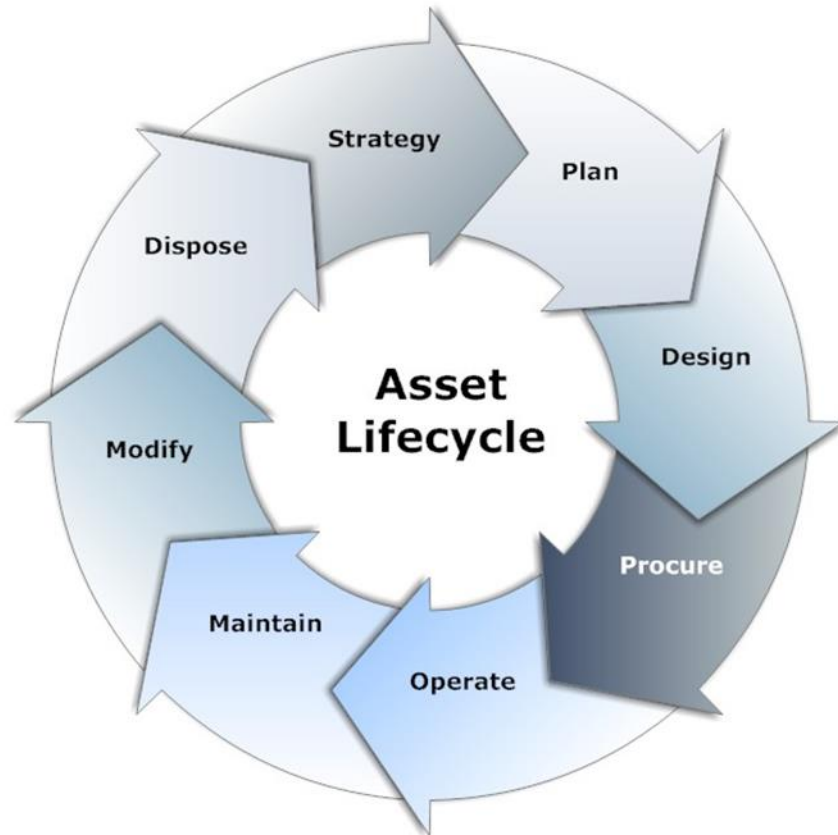


The Cost of Information Loss

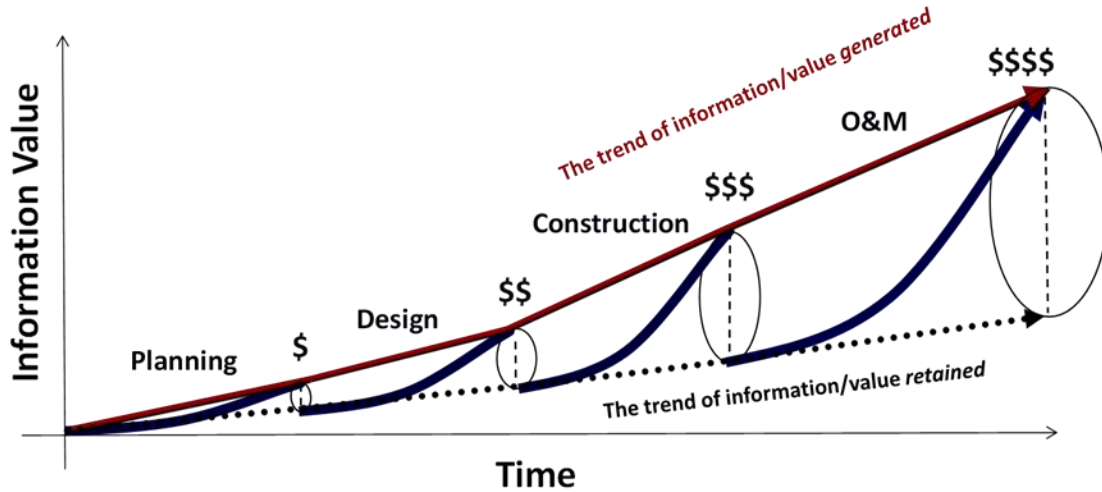


Merrick & Company recently had the opportunity to calculate the predicted return on investment (ROI) for a long term asset lifecycle management implementation of a new facility design, construction, and management using High Definition Surveying (HDS) and Building Information Modeling (BIM). This Scan to BIM approach was to be used on a facility planned to be about 375,000 square feet in size.



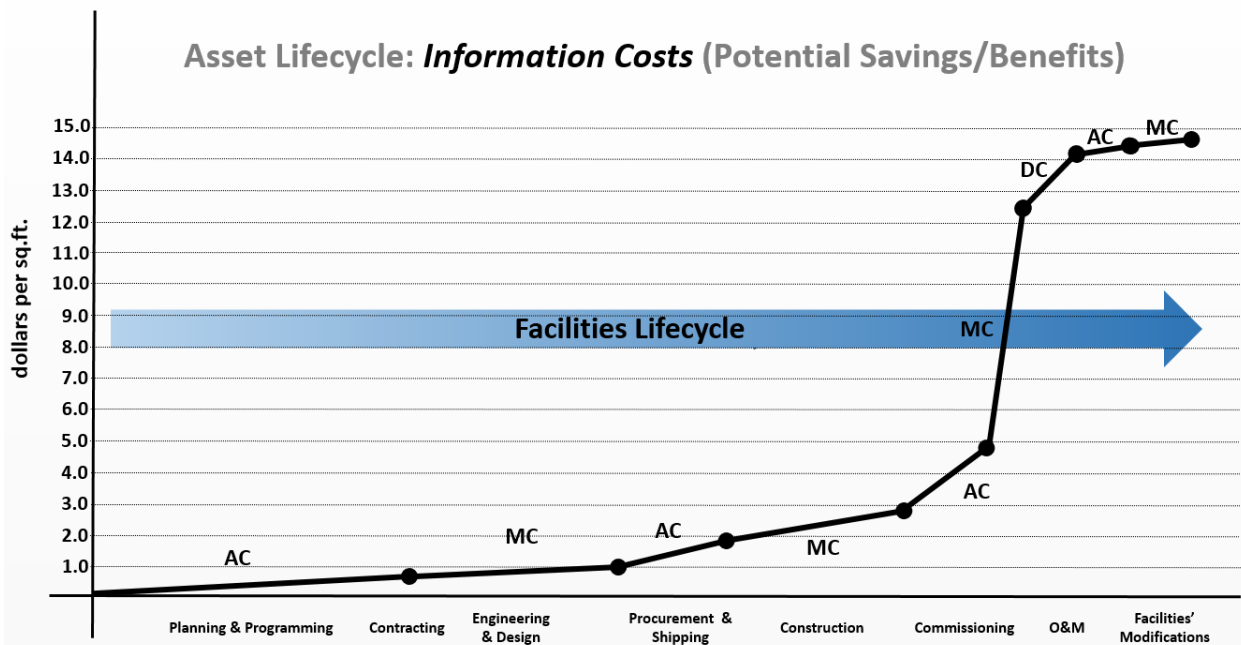
It is often very difficult to measure the effect of changes to a system that improve tasks and/or prevent problems that are difficult to quantify. ROI calculations involving intangibles are often based on educated guesses at best. We set out to focus solely on areas of measureable costs savings recognizing that there would be many more benefits from the extensive and long duration use of Scan to BIM. After much searching for existing ROI studies on this, we found little to no applicable resources to reference.

This led us to develop a Facility Asset Information Cost Model founded on a [National Institute of Standards and Technology \(NIST\)](#) report addressing the **cost of inaccessible or lost information** in the capital facilities industry. This report titled [Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry](#) stated that approximately 40% of engineering time is inefficiently spent locating & validating information. It also included that poor inter-systems communication wastes approximately 30% of project costs. The NIST report found that poor communication and information loss tend to be particularly severe during Asset Lifecycle phase transitions.



We understood from this that status quo inefficiency and waste suggest potential savings through better-managed assets. The model that Merrick developed identifies potential savings or benefits resulting from more efficient capture, access, and use of asset information. It employs NIST capital projects cost data escalated to 2015 values using compounded Producer Price Index data. The NIST report breaks down three types of costs:

- Avoidance Costs (AC) are associated with unproductive stove-piping effects, that is developing, maintaining, and translating across redundant database, work control, CAD, or paper exchange systems.
- Mitigation Costs (MC) are related to performing needlessly redundant activities, for example re-surveying, re-measuring, re-asbuilding, and/or manually re-entering data.
- Delay Costs (DC) arise from information inaccessibility problems, for instance stalled and idle maintenance operations while staff find, verify, or await correct facilities information.



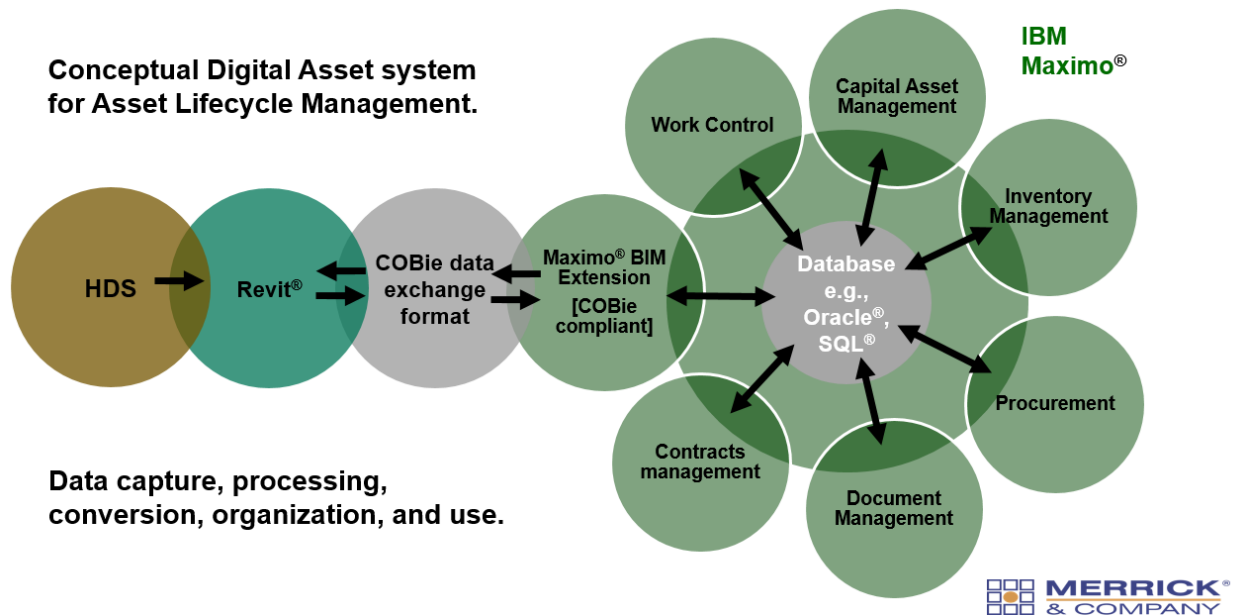
High-Definition Surveying (HDS) is a key component to the solution producing an accurate digital portrayal of the facility asset. HDS helps to efficiently produce an as-built that faithfully represents the actual constructed facility asset. HDS can:

- Help eliminate redundant/conflicting as-built records
- Act as a foundational component of the BIM, merging design & construction information into a single dataset
- Capture accurate and detailed facilities, capital equipment, utilities, and structural components positioning and configurations

Typically, across a large, complex design/build effort, information gathering and management are the responsibilities of the prime Contractor and its sub-Contractors. Usually, as-building responsibilities align to the contractual obligations of each party, with each Contractor working to its own priorities, capabilities, and standards. HDS makes an integrated solution more efficient, more accurate, and more reliable. When uniformly captured, integrated, and managed within a database, HDS as-built data provides an accurate, consistent, and ideal set of as-built information.

Beyond HDS data, a cost-saving BIM provides an efficient system for:

- Information processing into 3D graphical form that is accessible, intuitive and reliable
- A common data exchange format that facilitates information exchange between all asset stakeholders
- A common database that can be used to merge design, construction, O&M, and capital asset information into a single dataset



According to the capital facilities industry, to minimize asset lifecycle information costs one must put in place a detailed, integrated BIM. Through BIM development, we can produce and support a digital asset that faithfully and accurately represents the actual facility asset. With this digital asset, one can:

- Eliminate redundant systems. Consolidate design and construction information as a single source of information.
- Commit to the capturing of accurate, detailed, facility information - capital equipment, utility systems, structural components, etc.
- Ensure information and access to that information are intuitive, straightforward, & reliable.



In conclusion, the quantitative cost model that Merrick developed:

- Accounts for Digital Asset level-of-effort variability across an asset's lifecycle, employing a Monte Carlo simulation.
- The simulation model addresses the cost of HDS-BIM hardware, software, and labor resources.
- The Facility Asset Lifecycle includes planning design, construction, O&M, plus facility modifications.
- For lifecycle HDS-BIM, a conservative cumulative P75 cost (investment) metric is generated and considered.

When comparing the total costs of this Scan to BIM implementation against the NIST derived savings we realized **a nominal dollar positive ROI of 25%**.

If you would like to better understand how Scan to BIM can benefit your projects, please contact me at matt.bethel@merrick.com.