

BIM4FM: an International View

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Regional Editor – Australasia - for FACILITIES by Emerald



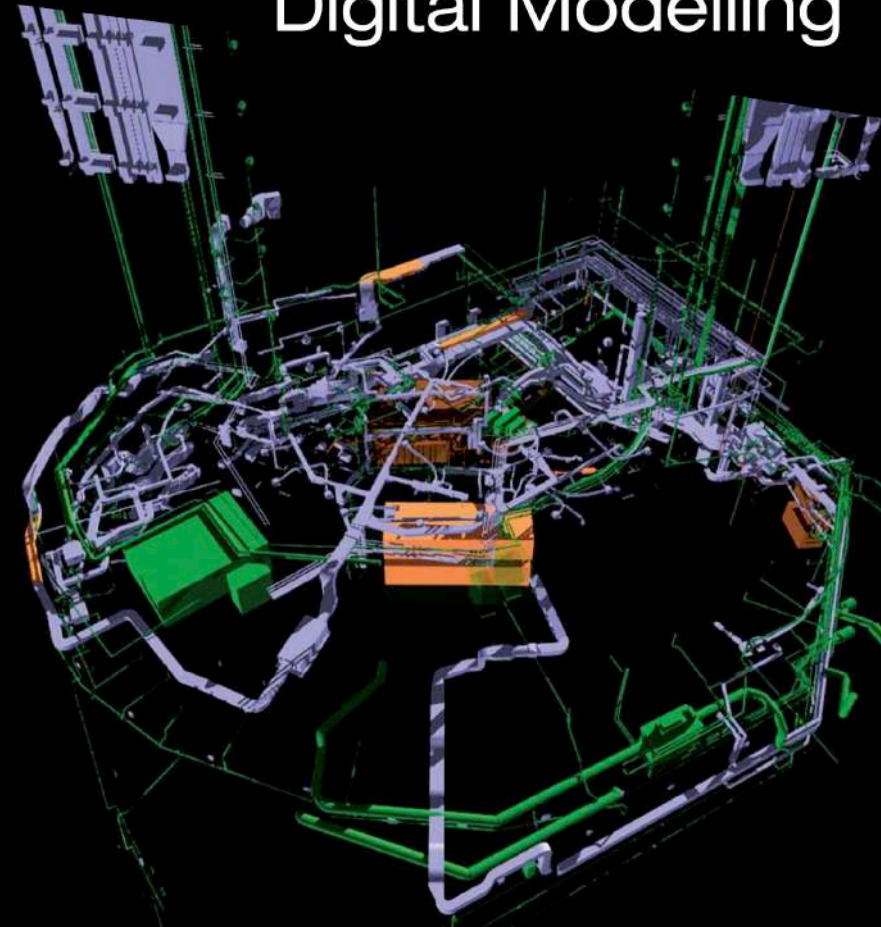


Melbourne





National Guidelines for Digital Modelling



- PhD The University of Reading, UK
- RMIT Manager for the BIM National Guidelines, Australia
- Research Leader at the CRC Construction Innovation
- Professional Certificate by Stanford University, USA

BIM4FM: Information based Design, Construction and Operation

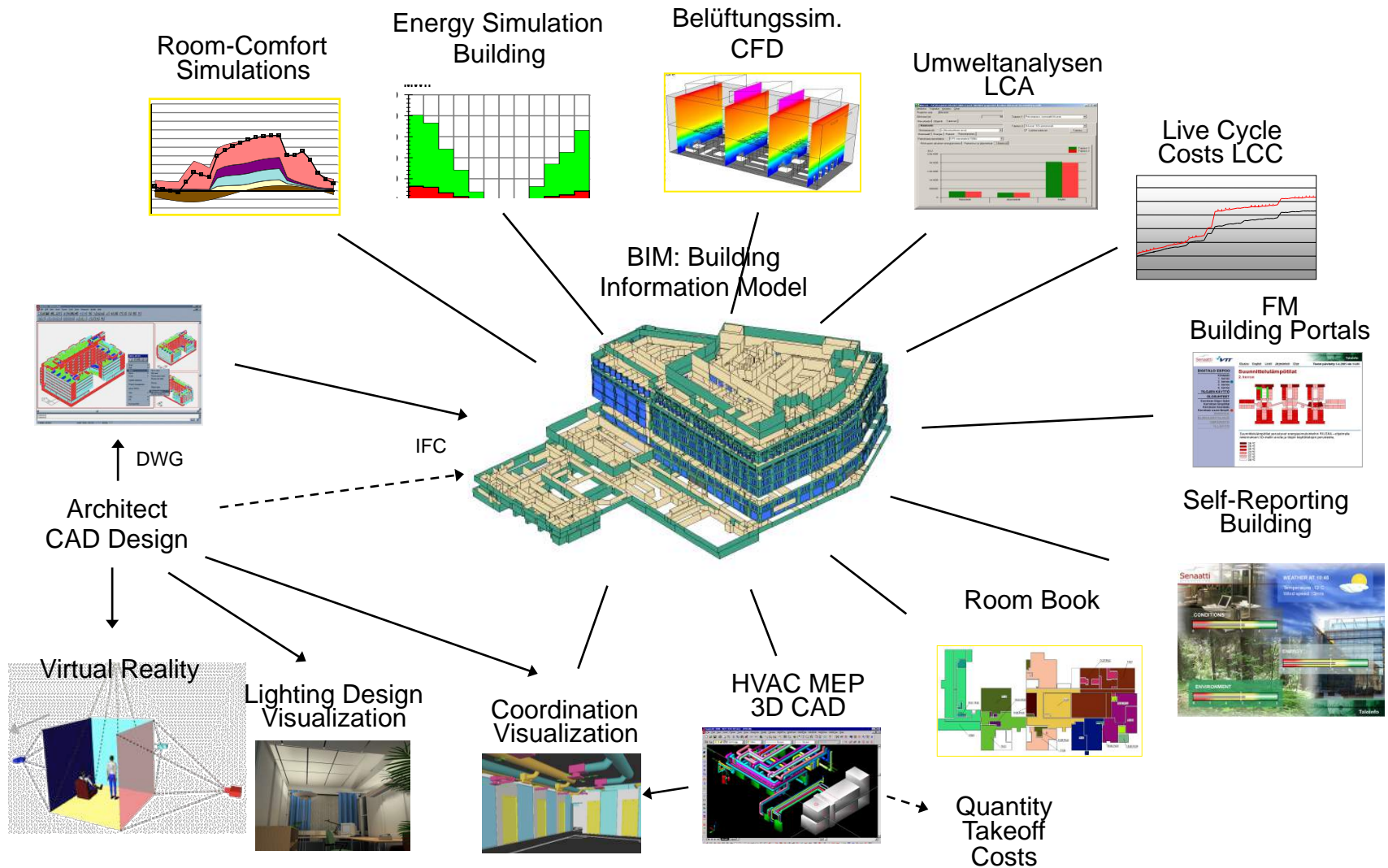
Prof. Dr. Ing. Manfred Breit

Institute for 4D-Technologies
University of Applied Sciences Northwestern Switzerland

Head of the Further Education Program
« Digitales Bauen - Digital AECO »

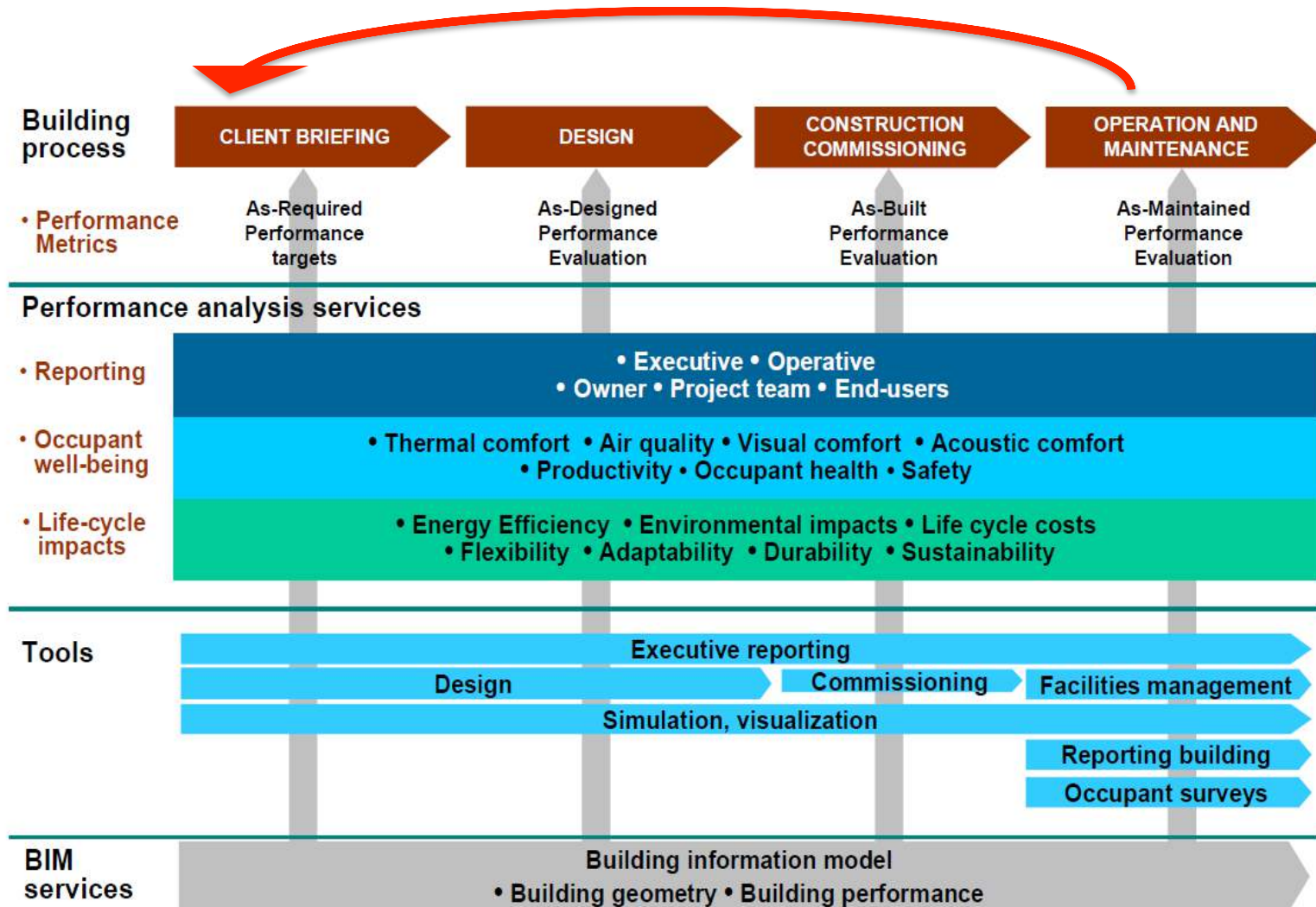


Use of Integrated Building Information



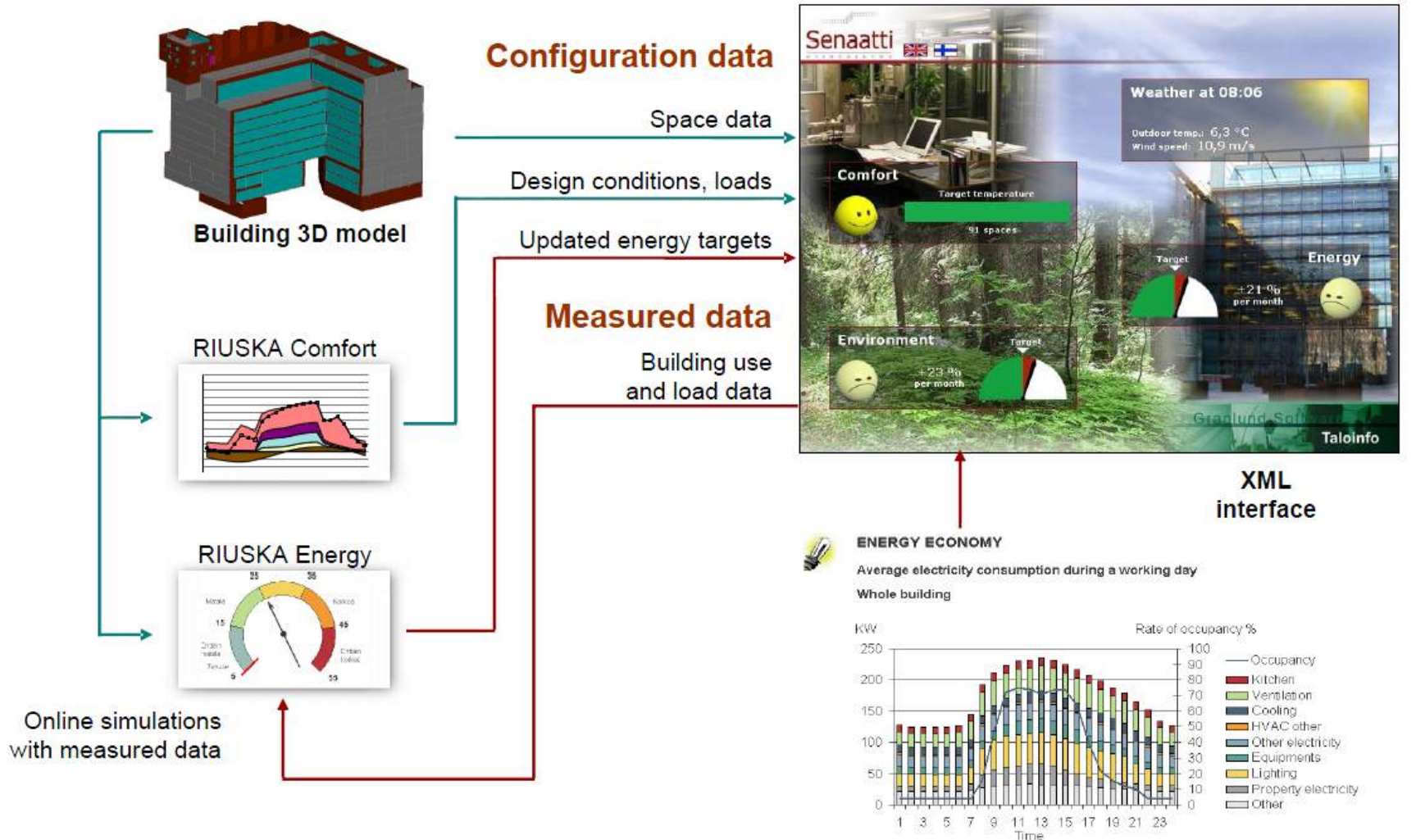
Source: Granlund

BIM supported Processes and Business Models



Source: Granlund

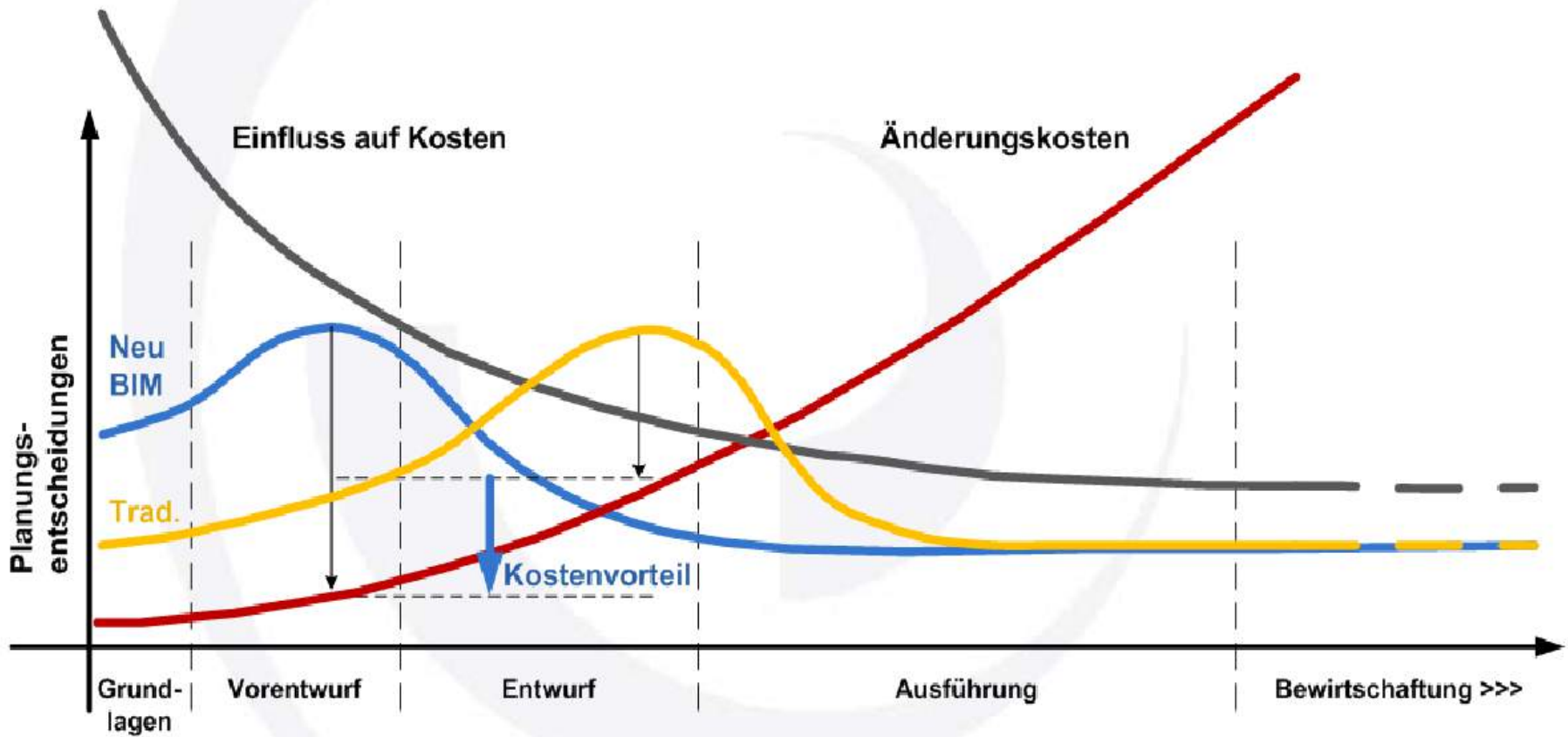
Self-Reporting Buildings – Link BIM with Business Model



Online simulations with measured data

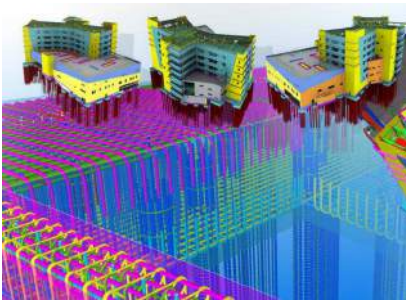
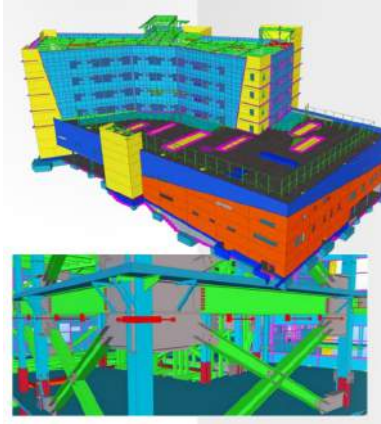
Source: Granlund

Principles of BIM



Source: buildingSmart

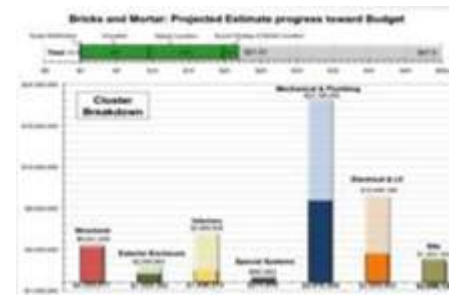
Case Study: Sutter Medical Center Castro Valley



IPD BIM enabled collaboration



Process Metrics



Target Costing



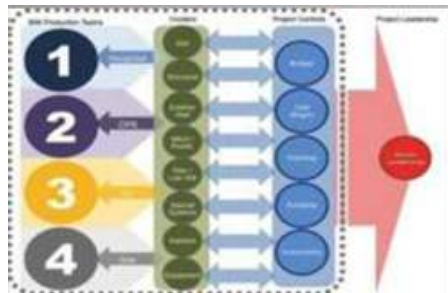
Design Assist



Virtual Building Tools



Design the «Big Room»



Virtual Company

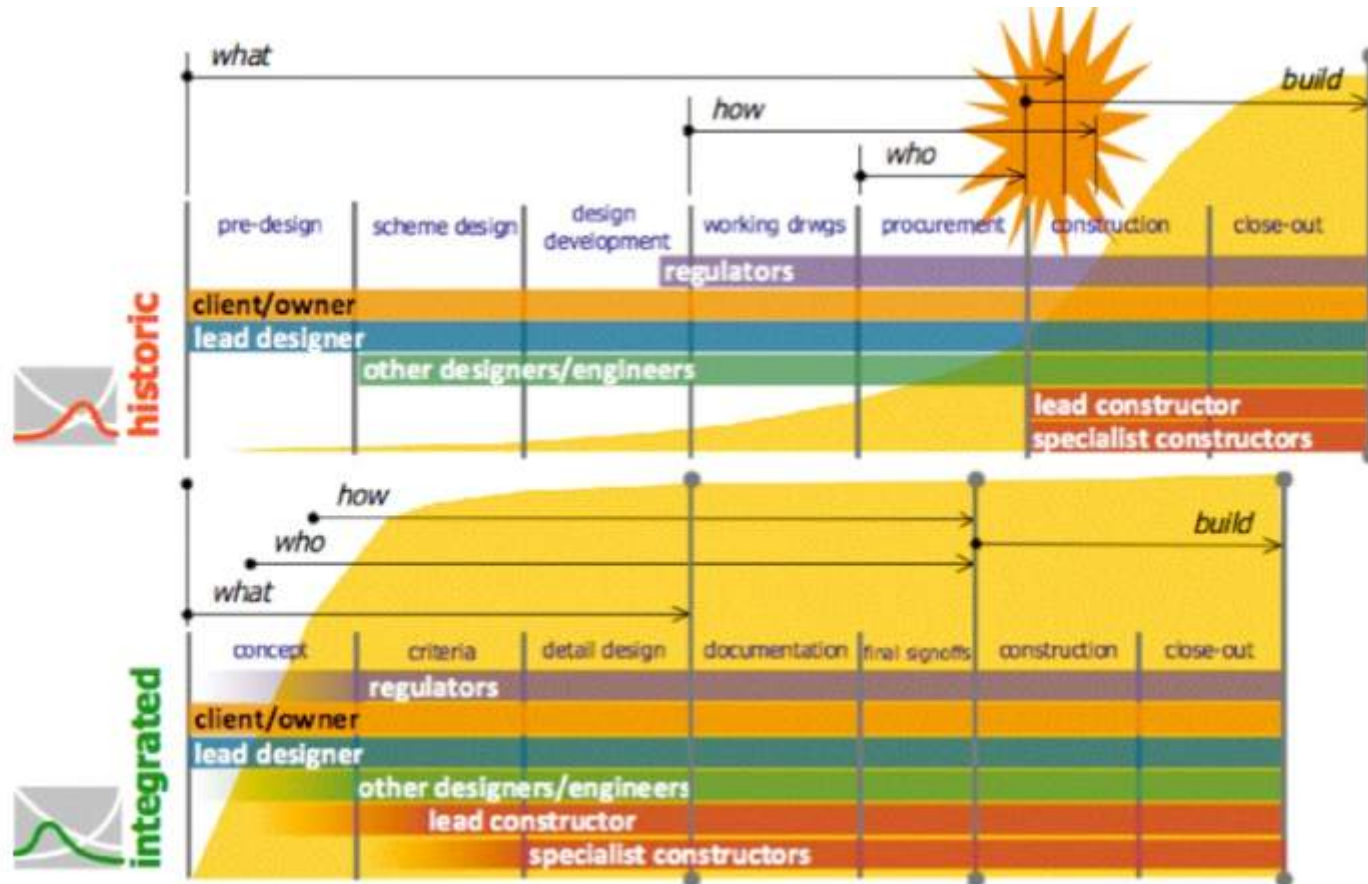


Collaborative Planning



«Big Room»

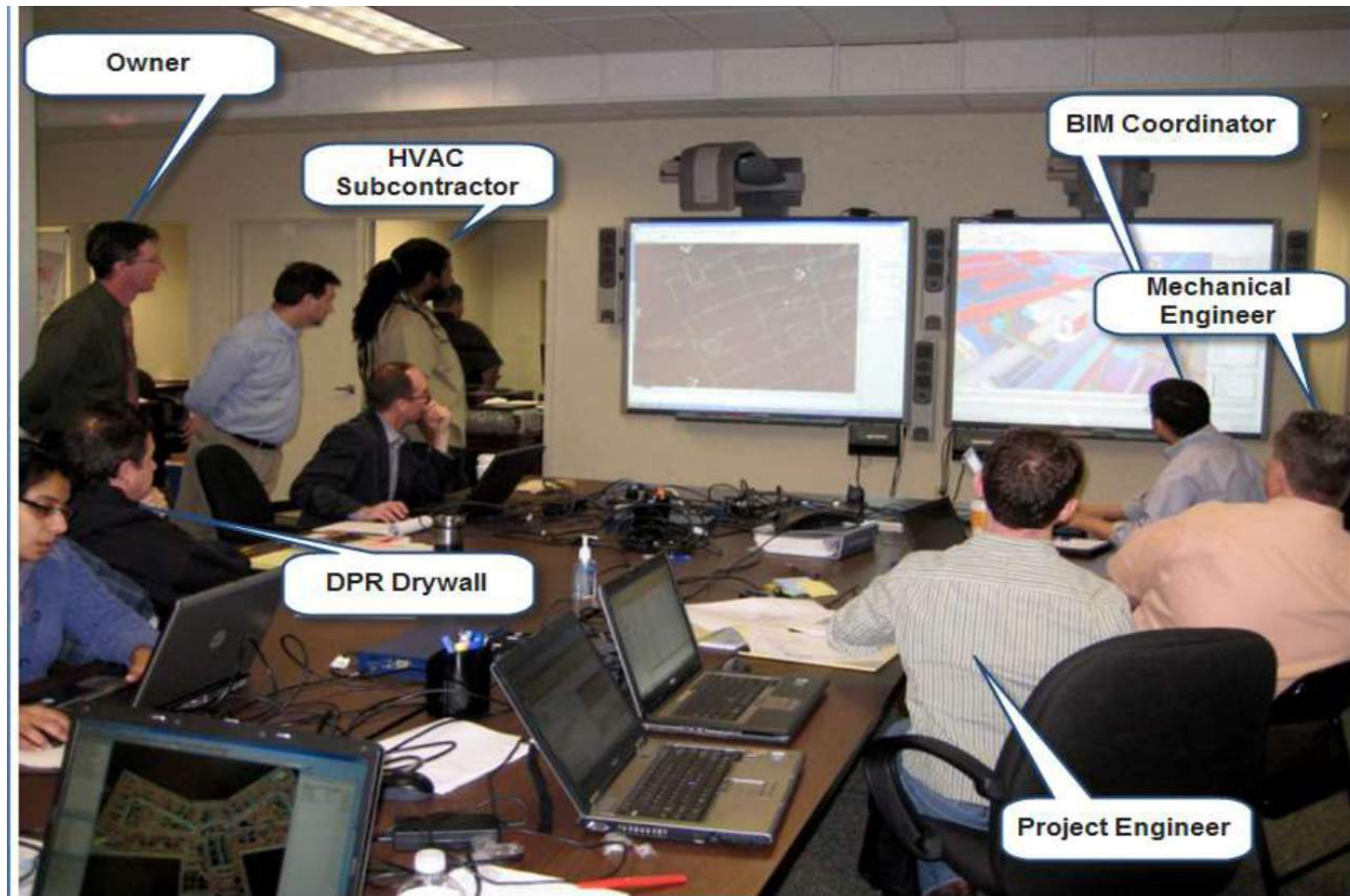
Comparison integrated and historic project delivery time lines



Source: Mossman, Ballard, Pasquire

Collaborative Planning with BIM

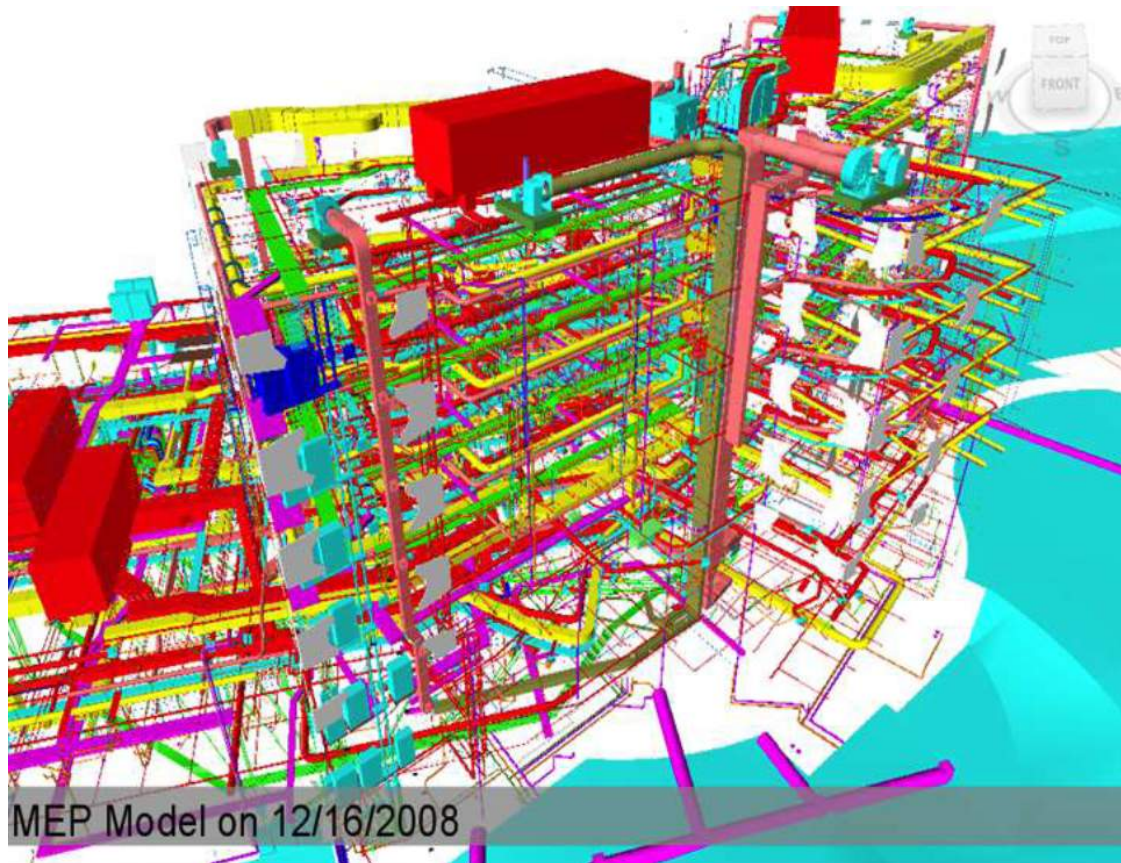
Case Study: Sutter Medical Center Castro Valley



Quelle: CIFE

Everything above 1.0 cm was modeled in 3D BIM

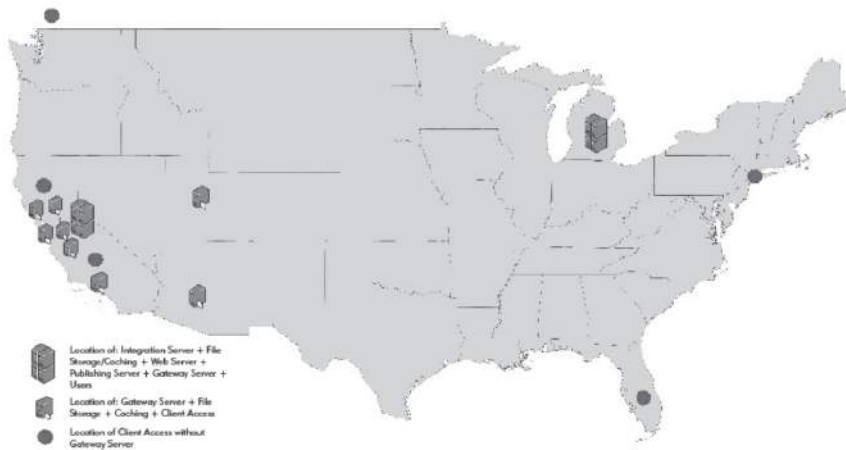
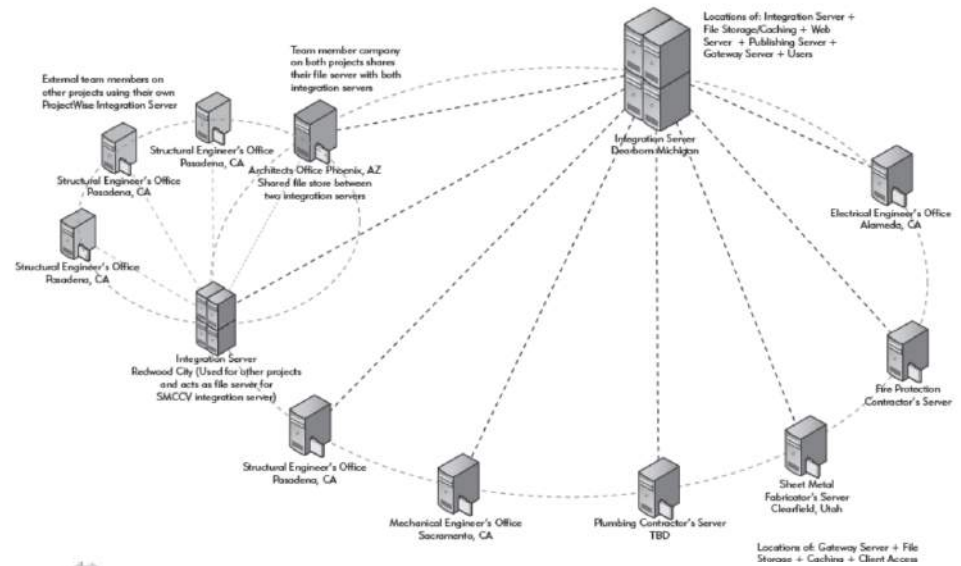
Case Study: Sutter Medical Center Castro Valley



Quelle: CIFE

Federated Modelmanagement

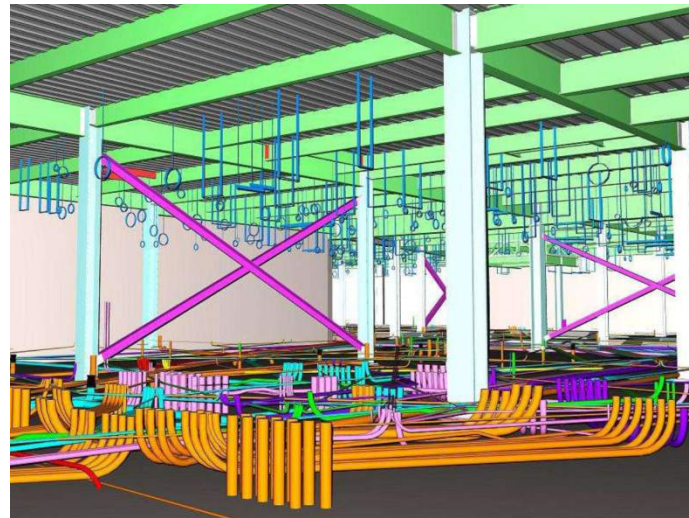
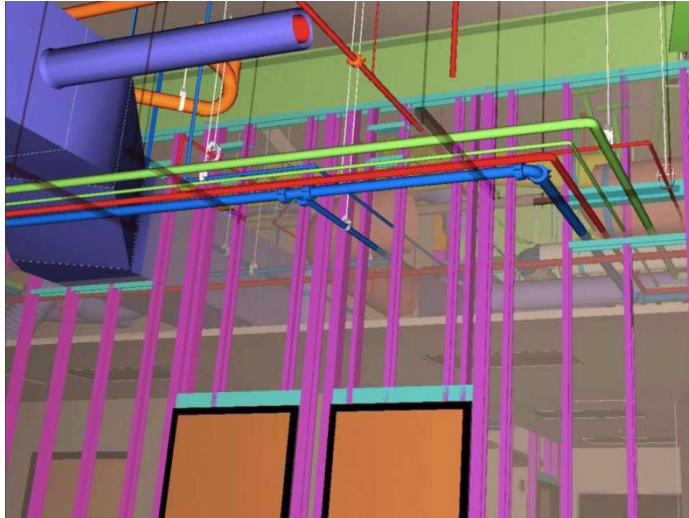
Case Study: Sutter Medical Center Castro Valley



Source: BIM Handbook

Construction based on the planned and coordinated BIM

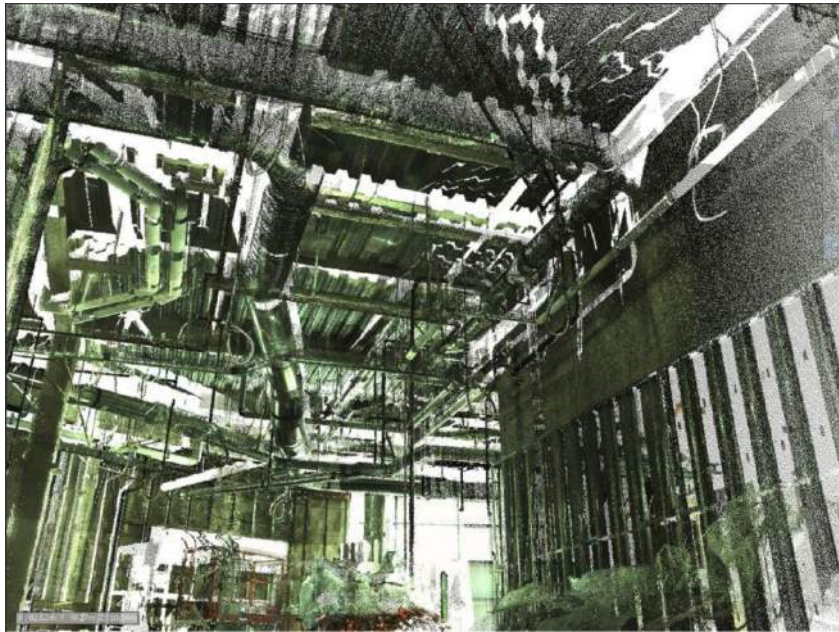
Case Study: Sutter Medical Center Castro Valley



Laser Scanning

Check actual versus planned – Interaction BIM and Site

Case Study: Sutter Medical Center Castro Valley



Quelle: CIFE

Transparent Performance Metrics

Case Study: Sutter Medical Center Castro Valley

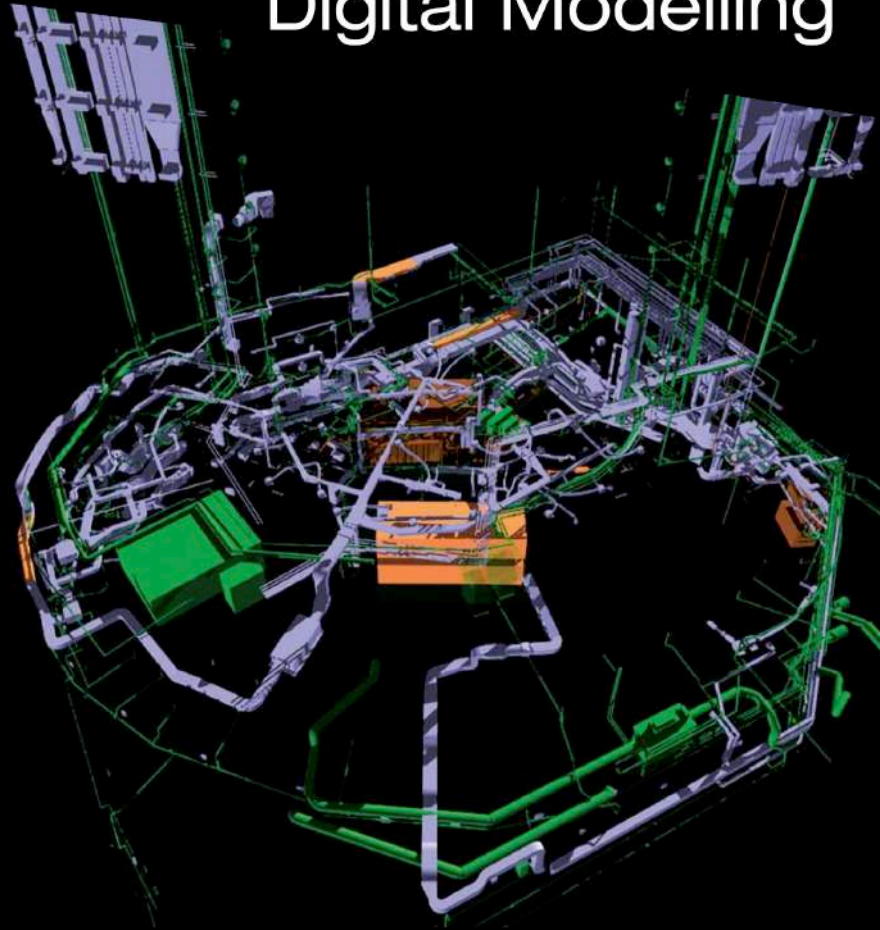


Quelle: CIFE



Royal Children Hospital Melbourne

National Guidelines for Digital Modelling



WHERE WE WERE **WHERE WE ARE** **NEXT STEP** **WHERE WE ARE GOING**

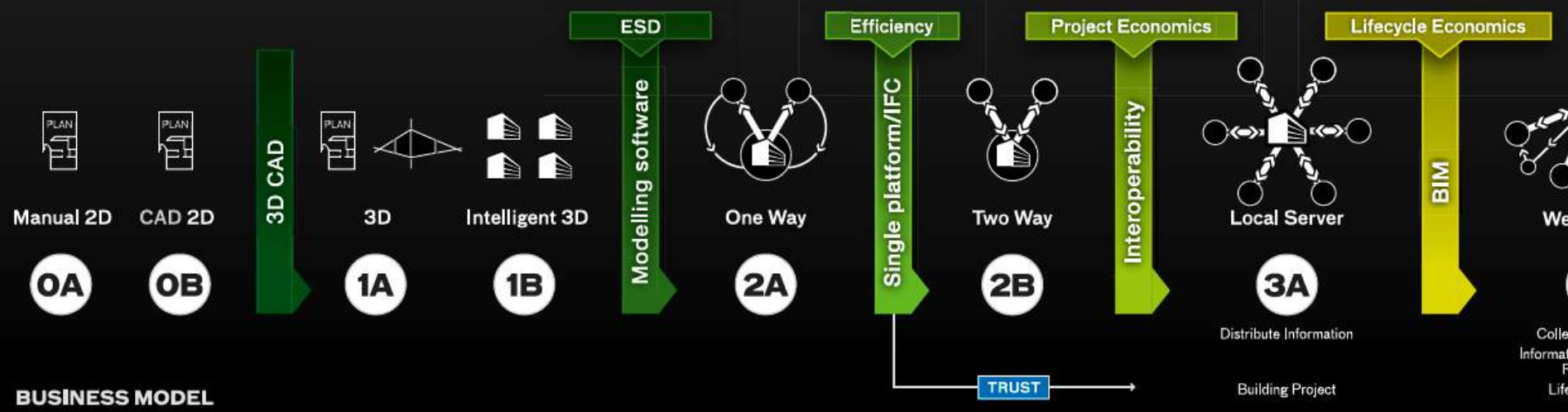
0 - 2D
Manual and CAD based (2D or 3D)

1 - MODELLING
Single-disciplinary use of object-based 3D modelling software within one discipline

2 - COLLABORATION
Sharing of object-based models between two or more disciplines

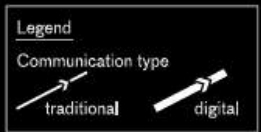
3 - INTEGRATION
Integration of several multi-disciplinary models using model servers of other network-based technologies

Representation **Prototype** **Full Information Capture**



BUSINESS MODEL

ISOLATED **COLLABORATIVE** **INTEGRATED**



Australian Institute of Architects



BIM in Practice Papers

BIM

BUILDING INFORMATION MODELING
**PLANNING GUIDE FOR
 FACILITY OWNERS**

A buildingSMART alliance™ Project
**VERSION 1.0
 APRIL 2012**
bim.psu.edu

Sponsored by:
 The Charles Pankow Foundation
 US DoD Military Health System
 Kaiser Permanente
 US Department of Veteran Affairs
 Penn State Office of Physical Plant
 The Partnership for Achieving Construction Excellence



Developed by
**The Computer Integrated Construction
 Research Program**
 DEPARTMENT OF ARCHITECTURAL ENGINEERING



BIM and the Building Lifecycle

Cost to the building lifecycle

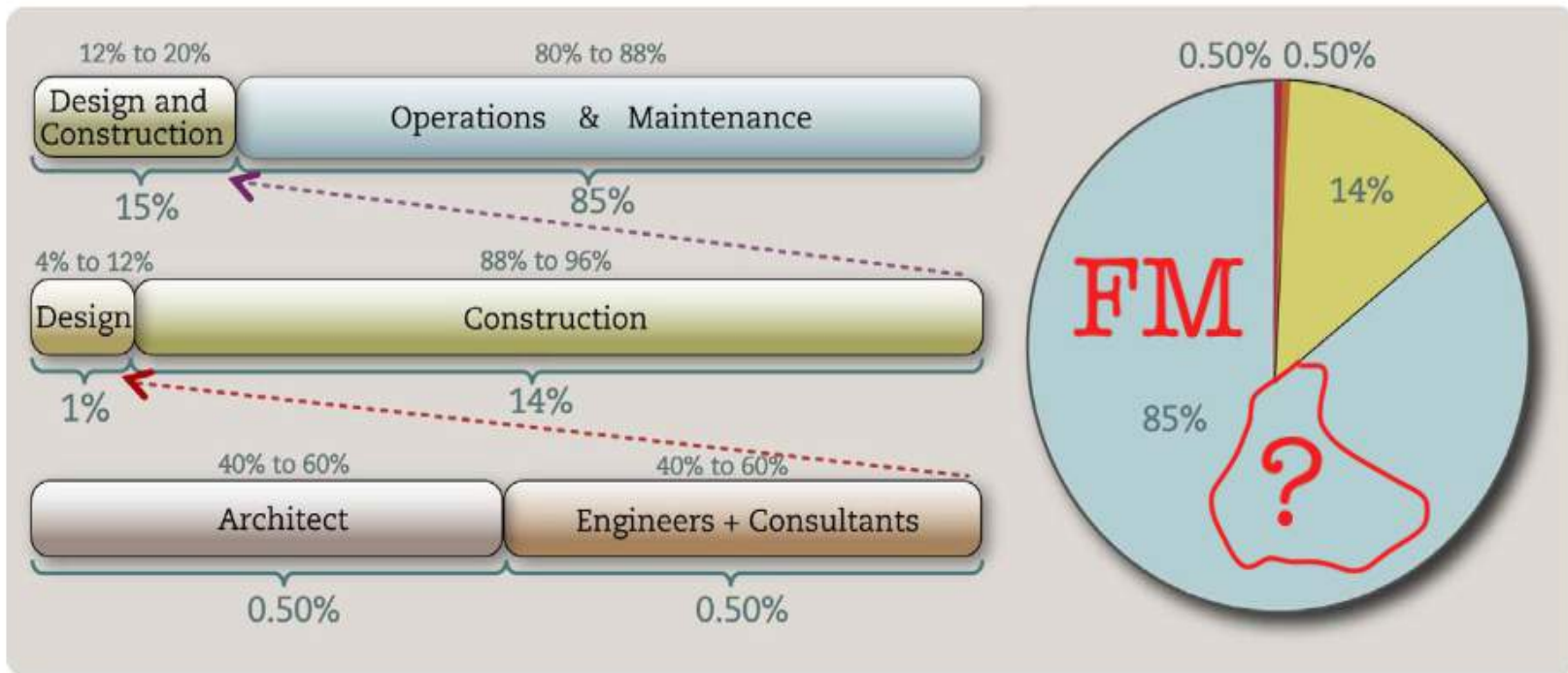
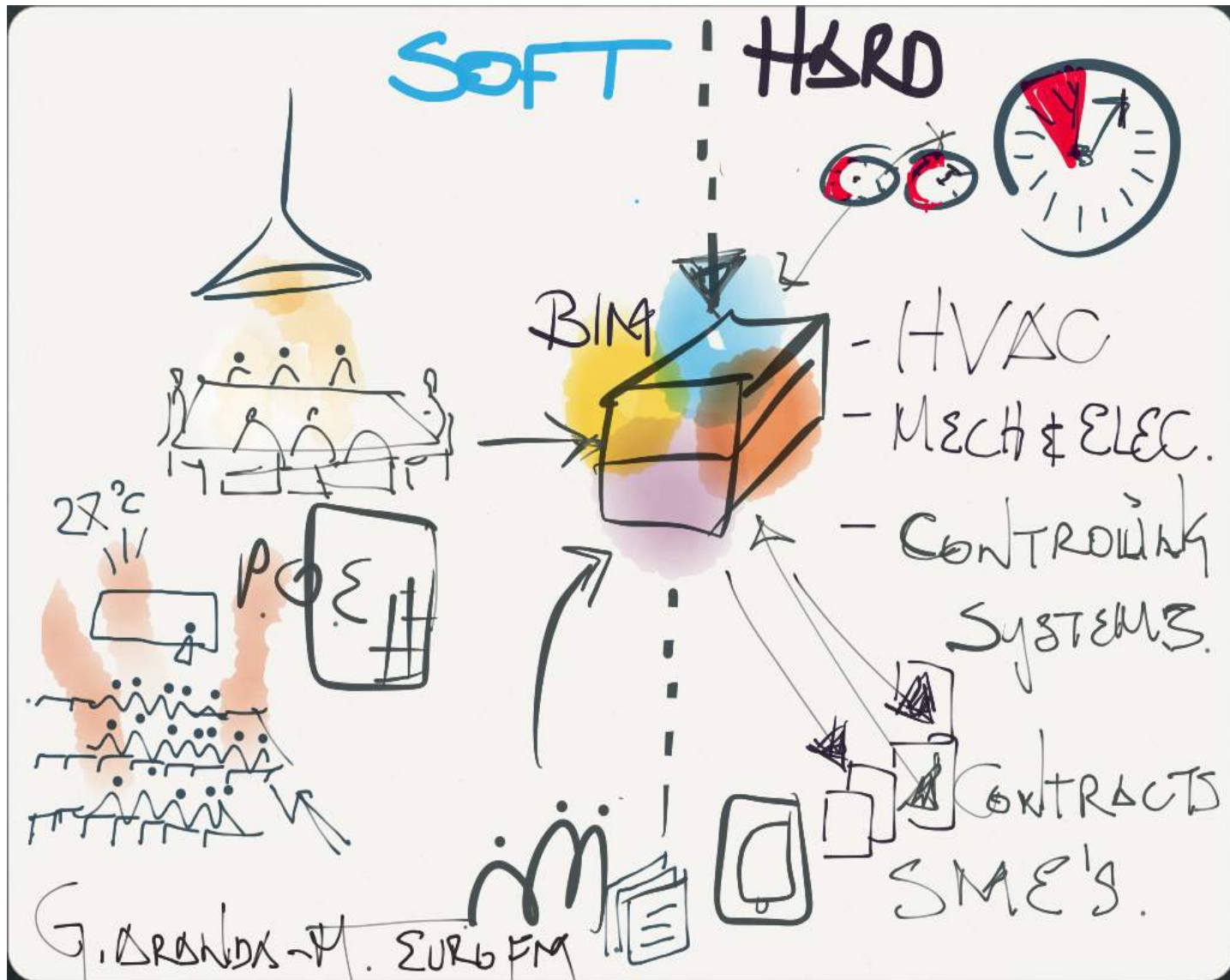
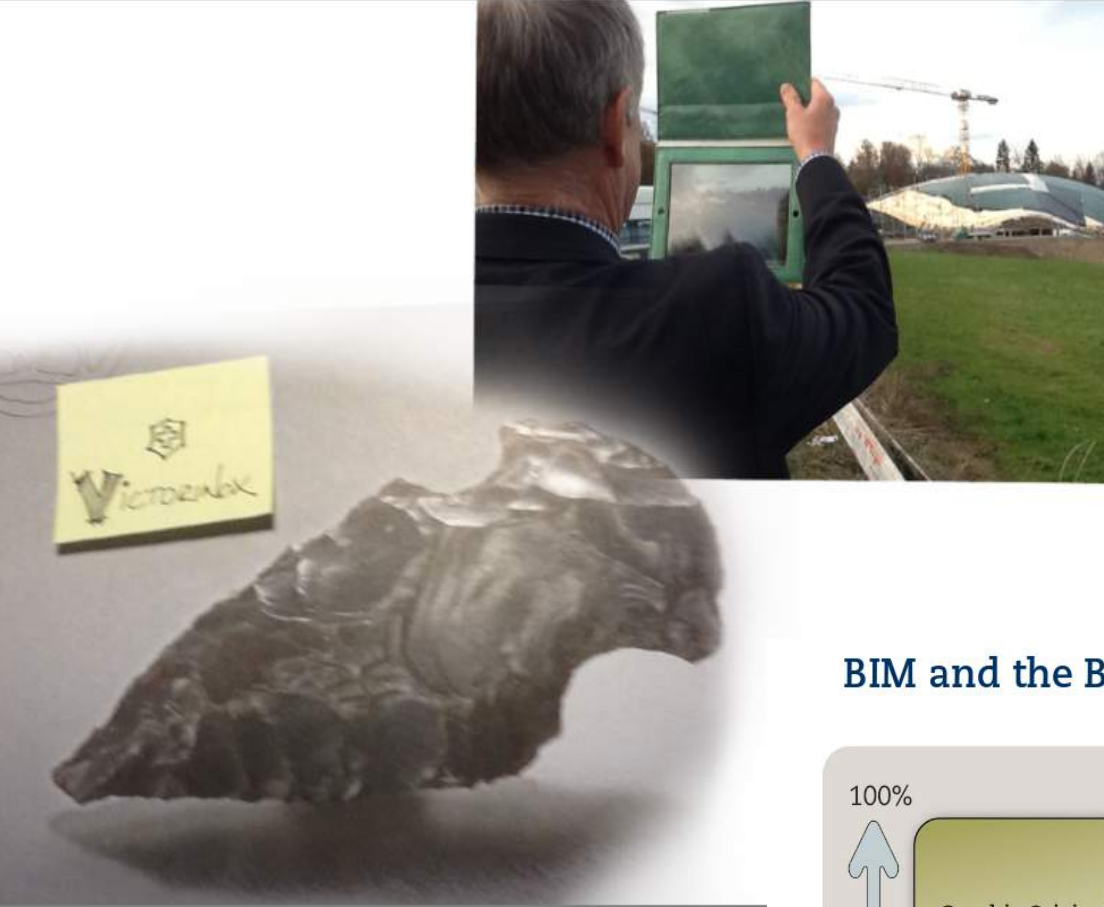


Image AEC Connect after: Marty Chobot, FM Systems & Chuck Mies, Autodesk

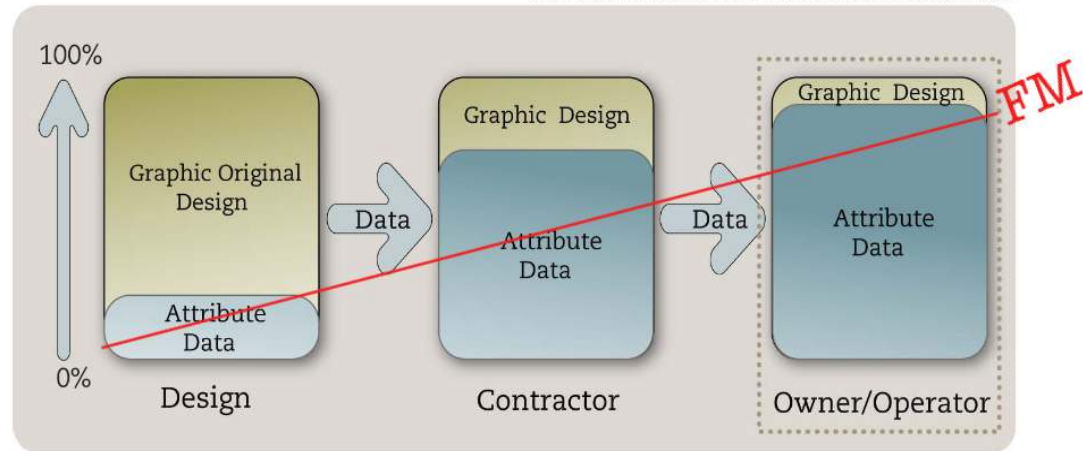






BIM and the Building Lifecycle

Image AEC Connect after: Marty Chobot, FM Systems & Chuck Mies, Autodesk



During Design, the Value of BIM sits mostly with the Geometry

Contractors see the Value of BIM Very Differently

Owners see the Value of BIM Very Differently

BIM



Viewer



iRhino 3D



BIMx



IPM Viewer



3D Cities



Structural View



3DVIA Mobile



Les Jacobins



AutoCAD WS



SightSpace



MonoVu



BIM 360 Glue



Catch



Genius Scan



Dropbox



SketchBook



Adobe Reader



Paper



Idea Sketch



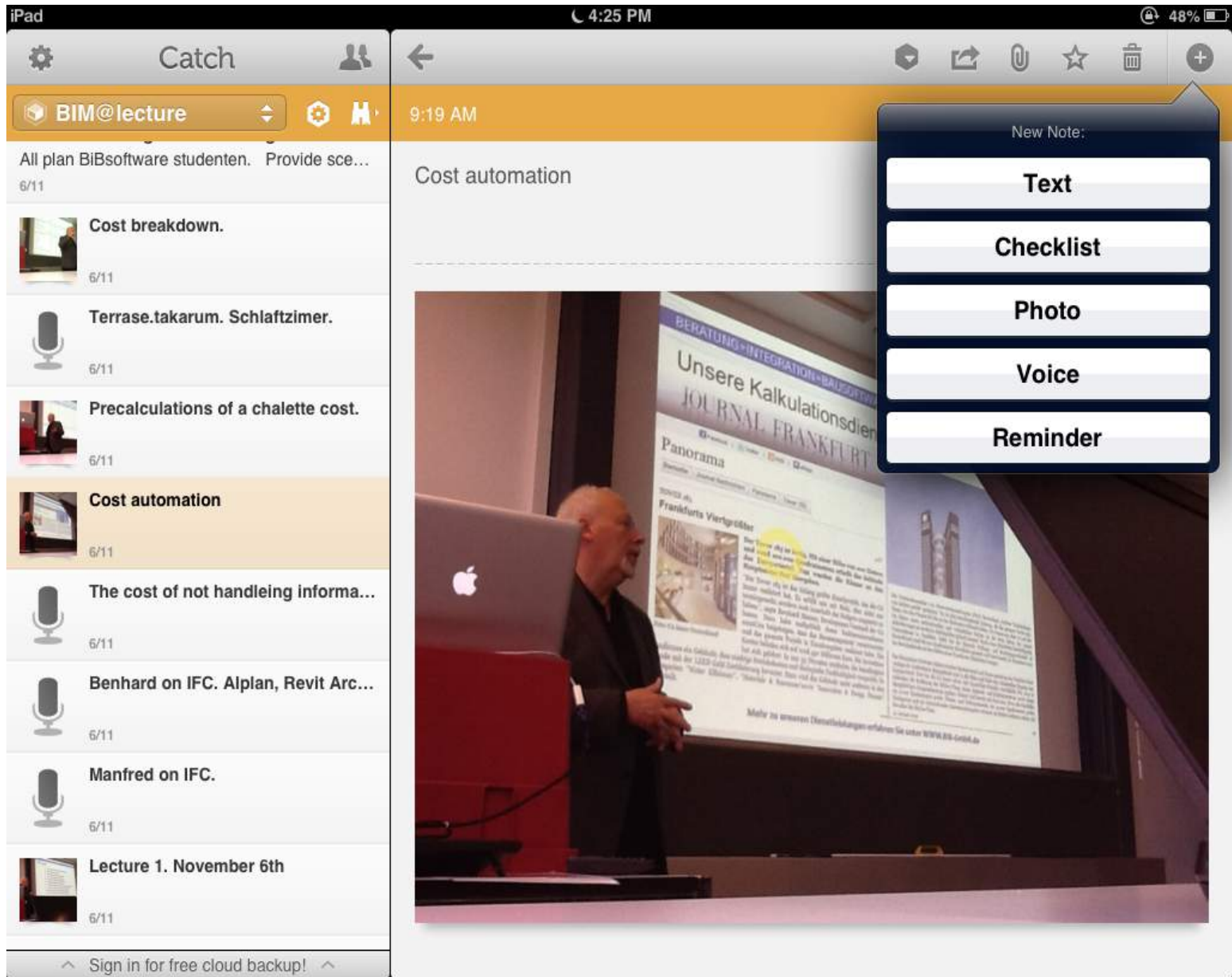
ExpenseFree

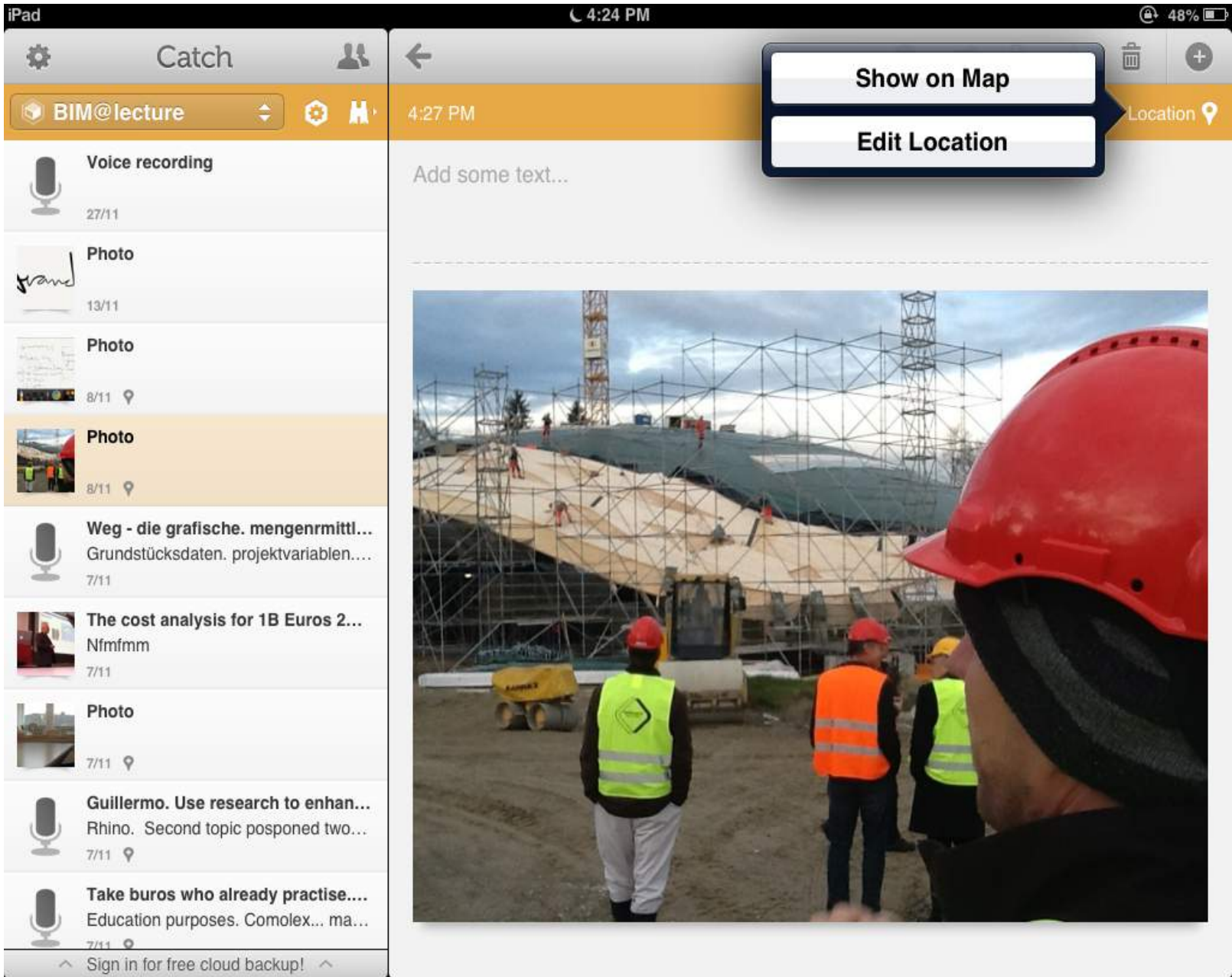


GRAPH









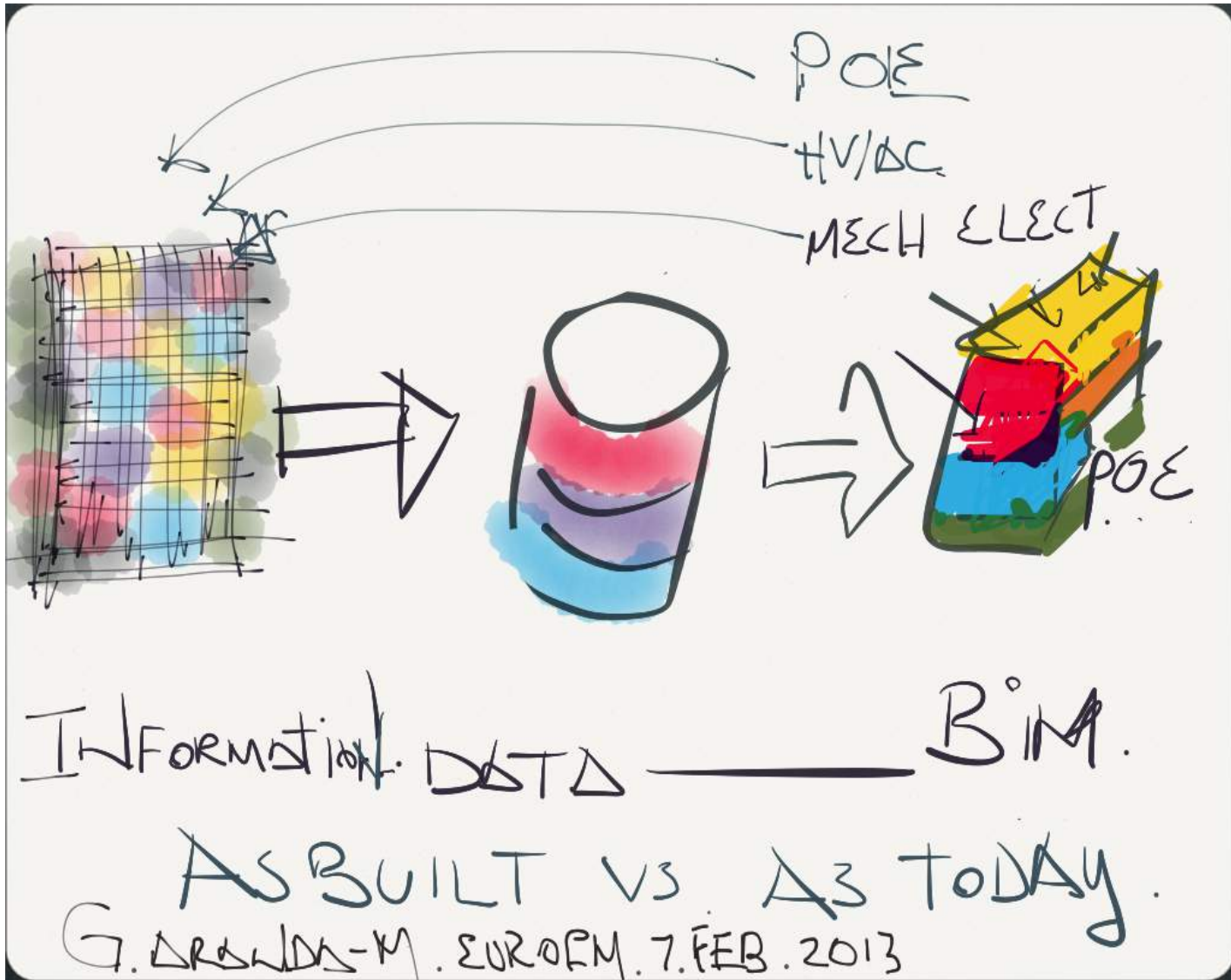
Show on Map

Edit Location

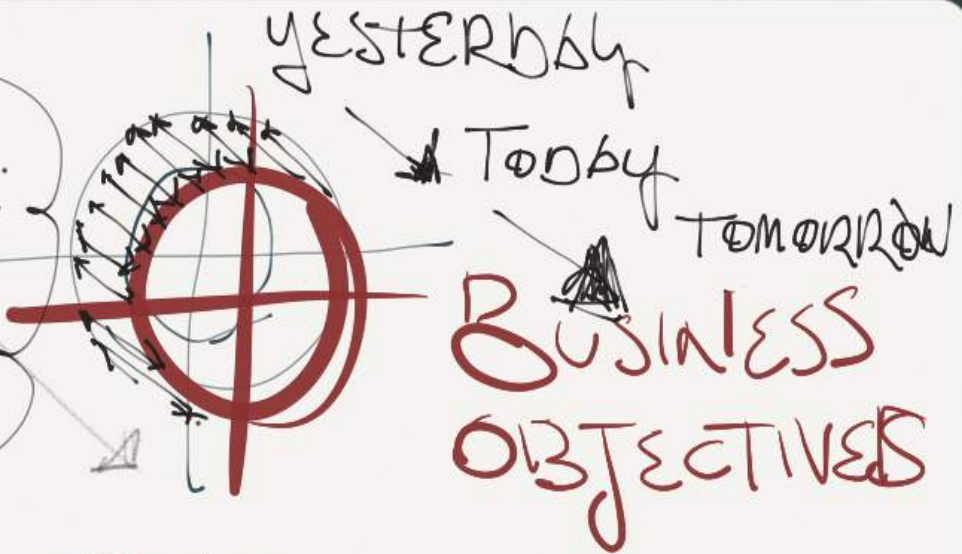
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Add some text...





ALIGNING
BUSINESS
OBJECTIVES



DAILY FM TASKS

RECORDED

— EURO-FM —

G. ARANDA M.
17 FEB. 2013



Image courtesy: Australian Design Review

A/Prof Dr Guillermo Aranda-Mena - RMIT Melbourne, Au.
Prof. Dr. Manfred Breit – FHNW Switzerland, CH
© 2013

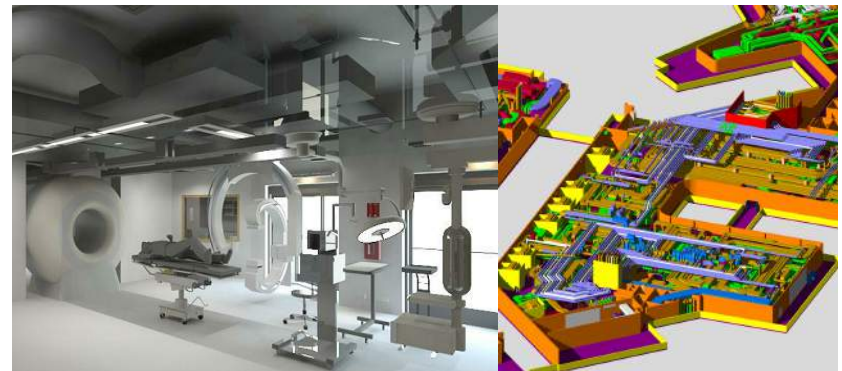
Case Study 2: The Royal Children Hospital Melbourne

The Facts:

Drivers and enablers for
a 1 billion AusDolls Hospital
procured under

Public Private Partnership with a
25+ years Government concession
period to private sector operations
and **FM**.

Royal Children's Hospital IMRIS, Melbourne



Market Sector: Health

Location:

Melbourne, VIC

Office:

Melbourne, VIC

Models:

Designed in: Revit MEP 2010
Developed in: Navisworks 2010

Services:

- Mechanical
- Electrical
- Hydraulics
- Fire Protection
- Fire Engineering
- ESD
- Security
- Specialist Lighting
- Vertical Transportation

Description:

In September 2007, NDY was appointed as part of the successful consortium to build the new Royal Children's Hospital in Parkville. The consortium comprises Babcock and Brown as sponsors, Bovis Lend Lease as builder, Spottless Group as facilities manager and architects Billard Leece, Bates Smart and HKS (US).

The new hospital is being delivered as a PPP under the State Government's Partnerships Victoria model and is expected to cost around \$850 million. It is due to open in 2011.

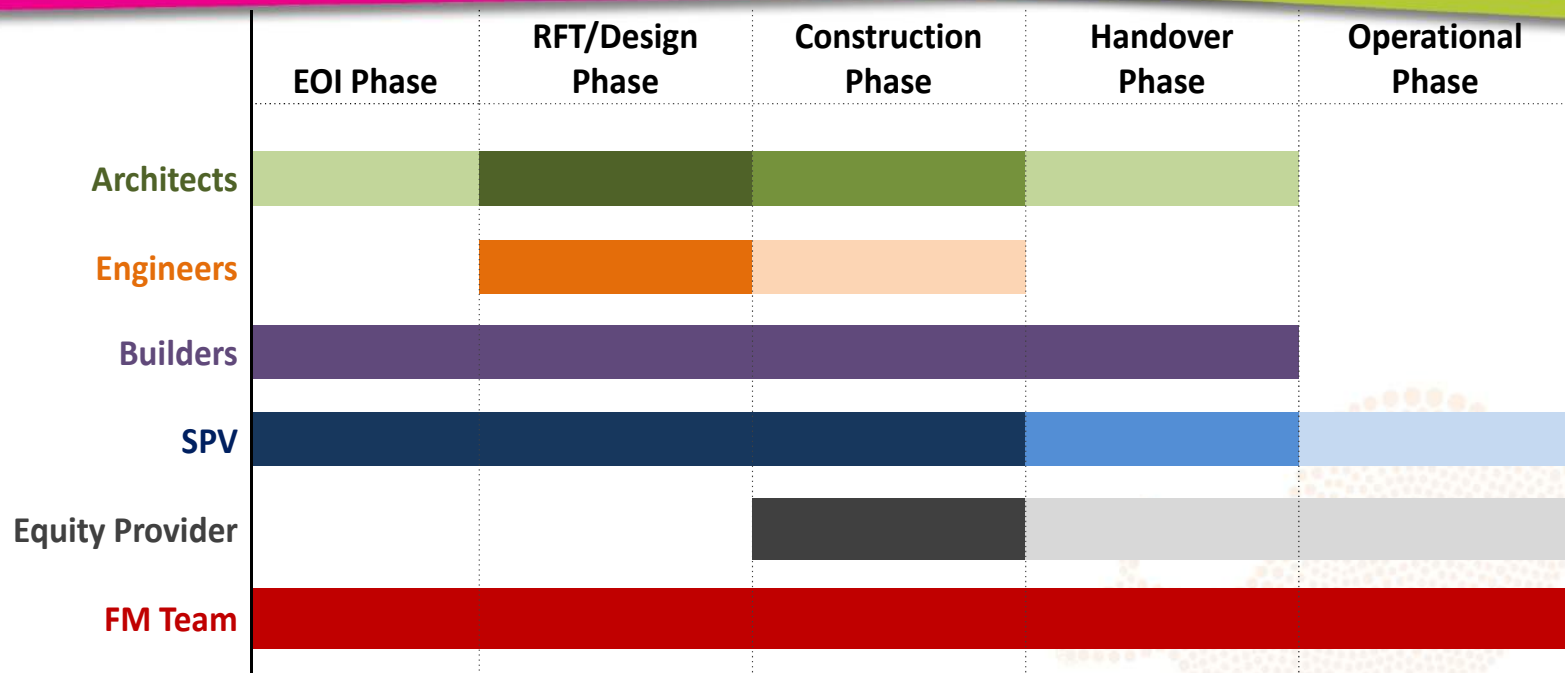
It is one of the largest hospital projects undertaken in Australia. Some of the features include:

- Aiming to be Australia's first 5 star Green Star hospital
- A 45% reduction in greenhouse gas through the use of energy efficient lighting, cooling and heating
- The inclusion of a 2.8MW gas fired co-generation plant and solar panels
- Chilled beams in the majority of non-patient areas
- Low or non volatile compounds in carpets, vinyls and paints
- Rainwater collection from 75% of new roof areas with storage tanks to collect 85% of run off
- Blackwater treatment plant for reuse of wastewater
- Zero net loss of parkland with the removal of the existing hospital.

NDY was instrumental in providing design input during the bid phase of the project, demonstrating our ability and commitment to assist the financier and builder during this crucial stage.

This is one of the biggest projects undertaken by the Melbourne office of NDY and has driven the use of some innovative BIM technologies.

FM role through the Project



ACTIVE

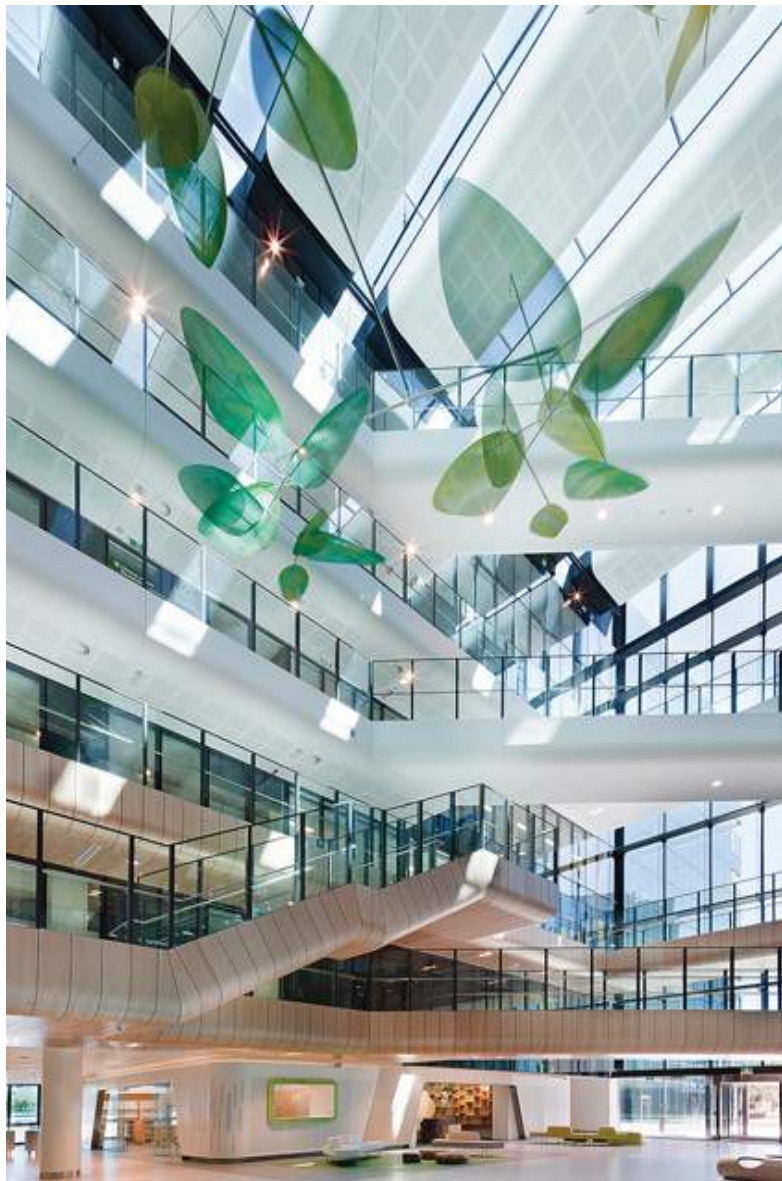
PASSIVE

RMIT University - Guillermo Aranda-Mena



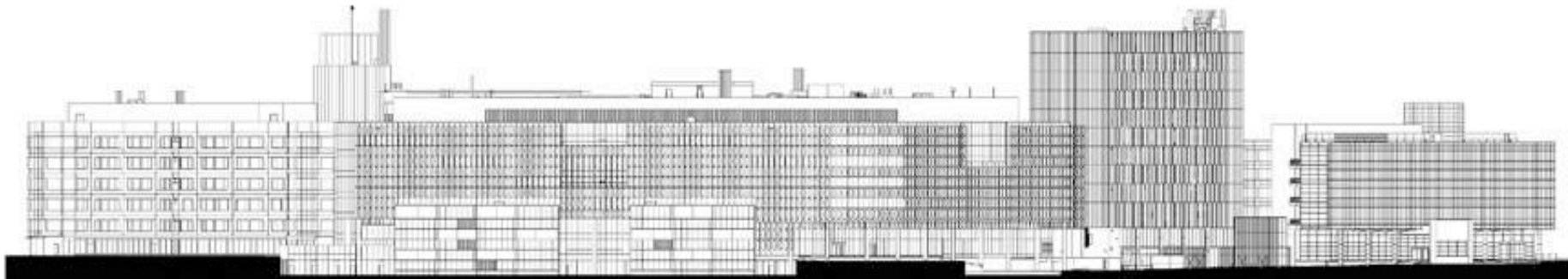
Image courtesy: Australian Design Review

A/Prof Dr Guillermo Aranda-Mena - RMIT Melbourne, Au.
Prof. Dr. Manfred Breit – FHNW Switzerland,, CH
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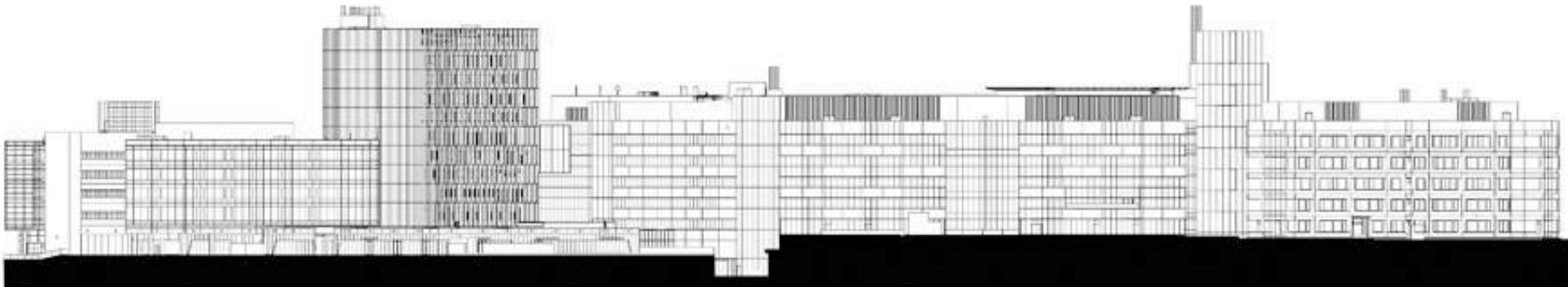








SOUTH ELEVATION



EAST ELEVATION

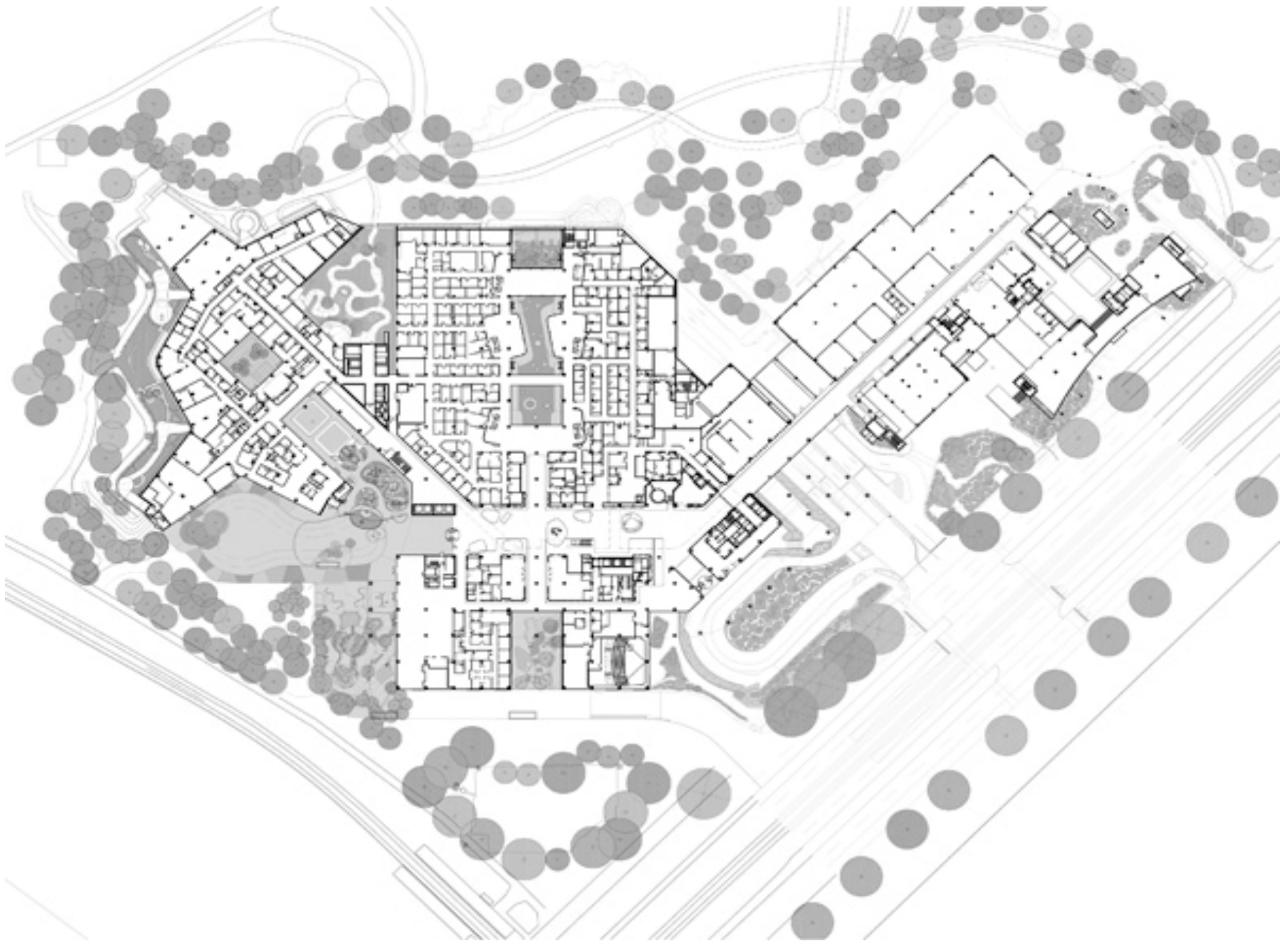




Image courtesy: Australian Design Review

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Impact of BIM and Process on Project Performance

Case Study: SERA Architects 2012

INTEGRATED PROJECT DELIVERY HOW WERE THESE METRICS CALCULATED?

1. Data from 20 past & present SERA projects were analyzed in 3 categories:

- **TYPE A** – two-dimensional drafting, little collaboration
- **TYPE B** – building designed with BIM, some collaboration
- **TYPE C** – all parties using BIM, high level of collaboration, some co-located work environment

2. The projects were normalized by square feet.

This allowed for a comparison of projects of different sizes and complexities.

3. In cases where data was unavailable internally,
we sought information from our industry partners.

EDITH GREEN-WENDELL WYATT FEDERAL BUILDING MODERNIZATION
CIFE SUMMER PROGRAM

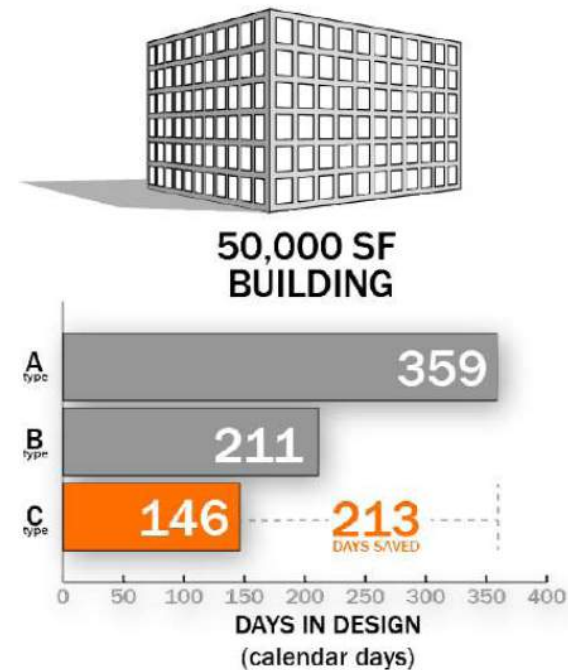
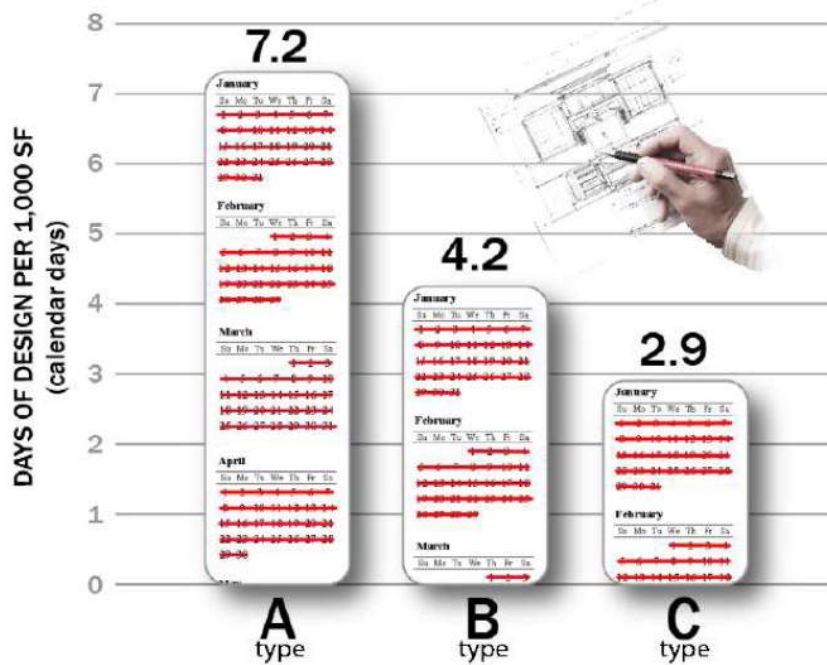
JUNE 20, 2012

Quelle: CIFE

Impact of BIM and Process on Project Performance

Case Study: SERA Architects 2012

REDUCTION IN DESIGN TIME

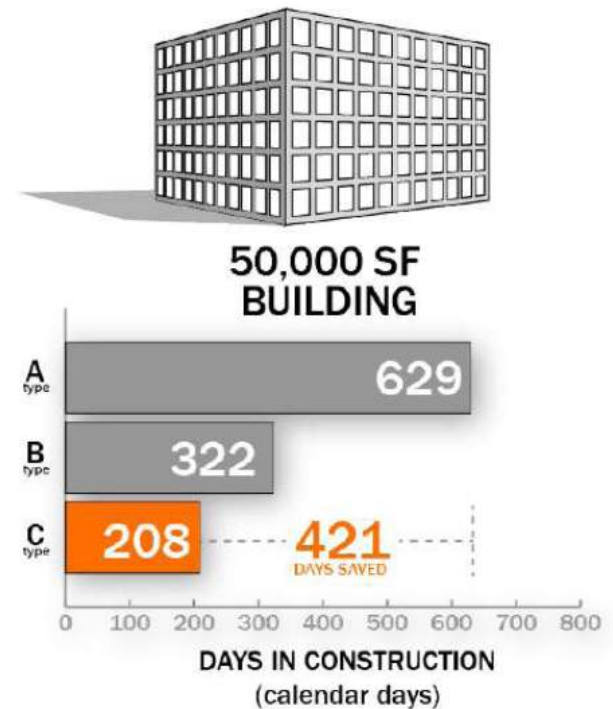
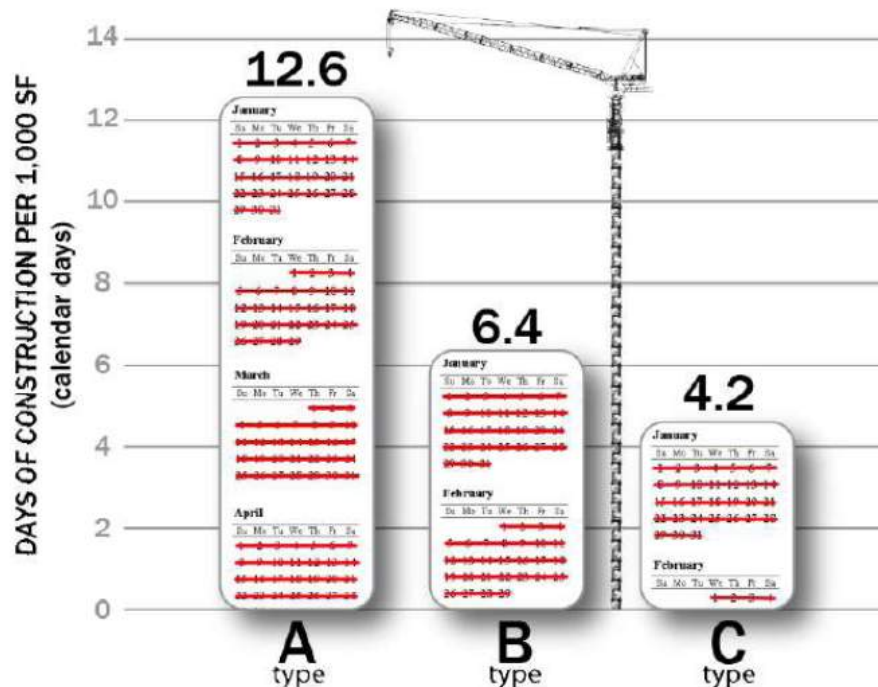


Quelle: CIFE

Impact of BIM and Process on Project Performance

Case Study: SERA Architects 2012

REDUCTION IN CONSTRUCTION TIME



Quelle: CIFE

MAS Digitales Bauen (dBAU) «Digital AECO»

Information Based Design, Planning, Construction and Operation

Curriculum

Strategic and Operative Deployment of BIM Technologies

- ❑ BIM Technologies, Potentials and Challenges
- ❑ Change of Design-, Planning- and Construction Processes
- ❑ Implementation in AECO Practice

Study Assignments focus on Industry Practice Topics and Implementation Problems



CAS Course «BIM - Potentials and Strategies»

Information Based Design, Planning, Construction and Operation



Fachhochschule Nordwestschweiz
Hochschule für Technik



Institute for
4D Technologies

- A module of the Master of Advanced Studies Curriculum «Digital AECO»
«Information Based Design, Planning, Construction and Operation»
- University of Applied Sciences Northwestern Switzerland in Cooperation with the Center für Integrated Facility Engineering der Stanford University, USA and der Zürcher Hochschule für Angewandte Wissenschaften Life Sciences + Facility Management



STANFORD
UNIVERSITY
CENTER FOR INTEGRATED
FACILITY ENGINEERING

Zürcher Hochschule
für Angewandte Wissenschaften



- The Programm in supported by buildingSMART Schweiz



MAS Digitales Bauen (dBAU) «Digital AECO»

Information Based Design, Planning, Construction and Operation

CAS dBAU 15 ECTS each

- 1.dBAU-1 Potential and Strategies Start September 2013
- 2.dBAU-2 Methods and Technologies Start March 2014
- 3.dBAU-3 Performance and Cost Management Start September 2014
- 4.Masterthesis Topic from Practice Start January 2015

Course 1 + 2 are mandatory, course 3 is arbitrary – further course will be developed with partner universities;

- Simulation / Engineering and Construction Planning
- The Digital Construction Site
- Operation and Facilities Management

MAS Digitales Bauen (dBAU) «Digital AECO»

Information Based Design, Planning, Construction and Operation



STANFORD
UNIVERSITY
CENTER FOR INTEGRATED
FACILITY ENGINEERING



Fachhochschule Nordwestschweiz
Hochschule für Technik



Institute for
4D Technologies

BIMStudy Tour – Center for Integrated Facility Engineering, Stanford University - BIM Leadership Seminar

Visit GSA PBS Office of the Chief Architect, San Francisco
BIM for Owners/Investors/Federal Administration – BIM-Incentive

Visit to Johnson Control (Building Services Technologies) - Facilities Management

Visit to DPR, Silicon Valley, IPD – Integrated Project Delivery
New Process-, Management- und Contract Models: Design to Value

BIM Leadership Seminar, CIFE, Stanford University
Analyses Industry Case Studies, Implementation Strategies, Current Research

- Frequency Index (0–10)
- Value Index (0–10)
- Impact Index (1–10)

Architect



Engineer



Contractor



Owner



Business and Marketing
Positioning for FM
professionals procuring
projects as **“Expert Client”**

What is your take?

Thank you,

A/Prof. Dr. Guillermo Aranda-Mena
Prof. Dr. Manfred Breit