BIM
Building Information…what?!

the UCL-CEGE approach

Dietmar Backes, Charles Thomson, Claudia Ramirez
Prof Nick Tyler, Dr Jan Boehm, Prof Stuart Robson, Dr David Chapman

BIM ?!

Schloss Sihlberg Zürich, Switzerland

Faro's Partnership with UCL

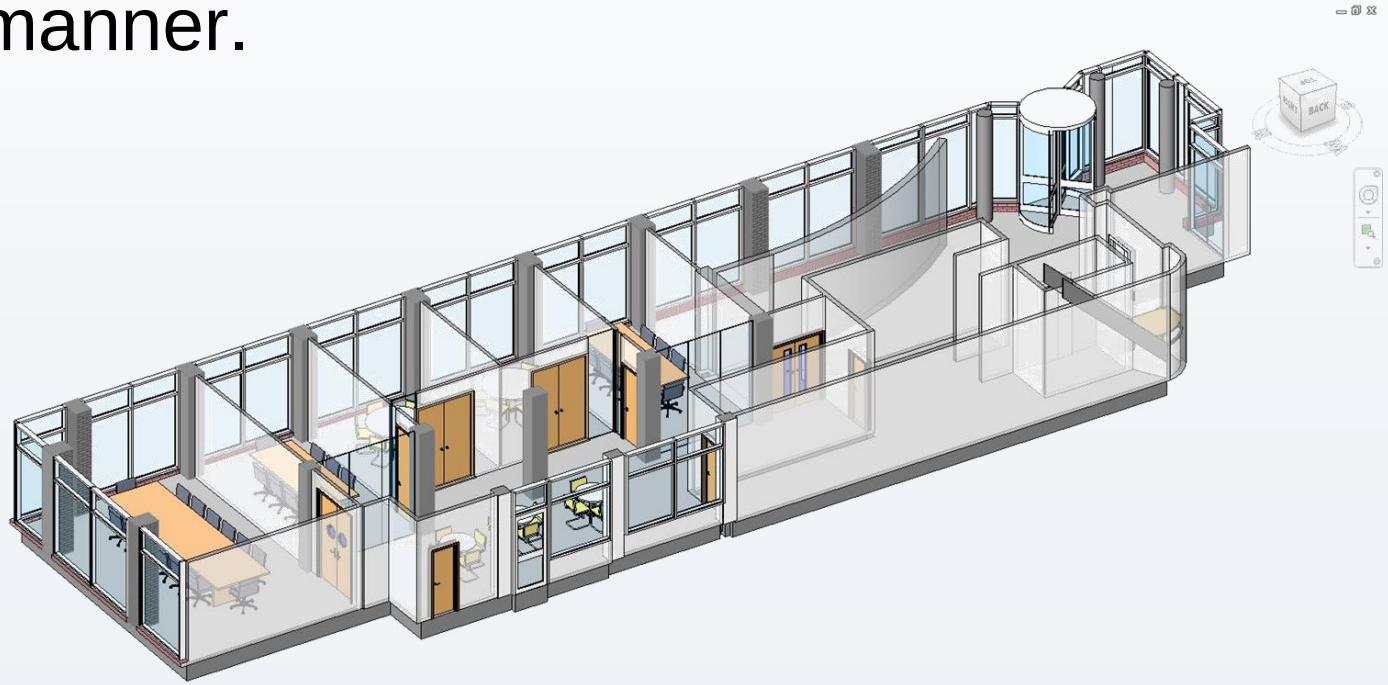
- UCL FARO collaboration agreement in 2010:
  - Widening the field of Laserscanning
  - Democratisation of PointClouds
- Three main UCL departments are involved
  - CEGE
  - Bartlett
  - Enterprise Management

So what is BIM?

- Many people are talking about it!
- Many professions embrace it!
- Many professions own it?
- Is it a Technology?
- Is it Software?
- Is it Method?
- Is it a process?
- Is it a one stop shop?

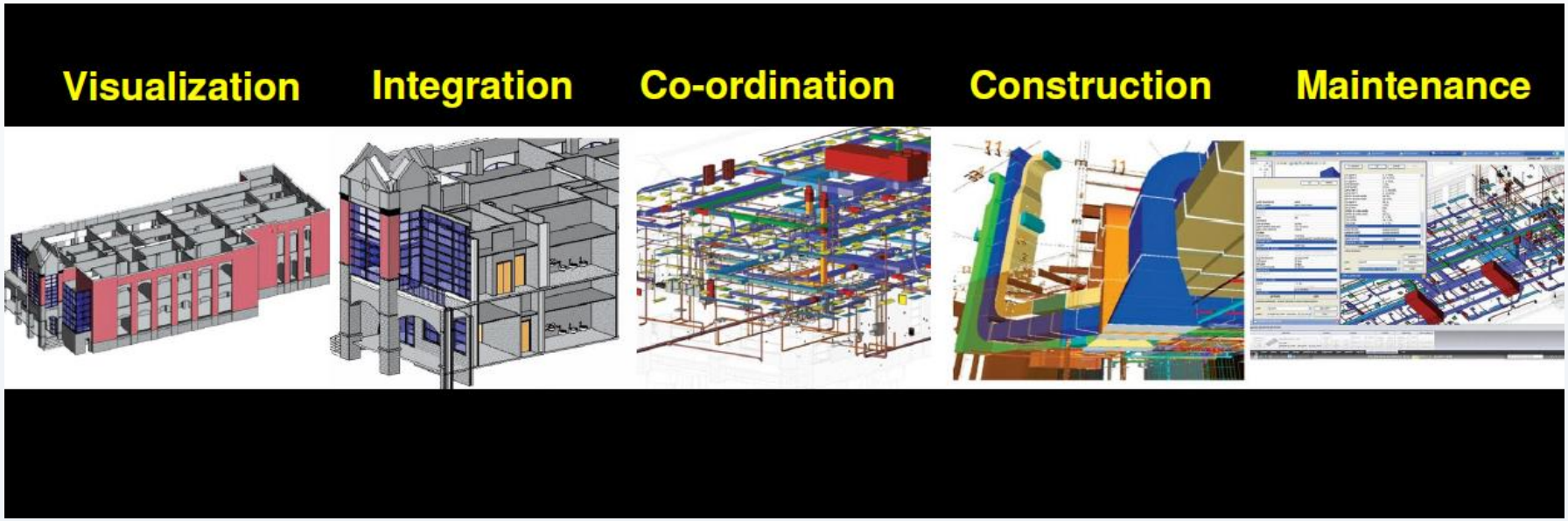
BIM

- **B**uilding **I**nformation **M**odelling/**M**anagement describes the common sense applications of current digital technology in a cooperative and inclusive manner.



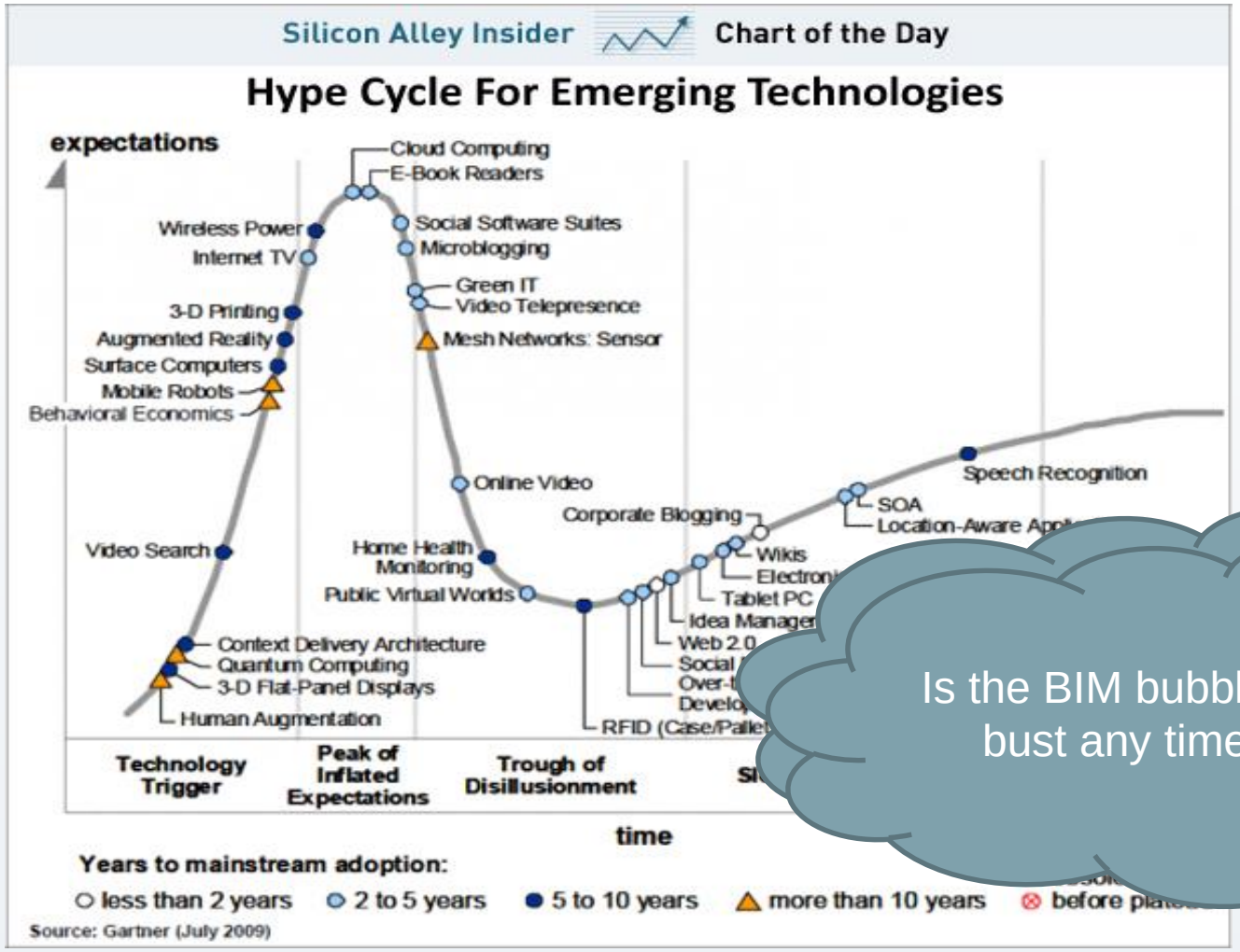
BIM

- Legislations in the UK will make the existence of some kind of BIM compulsory for any public project by 2016
- How will this look like?



© Paul Morrell, Government Chief Construction Adviser

Gartner Hype Curve

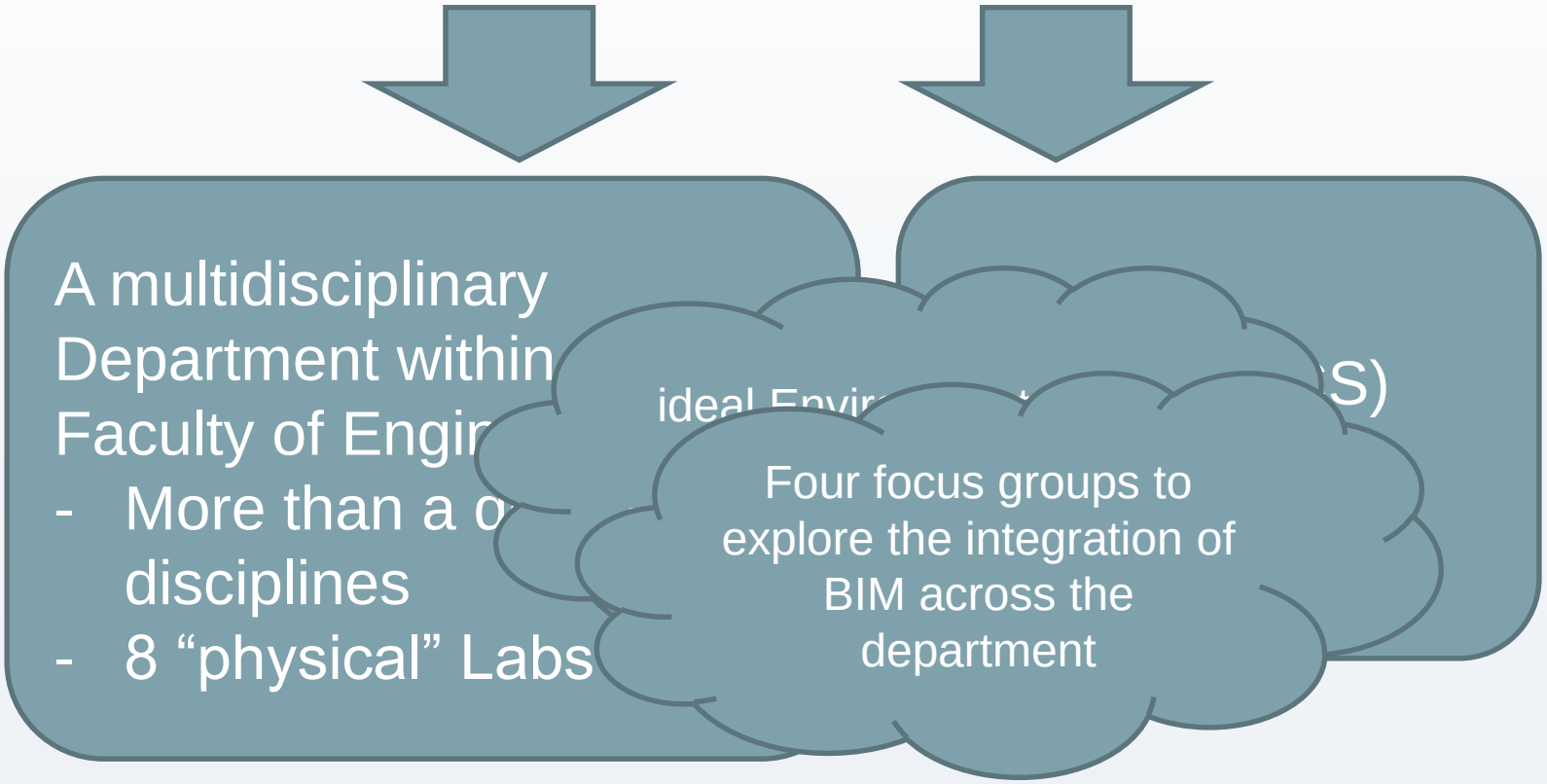


Is the BIM bubble about to bust any time soon?

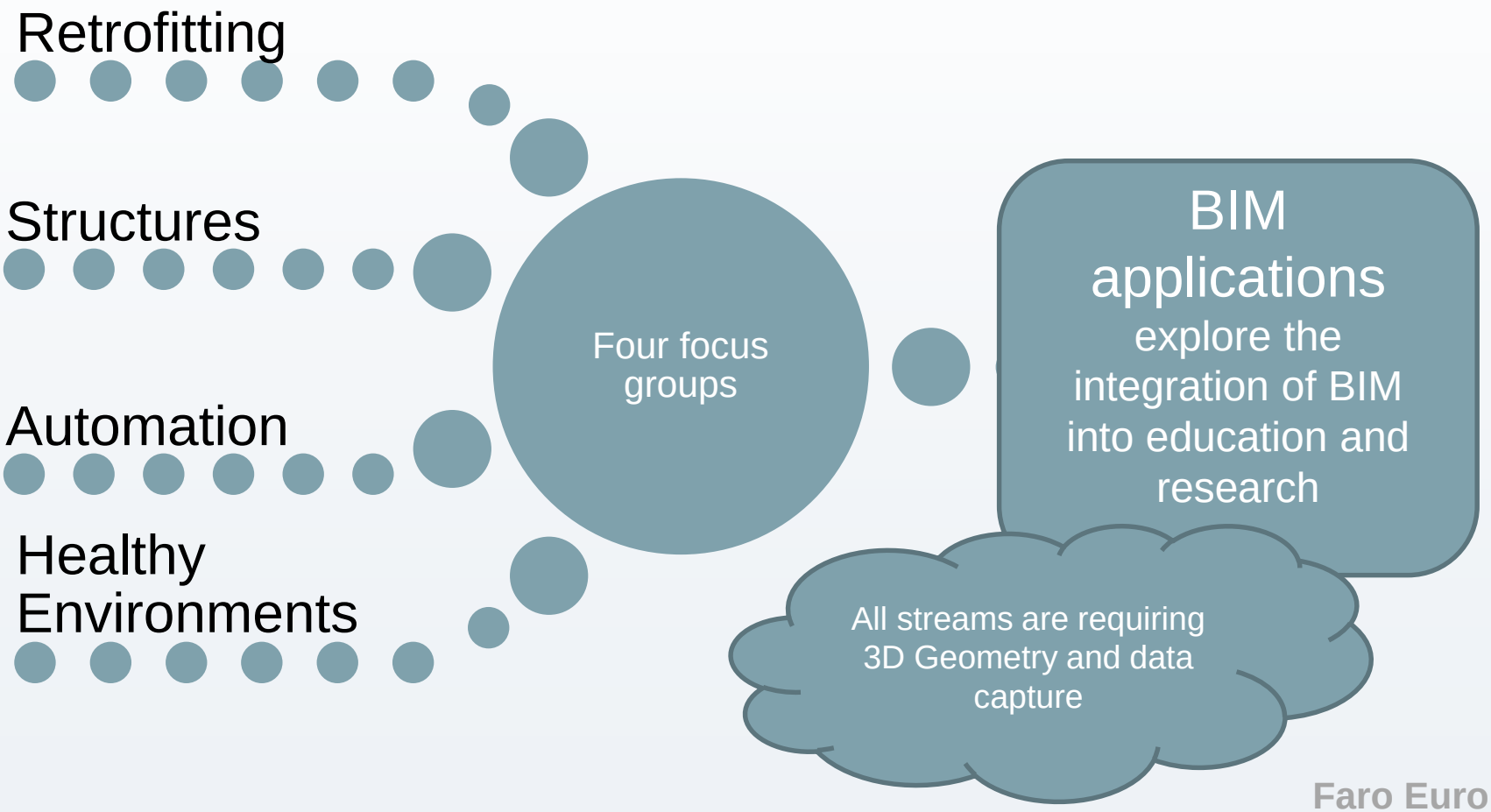
BIM the magic melting Pot?

BIM at UCL CEGE
- an integrated multidisciplinary approach

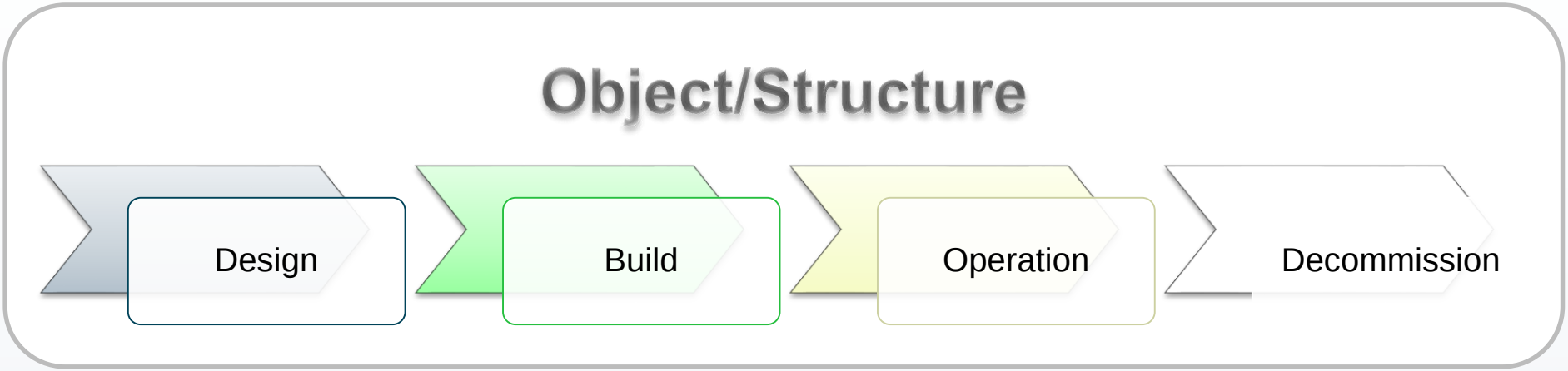
Civil Environmental and Geomatic Engineering



BIM at UCL CEGE
- an integrated multidisciplinary approach



BIM lifecycle as we understand it



From initial idea to detailed Design Model

Keeping the BIM up to date - Control in Dimension and

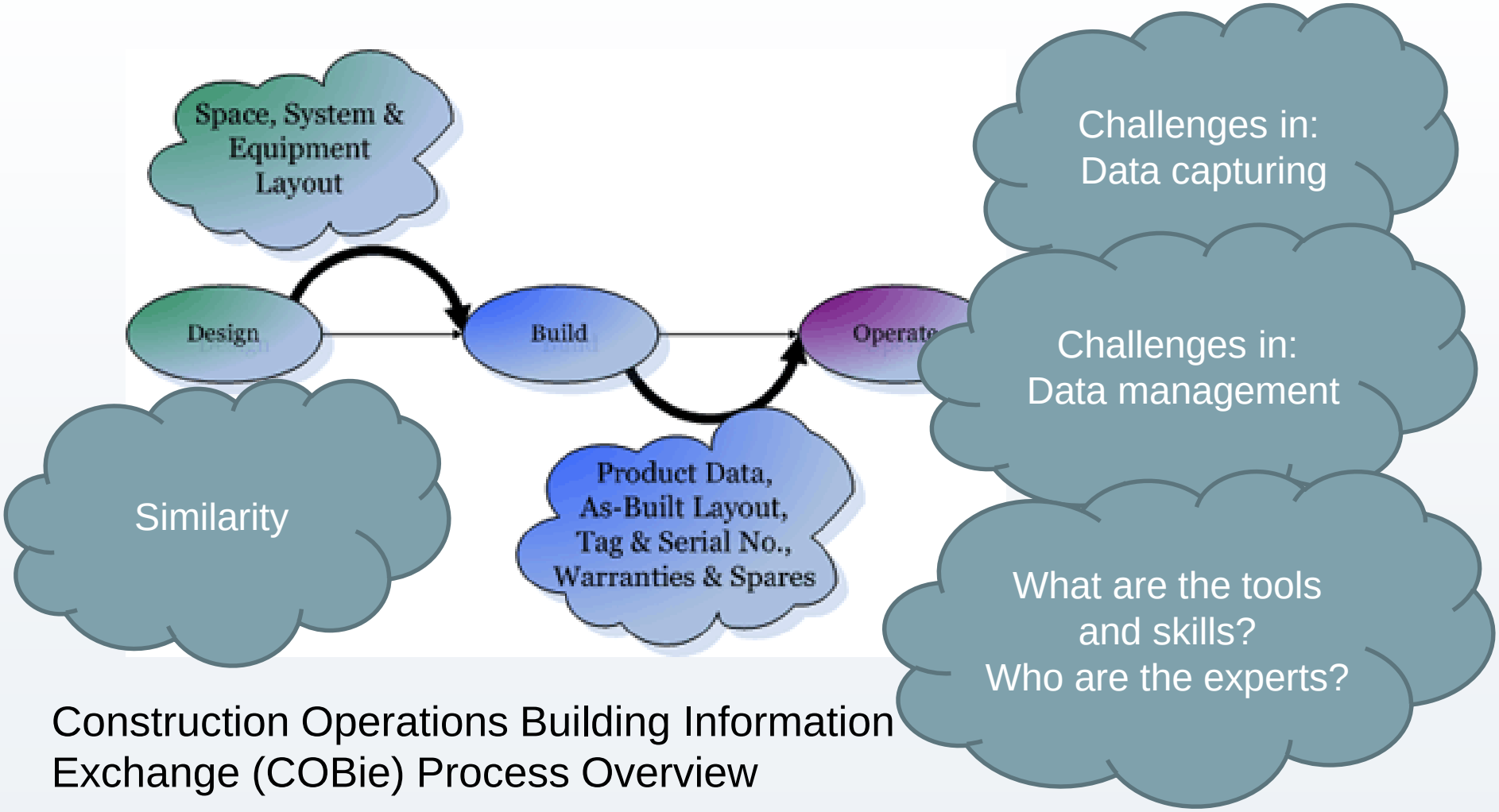
Using the BIM in asset and lifecycle management -

Controlled Decommission And Recycling

Using “3d reality capturing” tool
3D Laserscan

Using smart mobile devices

BIM lifecycle as we understand it



Construction Operations Building Information Exchange (COBie) Process Overview

Embracing Technology

Current and future Tools:

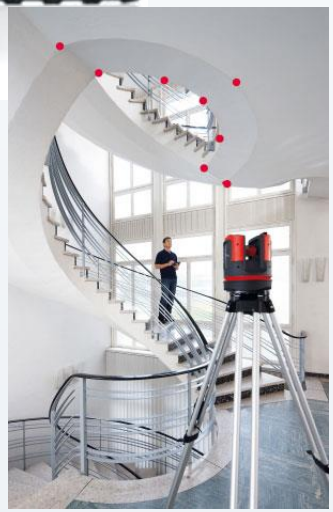
- Data and 3D reality Capture:
- Data Management
- Visualisation and Dissemination

Enabling technologies:

- 3D Reality Capture and Documentation
- Mobile Handheld devices
- Wireless high-speed communications and cloud computing
- Robust indoor navigation

Some Mainstream 3D Data Capturing tools:

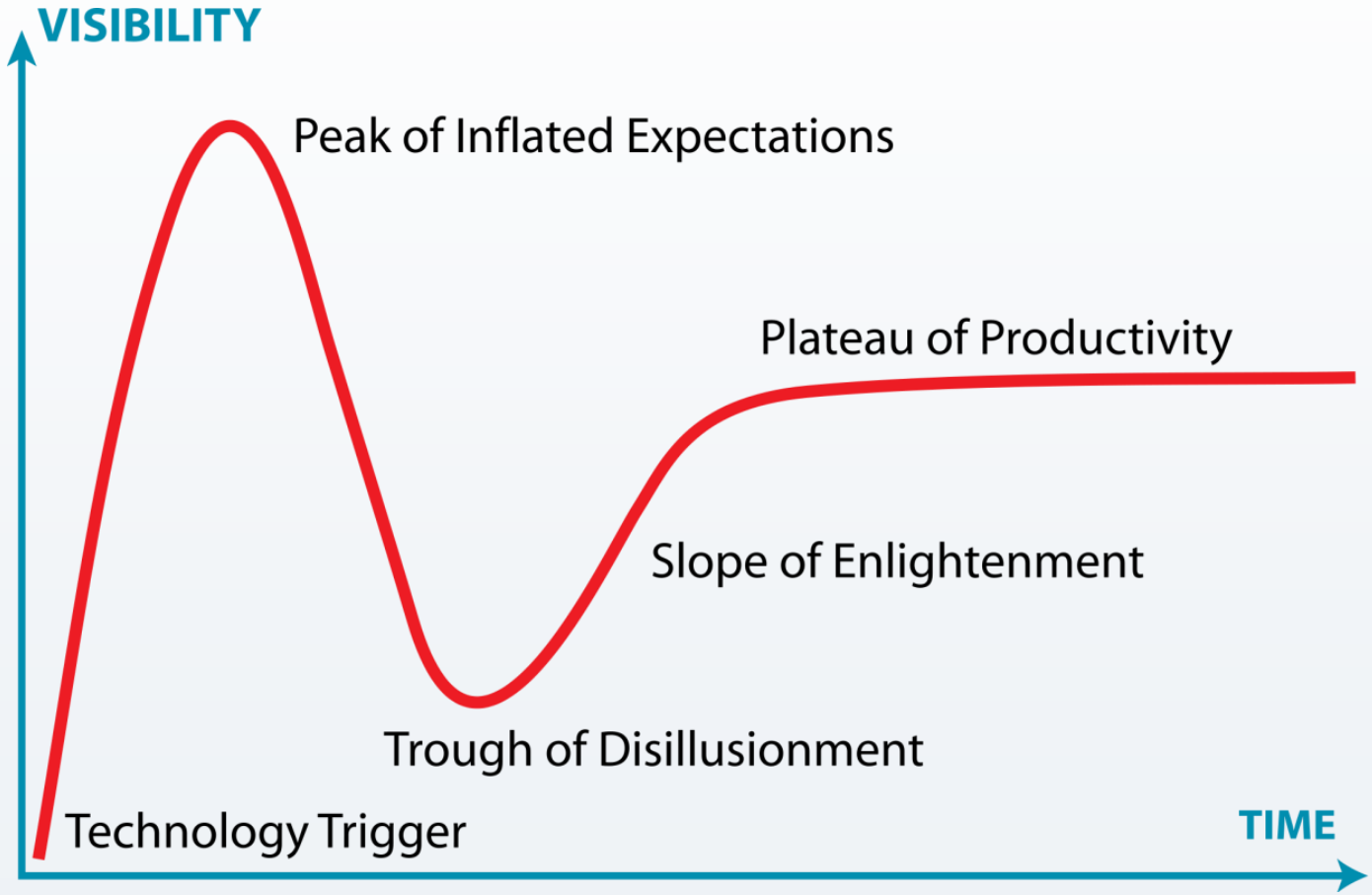
- Low cost survey: Laser Disto



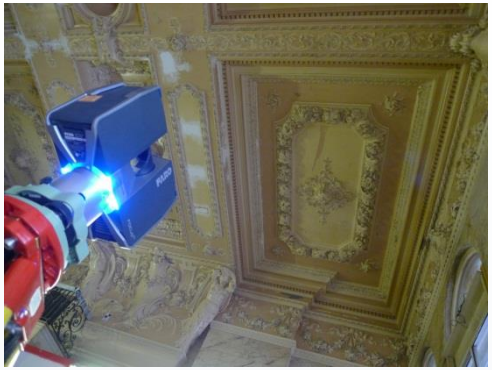
- Surveying: Robotic total station

- 3D Imaging, Laserscanning:

Where is Laserscanning – 3D Imaging in this Cycle



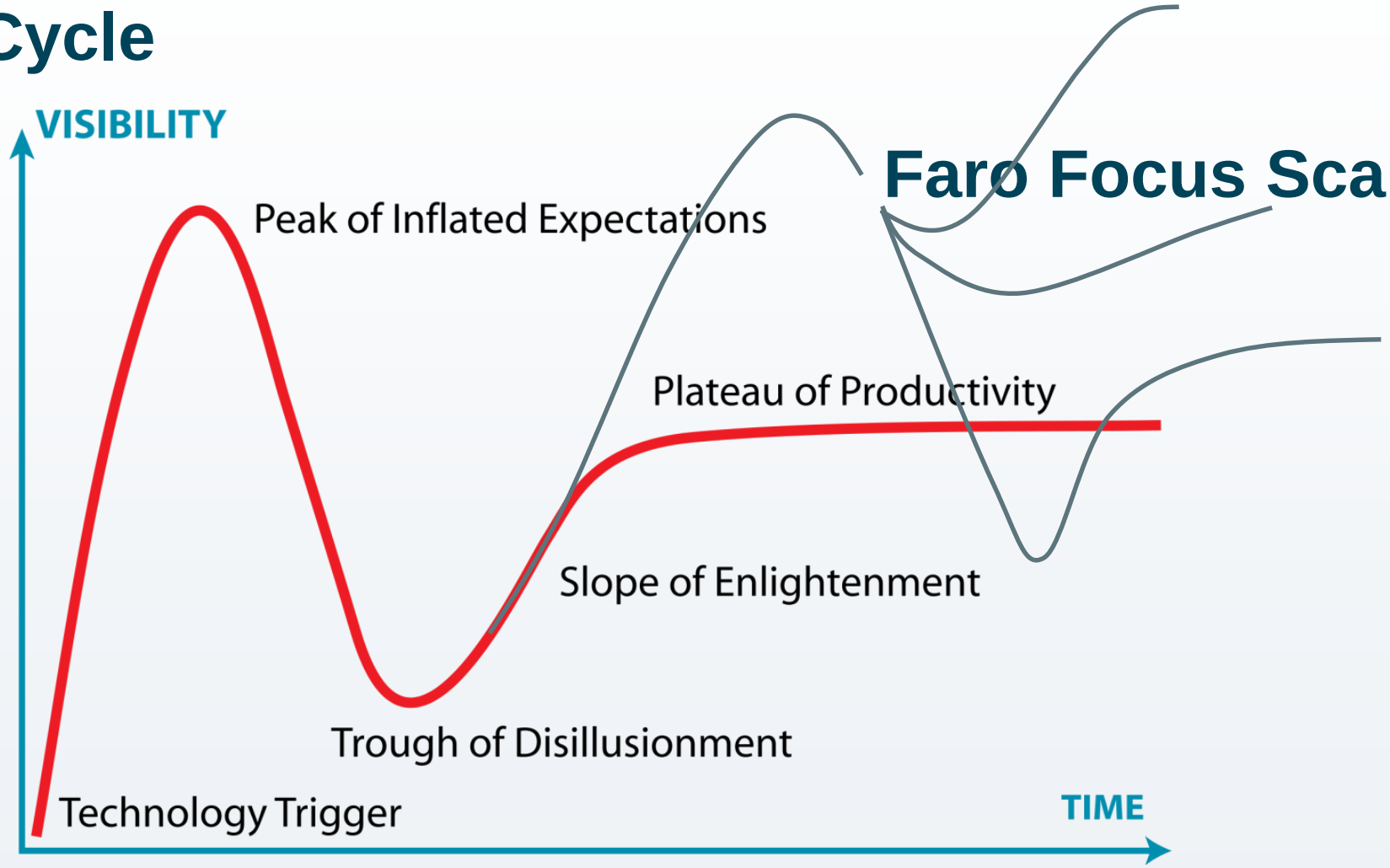
Step change in 2010: Scanner became smaller



- Features:
  - Compact and light
  - Sensor in DSLR format
  - Fast and easy to use
  - These Scanners produce vast amounts of data.

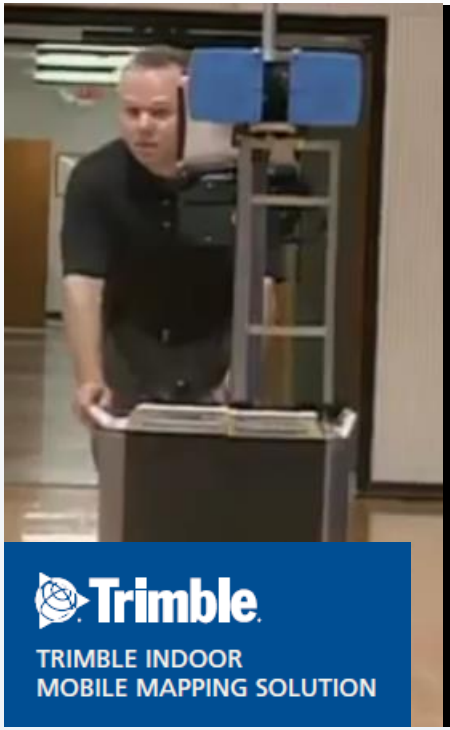
Faro Euro 2012

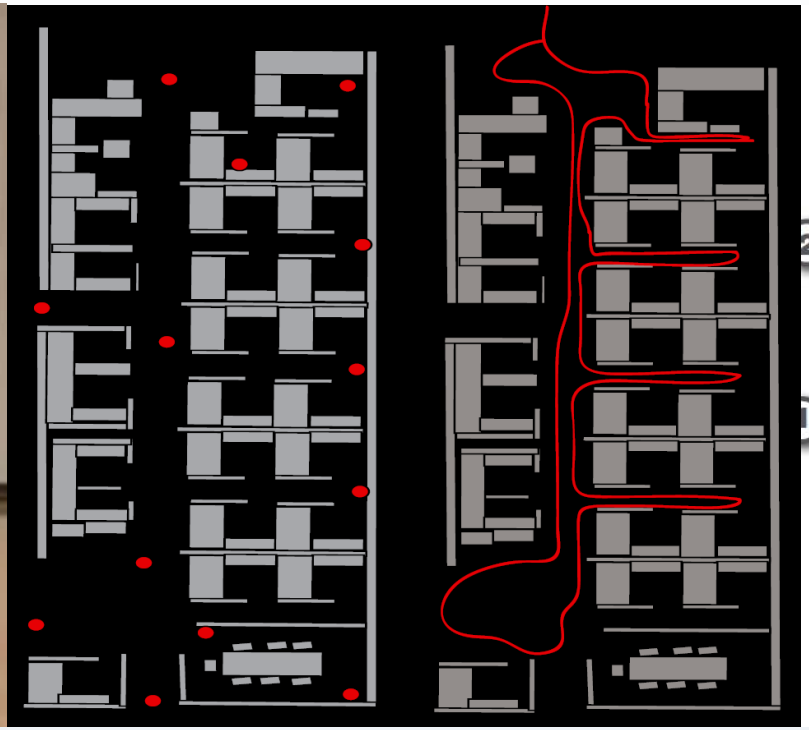
Where is Laserscanning – 3D Imaging in this Cycle



Emerging Indoor Mobile Mapping

TRIMBLE INDOOR MOBILE MAPPING SOLUTION (TIMMS)



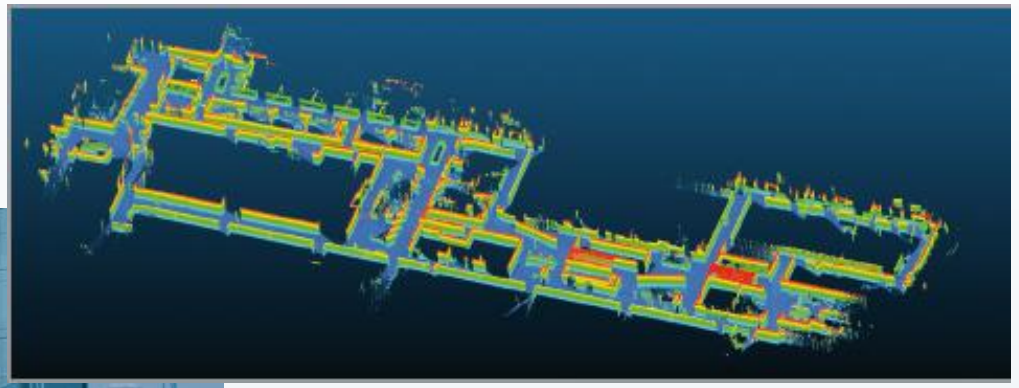


http://www.trimble.com/
http://youtu.be/-xFMY9xd3rc

System based on IMU's:
- very expensive
- Still cumbersome and heavy

Emerging Indoor Mobile Mapping

Indoor mobile mapping system IMMS
by Viametris



System based on “3D Lidar” vision SLAM:
- Small and compact
- Cheap
- Difficult to control,
  complex algorithms still subject to R&D

Emerging Low cost Tools for 3D Data Capturing:

- Photogrammetry
  - Dense image matching (semi global matching)
- Vision SLAM
  - via smart mobile device or UAV helicopter
- Range Cameras
  - E.g. PrimeSense, Microsoft
  - Combination with SLAM, e.g. KinFu

Using BIM on smart mobile devices: integrating new technologies!

© John Tocci

Augmented reality on mobile devices a lifestyle choice

Professional Systems

- Robust
- Mainly for Labs
- Expensive and cumbersome

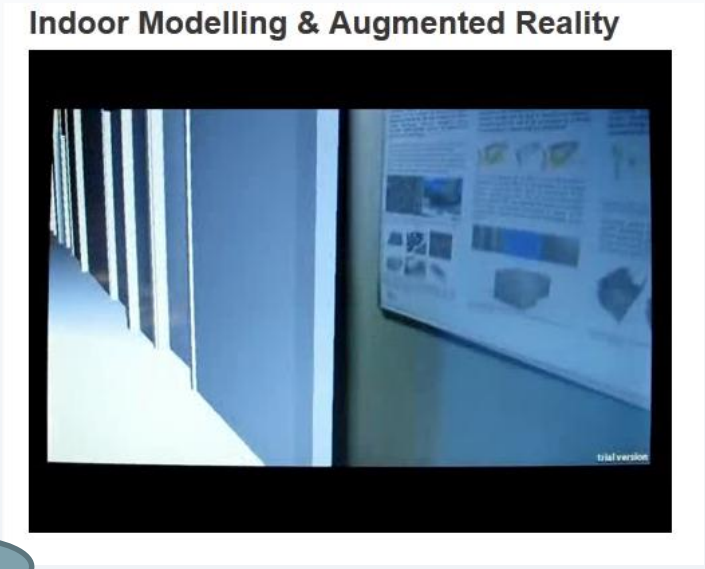
BYOD

Consumer Grade Products

- Fast moving development, e.g. Intel Ultrabook standard
- Interesting form factors

Augmented reality on mobile devices quick approaches

- Qualcomm Augmented Reality on Android
  - Qualcomm AR Extension for Unity:
    http://www.youtube.com/watch?v=CgnixC1-Bzs
  - We tried this:
    http://www.ucl.ac.uk/3dim/indoor
  - Sony Smart AR system
    http://www.youtube.com/watch?v=U4KTljBQovk



Very impressive

Augmented reality on mobile devices

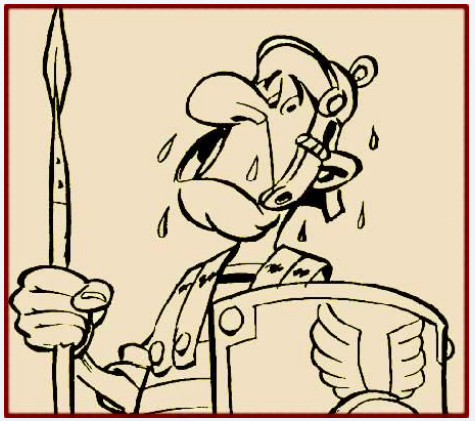
(BIM) Projects:

- **Scan 2 BIM**
- **or Scan 2 parametric model …and then BIM ?!?**

- Current case studies:
  - Healthy environmental infrastructure:
    - BIM & CFD
  - Outreach & knowledge transfer Gleeds Building Consultants:
    - Scan 2 BIM
    - Retrofit project Berners Hotel
- New initiatives:
  - Green BIM:
    - Environmental and sustainable factors,
  - Space Utilisation and asset Management
    - Healthy, Sustainable and efficient work environments

Case study:

- ✓ Healthy infrastructure and environment
  - ✓ BIM & CFD, simulations



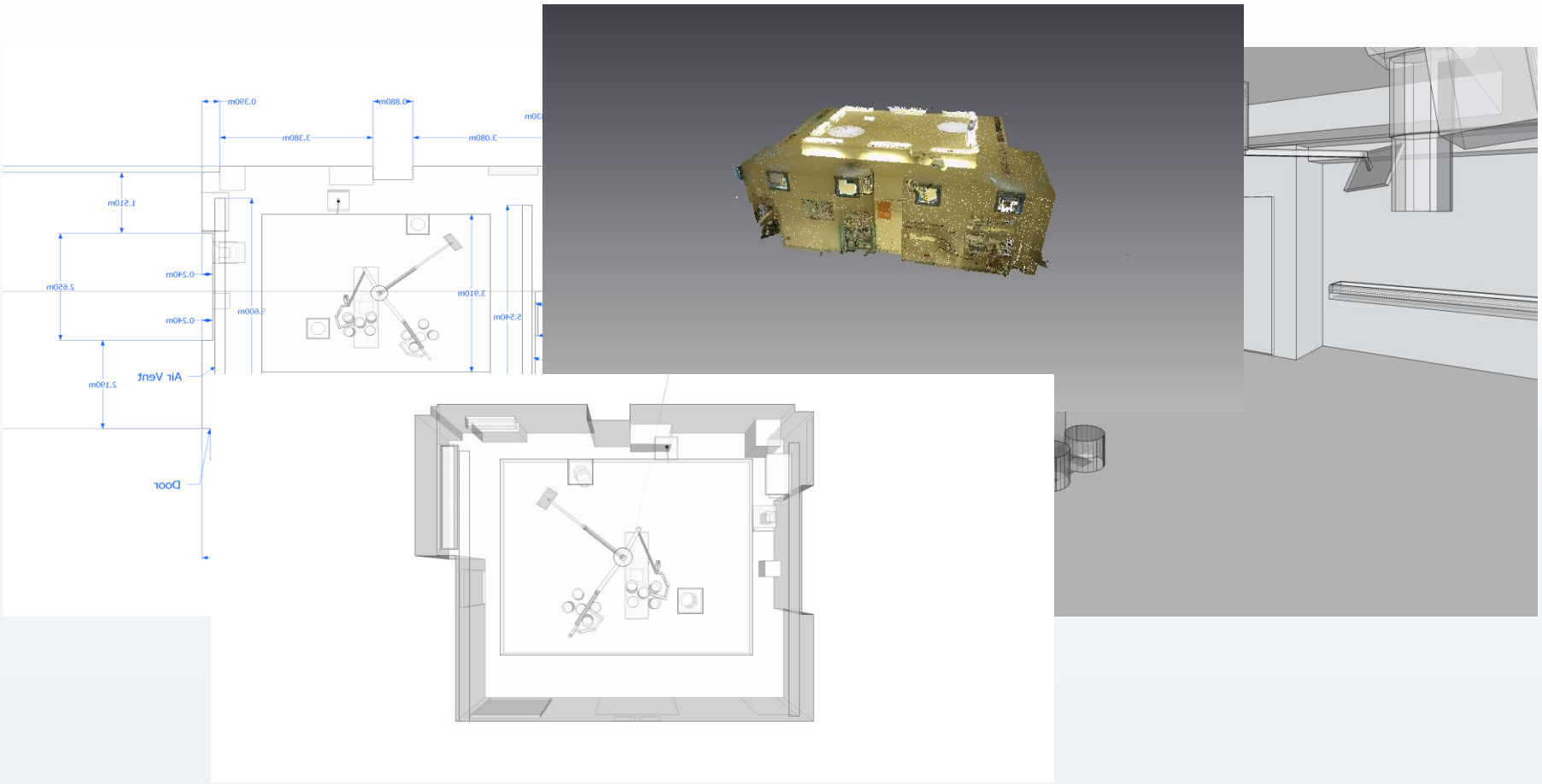
Healthy environmental infrastructure: BIM & CFD

Jonathon Taylor
Paula Tarttelin Hernandez
Dimitrios, Margaritis
Dr. Ka-Man Lai
et. al.

- GOSH operating theatre:

HIRC Healthy Infrastructure Research Centre

Healthy environmental infrastructure: BIM & CFD



Case study:

- ✓ Outreach & knowledge transfer Gleeds Building Consultants:
  - ✓ Scan 2 BIM

Knowledge Transfer and Outreach Project with Gleeds

Stuart McLeod

- FARO - UCL cooperation
- Gleeds - UCL advances HELO project

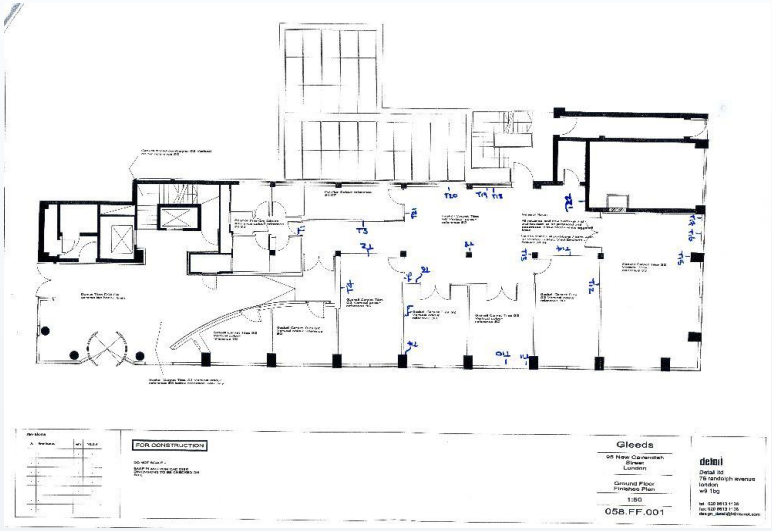
helo Higher Education London Outreach

European Regional Development Fund Investing in your future

BIM case study @ Gleeds

Aims:

- Introduction of 3D Laserscanning to anunfamiliar work environment (building consultancy, project management, quantity survey)
- investigate the integration of BIM into existing work environments and practice
- Create an “as built” 3D Model of a modern office environment
- Compare existing documentation with as built model qualitatively and quantitatively



BIM case study @ Gleeds
3D Laserscanning concept:

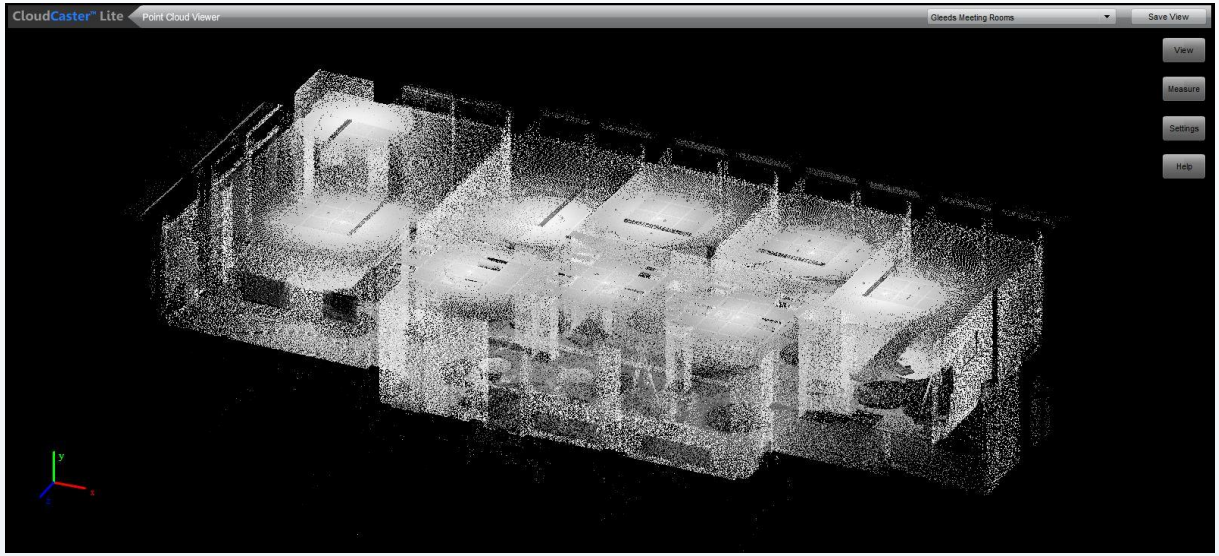
- 15 Laserscans over all

BIM case study @ Gleeds
3D Laserscanning concept:

- Registered using a traditional survey network

BIM case study @ Gleeds
3D Laserscanning concept:

- Understanding and handling vast point clouds (large data)
  - Dissemination of large datasets is impractical and problematic to none expert users
  - Use of web interfaces like Faro Webshare or Pointcaster to provide pointcloud information

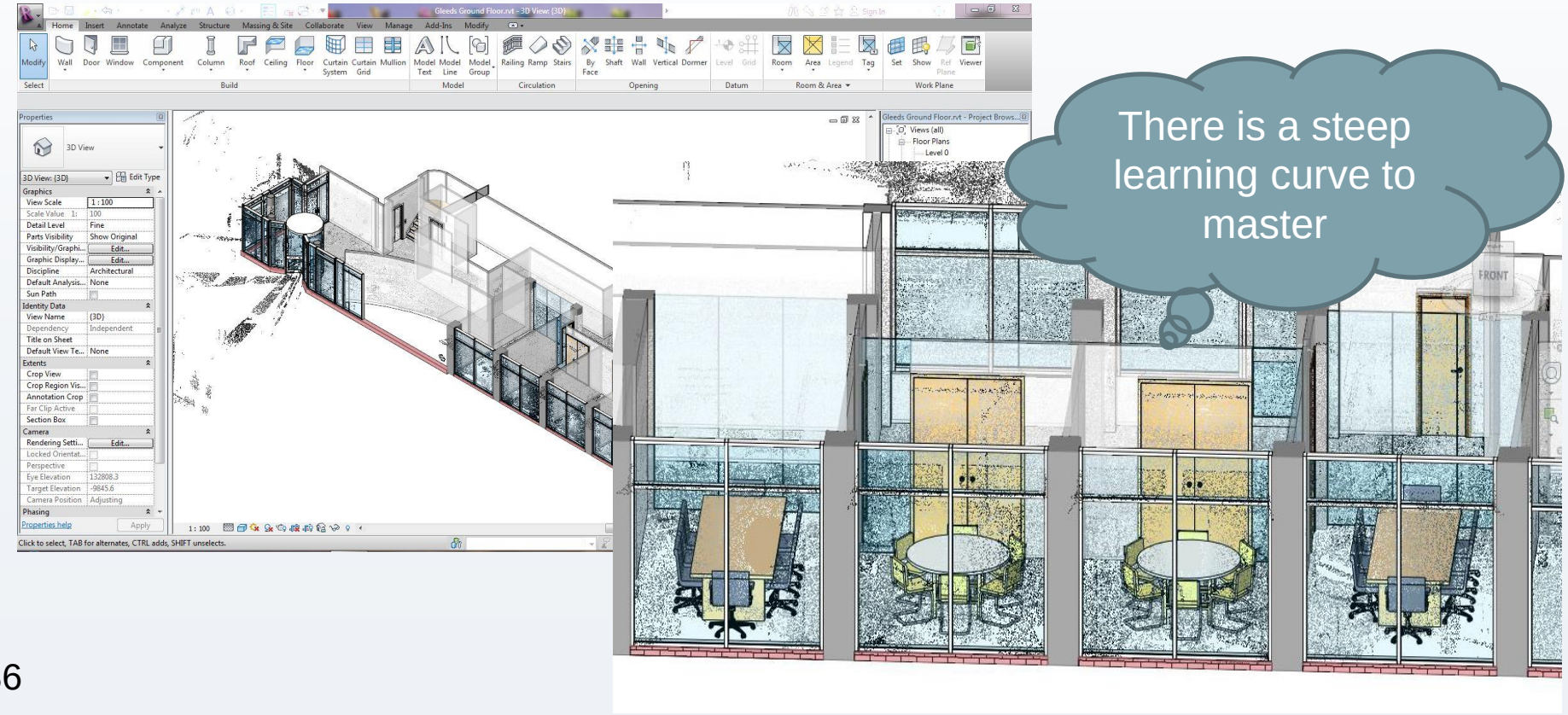


The registered Pointclouds are accessible via:
http://casestudies.pointclouds.org.uk/gOff/
http://www.pointclouds.org.uk

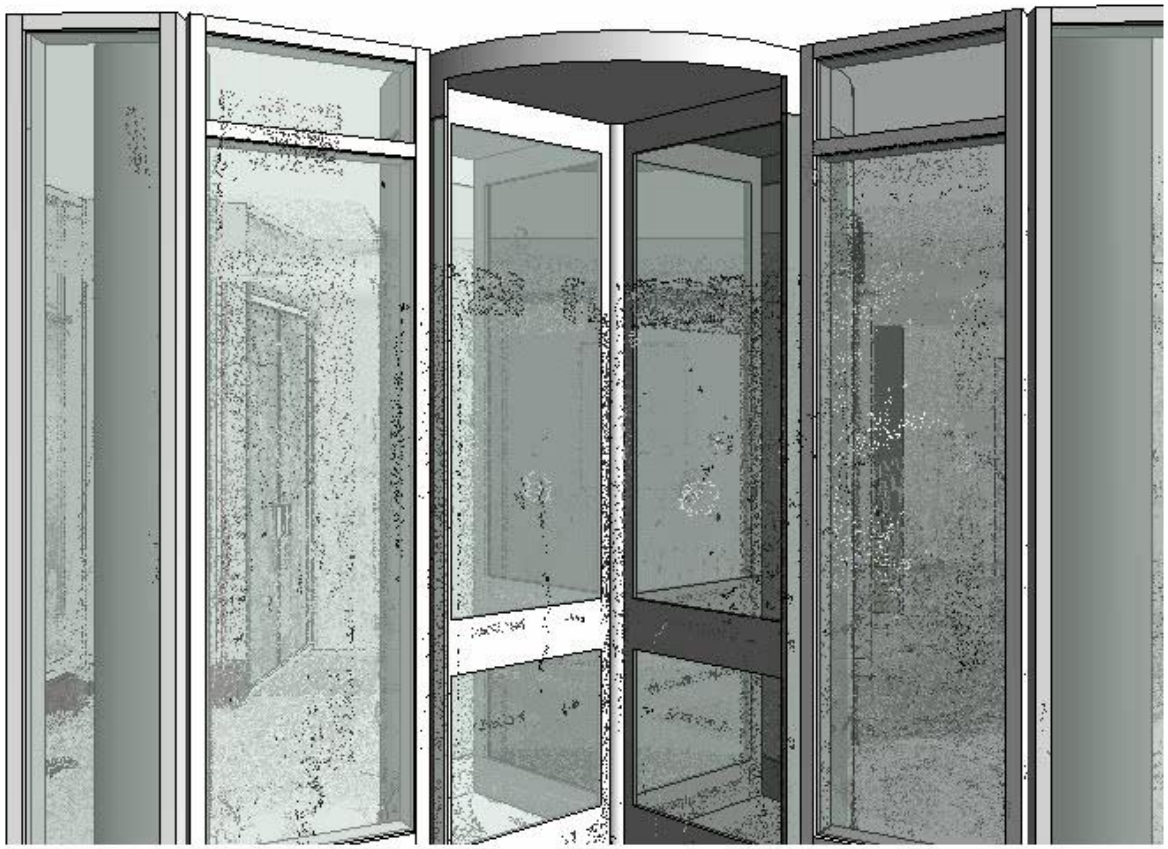
BIM case study @ Gleeds
Visualisation: walk through the point cloud

BIM case study @ Gleeds modelling in Revit

- Revit 2012 includes a pointcloud engine, thus allow direct import of the registered cloud
- The model is being build based on the registered pointclouds

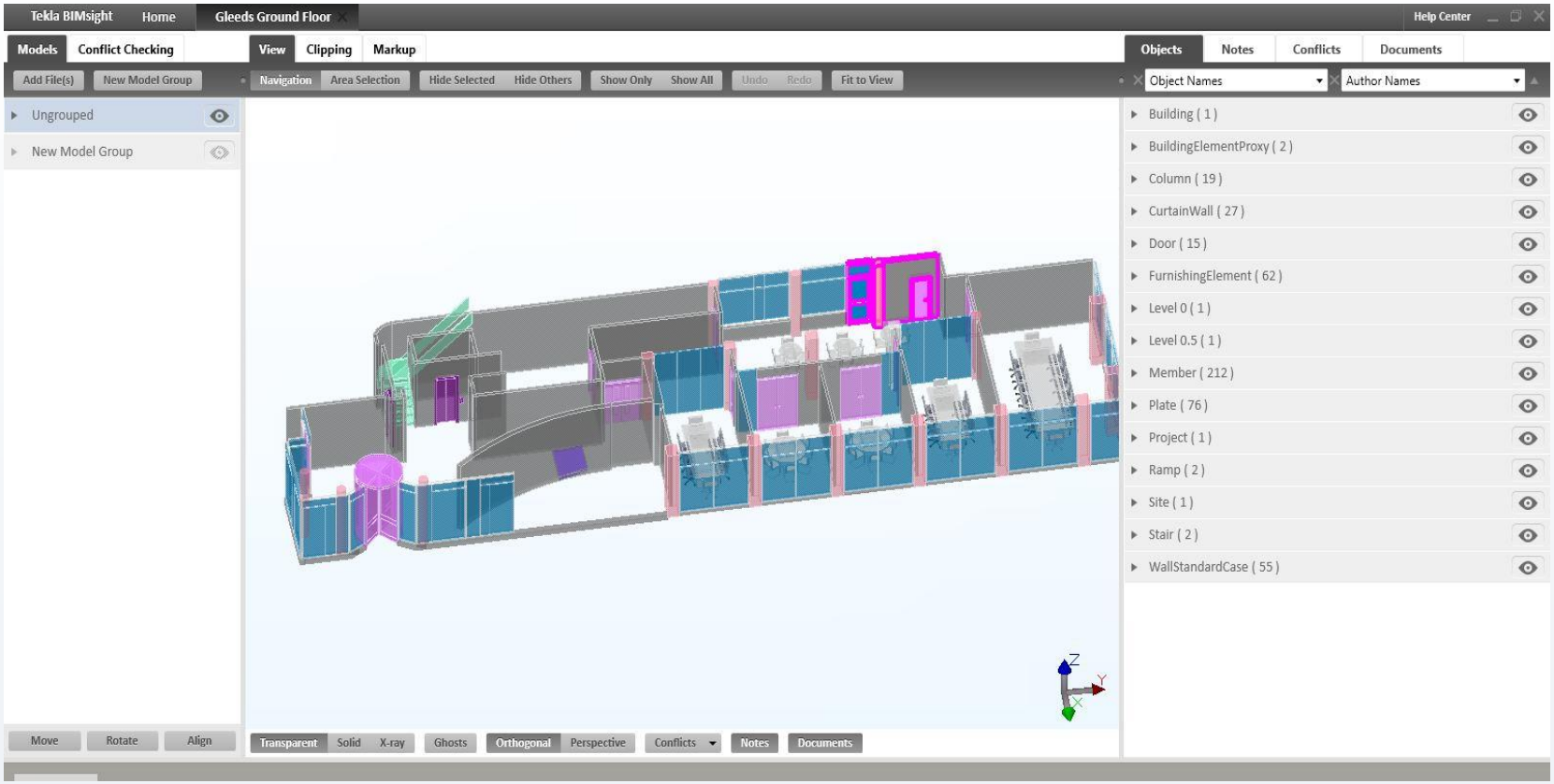


BIM case study @ Gleeds
Visualisation: walk through



BIM case study @ Gleeds

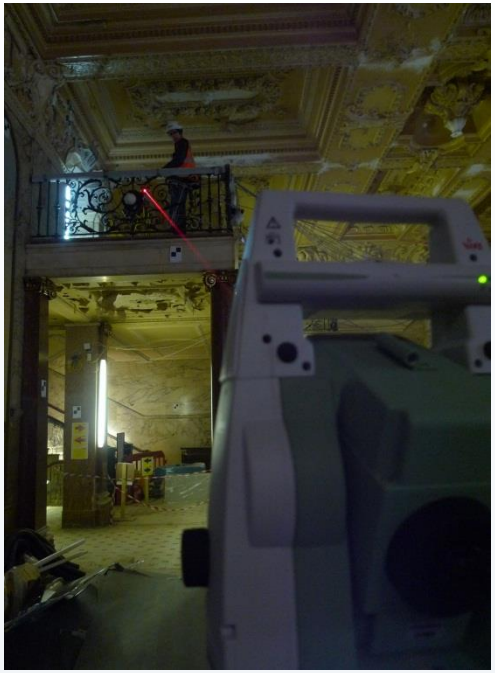
Results imported in Tekla BIMSIGHT via ifc format



Case study:

- ✓ Outreach & knowledge transfer Gleeds Building Consultants:
  - ✓ Retrofit project Berners Hotel

BIM case study @ Berners Hotel
Retrofit case study



Background:

- The derelict Berners Hotel is currently undergoing a comprehensive refurbishment
- Period architectural features shall be preserved

Aims:

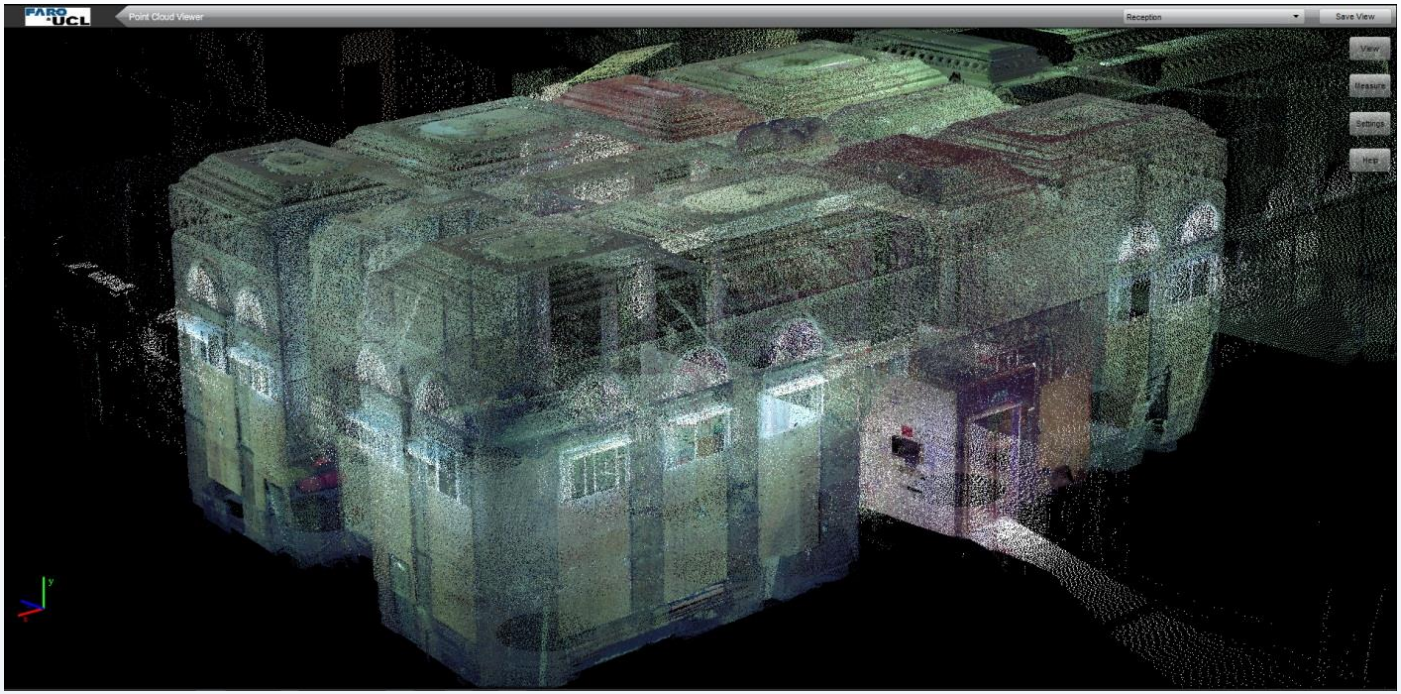
- Conducting a realistic case study on a live project based on the investigations of the initial study.
- Aspects of traditional methodology and BIM should be carried out parallel to allow direct comparison

BIM case study @ Berners Hotel
3D Laserscanning concept:

- 22 Scans using the Faro Focus Scanner
- Surveyed reference system to guarantee geometric fidelity

BIM case study @ Berners Hotel
3D Laserscanning concept:

- Dissemination of Scan results via Pointcaster



The registered Pointclouds are accessible via:
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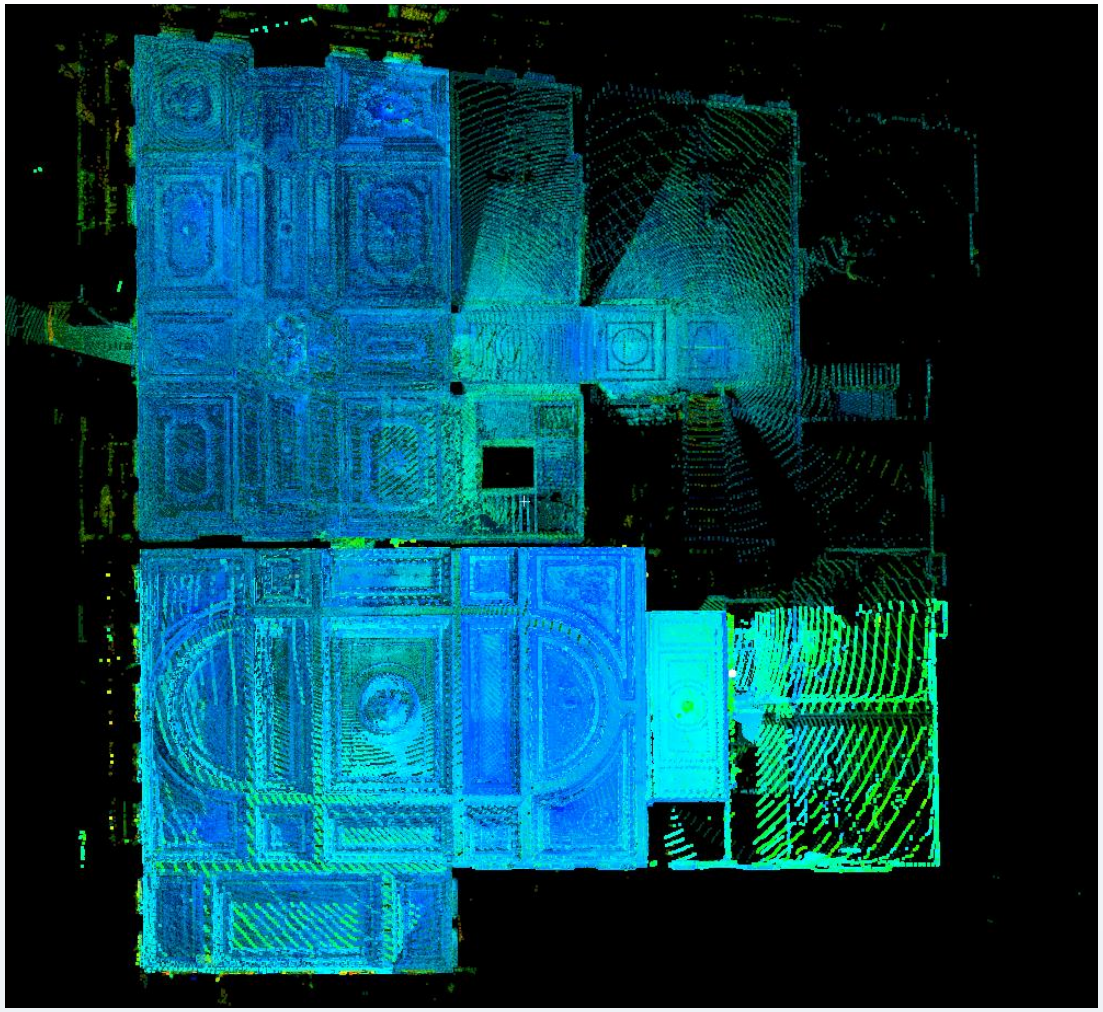
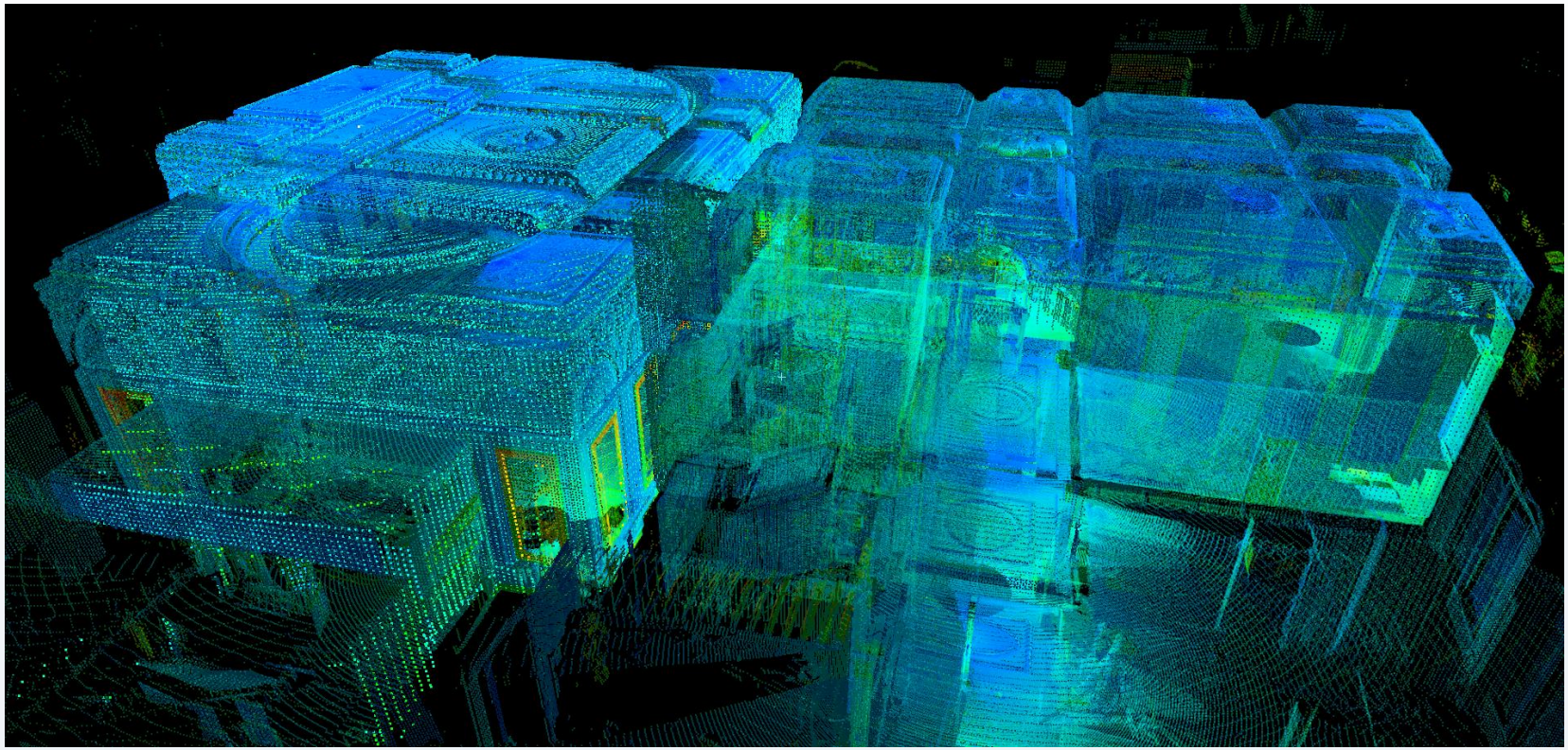
BIM case study @ Berners Hotel
3D Laserscanning concept:



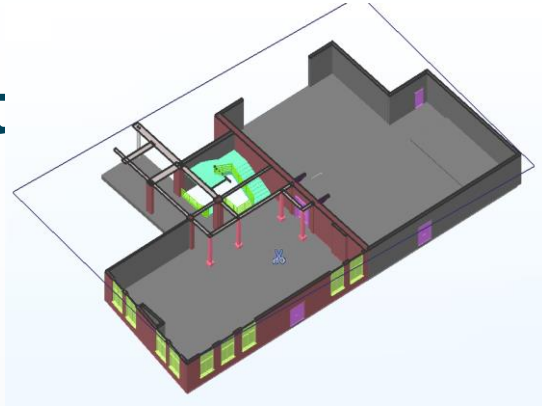
BIM case study @ Berners Hotel
3D Laserscanning concept:

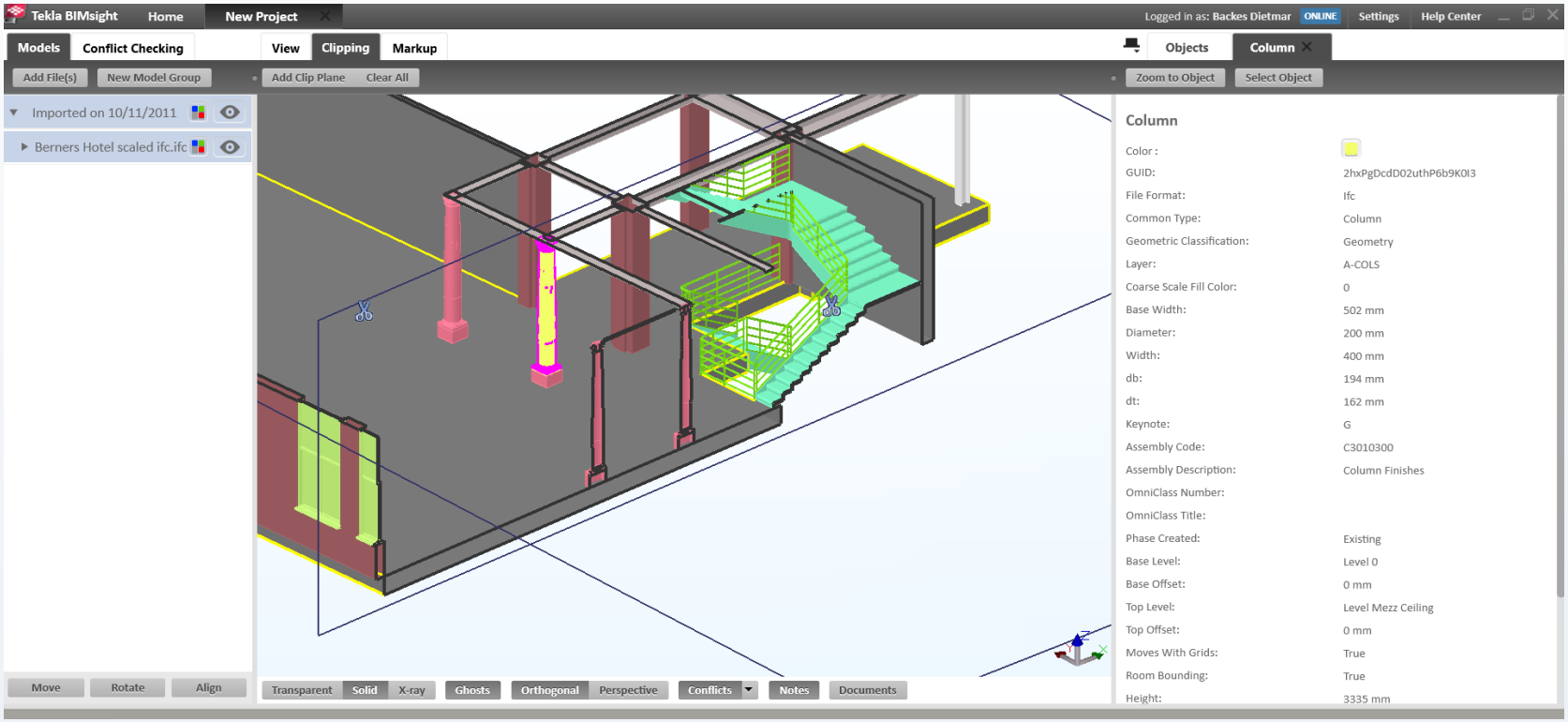


BIM case study @ Berners Hotel
3D Models for retrofit

- Screenshots of the simplified model overlaid point clouds
- Model as much as necessary not as possible!

BIM case study @ Berners Hotel
Results imported in Tekla BIMsight via ifc format

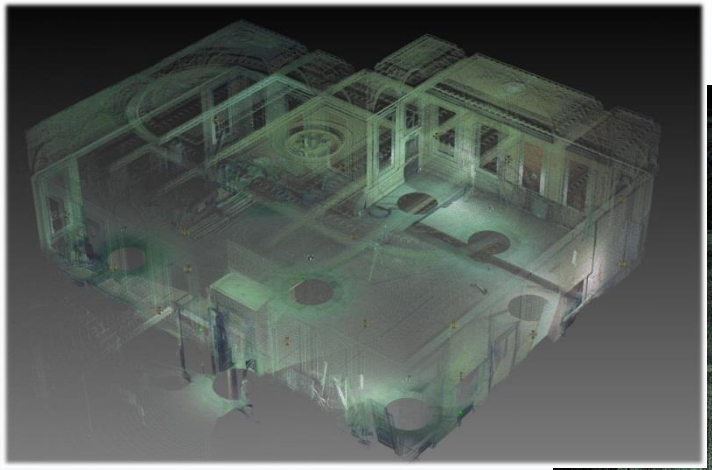




BIM case study @ Berners Hotel
Retrofit case study

- Current stage
  - Parametric model with basic building information completed
  - Consultations about next steps with Architects, Designers and Project mangers

BIM case study @ Berners Hotel
Retrofit case study



- Conclusions:
  - Complexity of modelling steeply increases:
    - in non standard environments i.e. old buildings
    - higher level of detail is required
  - Capture all, model if and when necessary

Next steps …New Initiatives

- ✓ GreenBIM project – grass root approach
  - ✓ Environmental and sustainable factors
  - ✓ Inclusive
- ✓ Space Utilisation and asset Management
  - ✓ Healthy, Sustainable and efficient work environments
  - ✓ UCL supported outreach project with BGM group

(GREEN) BIM Project

Build a Chadwick (GREEN) BIM to enable multidisciplinary cooperation and collaborative research into:

- Retrofitting
- Sustainability
- Healthy and productive work environments
- Integration and cooperation across disciplines (e.g., structures, fluids, materials)

(GREEN) BIM Project

Retrofitting

Structures

Automation

Healthy Environments

BIM

Four focus groups to explore the integration of BIM have been created

CEGE Green Group

Green Impact

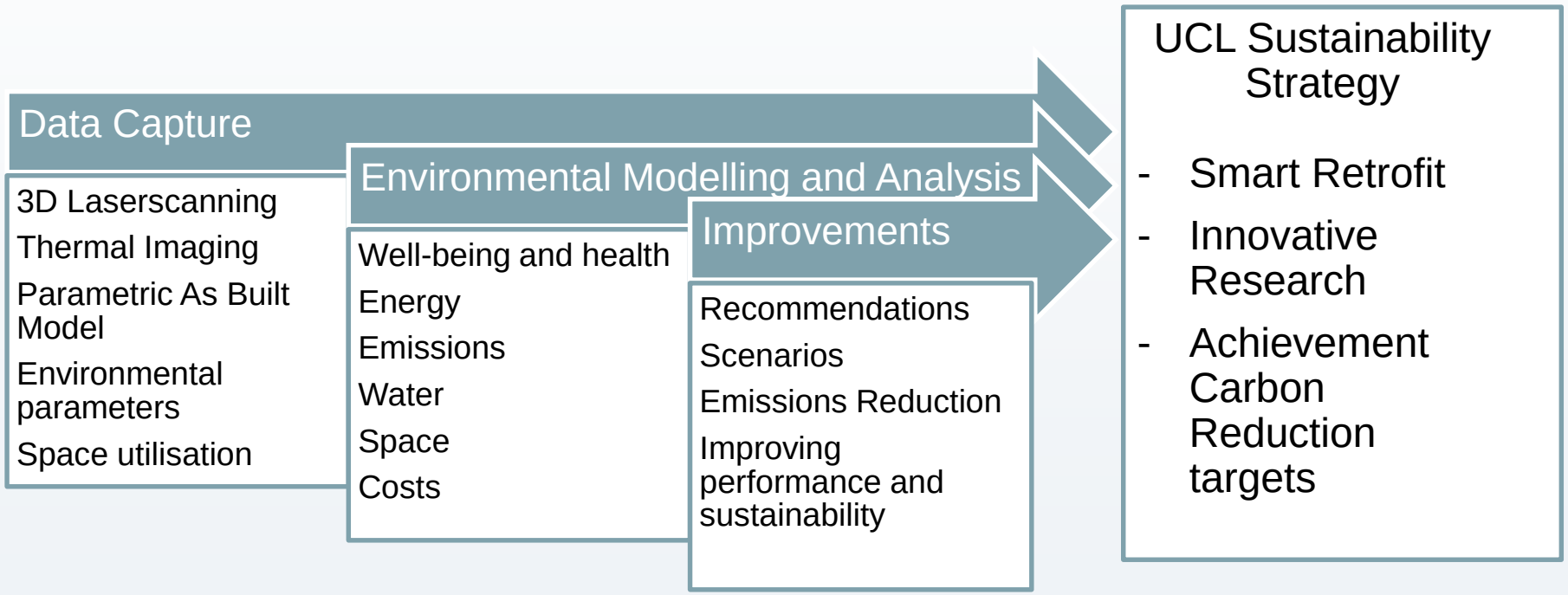
UCL

Green Impact Online Workbook

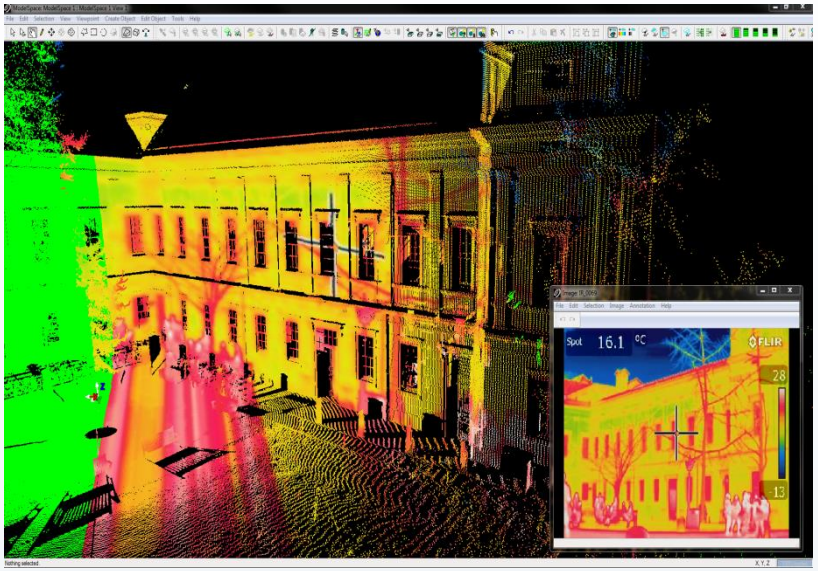
Faro Euro 2012

(GREEN) BIM Project

- A detailed Case study of UCL Chadwick building



(GREEN) BIM Project



Combining Enthusiasm, Interest and Support:

JOIN THE CLUB

UCL ADVANCES

helo Higher Education London Outreach

European Regional Development Fund
Investing in your future

The BGM Group
Workplace Integration Specialist

Faro Euro 2012

Many thanks for your attention
& Many thanks to our partners and friends!

"Are we now on the verge of just talking about BIM, or actually starting doing it?!"
Dr. Ilka May, Arup

And very special thanks to **David** Southam!

Next stop: lake cruise!