

Singapore BIM Roadmap: An Update

싱가포르 BIM 로드맵 : 업데이트

Dr Evelyn Teo Ai Lin Associate Professor

National University of Singapore

Abstract

As part of an economy-wide drive to enhance productivity in order to increase competitiveness, the Singapore government has introduced Construction Productivity and Capability Fund (CPCF) to assist the construction industry to improve the levels of productivity in the industry. Sequentially, to strengthen the technology capabilities of the industry, a Building Information Modelling (BIM) fund has been introduced as part of the CPCF Fund to help the construction industry to adopt advanced information and communications technology (ICT) so as to achieve productivity growth. Hence, the Singapore BIM Roadmap (five-year plan) had been devised by Building and Construction Authority (BCA) with the aim of helping the construction industry to enhance its productivity performance by encouraging the use of BIM. The BCA has developed five strategic thrusts to overcome the challenges faced by the industry when implementing BIM. The results have shown that the strategies are effective and the firms of local construction industry have experienced an average of 21.5% efficiency gains when using BIM as compared to 2D CAD. The BCA has introduced new initiative to help the industry to move forward by establishing the BIM R&D Steering Committee to formulate the BIM R&D roadmap concentrating on BIM strategies, practices and technologies steering towards overall construction productivity improvement. To build up Singapore's BIM R&D capability, two Centres of Excellence (COEs) have been set up: one at the National University of Singapore (NUS), and one at Nanyang Technological University (NTU) to support local industry's BIM adoption efforts.

Overview of Singapore Construction Industry

Productivity has been accorded top priority in the current growth strategy for Singapore's economy. However, the construction industry in Singapore, as in most other countries, is renowned for not being able to keep pace with the technological advancements and realising productivity gains and hence result in gross inefficiency (Smith and Tardif, 2009; Singapore Budget, 2014).

As part of an economy-wide drive to enhance productivity in order to increase competitiveness, the Singapore government has introduced Construction Productivity and Capability Fund (CPCF) to assist the construction industry to improve the levels of productivity in the industry. Sequentially, to strengthen the technology capabilities of the industry, a Building Information Modelling (BIM) fund has been introduced as part of the CPCF Fund to help the construction industry to adopt advanced information and communications technology (ICT) so as to achieve productivity growth. With the announcement that BIM e-submission be made a mandatory requirement for all public projects, starting from 2013^①, it is apparent to see a sudden rush for the construction industry to gain knowledge of BIM in an attempt to be BIM-ready.

Update of Singapore BIM Roadmap

The Singapore BIM Roadmap (five-year plan) had been devised by Building and

① Mandatory Architecture BIM e-submissions for all new building projects greater than 20,000m² in 2013 and by 2015, mandatory Architecture and Engineering BIM e-submissions for all projects greater than 5,000m².

개요

경쟁력을 향상시키기 위해 생산성을 높이는 경제 성장 동력의 일환으로 싱가포르 정부는 건설업계의 생산성향상을 돕기 위한 건설생산성 및 능력기금 (CPCF: Construction Productivity and Capability Fund)를 도입하였다.

그 결과로, 업계의 기술역량을 강화하기 위해 건설정보모델링(BIM) 기금이 CPCF의 일부로 도입되어 건설업계의 정보 통신 기술(ICT: information and communications technology) 차용을 돕고 있다.

따라서 싱가포르 BIM 5개년 계획은 건설업계의 BIM사용의 장려를 위해 싱가포르 건설청(BCA: Building and Construction Authority)에 의해 시작되었다.

BCA는 BIM 적용에 있어 장애물을 극복하기 위한 다섯가지 전략을 개발했다.

그 결과 2차원 CAD와 비교했을 때 21.5%의 효율성 향상을 보이는 등 그 전략의 결과는 효과적인 것으로 나타났다.

싱가포르의 BIM R&D역량을 높이기 위해 싱가포르국립대학 (National University of Singapore, NUS) 와 난양기술대학 (Nanyang Technological University, NTU)을 두 우수기관으로 선정하기도 했다.

싱가포르 건설 산업의 개요

생산성은 싱가포르 경제 성장전략의 최우선과제이다. 그러나 건설산업에 있어서는 다른 나라와 마찬가지로 최신 기술을 생산성향상으로 연결시키지 못하고 있고 비효율적이기만 하다. (Smith and Tardif, 2009; Singapore Budget, 2014)

경쟁력을 향상시키기 위해 생산성을 높이는 경제 성장 동력의 일환으로 싱가포르 정부는 건설업계의 생산성향상을 돕기 위한 건설생산성 및 능력기금 (CPCF: Construction Productivity and Capability Fund)를 도입하였다.

그 결과로, 업계의 기술역량을 강화하기 위해 건설정보모델링(BIM) 기금이 CPCF의 일부로 도입되어 건설업계의 정보 통신 기술(ICT: information and communications technology) 차용을 돕고 있다.

2013년부터 공공건물에 대한 BIM 납품이 의무화되면서 건설업계가 BIM도입을 서두르는 모습을 보게 되었다.

싱가포르 BIM 로드맵 업데이트

싱가포르 BIM 5개년 계획은 건설업계의 BIM사용의 장려를 위해 싱

Construction Authority (BCA) with the aim of helping the construction industry to enhance its productivity performance by encouraging the use of BIM.

In order to increase the adoption rate of BIM, the identified challenges faced by the construction industry such as (a) lack of demand for BIM, (b) entrenched in the 2D drafting practices, (c) steep learning curve to build up BIM expertise and (d) lack of ready pool of skilled BIM manpower; have to be overcome. Five strategic thrusts as shown in Figure 1 were formulated to overcome the said challenges with the public sector taking the lead (Figure 1).

With BCA rolled out of the *BIM Fund* under the CPCF in 2010, more than \$16 million of the fund have been dedicated to aid more than 600 firms to jump start their BIM journey. These firms have experienced an average of 21.5% efficiency gains when using BIM as compared to 2D CAD.

Surveys were conducted by BCA to examine the effectiveness of the implemented strategies and the results of these surveys showed that improvements have been made with the respondents highlighting that their productivity levels have been greatly improved (Figure 2).

The feedback from the local construction industry stating that the launch of the Singapore BIM Guide version 2 and BIM Essential Guides on 1 August 2013 have been handy to assist them when implementing BIM for their projects.

BIM R&D Roadmap

A BIM R&D Steering Committee has been established to formulate a BIM R&D roadmap, concentrating on BIM strategies, practices and technologies steering towards overall construction productivity improvement. To build up Singapore's BIM R&D capability, two Centres of Excellence (COEs) have been set up: one at the National University of Singapore (NUS), and one at Nanyang Technological University (NTU) to support local industry's BIM adoption efforts.

At NUS BIM Centre a BIM Integration Roadmap has been developed to augment

가폴 건설청(BCA: Building and Construction Authority)에 의해 시작되었다.

BIM 도입을 증가시키기 위해 a) BIM의 필요성을 느끼지못하거나 b) 확고한 2D 설계 관행 c)가파른 학습곡선 d)숙련된 BIM 인력의 부족 등의 문제점은 반드시 해결되어야만 한다.

이 장애물을 넘기 위해 Figure 1에서 제시한 것과 같은 다섯개의 전략이 개발되었다(그림 1).

2010년에 BCA의 BIM 기금이 시작된 이후, 1,600만 달러 이상이 600여 개의 회사가 BIM을 시작할 수 있도록 쓰였다. 이 회사들은 2D CAD와 비교해서 평균 21.5%의 효율성 향상을 경험했다.

BIM 적용 전략의 효과를 검토하기 위해 시행된 설문 조사에 의하면 생산성향상이 크게 늘었다고 응답한 참여자들이 많은 것을 볼 수 있다(그림 2).

또한 싱가포르 BIM 작성 지침서 버전 2(Singapore BIM Guide version 2)와 2013년 8월에 발행된 BIM 기본 지침서(BIM Essential Guide)가 BIM을 적용, 도입하는데 매우 도움이 되었다는 반응이 나오고 있다.

BIM R&D Roadmap

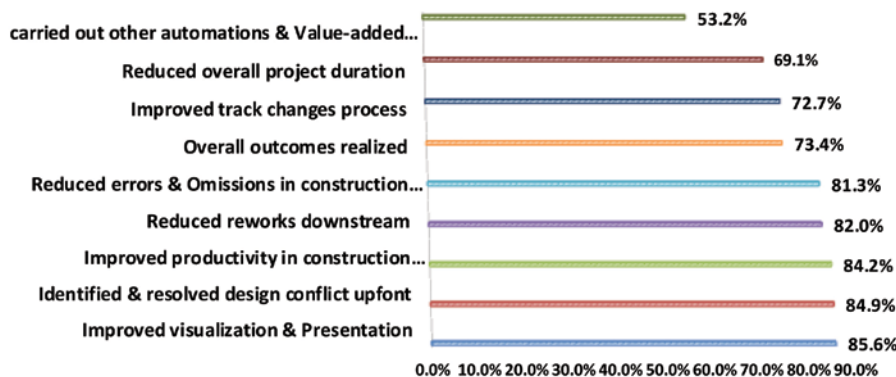
BCA는 BIM R&D 전략개발, 기술개발 등에 집중하는 BIM R&D 위원회 설립등의 새로운 계획도 수립하였다.

싱가폴의 BIM R&D역량을 높이기 위해 싱가포르국립대학 (National University of Singapore, NUS)와 난양기술대학 (Nanyang Technological University, NTU)을 두 우수기관으로 선정하기도 했다.

NUS BIM 센터의 BIM 통합 계획은 싱가포르의 BIM 역량을 증가시키



〈Figure 1〉 Five Strategic Thrusts (BCA)



〈Figure 2〉 Improvements made (BCA)

the BIM capability of Singapore Construction Industry for the up and coming areas related to BIM. It seeks to improve productivity and quality by transforming the way people design, deliver and manage the built environment through BIM innovation and practice. This will deliver greater value to clients and users in terms of cost reduction, higher quality, safety, and better performance of facilities over the entire life cycle. To achieve this goal, the NUS BIM Centre will be embarking on a series of BIM research projects to develop and implement best practices. It will work with local stakeholders as well as international collaborators (Table 1).

The NUS BIM Centre will conduct research using BIM technology to analyse the project and financial risk so as to make the construction process more efficient. The research agenda of the NUS BIM Centre will focus on the Life Cycle Approach in utilizing the six mandates of building and infrastructure projects. They are Architectural Design, Building Performance and Sustainability, Construction and Engineering, Project Delivery, Facilities Management and Demolition. NUS' vision for BIM Centre is to create values both locally and internationally working with public agencies, regional universities and agencies, international centres to conduct cutting edge research and develop policies as well as test-bedding the innovation. In short the proposed programme aims to transform BIM value, enhance BIM technology and differentiate BIM education/research/practice locally and globally.

The BIM Centre at NTU is focusing on pre-casting and the approach is different from NUS BIM Centre.

Conclusion

The Singapore BIM Roadmap with the rolled out of the **BIM Fund** under the CPCF in 2010, more than 600 firms have tapped on this BIM Fund to jump start their BIM journey. As a result, these firms have experienced an average of 21.5% efficiency gains when using BIM as compared to 2D CAD. To further assist the industry, the BIM R&D roadmap has been established focusing on BIM strategies, practices and technologies steering towards overall construction productivity improvement. As such, two Centres of Excellence (COEs) have been set up: one at the National University of Singapore (NUS), and one at Nanyang Technological University (NTU) to support local industry's BIM adoption efforts.

References

- Smith DK and Tardif M (2009), Building Information Modelling - A Strategic Implementation Guide for Architects, Engineers, Constructors, and Real Estate Asset Managers, John Wiley & Sons, Inc.
- Singapore Budget (2014), Speech by Singapore Deputy Prime Minister and Finance Minister.
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기 위해 개발되었다. 이 계획은 설계자들의 디자인, 납품, 관리하는 방식을 변화시킴으로서 생산성과 품질을 향상시키는 방법을 제시하고 있다. 그렇게 함으로서 발주처에 비용절감과 높은 품질, 안전, 더 나은 성능을 가져다 줄 수 있을 것이다. 이를 이루기 위해서 NUS BIM센터는 모범사례를 찾아내고 싱가포르 및 국제기관과 협력하는 일을 계속할 것이다 (표 1).

〈Table 1〉 NUS BIM Centre Integration Roadmap

International and Local Collaboration		
Research	Industry	Education
<ul style="list-style-type: none"> • BIM Innovation and Practice • Joint BCA-NUS BIM Conferences 	<ul style="list-style-type: none"> • BIM Industry Partnerships • BIM Guides 	<ul style="list-style-type: none"> • BIM Executive Programs • Student BIM Competitions

NUS BIM 센터는 또한 더 효율적인 건설공정을 위한 프로젝트 및 재무 위험을 분석하는데 BIM 기술을 이용하는 연구를 수행할 것이다.

다른 연구주제로는 건축설계, 건물성능, 지속가능성, 건설 및 엔지니어링, 프로젝트 납품, 시설관리 및 철거의 여섯개 의무분야의 활용 방식을 이용한 건물 생애주기에 대한 것이 있다.

BIM센터에 대한 NUS의 목표는 공공기관, 대학, 국제기관등과 같이 연구하고 개발하면서 싱가포르 국내 뿐 아니라 국제적으로 가치를 창출하게 하는 것이다. 다시 말해 위에서 제안된 프로그램은 BIM 가치를 더하고 와 BIM기술을 강화하며 BIM 교육과 연구, 실무를 차별화하는 것을 목표로 하고 있다.

NTU의 BIM 센터는 Pre-casting에 초점을 맞추고 있으며 NUS의 BIM 센터와는 다른 접근 방법을 택하고 있다.

Conclusion

2010년에 BCA의 BIM 기금이 시작된 이후, 1,600만 달러 이상이 600여 개의 회사가 BIM을 시작할 수 있도록 쓰였다. 이 회사들은 2D CAD와 비교해서 평균 21.5%의 효율성 향상을 경험했다. 싱가포르의 BIM R&D 역량을 높이기 위해 싱가포르국립대학 (National University of Singapore, NUS) 와 난양기술대학 (Nanyang Technological University, NTU)을 두 우수기관으로 선정하기도 했다. 🇸🇬



Dr Evelyn Teo Ai Lin

Associate Professor, National University of Singapore

Dr Evelyn TEO Ai Lin is Associate Professor at the Department of Building, Technical Co-ordinator of buildingSMART Singapore, Chairman of the Board of Examiners for Diploma in Building Information Engineering of BCA Academy Singapore; External Advisory Committee Member of buildingSMART Korea, International Advisor of buildingSMART Hong Kong, and Member of the Panel of Assessors to the Appeals Board (Land Acquisition). She has invented the BIM QTO system (patented system) and has won an excellent paper award in 2007 for the 'Deployment Framework to promote the Adoption of Automated Quantities Taking-off System'. Dr Teo is active in participating in BIM and Safety research projects both locally and internationally as researcher and consultant.

Hui Peng Yeo는 BIM Services Pte Ltd.의 디렉터로 재직 중이며 싱가포르 건설산업에서 다년간 경험을 쌓았다. 주요 경력으로는 BIM 적용 및 중압 공법 기술을 위한 자문위원으로 활동한 바 있다.