

Building Information Modelling and Management Teaching in Geospatial Engineering, Civil Engineering and Architecture

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Introduction

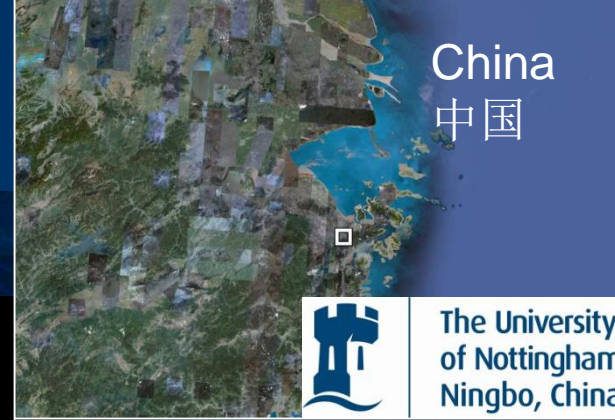
- Some Background on BIM Teaching
- BIM Modules at Nottingham
- BIM Teaching Facilities
- Masters Courses
- Conclusions

University of Nottingham Knowledge Without Borders 诺丁汉大学 知识无边界

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BIM Education Background

China accounts for 47.9% of the Asia-Pacific construction industry value. (MarketLine, [1])

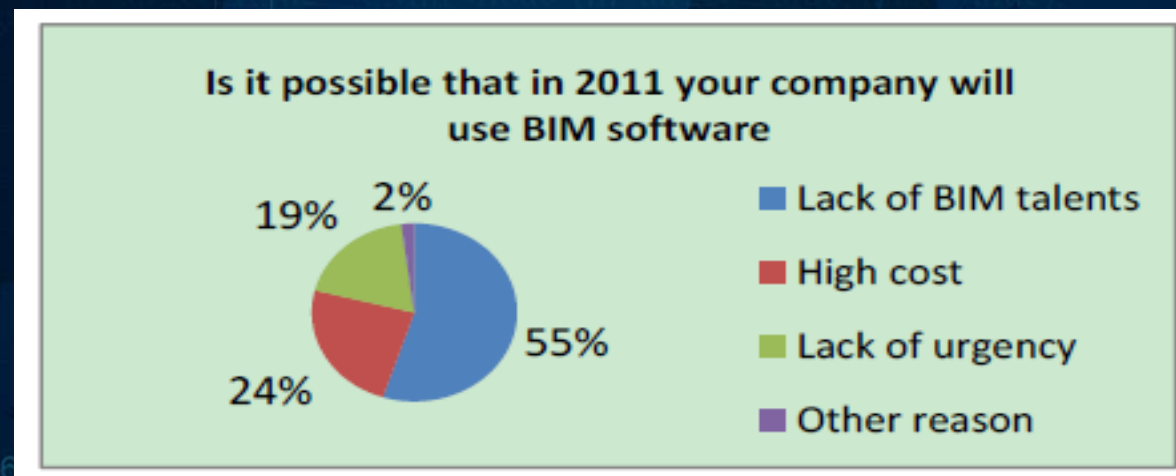
There were insufficient qualified BIM staff in China's AEC project management. (SCTA & LC [2] and SZEDA) [3]

BIM Education Background cont

- Lack of BIM personnel or BIM expertise was perceived as one major obstacle in BIM usage in the industry in both UK and China. (SCTA & LC [2]., and Eadie et al. [4])
- The diversified BIM areas and new BIM movements have created a greater demand on competent BIM professionals and college graduates with relevant BIM knowledge. (Jäväjä, S.S.P. & Salin, J. [5])
- Insufficient resources and university conservations are key barriers to promoting engineering education to meet the demands. (Trine, [6])

BIM in China

The 2011-2015 National Program of AEC Informatisation Development was published in May 2011 by China Ministry of Housing and Urban-Rural Development, and set out its intention to decide BIM as one of the core technologies in survey, design and building industry in the 12th five-year national plan in China.



China AEC Industry BIM Application Research Report 2011 results

BIM Teaching at Nottingham



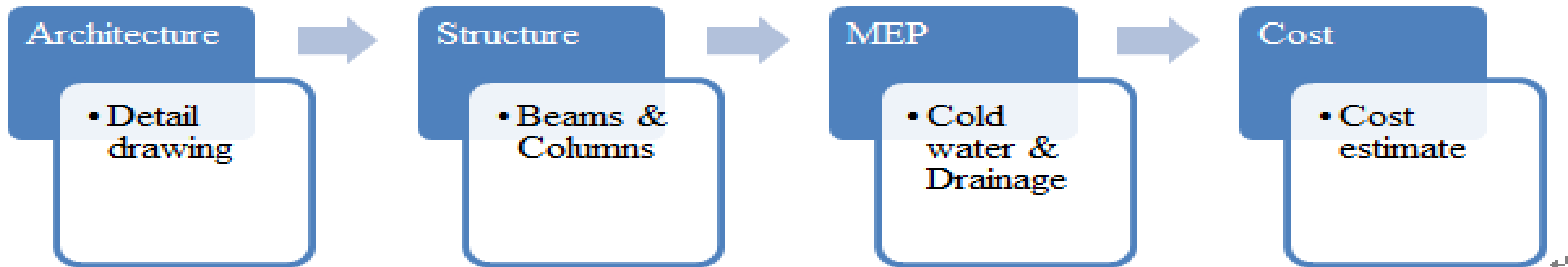
- H21EC1 – Engineering Communication
 - Compulsory 1st Year Module (BEng Civil Engineering)
- EE3BIM – Engineering Communication
 - Optional Final Year Module (BEng Civil Engineering, BArch Architecture), Compulsory for MSc
- H23TMB – 3D Modelling for BIM
 - Optional Final Year Module (BEng Civil Engineering, BArch Architecture), Compulsory for MSc

H21EC1 – BIM Content

- H21EC1 – Engineering Communication is designed to teach students effective communication through IT and personal abilities
- BIM was introduced into the module 3 years ago to complement the large CAD element of the module
- BIM Content
 - 2 Hours of lectures
 - 2 Workshops (Using REVIT)
 - 1 Coursework hand in (Essay)

EE3BIM – BIM Teaching

- Each student group consisted of members from different subjects;
- Teams use REVIT to produce BIM models in a collaborative process



Group Project Process

EE3BIM – BIM Teaching

An example of group project



1) Architectural form



2) Structural form



3) MEP system

ID	Material Name	Material Description	Material Area	Material Production	Quantity
001	Concrete	The concrete with 40kg/m³ Rebar	22.18	Langshan Concrete Company	44.36
002	Concrete	Same as Material Description	19.96	Langshan Concrete Company	39.92
003	Concrete	The concrete with 40kg/m³ Rebar	4.46	Langshan Concrete Company	8.92
004	Concrete	Same as Material Description	2.23	Langshan Concrete Company	4.46
005	Concrete	The concrete with 40kg/m³ Rebar	141.11	Langshan Concrete Company	282.22
006	Concrete	Same as Material Description	171.27	Langshan Concrete Company	342.54
007	Concrete	The concrete with 40kg/m³ Rebar	49.84	Langshan Concrete Company	99.68
008	Concrete	Same as Material Description	24.43	Langshan Concrete Company	48.86
009	Concrete	The concrete with 40kg/m³ Rebar	141.95	Langshan Concrete Company	283.90
010	Concrete	Same as Material Description	171.27	Langshan Concrete Company	342.54
011	Concrete	The concrete with 40kg/m³ Rebar	18.22	Langshan Concrete Company	36.44
012	Concrete	Same as Material Description	9.11	Langshan Concrete Company	18.22
013	Concrete	The concrete with 40kg/m³ Rebar	91.18	Langshan Concrete Company	182.36
014	Concrete	Same as Material Description	46.03	Langshan Concrete Company	92.06
015	Concrete	The concrete with 40kg/m³ Rebar	17.96	Langshan Concrete Company	35.92
016	Concrete	Same as Material Description	8.43	Langshan Concrete Company	16.86
017	Concrete	The concrete with 40kg/m³ Rebar	187.24	Langshan Concrete Company	374.48
018	Concrete	Same as Material Description	181.84	Langshan Concrete Company	363.68
019	Concrete	The concrete with 40kg/m³ Rebar	35.35	Langshan Concrete Company	70.70
020	Concrete	Same as Material Description	42.40	Langshan Concrete Company	84.80
021	Concrete	The concrete with 40kg/m³ Rebar	35.35	Langshan Concrete Company	70.70
022	Concrete	Same as Material Description	41.05	Langshan Concrete Company	82.10
023	Concrete	The concrete with 40kg/m³ Rebar	35.35	Langshan Concrete Company	70.70
024	Concrete	Same as Material Description	41.05	Langshan Concrete Company	82.10
025	Concrete	The concrete with 40kg/m³ Rebar	42.80	Langshan Concrete Company	85.60
026	Concrete	Same as Material Description	42.80	Langshan Concrete Company	85.60
027	Concrete	The concrete with 40kg/m³ Rebar	49.84	Langshan Concrete Company	99.68

4) Quantity take-off spreadsheet

H23TMB – BIM Teaching

Data Capture Techniques



Registration of Point Cloud Data

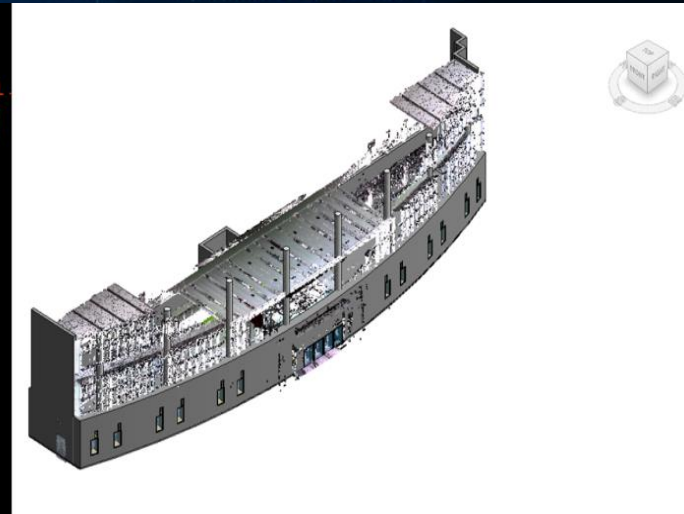
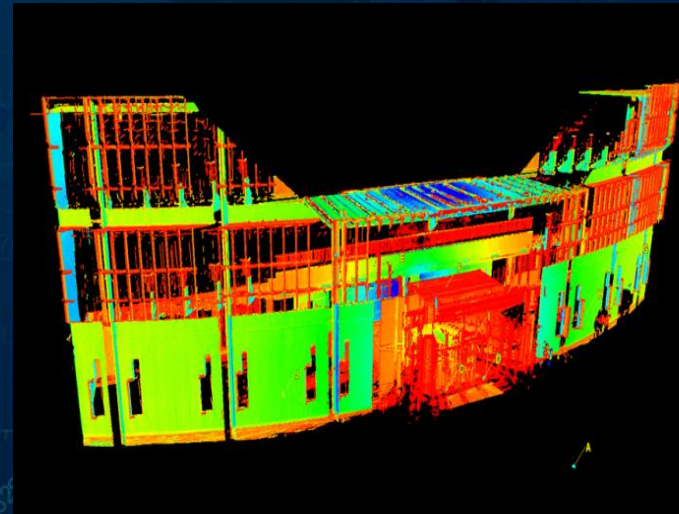


Cleaning of Point Cloud Data



Creation of Building Elements in REVIT to
Create BIM

- The module describes data collection techniques and is focused on group project work.



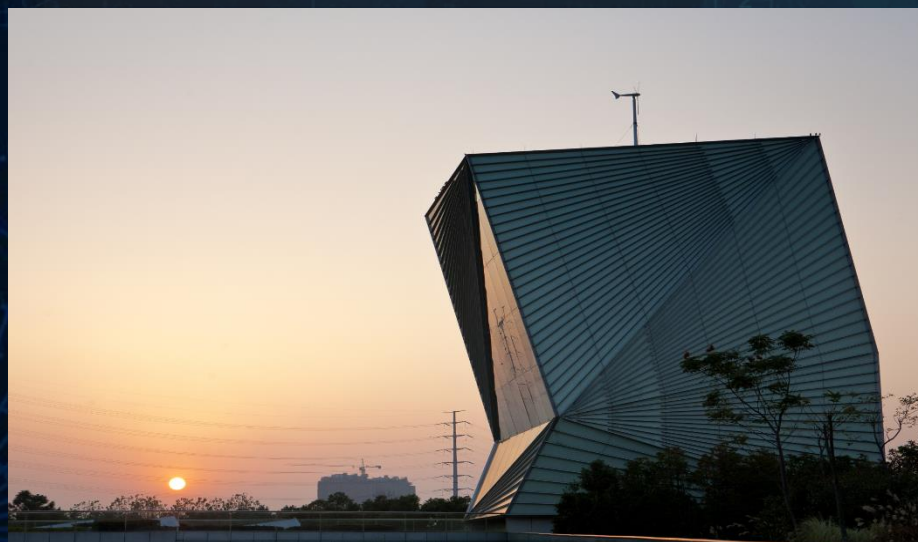
Teaching Facilities

- D-CiTi BIM Lab
 - Opened December 2015
 - Funded by Ningbo Government
 - Multidisciplinary
- Photogrammetry and Remote Sensing Lab
 - Civil Engineering Department
- Extensive Software
- BIM equipped Computer Labs

D-Citi Lab



- 156 m²
- 18 3D Workstations
- 6 Ultra High Performance Workstations
- 2 Mobile Graphics Workstation
- 1 Meeting Room
- 1 Virtual Reality, Augmented Reality Demonstration room



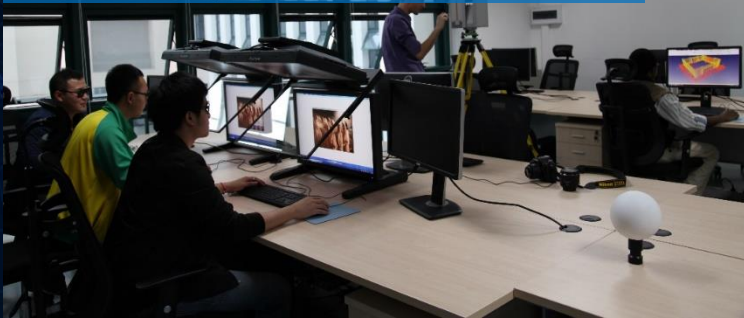
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Photogrammetry and Remote Sensing Lab

Photogrammetry and Remote Sensing Laboratory
GIS实验室



BIM Computer Room
BIM 机房 (130+)



Software

BIM & Survey Software

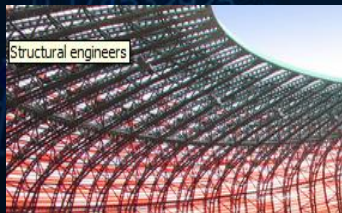
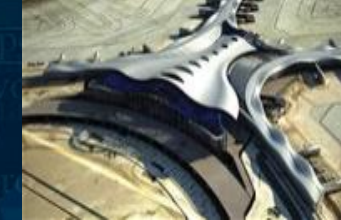
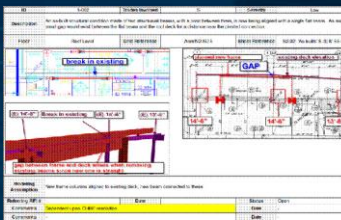
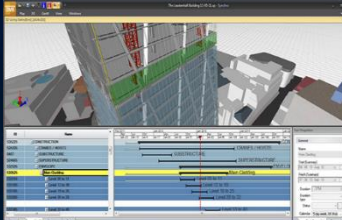
3D

4D

5D

Collaboration
Management

Survey Software
and GIS



MSc in Engineering Surveying and Geodesy

Core modules: 10/credits each

Autumn semester

Fundamentals of Satellite Positioning

Analytical Methods

Geodetic Reference Systems

Photogrammetry and Remote Measurement Techniques

Research Project Literature Review

Spring semester

Advanced Satellite Positioning

Engineering Surveying

Physical Geodesy

Survey Field Course

Research Project Organisation and Planning

Summer semester 60 credits

Research Project – MSc dissertation

MSc in Geospatial Engineering with BIM

Core modules: 10/credits each

Autumn semester

Fundamentals of Satellite Positioning

Analytical Methods

Introduction to BIM

Photogrammetry and Remote Measurement Techniques

Research Project Literature Review

Spring semester

BIM Knowledge and Management

Engineering Surveying

Global Smart City with Integrated BIM

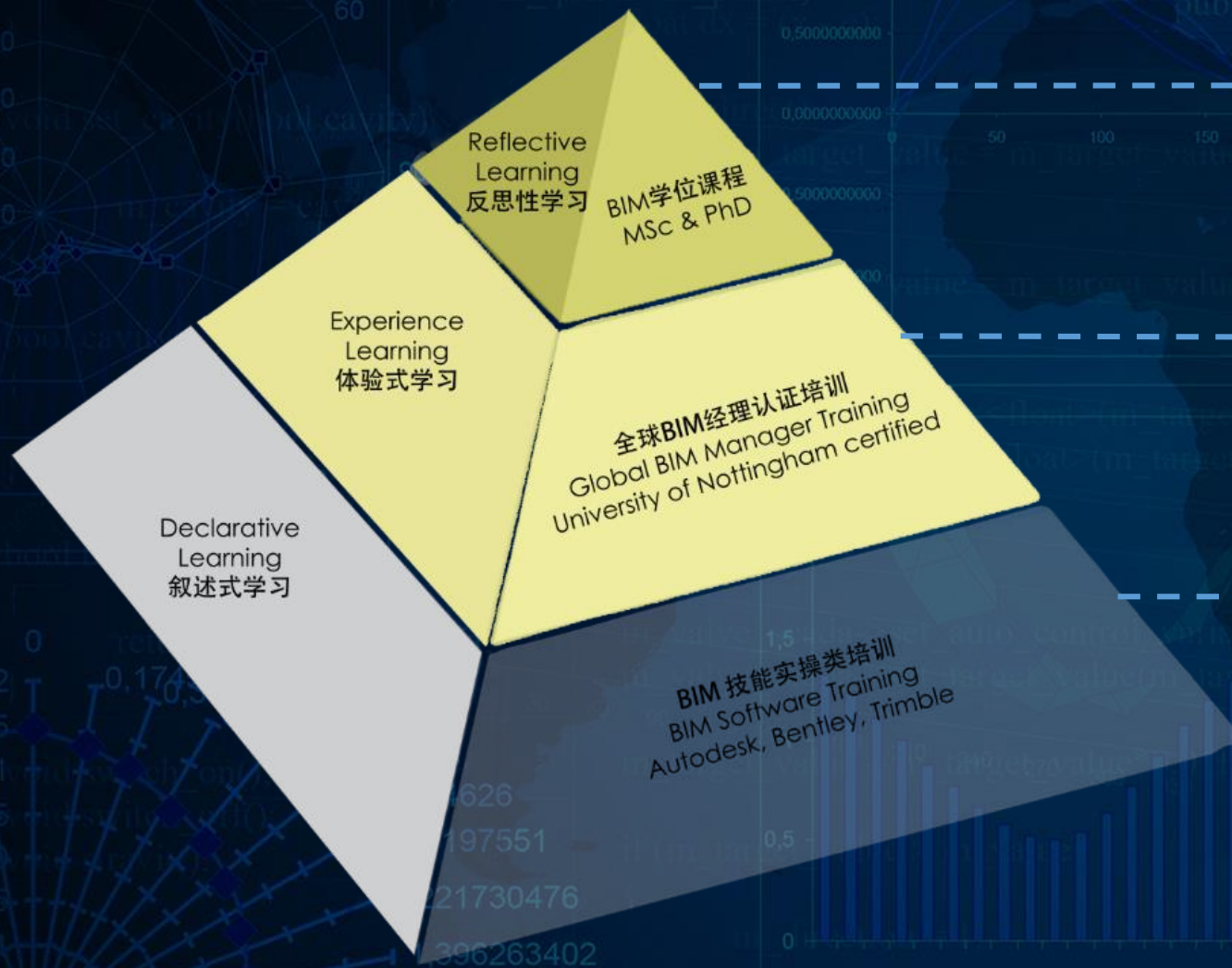
BIM+ and Its Future

Research Project Organisation and Planning

Summer semester 60 credits

Research Project – MSc dissertation

BIM Training



BIM MSc and PhD

Global BIM manager certification training

Operation Skills Training



Summer School

- In July at Nottingham China
- Places still available

Geospatial Engineering and Building Information Modelling



The Future

- To continue development of BIM content on the UG and PG courses at Nottingham
- To continue to develop CPD courses to train industry
- To Launch a full BIM MSc in the near future

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- [3] Shenzhen Exploration & Design Association (SZEDA), Guide for BIM application and development in the engineering & design industry of Shenzhen, Tianjin Science & Technology Press, Tianjin, pp. 20-22, 2013.
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- [6] Trine, R. Engineering education: quality and competitiveness from the European perspective, TREE-disclosing conference – a report, TREE –teaching and research in engineering in Europe, 2008.

THANK YOU



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