorganizing.

It's a truism to say that you don't know what you can't see. But, as we've seen in countless situations, the unseen can hurt you. This proves especially true when you reorganize, when you set out to deliberately change underlying organizational dynamics without clear views of what it is that you're reorganizing.

Imagine that the standard mental model of organizations that most of us hold is actually wrong. Imagine that the quick cartoon in our heads of how organizations work is in fact an epidemic distortion of reality. If this is true, it's no wonder that

our large organizations don't function very well, that bureaucracies rapidly grow out of control, and that frantic steering from the top seems to have so little effect.

We've spent most of this decade looking at, analyzing, and interpreting how our institutions actually are organized. We're here to report that most of us hold a distorted view of organizations.

While people like to think the hierarchy is irrelevant, it is nevertheless unavoidable. If you doubt this, try to collect your paycheck without the hierarchy. Although many do in fact earn their living from networks, most people on earth are paid by formal structures.

Reorganization is particularly dangerous when blindness shrouds the real organizational design. Here, simple approaches, while laudable in many contexts, are sure to cause more harm than good. Take, for example, the recent report from a client: his company was going through a reorganization exercise prior to layoffs. In the new design, every manager would have approximately ten people on staff—regardless of function, level, or experience. Ten people per manager. Before smashing the hierarchy and/or issuing such one-size-fits-all reorganization edicts, we encourage you to look at the realities of your own organization.

Three Myths, Three Realities

Based on our extensive research with Royal Dutch Shell, the original sponsor of our organizational mapping and analysis work, and in smaller pilots with other commercial and military organizations, we have uncovered three common beliefs about hierarchy. We've found them all to be false. Given our initial analysis of the top-level of the executive branch of the US government, which we report below, we're prepared to say that the same faulty thinking applies to the government as well.

These myths, vestiges of mechanistic thinking, are widely held:

> *Myth #1: Hierarchies are shaped like pyramids.*
>
> *Myth #2: Most managers have roughly the same average reporting spans; and*
>
> *Myth #3: Executives at the same level run organizations of roughly the same size.*

Our studies suggest three different realities, characteristics more indicative of organic, living systems.

> *Reality #1: Hierarchies are shaped like diamonds, wide in the middle, narrow at both ends. Picture a bell curve turned on its side.*
>
> *Reality #2: Manager spans are not average. They vary widely with many managers directing quite small teams with only a few people reporting*

directly to them while a few manage large teams with many reporting to them.

Reality #3: The size of most internal sub-organizations is small, regardless of where they sit in the hierarchy. And, there are a few large organizations that show up at nearly all levels, not just at the top.

Why do these myths and realities matter? Because the current conventional wisdom about reorganization—that "flatter is better"—is overly simplistic. Combined with the view that hierarchies always take the shape of diamonds, organizations are prone to centralize and regularize, to reactively remove managers and levels. Unfortunately, this impetus addresses only one aspect of organization dynamics: better control and internal communication. The need for more detailed decision-making, for smarter responses to greater complexity, does not factor into this change equation.

Calls for greater complexity rarely accompany demands for more simplicity.

Ironically, the compelling need to accommodate complexity itself has led to the breakdown of old industrial organizational models. Complexity breakdowns drive the need to reorganize. Hence, blunt "flattening" may actually aggravate the original problem, reducing the organization's ability to handle the very complexity that demanded it to change. Instead, the ability to deliver not-so-good decisions improves significantly.

Single-dimension approaches drive organizations faster to disaster.

Without knowing any better, we seek an "ideal" flat regular hierarchy, attempt to avoid "worse" cases of deep, detailed bureaucracies, and settle for something in the middle, an organization that is "the best we can do."

We believe we can significantly improve our ability to collaborate in large-scale structures. Given the state of the world, we must truly do "the best we can" to develop the smart 21st-century networked organizations we so desperately need.

Analyzing the US Government Hierarchy

For most casual observers of government, knowing who will hold the new positions in the Obama administration is enough. However, for those who really what to know what those stepping into these posts are up against, and for those people themselves, it's advisable to look deeper, to understand the true structure of our government—and whether its design is fit for purpose.

As a public service, we have started this investigation. Using publicly available org charts, we've mapped the top-level of the US government, using the existing administration's diagrams. We've then analyzed the management burden of the structures the Obama-administration appointees are stepping into—before they take it upon themselves to reorganize.

What we've found is this: there are a certain number of particularly complex positions in the senior ranks of government. These "hub positions" have very

high numbers of people reporting directly to them, which puts intense communication and coordination demands on the incoming office-holders. In essence, these second-in-commands in their agencies hold the entire senior executive structure of government together.

Why is it so important to identify these hubs? Network science answers this question. From study of networks in many arenas—from the Internet to the spread of disease to the array of Hollywood actors, researchers have found that such hubs are vital "nodes," centers of gravity that hold the whole complex together. Hubs provide the network with adaptability and offer robustness against accidents. These key switch points are also junctures of greatest vulnerability and catastrophic failure. Take out a few hubs, whether by accident, inattention, or attack, and you can bring down the whole network.

Preliminary Analysis of Senior Government Hierarchy

We draw our conclusions from some very basic data.

To establish an overall chart of the government, we must first plant the root node: the Constitution, which stands for the whole US government. This whole then splits into three parts—the judicial, executive, and legislative branches (Figure 4). The root node for the executive branch is the president.

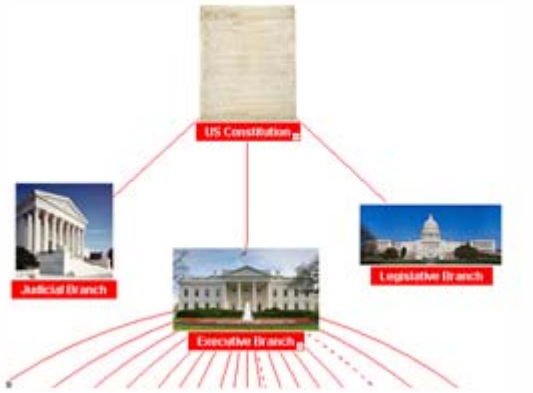


Figure 4: Three Branches of Government

Stitched-together, the org charts of top levels of the US government yield a simple tree of 715 nodes (positions) and links (reporting relationships). From this, we can make some basic statements related to the number of people reporting directly to a manager, in organization-speak, its span. In the terms of network science, the span is analogous to a very basic metric known as the node's "degree." Sorting positions by their spans identifies a small number of high-span positions in the hierarchy.

Figure 5: US Gov Org Chart

We obtained the data for each part of the executive branch from each department's web site, usually found in the "About" section. These cabinet-level org charts are collected together and arrayed under the official constitution-level org chart (Figure 5) from the US Government Manual (you may peruse our thumbnail catalog of all charts).

In our “US Gov Network Map,” we link the “Independent Establishments and Government Corporations” that float at the bottom of the executive branch to the president via group membership links. In truth, the statutory relationship between independent agencies and the president varies widely. Thus, we do not include them in this analysis. We have also not (yet) included the Executive Office of the President because we have only partial information about how these positions hook together. For example, we cannot tell how the dual deputy chiefs of staff, Mona Sutphen and Jim Messina, will split the load of what had been a single position. Now that Obama has taken office, the Executive Office has already undergone reorganization.

As we state in the introduction to this piece, our preliminary findings indicate that there are key hubs in the formal federal hierarchy. This finding is in line with the cutting-edge results of network science, evidence that there are “scale-free” networks throughout nature, in physical, biological, and human systems. What scale-free means is that in natural networks there is no average node; rather there are many low-connection nodes and a few nodes virtually off the chart in terms of associated links. Human organizations appear to be natural scale-free networks, not pyramidal machines.

How did we find the government’s “hubs in the hierarchy?” We mapped it as a network and then used simple tools to analyze it.

Government is large and complicated, but like any enterprise—public or private—it can be mapped as a network of nodes (positions) and links (reporting relationships). This method enables us to visualize, navigate, and analyze the whole government as a single network of interdependent people-in-positions.

These charts include the government’s senior management positions comprising: US cabinet secretaries; the deputy, under, and assistant secretaries; the major agency directors; the senior positions in the Executive Office of the President; and the independent agencies. For the most part, these are the key political positions that have fresh faces in the 2009 transition of government.

Having mapped the positions, we then are able to analyze the hierarchy as a network. Analysis provides a set of management metrics that relate to positions, not to the people occupying them. While traditional HR evaluates people on the basis of their performance, network science allows us to evaluate the positions they hold, based on their relative network metrics, their relationships and roles within the whole configuration of jobs. Of course, the map of the hierarchy is just the first that we can chart, albeit, the most basic one—and the one out of which those all-important paychecks are cut.

Naming the Hubs

Who are these hubs in the org charts? In the Bush administration organization, they are the deputy secretaries of Labor, Homeland Security, Health and Human Services, Transportation and the Deputy Attorney General. As things stand at the end of 2008, there are 28 people reporting directly to the Deputy Secretary of

Labor, 27 to those holding the next three posts, and 26 to the last. See Table 1 for the list.

Level	Span	Position	Department
3	**28**	Deputy Secretary of Labor	Labor
3	**27**	Deputy Secretary of Homeland Security	Homeland Security
3	**27**	Deputy Secretary of Health and Human Services	Health & Human Services
3	**27**	Deputy Secretary of Transportation	Transportation
3	**26**	Deputy Attorney General	Justice
3	**21**	Deputy Secretary of Energy	Energy
3	**20**	Deputy Secretary of State	State
3	**19**	Deputy Secretary of Treasury	Treasury
4	**19**	Chief of Staff to/or the Secretary of Defense	Defense
3	**18**	Deputy Secretary Housing & Urban Development	Housing & Urban Development
3	**17**	Deputy Secretary of Veterans Affairs	Veterans Affairs
3	**16**	Deputy Secretary of Agriculture	Agriculture
4	**16**	Chairman Joint Chiefs of Staff	Defense
2	**15**	Secretary of Education	Education
3	**15**	Deputy Secretary of Defense	Defense
4	**14**	Chief of Staff	Commerce
4	**13**	Associate Attorney General	Justice

Table 1: Reporting spans in Bush administration

In this list, most hubs are deputy secretaries or their equivalent; only one department head, the Secretary of Education, has anything like the large number of direct reports that the deputy secretaries do.

What does this picture tell us about how government functions? If we regard the department secretary as the CEO, we can see the deputies as chief operating officers. As the CEO, the secretary focuses out while the deputies focus in. This Janus-like arrangement usually gives the deputies very large spans and the secretaries quite small ones. As we imply above, these “level 3” positions, by virtue of being two steps to the president, hold the senior levels of government together.

That deputies have large numbers of people reporting to them is not news to people familiar with government structure. Indeed, these key players comprise the President’s Management Council, a coordinating body set up by President Clinton as one outcome of his Reinventing Government effort (where we played a minor consulting role). Deputies are easy-to-see lynchpin positions at the top of the federal hierarchy network. And, because they are visible, they generally get good support from their organizations, with sufficient administrative, human resources, and IT services to make their jobs doable.

What is less visible is the likelihood that this pattern repeats itself throughout the vast federal hierarchy. Having studied a number of similar reporting structures in the commercial arena, we've found hubs at every level—and particularly in the middle levels of these organizations. If the government structure mimics the commercial one, these sub-senior hub positions exist there too. In hierarchies we've studied, 15-20% of all positions are managers, and roughly 20% of those are major or minor hubs. *In other words, a mere 3-4% of employees may hold the whole federal hierarchy of millions of people together.* Again, if they're anything like their commercial counterparts, these lower-level hubs are likely to be under-supported, over-worked, and little recognized—which leads to poor organizational performance and even to catastrophic results.

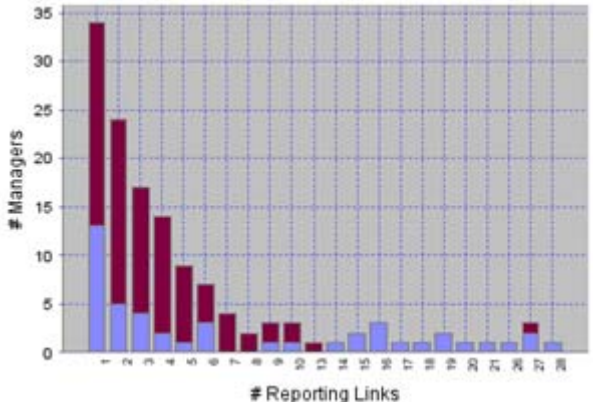


Figure 6: Senior US Gov Executive Span

What do we gain from identifying the key hubs in the hierarchy? First, the quality and speed of internal communication improves when we can pinpoint who's in touch with the whole organization. Second, it reduces the very substantial risk of failure for these positions. Pressure on hubs becomes particularly intense in periods of downsizing and restructuring, i.e. now. Remaining ignorant of who the hubs are and the special qualities of leadership required in those positions are points of great risk—and of great potential—during periods of reorganization.

As we mention in our myths above, a core, unexamined belief about organizations is that most managers have an "average" span centered around a normal distribution of number of direct reports. In this data set, there are 135 management positions and 580 "staff" at the lowest level of these charts (NB: some of these nodes represent tremendously powerful positions, such as the FBI Director). An "average" span of 5.3 direct reports, which we arrive at by dividing the total positions by the total number of managers, is not a typical span—there simply isn't one in scale-free networks (Figure 6).

In the senior ranks of the federal hierarchy, more than half—56%—of executives have no more than three people reporting to them. Less than a third of the managers have between four and nine staff reporting to them, analogous to what we conventionally think of as a "normal" management span. A surprising 16% of senior federal executives have between 10 and 28 people reporting to them.

These numbers are similar to results we've found analyzing other large organizations. Our most extensively studied case of a 5000-position, nine-level multi-national business unit of a global enterprise produces results such as those illustrated in Figure 7.

Thus, we're prepared to say that "hubs in the hierarchy" are not peculiar to government.

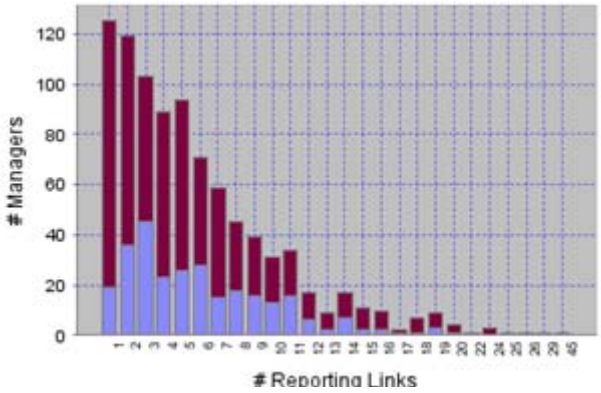


Figure 7: Case Study of Management Span

The Diamond in the Hierarchy

In organizations, levels are the big steps, the connective tissue between reporting relationships, and the trail from you to your boss to his or her boss all the way up to the top boss. In hierarchical networks, the top boss is, as we said earlier, the "root" node, the base of the tree. In network language, levels are the path of links between nodes and their roots. A path length is often called the "degree of separation," how many links separate two nodes.

In our group of departmental hierarchies, positions go from the President's Level 1 to Level 7 where, for example, the DARPA director sits (the Defense Advanced Research Projects Agency, whence cometh the Internet). Thus, there are *six degrees of separation* between the President and the DARPA director, ironically the same putative count of social connections it takes to link any two people on the planet.

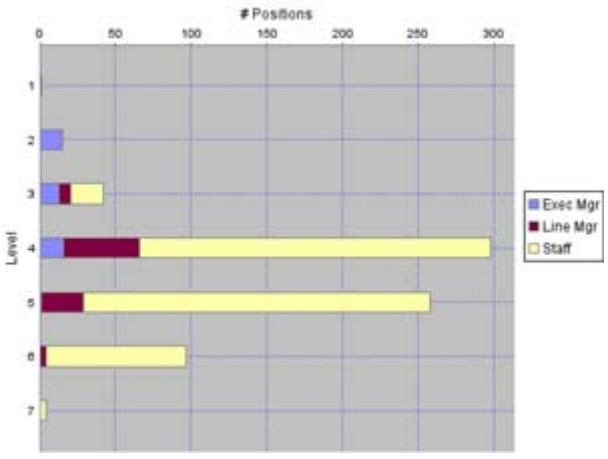


Figure 8: US Gov – Senior Positions by Level

Another unexamined myth about hierarchies is that when you array all the positions by level, they form pyramids. Traditionally, we think of hierarchies as small at the top and big at the bottom, a structure built for control. So if you analyze a large hierarchy, you would expect to see a slope from Level 1, at the top, to Level n, at the bottom. Instead, in the multi-position hierarchies we have analyzed, we see a more normal curve, with the bulk of positions in the middle levels. Most of the senior positions in this set of government are at Level 4, the people who report to the deputies (who report to the secretaries who report to the president). The graph of positions by level (see

Figure 8) produces a pattern similar to those we've found in more complete structures that we've had the opportunity to analyze: it's a diamond, not a pyramid.

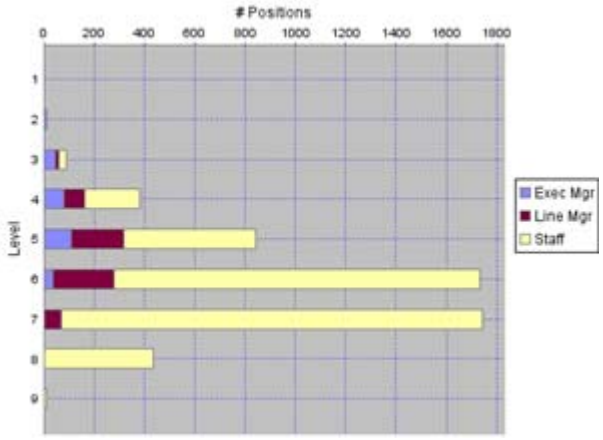


Figure 9: Case Study – All Positions by Level

The reason that large structures produce a diamond with the center of gravity in the middle levels is because of the unequal size of the component organizations sitting at the most senior table of executives. A typical CEO might have ten people on staff representing all the major functions of the enterprise. Of those functions, only two or three will employ large numbers of people—engineering and production in manufacturing, for example—while the other seven or eight functions employ a much smaller proportion of the overall headcount.

At the formal top table led by the president sit the Level 2 positions: vice president, the cabinet secretaries, other cabinet-level positions like the UN Ambassador, and the chief of staff. In our map of the top of government, three org charts are particularly large—Defense, Treasury, and HUD. In the case of Defense, the largeness of the chart reflects the largeness of the organization, but the other two cases are not the next largest departments. However, the different sizes of the org charts create the size impact on this data set.

The level structure generated by our "US Gov" data set is similar to that produced by our case study of a complete organization mentioned earlier (see Figure 9).

Why is the shape of the whole organization important? Because the image forms basic assumptions about the structure of power, particularly the framework of "top-down" and "bottom-up" relationships. Staff at the end of management chains, people who directly do the work and don't have anyone reporting to them, comprise 80-85% of a typical enterprise. These terminal positions are found at all levels, not at some imagined "bottom." For example, a senior advisor to a chief executive is a Level 2 staffer. The diamond pattern suggests an "edge-in" and "center-out" flow of decision-making and communication between staff and management.

In practical terms, knowledge of the whole management structure by level and reporting span enables a powerful internal communications capability, one that replaces the ineffective and inefficient top-down cascade of purpose, strategy, and policy. By communicating directly to the small number of managers—hub executives and supervisors at every level, the top executive can reach most of

the organization within two or three links rather through multiple transmissions famous for garbling messages along lengthy hierarchical communication chains.

This, in a nutshell, is how hierarchies can transform into networked organizations without destroying the physical structure of the bureaucratic classification and accountability system. The specialized boxes of bureaucracy are not themselves the problem with hierarchy, but rather the limitations and inflexibility of simple reporting relationships.

It's no secret that hierarchy-bureaucracy, "the system," frustrates everyone from "top" to "bottom." But, everyone is quite literally "part of the problem," part of the very structures that frustrate them. Today, enabled by ubiquitous interactive media, everyone can be part of the solution—which is to just add links.

Organizing at the Edge of Chaos

Early in the presidential contest between the newly-presumptive Democratic nominee Barack Obama and already named Republican John McCain, Elisabeth Bumiller published "Cast of 300 Advises Obama on Foreign Policy,"[1] to which the New York Times gave page-one real estate. Largely an insightful "who's-who" of his advisers for this delicate area of national concern, the article also offers remarkable portraits of the stark contrast between the organizing styles of two the candidates. One was simple, the other complex. Guess who won.

Bumiller describes Obama's apparatus as a "huge 300-person foreign policy campaign bureaucracy organized like a mini State Department to assist a candidate whose limited national security experience remains a concern to many voters." The article goes on to describe an "infrastructure" of twenty teams that focus on regions (e.g., Asia and China) and issues (e.g., nuclear proliferation). By contrast, Bumiller describes John McCain's approach as "a far smaller and looser foreign policy advisory operation, about 75 people in all, and none are organized into teams."

So there you have it. McCain had direct input from 75 people, an incredibly large "span" of "direct reports" by any organizational measure and an extremely flat organization. No "middle" men or women. Perfect for simplicity and direct communication. McCain, the ostensibly more experienced of the two men in foreign policy, didn't think he needed nuanced views regarding foreign policy, and he didn't get many.

Obama by contrast had a core team of six people managing twenty separate pipelines of progressively synthesized input from advisors with great depth of expertise. Larger teams had their own sub-teams, such as the forty-person nuclear proliferation team organized into eight working groups by Brookings Institution and National Security Council veteran Ivo Daalder.

In network terms, members of these teams are themselves hubs of networks. Thus, each of Candidate Obama's 300 advisors served as a funnel for a torrent of highly nuanced expertise flowing his way.

Compared with McCain, Obama had a smaller number of people reporting directly to him on foreign policy but, and it's a very important but, they connected to an extremely complex organization with many trusted middle men and women. Perfect for making complex decisions. Worth noting also is that this complex hierarchical structure was able to function and learn at the warp-speed required of a presidential campaign.

One subtle message in President Obama's 2009 Inaugural Address is that all of us must face complexity unflinchingly. Complexity is on its own growth curve. We can't stop it, but we can change how we see, understand, adapt to, and employ it. This is a major reason why transparency is so important. For people at all levels to lead effectively and make choices that are informed and wise, both locally and globally, we have to be able to *see* the whole of what we're doing in all its swirling, knotted, twisted, gummed up complexity.

Is Flatter Better?

In this season of reorganization (each layoff, merger, and acquisition precipitates it), how are you facing complexity? Are you reducing or increasing your ability to make good decisions?

For the past thirty years or so, the prevailing wisdom about organizations is this: the flatter, the better. An inch-high and a mile wide. Smash the hierarchy. Nowhere was this more evident than in the corporate press release of the then-new CEO of BP. In October, 2007, Tony Hayward said his company was determined "to improve performance by simplifying how the company is structured and run." While emphasizing that they have the right strategy and resources, he described BP's problem this way: "…we are not consistent and our organization has grown too complex."[2]

To remedy the situation, BP planed to adopt more standardized procedures and reduce the number of management layers from 11 to seven."[3] What major benefit did Hayward expect to gain from redesigning the organization? "… [T]he revenue boost expected from greatly improved operational efficiency over the longer term."

No one would argue that simplification is indeed more efficient, but here's the rub: It's not necessarily more effective.

On the broader point of the benefits of reorganization, we agree: Better organizational design offers enormous competitive advantage. Organization, after all, leverages all other advantages. But did BP engage this challenge with the right frame of mind? Certainly, the study Hayward commissioned that identified "7,500 'operational interfaces' – that is, potential management blockages" was on the right track. Gaining organizational benefits of the type BP's chief desires will not be easy for his or for any other enterprise. Nor is it

easy to remove four levels in an organization of roughly 100,000 people. Based on our research, it might even be suicidal. It is highly unlikely BP reached its goal.

Dogmatic global mandates, like one that says an organization must have no more than seven levels or that all managers should have ten reports (which a global financial management firm facing layoffs just executed), ignore other realities of business life. The number of levels your organization needs, or the optimal reporting span of your leaders, our research shows, is likely *a function of what those units are actually doing*.

Extensive study of one organization's structure shows that some parts of organizations are shallow, others deep—depending on what they're doing. Groups whose primary need is to **communicate** call for shallow structures that allow them to quickly spread messages; units engaged in **complex decision-making** require deeper structures that accommodate more specialization. The best structure fits the work at hand.

Our conclusions come from a detailed investigation of "Eleum," our pseudonum for one highly complex organization, the key 5000-employee unit of a global enterprise similar to BP[4], along with a variety of smaller pilot studies that we've conduced. Likewise, our findings are consistent with our preliminary analysis of the senior levels of the U.S. federal government inherited by the Obama Administration (See NetAge Report #2, Analysing the Organization as a Network).

Over a four-year period, we analyzed Eleum's formal hierarchy of who-reports-to-whom. We mapped its organization chart as a simple network of nodes and links, drawing our data directly from its HR system. Looking at what we found, we developed this hypothesis:

> *An organization seeks to minimize communication pathways while maximizing its capacity for complex decision-making.*

Organizations are islands of relative order in seas of chaos that stretch far beyond local horizons. Suddenly storms erupt—thanks to revolutionary technologies, unforeseen competitors, safety accidents, world events—that bring chaotic change. Such storms are gaining strength and blowing in more often. In response, enterprises find the old order shaken up and in urgent need of reorganization. Comes then the time, as it has with the economic tumult of 2008, the need for all of us to decide how to rebalance order and chaos.

Our purpose is to help you decide whether flatter is indeed always better for organizations. Or, do some circumstances call for deeper, more complex organizations? If so, how do you decide?

We derive principles from looking at hierarchical structure in detail, so you can apply them to daunting challenges we all face, both inside and outside government. The same analysis and principles help small organizations inside

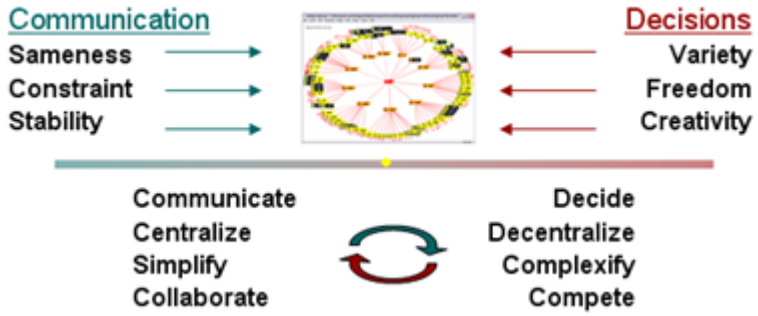
and outside big organizations optimize their own structures to fit their local situations.

Between Order and Chaos

Networks ripple. A small decision here plays out as major activity elsewhere in the web of people and positions. Big effects arise from many small movements. Abstractions at a large scale become everyday local juggling acts for managers and staff across the hierarchy.

Organizations need order *and* stability*,* flexibility *and* creativity (see Figure 10). The structure must provide sufficient constraints to maintain integrity *and* enough freedom to innovate and adapt. Sufficient sameness and commonality have to mix with requisite variety and difference. Otherwise, the organization is either completely moribund or a total madhouse.

Figure 10: Complementary Capabilities



Executives struggle to manage these contrasting forces. They find themselves simultaneously bringing some things to center and pushing other things out, simplifying in some places, “complexifying” (if that were a word) in other places. They push for more collaboration over here (perhaps to better deliver services) and more competition over there (perhaps to control costs).

From the early dawn of the field of information sciences, its thinkers like Claude Shannon, Norbert Weiner, and Nobelist Herbert Simon have regarded organizations as “communication systems.” At the same time, the first generation of systems scientists (including Ludwig von Bertalanffy, Kenneth Boulding, and James Grier Miller) considered organizations prime examples of complex systems—living systems—like cells and organisms.

Today’s cross-disciplinary scientists call organizations “complex adaptive systems.” These *whole* systems comprise interrelated *parts* that are also adaptive entities, ones that are able to learn from experience, to change and to evolve. Emergence is what happens when they generate new *levels* of order, a property essential to complex systems. John Holland frames this elegant process simply in the title of his book, *Emergence: From Chaos To Order.*[5]

As complex systems, then, organizations need to consider whether they have the "requisite variety" internally to meet the variety that is ever-growing in the external world.[6] How does "requisite variety" translate into organizational language? It means taking typical organizational decisions such as hiring different people with more specialties in more places. By increasing the number of people in a particular function, widening the variety of positions, and encouraging the voicing of differing ideas, the organization invites some relative "chaos" into its orderly world, which, by its very nature, ultimately requires restructuring to accommodate it, to bring back more order.

Order itself, however, is not the final objective. The purpose is not to squeeze out as much chaos as possible, but rather to maintain just enough without losing order. The trick is the right balance between order and chaos.

Yaneer Bar-Yam,[7] president of the New England Complex Systems Institute, describes the delicate point this way: "[The] balance between highly random and highly ordered motion is characteristic of the behavior of complex systems." MacArthur Fellow Stuart Kauffman, one of the founders of the Santa Fe Institute, makes a similar point, pushing the balance towards maximum variety. Complex systems, Kauffman says, seek "an ordered regime, near the edge of chaos."[8]

Communication and Decision-Making

Leaders *make* decisions then *communicate* them. Most executives depend on their organizational hierarchies to gather information, formulate options, offer recommendations, and make final decisions. Then they turn around and use the formal reporting lines as their primary conduits for distributing the official goals, strategies, policies, procedures, and other steers from the top. These directives eventually land in the laps of line managers who lead staff teams. This method of intelligence-gathering is changing, of course, with the rise of alternative input channels, largely the rapid dissemination of Web 2.0 technologies.

Regardless of how they gather and "promote" information to the executive level, organizations swing between decision-making, a comparatively complex process, and "decision-telling," which depends on communication. Hierarchies need to accommodate both: a capacity for high-complexity decisions communicated along the shortest possible paths.

Which brings us back to organizational structure:

- *As they seek to optimize communication, organizations tend to centralize. The bigger the span, the fewer the levels, the shorter the communication paths.*
- *To cope with complex decision-making, organizations tend to decentralize. The smaller the span, the greater the number of levels, the greater the capacity to make decisions.*

In simplest terms: to communicate, flatten the structure—reduce the number of levels—and enlarge the size of the teams. To make better decisions, deepen the structure—increase the number of levels—and make the teams smaller. In the

coming world, organizations will morph as needed to accommodate the pressing needs of the moment.

The dynamic of communicating and decision-making carves a hierarchical landscape that is high in some places, low in others. Many-tiered mountains of small decision-making teams optimized for complexity, like Obama's foreign policy operation, are scattered through low-elevation plains of large teams transmitting strategies, standards, and procedures, like his much flatter communication operation. Extreme flatness, such as the McCain foreign policy operation, tend more toward chaos than order and likely was one source of his organizational problem.

Overall, organizations need to accommodate added decision-making capability while becoming even smarter about communicating. How can they do this?

The answer lies in how they mix the ingredients of organization size, reporting span, and number of levels. The twin dynamics of communication and decision-making provide the mixing agent.

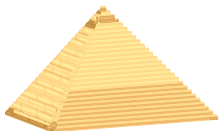
Systems for Communicating

In social networks, "six degrees of separation" are said to connect any two random people in the world.[9] In organizations, one degree separates each level: One link, one degree of separation.

Teams are ideal vehicles for communication. They are two-level organizations, a manager and his/her direct reports just one degree, one link, apart. Communication distance doesn't get closer than one degree, whether in networks of family, friends, or coworkers. Every manager in the hierarchy has a one-degree team, a star-shaped cluster of closely related positions. A hierarchy is an interlocked set of one-degree management teams.

From a larger perspective, messages stream down the hierarchy of reporting links, a progressively articulated tree like any wide-area communication system. In cable transmission networks, for example, signals cascade from the "head end" (Level 1) through high-capacity trunk lines (Level 2) into lower-capacity branches (Level 3) and feeder lines (Level 4), finally "dropping" a thin wire to your home (Level 5). By analogy, the CEO is the head-end source of signal and content with managers in between "repeating" and "amplifying" the source transmissions who ultimately "drop" the messages at the "homes" of the staff.

Left to itself, the communication imperative will drive an organization to extreme centralization, a flat, star configuration of all one-degree links connected to one all-powerful manager – the McCain model. While this may be fine for an organization of five, it is problematic for a group of fifty or seventy-five, to say nothing of five hundred or five thousand and higher orders of magnitude.

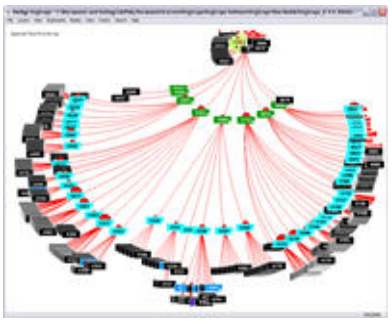


To see how a structure optimizes for communication, imagine a “regular hierarchy” the same size as Eleum’s. By regular hierarchy, we mean that each manager has a fixed span, in this case six direct reports (approximately the same as Eleum’s average manager span of 5.8). A regular hierarchy of this sort is valuable for purposes of contrast to the real case because it represents most people’s idea of what a hierarchy looks like—in profile, a pyramid (See Myth #1 in NetAge Report #2). It is also easy to illustrate the interplay of the three basic metrics (size, span, and level) with a regular hierarchy.

A tree with a span of six requires six levels—five degrees of separation—to accommodate our target organization size of 5247, Eleum’s total number of employees in this dataset.[10] A tree with a span of ten needs only five levels to get to the 5000+ number. A squatter, wider pyramid with plenty of room to spare, it contrasts with an organization that has a fixed span of three per team, which needs nine levels (a taller, skinnier pyramid) to reach the same organization size.[11]

In Figure 11, we show a large group of engineers with similar specialization titles (e.g., Operations Engineer[12]), an example of structure tuned to communication. Hyphenated titles (e.g., Operations Engineer-Facility A) often indicate a secondary reporting relationship elsewhere in the organization. Here, the large hub team aids the transmission of common standards, policies, and procedures. It also helps to circulate best practices for a group of experts. The leader acts more as the hub of a small community of practice than the maestro of an orchestra.

Figure 11: Big Teams



Systems for Making Decisions

Our primary everyday tool for tackling complex problems is analysis. “Breaking down” the problem divides something complicated into smaller, more digestible portions that may in turn be further divided. In organizational structure, this problem-solving capability shows up in the preference to differentiate and create more levels.

Bar-Yam points out how organizations respond as complex systems:

> “As the collective behavioral complexity at the scale of an individual increases, the branching ratio of the control structure becomes smaller and smaller so that fewer individuals are directed by a single manager, and the number of layers of management increases. The formation of such branching structures allows an inherently more complex local

behavior of the individuals and a larger complexity of the collective behavior as well."[13]

When complexity increases and an organization needs to make more decisions, it tends to decrease span and increase levels. Here, the hierarchy acts like a giant "decision-tree," a method used by operations researchers to analyze complex choices. At the top (Level 1) is the final decision to make (e.g., allocation of resources among major projects), with branches (Level 2) to each of the major option areas. Operations researchers map out successive levels of branching and analysis within each option until they have calculated all alternatives and values. The more complex the choice, the more (dizzying) decision branches they need to map.

How should a problem-solving organization of twenty-five handle difficult decision-making tasks, the ones that require hard technical evaluations and lots of different specialties? What "depth" of organization will make it easiest for them? It is likely to be more effective with three or four levels of positions than it is as a two-level team. The communication cost of this arrangement, however, is that some positions are now two and three degrees of separation from the boss, increasing the principal complaint against hierarchy.

In Figure 12, we give an example from Eleum that illustrates a more articulated decision-making structure. A large group of engineers, sporting a variety of specialties and roles in their titles (such as architects, planners, process engineers, technology specialists), is organized in small teams within specialized departments. Here the leader is likely managing an interdependent set of specialized professionals who need to work together to produce the required output. The maestro analogy is appropriate for this type of organization.

Figure 12: Small Teams

Left to itself, the complexity-only imperative drives an organization to ultimate reductionism and extreme decentralization, a single chain of command dropping from position to position, in Eleum's case, 5000-some levels. While single-person reporting chains of two or three degrees are surprisingly common, mile-deep vertical chains are hardly a great way to structure larger organizations.

But the trend is clear: organizational growth and larger size invariably require more levels, which inevitably increase the degree of separation among positions. More levels are on their way. And, once they've arrived, levels don't go away easily.

Back to Reorganization

We opened our prior NetAge Report that analyzes the top levels of the US Government with this proposition:

> Imagine that the standard mental model of organizations held by the vast majority of people, as we're postulating, is really wrong, an epidemic distortion of reality. No wonder our large organizations don't function very well, that bureaucracies rapidly grow out of control, and that frantic steering from the top seems to have so little effect. While people like to think the hierarchy is irrelevant, it is nevertheless unavoidable.

Without knowing any better, we seek an "ideal" flat regular hierarchy, seek to avoid "worse cases" of deep, detailed bureaucracies, and settle for something in the middle, a hierarchy-bureaucracy that is "the best we can do."

Insights from study of hierarchies as networks can be brought to bear on significantly improving people's ability to collaborate in large-scale structures. We must truly do "the best we can do" to develop the smart 21st-century networked organizations we so desperately need.

How might these results help answer the question we pose at the beginning: Is flatter better?

The risk an organization faces with a drive to eliminate levels is that it will severely damage its capacity to manage complexity. By shrinking levels in the push to optimize for communication, it may become too simple. Reducing levels—by chopping out managers and gathering people into ever-bigger teams—means more centralization. To take out multiple levels you will have to significantly change the size and distribution of spans.

BP may be correct in its overall diagnosis that its organization is too complicated and hard to manage, that its departmentalized specializations have grown beyond the capacity to communicate. Perhaps BP's CEO, Tony Hayward, believes this will take his enterprise too far into the "hot zone" of decentralization, causing its leaders to attempt to manage too much variety requiring too many decisions. Adjusting the overall balance back towards the "cooler zones" of communication may be the right strategic design strategy.

But, potential suicide for a BP—or any large organization with properties similar to Eleum's—is an ill-considered global mandate that overrides organizational design choices at the local level. Any imperative that forces sub-organizations to flatten and pushes teams to expand regardless of local circumstances is, in light of our analysis, foolish.

It's smarter to give global guidance without inviolable imperatives. Ideally, create an accurate map of the whole so you can make local organizational decisions in a common context.

Organizations should not homogenize their zones of communication and decision-making capabilities. Understand, then enhance and improve them.

Hierarchies are not governed from or by the top. Rather, governance emerges from the network of teams—large and small—that result from myriad local design choices. These choices have been made over the years and are being made every day by leaders at all levels.

This is how change happens, little snippets of organizational evolution in action.

Organizations—know thyself!

How to Reorganize Virtually

At the end of December, 2008, President-elect Obama's pick for Secretary of State, Hillary Clinton, made two critical picks of her own, naming dual deputy secretaries. James Steinberg, who served in the Bill Clinton administration as deputy national security adviser, will oversee foreign policy issues while Jacob Lew, Office of Management and Budget Director in the same administration, will have responsibility for day-to-day operations.

The decision to create two deputies signals a reorganization of the State Department. Naming two deputies is not only a departure from the current organization at State, but it is highly unusual with regard to all the current departmental org charts. Notably, however, two deputy chiefs of staff in the Executive Office of the President, Mona Sutphen and Jim Messina, were in the first wave of staff picks in mid-November. These actions are part of the impending *"physical reorganization"* of government, changes made by adding, moving, and merging boxes on an org chart. And that's the way most reorganization happens—by rearranging the boxes.

During the same pre-Christmas news cycle, the transition team announced another kind of reorganization, naming a new White House Task Force on Working Families to be led by Vice President Biden. This coordinating body includes the secretaries of Labor, Health and Human Services, Education, and Commerce, along with the directors or chairs of the National Economic Council, Office of Management and Budget, Domestic Policy Council, and the Council of Economic Advisors. The task force connects existing leadership positions—and by extension their organizations—into a new configuration, an example of the *"virtual reorganization"* of government. Instead of moving boxes, virtual reorganization connects them.

The Imperative to Reorganize and Its Impossibility

The imperative to reorganize has never been stronger. In 2009, widespread reorganization is driven by the economic crisis, which touches all sectors, and the presidential transition, which touches most of them. A sudden and drastic retrenchment throughout public and private sectors creates *de facto* reorganizations and painful readjustments where fewer people are left to do more work (to say nothing of a growing pool of experienced people out of work). And,

as Barack Obama takes his seat in the Oval Office, many anticipate transformations, read reorganization, in government as well.

While the new administration heralds momentous changes in governing, it also confronts an intractable organizational structure, albeit full of highly-competent and well-meaning people. As the economic crisis unfolds, this scenario will play throughout the public and private sectors as new leadership and old face the same reorganization imperatives and impossibilities.

"Virtual reorganization" is a response to the need to quickly reorganize a rigid structure designed to change slowly. The term seems to have been introduced in 2000 by then-GSA Administrator David Barram, an "e-gov" (as in electronic government) visionary who spearheaded the President's Management Council's development of Firstgov.gov. Now USA.gov, and still run by GSA, this web-based portal to the government was set up to serve diverse audiences of citizens, organizations, government employees, and visitors. At the time of its launch, Barram make the bold claim that virtual reorganization would "make the physical reorganization of government unnecessary."

As part of its 2004 Presidential Transition Series, the IBM Center for The Business of Government published "Government Reorganization: Strategies and Tools to Get It Done," outlining four driving forces for reorganization: "To make government work better, to save money, to enhance power, and to address pressing problems."

The report's author, Hannah Sistare, who at the time of its writing was executive director of the National Commission on the Public Service, charts the course of reorganization strategies over the 20th century, tracing four historical approaches: Commissions, Presidential Reorganization Authority, Executive Branch Reorganization Staff, and Congressional Initiatives.

Bottom line is this: It is really, really hard to reorganize the physical structure of government by shuffling, merging, and separating organizational units.

In the report's third section, "Government Reorganization for the 21st Century" Sistare also uses the term "virtual reorganization," referring to two approaches: "Virtual Reorganization through E-Government or by Coordinating Councils" and "(Physical) Reorganization by Commission or via Legislative Authorization." Like Barram, Sistare points toward threading existing structures together through network-like overlays. No box-movement or elimination required.

We agree. Virtual reorganization is a simple and effective way to gain organizational advantage. Here we set out three strategies for achieving it.

Strategies of Virtual Reorganization

The three virtual organizing strategies that we see emerging are: (1) e-government, from both external and internal perspectives; (2) coordinating councils and communities of practice; and (3) collaboration with virtual teams of leaders.

Strategy One: Implement e-Government, Externally and Internally

E-government (e-gov) is the term most commonly associated with the idea of virtual reorganization. Already implemented externally, the e-gov strategy has demonstrated the enormous potential of putting an easy-to-use lens on top of the government maze of functions. Sistare characterizes the e-gov strategy as a user-friendly "citizen's portal" to government services, citing the example of Barram's (now) USA.gov site. This external virtual reorganization allows user to look from the outside into specific points of contact within the government.

Likewise, the "Google for Government" law provides external transparency into government. The bipartisan Coburn-Obama Bill was the first law Barack Obama introduced when he came to the Senate. Officially the "Federal Funding Accountability and Transparency Act of 2006," it directed OMB to create a searchable database of almost $3 trillion (in 2007 dollars) in federal grants. The legislation called for tracking contracts, earmarks, direct payments, and loans by January 1, 2008. OMB made its deadline (see www.USAspending.gov for the result of this important piece of 21st-century legislation).

This e-gov spending-tracking capability should be put to immediate use in following the now over $3 trillion (end of 2008) in principally financial-rescue funding, and the many billions more in stimulus spending slated for 2009. Such insight into where our federal dollars are being spent not only adds to transparency and trust, but it also has the potential to engage many more minds in understanding how the whole program works, its interdependencies, and how it can be improved—quickly.

While *external* e-gov helps people outside by masking the complexity of government through a service-oriented user-friendly interface, *internal* e-gov helps people working for the government manage, not mask, the inescapable complexity of the real government. Internal e-gov offers an array of information and knowledge management services that support—and make more transparent--the inner workings of government.

One example of the internal e-gov strategy is reflected in a range of US Army services supporting people in their many organizational roles. The "Teams of Leaders (ToL) Communication Wheel" was developed as part of the "Teams of Leaders Handbook" and depicts the emerging service-oriented framework for the Army's multitude of internal information and knowledge management services (Figure

Figure 13: ToL Communication Wheel

13). The wheel segments services according to four types of customers, four roles in which people have internal information needs:

- Individuals,
- Organizations,
- Communities, and
- Teams

In more progressive information and knowledge management organizations, technologies may change beneath while the service-oriented user interface continues to improve at the surface. This same service framework can apply throughout government, or to any large enterprise growing its internal capability. A technology-supported path to virtual reorganization internally and externally is the foundation for the successful use of the other virtual reorganization strategies.

Strategy Two: Institute Coordinating Councils and Communities of Practice

Emerging as the leading fix for the ever-increasing complexity of government, the creation of coordinating councils and communities of practice represent the second strategy for virtual reorganization.

Matrix organizations are relatively primitive forms of virtual reorganization that show up in unusual places. An early and persisting example is the Joint Chiefs of Staff, a “coordinating council” that has been baked into the institutional structure of the Defense Department through matrix reports.

Examples are councils like the President’s Management Council of Deputy Secretaries and other COO-type positions. A “coordinating council” established by 2004 legislation is the Office of the Director of National Intelligence, that coordinates an “intelligence community” of sixteen intelligence agencies. Also indicative of this trend is the new charge handed to Carol Browner in her Executive Office assignment to link energy, climate, and environmental functions.

The new VP-led White House Task Force on Working Families layers over the hierarchy in three ways: as a network of cross-organizational links (Figure 14), as a tree of coordinating organizations (Figure 15), and as (Figure 16) people sitting at the same leadership table. The screenshots taken from our digital map of the government structure show three views of the same network.

Such federal government councils are formal, issue-based, cross-organizational networks. And early signs indicate their role and number will expand greatly in the Obama administration.

In contrast to e-gov strategies that sort out underlying complexities for users with a service overlay, the coordination strategies require an accurate map of the organizational topography to enable smart network coordination. If not visible and

mapped, these overlapping networks will sow confusion rather than plant guidance and encourage collaboration.

Coordination does not mean control; rather, it points toward influence and reciprocal leadership. A coordinating network respects the independent nature of its members while seeking to increase fruitful cross-links. When done properly, it results in better functioning, lower cost, more power, and/or the ability to quickly address a pressing problem. For such approaches to be successful, members need a shared mental model of themselves as a coordinating body and of the larger context in which they seek coordination.

Figure 14: Task Force in cross-link view

Figure 15: Task Force in tree view of organizations

Figure 16: Task Force in leader view

Unfortunately, many cross-government coordination efforts attempt to function with flawed “organizational awareness” of the hierarchical topography. Organizational awareness complements the military imperative to maintain “situational awareness” of the physical environment. All governments, with

their rooted, physical boundaries from large (national) to small (local) scales, contain both organizational and physical topographies.

Coordination "czars" (in our view, a poor, misleading term that unfortunately has gained common parlance) and councils can be used throughout the government hierarchy at all levels—even, importantly, across levels. Here, the Google Earth-like map of the bureaucratic topography can serve as a common framework for layering on any combination of coordination networks. A "digital org chart" easily tracks these network layers along with the changing physical topography of the government.

Councils are *centralized* coordination structures. There are also complementary structures of massive *decentralized* cross-organizational coordination, seen in the use of social media to support functional and issue-based online "communities." Prominent among these is the Army's extensive array of professional forums, well illustrated by "CompanyCommand.com." The commitment and enthusiasm of those involved in this cross-Army effort are reflected in its homepage description: "a grass-roots, voluntary forum that is by and for the profession with a specific, laser-beam focus on company-level command. By joining, you are gaining access to an amazing community of professionals who love Soldiers and are committed to building combat-ready teams."

Intellipedia is another example of virtual reorganization that taps the wisdom of the inner crowd through the use of user-generated media. Shared across the US intelligence communities, this wiki runs on two levels of security and access. If the intelligence community can offer itself up as a virtual organization, then we have to believe that any part of the government can.

Through forums, wikis, blogs, facebooks, and other social media engaged for organizational purposes like these two examples, the "edge-in" mass of people in the organization gains a voice, exchanges information, and rapidly solves problems. The combination of these two approaches to coordination—the "center-out" coordinating council approach together with an "edge in" community of practice approach—is the network equivalent of hierarchy using both "top-down" and "bottoms-up" approaches to coordination.

Strategy Three: Stimulate Collaboration with Virtual Teams of Leaders

Between the large abstract organization and the concrete individual person doing a specific job lays the small organizational workhorse, the team. Driven by the same forces transforming hierarchy and bureaucracy, teams are under reinvention in the 21st century. A combination of new technology and advances in understanding human behavior result in a new kind of high-performing small group: the "team of leaders" that works virtually.

Teams are everywhere in organizations. A hierarchy is, by definition, a nested team of leaders. Everybody has a manager and is part of the management team formed by the group that reports to that position, whether those sharing the same boss are explicitly recognized as a team or not. Executives lead multi-level teams

of teams. Everyone works in teams—even the board of directors and the cabinet of the United States.

The new wave of virtual reorganization has spawned countless more teams, particularly virtual ones that cross boundaries of space, time, and organization. Many people are now members of multiple teams simultaneously. People working at higher levels tend to be on multiple teams. “Team hubs,” someone who holds roles in many teams, are likely to be found at every level, just like “hubs in the hierarchy”.

The government offers an interesting example of virtual reorganization at the team level in its “Joint, Interagency, International, Multinational” (JIIM) teams. Such groups reach across radically diverse organizational lines, sometimes with no common root, comprising, for example, US combat forces in Afghanistan, that work with NATO, the other nations with forces stationed there, NGOs, local tribal leaders, and the Afghan government, among others.

The Obama Administration has indicated an expanded role, budget, and headcount for the State Department in leading America’s reengagement with the world, a position long-supported by the (old and new) Secretary of Defense, Robert Gates. Most of these new State positions, and many existing ones, will be reconfigured into JIIM teams, some of short duration, some slated to become permanent. It is essential that these teams learn the new behavioral rules of working virtually and collaboratively. Failure leads to dysfunction while success enables a level of performance and collaborative capability unachievable by traditional hierarchical, face-to-face teams.

Internal e-government information services support a wealth of collaboration tools at the most effective point of getting something done, where a team of people has common purpose. Creativity is charged with the virtual ability to bring in expertise wherever it is located and thus power innovation within the team.

We must emphatically restate what we’ve written in so many other places: the benefits of virtual work and collaboration do not flow from technology but rather from the new behaviors needed to work in and across networked organizations. Perhaps the most important of these behaviors is expanding leadership beyond the hierarchical model. Without changed ways of working and leading, technology is poorly applied and often destabilizing, destroying capability rather than creating more efficiency and effectiveness.

Process of Virtual-to-Physical Reorganization

Virtual reorganization strategies are not either-or approaches to improved governmental design. Rather the strategies form a development sequence of increasing capability at both large and small scales of organizational structure. Together, these strategies create a process that runs from e-gov to concrete reorganization by traditional means.

1. An e-strategy establishes an increasingly capable technology, information, and knowledge infrastructure that enables its own species of virtual

reorganization (e.g., user interfaces) while at the same time generating an environment for the growth of other strategies.

2. Coordination adds networked organizing elements to the hierarchy through centralized coordination councils and decentralized communities of practice. This increases problem-solving interactions at both the macro and micro scales of the organization.
3. Collaboration through teams supercharged with interactive technologies and the richly-linked, people-centered knowledge environment enable high performance across space, time, and organizational boundaries. This gets cross-boundary reorganization into the work-stream itself.

Ultimately, commissions of 21st-century government can build on the experiments, pilots, and successes of virtual reorganization to develop the case for significant physical reorganization by executive authority. Legislation is the last stop for making the most significant and long-lasting reorganizations, ideally structural changes well-honed and tested in earlier virtual processes of reorganization

All these strategies are sure to be in play in the early years of the Obama administration and will touch everyone wherever they work as the economic crisis that erupted in 2008 unfolds—and, with some good organizational thinking, will resolve more quickly than otherwise would be the case.

Footnotes

[1] A Cast of 300 Advises Obama on Foreign Policy. By Elisabeth Bumiller, *New York Times,* July 18, 2008.

[2] From BP press release, 11 October 2007.

[3] See International Business Times and International Herald Tribune articles.

[4] For more background, see our Eleum case study in The Virtual, Networked Organization, *Handbook of High-Performance Virtual Teams* (Jossey-Bass, 2008). This tells the Eleum story (real organization, made-up name), reports the basic information, and describes some of the management actions that resulted.

[5] John Holland, *Emergence: From Chaos To Order*, Perseus, 1998.

[6] W. Ross Ashby, one of founders of the information sciences, cybernetics, and systems theory, enunciated the "Principle of Requisite Variety." The principle says the states of a control mechanism must be equal to or greater than the states in the system controlled. A system's internal state must match or exceed the variety in its local environment.

[7] Yaneer Bar-Yam, "Complexity Rising: From Human Beings to Human Civilization, A Complexity Profile," p. 5-6. Paper at http://www.necsi.org/projects/yaneer/Civilization.html.

[8] Stuart Kauffman, *At Home in the Universe: The Search for the Laws of Self-Organization and Complexity*, Oxford University Press, 1995. Kauffman is currently at the Institute for Biocomplexity and Informatics at the University of Calgary.

[9] "The small world problem," by Stanley Milgram. Psychology Today, (2):60--67, 1967. "Six degrees" is now a common cultural concept.

[10] The specific Eleum numbers and calculations reported are a data snapshot of employees and structure drawn from the HR SAP system at one moment in late 2006.

[11] Regular hierarchies expand by a power series, each level an increase of one in the exponent of span (e.g., $6^0+6^1+6^2+6^3\ldots$).

[12] These and other examples are not actual Eleum titles, only illustrative.

[13] Yaneer Bar-Yam, *op. cit.* "Complexity Rising," p. 13.