

BIM的应用价值

Stephen Jones

行业调研高级总监

@sjonesdodge

Stephen Jones

- 本科: Johns Hopkins
- 工商管理硕士: Wharton 商学院
- 拥有建筑工程领域**19年**的经验
 - 一个大型建筑工程公司 Burt Hill (现 Stantec公司)的董事会成员
- **3年**施工软件企业的管理经验
 - 副总裁: Primavera (现 Oracle公司)
- 在**Dodge Data & Analytics**超过**12年**的经验 (前McGraw Hill Construction)
 - 行业调研高级总监
 - 就技术如何改变全球施工行业进行了数次深度的调研, 报告发布以及演讲。

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行业调研报告



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日程

Agenda

全球BIM和基于模型的流程发展关键趋势。
Key trends in the advance of BIM and model-based processes throughout the world

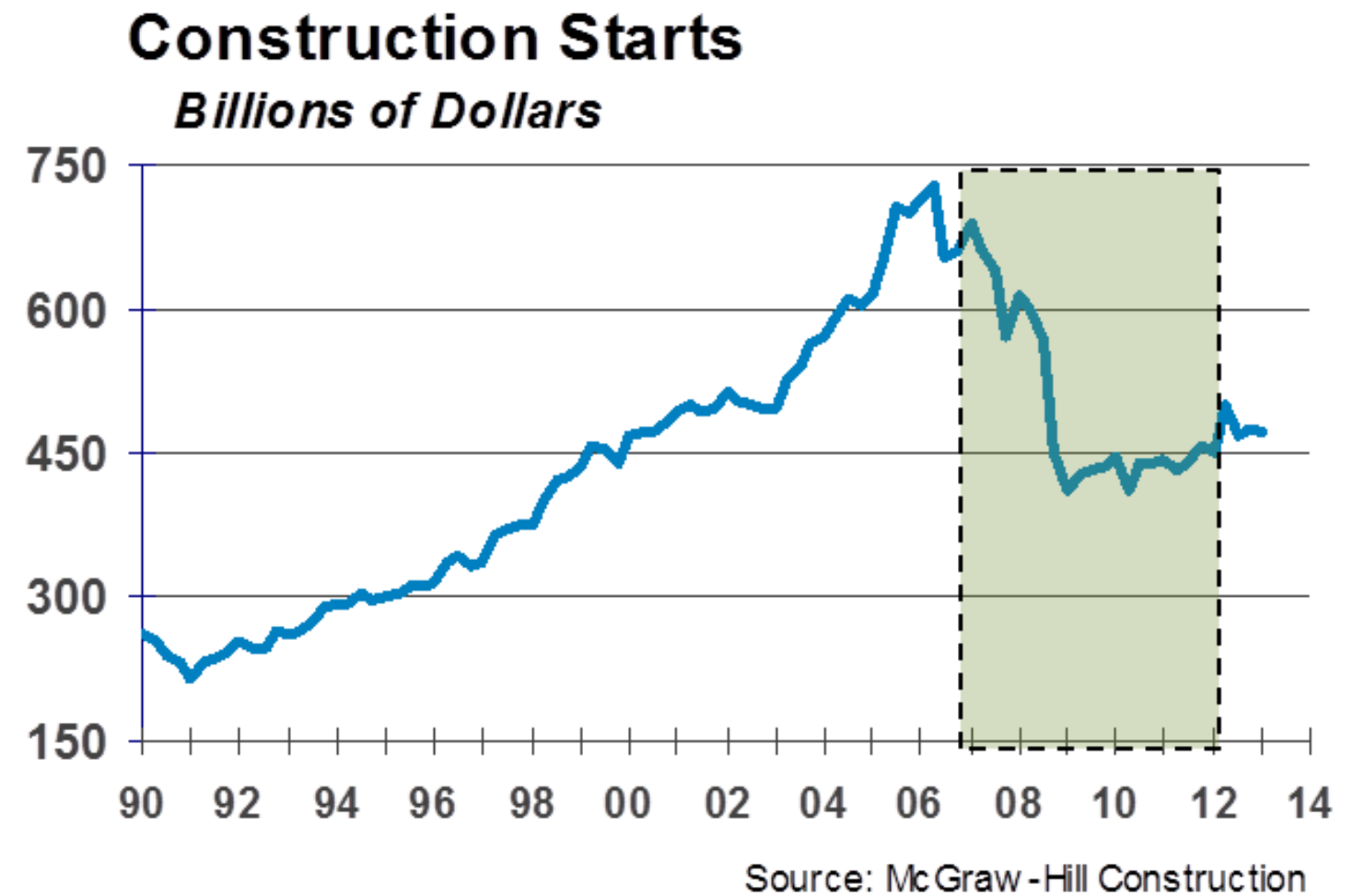
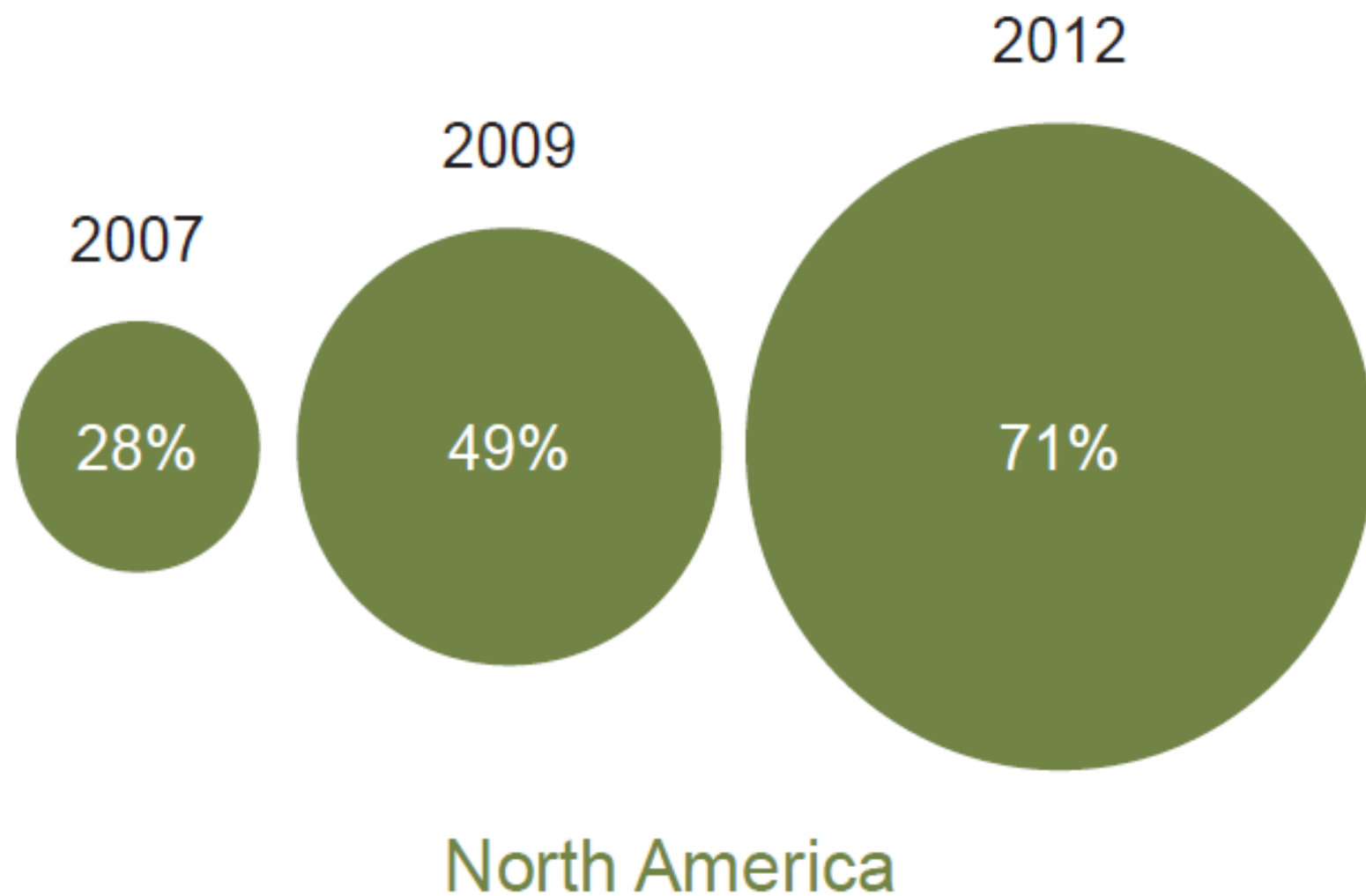
中国BIM应用价值研究报告的亮点
Highlights from BIM research in China

北美的BIM应用

BIM Adoption in North America

在经济危机下BIM的应用仍然明显增长

Adoption has grown strongly in spite of the financial recession

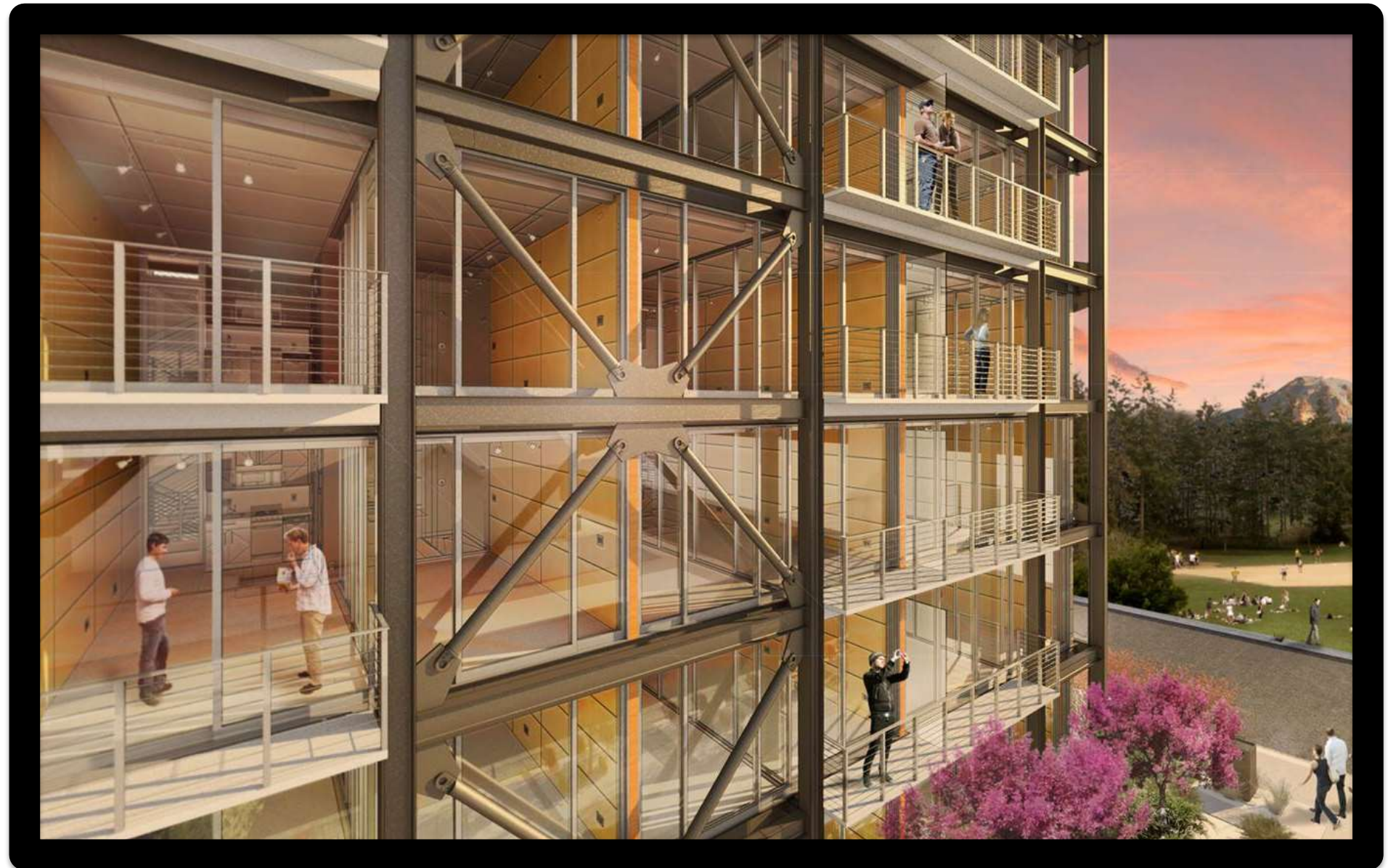


北美的BIM应用

BIM Adoption in North America

应用始于设计团队：可视化

Adoption began with the design team: VISUALIZATION



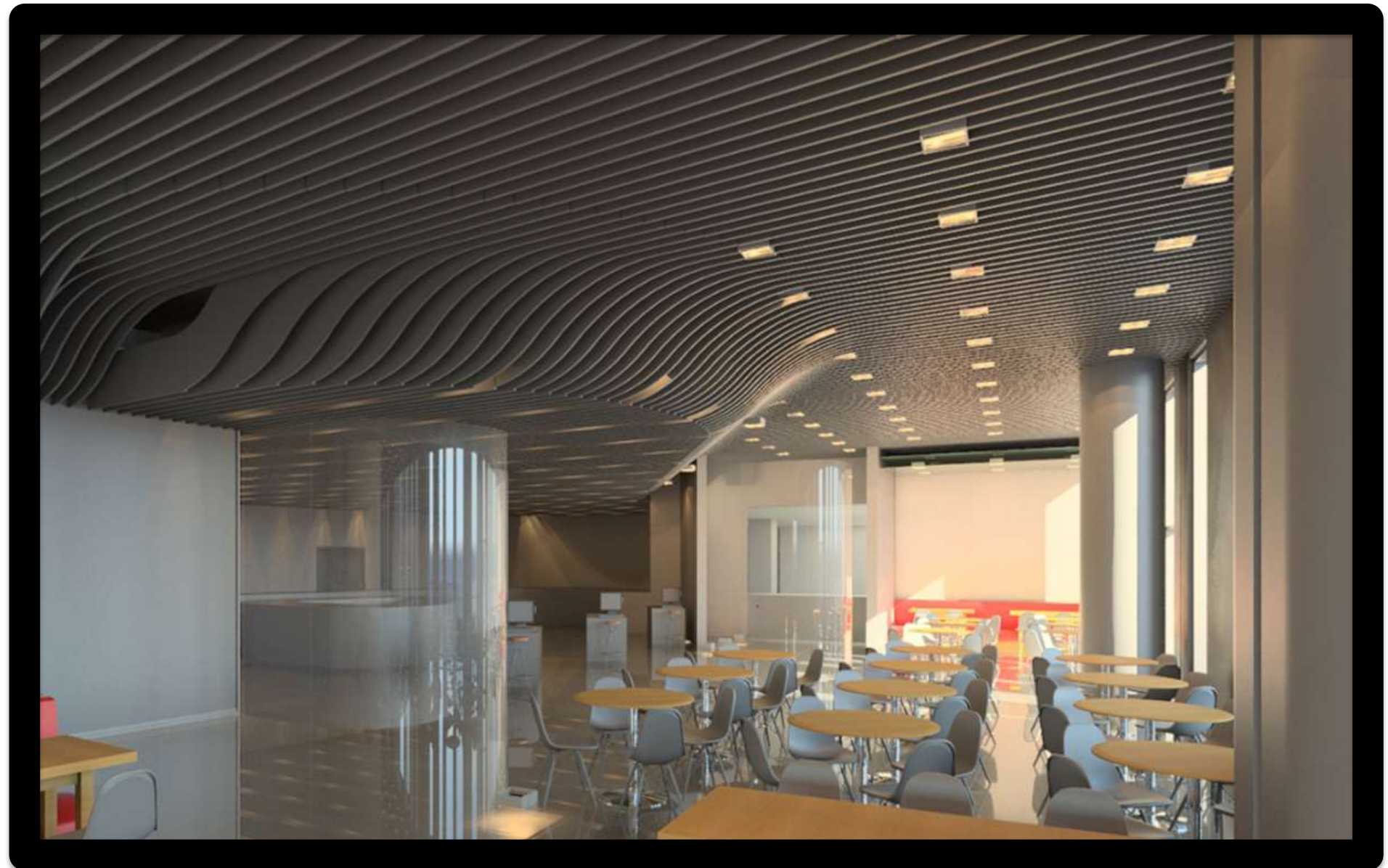
Source: Autodesk

北美的BIM应用

BIM Adoption in North America

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Source: Autodesk

北美的BIM应用

BIM Adoption in North America

应用始于设计团队：可视化

Adoption began with the design team: VISUALIZATION



Source: NRI

北美的BIM应用

BIM Adoption in North America

应用始于设计团队：可视化

Adoption began with the design team: VISUALIZATION



Source: ArchVirtual

北美的BIM应用

BIM Adoption in North America

应用始于设计团队：可视化

Adoption began with the design team: VISUALIZATION



数字资料为可视化提供了更多的
展现方式：全息打印

Digital data provides many
ways to visualize projects:
Holographic print



Source: Zebra Imaging

北美的BIM应用

BIM Adoption in North America

应用始于设计团队：可视化

Adoption began with the design team: VISUALIZATION



数字资料为可视化提供了更多的
展现方式：视频模型

Digital data provides many
ways to visualize projects:
Model in Video



Source: ICA

北美的BIM应用

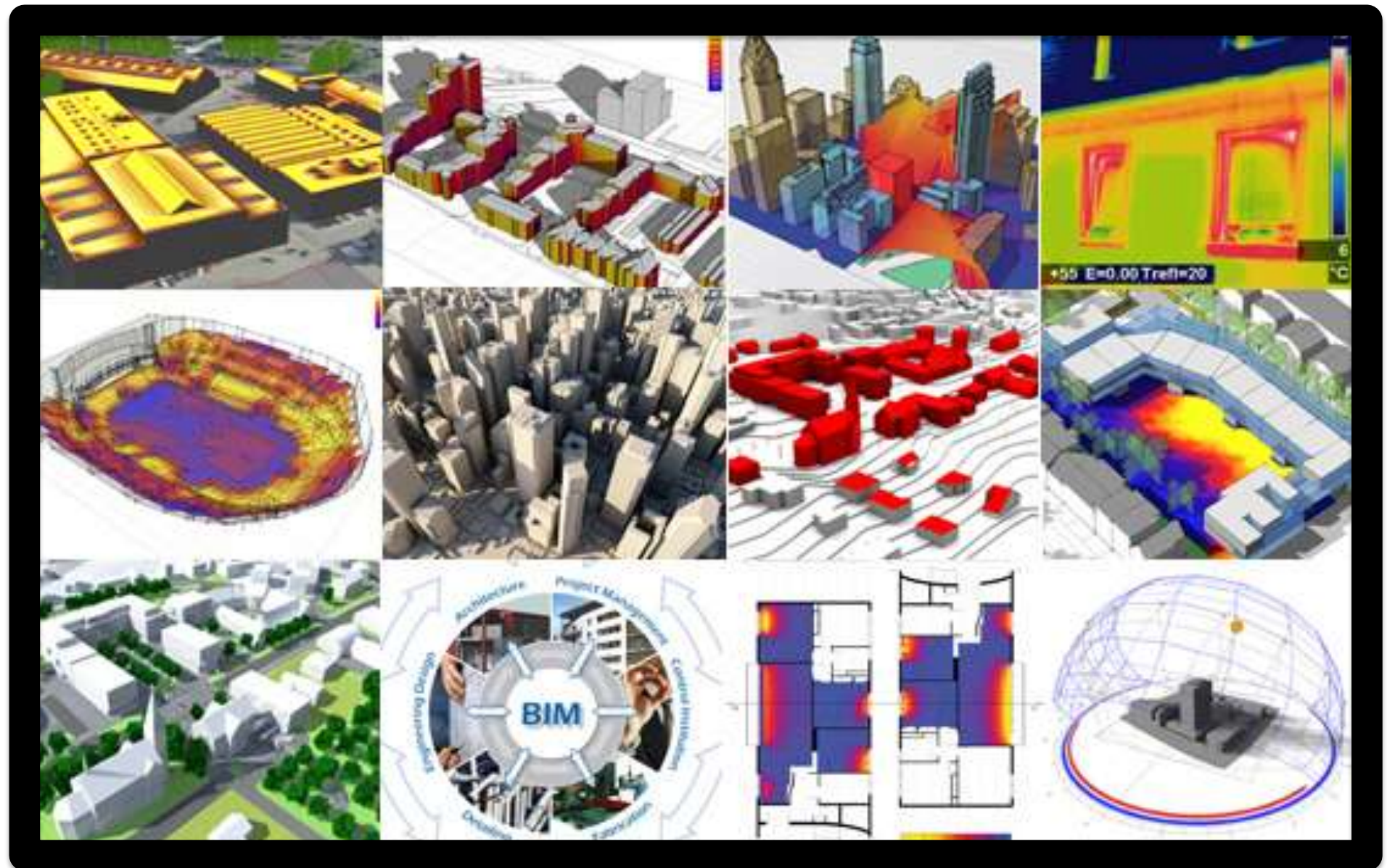
BIM Adoption in North America

应用始于设计团队：交付更好的项目

Adoption began with the design team: DELIVER BETTER PROJECTS



分析和模拟可以实现更好的项目
Analysis and simulation can make better projects



Source: Autodesk

北美的BIM应用

BIM Adoption in North America

应用始于设计团队：交付更好的项目

Adoption began with the design team: DELIVER BETTER PROJECTS

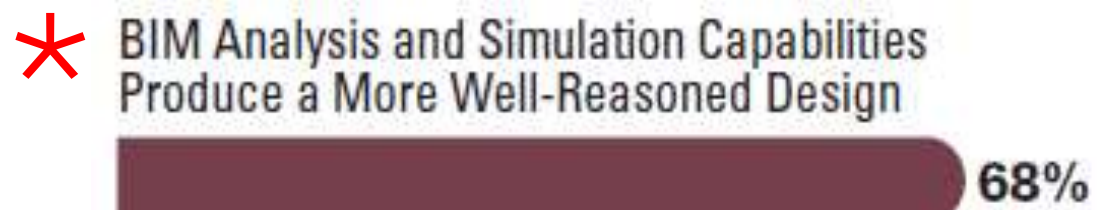


分析和模拟可以实现更好的项目

Analysis and simulation can make better projects

Owners' Ratings of BIM Benefit Statements

(Owners expressing High/Very High agreement)



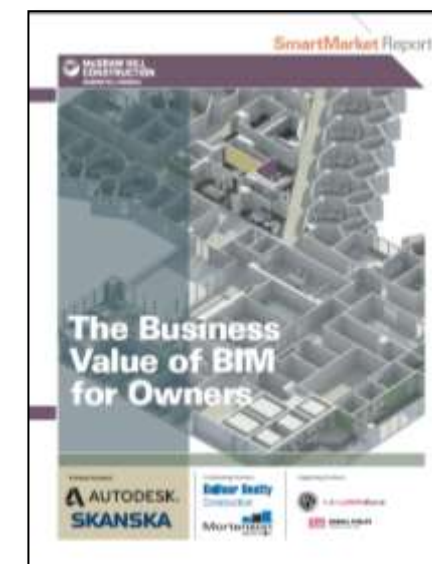
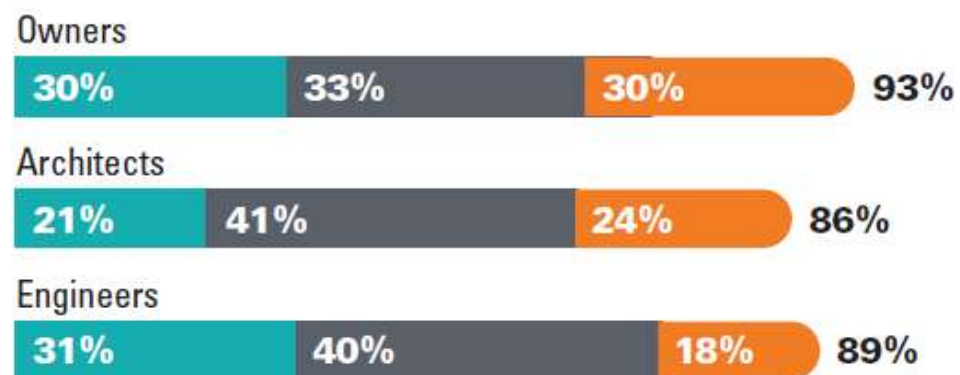
BIM Impact on Design

(According to Owners, Architects and Engineers)

Dodge Data & Analytics, 2015

Very High High Medium

* Improved Quality/Function of Final Design



2014



2015

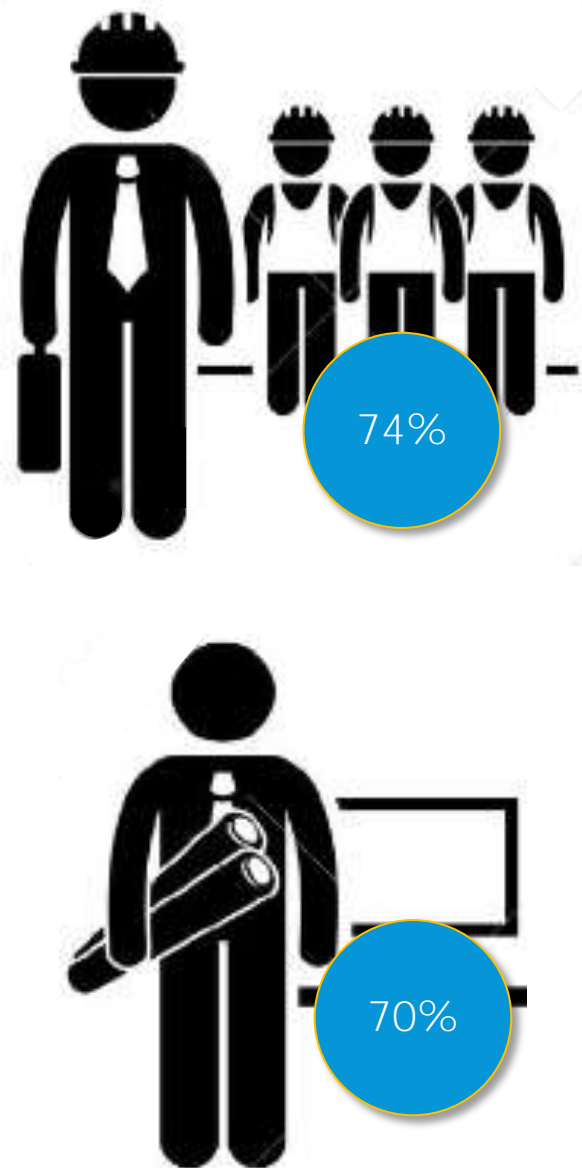
Source: Dodge Data & Analytics

北美的BIM应用

BIM Adoption in North America

2012年施工企业的BIM应用已经超越了设计企业

In 2012 contractors' adoption surpassed designers

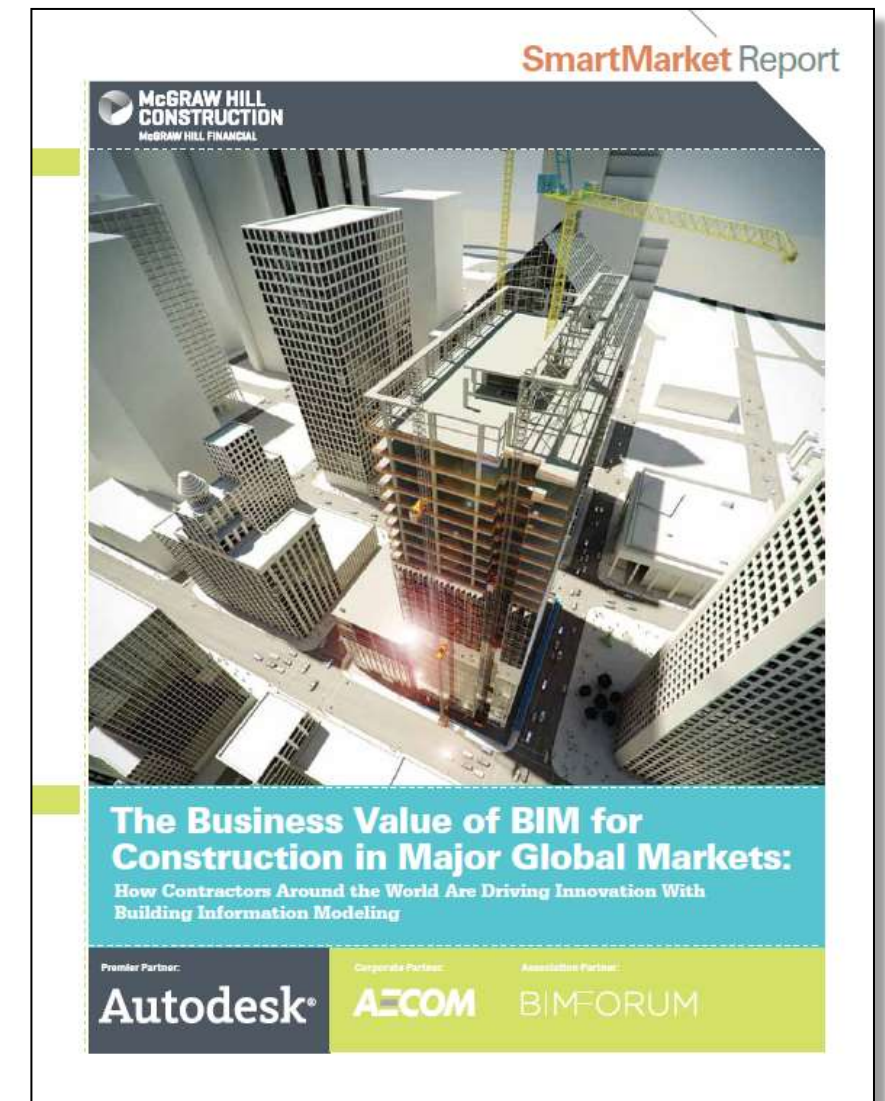
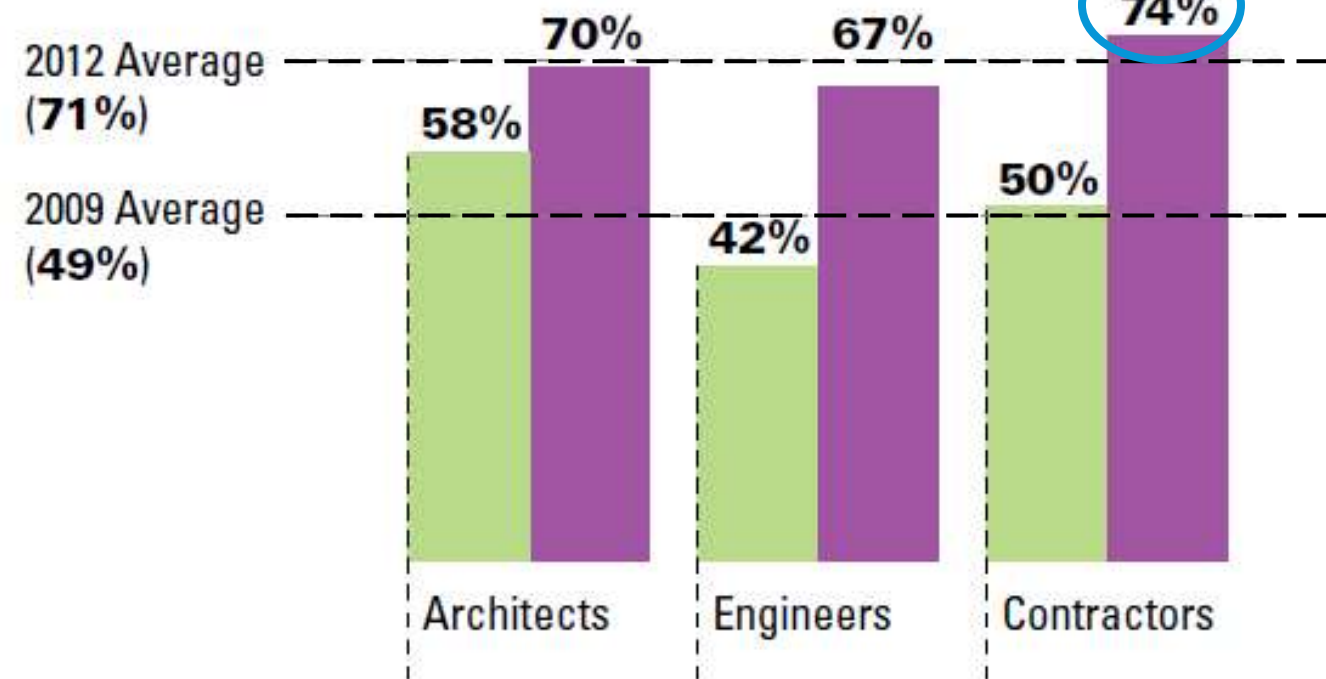


BIM Adoption by Type and Size of Firm

Source: McGraw-Hill Construction, 2012

2009 2012

2012 was a tipping point for contractors' engagement with BIM in North America



Source: Dodge Data & Analytics

全球施工企业的BIM应用

Contractors BIM Use Globally

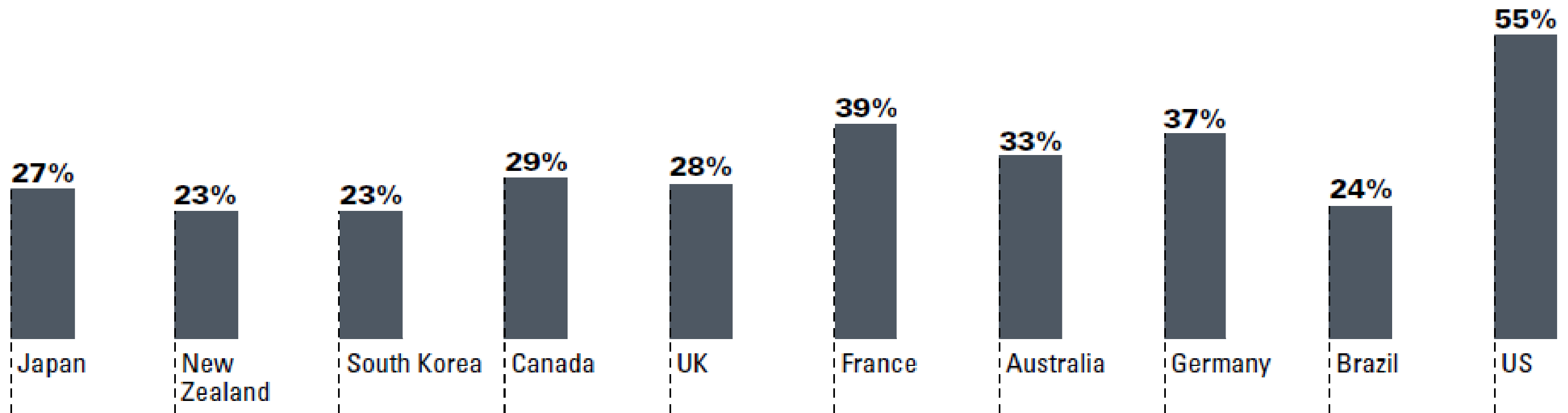
施工企业的BIM应用正在快速的增长

Contractors aggressively growing implementation

Percentage of Contractors at High/Very High BIM Implementation Levels

Source: McGraw Hill Construction, 2013

■ 2013



全球施工企业的BIM应用

Contractors BIM Use Globally

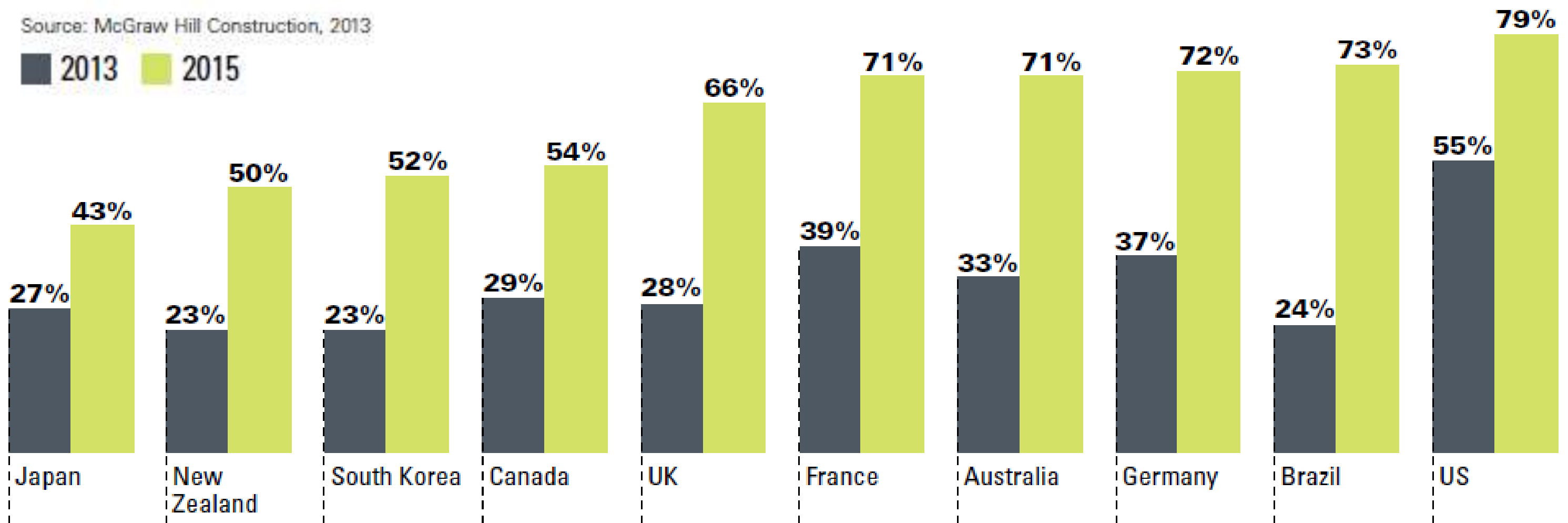
施工企业的BIM应用正在快速的增长

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■ 2013 ■ 2015



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Contractors BIM Use Globally

施工企业的BIM应用正在快速的增长

Contractors aggressively growing implementation

Percentage of Contractors at High/Very High BIM Implementation Levels

Source: McGraw Hill Construction, 2013

■ 2012 ■ 2015

71% 71% 72% 73% 79%

可预见性

CERTAINTY



全球施工企业的BIM应用

Contractors BIM Use Globally

施工企业在施工准备阶段的十大BIM应用方向

Contractors top 10 BIM activities during Preconstruction



增强施工的可预见性
Increasing the level
of certainty for
construction

Multi-Trade Coordination



Visualization of the Design Intent



Modeling for Constructability Evaluation



Determining Quantities From a Model



Integration of Model
With Schedule (4D)



Integration of Model
With Costs (5D)



Virtual Jobsite Planning
and Logistics



Value Engineering



Laser Scanning Capturing
Existing Conditions Into a
Model Before Construction



Safety Planning/Training

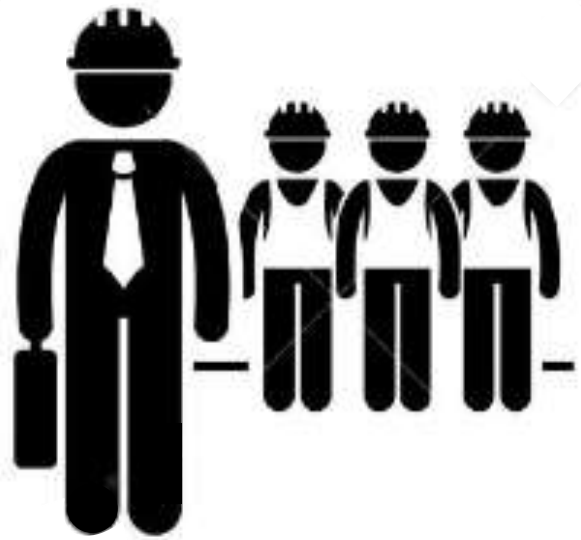


全球施工企业的BIM应用

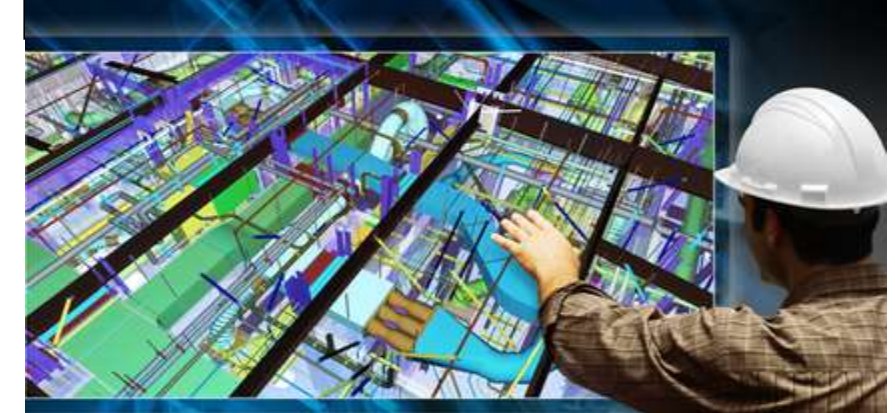
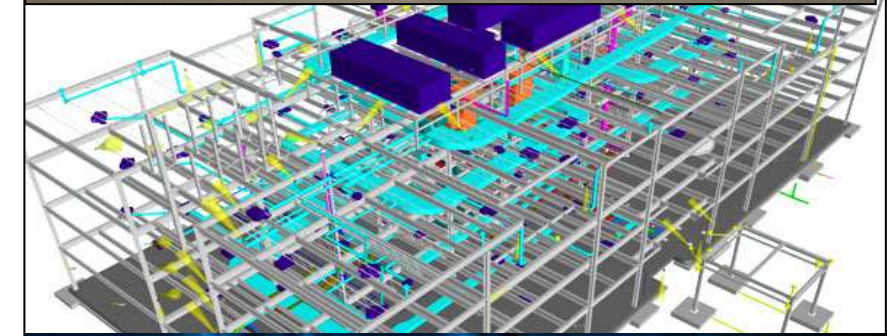
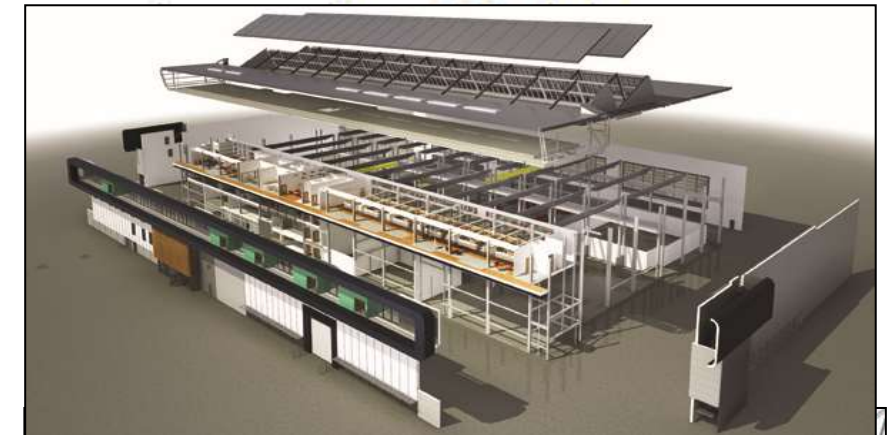
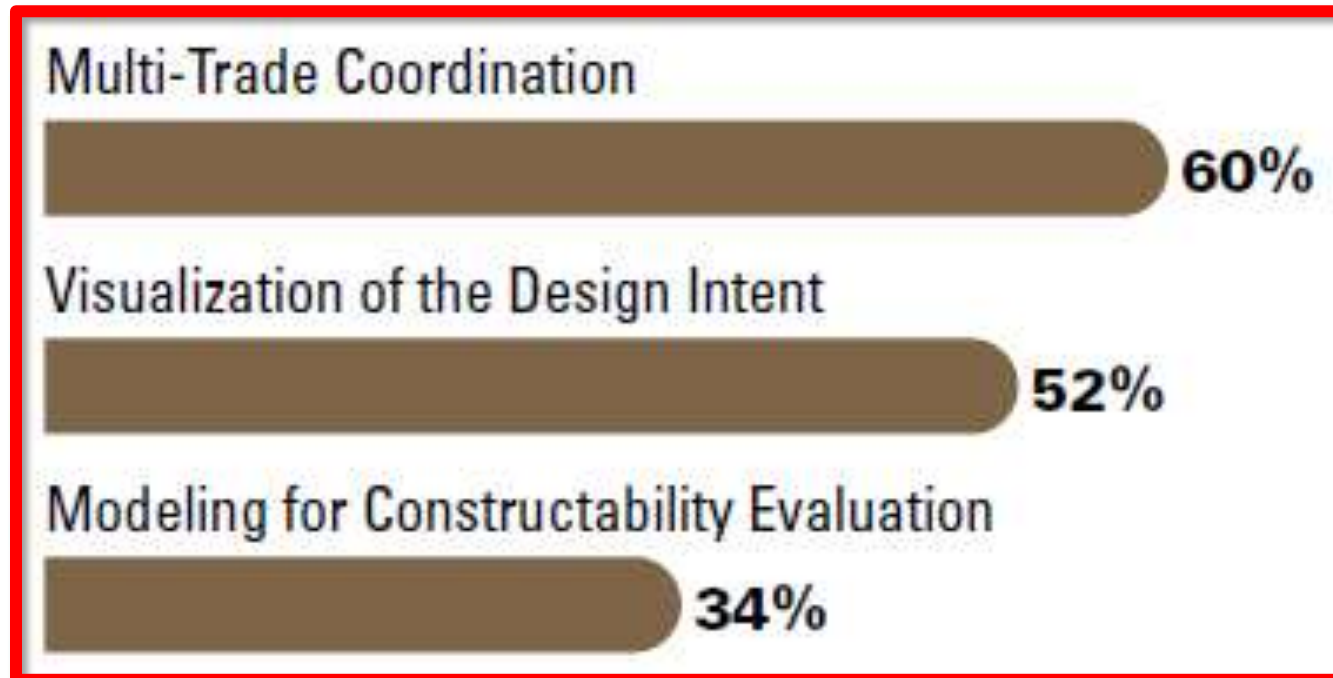
Contractors BIM Use Globally

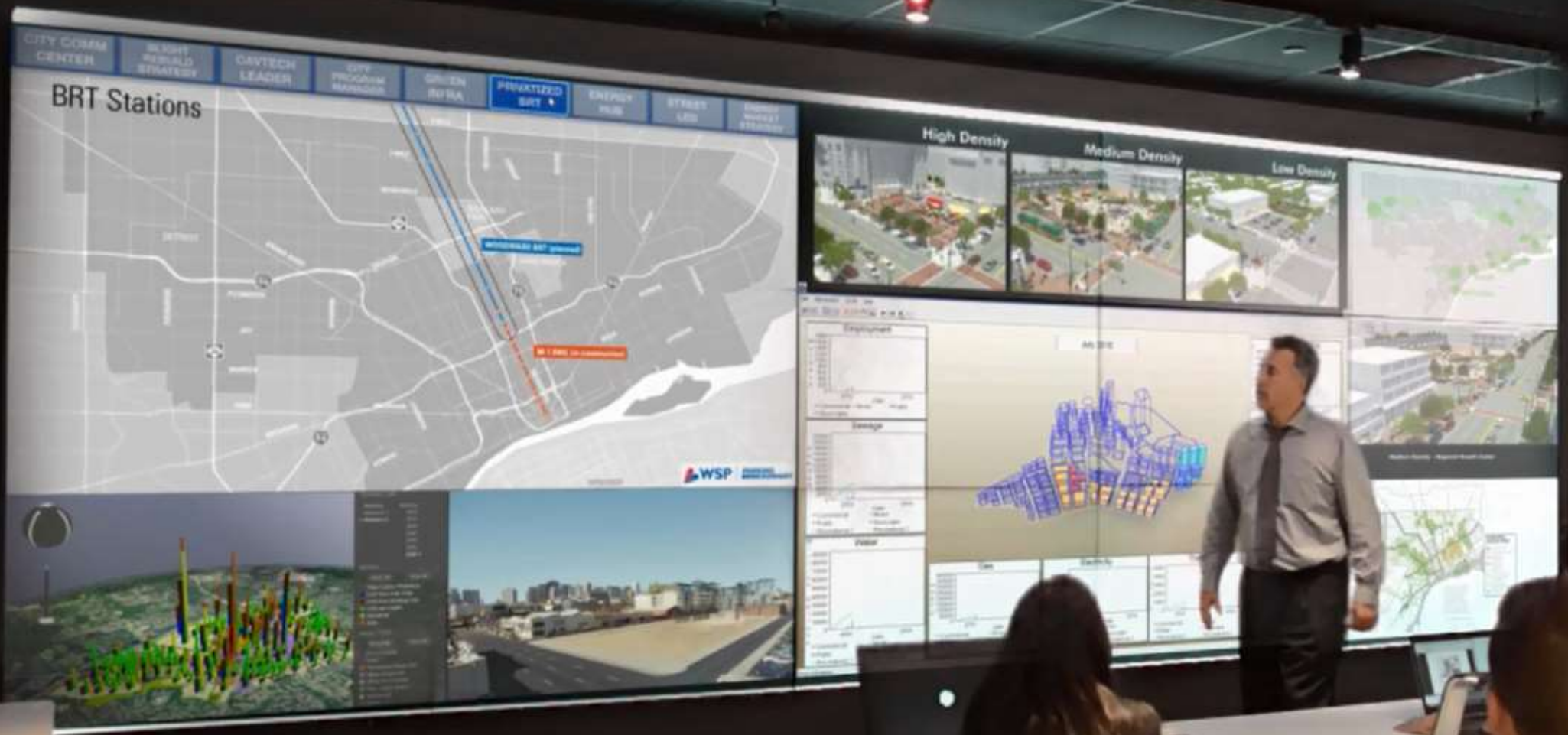
施工企业在施工准备阶段的十大BIM应用方向

Contractors top 10 BIM activities during Preconstruction



增强施工的可预见性
Increasing the level
of certainty for
construction





A man in a light blue shirt and dark tie stands in the center of the room, gesturing towards the digital display as if presenting or explaining the data.



全球施工企业的BIM应用

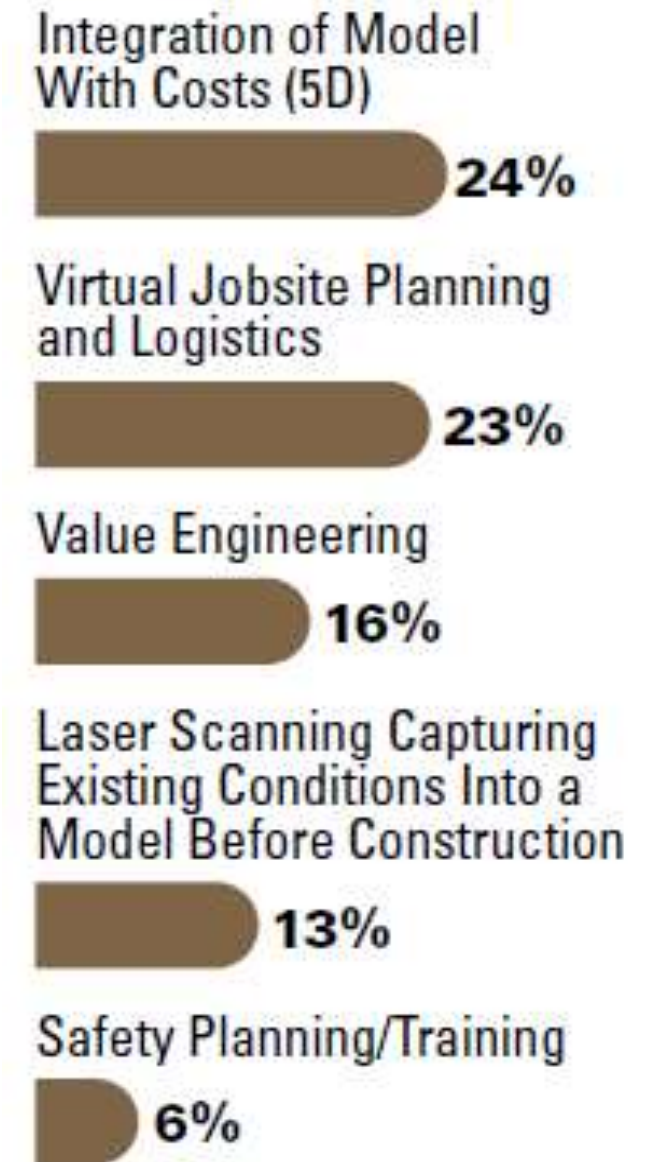
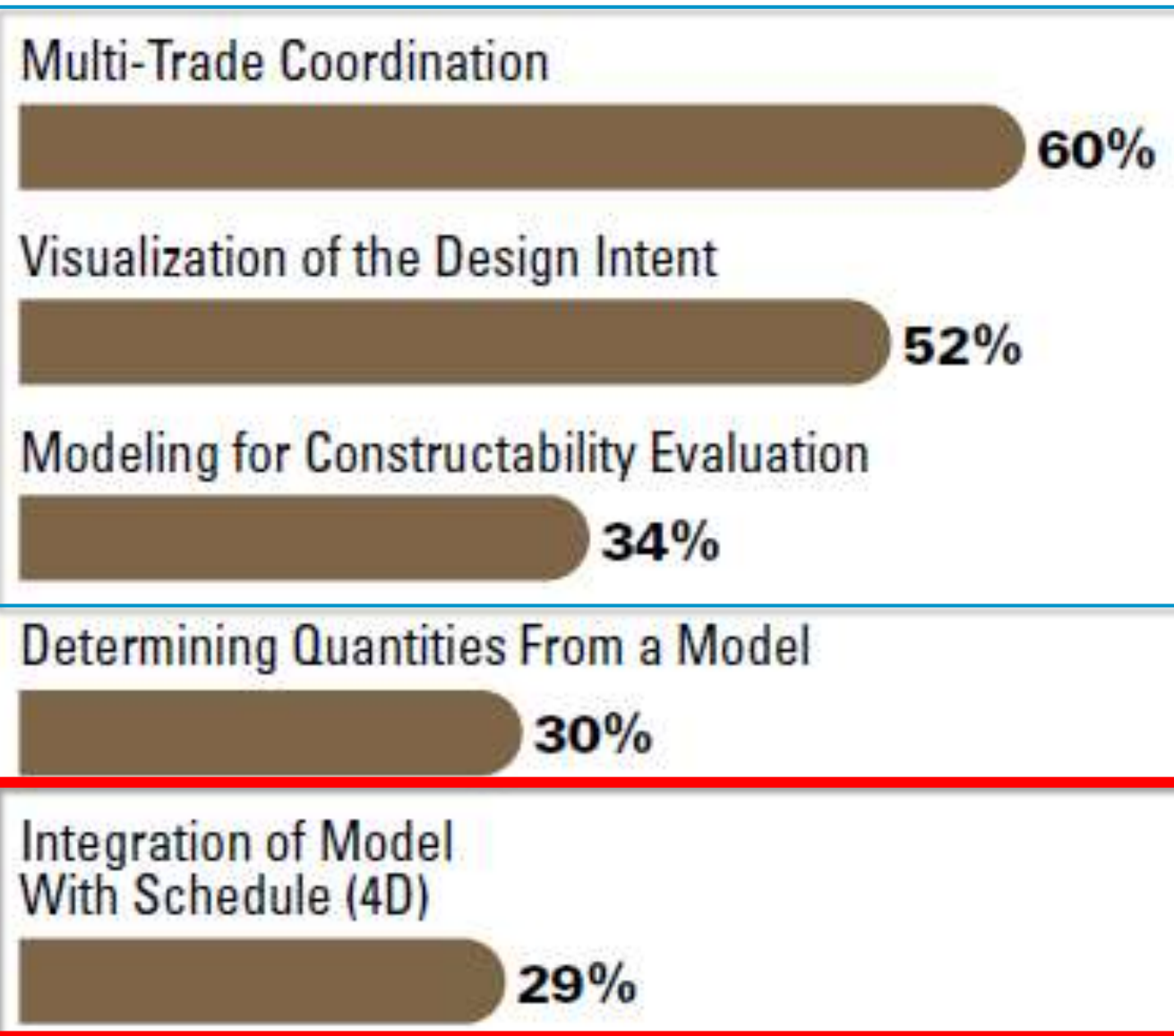
Contractors BIM Use Globally

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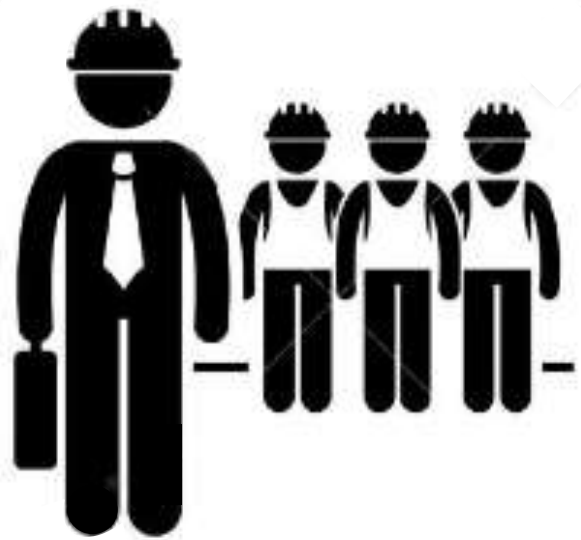
Source: Hatch
Mott MacDonald

全球施工企业的BIM应用

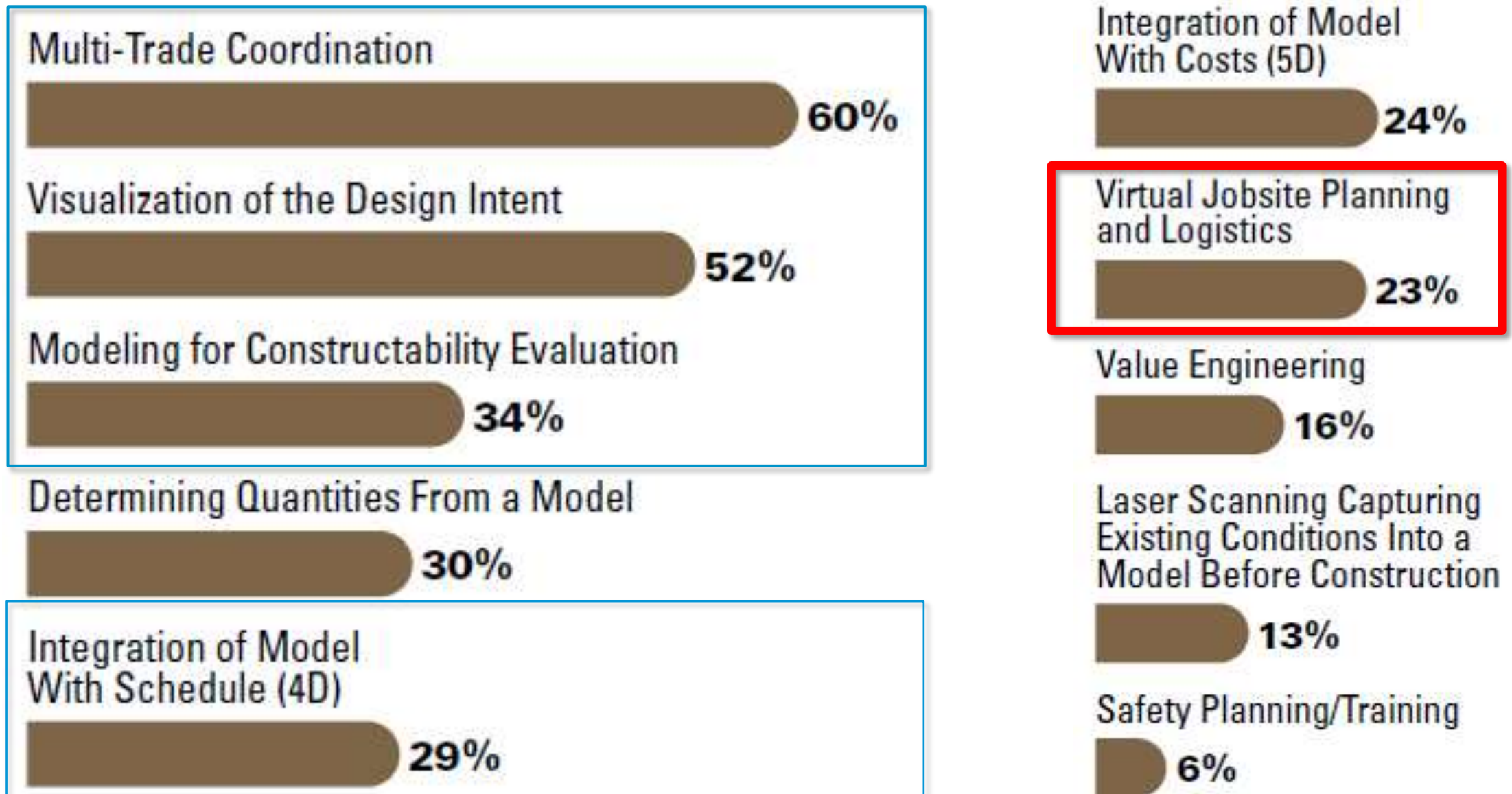
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construction



M 01	M 02	M 03	M 04	M 05	M 06	M 07	M 08	M 09	M 10	M 11	M 12	M 13	M 14	M 15	M 16	M 17	M 18	M 19	M 20	M 21	M 22	M 23	M 24	M 25	M 26	M 27	M 28	M 29	M 30	M 31	M 32	M 33	M 34	M 35	M 36
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● Award of Project



Image: Pinnacle Infotech

M 01	M 02	M 03	M 04	M 05	M 06	M 07	M 08	M 09	M 10	M 11	M 12	M 13	M 14	M 15	M 16	M 17	M 18	M 19	M 20	M 21	M 22	M 23	M 24	M 25	M 26	M 27	M 28	M 29	M 30	M 31	M 32	M 33	M 34	M 35	M 36
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Image: Pinnacle Infotech

全球施工企业的BIM应用

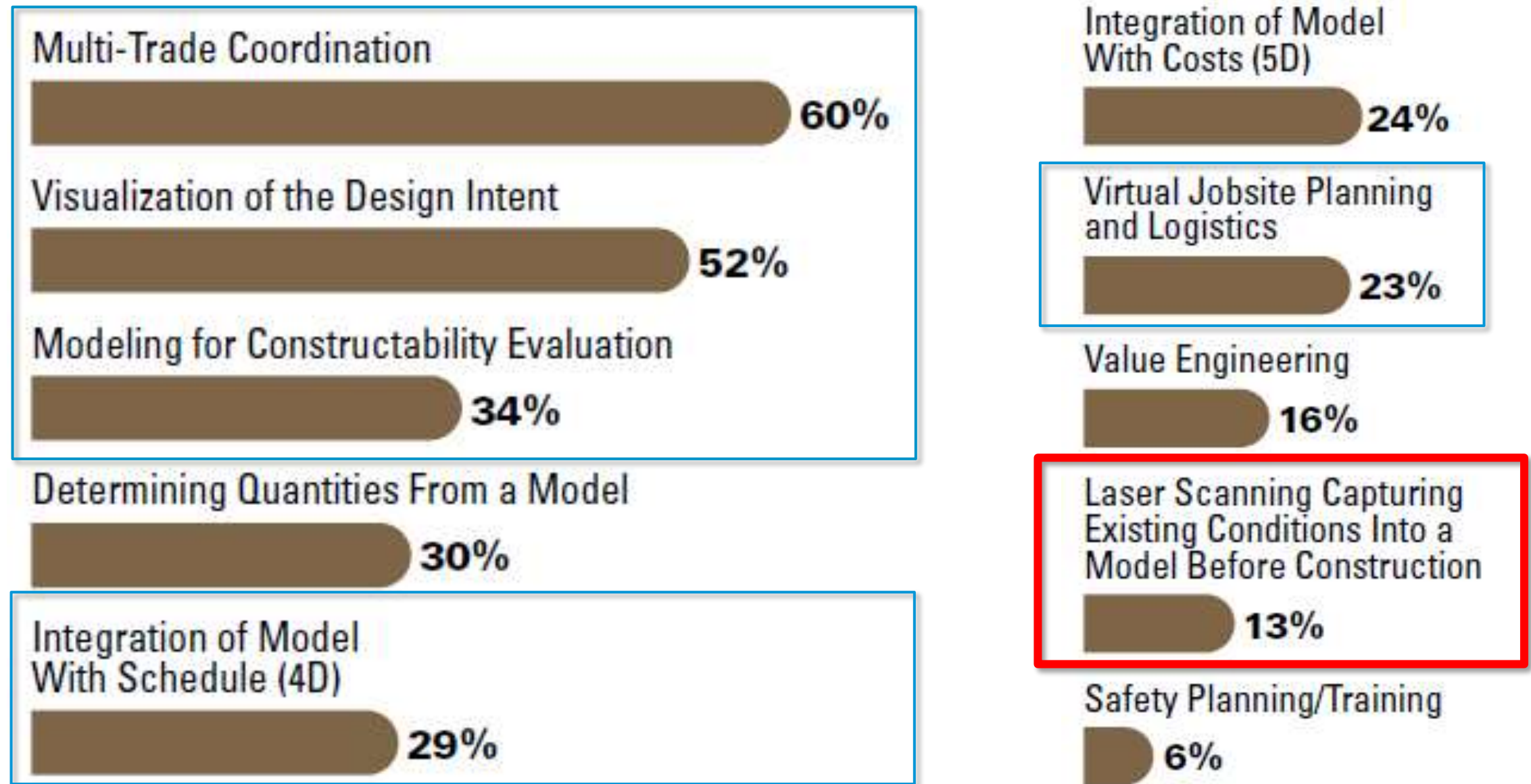
Contractors BIM Use Globally

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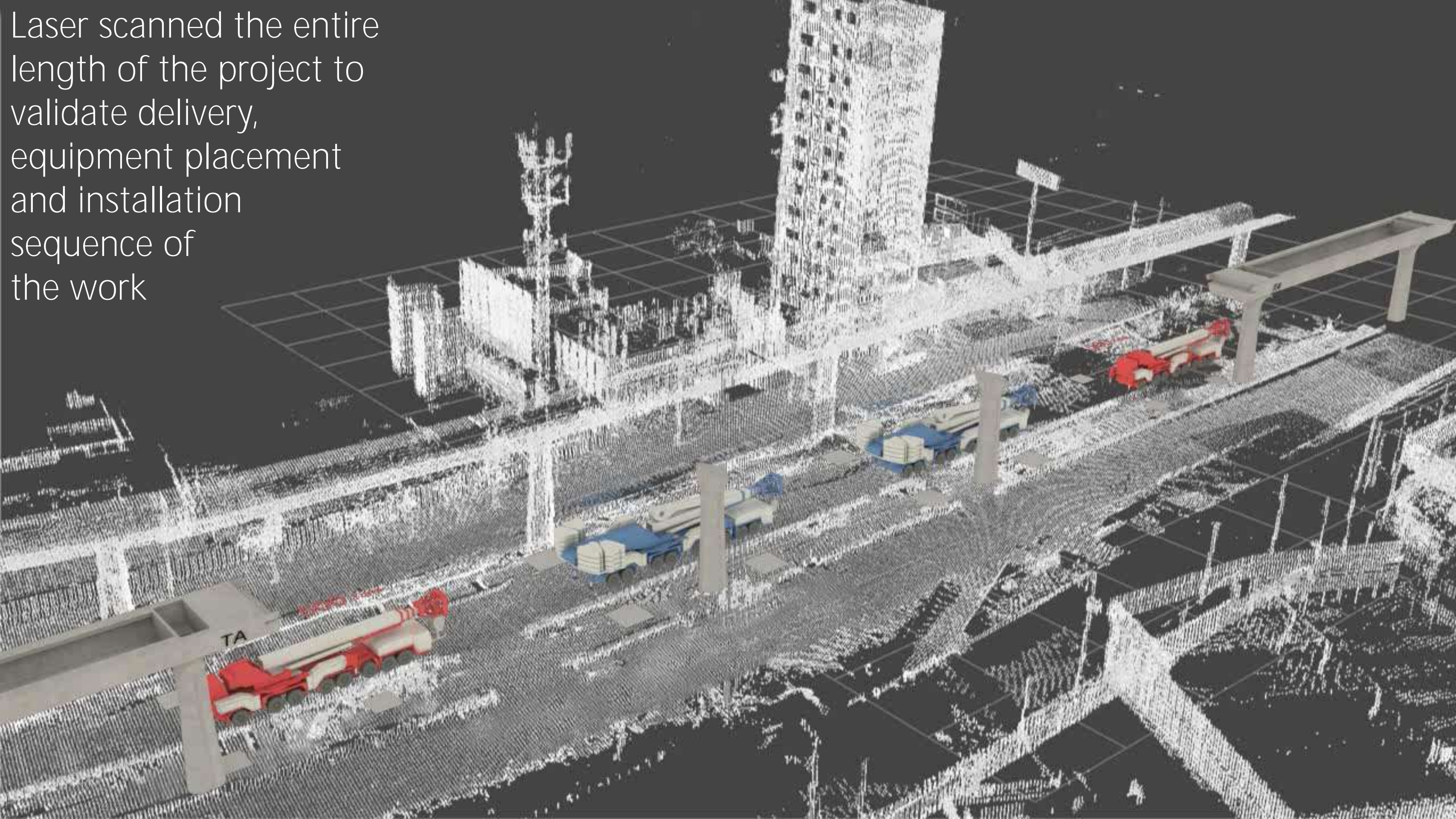
增强施工的可预见性
Increasing the level
of certainty for
construction





Source:
ICA

Laser scanned the entire length of the project to validate delivery, equipment placement and installation sequence of the work







SALAS
\$4,990

80

全球施工企业的BIM应用

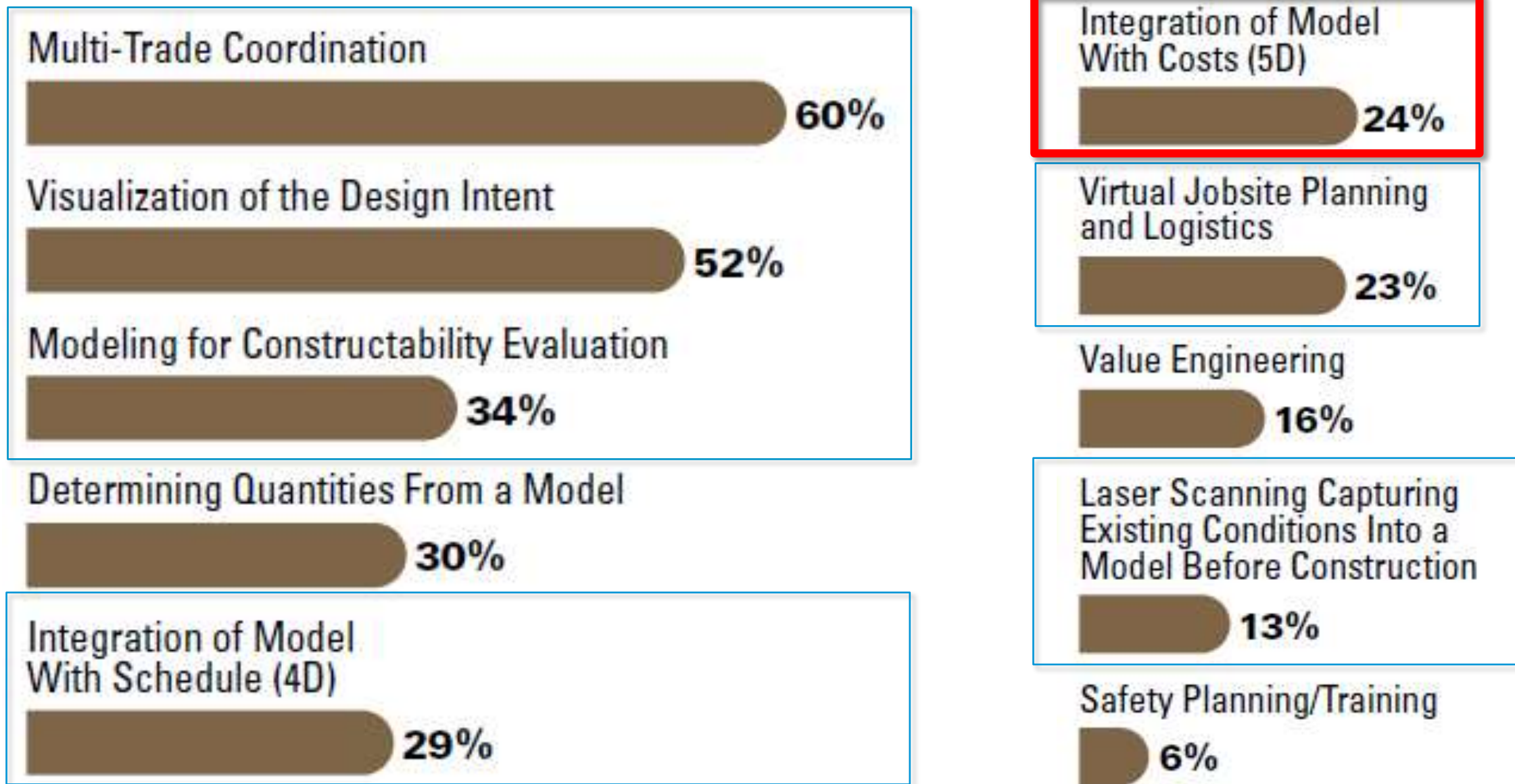
Contractors BIM Use Globally

施工企业在施工准备阶段的十大BIM应用方向

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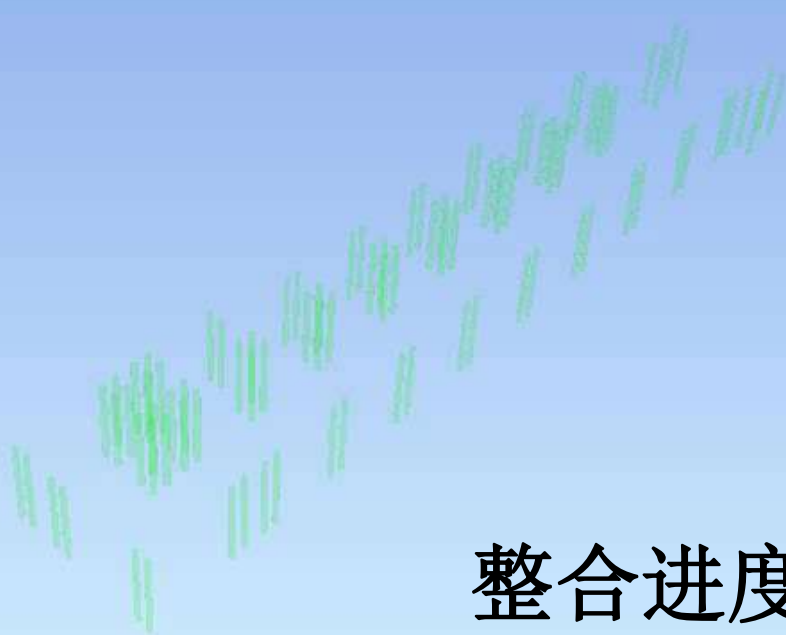


增强施工的可预见性
Increasing the level
of certainty for
construction

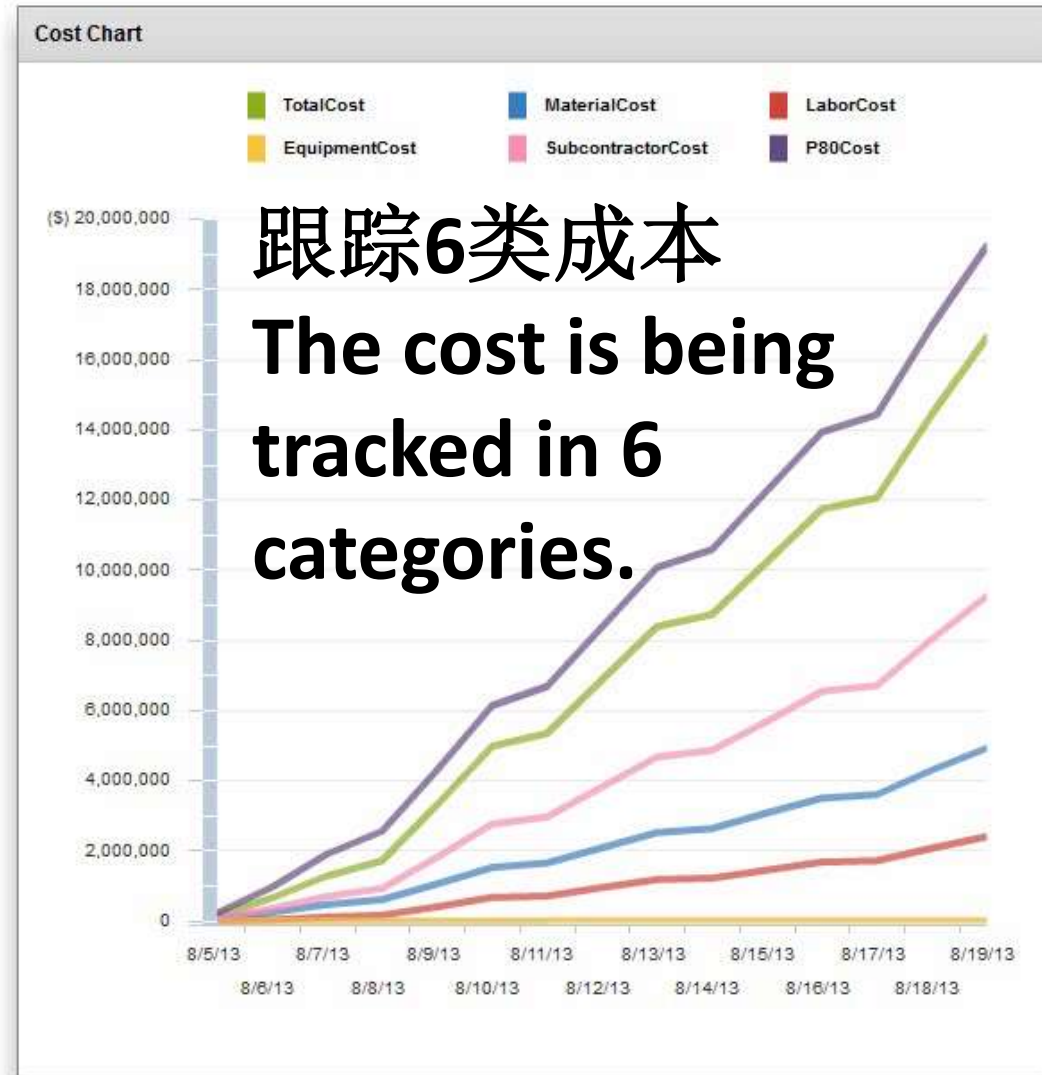


Monday 9:00:00 AM 8/5/2013 Day=1 Week=1
Material Cost = 0.00
Equipment Cost=0.00
Labor Cost=0.00
Total Cost with Overhead and Profit = 0.00

随着施工的进程
As the building is being built...



整合进度
The schedule is integrated...



play pause stop 25

TimeLiner

Tasks Data Sources Configure Simulate

8/5/2013 09:00 17:00 8/5/2013 8/19/2013

Name	Status	Planned Start	Planned End	Actual Start	Actual End
Monday August 05, 2013					
		9 AM	10 AM		
		11 AM	12 PM		
		1 PM	2 PM		
		3 PM	4 PM		
		5 PM	6 PM		
		7 PM	8 PM		
		9 PM	10 PM		
		11 PM	12 AM		
		1 AM			
Tuesday August 06, 2013					

全球施工企业的BIM应用

Contractors BIM Use Globally

在施工、预制和安装阶段的八大BIM应用方向

Contractors top 8 BIM activities during Construction, Fabrication and Installation



更确定地进行施工
Implement construction with greater certainty

Model-Driven Layout in the Field



Model-Driven Prefabrication



Status/Progress Monitoring



Augmented Reality to Visualize the Model and Existing Conditions Together



Laser Scanning During Construction to Validate Compliance With the Model



Supply Chain Management



Integrating Model With GPS to Control Construction Equipment Onsite



Model-Driven Robotics Onsite



全球施工企业的BIM应用

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Model-Driven Layout in the Field



Model-Driven Prefabrication



Contractors' Use of Models for Digital Fabrication

Source: McGraw-Hill Construction, 2012

Mechanical, Plumbing, Fire Suppression Systems



Structural Steel



Hangers



Electrical, Data and Communications Systems



Toilet Rooms



Building Envelope Elements



Structural Concrete



全球施工企业的BIM应用

Contractors BIM Use Globally

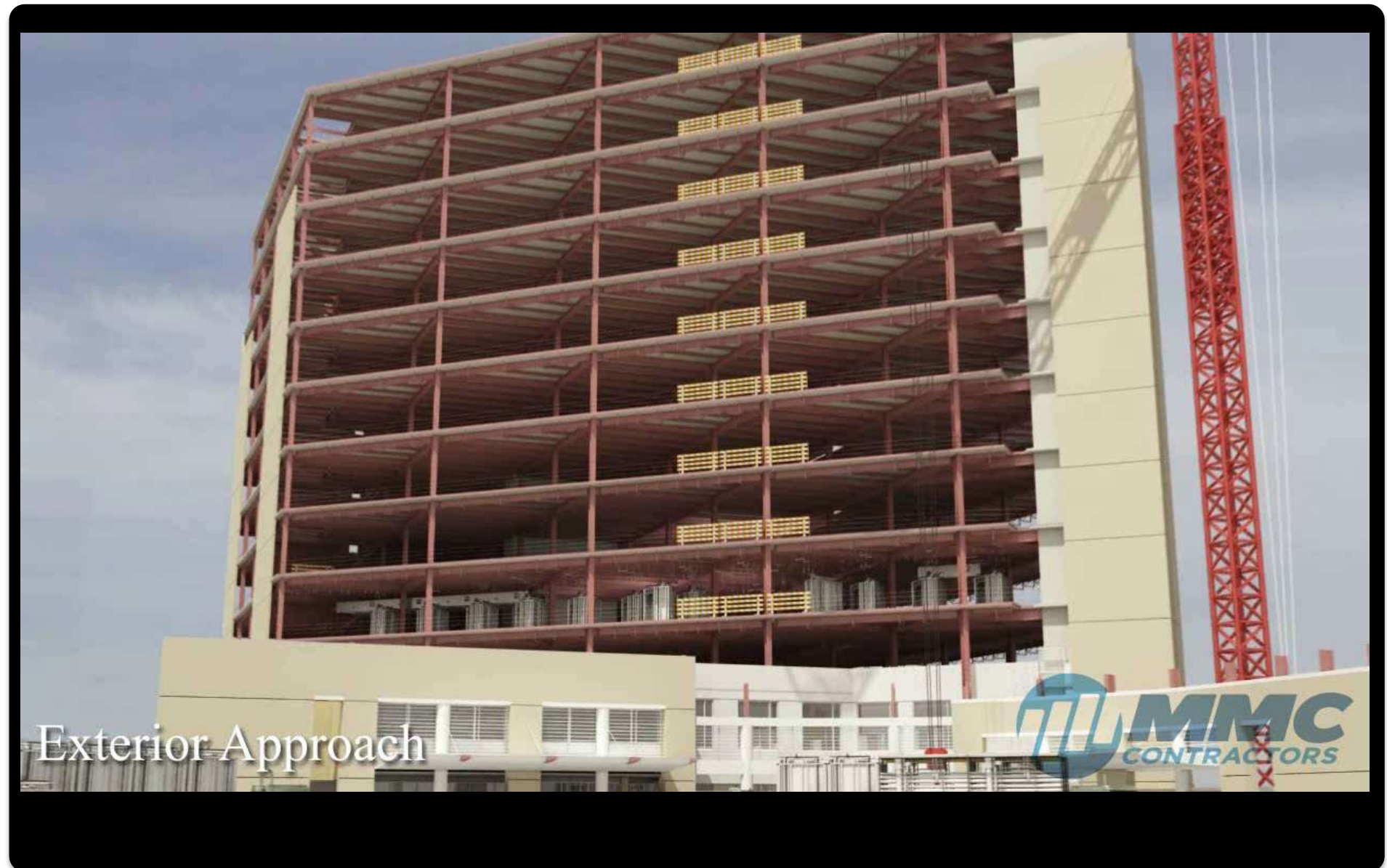
在施工、预制和安装阶段的八大BIM应用方向

Contractors top 8 BIM activities during Construction, Fabrication and Installation



模型驱动的机电预制

Model-driven
prefabrication of
mechanical systems



全球施工企业的BIM应用

Contractors BIM Use Globally

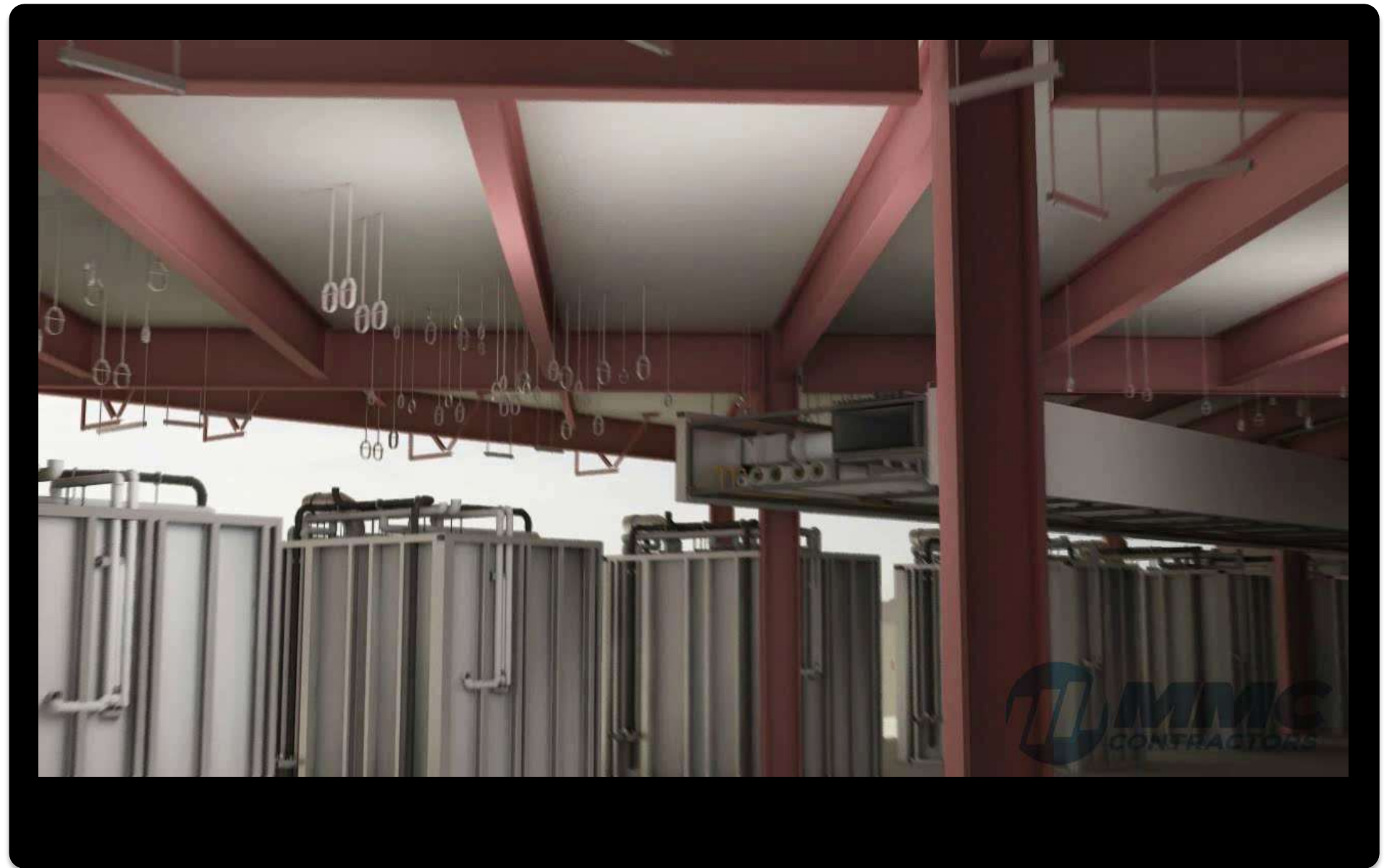
在施工、预制和安装阶段的八大BIM应用方向

Contractors top 8 BIM activities during Construction, Fabrication and Installation



模型驱动的放样及吊装

Model-driven layout
from above to install
hangars



全球施工企业的BIM应用

Contractors BIM Use Globally

在施工、预制和安装阶段的八大BIM应用方向

Contractors top 8 BIM activities during Construction, Fabrication and Installation



更确定地进行施工
Implement
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Status/Progress Monitoring



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Laser Scanning During
Construction to Validate
Compliance With the Model



Supply Chain Management



Integrating Model With
GPS to Control Construction
Equipment Onsite

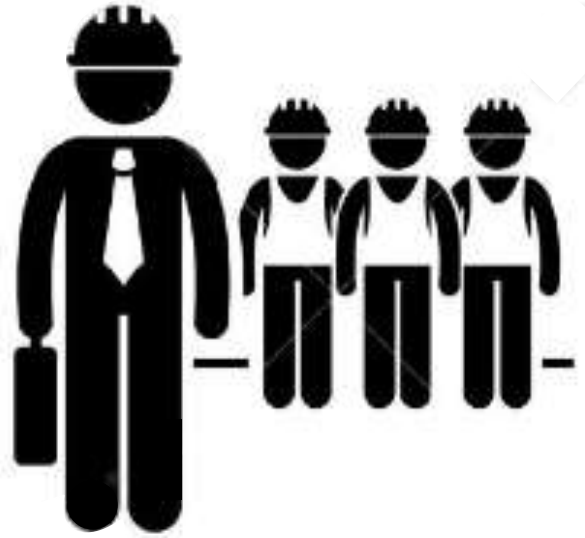


Model-Driven Robotics Onsite



全球施工企业的BIM应用

Contractors BIM Use Globally



模型驱动的模式式内装
Model-driven
modularization of
interior construction

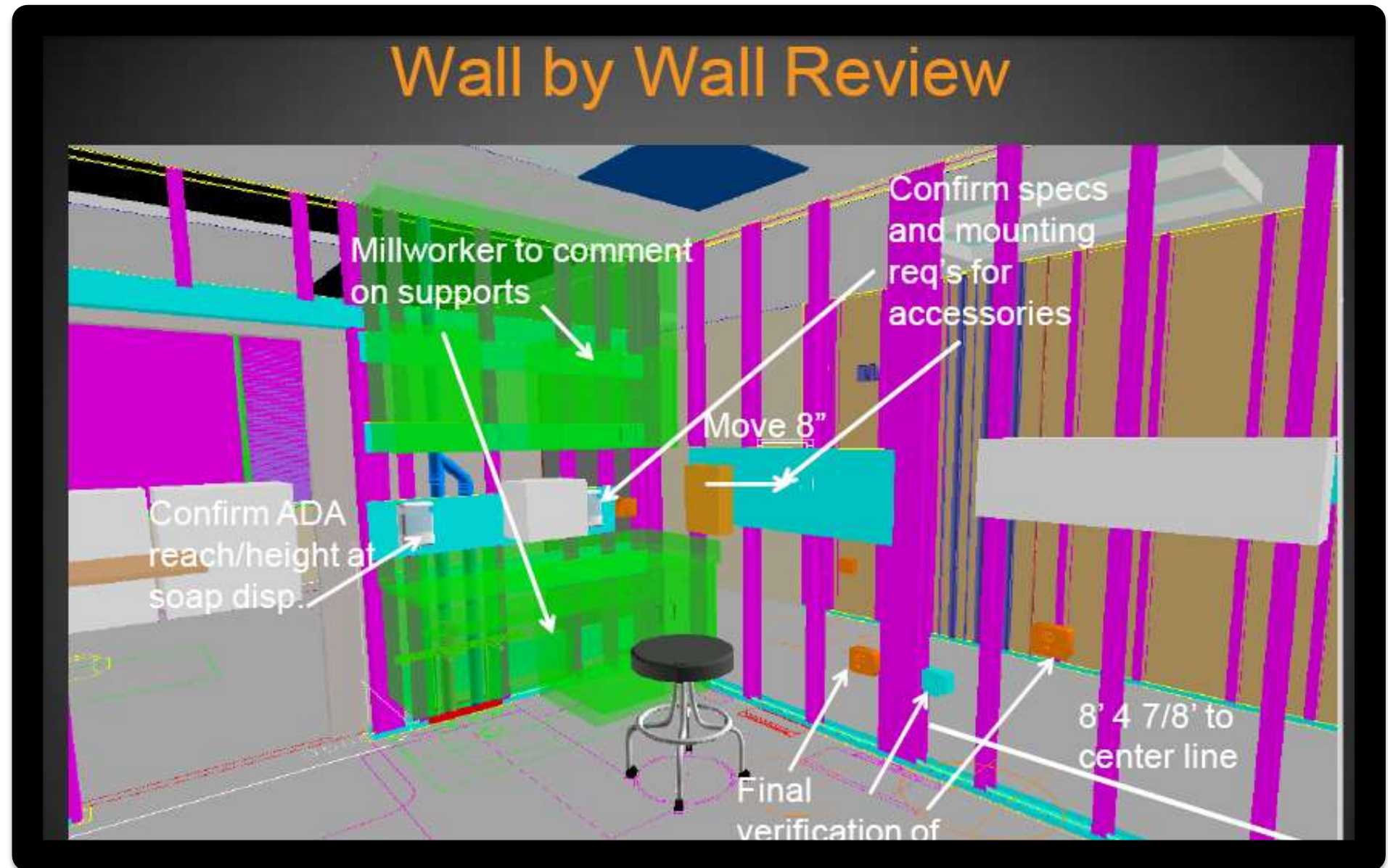


全球施工企业的BIM应用

Contractors BIM Use Globally



模型驱动的所有系统和设备的协调
Model driven coordination all systems and equipment



全球施工企业的BIM应用

Contractors BIM Use Globally



通过现实捕捉验证施工方案

Augmented reality to
validate before final
install



全球施工企业的BIM应用

Contractors BIM Use Globally

在施工、预制和安装阶段的八大BIM应用方向

Contractors top 8 BIM activities during Construction, Fabrication and Installation



更确定地进行施工
Implement
construction with
greater certainty

Model-Driven Layout in the Field



Model-Driven Prefabrication



Status/Progress Monitoring



Augmented Reality to Visualize
the Model and Existing
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Laser Scanning During
Construction to Validate
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Supply Chain Management



Integrating Model With
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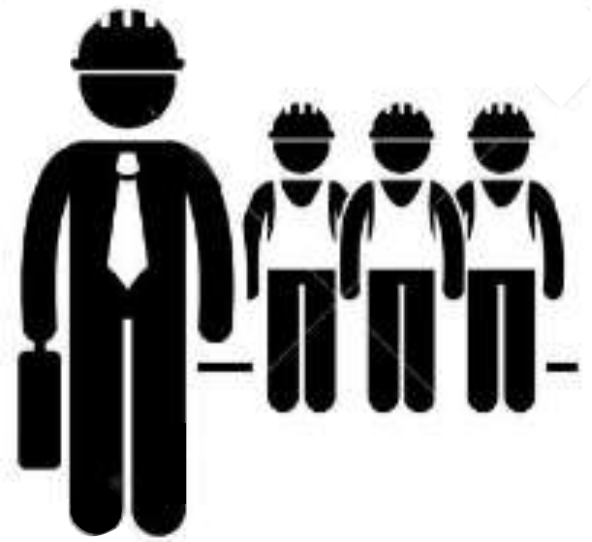


Model-Driven Robotics Onsite



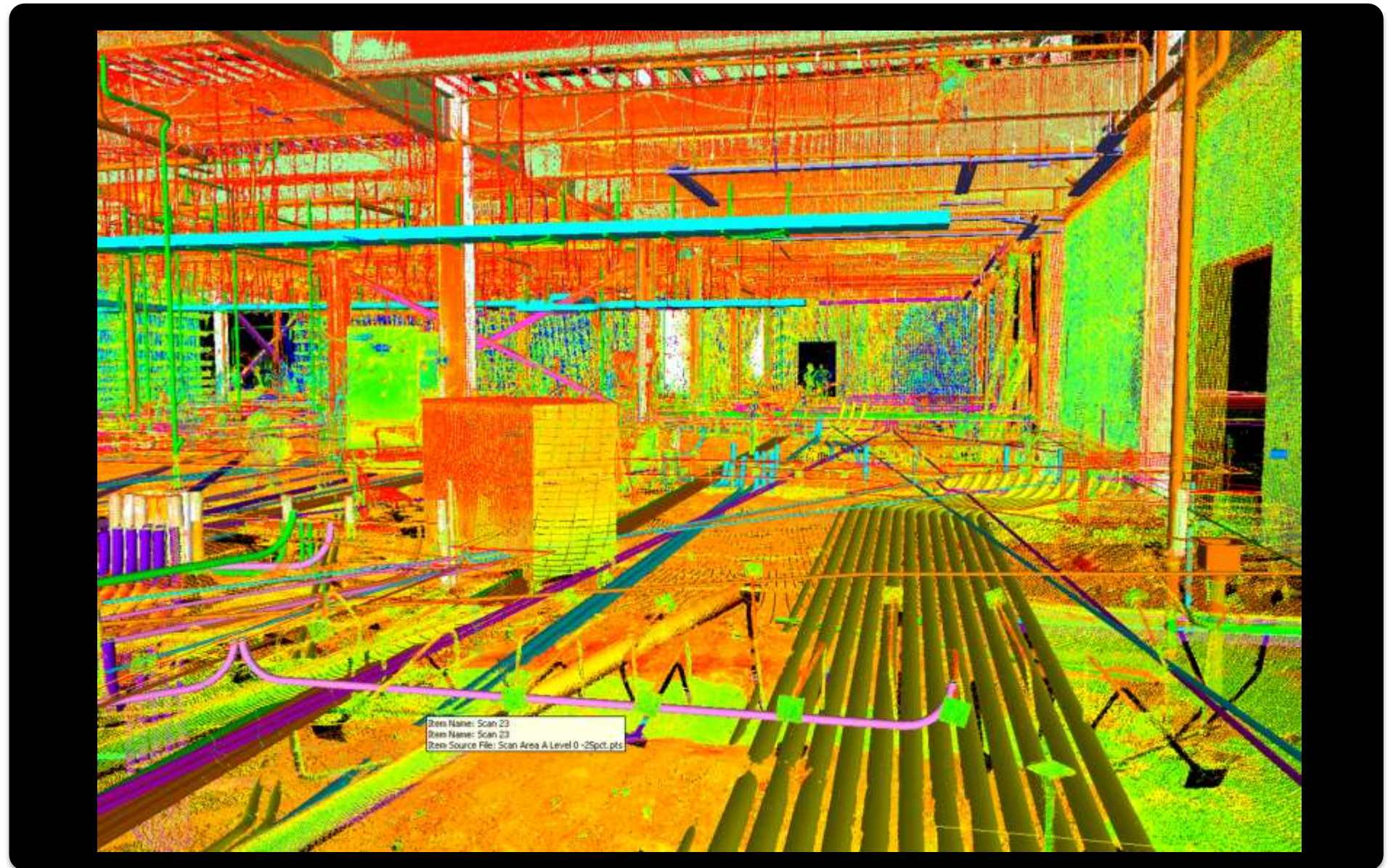
全球施工企业的BIM应用

Contractors BIM Use Globally



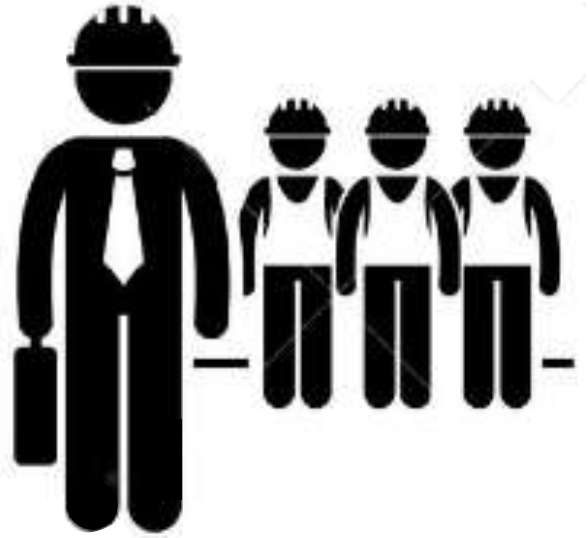
在灌装混凝土前扫描

Scan before
pouring concrete
on metal deck

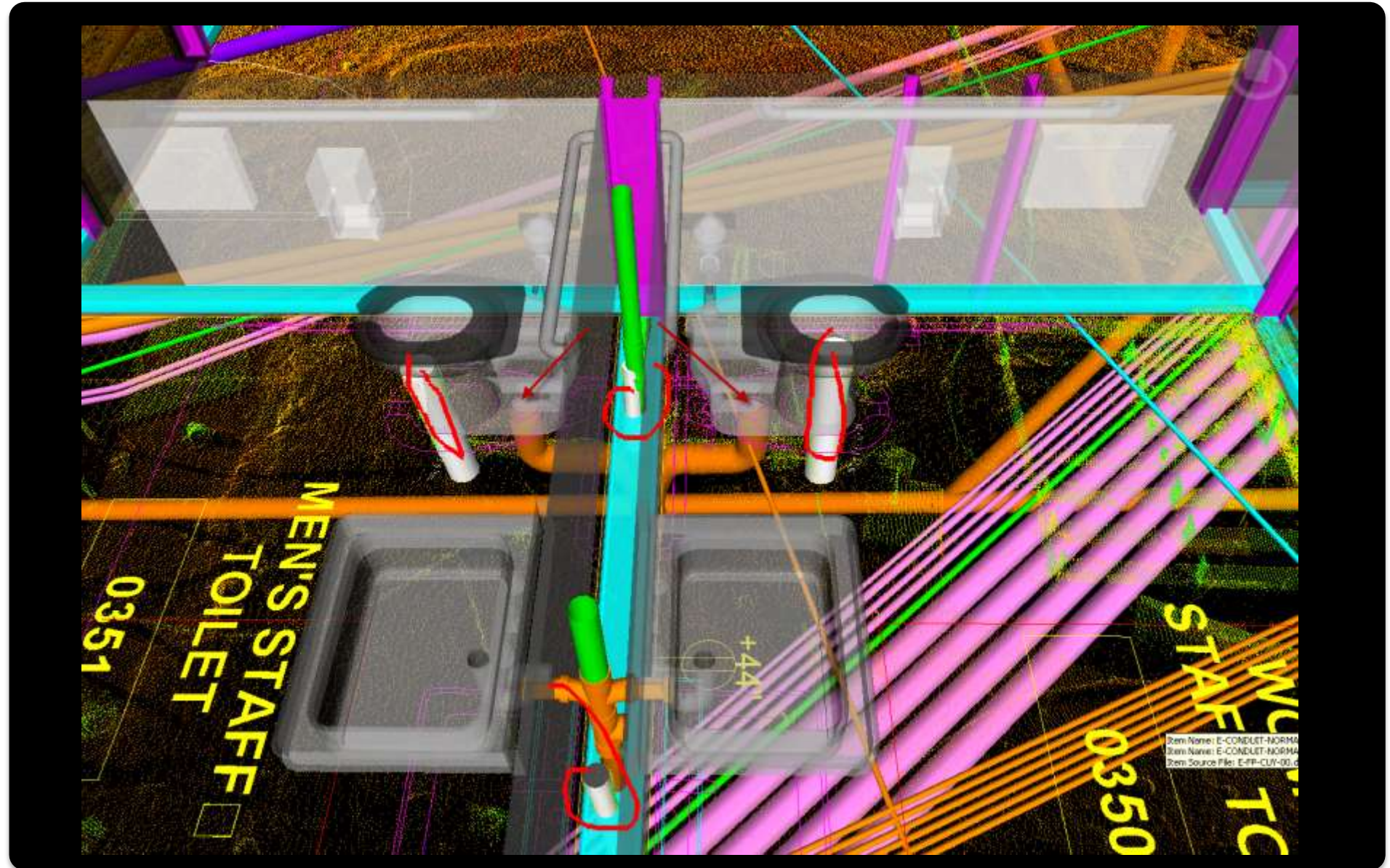


全球施工企业的BIM应用

Contractors BIM Use Globally



与模型对比验证精确性
Compare to model to
validate for accuracy



全球施工企业的BIM应用

Contractors BIM Use Globally



在扫描中整合模型管理变更

Model directly in the scan to manage daily design changes

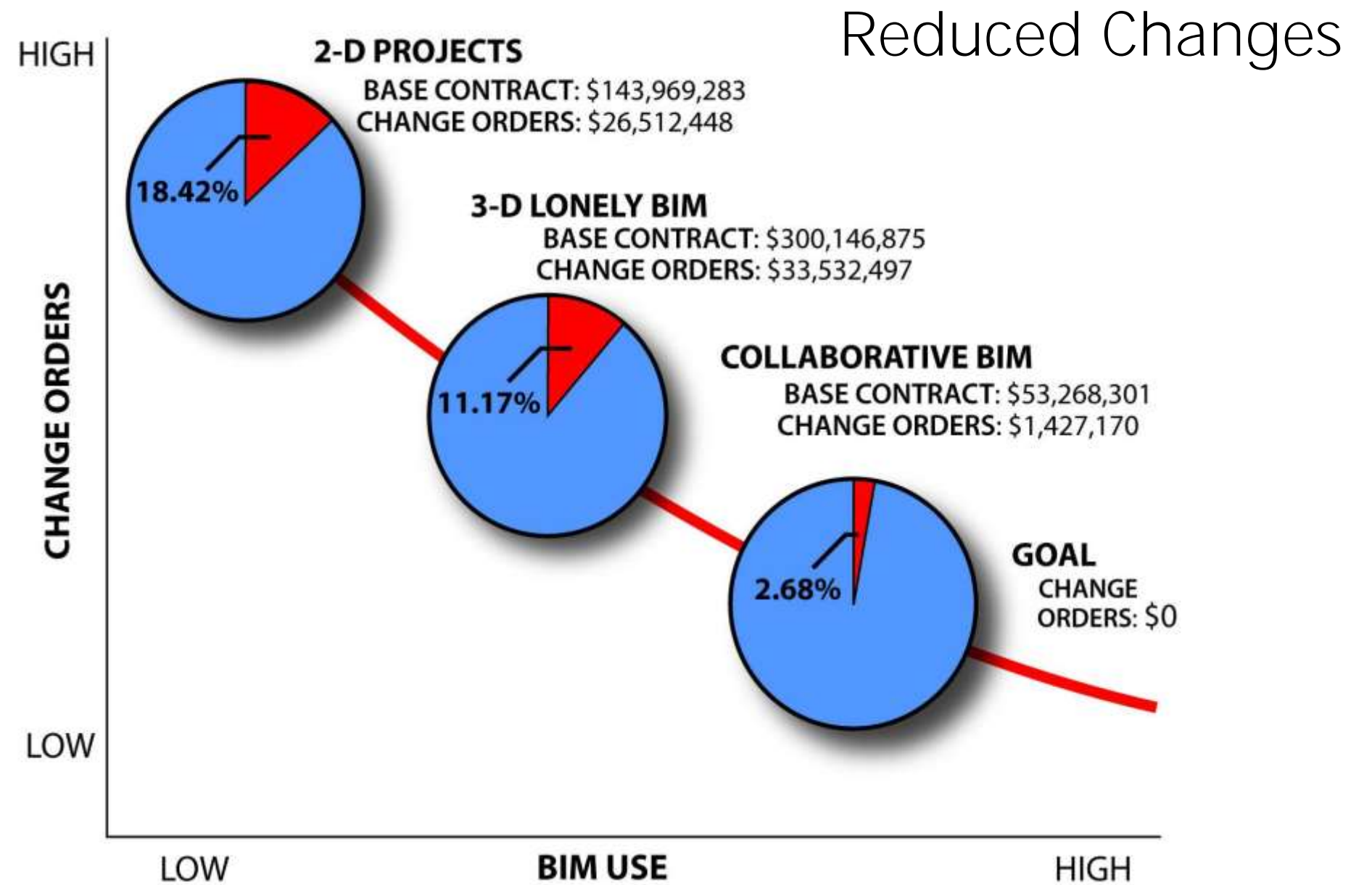


全球施工企业的BIM应用

Contractors BIM Use Globally

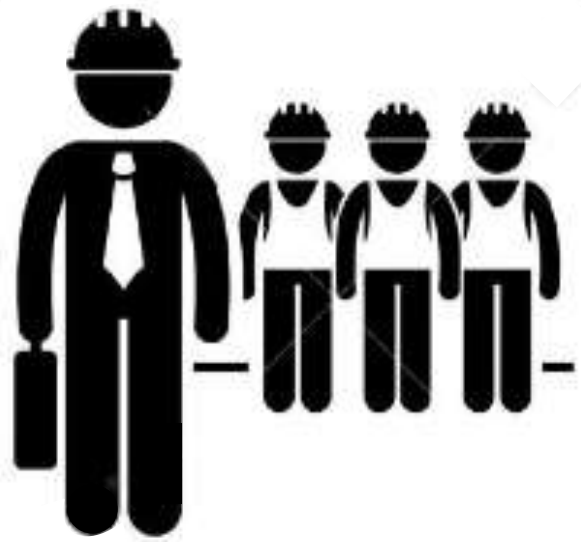


显著提升效率并节省成本
Productivity and cost saving benefits are very strong

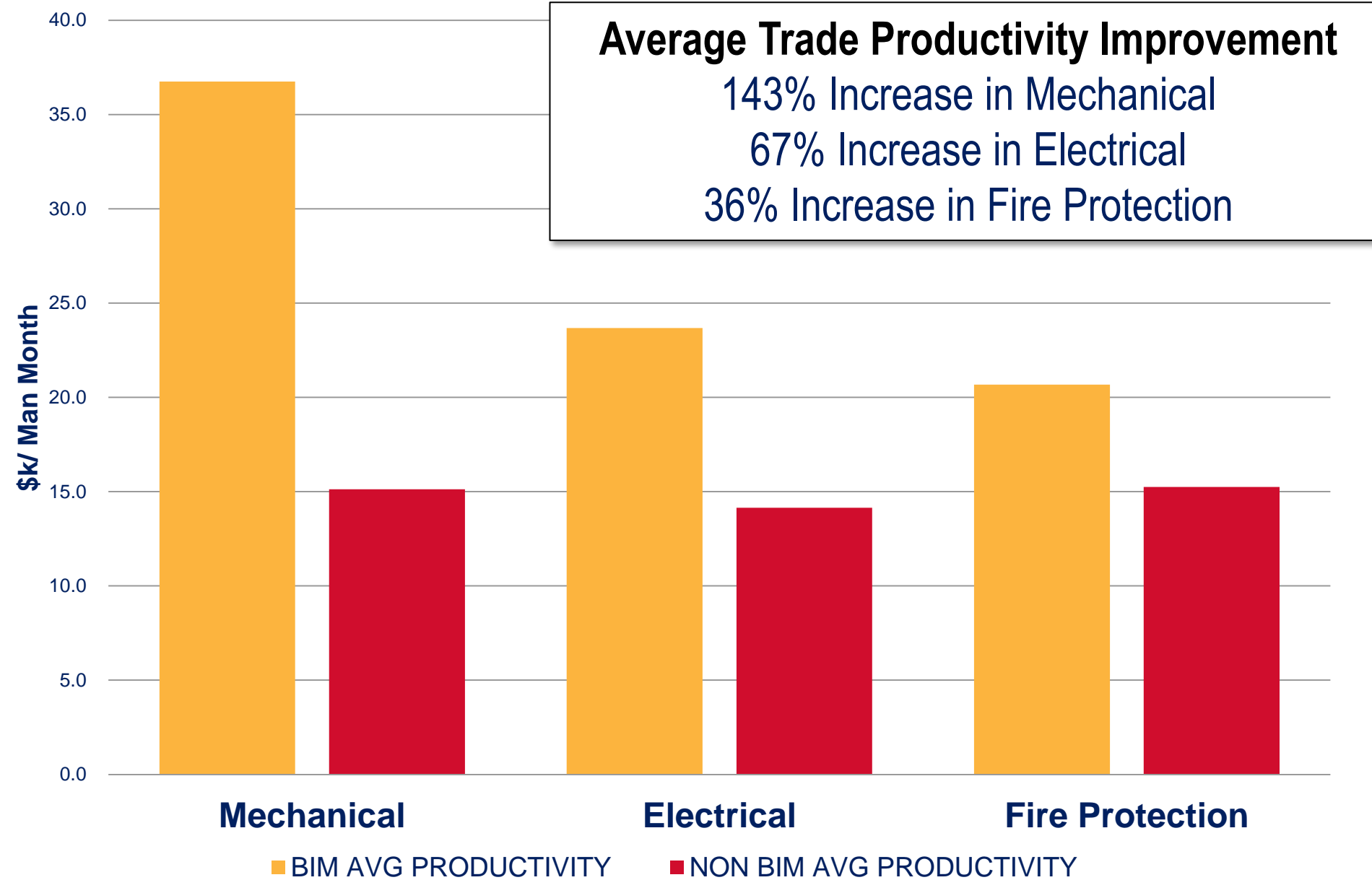


全球施工企业的BIM应用

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Productivity and cost saving benefits are very strong



日程

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Key trends in the advance of BIM and model-based processes throughout the world

中国BIM应用价值研究报告的亮点
Highlights from BIM research in China

中国BIM应用价值研究报告

The Business Value of BIM in China

2015年5月发布

Released May 2015

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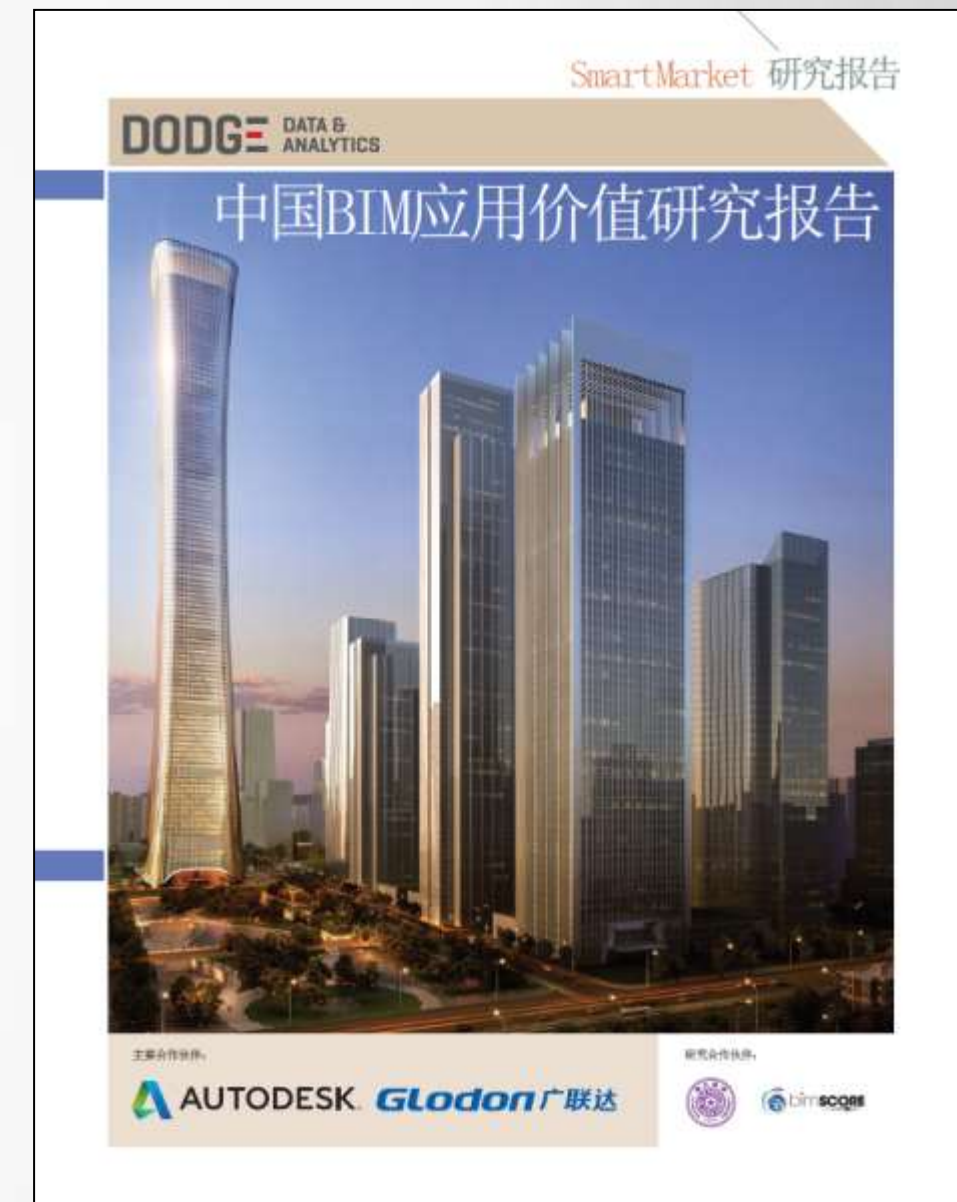
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中国BIM应用价值研究报告

The Business Value of BIM in China

总计350位用户参与调研:

- 144位来自施工企业
- 206位来自设计企业
- 296位BIM使用者及54位非使用者
- 来自大型，中型及小型企业的用户基本相当
- 分布于中国的各个地域
- 至少60%的用户参与建筑项目 (与工业及基础设施项目相比)



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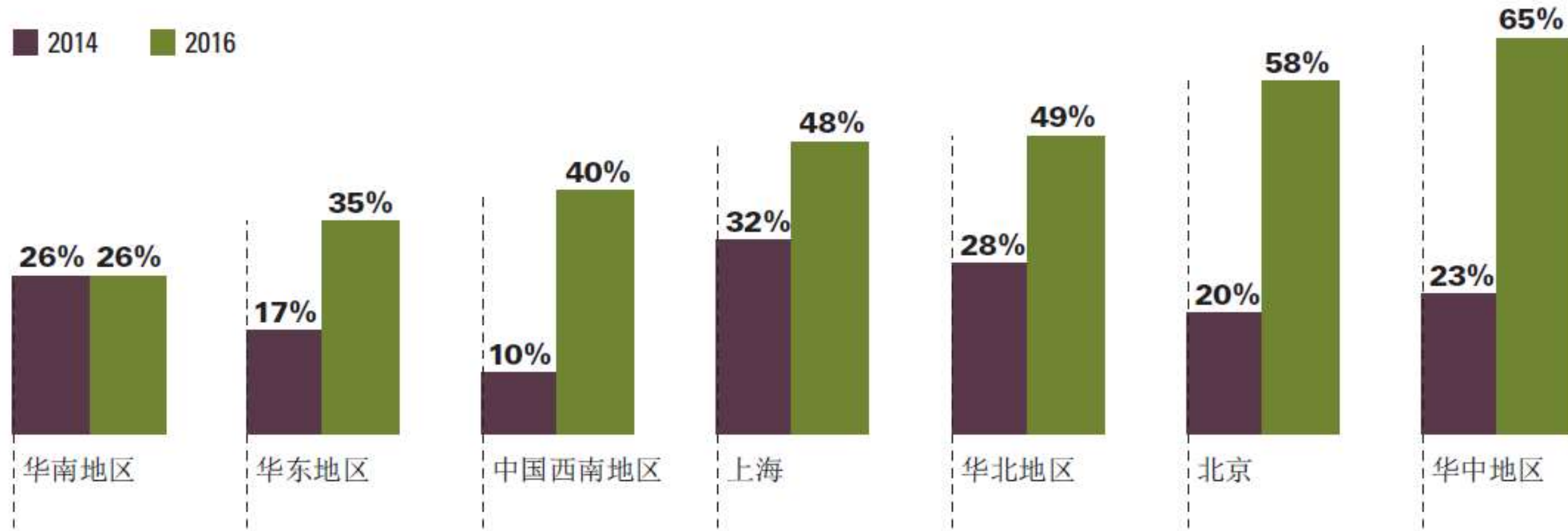
The Business Value of BIM in China

预测: BIM应用率高/极高的企业未来两年内的增长趋势
除华南地区之外，几乎所有的地区都将呈现明显增长

按区域划分的BIM实施情况 (根据目前/将来在超过30%的项目中应用BIM的设计企业和施工企业反馈)

Dodge Data & Analytics, 2015

2014 2016



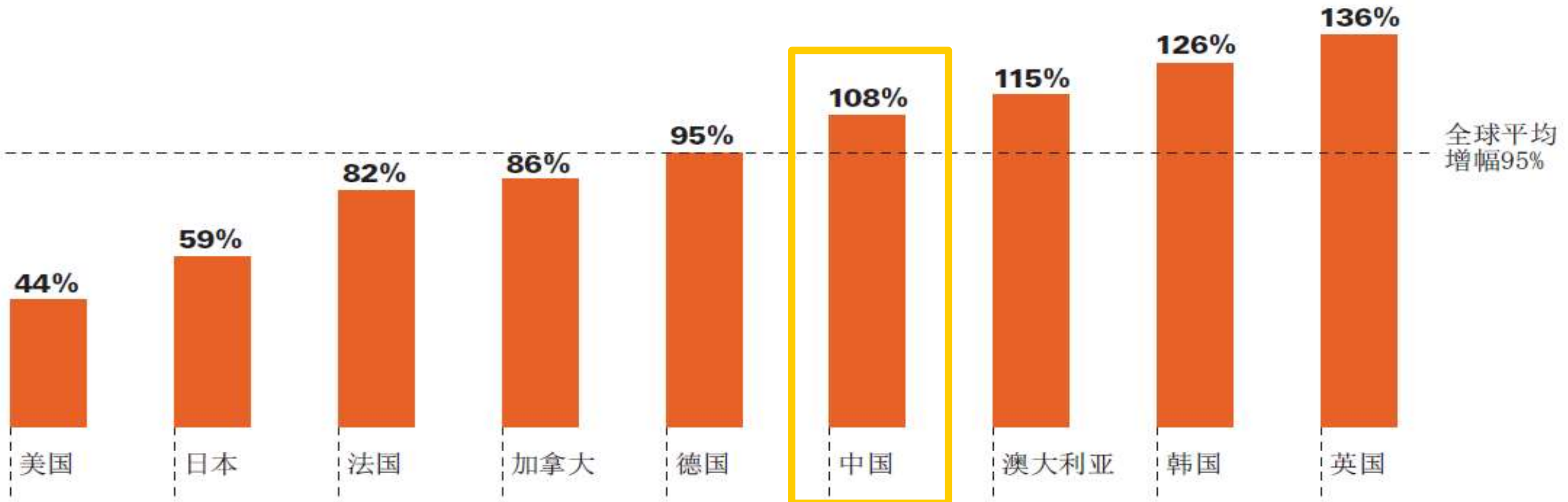
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The Business Value of BIM in China

预测: BIM应用率高/极高的施工企业增长
中国施工企业的增长超过全球的平均水平

未来两年BIM应用率高/极高的施工企业增幅预测
(在至少30%的项目中应用BIM的施工企业)

中国数据: Dodge Data & Analytics, 2015; 其他国家数据: 《SmartMarket研究报告: BIM对全球主要市场施工企业的应用价值》, Dodge Data & Analytics, 2013



中国BIM应用价值研究报告

The Business Value of BIM in China

所有的项目效益都很显著

Very strong results for Project Benefits by all parties

BIM创造的项目效益 (按获得高/极高效益的中国企业占比呈现)

Dodge Data & Analytics, 2015

■ 设计企业
■ 施工企业

优化设计方案



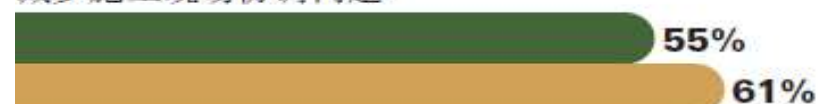
减少施工图中的错漏



提高客户参与度并增进了解



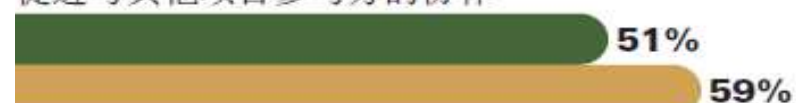
减少施工现场协调问题



减少返工



促进与其他项目参与方的协作



减少设计变更



降低施工成本



增强成本控制/可预测性



提高安全性



缩短整体项目耗时



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仅有一小部分设计企业和施工企业认为投资回报率为负

Only a small percentage of architects and contractors report a negative ROI

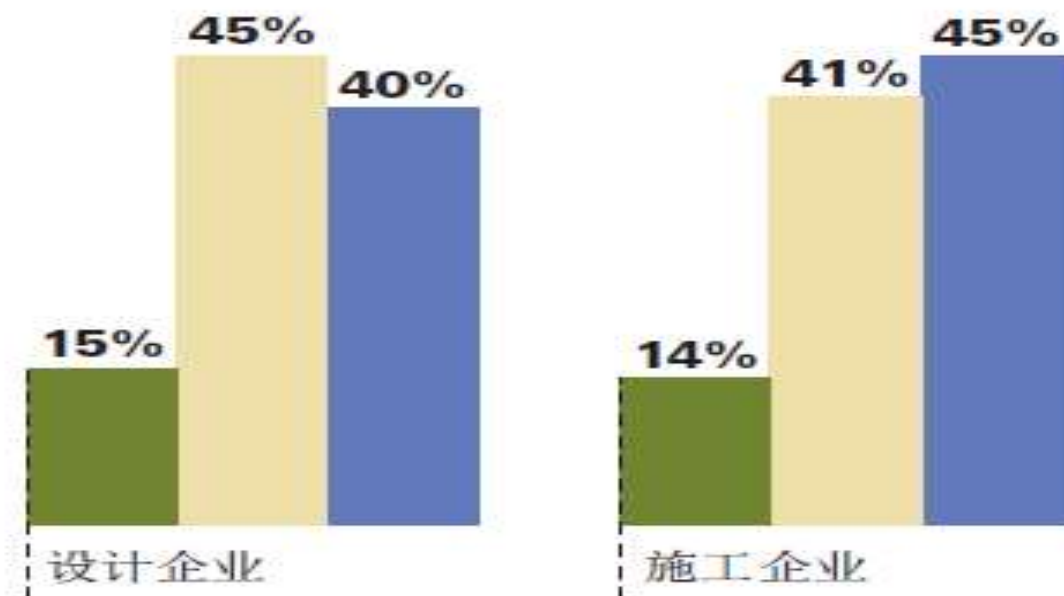
中国BIM用户的投资回报率认识

Dodge Data & Analytics, 2015

亏损

盈亏平衡

盈利



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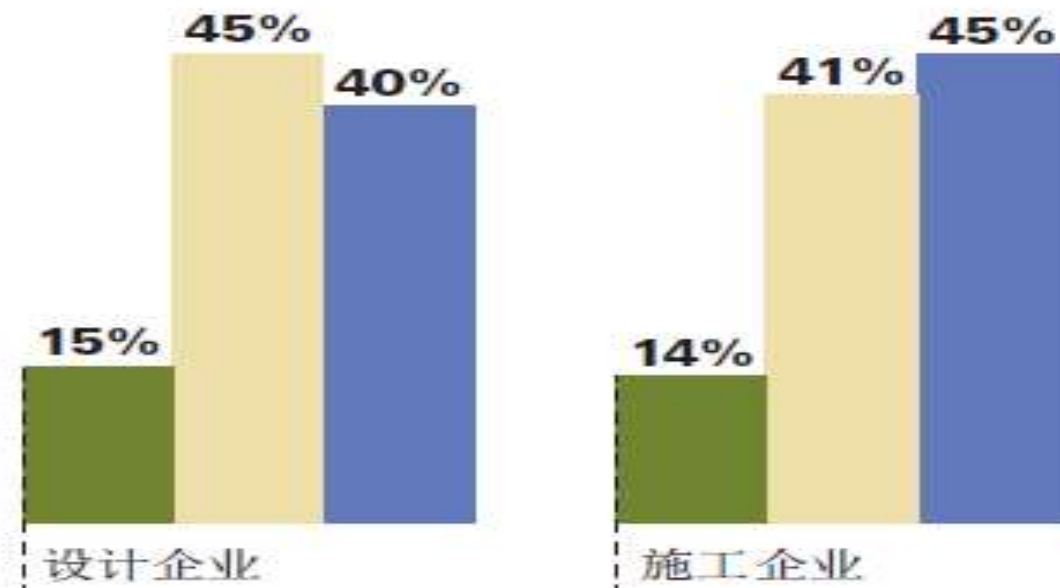
在BIM应用率较高的企业中投资回报率明显较高

ROI is much better for firms with high level of BIM implementation

中国BIM用户的投资回报率认识

Dodge Data & Analytics, 2015

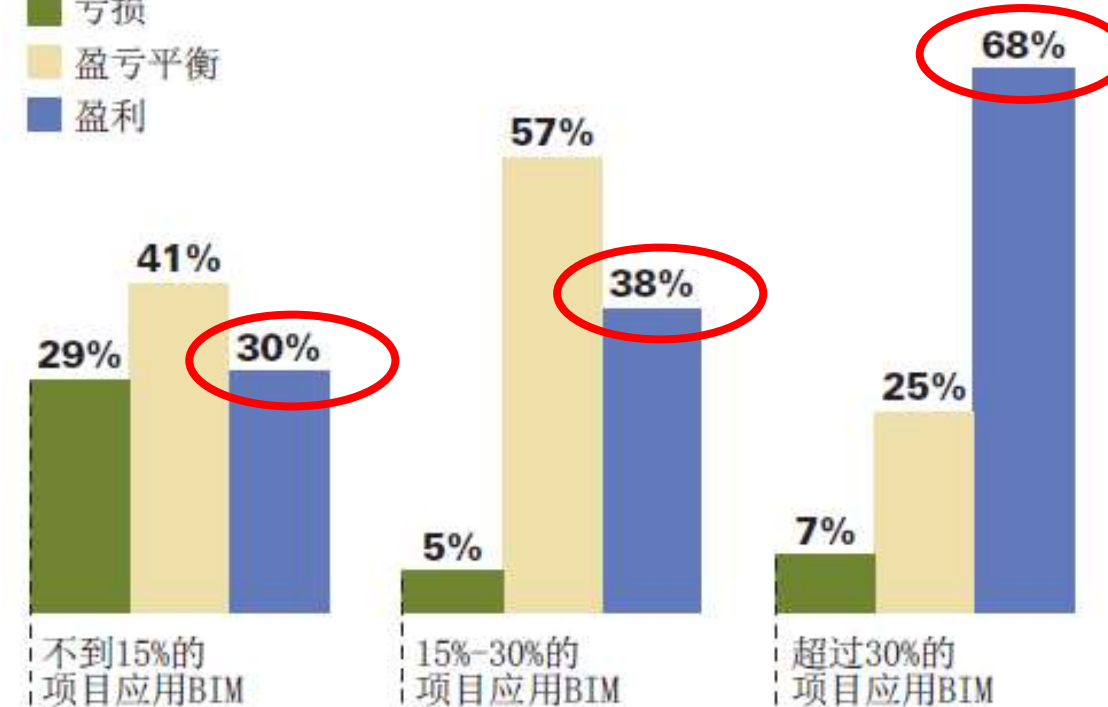
■ 亏损
■ 盈亏平衡
■ 盈利



中国BIM用户的投资回报率认识
(按BIM应用率划分)

Dodge Data & Analytics, 2015

■ 亏损
■ 盈亏平衡
■ 盈利



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如何提升BIM的效益

What do users need to improve their benefits from BIM?

设计企业的5大BIM需求

1. 加强不同的软件之间的数据互联互通
2. 清晰定义BIM项目的交付标准
3. 增强BIM软件的功能
4. 更多拥有BIM技能的员工
5. 更多证明BIM的应用价值的的数据

施工企业的5大BIM需求:

1. 更多拥有BIM技能的员工
2. 更多的具备BIM技能的企业
3. 增强BIM软件的功能
4. 更多的业主对BIM的需求
5. BIM数据与移动设备应用的整合

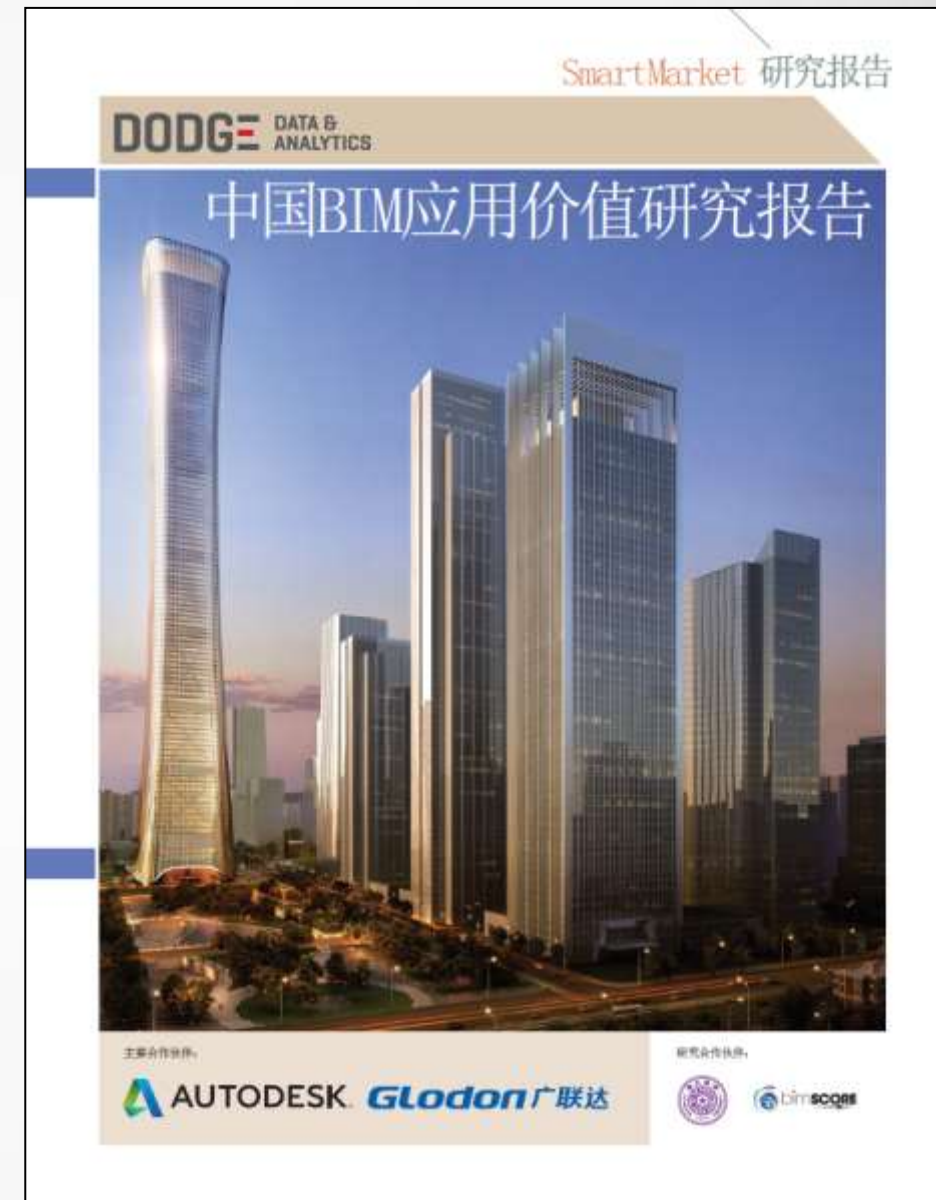
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在全球范围上来看，中国在BIM的应用和普及上取得了明显的进展。

报告中的更多内容：

- 数据
- 案例
- 专家访谈
- 分析报告



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