# Making Invisible Bureaucracy Visible
# In the DOE Nuclear Weapons Complex

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The National Research Council's February 2012 report on *Managing for High-Quality Science and Engineering at the NNSA National Security Laboratories* (National Academy Report), and the 2014 report of the *Congressional Advisory Panel on Governance of the Nuclear Security Enterprise: A New Foundation for the Nuclear Enterprise* (Advisory Panel Report) are the latest in a series of studies that lament how science and engineering is managed in the Department of Energy (DOE) Nuclear Weapons Complex.[1] Historically, DOE/NNSA's vision for transforming the Nuclear Weapons Complex has focused on site closures, consolidating foot prints, and more recently the consolidation of M&O contracts at facilities like the Y-12 National Security Complex and Pantex. This is the third in a series of articles that argues that NNSA's vision of transformation should be broadened to include *organizational* transformation, and explains two key reasons why organizational transformation has been so difficult within the DOE Nuclear Weapons Complex.[2] The *first* reason is that the Advisory Panel Report lacks a precise and reliable model of the structure and dynamics of organizational culture that describes the ways in which cultural elements: a) create the organizational problems described in the report, and b) can act like an *Invisible Bureaucracy* that frustrates and undermines positive change. The *second* reason that transformation has been so difficult is because practicing scientists, managers, and staff members in laboratories across the Complex have not understood the true nature of the problem; e.g., seeing themselves as being partly *responsible* for participating in, and sustaining, the bureaucracy, dysfunctionality, and lack of trust described by the report.

The Advisory Panel Report is well-researched, well-written, and its recommendations echo many of the key findings of the 54 previous studies that tried to address similar management problems – problems that go back more than two decades. While some of the strategic recommendations (like folding NNSA back under DOE) seem like a step backwards, the vast majority (if effectively implemented) would go a long-way towards fixing the dysfunctionality and lack of trust across the DOE/NNSA Complex. Importantly, the Advisory Panel recognizes that the "heavy-lifting" of implementing its recommendations will be transforming the culture of DOE/NNSA and its Contractor organizations. A key indicator that an issue is "cultural" is the existence of patterns of organizational behavior that span long-periods of time and are invariant under changes in leadership, organizational structure, governance, Presidential Administrations, and reengineering efforts. The Advisory Panel Report and its 54 predecessor reports, document the existence of these management problems back to the 1980s when: a) the Defense Nuclear Facilities Safety Board was formed to provide oversight for DOE, and b) Secretary Watkins deployed 38 Tiger Teams across the DOE enterprise. So in terms of cultural longevity, these management issues span the Administrations of five U.S. Presidents (Reagan, H.W. Bush, Clinton, W. Bush, and Obama), nine Secretaries of Energy (Herrington, Watkins, O'Leary, Pena, Richardson, Abraham, Bodman, Chu, Moniz), and organizational changes in both Federal and M&O leadership and myriad flavor-of-the-month "change" initiatives too numerous to recount. It's easy for the Advisory Panel to *say* that an organization's culture must change, but it's another thing to actually *do* it, because "culture" can act like an Invisible Bureaucracy that will frustrate and undermine the effective implementation of the report's recommendations.[3]

*The First Reason Transformation Has Been So Difficult*

In this section, we'll discuss the *first* reason that transformation has been so difficult – the 55 studies and reports have lacked a precise and reliable model of the structure and dynamics of organizational culture that describes the ways in which cultural elements: a) create the organizational problems described by the findings in the report, and b) can act like an *Invisible Bureaucracy* that frustrates and undermines positive change. Most managers struggle against the flow of overly complex systems and are frustrated by an *invisible force* that derails their attempts to make positive change. Their instincts tell them that the organization's culture is preventing them from getting the results they want, but "culture" has remained one of the least understood aspects of organizational life because it can act like an *Invisible Bureaucracy* that frustrates and undermines positive change. The day-to-day reality of Invisible Bureaucracy manifests itself in a number of recurring and troubling questions:

- Why is it so difficult for DOE/NNSA and its Contractors to make decisions, and why (once made) do so many of them go unimplemented?

- Why do most Federal and Contractor organizations have a gap between the *formal* (written) rules for how things get done, and the *informal* (unwritten) rules for how things "really" get done?

- Why do projects that seem to have the full support of top managers and key personnel die a slow death and no one knows what happened to them?

- Why have the recommendations from the previous 54 reports shown marginal or failed results, and how likely is it that the recommendations of the Advisory Panel Report will succeed in avoiding this same fate without a precise and reliable model of culture that describes how Invisible Bureaucracy works?

The Advisory Panel Report defines "culture" as one of root-causes of the problems identified in the study, and the most difficult part of obtaining deep, lasting change. It's importance is indicated by the fact that the word "culture" appears over 46 times in the report, including hybrid-uses like management culture, mission-driven culture, a culture of performance, and risk aversion culture. But the Advisory Panel Report does not contain a model of organizational culture that precisely and reliably describes how the structure and dynamics of culture actually work, and how to effectively implement the report's insightful and well-configured recommendations.[4] In what follows, I describe a model of organizational culture that has been shown to accomplish the kind of organizational and behavioral transformation that the Advisory Panel Report recommends; a model based on Edgar Schein's ground-breaking book, *Organizational Culture and Leadership*.[5]
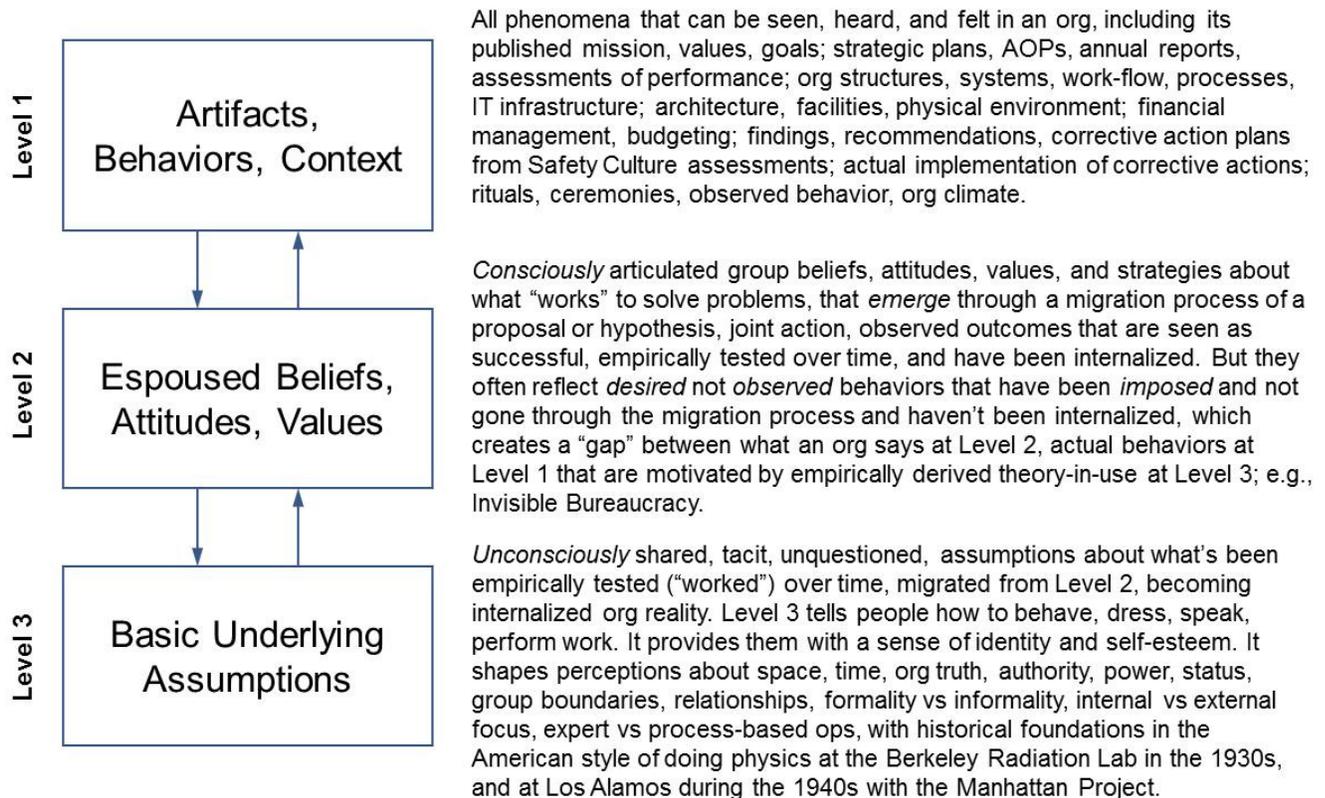
*Schein's Model of Organizational Culture*

Studies on organizational culture like Schein's, John Kotter's, *Corporate Culture and Performance*, and Jim Collins', *Built to Last* and *Good to Great* have shown that while an organization's culture powerfully molds its operating style and can positively (or negatively) affect its performance, "culture" has remained an overly-complex and somewhat mysterious topic for many managers and organizations.[6] As Schein warns, "The biggest danger in trying to understand culture is to oversimplify it in our minds. It is tempting (and at some level valid) to say that culture is just 'the way we do things around here,' 'the rites and rituals of our company,' 'the company climate,' 'the reward system,' 'our basic values,' and so on. These are all manifestations of the culture, but none *is* the culture at the level

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where culture matters. A better way to think about culture is to realize that it exists at several 'levels' and that we must understand and manage these deeper levels."[7]

As shown below, the structure of organizational culture goes from the very visible elements at the top of the diagram (Artifacts, Behaviors, and Context) to very tacit and invisible elements at the bottom (Basic Underlying Assumptions).[8] The Federal and Contractor sides of the Nuclear Weapons Complex need to adopt this three-level approach as a working model for how culture is defined, how one goes about transforming it, and how to implement the recommendations of the Advisory Panel Report.

## Schein's Levels of Culture

**Level 1 — Artifacts, Behaviors, Context**

All phenomena that can be seen, heard, and felt in an org, including its published mission, values, goals; strategic plans, AOPs, annual reports, assessments of performance; org structures, systems, work-flow, processes, IT infrastructure; architecture, facilities, physical environment; financial management, budgeting; findings, recommendations, corrective action plans from Safety Culture assessments; actual implementation of corrective actions; rituals, ceremonies, observed behavior, org climate.

**Level 2 — Espoused Beliefs, Attitudes, Values**

*Consciously* articulated group beliefs, attitudes, values, and strategies about what "works" to solve problems, that *emerge* through a migration process of a proposal or hypothesis, joint action, observed outcomes that are seen as successful, empirically tested over time, and have been internalized. But they often reflect *desired* not *observed* behaviors that have been *imposed* and not gone through the migration process and haven't been internalized, which creates a "gap" between what an org says at Level 2, actual behaviors at Level 1 that are motivated by empirically derived theory-in-use at Level 3; e.g., Invisible Bureaucracy.

**Level 3 — Basic Underlying Assumptions**

*Unconsciously* shared, tacit, unquestioned, assumptions about what's been empirically tested ("worked") over time, migrated from Level 2, becoming internalized org reality. Level 3 tells people how to behave, dress, speak, perform work. It provides them with a sense of identity and self-esteem. It shapes perceptions about space, time, org truth, authority, power, status, group boundaries, relationships, formality vs informality, internal vs external focus, expert vs process-based ops, with historical foundations in the American style of doing physics at the Berkeley Radiation Lab in the 1930s, and at Los Alamos during the 1940s with the Manhattan Project.

*Level 1 (Artifacts, Behaviors, and Context)*

Level 1 is immediately observable when you enter an organization as everything you see, hear, and feel within the organizational context – it's the initial impression people have about how various organizations do things differently. As an outsider to an organization's culture, Level 1 is easy to observe, but it's difficult to decipher in terms of what it "means" and how the underlying cultural dynamics actually "works." As Schein points out, "The Egyptians and the Mayans both built highly visible pyramids, but the meaning of the pyramids in each culture was very different – tombs in one, temples as well as tombs in the other."[9] As the content of the Advisory Report shows, you can see culture in action at Level 1 through behaviors, the configuration of the organizational context and organizational climate; and you may even have some intuitive "sense" about (and emotional response to) what you see, but it's difficult to know what the artifacts in the report actually *mean* or what *causes* them within that specific cultural context.[10]

At laboratories and plants around the DOE/NNSA Complex, Level 1 includes things like the organizational structures, ES&H management systems and work processes; IT infrastructure for the back-office and business functions; a published list of organizational values, operating principles, and management practices; websites and Internet-based information; strategic plans and annual operating plans, published annual reports; evaluations of organizational performance using systems like the Performance Evaluation Plans, Contractor Assurance Systems, and all forms of oversight; the allocation and management of physical, financial, and human resources; findings, recommendations, and corrective action plans from organizational and Safety Culture assessments, and the "gap" between the formal (written) rules for how things get done, and the informal (unwritten) rules for how things "really" get done; equipment, technology, and building layout; language and acronyms used by managers and staff members; accelerators, scientific apparatus and measurement tools, experimental detectors, and scientific computing infrastructures; organizational climate and the "style" as embodied in clothing, ways of addressing people within the organizational hierarchy and organizational functions, and the nature of emotional displays; and the facility's geographic location/s.

In much the same way, Deming argues that over 85% of the problems with organizational performance are in the structures, systems, and culture – put good people in bad processes and you get bad performance.[11] This is because the design of an organization's structures and systems creates a matrix of differing perspectives, interests, concerns, and results that people are held accountable for (PICR) that can either *facilitate* effective performance when they are properly aligned, or *frustrate* and *undermine* performance if the PIRC are competing or conflicting. The organizational context and the PICR matrix at Level 1 function like a *stage* upon which the day-to-day, week-to-week, and month-to-month activities of managers and staff members "act out" the roles, responsibilities and authorities assigned to them.[12] Many of the recommendations made by external and internal assessment teams are designed to create change at Level 1 (Artifacts, Behaviors, and Context), but the implementation of these changes are often not designed to penetrate to culture Level 2 (Espoused Beliefs, Attitudes, and Values), and over time to migrate even deeper to culture Level 3 (Basic Underlying Assumptions) – a process that will be described in more detail below.

While Level 1 can be observed by any cultural "outsider" who is given access to the workplace or who browses the Internet. Level 2 requires you to interact with "insiders" or "informants" who can explain how the organization actually operates and what the artifacts at Level 1 actually "mean" within that specific cultural context. The basic underlying assumptions of Level 3 are quasi-conscious to "insiders" and "informants" because they are like organizational blind spots. When trained and experienced organizational and cultural diagnosticians spend time analyzing an organization's culture using a model like Schein's, and those within the organization "fill in the blanks" with examples of day-to-day operations and misalignments between Level 1 and Level 2, the Level 3 (Basic Underlying Assumptions) that can derail attempts to improve performance at Level 1 begin to emerge for the people who actually work within the culture. The key is to identify misalignments between the three levels that point to the root causes of performance problems that just won't go away. These misalignments are the underlying mechanisms of Invisible Bureaucracy. The key to "deciphering" an organization's culture is to gather data and information about all three levels through evaluation of the organization's structures, systems, and organizational design using structured interviews, focus groups, a review of internal documents, on-site observation of day-to-day work processes, decision-making, and other activities that reveal the human-processes that underlay strategic, tactical, and day-to-day operations.

*Level 2 (Espoused Beliefs, Attitudes, and Values)*

Level 2 (Espoused Beliefs, Attitudes, and Values) should be viewed as either *beliefs* (how things work), *attitudes* (favor or disfavor towards a person, place, thing, activity, idea, or way-of-working), and *values* (what's important) that either *emerge* from or are *imposed* on organizations by external or internal forces.

- Level 2 elements can *emerge* from the experience of going through a migration process that produces internalized convictions about what "works" and "doesn't work" to solve problems and this creates a congruency and alignment between Levels 1, 2, and 3. This is what John Kotter and Tom Peters call "strong" culture.[13] This is based on *experiential* (internalized) knowledge where organizations learn to *know by doing as a group*; e.g., shared knowledge and shared experience.

- But Level 2 elements can also be *imposed* on organizations by external or internal forces, where the espoused beliefs, attitudes, and values have not gone through a Level-1-to-Level 2 migration process, so they tend to reflect *desired* not *observed* behaviors because they have not been internalized as an effective solution by the group. This creates a "gap" between what the organization "says" or espouses at Level 2, and what it "does" in terms of actual behavior and performance at Level 1. When imposed, these beliefs, attitudes, and values are based on an *intellectual* kind of knowledge, where organizations have a cognitive understanding that has not actually been acted-out in the empirical realities of day-to-day operations. Consequently, the driving force of organizational culture still comes from Level 3 basic underlying assumptions that are misaligned with the *imposed* Level 2 elements; e.g., an organization convinced against its will is of the same opinion still. This kind of misalignment between Levels 1, 2, and 3 describe the underlying cultural dynamic of Invisible Bureaucracy.[14]

*Emergent-Internalized Beliefs, Attitudes, and Values at Level 2*

Beliefs, attitudes, and values that *emerge* from empirical operating experience produce deep internalized convictions about what "works" to solve problems and this manifests itself in congruency and alignment between Levels 1, 2, and 3. The Level-1-to-Level 2 migration process operates as follows: a) an initial proposal or hypothesis is made by a leader for how a problem should be solved, b) the leader creates a *genuine* (internally recognized) sense of urgency about the need for positive change, and convinces the group to act on their belief and take joint action; e.g., gets initial buy-in from the group, c) an observed outcome that demonstrates that this solution has worked, with this being seen as successful by the group, and then d) this solution is empirically tested over time and continues to be effective in solving problems. Over time, the group-learning and organizational experience associated Level 2 beliefs, attitudes, and values becomes *internalized* and *solidified* into an ideology and operating philosophy that is empirically verified by the external environment when customers reward the organization's performance. The power of this organizational ideology and operating philosophy to either: a) create truly great organizations, or b) frustrate and undermine organizational and behavioral transformation is described by Jim Collins in *Built to Last* and *Good to Great*, and by other transformation experts like Kotter.[15] Over time, these Level 2 elements are internalized and begin to migrate to the Level 3 basic underlying assumptions that define an organization's reality, so the key indicator that an organization's espoused beliefs, attitudes, and values are emergent and have been internalized is a deep sense of congruency and alignment between the empirical realities of Levels 1, 2, and 3 as shown in the figure below.

# Emergent-Internalized vs Imposed Level 2
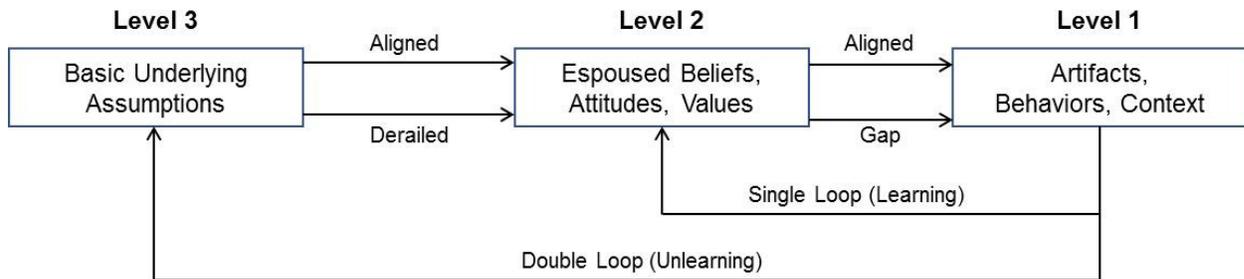


Once the cultural elements are solidified, managers and staff members tend to *defend* their accumulated internalized experience at Level 2 because their group-learning and the group-history of organizational performance tells them that this is how things should be "done" around here. The espoused beliefs, attitudes, and values that typify Level 2 are often echoed in structured interviews that are conducted by assessment teams. The fact that laboratories around the DOE/NNSA Complex have so many (but different) structures, systems, processes, and ways-of-working based on the same DOE Orders that each site sees as essential to effective operations is perhaps one of the greatest challenges to large-scale transformation across the DOE Complex. For example, one person interviewed at an organization in the Complex said, "We have one of the best productivity programs in the Complex so why try to 'fix' it?" A person interviewed at another organization commented, "We believe we have the best Con Ops systems and we will defend them against change."

*Imposed Beliefs, Attitudes, and Values at Level 2*

Beliefs, attitudes, values, ways-of-working, processes, and strategies that are *imposed* by external or internal forces, and do not go through the Level-1-to-Level 2 migration process, tend to reflect *desired* not *observed* behaviors because the outcomes have not been empirically verified as "working" by group-experience. Consequently, they have not been internalized at Level 3. This creates a "gap" between what an organization says (espouses) at Level 2, and actual behavior at Level 1 that is motivated by what Chris Argyris calls empirically derived theory-in-use assumptions at Level 3. Theory-in-use consists of implicit assumptions that emerge through experience and empirical verification that gets internalized and guides the Level 1 behaviors of managers and staff members in organizations.[16] This is shown in the diagram above where Schein's three-level culture model has been reconfigured into a double-loop learning configuration to show how these cultural dynamics operate in organizations.[17]

Unlike the emergent-internalized form described above, Level 2 elements that are *imposed* do not go through the Level-1-to-Level 2 migration process. Rather, the new requirement is *imposed* on the organization through the kind of transactional oversight described in the Advisory Report which often creates stress and organizational pressure, but fails to create a *genuine* (internally recognized) sense of urgency that creates buy-in from the group. In other words, the imposed changes of transactional oversight never make it past the second step in the migration process and don't migrate to the deeper Level 3 elements so they are never internalized and owned by the group. Consequently, the existing Level 3 assumptions shown in the diagram above tend to *derail* the imposed Level 2 elements, and *drive* the actual behaviors at Level 1 which produces the same results over and over again, despite

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continued attempts to create sustainable change. As described earlier, the misalignment between Levels 1, 2, and 3, and the derailing of organizational intentions manifest themselves as Invisible Bureaucracy.

For example, it's common for organizations to espouse "teamwork" as a core value at Level 2, while actually rewarding *individual competitiveness* (Level 3 driving Level 1 behavior). It's common for organizations to espouse commitment to the organization's overall mission at Level 2, while maintaining a configuration of structures and systems at Level 1 that creates conflicting (or competing) perspectives, interests, concerns, and results that people are being held accountable for. It's common for organizations to espouse that they are committed to ES&H and an effective Safety Culture at Level 2, while evidence of this is either missing or inconsistent with the flow of day-to-day operations at Level 1. When analyzing an organization's espoused beliefs, attitudes, and values it's important to distinguish carefully between those that have *emerged* and have been internalized through operational experience and are congruent with the basic underlying assumptions at Level 3; and those that have been *imposed* and reflect only *desired* behaviors at Level 2 that are not evidenced in day-to-day operations at Level 1. My own experience of working in the DOE/NNSA Complex has shown that the vast majority of day-to-day operations fit squarely into the imposed Level 2 category.

So as a **general rule**, when management identifies a Level 1 problem in the performance of the organization, the first step should be to improve, reconfigure, or replace the appropriate structures and systems to remove barriers to positive change, and to bring Level 2 and Level 1 back into alignment to get the desired results. If the these performance problems persist in the face of these changes and just won't go away, this is an indicator that an organization's Level 2 espoused beliefs, attitudes, and values are *imposed* as indicated by the misalignment between Levels 1, 2, and 3; e.g., Invisible Bureaucracy. When you see incongruence and misalignment (a "gap") between Level 1 and Level 2 that resists numerous attempts to create positive change, the root cause is often that internalized Level 3 basic assumptions are *derailing* imposed Level 2 elements, and unintentionally motivating and driving behavior at Level 1, despite the efforts of management to the contrary. In such cases, the path forward should be to identify and explore the ways in which Level 3 assumptions are derailing management's espoused intentions at Level 2, and to begin the corrective action process of aligning Level 1, Level 2, and Level 3 by making Invisible Bureaucracy Visible.

### Level 3 (Basic Underlying Assumptions)

Level 3 basic underlying assumptions consist of tacit, unquestioned, taken-for-granted, empirically verified, internalized assumptions about how an organization should (should not) be operated that are quasi-conscious to people within the organization. As described by Chris Argyris' notion of the Left-Hand Column, these assumptions are often undiscussible with people outside a given culture even if they are brought into awareness.[18] It's important to remember that Level 3 assumptions are a repository of beliefs, attitudes, and values that were once Level 2 elements that have been empirically verified over time and have gone through the Level-1-to-Level 2 migration process and become internalized. Interestingly, the process of Level 3 culture formation has many things in common with the formation of personality. In terms of personality formation, by the time we're old enough to know that we *have* a personality we've had no hand in fashioning it. In much the same way, an organization's culture is like its personality and many managers wake up one day and find themselves with structures, systems, and a culture that they have not consciously chosen; in business relationships that may not be in their best interest; with assumptions about generating revenue and patterns of spending that they have not consciously chosen; with employees who are not matched to the organization's human capital needs; pursuing objectives and goals that don't produce the desired results. In other words, culture "happens to" organizations. Schein states, "Basic assumptions as defined here have become so taken for granted

that you find little variation within a social unit. This degree of consensus results from repeated success in implementing certain beliefs and values… In fact, if a basic assumption comes to be strongly held by a group, members will find behavior based on any other premise inconceivable. For example… in an occupation such as engineering, it is inconceivable to deliberately design something that is unsafe; it is a taken-for-granted assumption that things should be safe."[19]

The Advisory Panel Report accurately describes many of the key problems that have plagued the Nuclear Weapons Complex over the last two decades, supported by objective evidence at Level 1. The recommendations for change and corrective action are *imposed* improvements, reconfigurations, and replacements of day-to-day operations, along with beliefs, attitudes, and values at Level 2 for "how it *should* be done around here" that have not gone through the Level-1-to-Level 2 migration process so they have not become Level 3 assumptions. So during the early phases of implementing the Panel's recommendations, Schein's model would predict the activity of Invisible Bureaucracy manifested as misalignment between Level 1, Level 2, and Level 3, with the Level 3 assumptions derailing the newly imposed Level 1 changes in operations, and imposed Level 2 beliefs, attitudes, and values. Schein's model also predicts that this misalignment will continue until the Level-1-to-Level 2 migration process is complete. Prospective "implementers" of the report's recommendations should not underestimate how long this migration process actually takes, and the *staying power* of Level 3 assumptions.

John Kotter and James Heskett liken the Level 3 resistance to cultural change to a mattress or sofa with inner springs. When you sit on a sofa, the force of your body-weight changes the sofa's shape, but the springs are designed to return to their original position once the force is removed.[20] In much the same way, leaders use the force of their authority to change the "shape" of organizational culture, but like a sofa it resists. When employees *say* they will support change, but *do* things to undermine and frustrate it, leaders and managers normally increase the amount of force proportionally and this becomes increasingly difficult to sustain over long periods of time. A practical example of the "sofa effect" is the use of software packages to change the way work is performed. In most cases, leaders and managers don't have to apply increasing levels of pressure to enforce changes to work processes because the new software won't allow employees to work in the old way – they're forced to adopt the change. But despite this, some employees will circumvent change by spending days, weeks, or even months using peripheral software packages to make the new system look and feel like the old one; e.g., they download data from the new accounting software into a spreadsheet then format it to work like the old process. In other words, they create *shadow systems*. When leaders diminish, remove, or inconsistently apply organizational force, the culture migrates back to its original shape just like a sofa. Often, employees passively resist the changes and eventually the initiative loses steam and dies. This has been the case across the DOE Complex – like holding your breath underwater to swim from one end of the pool to the other, managers and staff members have learned to "go with the flow" outwardly, and then wait this newest change initiative out. Each time employees succeed in derailing a change initiative the Level 3 assumptions and Invisible Bureaucracy become more robust and more difficult to change the next time. So it is better *not* to undertake a process of cultural transformation at all than to begin, fail, and fatigue an organization with yet one more "flavor of the month."

So we have objective evidence that characterizes the current artifacts, behaviors, and context at Level 1, and we have objective evidence of the Level 2 espoused beliefs, attitudes, and values because they are described by the Advisory Panel Report in great detail. But what exactly are the Level 3 assumptions that have derailed implementation of the recommendations of the first 54 reports, and how likely is it that the Advisory Panel's recommendations will avoid the same fate, unless they are implemented using a precise and reliable model of culture that describes how Invisible Bureaucracy actually works?

*So What Are Some of the Key Level 3 Assumptions for the DOE Nuclear Weapons Complex?*

Schein tells us that the key to understanding the Level 3 elements of any culture is to *think historically* because culture is the *historical residue of success*.[21] So in the case of the Nuclear Weapons Complex, Level 3 assumptions will emerge from an historical analysis of the American style of doing physics in E.O. Lawrence's Berkeley Radiation Lab in the 1930s, and the Manhattan Project in the 1940s headed by Oppenheimer and Groves, where Oppenheimer controlled what went on *inside* the gate, and Groves controlled what went on *outside* the gate.[22] But the Advisory Panel Report and its predecessor reports have proceeded from a deeply tacit cultural assumption that the practice of science *itself* should remain largely unchanged, while transformation efforts should be focused almost exclusively on the structures, systems, and culture of the mission-support infrastructure within which scientific work is performed. Most practicing scientists see cultural reflection on how scientific work is done as being beyond the scope of the practice of science itself, and beyond the scope of scientific peer review. The details of this historical analysis that describes the origin of these Level 3 assumptions will be presented in a subsequent article entitled, *Making Invisible Bureaucracy Visible in the DOE Nuclear Weapons Complex (Part II)*, but some of the key Level 3 assumptions that will be explored in that article are listed below. The Advisory Panel Report describes some of the Level 1 and Level 2 manifestations of these assumptions, but without a precise and reliable model of culture it is highly unlikely that implementers of the report's recommendations will know what these things "mean" or how to prevent Invisible Bureaucracy from derailing their change efforts. The Level 3 assumptions reflect differing *perspectives* and *values* about operational issues like:

- Formality versus Informality
- External versus Internal Focus
- Risk-Taking versus Risk Aversion
- Competence versus Incompetence

It's hard to overestimate the behavioral and performance-based *shaping* power of Level 3 assumptions. Level 3 tells people how to behave, dress, speak, and how to plan, perform, assess, and improve their work. Level 3 provides people with a sense of identity and self-esteem. These assumptions shape and define scientists' and mission-support personnel's perceptions about space, time, organizational truth, authority, power, status, group boundaries, relationships, and tacit, unquestioned, taken-for-granted assumptions about the relative *value* of the items listed above. Elements of these same Level 3 assumptions manifest themselves today at laboratories whose history is traceable to the Manhattan Project and even non-nuclear facilities like Fermilab whose first Director (Bob Wilson) was one of the inner-circle of physicists at Los Alamos during the war years. These same Level 3 assumptions are also a foundation upon which many of the problems identified in Chapter 3 of the Advisory Panel Report are predicated. **Bottom Line**: The precision and reliability of Schein's culture model should be used by the Federal and Contractor organizations tasked with implementing the recommendations from the Advisory Panel Report to increase the probability of making deep, lasting change across the DOE Nuclear Weapons Complex.

### The Second Reason Transformation Has Been So Difficult

The *second* reason that transformation has been so difficult is because practicing scientists, managers, and staff members in laboratories across the DOE Complex have not understood the true nature of the problem; e.g., seeing themselves as being partly *responsible* for participating in, and sustaining, the bureaucracy, dysfunctionality, and lack of trust described in the Advisory Report. Deep, sustainable change in organizations almost always requires a burning platform and there are two kinds: reactive

and proactive. The *reactive* kind is when managers wait until a situation has gone critical to seek help or try to create positive change. Managers who adopt the *proactive* kind of burning platform realize that while the situation may not be critical right now, it probably *will be* if they allow ineffective ways-of-working and attitudes to continue frustrating and undermining their organization and the practice of science. So they *intentionally create* a burning platform by developing a credible and compelling business case for change that disrupts the status quo and shows people why they can't continue doing business like they have been. Proactive managers use objective data from the organization's actual performance and the kind of analysis presented in the Advisory Panel Report to cast doubt on the validity of current ways of operating labs and practicing science. They use a credible and compelling business case to help both scientific and mission-support staff begin to see themselves as partly *responsible* for participating in (and sustaining) the organization's performance problems.

But once a sense of personal responsibility penetrates peoples' denial and defense routines, they begin to experience what Schein calls *survival anxiety* or *guilt* about the fact that they are partly *responsible* and really do have to change.[23] But as soon as people accept the need to change, they start experiencing *learning anxiety*; e.g., the fear of doing their job differently and/or changing their relationships, and reconfiguring how the organization is structured and works day-to-day. The changes created by the burning platform create a self-reinforcing loop of survival anxiety, which creates learning anxiety, which in-turn increases the level of survival anxiety, etc. etc. Schein identifies two principles that people should remember when effectively managing the vicious cycle that survival anxiety and learning anxiety can create.

- Initially, survival anxiety and/or guilt must be greater than learning anxiety in order to penetrate peoples' denial and defense routines, and to begin the process of recognizing and changing ineffective patterns of performance and Invisible Bureaucracy with the goal of getting different results.

- Creating sustainable change requires that learning anxiety be *reduced* by: a) building new skills, competences, and concrete ways of adapting to (transitioning to) new ways-of-working, and b) creating a climate of psychological safety for managers and staff members where they can openly discuss their perspectives, interests, and concerns about the changes, rather than continuing to ratchet-up the level of survival anxiety which creates a fear-based environment that erodes trust.

When properly managed, the interaction between learning anxiety and survival anxiety can be used to "unfreeze" the solidified (calcified) ways-of-working and interacting that become Invisible Bureaucracy and barriers to positive change. When you hear leaders in DOE/NNSA or in Contractor organizations make statements like, "We're already implementing many of the things in the report" a few weeks after the report is issued, as if to imply, "We already knew about this and have it covered," more than likely they are making changes at Level 1 and imposing Level 2 edicts on top of powerful and robust Level 3 assumptions which creates more misalignment and Invisible Bureaucracy, and almost never leads to the kind of deep, sustainable change that the Advisory Panel recommends.

Transformation has also been difficult because *transformation is difficult*. Real transformation will disrupt the status quo and challenge the tacit assumptions, belief structures, and the ways people work together. Schein points out, that although most leaders would typically not describe it as "therapy," organizational transformation is functionally the equivalent (for groups) of what individuals undergo when they seek therapeutic help because things are not working in their lives.[24] In many cases, transformation will challenge and undermine employees' professional identities and the way they've done their jobs for years. So it's no wonder that they will overtly (or covertly) push back on change

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individually (and in groups) with enormous force of will. The key to mitigating this resistance is to enlist managers, staff members, and practicing scientists who actively support the change in creating their own futures rather than having it "done to them." This ensures that better decisions will be made and implementation has a better chance of succeeding. Achieving this kind of change will require Federal and Contractor organizations to tolerate the uncertainty that transformation will bring *long enough* for new cultural norms and ways-of-working to emerge in place of the old ones. This is why it takes so long to transform a single level of management and why it is so important to create a sense of organizational and psychological safety for the people undergoing the change. ***Bottom Line***: Given the tendency of most managers to *impose* Level 2 elements about "how it *should* be done around here," and the robust and stubborn nature of Level 3 assumptions to behave like a mattress or sofa with inner springs that bounce back, trying to obtain long-term sustainable change by holding people *accountable* is necessary, but not sufficient to achieving organizational and behavioral transformation. Rather people need to begin to see themselves as being partly *responsible* for participating in, and sustaining, the bureaucracy, dysfunctionality, and lack of trust in the organization, and that requires a burning platform to create a sense of *urgency* about the need for deep, profound, sustainable change.

### *The Need for Leadership*

Transformation must start at the very top of an organization if it is to succeed. Successfully implementing the recommendations in the Advisory Panel Report will require a sustained commitment of time and human, material, and financial resources at a time when budgets are shrinking. Studies and field experience have shown that in mature organizations (like the ones in the Nuclear Weapons Complex) it takes at least eighteen months to two years per level of management changed, even when substantial resources are dedicated specifically to the transformation process, with some transformations in industry taking more than fifteen years.[25] The change-averse and risk-averse nature of the DOE/Contractor's culture will overtly and covertly work against positive change, even if it's in the best interest of the nuclear mission and National Security. So top managers on both the Federal and Contractor sides should "count the cost" and not underestimate the difficulty and long-term nature of the task they will face.

Achieving authentic change will require *perseverance* and *pacing* on the part of Federal and Contractor leaders and managers. Some studies show that the momentum of transformation is likely to be lost more than once over the course of the transformation initiative because many employees across the organization strongly prefer that the change not happen.[26] In these cases, visionary leaders intervened *personally* to get the change process back on track, and publicly reaffirmed their commitment to staying the course. These were true "defining moments" when the leadership was tested and employees noticed whether or not the commitment of top management wavered; e.g., whether their deeds followed their words. At these critical times, individual managers and staff members made personal decisions about whether to support (or oppose) the change-initiative based on how they saw their leaders in those moments. Top and middle managers across the DOE Complex *must* provide this same kind of visionary leadership if they are to succeed in implementing the recommendations of the Advisory Panel Report and building *a new foundation for the nuclear enterprise*.

# End Notes

[1] See National Research Council, *Managing for High-Quality Science and Engineering at the NNSA National Security Laboratories*, Prepublication, (Washington, DC: The National Academies Press, 2012), and the *Congressional Advisory Panel on Governance of the Nuclear Security Enterprise: A New Foundation for the Nuclear Enterprise* issued in November 2014.

[2] For the first two articles see, Mark Bodnarczuk, *Why Transforming the DOE Nuclear Weapons Complex Is So Difficult (Part I)*, (Boulder, CO: Breckenridge Press, May 2012), and Mark Bodnarczuk, *Why Transforming the DOE Nuclear Weapons Complex Is So Difficult (Part II)*, (Boulder, CO: Breckenridge Press, May 2012).

[3] Mark Bodnarczuk, *Making Invisible Bureaucracy Visible: A Guide to Assessing and Changing Organizational Culture*, (Boulder, CO: Breckenridge Press, 2009).

[4] The Advisory Panel Report does provide an informal definition of organizational culture, "This is how things are done here" which is of little or no value in actually understanding and transforming cultural dynamics that behave like Invisible Bureaucracy. This definition originally appeared in Terrence Deal and Allan Kennedy, *Corporate Cultures: The Rites and Rituals of Corporate Life*, (New York: Perseus Books Publishing, 1982), p. 4.

[5] I would like to thank Ed Schein for his valuable feedback and insights on this paper. Also, see Edgar Schein, *Organizational Culture and Leadership*, 4th Edition, (San Francisco, CA: Jossey-Bass, 2010); Edgar Schein, *Corporate Culture Survival Guide*, (San Francisco, CA: Jossey-Bass, 2009); John Kotter and James Heskett, *Corporate Culture and Performance*, (New York: Free Press, 1992).

[6] See Edgar Schein, *Organizational Culture and Leadership*, 4th Edition, (San Francisco, CA: Jossey-Bass, 2010); Edgar Schein, *Corporate Culture Survival Guide*, (San Francisco, CA: Jossey-Bass, 2009); John Kotter and James Heskett, *Corporate Culture and Performance*, (New York: Free Press, 1992); James Collins and Jerry Porras, *Built to Last*, (New York: Harper Business, 1994); Jim Collins, *Good to Great*, (New York: Harper Business, 2001); Jim Collins, *Good to Great and the Social Sectors*, (New York: Harper Collins, 2005); and Mark Bodnarczuk, *Making Invisible Bureaucracy Visible: A Guide to Assessing and Changing Organizational Culture*, (Boulder, CO: Breckenridge Press, 2009.

[7] Edgar Schein, *Corporate Culture Survival Guide*, (San Francisco, CA: Jossey-Bass, 2009), p. 15 ff.

[8] See Edgar Schein, *Organizational Culture and Leadership*, 4th Edition, (San Francisco, CA: Jossey-Bass, 2010), p. 17 ff, and Edgar Schein, *Corporate Culture Survival Guide*, (San Francisco, CA: Jossey-Bass, 2009), p. 15 ff. Echoing Schein's work, the Breckenridge Equation™ uses a dynamic model of organizational culture that focuses on the results that an organization gets, good or bad. See Mark Bodnarczuk, *Making Invisible Bureaucracy Visible: A Guide to Assessing and Changing Organizational Culture*, (Boulder, CO: Breckenridge Press, 2009, p. 23 ff.

[9] See Edgar Schein, *Organizational Culture and Leadership*, 4th Edition, (San Francisco, CA: Jossey-Bass, 2010), p. 26.

[10] Edgar Schein, *Corporate Culture Survival Guide*, (San Francisco, CA: Jossey-Bass, 2009), pp. 15-17.

[11] See W. Edwards Deming, *Out of Crisis*, (Cambridge, MA: The MIT Press, 2000).

[12] The metaphor of organizational culture as a "stage" is used very effectively in Gerald Driskill and Angela Laird Brenton, *Organizational Culture in Action*, (Thousand Oaks, CA: Sage Publications, 2005).

[13] See John Kotter and James Heskett, *Corporate Culture and Performance*, (New York: The Free Press, 1992), p. 15 ff., and Thomas Peters and Robert Waterman, *In Search of Excellence*, (New York: Time Warner Book, 1982), p. 76.

[14] Mark Bodnarczuk, *Making Invisible Bureaucracy Visible: A Guide to Assessing and Changing Organizational Culture*, (Boulder, CO: Breckenridge Press, 2009.

[15] See James Collins and Jerry Porras, *Built to Last*, (New York: Harper Business, 1994); Jim Collins, *Good to Great*, (New York: Harper Business, 2001); Jim Collins, *Good to Great and the Social Sectors*, (New York: Harper Collins, 2005); John Kotter and James Heskett, *Corporate Culture and Performance*, (New York: Free Press, 1992); See Chris Argyris, Robert Putnam, and Diana McLain Smith, *Action Science: Concepts, Methods, and Skills for Research and Intervention*, (San Francisco: Jossey-Bass Publishers, 1985); and Chris Argyris, *Knowledge for Action: A Guide to Overcoming Barriers to Organizational Change*, (San Francisco: Jossey-Bass Publishers, 1993).

[16] Chris Argyris, *Overcoming Organizational Defenses*, (Upper Saddle River, NJ: Prentice Hall, 1990), See p. 12-13; Chris Argyris, *Reasoning, Learning, and Action: Individual and Organizational*, (San Francisco, Jossey-Bass, 1982), pp. 82-106; and Chris Argyris, *Knowledge for Action: A Guide to Overcoming Barriers to Organizational Change*, (San Francisco: Jossey-Bass, 1993), p. 250-251.

[17] For a description of double-loop learning see Chris Argyris, *Overcoming Organizational Defenses*, (Upper Saddle River, NJ: Prentice Hall, 1990), p. 94; Chris Argyris, *Reasoning, Learning, and Action: Individual and Organizational*, (San Francisco, Jossey-Bass, 1982), pp. 104-106; and Chris Argyris, *Knowledge for Action: A Guide to Overcoming Barriers to Organizational Change*, (San Francisco: Jossey-Bass, 1993), pp. 61-62.

[18] For a discussion of the Left-Hand Column, see Chris Argyris, *Action Science*, (San Francisco: Jossey-Bass, 1985), See pp. 340-341; Peter Senge, *Fifth Discipline Field Book*, (New York: Doubleday, 1994), pp. 246-252.

[19] Edgar Schein, *Organizational Culture and Leadership*, 4th Edition, (San Francisco, CA: Jossey-Bass, 2010, p. 28.

[20] See Kotter and Heskett, *Corporate Culture and Performance*, 1992, p. 79.

[21] Edgar Schein, The Corporate Culture Survival Guide: Sense and Nonsense about Culture Change, (1999) p. 29.

[22] See Richard Rhodes, *The Making of the Atomic Bomb*, (New York: Simon & Schuster, 1986); and especially the letter from Leslie Groves to Oppenheimer outlining their mutual roles, responsibilities, and authorities as found in Cynthia Kelly (ed.) *The Manhattan Project: The Birth of the Atomic Bomb in the Words of Its Creators, Eyewitnesses, and Historians*, (New York: Black Dog & Leventhal Publishers, 2007), pp. 14-15.

[23] For more details on learning anxiety and survival anxiety see, Schein, *The Corporate Culture Survival Guide*, 1999), and Schein, *Organizational Culture and Leadership*, 1992.

[24] See Edgar Schein, *Corporate Culture Survival Guide*, (San Francisco, CA: Jossey-Bass, 2009), p. 102.

[25] Edgar Schein, *Corporate Culture Survival Guide*, (San Francisco, CA: Jossey-Bass, 2009), p. 132.

[26] See Edgar Schein, *Organizational Culture and Leadership*, 4th Edition, (San Francisco, CA: Jossey-Bass, 2010); Edgar Schein, *Corporate Culture Survival Guide*, (San Francisco, CA: Jossey-Bass, 2009); John Kotter and James Heskett, *Corporate Culture and Performance*, (New York: Free Press, 1992); and Mark Bodnarczuk, *Making Invisible Bureaucracy Visible: A Guide to Assessing and Changing Organizational Culture*, (Boulder, CO: Breckenridge Press, 2009).