
Keynote Speaker:
Prof. HUANG Qiang
Chairman, China BIM Union
Vice-President, China Academy of Building Research
Featured speakers:
Anthony Butler
Michael Green
Simon Vaux
With case studies by:
Melanie Binks
Liz Partridge
Alex Leese


BIM&…?

P-BIM & HIM


And a panel discussion with:
Luiz Aguiar
James Cameron
Andrew Curthoys
Sumit Oberoi
Teresa Scott
Antony Sprigg
Matthew Trigg
NATSPEC Construction Information


Huang Qiang
China BIM Unio
NATSPEC presents
STRATEGIC OUTCOMES
with BIM
3 August 2017

buildingSMARTalliance®
a council of the National Institute of Building Sciences

January 12, 2016

We've already done it

Executing the Plan

NBIMS–Challenges

- NBIMS has had lots of free downloads, but its value is difficult to establish
- NBIMS is primarily a compilation of standards that exist elsewhere
- No hierarchy or framework for the NBIMS stds (OmniClass == COBie)

...and perhaps, as a result,

- NBIMS hasn't been implemented by software vendors to date

NBIMS–A Vision (~5 years)

- NBIMS is a group of *well-defined exchange modules* implementable in BIM software
- Some SW vendors will have implemented NBIMS (partially or completely)
- There is a cloud-based test for NBIMS exchange quality (usable by anyone)*

...and perhaps, as a result,

- Open-standards interoperability quality and usability is greatly increased

*and perhaps serving as a revenue stream for bSa

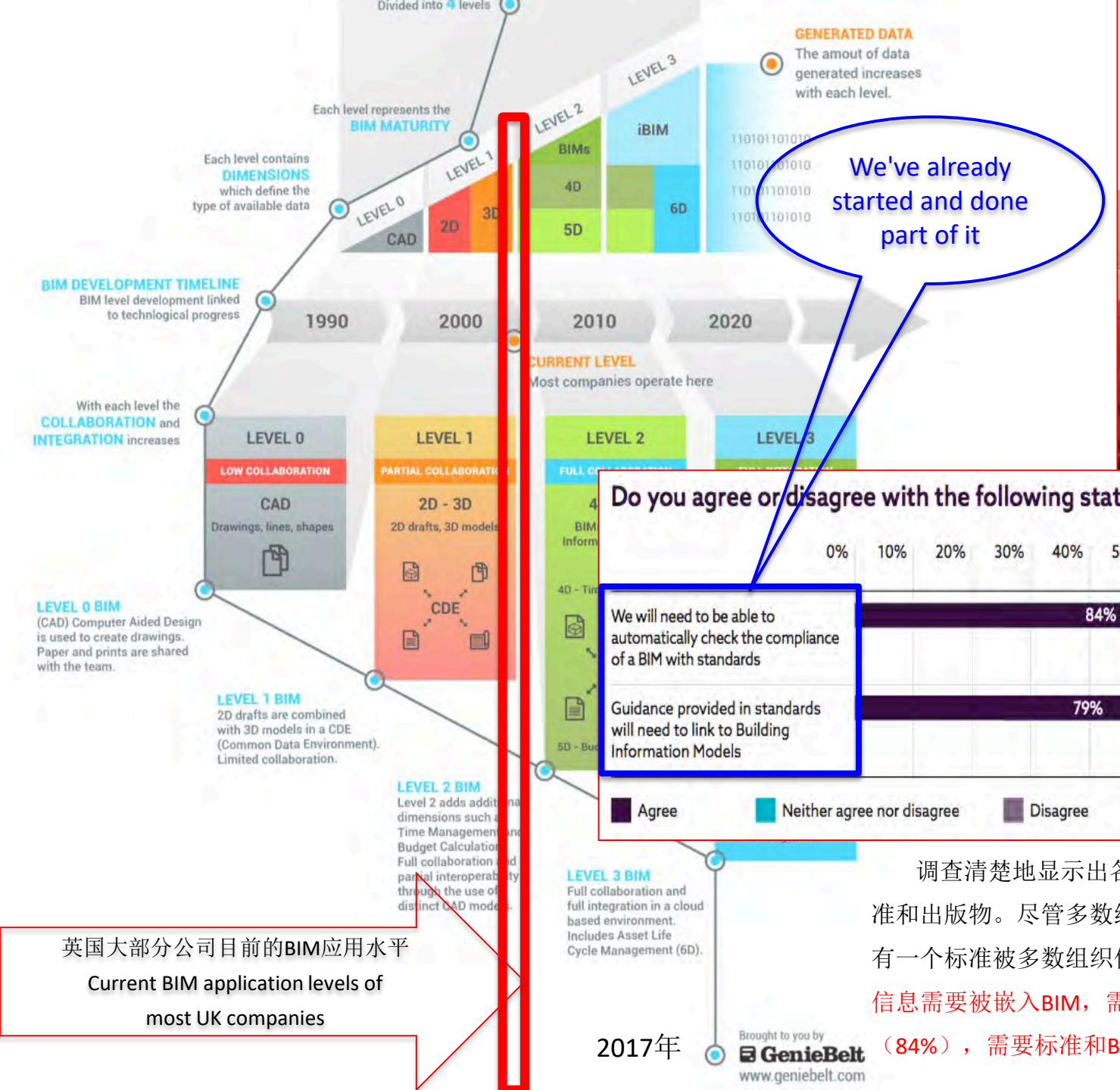
Proven Practices

2016 Goal:

Create a venue for Proven Practices to be shared, developed, and supported

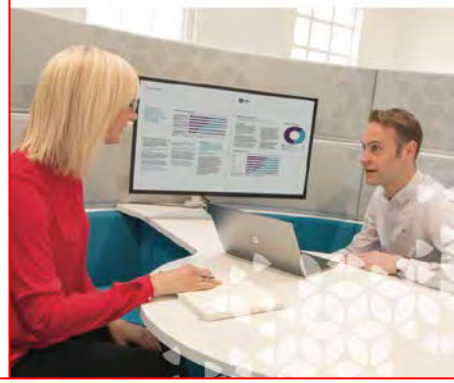
Keys to Success:

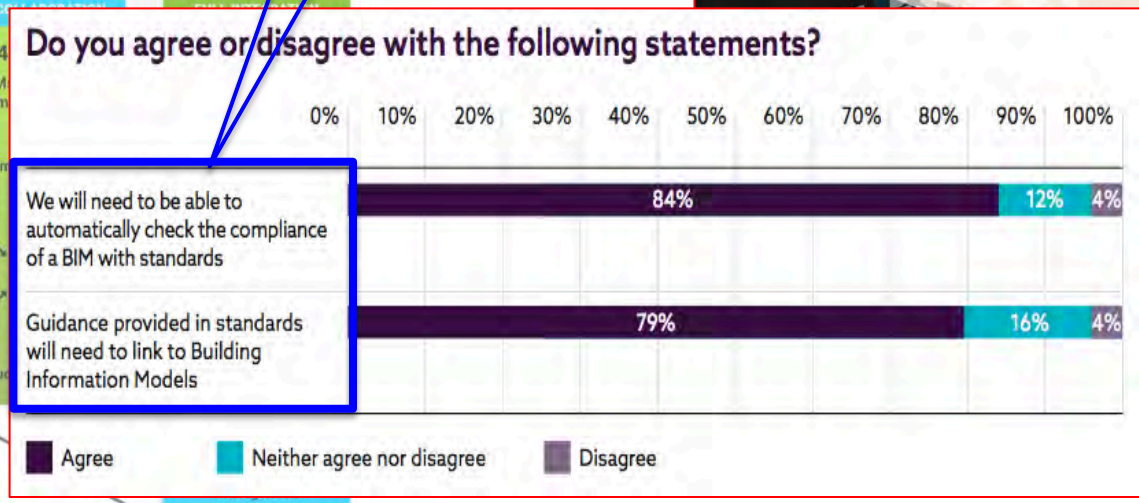
- Clear definition of Proven Practice
- A shared environment for practices
- Support from software vendors



NBS

National BIM Report 2017





英国大部分公司目前的BIM应用水平

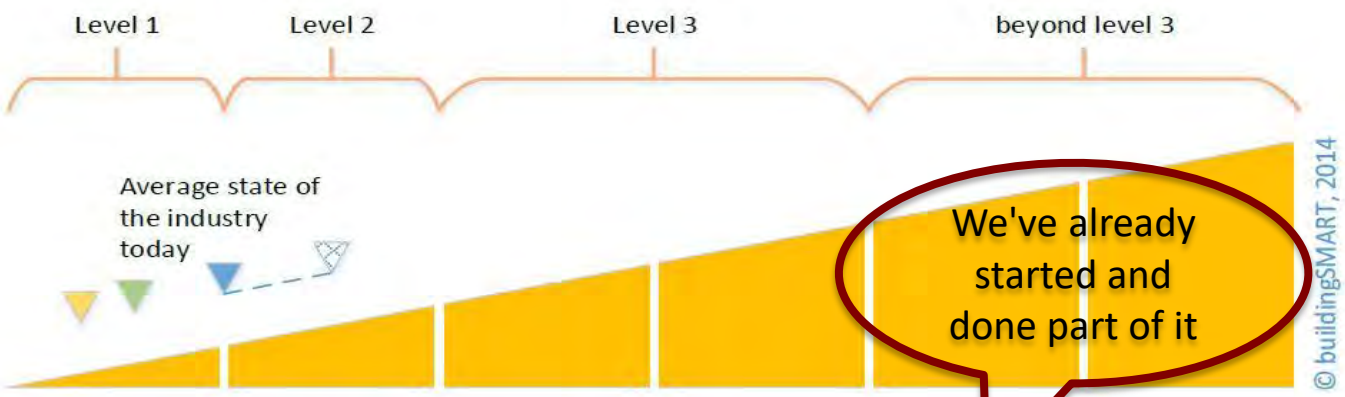
Current BIM application levels of most UK companies

2017年

调查清楚地显示出各组织在BIM过程中使用的标准和出版物。尽管多数组织已经采用了BIM，但是没有一个标准被多数组织使用。展望未来，关于标准的信息需要被嵌入BIM，需要能够进行自动规则检验（84%），需要标准和BIM之间的链接（79%）。

Technical roadmap for process support

- Building
- Infrastructure
- Portfolio Mgmt



Main theme	documents	bulk BIM	purpose BIM and data drops	workflow BIM	cloud BIM	...
Working means	2D / 3D drawings	3D BIM Discipline specific files			BIM data proliferated over the web	
Standards, formats	dxf, dwg, pdf	ifc (CV, COBie)	ifc's mvdXML	ifc's BCF		
Way of communication	document based worki	bulk model exchange	purpose driven model exchange	work flow driven mode updating		
Technology means		file server, reference hole models	BIM hubs, reference partial models	web services reference objects		
To-do list		start IFC for nfra, define oD's (IDM 5+)	purpose MVD's (25+), deliver first IFC Infra	modularize IF web linking exchange re		
Future developments			enhance on operational	prepare for portfolio mgr		

Average state of the industry today

The government's BIM goals

bSI 20年的努力结果
bSI 20 years' contributions

中国P-BIM研究起点
Starting point of P-BIM research in China

P-BIM

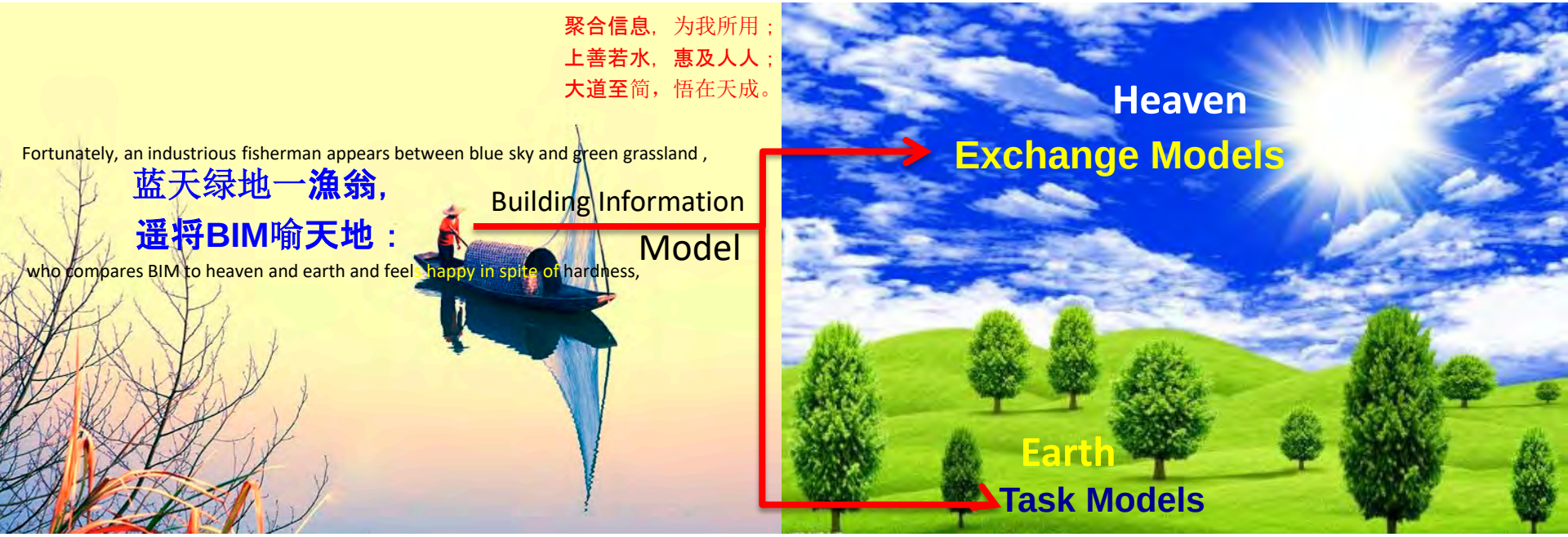
HIM

《道德经》中说：“万物之始，大道至简，衍化至繁。”极简主义也是这样，与传统经典不谋而合，以简单到极致为追求，感官上简约整洁，品味和思想上更为优雅。虽简约，却不简单。

20世纪中期，从著名现代建筑大师密斯·凡·德·罗的那句“less is more（少即是多）”开始，化繁为简的美学设计理念，几乎影响了我们生活的一切。从建筑到时尚，从设计到摄影，再到包裹着我们生活的家居产品，“极简即美”的背后，早已经不是一句口号那么简单。对于BIM，我们也需要将“极简即美”应用其中。

As the old saying goes, in the beginning of the universe, the greatest truths are the simplest and grow to be complicated. Minimalism is similar to this old saying with simple principle but resourceful.

In the middle of twenty century, Ludwig Mies Van der Rohe, great master of modern architecture, raise the idea “less is more” that exert profound influence on our life, from architecture to fashion, from design to photographing, almost all the product around us. “Minimlism Is Beautiful” is not just a slogan, **BIM also need this advanced idea.**

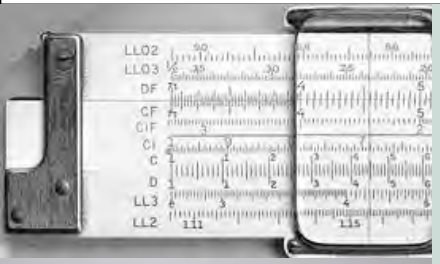


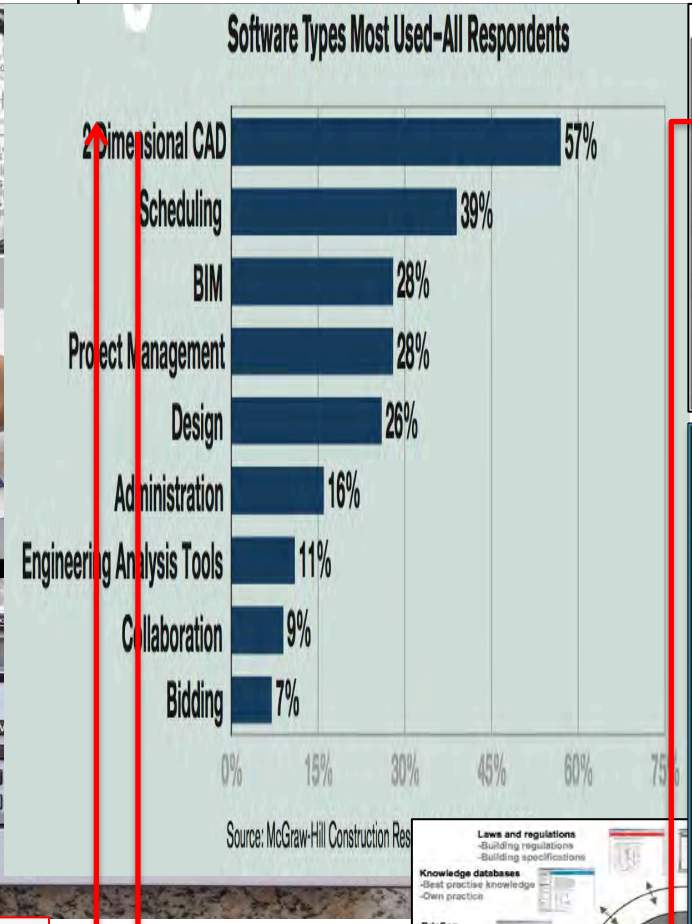
恰到好处的净，妙到分毫的境，极简近乎禅，可感受，不可语。

Appropriately Clean, Better detail, Close to Buddhist with minimalism, can be felt but hard to explain.

信息化从三个不同技术提高我们的工作效率与质量，BIM的本质是信息系统集成技术：

硬件技术	软件技术	信息系统集成技术
计算机技术（含传感器）	含BIM软件	BIM（软硬件数据接口技术）





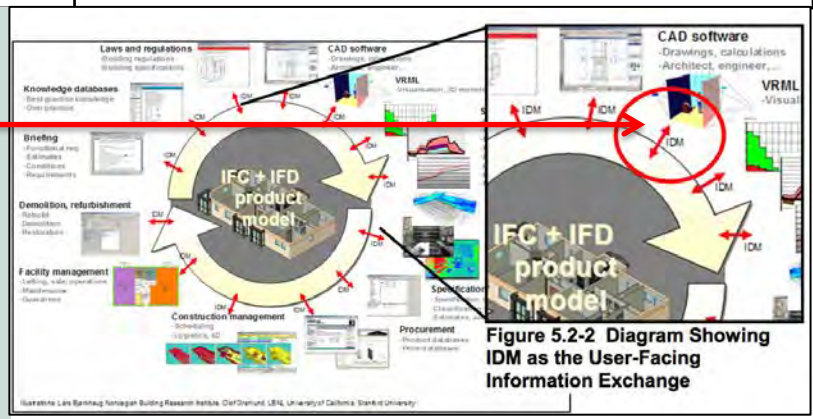
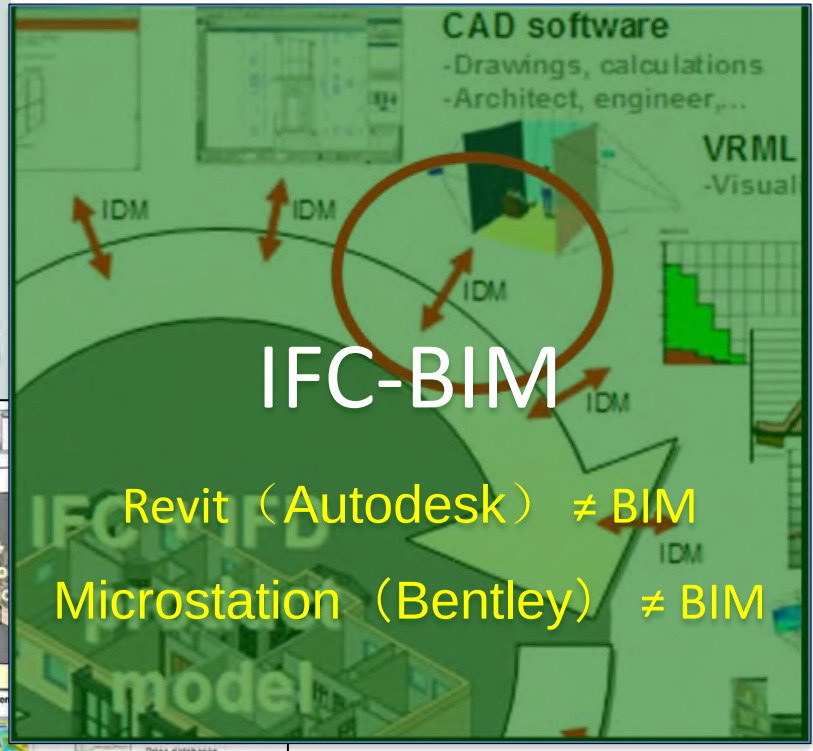


Figure 5.2-2 Diagram Showing IDM as the User-Facing Information Exchange



软件及数据库技术

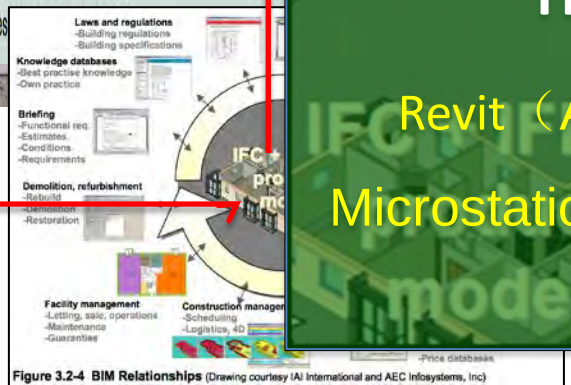
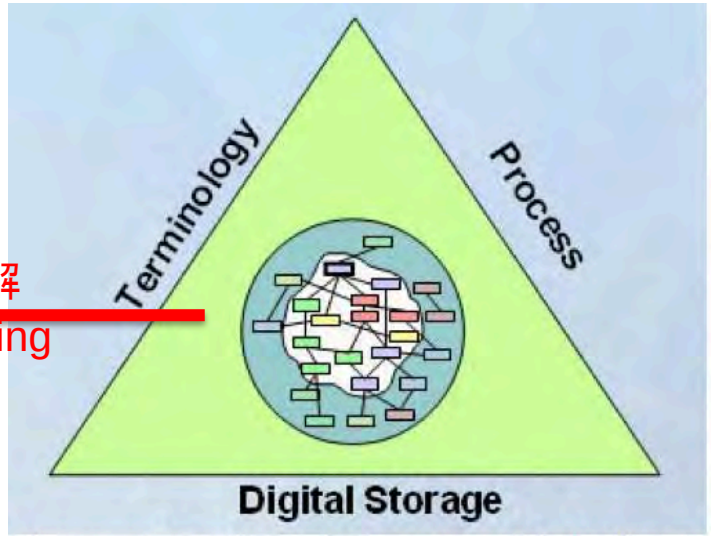


Figure 3.2-4 BIM Relationships (Drawing courtesy IAI International and AEC Infosystems, Inc)

P-BIM的理解

Understanding



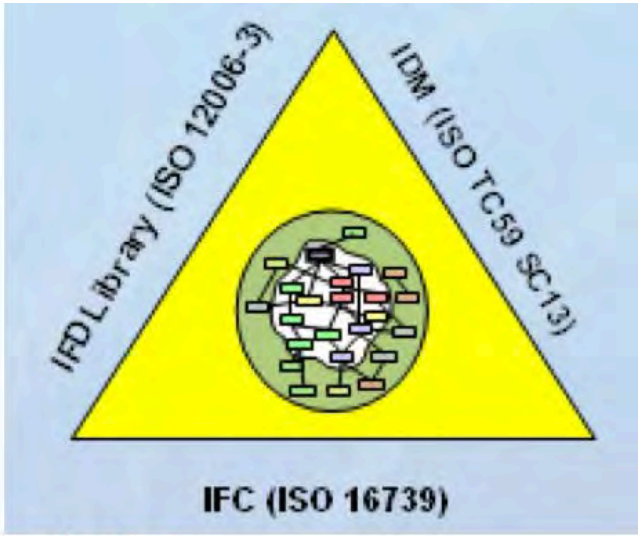
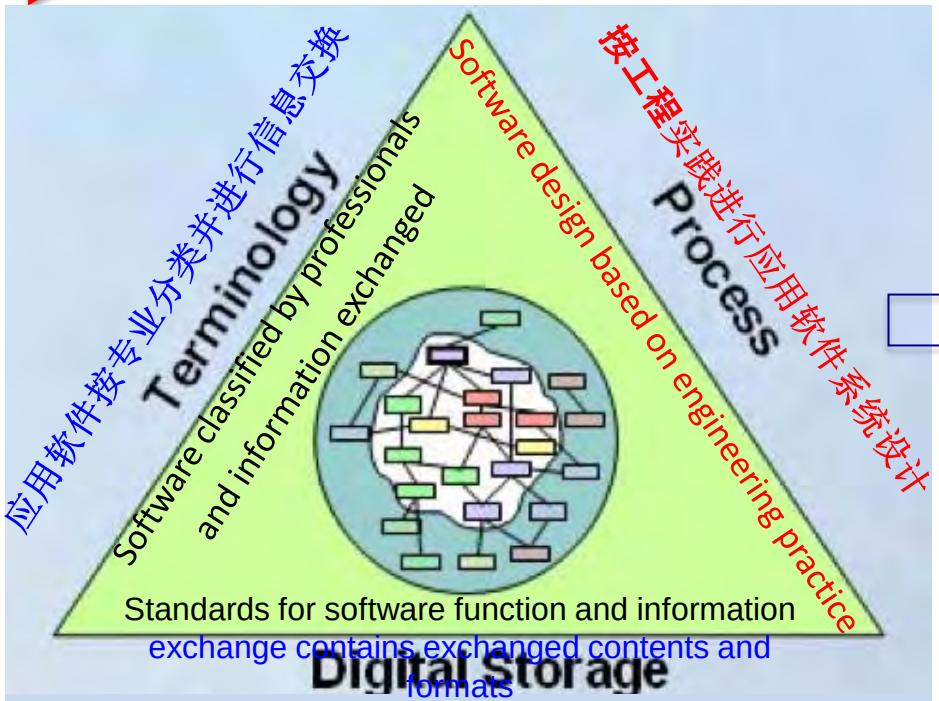
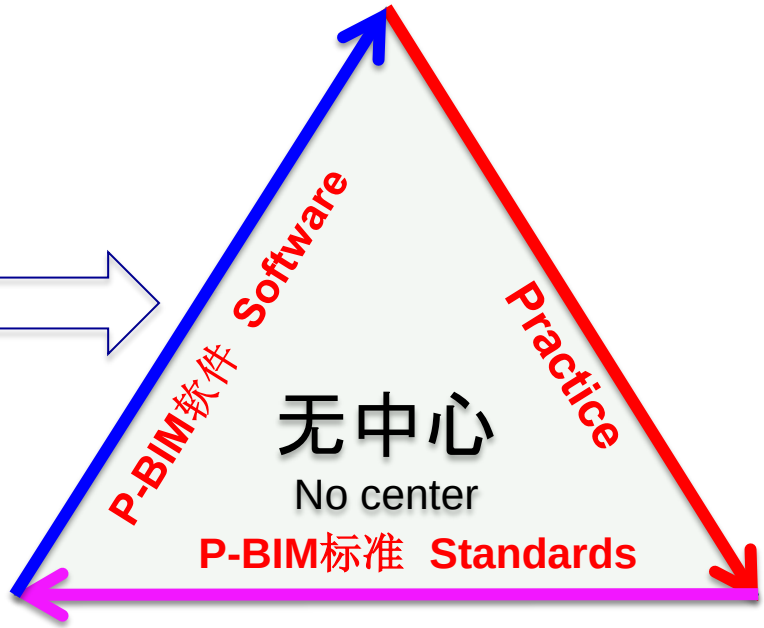


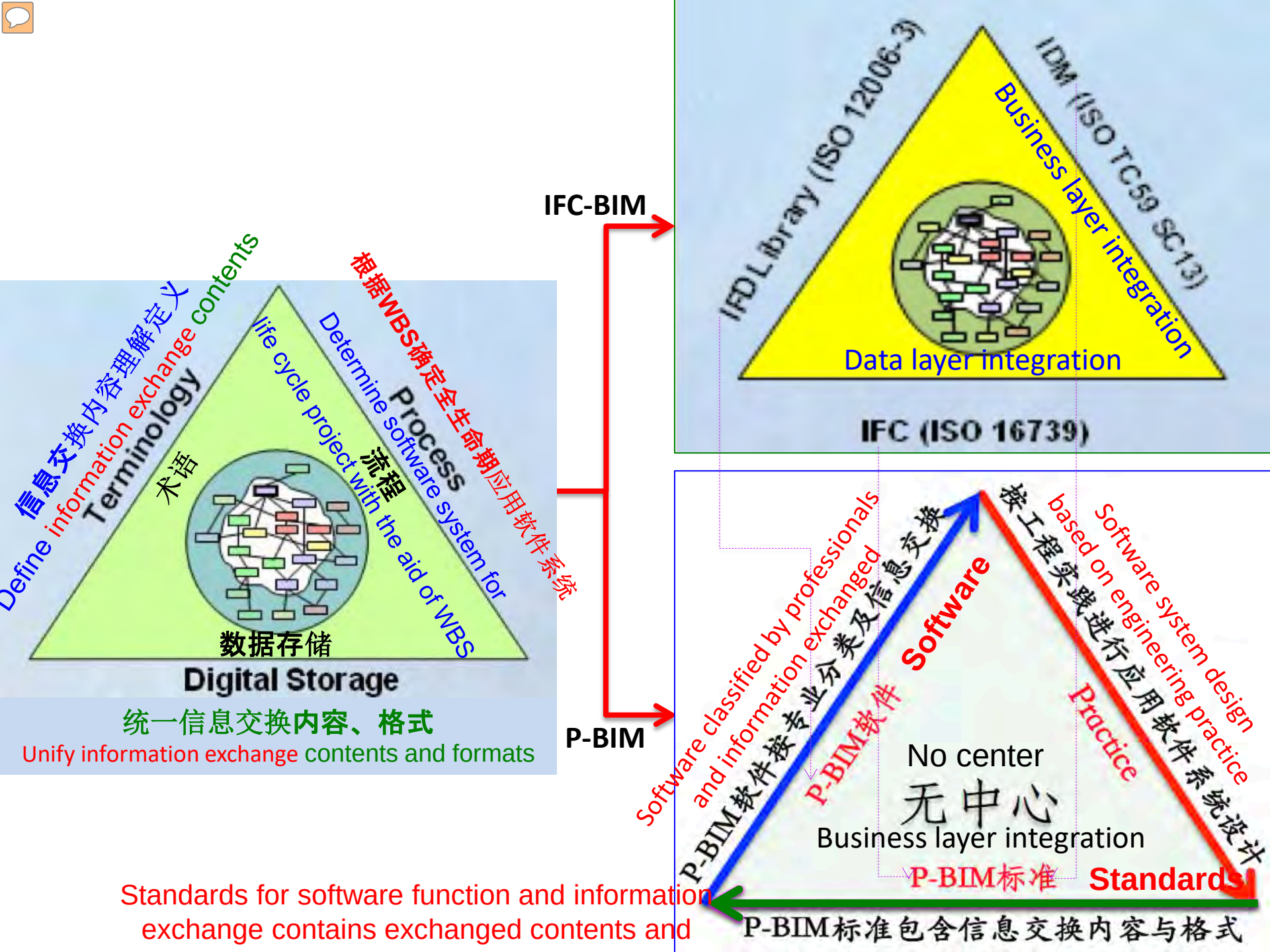
Figure App C-1: Interoperability through Standards
(Courtesy Janne Aas-Jakobsen, Jotne EPM Technology AS)





P-BIM： practice-based BIM model

Unified standard for building information modeling


IFC-BIM
IFD Library (ISO 12006-3)
IDM (ISO TC59 SC13)
Business layer integration
Data layer integration
IFC (ISO 16739)
信息交换内容理解定义
Define information exchange contents
Terminology
术语
life cycle project with the aid of WBS
Determine software system for
Process
流程
根据WBS确定全生命期应用软件系统
数据存储
Digital Storage
统一信息交换内容、格式
Unify information exchange contents and formats
P-BIM
Software classified by professionals and information exchanged
P-BIM软件按专业分类及信息交换
Software
P-BIM软件
Software system design based on engineering practice
按工程实践进行应用软件系统设计
Practice
No center
无中心
Business layer integration
P-BIM标准
Standards
P-BIM标准包含信息交换内容与格式
Standards for software function and information exchange contains exchanged contents and

BIM system from view of platform & software

HUANG Qiang （July 2017）

3

1

4

Software & data exchange implementation technology

BIM standard (guideline) implanted into software

P-BIM software

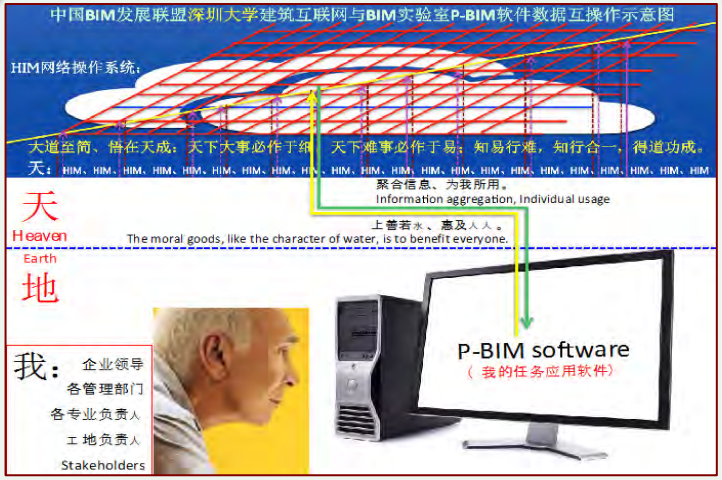
Software implementation technology

Software inserted into engineering practice

Practice

Software & Internet^{+} technology

P-BIM software interfaced with HIM network



P-BIM standard

3

1

2

2

Practice integrated into BIM standard system

Software & data exchange technology

Big issues must be done in detail, difficult affairs done from easy beginning, and right direction known for the long journey

实现电子数据交换、管理和访问做到流畅且无缝对接。
信息只需输入电子系统一次，参与各方瞬间就能按需提取。
The implementation of electronic data exchange, management and access to achieve are smooth and seamless. Information is only required to enter the electronic system once, and the participants can instantly extract on demand

P-BIM

围绕建立我国自主BIM平台、开发自主知识产权P-BIM软件、使用国外BIM软件确保信息安全。维护我国建筑业数据主权，解决我国目前建筑业大数据开源创新不足等问题，为建筑业“双创”提供顶层设计。

P-BIM on the establishment of China's own BIM platform, the development of independent intellectual property rights of the P-BIM software, the use of foreign BIM software to ensure information security. It maintain China's construction industry data sovereignty ; solve the problem of China's big data source of lack of innovation in the construction industry ; the construction industry "double" top layer design.

4、BIM软件网络操作系统

Practice（HIM）方法

4. BIM software network operating system Practice (HIM) method

1、BIM整体应用的

Practice分析方法

1. Practice analysis method for BIM whole application

3、BIM点应用的

Practice分析方法

3. the Practice analysis method of BIM point application

2、BIM全生命期应用软件系统

Practice（WBS）方法

2. the BIM life cycle application software Practice (WBS) approach

P-BIM：基于工程实践的建筑信息模型应用方式 Practice-based BIM Model

BIM整体应用Practice分析方法：

Practice	Project	Professional	PDM	Play-well	Public

P-BIM






建筑
Architecture

结构工程
Structure

桩基
Pile Foundation

地基处理
Foundation Treatment

地连墙
Even Wall

策划模型
Planning Model

规划模型
Programing Model

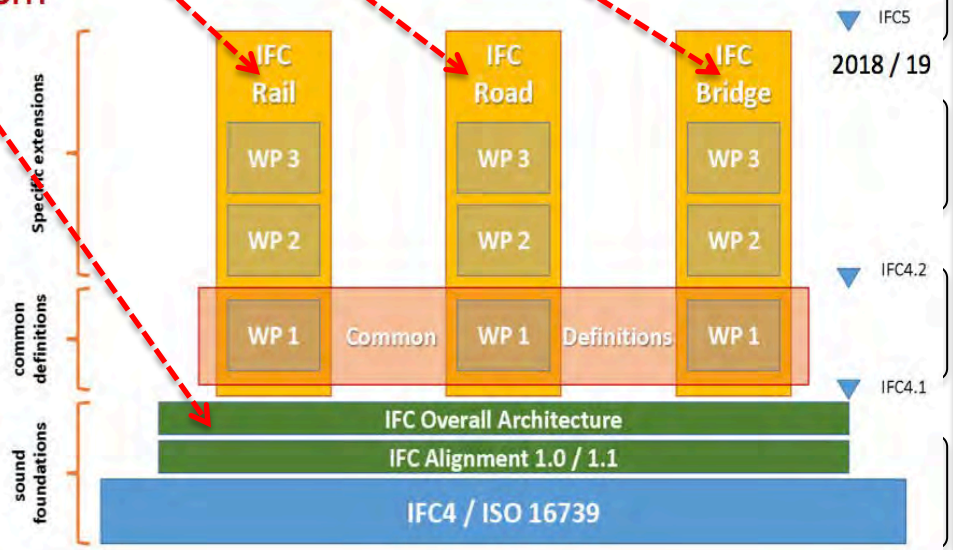
政府管理人员
Public Servant

业主管理人员
Owner management personnel

规划师
Planner

buildingSMART
Infrastructure Room

2017 Work Plan



Proprietary：专门的可互操作公开信息交换标准（P-BIM标准）

P-BIM standard is specialized for exchanging interoperable public information

BuildingSMART MVDs

Name
Basic HandOver to Facility Management

Other International Organizations MVDs

Name
Architectural Design to Building Energy Analysis
Architectural Design to Circulation/Security Analysis
Architectural Design to Quantity Takeoff for Cost Estimating
Architectural Design to Spatial Program Validation
Concept Design BIM 2010
Design to Code Compliance Checking (ICC 2006)
Early Concept Design to Analysis
Nordic Energy Analysis (subset of CDB-2010)

Other Active MVD Projects

Name
Architectural design to landscape design
Architectural design to structural design
Architectural design to thermal simulation
Architectural Programming to Architectural Design
Curtain Wall Design to Energy Analysis
Extended coordination view

Architectural design P-BIM software function-and-information exchange standard

建筑设计P-BIM软件功能及信息交换标准

BuildingSMART MVDs

Name
Extensibility
Indoor climate simulation to HVAC design
Landscape design to road design
Masonry Structural Design to Structural Analysis
Modular Bldgs-Arch.Design to Struc.Design
Precast Concrete Exchanges
Road design to landscape design
Space Requirements and Targets to Thermal Simulation
Structural design to structural analysis
Structural Design to Structural Detailing (ATC-75)
Wood Structural Design to Structural Analysis

Inactive MVD Projects

Name
Architectural design to quantity take-off - level 1
Architectural design to quantity take-off - level 2
Architectural design to quantity take-off - level 3

Statistics (June 12, 2017, 3:51 pm)

29 Model Views 92 Main Concepts 1578 Static Concepts with 2099 Bindings 74 Organizations represented by 135 Persons

Hierarchical Information Relationships

Huang’

Interoperability Matrix

Hybridization Data Formats Exchange

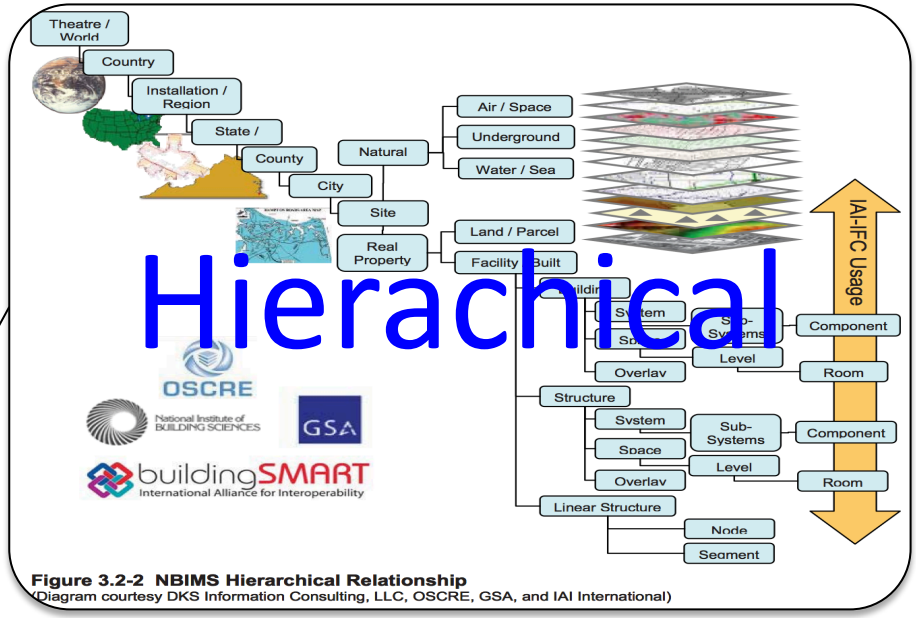
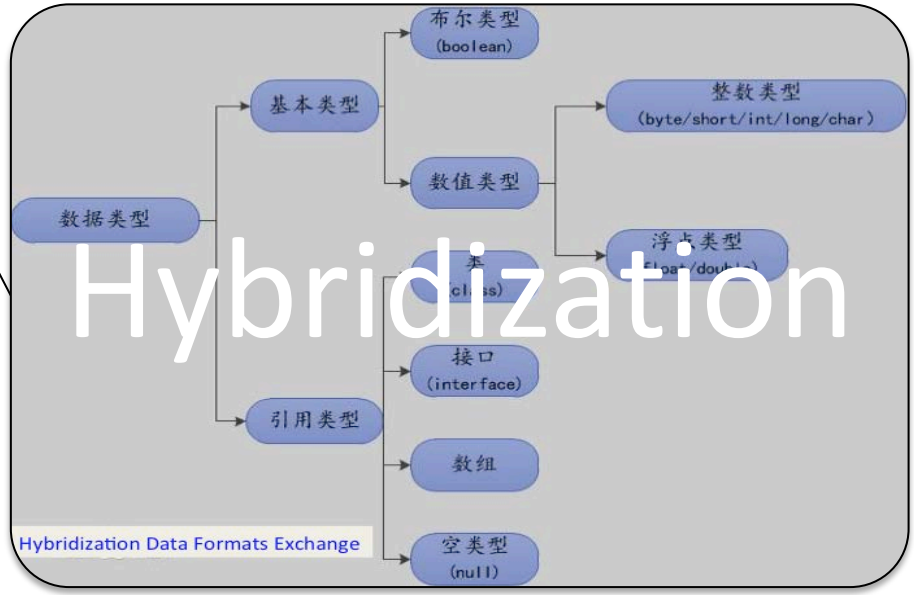


Figure 3.2-2 NBIMS Hierarchical Relationship
(Diagram courtesy DKS Information Consulting, LLC, OSCRE, GSA, and IAI International)



HIM

单个平台（软件）应用
Single software application

规划平台A
Planning platform

设计平台B
Design platform

合约平台C
Contract platform

实施（竣工平台D
As-built platform

ERP
平台E

OA
平台O

业主项目管理平台M
Owner's PM platform

单个平台（软件）应用
Single software application

规划平台A
Planning platform

设计平台B
Design platform

合约平台C
Contract platform

实施（竣工平台D
As-built platform

ERP
平台E

OA
平台O

业主项目管理平台M

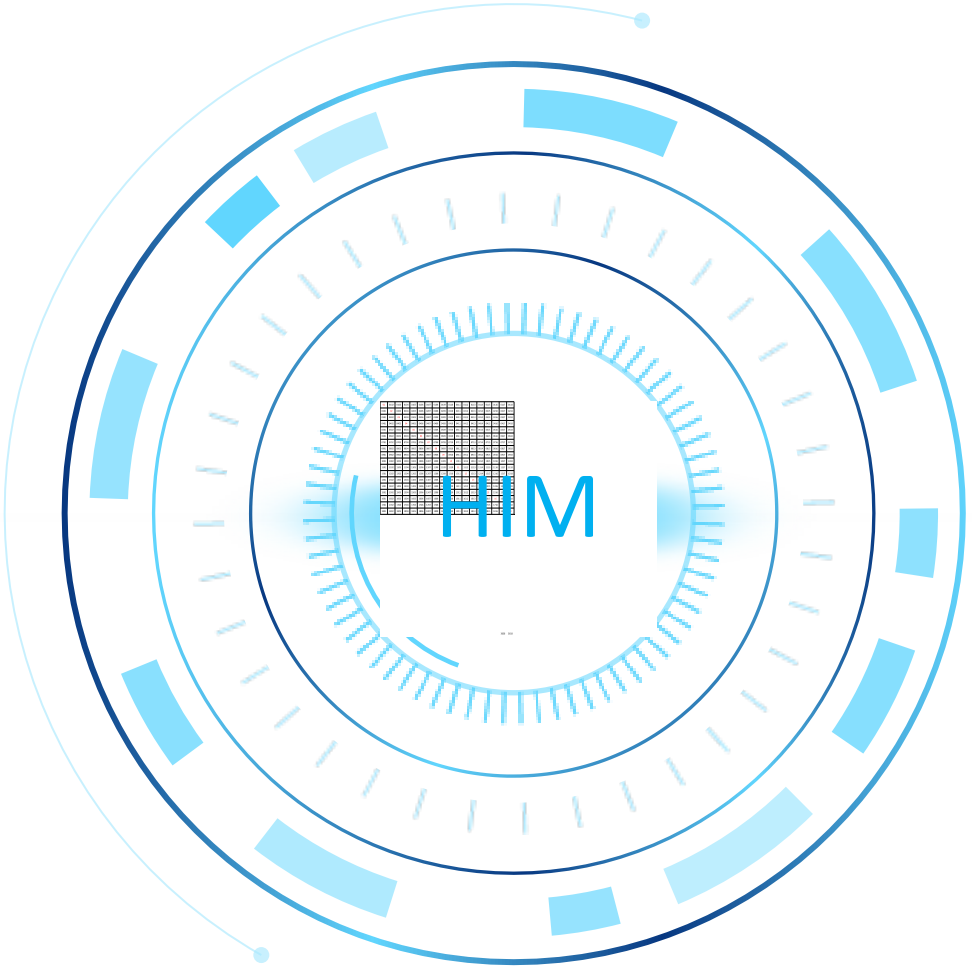
软件数据互用（INTEROPERABILITY）

软件数据互用

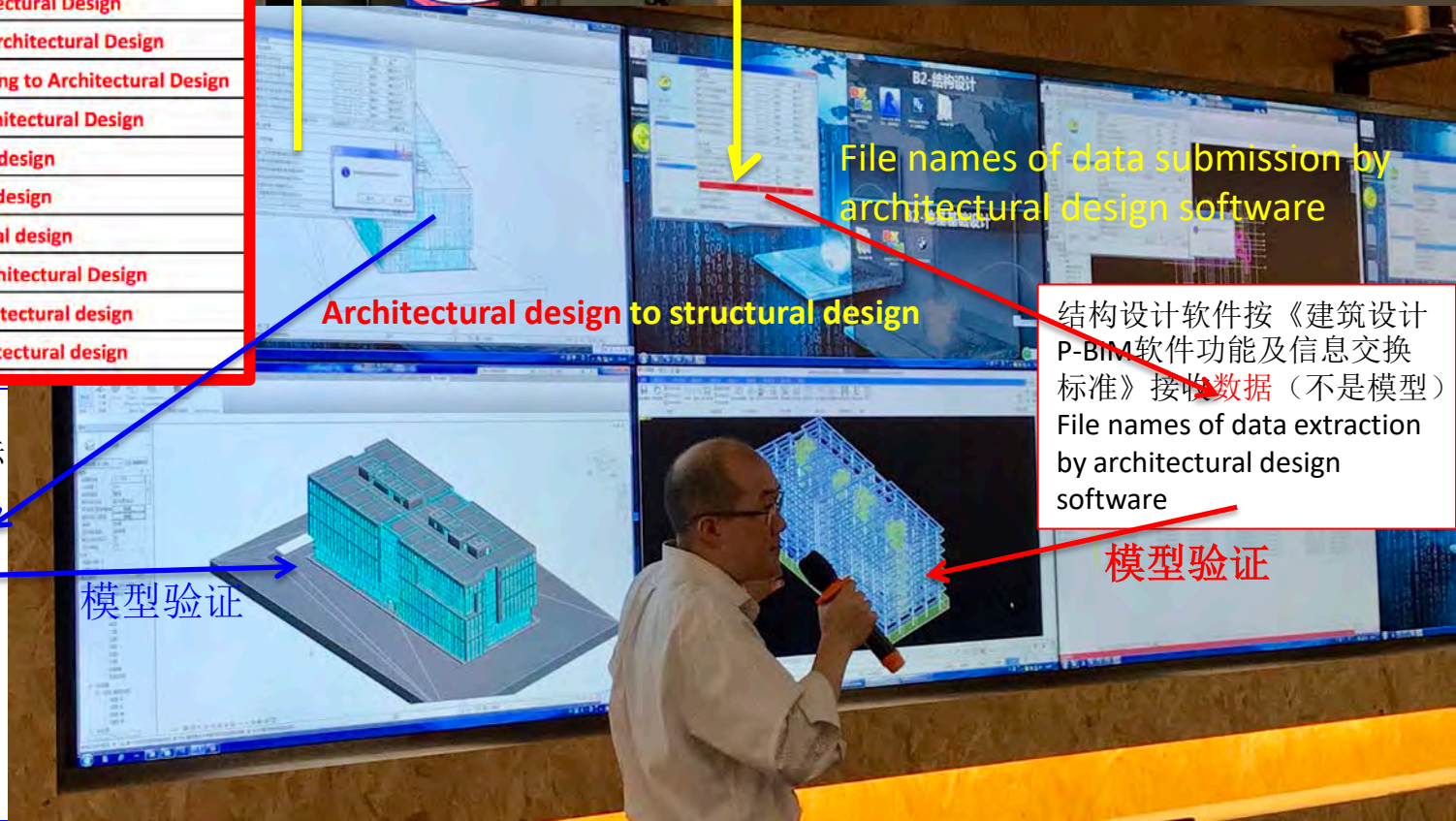
聚合信息 为我所用（电子数据无缝对接）

Information aggregation, Individual usage

The implementation of electronic data exchange, management and access to achieve are smooth and seamless.



序号 (No.)	建筑设计软件推送数据文件名 Architectural design software pushes data file names
1	Architectural Design to Building Energy Analysis
2	Architectural Design to Circulation/Security Analysis
3	Architectural Design to Quantity Takeoff for Cost Estimating
4	Architectural Design to Spatial Program Validation
5	Architectural design to landscape design
6	Architectural design to structural design
7	Architectural design to thermal simulation
8	Architectural Design to Architectural Programming
9	Architectural design to quantity take-off - level 1
10	Architectural design to quantity take-off - level 2
11	Architectural design to quantity take-off - level 3
序号	建筑设计软件接收数据文件名
1	Building Energy Analysis to Architectural Design
2	Circulation/Security Analysis to Architectural Design
3	Quantity Takeoff for Cost Estimating to Architectural Design
4	Spatial Program Validation to Architectural Design
5	landscape design to Architectural design
6	structural design to Architectural design
7	thermal simulation to Architectural design
8	Architectural Programming to Architectural Design
9	quantity take-off - level 1 to Architectural design
10	quantity take-off - level 2 to Architectural design



建筑设计软件按《建筑设计P-BIM软件功能及信息交换标准》推送数据（不是模型）
In compliance with *Standard for P-BIM software function and information exchange of architectural design*, the architectural design software accomplishes **Data Drops** (information/data exchange) , rather than model exchange.

结构设计软件按《建筑设计P-BIM软件功能及信息交换标准》接收数据（不是模型）
File names of data extraction by architectural design software

bsi.

PAS1192-2:2013

9.4.2 …CDE

the common data environment

(CDE)

英国PAS1192-2:2013 9.4.2 …CDE

Seamlessly Integrated

P-BIM & HIM

The architectural design software accomplishes automatic exchange of information respectively with structural design software and HVAC design software, as required.

工程全生命期数码BIM平台

Engineering life cycle digital BIM platform

（自主知识产权、中国BIM发展联盟产品、免费）

(Independent intellectual property rights, China BIM Union products, free of charge)

⑤ 从平台及软件看BIM系统——基于HIM数码平台的P-BIM软件系统

⑤ BIM from view of platform & software

①②③④⑤Reference documents series at CBIMU website：
http://www.bimunion.org

② Practice integrated into BIM standard system

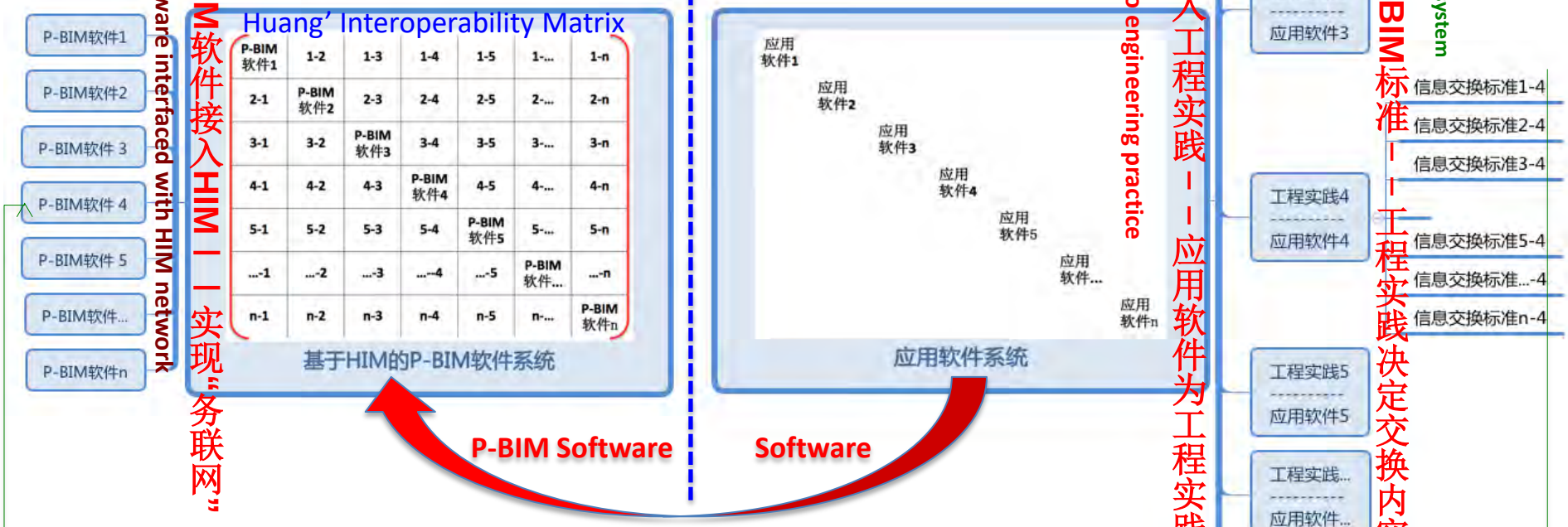
② 将工程实践融入BIM标准——工程实践决定交换内容与格式

① Software inserted into engineering practice

① 将应用软件嵌入工程实践——应用软件为工程实践服务

④ P-BIM software interfaced with HIM network

④ 将P-BIM软件接入HIM——实现“务联网”



“工程实践4”《P-BIM软件功能与信息交换标准》

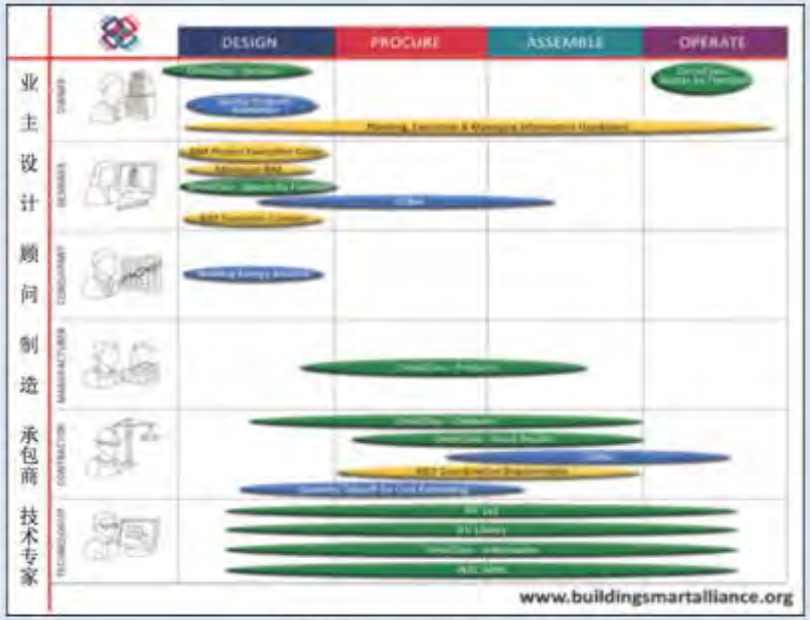
Practice 4： ***Standards for P-BIM software function and information exchange***

③ BIM standard (guideline) implanted into software

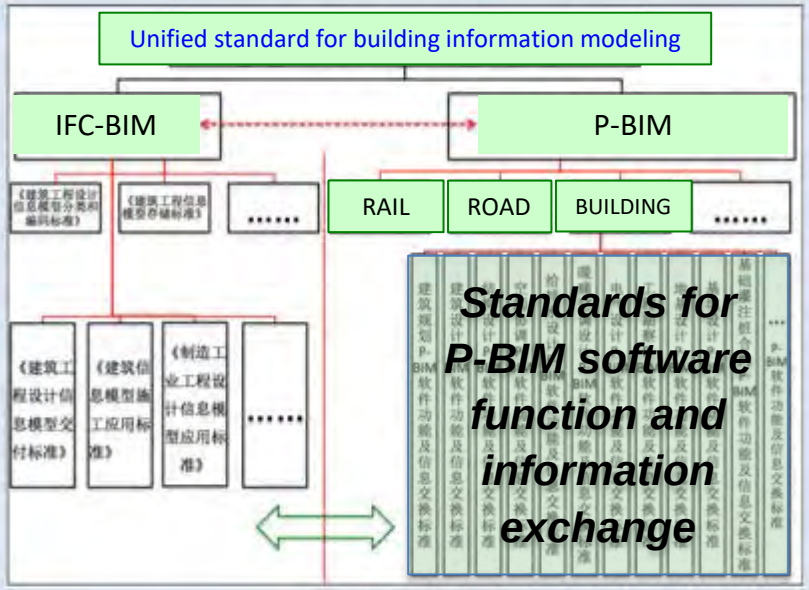
③ 将BIM标准植入应用软件（P-BIM软件）——BIM标准为应用软件服务

BIM标准体系：

BIM标准体系（培育一颗大树还是一片森林？）



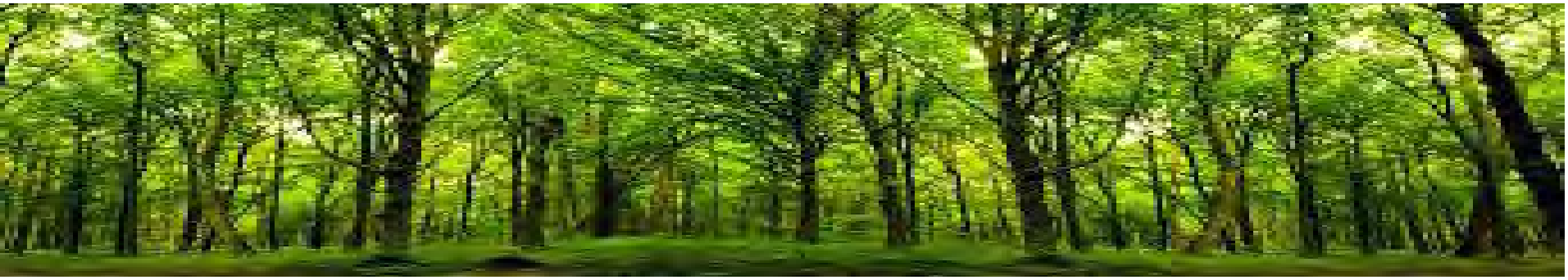
buildingsmartalliance



中国BIM发展联盟

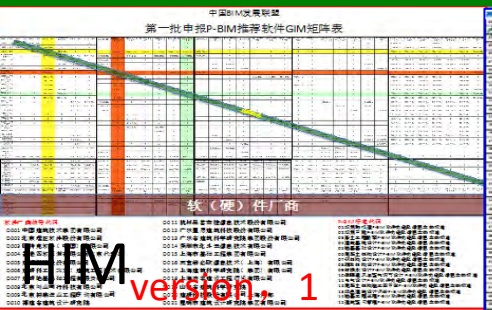
Your Leadership

This will not help!



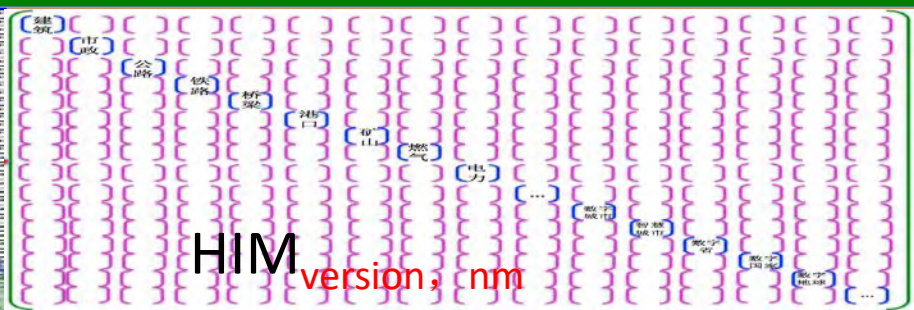
Your Leadership

Growing the Standards



HIM version，1

HIM version，j



HIM version，nm

国家标准《建筑信息模型应用统一标准》

Unified standard for building information modeling

土木工程学会标准《建筑工程信息交换实施标准》

HIM Standard

项目策划

P-BIM软件功能与

项目规划设

P-BIM软件功能与信息

建筑设计

P-BIM软件功能与信息交

地基分BIM协

P-BIM软件功能与信息

勘察设计

P-BIM软件功能与信息交

• • • • • • •

P-BIM软件功能与信息交换标准

标准化协会标准：

P-BIM软件功能与信息交换标准

标准化协会标准：

P-BIM软件功能与信息交换标准

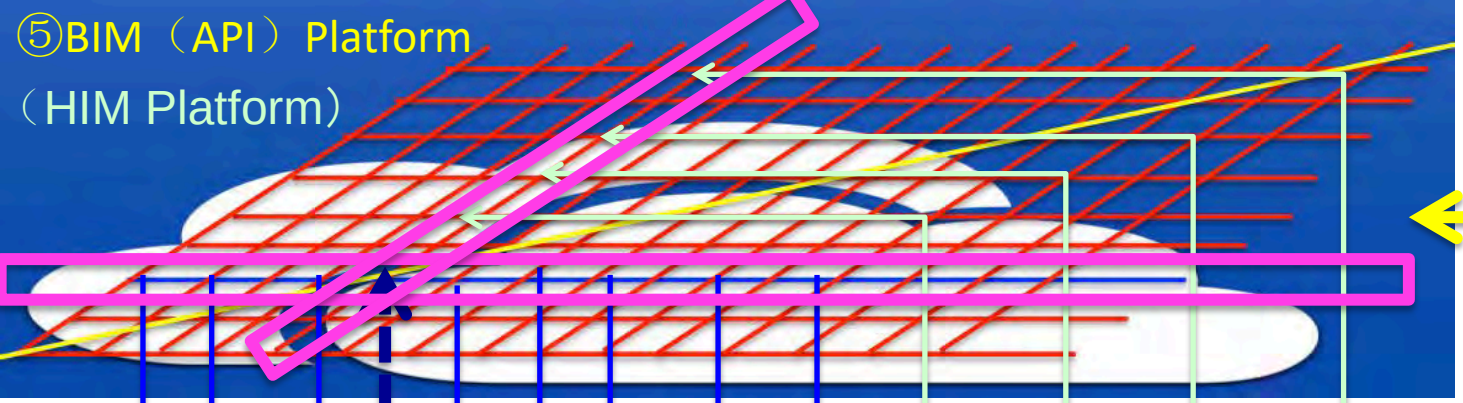
Standards for P-BIM software function and information exchange

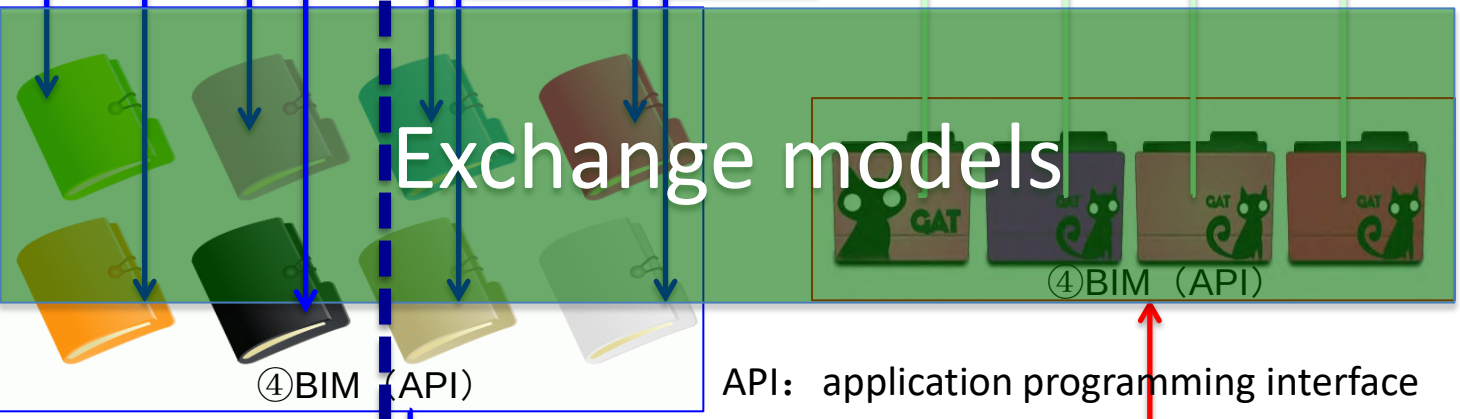
标准化协会标准：

P-BIM软件功能与信息交换标准

标准化协会标准：

P-BIM软件功能与信息交换标准



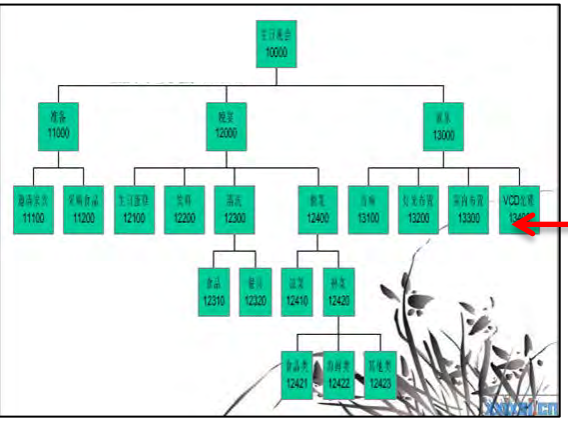


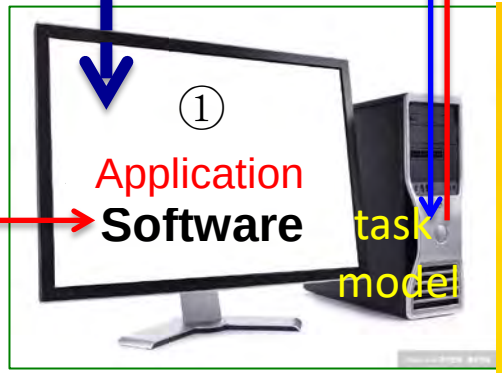
④BIM（API）

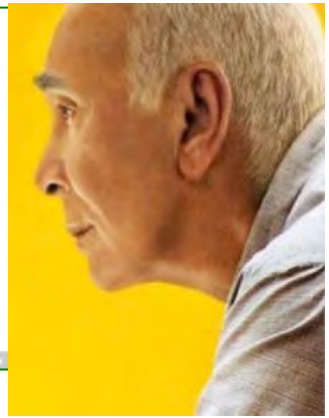
API：application programming interface

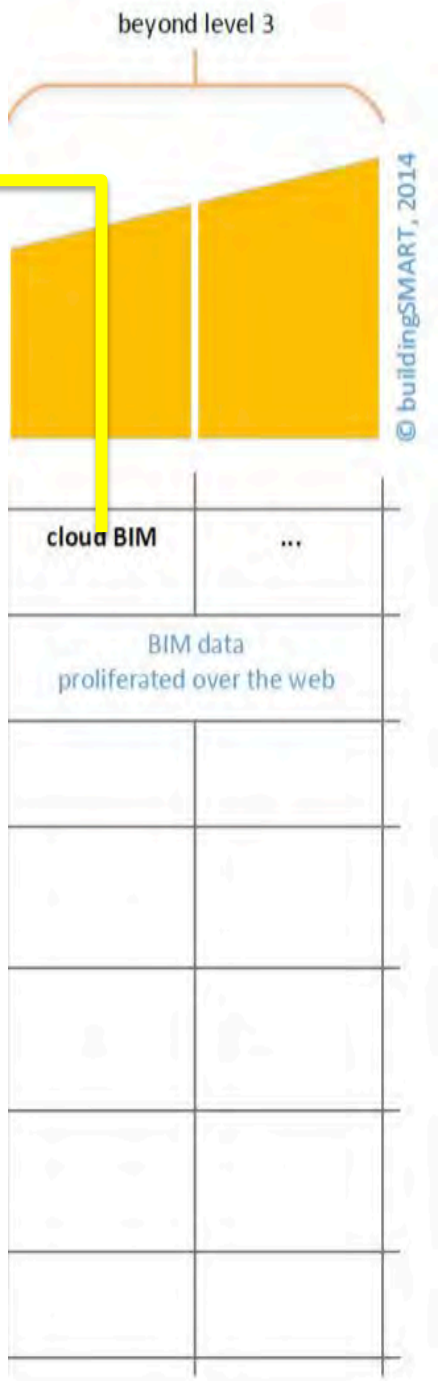
③BIM（API）**Standard**

②**Practice（WBS）**









HIM

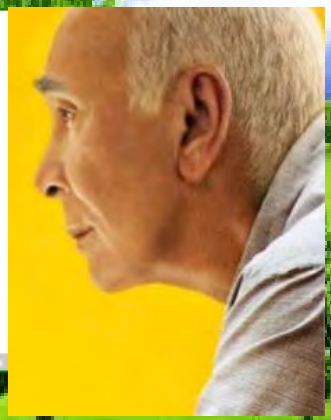
BIM

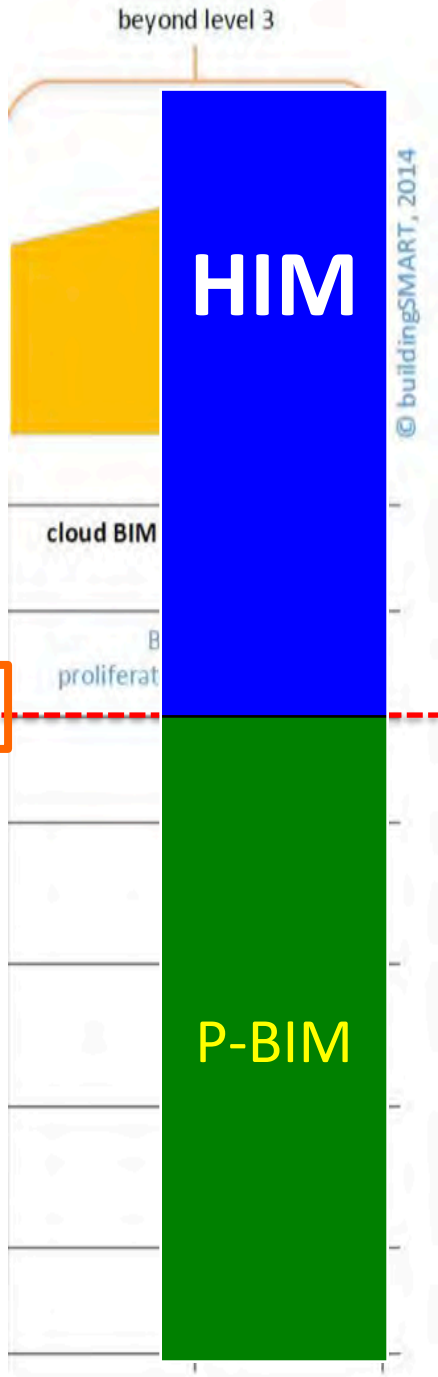
Management(standard)

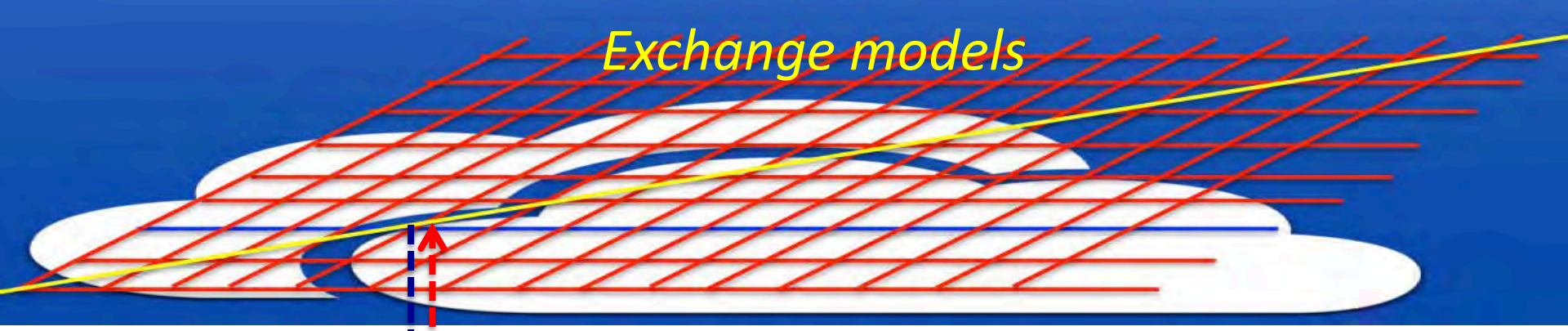
Exchange models
Task models

Model

Modeling



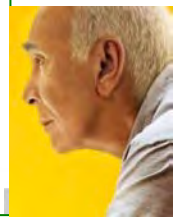




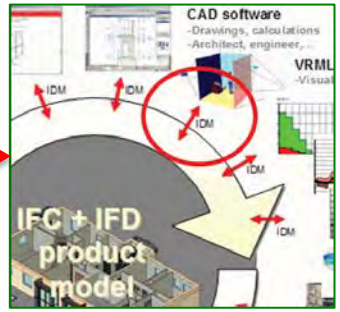
IDM or P-BIM Standard

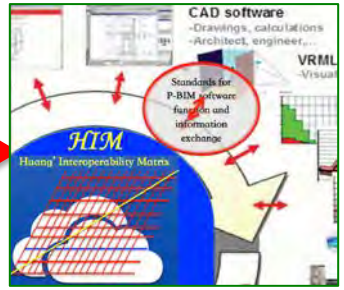
P-BIM Software

Task model

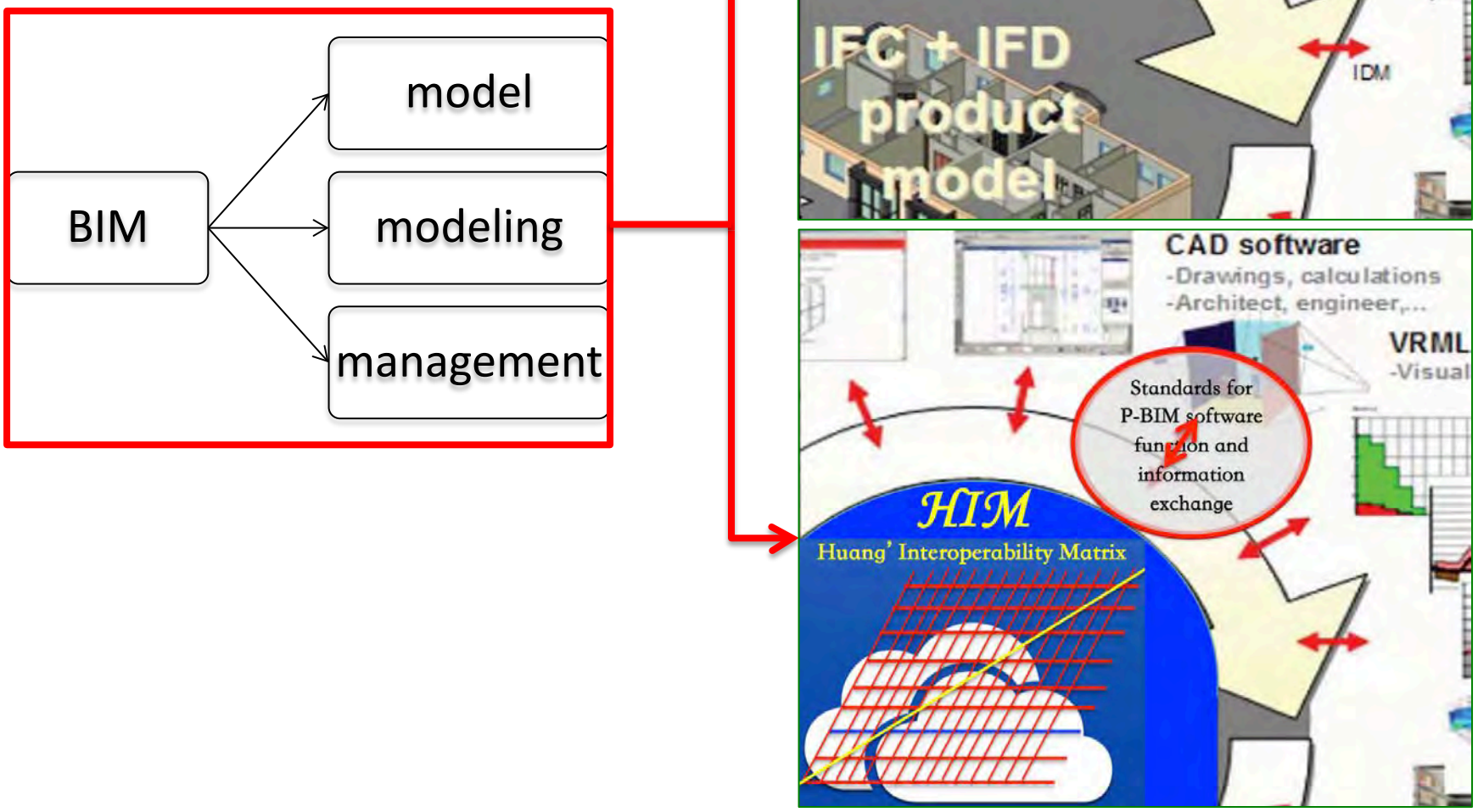


BIM



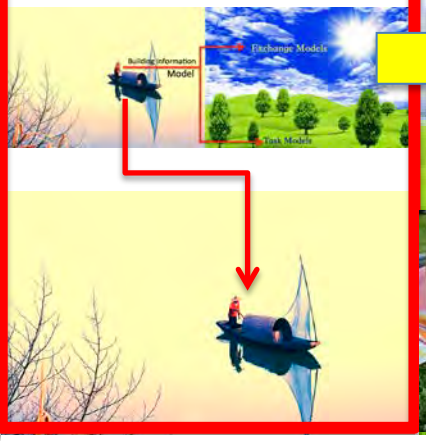


IFC+IFD model or Other model


BIM
model
modeling
management
CAD software
-Drawings, calculations
-Architect, engineer,...
VRML
-Visual
IDM
IDM
IDM
IDM
IDM
IFC + IFD
product
model
CAD software
-Drawings, calculations
-Architect, engineer,...
VRML
-Visual
Standards for
P-BIM software
function and
information
exchange
HIM
Huang' Interoperability Matrix

神州大地湧BIM，
成千上万弄潮儿。
伤筋动骨烦恼多，
苦煞昔日从业君。
蓝天绿地一渔翁，
遥将BIM喻天地，
造福诸君累出乐。

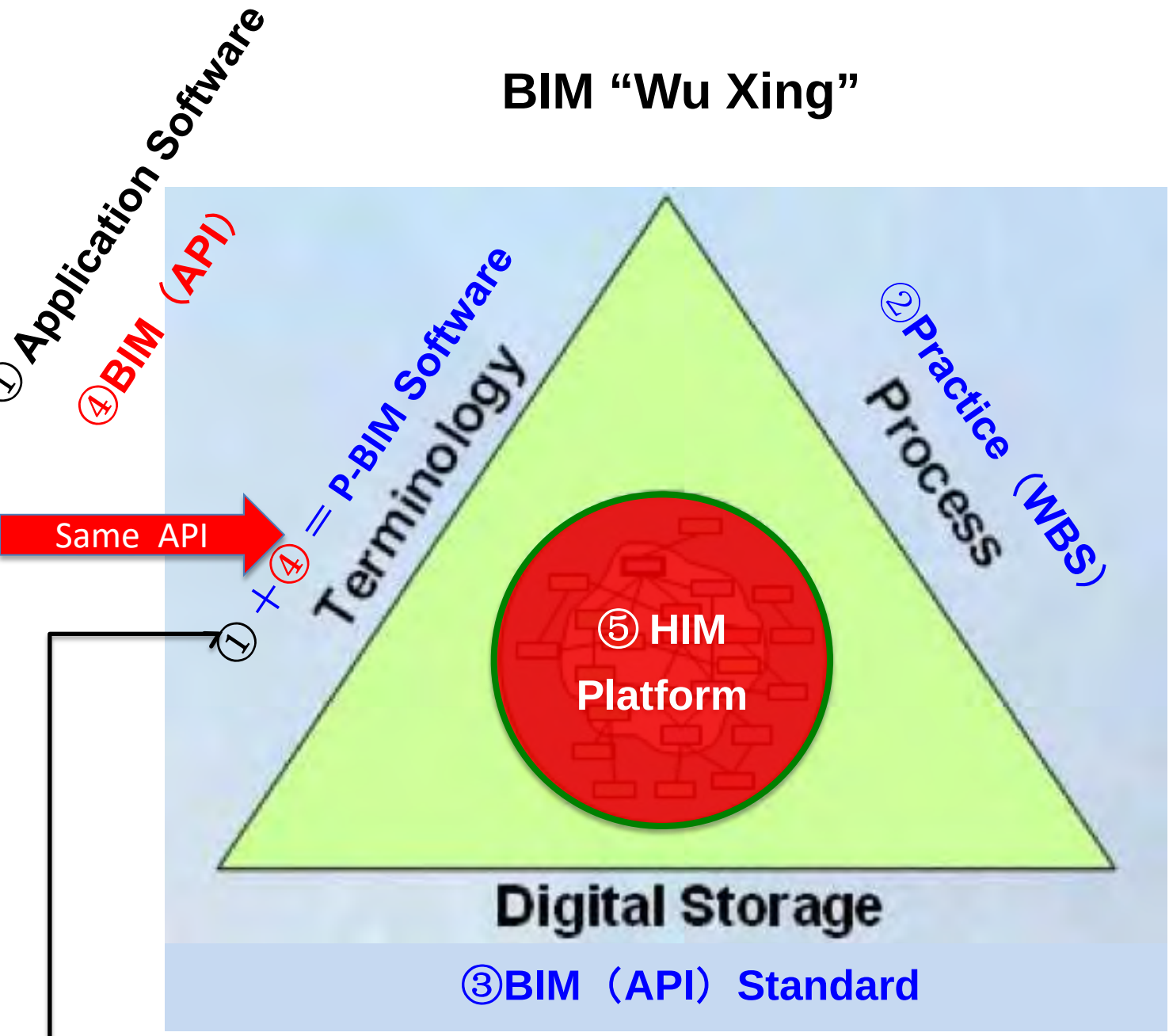
—7/25/2017凌晨



BIM “Wu Xing” Research ：

On the one hand, the theory of the five elements believes that everything in the world is composed of metal, wood, water, fire and earth of the five most basic material. This is the correct understanding made to material world. On the other hand, it still think everything is not isolated, but constantly changing, and maintaining a coordinated and balanced state. The theory is to understand the world with wood, fire, soil, metal, water five kinds of basic characteristics of things and creation and destruction rules, and is a kind of world view and methodology to explain the world and explore the movement rules of things in the universe. It’s a simple materialism and dialectics of ancient philosophy.

BIM “Wu Xing”



Different vendor， samilar **software** function.

Wu Xing	Five elements for BIM
wood	① Application Software
fire	② Practice（WBS）
earth	③ BIM（API） Standard
metal	④ BIM（API）
water	⑤ HIM Platform

结果 Outcome

方法论 Methodology

① 应用软件源于工程实践
① Software inserted into engineering practice

人法地，地法天。

② Practice integrated into BIM standard system
② 工程实践需要信息化（BIM标准）

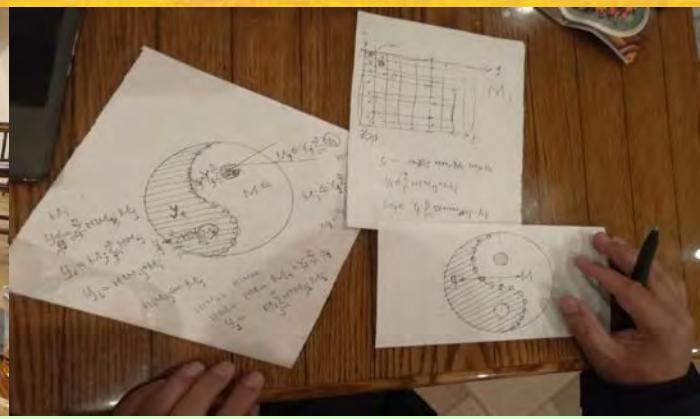
⑤ BIM交换平台（BIM（API）Platform）

③ BIM标准不能脱离软件系统（P-BIM软件）
③ BIM standard (guideline) implanted into P-BIM software

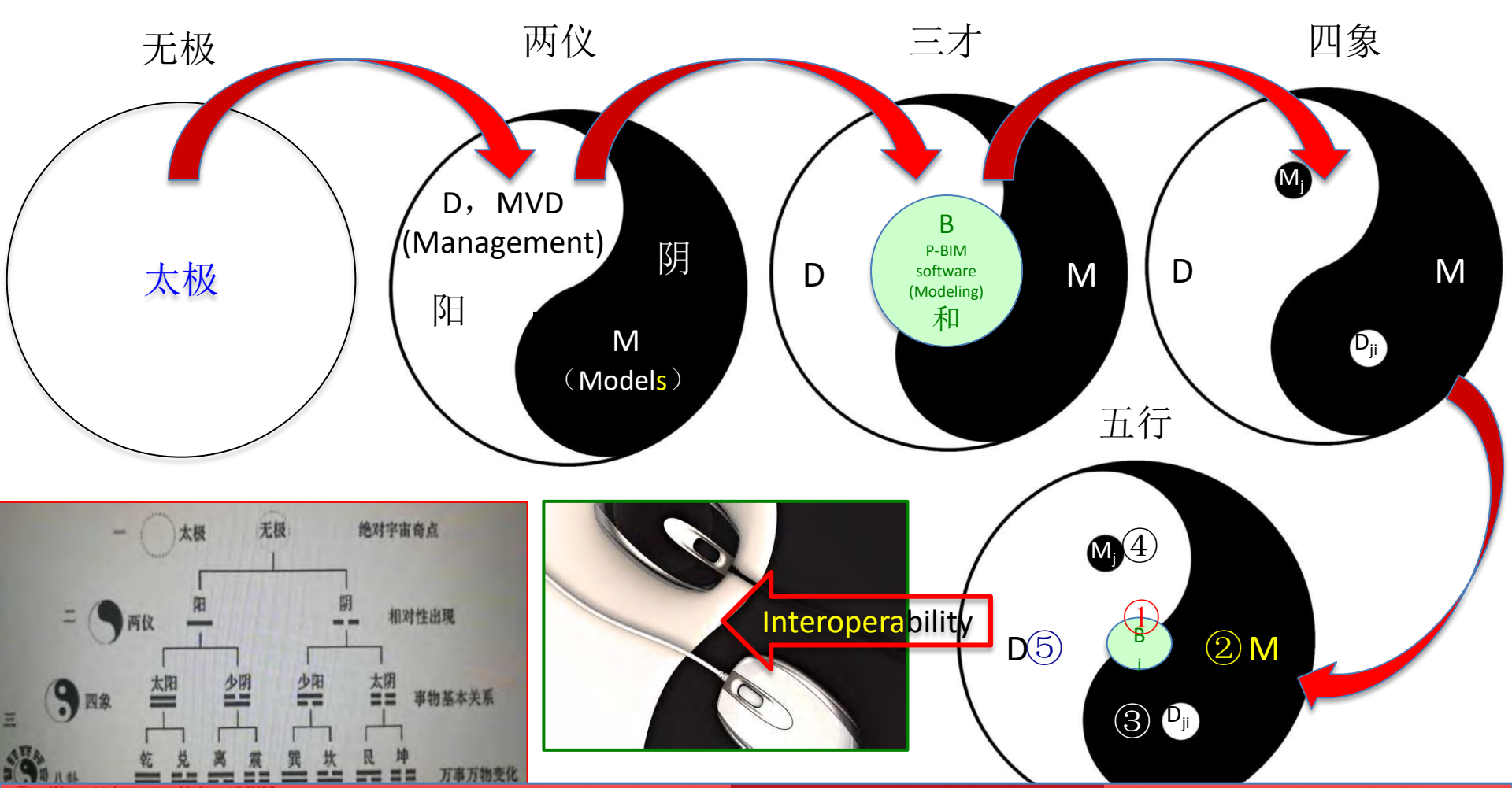
天法道，道法自然。

④ P-BIM software interfaced with HIM network
④ P-BIM软件数据交换自然（自动）完成

聚合信息，为我所用；
Information aggregation, Individual usage
上善若水，惠及人人；
The moral goods, like the character of water, is to benefit everyone.
大道至简，悟在天成。



Complex things need to be done in the simplest way, simple things done repeatedly, repetitive things done wholeheartedly, and with long-term persistence, success will be achieved naturally.



Top Ways to Improve Value of BIM : Interoperability

建筑信息模型（BIM）“五行”相位（BIM “wuxing” phases）

The relations between wuxing are interpolation, interaction, over action and counter-action, which are believed to be the common law of the motions and changes of the creatures in the universe.

⑤ 从平台及软件看BIM系统

⑤ BIM from view of platform & software

人法地

①将应用软件嵌入工程实践

① Software inserted into engineering practice

地法天

②将工程实践融入BIM标准

② Practice integrated into BIM standard system

天法道

③将BIM标准植入P-BIM软件系统

③ BIM standard (guideline) implanted into software

道法自然

④将P-BIM软件接入HIM

④ P-BIM software interfaced with HIM network

① ② ③ ④ ⑤ 系列文章参考中国BIM发展联盟网站（Reference documents series at CBIMU website）：//www.bimunion.org

建筑信息模型（BIM）“五行”属性（BIM “wuxing” property）

The doctrine of five phases describes two cycles of balance, a generating or creation (生,sheng) cycle and an overcoming or destruction（克,ke） cycle of interactions between the phases .

五行	五行相生 Generating	五行相克 Overcoming
①木 wood	Wood feeds Fire; 木生火： 火多木焚； 强木得火， 方化其顽。	wood parts earth; 木克土： 土多木折； 土弱逢木， 必为倾陷。
②火 fire	Fire creates Earth (ash); 火生土： 土多火晦； 强火得土， 方止其焰。	fire melts metal ; 火克金： 金多火熄； 金弱遇火， 必见销熔。
③土 earth	Earth bears Metal; 土生金： 金多土变； 强土得金， 方制其壅。	earth absorbs water; 土克水： 水多土流； 水弱逢土， 必为淤塞。
④金 metal	Metal collects Water ; 金生水： 水多金沉； 强金得水， 方挫其锋。	metal chops wood 金克木： 木多金缺； 木弱逢金， 必为砍折。
⑤水 wate	Water nourishes Wood; 水生木： 木多水缩； 强水得木， 方泄其势。	water quenches fire; 水克火： 火多水干； 火弱遇水， 必不熄灭。

相生关系 generating or creation

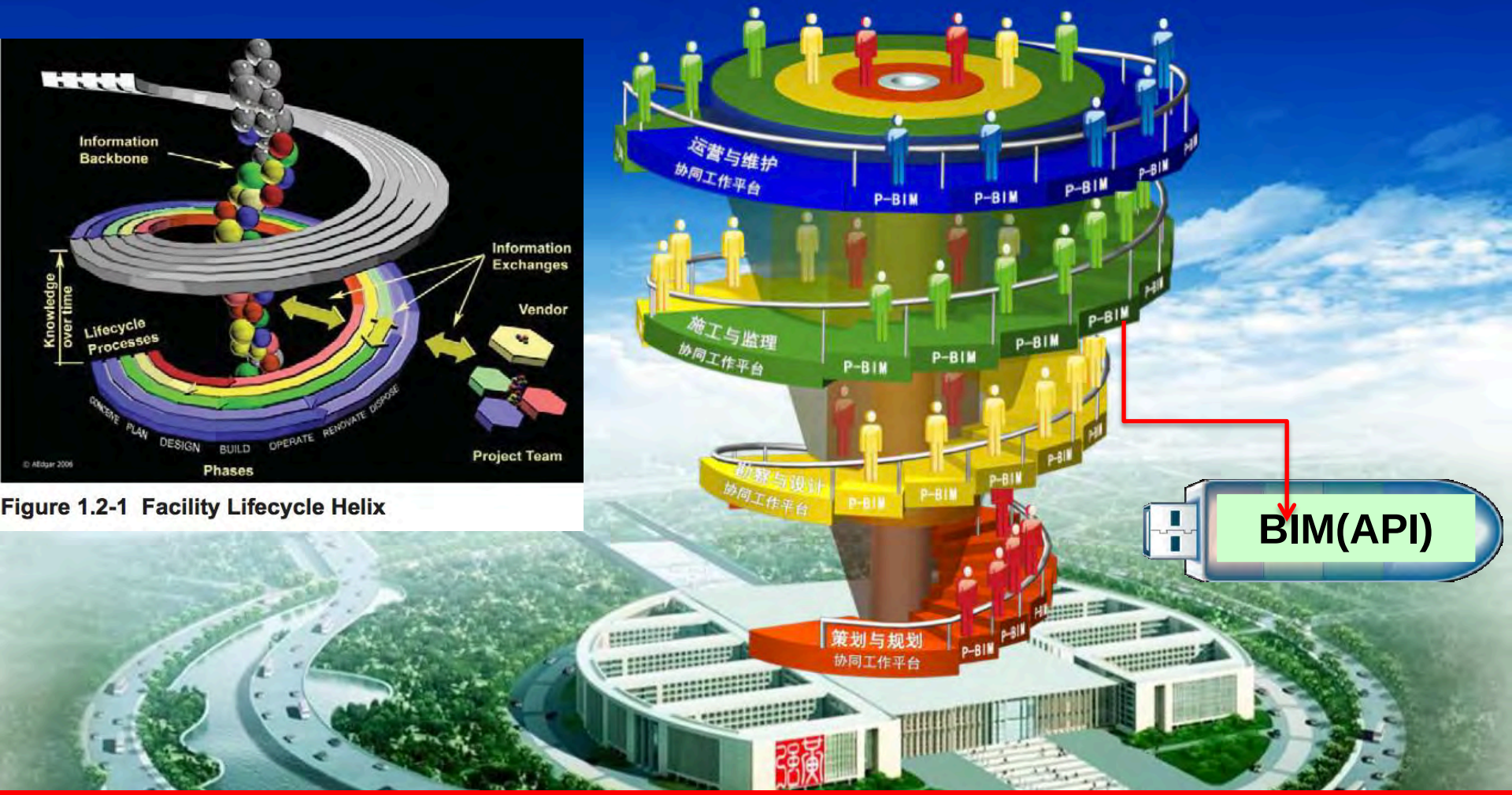
相克关系 overcoming or destruction

五行 wuxing	五行相生 Generating		五行相克 Overcoming	
① 木 wood 应用软件 **Application Software**	Wood feeds Fire; 木生火： 火多木焚； 强木得火， 方化其顽。	应用软件产生BIM工程实践（WBS）应用： WBS的唯一性决定了应用软件功能唯一性； 应用软件对应分类（功能）明确的工程实践， 才能解决应用软件的生存问题。	wood parts earth; 木克土： 土多木折； 土弱逢木， 必为倾陷。	应用软件限定（一对一）BIM（API）标准； BIM（API）标准复杂则应用软件无可适从； 不落地的BIM（API）标准对于应用软件， 没有实用价值。
② 火 fire 工程实践（WBS） **Practice**	Fire creates Earth (ash); 火生土： 土多火晦； 强火得土， 方止其焰。	工程实践产生BIM（API）标准： BIM（API）标准太多工程实践无所适从； 工程实践（WBS）结合BIM（API）标准， 才能阻止软件大而全的无序开发方式。	fire melts metal ; 火克金： 金多火熄； 金弱遇火， 必见销熔。	工程实践WBS限定（一对一）BIM（API）； BIM（API）必须简单实用； 繁琐的BIM（API）用于工程实践， 难以产生价值。
③ 土 earth BIM（API）标准 **Standard**	Earth bears Metal; 土生金： 金多土变； 强土得金， 方制其壅。	BIM（API）标准产生BIM（API）： 一个BIM（API）对应一个工程实践（任务）； BIM（API）标准对应BIM（API）， 才能解决BIM标准编成一片森林的问题。	earth absorbs water; 土克水： 水多土流； 水弱逢土， 必为淤塞。	BIM（API）标准约束BIM（API）平台； BIM（API）平台统一管理BIM（API）标准； 用无逻辑的BIM（API）平台管理BIM标准， 就会出现交换通路淤塞。
④ 金 metal **BIM（API）**	Metal collects Water ; 金生水： 水多金沉； 强金得水， 方挫其锋。	BIM（API）催生数码BIM（API）平台： BIM（API）平台与BIM（API）位于不同层面； BIM（API）置于BIM（API）平台， 才能理解BIM（API）的简单（容易实现）。	metal chops wood 金克木： 木多金缺； 木弱逢金， 必为砍折。	BIM（API）限定应用软件（功能）开发； 应用软件需要配套BIM（API）； 功能不好的应用软件与BIM（API）相配， 也不能为市场所接受。
⑤ 水 water BIM（API）平台 **（HIM）Platform**	Water nourishes Wood; 水生木： 木多水缩； 强水得木，	在BIM（API）平台上开发更多的应用软件： 应用软件越，BIM（API）平台越简单； BIM（API）平台聚集了更多应用软件，	water quenches fire; 水克火： 火多水干； 火弱遇水，	BIM（API）平台限定（一对一）工程实践； 应按工程实践增加而调整BIM（API）平台； 弱工程实践（WBS）设计置于（API）平台，

IFC-BIM

Figure 1.2-1 Facility Lifecycle Helix

P-BIM



Big issues must be done in detail, difficult affairs done from easy beginning, and right direction known for the long journey

Thank you

China Academy of Building Research Huang Qiang