BIM Explained

BIM

Building Information Modeling (BIM) of recent years has become a buzz word often believed to be new technology but in fact BIM has been in development since the late 70s, technologies such as Revit and ArchiCAD began in the 80s, 30 years ago. Even with its history the concept and use of BIM is only now reaching a tipping point in the Canadian construction industry, from National BIM Standards International BIM Report 2017, 78% of Canadians surveyed believe BIM is the future of project information with already 67% of respondents currently using BIM.

Building Information Modeling is the process of collaboratively developing and managing an integrated digital model containing a built asset's geometry and lifecycle information. The model acts as a 'single-source of truth' and supports the many practices that are involved in the design, construction, operation and management of a built asset. The underlying principle of BIM is the data driven approach to project delivery as opposed to the traditional, 2D/representational approach that has been the norm. While a single, unified model is still some ways off due to a number of practical, technical and organizational issues, there is increasing empirical evidence that BIM, deployed within an appropriate environment, can lead to important gains in efficiencies. These gains are attributable to the high quality and streamlined information flows that result in fewer errors and support global optimization of asset lifecycle practices.

BIM is a multi-faceted term best defined by the National BIM Standards as a digital representation, a process, and a management system. To elaborate:
- Building Information Model is the digital representation of a facility, both its physical and functional characteristics through the building's entire lifecycle (conception to demolition).
- Building Information Modeling is the collaborative process of utilizing the Building Information Model and leveraging the data to design, construct and operate the building through the building's entire lifecycle (including facility management)
- Building Information Management is the development of an asset lifecycle process enabling the shared utilization of the information within the Building Information Model over the building's lifecycle.

The currently fragmented construction industry has a need for a centralized platform for information sharing due to the increasing complexity of the buildings themselves and the growing number of experts involved. BIM is that forum for collaboration which in-turn increases efficiency of information sharing between the multiple parties that collaborate throughout its lifecycle.

The BIM lifecycle is envisioned to begin at the planning and programming stages of the facility, throughout the design phases and construction and then on to operation and maintenance and then back to planning, design and construction of renovations and so forth until the facilities demolition.
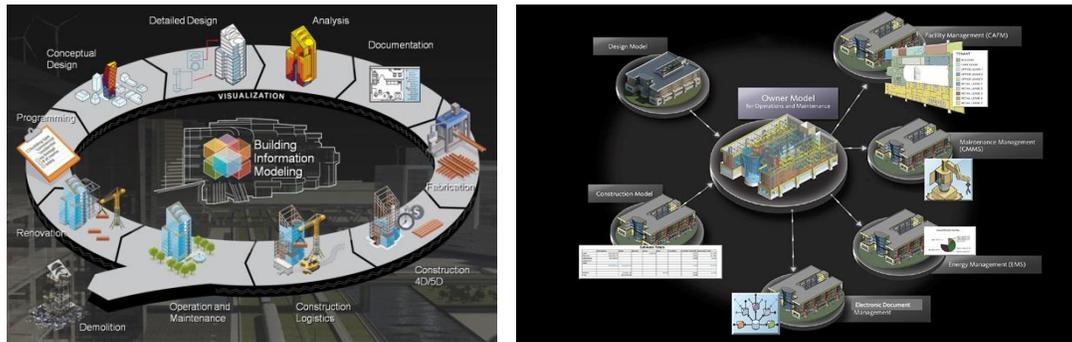
Images courtesy of Autodesk

The use of BIM for operations as a tool for facility management is the longest phase of the BIM and where much of the investment in the process is realized due to all the integrated data. Owners are able to replace the boxes of paper drawing, owner manuals, warranty documents, shop drawing, and as-built drawings with the BIM, where information is centralized, searchable and accessible. The BIM contains all the needed assets and associated information digitally. According to respondents to the NBS Report 2017 only 26% report passing the model on to those responsible for tor the continued managements of the building but 70% believe that clients will increasingly insist on the adoption of BIM.

Collaboration

Collaboration is at the center of BIM's success. BIM collaboration includes both communication amongst all the parties involved with a universal approach to the collaborative design, realization and operation. The NBS International BIM Report 2016 reports that 88% of BIM Users agree that adopting BIM requires changes in our workflow, practices and procedures and that 63% of respondents equate BIM with collaboration.

Collaboration includes the communication of the building information models to one another which often exist as different file formats that may not natively be compatible. This full collaboration is based on open standards and workflows referred to as Open BIM. Open BIM is an initiative of buildingSMART and several leading software vendors using the open buildingSMART Data Model. Moreover:

- openBIM supports a transparent, open workflow, allowing project members to participate regardless of the software tools they use.
- openBIM creates a common language for widely referenced processes, allowing industry and government to procure projects with transparent commercial engagement, comparable service evaluation and assured data quality.
- openBIM provides enduring project data for use throughout the asset life-cycle, avoiding multiple input of the same data and consequential errors.

At a technical level open BIM and seamless collaboration can be achieved once issues of interoperability are overcome. Interoperability is "the ability of two or more systems or components to exchange information and to use the information that has been exchanged." (IEEE, 1990). These standards cannot

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be achieved by any single vendor, but must be a consortium of software providers, practitioners, academics and client-owners all working collaboratively to achieve interoperable solutions.

To learn more visit: http://www.buildingsmart-tech.org/

IEEE 1990. A compilation of IEEE standard computer glossaries. standard computer dictionary.

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Canadian BIM Organizations

Institute for BIM in Canada

The Institute for BIM in Canada (IBC) is a steering committee composed of constituent organizations that represent key industry associations, specifically the Royal Architectural Institute of Canada (RAIC), the Association of Consulting Engineering Companies (ACEC), the Canadian Construction Association (CCA), the Construction Specification Canada (CSC), Public and Private Owners. IBC is the acting Steering Committee for buildingSMART Canada.

They have developed and published significant Canadian BIM Resources that supports BIM adoption, such as the BIM Contract Appendix and the BIM Project Execution Toolkits.
Visit to learn more ibc-bim.ca

buildingSMART Canada

buildingSMART Canada (bSC) is the national chapter of buildingSMART International and is a council of the Institute for BIM in Canada (IBC), functioning as its operational arm. bSC believes in collaborative approaches based on BIM tools, technologies and processes.

bSC is involved in local, regional, national and international activities producing Canadian BIM resources and initiatives such as the Canadian Practice Manual for BIM, the bSC Affiliates program, and the BIM in Canada: Best Practice Forum. bSC continues to participate on the buildingSMART International Technical committees and is an active member of the bSI People Compliance Committee. Its participation provides a Canadian perspective to efforts toward the realization of international standards in support of the goals of interoperability of data, consistency and efficiency in work processes, and optimization of information classification systems.

bSC created The Roadmap to Lifecycle Building Information Modeling in the Canadian AECOO Community which continues to drive the change required to lead the transformation to a better performing Canadian AECOO community through the implementation of collaborative, open BIM-based project delivery and lifecycle processes.

Visit to learn more buildingsmartcanada.ca

CanBIM

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The Canada BIM Council (CanBIM) is the business voice of Canada's BIM community, advocating on behalf of the Architectural, Engineering, Construction, Owner, Operator and Educational community for the implementation of BIM in Canada.

CanBIM offers both individual and organization memberships, provides regional sessions in many Canadian cities throughout the year, as well as produces documents such as their annual publication CanBIM Innovation Spotlight and the AEC (Can)BIM Protocols.

The CanBIM Certification Program was launched in 2014. It is a tiered certification program providing a benchmark for BIM Competency and Process Management. The objective of the certification program is to bridge BIM education and the AECOO industry's implementation and use of BIM.

To learn more visit canbim.com

bSC Affiliates

The bSC Affiliates are regional BIM communities that bring together local members in face-to-face meetings featuring presentations, networking and peer-to-peer discussions. There are bSC affiliate groups in a number of cities across Canada each of which acts as an autonomous community addressing the specific needs of its region.
These local BIM communities remain connected to one another through bSC.

The current bSC affiliates include:

- BIM BC (Vancouver / Victoria. Visit: bimbc.com
- BIM Quebec. Visit: bimquebec.org
- Calgary BIM Community Visit: cbimc.ca
- Edmonton BIM Community. Visit: ebimc.ca
- Toronto BIM Community. Visit: tbimc.ca
- Winnipeg BIM Community. Visit: wbimc.ca
- Regina BIM Community. Visit: rbimc.ca

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Canadian BIM Resources

Canadian Practice Manual for BIM (C-PMB)

The Canadian Practice Manual for BIM is designed to provide novice and intermediate BIM users the framework for developing and adopting company-centric practices to streamline and improve their use of digital information. This three volume book was written for all participants of the AECOO industry implementing or running BIM-enabled projects. It includes a range of topics from high-level non-technical explanations regarding Building Information Models and Processes to BIM Implementation companywide to minimize impact as well as BIM at a project level and how it differs from traditional approaches.

For more information or to obtain a copy visit: Canadian Practice Manual for BIM

The Roadmap

The Roadmap to Lifecycle Building Information Modeling in the Canadian AECOO Community was developed to prompt, guide and sustain the transformation to BIM, supporting collaborative approaches to project delivery based on building information modeling (BIM) tools, technologies and processes that are aligned with other similar initiatives currently under way around the globe.

The roadmap articulates six principles and develops them by setting clear milestones aimed towards a verifiable desired state. bSC is confident that the roadmap will facilitate the transformation to a better performing industry through the collective participation of all its stakeholders and a National BIM mandate.

For more information visit: buildingsmartcanada.ca/roadmap-to-lifecycle-bim/

BIM Forum

The BIM in Canada Best Practice Forum is a free online resource available to all industry stakeholders and supported by industry experts in Canada. It offers a unique opportunity to discuss issues and topics relevant to the BIM implementation in Canada.

Visit: forum.buildingsmartcanada.ca/

IBC Contract Language Documents Package

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To encourage the use of BIM in Canada the IBC created the IBC BIM Contact Appendix. The Appendix is based on previously developed BIM Contracts; it is designed to be appended to our standard construction contracts such as Document 6, ACEC 31, CCDC 2 and other standard form contracts already known to the Canadian construction industry. This contract appendix covers topics such as copyright, model element ownership and more.
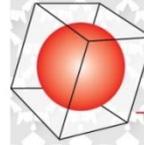
The Appendix is a standard fillable PDF form, which is accompanied with IBC 201 the LOD Authorized Uses and Model Elements Table as well as the Guide to the Use of IBC Contract Language which provides clause by clause commentary.

For more information or to obtain a copy visit: IBC Contract Appendix

IBC BIM PxP Toolkit Package

The IBC has developed a series of BIM Project Execution Plan Toolkits to assist project teams in developing their own project specific BIM Execution Plans. There are 3 PxP Toolkits, one for the design development phase, one for the construction phase and one for the Handover and maintenance phase.

Each of these toolkits consists of several parts: an overview document, an executive Summary which is a high-level explanation, an illustrative guide, an example Project Execution Plan and the PxP Template.

For more information or to obtain a copy visit: IBC BIM PxP Toolkits

AEC (Can) BIM Protocols

The AEC(CAN) BIM Protocol is a Canadian document that has been developed by CanBIM members representatives from architectural, engineering, and construction companies across Canada. These

members are from large and small firms, working on projects of all sizes. It focuses primarily on encouraging adaptation of emergent standards for practical and efficient application of BIM in Canada, particularly at the design stages of a project.   The second version was issued in 2014.

For more information or to obtain a copy visit: AEC (Can)BIM Protocols

RAIC Canadian Handbook of Practice Second Edition

The second edition of the Canadian Handbook of Practice contains valuable BIM information for practicing architects.   Specifically addressing the impact of BIM on Architectural Scope of Services, Schedule and Fees, Drawing Packages and BIM's influence on the architectural practice.

For more information or to obtain a copy visit: Canadian Handbook of Practice - 2nd edition and The Royal Architectural Institute of Canada: Building Information Modeling (BIM) Practice Builder. 2007. *www.raic.org/practice/bim/bim-practice-builder_e.pdf*

IBC Benefits of BIM to Owners Document

This report explores the use of BIM from an owners' perspective. It identifies the most common uses of BIM based on a review of case studies and feedback from owners with BIM experience and quantifies the benefits they have realized through its use.

For more information or to obtain a copy visit: Benefits of BIM to Owners