Building Cost Information Modelling Framework

by Suranga Jayasena and Ramadha De Silva

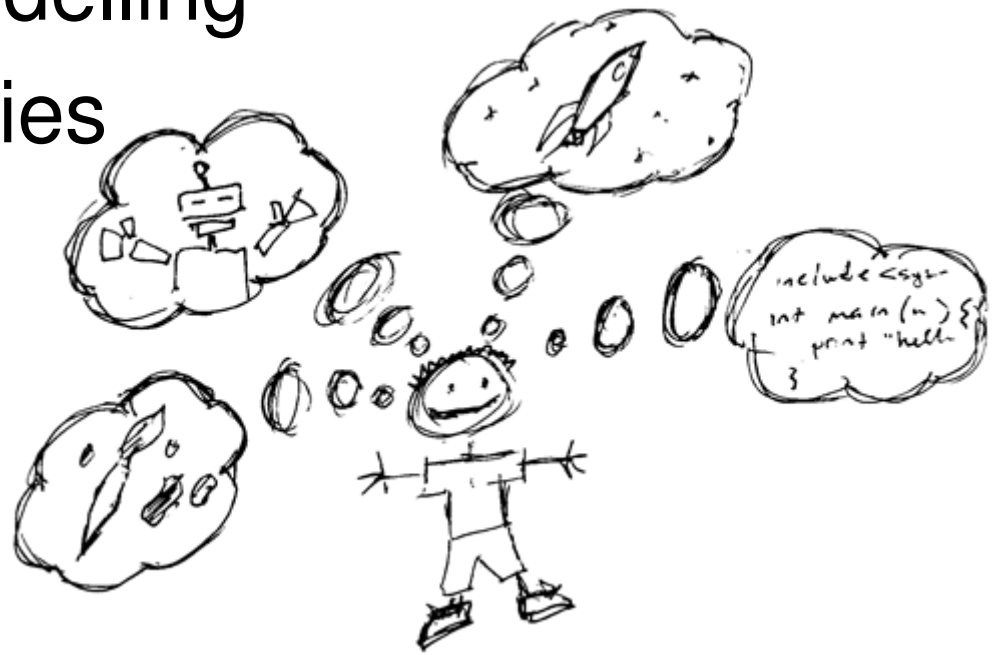
What is **BIM**?

- The New Buzzword
  - the raindrop to the desert

- Is it really worthwhile?
- Should we *"know"* it?
- Are we ready?

What they said about BIM

- Virtual Construction
- Is 3D modelling
- 4D, 5D, ..., nD modelling
- Automatic Quantities
- Clash detection
- Constructability
- ...



Building Information Modelling

- **digital representation** of physical and functional **characteristics** of a building
- creating a **shared knowledge resource** for information about it
- forming a reliable basis for decisions during its life cycle, from earliest conception to demolition

BIM will

- Support continuous and immediate availability of
  - **Design scope, Schedule, and Cost Information**
- That is
  - **High quality**
  - **Reliable**
  - **Integrated, and**
  - **Fully coordinated**

How ?

- Allow **virtual construction** of a building to **full details**.

- BIM objects are intelligent
  - Defined properties, and Relationships with other objectives
  - Parametric properties are interrelated

Development of BIM

- BIM is not a software
- but, an IT solution for
  - IT tools and applications
  - To share various information about a building
  - In a common platform
- Common platform >> independent of the software used.

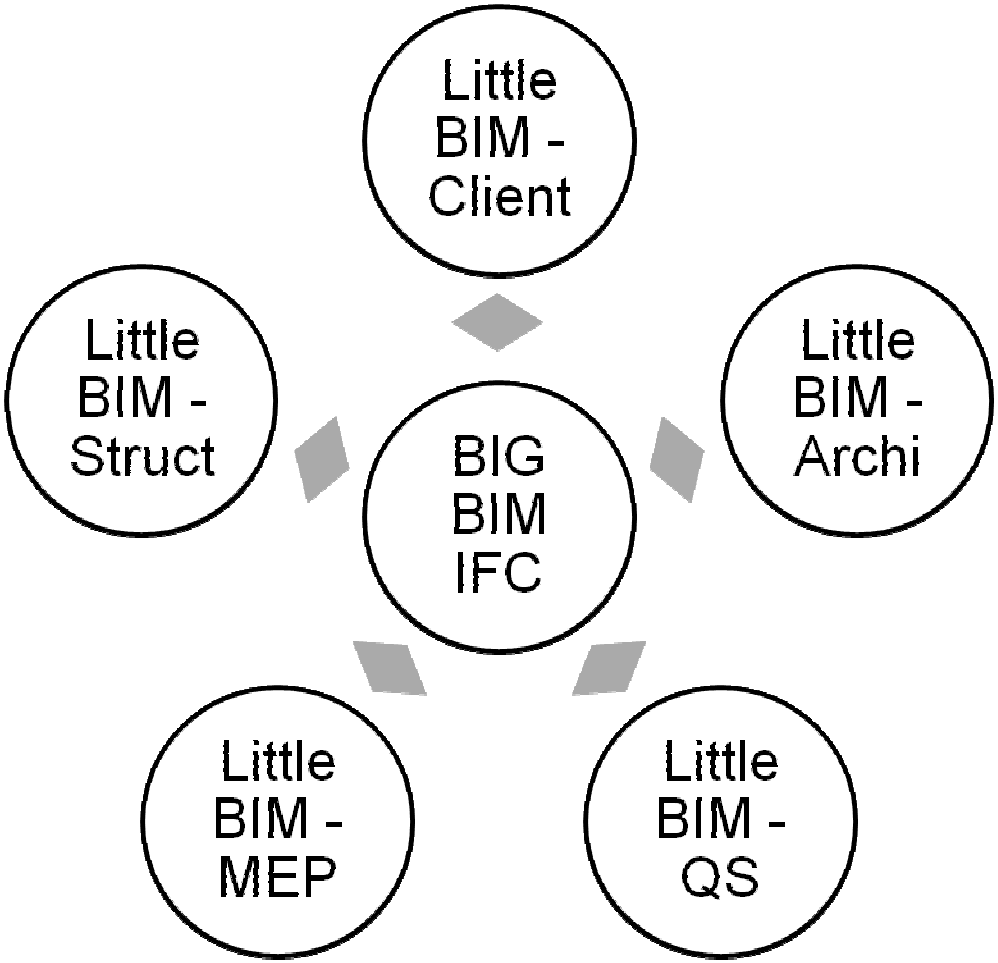
BIM Data Model

- IFC (Industry Foundation Classes)
- Developed by buildingSMART
- IFC is a database/information schema
- is an EXPRESS based entity-relationship model
- IFC = master file format of building
- Applications use sub-set of IFC schema
  - MVDs: Primary and Add-on views

Why IFC

- Non-proprietary,
  i.e. Open Standard
- Allows heterogeneous data environment
  independent of the software used
- Borderless information sharing
- ISO 16739:2013
- Well suited to be the BIG BIM

BIG BIM little BIM



Back to the Question - **How?**

IFC Data Model

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ISO-10303-21;
HEADER;
FILE_DESCRIPTION(('ViewDefinition [CoordinationView,
    SpaceBoundary2ndLevelAddOnView]', 'Option [Filter: ]'),'2;1');
FILE_NAME('S:\\[IFC]\\[COMPLETE-BUILDINGS]\\FZK-MODELS\\FZK-Haus\\ArchiCAD-
    14\\AC14-FZK-Haus.ifc','2010-10-07T13:40:52',('Architect'),('Building Designer
    Office'),'PreProc - EDM 5.0','ArchiCAD 14.00 Release 1. Windows Build Number of the
    Ifc 2x3 interface: 3427','The authorising person');
FILE_SCHEMA(('IFC2X3'));
ENDSEC;

DATA;
#1= IFCORGANIZATION('GS','Graphisoft','Graphisoft',$,$);
#5= IFCAPPLICATION(#1,'14.0','ArchiCAD 14.0','ArchiCAD');
#6= IFCPERSON('','Haefele','Karl-Heinz',$,$,$,$,$);
```

```
…
#13= IFCOWNERHISTORY(#12,#5,$,.ADDED.,$,$,$,1286451639);
...
#36= IFCDIRECTION((0.,0.,1.));
..
#9792= IFCDIRECTION((-1.,0.,0.));
#9796= IFCCARTESIANPOINT((12.,0.,0.));
#9800= IFCAXIS2PLACEMENT3D(#9796,#36,#9792);
#9803= IFCLOCALPLACEMENT(#593,#9800);
#9806= IFCWALLSTANDARDCASE('16DNNqzfP2thtfaOflvsKA',#13,
    'Wand-Ext-ERDG-4',$,$,#9803,#9876,'A6C3DE63-3731-4F6A-94-
    7E-DE8A8295779F');
#9825= IFCCARTESIANPOINT((0.,0.));
#9829= IFCCARTESIANPOINT((12.,0.));
#9833= IFCPOLYLINE((#9825,#9829));
#9837= IFCSHAPEREPRESENTATION(#51,'Axis','Curve2D',(#9833));
...
```

```
….
#305278=
    IFCRELASSOCIATESMATERIAL('04sq1IPR1FWAzND06VwI7q',
    #13,$,$,(#305270),#758);
#305280=
    IFCWALLTYPE('3dgkPOtg9D0BwPEuBkzI8t',#13,'Leichtbeton
    240',$,$,$,$,$,'Leichtbeton 240',.NOTDEFINED.);
#305286= IFCRELDEFINESBYTYPE('0rqFU$fDTEueL7Udv5yhfM',
    #13,'Leichtbeton 240',$,(#17071,#17196,#17323,#17446,#18165),
    #305280);
#305288=
    IFCRELASSOCIATESMATERIAL('3dfBLmGRD13RTCOIW1fXtq',
    #13,$,$,(#305280),#17058);
ENDSEC;

END-ISO-10303-21;
```

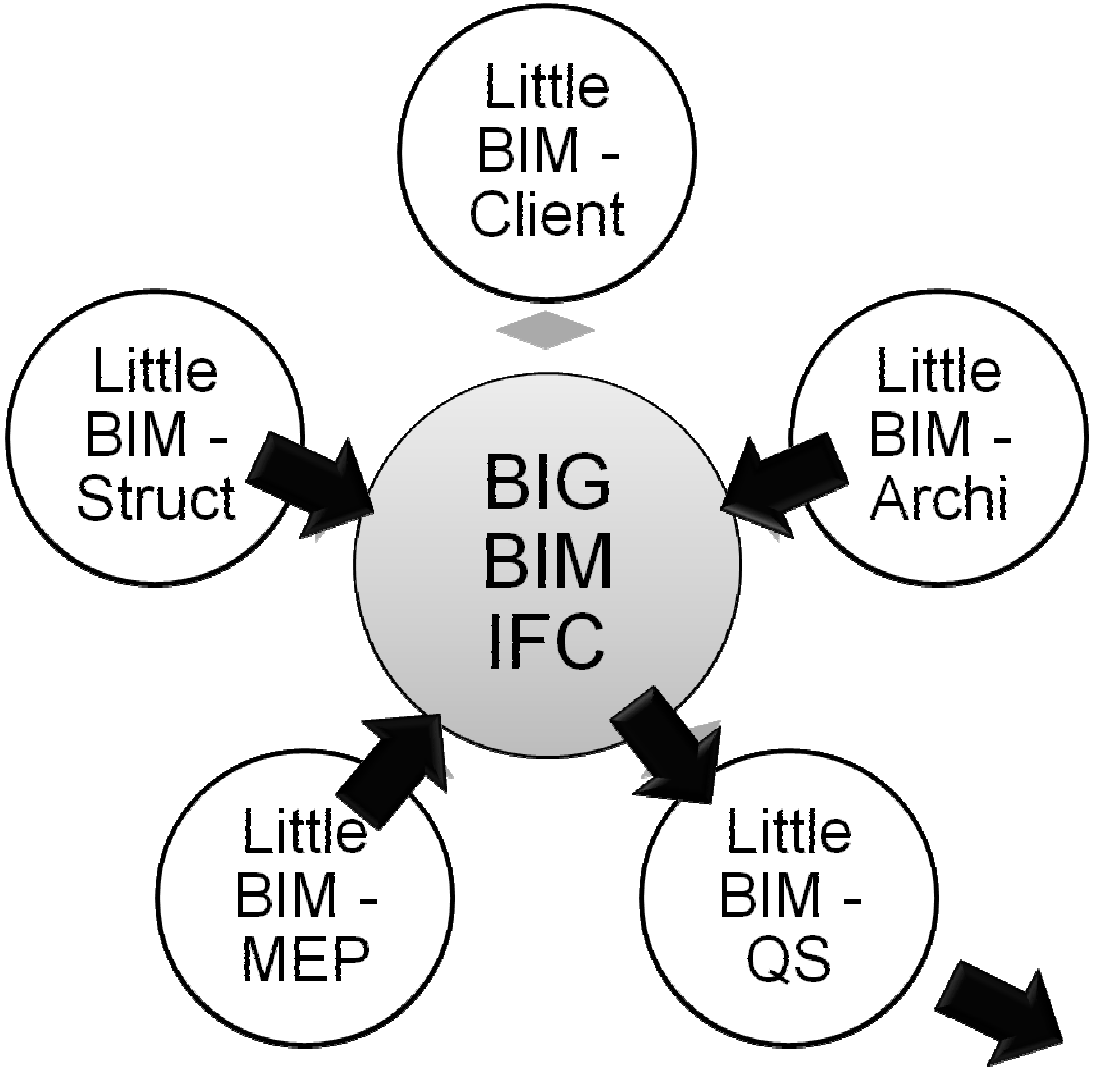
This was just a Small House

What is **BIM**?

- **digital** ~~**representation**~~ **description** of physical and functional **characteristics** of a building
- creating a **shared knowledge resource** for information about it
- forming a reliable basis for decisions during its life cycle, from earliest conception to demolition

» (CPIC, 2011).

Shared Knowledge Resource



Why Not ?

- No effective software tools
- No standard method established
- Need for standards for cost information representation (within the description)

Building Cost Information Modelling Initiative

- Building Cost Information Modelling Framework
- BIM Quantity takeoff automation to suit QS Needs
- BIM and Future of Quantity Surveying

BCIMF - Aim and Objectives

- **Aim**: To develop a conceptual framework for Building Cost Information Modelling
- **Objectives**:

1. Identification of the modelling framework of BIM
2. Identification of cost modelling techniques complementing the framework
3. Identification of the development process of a BIM
4. Modification of the cost modelling technique for it to be efficiently and effectively integrated into BIM
5. Validation of the framework for Building Cost Information Modelling (BCIM)

Current Findings

- Support from IFC Schema
  - Significant support
    - Resource costs
    - Calculations
    - Cost Schedules
    - Currency conversions, etc.
  - Few challenges

Recommendation

- Internationally Standardized Practice for BCIM
  - Enables development of software tools
  - ... wheel will start spinning

Final Remarks

- BIM is a paradigm shift in the way we record information about buildings
  - Compare this with conventional methods
    - Drawings
    - Tables
    - Text

Printed | Digital

  - QS Practice evolved within this context

- Do we remain in the old paradigm?

www.bcimi.org

Think

BCIM.

Thank You