Innovation and Change Management in Public and Private Organizations: Case Studies and Options for EPA

April 2003

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Appendices A through F provide more detailed slides and case notes for each of the organizations studied.

For each case, slides and narrative are presented in the following framework:

- Mission and relevance to the EPA
- Causes of change
- Innovations
- Change management

Appendix G is a bibliography of business literature related to innovation and change management, compiled in the course of our study.
APPENDIX A – FOOD AND DRUG ADMINISTRATION (FDA)

Food and Drug Administration: Mission and Relevance to EPA

- FDA's mission is “to promote and protect the public health by helping safe and effective products reach the market in a timely way, and monitoring products for continued safety after they are in use.”
  - Many products and regulatory processes
- Implementation of regulatory requirements and review of new drug applications analogous to EPA’s implementation of TSCA, FIFRA, others?
  - Involves multiple stakeholder groups with competing interests

FDA: Causes of Change

- Decades of concern by industry and others over cost and time for reviews of premarket drug applications
- Anticipated increase in new drug applications
- No additional revenue sources available

FDA: Innovations

- Balanced consumer protection and health promotion mission objectives
- Aligned organizational structure to meet performance targets
- Made drug application review process more transparent
- Gave priority to applications based on benefit-risk
- Leveraged internal changes to influence industry behavior
- Improved information flows to streamline review process

FDA: Change Management

- Used quality and time metrics to signal internal change
- Managed culture change internally and externally
- Established industry-agency group to evaluate change
- Eased resistance to change through extensive new hires
- Created more leadership opportunities through new structure

Food and Drug Administration

By Richard A. Rettig

The regulation of pharmaceuticals by the Food and Drug Administration has a long history. It begins in 1906 with passage of the Food and Drugs Act, which gave FDA the authority to interdict and penalize any drug that was adulterated or misbranded. The 1938 Food Drug and Cosmetic Act required drug firms, before marketing a new product, to notify the agency of the product’s safety. The Drug Amendments of 1962 transformed premarket notification to premarket approval, added the requirement that a drug be shown to be effective in addition being safe, and extended FDA authority over the design and conduct of clinical trials of new drugs (Merrill, 1996). In 1992, following two decades of criticism of FDA for the length of time it required to review a New Drug Application, Congress enacted the Prescription Drug User Fee Act (PDUFA) (Merrill, 1996).
This paper briefly summarizes the provisions of PDUFA. It then analyzes the implementation of PDUFA by FDA as a case study of successful organizational innovation.

**PDUFA**
The critique of FDA by the pharmaceutical industry and sympathetic academics focused on the lengthy time required for FDA to review a premarket application for a new drug. The 1992 PDUFA legislation, however, did not relax any FDA regulatory requirements, as might have been advocated by the pharmaceutical industry. Instead, it reflected acceptance of FDA’s argument that review times were lengthy because of a scarcity of reviewers. Thus, agency performance was linked to agency resource needs as the primary justification for the legislation.

The basic elements of the PDUFA “deal” involved the following: industry accepted the imposition of user fees on NDA and other submissions; Congress agreed that user fee revenue would not substitute for appropriations; the agency agreed to performance goals for application review; and legislative authority was limited to 5 years (Shulman and Kaitin, 1996).

FDA has relied on user fees on color certification and insulin since the 1950s. Policy discussions of their broader use have occurred for several decades before 1992. The rationale articulated in the 1980s that would eventually prevail was the following:

When the user fee proposal resurfaced in the mid-1980s, a new sense of urgency assured it a place on the agenda of both Congress and the pharmaceutical industry. The immediate source of the urgency was the growing disparity between FDA resources and the demands on the agency created by the increasing volume and complexity of the agency’s workload. New statutory obligations, an expanding regulatory agenda, and growth in the number of actual and anticipated filings [i.e., NDAs] forecast problems for the FDA and for the companies it regulated (Shulman and Kaitin, 1996).

**Fee structure.** (Shulman and Kaitin, 1996) User fees apply to prescription drugs, including most biologicals, and to over-the-counter (OTC) products that are the subject of an NDA. Exemptions include blood and blood products, in vitro diagnostics, other biologicals, and generic drugs. There are three types of fees: application fees, annual product fees, and annual establishment fees. Application fees apply to NDA, Product License Applications (required of biologicals), supplemental applications (e.g., new indication, labeling...

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1 The approval of a new drug for commercial marketing requires that “adequate and well controlled studies” be conducted that demonstrate the safety and effectiveness of the product in question. Parties wishing to test a new drug in humans must file an Investigational New Drug (IND) application, which FDA must review within 60 days of receipt. However, a sponsor of a trial may proceed if FDA has not responded to the IND application within 30 days. Clinical trials conducted under an FDA-approved IND are classified as phase 1, 2, or 3: phase 1 trials involve small numbers of patients, usually health volunteers, and test toxicity; phase 2 trials involve more patients, typically having the disease in question, and examine dosing, evidence of effectiveness, as well as extending the data on safety; phase 3 trials are larger still, focus on effectiveness, and provide the data on which a New Drug Application (NDA) is submitted to FDA for review and approval. FDA review of an NDA submission results in approval or disapproval for marketing. Disapproval identifies the deficiencies that must be remedied in a resubmission.

2 PDUFA was reauthorized in the Food and Drug Administration Modernization Act (FDAMA) of 1997 and is being reauthorized for the second time in 2002.

3 At the time of enactment of PDUFA, new biologicals required both a Product License Application (PLA) and an Establishment License Application (ELA). Since that time, these two applications have been consolidated into a single Biological License Application (BLA).
change), and prescription-to-OTC applications. The full application fee in 1993 was $100,000, which climbed in fiscal year 1994, FY 1995, and FY 1996, respectively, to $162,000, $208,000, and $204,000. Applications without clinical data were set at 50 percent of the full application fee. Annual product fees for fiscal years 1993 through 1996 were $6,000, $9,400, $12,200, and $12,600, respectively. Establishment fees for those same years were $60,000, $93,800, $129,000, and $135,300, respectively. There are other technical features of the fee structure that need not concern us here.

Performance goals. In return for user fee financing of application reviews, the agency agreed to certain performance goals. It did so, however, not in the statute but in an exchange of correspondence between then-Commissioner David Kessler and the chairman of the relevant congressional committees. These goals were predicated on the hiring of 600 new review staff, 300 of them for the Center for Drug Evaluation and Research (CDER) and 300 for the Center for Biologics Evaluation and Research (CBER). Hiring was to be phased in over the 5-year period: half of these new review staff were to be hired by early 1995 and the remainder by the end of FY 1997.

The specific performance goals were as follows:

The performance goal for Standard NDAs, PLAs, and supplements with clinical data was that FDA would “review and act on” such applications within 12 months from the date of submission. “Review and act on” meant that FDA would complete a comprehensive review of an application and issue an FDA action letter. However, review does not necessarily mean approval. An action letter might indicate approval, but it might also indicate deficiencies to be remedied by a resubmission. Resubmissions restart the clock.

The performance goal for Priority NDAs, PLAs, ELAs, NDA supplements and PLA and ELA amendments is a 6-month “review and act on” period.

In cases where a major amendment to an application is submitted within 3 months of the anticipated FDA action date, the Kessler letter stipulates that an additional 3 months would be added to review time. This feature is designed as a disincentive to filing an application for which additional important data are expected during the review period.

Overdue applications and submissions were targeted for elimination within an 18- to 24-month period, depending on the nature of the backlogged application.

FDA agreed to establish a joint agency/industry working group to oversee joint efforts to improve review times; implement a project management system within 12 months for NDA reviews and within 18 months for PLA/ELA reviews; implement within CBER a performance tracking and monthly monitoring system similar to that in place in CDER; adopt uniform standards for computer-assisted NDAs in FY 1995; and initiate a pilot computer-assisted PLA program in FY 1993.

Implementation of PDUFA
The implementation of PDUFA has been successful by practically all accounts. FDA reports attest to this. Industry response has been favorable. And the two successive reauthorizations by Congress, in 1997 and
2002 (currently in process), have tweaked but not fundamentally changed the basic structure of the 1992 legislation.

What factors account for this implementation success? First, there was an expectation that the substantial investments in medical research in the 1980s by both the public sector, mainly the National Institutes of Health, and private sector, primarily the pharmaceutical industry, would result in a flood of New Drug Applications being submitted to FDA. FDA anticipated a markedly increased workload ahead of it.

Second, FDA was sensitive to the “drug lag” criticism of its lengthy review times. The agency had already begun to respond during the tenure of Dr. Frank Young, Commissioner of Food and Drugs from 1987 to 1989, by increasing the number of drug application reviewers from 70 to 90. The average review time to approve a new molecular entity, which had been 30 to 32 months during most of the 1970s and 1980s, fell to 24 months by 1990 (Temple, 1996). Thus, the basic rationale - conceptual and empirical - for the 1992 legislation of tying personnel needs to agency performance was established several years before the enactment of PDUFA. This rationale created a comfort level among key policy makers within the agency, in industry, and in Congress for passage of the legislation.

Third, Dr. David A. Kessler, who became Commissioner in late 1990, quickly understood that user fees were the most likely, perhaps the only, source of new revenues. FDA had experienced declining appropriations in prior years. Moreover, the federal government was incurring substantial annual deficits at that time, which severely constrained the prospects for increased appropriations. Kessler reportedly brokered the deal with the pharmaceutical industry that resulted in the 1992 act.

Fourth, PDUFA implementation focused basically on a single aspect of drug evaluation, namely, shortening the review time and subjecting the review process to systematic management. The performance goals of 6 months for a priority NDA and 12 months for a standard one were seen as reasonable. An NDA could be assigned primary, secondary and tertiary reviewers; the review could be split into parts. Importantly, the legislation did not seek any reduction in the quality of reviews. Previously, when a reviewer was challenged on the length of time being taken, the rejoinder would be, “Do you want it done right or done fast?” Doing it right, of course, was the only acceptable response. Now, with added resources, a review could be done right and quickly.

The endpoint of the implementation effort was completing the review. This time was measured from the date of submission to the date of an approval letter. Accomplishing this involved changing industry behavior. Prior application submissions were not always complete and the agency did not always insist on completeness. Frequently, as a review was nearing completion, the industry sponsor would submit new data, thus extending the time of review. PDUFA led to the agency insisting on a complete application at the time of submission and it adopted a “refusal to file” policy for applications that were incomplete or had serious deficiencies. In the first year of PDUFA implementation, CDER refused to file about one-third of the submissions. Industry quickly got the message and the level fell to less than 5 percent in the second and subsequent years.

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4 This discussion is based in large measure on interviews with Dr. Robert J. Temple, Director, Office of Medical Policy, Center for Drug Evaluation and Research (CDER), FDA, and Dr. Murray M. Lumpkin, Senior Associate Commission, International Affairs, FDA. At the time of the events discussed, Lumpkin was in CDER and his responsibilities included implementation of PDUFA.
Agency practice also had to change. Previously, the reviewer of a major section (chemistry, clinical, statistical) who completed his/her review first would generate an approvable/non-approvable letter, regardless of whether the entire review was done or not. Subsequently, FDA agreed to provide a single letter only after all sections of the review were complete.

Fifth, the focus on shortening review did, however, involve a fundamental shift in how the agency understood itself. Previously, it saw itself as a consumer protection agency whose mission was to keep bad products off the market. Subsequently, it came to accept a health promotion mission as well, that of getting good products to market quickly. The change in agency culture, then, was not simply one of greater efficiency but of balancing these two objectives.

Sixth, user fee revenues were used for two purposes, hiring new review personnel and investing in supporting infrastructure. A total of 600 to 700 new reviewers were to be added, equally divided between to CDER and the Center for Biologics Evaluation and Research (CBER). These new personnel were to be phased in over the 5 years of the legislation. The agency benefited from several factors in the mid-1990s, according to Temple, when it began to hire M.D.s and Ph.D.s. NIH funds were getting scarce, Health Maintenance Organizations were making physicians’ lives unpleasant, and health reform was collapsing. FDA was more attractive relative to other alternatives.

Moreover, to the extent that resistance to the new regime existed among previous hires, the sheer number of new hires steadily erased that over time and their training focused on PDUFA implementation. Previously, CDER had 5 to 6 statisticians; today they have about 80. Furthermore, as Lumpkin notes, M.D.s and Ph.D.s had always met performance goals. They were individuals who had succeeded in their careers. Hitherto, the agency had not set performance goals. Once goals were set and deemed reasonable, these highly trained and motivated individuals found it natural to fulfill them.

Seventh, infrastructure investment was very important and PDUFA funds made that possible. Incredible as it sounds, under the old regime medical reviewers would write out their reviews of an NDA on legal pads in longhand and then wait as long as 6 to 8 months before they were typed – on typewriters – by a secretary. The agency purchased desktop computers, both secretarial-administrative and professional new employees were trained in 10-finger, touch-typing and were familiar with word processing. Review documents could be generated faster. A technological revolution in office work intersected with FDA’s implementation of PDUFA.

Eighth, FDA put a number of policies and procedures in place to manage the drug review process. Project management and the team concept were important features. Previously, an application would be received and its parts (chemistry, clinical, statistical) would be parcelled out to the relevant disciplines. After PDUFA a review team was formed, review assignments – primary, secondary, tertiary – were made, and review time lines developed. Monthly tracking reports were circulated within CDER at the division level, so everyone knew how everyone else was doing.

Organizational changes were also made. In CDER at the time of PDUFA, there were two Offices of Drug Evaluation – ODEs - with 8 divisions reporting to them. This was viewed prospectively as a bottleneck and as a result the number of ODEs was increased to 5 and the reviewing divisions to 15. In addition to
eliminating the bottleneck, this had the added benefit of allowing a number of good people to assume senior leadership positions in the agency.

Criticism
Not all reactions to PDUFA and its implementation have been approving. Two lines of criticism have been forthcoming. One line, based on a survey of FDA medical reviewers, has been that a significant number of the review staff are unhappy with the pace of review and the pressure to approve new drugs. The respondents to the survey, which was conducted by Public Citizen, were anonymous. FDA CDER, in a partial response, reviewed all internal reviews of the NDAs approved in 1998. Of the 30 or so approved that year, there was only one disagreement regarding approvability: the reviewing division said no, the head of CDER said yes.

The other line of criticism has been that faster review times have meant that a disproportionately larger number of drugs have been approved for marketing and have subsequently been withdrawn than was true in the past. This very serious charge occasioned an FDA review of withdrawals and publication of results of the review in the Journal of the American Medical Association (JAMA). Although the drugs were withdrawn during the PDUFA years, this was not related to their more rapid review.

More recently, this charge has been renewed in a JAMA paper of May 1, 2002 (Lasser et al., 2002). Finally, although not a function of PDUFA, FDA drug review has changed as the science behind drug development and regulation has changed. Agency reviews of new drugs have given increased attention to liver (or hepato-) toxicity, the most common reason for withdrawal of drugs from the market; to drug-induced QT prolongation with the potential for torsades de pointe (arrhythmia); and to drug-drug interactions.
REFERENCES


APPENDIX B – VETERANS HEALTH ADMINISTRATION

Veterans Health Administration: Mission and Relevance to EPA

- Mission to provide medical care to veterans.
  - Includes education and training, research, contingency support to the DoD, and services to the homeless
- Analogy to EPA is the multifunctional and geographically dispersed operations
  - Changes in external environment spurred changes in vision and operations
  - Congressional mandates and internal rules had to be changed to realize the new vision

VHA: Causes of Change

- External:
  - Hospital-based system could not efficiently or effectively deliver outpatient care
  - Lack of primary care physicians (mostly specialists)
  - Ill-equipped to deliver community-based care
  - Shift in patient demographics (older, sicker)
  - Freeze on agency budget
- Internal:
  - Lost track of mission and business
  - Centralized and narrowly focused decision-making process
  - Eligibility rules hindered delivery of outpatient services
  - Limited ability to contract with outside providers
  - Inability to reconcile competing stakeholder claims

VHA: Innovations

- Established Veterans Integrated Service Networks to efficiently provide a continuum of care
- Pushed decision-making closer to service delivery
- Focused on accountability and performance to support clarified mission
- Aligned budget with service delivery and performance (Veterans Equitable Resource Allocation)
- Restructured R&D to support mission

VHA: Change Management

- Clarified mission, as articulated by visionary leader
- Built compelling business case for change
- Obtained changes in law and rules to support clarified mission
- Communicated compelling vision, mission, and goals to Congress, staff, and stakeholders
- Selected senior managers supportive of change
- Use organizational change to spur experimentation

Veterans Health Administration, Department of Veterans Affairs
By Richard Rettig

Introduction
The Veterans Health Administration (VHA), a principal part of the Department of Veterans Affairs (DVA), has its origins in the creation of the Department of Medicine and Surgery within the Veterans Administration in 1946. The department has evolved in the half-century plus into the veterans health care system, the VHA. The VHA accounts for approximately 80 percent of department personnel and over half the budget (Kizer, 1999).

VHA, once seen as an archetypical, cumbersome government bureaucracy, has been transformed in the past decade. One commentator described this as “the most radical redesign of VA health care to occur since the veterans health care system was formally established in 1946 (Kizer et al., 2000).
This study relies on the substantial literature generated by this transformation and on interviews with key past and present VHA officials. It examines the path followed by the VHA in the 1990s to refocus and reorganize its entire business model of delivering health care to veterans.

**The Veterans Health Care System**

Administered by the VHA, the veterans health care system is the largest, fully integrated health care system in the United States. The system dates from 1946 when Congress authorized the creation of the VA Department of Medicine and Surgery in partial response to veterans returning from World War II. In fiscal year 1999, it provided care to more than 3.6 million individuals at more than 1,100 sites in all U.S. states and in Puerto Rico, the U.S. Virgin Islands, Guam, Samoa, and the Philippines. Its budget was then greater than $20 billion. Its staff of about 182,000 included nearly 13,000 physicians, 53,000 nursing personnel, and thousands of other health care professionals. Its physical assets included 172 hospitals, more than 600 ambulatory and community-based clinics, 132 nursing homes, 206 counseling centers, 40 residential care centers, and 73 home health care programs (Kizer et al., 2000).

The five major missions of the VHA are the provision of medical care; education and training; research; the contingent support of the Department of Defense medical care system in wartime; and the provision of services to the homeless.

**Setting the Stage for Change**

The VHA innovation story focuses on the changes introduced by Kenneth W. Kizer, M.D., M.P.H., Undersecretary for Health Affairs of DVA from late 1994 until 1999. Important developments within and outside VHA set the stage for Kizer to introduce significant institutional change. In the early and mid-1990s, internal and external reports criticized a number of VHA activities. Internal VHA reports addressed the extensive use of acute care beds, legal constraints on outpatient eligibility, central office organization, and field organization (VHA, 1994). The General Accounting Office issued reports that dealt with outpatient care and opportunities for greater efficiency in service delivery (GAO, 1993; GAO, 1996). These reports identified the key issues requiring attention.

VHA also faced external threats to its existence, which provided powerful stimuli for survival-based change. Young identified four such threats (Young, 2000). First, in the early 1990s, when the rest of the country was shifting the site of care away from the hospital to the outpatient clinic, the VHA was still mainly an inpatient, hospital-based system out of sync with the times. Second, partly as a result of the shift to outpatient settings, VHA confronted the prospect of losing veterans to the private health care sector. Third, VHA also faced the threat of a Congressional freeze on its appropriations. Finally, demographic change in the veterans’ population had resulted in an older and sicker VHA patient than was true for health care in general, creating serious challenges to the type of care provided.

Many factors came together in 1994 to set major institutional change in motion. The internal and external critiques and external threats prepared the ground for organizational innovation. But change in large organizations is never self-executing. Kizer arrived at a propitious time, then, and seized the moment.
Leadership

Kizer, by all accounts, was the architect of the VHA transformation. His contribution underlines the importance of leadership to organizational change. Indeed, the first lesson that Young draws from his analysis of the VHA transformation was this: “Appoint leaders whose backgrounds and experiences are appropriate for the transformation” (Young, 2000).

Kizer brought much to the task. Importantly, he had relevant public sector experience, having come to the Undersecretary’s position from that of Director of Health Services, in the California Department of Public Health. He had been Director of Emergency Medical Services within the Department for 18 months before that, during which time he engineered major structural reform. He had broken the mold of conventionality early in his career, when he became the first graduate of the UCLA School of Medicine to simultaneously earn a Master of Public Health (MPH) degree. Reportedly he was also “an enthusiastic and knowledgeable student of private-sector innovations in the delivery of health services” (Young, 2000). He was also, by personality, disposed to action.

Kizer was the right person for VHA at the right time. But he came to the position in a way that was hardly foreordained. In accordance with the DVA statutory procedure for recruiting senior personnel, the Deputy Secretary, who chaired the search committee, contacted Kizer initially in January 1994. He was interviewed in mid-February. Subsequently, he was one of three candidates sent to the White House for vetting. He is unclear whether he was the first choice of the Clinton White House as he had worked for Governor George Dukmejian, a California Republican, and did not consider himself to be political. But he was selected, nominated, and confirmed by the Senate in September 1994, and assumed office that October.

Kizer’s colleagues did not encourage him to take the position. The “universal consensus,” he said, was that the position was “a non-starter.” “Don’t take the job was the advice I got from everyone. It will only yield incremental change and it is politically impossible” (Kizer, 2002). That Kizer chose to accept the position, when he might have done otherwise, only highlights the dependence of organizational innovation on contingent factors such as the willingness of particular individuals to respond to daunting challenges. But Kizer was not a VHA insider. Thus he was not beholden to existing organizational structures or patterns of behavior rooted in long-standing personal relations and established ways of doing things. By temperament and experience he wished to exercise leadership.

Acting with Dispatch

Although not an insider, Kizer used the time from his initial contact with the Deputy Secretary until his nomination to inform himself about VHA. He read the numerous reports, talked to many people, and reflected on needed changes. Moreover, 1994 was the year of denouement for the Clinton health care reform proposal. The debate that swirled around that ill-started effort brought many contextual issues into focus regarding the nature and direction of change in the health care system, both public and private. California functioned as a laboratory for change. As Kizer put it, “As Director of Health for California, I was very involved in reform. California is unique in combining financing and public health. It includes California Medicaid, Children’s Service, Public Health, and California’s Environmental Protection Administration. It had all the ingredients of being a system – health care, public health, and environmental quality. I had done the dance” (Kizer, 2002).
Kizer wasted little time in instituting change. He sought to create a vision for change through an intensive planning process of several months duration. A senior leadership team was formed and planning involved meeting with individuals from across the organization. This provided the senior leadership team with grist for Vision for Change: A Plan to Restructure the Veterans Health Administration. This document, issued soon after Kizer arrived, provided the basic ground plan for organizational innovation (VHA, 1995). Two other vision statements – one on strategic principles and another on objectives for change -- provided more detailed operational guidance (VHA, 1996, VHA, 1997).

These vision documents were intended to state clearly the purpose and goals of the organizational transformation and to set high standards for their accomplishment. Even so, according to Young, VHA experienced some difficulty in communicating to frontline employees (Young, 2000).

A Communications Strategy – Aggressive Yet Flawed

Introducing and implementing major organizational change requires a communications strategy. In medicine, “the literature” has a status not found in all professions. It not only conveys information on recent scientific and clinical developments, but it confers legitimacy on concepts and ideas and on the contributors to the literature. Kizer understood these realities and sought to exploit them.

He wrote many papers about both general and specific aspects of VHA transformation. Journalists featured him in numerous articles. And he was indefatigable on the speaker’s lecture circuit. Among other things, the VHA transformation, or aspects of it, was featured in “special issues” of the following journals that Kizer and his colleagues edited, wrote, and organized:

- “Special Edition on the Veterans Health Administration.” Hospital and Health Services Administration 1997;42(3).

The communications failure lay in the limited extent to effective communications were established and maintained with frontline workers. This was not the fault of VHA but of Department policy. Although VHA had 240,000 employees, the Secretary’s office of DVA did not authorize a single communications officer for the administration. The department viewed all DVA “communications” functions as issues of external press and public relations. It was oblivious to using communications for internal management purposes.

An Overview of Changes Introduced

The VHA transformation involved many changes introduced by Kizer. These included:

- Creating the Veterans Integrated Service Networks (VISNs) and shifting the focus of VHA away from the Veterans hospital toward the health care of veterans
- Changing eligibility criteria for the access of veterans to the veterans health care system
- Establishing the Veterans Equitable Resource Allocation (VERA) system
Introducing quality management into VHA health care, including the increased use of clinical practice guidelines

Launching a number of disease-specific or therapeutic area-oriented clinical care initiatives in tuberculosis, acute myocardial infarction, hepatitis C, and oncology

Reorganizing the provision of physician, nursing, and allied health professional care

Realigning VHA graduate medical education and patient care

Modifying the organization and conduct of VHA research and reorienting it strongly to the VHA patient care mission

Changing how VHA manages pharmacy benefits

Emphasizing the “safety net” function of VHA

Any one of these changes would be regarded as a major undertaking in its own right. Taken together, the changes are awesome.

Reorganization – Changing the Structure

One of the most important changes Kizer introduced in his first year was the creation of 22 regional entities called Veterans Integrated Service Networks (VISNs) (Kizer et al., 2000). These networks became the operating basis of the organization. In taking this step, he decentralized a highly centralized VHA bureaucracy that functioned by top-down, central office control of veterans’ hospitals and shifted the locus of control upward from the local VHA hospital to the region. Budgeting, planning, and operational authority was transferred to the VISNs from the central office.

The reorganization had two effects. First, it reduced central office control over the field. Previously, VHA was accustomed to detailed centralized regulation of the nearly 200 hospitals, a strategy that overloaded the center and paradoxically increased local hospital autonomy. As regulations become more detailed, they provide increasing opportunity for local “work arounds” that have the unintended consequence of obscuring, if not evading, their initial purposes.

Second, the reorganization established the organizational framework at the regional level for moving VHA away from a hospital-based, inpatient-oriented health care delivery system to one that integrated inpatient and outpatient care. This integration was intended to shift system focus from the hospital to the health care needs of veterans (Kizer, 1998). Recruiting network leadership was a key to the successful implementation of the VISN system. Kizer involved himself deeply in the recruitment of network directors. He described the effort in this way: “We tried to get a mix, a blend of institutional memory and forward looking thinking; insiders and outsiders with different ways of looking at things. The network directors were new positions. We sought new types; I spent a lot of time on this. Of the 22, some were very good; others were O.K. I interviewed all candidates in 2-hour sessions. I gave a whole month to this, spending 2 to 3 days at each of 4 sites, seeing a total of 120 candidates. There were several deep selects [i.e., individuals down in the ranks who were elevated above their superiors in the selection process]. One-third of the initial directors were from outside VHA” (Kizer, 2002).
Kizer also introduced an accountability system built around performance contracts for VISN directors (Kizer et al., 2000). The directors’ contracts linked performance goals with financial incentives. Goals embraced many activities according to Young: the development of core competencies, the implementation of programs or activities, and the achievement of quantitatively measurable improvements in efficiency and quality (Young, 2000). The accountability system served to align the performance objectives of network directors with the strategic objectives of VHA. The emphasis on accountability also served the symbolic function of reinforcing throughout VHA the concern of the central office for improving institutional performance.

**New Eligibility Rules for Veterans – Treating the Whole Patient**

The eligibility rules for veterans to obtain health care were fixed in statutes until 1996. They focused on defining eligibility in terms of a veteran’s service-related disability and his or her access to hospital care for receiving such treatment. Patient eligibility rules did not focus on treating the whole veteran. Change was essential, therefore, if VHA was to treat the whole person and implement the shift to outpatient care.

Although arguments to change eligibility rules had been put forward for some time, they were typically based on appeals to increased access to care. Congress had not responded to these pleas, however, for fear that the net effect of increased access would be increased demand for more care and that this would result in greater need for appropriated funds. To this issue Kizer brought political acumen, diligence, and persuasiveness. He “worked behind the scenes” with Congress and used “some different lines of reasoning than had been employed before.” Focusing less on increased access, he argued that formal enrollment of veterans in the system without regard to cumbersome eligibility rules would be a key to accountability and that system management could not be served without such a change. Congress bought the argument. Eligibility rules were changed. They were no longer linked to hospital care but put inpatient and outpatient clinic care on the same basis allowing treatment to occur in the most appropriate setting (Kizer, 2000).

**Resource Allocation – Moving Toward Equity and Efficiency**

Yet another major innovation introduced in the transformation dealt with the allocation of Congressionally appropriated funds. The existing resource allocation system was described as “neither predictable nor widely understood” and one that “perpetuated inefficiencies” (Kizer, 2000). A capitation-based resource allocation system was established – the Veterans Equitable Resource Allocation (VERA) methodology. Patient care was divided into “basic care” and “complex care,” a national price was set each type of service with adjustment at the VISN level for the cost of labor and 5 other variables. This methodology simplified the budget process and allowed a more equitable allocation of resources across regions and among care providers. It also resulted in reduced per patient expenditures: in a 6-year period from fiscal year 1994 through fiscal year 1999, the system-wide average annual per patient expenditure fell 25 percent from $5,479 to $4,105, respectively (Kizer et al., 2000).

VERA objectives included change in resource allocation over time in response to changing geographic distribution of veterans; reflection of geographic differences in the costs of care and the health care needs of veterans; and periodic refinement of the system based on careful monitoring (Wasseran et al., 2001). A recent RAND analysis concluded that “in spite of VERA’s possible shortcomings, we note that VERA appears to be designed to meet its objectives of reallocating resources to match the geographic distribution of the veteran population more closely than did previous VA budget allocation systems” (Wasserman et al., 2001).
Importantly, this analysis noted that VERA represented “only one piece of the veterans’ health care puzzle.” That’s also how Kizer saw it (Wasserman et al., 2001).

Expanding Access
Creating integrated networks, changing patient eligibility, and revising the resource allocation system made it possible to expand access by emphasizing ambulatory care (Kizer et al., 2000). This involved introducing universal preadmission screening, rigorous admission and discharge planning, system-wide primary care, universal telephone-linked care, and creating beds for those needing lodging but not hospital care.

VHA closed 55 percent of its acute care beds reduced total bed-days by two-thirds, and increased ambulatory care visits by 35 percent between September 1994 and September 1999. In contrast, nursing home beds decreased by less than 3 percent and domiciliary beds by about 15 percent. An estimated 700,000 more patients were cared for in 1999 than in 1994. Three hundred outpatient clinics were established during these years with no new appropriated funds but through the savings realized from other innovations. The family of innovations reinforced each other.

Focus on Quality
In addition to the many operational innovations discussed above, Kizer introduced a wide array of measures designed to measure and improve the quality of care delivered to veterans. Quality improvement efforts were organized in terms of “a structure-, process-, and outcomes-focused quality management accountability framework (QMAF)” (Kizer, 1999). The QMAF framework targets the following 10 dimensions of VHA activity: personnel and human resources; clinical care; performance indicators, internal review and improvement; external review and oversight; technology management; patient-reported outcomes (service satisfaction); education; research; and change management (Kizer 1999). An overall strategy and a set of supporting tactics are associated with each of these dimensions. For example, the strategy for clinical care is “to maximize utilization of clinical care activities that increase the likelihood of achieving desired health outcomes.” The tactics include primary care, telephone-linked care, utilization management, community-based services and home care, care/case management, practice guidelines/clinical pathways, shared decision making, palliative care, practice profiling, transplant review boards, contract specifications, and programs of excellence (Kizer 1999).

A number of changes in specific VHA quality of care indicators were introduced, including the following: the Chronic Disease Care Index measures how well VHA follows national guidelines for certain high-volume diagnoses; the Palliative Care Index measures care provided at the end of life; a mental health report care has been implemented; and, in fiscal year 1999, implementation was planned for a Long Term Care Index and an Occupational Safety and Health Index.

The guiding principles for the quality initiative numbered 15 in one report. Prominent among them are the following (Kizer, 1999):

“The VHA should strive to achieve the highest possible quality of care . . .”

“Improved performance is the result of actively managing performance.”
“All institutional processes, practices, and policies contribute directly or indirectly to the quality of care provided.”

“Broad-based quality improvement is an essential management method and an organizational imperative, but it is an iterative process and should be viewed as a long journey involving continuous self-criticism, learning and change.”

“Improving quality requires commitment and involvement at all levels of the organization and by all staff and their representatives.”

“Resource allocation and personnel payment methodologies should be strategically linked to quality improvement.”

“Research is an integral part of any high-quality health care system, and the primary mission of a health care organization’s research program should be to improve the quality of care provided to its patients.”

On the latter point regarding research, the Quality Enhancement Research Initiative (QUERI) was established as a response to increasing demands for assurance that quality medical care was being delivered. It is managed by the VHA’s Health Services Research and Development Service (HSR&D). QUERI was described as identifying “research evidence to support best practices,” identifying variations from best practice, and then implementing “or translating” research evidence into clinical best practice (Feussner et al., 2000). An entire supplement to Medical Care was devoted to QUERI applications in chronic heart failure, diabetes mellitus, ischemic heart disease, human immunodeficiency virus/acquired immunodeficiency syndrome, mental health, spinal cord injury, stroke, and substance abuse.

**Accountability – Performance Management Program**

Accountability was established throughout VHA at all levels. A performance management system was established for all personnel. In addition, a long-standing policy barring the dismissal of a VHA physician was eliminated on grounds other than clinical incompetence. Physicians were placed on notice that support of VHA innovation was required.

Information systems have been a major part of the VHA transformation strategy. The abundant literature on the transformation includes little information on these systems. Empirical examination of the information technology infrastructure is needed to develop an understanding of this critical feature of system change.

**Linking Research to Clinical Care**

Kizer’s career has been spent as a health administrator, not as a researcher. However, VHA research was another element of the enterprise that underwent major change. In this case, Kizer brought his usual concerns to bear on the issues: developing a system that served veterans health; reducing fragmentation among and between programs; and showing value for invested funds.

One of the major steps taken was to create a research realignment committee. In VHA, as in many other organizations, substantial autonomy had been ceded over time to researchers by the policy and operational elements of the organization. The interests of the individual researcher often drove research priorities,
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programs and budgets. In theory, VHA R&D was meant to contribute to improved patient care. But the reality was infrequently realized. The research realignment committee focused on establishing a system that linked research to improved patient care.

The committee was appointed by Jesse Brown, Secretary of Veterans Affairs, in October 1995, “to review the scope and structure” of VHA research programs and to make recommendations about “possible realignments” to Kizer (VHA, 1996b). The committee addressed issues initially raised in a 1991 internal VA report and in prior reviews by the National Academy of Sciences. The charge to the committee was “to ensure that the research portfolio” targeted the needs of veterans appropriately; capitalized on the unique resources of the veterans health care system; had “sufficient managerial flexibility” to respond rapidly to changing needs while maintaining a stable infrastructure; had “appropriate balance” among basic, applied, and outcomes research; and was organized to promote multiple benefits. It was asked to consider two other questions: the readiness of the program to enter into research partnerships with industry and non-profit entities; and the appropriateness of its patient informed consent procedures (VHA, 1996b).

The realignment committee reached a number of conclusions about the VHA research program, of which the following are among the most important (VHA, 1996b). First, an opportunity existed to strengthen the relationship between the VHA research mission and its patient care mission. Second, VHA lacked a mechanism for “a comprehensive independent review of its entire research portfolio.” Third, in the economic resources domain, intramural research funds had fallen as costs had risen; institutional costs of extramural research [supported by others] were not sufficiently recovered. Fourth, administratively, sufficient flexibility existed to deploy existing resources to meet high-priority problems; research quality and performance were not then part of the VISN directors’ performance responsibilities; the infrastructure was generally satisfactory but needed to be maintained. Additional findings were that grants were accepted from private sector sources but joint ventures were underutilized; that relations with the nation’s medical schools could be “further refined to benefit both parties”; and that human subjects protections met or exceeded existing standards but were cumbersome. Finally, relative to human capital, the committee concluded that “the VA is not satisfactorily recruiting and sustaining the next generation of outstanding clinical investigators.”

The committee made 10 recommendations, of which the more important are the following (VHA, 1996b). Designated Research Areas (DRAs) were endorsed as an organizing principle for relating research objectives to the mission of veterans health care. A national council to oversee DRAs was proposed. Several recommendations dealt with seeking increased intramural funding, recovering extramural indirect costs, and increasing royalties from patents and joint ventures. The success of the research enterprise should be “an integral component” of each VISN director’s job. Career development was addressed at length. VHA relations with medical schools should be reviewed. VHA needed to be a “leader” in human subjects protection. The committee concluded its report by stating the “research is an essential component of VA’s mission to provide high quality care to the Nation’s veterans.” VHA’s outstanding research record, however, would be imperiled in the then austere fiscal environment if it rested on its laurels. Therefore, “VA research can be refined to focus more strategically and more visibly on the needs of the veteran population it serves” (VHA, 1996b).

During the work of the realignment committee, Kizer also recruited John Feussner from Duke University’s department of medicine to head VHA research and development. Feussner had not known Kizer previously.
In the initial interview, Kizer asked “What would you do if you had this job [head of R&D]?” Feussner recalls his reaction (Feussner, 2002):

I was suspicious that he was just asking this question, not that he wanted real change. I said that I would want a mission-oriented program, with a tighter linkage between research, generating products, and outcomes of products, a program that would directly couple research with medical practice and health policy. This [VHA] is a health system, after all, and research should serve the health mission. I was stunned that he agreed with me. I was suspicious, didn’t really believe him. There was a bit of mutual distrust at first.

Feussner was not a member of the realignment committee, whose vice chairman headed the research service of the Durham VAH where he practiced. However, he participated in several of the realignment committee’s meetings, thus in an excellent position to implement the changes recommended by it. In 1999, when a report on the implementation of the committee’s recommendations was published in Academic Medicine, the Journal of the Association of American Medical Colleges, the authors included George W. Rutherford and Timothy R. Gerrity, chair and vice chair respectively of the committee, and Kizer and Feussner (Rutherford et al., 1999).

Feussner, in a 1998 article, indicated that one of the “first priorities,” following the committee’s recommendations, “was to forge a new balance between fundamental and clinical research” (Feussner, 1998). To that end, he sought to expand the VA Cooperative Studies Program, enhance health services research, revitalize the VA rehabilitation research program, and create a “sustainable” Epidemiologic Research Program. All these efforts, he reported, had been accomplished in the past two years.

The VHA research story, then, involves the following key elements: creating a focused effort that links veterans research with veterans health care; integrating intramural and extramural research; integrating clinical, health services, and rehabilitation research across the entire spectrum from laboratory research to reduction of research findings to improved, and measure, quality of patient care; obtaining more financial support for research; engaging the private sector in joint ventures; and putting the entire enterprise on a veterans population-based priority-setting pathway.

Feussner reflected on Kizer’s contribution to the changes in VHA research and development efforts in the following way (Feussner, 2002):

Many people view Kizer as only concerned with primary care. He was population-driven from soup to nuts - primary care, secondary care, tertiary care. Before Kizer, much was ad hoc and now is institutionalized. He created the milieu for cross functional collaboration. He wanted the best answer. If there was none, he wanted the data. Research got data for him. He used us. [In turn] We gained access to the clinical arena, which made integration with clinical services possible. In QUERI we obsess about results. For VERA, we did lots of good research, disease-specific work, econometric work on system efficiency and effectiveness.
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APPENDIX C – CUSTOMS SERVICE

### Customs Service: Mission and Relevance to EPA
- Customs mission is to protect domestic borders and enforce international trade laws
  - Large, geographically dispersed agency
  - Multifunctional including enforcement responsibilities, data management, and revenue collections
  - Major interactions with businesses and individuals
  - Outdated legislative mandates inhibited change

### Customs: Causes of Change
- Rapid increases in passengers, trade volume, and expectations of customers (manufacturers, shippers, brokers, importers, and exporters)
- Antiquated procedures prescribed by law constrained options to improve efficiency and compliance
  - Geographically based record-keeping by individual transaction prevented account-based management and compliance measurements
- Flat operating budgets and resources relative to rapid increase in demand for services

### Customs: Innovations
- Enabled business restructuring with new information system and strategic use of information
- Adopted “informed compliance” and strategic problem-solving
- Applied risk management to enforcement process
- Raised compliance through account management
- Applied business process improvement to core processes
- Built effective partnerships with business

### Customs: Change Management
- Initiated and controlled change
- Built case for change with external stakeholders and Congress
- Changed organization to align with modernization goals
- Identified leaders and career staff committed to change
- Used prototyping to test new processes and guide scale-up
- Recognized value of proactive field staff training

## U.S. Customs Service
By Debra Knopman and Irene Brahmakulam

### Introduction
The U.S. Customs Service, currently within the U.S. Department of the Treasury, was established by the first Congress in 1789 to collect tariffs and stave off impending bankruptcy of the new government. It now has 19,500 employees, more than 300 ports of entry, annual revenue collections of $22.1 billion, and an annual budget of $3.1 billion.

Called America’s Frontline, Customs has emerged as the key enforcement agency responsible for protecting national borders, monitoring imports and exports, collecting tariffs, interdicting illegal drugs, and disrupting money laundering operations. As indicators of the magnitude of its operations, in a typical day, Customs processes over 1.3 million passengers, over 50,000 trucks and containers, 580 vessels, 2600 aircraft, and 355,000 vehicles (U.S. Customs, 2002a). In the newly proposed Department of Homeland Security, Customs
would be one of its most significant components in terms of number of employees, budget, and core functions.

Beginning in the 1980s, Customs has been in a near-constant process of change, begun initially as an effort to automate paper processing of imports, boosted by the far-reaching Customs Modernization Act of 1993, and further propelled by major process redesign and reorganization efforts in the mid-1990s. This case study tells the story of how Customs has proceeded in the last 18 years to move from an 18th century model of tariff collection to a complex modern model of service and enforcement that integrates border protection, trade facilitation, and revenue collection. This case study is based on available literature and interviews with former and current Customs officials.

**Mission, Values, and Functions**

Customs states its mission in the voice of its employees (U.S. Customs, FY2001 Annual Report):

- We are the guardians of our Nation’s borders – America’s Frontline.
- We serve and protect the American public with integrity, innovation, and pride.
- We enforce the laws of the United States, safeguard the revenue, and foster lawful international trade and travel.

Customs’ core values – integrity, accountability, fairness, service, and pride – reflect its role as a regulator and enforcer of laws as well as its very long history of service delivery. It is notable that “innovation” appears in its mission statement as a central feature of its service.

By law, Customs is responsible for carrying out the following activities (U.S. Customs, 2002b):

- Protecting the general welfare and security of the United States by enforcing import and export restrictions and prohibitions;
- Assessing and collecting Customs duties, excise taxes, fees and penalties due on imported merchandise;
- Processing persons, baggage, cargo and mail;
- Detecting and apprehending persons engaged in fraudulent practices designed to circumvent Customs and related laws;
- Protecting American intellectual property rights and preventing illegal trade practices;
- Interdicting and seizing contraband, including narcotics and illegal drugs; and
- Collecting accurate import and export data for compilation of international trade statistics.

Besides its own governing statutes, Customs enforces over 400 other provisions of law for at least 40 agencies. Some of these statutes relate to environment, health, and safety including: motor vehicle safety, emission controls, water pollution, pesticide controls, Freon smuggling, and the interdiction of illegally transported endangered wildlife. Other laws safeguard American agriculture and business (U.S. Customs, 2002b).
Causes of Change
Over the last 20 years, the most compelling force for change in Customs has been the growing gap between increased responsibilities and static resources to meet those responsibilities. By the early 1980s, Customs officials recognized that they were unlikely to see any significant increase in budget or personnel ceilings to cope with the explosion of global trade and travel. Fulfillment of Customs’ core mission to protect U.S. borders and foster trade was in serious jeopardy.

Trade and passenger traffic have been increasing rapidly since the early 1970s. For example, passenger traffic has increased from 226 million in FY1970 to 489 million in FY2000 (U.S. Customs, 1996). The number of trade entries (defined as individual import transactions that accompany each shipment of goods) increased from 2.7 million in FY1970 to 25 million in FY2001 (Bonner, 2002). Trade is expected to continue to grow at a rate of 8 to 10 percent per year (Bonner, 2002). Amplifying this increase is the rapid growth of “just in time” manufacturing and distribution throughout the U.S. economy, and the consequent economic pressure for quick processing time at ports of entry.

Century-old laws constrained some of the most important changes needed to make Customs more efficient and effective in protecting national borders. For example, a Customs official was required by statute to count the number of cannons on incoming ships, physically carry bills of lading from the importer to the Customs office, and collect payment for each individual transaction. Most important, the statutes required Customs to inspect every incoming shipment of goods, an impossibility given the flow of goods and passengers relative to available resources. In reality, Customs is only able to inspect about 2 percent of shipments. Thus, Customs needed a new risk-informed strategy for compliance and enforcement to focus their efforts on their highest priorities.

Finally, trade facilitation has taken on far greater significance since the 1970s. The U.S. has been at the forefront of globalization, and the promotion of free trade has become a central tenet of U.S. economic and foreign policy. Revenue collection is no longer the overriding concern of the agency, although Customs remains second to the Internal Revenue Service as a revenue raiser for the government. For Customs to meet its statutory obligations, it needed to substantially transform its culture and business practices, and improve its communications with the community of brokers, exporters, importers, and others (known as the “trade”).

Initiating Change Through Automation
The first significant step Customs took to cope with the dramatic increases in imports was to automate its paper processing of individual transactions. In 1984, the agency released the Automated Commercial System (ACS) to “track, control, and process all commercial goods imported into the United States” (U.S. Customs, 2002c). However, the potential for information technologies to radically change how transactions were tracked, processed, and analyzed took years for some in Customs to fully comprehend.

As originally conceived in Customs, “automation” implied a replication of paper processing to a more rapid machine format, but without necessarily any change in filing procedures, content, format, or structure for analysis and strategic planning. For example, paper processing of imports required a transaction- and geographically-based view of trade; that is, the forms were filed and stored at each of the more than 300 ports of entry where the individual transaction occurred. This made it extremely difficult to capture a big-picture
view of trade, identify major importers who used multiple ports, compile useful statistics to guide resource allocation and enforcement actions, and move toward “account-based” management of transactions.

ACS was a crucial step toward moving Customs away from its colonial roots in manual inspection and processing of imported goods and toward a more sophisticated understanding of a far more complex world of trade and business management. Part of this transition process was addressed by a planning exercise initiated in 1987 by the Commissioner of Customs at the time, William von Rabb. He established a “Day One” Board of Directors. The Day One Board, composed of assistant commissioners and other senior officials, began the process of stepping back from Customs’ current operations and organization and considering new ways of doing business. They considered the new and rapidly changing external environment within which Customs was functioning and was likely to face in the future. This process helped to consolidate an internal consensus that to realize the full benefits of new information technologies – and survive in the new world of globalization – Customs would need changes in its statutory framework.

The Next Step: Customs Modernization

By the late 1980s, the promise and the limitations of ACS had become more apparent as increases in trade and passengers continued unabated. The Day One Board recognized the impossibility of using computers to comply with the letter of Customs’ governing statutes which required, among other things, that a Customs officer physically receive documentation of shipments from importers. Customs began to develop its own wish list of legislative changes in 1990. The Trade had its priorities as well, primarily concerning changes in Customs’ compliance and enforcement procedures.

By 1993, Congress had not yet gathered sufficient consensus to move forward on major legislative changes for Customs. However, the enabling legislation for U.S. ratification of the North American Free Trade Agreement (NAFTA) emerged as the vehicle for what was called the Customs Modernization and Informed Compliance Act (known now as the Mod Act) (1993). NAFTA imposed substantial additional burdens on Customs. The agency successfully argued that without some relief from its numerous constraining statutes, Customs would lack the flexibility and tools to meet its obligations under the treaty.

The chemistry of legislative change in 1992 and 1993 became an important force in Customs’ evolution toward a more effective and innovative organization. George Weise, staff director of the International Trade Subcommittee of the House Ways and Means Committee emerged as a critical moderator of the dialogue between the public and private sectors, and was instrumental in the passage of the Mod Act. The Joint Industry Group, originally formed in 1976, brought together a representative group of private sector players involved in international trade with key Customs officials to openly and actively debate options for change. Weise is largely credited with leading the consensus building process that ultimately led to passage of the Act.

The Mod Act included several critical components (“Customs Modernization” 1998):

- Major shift in compliance burden from Customs to importers, through the concept of informed compliance, in determining correct classification, value, and duty rate for imported goods;
- Substantial changes in reporting requirements that would enable importers to file monthly summaries, and file reports electronically and remotely through a national entry processing system; and allow Customs to track compliance;
Major overhaul of Customs' information systems, including requirements to consult with the Trade, prototype new designs, and evaluate performance

George Weise became Commissioner of Customs six months before final passage of the Mod Act at the end of 1993. He proceeded to lead a major reorganization of the agency and initiate other management changes that would enable Customs to implement the Act.

Implementation of the Modernization Act
Between 75 and 90 percent of Customs' regulations were affected by the Mod Act. To deal with rewriting regulations and implementing other portions of the Act, Customs initiated or accelerated a series of changes simultaneously beginning around 1994. These included:

- Major structural reorganization;
- Adoption of business process improvement as the management model of choice;
- Building comprehensive new information software to implement an account-based instead of transaction-based processing system;
- Major shift in orientation from an after-the-fact punitive view of enforcement to the dual approaches of informed compliance and strategic problem solving; and
- Widespread use of prototyping to test and evaluate new technology systems, potential regulatory changes, and other internal processes.

These major initiatives are discussed below.

Reorganization
Prior to its reorganization in 1994, Customs was a highly fragmented agency with a relatively weak central office. Customs had been organized into seven geographical regions, each headed by a regional commissioner. Within the regions, there were 40 districts that operated 300 ports of entry (by air, sea, and land). Power largely resided in regional offices, districts, and individual ports with relatively little interaction among them. Implementation of the Mod Act would clearly require a far more integrated organization with more people on the frontlines, fewer management layers, and a more strategically oriented headquarters presence to lead the way.

In structural terms, the most important change Weise made was to dismantle the regional offices and replace them with 20 Customs Management Centers (CMC). There were several motivations for change in structure: to improve consistency in processes and enforcement across Customs, to introduce greater efficiencies in operations, improve accountability in performance, and promote trade compliance. The proposal initially met with some Congressional resistance as virtually all proposed office closures and relocations do. However, Congress eventually accepted the restructuring plan, without any required statutory changes. Each CMC provided common administrative and management support services to the individual ports, and were thus largely transparent to customers.

Weise also established an Office of Strategic Trade in headquarters to provide leadership, analysis and strategic thinking, and coordination with Customs’ implementation of the Modernization Act. Since Weise’
departure from Customs, the balance of power has shifted more toward headquarters control, but in general, the structural changes put in place in the mid-1990s have endured.

Business Process Improvement
At the same time as the reorganization process was initiated, Customs adopted the concept of business process improvement (BPI), a popular method in the private sector to improve performance by understanding how multiple offices and activities affect core organization-wide functions (Rummler and Brache, 1995).

Michael Lane, former Deputy Commissioner, described process redesign as it was followed at Customs in the following way:

“Whereas most organizations have tended to organize and manage by occupational series or functional specialty, process management requires that our perspective of work be broadened to visualize a stream of work, or process, that flows from inputs (merchandise, consignees, or passengers) to finished products (cleared goods and passengers in compliance with customs and other agency laws) in a timely fashion at minimal cost to government and industry. With process management, organizations view their work flow horizontally across organizational lines and view those processes from end to end as a whole” (Lane, 1998).

Customs identified its core processes as Trade Compliance (imports), Passenger Clearance (in and out), and Outbound Compliance (exports). Its support processes are information and technology, finance, and human resource management. For each process, a process owner was designated to lead the process mapping exercise, identify weak links, duplication of efforts, develop options for change, and implement improvements. Process owners worked with process redesign teams formed from headquarters and field office staff. Process redesign teams traveled the country to interview Customs personnel. As an example, the Passenger Clearance Process Team faced the well-known but previously unaddressed fact that Customs was replicating the work performed by the Immigration and Naturalization Service when passengers entered the country at international airports. Passengers were being questioned first by INS officers and then by a Customs officer. The two agencies agreed that one well-structured interview would be sufficient (Sparrow, 2000).

The Trade Compliance Process redesign is largely viewed as a significant milestone in connecting the power of information technology to the informed compliance strategy discussed below. The redesign team grasped the significance of performance measures as a means of driving process improvements and communicating progress internally and externally.

Account-Based Information Processing
Full implementation of the Mod Act continues to depend on successful deployment of the Automated Commercial Environment (ACE), intended to replace the current import processing system, ACS (2002d). The seventeen-year old ACS frequently experiences downtime, forcing users to return to paper processing of transactions, adding substantial delays at ports, and creating even higher demands on staff to go back and

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5 When Customs refers to Trade, it is a catchall phrase for the trading community (e.g., importers, exporters, brokers, port authority).
enter the information into ACS when it goes back on-line. ACS was not designed to be an analytic tool, or an interactive system in which users could easily extract data for strategic analysis. In contrast, ACE will enable the critical transformation of Customs information from transaction-based to account-based, enabling remote filing, strategic deployment of resources to the most critical accounts, and providing a valuable tool to detect compliance problems (Weise, 2002).

The road to full development of ACE has not been smooth. Customs has had major problems in the past in implementing such a large-scale software change. Through better communications between the information technology and business staff in Customs as well as extensive use of prototyping, however, Customs now appears to have gotten back on track with ACE development. ACS will be replaced in seven releases and four increments.

**Informed Compliance, Shared Responsibility, and Reasonable Care**

From the Modernization Act, the concepts of informed compliance, shared responsibility, and reasonable care emerged. The idea was that “in order to maximize voluntary compliance with Customs laws and regulations, the trade community needs to be clearly and completely informed of its legal obligations,” and that the trade community would act with reasonable care to meet those responsibilities (U.S. Customs, 1999). Congress sought to shift the legal burden of compliance to exporters and importers, while raising the requirements for improved information and accountability for Customs. Congress also recognized the need to give Customs the authority to implement selective compliance and enforcement regimes and compliance measurement techniques to effectively target limited resources.

Compliance measurement took on great importance in the shift to the informed compliance paradigm. In 1995, when the informed compliance strategy was unveiled, Customs was beginning to grasp the full implications of an account-based measurement and tracking system. For example, they found that 0.1 percent of importers (350 out of 318,000) accounted for more than 50 percent of all import value. Knowing also that their overall compliance rate for all imported goods was 81 percent, this kind of demographic information would have profound implications on how Customs would need to deploy its limited compliance and enforcement resources to raise compliance. (In fact, by FY2001, Customs had succeeded in raising its overall level of compliance to 91 percent.)

Customs now tracks importers by their volume of shipments and commodities, recognizing that these kinds of disaggregations of data would be critical in targeting compliance initiatives and enforcement actions. The compliance tracking and targeting comes together in an annual Trade Enforcement Plan that presents compliance measures, and then sets out targets for compliance assessments, trade interventions, sustained customer interventions, and investigations.

Implementation of the “informed compliance” strategy was highly dependent on reorganization and the opportunities it created to take both a “top down” and “bottom up” approach. According to the 1995 Informed Compliance Strategy:

“Customs’ new structure streamlines communication between headquarters and the field, provides a mechanism to prioritize trade issues, creates a direct line of authority for addressing trade matters that are national in scope, and promotes the initiative and
empowerment of field managers on trade compliance concerns directly related to a local environment” (U.S. Customs, 1995).

In adopting the informed compliance strategy, Customs recognized that the enforcement process did not lend itself to the business process improvement model. Instead, to handle specific interventions, the agency created the Strategic Problem-Solving (SPS) program managed by the newly revamped Office of Investigations, using $2 million of Weise’s discretionary funds. The focus of SPS was “on the identification and control of specific smuggling problems” (e.g., criminals, smugglers, illegal activities) (Sparrow, 2000). Strategic problem solving occurs at the national level as well as at individual ports. Officials at all levels were empowered to use compliance measurements to identify problem areas and then devise appropriate solutions to solve them. To facilitate dissemination of lessons learned, a support system was integrated into SPS, enabling employees to electronically access summaries of former and current projects (Sparrow, 2000).

Prototyping New Technologies, Regulations, and Processes
Congress intended for Customs to work closely with the trade as it moved forward on automation, regulatory change, and other initiatives. It strongly endorsed the use of prototyping and evaluation as a means of testing new procedures before full implementation.

One of the most important prototypes was the National Customs Automation Program (NCAP). This has served as the prototype for the new ACE system, using existing software to the extent possible. Its purpose is to “demonstrate a fully electronic process for release of cargo, the collection of import data and duties, and supports the critical elements of the Modernization Act and business process redesign, such as account management and periodic filing” (U.S. Customs, 2001). In what was widely viewed as a initial successful experiment, three major automobile companies participated along with two other importers used NCAP. More prototypes with other sectors are underway.

Prototyping is used in virtually every facet of Customs’ operations, including new information products, new enforcement technologies, and new management methods. For example, a prototype was developed to test the account-based processing approach using 10 importers selected by Customs. At the same time, Customs began to prototype the idea of account managers to work with selected high-volume accounts to improve compliance. Customs now has over 1100 companies in the Customs Account Management Program: 275 are managed nationally and 844 are managed locally at ports of entry (U.S. Customs, 2000). As a general matter, Customs initiates prototypes, comprehensively reviews success rates, and then makes a management decision, based on results and available resources, to move toward more systemwide deployment. Customs relies on normal budget and appropriations processes to fund prototypes.

Lessons Learned From Modernization
Customs modernization has been long and often difficult. However, throughout the process, Customs had the benefit of strong career and political leadership within the organization as well as the imprimatur of Congress and the Administration. George Weise was a pivotal figure in his role as consensus builder on the staff of the House Ways and Means Committee in the early 1990s, and later as Commissioner at the time of passage and initial implementation of the Mod Act. Other senior officials including Michael Lane and Sam Banks played pivotal leadership roles in reorganization, strategic planning, and business process improvement.
Customs also learned that change requires widespread, systematic, and frequent training for frontline workers if the new ways of doing business are to have any chance of succeeding. For some employees, change came too fast. They were not always aware of changes occurring; at other times, they had too much information to process at one time. Management generally recognized these problems, but some also believed that there was value in getting quickly past the “pain” of reorganization and other changes.

In the case of the transition from ACS to the new and still unrealized ACE, Customs learned what its internal limitations were in implementing such a massive and complex software system. In fact, this was one of several examples of Customs officials recognizing that the change process needs to be managed actively at each step along the way, with testing and evaluation built into every major initiative.

To a considerable extent, career leaders within Customs took control of the change process. What began as an “automation” project soon took on much larger significance as Customs staff began to grasp the enormous potential of information technologies to totally change the way they operated. While they probably got more than they bargained for in the Mod Act in terms of changes in the compliance and enforcement program, they asked for and received the major statutory changes they needed to move toward a major overhaul of reporting and filing requirements, the need for which became obvious as they faced the limitations of ACS.

Customs officials understood that liberation from the old transaction processing requirements would have far more significance than simply eliminating some paperwork. They understood that it would enable them to make the crucial leap forward from a transaction-based to an account-based system of monitoring and management. This was a critical step toward closing the gap between available resources and growing levels of trade and passengers. It also pointed out the need for major organizational change to implement the new account-based management model. Most significantly, these changes paved the way for a new model for compliance and enforcement, and gave Customs the measurement and accountability tools to decentralize problem-solving and empower staff at the local level to devise innovative approaches as appropriate.

**Relevance to EPA**

Customs possesses a number of similar attributes to EPA. Like EPA, Customs is a large, geographically dispersed agency. Its mission includes multiple functions whose objectives do not always align with one another. For example, at Customs, the fulfillment of enforcement functions can at times slow down the processing of imported goods. “Cheaper, faster, better” is inherently complicated in an agency with regulatory and police functions.

The ability of Customs to succeed in its mission to facilitate trade and protect our borders depends to a considerable degree on the agency’s success in working with the private sector. Similarly, EPA has come to recognize the need for close working relationships with the firms it regulates, attempting to strike a balance between the need for “informed compliance” and the responsibility to monitor and enforce laws and regulations with fairness and objectivity.

Customs eventually fell victim to its own corpus of laws that held it back from a major shift in ways of doing business to keep up with changing external circumstances. The disconnect between vision and reality at Customs became obvious to inside and outside observers. Similarly, EPA is bound by a body of law devised
before the transformative potential of information technologies was understood. Further, priorities for environmental problems as viewed from the 1970s and 1980s also look different than those before us today.

An important reason for selecting Customs as a case study was because of the significance of its enforcement responsibilities, which by volume and frequency, are more extensive than EPA’s. Clearly, Customs has found a way to get much smarter about how to target limited enforcement dollars by strategic use of intelligence (made possible by better data gathering and record-keeping) and leveraging the private sector’s self-interest in high compliance rates along side rapid processing times. Competitive interests actually support a tough enforcement regime, but the quid pro quo for such a regime is that the agency needs to be clear and consistent about paths to compliance.

In implementing the informed compliance and problem-solving program, Customs found a means of empowering officials throughout the organization to take initiative and work outside normal procedures to get a specific problem solved. Many enforcement problems are place-specific, and thus require the expertise of local Customs officials. Other problems are systemic and require a national response.

In sum, Customs and EPA each have difficult and complex missions that span jurisdictions, require the provision of technical assistance and information, demand legal enforcement actions, and benefit from partnerships with the private sector and individuals. Customs has made considerable progress over the last decade in becoming a more innovative and flexible organization without compromising its duties to protect national borders. It has built its transformation on the promise of new information technologies and organizational change to fit its goal to “think like business” (Winwood, 2001). As important as these steps, Customs also came to understand the necessity of communicating new directions to frontline workers and providing adequate training and tools to accomplish their duties. Their 1993 formula of “people, processes, and partnerships” accurately captures their understanding that change needed to occur on several fronts, not in isolation, but in close coordination.
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APPENDIX D – DUPONT

**DuPont: Mission and Relevance to EPA**

- Mission is to profitably deliver “science-based solutions” in multiple markets
- Large, geographically dispersed manufacturer with many different product lines and core competencies
- Relationship of corporate management to business units analogous to EPA HQ and regional offices
  - Decentralized decision making, some degree of organizational inertia
- Asymmetry of success versus failure in some businesses because of significant safety issues and scale-up expenses in capital intensive businesses

**DuPont: Causes of Change**

- Recognition that innovation would be critical to survive in the 1990’s business environment
- Lull in major new products generated from research investments. Wall Street Journal front page article in 1992:
  - “[D]espite spending of more than $13 billion on chemical and related research over the past 10 years, DuPont’s scientists and engineers were a technological black hole.”
  - “They sucked in money but, company officials concede, didn't turn out a single new blockbuster or even many innovations.”
  - “The technology is great, but where’s the payoff?”

**DuPont: Change Management (1)**

- Used leadership to signal and sustain change
- Used structured innovation processes (Apex® and PACE®)
- Formed Innovation Board with senior staff
- Developed innovation agenda and ten-year plan
- Established Center for Creativity and Innovation

**DuPont: Change Management (2)**

- Exploited knowledge from across the organization
- Incorporated information from external sources
- Aligned incentives for technical staff with mission and goals
- Empowered innovation leaders with funding and authority
- Nurtured innovation networks

**DuPont**

By Parry Norling and Susan Resetar

**Background**

In 2002, DuPont is celebrating its 200th anniversary. DuPont began as a small, family firm and grew into a global enterprise operating in 70 countries around the world. From a manufacturer of one main product - black powder for guns and blasting - DuPont grew through a series of scientific leaps into a $24.7 billion supplier of innovative materials, services and technologies. In 2001, DuPont had revenues of $24.7 billion, 79,000 employees, and 135 manufacturing facilities operating in 70 countries.

The history of DuPont’s research and development activities, the relationship between science and corporate strategy, and the role that innovation has played in the growth and nature of the company is well documented (Hounshell, 1988). DuPont has made significant investments in R&D. In 2001, R&D expenditures were $1.6 billion or 6.5 percent of sales.
Antecedents of Change

In the late 1980s and early 90s, concern over innovation and creativity was expressed in at least three ways at DuPont. First, an “Innovation Audit”, conducted company-wide in 1985, assessed the supports and barriers to innovation. This assessment found that idea generation was strong, teams were effective and management was patient. However, a number of barriers existed as well. For example, there was a lack of real value for innovation, an inability to accept “small beginnings,” the absence of continuity in decision-makers, too few pathways to get an idea accepted, too much “turfiness,” and lack of sponsors for developing an idea (Pinchot, 1990).

Second, in 1989 DuPont corporate management surveyed employees to pinpoint critical leadership values for the 1990s. Employees commented that while innovation was a key value, it needed encouragement through a renewed focus (Tanner, 1997). Third, was also a lull in major new products generated from research investments. The Wall Street Journal reported in a 1992 front page article:

- “[D]espite spending of more than $13 billion on chemical and related research over the past 10 years, DuPont’s scientists and engineers were a technological black hole.”
- “They sucked in money but, company officials concede, didn’t turn out a single new blockbuster or even many innovations.”
- “The technology is great, but where’s the payoff?” (Wall Street Journal, 1992, Norling, 1998)

While DuPont’s investments in R&D were declining somewhat during this period, the Wall Street Journal indictment was attributable to the shorter term focus of R&D in the late 1980s and early 1990s as well as the absence of breakthrough innovation. (Miller, 1997).

As a result of these pressures DuPont took a number of steps in the 1990s to increase the effectiveness of its research and development investments. DuPont:

- Created a Center for Creativity and Innovation
- Adopted a structured development process and instituted the “APEX” process for breakthrough research
- Refocused personnel rewards
- Encouraged technology-related networks
- Keyed off DuPont’s historic patterns of innovation
- Developed an innovation agenda and ten year technology plans

In addition to these initiatives, DuPont maintains its corporate-wide technology council, cross-cutting research activities at the corporate research laboratories, and scale-up and commercialization expertise.

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6 Consultant Gifford Pinchot conducted the company-wide “Innovation Audit.”
7 Prather advises organizations that measure the climate for innovation, to do so only if they plan to implement improvements. “The act of measuring an organizational climate changes it. After all, people tend to expect the climate ot improve if management has gone to the trouble of measuring it, and when things do not improve, the climate will actually become worse (Prather, C. and L. K. Gundry (1995).
Center for Creativity and Innovation

“The basic concept for the Center for Creativity and Innovation was to have a small core group that could reach out across the business units, inspiring local champions to become active in learning and applying creative thinking tools (Tanner, 1997).” It built on experience at the DuPont Industrial Fibers Division, where formal activities to promote creativity and innovation had been pursued since 1986. The Center, established in 1990, organized three types of services aimed at educating staff about specific creativity techniques; applying these techniques to existing problems; and promoting an environment outside the center to sustain creativity and innovation. The center staff provided information on workshops, educational materials, and other skill building techniques; built networks of facilitators and creative thinkers; ran problem-solving workshops; and provided seed grants of $5,000 to $50,000 to employees for developing ideas that could not be funded from traditional sources. The effort was restructured in 1993, moving many of the Center responsibilities into the line organization.

There are many lessons learned from DuPont’s experience with DuPont’s Center for Creativity and Innovation (and its predecessor in the Industrial Fibers Division) described by Tanner, who established the corporate center. One, given the three phases of creative problem solving – problem definition, idea generation, and action planning – is that during problem definition, making sure the group is focused on the right problem is frequently overlooked. In addition they found that better solutions are found by harnessing diverse thinking styles (Tanner, 1997 and Prather and Gundry 1995). Another lesson is that it is essential to develop a supportive environment. This was done at DuPont by exploiting champions and networks to diffuse knowledge and publicizing successes. Tanner states that the key to sustaining momentum for innovation is to develop local champions who are results-oriented and lead by example (Tanner, 1997). In addition, they found that creativity and innovation will be valued if resources and attention (in the form of training, forums, newsletters) are devoted to the issue and support comes from both top-management and local managers. Finally, they found that behavioral change takes on the order of two to four years to permeate the organization (Tanner, 1997). Generating creative ideas is one piece of the innovation puzzle addressed by the Center for Creativity and Innovation. Taking these ideas to market realization requires a different process.

Structured Development Process

In the early 1990s, DuPont began to benchmark the R&D processes of a number of organizations. DuPont managers found the development process used by Motorola to be most impressive. (Note: At this time DuPont was benchmarking others on a number of business processes and in turn was being benchmarked by others; DuPont had one individual assigned full time to manage the benchmarking efforts.) As a result of this benchmarking exercise, DuPont purchased the commercially available process called Product and Cycle-Time Excellence ® (PACE) used by Motorola (McGrath, 1996). The innovations managed with this process are developments, which are typically more incremental and short term by nature.

8 More details on the Creativity Center’s structure and the specific approaches employed to stimulate creativity and engage the rest of the organization can be found in Tanner 1997.
8 DuPont purchased the “installation” of the Product and Cycle-Time Excellence ® (PACE) innovation process from PRTM for two business units and the rights to train “process engineers” to develop the process in the remaining business units for $2 million. It can take over six months to “install” PACE in an organization – with training, trial runs, development of process guidebooks adapted to the business needs and culture of the group. Firms that want to do it themselves have used the writings of Cooper rather than turning to PRTM for help. Robert G. Cooper, Professor of Industrial Marketing and Technology Management at McMaster University,
The PACE process has five key elements: a multifunctional project core team; a project approval committee (PAC) involving key business leaders who can commit resources (budgets, people, facilities); a project timing roadmap; definite phase reviews of the project at critical milestones by the PAC; and a PACE engineer or leader who sees that the innovation process works. At each milestone, the PAC gives the go-no-go decision to continue the project. At some firms, the PAC or business team can increase the value of the project by increasing the scope of the project or markets for targeting the product. The PAC can also help in the task of risk assessment for implementing the innovation. The process becomes a business process not a functional R&D process. However, implementing the process is not easy; members of the PAC have to learn disciplined decision-making and must actively participate in the entire innovation process; core team members must understand that commitments must be met by the next phase review or the project could be terminated; and the PACE engineer must learn how to operate the process without adding burdensome requirements.

The PACE process was implemented at DuPont over several years time. Initially a couple of business units adopted the process. It spread to about two-thirds of DuPont’s business units over a five year period with the help of a corporate champion, a consulting team, and a network of early adopters who helped to build internal capability (Tanner, 1997). Experience with this process has shown that project cycle time is typically reduced by half because decisions are required in a timely fashion and projects have full resources. In addition, projects have been more effectively focused on strategic objectives (Tanner, 1997).

Tanner notes that taking ideas to commercial success requires a team effort that is supported by a senior leader. According to his experience, the team must be empowered to make decisions, have its own internal management process to implement the idea and the senior leader must be actively involved in decision making, identifying issues, overcoming obstacles, and communicating problems (Tanner, 1997).

Breakthrough Project Management Process

In 1998 Miller, DuPont’s Chief Science and Technology Officer at the time, implemented the “Apex” process seeking proposals for breakthrough projects. Funding for these projects is obtained directly from the CEO rather than from controversial taxes on the businesses. Many different techniques are used to get the ideas for the projects. Project proposals are prepared by individuals; or by teams of researchers and business managers. The proposals define the opportunity and how the research (with milestones) will capture the opportunity. The primary criterion is that the research will generate a major new business, on the order of $500M business. Other criteria include in-house expertise, and strategic fit (Karol et al., 2002). A board of business and technical leaders select the projects for funding and then follow progress at the identified milestones. About 15 percent of proposals are funded from the CEO’s budget and amount to approximately 10 percent of DuPont’s R&D investments. Here is where top management’s leadership role is so important for innovation to flourish. It is recognized that in breakthrough research it takes over 300 reviewed ideas to get one commercial success (Stevens and Burley, 1997).
Incentive Structure for Scientists

Following studies by human relations, the height of the technical ladder was increased in 1994. Two additional levels were added so that professionals could receive pay and benefits equal to that of laboratory directors. As the result of a “pay-for-performance” study, it was recognized that ranking and rating employees along a forced distribution based on contributions within the past year was counterproductive. The rankings lacked “engineering accuracy”; this approach resulted in very small pay differentials and considerable demoralization. Incentives were such that researchers would only be interested in short term projects having high probabilities of success rather and not longer term, risky breakthrough projects. As a result of this analysis the focus was shifted to professional progression instead, salary increases were sizeable, and promotional evaluations were based on results over a number of years (encouraging work on more significant longer term work). This tended to shift motivation back to the work itself, which is more natural for scientists.

Technology-related Networks

In 1994, the DuPont Fellows, a group of the highest ranking scientists and engineers made eight recommendations to the head of DuPont R&D. One of the recommendations was to form a “technical society” similar to those at Monsanto and 3M. In response R&D management began to identify existing networks of researchers and then helped to form other networks in areas of technology where there were no networks. By 1996, 230 technology-related networks and 140 other networks had been either identified or created (Norling 1996). Networking, both externally and internally, becomes a critical activity in innovative organizations. For example, networks can facilitate bringing together the breadth and depth of knowledge necessary to solve a given problem to improve the quality of the solution as well as its timeliness. Networks can also be used to cheaply and quickly disseminate information about good ideas to improve the likelihood they will be used in other settings or applications. Networks can also be used to bring in the various functional perspectives necessary to see a new idea through implementation. They can also be used to keep the organization linked to changes in the external environment and customers. “In one year; networks in DuPont reduced costs by hundreds of millions of dollars, reached decisions on preferred suppliers, developed standards and guidelines, conducted training and development workshops, provided the basis for significant sales, provided support and critical information, transferred technology across the company helped in the reuse of equipment, established numerous collaborations and avoided duplication of work.” (Norling, 1996)

Recognize Historical Patterns of Innovation

During his Innovation Audits in the mid-1980s, Gifford Pinchot had pointed out that DuPont R&D tended to change focus in recurring cycles (Pinchot, 1990). Within 15- to 20-year cycles, the emphasis shifted from a period of discovery research for growth, new businesses, new products to a later period of consolidation, cost reduction, quality improvements, and efficient manufacturing. In 1995, during a period of downsizing, constrained research, and intense cost controls, it was recognized that the cycles were continuing. If so, then the period of 1996-2004 would be a time for renewed discovery research. Joseph Miller used this observation to “sell” and encourage innovation throughout DuPont and to corporate management. In the role of leader, he talked to researchers, published in journals and internal DuPont newspapers, all to say that innovation is important and the “time is now” (Miller, 1997).
Develop an Innovation Agenda and Ten-Year Technology Plans

In 1997, Miller developed an innovation agenda. All DuPont science and technology directors were required: to relate their R&D plans to the six main areas on the agenda and to prepare ten year technology plans that mapped out multi-generational technology roadmaps (somewhat similar to efforts at GE and Motorola). In doing this he also emphasized the need to be tied to the science base (understanding scientific developments) and to identify the drivers for the planned technology developments. By doing this Miller provided the needed leadership for innovation in the company. The technology plans were reviewed and debated at meetings of the Technology Council (the Chief Technology Officer and Science and Technology Directors of the businesses. These debates and discussions helped to communicate across the company the goal setting and strategic planning for individual units; this was especially important where common technology platforms were involved. This was further emphasized as the CEO reviewed strategic plans for each business and examined the related technology plans. (Note: For years Motorola has developed technology road maps - including required “minority opinions”). Motorola uses technology roadmaps to understand how various innovations interrelate and contribute to corporate goals (among other purposes). General Electric is known for its “three generation” plans - thinking out ten years or so how its technology platforms, services, or initiatives will evolve or be drastically changed through technology developments. The plan helps define projects to be initiated now to support long-term developments. The product development process considers a multi-generational view to encourage innovation. Each product development considers likely customer requirements or needs for 3 generations of the product, typically 24 and 36 months time horizons. The plan identifies required changes in technology and product performance. GE plans in this way to improve time to market and to encourage more dramatic innovation. Prior planning, which did not consider multiple product generations, tended to be more incremental and cautious (Kanter, 1997).

Additional Actions

From 1991 onward, DuPont conducted informal morale/satisfaction surveys of researchers by e-mail. The questionnaire asked employees to confidentially rate their work environment and the work itself each on a scale of 0-10 with predetermined descriptors. Scores and comments were reported by work group (when at least five individuals responded). R&D management was able to act upon a number of suggestions, complaints, and ideas in the comments in an attempt to deal with pockets of low morale.

Some effort was begun in 1998 to learn from DuPont experience. Successes and failures were included in this effort. Case histories were prepared by graduate students of historian David Hounshell based on interviews with present and former researchers. DuPont also participated in a study on “Radical Innovation” by the Industrial Research Institute and the Lally School of Business at Rensselaer. Two ongoing projects from DuPont were among the dozen projects included in the five-year study (Leifer and McDermott et al., 2000).

In 1998, DuPont was seeking to “reinvent” itself and Miller made sure that the R&D community recognized the important role that R&D was to play in this transformation; especially the role that the biological sciences were going to play in the sustainable growth for the company. This was reinforced with the hiring of especially talented life scientists.

Did all these steps achieve results? A number of promising products and technologies have been developed, the R&D community certainly recognized the importance of innovation for the growth of DuPont, and
significant opportunities are being pursued in the laboratory. Whether market success will materialize, will depend on time and improved economic conditions.

Relevance to EPA
DuPont offers a potentially useful model of structured innovation for EPA. Their use of an “innovation audit” was a novel means of developing a common corporate understanding of the strengths and weaknesses of the innovation within DuPont. The audit served to focus attention on those aspects of organizational structure and process that were most in need of attention. From that point forward, rather than reinventing the wheel, DuPont purchased well-tested, commercially available processes to jump-start their own internal transformation processes. The process was diffused gradually throughout DuPont business units and local champions and networks helped internalize and spread lessons from implementation.

Two structured development processes, handled at different management levels, are employed depending on the focus or scope of the innovation. DuPont makes ample use of communities of practice to share ideas across the research, development, and marketing units of the corporation.

DuPont’s senior leadership provided a sustained focus on the compelling need for continuous innovation to add to the bottom line. Their Project Approval Committee was empowered to make decisions, as its name implies, and systematically and periodically evaluate the likely benefits of continued corporate investment. The PAC ensures that projects that move forward have full resources, a key point for EPA to consider should it pursue a PAC-like decision-making structure.
REFERENCES


APPENDIX E – MARRIOTT INTERNATIONAL

Marriott International: Mission and Relevance to EPA
- Marriott International’s mission is to sell room-nights, food and beverage and time shares
  - Franchisees own the hotels
  - Corporate provides the expertise in all aspects of hotel management and operations
- Marriott corporate relationship with franchisee analogous to EPA’s relationship with states on permitting
- Customer relations may have some applications in EPA public involvement activities

Marriott: Causes of Change
- Major rethinking of business model prompted by:
  - Less than successful ventures into diversification
  - Losses and layoffs arising from real estate market crash and economic recession in early 1990s
- Recognition that business strength was in siting, design, and operations, but not necessarily in ownership
  - Franchising lowers risks and debt and yields steadier revenues

Marriott: Innovations
- Transformed model from hotel ownership to management
- Blended consistency with innovation
- Used performance measures to manage brand protection
- Segmented hotel market by customer preferences
- Created culture of “Associates First” to retain employees
- Used information technologies to improve service and profits

Marriott: Change Management
- Communicated role as provider of quality service
- Supported innovation with HR practices and rewards
- Used local settings to test new ideas

Marriott International
By Debra Knopman and Irene Brahmakulam

Introduction
Begun in 1927 as an A&W root beer stand in downtown Washington, D.C., Marriott International is now an international leader of hotel management services, including lodging, food distribution, and senior living businesses. Marriott has more than 140,000 employees around the world and annual sales of about $20 billion.

Marriott International was one of two businesses spun off from the original Marriott Corporation in 1993. The core business of hotel ownership, along with its massive debt, was contained within Host Marriott, and the franchise lodging and food services businesses moved in their entirety to Marriott International. The motivation for the split was to create a business entity, Marriott International, that would be insulated from the risks of real estate markets and property ownership, and instead focused on hotel management through the more profitable and less volatile franchising model.
Our interest in Marriott stems from its frequent identification in the business literature as a visionary company that made a successful turnaround in the early 1990s. Because of its decentralized franchise operations, Marriott appears to have relevance and value as an analog to EPA’s state delegation and permitting processes. Marriott also appears to have struck a profitable balance between enforced compliance with standard operating procedures and active encouragement of innovation and problem-solving among its front-line and corporate employees. Hence, this case study concentrates primarily on the franchise aspects of Marriott International as well as its balancing act between consistency and innovation, relying on literature and interviews with senior executives.

**Marriott’s Core Business and Values**

Marriott International now operates or franchises about 2,400 properties in 65 countries and territories, 47 time-share resorts, 155 senior living communities, 26 golf courses, and 19 hotel reservation centers. It distributes food and related items to 7,000 wholesale customers, including Marriott’s own operations through 13 regional distribution centers.

By most measures, Marriott is a highly successful enterprise. For three consecutive years, Fortune magazine has named Marriott International “Most Admired Company” in the lodging industry. The 2001 American Customer Service Index (ACSI) created by the University of Michigan Business School’s National Quality Research Center rated Marriott International as the best in customer satisfaction for hotels (“America’s Most”, 2002). Marriott was identified as a visionary company by business management experts Jim Collins and Jerry Porras (1997). They describe visionary companies as “premier institutions – the crown jewels in their industries, widely admired by their peers and having a long track record of making a significant impact on the world around them.”

Marriott’s core values are simple and straightforward: an “associates first” culture premised on the belief that satisfied and motivated employees will lead to high customer satisfaction, a commitment to continuous improvement and problem solving, and dedication to hard work and “having fun while doing it” (Collins in Marriott and Brown, 1997). Clearly, the company’s overriding objective is to create wealth, but in the process, it views the heart of its business as making people feel at home while away.

Marriott has distinguished itself in its ability to protect and enhance the quality of its multiple brands under the larger banner of the Marriott name. Profitability is derived from management expertise and high customer and workforce satisfaction. All of its core functions and processes are designed to achieve these conditions for success. In the words of CEO Bill Marriott,

> All of our intense attention to detail translates into consistent quality. Consistent quality leads to high customer satisfaction. Customer satisfaction translates into high occupancy, repeat business, and good room rates. Those in turn bring home good profits and attractive returns to property owners (Marriott and Brown, 1997).

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10 Criteria included: premier institution in industry; widely admired by knowledgeable business people; made an indelible imprint on the world in which we live; had multiple generations of chief executives; been through multiple product or service life cycles; and founded before 1950.
Marriott constantly reevaluates its strategic goals to stay ahead of the competition and remain profitable. The urgency of this continual process of self-examination appears to arise from the strong memories of the early 1990s, when complacency and over-confidence led to a near-death experience.

**Causes of Change**

In the early 1980s, Marriott began looking for ways to diversify its business. It bought fast food restaurant chains like Roy Rogers and entered into the amusement park business. While these seemed like good ideas at the time, Marriott leadership came to recognize later in the 1980s that they did not understand these other businesses particularly well, and consequently, were not making much money from them. At about this same time, Marriott had become one of the largest real estate developers in the United States. The company was opening at least one new hotel a week, and averaging $1 billion in new construction annually. However, by 1990, the real estate market began to weaken significantly and an economic recession took hold. The company edged dangerously close to bankruptcy, prompting layoffs and project terminations (Marriott and Brown, 1997). The company’s leadership was now in the hands of the founder’s son, Bill Marriott, who around this time suffered two major heart attacks.

The need to change was hence thrust on the company from a combination of external forces and internal missteps, but the solution to the company’s crisis came entirely from within. Marriott’s leadership recognized that its survival depended on its ability to better manage risk and to focus on the businesses it best understood. Marriott had become an industry leader in sitting new properties, and was just beginning to master the practice of segmenting the lodging market to cater to different classes of travelers. Up until this point, Marriott had been in the one-size-fits-all mind set of building and operating full service hotels. Marriott also had developed a highly efficient internal food distribution system whose services it came to realize it could profitably sell to others.

The key to Marriott’s turnaround came in recognizing the value in franchising. Franchising hotel management services shifted ownership risk to the franchisee, allowing Marriott to concentrate on its core expertise in operating hotels and other types of lodging and housing services. Marriott would still build hotels, but it would immediately sell the properties, and at the same time, enter into long-term management contracts.

**Franchise Management**

Marriott International’s core business can be viewed as a portfolio of lodging brands – including Marriott Hotels, Courtyard by Marriott, Marriott Residence Inn, the Ritz-Carleton, and a dozen others – differentiated to serve distinct classes of travelers, guests, and residents. Marriott franchises its various brands to property owners. In return for the privilege to use Marriott’s brand name and access to Marriott’s vast network of reservations, marketing, and management services, franchisees agree to pay franchise fees and abide by Marriott’s brand standards and operating procedures.

Marriott receives a base franchise fee and an incentive fee, which is a negotiated share of the hotel’s gross revenues. This creates a dynamic in which both Marriott and the franchisee have strong incentives to maintain the quality of the brand, improve performance, and strive for maximum profitability at individual properties. The franchising fees are Marriott International’s primary revenue source. The base fee is about 3 to 4 percent of a hotel’s gross revenue regardless of profitability. Franchise agreements are typically structured so that Marriott’s share of incentive fees increases as the hotel’s revenue and profits increase (Flanigan, 2002).
This percentage is usually between 15 to 30 percent, but can sometimes hit 50 percent of a hotel’s profit. The franchising fee is also based on the level of services provided by Marriott (Dow, 2002; Brown, 2001).

Marriott’s association with the franchise can run the gamut from simply using the name, marketing resources, and reservation system to running “everything from reservations and maid service to supplies and bookkeeping at its hotels” (Hedgepeth, 2002). These services include:

- Support and advocacy networks to provide real-time assistance in development, financing, pre-opening, operations, and marketing.
- Integrated reservation and revenue management systems to help franchisees maximize revenue using a database of information on guests’ preferences.
- Regional market management teams to assist in cross-marketing among brands, sales, operations, human resources, revenue management, and finance.
- Brand management teams to identify and establish brand strategies. (Teams work across brands to avoid conflict, but also seize on cross-marketing opportunities.)
- Internet and PC-based marketing, sales, and training tools.
- Operations planning and support teams to develop innovative products and services to increase customer satisfaction (Marriott, 2002a).

Each franchisee has a “go to” person at Marriott, who helps on a one-on-one basis. When first joining, franchisees go through a lengthy education and training process beginning with a one-week orientation in Washington, D.C., to learn about Marriott resources and how to use them.

Management by Performance Measures

The Balanced Scorecard is a trademarked measurement tool to objectively measure each property’s ability to achieve sustainable growth, meet operational goals, and uphold the quality of the brand (Marriott, 2002b). The Balanced Scorecard rates the quality of individual hotels against other hotels within the same brand and also against other Marriott brands. Hotels are given scores in four areas: customer satisfaction, associate satisfaction, financial results, and working order. Associate and customer satisfaction are determined through results of sophisticated surveys given to each of these groups.

For each of the four areas, ratings are given through a numerical score and a traffic light coding system. A hotel may receive a green light if it falls within the top 20 percent of the scale, a yellow light if it falls within the 50 to 80 percent range, and a red light if it falls below 50 percent. The Balanced Scorecard results are distributed among all the hotels franchised or owned by Marriott International.

The Scorecard is thus used as an individual measure of performance, as a motivator to spur laggards to improve their performance, and as a highly visible recognition for high performers. High ratings create celebrity status among hotels. If, for example, a Courtyard by Marriott receives a green light for working order, that hotel is considered to be adding value to the brand. Other Courtyard franchisees who earned yellow and red lights are strongly encouraged to learn from the high performer how to improve their working order. The Balanced Scorecard clearly creates a sense of competition among hotels within a given brand, but
it also seems to reinforce the notion that they are mutually dependent on one another to uphold the quality of the brand. In principle, all hotels could receive green lights; in reality, Marriott is continually raising standards to meet new goals.

Sophisticated customer surveys contribute to the scorecard process. In the past, Marriott hotels had a comment card in every room, which was usually only filled out by guests who were either angry, elderly, or young. Similarly, employees learned to skew the system, stuffing the comment box with positive comments to make the hotel appear better than it really was. Now, Marriott uses a tightly constructed Guest Satisfaction Survey, targeting a representative sample of the primary customer classes for each hotel. For example, a survey for an airport hotel is geared toward business travelers. A downtown hotel might cater almost exclusively to convention and meeting attendees.

These surveys provide Marriott and the franchisees with reliable information about the adequacy of their services, areas ripe for change or innovation, and suggestions for performance measures they may be overlooking. Marriott has also made extensive use of focus groups and customer surveys to design the layouts of their hotels, select room furnishings, arrange furniture and lighting, and organize check-in procedures. For example, Marriott discovered in its customer surveys that the check-in process was hotel-focused rather than customer-focused. Guests were forced to deal with (and often tip) a doorman, a bellhop, a desk clerk, and a concierge. In response to this persistent sign of guest discontent, Marriott now draws a wider circle around the check-in procedure and assigns associates to provide more of a seamless web through the whole process.

To promote performance improvement, brand standards are continually being raised. Franchise management and performance are overseen by vice presidents who are assigned to specific regions in North America and around the world (Dow 2002). Regional vice presidents work closely with individual hotels that received red lights to devise improvement plans. If the situation does not improve by the following quarter, the hotel will receive a formal letter of warning. If improvements are not measured within nine months, Marriott considers that the hotel is putting the brand at risk. Under the terms of the franchise agreement, Marriott will either sever ties with the franchisee and revoke its use of the Marriott name, or Marriott will impose strict requirements on the franchisee to fix all problem areas within a time certain (Dow, 2002). The negative economic consequence of a bad apple in the brand is considered sufficient incentive for fellow franchisees (with high ratings) to work with their colleagues at the lower-performing properties to improve their quality.

Other mechanisms for measuring and improving employee performance include the Guest Service Index, which is used by individual property managers to guide service improvement under their control. The Guest Service Index is tied to bonuses and promotion. Marriott also pioneered the use of corporate employees posing as customers. If service is good, the employee receives an on-the-spot award; if service is poor, employees are sent to retraining (they get up to three opportunities to improve before their termination).

Performance measures are also used to build new business opportunities. At the corporate level, Marriott conducts studies to identify feasible markets for its hotel products and services. It then builds the products around the needs of the specific market (Siguaw and Enz, 1999). For example, studies of business travelers revealed their numerous frustrations with such matters as moving furniture to find an electrical outlet for their laptop computers. Marriott heard these complaints, and proceeded to design Courtyard by Marriott to better meet the needs of their business travelers.
As another example of corporate responsiveness based on measures of customer needs, Marriott developed a “customer centric” sales force, which places salespeople where the customers are rather than in a Marriott hotel for easy accessibility. Also, the company created event-booking centers for reserving rooms for meetings in multiple locations, thus permitting “one-stop shopping.”

Managing Change: Balancing Consistency with Innovation
Marriott has developed standard operating procedures (SOPs) for every aspect of its business, and at times, has been teased by others in the industry for its fanaticism with compliance (Marriott and Brown, 1997). Their motivation for adhering to SOPs is to produce consistency in quality and service, which Marriott believes is the backbone of a brand’s performance. Customers return because of the expectation of consistency – no surprises and no hassles – with their last (positive) experience. The corporate view is also that the SOPs provide Marriott and its franchisees with a common framework to evaluate and infuse new ideas. The SOPs are continually reviewed and improved for efficiency and effectiveness. SOPs also substantially ease the opening of new properties and the training of new employees.

The innovation process at Marriott builds on the foundation of consistency in service achieved through adherence to the SOPs. Many of Marriott’s innovations occur at the local hotel level. Hotel managers are empowered to solve problems that arise without asking for permission from the front office. Similarly, Marriott’s regional managers are empowered to manage the process of diffusing innovations to other properties. Another diffusion mechanism is through CEO Bill Marriott, who visits about 200 Marriott locations around the world annually. He returns to headquarters with new ideas, where they become either part of the Standard Operating Procedures or written up in Marriott World Magazine, which goes to associates in every Marriott hotel. There are a few situations or problems in which headquarters finds the solutions and then spreads the word company-wide.

The prevailing corporate view, however, is that most innovation arises at the hotel level in the context of individual problem solving (Marriott and Brown, 1997). For example, a few years ago, Farmington, Connecticut had an extremely low unemployment rate. The Marriott hotel located there had to close several floors because they were unable to hire new employees to do the housekeeping. Through a friend, one of the hotel managers had heard of an organization for the disabled and soon thereafter formed a partnership with it. The managers were able to interview, screen, train and hire some of the disabled for housekeeping positions. Word spread of the success of this program, and similar ones were subsequently set up in other cities.

In Washington, D.C., a Marriott hotel worked with a local agency to hire people on welfare. In New York, Marriott hotels partnered with several city assistance agencies. New employees hired through these programs went through an intensive six-week training course. Managers found that if these employees could manage to stay employed for two years, they tended to become loyal and reliable Marriott associates. In fact, the turnover rate for these welfare to work individuals was significantly lower than those employees who had been hired through normal processes (Dow, 2002; Dow and Cook, 1996).

Use of Information Technologies to Improve Performance
Marriott cleverly embraced information and internet technologies to weave together their multiple businesses and properties, capture huge economies from a unified reservation system, and offer other consolidated
services to franchisees. Each property has its own website tied to the corporate website. Online reservations are now a rapidly growing source of bookings (Whitford, 2000).

One of its information technology-based products is called Marriott Rewards – a multi-brand, frequent-guest program allowing members to earn and redeem points for staying at any of the Marriott lodging brands. Reservations can be made through its website (Turcsik, 2000). The company has also created a web-based system to track customers’ likes and dislikes, which then can be used to tailor promotional offers (Borrus, 2000).

**“Associate-First” Culture/Human Resource Management**

Besides branding its products, Marriott is also trying to brand employment. That is, it wants to be able to “promise a great work experience” to potential employees and then validate the claims through surveys and other performance tools (Marriott, 2000). For five consecutive years, Fortune has named the company as one of the “100 Best Companies to Work For” (2002). Matthew Saperstein, director of human resources for the Atlanta Marriott Century Center, observed that the “respect of colleagues and appreciation of associates is a corporate culture that begins with J.W. Marriott Jr. and flows freely throughout the organization.” The working assumption is that if associates are not happy, then the guests won’t be either.

When asked, associates will say that they work for Marriott International, and then for the specific hotel brand, even when someone else actually owns the hotel. Marriott has created systems to both “attract and retain the most qualified associates and enhance associate loyalty at the property, regional, and corporate levels” (Marriott, 2002c). Marriott uses several different types of training methods.

- Job fairs and screening tools have been developed for assessing prospective associates. Concurrently, cross-brand referrals are made to help associates move ahead in their careers.
- Ninety-day Associate Orientation program: general training and individualized skills learning in areas such as corporate mission, values, business objectives, pay and benefits, getting ahead, supervisory development, aging process, and residents’ rights.
- “Mouse touch/human touch” approach to training – relying both on CD-ROM training and manager-led workshops to train employees with critical job skills.

Associates are required to take at least 16 hours of training per year. Financial support and flexible hours are available to those who want to pursue college degrees or other education. Managers are provided with a common framework to feel part of the Marriott community, adhere to its standards and operating procedures, and represent the company well (“A Snapshot”, 1999). A 1-800 associate resource line was created to help employees with issues ranging from childcare to legal services.

The same training system is used across hotels and brands. Marriott also employs a 10-minute daily training session to maintain a high awareness of SOPs. During the daily training, employees receive a corporate message, personalized to each hotel brand. The message is one of the 21 hospitality standards developed at headquarters. This is followed by a message that is unit-specific and may be something as simple as reminding employees to smile when dealing with guests and one another.
Retention rates appear highly correlated with the quality of initial training and the work experience during the first 90 days. To improve the initial job experience, Marriott uses a buddy system with its new employees, partnering them up with employees that have been in their positions for a period of time (Dow, 2002). Marriott also uses training as a retention tool to help associates advance within the company. More than 50 percent of Marriott’s managers have been promoted from within the company as a means of preserving corporate culture.

Because many process innovations and new ideas occur at the hotel level, the reward and recognition system is largely hotel-based. At the hotel level, awards are often given on the spot when good deeds are done, rather than at a set time for only one individual as occurs in “employee of the month” programs. Awards may be a dinner for two at the hotel restaurant, a weekend stay at a hotel, or recognition at a staff meeting (Dow, 2002). At a more formal level, Marriott has established an Associate Appreciation Day to praise and recognize all of its associates for their hard work. The J. Willard Marriott Award of Excellence (given out once a year) and the Tiefel Awards (given throughout the year) also recognize associates for “above and beyond” type service or innovation.

Relevance to EPA
Marriott presents several useful analogs to EPA’s regulatory mission and culture. Like EPA, Marriott’s franchising business requires strict adherence to standard operating procedures, analogous to regulations and permits. However, Marriott also recognizes that specific circumstances with individual properties and guests require flexibility. Associates are strongly encouraged and empowered to solve problems on the spot, and not wait for permission from corporate managers. New ideas that meet the test of improving some measured aspect of performance are diffused through the organization, typically beginning at the local level and then moving through Marriott’s regional network.

Another area of interest for EPA is Marriott’s evolution of multiple brands and market segmentation to deal with different types of customers. This is analogous to the vast differences within the regulated community by sector, size, and willingness/ability to improve on performance outside of the box of conventional regulatory solutions. Marriott was able to expand its market share in the lodging industry by catering to different classes of customers, and improving their delivery of services to the various market segments.

A third important analog is Marriott’s structuring of franchise agreements. To some extent, these agreements look like both permits and National Environmental Performance Partnership System agreements with the states (as they might be). The agreements specify numerical performance targets, compliance and reporting mechanisms, and consequences of failure to comply. Unlike permits or NEPPS agreements, however, these franchise agreements also include carefully structured incentives for both the franchisee and Marriott to perform at their highest level. Marriott is expected to deliver a set of services to help the franchisee maximize profits. This is akin to EPA, at either the regional or headquarters level, providing states with technical assistance, monitoring technologies, and program resources. The franchisee is expected to produce results consistent with Marriott’s brand requirements. When both sides do their jobs well, they both reap rewards.
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# Procter & Gamble: Mission and Relevance to EPA

- Mission is to profitably manufacture consumer products with quality and value
- Large, multifunctional, and geographically dispersed organization
- Relationship of corporate management to business units analogous to EPA HQ and regional offices
  - Decentralized decision making, some degree of organizational inertia
- History of product and process innovations

# Procter & Gamble: Causes of Change

- Company appeared to be “losing its edge” during 15 year drought of new brands
- Perceived loss of competitive advantage and falling market share

# Procter & Gamble: Innovations

- Established “key customer” liaisons
- Implemented model of “Connect and Develop”
- Funded “communities of practice” across organization

# Procter & Gamble: Change Management

- Structured process to develop new brands
- Invested and supported internal collaboration, new ventures
- Experimented in the marketplace
- Established Innovation Leadership Team
- Supported change through sustained leadership
- Provided rewards and recognition for innovators
- Focused incentives on quality of work more than money

## Procter & Gamble

By Parry Norling and Susan Resetar

William Procter, a candle maker, and James Gamble, apprenticed soap maker, formed the Procter and Gamble (P&G) enterprise in 1837. P&G is now a $40 billion company with 106,000 employees in more than 80 countries. It develops, distributes, and markets products for fabric and home care, baby care, feminine care, beauty care, health care, and food and beverages, selling more than 250 brands to five billion consumers in 130 countries. P&G brands include such household names as Tide, Pampers, Puffs, and Bounty. P&G was built on its ability to make critical connections between in-depth knowledge in one marketplace or technology and other areas, for example, taking its knowledge of soap making and applying it to shampoo, or soft papermaking and applying it to diaper manufacturing.

Our interest in P&G stems from its highly structured approach to innovation developed in response to a 15-year drought of new products. P&G focused on the product innovation concept of “connect and develop” (C&D) rather than on a more traditional linear, and sometimes, insulated view of research and development (R&D). C&D encompasses a set of structures to improve the flow and exchange of information and new
ideas across P&G’s global enterprise (40 percent of its 8,000 research staff are outside North America); receive and act on continuous feedback from consumers; and rapidly move good ideas into the marketplace. Besides product innovation, P&G continues to experiment with new business models, including their approach to branding and their interactions and relationships with customers.

P&G’s Core Values and Mission
P&G believes that innovation is the cornerstone of its success and its people are its most important asset. It has built its global workforce around five core values: leadership, ownership/ accountability, integrity, passion for winning, and trust. These values are embodied in their employee recruitment, reward, and retention programs as well as the various corporate structures developed to ensure a sustained commitment to innovation.

Causes of Change
Until a few years ago, P&G had not introduced a new brand since 1983. Over this same period of time, P&G’s research enterprise became more geographically dispersed; the informal exchange and cross-fertilization among and between researchers and marketers in their headquarters lunchroom no longer captured the breadth of expertise within P&G or tapped into expertise outside of the corporation. Also in the 1980s, market conditions were changing rapidly; reducing time-to-market became a major competitive advantage for firms. Over-conservatism in product development led to many missed market opportunities and losses of market share. One example given was P&G’s early development of ready-to-use cake frosting, but its failure to market the product because of its belief that women who baked cakes would prefer to make their own frosting (Brunner, 2001). P&G essentially missed the major shift in consumer preferences for prepared foods as more women entered the workforce and time devoted to food preparation diminished.

P&G leadership recognized that these changing conditions required a different approach to technology development and marketing. The source of new technologies became less important than taking whatever good ideas were available – whether developed in-house or externally – and rapidly moving them into marketable products.

Overview of Key Innovations
P&G pursued both structural and procedural changes to stimulate a culture of innovation and a faster track for new product development. Several themes emerged:

- CEO leadership
- Senior-level innovation leadership team
- Internal venture capital fund for new ideas
- Importance of information flows to innovation
- Focus on relationships with suppliers, distributors, and particularly customers.
- Linkages to external sources for ideas and technology.
- Brand competition to avoid complacency
- Human resources policies to match needs of an innovating organization
Structuring the Innovation Process

Gordon F. Brunner, former Chief Technology Officer at P&G, was a major factor in product innovation and helping P&G become a global business. He provided the impetus behind the full globalization of P&G’s R&D operations where today over 8000 technical people are deployed at 19 technical sites in 9 countries. In 1991, he became the first R&D head to be appointed to P&G’s Board of Directors.

To accelerate the pace of innovation, Brunner led the re-engineering of the company’s innovation process with special emphasis on the upstream pipeline of breakthrough products. Brunner created an Innovation Leadership Team (ILT) to build internal capability for innovation, provide seed funding for initiatives in existing businesses, and provide funding for new businesses. Since 1994, the ILT has served as the company’s venture capital board with a $225 million annual budget to invest in ideas that come up from existing businesses and corporate R&D. (The ILT began with a budget of $10 million.) The ILT provides counsel on improving the potential of submitted ideas, authorizes financial support, and provides incubating services for those ideas with promise. The ILT may give ideas on how to better serve customer needs, how to access outside alliances, or build relationships. The ILT may make interventions during business strategy reviews to ensure that data are gathered and analyzed from complementary markets, not just those within the immediate interest of the unit.

Creating these formal mechanisms for funding high-risk, early stage projects sends the message that this type of innovative work is highly valued and that informed risk-taking – and possible failure – is acceptable. This message must come from the top and its credibility reinforced by performance review and reward systems.

P&G also uses a structured process for later stage projects, using clear and measurable criteria during new product development reviews, which occur when a project is established, in-progress, and commercialized. The new product launch system uses a go/no-go stage-gate process. New products undergo laboratory testing as well as extensive consumer and market research before a commitment is made to larger field tests and eventually commercialization. Well-understood and transparent processes such as the ILT process and the later-stage process help create a supportive environment for innovation.

In the last two years, building on higher levels of R&D investment in concert with the innovation process changes, 15 new P&G brands entered “learning markets”; six of these brands have expanded into national markets. Although P&G holds more than 24,000 active patents worldwide and receives about 3,800 new patents each year, it cares most about turning new ideas into marketable products (Procter and Gamble, 2002a). In 1995 P&G won the National Medal of Technology for developing and applying technologies to consumer products.

Leadership at the Corporate Level

The P&G website and our interviewees consistently stated the importance of leadership in supporting and sustaining innovation (Procter and Gamble, 2002b; Brunner, 2002). Throughout the company’s history, P&G CEOs have recognized the valuable role innovation has played in the success of the enterprise. Gordon Brunner emphasizes that the primary determinant of a supportive environment for innovation is an active CEO. For example, simply committing funds is not sufficient; the CEO must personally participate in decision-making.
The importance of CEO involvement has a pragmatic dimension. Because innovation requires challenging the status quo, it may lead to eliminating or downgrading existing businesses. As a result, certain parts of the company may feel threatened and work to sabotage new ideas. Lower levels of leadership within the organization are often unable to transcend these real internal threats to existing business units and traditional practices.

**Improve Information Flows Internally and Externally**

P&G has taken an aggressive stance toward improving information flows to support innovation. P&G has several initiatives that seek to gather and disseminate information on a range of issues from technology developments to customer interests under the rubric of “Connect and Develop.” The point of C&D is to improve the focus and effectiveness of R&D by making the connection between “what’s needed” and “what’s possible.”

Connect and Develop includes improving links internally and externally. C&D initiatives include: use of the corporate intranet and “smart” report systems for knowledge sharing, global technology forums, communities of practice, technology entrepreneurs, joint technology developments, licensing of intellectual property, use of government and university research capabilities, and a recent connection-making exposition at P&G called Innovation 2000 (Sakkab, 2000).

Brunner created a Global Technology Council. The Global Technology Council is comprised of the business unit technology directors, corporate R&D managers and other key R&D personnel from many corporate locations. This council looks for ways to leverage capabilities existing within the business units and identifies areas for exploratory research and early-stage product development. In recent years, this internal venturing has been extended to creative external venturing approaches with traditional and non-traditional suppliers, universities and federal laboratories. Brunner received the Industrial Research Institute Medal in 2000 “for his contributions to consumer products that improve the quality of life for the world’s consumers; for his leadership in creating an effective, global R&D organization built upon technical mastery, passion for new technology connections, and diversity; and for his visionary leadership in creating a portfolio of discontinuous, innovative business ventures that provide dramatically new product benefits and new-to-the-world products.”

Another initiative was the formation of 20 formal “communities of practice,” which are funded networks across the corporation. Areas of focus for the communities range from biotechnology to packaging to perfume/flavor. The purpose of the communities of practice is to “promote cross fertilization and diffusion of expertise” (Sakkab, 2000). They accomplish this in a variety of ways. The network may be used to locate subject experts or to solve a problem. Some hold seminars. Each community is sponsored by an R&D vice president and some have full-time staff leading them.

A global technology network within P&G, known as InnovationNet, has increased the effectiveness of its R&D enterprise. On InnovationNet, 18,000 innovators (in R&D, marketing, purchasing, patenting, and manufacturing) can trade information and make connections across the company. InnovationNet helps

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11 The full list is analytical, biotechnology/life sciences, colloid and surface chemistry, 3D visual computing, fiber, functional polymers, imaging, malodor control, microbiology, organic chemistry, packaging, perfume/flavor, process community, products research, regulatory and clinical, robotics, sensors, skin science, statistics/math, wipes/substrate-based products.
innovators make new connections, collaborate, and cross-fertilize expert knowledge. Nine million documents are on line. The site hosts 600 websites for Global project teams and individual websites for the communities of practice. P&G believes that the improved communication has doubled productivity by allowing more rapid access to information already available within P&G.

Connections to external sources of technology are also part of the process. Where the company was once quite insular in its operations, P&G now actively pursues joint technology agreements with other companies, universities, and strategic suppliers to bring in new knowledge. A master collaboration agreement outlines operating conditions, intellectual property rights, and other terms. P&G also has pioneered the “learning acquisition” – taking on a small firm to provide its employees with the opportunity to directly learn skills in a new business, market, or technology. For example, P&G acquired a bakery to learn about soft cookies. More recently, it purchased Tender Leaf Tea to learn about a growing category of the beverage business (Roberts and Berry, 1985). It has also made tactical acquisitions, such as buying Laundromats during the development of Bounce fabric softener to understand customer usage of the product.

Stay Close to the Customer
In P&G’s view, the goal of R&D is to create products that meet the most demanding of consumer needs and outperform the strongest competitive products wherever they exist. The key is to have the researcher closely linked or connected to the marketplace.

P&G made a multi-million dollar investment in “Innovation 2000,” which brought together suppliers, distributors, customers, and many in P&G to explore a myriad of new ideas to catalyze the innovation process. Innovation 2000 was aimed at changing the culture to become less internally directed and constrained, with a goal of having half of P&G’s innovation eventually come from external partnerships. An immediate goal of the first staging of the forum was to have each business unit come away with one major new product idea to develop; this goal was exceeded. Over 2,200 ideas resulted from the forum. These were captured in real time in a database, with the most promising later tapped for further development (Sakkab, 2000).

P&G has also established a joint organization with Wal-Mart, P&G’s single largest customer, to manage the highly complex, mutually important relationship between the two companies. Staffed with employees from both companies, this organization is an extension of an earlier innovation at P&G, key customer account managers.

Human Resources Incentives
P&G places high value on its policy of hiring from within. There are three principles that guide human resources practices at P&G. The first, and most important, is to provide challenging and interesting work. The second is to recognize the contributions either through honorary societies (Victor Mills is the highest honor at P&G) or through bonuses (CEO Smale established a trust fund to recognize and reward innovators). The third principle is to recognize that a relatively few managers and technologists play a major role in stimulating change and learn to tap into their capabilities. P&G has dual career paths that allows technologists to achieve commensurate pay without management responsibility (James 2002). These individuals are nurtured within the corporation as “stars” whose incentives and rewards are commensurate with the value the company places on innovation. P&G recognizes that not everyone is or should be in this
class, but that a few well-placed individuals throughout the organization can have a large impact on P&G’s ability to stay ahead of its competition.

Innovation requires that workers are motivated to seek challenging goals (Brunner, 2001). Leaders of the various facets of innovation also need personal entrepreneurial skills that support exploring entirely new approaches. This type of individual is quite different than a manager skilled at keeping a well-honed operation on track. There has to be a strong interest in experimenting and willingness to take informed risks when a certain outcome is not possible to know (Brunner, 2002). As a more general matter, to reinforce a desire for change, P&G employees in setting annual goals are expected to show how they will change their jobs in the coming year (Tushman and Anderson, 1997).

P&G invests heavily in training to further stimulate innovation. Website-based training is available on how to manage the innovation process. There are internal technical symposiums, an electronic system for sharing knowledge, and a liberal policy for attending professional society/technical meetings (Procter and Gamble, 2002b).

**Brand Competition**

In the 1930s, P&G’s leadership was concerned that complacency would settle in as the company became tops in its field. The decision was made to let P&G brands compete directly with one another, almost as if they were from different companies. The competing brand management structure became a powerful approach to stimulate change and improvement from within, and was eventually copied in one form or another by nearly every U.S. consumer products company (Collins and Porras, 1997).

**Lessons Learned**

P&G’s experience clearly suggests that top management support for innovation must be strong, clear, and sustained. This goes well beyond corporate cheerleading to the specific need to make decisions that may have a negative effect on some parts of the business while having a positive effect on the overall performance of the corporation.

P&G appears to have a highly sophisticated approach to human resources that does well in differentiating the different kinds of talent and risk-taking required in different positions throughout the organization. P&G recognizes that not everyone in an organization needs to be entrepreneurial or innovative, but core leadership positions do require such individuals who are willing to take informed risks and push beyond the status quo.

Interestingly, for a consumer products business, it took a 15-year drought in new products to recognize the need to vastly improve their relationships with key customers and better understand consumer preferences. P&G works horizontally rather than vertically with a customer like WalMart to be more responsive to their specific needs. This represents a major shift away from a one-size-fits-all sales force model that basically views its job as selling rather than listening and responding to customer preferences.

**Relevance to EPA**

P&G’s use of the Innovation Leadership Team may have applicability to EPA. Leadership on innovation was made more credible by a series of specific and concrete measures to fund and support internal collaboration,
new business ventures, and communities of practice. In the context of EPA, these are all measures that could be taken in full partnership with the states, tribes, and others with little or no legal or regulatory implications.

“Communities of Practice” appear to have considerable merit in bringing together individuals across organizational lines with the agency as well as with states, tribes, and others who can share critical knowledge in particular areas like permitting, compliance assistance, budgeting, and monitoring. The benefit is to more widely share information that might otherwise be inaccessible to individuals in other offices and increase the collective knowledge about potentially valuable innovations.

P&G established key customer liaisons with their largest customers like WalMart. In the context of EPA, this kind of relationship would need to be carefully shaped to provide maximum benefit for the environment, administrative efficiencies, and time and resource savings to the regulated entity. Because of the regulatory relationship, EPA might not be able to carry the liaison idea as far as the collaborative character of the P&G relationship, but might be able to strike an appropriate balance of improved communication, elimination of redundancies, and honoring the need for objectivity as a regulator.

P&G’s human resources practices may have applicability to EPA. Specifically, their recognition and reward systems are designed to reinforce innovative behavior among employees who are in key leadership positions. They have found a way to reconcile their commitment to promote from within with their compelling need to interact more with experts and entrepreneurs outside of P&G.
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APPENDIX G – BIBLIOGRAPHY OF INNOVATION MANAGEMENT

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This report can be downloaded at no cost from http://www.rand.org/publications/DB/DB393.

RAND used a case study approach to provide examples of public and private sector organizations that had succeeded in becoming more innovated, and in the process, systematically developed “system for system change” to manage the change process. The logos on this page represent the organizational case studies described in the report on the Food and Drug Administration, the Veteran’s Health Administration, the U.S. Customs Service, DuPont, Marriott, and Proctor and Gamble.

Effective March 1, 2003, the U.S. Customs Service is no longer an agency within the Department of Treasury, but is now under the Department of Homeland Security as U.S. Customs and Border Protection.