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DOE 5700.6C, 10CFR830.120, DOE-ER-STD-6001-92, and Covey-Based TQM: A Historical Perspective on Current Issues in Research Environments

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DOE 5700.6C, 10CFR830.120, DOE-ER-STD-6001-92, and Covey-Based TQM: A Historical Perspective on Current Issues in Research Environments

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Abstract

Three years ago there were no standards or published guidelines for quality in research environments. Today, one standard has been published,[1] and three guidelines documents are in final draft form and about to be published.[2] In this paper, I describe the events that led to the writing of *DOE 5700.6C*, *10CFR830.120*, and *DOE-ER-STD-6001-92*, focusing on the cultural barriers that arose (largely in the community of quality assurance professionals) during this process. I go on to describe why I believe that implementing *DOE 5700.6C* and *10CFR830.120* must be pushed even further toward an approach that embodies the *Malcolm Baldrige National Quality Award* and why *even this* is not far enough. The reason is because the most crucial aspect of successfully implementing a quality initiative is to base it on a cohesive, unified foundation of organizational and individual values and beliefs. Stephen Covey's *7 Habits of Highly Effective People* and *Principle Centered Leadership* provide such a foundation.[3]

Framing the Question

The struggle to develop quality management concepts that "map" onto the cultural and work practices found in basic and applied research environments has been (for better or for worse) a struggle to differentiate basic and applied research from the nuclear industry. As recent as 1990, almost every national laboratory had a quality program that was traceable to, based on, influenced by, or in reaction to the nuclear quality standard *ASME-NQA-1*.[4] By 1993, almost every national laboratory had developed a quality program that was based on, traceable to, or heavily influenced by

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[1] See *DOE STANDARD, Implementation Guide for Quality Assurance Programs for Basic and Applied Research, (DOE-ER-STD-6001-92)*, June 1992.

[2] See *International Atomic Energy Agency Safety Guide for Quality Assurance for Research and Development, (50-SG-QA16)*; *American National Standard Quality Systems Guidelines for Research, (ANSI Z-1.13-19XX)*; and R. Ronald Geoffrion, Robin Gill, George Roberts, *ASQC Quality Assurance Guidelines for Research and Development*, (Milwaukee, WI: ASQC Quality Press, 1994).

[3] Stephen R. Covey, *The 7 Habits of Highly Effective People, Powerful Lessons in Personal Change*, (New York: A Fireside Book, Simon & Schuster, 1990), and Stephen R. Covey, *Principle-Centered Leadership*, (New York: Summit Books, 1991).

[4] See *Workshop on Quality Assurance in Basic Research and Research and Development Environments*, (Batavia, IL: Fermilab, January 12, 1990), held at Lawrence Livermore National Laboratory.

DOE 5700.6C (Quality Assurance) and the *DOE Standard; Implementation Guide for Quality Assurance Programs for Basic and Applied Research (DOE-ER-STD-6001-92)*.[5] With the recent publication of *10CFR830.120* in the Federal Register and the distribution of the *DOE Total Quality Management Implementation Guidelines*, most national laboratories are trying to understand how to respond to *10CFR830.120* and how to put together a total quality management (TQM) program based on the recently published *DOE Total Quality Management Implementation Guidelines*. It is clear that *10CFR830.120*, *DOE 5700.6C*, and *DOE-ER-STD-6001-92* are a "family" of documents and that producing a modified quality assurance (QA) program in light of the new rule will not be problematic for most laboratories. But unfortunately, many of the TQM programs have become "silos" that are separate from the quality traditions described in the first part of this paper.

In what follows, I will briefly recount some of the historical events that brought about this change in quality traditions from the perspective of one who participated in the process. Within this historical context, I discuss how to avoid the tendency to create quality silos by transforming QA programs based on *DOE 5700.6C* and *10CFR830.120* into TQM programs that embody quality elements from the *Malcolm Baldrige National Quality Award* criteria and the *DOE Total Quality Management Implementation Guidelines*. I conclude with some reflection on why *even this* is not enough - why it is so crucial to base any quality initiative on a unified foundation of organizational and individual values and beliefs like the one provided by Stephen Covey's *7 Habits of Highly Effective People* and *Principle-Centered Leadership*.

I. The Early History of R&D Quality Assurance

In July 1967, the U.S. Atomic Energy Commission (AEC) published *Appendix A to Title 10, Part 50 of the Code of Federal Regulations (10 CFR 50)*.[6] Appendix A contained only one sentence on QA, which stated that a QA program had to be established to "provide adequate assurance that the structures, systems, and components will satisfactorily perform their safety functions." During the licensing hearings for Commonwealth Edison Company's Zion Plant in 1968, the AEC's Atomic Safety and Licensing Board criticized the industry's lack of standardized requirements for its QA programs. The board ruled that a document must be drafted to address these missing requirements. As a result, *Appendix B of 10 CFR 50* was drafted then issued for comment in April 1969; in June 1970, Appendix B was approved and became part of the Code of Federal Regulations.[7] Appendix B refined several existing QA requirements documents, including *MilSpec Q-9858* and the NASA program quality requirements, but it expanded previous standards work to address all areas of an

[5] See Mark Bodnarczuk (ed.), *Fourth Annual Workshop on Management in Basic and Applied Research Environments*, (Golden, CO: National Renewable Energy Laboratory, 1993), NREL/CP-320-5717; DE93018231, held at Stanford Linear Accelerator Center.

[6] Appendix A of *10 CFR 50* contained "General Design Criteria for Nuclear Power Plants." I have taken much of the historical material in this section from Frank Hawkins, *Quality Assurance: A Performance-Based Approach*, (Germantown, MD: U.S. Department of Energy, NE-72).

[7] Appendix B of *10 CFR 50* contained "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants."

acceptable QA program. The QA requirements found in Appendix B were specifically targeted for the design, construction, and operation of commercial nuclear plants and with the disbanding of the AEC, the responsibilities for nuclear safety (and quality) were transferred to the Nuclear Regulatory Commission (NRC).

Industry's response to Appendix B was *ASME NQA-1 (Quality Assurance Program Requirements for Nuclear Power Plants)*. In 1975, the American National Standards Institute (ANSI) assigned responsibility for the development and maintenance of nuclear power QA standards to the American Society of Mechanical Engineers (ASME); under the auspices of the ASME Main Committee on Nuclear Quality Assurance, *ASME NQA-1* was first published as an American National Standard in 1979. *NQA-1* was an interpretation of the AEC/NRC requirements found in *10 CFR 50 Appendix B*. Without recounting the intricate details of the revisions from *DOE 5700.6* and *DOE 5700.6A*, it is important to point out that *DOE 5700.6B* adopted *NQA-1* by stating that it was the "preferred standard" in the nuclear area. But as was so often the case, what in *principle* was meant to be "preferred guidance" became requirements in the *practice* of prescriptive auditors. Some early attempts within the DOE arena sought to move away from nuclear QA in the weapons and non-nuclear areas,[8] and there were also attempts by quality professionals outside of DOE to come to terms with how one applied quality in a research environment.[9] But by and large, quality professionals at national laboratories struggled with "grading" the requirements of *NQA-1* to non-nuclear, non-weapons basic and applied research. Most of these attempts were unsuccessful because the resultant QA programs were written mainly by quality professionals and read primarily by other quality professionals.

Quality as a Scientific Practice

Meanwhile, at many of the national laboratories, the scientists and managers who conceived and carried out the research that made America scientifically pre-eminent following the Manhattan Project developed informal management systems and practices to assure quality and programmatic success. They did not call them quality practices. More importantly for our discussion, these practices evolved slowly by trial and error in isolation from most quality professionals and in isolation from the increasing levels of accountability required by government funding agencies. These practices included planning, peer review, recording of data and ideas in notebooks, personnel selection based on reputation and competence within a scientific community, calibration of data-gathering devices, and

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[8] On the weapons side, I am thinking primarily of a document numbered as QC-2 and entitled "Quality Assurance for DOE Nuclear Weapons Activities," first issued in October 1983 under the signature of R. G. Romatowski and subsequently re-issued in February 1990 under the signature of Bruce G. Twining, who was the Manager of the DOE Albuquerque Operations Office. On the research side, I am thinking of Edward G. Cumesty, "An Agenda for Quality Assurance in Advanced Energy Laboratories," published in the *Proceedings of the Fourteenth Annual ASQC National Energy Division Conference*, Session T, September 1987. Cumesty was then Deputy Manager of the DOE Chicago Operations office.

[9] I am thinking primarily of George W. Roberts, *Quality Assurance in Research and Development*, (New York: Marcel Dekker, Inc., 1983).

reports to sponsors. *These* were the mechanisms used to assure quality in research, but they were often informal, not adequately documented, and often applied inconsistently.

In an era when the scale, cost, complexity, and programmatic risks of research were small, these informal management systems were viewed as adequate given the nature of the scientific work. But over the last 15-20 years, the scale, cost, complexity, and programmatic risks of basic and applied research have increased dramatically and this "big science" has required the development of a more systematic approach to management. Although the descriptor "big science" has been reserved almost exclusively for enormous apparatus *localized* in a single spot (for example, high-energy physics and experimental astrophysics detectors), an analogous expansion in "small" science occurred over this same time period; but rather than 3,000-ton particle detectors at accelerators costing $60 million, table top apparatus and the scientists using them were linked into enormous *decentralized networks*. Scientists in such networks participated in billion-dollar research programs like the National Institutes of Health sponsored Human Genome Project, or research that was aggregated into a single DOE field work proposal (FWP) exceeding $20 million. Both kinds were big science, and both required a more systematic approach to the management of basic and applied research - not just because the funding agencies mandated it, but because the scale, cost, complexity, and programmatic risks of *the science itself* required it.

Unfortunately for the scientists who worked in DOE-funded environments and needed guidance in developing value-added quality management systems, the most widely used systematic approach to quality known to most of the quality professionals at national laboratories was *NQA-1*. As a result, the rigid, compliance-based, regulated approach to quality that was so typical in the nuclear area was dismissed by scientists and research managers alike as unproductive and not value-added to research performance. Fortunately, a few forward thinking quality professionals believed that the informal practices developed by scientists could provide at least a partial basis for developing a more systematic approach to managing basic and applied research.[10] From the mid-1980s, numerous published papers and conference presentations aimed at developing a tailored approach to quality in basic and applied research environments.[11]

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[10] Examples include Wayne Delvin, *Report No. HEDL-7471, Quality of Scientific and Engineering Data*, (Richland, WA: Hanford Engineering Development Laboratory, July, 1986); Peter L. Bussolini, Alvin H. Davis, and R. R. Geoffrion, "A New Approach to Quality for National Research Labs," in *Quality Progress*, January 1988); and Mark Bodnarczuk, "Towards an 'Orthodox' Quality Assurance Program: Canonizing the Traditions at Fermilab," in *Proceedings of the Fourteenth Annual ASQC National Energy Division Conference*, Session T, September, 1987. Also during this time period, Marvin Shear at Brookhaven National Laboratory was probably the first quality professional to make the distinction between the kinds of quality elements used for support organizations and those used for the actual performance of research, see Marvin Shear and Mike Bebon, "A Realistic Approach to QA in Basic Research," in *Proceedings of the 15th Annual ASQC National Energy Division Conference*, September, 1988.

[11] A list of the more important publications can be found in Mark Bodnarczuk (ed.), *Fourth Annual Workshop on Management in Basic and Applied Research Environments*, (Golden, CO: National Renewable Energy Laboratory, 1993), NREL/CP-320-5717; DE93018231, held at Stanford Linear Accelerator Center.

A Return to Fundamentals - DOE 5700.6C and 10CFR830.120

By early 1990, these problems had reached the attention of the NQA Main Committee who asked Ford Knight to put together (and chair) a meeting of the concerned parties as a part of the NQA Main Committee meeting held in April 1990 at Baltimore. Ford asked me to make the opening presentation designed to highlight what I believed to be the pertinent issues involved in using *NQA-1* in research environments. What most of us in attendance wanted to get out of the meeting was some indication from the NQA Main Committee that they would support (and possibly sponsor) the writing of a new standard tailored specifically for basic and applied research environments. During and following my presentation, the discussion was very intense as many of those who had struggled to differentiate basic and applied research from the nuclear industry recounted the problems, issues, and lessons learned to the NQA Main Committee members who attended.

One of the individuals who participated was unknown to most of us in the group - he was a new DOE employee who had come from Nuclear Regulatory Commission headquarters. His name was Frank Hawkins, and he suggested that rather than submit ourselves to the arduous task of writing a national consensus standard, he would work with us to revise *DOE 5700.6B* and change what he viewed as the two most fundamental problems. The first problem emerged because the boundaries (thresholds) between what constitutes a *requirement* (what to do) and what constitutes *guidance* (how to do it) had become blurred - guidance documents were elevated to the level of requirements documents. Instead, he claimed that DOE should clearly distinguish expectations (requirements) from "how-to" (guidance) because there is a big difference between articulating expectations and prescribing *how* people should meet those expectations.[12] The second problem that Frank discussed was that DOE and its contractors needed to shift their focus back to the underlying (common) principles of quality, and this could be done by organizing the conceptual framework of the revised order around the categories of management, performance, and assessment which were essentially a modified version of Deming's Plan, Do, Check, Act cycle. If a revised DOE order or new rule-making could be drafted that addressed both of these problems, the underlying management problems for all types of DOE-sponsored work (especially the nuclear area, Frank's primary area of concern) could be solved. As part of the change in DOE's overall quality philosophy, Frank claimed that researchers in national laboratories would also benefit because they would be allowed to determine *how* they were going to meet DOE's quality expectations and consequently they could avoid the prescriptiveness that had originally driven them away from nuclear-based quality. For most of those in attendance, Frank's plan seemed *too good to be true* and it was agreed that Ford Knight would explore what was involved in beginning the process of developing a quality standard for basic and applied research. I volunteered to host the second meeting of this NQA research group at Fermilab and Frank Hawkins was present. During the meeting, he asked me to comment confidentially on a preliminary draft of what was to become *DOE 5700.6C* and *10CFR830.120*. I subsequently published a paper which described some

[12] At the risk of being anachronistic, these principles have subsequently been described in *DOE Notice 1321.138 (Departmental Directives System: Interim Improvement Notice 2)*, February 16, 1993.

of the similarities and differences between *ASME NQA-1* and *10CFR830.120*, and argued that we should abandon all attempts to use NQA-1 in research environments.[13]

In the months that followed the Baltimore and Fermilab meetings, quality professionals (including those in the nuclear area) were divided about what might happen if *DOE 5700.6B* were rewritten. Some were skeptical about whether *DOE 5700.6B* could actually be revised at all, never mind in a way that was more user friendly to research environments. Others claimed that a new DOE order was not enough, that we needed a national consensus standard to provide the appropriate "stature." Yet others were concerned about the fact that *DOE 5700.6C* would have a symmetric partner, *10 CFR 830.120*, which would still tie quality theory and practice in basic and applied research to the nuclear area. Still others wondered who Frank Hawkins was, whether he could do what he said he could, and whether this new employee (for all of his good intentions) would simply get ground up in the DOE bureaucracy. One last concern of special note - some believed that things might actually get worse for basic and applied research! Specifically, although research environments *did* have to use the 18 elements of *NQA-1* as the basis for their quality programs, they *only* used the 18 elements, not the supplements and non-mandatory appendices. With *DOE 5700.6C* would come something called Attachment I that would provide interpretive guidance for applying the 10 criteria to organizations. While Frank viewed the problem of *guidance becoming requirements* as one of the fundamental problems requiring change in DOE, many quality professionals feared that renegade auditors would use the guidance found in Attachment I *as* requirements and then ratchet down their laboratories - *no matter what DOE 5700.6C said to the contrary.*

The Development of a Quality Standard for Basic and Applied Research

Although I shared most of these concerns, I was especially troubled by the last one. In myriad discussions over the time period in which initial drafts of *DOE 5700.6C* and Attachment I were beginning to take shape, Frank assured us that if in the end the basic and applied research community believed that Attachment I was inappropriate for scientific laboratory work, we could fashion an Attachment II (or a DOE standard) that would provide specific guidance for research environments. Although many people commented on (and provided input to drafts of) *DOE 5700.6C*, the document became associated (correctly) with Frank Hawkins. Despite the objections of many "nay-sayers," a DOE-ER sponsored subcommittee chaired by Marvin Shear of Brookhaven National Laboratory was formed in July of 1991, and *DOE 5700.6C* was issued one month later on August 21, 1991. More importantly for the history of the development of quality management systems for basic and applied research, *DOE 5700.6C* canonized the initial work of the DOE-ER subcommittee by including a statement that, "Additional Implementation Guides, such as for research and development work, will be developed, and after approval, be incorporated into the provisions of this Order."[14]

In subsequent meetings with Marvin Shear, DOE-ER-8 asked me to be the primary author of what was to become *DOE Standard; Implementation Guide for Quality Assurance Programs for*

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[13] See Mark Bodnarczuk, "The Application of 10CFR830.120 in a Basic Research Environment" in *The Proceedings of the 18th Annual ASQC National Energy Division Conference*, April, 1991.

[14] See DOE Order 5700.6C, section 9 (Requirements), a. (2), p. 5.

Basic and Applied Research (DOE-ER-STD-6001-92). In designing the overall conceptual framework for the first "straw man" draft, I spent many hours in detailed discussions with Marvin and Frank Hawkins hashing over matters of interpretation and other more fundamental problems. What emerged from *one* of these fundamental problems permanently changed the way Frank, Marvin, and I viewed quality assurance relative to the other DOE orders.

The parameters of the problem can best be stated by posing a question: given the fact that *DOE 5700.6C* invoked the requirements of *DOE 1324.2A (Records Disposition)* and also contained a requirement for a documents and records system (criterion 4), was it necessary to develop *two separate* documents and records programs - one to satisfy the requirements of *DOE 5700.6C* and another one to satisfy the requirements of *DOE 1324.2A*? While Frank's answer to this question was a resounding *no*, I knew that at the contractor level it had been a common practice to duplicate these kinds of requirements. The result was vertically oriented "silos" that were defended as organizational turf. In fact, the *functional* DOE organization chart turned out to be a *summation* of the roles, responsibilities, and authorities defined in over 300 DOE orders. Based on these discussions, I began developing a conceptual framework that used *DOE 5700.6C* to orchestrate and integrate the other DOE orders into a total management system, with the goal of reducing (or eliminating) the redundancy and overlap within the DOE orders system at the contractor level. I gave an overview of my attempts to implement this framework at Fermilab as a conclusion to a paper presented at the 18th Annual ASQC Energy Division conference in the Fall of 1991, and later wrote and presented a paper in September 1992 specifically on the topic of integrating orders.[15]

Most importantly, a clear statement was included about the orchestrating and integrating functions of the 10 criteria in *DOE-ER-STD-6001-92*. Having limited the applicability of the standard to DOE-ER facilities and with the strong support of Frank Hawkins and Maureen Hunemuller (then with DOE-ER-8), the standard was published in June 1992.[16] This part of the history is important because most of the national laboratories subsequently adopted some type of approach to integrating DOE orders as part of an overall management system. Also, in response to *Executive Order 12861* (September 11, 1993) and Vice President Gore's report of the national performance review entitled *From Red Tape to Results, Creating a Government That Works Better & Costs Less*, there is a DOE-wide initiative to reduce the DOE directives by 50% or more over the next three years. For example, DOE-EH has developed a similar conceptual framework and has begun the process of functionally collapsing and combining the DOE directives for which they are responsible.[17]

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[15] See Mark Bodnarczuk, "A Conceptual Framework for Using DOE 5700.6C and the Other DOE Orders as an Integrated Management System; the Fermilab Experience," in *Proceedings of the 19th Annual ASQC National Energy and Environmental Quality Division Conference*, Orlando, Florida, September 20-23, 1992.

[16] See DOE-ER-STD-6001-92, section IIA, a., p. 6

[17] See Al Gore et al. *From Red Tape to Results; Creating a Government That Works Better & Costs Less, Report of the National Performance Review*, U.S. Government Printing Office, Washington, DC, September, 1993.

II. Principles and Values as a Foundation for Quality Initiatives

When one views the development of *DOE 5700.6C*, *10CFR830.120*, and *DOE-ER-STD-6001-92* against the background described above, these documents represent tremendous progress in integrating the quality principles from industry (Juran and Deming) into the philosophical underpinnings of how quality is done for DOE-funded science. One can push *DOE 5700.6C* even further toward TQM by redefining the scope of criterion 1 from "Program" to "Strategic Quality Planning and Leadership," and criterion 2 from "Training and Qualification" to "Human Resource Development and Management," then combining criteria 5, 6, 7, and 8 into a single work-process element, and combining criteria 9 and 10 into a single assessment criterion (see figure below).

Plan
Strategic Quality Planning and Leadership
Human Resource Development and Management
Documents and Records
Do
Work Processes
Check
Assessments
Act
Continuous Improvement

Once this modification is made, one can then functionally collapse the *Malcolm Baldrige National Quality Award* criteria into these six criteria. The result is a single unified set of criteria that constitutes a Deming cycle (Plan, Do, Check, Act) and is consistent with the *DOE Total Quality Management Implementation Guidelines*. As a result, the six criteria can be used as a set of *performance* guidelines for managing our work, and also as a single unified set of criteria for conducting *assessments* - regardless of who performs the assessment (manager or independent). But even this Baldrige component does not push *DOE 5700.6C* far enough. What is missing is a cohesive, unified foundation of values and beliefs that focuses both on individuals and organizations.

Covey-Based Principles for Individuals in Research Environments

There is a persistent myth that people can leave their values and beliefs at the door when they come to work - that there is a kind of "first amendment" separation between personal and professional life - that one's personal values and beliefs have *no* place in the *work*place. The myth also teaches that duplicities between personal and professional life can be effectively hidden under a pleasant smile, an intellectual disposition that is interested only in "the facts," or drowned in the nebulous, covert undercurrents of organizational politics. In what follows, I will use some of Stephen Covey's views to

support my own belief that this myth is fundamentally misguided.[18] My own experience has been that as the variance between personal and professional values and beliefs becomes wider, the interpersonal skills or management style of that individual become increasingly duplicitous, less direct, more difficult to "figure out," and consequently, much less effective. Paradoxically, the duplicity becomes more evident to everyone *except* the duplicitous person - that is, unless the person is reflective about such matters.

I claim that it is impossible for individuals to leave their values at the door when they come to work. Each of us possesses (or are possessed by) a complex set of interrelated values and beliefs about the way the world is. I describe this values-set as an *ethos* (the rules of the game) or as a paradigm (the "lens" through which we see the world).[19] It is hard to overestimate how powerfully our paradigms constrain, and even determine, how we view reality. As Covey points out, people do not see the world as it *is*, they see it as *they are* - through their own personal autobiographical histories and setting in life. Humans have no access to the world "out there" independent of their paradigm, and this is why it's *not possible* for individuals to check their values and beliefs at the office door. In research environments, the myth is worth noting because it is consistent with the tendency of many researchers to remove the social and human factors from their descriptions of what science *is*. As I have described elsewhere, scientists tend to denigrate managerial and interpersonal skills and exalt scientific expertise, although in some instances the scientific community sanctions a scientist becoming a manager - if all the good science has been rung out of him, or if he is needed to defend the "scientific community" against intrusion by outsiders.[20]

In his research, Covey conducted an analysis of the success literature of the last 200 years, looking for the key to what constituted success. He found that during the first 150 years, success was measured by a person's character (the character ethic), while in the last 50 years, it has been measured by an individual's personality (personality ethic). When an individual adopts the character ethic, his life is characterized by values like integrity, humility, fidelity, patience, and the Golden Rule. An individual that seeks success through the personality ethic is characterized by the "social mirror" - the public image of his attitudes, behaviors, skills, and techniques. Covey claims (rightly) that using human influence strategies without character will not succeed in the long run. When a person embodies the personality ethic, the level of duplicity increases. When a person embodies the character ethic, the goal is continually to narrow the gap between what he or she *is* and the way they actually *act*.

I believe that principle- and value-based issues have traditionally been avoided in the workplace because no systematic mechanism exists for dealing with them. Covey's 7 Habits provide such a mechanism. Systematic application of Covey's principles can help to reduce the variance between personal and professional values and beliefs. The interpersonal skills and management skills

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[18] Stephen R. Covey, *The 7 Habits of Highly Effective People; Powerful Lessons in Personal Change*, (New York: A Fireside Book, Simon & Schuster, 1990).

[19] I am defining the notion of "paradigm" in the same tradition as Kuhn; see Thomas Kuhn, *The Structure of Scientific Revolutions*, 2nd. ed. enlarged, (Chicago: The University of Chicago Press, 1970).

[20] See Mark Bodnarczuk, "Defining Metrics for Evaluating and Improving Basic Experimental Science" in *The Proceedings of the ASQC 48th Annual Quality Congress*, May 22-25, 1994.

of individuals will become less and less duplicitous, more direct, easier to "figure out," and consequently, much more effective. In the final analysis, organizations are changed *one person at a time*, but it is the combinatorial complexity of these individuals that will determine whether TQM initiatives will fail or succeed.

Covey-Based Principles as a Foundation for Organizational Quality Initiatives

One of the most crucial factors in whether or not TQM initiatives succeed is leadership - active support from the senior management of an organization. In fact, some quality theorists claim that it is 10 times easier to implement TQM in an organization when senior management is on board then when they are not. If quality initiatives are built on Covey-based principles and if senior managers are committed to these principles, the likelihood of successfully implementing quality management is powerfully enhanced because not only are Covey's principles consistent with TQM, they are also one of the only ways I know of to obtain the kind of gut-level cultural change required for successful TQM implementation. Fortunately, the *DOE Total Quality Management Implementation Guidelines* document recognizes this and endorses Covey along with TQM.[21]

Beginning the quality journey requires that organizations develop strategic plans with mission and vision statements, core values, core competencies, critical success factors, goals, and action plans. But the process of implementing an organization's mission statement and core values down through line organizations is long, arduous, and problematic, largely because of organizational and cultural resistance. A small part of this resistance may be laid at the door step of training - people must know what you want them to do. Another small element may be due to a lack of practical knowledge - people must know how to "cash out" their new TQM knowledge in terms of their jobs. But the majority of organizational resistance is actually a resistance to the cultural change that the Secretary of Energy is trying to affect within DOE and in national laboratories. Juran tells us that organizational change is always accompanied by an "uninvited guest" - the social consequence of the change.[22] The social consequence becomes manifest as disruptions in the culture (habits, beliefs, attitudes, practices, traditions, status, and values) and, consequently, the affected people develop strategies for resisting these perturbations. This is metaphorically characterized as the mobilization of antibodies to fight off bacteria that invade, and subsequently disrupt, the healthy status quo of the body. The resistance to quality management is *almost always* this type of values- and principles-based roadblock.

I believe that the single most important element of the cultural transformation that is occurring in the DOE complex is embodied in the DOE core values that are consistent with Covey's 7 Habits. But sadly, my own experience is that the core values are scanned (maybe even hung on the wall), but then it's business as usual. Before we will see any substantive changes in the DOE complex, the core values must become the framework within which all decisions are made - a constraining force that

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[21] See *DOE Total Quality Management Implementation Guidelines,* December, 1993, p. 1 ff.

[22] See J.M. Juran (ed.), *The Quality Control Handbook*, 3rd. ed, (New York: McGraw-Hill Book Company, 1979), pp. 7-27 ff.

affects the outcome of all decisions. But it is simply impossible for people in meetings to make decisions based on these core values if *they cannot even remember what those values are*.

Even if you begin with a group of senior managers that are unreservedly committed to implementing quality management, if you constrain all organizational decisions with your core values, if you attempt to push all of this down through the line organization, you may not succeed in creating a culture that is principle- and value-based because of organizational and cultural resistances. It is important to remember that organizations are constituted *by individuals* and organizations are changed *one person at a time*. So if one is really serious about implementing quality management, one way to improve the odds of succeeding is to create an organization constituted by proactive people, who exemplify personal leadership, who think win/win, who seek first to understand and then to be understood, and who value synergy, diversity, and team work. An organization of individuals who have internalized these and other aspects of Covey's 7 habits will probably not resist TQM because the two embody so many of the same principles and practices. In a sense, Covey is a heuristic for determining an organization's openness to TQM. If the people in an organization view the 7 Habits as "more of that touchy-feely stuff," then it is highly probable that the organization will have a low tolerance for many of the TQM principles.

In closing, it is fashionable for many QA professionals, researchers, and line managers to be *intellectually promiscuous* about the many approaches to quality, intellectually experiencing many "quality" lovers, but never "falling in love" or committing to a view of their own. I believe that Covey can provide a common foundation for more "orthodox" QA and *DOE 5700.6C* or *10CFR830.120* programs, as well as TQM. This foundation provides the much needed human side that is almost entirely missing from *DOE 5700.6C* or *10CFR830.120*, and it is consistent with TQM. Why is it so important to focus on the human side of the equation, rather than on the compliance side? In my own experience, one of the most serious issues we face is not compliance (that's just another customer requirement), the most serious (and detrimental) issue we face is the *compliance mentality* - an attitude that a Covey-style approach to human relationships can help eliminate.