



Model development management on Highways England SMART motorways projects with CH2M

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CH2M

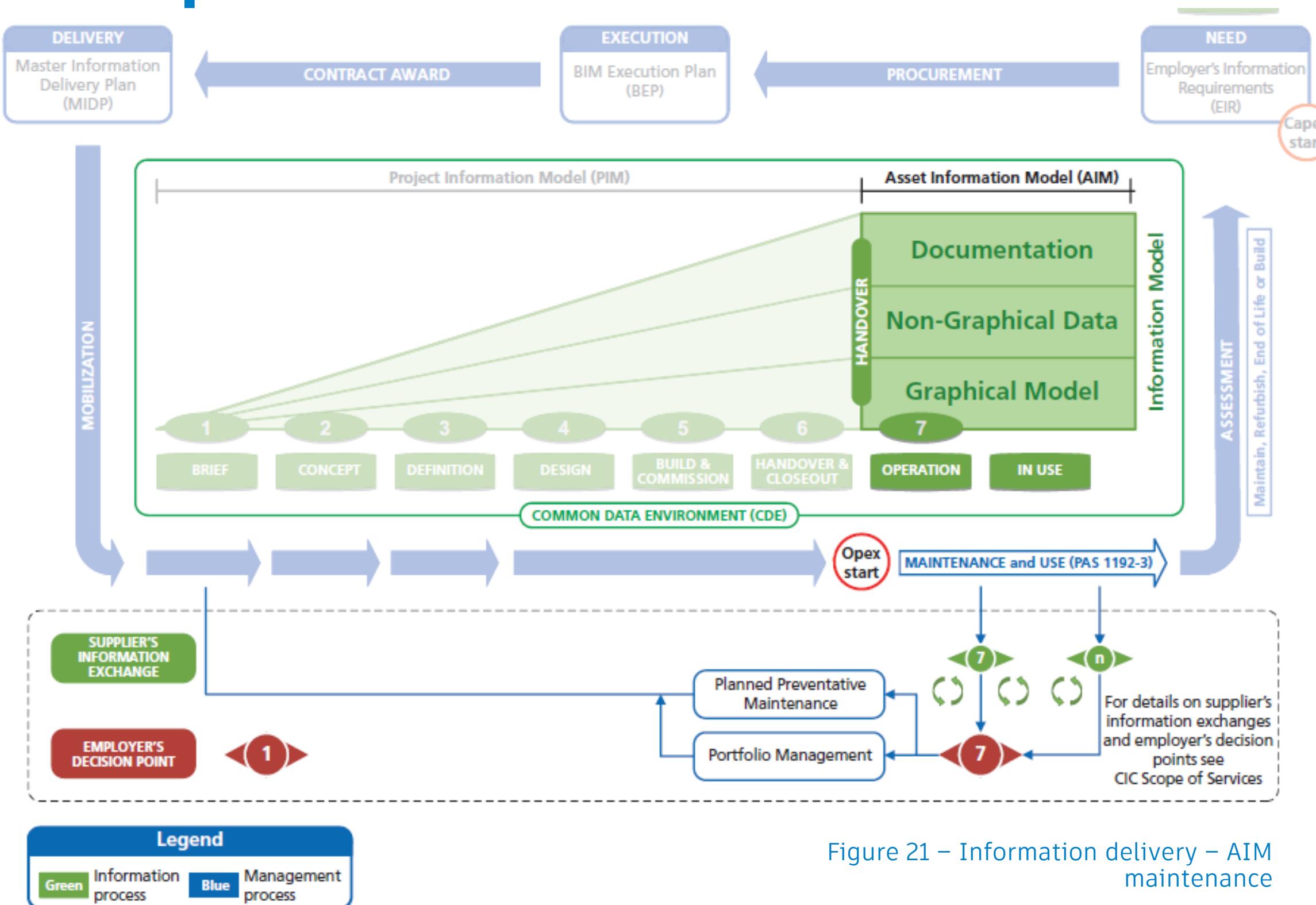
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Agenda

- Client Requirements
 - Governing Documents
 - Resulting scope of information
- Solution Architecture
- Key features
- Live Demo
- Resulting Output
- Questions

Client Requirements



Client Requirements

Client Requirements

 HIGHWAYS ENGLAND

Asset Information Group

ASSET DATA MANAGEMENT MANUAL
PROVIDER REQUIREMENTS
ASSET DATA MANAGEMENT REQUIREMENTS

Edition 4 – November 2015
Version: 2.0

This document **MUST** be used in conjunction with the ADMM Introduction and ADMM appendices sections.

 Building Information Modelling (BIM)
Employer's Information Requirements

Highways England
July 2015

Interim Advice Note 184/16
Highways England CAD and Data Standard

INTERIM ADVICE NOTE 184/16
Highways England Data & CAD Standard

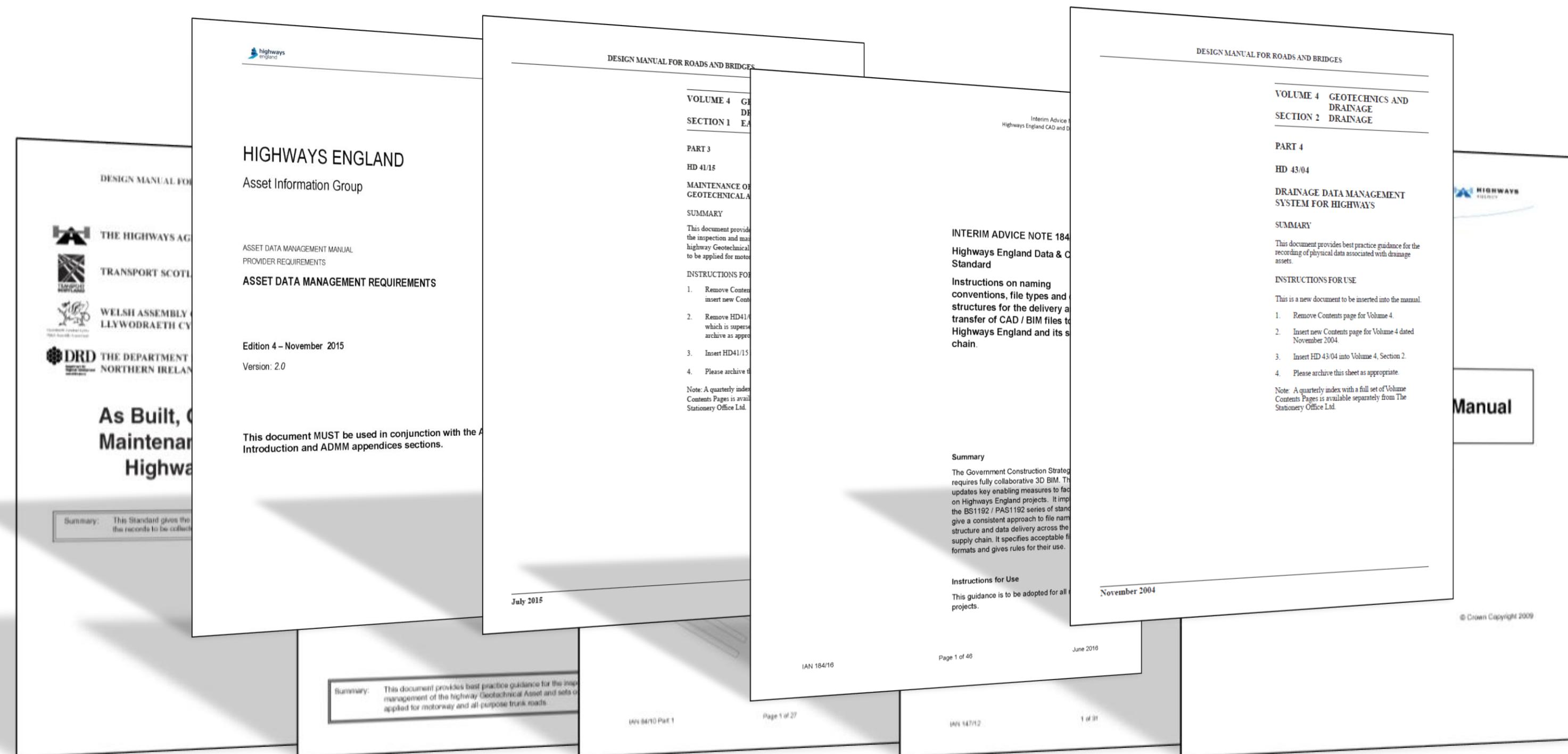
Instructions on naming conventions, file types and data structures for the delivery and transfer of CAD / BIM files to Highways England and its supply chain.

Summary
The Government Construction Strategy requires fully collaborative 3D BIM. This IAN updates key enabling measures to facilitate this on Highways England projects. It implements the BS1192 / PAS1192 series of standards to give a consistent approach to file naming, structure and data delivery across the whole supply chain. It specifies acceptable file formats and gives rules for their use.

Instructions for Use
This guidance is to be adopted for all new projects.

IAN 184/16
Page 1 of 46
June 2016

Client Requirements



Highways England Handover Requirements

Attributes										
Name	Type	Values	Requirement	Phase	Required By	D	C	M	Data Source	Comments
Status										
Object ID	VARCHAR			Design / Const / Ma	All	M	M			
Status	ENUM			Design / Const / Ma	All	M	M			See IAN 184 for Asset Status
3D Model Confidence	ENUM			Design / Const / Ma	All	M	M			Relevant to 3D model of existing
3D Model Revision	VARCHAR			Design / Const / Ma	All	M	M			Model version the design data came from
3D Model File	VARCHAR			Design / Const / Ma	All	M	M			Model file the design data came from
Location										
XSP	VARCHAR		ADMM	Design / Const / Ma	Maintainer	O	O	M		
Section Label	VARCHAR		ADMM	Main	Maintainer	O	O	M		
Start Chainage	NUMBER		ADMM	Design / Const / Ma	All	M	M	M		
End Chainage	NUMBER	NOT APPLICAB	ADMM	Design / Const / Ma	All	N/A	N/A	N/A		
Start Date of Asset	DATE		ADMM	Const / Main	All	O	O	M		
Road Link	VARCHAR			Design / Const / Ma	All	M	M			The road link the chainage relates to
Start Easting (X) Local	NUMBER			Design / Const / Ma	All	O	O		AutoCAD	
Start Northing (Y) Local	NUMBER			Design / Const / Ma	All	O	O		AutoCAD	
Start Elevation (Z) Local	NUMBER			Design / Const / Ma	All	O	O		AutoCAD	
End Easting (X) Local	NUMBER	NOT APPLICABLE		Design / Const / Ma	All	N/A	N/A	N/A	AutoCAD	
End Northing (Y) Local	NUMBER	NOT APPLICABLE		Design / Const / Ma	All	N/A	N/A	N/A	AutoCAD	
End Elevation (Z) Local	NUMBER	NOT APPLICABLE		Design / Const / Ma	All	N/A	N/A	N/A	AutoCAD	
Start Easting (X) National	NUMBER			Design / Const / Ma	All	O	O			Calculate from Local Grid
Start Northing (Y) National	NUMBER			Design / Const / Ma	All	O	O			Calculate from Local Grid
Start Elevation (Z) National	NUMBER			Design / Const / Ma	All	O	O			Calculate from Local Grid
End Easting (X) National	NUMBER	NOT APPLICABLE		Design / Const / Ma	All	N/A	N/A	N/A		Calculate from Local Grid
End Northing (Y) National	NUMBER	NOT APPLICABLE		Design / Const / Ma	All	N/A	N/A	N/A		Calculate from Local Grid
End Elevation (Z) National	NUMBER	NOT APPLICABLE		Design / Const / Ma	All	N/A	N/A	N/A		Calculate from Local Grid
Security										
Security Classification	ENUM?					M	M			

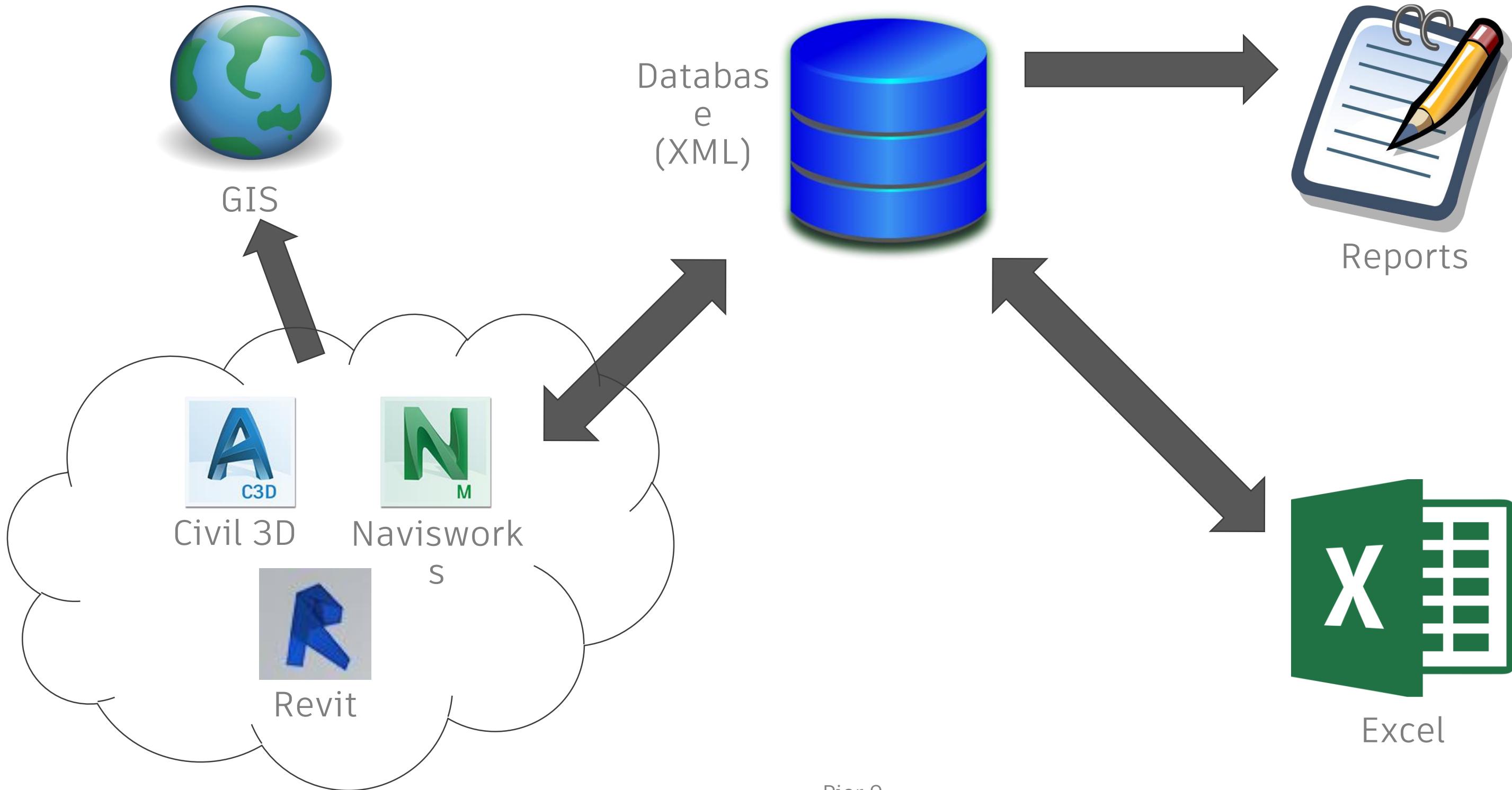
23 Attributes are common to all asset types. Most are location based

Highways England Handover Requirements

Asset Code:		MH		Category: Devices		Category: Lighting Point	
Document References:		HD 43		Asset Code: DEV_DRC		Asset Code: LIPO	
Links:		Drawings, Spec App 500 Series, Drainage Schedules		Links: MCH 1864		Links: ADMM	
Attributes							
Name	Type	Values	Requirement	Phase	Required By	D C M	Data Source
Object ID	VARCHAR			Status			
Status	ENUM			Design / Const / M All	M M		
3D Model Confidence	ENUM			Design / Const / M All	M M		
3D Model Revision	VARCHAR			Design / Const / M All	M M		
3D Model File	VARCHAR			Design / Const / M All	M M		
XSP	VARCHAR			Design / Const / M All	M M		
Section Label	VARCHAR			Location			
Start Chainage	NUMBER			Design / Const / M Maintainer	0 0		
End Chainage	NUMBER			Main	Maintainer	0 0	
Start Date of Asset	DATE			Design / Const / M All	M M		
Road Link	VARCHAR			Design / Const / M All	M M		
Start Easting (X) Local	NUMBER			Design / Const / M All	M M		
The asset has 154 types and 520 signs.							
Attributes ranging from 25 to 94 per asset type.							
One scheme has 520 signs resulting in 85,100 asset fields to be populated.							
One scheme 50km length – 1,000,000+ attributes							
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Attributes ranging from 25 to 94 per asset type.							
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One scheme 50km length – 1,000,000+ attributes							

Solution Architecture

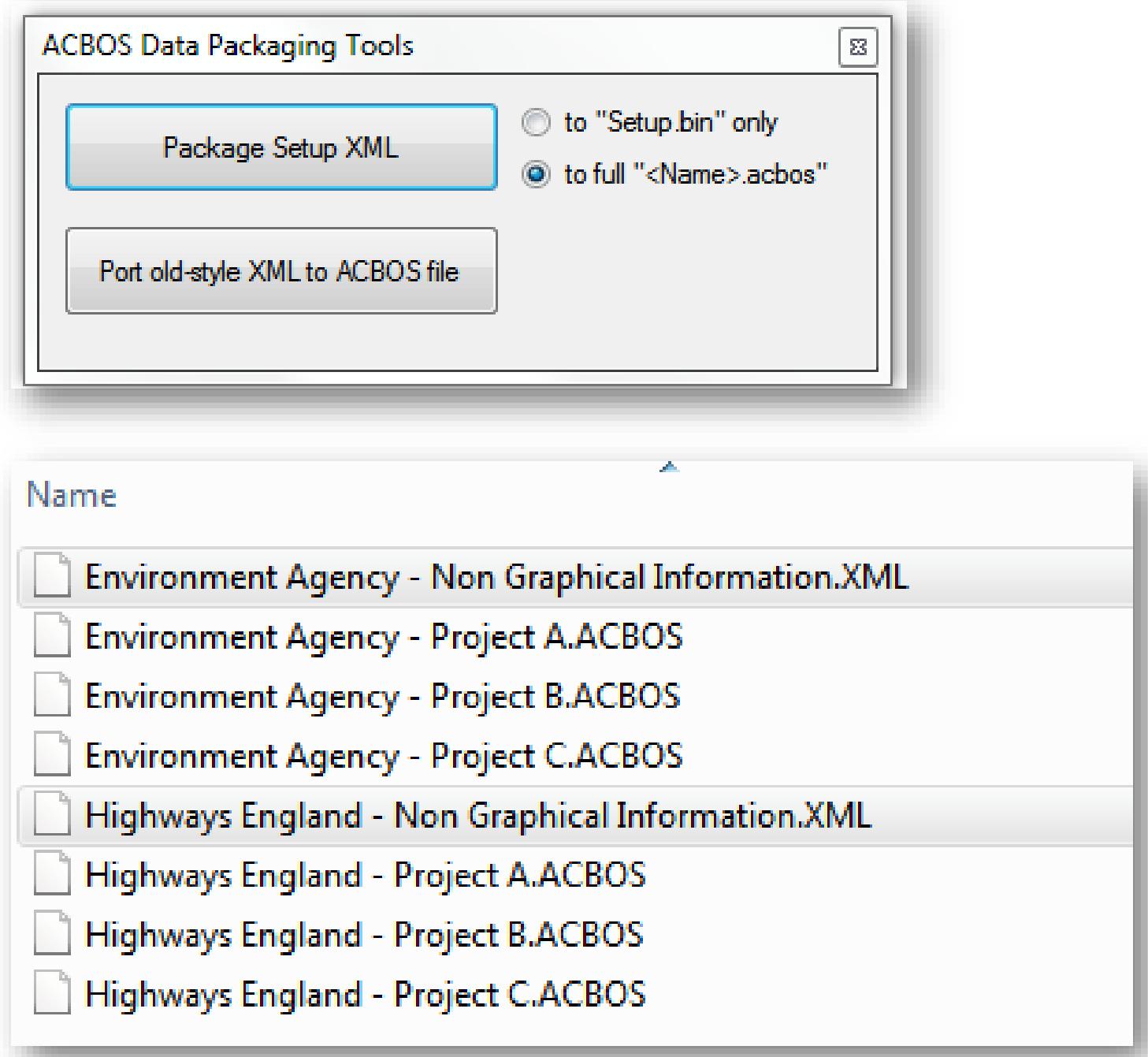
Solution Architecture



The background of the slide features a complex, abstract geometric pattern composed of numerous thin, light-grey lines forming a mesh of triangles and larger polygons. This pattern is set against a solid white background. A solid blue rectangular bar is positioned horizontally across the middle of the slide. The text is centered within this blue bar.

Model Development Manager Capabilities

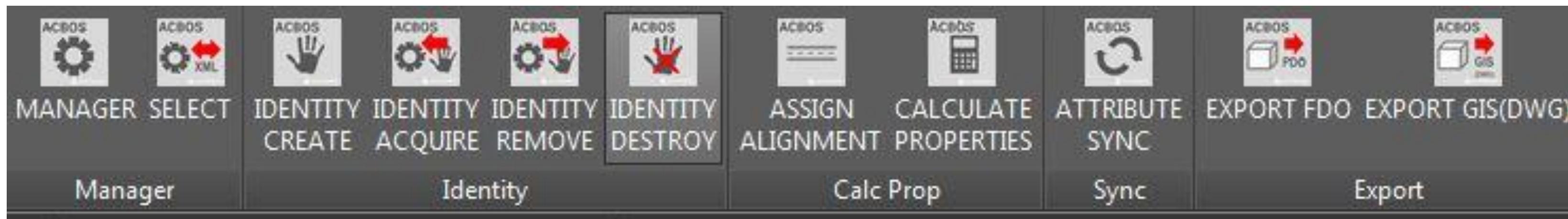
Project Setup



- Create XML schema template per client
- Easily create specific project database file from the template
- Assign project information such as Project ID and Name
- All generated asset ID numbers will contain the Project ID code

Model Development Manager

Civil 3D Ribbon



Manager

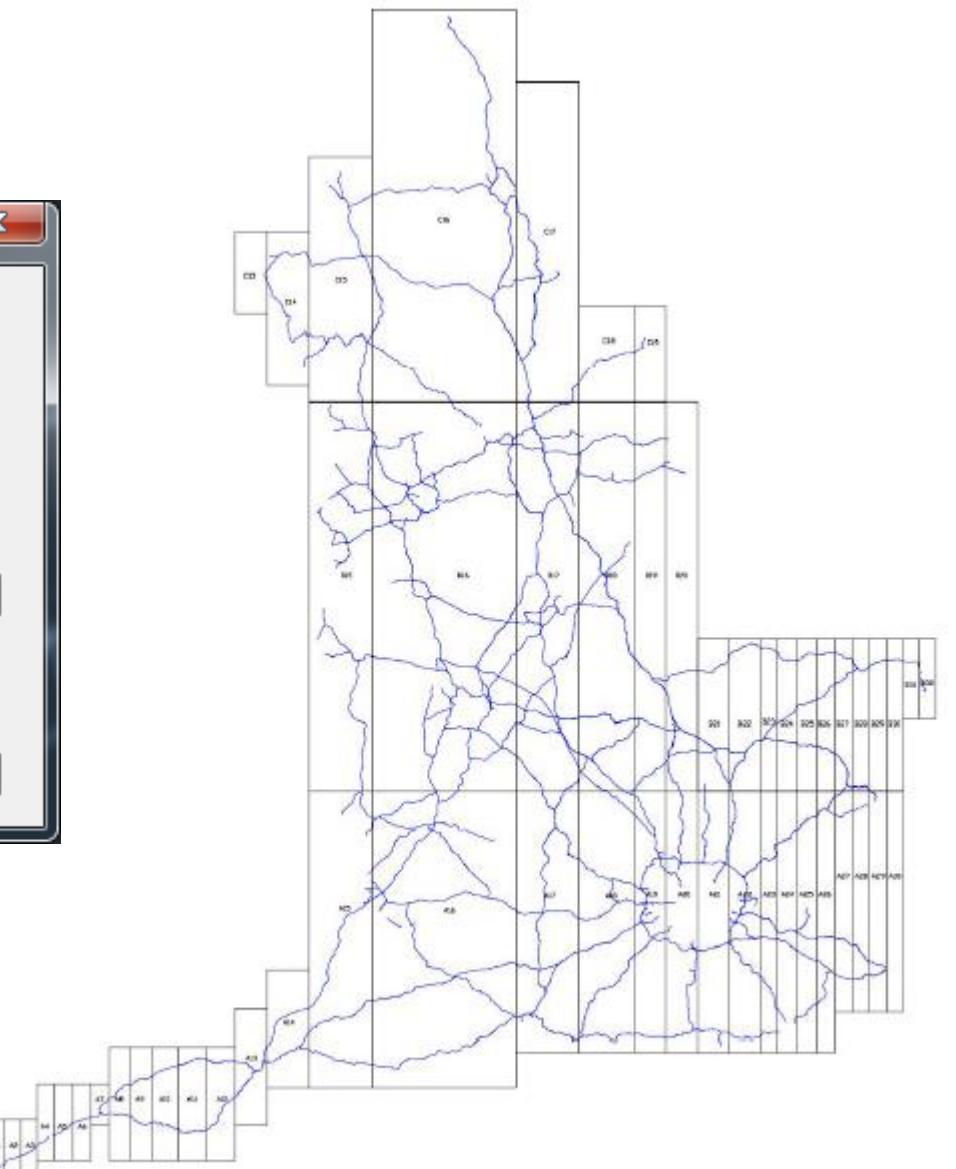
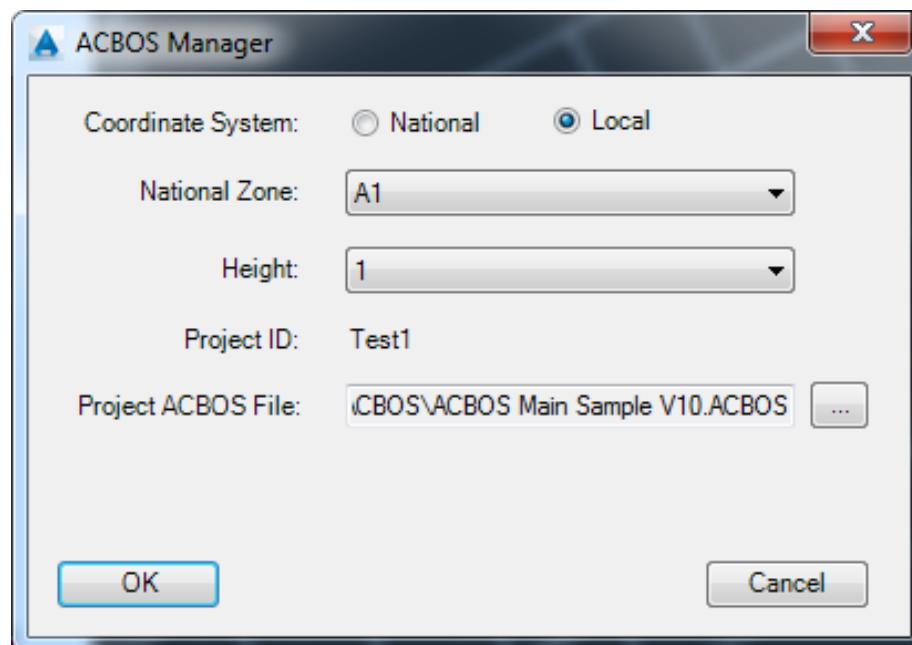


Figure 3: Highways Agency Local Grid Layout for England

- Set the database file to use with the model
- Specify if your model is in National or Local coordinate system.
- Specify details for Local Grid setup (Currently accepts IAN 99 zone bands)

Calculate Properties

- MDM can automatically calculate for each object:
 - Start / end chainage in relation to its assigned alignment
 - Bounding box X,Y,Z coordinates in both National and Local grids.
- Easily change which alignment objects are assigned to with “Assign Alignment” tool

PROPERTIES	XSP	Display (2)
SectionLabel		
StartChainage	50920.61	
EndChainage	52520	
StartDateofAsset		
RoadLink		
StartEasting(X)Local	473755.86	
StartNorthing(Y)Local	169260.12	
StartElevation(Z)Local	41.52	
EndEasting(X)Local	475272.87	
EndNorthing(Y)Local	169595.85	
EndElevation(Z)Local	60	
StartEasting(X)National	611917.65	
StartNorthing(Y)National	-1682.08	
StartElevation(Z)National	41.52	
EndEasting(X)National	613435.18	
EndNorthing(Y)National	-1346.23	
EndElevation(Z)National	60	
SecurityClassification	To be Populated	
InstallationDate		

Highways England Handover Requirements

Attributes										
Name	Type	Values	Requirement	Phase	Required By	D	C	M	Data Source	Comments
Status										
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Section Label	VARCHAR		ADMM	Main	Maintainer	O	O	M		
Start Chainage	NUMBER		ADMM	Design / Const / Ma	All	M	M	M		
End Chainage	NUMBER	NOT APPLICAB	ADMM	Design / Const / Ma	All	N/A	N/A	N/A		
Start Date of Asset	DATE		ADMM	Const / Main	All	O	O	M		
Road Link	VARCHAR			Design / Const / Ma	All	M	M			The road link the chainage relates to
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Start Northing (Y) Local	NUMBER			Design / Const / Ma	All	O	O		AutoCAD	
Start Elevation (Z) Local	NUMBER			Design / Const / Ma	All	O	O		AutoCAD	
End Easting (X) Local	NUMBER	NOT APPLICABLE		Design / Const / Ma	All	N/A	N/A	N/A	AutoCAD	
End Northing (Y) Local	NUMBER	NOT APPLICABLE		Design / Const / Ma	All	N/A	N/A	N/A	AutoCAD	
End Elevation (Z) Local	NUMBER	NOT APPLICABLE		Design / Const / Ma	All	N/A	N/A	N/A	AutoCAD	
Start Easting (X) National	NUMBER			Design / Const / Ma	All	O	O			Calculate from Local Grid
Start Northing (Y) National	NUMBER			Design / Const / Ma	All	O	O			Calculate from Local Grid
Start Elevation (Z) National	NUMBER			Design / Const / Ma	All	O	O			Calculate from Local Grid
End Easting (X) National	NUMBER	NOT APPLICABLE		Design / Const / Ma	All	N/A	N/A	N/A		Calculate from Local Grid
End Northing (Y) National	NUMBER	NOT APPLICABLE		Design / Const / Ma	All	N/A	N/A	N/A		Calculate from Local Grid
End Elevation (Z) National	NUMBER	NOT APPLICABLE		Design / Const / Ma	All	N/A	N/A	N/A		Calculate from Local Grid
Security										
Security Classification	ENUM?					M	M			

23 Attributes are common to all asset types. Most are location based

The background features a complex, organic geometric pattern composed of numerous thin, light gray lines forming a mesh of triangles and irregular polygons. This pattern is set against a solid white background. A solid blue horizontal bar, approximately one-tenth of the image's height, runs across the middle. The text is positioned on this blue bar.

Live Demo

Graphical and Non-Graphical Information



Properties

Item	P1-1200SGFA	Attributes	Material	TimeLiner	Entity Handler
Property					
ACBOS_ProjectId					
ACBOS_ObjectId					
ACBOS_ClsItemId					
ACBOS_Alignment					
ObjectID					
Status					
3DModelConfidence					
StartChainage					
EndChainage					
StartEasting(X)Local					
StartNorthing(Y)Local					
StartElevation(Z)Local					
EndEasting(X)Local					
EndNorthing(Y)Local					
EndElevation(Z)Local					
StartEasting(X)National					
StartNorthing(Y)National					
StartElevation(Z)National					
EndEasting(X)National					
EndNorthing(Y)National					
EndElevation(Z)National					
SecurityClassification					
SourceID					
Width(m)					
X(Easting)					
Y(Northing)					
Height(m)					
ExpectedServiceLife					
MountingHeight(m)					
Owner					
CurrentMaintenanceContract					
CurrentlyMaintainedBy					
ConditionRating(Manual)					
RiskRating					
TSRGD_Diagram_Number					
SignFaceCategory					
MountingMethod					
SGFAReusable					
Illuminated					
LampType					
EDRPatch					
XHeight(mm)					
Setback(m)					
MinimumClearVisibility(m)					
SuppPlateXHeight(mm)					



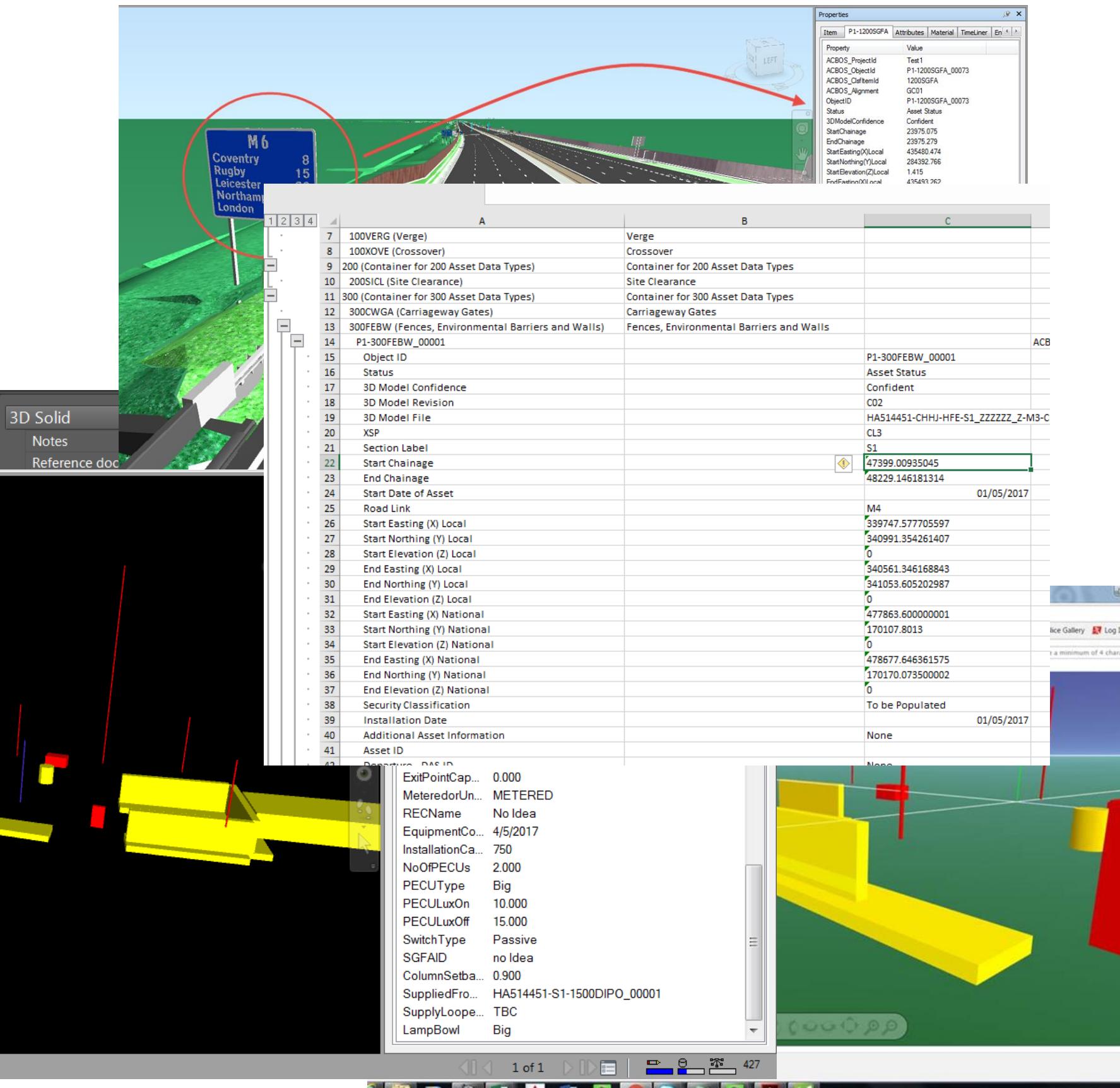
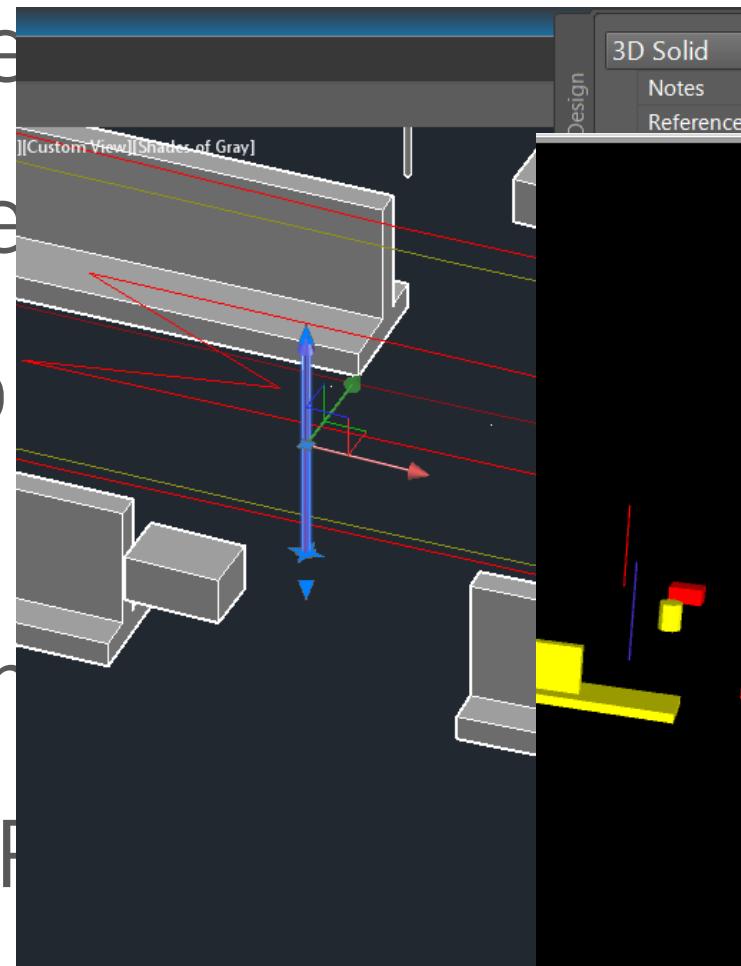
Properties

ObjectID	P1-1200SGFA_00114
Status	Asset Status
3DModelConfidence	Confident
3DModelRevision	
3DModelFile	
XSP	
SectionLabel	
StartChainage	20171.16
EndChainage	20171.28
StartDateofAsset	
RoadLink	
StartEasting(X)Local	438691.67
StartNorthing(Y)Local	282380.19
StartElevation(Z)Local	1.35
EndEasting(X)Local	438697.18
EndNorthing(Y)Local	282395.96
EndElevation(Z)Local	89.97
StartEasting(X)National	943593.18
StartNorthing(Y)National	71316.8
StartElevation(Z)National	1.35
EndEasting(X)National	943598.7
EndNorthing(Y)National	71332.56
EndElevation(Z)National	89.97
SecurityClassification	To be Populated
InstallationDate	
AdditionalAssetInformation	
Departure-DASID	
SourceID	0
Width(m)	0
X(Easting)	0
Y(Northing)	0
Height(m)	
ExpectedServiceLife	
AssetID(IdentityCode)	
MountingHeight(m)	
Owner	
CurrentMaintenanceContract	
CurrentlyMaintainedBy	
ConditionRating(Manual)	
RiskRating	
TSRGD_Diagram_Number	
SignFaceCategory	SNSF_CATEGORY
MountingMethod	

A red box highlights the 'SNSF_CATEGORY' entry in the 'SignFaceCategory' dropdown menu. A red arrow points to the 'MountingMethod' entry in the same menu.

MDM Outputs

- The data is available:
 - In the tools
 - In the federate
 - For use in schedules
 - As Industry Foundation Classes – in HE CDE
 - As GIS in a number of ways
 - Tab (CONFIRM)
 - SHP (HE-IAMIS)



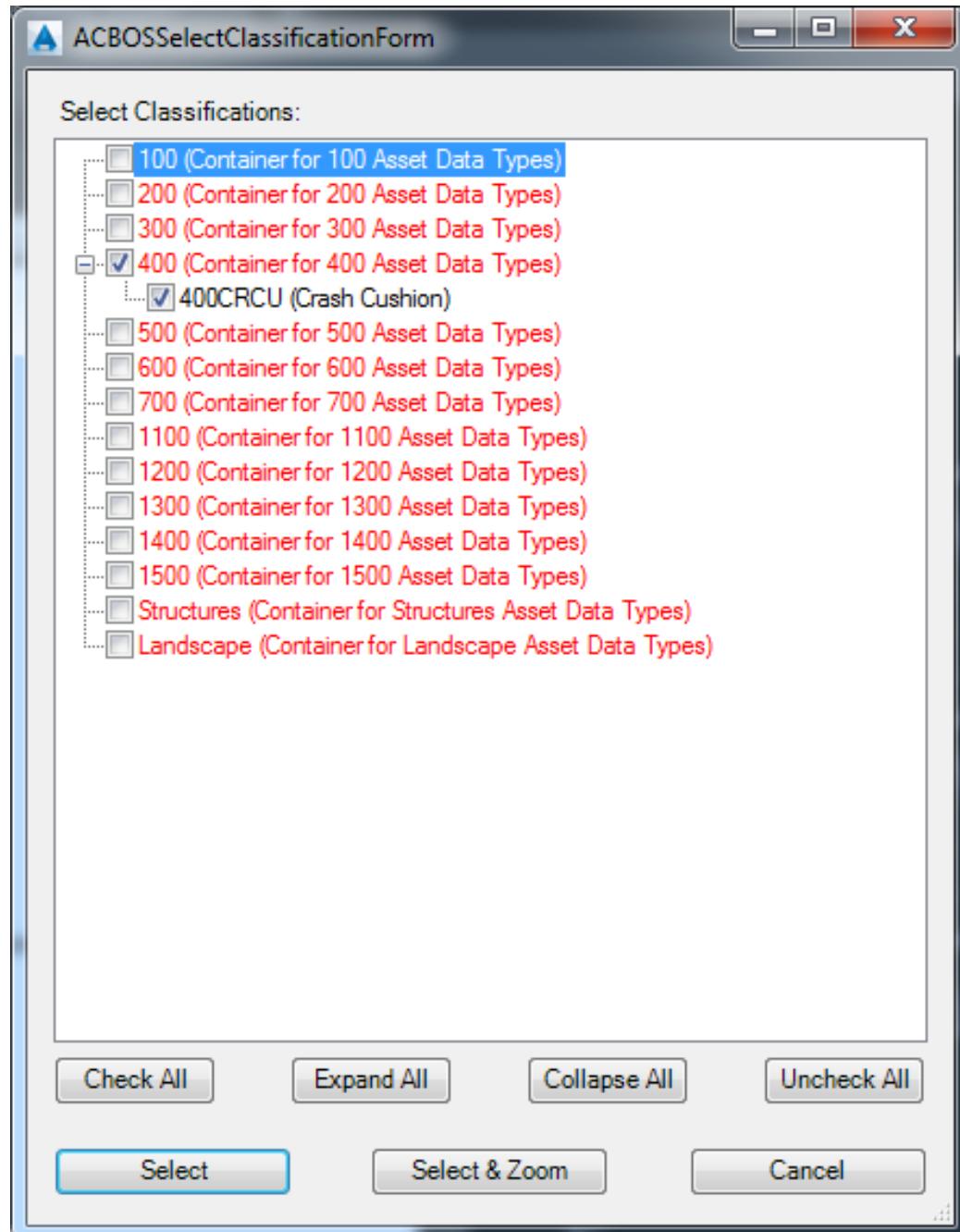
Development Team

- Pete Burchill
- Paul Napier
- Jon Dempsey
- Rich McCabe
- Miroslav Schonauer (Autodesk)
- Emyr Isaac (Autodesk)
- Lynn Palko (Autodesk)



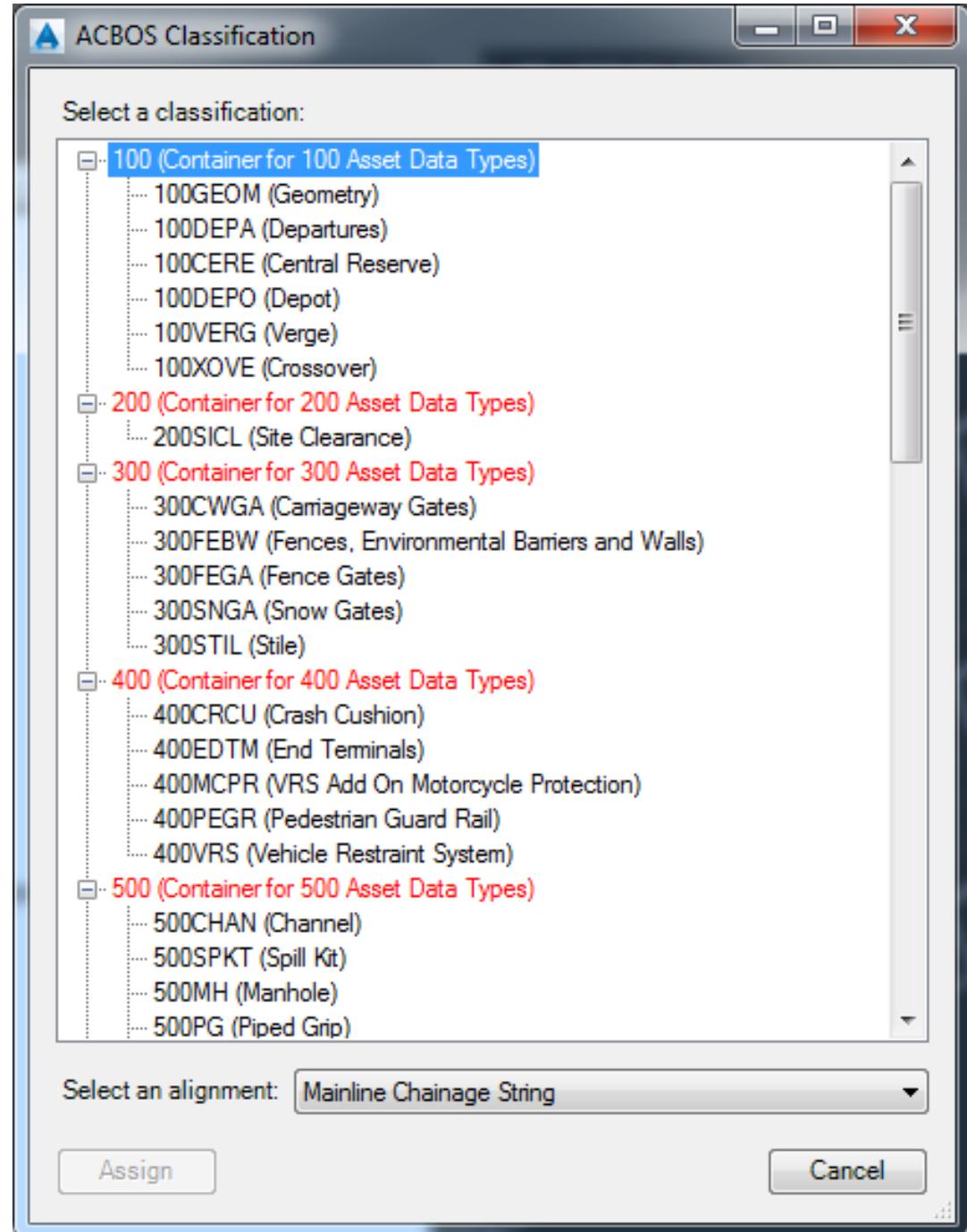
Questions & Answers

Select



- Select objects within model which have been “tagged” as an asset
- Able to refine selection by asset type, and by individual assets.
- Automatically zoom to selected asset(s)

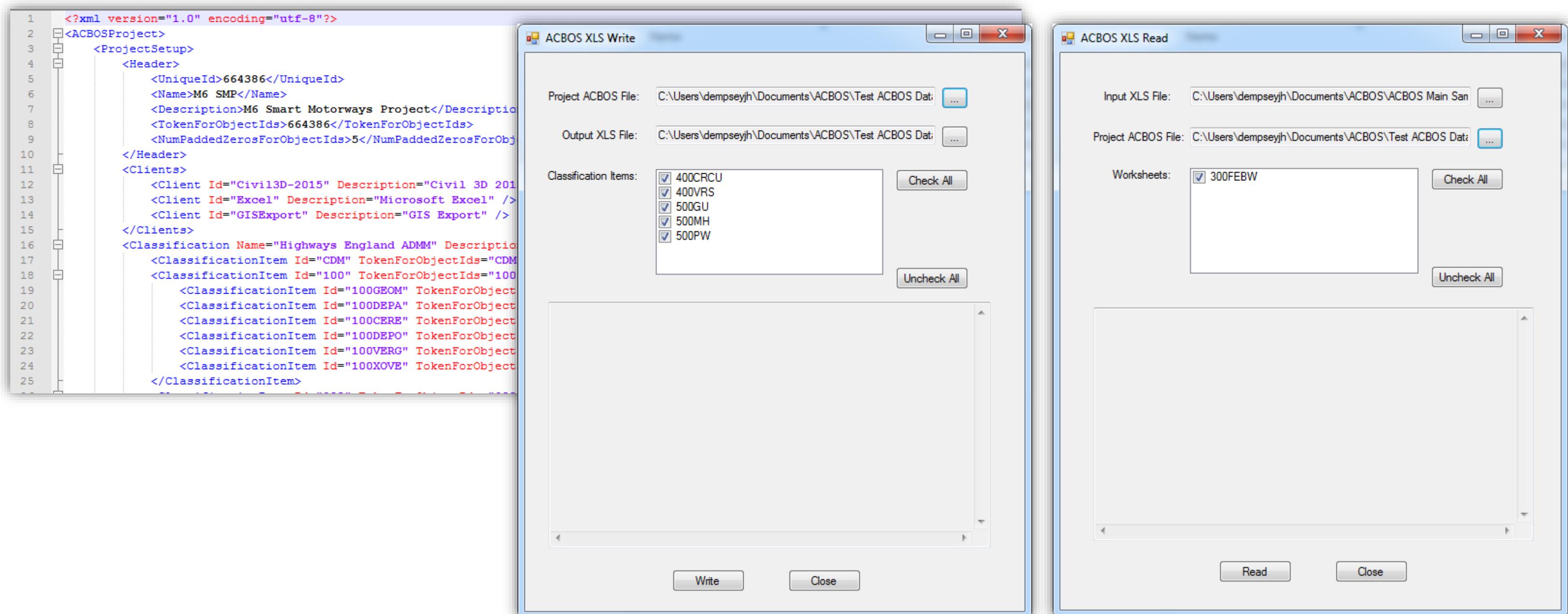
Identity Create / Acquire / Remove / Destroy



- Assign an object as a specified asset.
- Assign with new asset record (Identity Create)
- Assign with existing asset record (Identity Acquire)
- Remove object assignment with asset record, but leave asset record in database to be reassigned later (Identity Remove)
- Remove object assignment with asset record, and delete asset record from database (Identity Destroy)

XML \leftrightarrow XLS

- Write to/from the database via Excel spreadsheets



Asset Reports

- Query the database with Regular Expressions or C# LINQ queries on any asset type and attribute
- Export results to Excel or XML formats

ACBOS Report

Add Files... Remove Refresh Displaying 16 / 16 objects

ACBOS Main Sample V10

Selected Classifications [Select...](#)

Object Id (RegEx) [help...](#)

C# LINQ [help...](#)

```
1 t =>
2 t.IsObject &&
3 t.DisplayName != null &&
4 t.DisplayName.StartsWith("P1-100CERE")
```

DisplayName	Description	AttributeValue
1500TSSIG (Traffic Signal Signal)	Traffic Sig...	
1500TX (Transmission)	Transmissi...	
200 (Container for 200 Asset Data Types)	Container ...	
200SICL (Site Clearance)	Site Clear...	
300 (Container for 300 Asset Data Types)	Container ...	
300CWGA (Carrigeway Gates)	Carrigew...	
300FEBW (Fences, Environmental Barriers ...	Fences, E...	
P1-300FEBW_00001		
3D Model Confidence	Confident	
3D Model File		
3D Model Revision		
Additional Asset Information		
Asset ID		
Boundary Fence YesOrNo	False	
Condition Rating (Manual)	TO BE POPULATED	
Current Maintenance Contract	TO BE POPULATED	
Currently Maintained By	TO BE POPULATED	
Departure - DAS ID		
End Chainage	48229.146181314	
End Easting (X) Local	340561.346168843	
End Easting (X) National	478677.646361575	
End Elevation (Z) Local	0	
End Elevation (Z) National	0	
End Northing (Y) Local	341053.605202987	
End Northing (Y) National	170170.073500002	
Expd EOL Sound Absorp Perf		
Expd EOL Sound Insulation Perf	555555555	
Expected Service Life	0	
Height (m)	0	
Initial Sound Absorp Perf		

Show All Attributes

Export to GIS

- MDM can automatically export a model to GIS formats
 - Export to DWG creates a GIS compatible drawing. Then able to export to any GIS file format Civil 3D is capable of
 - Export via FDO exports directly to .shp for all assets in a model file.
- GIS config file specifies if an asset should be converted to a point, line, or polygon

