Building Information Modelling in the China (and the UK)

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Introduction

- University of Nottingham Ningbo China
- D-CiTi Lab
- Motivation for BIM
- Motivation for BIM teaching
- BIM Teaching at UNNC
- BIM example in China
University of Nottingham
Ningbo China (UNNC)
宁波诺丁汉大学

- 7,000+ students
-7000+ 学生

- 89% home; 11% International
-89%本土，11%国际生

- 700+ employees
-700+ 名员工
Based on the development of **BIM technology and smart city**, D-CiTi Lab combines researches with innovation.

**D-CiTi Lab** has more than 10-year BIM project experience, with world-leading R&D:

- Provision of the first UK MSc in Geospatial Engineering with BIM in China
- Provision of certified BIM executive and management training course
- Delivery of BIM project and its solution and implementation
- Development of global BIM standard and its formulation
- Global BIM R&D collaboration
- Organizing global BIM conference
- Market development

On December 11th 2015, “**D-CiTi Lab Launch Ceremony and International Forum on Digital Built Britain**” was held in Shanghai British Centre. Experts, scholars and executives from domestic and overseas BIM relevant industries gave impressive speeches and presentations for the ceremony.
156 ㎡ area
12 high performance 3D design workstations
6 high performance graphic rendering workstations
2 mobile graphic workstation
1 smart meeting room
1 virtual reality exhibition hall
1 augment reality and artificial intelligent exhibition hall

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BIM Hardware and Software

Photogrammetry and Remote Sensing Laboratory
GIS实验室

BIM Computer Room
BIM 机房 (130+)
D-CiTi Lab Partners

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<tr>
<th>CIOB</th>
<th>University of Cambridge</th>
<th>Bentley</th>
<th>WSP Parsons Brinckerhoff</th>
<th>PCSG</th>
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<tbody>
<tr>
<td>RIBA</td>
<td>RICS</td>
<td>Autodesk</td>
<td>ARUP</td>
<td>AEC3</td>
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<td>ICE</td>
<td>Pix4D</td>
<td>Tekla</td>
<td>ERICloud</td>
<td>AECOM</td>
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<tr>
<td>CIBSE</td>
<td>BIM</td>
<td>Vico software</td>
<td>GLUMAC</td>
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<td></td>
<td>BIM+</td>
<td>Synchro software</td>
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<td>Leica Geosystems</td>
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BIM Motivation (in the UK and China)

- Low Productivity
- High Cost
- Government Policy
Low productivity and high cost in UK construction industry

Between 1997-2006:
- Inflation rose by 25%
- Car cost rose by 1.5%
- Construction cost rose by 89%

Prices rose by 50% from 2000 to 2008 = 6% pa
RPI over the same period rose by 26% = 3.2% pa
BIM Education Motivation (in China)

China has started to make BIM standards and policies that meet national requirements since 2011. The following timeline shows BIM policy and standard released by Ministry of Housing and Urban-Rural Development (MOHURD).

BIM Policy & Standard by MOHURD

- **2011**: Started BIM related policies and standards
- **2013**: “Proposals on Enhancing the Development and Improvement in the Construction Industry”
- **2014**: “Guideline about Promoting the Application of Building Information Modelling”
- **2017**: “Request for Proposal on BIM Application in the Construction Industry”
BIM Government Policies in China

The Urban and Rural Construction Committee and 7 provinces have initiated policies to promote BIM technology in construction industry.
Very recently, the **Urban and Rural Construction Committee** released a guideline on pushing BIM in China; by **2020**, all public building level 1 design institutes and construction companies need to be BIM ready, for major projects, green building and communities, the usage needs to meet 90% target.

- Focus of Construction Unit
- Focus of Survey Institute
- Focus of Design Institute
- Focus of Engineering General Contractor
- Focus of O&M Unit
Strategic Plan started in 2009

- Over 70,000 construction companies
- Direct workforce > 4000m
- Before 2010 – conceptual stage
- 2010-2015 – BIM and other digital technology adoption
- 2015-2020 – fully implemented

Annual new construction area growth

>800-900 billion m²

<table>
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<tr>
<th>New construction Type</th>
<th>Resident-ial building</th>
<th>General Public Facilities</th>
<th>Large-scale Public Facilities</th>
</tr>
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<tbody>
<tr>
<td>Proportion %</td>
<td>58.5%</td>
<td>36.1%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Area (billion m²)</td>
<td>468-526</td>
<td>289-325</td>
<td>43-49</td>
</tr>
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Applying BIM in China:
Is it the trend or uphill battle?
Or it will be done in ONE years?!

Mandatory to use BIM

Government encourage to use BIM by tax elimination, pre-sale policy and etc.
Government Policies

The Urban and Rural Construction Committee released “2016~2020 construction information development outline”. This is the guidance document that will lead the development of China's construction industry over the next 5 years. Recently, the quality and safety supervision division head interpreted this document:

Key words of informatization technology in the outline:

- BIM
- Big data
- Intelligentization
- Mobile communication
- Cloud computing
- Internet of things
- Digitization
- Cyberization
- 3S (RS\GIS\GPS)
- Location based services (LBS)
- Sensor
- Radio frequency identification
- Near field communication
- QR droid
- 3D print
- Intelligent robot
- Intelligent monitoring equipment
- 3D laser scanning
- Virtual reality
- Augmented reality
- Mixed reality

Opinions on further strengthening the application and popularization of BIM in Shanghai (September 6th, 2016)

For projects which use BIM technology through a construction company, if BIM is used in design and construction phase, will get 20 RMB subsidy for each square meter, the maximum is not more than 3 million yuan; if use BIM in the design, construction and operation phase, will get 30 RMB subsidy for each square meter, the maximum is not more than 5 million RMB.
In 2014 an investigative report in China found that 67% of Chinese companies involved in the construction sector saw a lack of BIM trained staff as a limiting factor to the expanding use of BIM within the industry. (SCTA, 2014)
1. Understand what BIM is, the contextual requirement for BIM Level 2 and its connection to the Government Construction Strategy and Industrial Strategy 2025.

2. Understand the implications and value proposition of BIM within your organization.

3. Understand the requirement for the management and exchange of information between supply chain members and clients as described in the 1192 suite of standards and PAS55 / ISO 55000.
D-CiTi Lab 培训体系

D-CiTi Lab Training Academy

BIM学位课程
- BIM PhD
- BIM MSc Geospatial Engineering with BIM

BIM管理培训 BIM Management
- 高级管理类培训
- 全球认证系统

技能实际操作类型培训

BIM管理培训
- BIM Management Training

BIM软件培训
Bim Software Training
Autodesk, Bentley, Trimble

BSI

D-CiTi Lab

The University of Nottingham

CIOB

Synchro Software

Tekla

VICO Software

Bentley

Autodesk
BIM Education at Nottingham China

• Interdisciplinary Case Study Design
• As Built BIM projects
BIM Education @ Nottingham China

- BIM education is not simply changing the engineering education tool from 2D CAD to 3D visualization (Tang et al. 2015).

- Collaboration was deemed the key of BIM implementation (Eadie et al., 2013; Szeda, 2013; Tang et al., 2015).
BIM Module @ Nottingham - Project Workflow
see Jin et al (2016).
Structure Redesign
Natural ventilation

Wind catcher

Wind analysis

Stack Ventilation
Cross Ventilation

Louver

Stale air out

Anti bird mesh

Weatherproof louvres

Ceiling diffuser
Simulation of Shading Device: Total Radiation
Surveying for BIM – Optional Module (Workshop)
see Hancock et al 2016
FIG WORKING WEEK 2017
BIM FOR SURVEYORS
Helsinki Finland Sunday 28 May 2017

Data collection → 3D point cloud → BIM model
Student As Built BIM of on Campus Building
# Student BIM Feedback

<table>
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<tr>
<th>Benefits from BIM adoption</th>
<th>Disadvantages and challenges in BIM usage</th>
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<tr>
<td>• Improved communication from the virtual environment provided by 3D visualization</td>
<td>• Lack of interoperability when exchanging building information among disciplines</td>
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<tr>
<td>• Enabled building information exchange</td>
<td>• Lack of sufficient families in the existing library of Revit</td>
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<tr>
<td>• Enhanced collaboration among different disciplines</td>
<td>• Lack of standards for BIM implementation</td>
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<td>• Efficiency in converting building models into drawings and rendering</td>
<td>• Difficulty in expressing architectural ideas in the early design stage</td>
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<td>• Lack of user-friendliness in MEP design</td>
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Newly Built Car Park in Ningbo – The 1st As-Built BIM in Ningbo

- Leica HDS 7000 Laser Scanner: Data Collection
- Cyclone: Data Processing
- Recap: Format Transformation
- Revit: As-built Model

Comparison and Analysis → As-designed Model
Newly Built Car Park in Ningbo – The 1st As-Built BIM in Ningbo
Modifications made in AutoDesk Recap
Checked against the structural design
Finally Import model in REVIT and set levels and grids
Visualization Coordinative Design
References


Thank you!

Any Questions?

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