BIM
Building Information…what?! 
the UCL-CEGE approach

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BIM ?!

What is BIM?!
BIM = Beer Information Map!
That sounds much better!
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

- **Building Information Modelling/Management** 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?

Who is this druid?
BIM at UCL CEGE
- an integrated multidisciplinary approach

Civil Environmental and Geomatic Engineering

A multidisciplinary Department within the Faculty of Engineering
- More than a dozen disciplines
- 8 “physical” Labs

Four focus groups to explore the integration of BIM across the department
BIM at UCL CEGE
- an integrated multidisciplinary approach

Retrofitting

Structures

Automation

Healthy Environments

Four focus groups

BIM applications explore the integration of BIM into education and research

All streams are requiring 3D Geometry and data capture

Faro Euro 2012
BIM lifecycle as we understand it

Object/Structure

Design
Build
Operation
Decommission

From initial idea to detailed Design Model
Keeping the BIM up to date - Control in Dimension and Progress
Using “3d reality capturing” tools - 3D Laserscanners
Using the BIM in asset and lifecycle management
Using smart mobile devices
Controlled Decommission And Recycling

Faro Euro 2012
BIM lifecycle as we understand it

Construction Operations Building Information Exchange (COBie) Process Overview

Challenges in:
- Data capturing
- Data management

What are the tools and skills?
Who are the experts?
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:

Faro Euro 2012
Where is Laserscanning – 3D Imaging in this Cycle

- Peak of Inflated Expectations
- Plateau of Productivity
- Slope of Enlightenment
- Trough of Disillusionment

Technology Trigger
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.
Where is Laserscanning – 3D Imaging in this Cycle

- Technology Trigger
- Trough of Disillusionment
- Slope of Enlightenment
- Plateau of Productivity
- Peak of Inflated Expectations
Emerging Indoor Mobile Mapping

TRIMBLE INDOOR MOBILE MAPPING SOLUTION (TIMMS)

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

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

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Augmented reality on mobile devices a lifestyle choice

**Professional Systems**
- Robust
- Mainly for Labs
- Expensive and cumbersome

**Consumer Grade Products**
- Fast moving development, e.g. Intel Ultrabook standard
- Interesting form factors

BYOD
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=U4KTjBQovk

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

• GOSH operating theatre:

Jonathon Taylor
Paula Tarttelin Hernandez
Dimitrios, Margaritis
Dr. Ka-Man Lai
et. al.
Healthy environmental infrastructure: BIM & CFD
Case study:

✓ Outreach & knowledge transfer Gleeds Building Consultants:
✓ Scan 2 BIM
Knowledge Transfer and Outreach Project with Gleeds

- FARO - UCL cooperation
- Gleeds - UCL advances HELO project
BIM case study @ Gleeds

Aims:

- Introduction of 3D Laserscanning to an unfamiliar 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

There is a steep learning curve to master
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:
http://casestudies.pointclouds.org.uk/gBerners/
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

Faro Euro 2012
(GREEN) BIM Project

• A detailed Case study of UCL Chadwick building(100,379),(886,427)

Data Capture
- 3D Laserscanning
- Thermal Imaging
- Parametric As Built Model
- Environmental parameters
- Space utilisation

Environmental Modelling and Analysis
- Well-being and health
- Energy
- Emissions
- Water
- Space
- Costs

Improvements
- Recommendations
- Scenarios
- Emissions Reduction
- Improving performance and sustainability

UCL Sustainability Strategy
- Smart Retrofit
- Innovative Research
- Achievement Carbon Reduction targets

Faro Euro 2012
(GREEN) BIM Project

Combining Enthusiasm, Interest and Support:

JOIN THE CLUB
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!