



WP4 -BIM INTERMODAL TERMINALS STATUS OVERVIEW

José Robiou

IDP

1st global meeting

Kiruna, April 2017





TABLE OF CONTENTS

1. Status overview
2. Objectives and deliverables
3. Work done
4. Immediate objectives (next 6 months)
5. Changes from envisaged plan
6. Potential risks and opportunities





Main works in WP4:

- *BIM execution plan guideline. Submitted in 31/03/2017*
 - *Included BIM execution plan workshop 23-24 /03/2017 with the participation of Viasys, BASF, IDP and VTT*
- *Modelling of existing terminals starting as of 03/04/2017*
 - *Phase I, Previous Works started with CONT and APSP for existing terminal infrastructure data collection. In parallel works with VTT and Viasys to define modelling basis for future testings*
 - *Phase II, to be engaged in parallel with available information*
- *Modelling of virtual terminals starting 01/05/2017*



2- OBJECTIVES AND DELIVERABLES

- *BIM execution plan definition. Deliverable 4.1*
 - *Modelling strategies to comply with specific project innovations and demonstrations*
 - *Modelling recording and mapping strategies for future implementation purposes*
- *Modelling of existing Railway Terminals. Deliverable 4.2*
 - *Data Collection and surveys of existing infrastructure*
 - *Build BIM model of existing terminals according to established guidelines*
- *Modelling of virtual Railway Terminals. Deliverable 4.3*
 - *Build BIM model of virtual terminal using as a guideline the desired optimizations for WP2*
- *Implementations in virtual terminals of innovations from WP2. Deliverable 4.4*



3- WORK DONE

✓ *BIM execution plan definition. Deliverable 4.1*

✓ *BIM uses/goals according to project phasing matrix.*

	Plan	Design	Construct	Maintenance
Goals / Outputs	<ul style="list-style-type: none"> Interactive and visual terminal planning KPI's 	<ul style="list-style-type: none"> Design analysis, quality KPI's 	<ul style="list-style-type: none"> Constructability analysis, Efficient construction KPI's 	<ul style="list-style-type: none"> Efficient maintenance KPI's
BIM Tools / Uses	Layout sketching tool for Explorer <ul style="list-style-type: none"> Draw areas and networks Define element attributes Import layout DWG/DGN and convert to elements 	<ul style="list-style-type: none"> Design coordination Clash detection Compare to plan layout and requirements 	<ul style="list-style-type: none"> Quantity takeoff Edit model attributes (manufacturer, materials, type coding, etc.) 	<ul style="list-style-type: none"> Read maintenance objects from BIM model Maintenance task planning and programming tools Export to COBIE
Model	Simple layout model (basically 2D but raised into 3D for better visualization) Model hierarchy (main element, sub element, etc.) Existing & Plan Object types <ul style="list-style-type: none"> Area topology Network topology Static elements Access point areas Object attributes <ul style="list-style-type: none"> Name & GUID Type / usage Capacity attributes (volume, number of elements, lanes, vehicles per hour, etc.) Relation links to other objects (access points) Visual representation (3d-block, cranes, unloading / loading machinery, gates, etc.) Requirements, risks, notes 	3D Design model <ul style="list-style-type: none"> Structures as BIM objects based on design standards and regulation Disciplines <ul style="list-style-type: none"> Existing <ul style="list-style-type: none"> Sea bed Surfaces, buildings, utilities, etc. Design <ul style="list-style-type: none"> Roads Rails Structures (bridges, wall, etc.) Traffic guidance Landscaping Utility networks Buildings Terminal elements (storages, etc.) OpenBIM standards <ul style="list-style-type: none"> IFC, LandXML 	5D Constructible model <ul style="list-style-type: none"> Construction phases Rework on design BIM model to adjust real constructible elements (manufacturer, materials, type coding etc) Quantities from model Construction method → resources → cost & schedule of construction Collect maintenance information Construction safety (safety zones, barriers, etc.) Temporary constructions (storages, temporary roads, etc.) 	6D Maintenance model <ul style="list-style-type: none"> Maintenance planning programming (tasks, scheduling) attached to BIM objects Service information like service manuals etc connected to model
Simulation engine	<ul style="list-style-type: none"> Read model elements as input for simulation Create simulated dynamic objects into Explorer (containers, trains, vehicles, cranes, etc.) Visualize results in model (volumes, bottlenecks, etc.) CAPEX, OPEX estimates 	<ul style="list-style-type: none"> Energy simulations 	<ul style="list-style-type: none"> Construction time CO2 emission simulation 5D simulation Model based cost calculation 	<ul style="list-style-type: none"> Maintenance task optimization Material durability / lifecycle costs



3- WORK DONE

✓ *BIM execution plan definition. Deliverable 4.1*

✓ *Survey and Legacy data strategy.*

- *Topographic base map (CAD, GIS, Raster)*
- *Topographical surface model (DTM, LIDAR)*
- *Layout (CAD plans, points cloud)*
- *Environmental information (CAD format, GIS)*
- *Hydrology study (CAD format, GIS)*
- *Geotechnical study (CAD format, GIS)*
- *Railway network (Istram, CAD format, GIS)*
- *Road network (Istram, CAD format, GIS)*

Model Categories / Surver & Legacy Data Mapping							
Category	Elements	Format	Type	Format	Type	Format	Type
1. Earth Works	Terrain Surfaces						
	Gradings						
	Trenches						
2. Railway	Rail Bed						
	Balast						
	Rail and sleepers						
	OH/ Gauges						
2. Road	Road Pavements						
	Kerbs, gutters						
3. Civil Works	Retaining Walls						
	Birgde Piers and Abutments						
	Bridge Decks						
4. Site Design	Pavements						
	Landscaping						
	Urban utilities						
5. Utilities	Site Utilities						
6. Foundations	Slabs on Grade						
	Foundations						
7. Structures	Columns						
	Beam						
	Walls						
8. Architecture	Partitions						
	Cladding						
	Ceilings						
	Roofing						
9. MEP/FP/SEC	Mechanical Systems						
	Electrical Systems						
	Plumbing Systems						
	Fire Protection						
	Security Systems						
10. Specialized Equipment	Equipment						



3- WORK DONE

- ✓ *BIM execution plan definition. Deliverable 4.1*
- ✓ *Element Modelling*

Model Categories / BIM design-modelling phase					
MODEL / SW			Attributes / Parameters		
Category	Elements	Platforms/ Design	Design	Construction	Asset
1. Earth Works	Terrain Surfaces	ISTRAM / ALLPLAN / CIVIL 3D			
	Gradings	ISTRAM / ALLPLAN / CIVIL 3D			
	Trenches	ISTRAM / CIVIL 3D			
2. Railway	Rail Bed	ISTRAM / ALLPLAN / CIVIL 3D			
	Balast	ISTRAM / ALLPLAN / CIVIL 3D			
	Rail and sleepers	ISTRAM			
	OH/ Gauges	ISTRAM			
2. Road	Road Pavements	ISTRAM / ALLPLAN / CIVIL 3D			
	Kerbs, gutters	ISTRAM / ALLPLAN / CIVIL 3D			
3. Civil Works	Retaining Walls	ISTRAM / ALLPLAN / CIVIL 3D / REVIT			
	Bridge Piers and Abutments	ISTRAM / ALLPLAN / REVIT			
	Bridge Decks	ISTRAM / ALLPLAN / REVIT			
4. Site Design	Pavements	ISTRAM / ALLPLAN / CIVIL 3D / REVIT			
	Landscaping	ISTRAM / ALLPLAN / CIVIL 3D / REVIT			
	Urban utilities	ISTRAM / ALLPLAN / CIVIL 3D / REVIT			
5. Utilities	Site Utilities	ISTRAM / CIVIL 3D / ALLPLAN / REVIT			
6. Foundations	Slabs on Grade	ALLPLAN / REVIT / TEKLA			
	Foundations	ALLPLAN / REVIT / TEKLA			
7. Structures	Columns	ALLPLAN / REVIT / TEKLA			
	Beam	ALLPLAN / REVIT / TEKLA			
	Walls	ALLPLAN / REVIT / TEKLA			
8. Architecture	Partitions	ALLPLAN / REVIT			
	Cladding	ALLPLAN / REVIT			
	Ceilings	ALLPLAN / REVIT			
	Roofing	ALLPLAN / REVIT			
9. MEP/FP/SEC	Mechanical Systems	REVIT MEP			
	Electrical Systems	REVIT MEP			
	Plumbing Systems	REVIT MEP			
	Fire Protection	REVIT MEP			
	Security Systems	REVIT MEP			
10. Specialized Equipment	Equipment	REVIT MEP			



3- WORK DONE

- ✓ *BIM execution plan definition. Deliverable 4.1*
- ✓ *Element Modelling*

Element Categorization / Planning Interface						
Category	Element	Bim object type	Attributes	Attributes	Attributes	Attributes
1. Waterside Area	a.Berth	Area	P h y s i c a l	O p e r a t i o n a l	S i m u l a t i o n	D e s i g n C r i t e r i a
	b.Apron	Network				
	c.Navigation Area	Area				
2. Quayside Transport	a.Vehicle Access Area	Area				
	b.Handling System	Area				
3. Stacking area	a.Piles of Containers	Area				
	b.Bulk Stacking	Area				
	c.Warehousing	Area				
	d.Access Gates	Area				
4. Unloading Areas	a.Vehicle Unloading Areas	Access point				
	b.Train Unloading Areas	Access point				
5. Internal Transport Area	a.Railway	Network				
	b.Road	Network				
6. Gates and Connections	a.Truck Gates	Access point				
	b.Rail Gates	Access point				
	c.Weighing	Access point				
	d.Scanners and detection	Access point				
7. Auxiliary Buildings	a.Buildings/Spaces	Area				
8. Utilities	a.Utilities	Area/Network				
9. External Transport	a.Railway	Network				
	b.Road	Network				



- ✓ *BIM execution plan definition. Deliverable 4.1*
- ✓ *Classification Standards*



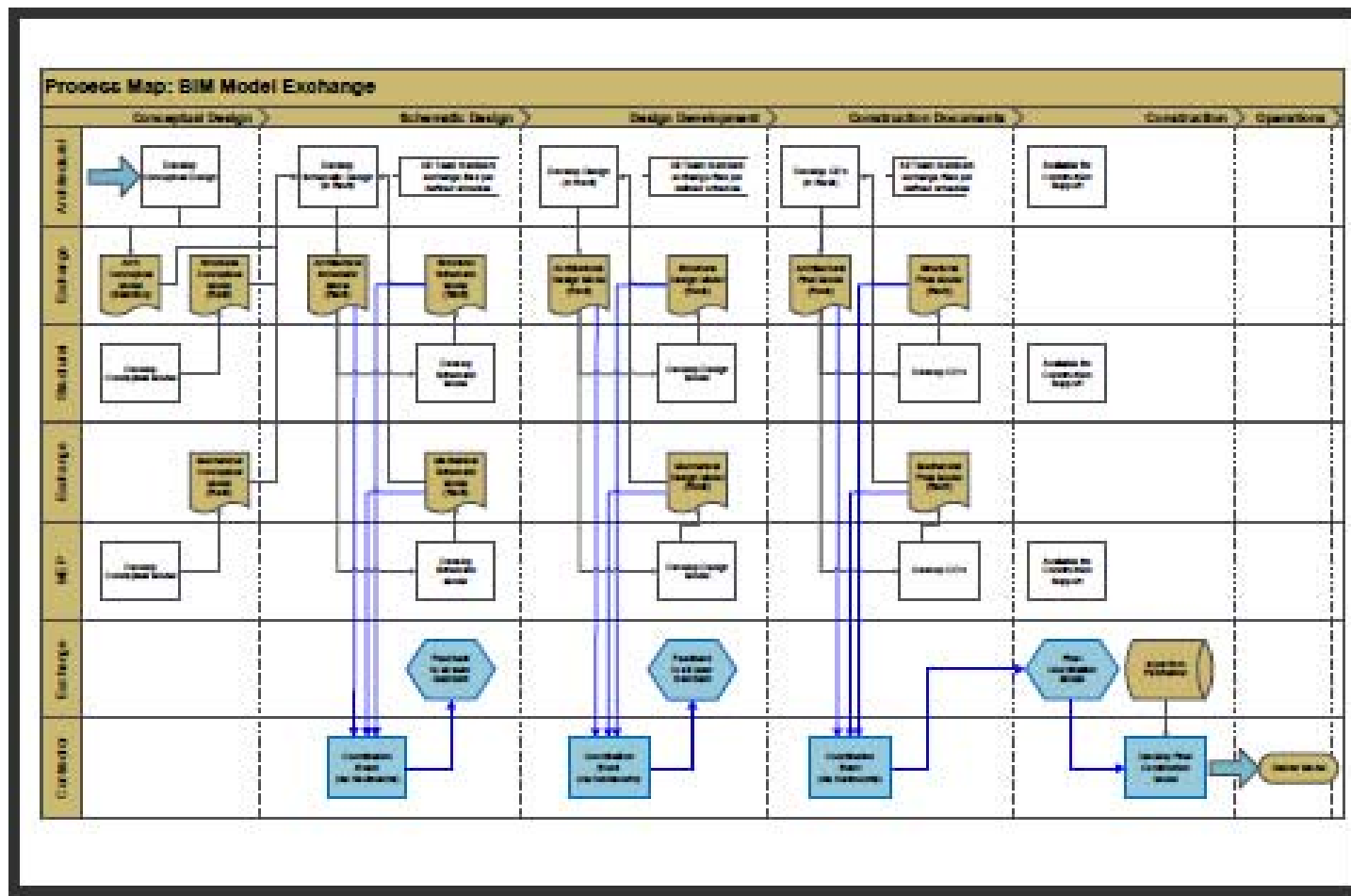
The 15 inter-related *OmniClass* tables are:

- Table 11 - Construction Entities by Function
- Table 12 - Construction Entities by Form
- Table 13 - Spaces by Function
- Table 14 - Spaces by Form
- Table 21 - Elements
(includes *Designed Elements*)
- Table 22 - Work Results
- Table 23 - Products
- Table 31 - Phases
- Table 32 - Services
- Table 33 - Disciplines
- Table 34 - Organizational Roles
- Table 35 - Tools
- Table 36 - Information
- Table 41 - Materials
- Table 49 - Properties



3- WORK DONE

- ✓ *BIM execution plan definition. Deliverable 4.1*
- ✓ *Modelling workflow mapping*





3- WORK DONE

- ✓ *BIM execution plan definition. Deliverable 4.1*
- ✓ *Data requirements*

	Plan	Design	Construct	Maintenance
Geometry	2D/3D layout topology model	3D BIM objects	5D BIM objects Final elements + temporary elements	6D BIM objects As-built model
Information	Type classification, physical attributes, operational attributes, simulation attributes Requirements, risks	Dimensions, volumes, materials, quality, design parameters, specifications / requirements, IoT sensors	Materials, manufacturers Construction method	Installation date Maintenance dates Maintenance tasks Service documentation

Attributes	Attributes	Attributes	Attributes
Physical	Operational	Simulation Specific	As-Built



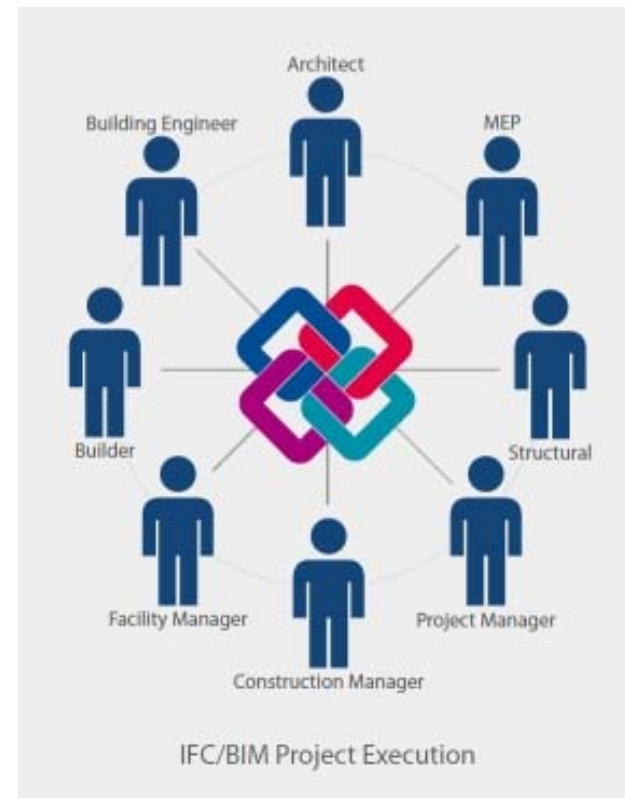
3- WORK DONE

✓ *BIM execution plan definition. Deliverable 4.1*

✓ *Exchange protocols*

✓ *OPEN BIM - proposed formats*

- IFC
- LandXML
- GML
- City GML
- RailML
- Raster
- DTM
- LIDAR





3- WORK DONE

- ✓ *BIM execution plan definition. Deliverable 4.1*
 - ✓ *Software requirements*



AUTOCAD
MAP 3D



AUTODESK
CIVIL3D



istram®



AUTODESK® REVIT® 2017



TEKLA® Structures



AUTODESK
NAVISWORKS



3- WORK DONE

- ✓ *BIM Intermodal Terminals. Deliverable 4.2 - 4.3*
 - Phase I. Infrastructure data collection*
 - *WMS available information*





3- WORK DONE

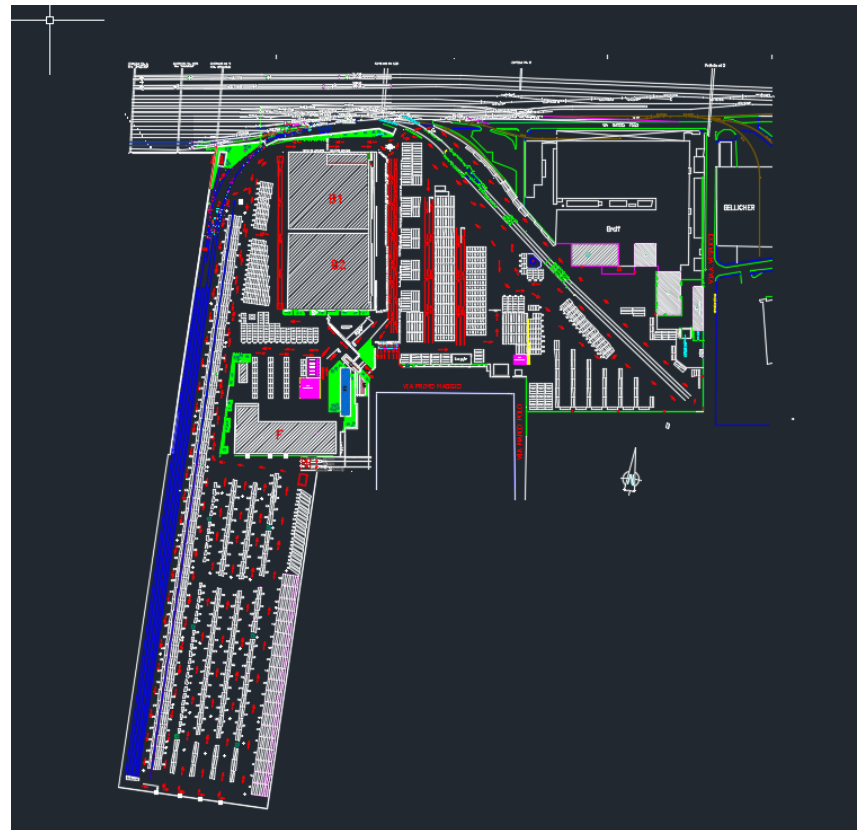
- ✓ *BIM Intermodal Terminals. Deliverable 4.2 - 4.3*
 - Phase I. Infrastructure data collection*
 - WMS available information*





3- WORK DONE

- ✓ *BIM Intermodal Terminals. Deliverable 4.2 - 4.3*
 - Phase I. Infrastructure data collection*
 - *Infrastructure asset survey from Contship Italia*





3- WORK DONE

- ✓ *BIM Intermodal Terminals. Deliverable 4.2 - 4.3*
 - Phase I. Infrastructure data collection*
 - *Infrastructure asset survey from La Spezia*





3- WORK DONE

✓ *BIM Intermodal Terminals. Deliverable 4.2 - 4.3*

Phase I. Infrastructure data collection

- *Infrastructure asset survey from La Spezia*
- *Infrastructure asset survey from Melzo*
- *Additional Survey Strategies needed for data complementation.*

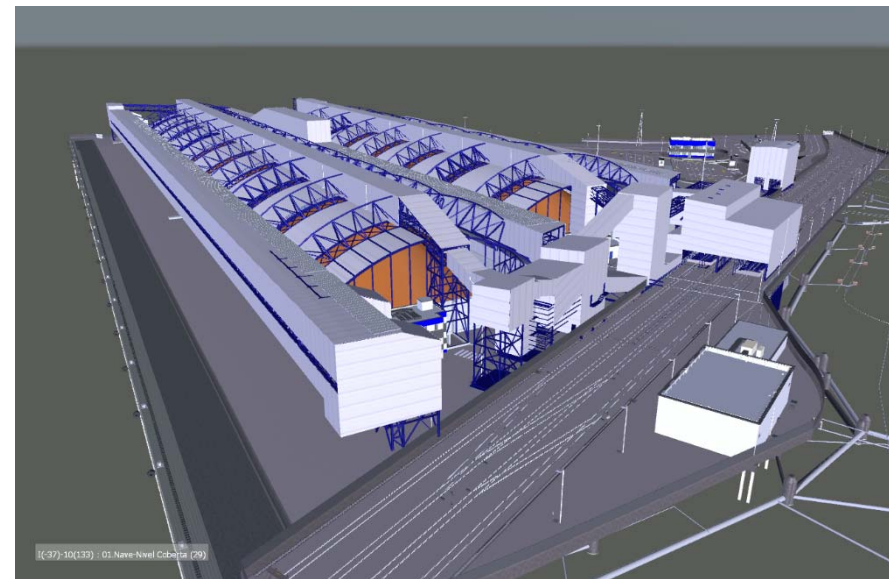
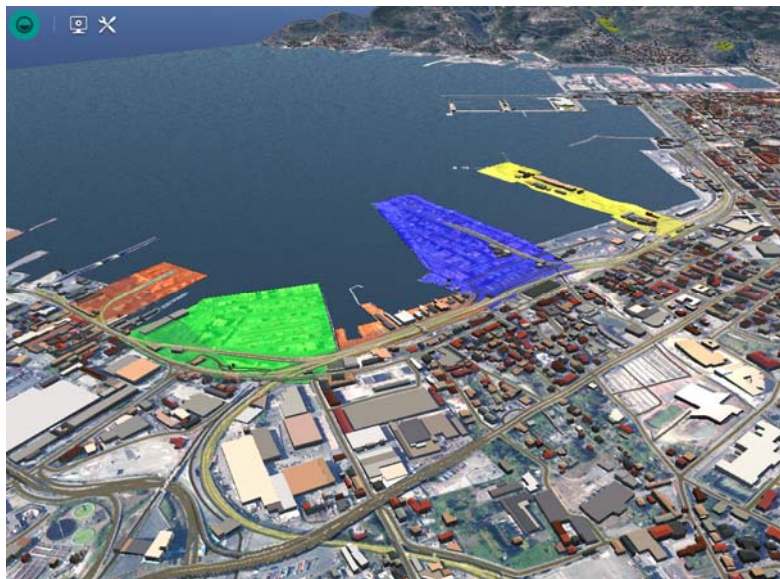




4- IMMEDIATE OBJECTIVES (NEXT 6 MONTHS)



- *Phase I. Data recollection and integration.*
 - *Involvement of WP leaders that require BIM development*
 - *Definition of data requirements and scope that comes from each WP definition*
 - *Determine Scope for each WP BIM development (Requirement list)*
 - *Standard Data management platform to avoid overlapping information requirements*





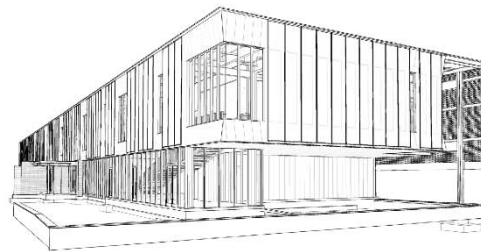
4- IMMEDIATE OBJECTIVES (NEXT 6 MONTHS)

- Asset management innovations

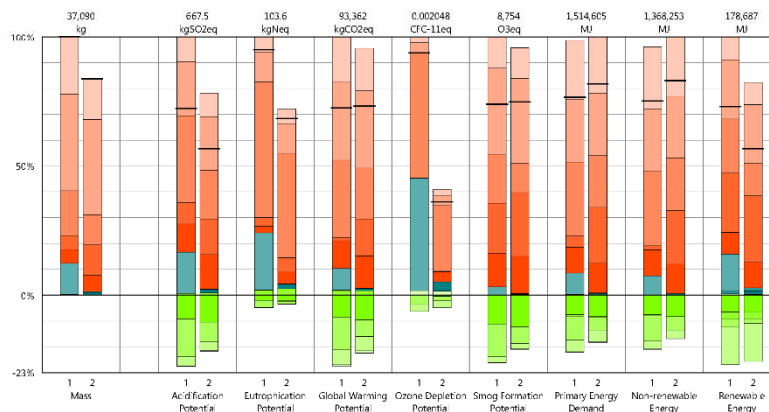
Tally™ can be used to compare design options.



Option 1 - Corrugated Shingle Cladding

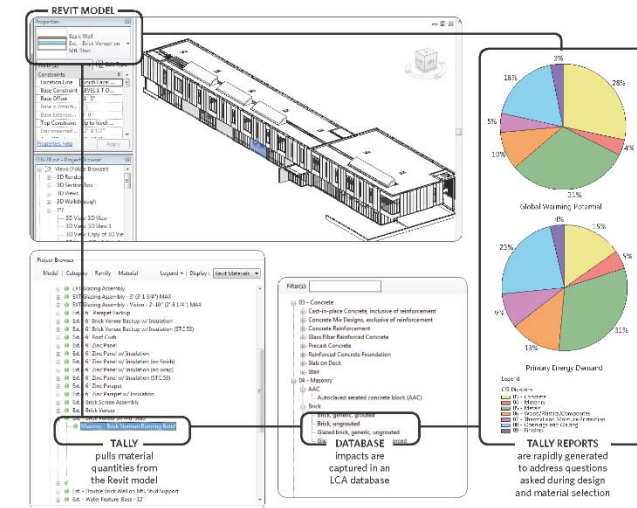


Option 2 - Translucent Panel Cladding (Selected)



Results Per Life Cycle Stage, Itemized by CSI Division

Tally™ pulls material quantities from the Revit model to create an accurate bill of goods.



© KT INNOVATIONS

© KT INNOVATIONS



QUESTIONS?
10'



THANKS!