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The BIM Balancing Act: Tilt the Scales in Your Favor

The BIM Balancing Act

By David M. Hammond, RLA, ASLA, APA

ALEXANDER CALDER'S MOBILES ARE useful symbols for balancing the elements of an organization as fundamental changes within the industry and missions/business structures impact an organization.

As a trained engineer Calder had the understanding of balance and equilibrium needed to experiment, fail and succeed in his work. His work is a physical metaphor for maintaining equilibrium when the winds of change blow. As with Calder's mobile an organization implementing BIM must maintain a balanced relationship between:

1. Business process improvements;
2. Enabling technology; and
3. Organization/cultural.

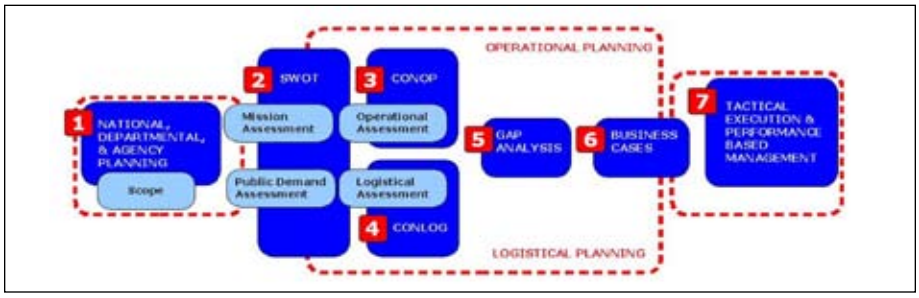
A BIM storm is blowing. BIM technology will impact the equilibrium of your organization no matter what role it plays in the building industry. The size of your organization does not matter—it will experience transformation, disruption, and rebellion. For instance, it is not uncommon for technology initiatives to fail because of user resistance related to culture. "That's not how we do things around here" is not an uncommon phrase for JBIM readers.

Unanticipated change and unintended consequences will occur over time within any organization. Touch one organizational element and the others begin to spin in multiple directions. It is nearly impossible to introduce change in one element without impact on the others. Over time and unattended the response to change can become points of failure and disruption (out of balance) or opportunities to innovate and transform.

Since 1997 the U.S. Coast Guard has faced many challenges. The organization has experienced national crisis and disruptive change while implementing BIM pilots. Understanding the three key elements of organizational change and finding solutions to inevitable problems experienced by the Coast Guard did not happen immediately. As a result not all pilots have become universally accepted. Some innovations have been accepted by early adopters and enlightened local leadership; while other innovations have been resisted by local users and status quo leadership. Thus a seamless workflow and a truly integrated system has yet to be realized. More will need to be accomplished in order to streamline these components into an enterprise BIM system implemented across the organization.

The experiences of the US Coast Guard as an owner organization implementing BIM and the changes that were turned to opportunities can help anyone manage an implementation of BIM. It starts with a balanced design supporting the overall goals of the organization and uses technology enablers, information, and flexibility to maintain organizational equilibrium.

VISION, REVISION, VISION AGAIN



When preparing to implement a dramatically transformative technology such as BIM, it is important to have full support from executive leadership who convey a clear vision, yet develop a flexible and dynamic strategy to enable that vision.

Coast Guard Commandant Admiral Thad Allen commissioned a strategic facility management study as a Rear Admiral in charge of Coast Guard resources in 1997. The resulting Shore Facility Capital Asset Management (SFCAM) Study, initiated the direct link between facilities and strategic Coast Guard mission success. This was the business driver that eventually blew BIM into the Coast Guard. It was the baseline to the follow-on SFCAM Strategic Initiative, that then lead to the SFCAM Roadmap. The initiative described "what" and the roadmap described both "how", "when" and "why" BIM and other technologies and collaborative processes needed to be implemented.

The study pointed out how professional engineers needed to transform shore facility support from a decentralized, locally controlled traditional facility engineering organization, to a single chain of command operation. This allowed comprehensive coordination of a capital asset management organization with a $7.5 billion portfolio supporting agency-wide strategic outcomes. The transformational need then resulted in a new vision that has guided our shore support organizational change efforts.

At the same time and prior to 9/11, Rear Admiral Allen had a larger Coast Guard-wide vision he called "Systems-of-Systems."

It included systems engineering approaches to mission execution. The result was better integration of mission, operations, and logistics with interoperable C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance) systems. SFCAM became a separate, but integrated, "mini mobile" suspended from part of the larger Coast Guard mobile.

While few people understood what it would take to achieve the goals stated in the study, Admiral Allen said, "David, don't worry, it will take 10 years to achieve these initiatives."

This year Admiral Allen presented to Congress a plan that reorganizes the Coast Guard's major components to consolidate operations, unify operational command and control, and places new emphasis on readiness and doctrine that has direct impact on facilities management. "I'm trying to change the culture and structure of the Coast Guard to make it a change-centric organization that's more capable of sensing the external environment and very subtle changes in demand

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However, because Building Information Models of all the facilities had already been created by Dianne Davis and her team from AEC Infosystems, Inc; a security assessment and analysis of Anti-Terrorist and Force Protection (AT/FP) was conducted without having to access the installations.

Ian Thompson of Standing Stone Consulting, Inc. was able to use BIMs that included operational and organizational data as well as architectural and geospatial data to complete 80 percent of required CPTED-RED security analysis of the facilities and the overall installation without ever entering the Charleston base. Enough security analysis was conducted virtually to move forward on critical parts of the security pilot project in ways that would not have been possible without BIM and the new approach to facilities.

The BIM models were used for line of sight, measuring set-backs, and developing architectural solutions in real time for some issues. The time to insight and decision was significantly reduced and the quality of information supporting complex issues was improved.

The security analysis exercise is also an excellent example of collecting data once and repurposing it for many intended and unintended uses. "Collect once, use often," is a data strategy that increases productivity in surprisingly positive and measurable ways. Readiness capabilities in Charleston after 9/11 were tested and verified in ways that had no comparative example with other government projects.

By April 2005 Paul Harold and his team at the Coast Guard Civil Engineering Technology Center had integrated Google Earth™ imagery with existing Coast Guard shore infrastructure databases using KML and API software coding to place Coast Guard information on the 3D maps of the world. This was also integrated into the enterprise-wide Capital Asset Management Portal (CAMP).

For the first time, shore infrastructure data, images, drawings, and documents could be related to a 3D-geographic point on the earth and shared by users without any special GIS software or skills. In fact, Coast Guard pilots began using the site imagery to plan their flights to Coast Guard units. This led air station personnel using the site to mine data about their own specific facilities and relate it to their operational requirements and performance. BIM models of piers were e-mailed to cutters in preparation to docking.

Another example of unintended use of existing data occurred during and immediately after hurricane Katrina in September 2005. While Vice Admiral Allen stepped in to lead the overall recovery efforts, Coast Guard engineering personnel used the site to view almost real-time updates of damage reports and recovery efforts related to Coast Guard installations that were caught in harm's way. Investigation of commercial market products revealed the importance of object technology and geographic information systems. Following 9/11, the importance of having building objects communicate with geospatial systems increased significantly in importance to mission execution success.

35 SECTOR COMMAND DESIGN PILOTS

Unforeseen re-uses of BIM information requires not only imagination and the understanding of business cases, but how cultural changes can be immediate when impacted by unforeseen changes in situation. This combination of environmental change, operational needs, accessibility to trusted and re-usable BIM data and flexible and imaginative teams produce true innovation.

Another direct result from 9/11 was a requirement to create 35 Coast Guard Sector Commands by combining marine safety and operations units at our ports across the country. Each port required a new Sector Command Center for which no requirements existed. In Feb 2005 the first version of the Sector Command Center Parametric Planning Tool software was delivered to the Coast Guard by Kimon Onuma and his team of ONUMA, Inc. The innovative visual

relational database software was used to rapidly define the project parameters, originate the project program requirements, and create design development options.

In less than 45 days, a team of internal staff and expert consultants developed and tested new BIM tools and processes. The team then implemented the tools and processes to create schematic designs of all 35 Sector Command Centers in 4 months.

It would have required a combined 350 months if previous methods were used. This award-winning Sector Command Center project featured use of first-of-a-kind, web-based BIM relational database software planning tools from ONUMA, Inc. with collaboration from AEC Infosystems, Inc.

Immediately following the Sector Command Center project was the Off Cycle Crew Support Unit (OCCSU) Planning Project that was greatly assisted with a customized version of the Sector Command Center Parametric Planning Tool. This version of the parametric planning tool proved as successful as the Sector Command Center Parametric Planning Tool. Both tools are still up and running as enterprise systems run over the CAMP portal.

FINDING PARTNERS—SHARING KNOWLEDGE

SFCAM Roadmap pilots were driven by operational need. The Coast Guard is an owner-operator responsible for the entire life cycle of facility assets. At least 85 percent of the total life cycle costs of the shore plant accrue during the operation and maintenance phases. Planning, design, and construction only account for 10-15 percent of total life cycle costs. BIM-Based Facility Assessments at several locations mapped the processes for efficient data collection and level of BIM detail. The right BIM information resulted in the Coast Guard's portfolio of more than 8,000 buildings totaling 33 million square feet to be modeled at a low level of geometric detail but with a high level of information; and 15 percent of the portfolio modeled at a high level of detail. The assessments pilot combined the creation of data rich BIM models as part of an overall facility inventory and assessment process led by CDR Jack Dempsey and his team at Civil Engineering Unit Oakland.

Initial research into improving centrally managed enterprise facilities processes with advanced technology revealed the need for extensive taxonomic classification systems; adherence to national and international open standards; data/metadata normalization/harmonization; open data sharing, and the abandonment of proprietary systems - all issues familiar to readers of JBIM.

Early investigations for existing information about advanced technology applied to facilities management led to involvement with National Institute of Building Sciences; the Construction Specification Institute; the Open Geospatial Consortium; the American Institute of Architects; The Open Standards Consortium for Real Estate; and membership in the Federal Facilities Council; the buildingSMART alliance; and buildingSMART International where the Coast Guard remains an active member.

BALANCING ACT II, III…

In a short period of time great challenges impacting the industry, nation and the US Coast Guard forced new business processes and mission requirements. Continuous planning became necessary and possible because of BIM implementation. Why BIM was developed was facility management related, how the models became useful was and will be dependent upon the flexibility and cultural changes in the organization.

9/11, sustainability, environmental and security needs required change. BIM technology and processes enable a positive response to change. The complex balancing act the Coast Guard shore support is conducting within the larger Coast Guard framework has produced much innovation, much resistance, and much insight. SFCAM is a "mini mobile" in balance with the larger change management "mobile" created by Admiral Allen.

As you read these words the Coast Guard is poised to implement its most dramatic restructuring since World War II. Change is naturally resisted unless there is a motivating circumstance or cultural change that helps overcome the resistance. These examples provide a simple overview of the complex balancing act the Coast Guard shore infrastructure professionals have managed over time and the enabling role that BIM technology will play in the Coast Guard of tomorrow. This balancing act will take a strong vision expanded by the successes and failures we have experienced; full support from enlightened leadership; and a flexible strategy rather than a rigid strategic plan. These are essential for any organization or business facing change today.

David M. Hammond, RLA, ASLA, APA is a Senior Program Manager for the Coast Guard's Office of Civil Engineering. He is an internationally recognized expert and thought-leader within the AECOO industry with regard to organizational change management; process reengineering; integrated decision-making; and performance-based asset management.

James Watson and William Faesenmeier of MACTEC also contributed to the BIM-Based Assessment pilots.