

## Bridging the Data Gap in Federal Asset Management

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### Abstract

Significant initiatives in the last few years to improve the Federal Government's management of its vast and diverse portfolio of real property holdings, valued over \$328 billion worldwide, have experienced mixed success. As highlighted in 2003 in the Government Accounting Office's High-Risk Series report on Federal Real Property, the government portfolio was beset with long-standing problems of excess and underutilized property, deteriorating facilities, unreliable data, and costly space challenges.

The initiative to standardize real property assessment of federal facilities is a positive step, but without further refinement, may create more confusion as existing business models and technology are being adapted by each agency in different ways.

## Real Property Asset Management: An Recent Initiative for the Federal Government

Significant initiatives in the last few years to improve the Federal Government's management of its vast and diverse portfolio of real property holdings, valued over \$328 billion dollars worldwide<sup>1</sup>, have experienced mixed success. As highlighted in 2003 in the Government Accounting Office's High-Risk Series report on Federal Real Property, the government portfolio was beset with long-standing problems of excess and underutilized property, deteriorating facilities, unreliable data, and costly space challenges. The initiative to standardize real property assessment of federal facilities is a positive step, but without further refinement, may create more confusion as existing business models and technology are being adapted by each agency in different ways.

The desire for a government-wide effort to track, manage and measure real property business practices was reinforced when President Bush signed Executive Order (EO) 13327 for Real Property Asset Management in February, 2004 as part of the overall President's Management Agenda (PMA) to improve the management of the Federal Government.

The directive established the Federal Real Property Council (FRPC), under whose aegis a government-wide real property inventory was established (christened the FRPP – Federal Real Property Profile). The EO required federal agencies to submit their real property asset data to the consolidated FRPP inventory annually for review by OMB. One goal is to identify facilities that are underutilized or not aligned to current federal needs and mission.

### Challenges in Meeting EO 13327

Real property data has been collected from federal agencies for more than 50 years for various purposes, in many formats. The FRPP represents the first mandated, strictly defined format to be required from all federal agencies. The inventory includes land, structures, and buildings with each asset record containing 23 data elements. The EO prescribes a specific data delivery method (XML), and requires reporting at the constructed asset level rather than the campus or project level more typical historically in Federal practice. The FRPP also includes four performance measures to serve as metrics in evaluating inventory assets.

Some of the challenges faced by agencies in developing comprehensive asset management programs include:

- Real property asset management is not a well-defined practice area; the federal agencies often decentralize and disperse reporting requirements throughout agency organizations. Weak asset oversight over the years has left agencies with many assets that are no longer effectively aligned with, or responsive to, agencies' changing missions.
- Many assets are in an alarming state of deterioration; agencies have estimated restoration and repair needs to be in the tens of billions of dollars. Performing comprehensive conditions

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<sup>1</sup> US Government Accounting Office: *High-Risk Series: Federal Real Property*, GAO-03-122, January 2003.

assessments of these facilities is a costly and time consuming exercise requiring the evaluation of professional engineers and architects.

- Historically, key data such as space utilization, facility condition, security and age was not collected, limiting how well budgeting and strategic decision making could be developed.
- No generic standards for real property asset management - or for its data - exist in the private or public sector. Unsurprisingly, this has resulted in a lack of coherence in agency asset management organizations and data systems. Agencies often track the same information with multiple applications, in different data formats. Even within agencies, methods to describe assets are highly variable. The newly published FRPP inventory requires format in XML of 23 data elements which have been strictly defined by the FRPP data dictionary, but leaves much to agency's imagination in terms of evaluating the data elements.

With multiple tracking methods, no real property oversight standards, and no significant track record, the completeness and correctness of federal asset inventory data must be suspect at this juncture. For the ultimate success of the FRPP inventory and all agency asset management, significant efforts made to improve its quality as well as its completeness.

*Underlying an effective performance measurement system are accurate, verifiable, and repeatable data. Lack of quality data can be a principal obstacle to choosing effective indicators or to implementing an effective performance measurement system.<sup>2</sup>*

The immaturity of performance metrics makes them an evolving tool. There are no broadly shared and enforced definitions for metrics in federal asset management organizations to date. For example, the FRPP performance metric field - Condition Index, can be calculated by multiple methods, and federal agencies have adopted differing ways to do so based on their organizational needs NASA conducts its assessments using its Backlog of Maintenance and Repair Method, whereas DOD has developed its very detailed Facilities Sustainment Model.

The first step in developing high level performance indicators is to establish organizational goals in support of agency mission requirements and to establish a time period for attainment. Additionally, if departments and agencies are to develop effective performance measurement systems, accurate and complete data for these types of facilities portfolio characteristics are required.<sup>3</sup> The broad and disparate nature of real property asset management in federal sector makes it a complex issue requiring solutions on many levels. There are more than 30 federal departments and agencies, having a wide range of missions and programs. Their asset portfolios range in size from a few hundred to more than a hundred thousand individual structures, buildings, and their supporting infrastructure. They are diverse in terms of facility types, mix of types, and geographic dispersal.

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<sup>2</sup> National Research Council of the National Academies. *Investments in Federal Facilities: Asset Management Strategies for the 21st Century*. Washington, D.C.: National Academies Press; 2004.

<sup>3</sup> Cable, John H. and Davis, Jocelyn S. *Key Performance Indicators for Federal Facilities Portfolios*, The National Academies Press, Washington, DC. 2004.

## Case Studies: Agencies Vary in Meeting Executive Order 13327

Federal agencies approached the mandates of the EO in different ways, reflecting various levels of analysis in asset management and organizational structure. The examples below illustrate both the range of issues agencies address and their different methods of approach in trying to enhance their real property data management.

### Health and Human Services (HHS)

HHS is comprised of a number of large, diverse and fairly autonomous operating divisions - “opdivs”, notably NIH, FDA, and CDC. Holders of a huge real property portfolio, HHS oversees 4,200 buildings and holds leases with exposure of over \$300 million annually. The agency gradually eliminated its central facilities office during the 1980s. Without centralized oversight, the agency experienced a range of problems in construction, leasing and policy. HHS reversed course in 2002, instituting a backbone of asset management oversight at HQ. Day-to-day asset and data management functions remain delegated out to the divisions, closer to the technical missions. The opdivs have separately developed very robust asset management systems based on COTS systems, which include Tririga, Aperture, Maximo, and MicroMain, to manage their highly technical facilities.

The major hurdle the agency faced in meeting EO 13327 was organizational. Because of their previous decentralization, HHS headquarters did not have the infrastructure, either in data systems or personnel, to manage real property comprehensively or consistently. The agency chose to implement a new system (ARIS) as an inventory database to consolidate selected data from the separate, but well-populated opdiv asset management systems for review and management at HQ level, in order to respond to the annual FRPC data reporting requirement. ARIS was developed from an internet, subscription-based COTS application, Harbor Flex from LeaseHarbor LLC.

*Significant legwork was needed gather performance metric data:* As with most agencies, significant efforts are being conducted by HHS to fill in blanks on the performance metric fields, particularly for facility condition indices (FCIs).

*Future directions:* The agency aims to keep its ARIS system lean and wants the system to operate as a review and reporting tool, not a day-to-day management system. The most critical goals are to enhance reporting and consequently verify data and overall asset management operation from that data.

### U.S. Department of Agriculture (USDA)

The USDA, comprised of more than 30 agencies and offices, has an enormous asset inventory. It owns nearly 22,000 buildings and has more than 1,100 space assignments in 747 GSA buildings. The agency chose to develop a real property management system, named CPAIS, in-house. The implementation of a web-enabled, Oracle based application cost approximately \$8 million dollars and took 17 months.

*System design reflects agency organization:* The agency has a very centralized asset management organization. The system was developed based on an existing asset management application in use by the U.S. Forest Service - the agency’s biggest asset owner with 85% of the USDA total.

*EO 13327 impacts agency systems:* CPAIS system implementation was complicated being under development concurrently with the issuance of EO 13327. In addition to the agency's internal requirements, the developers also had to integrate data fields and formats to meet the evolving demands of the EO. The agency was on its own to define standards, especially at the granular level. As an example, USDA tabulates its roads (quantities) in miles - the FRPP inventory requires reporting roads in lane miles. Discrepancies like this forced USDA to rework data fields in their asset management systems to accommodate the FRPC definitions, or alternatively, create a translation process to upload its records into the FRPP database.

*No enterprise-wide asset management practices:* There has been no established method for tracking assets government-wide, as well as no means to record assets that have been disposed of. This presented challenges for the USDA in completing its land inventory, having inherited numerous land records, often incomplete, from other agencies, making it difficult if not impossible to trace information about these assets.

*Lack of interoperability:* The department also experienced difficulties in integrating information on leased assets. Most data on these assets reside with lessors, primarily GSA in USDA's case. Getting information from external systems not only involved a lot of red tape, but required translation and reformatting from those systems to USDA defined formats.

*Developing performance metrics:* Most agencies need to spend considerable effort to capture performance metric information, particularly condition indices which usually require building surveys. The required replacement value field is also difficult to determine. Operations and maintenance data was typically tracked at a campus or installation level. Since the FRPP required this data at the constructed asset level, agencies needed to rework their processes and reprogram systems to allocate the value down to individual assets.

## **The Department of Transportation**

DOT is an organization that did not have a consolidated real property organization prior to EO 13327. Intently mission-driven, the agency generally conducted its asset management as an adjunct to its programs. As a consequence, asset data is spread throughout the agency in many repositories, from spreadsheets in smaller divisions ("modes"), to diverse, sometimes overlapping systems that include leasing and budgeting, property inventory, real property workflow, space layout/CAFM applications, CAD, energy analysis, fixed asset costing, maintenance and work order/CMMS systems.

*The challenge of consolidating information.* The agency's major challenge was to consolidate its asset information into a single system of record to meet the demands of the EO. DOT chose to enhance an established FAA system because it aligned closely with the data requirements of the EO and since the FAA owns 97% of DOT assets. This system REMS, is a customized Oracle database with a web enabled front-end and tracking over 72,000 assets.

*Technical organizations have special requirements.* Much of the inventory was "non-peopled", supportive of the agency's mission and consisting of runways, aviation equipment shelters, and similar

facilities. Its support data was not organized in an asset management database required for more typical uses like office space. Condition assessments on most assets were conducted at the program level and typically were done on longer cycles than the EO mandated. Significant data gathering was required, especially for the performance metric fields. Operating costs were maintained in a separate financial system and did not track inventory at the constructed asset level.

*The need for a strong asset management plan.* The challenges faced by this agency highlight the significant efforts needed by organizations not having a consolidated asset management organization. Asset data exists in uncoordinated repositories, and an overall capability to plan and manage from the data was missing. The difficulties of consolidating an AMO and consolidated data inventory are complicated by being an unfunded mandate in an era of declining budgets and scarcity of personnel to carry these tasks out.

## **Bridging the Information Gap: Potential Integration through Building Information Modeling**

The asset manager's dilemma is to improve and standardize the quality of their data, meet mandated requirements, and support the day-to-day functions of their agency with declining resources and increasingly complex environments. One solution to this difficult challenge is to employ technological applications such as graphically-linked databases and building information modeling (BIM).

Asset and facilities management has primarily relied on text data, CAD drawings and customized databases for its information support tasks. New graphics-based software applications offer facility managers more sophisticated, dynamic applications. Instead of typical 2D line drawings with no inherent intelligence, these applications link asset databases to drawing objects. BIM, in particular, will extend the capability to manage building systems more thoroughly and accurately by its use of parametric objects. Components - or objects - in a BIM model, can not only track and tabulate data but, if parametric, will change if the elements they are in relationship change (e.g. changing a wall location will change a square footage calculation if that relationship has been set).

Design and construction projects are data rich and can provide asset managers a solid base of asset information. Data currently delivered to facility managers at project completion, however, can be uneven in format, completeness and quality. BIM offers the opportunity for asset managers to extract a more useful and comprehensive information package at project completion.

### **Improved Interoperability by Employing Standards**

The current lack of interoperability in data systems has conservatively cost the U.S. capital facilities industry \$15.8 billion dollars in annual operating costs.<sup>4</sup> Asset management interacts with many parties, both within, and external to, an organization. Intelligent drawings and BIM, as consolidated and sophisticated data tools, will require a more rigorous use of standards. Establishing standards will help align data received at project completion to the organization's requirements, as well as export or report

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<sup>4</sup> Gallaher, Michael, O'Connor, Alan; Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry. NIST, 2004.

the information to the many parties that interact with asset organizations. Any application, whether it is a consolidated agency-wide system, or an intelligent drawing or BIM application, should have the capability to store, retrieve and export information by use of industry or formalized standards such as SQL, DXF, DWF, XML, IFCs.

Applications should have the capability to perform tasks and track information according to standard asset management methods as they are more commonly acknowledged and adopted. The intelligence for these standards can be programmed into routines handled by intelligent CAD/CAFM or BIM.

Examples of these could include: Performing area calculations according to standards such as BOMA; Tracking space utilization by standard metrics such as GSA's *cost per square foot, employees housed*; managing maintenance activities by reliability-centered maintenance (RCM) guidelines. To avoid the "Tower of Babel" of data formats typical in large organizations, agencies need to enforce compliance with a standard, published data dictionary for an organization, much as the FRPC has instituted for the FRPP inventory.

### **Enhanced Data Viewing and Reporting**

Populating an asset inventory is only half the battle. For successful asset management, facilities professionals need to extract, manipulate, and review data in the system on a regular basis, and need tools for doing so easily and quickly. (Neither of which are typical in many database repositories prevalent in asset organizations). Intelligent CAD-linked databases and BIM offer the capability for more powerful reporting by associating information with building elements in the physical facility.

Organizing facility information by graphical methods echoes how information is structured in the real world, making the data easier and more intuitive to work with. Strong integration of database information with building plans provides more easily retrievable and clearly understood feedback of facility components and projects. The capability to drill down graphically for information, and create reports interactively from visual inspection gives users a means to get feedback about tasks in a quick, intuitive manner. Combining graphics from referenced building elements with data adds to the clarity and message of the report.

The most underdeveloped part of current asset inventories or CAFM systems is the capacity for users to get information out of them, especially for rapid "on-the-fly" (ad hoc) requests. Applications should offer drill-down methods of creating reports or natural language queries for easier interaction with the database especially for non-technical users.

### **Conclusion**

The challenge for agencies to meet Executive Order 13327 and improve their asset management organizations relies on their instituting well-defined asset management organizations (AMO) and clear strategic plans for managing assets. Asset data management will get its cue from the AMO mission plan and overall direction. With the size and diversity of federal agencies being what it is, there is no one-size-fits-all solution to asset management, but the FRPC should endeavor to support the establishment of additional standards for asset management data.

New sophisticated technologies such as intelligent CAD-linked databases and BIM, offer the means to intake building information with more accuracy and completion, and to manage the built environment with greater efficiency and feedback. Points to consider in implementing these systems include:

- Applications such as BIM can be employed at operational levels of the organization for more focused management tasks. Data from these applications can be exported via standard formats and collected by inventory systems that have broader system intents.
- Robust reporting tools are essential – the #1 job of any asset management system is providing data to improve decision-making and assist the overall management of the organization. Intelligent CAD-linked databases and BIM contain a rich environment of information and leverage it by providing data affiliated with the building element or project it relates to in more easily understood reports.
- To obtain appropriate information from building project participants, asset managers need to act as the “owner” of the AEC project process. To do so they need to define the scope, format, and level of detail of information to be delivered to them at project completion. Beyond the base CAD drawings that have been typical in the past projects, deliverables may include component data (such as space planning assignments, FFE inventories, and LEED data, among others).
- CAD is a complex application directed to document building construction. To be useful in managing facilities, CAD drawings usually need to be distilled from their AEC level of detail and usable for non-CAD facile users. Autodesk’s FM Desktop, for example, employs a mechanism to use CAD drawings as a simplified backdrop, with data overlays that are FM task-centric (such as space assignments, wiring plans, renovation project areas, etc). When necessary, the referenced CAD drawings are updated by CAD specialists, and since there is a link to the FM application, changes are automatically updated in the CAFM application.
- The DWF format is an open, secure, highly compressed file format without the overhead associated with complex CAD drawings. This format can provide CAFM systems with a leaner, more appropriate “underlay” for visually managing facilities, and assist in getting day-to-day tasks accomplished in an easier and more intuitive manner – critical for non-technical, resource-constrained facilities managers.
- Building Information Management (BIM) is a maturing technology that will provide a single integrated 3D building data model and with it, a means of managing assets on a full lifecycle basis. BIM will require federal asset managers to strongly define the BIM product they will receive from their project participants. A complex technology, BIM will most likely be employed, at least initially, on significant federal assets such as courthouses, laboratories, embassies and template designs. Full implementation of BIM will require a higher level of user skill than current CAD or CAFM applications, which may limit its initial adoption to agencies with staff capabilities to support it.

As BIM is an evolving technology, the FRPC should sponsor pilots to develop protocols for more consistency in asset management. Pilot studies will help lay the groundwork for extending BIM as it is

further implemented, and work to establish means and methods for more robust data interchange among participants in the asset management process.

**About Louise Sabol**

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