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BIM EDUCATION - GLOBAL - SUMMARY REPORT - 2013

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EXECUTIVE SUMMARY

This report provides a brief summary of the current status of BIM education in a number of countries across the globe. The countries included in this report are the countries of the respondents to an email that Richard Choy (NATSPEC) sent to a group of parties with an interest in BIM, in October 2013.

The email requested that respondents provide a paragraph outlining the current status of BIM education their country. This was interpreted in two ways, with the respondents either describing the current level of BIM awareness/use in their country or the current level of training/tertiary education available.

The responses indicated that BIM education and BIM awareness/uptake is currently at different levels of implementation across the globe. Tertiary education institutions are either already providing, or gearing themselves up to provide, BIM education on both an undergraduate and postgraduate level. Some countries, such as the UK, appear to be leading the way in terms of the number of postgraduate BIM courses available at universities.

It would appear that the majority of BIM education available to date focuses on training in the use of particular BIM software packages. Training in openBIM concepts, BIM management and working in collaborative BIM environments, appears to still be in its infancy.

It is clear from the responses that awareness and uptake of BIM is certainly increasing, with BIM already widely adopted in the Architecture, Engineering and Construction (AEC) industry or with industry/government preparing themselves for the imminent arrival of BIM.

An industry reluctance to change, a ‘wait and see’ approach and a shortage of experienced/educated BIM practitioners/technicians/educators is slowing the inevitable uptake of BIM in the AEC industry. It is clear that tertiary education institutions, with the support of government and industry, need to fully incorporate BIM education into their curricula, to provide the AEC industry with the ‘BIM-ready’ graduates required for the collaborative BIM working environments to which they will be part of in the future.

INTRODUCTION

Question

In October 2013 Richard Choy (NATSPEC) sent an email to global group of parties with an interest in BIM, asking for a brief paragraph outlining the current status of BIM education in each of their countries.

This question was interpreted in two ways, with the respondents either describing the current level of BIM awareness/use in their country or the current level of training/tertiary education available. Some respondents also provided a much more detailed response than a brief paragraph.

Report

This report summarises the responses received, providing a brief summary of the current status of BIM education in each respondents country, based purely on the responses received. It does not attempt to fully document the status of BIM education/awareness in each country. The report has been organised by listing each country in alphabetical order.

The report includes only countries from which a response was received.

BIM EDUCATION - BY COUNTRY

AUSTRALIA

Education/Training

Most universities are starting to incorporate the topic of BIM into their undergraduate courses, although this is quite often at a very basic level of information, simply covering the concepts of BIM or the basics of using a particular BIM software package.

Many TAFE (technical) colleges are providing courses where BIM is incorporated into the syllabus. However, this is usually related to the use of specific BIM software packages. The topic of BIM management or the procedures for working in a collaborative environment are not generally covered in these courses.

NATSPEC has been providing an *Introduction to BIM* presentation to undergraduate students at Universities across Australia for the past 2 years. NATSPEC also provides industry seminars on the use of the NATSPEC National BIM Guide, NATSPEC BIM Management Plan and their associated documents.

Software vendors provide training in their particular software packages and there are lots of short courses on BIM provided by private training organisations. Large firms often also organise their own in-house BIM training and education days.

The NATSPEC BIM website (bim.natspec.org) is a useful resource for information on BIM and the numerous BIM guidelines that are available.

Initiatives/Organisations

Three universities (University of South Australia, University of Newcastle and University of Technology, Sydney) are currently involved in a project supported by the Australian Government Office for Learning and Teaching (OLT) called CodeBIM (Collaborative Building Design Education using BIM).

The project aims to examine whether collaborative design education can be improved using BIM technologies; how best to adapt these technologies to existing Architecture, Engineering and Construction (AEC) courses; and to develop new curriculum for collaborative building design courses in a variety of delivery modes.

The Australian Institute of Architects (AIA) and Consult Australia established a BIM education working group of industry and academia members in 2011. This group produced a series of documents, published in August 2012, which represent the position of the group and are to act as a foundation for further work.

The group identified that introducing BIM into academia would be a difficult change process and, like any major change process, would likely encounter resistance. Some of the reported difficulties included:

- The difficulty of introducing new topics into an already crowded curriculum.
- Unfamiliarity of lecturers with BIM and other fast-paced technologies and workflows.
- Reluctance of some lecturers to alter established teaching methods coupled with an unwillingness by some to retrain in new topics.
- Inability to bridge the traditional educational silos of AEC and deliver collaborative courses and programs.

The group identified 20 education principles (EP), the following are the key principles related to BIM learning providers:

- EP9. Accreditation and professional associations should engage with universities to develop new collaborative BIM courses or to integrate the principles and technologies of multidisciplinary collaboration into their existing curricula.
- EP11. There is need to de-mystify the BIM process and develop integrated, coordinated and viable BIM training modules delivered via professional associations. These training modules should align with university/TAFE curricula and tightly complement their educational deliverables.

- EP13. There is a need for regular BIM Learning opportunities and non-technical BIM learning materials, specifically tailored for senior and executive staff.
- EP14. There is a need to consider how to assess and improve the BIM knowledge, skill and experience of current professionals, para-professionals and tradespeople.

The Western Australia AIA BIM Group is collaborating with Curtin University, University of Western Australia, Central TAFE and the Construction Industry Training Board (CITB) to advance BIM education.

Curtin University has also collaborated with Huazhong University of Science and Technology (HUST), Wuhan, China, to establish the Australian Joint Research Centre for BIM. The centre focuses on developing leading research that integrates BIM with other advanced concepts and technologies and acts as an allied international platform for creating and sharing knowledge among researchers, engineers and innovators to improve the performance and productivity of building projects in the energy, mineral and construction industries across Australia and China.

Awareness/Uptake

BIM is being widely used on projects in Australia and by Australian consultants working on overseas projects. The use of BIM for FM/Operations/Maintenance is slowly taking off with some high profile projects such as the Sydney Opera House using BIM retrospectively to create a working model for FM.

The NATSPEC National BIM Guide and BIM Management Plan have been well received and are being increasingly adopted across industry both as a framework for building projects as well as within education programs. This success has led to NATSPEC being engaged by the NZ Ministry of Business to author the New Zealand BIM Guide.

CANADA

Education/Training

Other than academic institutions, not aware of any courses or programs in Canada that teach vendor-neutral BIM. George Brown College, in conjunction with BRE-Canada, is in the process of delivering a vendor-neutral/open standards/buildingSMART approach type of program/certification for technicians, managers and designers.

Algonquin College is in development of two BIM certificate programs: one at the undergraduate level and one at the graduate level. Both programs will explore the bigger picture of BIM while gaining skills and knowledge in specific tools, operations and processes. Software-specific courses are already offered to students in the Architectural Technology program and through Continuing Education.

Algonquin College also now offers a Bachelor of Building Science program where BIM is taught in relation to the roles and responsibilities of the Building Science Professional. Specifically, BIM exposure and teaching in this program is related to viewing the construct from a holistic systems perspective, focusing on energy efficiency, building performance and buildings as systems.

Software providers are also providing training with their products.

Initiatives/Organisations

Currently no incentive is being provided from government to encourage BIM use. Whilst individuals in government positions talk positively, there is no hint of support, by requiring the use of BIM on government projects.

Another example is that of the National Research Council (NRC), an independent crown corporation, who recently elected to shut down the campus where much IT BIM research was taking place. Some experts were moved to Ottawa, but the NRC now wish to focus their efforts on energy efficiency, materials and systems testing. This leaves government sponsored BIM research pretty much out in the cold.

Industry associations - There are two BIM-related organisations:

- Institute for BIM in Canada (IBC): Operated by a group of association representatives (engineers, architects, CSC, contractors, government, etc.). It is largely funded by the Canadian Construction

Association. This group applied for and received approval to start and operate the buildingSMART Canada (bSC) chapter.

- CanBIM: A blend of companies and associations. It has successfully managed to become more well-known than the IBC, and has succeeded in attracting many industry members (individuals and companies). Its primary activity has been BIM seminars.

Awareness/Uptake

Some architectural and engineering firms have been using BIM software for some time, however many are still drafting in 2D CAD. Large contracting firms in Canada have embraced BIM quite well, a few using BIM of their own accord, to help them manage projects.

BIM continues to make inroads into design offices, but not at the speed anticipated. Graduates coming out of Universities and Colleges are much more proficient in operating in BIM. The primary stumbling block to BIM implementation is hardware able to deal with the very large files generated.

The results of the 2013 BIM Survey show that 96% of respondents were aware of BIM and 64% are currently using BIM. The results of the survey can be found at the following link:

www.digicon.ab.ca/Data/Sites/1/downloads/spexnews/canadian_bim_survey_2013_2013-06-26-all-logos.pdf

A synopsis of the survey results can also be found at the following link:

www.digicon.ab.ca/Data/Sites/1/downloads/spexnews/digicon-ibc_surveyanalysis_2013-06-26.pdf

The development of Point Cloud technology and 3-D Laser scanning has now reached the point where it is more economical to use, than conventional methods for surveying existing buildings. This development alone will advance the use of BIM technology in the field of repair, renovation, and maintenance of existing buildings.

CHINA

Education/Training

The China BIM Union has given many education presentations to hundreds of BIM professionals, presented by Mr Huang Qiang, the vice president of the China Academy of Building Research (CABR), the chairman of the board of directors of China BIM Union. Mr Huang also attended and presented at the Government BIM Symposium 2013 in Singapore.

Initiatives/Organisations

The China BIM Union and the development of BIM standards keep progressing.

A draft for public comment (in Chinese) of the Chinese National Standard ‘Unified Standard for BIM Application’ has just been completed. A series of CECS standards are being developed for P-BIM (Professional BIM) software application and data exchange for specific tasks.

The China BIM Union has been approved as the China Industry Technology Innovation Strategic Alliance by the Ministry of Science and Technology of the People's Republic of China in 2013.

Awareness/Uptake

Current BIM objectives for China include:

- Targets/Goals: Data sharing and interoperability in project life cycle.
- Motivation: Improve efficiency in industry.
- Challenges: The distribution of interests of BIM data.
- New initiatives: Promote BIM through P-BIM mode.
- Strategies: Combine BIM application with specific tasks of AEC in the project life cycle.

CZECH REPUBLIC

Education/Training

The Czech BIM Council continually provide education through BIM seminars, workshops and presentations.

Initiatives/Organisations

The Czech BIM Council's Conference BIM DAY 2013 was held on 31st October and the Czech BIM Guide was due to be released in October. The BIM Guide will be followed (probaly next year) by a BIM execution planning guide, protocols, etc.

There is a lack of impulse from government for the promotion of BIM use, partly due to elections taking place. The political situation is unstable and therefore a number of important approvals have been delayed.

A representative of the Czech Office for Standards, Metrology and Testing attended the buildingSMART week in Munich. The acceptance process of ISO standards is going ahead.

Awareness/Uptake

There are a few BIM projects currently running (big projects) but 2D is still used for the majority of projects. Designers are still a bit sceptical of BIM, primarily due to the cost of software and education/training.

However, awareness of BIM in the Czech Republic is increasing due in part to the activities of the Czech BIM Council.

FINLAND

Education/Training

Universities and polytechnics provide BIM education for their students. All current construction and architecture students study BIM to some extent.

For postgraduates there are a number of options:

- Software companies. In particular Graphisoft's local vendor is active, skilled and innovative in providing education and training.
- Various courses provided by a variety of players.
- Large companies such as Skanska (construction) and Senaatti (state client office) arrange focussed in-house training as required.
- According to the 2013 BIM survey, asking colleagues is the most popular way of obtaining information about BIM.

Initiatives/Organisations

There are a number of initiatives taking place in Finland, including the following:

- COBIM, the national common BIM requirements, was published in March 2012 and it is now in widespread use.
- Guidelines similar to COBIM, but for Infrastructure, are to be finalised by the end of 2013.
- The Finnish XML based data format for neutral BIM data exchange for infrastructure is now a buildingSMART project - MVD for LandXML v1.2.
- buildingSMART Finland now has some 70 members and user groups for public clients, building permit authorities, HEPAC design, town planning, and infrastructure will start next year.

Awareness/Uptake

The recently published 2013 BIM survey provides a good picture of the current status of BIM in Finland. The survey results show that 87% of respondents were aware of BIM and 65% are currently using BIM. The results of the survey can be found at the following link:

www.rakennustieto.fi/material/attachments/tutkimus-_ja_kehittamistoimita/6JKcTDSMO/BIM_Survey_Finland_findings.pdf

BIM is now in everyday use in Finland, it is not known on exactly how many projects, however large firms such as Skanska use BIM for 100% of their own production.

Public sector clients say they will demand the use of BIM on their projects during the next year.

The size of the Finnish market is 30 billion euro.

HONG KONG

Education/Training

Some universities are offering optional BIM courses in their degree programmes. The Vocational Training Council (VTC) has included BIM training in their construction related Higher Diploma programmes.

The Construction Industry Council (CIC) is collaborating with training institutes to increase BIM capability for the frontline workforce and professionals and to increase the capacity of BIM model developers.

The CIC is also going to organise a series of BIM promotional activities in collaboration with the industry stakeholders to raise the industry's awareness and understanding of BIM.

Initiatives/Organisations

In order to address the needs and enthusiasm of the Hong Kong construction industry, in relation to BIM, a Working Group was established under the Committee on Environment and Technology of the CIC and chaired by Ms Ada FUNG, the Deputy Director of Housing (Development and Construction) of the Hong Kong Housing Authority. The group was tasked with the job of setting out an industry-wide roadmap and implementation strategy for achieving market transformation with respect to the application of BIM in the construction industry.

The Working Group recently issued the *Final Draft Report of the Roadmap for BIM Strategic Implementation in Hong Kong's Construction Industry,* in which 16 initiatives, under the following 9 areas, are suggested for the industry-wide implementation of BIM in Hong Kong:

- Collaboration.
- Incentive and Proven Benefit.
- Standard and Common Practice.
- Legal and Insurance.
- Information Sharing and Handover.
- Promotion and Education.
- Compliant BIM Tool.
- Audit and Risk Management.
- Global Competitiveness.

The Report recommends the following imminent actions to be taken by the industry:

- ESTABLISHMENT OF STANDARDS - Devise a set of common standards, good practice or reference documents.
- PROMOTION - Carry out more promotional activities.
- TRAINING - Build up BIM capacity by providing training with respect to three areas: BIM model development, management of BIM and use of BIM model.

A copy of the Report can be downloaded from the CIC website via the following link:

Final Draft Report of Roadmap for BIM Strategic Implementation in Hong Kong's Construction Industry

The CIC is going to commission a consultant to prepare a set of BIM standards for industry-wide adoption, as Phase One of the BIM standards development. This phase of standards development will cover the areas of project execution plans, modelling methodology, level of detail, component presentation style and data organisation.

The 2013 CIC Conference - *Construction Innovation: Productivity and Technology*, is taking place on 29th November. BIM will be a key topic of the conference.

Awareness/Uptake

BIM implementation in Hong Kong is still in the primary stage in terms of the scale of application. Most major developers have adopted BIM to some extent and the Real Estate Developers Association encourages their members to adopt BIM.

Some public sector clients have been using BIM and the Development Bureau is exploring the types of public construction projects to which BIM can be effectively applied. The majority of major contractors have been using BIM for items such as site safety, construction analysis, cost control, work scheduling, etc.

Architects, engineers and surveyors are preparing themselves for the adoption of BIM with some practices already experienced in its use.

NETHERLANDS

Initiatives/Organisations

The CB-NL (Concept Library) project has been initiated and agreement has been reached with buildingSMART International on collaboration with buildingSMART Data Dictionary (bsDD). The project will run for 2 years, with funding of 5 million euro (2 million cash, 3 million in-kind).

The Netherlands construction industry as a whole is involved in the project, over 200 people. It will cover construction, civil works and geospatial environment, with new technology and new content being developed.

The result will be a concept library with semantic structure and developed, validated and usable content.

NEW ZEALAND

Education/Training

BIM is taught by a few of the tertiary institutes and some software suppliers also provide training. A number of one-off industry presentations and seminars have also taken place.

Construction Information Limited (CIL) have provided a series of seminars to product manufacturers.

Initiatives/Organisations

A government – industry partnership is helping to raise awareness of BIM

Awareness/Uptake

The recently published 2013 BIM survey provides a good picture of the current status of BIM in New Zealand. The survey results show that 98% of respondents were aware of BIM and 57% are currently using BIM. The results of the survey can be found at the following link:

www.masterspec.co.nz/news/reports-1243.htm

BIM education and training was identified in the survey as the number one ‘Roadblock’ for broader BIM adoption.

NORWAY

Education/Training

There is no central government requirement for BIM education at a tertiary level. BIM education in colleges and universities is driven by a few engaged teachers. There are at least seven faculties that are running openBIM courses and several colleges that have special BIM studies. Together with various client organisations, buildingSMART Norway are putting pressure on the faculties and on the new government in relation to BIM education.

buildingSMART Norway are close to releasing an educational program. The program will not be taught by buildingSMART but will be in the form of a teaching plan to be used on courses for both students and professionals. The program consists of a basic course and three role specific courses for clients, architects/engineers and contractors. It is proposed to also provide a teaching plan for business leaders and in time for FM/Operations/Maintenance.

The teaching plans do not include specific software training but focus instead on how to behave in a multi-discipline openBIM environment. The plans are free to use for buildingSMART Norway member organisations.

The educational program also consists of a user certification program, where users can take an exam and get a diploma documenting their BIM skills. To date the program has only been developed in Norwegian, but it is anticipated that when complete it will be translated to English.

Norconsult also offers courses in BIM related to their own software.

Initiatives/Organisations

A new BIM standard for object libraries has recently been released by Standards Norway.

Awareness/Uptake

The majority of new projects are now using 3D models and BIM is slowly spreading into new fields such as operations and maintenance.

SOUTH AFRICA

Awareness/Uptake

BIM is rarely used, most projects use 2D CAD as a standard. When BIM is used, it is usually for larger or more technically complex projects, for example, a very complicated BSL3 High Containment Laboratory has just been modelled in ArchiCAD, and the model is currently being populated with project information.

UNITED KINGDOM

Education/Training

There are a number of postgraduate courses on BIM being provided by tertiary institutions around the UK, including but not limited to the following (each link below will bring you to the relevant website for further information):

- Middlesex University.
- University of Salford.
- University of South Wales.
- University of Liverpool.
- Northumbria University.
- Birmingham City University.
- The University of Sheffield.
- UCL.
- University of Wolverhampton.

Many of these institutions also offer postgraduate certificates and other 'lesser' courses on BIM.

BIM is increasingly becoming a feature of undergraduate courses, but for architecture courses BIM is not yet an explicit requirement for RIBA/ARB course accreditation/validation. Nevertheless, some universities promote their BIM expertise, see Glasgow Caledonian University for example.

The NBS have BIM as a 'topic area' on their website, with lots of articles, videos and reports. This material is educational in a broad sense. There are also many events/conferences/shows held throughout the UK on the topic of BIM.

Initiatives/Organisations

Short courses on BIM are widely available outside the universities from organisations such as:

- Construction Industry Training Board (CITB).
- Institution of Civil Engineers (ICE).
- Building Services Research and Information Association (BSRIA).
- Building Design (BD).
- Building Research Establishment (BRE).

Awareness/Uptake

The recently published 2013 BIM survey provides a good picture of the current status of BIM in the UK. The survey results show that 94% of respondents were aware of BIM and 39% are currently using BIM. The results of the survey can be found at the following link:

www.thenbs.com/pdfs/NBS-NationlBIMReport2013-single.pdf

UNITED STATES

Awareness/Uptake

Research published by McGraw-Hill Construction in 2012 shows a rapid increase of BIM usage by architects, engineers, contractors and clients in North America. The percentage of companies using BIM was recorded at 71%, a jump from the 49% recorded in 2009 and the 17% recorded in 2007.

Users are reporting increased business benefits from BIM including better profits, more accurate documentation, less rework, reduced project duration, fewer claims and the ability to offer new services.

The full results of the research were published in the *The Business Value of BIM* in the North America SmartMarket Report published in November 2012.

CONCLUSION

Whilst the respondents provided different viewpoints to the question posed, it is clear from the responses received that BIM education and BIM awareness/uptake is currently at different levels of implementation across the globe. Where some countries appear to have embraced the implementation of BIM, others are just in the process of getting themselves prepared for its arrival.

Tertiary education institutions are either already providing, or gearing themselves up to provide, BIM education on both an undergraduate and postgraduate level. Many vocational education institutions are also already providing BIM education to the industry's tradespeople and para-professionals. Some countries, such as the UK, appear to be leading the way in terms of the number of postgraduate BIM courses available at universities.

It would appear that the majority of BIM education available to date focuses on training in the use of particular BIM software packages, particularly seen as a lot of training for professionals appears to be provided by the software vendors. Training for both graduates and professionals in openBIM concepts, BIM management and working in collaborative BIM environments, appears to be still in its infancy.

It is clear from the responses received and the various survey results provided, that BIM awareness and BIM uptake is certainly increasing, with BIM already widely adopted in the AEC industry of particular countries or with industry/government preparing themselves for the imminent arrival of BIM.

A general reluctance to change in the industry, a ‘wait and see’ approach and a shortage of experienced/educated BIM practitioners/technicians/educators is slowing the inevitable uptake of BIM in the AEC industry.

To meet future needs it is clear that tertiary education institutions, with the support and backing of government and industry, need to fully incorporate BIM education into their curricula, to provide the AEC industry with the ‘BIM-ready’ graduates required for the collaborative BIM working environments to which they will be part of.