Benchmark of Alberta’s AEC Industries’ Knowledge of Building Information Modeling (BIM)

Basel Abdulaal, Ahmed Bouferguene, Mohamed Al-Hussein

Department of Civil & Environmental Engineering
Hole School of Construction – University of Alberta
Yet, another point of view (not a definition) of what is BIM!

- Fact #1: Infrastructures are naturally 3-dimensional
- Fact #2: A given infrastructure goes through 3 major stages:
  - Design
  - Construction
  - Maintenance
- Fact #3: A given infrastructure requires financing $$$
- Fact #4: A given infrastructure must be delivered within a specific timeframe
- Fact #5: All the above are interconnected thus correlated!

Since BIM is about information we can see it as a model of a living infrastructure at the center of which is (probably) a nD model to which are attached ALL the relevant information corresponding to 3 major periods of the life cycle: Before, During and After the infrastructure is built.
A point of view on “Why do we need BIM”

- One word answer: Efficiency!
  - Efficiency = Sustainability + Quality + Profitability

- A look into material consumption: The case of US†

Raw material consumption in the United States between 1900 and 1995

40% of global raw materials are consumed by buildings

Consumption of construction material increases at an alarming speed!

Inefficiencies and waste in the construction industry

• A NIST study from 2004 targets lack of AEC software interoperability as costing the industry $15.8B annually
• A US Bureau of Labor Statistics study shows construction alone, out of all non-farm industries, as decreasing in productivity since 1964, while all other non-farm industries have increased productivity by over 200% during the same period †

† Comparative Efficiency of Industries (after D. Smith, NIBS, 2009)
BIM: A path to profitability

According to McGraw-Hill Construction Research and Analysis†, implementation of BIM technology has positive financial impacts.

A snapshot on the state of BIM in the AEC industries of Alberta
• In May 2010, a survey geared to probe the level of BIM usage in the Alberta construction industry was provided to 140 participants at a workshop on BIM held at the University of Alberta.
• Out of the 140 workshop participants, 80 of them took the survey.

<table>
<thead>
<tr>
<th>Organizations Distribution per Discipline</th>
<th>Distribution of Years of Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Architecture</strong></td>
<td><strong>Average : 14.6</strong></td>
</tr>
<tr>
<td><strong>Contractor</strong></td>
<td><strong>Group of Years of Experience</strong></td>
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<tr>
<td><strong>Architecture + Engineering</strong></td>
<td><strong>&lt; 2</strong></td>
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<tr>
<td><strong>Multidisciplinary Eng.</strong></td>
<td><strong>2 to 5</strong></td>
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<tr>
<td><strong>Engineering Others</strong></td>
<td><strong>6 to 10</strong></td>
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<tr>
<td><strong>Building Services Engineering</strong></td>
<td><strong>11 to 15</strong></td>
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<td><strong>HVAC Engineering</strong></td>
<td><strong>16 to 20</strong></td>
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<tr>
<td><strong>Building Material and Facility Management</strong></td>
<td><strong>&gt; 20</strong></td>
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<tbody>
<tr>
<td>13.75%</td>
<td>10.00%</td>
<td>8.75%</td>
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Knowledge of BIM: “What is BIM?”

How would you describe BIM?

- a technology
- a tool
- a process
- a philosophy
- a software

### BIM Definition

<table>
<thead>
<tr>
<th>Definition</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>C: BIM is a process</td>
<td>33.33%</td>
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<tr>
<td>B: BIM is a tool</td>
<td>29.01%</td>
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<tr>
<td>D: BIM is a philosophy</td>
<td>17.90%</td>
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<tr>
<td>A: BIM is a technology</td>
<td>10.49%</td>
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<tr>
<td>E: BIM is a software</td>
<td>9.26%</td>
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</table>

### Distribution of BIM Definitions

- Technology
- Tool
- Process
- Philosophy
- Software

Percentage of Respondents

- Architecture
- Contractor
- Other
Organization experience/knowledge of BIM
Motivations of BIM implementation

Rate to what degree you think BIM will be used in your field?

In your opinion, what kind of impact BIM will have on your field of practice?
What is your organization’s strategy towards BIM training?

Rate the level of interest in your organization for the following:

Organizations' Strategies Towards BIM Training

- Attend seminars and workshops: 29.34%
- Attend training programs offered by educational institutes: 16.17%
- Self-paced tutorials with software: 14.37%
- Hired outside training: 14.37%
- No plan for training: 13.77%
- Hired BIM 'expert' from another company to train staff: 6.55%
- Other: 5.39%

Organization Interest Level in BIM

- Leaders interest in BIM
- Staff interest in BIM
- Training in BIM
- Investment in BIM
- Your personal interest in BIM

Low/Poor: 0%, Moderate/Ok: 0%, Above average: 0%, Very High/Exceptional: 0%
Rate the level of effectiveness of your organization's BIM training program on a scale of 0 to 4?

Level of BIM Training Effectiveness Programs

- N/A we do not use BIM (33.75%)
- 0 = nonexistent (16.25%)
- 1 = very ineffective (2.50%)
- 2 = ineffective (5.00%)
- 3 = moderately effective (37.50%)
- 4 = very effective, successful (5.00%)

Unsatisfactory training (57.5%)
Knowledge of BIM: “What is BIM?”

How would you describe BIM?

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• a process
• a philosophy
• a software

Before

![BIM Definition Before]

After

![BIM Definition After]
Organizations’ experience/knowledge of BIM: before and after opinions

How would you rate your organization’s experience/level of knowledge of BIM?

Before

After
Knowledge of BIM: “What is BIM?”

How often do you use software that supports BIM?

Before

After
Knowledge of BIM: “What is BIM?”

Is your organization heading in the right direction with BIM?

Before

After
Conclusion

- Motivations
- Obstructions
- Lack of organizational training strategy
- Interoperability
- The absence of standards and guidelines
- As BIM is neither universal nor required (no active adoption)
- Work process is left unchanged
- Legality

<table>
<thead>
<tr>
<th>Benefits of BIM adoption per discipline</th>
<th>Users</th>
<th>Owners</th>
<th>Designers</th>
<th>Engineering</th>
<th>Contractors</th>
<th>Manufacturing</th>
<th>FM</th>
<th>Software Vendors</th>
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<td>Better expected return on investment</td>
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<td>Better productivity level</td>
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<td>Project delivered on schedule</td>
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<td>Less rework</td>
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<td>Better result of Life Cycle Cost Analysis</td>
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<td>Higher level of communication</td>
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<td>Higher safety level</td>
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<td>Higher sustainability level</td>
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<td>Cost effective</td>
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<td>Better quality</td>
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<td>Better visualization</td>
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<td>Better understanding of expected end-result</td>
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There is a lack of education on BIM technology and its relationship with IPD.

It is important to establish BIM guidelines for Canada that can be integrated with international guidelines in the future.

Process change within the AEC and FM industries is often unaddressed. There is still a large concentration on the manual, document-based process rather than the one-model concept of project delivery.

The number one motivation to implement BIM technology is the steady market demand.