

February 24, 2021

I'm dictating this using the latest voice-activated letter writer app in my driverless car. Can't see going back to typing another letter again! Our O&M group has been using voice-activated FM for a couple of years to not only navigate virtual buildings but also to call up parts list and manuals allowing hands-free repair activities, significantly increasing their productivity and reducing injuries. Things are so much better in 2021 than 8 years ago. Finally all that flack about lack of interoperability has been overcome and A/E/C/O world is a better place, but it wasn't easy.

Looking back I see several events that set this huge change in motion. First was the 2014 update of the National Institute of Standards and Technology (NIST) 2004 study on the cost impact of inadequate interoperability in the US Capital Facilities Industry. The original study estimated in 2002 the cost as \$15.8B/year but the revised 2014 study projected these costs to be nearly double at **\$27B/year by 2017**. This study concluded to continue to ignore the interoperability costs is not sustainable, and called for immediate action by the Facilities industries private and public sectors.

Responding to this study, a 2015 Global Interoperability Summit was held in Washington DC with US President and Agency officials meeting with other country representative to learn how other governments were attempting to address interoperability costs in their Capital Facility industry. With UK close to achieving their 2011 mandate for a 20% reduction in construction costs (~\$27B) by 2016, we saw in 2014, Australia, Scandinavia, Europe, and Asian governments issued their cost reduction mandates.

In contrast to the UK where the government structure allows for a Construction Czar to set government policy, US Government is designed with 3 independent branches precluding one person having too much authority or control. However, this looming situation called for immediate measures, and the President gave an executive order for the formation of *Capital Facilities Interoperability Consortium (CFIC)*. This private-public entity of government and industry experts oversaw the development and implementation of Capital Facilities policies for addressing interoperability through accelerated testing/certification of open standards. Similar to the other governments, the 2015 US mandate was: *eliminate the projected \$27B/year costs by 2018, by about the same amount as UK, but 2 years quicker.*

Unlike the existing open standards efforts hindered by lack of funding and industry incentives, the \$1.7B annual budget for this undertaking was funded by private industry, software vendors, with Federal and State agencies to ensure there was a shared financial burden and responsibility to meet mandated reductions. Finally a FUNDED Federal mandate. It was from 2015 to 2018, the public-private consortium took decisive actions to solve the interoperability issues at a level never attempted before by any industry sector.

Since all the actions taken by this consortium are fully documented and well known, it is more important to discuss how by overcoming interoperability issues we were able to do things not possible before. For example, every information exchanges standards we now take for grant were created, tested and implemented in software at a rate never seen before due to leveraging automated processes developed by the consortium, and still in use today. An important component to the solution was International Data Dictionary, also completed during this time. The major role of the Dictionary played was the authoritative source for assigning GUIDs to product attributes for improving product comparisons

through web services, automating equipment submittal approval process to reduce time to order, and retrieval of reliable information exchange data sets.

The industry standard most relied on for this effort was National BIM Standard-United States (NBIMS-US). All processes previously developed for NBIMS -US were accelerated to ensure industry had a standard that could keep up with constant changes going on to meet the mandated savings by 2018. NBIMS-US has now become a model of how to streamline a standards process using social media apps for industry input, cloud based collaborative environments for quick decision making, and automated balloting, standards verification/testing, and software certification. All developed in this 3 year period.

But the true value of interoperability can be seen at the Facilities operational level. Having been involved for 20 years with O&M at a National Lab and now their Director of Facilities, we have achieved significant cost saving since 2013. Just this last week, our latest construction project was completed in half the time, by using modular building methods with interoperable virtual design, fabrication and construction tools. With our *Transition to Operations* approach, we used NBIMS information exchange standards (COBie, SPACie) to retrieve 50% of O&M information from 100% design models which is used in both asset and space management applications.

With these exchange standards and product attribute GUIDs incorporated into all BIM authoring tool and in our FMS applications, the receiving system can now reach into the BIM and retrieve the exchange information it needs. No more exporting of exchange formatted files for importing into another system. What 8 years ago was a 2-3 month after occupancy manual data entry workflow is now automated process between the designers authoring tools directly with Facilities management applications as soon as the information is available. The rest of the data can be scanned in with mobile devices during construction.

But we also saw drastic improvements made to the design analytic tools to optimize building energy and maintenance efficiencies. Now being able captured and exchange real time energy data with these tools has given us confidence in future operational costs, which previously were budget nightmares.

From a Facility Mangers perspective, the most compelling outcome of the US 2015 mandate was the federal design and construction procurement contracting strategies have been revamped. With Design-bid-build no longer seen as viable, we use design-build and design-build-operate contracting methods for new building projects. Both options have incentive clauses for all parties to perform their work to benefit the whole building lifecycle. With design-bid-build there was no incentive for designers to invest in tools that the ultimately ROI was received by downstream contractors being more efficient. To ensure the building not only operated when turned over to the Owners, but the operational costs conformed to design expectations, a 2-3 years operating component was added to the contract. This way designers and installers are motivated to ensure the building operates as designed, and make equipment purchasing decision based on life cycle costs not low price.

Even with all the improvements we will always have new challenges. But that's for the next generation to solve. For now I am feeling pretty good about how far we have come, and hate to think what would have happened if we had not pushed to take the steps we did in 2015.

Birgitta Foster, previously Assisting Director of Capital Facilities Interoperability Consortium