

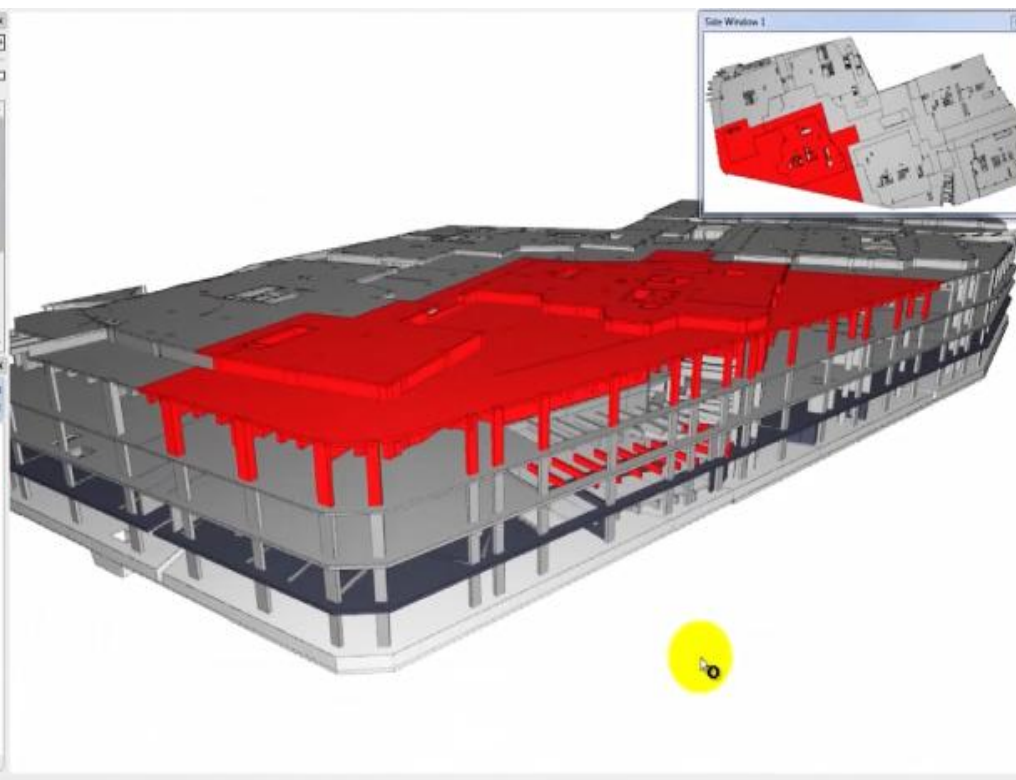
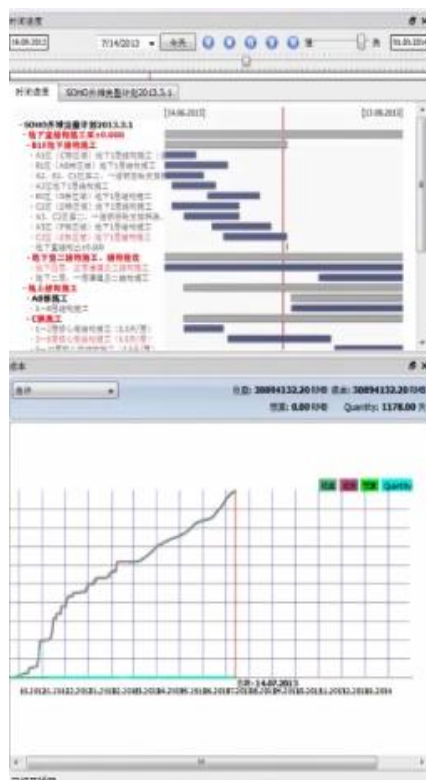
多维度应用 (II)

周炜 博士

5D成本管理

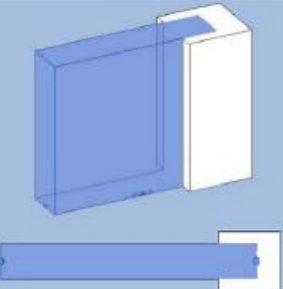
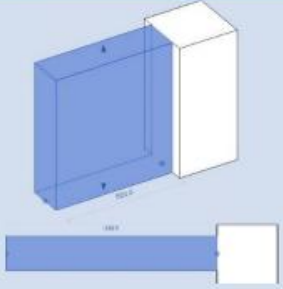
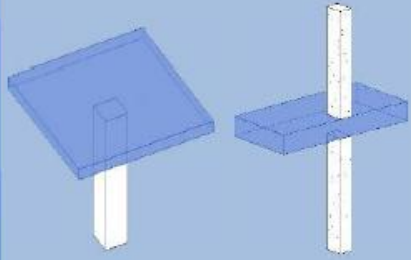
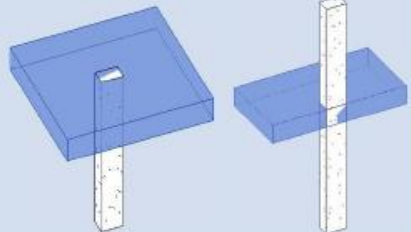


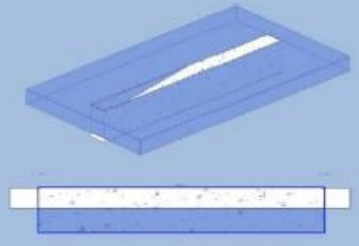
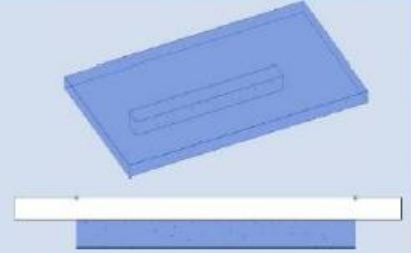
➤ 概念

- 5D BIM = 3D BIM 构件 + 4D 施工计划 + 成本算量清单
- 要点1：基于3D模型的工程算量
- 要点2：施工过程中的动态成本管理



5D成本管理

➤ **建模要求:** 符合工程量计算的扣减规则并经实际工程验证

	Wall 墙		Slab 板	
	Error X	Correct √	Error X	Correct √
Column 柱	 <p>Column is deducted by Wall 柱被墙扣减</p>	 <p>Non-overlapping between Column and Wall 柱与墙不重叠</p>	 <p>Column Attaches to the Bottom of Slab 柱绘制到楼板底面</p>	 <p>Column Inserts the Slab and Attaches to the Top Surface 柱子绘制到楼板顶面</p>
Beam 梁	 <p>Beam is Deducted by Wall 梁被墙扣减</p>	 <p>Beam Overlaps Wall 梁与墙重叠</p>	 <p>Slab overlaps Beam 板与梁重叠</p>	 <p>Non-overlapping between Slab and Beam 板与梁不重叠</p>

5D成本管理

➤集成化成本管理

➤算量计价

➤合同

➤供应链

➤财务

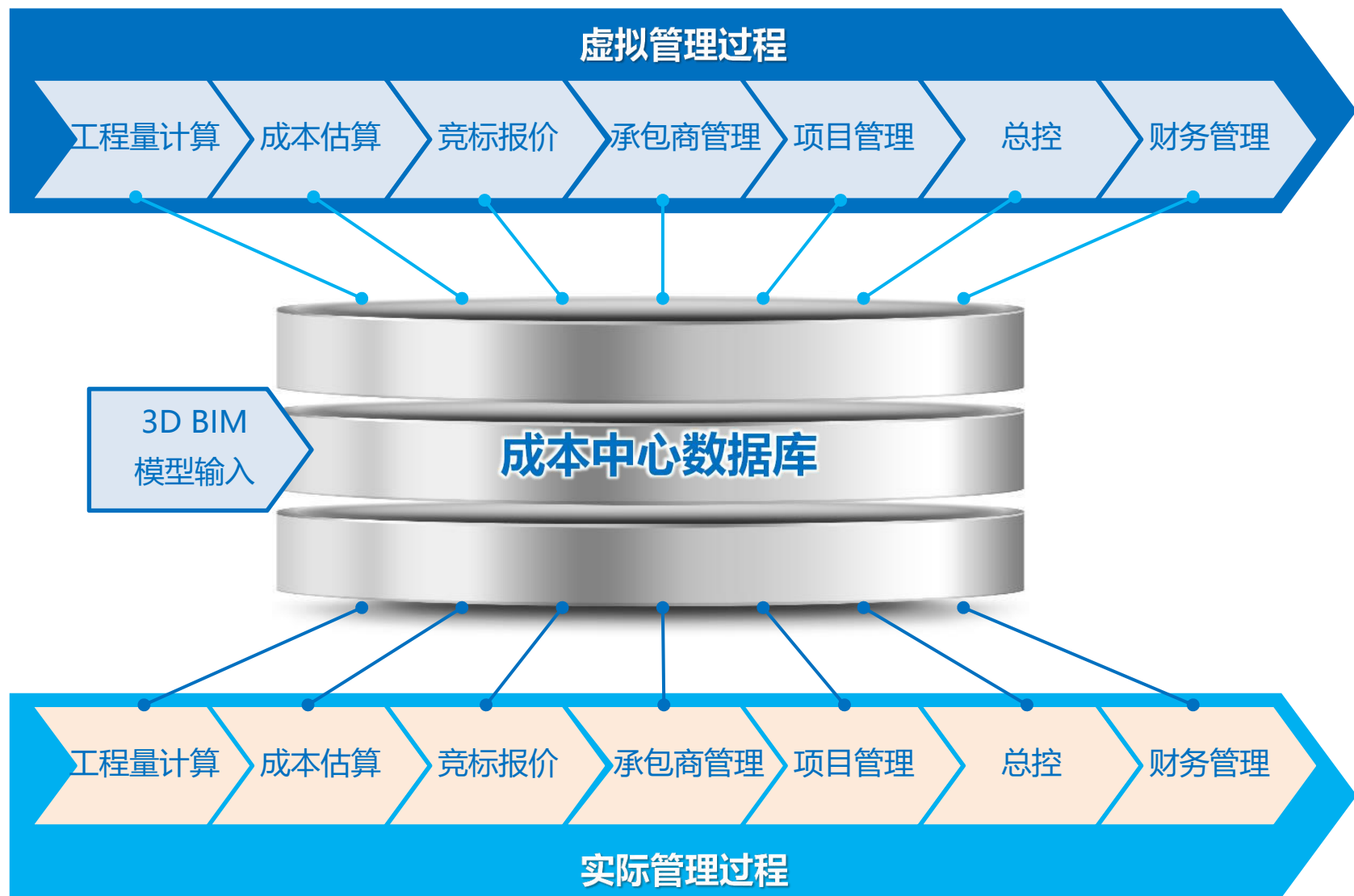
➤基于云端应用

➤人工智能应用

➤使用费用较高

➤团队专业培训

➤模型要求较高



5D成本管理

建造

6D运营维护

- 设施及资产管理 (FM/AIM)
- 收益、效率、投入产出、费效比等



6D运营维护

➤ 实施原则

- ①需求分析
- 理解建成后的需求
- ①设计阶段
- 按需建模提供数据
- ②施工阶段
- 同步搜集资产数据
- ③运营阶段
- 实现信息透明
- 持续更新资产数据



6D运营维护

➤ 横跨设计、施工、运维三个阶段

➤ 设计阶段

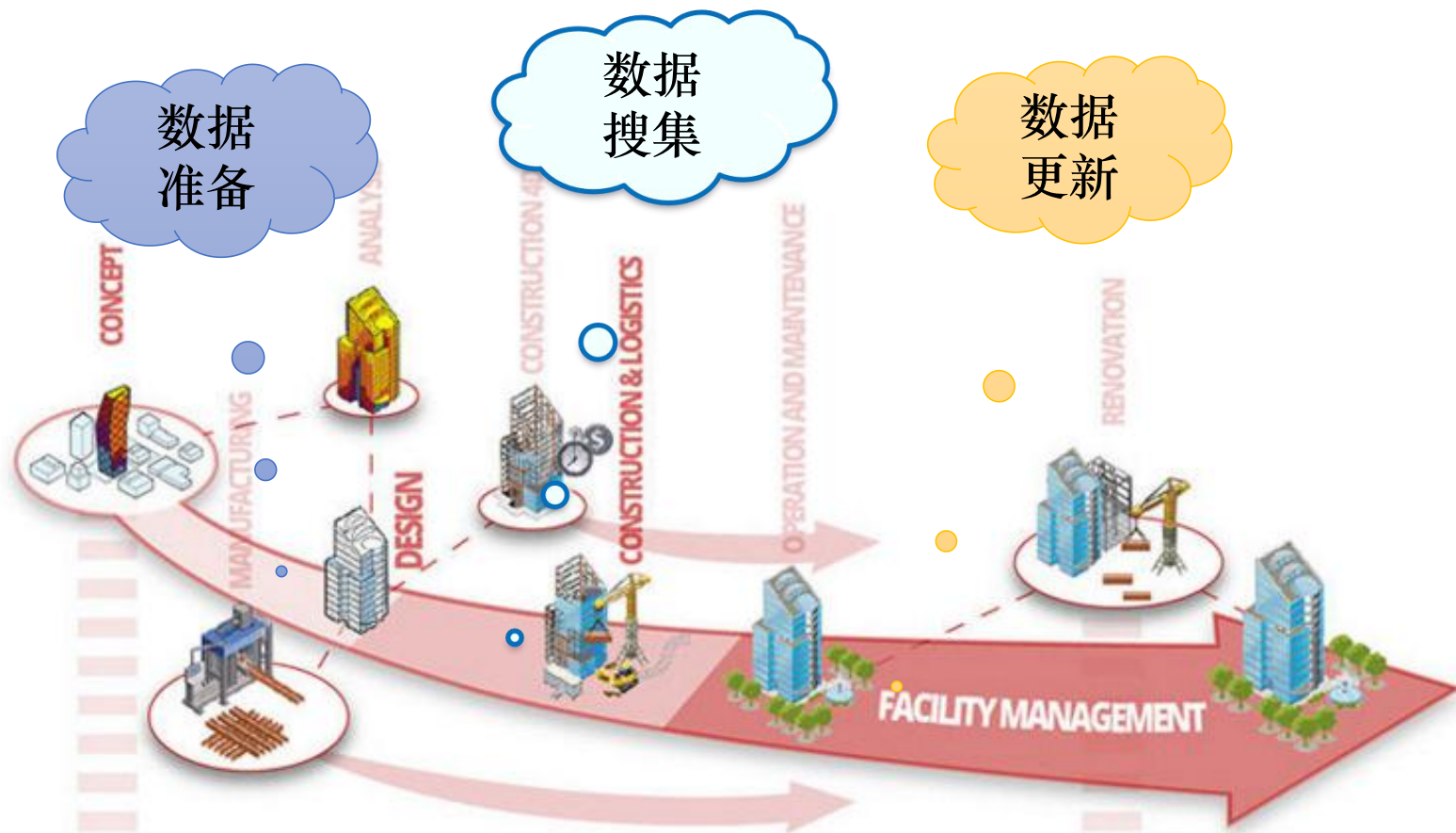
- 理解建成后的需求
- 满足下游数据要求

➤ 施工阶段

- 同步搜集资产数据

➤ 运营阶段


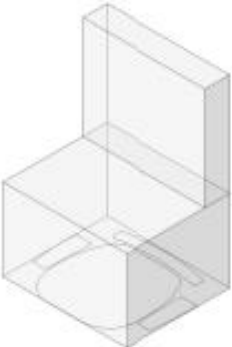



- 实现信息透明
- 持续更新资产数据





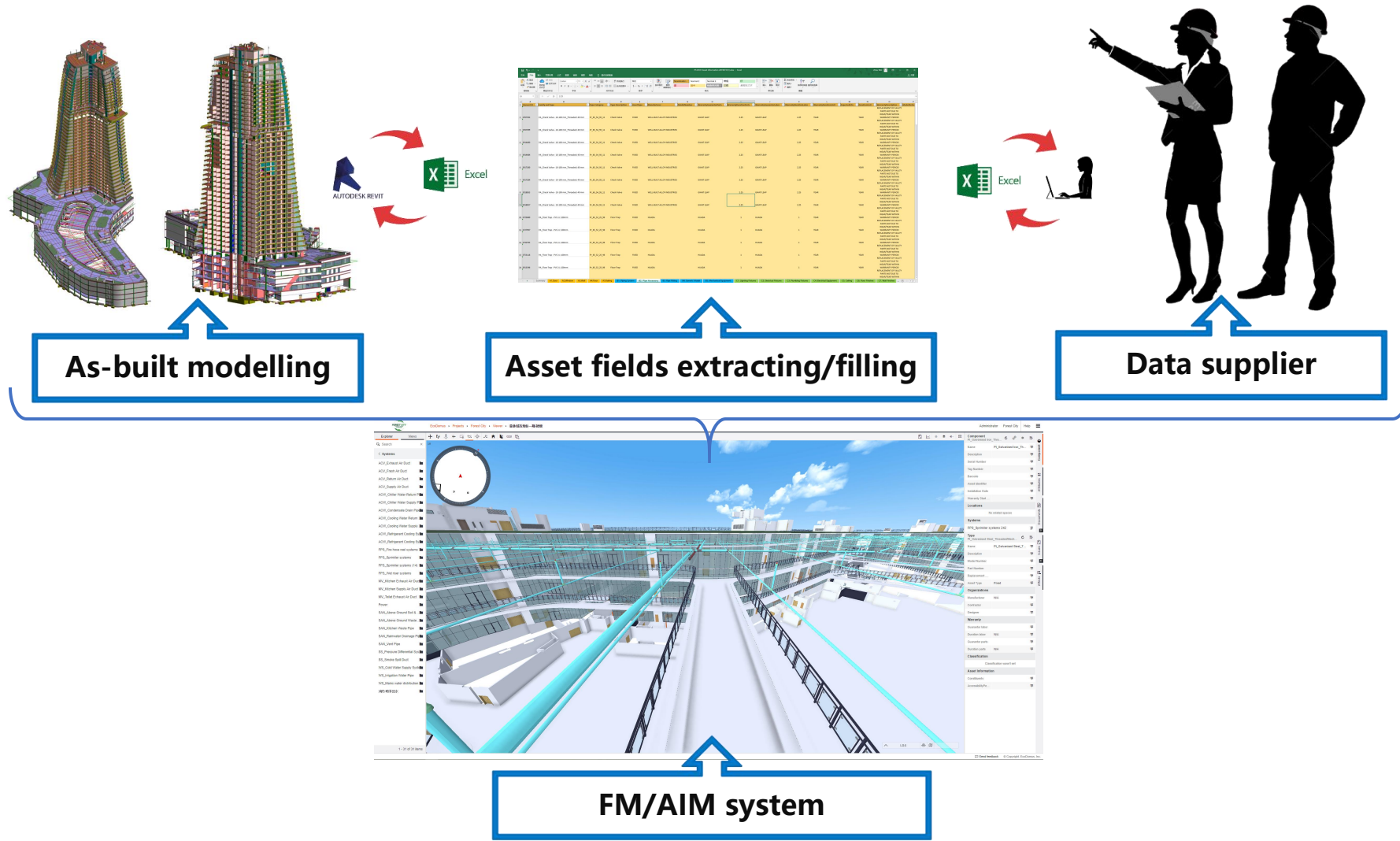
6D运营维护

- ▶ **6D modelling: requirements**
- ▶ Modelling protocol: input BIM data fits for FM/AIM
- ▶ LoD : LoD500 as-built model

LOD 100	LOD 200	LOD 300	LOD 400	LOD 500
				
Concept (Presentation)	Design Development	Documentation	Construction	Facilities Management
DESCRIPTION: Office Chair Arms, Wheels WIDTH: DEPTH: HEIGHT: MANUFACTURER: Herman Miller, Inc. MODEL: Mirra LOD: 100	DESCRIPTION: Office Chair Arms, Wheels WIDTH: 700 DEPTH: 450 HEIGHT: 1100 MANUFACTURER: Herman Miller, Inc. MODEL: Mirra LOD: 200	DESCRIPTION: Office Chair Arms, Wheels WIDTH: 700 DEPTH: 450 HEIGHT: 1100 MANUFACTURER: Herman Miller, Inc. MODEL: Mirra LOD: 300	DESCRIPTION: Office Chair Arms, Wheels WIDTH: 685 DEPTH: 430 HEIGHT: 1085 MANUFACTURER: Herman Miller, Inc MODEL: Mirra LOD: 400	DESCRIPTION: Office Chair Arms, Wheels WIDTH: 685 DEPTH: 430 HEIGHT: 1085 MANUFACTURER: Herman Miller, Inc MODEL: Mirra PURCHASE DATE: 01/02/2013

(Only data in red is useable)

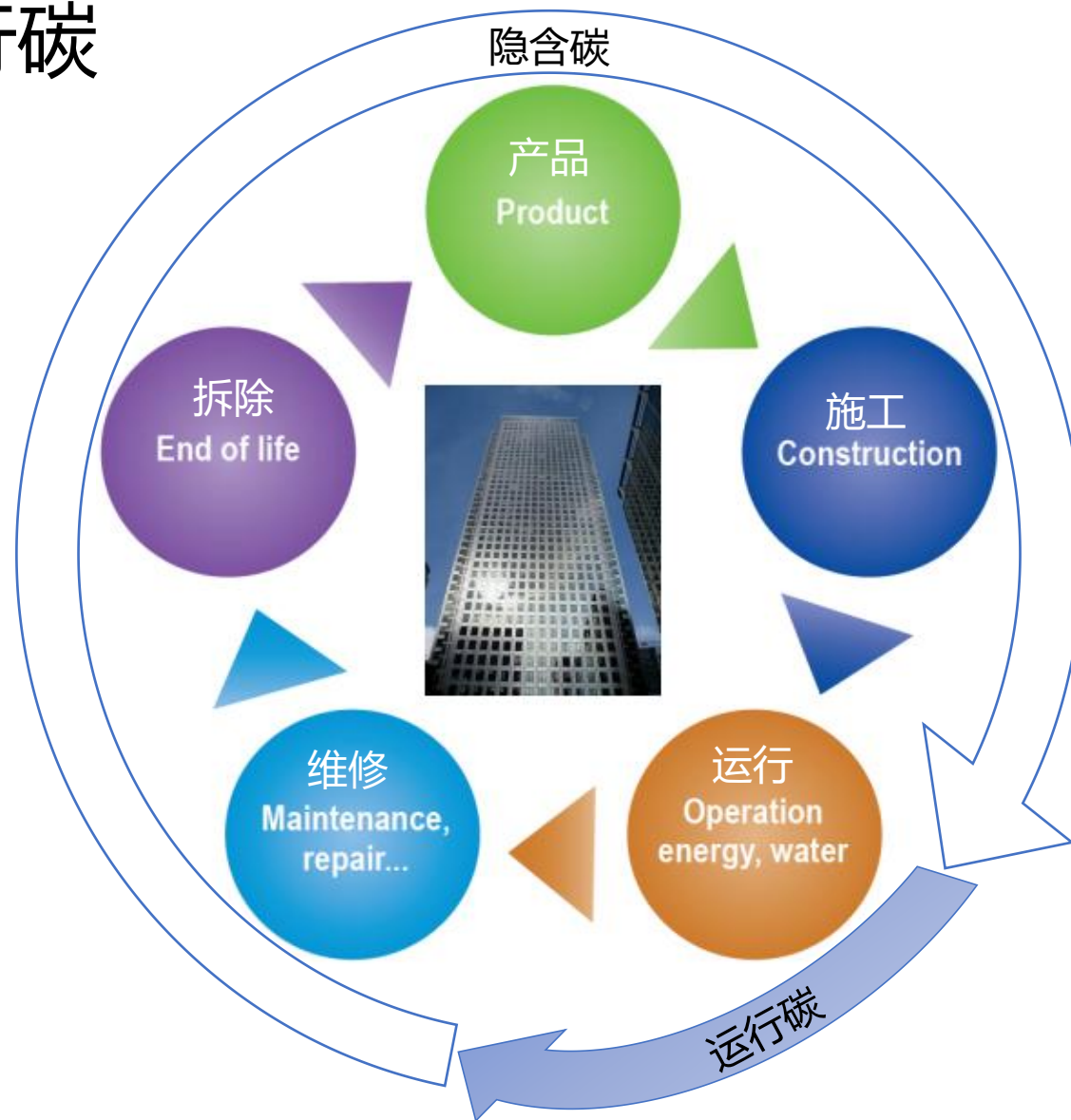
► 6D modelling: case study



7D绿色建筑

➤ 隐含碳 vs. 运行碳

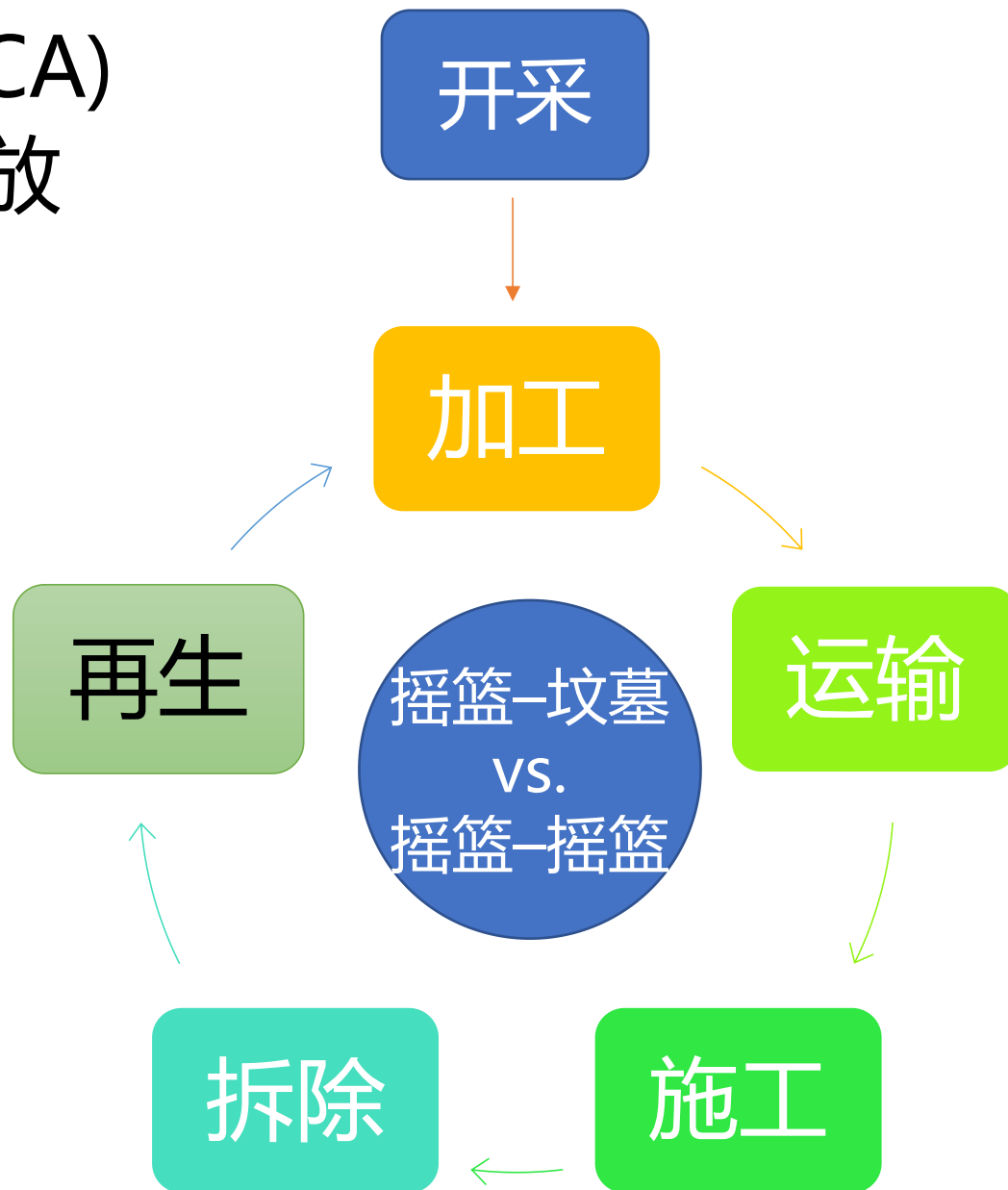
- 多个阶段
- 多种因素
- 多种材料
- 固定投入
- 不易更改



7D绿色建筑

➤ 全生命周期评价 (LCA)

- CO₂ 每个阶段排放
- 摇篮-坟墓
- 摇篮-摇篮



7D绿色建筑

▶ 隐含碳计算

- ▶ 在产品设计阶段考虑材料构成
- ▶ 所需材料清单是计算的重要依据
- ▶ 应用BIM模型可通过工程量统计实现计算

Embodied carbon of concrete blocks 8.379 kg CO₂e

+

Embodied carbon of mineral insulation 9.229 kg CO₂e

+

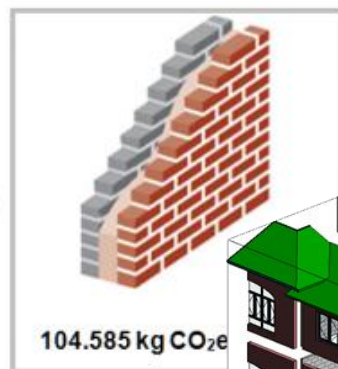
Embodied carbon of bricks 76.066 kg CO₂e

+

Embodied carbon of mortar 9.474 kg CO₂e

+

Embodied carbon of wall ties 1.437 kg CO₂e



104.585 kg CO₂e

openbom

Dashboard Part number: HAHN-Sternmotor Name: Quantity Report for HESS - HAHN-Ster...

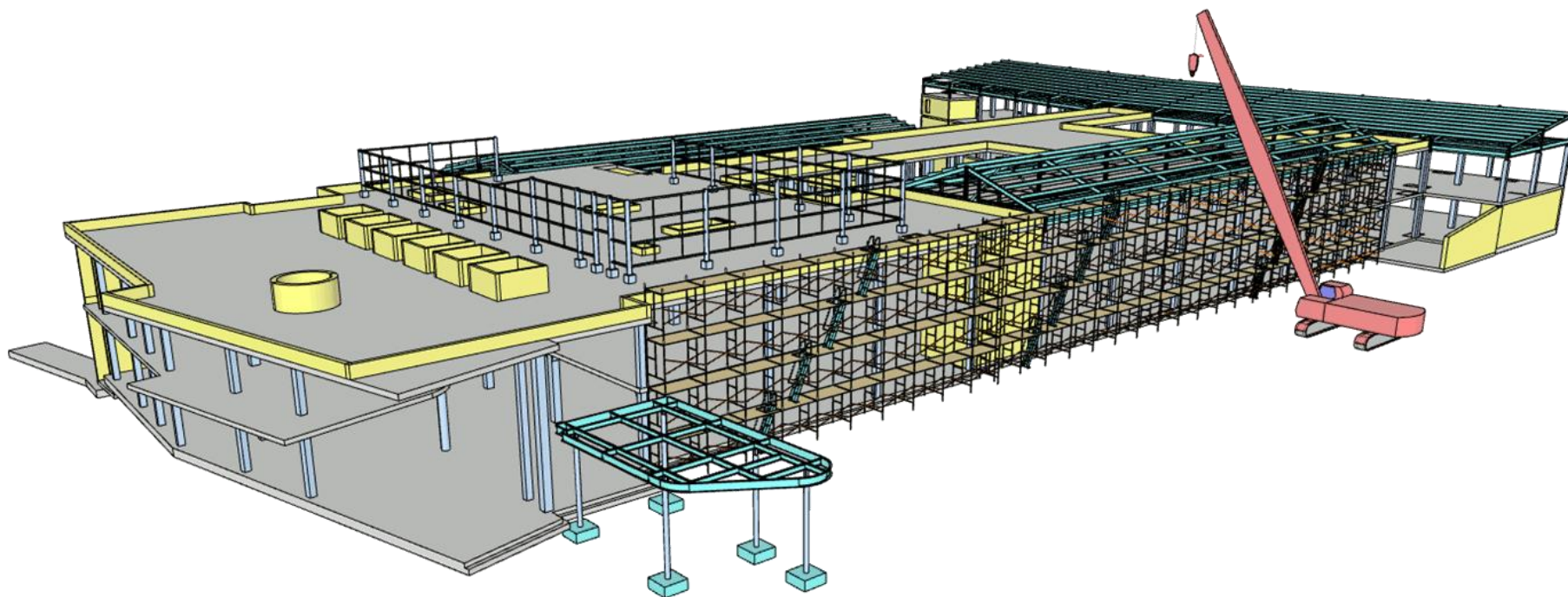
BOM: Flattened View: default (BOM)

Revisions (Latest state)

Parts and Catalogs

8D施工安全

- **高空坠落和移动物撞击**是施工现场极力避免的风险
 - 个人作业: 3D 场景走入, 答题纸, 截屏
 - 所需模型: 3D PDF文件, 渲染模式: 实色轮廓
 - 所需软件: Windows 电脑, Adobe Reader XI以上





感谢聆听