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Storm
Brewing in the
Construction Industry...
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Integrating Facilities Stovepipes for Total Asset Management (TAM)

By Harry Singh, Woolpert, Inc. AND William H. Dunn, NAVFAC Atlantic

TRADITIONALLY, FACILITIES ARE MANAGED along functional, product-oriented stovepipes. While some integration and cross feeding does take place, this certainly is not optimal. Competing and conflicting actions due to miscommunication increase information loss as the facility passes through various phases of its life cycle as shown in **Figure 1**, adversely affecting the reliability and availability of facilities. Optimal solutions that meet facilities' needs now and into the future are achieved by viewing facilities holistically and integrating these stovepipes in ways that balance the return on investment (ROI) with an acceptable level of risk while reflecting an owner's vision, mission and goals to further business, financial, and facilities plans.

Most organizations have developed stovepipes in each phase of the aforementioned life cycle, resulting in a tremendous loss of information. Information exchange is typically accomplished today with drawings and specifications. As each member of the building team changes its work, all others need to change also. This process leads to long-term operational problems and missing information, which includes:

- Specs typically delivered in boxes of paper documents;
- Known warranty information/terms;
- Documented preventative maintenance requirements;
- Equipment location and design criteria;
- Spare parts and supplier information;
- Appropriate space utilization;
- Energy costs;
- Alternative facility use and optimization; and
- Contingency operations.

The solution is integrating stovepipes and minimizing information loss from one phase of the life cycle to the next, thereby reducing overall costs for owners to operate and maintain the facility, as shown in **Figure 2**.

A TAM approach integrates "stovepiped" functions and requires interdependent dialogue between all disciplines and phases of the life cycle. TAM is an effective way to meet facility goals and objectives although a different

school of thought suggests that facilities are solely in support of the corporate mission. However, research demonstrates that the success of an entire organization is dependent upon the inter-relationships of effective facilities as well as financial and business planning. Successful business outcomes depend on these areas and share more than a common mission; they must also share actively integrated facility planning and management.

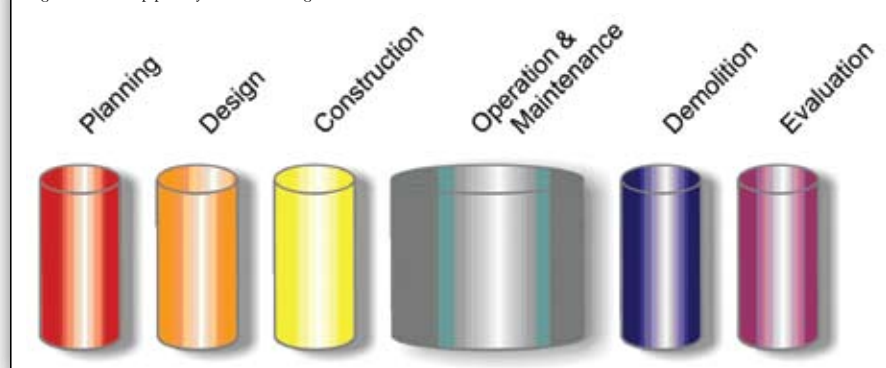
For a new project, architects and engineers typically start to plan the design of the building and then convey ideas by creating construction documents. Those documents are passed to the builder, who interprets the documents to connect

materials and construct the building. At substantial completion, the building is passed to the owner. From this point, occupation and usage begins and leads to maintaining the building for years. Throughout occupation and usage, evaluation of the building occurs to either extend the life by implementing improvements or retire the facility.

For effective corporate facility planning and management to occur, physical assets must be viewed in the context of the entire life cycle with knowledge added at each phase, as shown in **Figure 3** (on page 31).

A facility's life cycle can be viewed in stages including planning, design, construction,

Figure 1 – Stovepiped information storage.



Information Exchange Losses

Management support information should be :

- Collected continuously throughout facility life-cycle (created once)
- Managed uniformly in standard framework
- Securely available 24x7

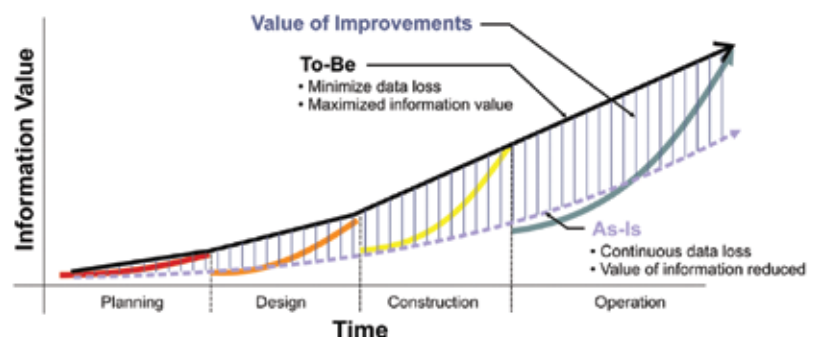


Figure 2. Courtesy of NIBS 2006, 2007. National Building Information Model Standard, Appendix – B, Construction- Operations Building Information Exchange (COBIE): Pilot Implementation Standard, March 2007.

occupation/use, maintenance and demolition, cycling back to planning. The evaluation or assessment stage is vital in the facility life cycle as it reveals information that enables strategic decisions, including options to sell, lease, purchase, upgrade, renovate or expand facilities. The assessment process evaluates shortfalls and can recommend changes to enhance productivity, energy efficiency and other factors to improve suitability and meet the facility's intended use. To be highly effective, a facility assessment must be based upon criteria that the owner and consultant establish together. The criteria must reflect sound principles of architecture and engineering as well as the client's goals, objectives, values and culture.

Optimized TAM is achieved by integrating the stovepipes/phases while adding more information at each phase of the life cycle and exerting **maximum effort in collecting information** at the design stage to realize cost savings, as shown in **Figure 4** (on page 32).

There is a wealth of information from the planning, design and construction process that is not effectively handed over to operations. The bookshelf in the locked room is not much use. The DVD full of PDFs seems convenient until you try to find a specific PDF. The designers analyze alternative designs to determine the lowest life cycle cost while constructors utilize the time dimension to schedule on-time materials delivery. The facility manager accesses warranties and schedules preventive maintenance as users confirm that the as-built facility meets planned requirements. Yet, none of them have access to the information that led to the decisions that preceded them.

The Operation and Maintenance Support Information (OMSI) program provides a process and a product that captures, organizes and expands key facility information produced during the design and construction of a facility. OMSI is not simply the product data delivered. It also organizes the data using a system's perspective and develops

detailed system operation and maintenance procedures including preventive maintenance schedules, troubleshooting and repair.

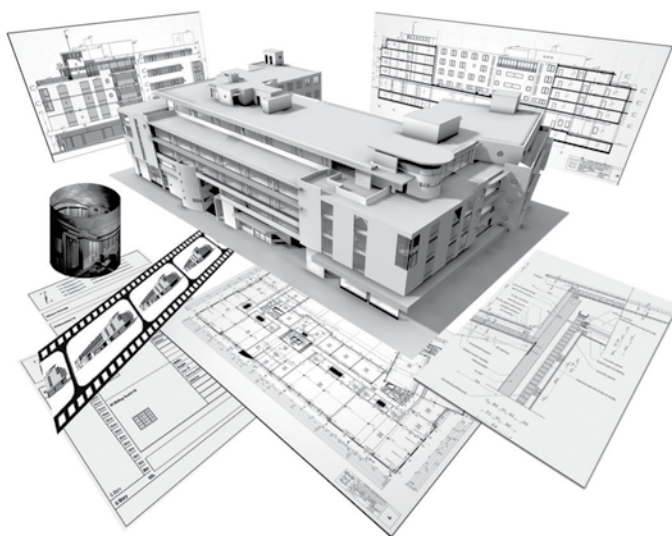
OMSI is the first attempt to organize information in a manner that allows use to facility operators. However, OMSI does not have the information formats standardized, preventing industry-wide use.

The National Institute of Building Sciences (NIBS) is developing a National Building Information Model Standard (NBIMS), to define and standardize data requirements for facility types through the use of Construction-Operations Building Information Exchange

(COBIE), including facilities on military installations. COBIE, as with all NBIMS projects, is an open standard through which information created during design and construction can be transferred directly to facility operators, maintainers and managers in useable electronic format.

NBIMS projects are developed based upon the Information Delivery Manual (IDM) process. IDM allows standards for information exchange to be defined from specific requirements. The COBIE report identifies the IDM exchange requirements and functional parts. These functional parts directly

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Building Information Modeling is the new name for the Virtual Building technology Graphisoft developed over 25 years ago. ArchiCAD is a BIM engine that pioneered the process of integrating information between the 3D model and construction documents.

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Total Asset Management - Facility Lifecycle

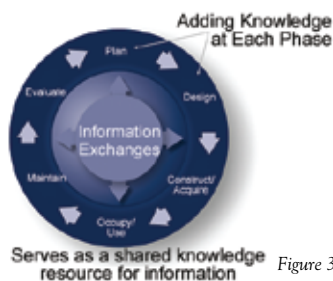


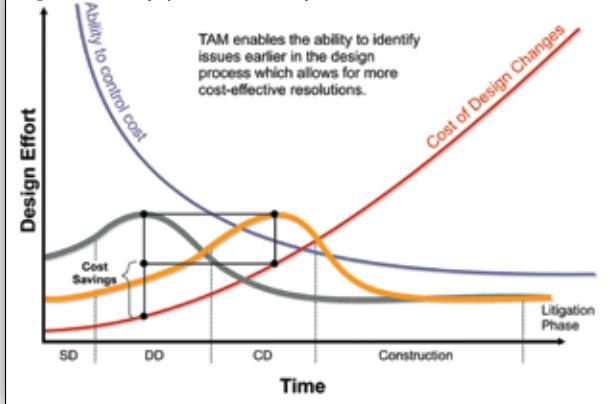
Figure 3



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Figure 4. Courtesy of Patrick MacLeamy, IAI International.



link user requirements to the Industry Foundation Class (IFC) model. IFC is an international open standard, serving as the basis for all NBIMS exchanges.¹ OMSI will serve as a vehicle for capturing pertinent data created during the design and construction process and will eventually coordinate with COBIE standards while keeping its identity because OMSI is directed by NAVFACINST 11013.39B, OMSI.

Typically, the total cost of ownership distribution is 25 percent planning, design, construction and demolition; 55 percent operations and maintenance; and 20 percent

profit margins are increasingly squeezed, maintenance is one of the few areas where profitability can be improved. Maintenance has traditionally been managed as a cost to be minimized rather than a strategic process that assures the profitability of the business.

Results achieved by successfully integrating these "stovepipes" as part of an asset management system include:

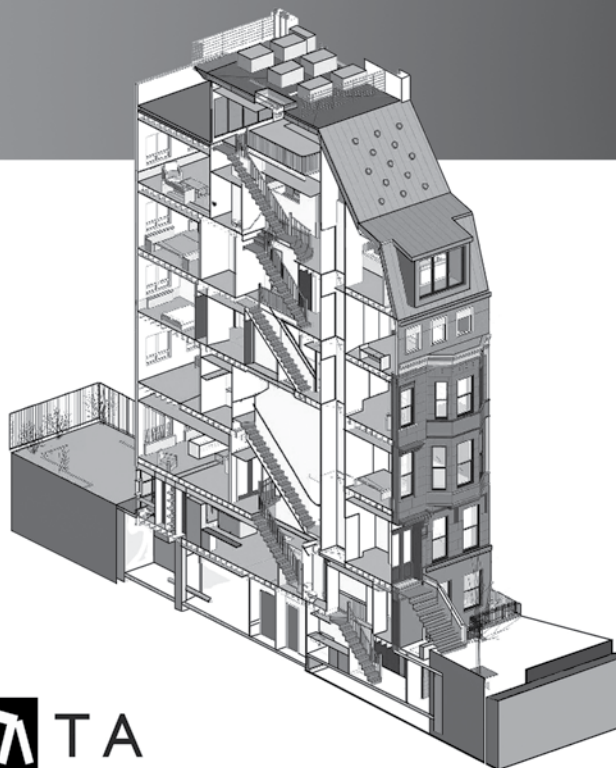
- 20-50 percent productivity increase;
- 25-60 percent profit increase;
- Up to 98 percent machine downtime reduction; and

recapitalization. The cost-saving potential at the O&M stage of the life cycle is highest when all the information provided by OMSI or COBIE is collected and made available in early stages of the life cycle; however, continuous accumulation of information is necessary. Maintenance is a significant part of the direct operating cost for businesses. As

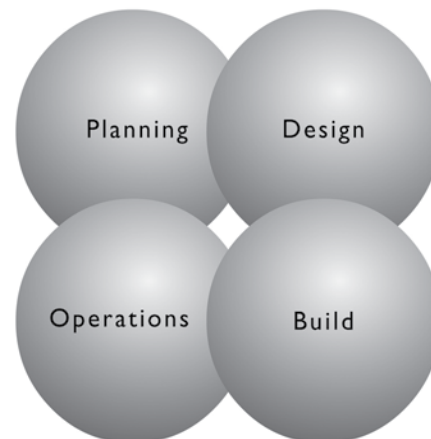
- Up to 30 percent maintenance cost reductions.

Asset management needs must be considered as a holistic management system. This will ensure that good decisions for the use and care of equipment are consistently made and implemented to constitute the best business value. Such a management system will ensure assets remain capable of delivering the performance required by the business throughout the asset life cycle span. ■

Harry Singh is project director for Woolpert, Inc. Before joining Woolpert, Singh served the Department of Navy for 25 years and retired as head of Facility Sustainment and Services, from Headquarters, Naval Facilities Engineering Command (NAVFAC), where he was responsible for implementing policies reflecting best business practices and developing FM solutions. Previously, he was Director of Engineering, Public Works Department at HQ Naval District Washington at the Washington Navy Yard. He is an active participant in the national and international organizations such as Federal Facilities Council, International Facility Management Association (IFMA) and APPA.



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