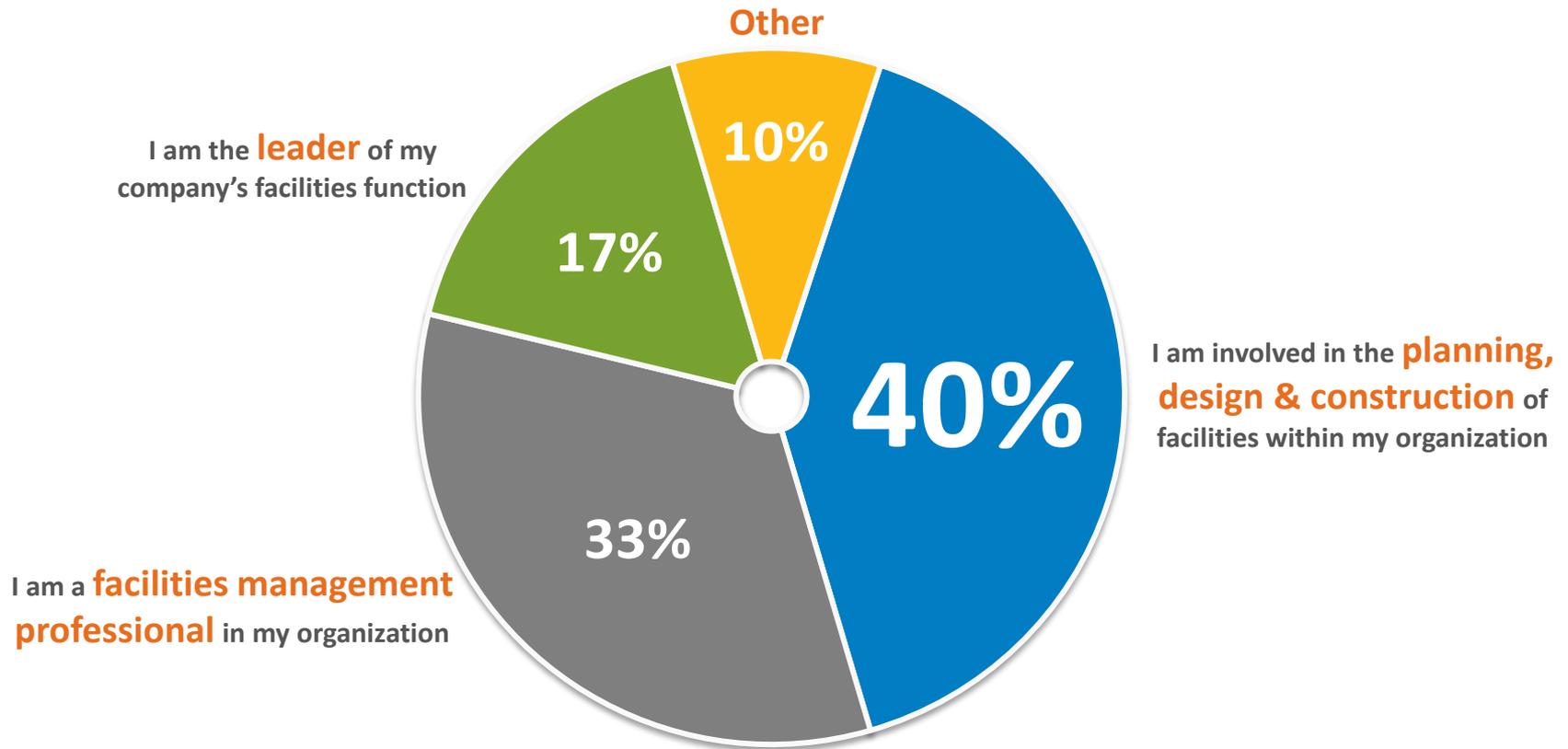# *Understanding Your Facilities Information Needs and the Potential of BIM to Your Organization*

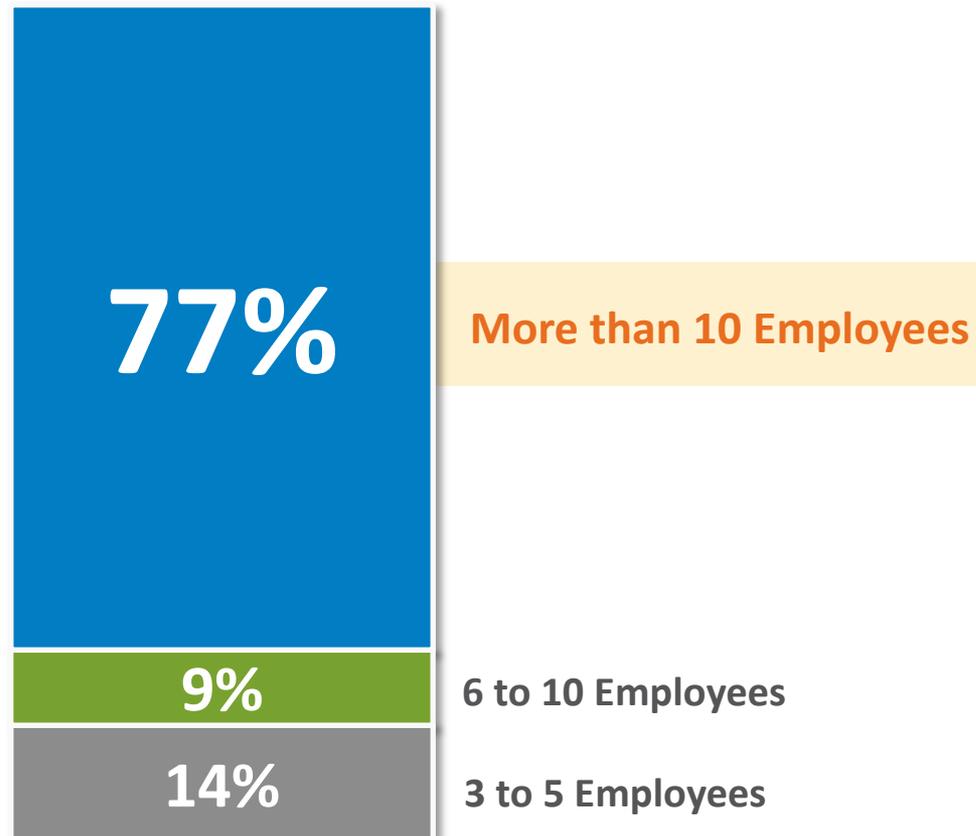## Post-Occupancy BIM Study

April 2011

Mortenson
construction

What is **your role** within the organization
as it relates to facilities and facilities management?

Other

10%

I am the **leader** of my company's facilities function

17%

40%

I am involved in the **planning, design & construction** of facilities within my organization

33%

I am a **facilities management professional** in my organization

Facilities Management

BIM

BIM Use On Projects

Mortenson construction

How many **in-house facilities services employees** does your organization have?

77% — **More than 10 Employees**

9% — 6 to 10 Employees

14% — 3 to 5 Employees

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What are the **Significant FM Challenges** Facing Owners?

1. **Funding and Staffing Shortages**

2. **Effective Documentation of As-Builts, Equipment Data, etc.**
(Both the initial collection and the ongoing maintenance of documentation)

3. **Development and Management of Maintenance Processes**

4. **Renovation and Maintenance of Existing (Older) Buildings**

5. **Achieving Sustainability and Energy Savings Goals**

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What are the **Significant FM Challenges** Facing Owners?

"Funding for operations that meet customer expectations."

"Time, funding and technical training of the front line staff. System operations understanding."

"Maintaining accurate as-built drawings to provide to designers and contractors so scope and budget match. We often find surprises that increase the cost of the project significantly."

"Achieving energy savings while renovating older structures quickly and cheaply."

"Achieving sustainability goals on energy, water and greenhouse gases."

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construction

Broader Sampling of Responses:

Funding

"Funding for operations that meet customer expectations."
"Finding dollars to meet maintenance demands."
"Getting the funds to perform the work that may have a longer ROI."

Time / Staffing

"Time, funding and technical training of the front line staff. System operations understanding."

Documentation

"Maintaining accurate as-built drawings to provide to designers and contractors so scope and budget match. We often find surprises that increase the cost of the project significantly."
"Getting up-to-date information on the building and the assets."
"Having usable as-built information to maintain and expand the facilities."
"Collecting and maintaining equipment data information."
"Standardizing information, better communication."

Maintenance of Existing / Older Buildings

"Our biggest challenge is the up-keep of a building that is hard to maintain because designers don't listen to the people that are responsible for that job. We have four buildings now that we can't get equipment into to change lights because the width of the door is too narrow. We were told that it wouldn't look good with wider doors and we didn't know what we were talking about."
"Old facilities, constant change, new facilities coming online with more complicated systems."

Maintenance and Management

"Bringing a new asset management system online in concert with a major capital improvement project."
"Day-to-day management of the building HVAC and controls system."
"Facility occupancy buy-in of our efforts to maintain systems."
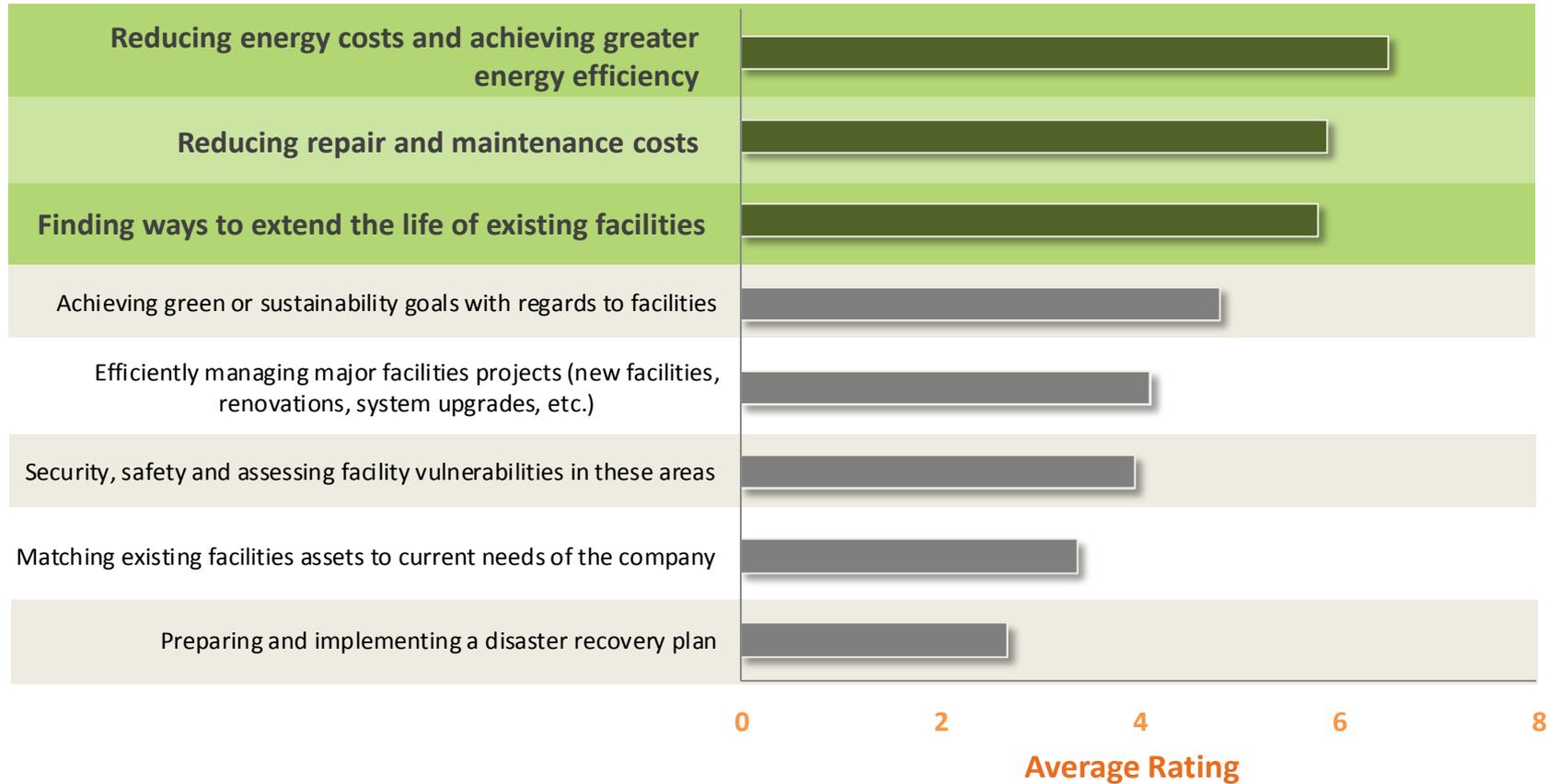"Assisting ownership with anticipated maintenance schedules and life cycle costs."

Sustainability/Energy Savings

"Achieving energy savings while renovating older structures quickly and cheaply."
"Achieving sustainability goals on energy, water and greenhouse gases."

Please **rank** the following **common facilities goals** in terms of their **importance to your organization**

(1= Least Important, 8 = Most Important)

Average Rating

Chart categories (top to bottom):
- Reducing energy costs and achieving greater energy efficiency
- Reducing repair and maintenance costs
- Finding ways to extend the life of existing facilities
- Achieving green or sustainability goals with regards to facilities
- Efficiently managing major facilities projects (new facilities, renovations, system upgrades, etc.)
- Security, safety and assessing facility vulnerabilities in these areas
- Matching existing facilities assets to current needs of the company
- Preparing and implementing a disaster recovery plan

X-axis: 0, 2, 4, 6, 8

Facilities Management | BIM | BIM Use On Projects

Mortenson construction

What's **Currently Missing** to Effectively Manage Your Facility?

1. Accurate and Complete As-Builts and O&M's

2. Effective Dissemination and Communication of the Information

3. Real-Time Performance Data for Measuring Energy Usage

4. Development of a Long-Term Capital Planning and Asset Management Plan

Mortenson construction

What's **Currently Missing** to Effectively Manage Your Facility?

"The actual population in our buildings. Energy use in our systems."

*"Life Cycle Costs (as opposed to initial cost) of equipment installed as part of a capital improvement."*

"[The Master Plan] should be updated annually to see if the organization is following the plan and if not it needs to reflect those changes and communicated out so everyone is on the same page."

"Not too many gaps, but information is spread across a wide array of media and is held by different people and groups, making it inefficient to access or share."

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Broader Sampling of Responses:

- Electronic drawings (AutoCAD and pdf) are lacking.
- Not really . . . we have plenty of information; presented in compelling ways.
- Costs of system replacements in current and future dollars.
- Need to develop a long-term capital planning and asset management plan for our facility.
- In our case, multiple RFIs and CORs didn't make it into a complete set of as-builts. I would recommend more follow through on the back end with document updates as the project adjustments happen.
- The actual population in our buildings. Energy use in our systems.
- Life Cycle Costs (as opposed to initial cost) of equipment installed as part of a capital improvement.
- None
- I look forward to receiving the BIM drawings for new library. We have moved to having our information online.
- We have a Master Plan that was performed by a third party for the entire system. This plan should be updated annually to see if the organization is following the plan and if not it needs to reflect those changes and communicated out so everyone is on the same page.
- Not too many gaps, but information is spread across a wide array of media and is held by different people and groups, making it inefficient to access or share.
- Code changes, especially healthcare.
- Yes, equipment info doesn't get to our O&M group very quickly -- if ever -- after construction.
- Current utility lines.
- Complete drawings and O&Ms on the plan site.
- Lack of complete and/or organized operations and maintenance information on equipment and systems.
- Facility performance data
- Accurate / maintained as-build info
- Life cycle costs
- Specific equipment data
- Old drawings not updated
- Yes, better information transfer from design to construction and then onto operations
- Construction progress photos tied to as-build databases

Who has **primary responsibility** for
maintaining and servicing your facilities management tool(s)?

76%
In-House Staff

12%
Software Vendor

6%
Outsourced Facilities Management Team

6%
Other

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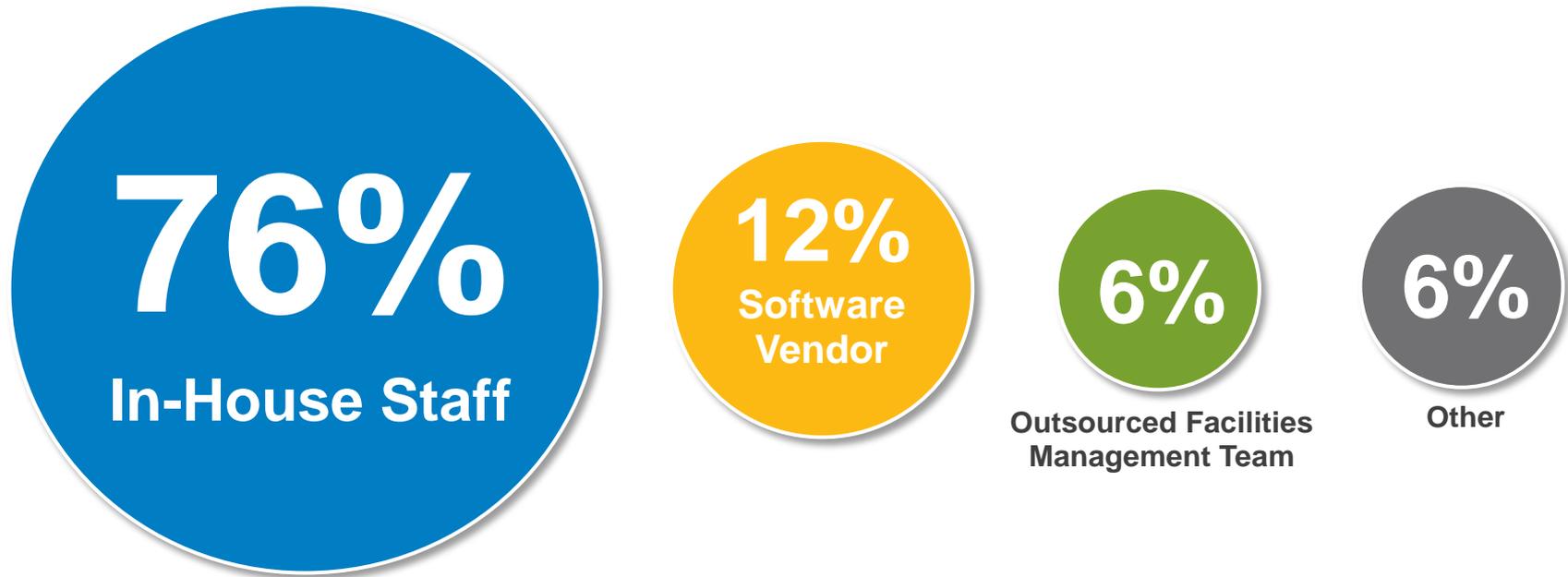
Which of the following statements most closely matches
your familiarity with BIM?

63%

I am **somewhat familiar** with BIM but I have more to learn

37% I **am familiar** with BIM

Facilities Management

BIM

BIM Use On Projects

Mortenson
construction

The primary role of BIM is for **planning and construction.** BIM **does not** currently play a significant role in the management of respondents' facilities. However, there is **significant interest** for finding ways to leverage the information in the near future.

BIM

Facilities Management

BIM Use On Projects

Mortenson construction

What is the **Current Role of BIM** in Facilities Management?

"We are looking for ways to extend our BIM's into **post-occupancy tools***, as all our projects utilize BIM."*

*"***No role at present.** *We are in the process of requiring designers to use BIM on current and future projects. We expect it to help inform decisions and improve operations after occupancy."*

*"***Very little, if any, after a new construction project** *is constructed and turned over."*

"Primary role for new construction in **delivering building and equipment data.** *That* **information is linkable and usable with our FM software.***"*

Mortenson construction

Broader Sampling of Responses:

- We use it in planning and construction of new buildings
- Plays no role
- Primary role for new construction in delivering building and equipment data. That information is linkable and usable with our FM software.
- Our information provides a closer look at how our mechanical systems are positioned within the facility, but unfortunately doesn't provide a complete / actual positioning. The linking of the as-built information is a good idea.
- Very little, if any, after a new construction project is constructed and turned over.
- We have GIS, automation, graphics, and overall extensive computerized systems for reporting and analysis.
- No role at present. We are in the process of requiring designers to use BIM on current and future projects. We expect it to help inform decisions and improve operations after occupancy.
- We are just on the edge of use. The library that we just finished is our first building.
- We are transitioning into BIM. All new projects are being done in Revit.
- Information transfer, speeding info to maintenance staff, decreased construction cost (change orders specifically) better coordination
- We are looking for ways to extend our BIM's into post-occupancy tools, as all our projects utilize BIM.
- BIM is not used.
- None
- Limited at this time but as more projects use BIM, we will certainly take advantage of the information
- None at this time, but it could provide valuable historical facilities construction information

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Based on your current knowledge, what is the value or potential value of BIM information to your organization?

(1 = Not very valuable, 10 = Extremely valuable)
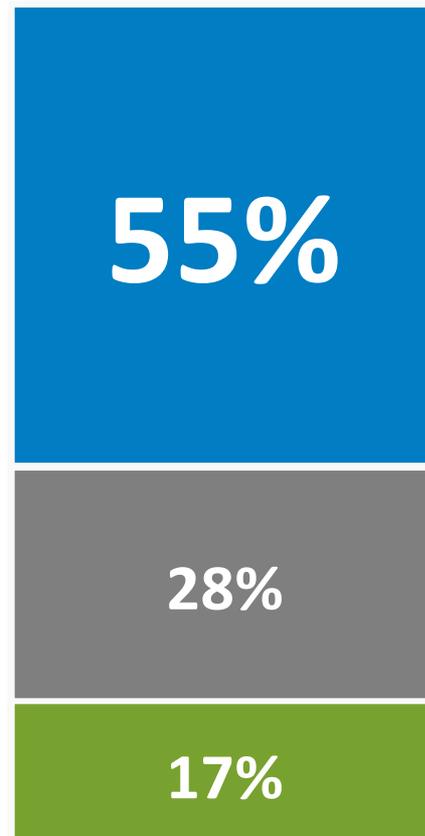
55%

Extremely Valuable
(Responses 8 through 10)

28%

Somewhat Valuable
(Responses 4 through 7)

17%

Not Very Valuable
(Responses 1 through 3)

Facilities Management | BIM | BIM Use On Projects

Mortenson construction

What **Value** does BIM bring to your Organization?

Primary

1. **Clash Detection and coordination during construction**

2. **Accurate as-built information**

3. **Equipment data**

Secondary

1. **Riser diagrams**

2. **Commissioning data**

3. **Asset inventory and space management**

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What **Value** does BIM bring to your Organization?

*"**Most value during construction.** Information provided in an intuitive way to the facilities staff in a format that is easy to access and use."*

*"**Accurate as-built information**"*

*"**Equipment data** from commissioning process"*

*"**Accurate riser diagrams** for plumbing, mechanical, and electrical installations"*

*"**Integration with BAS and CMMS**, moves and asset inventory as well as finish and material data"*

*"Historical as-built information for **underground infrastructure**"*

Mortenson construction

Broader Sampling of Responses:

- In the construction and renovation
- Space management, maintenance management
- Equipment data from commissioning process.
- Multi-dimensional views of MEP.
- Equipment location and configuration.
- Effective and efficient operations and recording of history of operations, costs and performance
- Accurate riser diagrams for plumbing, mechanical, and electrical installations
- Integration with BAS and CMMS, moves and asset inventory as well as finish and material data
- The visual aspect that it will give to our hvac system and maintaining our buildings.
- Coordination between disciplines
- The current programs such as Revit do not have the capability yet to provide useful design tools to us to properly use the "I" portion of BIM. We currently model in 3D, but there just isn't enough capability or information for us to justify the expense of trying to use the fledgling design capabilities.
- Complete 3D as built information
- Construction to ops transfer of data, models
- All data is important in some respect. We attach very little useless data. Most important might be quantification and costing data, as well as keynote construction data.
- Equipment data
- Historical as-built information for underground infrastructure
- Accurate as-built information

Mortenson
construction

What would make BIM more valuable to your organization in the future?

1. Integration with existing CMMS, FMS and EMMS systems

2. Database links between building components and design information

3. Development of an easier to use BIM software or interface to facilitate mass implementation across the various organizations.

Mortenson construction

What would make BIM more valuable to your organization in the future?

"Seamless transfer from construction into our EMMS and FMS"

"Easy viewers that don't require full versions of the original software."

"CMMS systems getting up to speed with the integration of BIM data"

"Accessible on mobile devices"

"First and foremost would be to have BIM a little easier to use with updating of O&M manuals for equipment. There is an excel spreadsheet that is required to make the connection, and it complicates the process. There should be more of a "point, click, upload, complete" approach."

"The potential of having convenient access to embedded or linked information for building components, materials and equipment as well as design information."

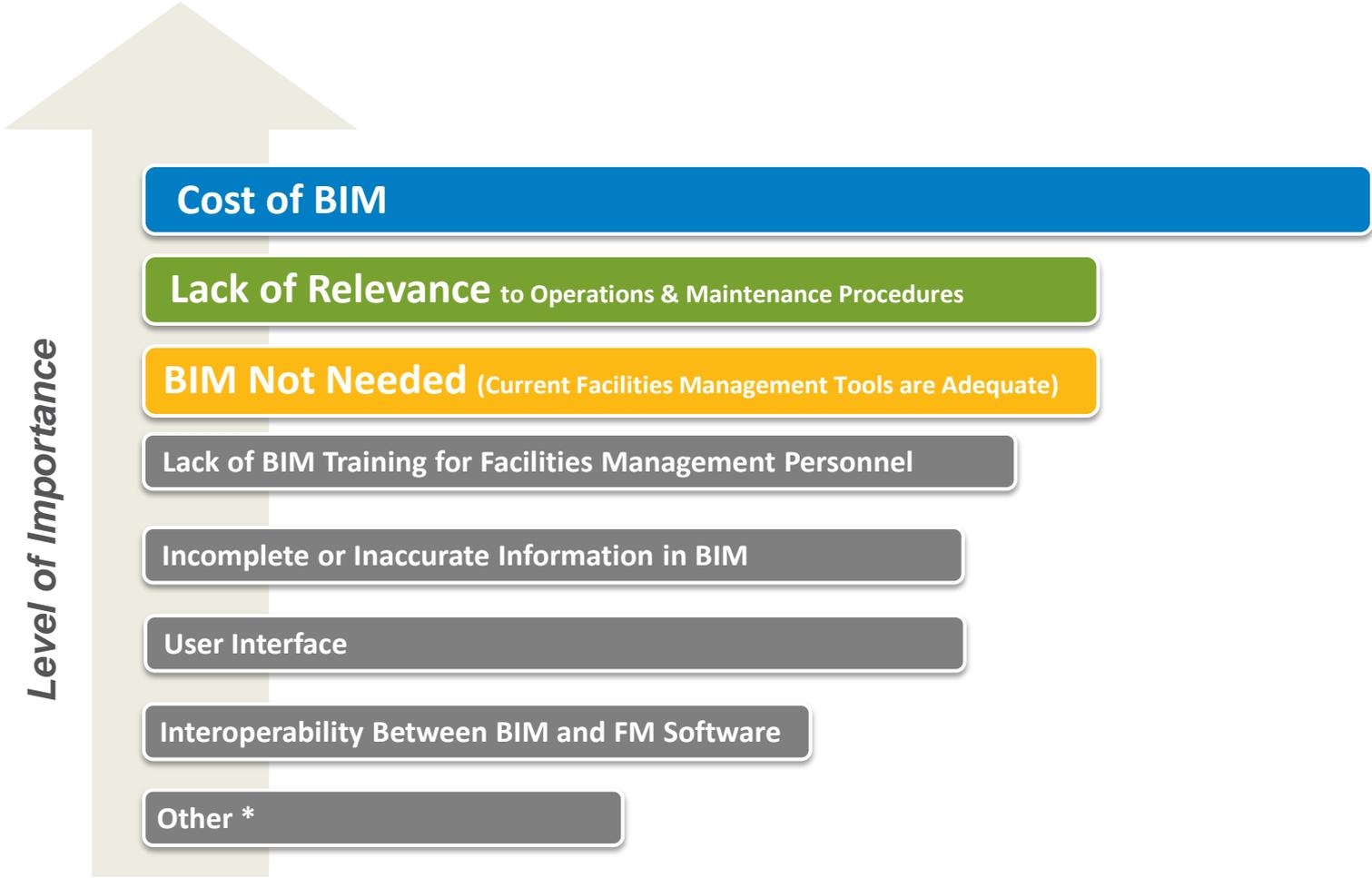Mortenson construction

Broader Sampling of Responses:

- We don't have the personnel, nor space for the personnel, nor the computer capacity to utilize [BIM] in our organization.
- Accessible on mobile devices
- Ability to track ROI of BIM implementation
- Thanks for asking. First and foremost would be to have BIM a little more easier to use with updating of O&M manuals for equipment. There is an excel spreadsheet that is required to make the connection, and it complicates the process. There should be more of a "point, click, upload, complete" approach. We had to make decisions on program content and detail based upon dollars available. As a result, we didn't get everything we wanted. I would recommend a full product without barriers to your desired outcome.
- Coordinating the BIM identification nomenclature with our other systems like ATG & TMS.
- Accuracy
- CMMS systems getting up to speed with the integration of BIM data
- Having all our building drawn in BIM
- If Revit or any other program evolved to include the information management capabilities, such as easy to use panelboard schedules, integration with design programs such as SKM, or the capabilities to size feeders. These tools exist in a very rudimentary form right now.
- Use 3D model as a central location to collect all as-built inforamtion, and keep the model updated as repair/modifications are made.
- One-stop shopping for data transfer and development, improve Autodesk's packages
- Interoperability with a variety of packages
- Seamless transfer from construction into our EMMS and FMS
- Do not know, so far this is an untapped resource.
- Easy viewers that don't require full versions of the original software.

Facilities Management | **BIM** | BIM Use On Projects

Mortenson construction

How many of your organization's
new construction or remodeling projects have utilized BIM?

76%

Have utilized BIM on at least 2 Projects

Mortenson construction

What do you see as the primary obstacles that may keep BIM from becoming a more useful ongoing facilities management tool?
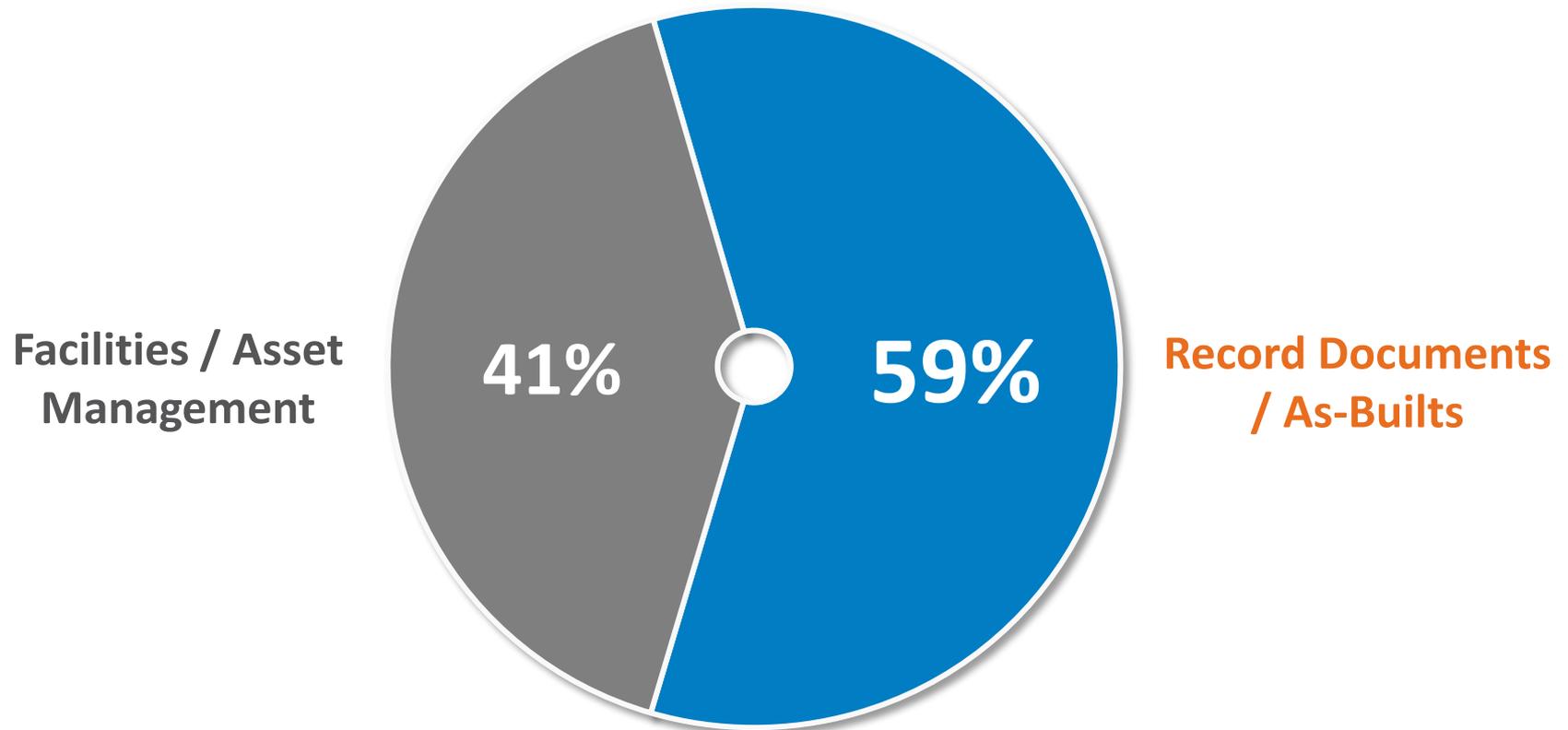
Level of Importance

Cost of BIM

Lack of Relevance to Operations & Maintenance Procedures

BIM Not Needed (Current Facilities Management Tools are Adequate)

Lack of BIM Training for Facilities Management Personnel

Incomplete or Inaccurate Information in BIM

User Interface

Interoperability Between BIM and FM Software

Other *

* Information modeling is borderline useless to us right now in its current implementation

Facilities Management

BIM

BIM Use On Projects

Mortenson construction
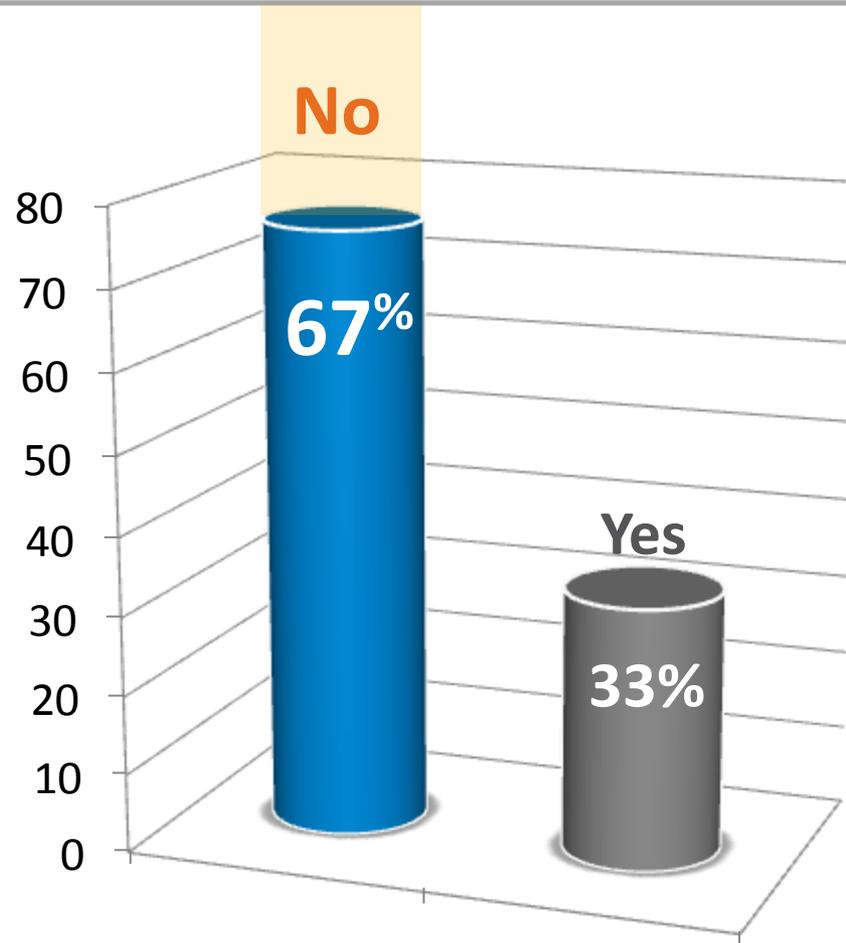
What do you see as the
primary purpose of end-of-project BIM deliverables?

Facilities / Asset Management — 41%

59% — **Record Documents / As-Builts**

Have you completed a project in which an
end-of-project BIM deliverable was provided?
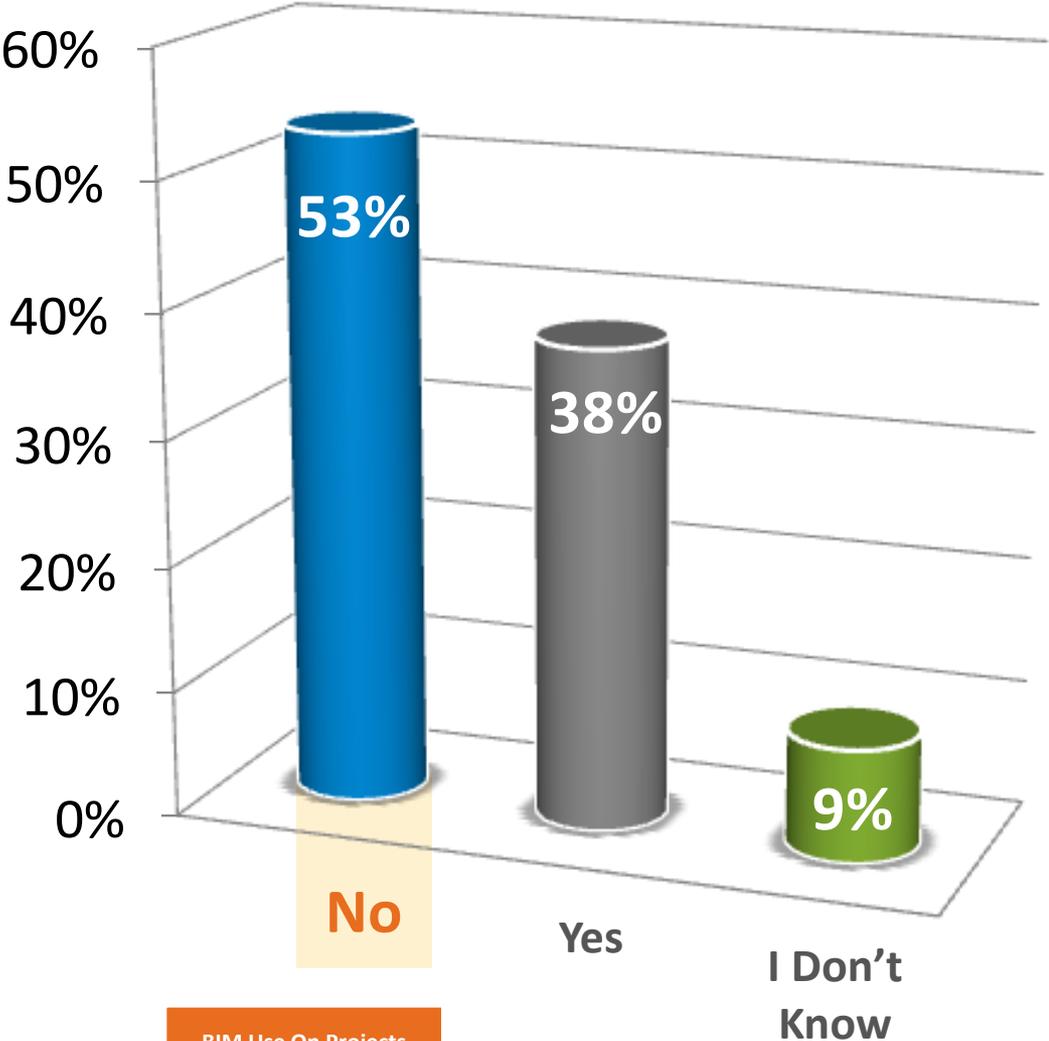
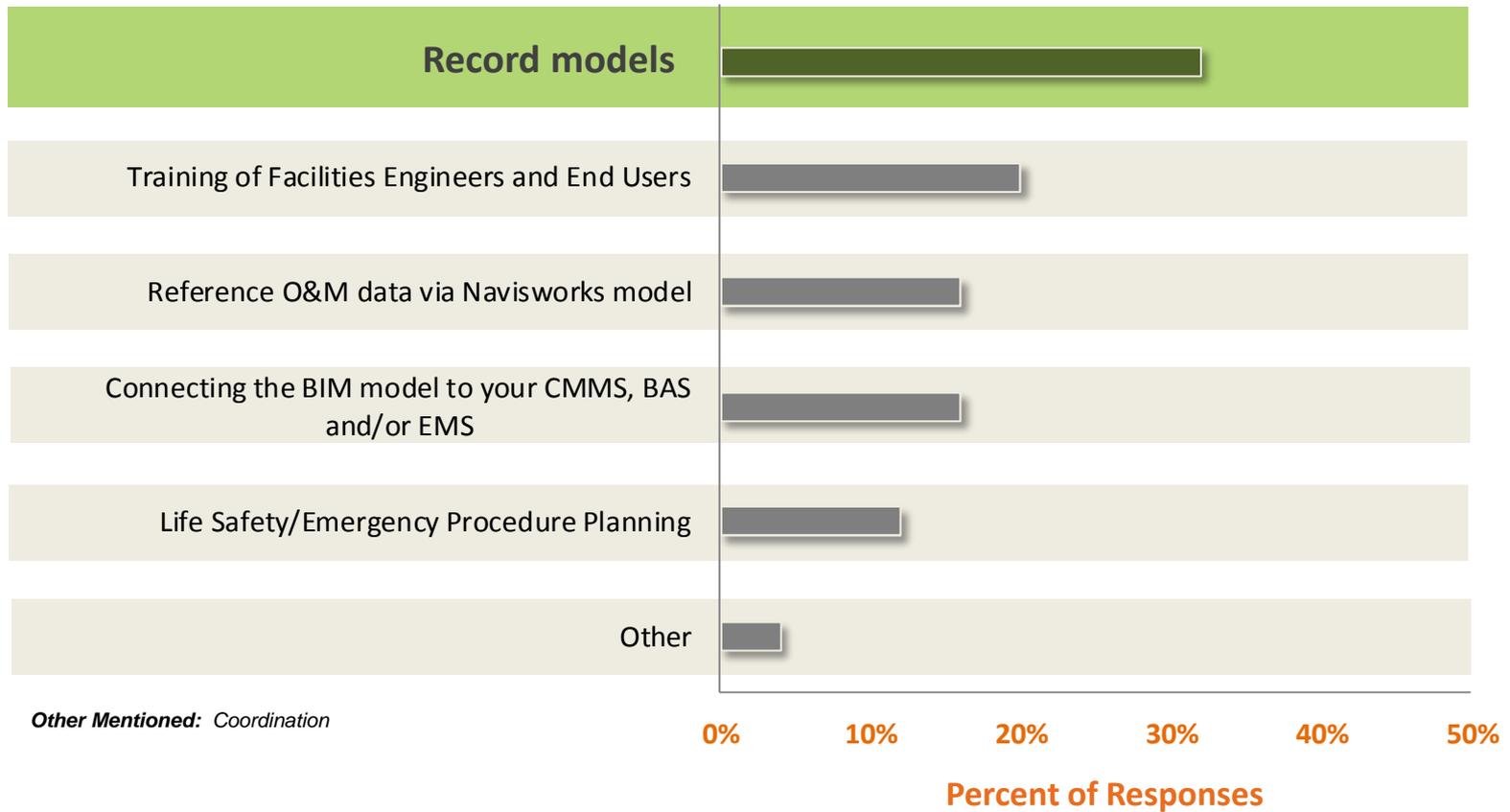**What was the BIM deliverable(s) provided to you at the end of the project?**

88%
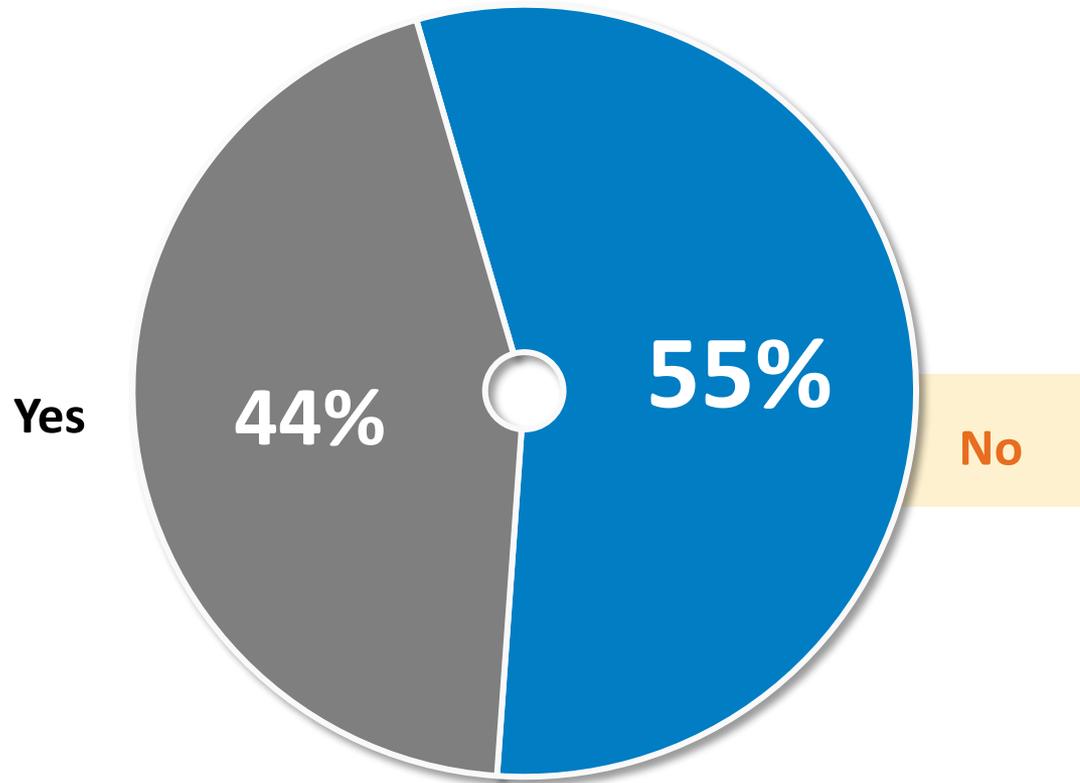
Of BIM deliverables involved some form of **Navisworks**

47%

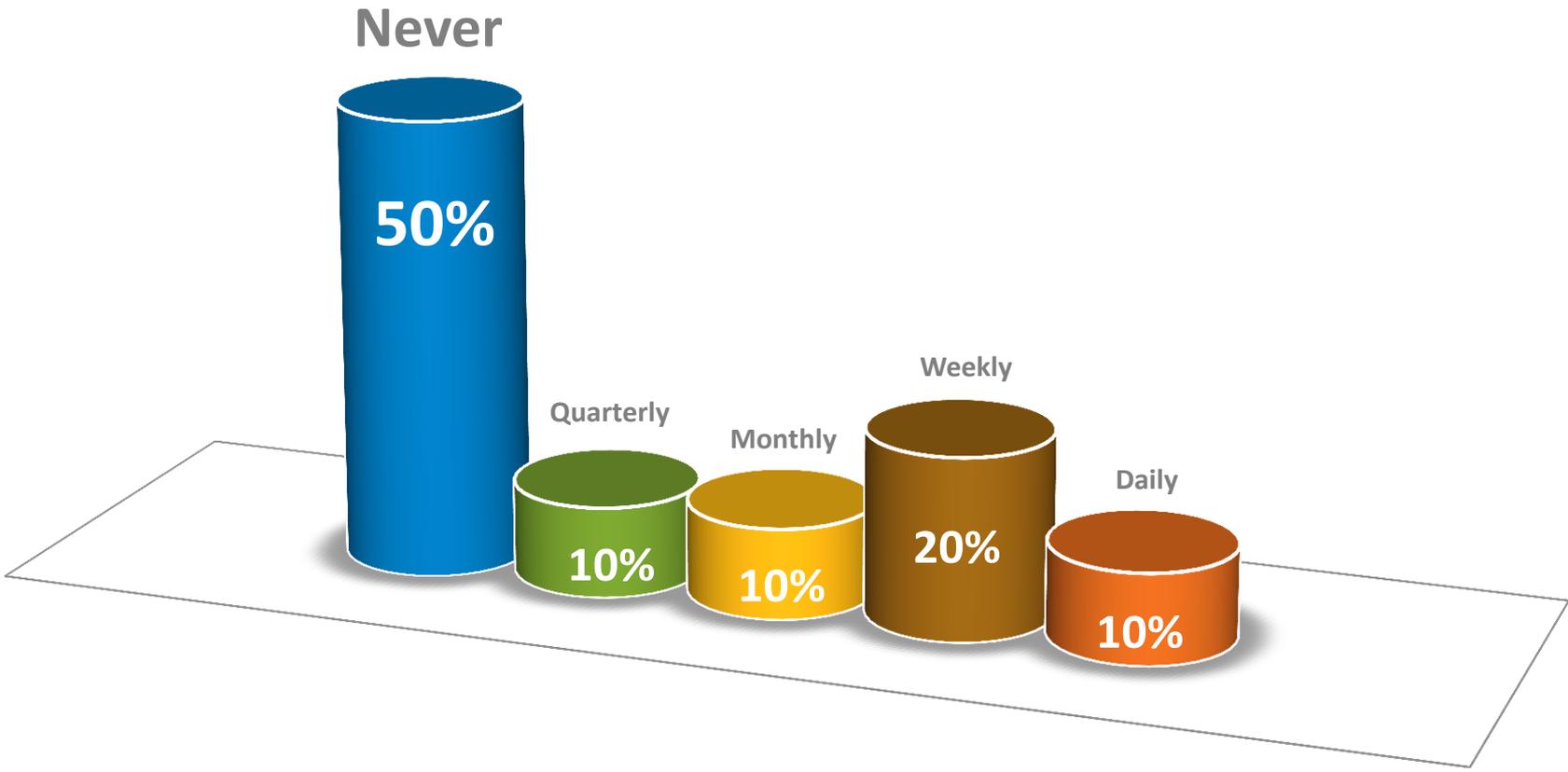Of BIM deliverables involved some form of **Revit, Bentley, or ArchiCAD**

Mortenson construction

How did you originally
intend to utilize the BIM deliverable?

Record models

Training of Facilities Engineers and End Users

Reference O&M data via Navisworks model

Connecting the BIM model to your CMMS, BAS and/or EMS

Life Safety/Emergency Procedure Planning

Other

Other Mentioned: *Coordination*

0%   10%   20%   30%   40%   50%

Percent of Responses

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construction

Are you **using the BIM deliverable** as you originally intended?

Yes **44%**   **55%** No

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How often is the BIM Information Referenced

or Utilized on a Regular Basis?

Which aspect of the
BIM deliverable did you find most valuable?

Visualization of the facility

9%

Information contained within the model

36%

55%

Both are equally valuable

Mortenson construction
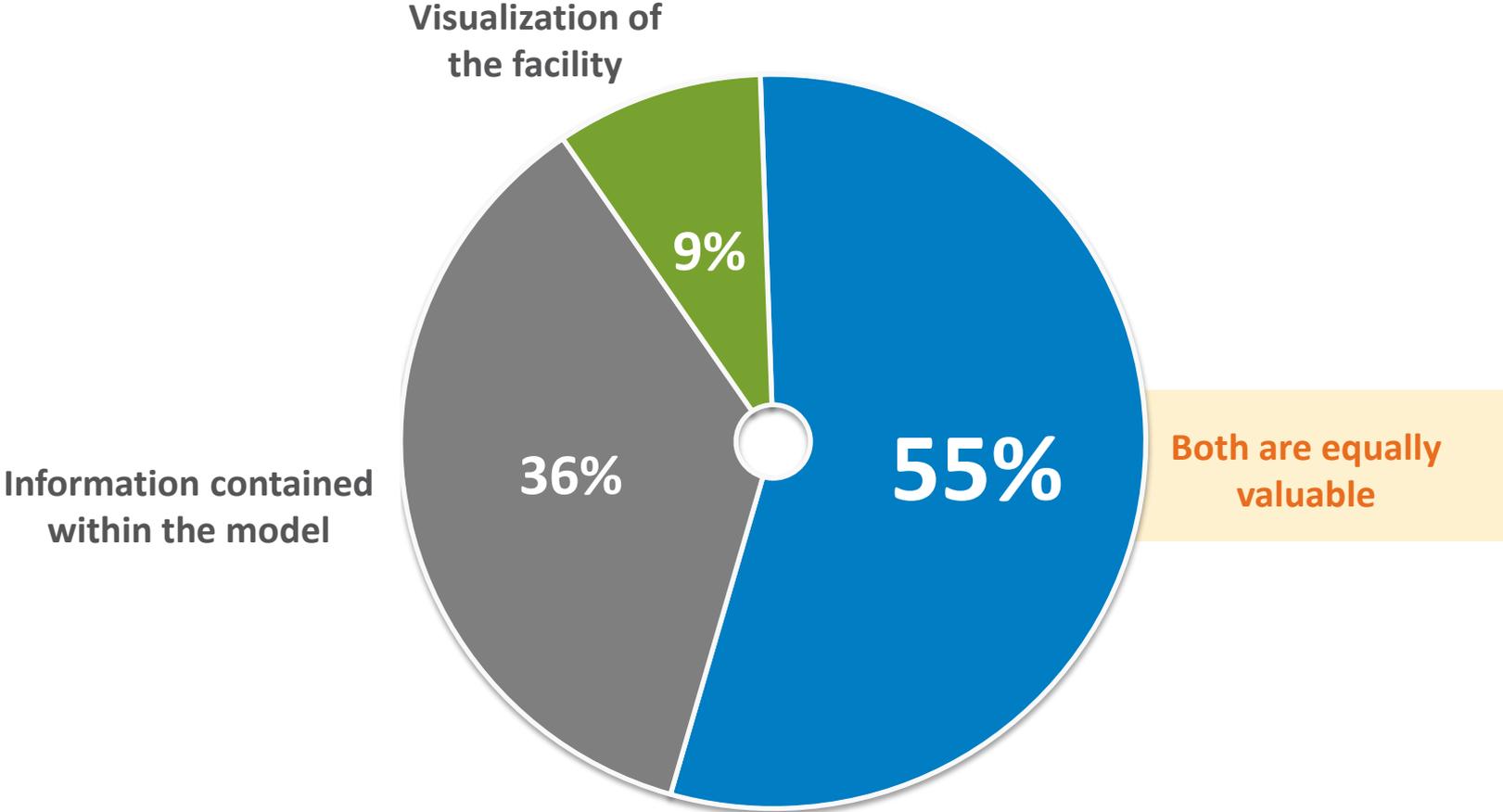
How **valuable** have you found the BIM deliverable tool for this project?

Scale of 1 (not very valuable) to 10 (extremely valuable)

25%	**Extremely Valuable** **(Responses 8 through 10)**
42%	**Somewhat Valuable** **(Responses 4 through 7)**
33%	**Not Very Valuable** **(Responses 1 through 3)**

Facilities Management | BIM | **BIM Use On Projects**

Mortenson construction

The most limiting factor is the **lack of training, hardware and software** to fully realize the benefits of BIM to FM. The complex BIM software user interface **requires regular use** to maintain familiarity with the tool. A narrow focus on visualization also hinders organizations' ability to comprehend the far-reaching value of BIM.

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What factors have limited the value of the BIM deliverable ?

"Lack of training for facilities management personnel, User interface, Fighting the mindset by some that BIM is not needed."

"Visualization in 3D. People get too caught up in it and misleads real users to notion that 3D is the end in mind. It's nice to have, but not really needed to serve its most useful purposes: Information and data."

"A complete account of equipment [location]. We have had three major add-ons since initial occupancy and those areas are not included. This makes the system less attractive to use on a regular basis. Good for remodel work."

Mortenson construction

Broader Sampling of Responses:

- Not having staff to utilize it as a tool
- Visualization in 3D. People get too caught up in it and misleads real users to notion that 3D is the end in mind. It's nice to have, but not really needed to serve its most useful purposes: Information and data.
- A complete account of equipment positioning. We have had three major add-ons since initial occupancy and those areas are not included. This makes the system less attractive to use on a regular basis. Good for remodel work.
- Not all facilities staff have a computer and they are not trained to use the BIM data.
- Complexity and training required for a person that cannot use it every day to be able to use it infrequently
- Management
- (Number 1 reason) lack of training for Facilities management personnel, (2) User interface, (3) Fighting the mindset by some that BIM is not needed.
- BIM is not accurate, or hard to review
- Linking models with FM software with double pass potential

Do you plan to request a
BIM deliverable on your future projects?

No 15% 85% Yes

BIM Use On Projects

Facilities Management   BIM

Mortenson
construction
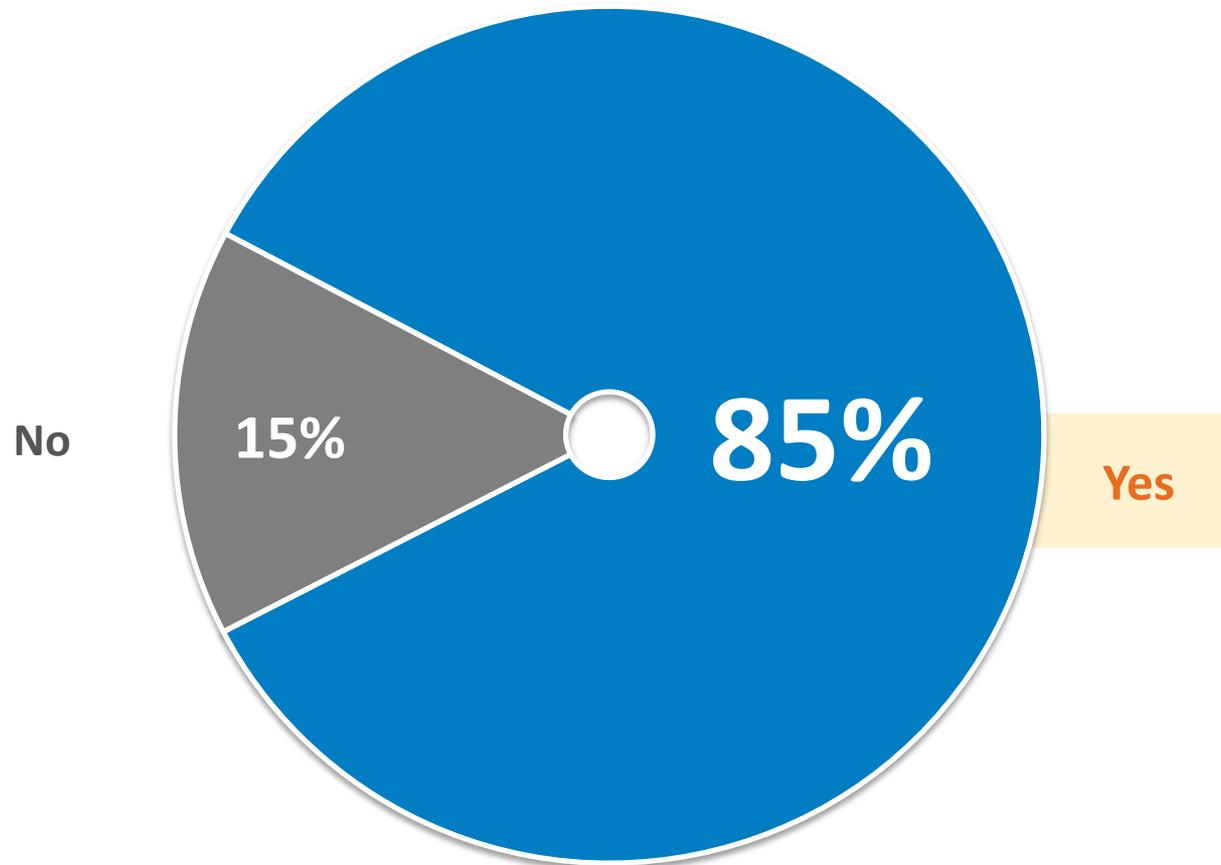
What changes would you make to the BIM deliverable to make it even more valuable?

The overwhelming response is the **level of accuracy** in the model during design all the way through construction. Building components need to **represent real world conditions** during design and be coordinated/updated during construction to **reflect the true as-built condition.** The final deliverable must reflect the real world conditions.

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What changes would you make to the BIM deliverable to make it even more valuable?

"Align design, construction and commissioning teams for a common deliverable package for the whole project that can more easily integrate with FM/CMMS software."

"More affordable. Priced way to high. Needs more follow-through on the back end with updates during the warranty period. Equipment layout must be coordinated with as-built conditions, not drawings. It doesn't make sense to have a final product that isn't based upon where the equipment, duct, conduit or pipes actually are positioned."

"Include as much detail as possible on all materials, equipment, and locations in an integrated way in the model."

"Building ACCURATE and COMPLETE model with ALL elements BEFORE construction takes place, and COPY the virtual model into the real world. If BIM model is NOT accurate and does NOT represent ALL elements, it will have no value."

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Broader Sampling of Responses:

- Align design, construction and commissioning teams for a common deliverable package for the whole project that can more easily integrate with FM/CMMS software.
- More affordable. Priced way to high. Needs more follow-through on the back end with updates during the warranty period. equipment layout must be coordinated with as-built conditions, not drawings. It doesn't make sense to have a final product that isn't based upon where the equipment, duct, conduit or pipes actually are positioned.
- Include as much detail as possible on all materials, equipment, and locations in an integrated way in the model.
- Not sure
- Don't know yet
- Building ACCURATE and COMPLETE model with ALL elements BEFORE construction takes place, and COPY the virtual model into the real world. If BIM model is NOT accurate and does NOT represent ALL elements, it will have no value.
- Good contracting tools

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