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Mr. Chairman and Members of the Subcommittee, I am Raymond Wells, Chief Technology Officer, U.S. Federal Industry and Vice President of Strategic Transformation for IBM's Software Group.

IBM appreciates the committee's invitation to talk about Federal Enterprise Architecture. We are pleased to submit this written testimony for the committee's record.

My message to the Committee today is rather simple. The focus provided by the Federal Enterprise Architecture initiative of the Office of Management and Budget is sound policy. It helps agencies leverage their technology and their operational processes to focus on strategic priorities. This will be of enormous benefit to the government, citizens and vendors.

Simply put, an Enterprise Architecture is a framework, or more specifically, a set of interlocking frameworks that must have at their core the organization's mission and strategy. The framework will define the infrastructure and technological capabilities that the organization requires, as well as the business processes and data it needs to accomplish its mission. At a high level, we have a technical architecture and a business process or business reference architecture; and, to reiterate, both must strongly reflect and be aligned with the organization's mission and strategy.

An agency preparing its Enterprise Architecture should avoid considering it to be an academic exercise or an obstacle to be overcome in the acquisition process. Key business processes should guide and provide the priority for information technology investments. Enterprise Architecture is not about technology. Rather, it is about the strategic management of technology resources to provide the installation and manifestation of efficient and effective business processes. Tactical management of technology is excessively expensive; EA provides the framework for strategic allocation of information technology resources.

The Office of Management and Budget's Federal Enterprise Architecture (FEA) begins with a correct assumption. An Enterprise Architecture is more than technology or processes. It is strategic. It must be continually assessed and actively managed in order to align the organization's vision and its information

technology investments, and to facilitate the achievement of the Agency's initiatives, and, ultimately, its mission.

Technology's primary purpose is to act as an enabler of efficient and effective processes. The use of information-systems technology has evolved from the automation of simple but repetitive tasks to the management of complex business and mission processes today. Most organizations can no longer function if automated systems are unavailable.

Now technology is shifting to become a key component of service delivery.

Industry discovered during the 1990's that a paradigm shift had to occur in the management of information technology assets. They needed to be managed as a strategic asset not a collection of tactical assets. A generation of easily deployed technologies resulted in the proliferation of hardware and software assets managed by different organizational entities with various levels of expertise.

The result was extraordinary inefficiency in the application of technology assets and a resulting inefficient cost structure.

International Business Machines Corporation, by focusing on using technology to enable core business processes has reduced its cost structure significantly, allowing us to use that money in the pursuit of core business purposes.

The lesson is simple: the strategic management of technology assets, aligned to core business processes, is far less expensive and far more productive.

Let me elaborate further on IBM's transformation in the utilization of technology, and show its obvious relevance to the business-modernization efforts in progress within the Federal Government.

IBM's Business Transformation

IBM has undergone a major financial, competitive, and cultural transformation since 1993. That year, a new vision took hold within IBM that sought to refocus on the customer and the marketplace as the measure of success, and recreate the company as an integrator that could translate technology into business value.

The need for this transformation was self-evident: In 1993, our stock price hit a 20-year low. We posted an $8.1 billion loss. We failed to recognize fundamental changes in the marketplace and saw our profit margins evaporate. IBM operated 24 separate business units, which together sold more than 5,000 hardware products and 20,000 software products. Efforts at cost-cutting and efficiency were dampened by our size and complexity of our operations.

IBM's transformation began with a fundamental examination of everything the company was doing and the processes by which the enterprise was being run. Cutting costs and driving common processes and systems across the entire global IBM organization became the key to going to market as One IBM. Among our efforts:

- Internal Business Processes -- By consolidating and focusing on our internal business processes, IBM improved our time-to-market by 75 percent. This saved more than $9 billion.

- Software Applications -- Prior to our transformation efforts, IBM ran more than 16,000 unique software programs. Now that number is less than 6,000.

- Infrastructure -- Within IBM, we consolidated 155 data centers, 128 CIO positions, 31 private networks and hundreds of different PC configurations into: 12 data centers worldwide; one network; four PC configurations; and one CIO.

These were but a few of our internal accomplishments.

As a recent IDG case study put it, “Since IBM embarked on its business transformation nearly a decade ago, the company has gone from a collection of siloed business units to an agile and integrated enterprise focused on the customer.”

IBM has seen direct business results from this transformation:

- From 1994 through 2003, IBM’s e-business transformation efforts have realized $17.4 billion in cost savings from $6.4 billion in investment.

- From 1993 to 2003, IBM reduced IT spending by 31 percent, while increasing our IT resources about 2.5 times (since 1996) to support new applications and processes, additional workload volume, enhanced functionality and acquisitions.

- We have continued to move procurement to the Internet, now purchasing some 95 percent of goods and services electronically, generating more than $400 million in cost avoidance.

Now we have taken our EA-enabled transformation a critical step further: creating the e-Business On Demand model that we believe will be the driving force in global business in the near future and beyond.

An on-demand business is an enterprise whose business processes -- integrated end-to-end across the company and with key partners, suppliers and customers -- can respond with agility and speed to any customer demand, market opportunity or external threat. An on-demand business:

Is **responsive** -- responding almost intuitively to dynamic, unpredictable changes in demand, supply, pricing labor, competitors’ moves, capital markets and the needs of its constituencies -- customers, partners, suppliers and employees.

Uses **variable** cost structures and adapts processes flexibly. This flexibility will enable it to reduce risk and to do business at high levels of productivity, cost control, capital efficiency and financial predictability.

Is **focused** on its core competencies, its differentiating tasks and assets, while tightly integrated strategic partners manage selected tasks -- from manufacturing, logistics and fulfillment to HR and financial operations.

Is **resilient** enough to manage changes and threats -- from computer viruses, to earthquakes, to spikes in usage -- with consistent availability and security.

IBM believes that as governments, including the United States and its agencies, adopt and embrace the on-demand model, our leaders will be enabled to see and manage their agencies as an integrated whole, central to the transformation process.

What are the Benefits of an Enterprise Architecture?

The IBM story has obvious parallels to the federal government's EA efforts. That brings us to the benefits of the Enterprise Architecture. The primary benefits of an Enterprise Architecture are to move toward common processes and systems, department-wide and cross-agency where appropriate, and to foster more efficient communication, collaboration, and cooperation, through shared business processes and information. It also has the additional advantage of helping to create a unified "culture" within the agency.

A living Enterprise Architecture:

- **Provides a migration path to get to the strategic infrastructure / capabilities**
- **Facilitates program planning and acquisition decision-making**
    - Use and reuse of common components
    - Utilizes consistent frameworks, blueprints, process models, technology
    - Prevents duplicate data being created/deleted by multiple processes
    - Facilitates a simplified technology infrastructure
    - Makes it easier to mix and match, and to use best of breed solutions
    - Impact of changing process or technology can be evaluated

Improves time to program implementation

- Better identification and clarification of scope of project start
- Uses a structured approach to management and development
- Improved communication through a common approach (frameworks, blueprints, processes)

- **Improves resource allocation**
  - Assists in preventing process or technology gaps and overlaps
  - Creates a more flexible technology infrastructure that is transparent to the user
  - Includes allocation of people, time, and money
- **Facilitates continuous improvement**
  - Technology changes and upgrades are hidden from the users
  - Able to apply any new programmatic or process scope requirement
  - Metrics and measurements are designed into the process
- **Provides more flexible and robust, integrated processes and applications**
  - Includes integration of security and privacy elements into the framework and processes
- **Assists prevention of unnecessary organizational role development**
  - Uses consistent roles and relationships

What are the keys to implementing a successful Architecture Management Process?

- Proper organization and staff must be in place. EA organizational alignment with the functional organizations is key.
- Clear ownership of the Enterprise Architecture at each level, with specific process owners, component leaders and department and agency participation
- Active sponsorship and championing including visible management support from Senior Officials

- Proper level of resources (people, tooling, etc.) must be obtained and sustained to support all priority transformation operational initiatives.

  An Architectural Management Process, such as the Federal Enterprise Architecture Management System (FEAMS) needs to be clearly defined and understood. The process must be flexible enough to adapt to departmental needs and changes as necessary. It must be a dynamic process that adds real value to the agency, not just something to be ticked off on the checklist.
- The organization must have effective communications and distribution of the process. The Enterprise Architecture must be constantly and consistently marketed by the staff and departmental leadership. The process must be built into the culture of the agency and its mission.

What is the Federal Government Doing Right?

I would say that at the leadership and framework level the Federal Government is approaching FEA in very much the right way. The Architecture has been defined (all 5 major elements of it), there is a program office in place within OMB to help manage the process, and there is a Management System (FEAMS) now available that gives agencies the tools to assess their requirements and to develop and implement their own Enterprise Architectures. FEAMS also includes a repository of process solutions from other agencies that can be reused or extended, to avoid duplication and to better leverage available resources.

At the OMB level, and from an outsider's perspective, it would appear that the process is being well enforced. EA-related submissions are required as part of agency budgetary requests, whether programmatic or IT, and help to define the value and results expected, and how the proposed expenditures fit within the strategic framework.

As part of this process, OMB has given the agencies a high-level framework, along with tools and guidance, to do Enterprise Architecture Assessments. Among other factors OMB considers are the maturity of an agency's EA, including the status of the agency EA development, and how capable the EA is of being able to guide the agency's strategic investments. A successful EA implementation will give the agency an extremely powerful mechanism to enable successful transformation in achieving the agency's mission.

The other major factor: how is the agency EA being integrated with the broader FEA model. Consistency with the broader FEA model is important for broader collaboration and information sharing, as well as for cross-agency solutions.

The annual Exhibit 300 performance review requirement establishes metrics for how an agency is progressing in its strategic implementations, and what value has been created by its actions, including those in developing and implementing

its EA. This creates quantitative assessments that demonstrate both value and good management. Agency EA progress is further monitored through the quarterly scorecard reviews.

Is there room for Federal Government improvement in implementing the FEA?

The opportunity for Enterprise Architecture improvement is not one that is limited to the Federal Government, but since that is the question asked, I'll answer, yes, there is room for improvement.

I believe the question is not, is the right framework and management guidance in place through the efforts of, among others, OMB, the Federal CIO Council, as well as legislative guidance and oversight by the Congress. I believe that framework and guidance is good. What needs to be done now is to assure that departmental and agency leadership have bought into the EA process and are driving their organizations accordingly.

What we see, if we examine the OMB scorecards, is that some agencies are moving much more rapidly than others in developing and implementing their EAs. In some instances, this can be explained, not by a lack of interest or leadership, or by a lack of actual hard work, but by the complexity of the technological capabilities and operational requirements that need to be mapped. As an example, one only needs to look at the very good work the Department of Homeland Security is doing to determine how great is the effort needed to identify these requirements and to create an architecture to integrate the technological infrastructure and processes of the 22 component agencies of that department.

The Department of Defense Example

Perhaps no better example exists of the challenges facing the Federal Government than that of the U.S. Department of Defense. With over $1 trillion in assets, an annual budget of $378 billion and 3 million military and civilian employees, as well as global missions, facilities and suppliers, DoD may be the world's largest and most diversified enterprise. Therefore, the DoD's enterprise architecture is the largest, most complex and most pervasive enterprise architecture developed to date, either in the public or private sectors.

Historically, the Department's Services and agencies have used many individual procedures to conduct their work, as well as a multitude of systems to support those procedures. Most of these business processes have focused primarily on the Services' and agencies' own operations. This has placed limits on DoD's ability to provide timely, accurate, and reliable business and financial-management information, and to share information. This, in turn, has created higher-than-necessary costs for performing the business of defense.

In April 2002, as part of its Business Management Modernization Program (BMMP) the U.S. Department of Defense (DoD) contracted with IBM, working with other subcontractors, to develop a framework to transform and modernize the way DoD conducts all of its business operations, including strategic planning and budgeting, financial management and accounting, installations and environment, human resources, logistics and procurement. This framework has four main keystones: 1) A "to-be" DoD Business Enterprise Architecture; 2) A capabilities-driven Transition Plan; 3) Portfolio management and system assessment; and 4) A transformation governance and champion organization. Developing this framework has been and remains a massive undertaking involving over 2,000 information systems and many thousands more business processes.

I want to focus on the Business Enterprise Architecture, or BEA, which has been created from the many capabilities and thousands of business processes I mentioned. The BEA model represents the enterprise end-to-end operational processes and activities, information exchanges, and the corresponding systems and technology requirements, that is, it identifies the "to be" capabilities. The model is executable because it provides a clear template for programs, solutions, and other key operational outputs that enable the end-to-end missions of DoD Services and Agencies. The operational results of these BEA-compliant programs and solutions will collectively achieve DoD's Enterprise strategic goals. The BEA model is also executable because it facilitates the development of a Transition Plan based on BEA-based strategic capability needs. Finally, the BEA model is executable because an acquisition and management system can be put in place to oversee the Transition Plan.

To give you an indication of the scope and complexity of the effort, it took a year to develop the initial version of the Activity Model of the DoD Business Enterprise Architecture, which was delivered, on schedule, on May 1, 2003. This Activity Model is part of the "to be" view of the architecture that will drive DoD's business operations in the future. The Activity Model depicts more than 740 activities, 2,589 information exchanges, 9,946 definitions, 76 data stores, 1,081 business rules, and 4,020 business and financial requirements.

Culture change is a key component of BMMP. Hundreds of existing policies will change. Dozens of existing systems will be modified. More than 1,000 existing systems will be phased out and more than 100 new systems will be implemented.

The Business Management Modernization Program will enable DoD to provide greatly improved support for the warfighter. The program will aid DoD in a vast array of tasks, from the mundane, such as issuing supplies on time and with reduced paperwork – to those critical to our country's defense, such as identifying chemical warfare experts through an integrated employee information

profile, or pinpointing what munitions are available at any given place at any given moment. It will also help the Department to accomplish its primary goal to achieve a Clean Audit Opinion by 2007.

The DoD Business Enterprise Architecture is just the first step on a long road to transformation. Results and change are often evolutionary, not revolutionary. In building the BEA, we are developing a Defense-wide information technology infrastructure that will include all appropriate system requirements associated with critical infrastructure protection and information assurances to ensure consistency with DoD's Joint Technical Architecture. The architecture is still evolving and will be updated continually. Further business process re-engineering and definition of data requirements can be expected in the future.

Furthermore, realizing that there must be an active and implementable plan of action, we are taking steps to ensure that the transition plan correlates with the architecture and that it contains measures that help us control future investments in business systems. It will also encourage retirement of outdated legacy systems as quickly as possible.

BMMP Accomplishments

While we have indeed encountered challenges implementing BMMP at the Department, we are already seeing measurable results that have positive impacts on the Department's business processes and capabilities. These successes include the following:

Developed and implemented a broad-based program strategy.

Created initial versions of a Business Enterprise Architecture (BEA) and a Transition Plan.

Established a Department-wide governance structure for business transformation.

Outlined a portfolio management process and corresponding system-assessment process design.

Developed the methodology for business processes reengineering and modeling.

Provided extensive support for business process reengineering in the target areas.
Developed an initial inventory of business systems.

Identified relevant accounting and financial rules and requirements necessary to correct material weaknesses in the Department's Financial Statements and the corresponding financial transactions.

Identified the basic template for a Standard Accounting Code Structure. Developed the template and pro forma entries for implementation of a Standard General Ledger.

Developed an initial Business Process Reference Model to use as a starting point for Business Process Reengineering and Modeling across the Department.

Challenges/Lessons Learned from the DoD BMMP Activity

IBM is aware that adapting transformation models from the private sector to the Federal Government structure is not easy. At DoD, given the shared military and civilian leadership, the culture differences among the Services, varied infrastructure stages of development, existing policies and past practices, delivering a top-down model for implementation is formidable. The breadth, depth and different missions, compounded by national and international interests, add further complexity. There will continue to be a need for change management and individual Service involvement in the planning and execution stages of the BEA development and implementation, just as there is with other agencies, and in the private sector. Further, as ongoing DoD transformation activities emerge that must be considered and integrated into the enterprise architecture, we and DoD will work with all interested and affected stakeholders to receive their support and ideas to enhance the BEA and expand it to include all relevant transformation activities.

Conclusion

We believe the focus on Enterprise Architecture is a key process in the United States Government and its Agencies being able to achieve the same results.

Total cost of ownership of providing technology is the only true measure important. Typical considerations exclude so-called hidden costs. Many focus on the highly visible cost of acquisition of hardware, software and bandwidth. In most industry activity based cost analysis, the human capital costs exceed the technology cost. Certainly that is true in many federal agencies today.

The focus on the Enterprise Architecture process should be the basis for evolution from the tactical, even sub-tactical, management of technology assets within the Federal Government to a more strategic focus. The Federal Enterprise Architecture provides a foundation for governmental transformation which will enable agencies more effectively to accomplish their missions by strategically leveraging their information technology investments and operational processes.

Thank you for the opportunity to discuss or views and experience with you.

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