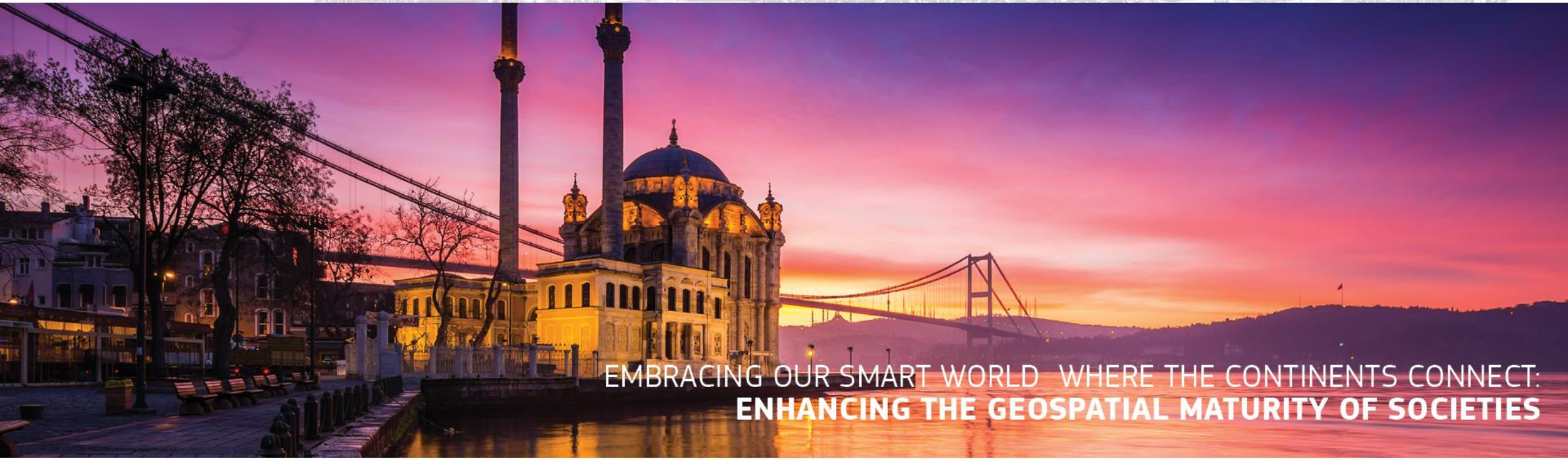
FIG 2018 ISTANBUL

XXVI FIG CONGRESS

6–11 May 2018, İstanbul



EMBRACING OUR SMART WORLD WHERE THE CONTINENTS CONNECT:
ENHANCING THE GEOSPATIAL MATURITY OF SOCIETIES

Organized by

INTERNATIONAL FEDERATION OF SURVEYORS

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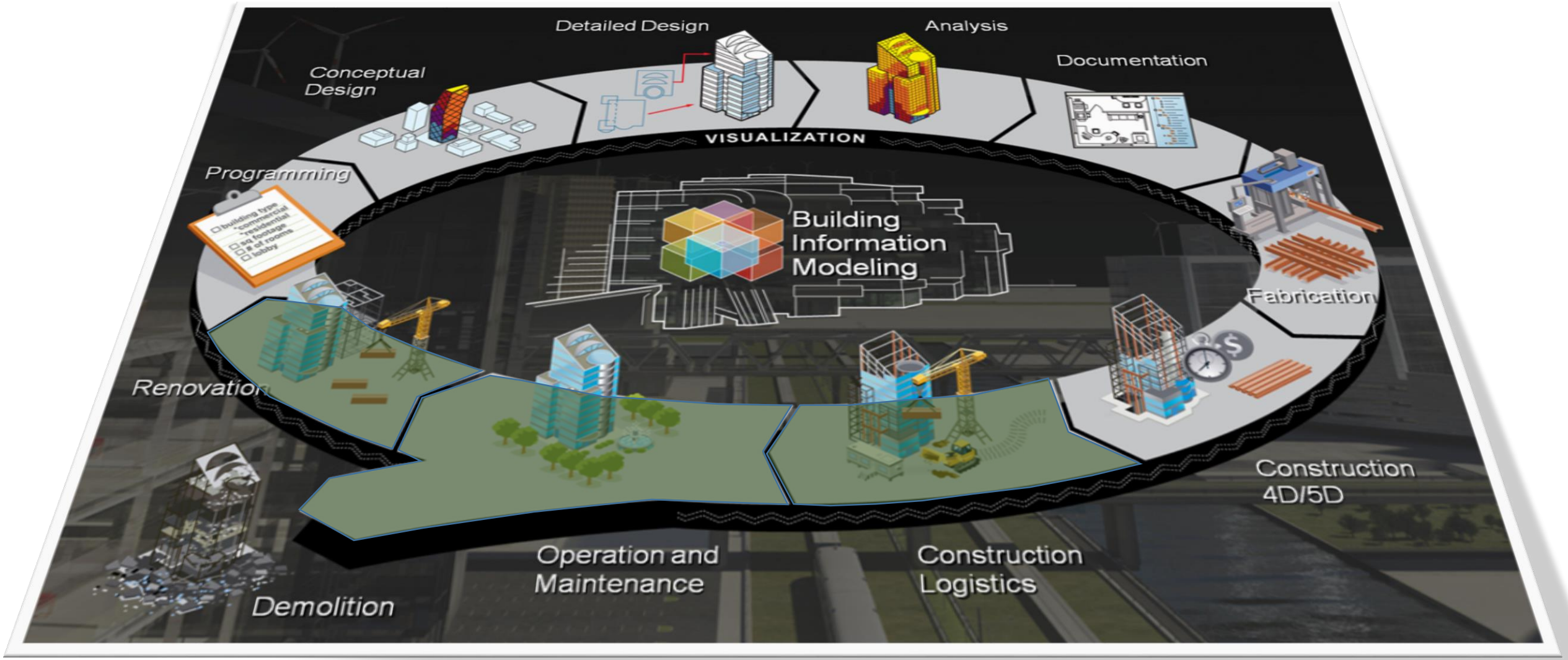
BIM AND GIS INTEROPERABILITY

FIG YOUNG SURVEYORS

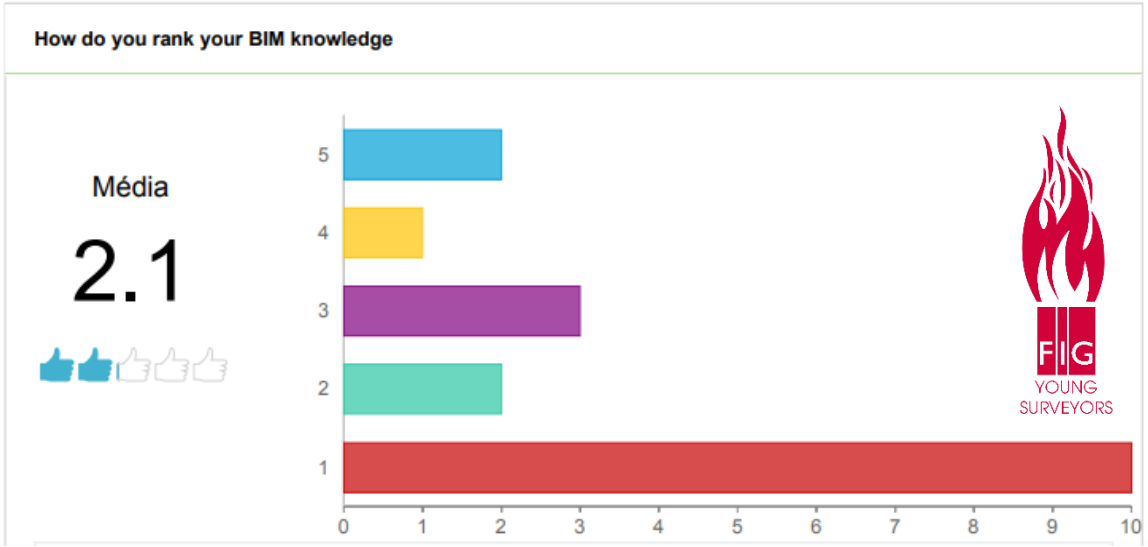
EDGAR BARREIRA | INÊS VILAS BOAS
YOUNG SURVEYORS PORTUGAL

WHAT IS BIM?


Detailed Design
Analysis
Documentation
Conceptual Design
VISUALIZATION
Programming
Building Information Modeling
Fabrication
Renovation
Construction 4D/5D
Operation and Maintenance
Construction Logistics
Demolition

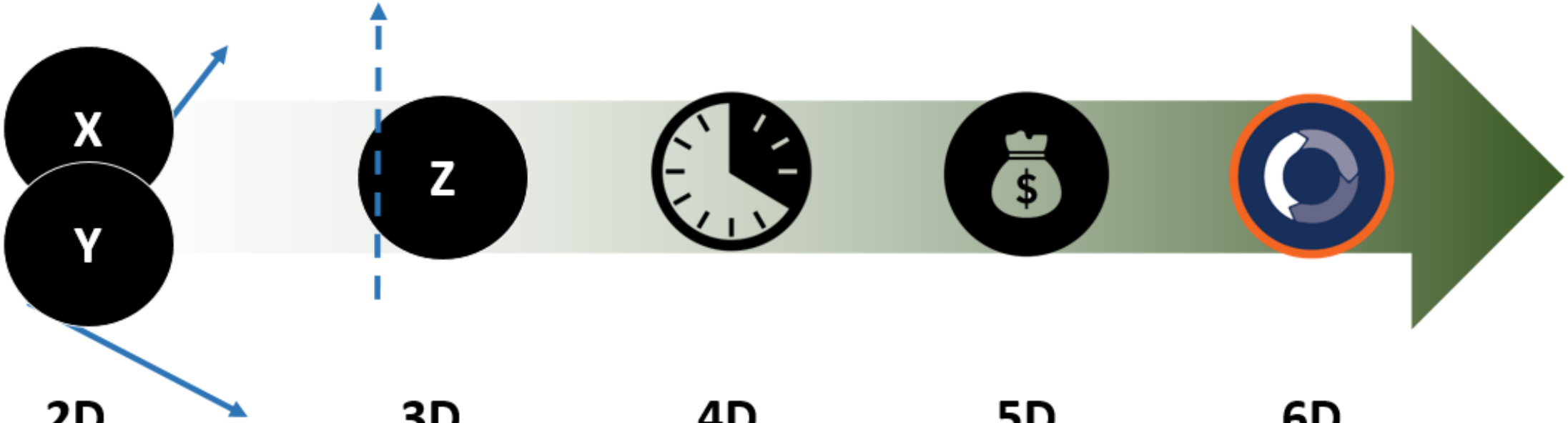
WHAT IS BIM?

How Young Surveyors looked for this one year ago (YSEM17 - Helsinki)?



WHAT IS BIM?

An incremental plus equation…



WHY GET BIM FOR US?

Take a look for the Vision and Opportunities

❖ Move from Analogue into Digital	✓ Surveyors made this long time ago! We are so good for this!
❖ Move from Drawings/PDFs into Data	✓ GIS is within our skills. Let's to it!
❖ Enabled Data-Driven Decision-Making	✓ You just need to be a better Data Scientist, but using what you know about geography!
❖ Information Management in embedded	✓ It's not a Surveyor problem. But Surveyor knows the importance of integration!
❖ Reduce wastage in construction	✓ Our tradition is to be budget-keepers. Go with the flow!
❖ Make efficiencies in operation / maintenance	✓ Geography is absolutelly part of the response. And Geography is our realm, right !?

WHY BIM-GIS INTEGRATION?

Real or 3D GIS models?

WHY BIM-GIS INTEGRATION?

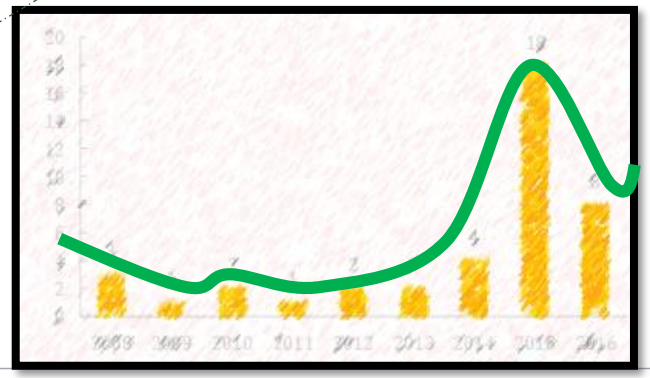
Check the major diferences on software to manage BIM

BIM

- File based
- File based exchange
- Inferior data exchange between COTS products
- Small number of users

GIS

- ✓ Server based w/ relational databases
- ✓ File and webservices for Exchange
- ✓ Full integration between COTS and OS products
- ✓ Large number of users



Evolution of the scientic articles about BIM-GIS in last years

HOW TO ADD VALUE WITH BIM-GIS INTEGRATION?

To Plan, To Design, To Build

- Site Selection/Location planning
- Site circulation/parking/vehicle routing
- Visualization
  - Building Skins
  - Textures
- ViewShed analysis
- Drainage analysis
- Erosion control analysis
- Height analysis
- Airspace encroachments
- Shadow analysis (solar potential)
- Security/Evacuation planning
- Temporal Analysis
  - Historical
  - Existing
  - Future
- Economic Analysis
- Demographics
- Soil Conditions
- Transportation
- Emergency Management/Security
- Total Cost of Ownership/Lifecycle Analysis

HOW TO ADD VALUE WITH BIM-GIS INTEGRATION?

Use GIS as a Live layer of an operation

- GIS-based Facilities management (maintain 3-D models)
- Network routing/analysis
- Asset management
- Public Safety (Security, Fire Protection…)
- Way-Finding (Routing)
- Interior Space analyses (Areas, Elevation, Volumes)
- Energy Management (sensors)

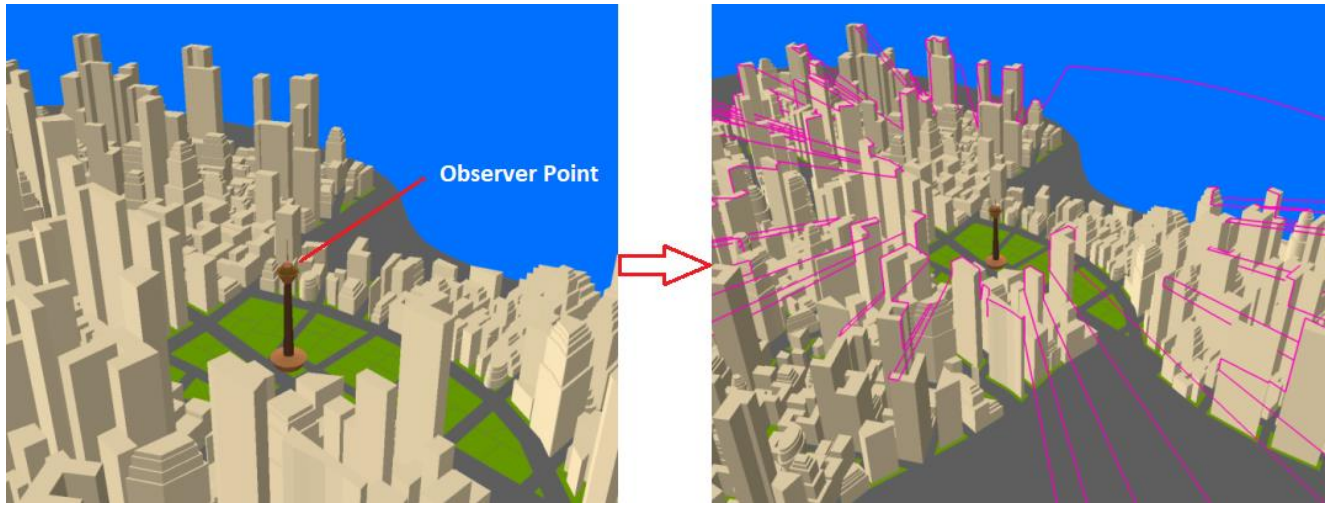
HOW TO ADD VALUE WITH BIM-GIS INTEGRATION?

Analyse BIM as a typical GIS layer

- Existing As-built architectural/structural models
- Existing As-built networks
- Security planning
- Evacuation routing

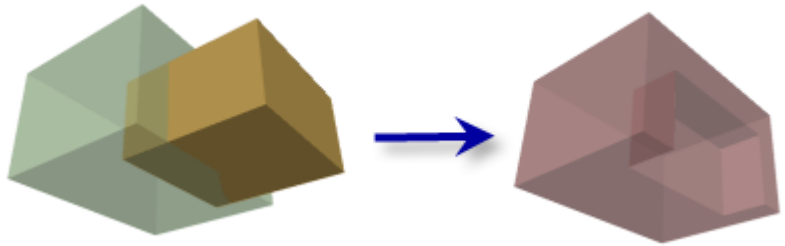
HOW TO ADD VALUE WITH BIM-GIS INTEGRATION?

Analyse BIM as a typical GIS layer (examples)

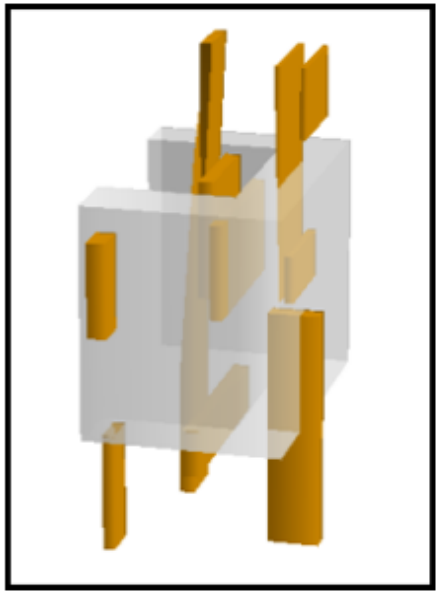


Input
Multipatch Features

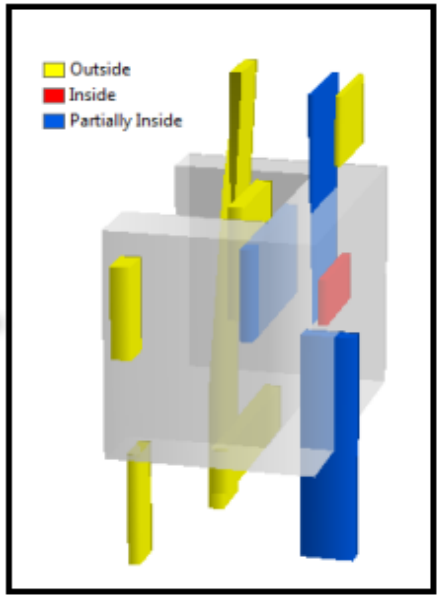
Output
Difference 3D



Input
Multipatch Features

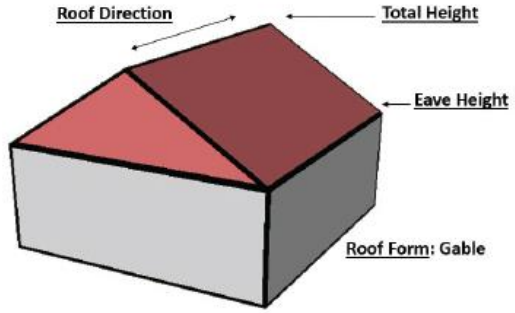


Output
Inside 3D (features symbolized using output table)

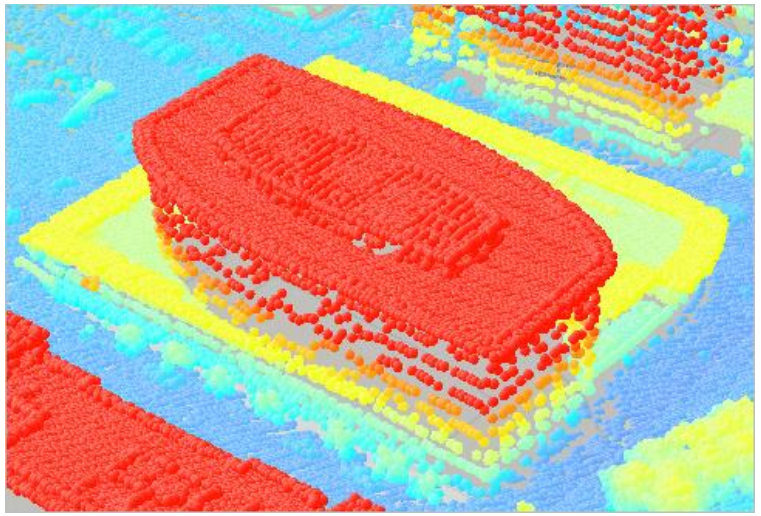


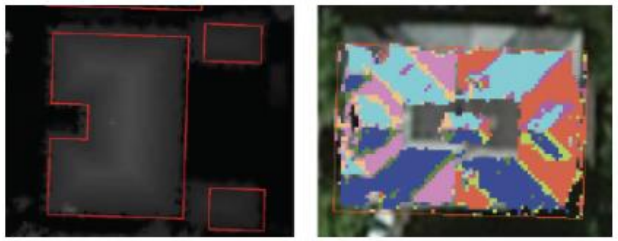
HOW TO ADD VALUE WITH BIM-GIS INTEGRATION?

Integrate point clouds with BIM models as a plus (examples)

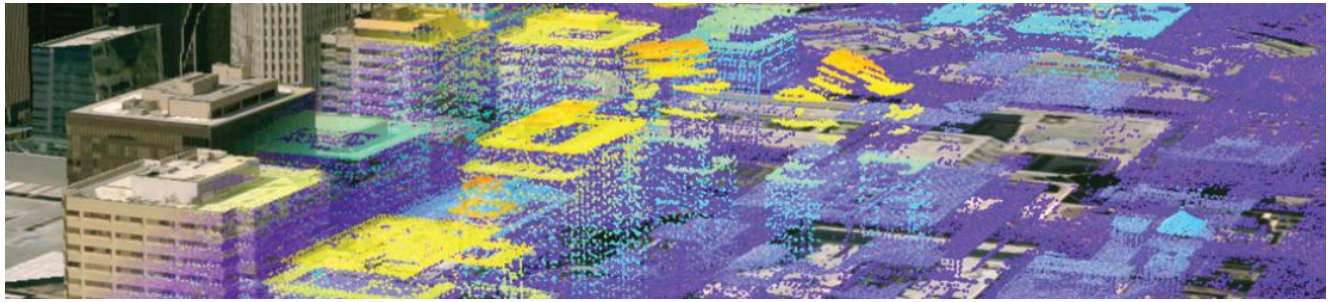


The basic attributes for procedurally creating a 3D building.





Building footprint polygons on a digitial surface model raster (left) and a rooftop classified by slope and aspect.



All the images from The ArcGIS Imagery Book


esri
THE SCIENCE OF WHERE

HOW TO ADD VALUE WITH BIM-GIS INTEGRATION?

Some of the most popular 3D data formats

- **3DS**
- ACAD
- ADAC
- AIS
- AIXM
- AIXM5
- ARCGEN
- ARCGISMAP
- ARCGIS_LAYER
- ARCINFO
- ARCPADAXF
- BMP
- CAT
- CDED
- CGDEF
- **CITYGML**
- **COLLADA**
- CSV
- DATAFILE
- DB2
- DB2SPATIAL
- DBF
- DGNV8
- DLG
- DMDF
- DNF
- DSFL
- DTED
- DWF
- E00
- EPA_GDXML
- EPS
- ESF
- ESRIMSD
- FACET
- FFS
- FILECOPY
- FILEGDB
- FM0
- FM0_SQL
- GDMS
- GENAMAP
- GENERIC
- GEODATABASE_FILE
- GEODATABASE_MDB
- GEODATABASE_SDE
- GEODATABASE_XML
- GEOHASH
- GEOJSON
- GEONET
- GEORSS
- GEOTIFF
- GG
- GIF
- GML
- GML212
- GMLSF
- GOOGLE_SPREADSHEET
- GOOGLEFUSIONTABLES
- GOOGLEFUSIONTABLES_DB
- GPX
- GRD
- IDRISI
- IEPS
- **IFC**
- IFF
- IGDS
- INFX
- INFXSPATIAL
- ISO8211
- IUF
- JOBXML
- JSON
- KF85
- LANDONLINE
- LANDXML
- **LAS**
- MASIK
- MCF
- MDB_ADO
- MGE
- MIF
- MITAB
- MOEP
- MSSQL_ADO
- MSSQL_SPATIAL
- NEN3610
- NTF
- NULL
- OBJ
- ODBC2
- OGCKML
- OGEOSMS
- ORACLE
- ORACLE8I
- ORACLE8I_DB
- **ORACLEPOINTCLOUD**
- OSM
- OSVECTORMAPDISTRICT
- OSVECTORMAPLOCAL
- PCARCINFO
- PDF
- PDF2D
- PHOCUS
- **POINTCLOUDXYZ**
- POSTGIS
- POSTGRES
- QLF
- RDB
- RDB_PROJECT
- REGIS
- S57
- SAIF
- SALESFORCE
- SCHEMA
- SCHEMA_FROM_TABLE
- SDE30
- SDL
- SDTS
- SEG-P1
- SHAPE
- **SKETCHUP**
- SLF
- SPATIALITE
- SQLITE3
- SQLLDR
- STRUMAP
- SVG
- TEXTLINE
- TIGER
- TIGERGML
- TOP10
- TOP50NL
- UFO
- VML
- VPF_DB
- VRML
- VRT
- WFS
- WHITESTAR
- WKB
- WKT
- X3D
- X3D_VRML
- XDK
- XLS_ADO
- XML
- **XYZ**
- Z-MAP_ASCII
- ZFS
- ZGF
- ZMAP

CASE STUDY

Hospital Divino Espírito Santo (Azores – Portugal)

ARIPA ARQUITECTOS

esri Portugal
THE SCIENCE OF WHERE™

CASE STUDY

Workflow

Both parties developed this case study in diferente phases to get solid outputs for each workflow step.

Step 1

Sharing Knowledge

Step 2

Interoperability Tests

Step 3

IFC/REVIT Interoperability

Step 4

Geo-Services and Virtual Reality

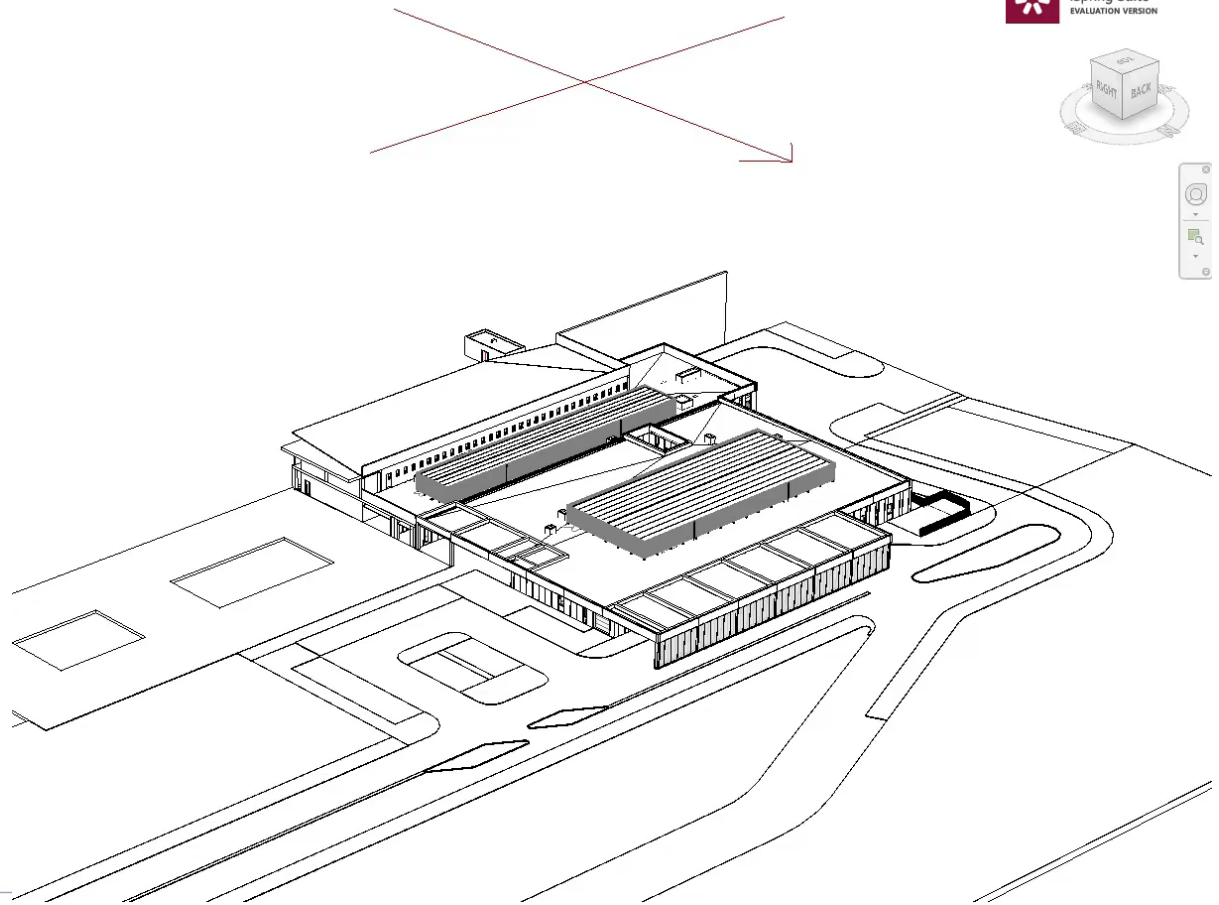
CASE STUDY

Workflow | Step 1

Step 1 — Sharing Knowledge

Both parties shared BIM technical knowledge and how to leverage BIM through interoperability. This phase was useful to understand the requirements and the priorities to integrate a REVIT project into GIS. The parties identified:

- Contents and good practices to manage the information
- Requirements to transfer graphic components and the best practice to manage the collaboration
- Market strategy



CASE STUDY

Workflow | Step 2

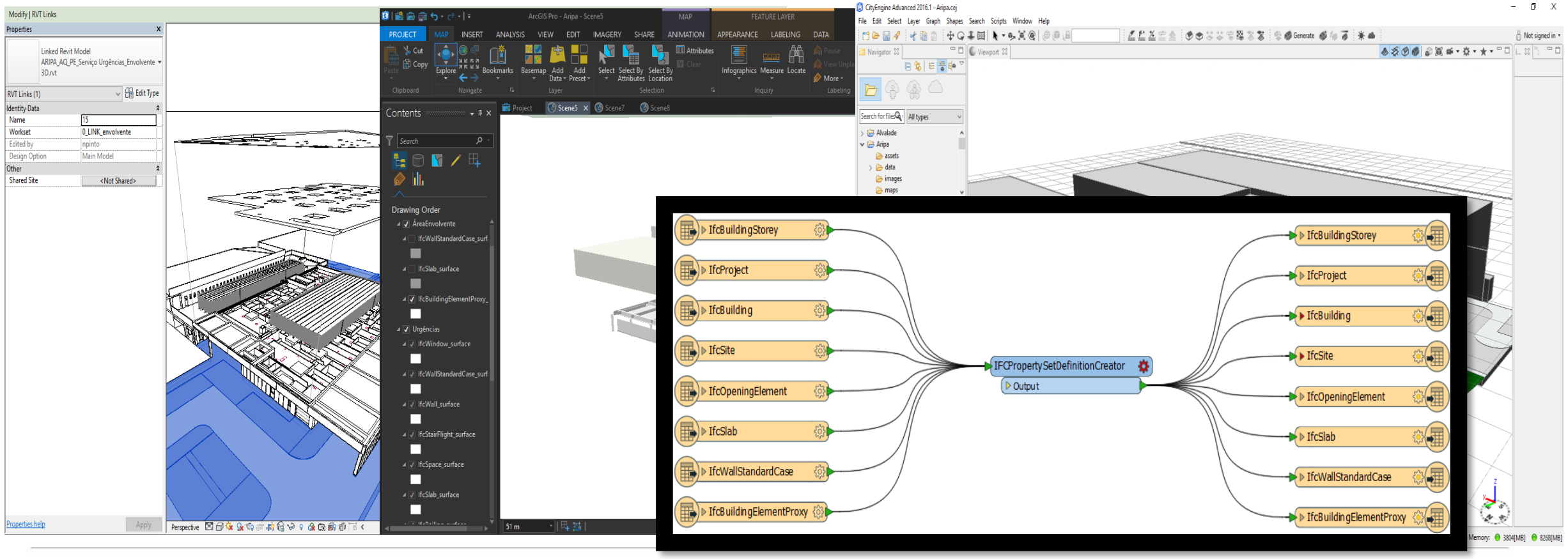
Step 2 — Interoperability Tests

The teams started to research and test different interoperability formats. After these tests both parties listed **advantages and disadvantages**. Interoperability is regularly on the mindset of GIS professionals and the sequence of procedures were:

- The architecture model was modeled and managed in **Autodesk Revit** format (**RVT**)
- The model was exported to an interoperable format: **IFC** by buildingSMART Data model
- The model was imported for the **ArcGIS** ecossystem

CASE STUDY

Workflow | Step 3 | IFC / REVIT Interoperability



CASE STUDY

Workflow | Step 4

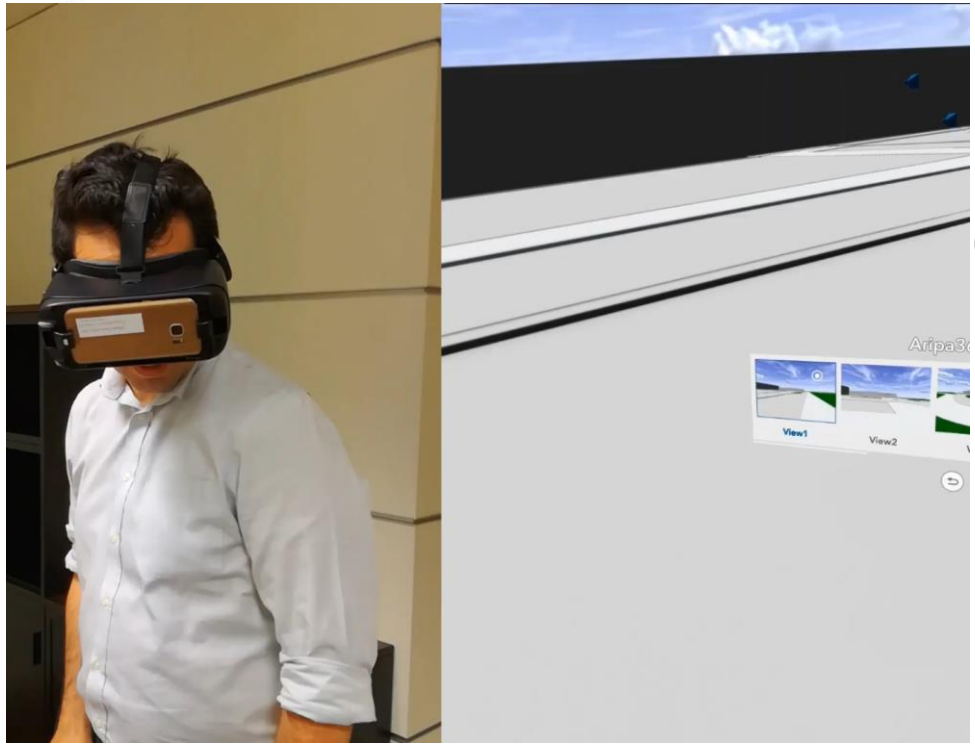
Step 4 — Geo-Services and Virtual Reality

IFC turns into a fundamental interoperable format for BIM, improving the interaction between different software (CAD-GIS or GIS-GIS). In this case the end platform was ArcGIS Online, as the reference technology platform to allow as-a-Service BIM platform. This platform allows:

- Access for all kind of professionals, with different levels of permissions
- Reduce project errors and an easy way to show the project for the infrastructure owners
- Keep the copyright of the project and its object classes and families

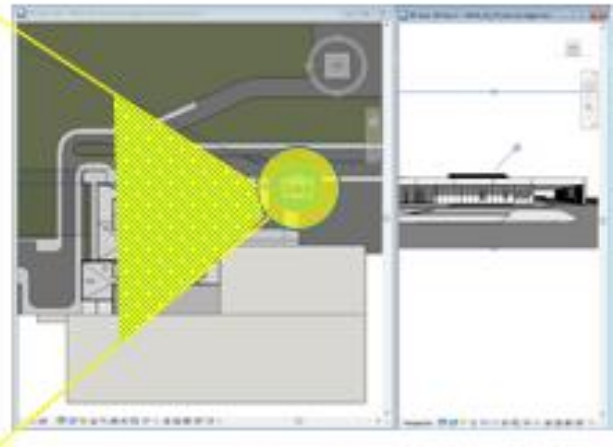
CASE STUDY

Applications | Virtual Reality



SAMSUNG Gear VR Powered by oculus

Configuration of points of view



Virtual Reality as trigger to improve the project meetings between Architects and the owners

CASE STUDY

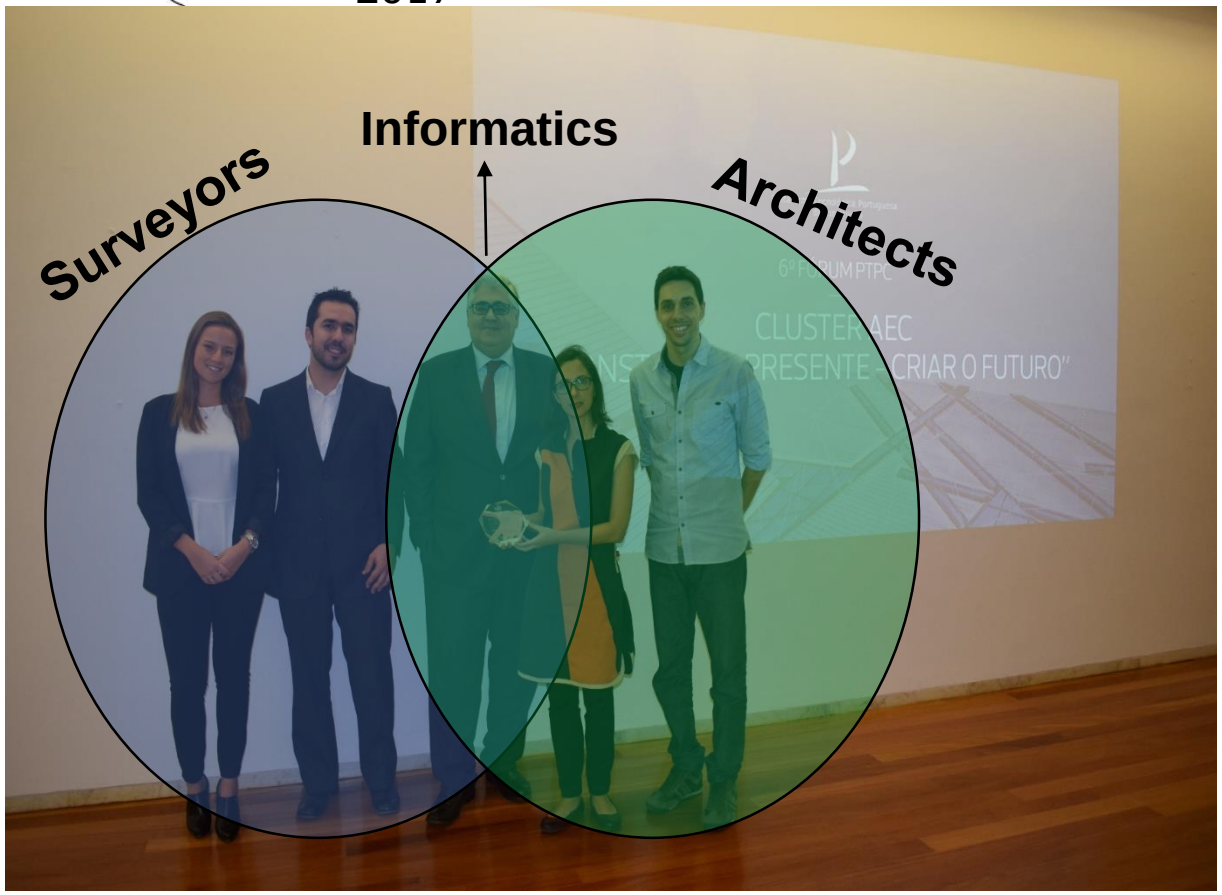
Applications | Site Viewer

Georeference is important to use in the site of the works (for the owner or another companies)

This solution must be improved in the next interactions, to adapt and add more tools for each *persona* and business

CT197 NATIONAL BIM AWARD

2017

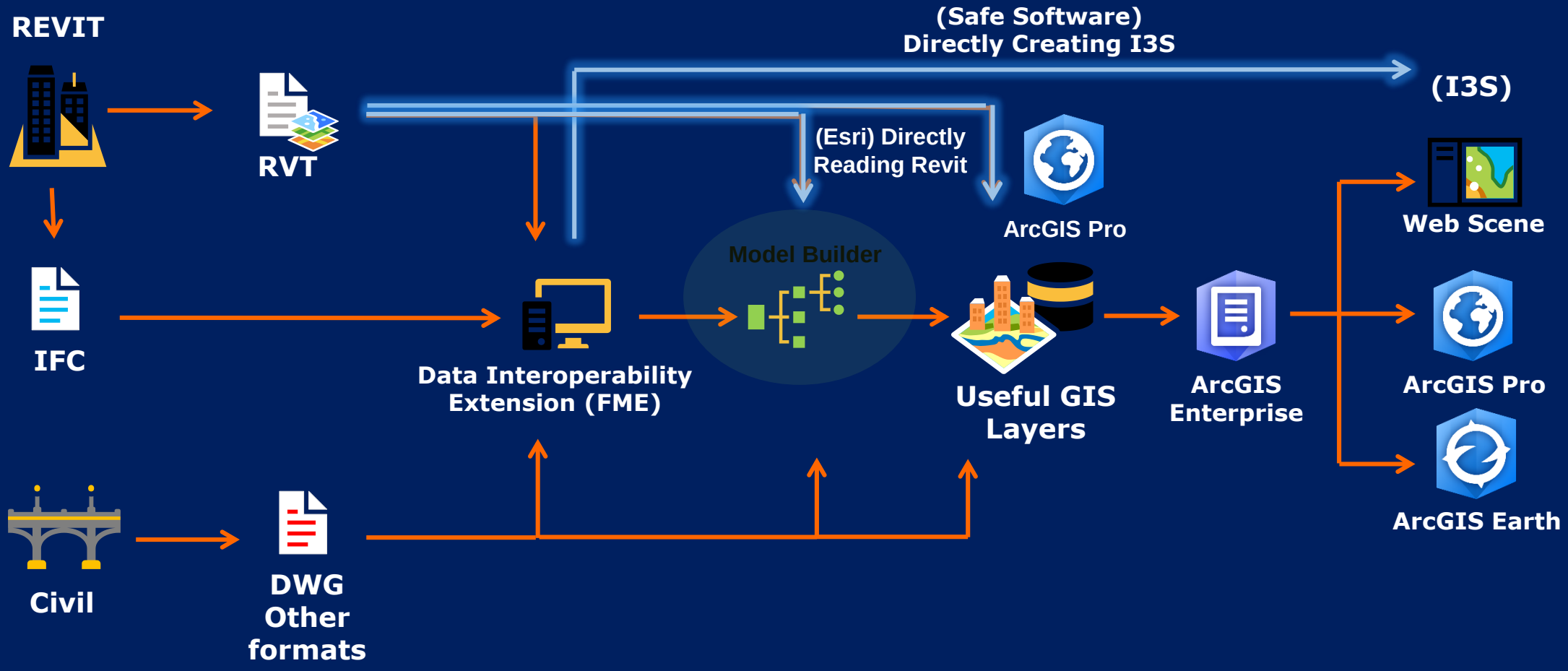


Team:

Sara Pelicano (Administrator at ARIPA)
Nuno Pinto (BIM Manager at ARIPA)
Rui Sabino (CEO at Esri Portugal)
Edgar Barreira (Consultant at Esri Portugal)
Inês Vilas Boas (GIS Consultant at Esri Portugal)

WHEN THE TECH LEADERS JOIN EFFORTS…

TOP BIM-GIS INTEGRATION



c_rvt8_Townhouse.rvt - 3D View: 3D p...

Type a keyword or phrase

Sign In

File | Architecture | Structure | Systems | Insert | Annotate | Analyze | Massing & Site | Collaborate | View | Manage | Add-Ins | Modify | Roofs

Modify | Materials | Additional Settings | Design Options | Main Model | Manage Links | Phases | Dynamo | Dynamo Player

Select | Settings | Project Location | Design Options | Manage Project | Phasing | Selection | Inquiry | Macros | Visual Programming

Modify | Roofs

Project Browser - c_rvt8_Townhouse.rvt

- Families
  - Annotation Symbols
  - Cable Trays
  - Casework
  - Ceilings
  - Conduits
  - Curtain Panels
  - Curtain Systems
  - Curtain Wall Mullions
  - Detail Items
  - Doors
  - Duct Systems
  - Ducts
  - Flex Ducts
  - Flex Pipes
  - Floors
  - Furniture
  - Generic Models
  - Pattern
  - Pipes
  - Piping Systems
  - Planting
  - Plumbing Fixtures
  - Profiles

Properties

Basic Roof
Generic - 12"

Roofs (1) | Edit Type

Slope	
Thickness	1' 0"
Volume	1626.43 CF
Area	1626.81 SF
Identity Data	
Image	
Comments	
Mark	
DonText	My Value
Phasing	
Phase Created	New Construction
Phase Demolis...	None

Properties help | Apply

1/2" = 1'-0"

Click to sele... B for ... nate ... CTRL adds, SHIFT unselects.

:0 | Main Model | :1

Search Windows

12:43 PM
2/27/2018

NEW TRENDS

GIS into Unreal Engine

NEW TRENDS

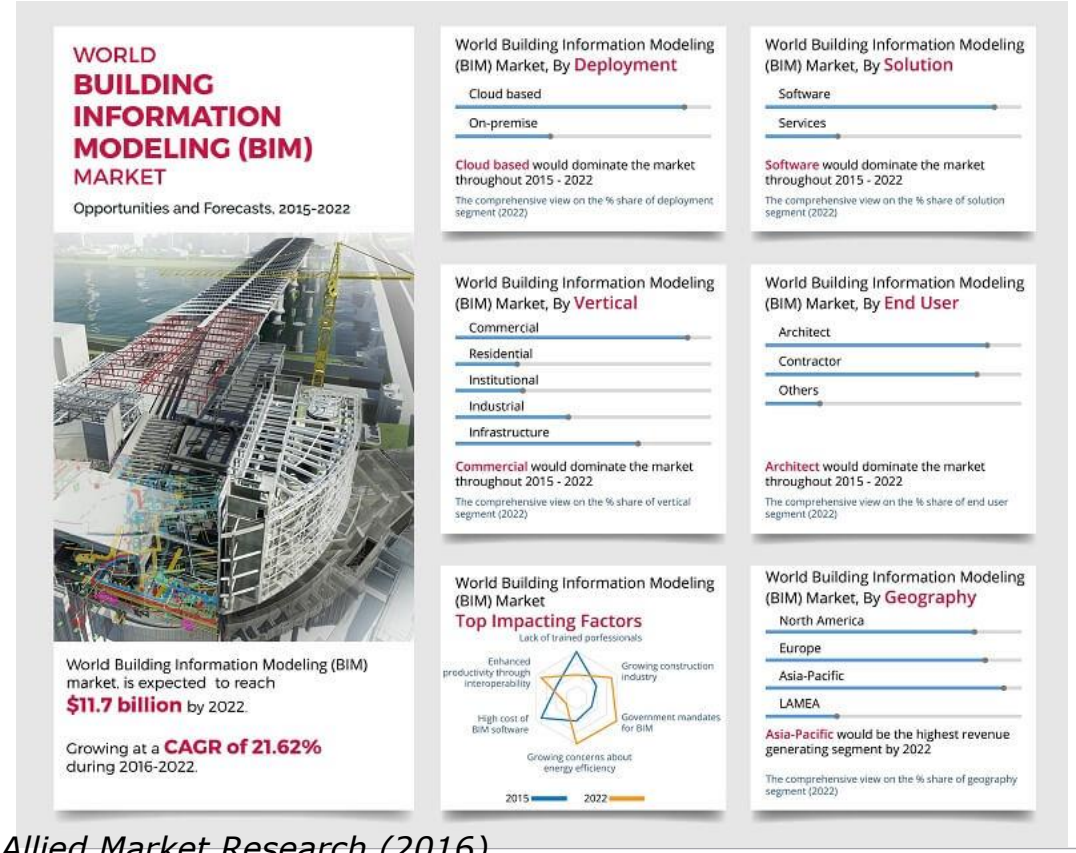
GIS from simple mobile apps - SPIKE

Surveyors must keep updated the technical approaches to be part of the evolutions, not the breaks for the innovation.

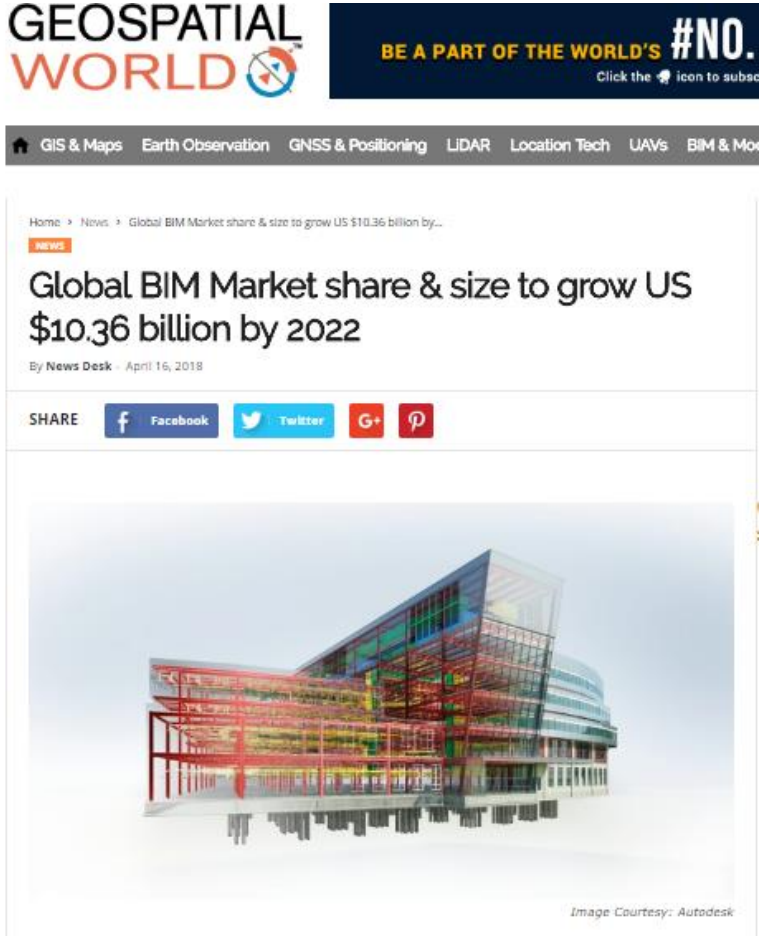
SKIPE is not a tool for Surveyors, if Surveyors don't consider it as a tool for the another ones to update its own projects…In this case, with a perfect integration with GIS, Surveyors will work in collaboration with another ones and be leaders in a process (not followers – followers ensure Surveyors must be Leaders!

ABOUT REVENUE…

Statistics about the size Market of BIM



Allied Market Research (2016)



Geospatial World Media (2018)

CHALLENGES…

What kind of challenges for BIM-GIS and for the Surveyors?

Please! Try don't be this folk!

Try to be one of these ones!

BIM AND GIS INTEROPERABILITY

EDGAR BARREIRA | INÊS VILAS BOAS
YOUNG SURVEYORS PORTUGAL

THANK YOU!
YSNPORTUGAL@GMAIL.COM