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Educating Green Building Stakeholders About the Benefits of BIM - The Philippines Experience

Submitted by: Association of Structural Engineers of the Philippines, Inc.
(ASEP)



**Joint APEC-ASEAN Workshop - How
Building Information Modeling Standards
Can Improve Building Performance
Medan, Indonesia
24-25 June 2013**

How Building Information Modeling Standards Can Improve
Building Performance
A Joint APEC-ASEAN Workshop
June 24-25, 2013

EDUCATING GREEN BUILDING STAKEHOLDERS ABOUT THE BENEFITS OF BIM

The Philippines Experience

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Introduction



- The Philippines construction industry is currently experience growth.
- The vibrant construction industry provides a venue for introducing new technologies which shall improve productivity and efficiency.
- Building Information Modeling (BIM) as a process shall improve and facilitate documentation in the design, construction, operations, and maintenance of the built environment.



Introduction




- Construction projects are expected to nearly triple in value in 2013 as the Philippines' growing economy supports demand for infrastructure.
- Construction market research firm BCI Asia described 2013 as the "birth of new construction" for the Philippines with P1.18 trillion worth of projects projected to start. That is a 264 % growth compared to the previous year.



SOURCE : (Riza T. Olchondra, *Philippine Daily Inquirer*, 8 Nov 2012)

BIM in the Philippines

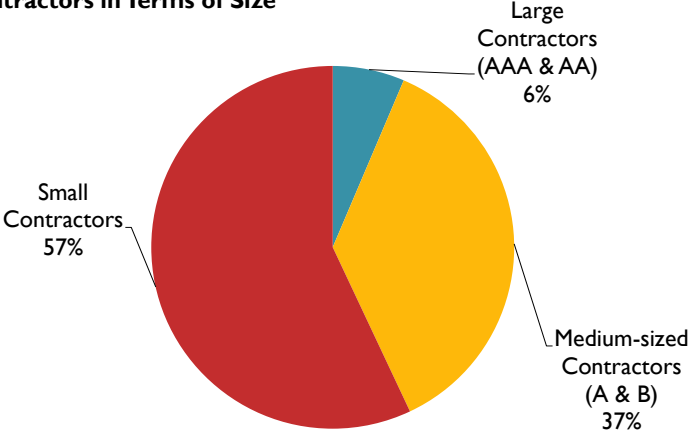
- The use of BIM in the construction sector is at its early stages.
- Construction companies that use BIM do so because their clients require them.
- Contractors in terms of size
 - Large construction companies: 6%
 - Medium sized construction companies: 37%
 - Small construction companies: 57%



THE PHILIPPINE CONSTRUCTION INDUSTRY


For 2010-2011, Philippine Contractors Accreditation Board PCAB has issued a total of 3,325 contractors' licenses. Out of the total, 97.3% are for renewal while 2.7% are new issuances.

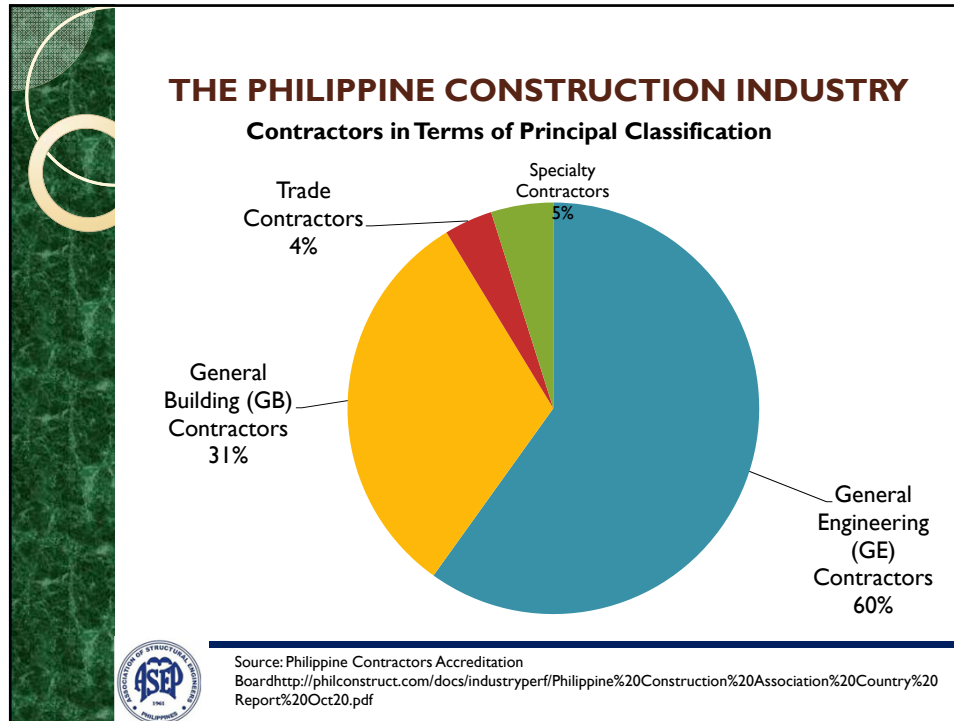
Contractors in Terms of Size



Contractor Size	Percentage
Small Contractors	57%
Medium-sized Contractors (A & B)	37%
Large Contractors (AAA & AA)	6%

Source: Philippine Contractors Accreditation Board <http://philconstruct.com/docs/industryperf/Philippine%20Construction%20Association%20Country%20Report%20Oct20.pdf>





BIM in the Philippines

Korean experience similar to the Philippines (Kim, Inham, 2012)

- Low level of design technology using BIM
- Lack of sharing environment for design information, data, knowledge
- Lack of National Standards for design documents and classification system
- Dispersed investments for BIM technology contents development
- Reproduction for duplicate data
- Cost increasing for construction and facilities maintenance because of incomplete design
- Lack of responding ability for IT convergence technology
- Gap of BIM technology and policy

SOURCE : Kim, Inham; "BIM Activities in Korea"; building SMART International Conference in Tokyo, October 2012

BIM in the Philippines

- In the Philippines, less than a third of the construction industry stakeholders have just started adopting the BIM process. most of them focus on the 3D model while the other two thirds are not even aware of the of what BIM is. In the government sector, the level of awareness of the BIM process is very low.
- In another study, less than 20% in the surveying industry use BIM-assisted automatic generation of quantity take-off (Dela Cruz, 2012). Majority of the industries were comfortable with the traditional way of quantity survey using the 2D platform.
- Most of the companies in the architectural, engineering and construction industry that were the early users of BIM were involved in international projects which require submittals in BIM formats.



SOURCE : Gonzalez, Divina R., "Assessing the Impact of Building Information Modeling(BIM) in Construction Productivity", Master of Science in Civil Engineering Thesis, Mapua Institute of Technology, Intramuros Manila, 2013

Collaboration

- Model data needs to be available to all parties during the design and construction phase.
- Critical collaboration between participants is key to the project's success.
- Cloud computing provides opportunity for all participants to engage in multi-disciplinary and trans-disciplinary collaboration.



SOURCE Suchoki, Marck; "Integrating spatial data in BIM for Infrastructure through the lifecycle"; AGI Geo Community, Autodesk; 2012

Example of a BIM Project Collaboration Map

p. 18 Singapore BIM Guide

	Employer	Architect	Consulting Engineers	Contractor / Quantity Surveyor
Conceptual Design	Provide requirements related to form, function, cost and schedule	Begin design intent model with massing concepts and site considerations	Provide feedback on initial building performance goals and requirements	Provide feedback on initial building cost, schedule, and constructability*
Schematic / Preliminary Design	Provide design review and to further refine design requirements	Refine Design Model with new input from Employer, Consulting Engineers, and Construction Manager.	Provide schematic modelling, analysis and system iterations as Design Model continues to develop	Provide design review and continued feedback on cost, schedule, and constructability *
Detailed Design	Design reviews. Final approval of project design and metrics	Continue to refine Design Model. Introduce consultants models and perform model coordination	Create Discipline specific Design Models and Analyses	Create Construction Model for simulation, coordination, estimates, and schedule *
		Finalize Design Model, Tender Documents and Specifications, Regulatory Code Compliance	Finalize Discipline specific Design Models, Tender Documents and Specifications, Code Compliance	Enhance Construction Model and perform final estimate & construction schedule, Manage bid process,



SOURCE : Singapore BIM Guide; Building and Construction Authority; Singapore 059110; www.bca.gov.sg; May 2012

Example of a BIM Project Collaboration MAP (cont.)

p. 18 Singapore BIM Guide

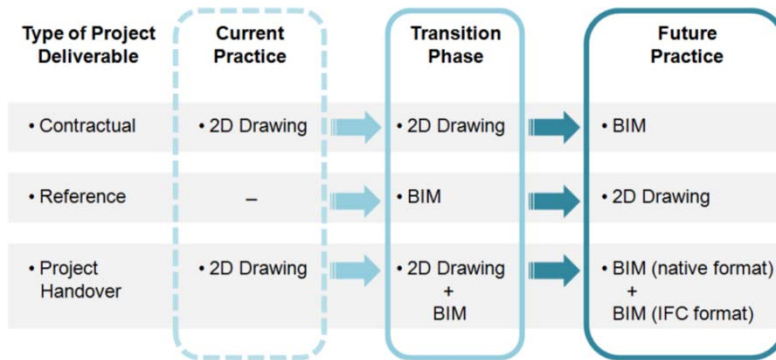
	Employer	Architect	Consulting Engineers	Contractor / Quantity Surveyor
Construction	Monitor construction and give input to construction changes and issue	Respond to construction RFI's, Perform contract administration, update Design Model with changes	Respond to construction RFI's and update Discipline specific Design Models, field conditions, and commissioning	Manage construction with subcontractors and suppliers, inform changes to Design Model
As-Built		Verify As-Built model	Verify As-built model	Prepare As-built model
Facility Management	Engage Architect and Facilities Group for handing over	Coordinate information exchange through model to Facilities Group	Prepare handover documentation	



SOURCE : Singapore BIM Guide; Building and Construction Authority; Singapore 059110; www.bca.gov.sg; May 2012

Transition phase from 2D to BIM

p.20 Singapore BIM Guide



SOURCE : p.20 Singapore BIM Guide; Building and Construction Authority; Singapore 059110; www.bca.gov.sg; May 2012

THE GREEN BUILDING MOVEMENT IN THE PHILIPPINES



Philippine Green Building Council (PHILGBC)

- A national not-for-profit organization established to promote the sharing of knowledge on green practices in the property sector.
- An alliance of building and construction industry leaders from both the public and private sectors
- Council is currently developing a green building rating standard under its Building for Ecologically Responsive Design Excellence Program (BERDE Program)
- The BERDE Program is be administered and implemented by a multi-sectoral group.



THE PHILIPPINE EDUCATION SYSTEM









MANAGEMENT OF A TRIFOCALIZED EDUCATION SYSTEM


Administration of the education system in the economy is trifocalized (3 different agencies manage the 3 education levels of the system)

Commission on Higher Education (CHED)
– responsible for higher education

Technical Education and Skills Development (TESDA) –
mandated to administer the post secondary middle-level manpower training and development

Department of Education (DepEd)
– mandated to focus on basic education (covers elementary, secondary and non-formal basic education)





SOURCE: A Roadmap To The Philippines' Future: Towards A Knowledge-based Economy

TESDA

SKILLS CERTIFICATE EQUIVALENCY PROGRAM (SCEP)

- An individual needs to undergo competency assessment for the identified qualification in any of the accredited assessment centers nationwide.
- Passers of the competency assessment shall be issued a NC or COC.
- A **National Certificate (NC)** is issued when a candidate has demonstrated competence in all units of competency that comprised a Qualification.
- **Certificate of Competency (COC)** is issued to individuals who have satisfactorily demonstrated competence on a particular or cluster of units of competency

Training for Work Scholarship Program (TWSP) Enrolment and Graduates, Assessed and Certified and Employment by Qualification: 2010


Qualification	Enrolled	Graduates	Assessed	Certified	Employed
Information & Communications Technology	20,307	15,680	2,433	1,091	1,048
2D Animation NC III	40	18			
Animation NC II	70				
Career Entry Course for Software Developer (Legacy System/COBOL) NC IV	15	15			
Career Entry Course for Software Developer (Microsoft .Net) NC IV	45	45			
Career Entry Course for Software Developer (Java) NC IV	110	80			
Career Entry Course for Software Developer (Oracle) NC IV	70	45			
Computer Aided Design NC II	93	93	25	18	
Computer Aided Drawing	57	57	55	55	
Computer Hardware Servicing NC II	5,916	3,644	1,605	915	119
Computer Programming NC IV	3,380	2,113	647	11	262
Contact Center Services NC II	39	38			
Creative Web Page Design	1	1			
Finishing Contact Center Agent NC II	9,756	9,166	60	55	667
Finishing Course for Medical Transcriptionist NC II	227	154			
Legal Transcriptionist NC II	100	100			
Professional 3D Maya Animation NC II	18				
Professional Assistant 2D Maya Animation NC II	33				
Software Developer NC IV	38				
Visual Graphic Design NC III	168				
Web Design	91	91	41	37	
Web Development	40	40			



[http://www.tesda.gov.ph/uploads/File/Planning2012/TVETSTAT/Philippine%20TVET%20Statistics2005-2011final%20\(cleandata\)revised9-25-12a.pdf](http://www.tesda.gov.ph/uploads/File/Planning2012/TVETSTAT/Philippine%20TVET%20Statistics2005-2011final%20(cleandata)revised9-25-12a.pdf)

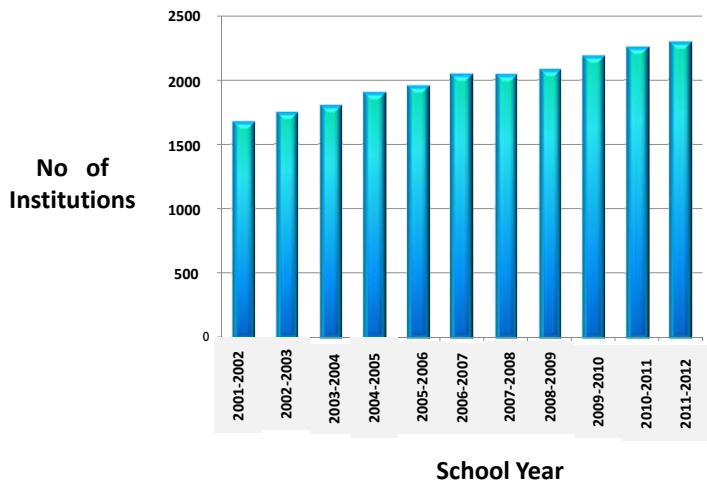
ENGINEERING AND ARCHITECTURE EDUCATION IN THE PHILIPPINES

- There are about 2,282 higher education institutions in the Philippines.
- About 250 higher education institutions offer degree programs in engineering and architecture.
- About 398,604 are admitted into an engineering or architecture degree program.
- The average number of graduates in engineering and architecture over the last five years is about 54,000.




SOURCE: Commission on Higher Education (CHED) "Higher Education Indicators as of July 24, 2012"; <http://www.ched.gov.ph>

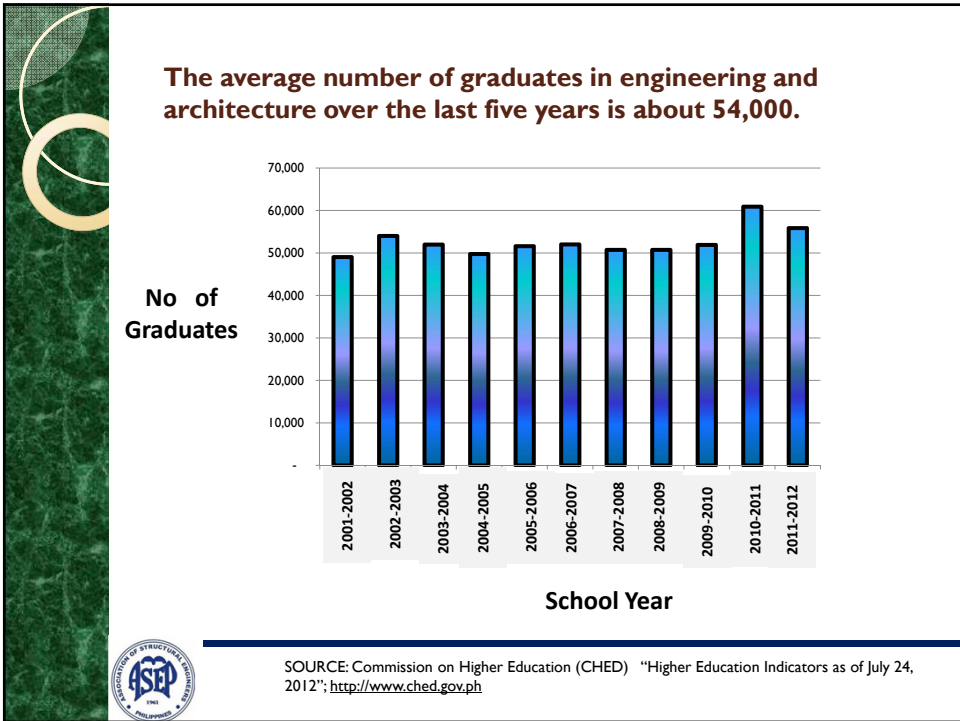
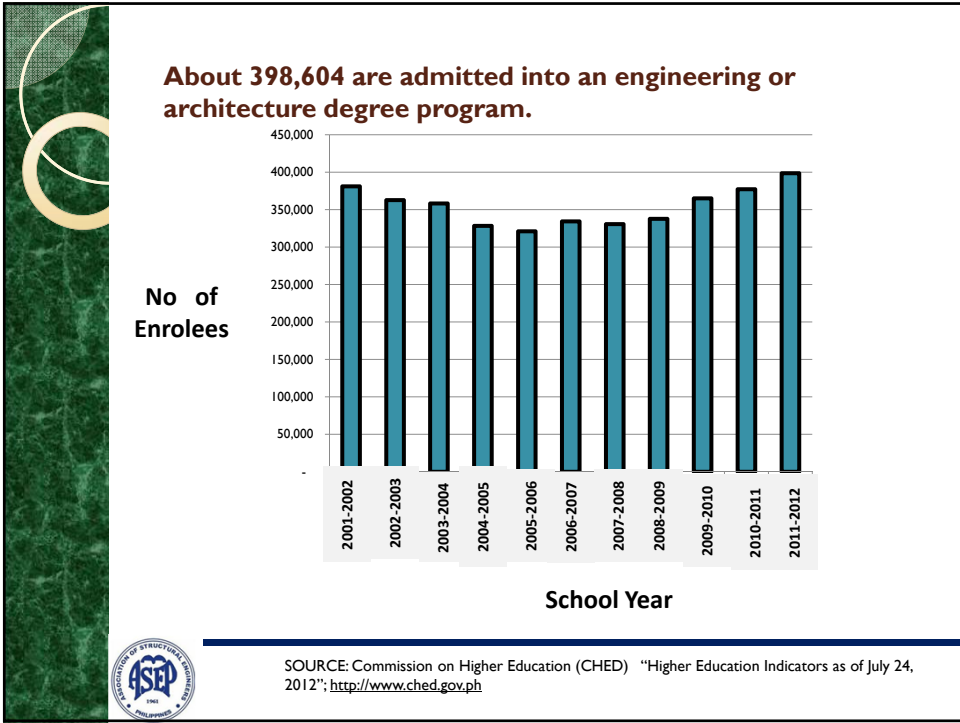
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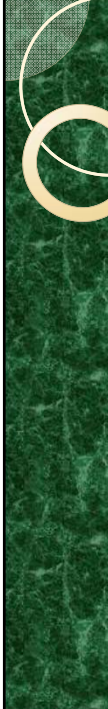


School Year	No of Institutions
2001-2002	1700
2002-2003	1750
2003-2004	1800
2004-2005	1900
2005-2006	1950
2006-2007	2050
2007-2008	2050
2008-2009	2100
2009-2010	2200
2010-2011	2250
2011-2012	2300



SOURCE: Commission on Higher Education (CHED) "Higher Education Indicators as of July 24, 2012"; <http://www.ched.gov.ph>





Curriculum



The minimum curricular guidelines of CHED do not include BIM as part of a coursework.

Course works that require the preparation of physical representation of an object or facility.

- Engineering Drawing
- Computer-Aided Drafting

BIM may be used as a tool in


- Quantity Survey
- Cost Planning
- Scheduling
- Procurement Planning
- Site Management
- Change Management
- Coordination
- Other subject areas of engineering



Curriculum

Some reasons why BIM courses have not been formally incorporated in the engineering curricula.

- High cost of software and computer hardware
- Lack of qualified trainers
- Lack of standards and learning modules
- Lack of awareness of benefits of BIM



Suggested actions by higher education institutions

Higher education institutions need to undertake capacity building

- Training of trainers
- Equipment acquisition and purchase of IT software.
- Support from industry by way of collaboration in the development of case studies as well as participation in an industry led
- Academe supported initiatives in the preparation of learning materials/ modules.
- The academe may undertake collaborative research and development of open standard BIM platforms.

Changes in Engineering Programs

- Engineering curricula are now required to implement outcomes-based education.
- Some courses in the general education component of higher education shall be moved to the basic education as part of the change process to implement the K to 12 program.



Changes in Engineering Programs

Some of the Program Outcomes addressed by the BIM process:

- d. An ability to work effectively in multi-disciplinary and multi-cultural teams.
- i. An ability to engage in life-long learning and an acceptance of the need to keep current of the development in the specific field of specialization.
- j. An ability to use the appropriate techniques, skills and modern engineering tools necessary for the practice of engineering.



BIM IN NON-FORMAL COURSES

- Continuing professional education is mainly delivered through non-formal training, seminars, workshops and short courses.
- The lack of qualified/trained professionals to conduct the teaching and learning activities is the reason why the number of BIM practitioner remains low.
- The demand for trained specialist of the BIM process is incrementally increasing as awareness of the BIM process and technology improves.



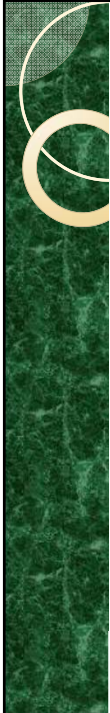


STRATEGIC INITIATIVES

- An alliance of BIM practitioners may be organized to advocate for the promotion and awareness of the BIM process and technology.
- An industry-academe partnership to develop and implement formal and non-formal training may be undertaken.
- A technical committee composed of the various BIM stakeholder representatives may be constituted under the Department of Trade and Industry – Bureau of Product Standards to develop an Open BIM standards.
- The Technical Panel for Engineering and Technology of CHED may consider the inclusion of the BIM process in appropriate courses of the engineering curricula.




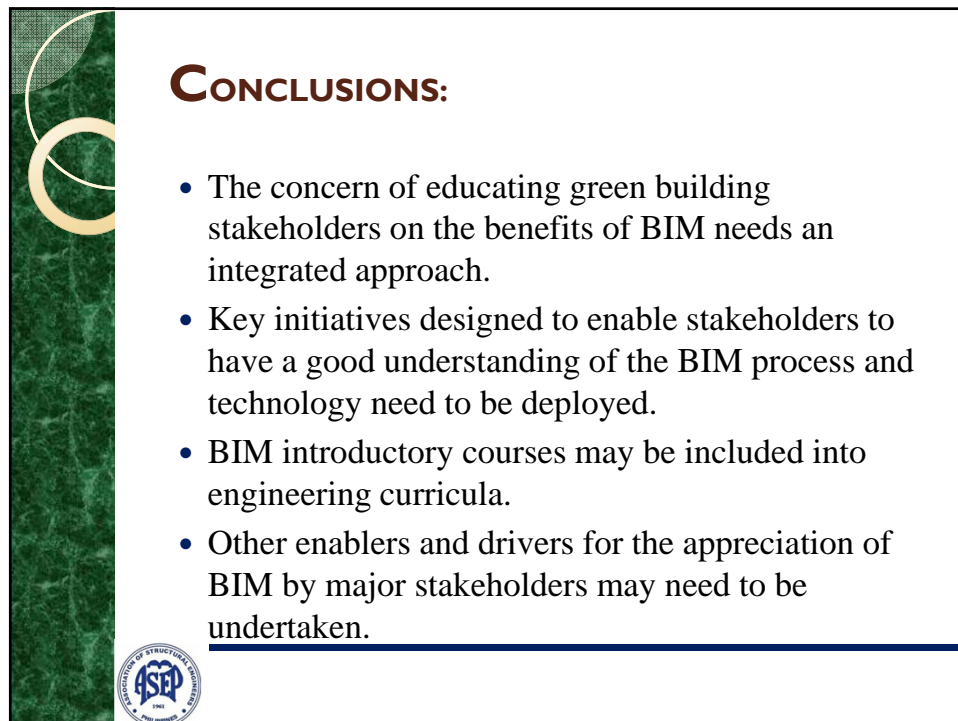
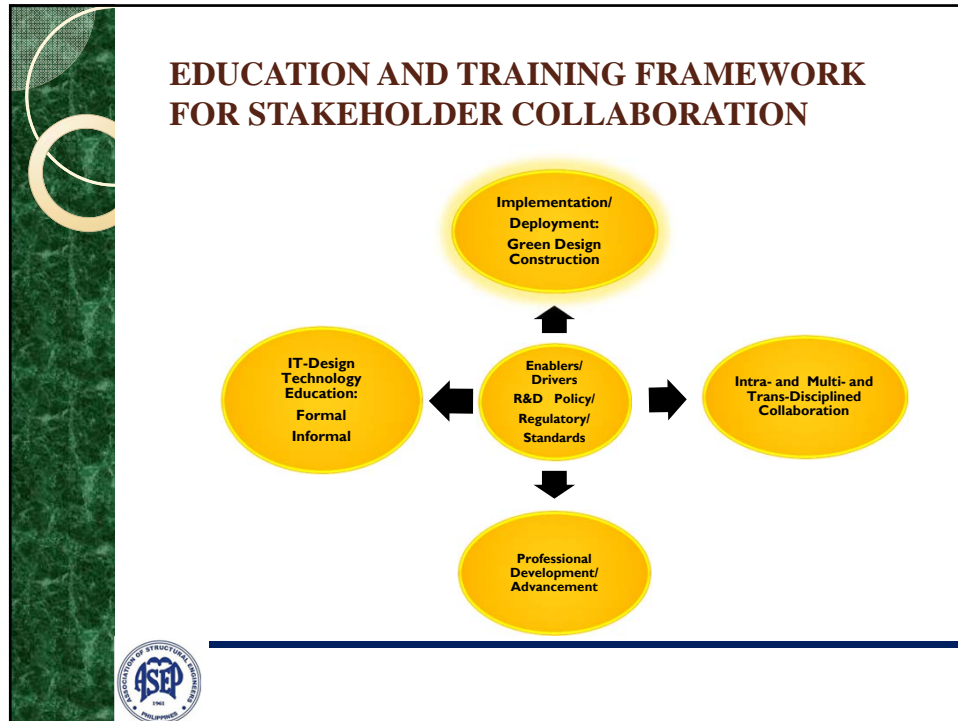
SOURCE :Kim, Inham; "BIM Activities in Korea"; building SMART International Conference in Tokyo, October 2012




STRATEGIC INITIATIVES

- Mandatory use of BIM may be required for essential or important government facilities.
- International collaboration for sharing and encouraging experiences on BIM may be organized on a regular basis.
- A research, development, publication, and promotions program on BIM may be undertaken with members of the academia as lead.
- Information sharing mechanism and integrated usage environment may be developed.


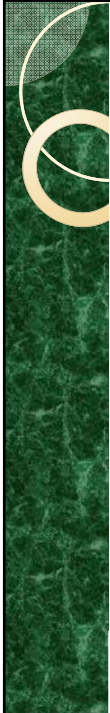







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Thank You !

