CIM Configuration:

Simplifying the configuration process to support timely and cost-efficient implementation of the CIM standard

SMART GRID FORUMS | Common Information Model 2020

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Scottish & Southern Electricity Networks

Contents

- Business Background
- Evaluating how CIM compares with alternative standards for system integration in terms of ease of implementation, reliability and security
- Using CIM to integrate Network Management, Outage Management, GIS, Asset Management and Customer Management systems
- Adopting CIM for integration with external parties in a DSO world
- Lessons learned in the configuration of CIM and its role in integration
- Building in-house CIM expertise to ease the configuration process across different systems

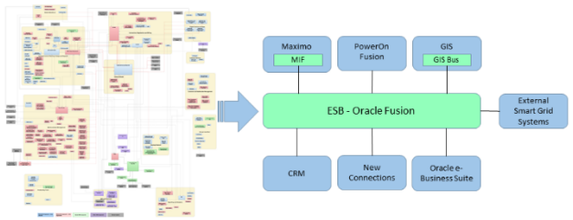
Business Background

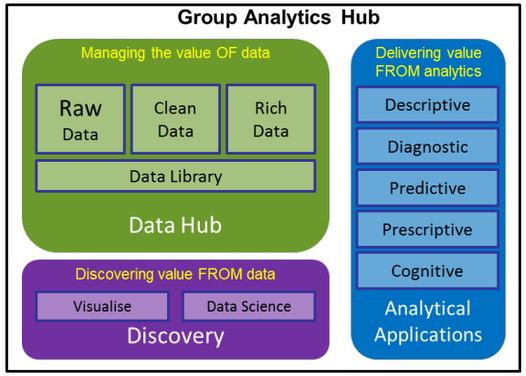
SSEN – where we operate

ELECTRICITY AND GAS TRANSMISSION NETWORKS

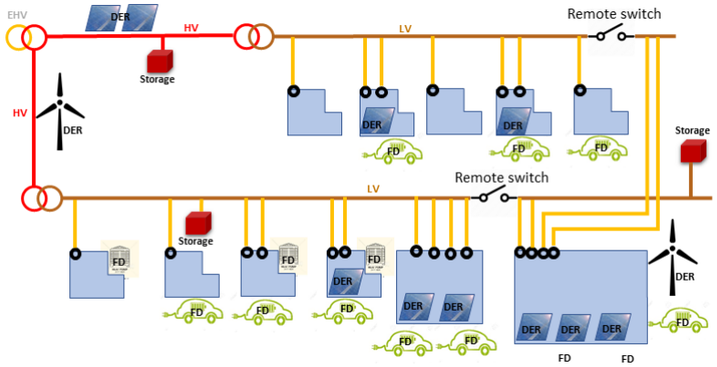
- Scottish Hydro Electric Transmission (SHE)
- Scottish Power Transmission (SPT)
- National Grid Gas (Transmission) (NGGT)
- National Grid Electricity Transmission (NGET)

Business Drivers for CIM





Business and IT Transformation



Transition to DSO

Why are we using CIM for integration?

Summary of our Integration Strategy

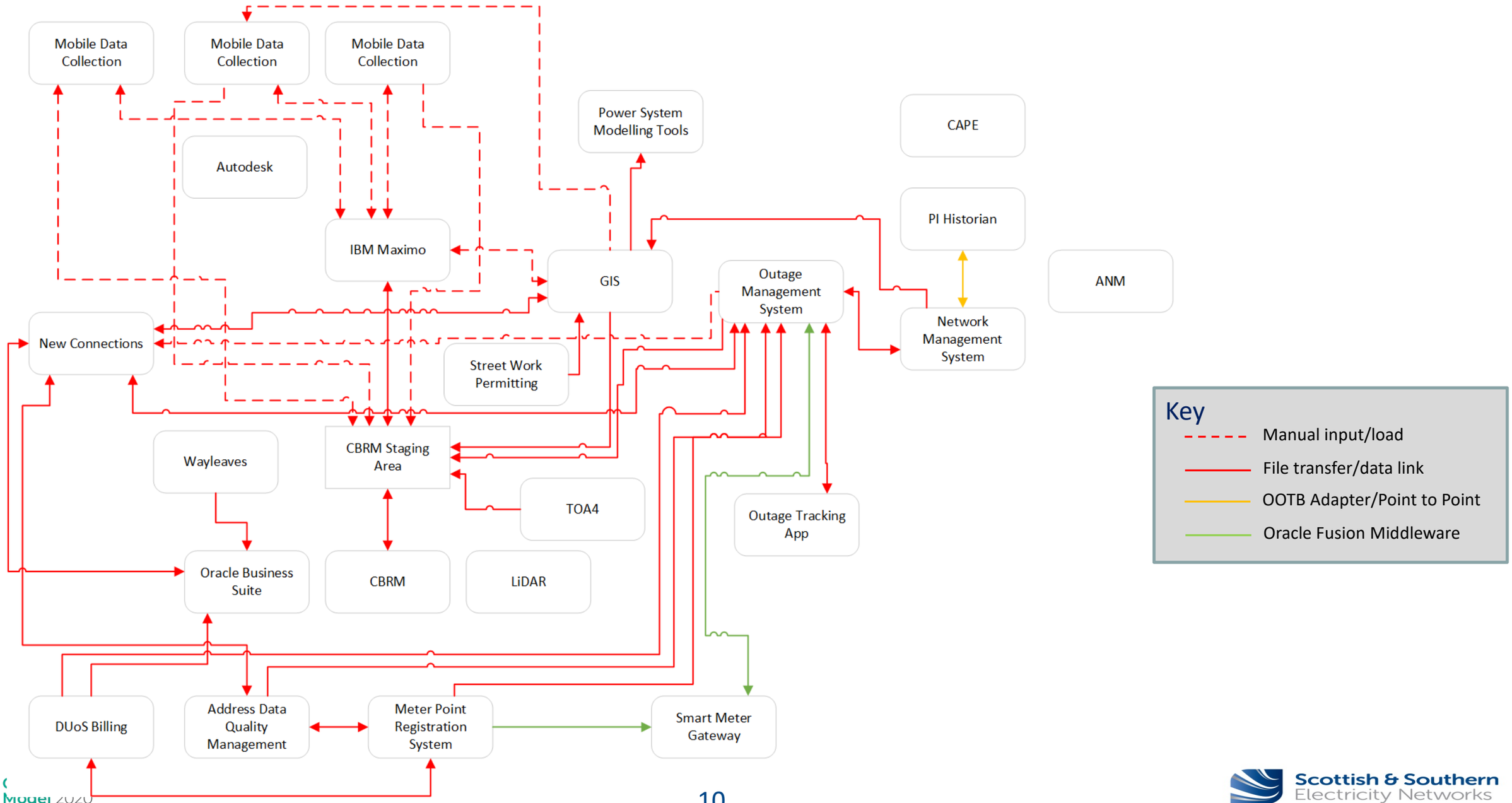
Integration Layer (Oracle Fusion)	Decision that that our applications are to be integrated through an Integration Layer (Oracle Fusion) unless an exception is explicitly agreed
Common Messaging Model	Implementing a Common Messaging Model is a long established integration best practice. It promotes decoupling of applications by providing a common exchange format. The model is typically realised as an XML Schema Definition (XSD).
Common Information Model	Supported by senior business stakeholders in Distribution Systems Operations, we agreed that CIM was the best model to adopt

Why use CIM for Integration?

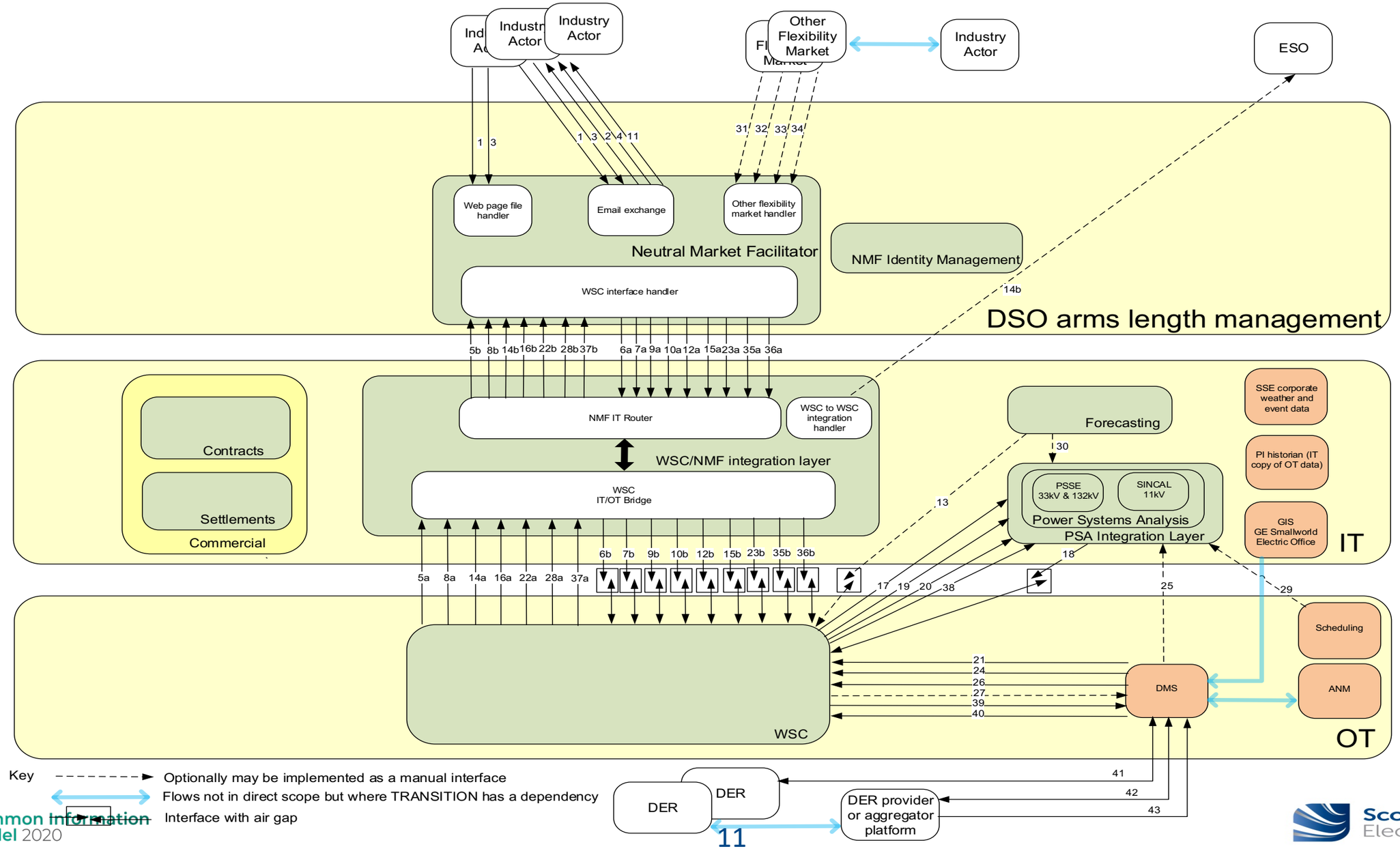
- Using an industry standard promotes the required interoperability between different organisations and products
- Analysis work for our DSO Transition and ENA-led work for exchange of data with the ESO has identified that CIM is becoming a preferred industry standard for data exchange.
- Many network companies have already adopted the standard as the means to exchange data between corporate systems and, to a limited extent, exchange data between companies.
- The European Network of Transmission System Operators for Electricity (ENTSO-e) has adopted the IEC CIM standard for data exchanges such as Ten-Year Network Development Plans and Regional Investment Plans amongst other exchanges.
- There is also a lack of viable alternatives to CIM and it is not considered viable to develop alternative standards.

Integrating: Internal Systems and External Systems

Overview of system interfaces prior to CIM based-integration



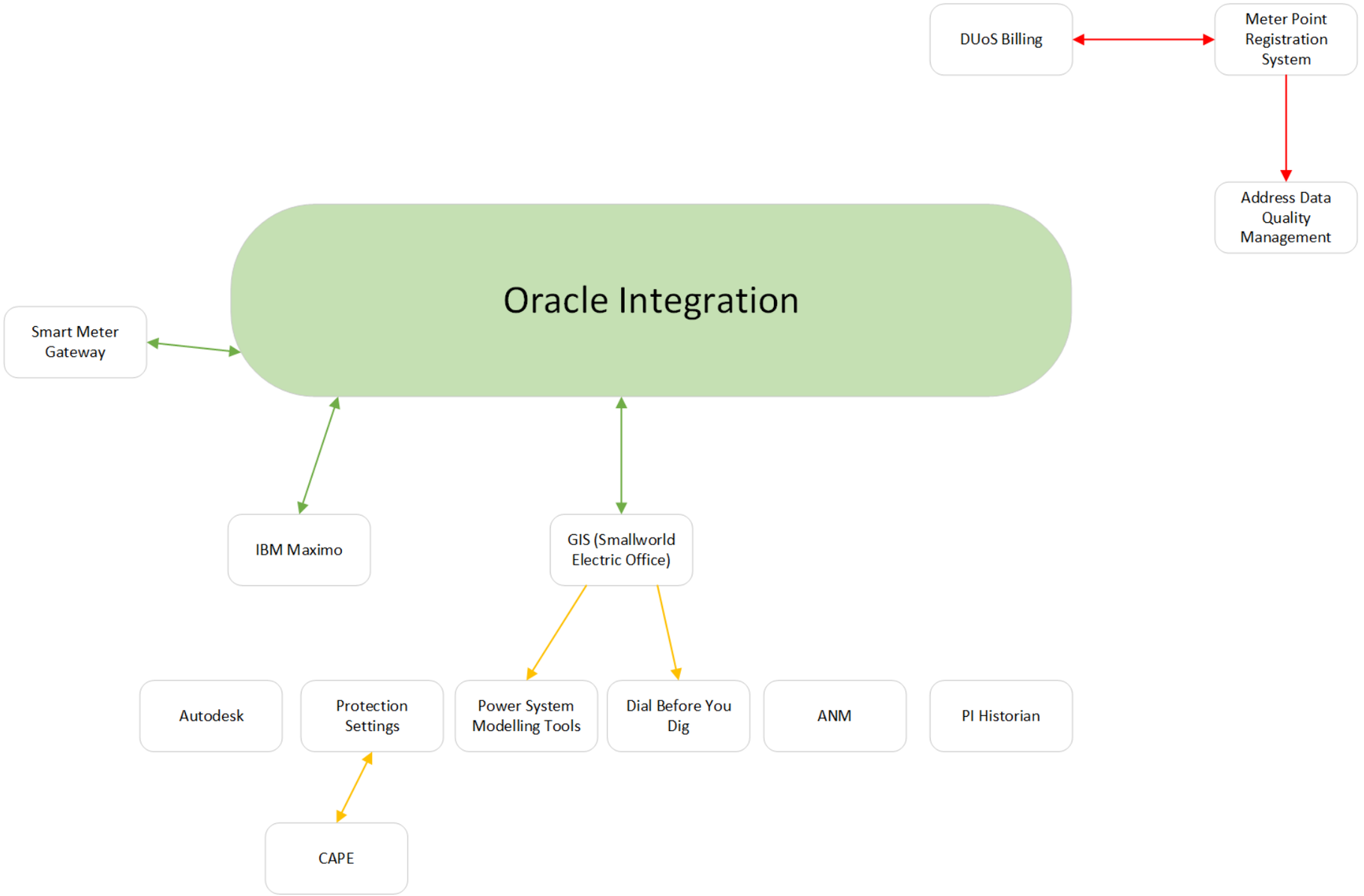
Future Interfaces for DSO



Assessment of Core Systems

System	Assessment
IBM Maximo	No CIM capability. Messages to be transformed in the Integration Layer.
Smallworld Electric Office	CIM compatible
Mobile Asset Data Collection Apps	Third parties are now adopting CIM
CBRM	Third party is now adopting CIM
Oracle Service Cloud (CRM and New Connections)	No CIM capability. Messages to be transformed in the Integration Layer.
Oracle eBusiness Suite	No CIM capability. Messages to be transformed in the Integration Layer.
PowerOn Advantage (Network and Outage Management)	CIM compatible
Power System Analysis Tools	Awaiting product upgrades (Siemens, DigSilent)
Active Network Management	CIM compatible
Neutral Market Facilitator	Subject to tender
Whole System Coordinator	Subject to tender
Analytics Platform on Azure	Will use CIM as the basis for a Logical Data Model

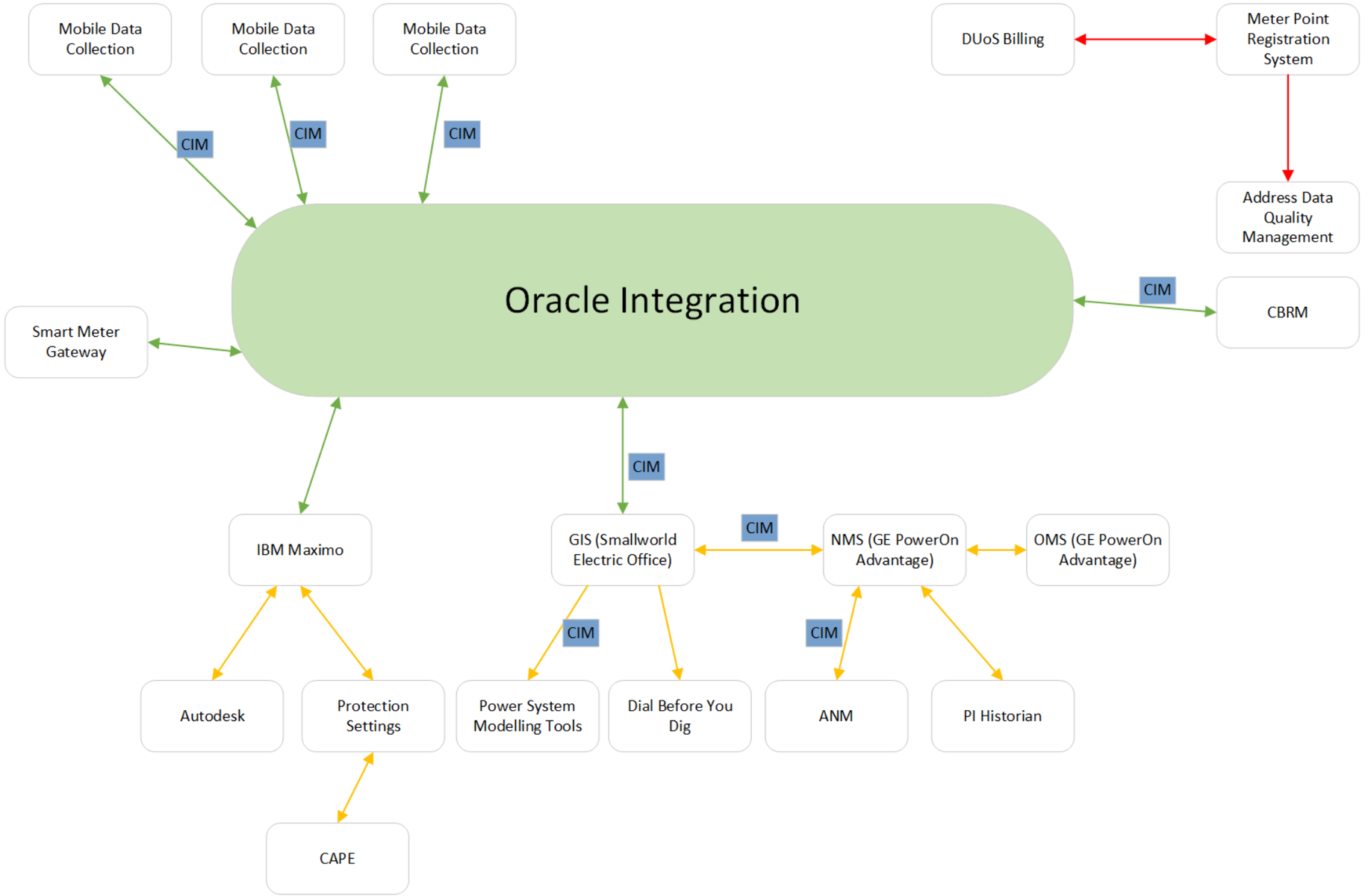
Current Status of Integration using CIM



Key

- Manual input/load
- File transfer/data link
- OOTB Adapter/Point to Point
- Oracle Fusion Middleware

Integration using CIM – end 2020



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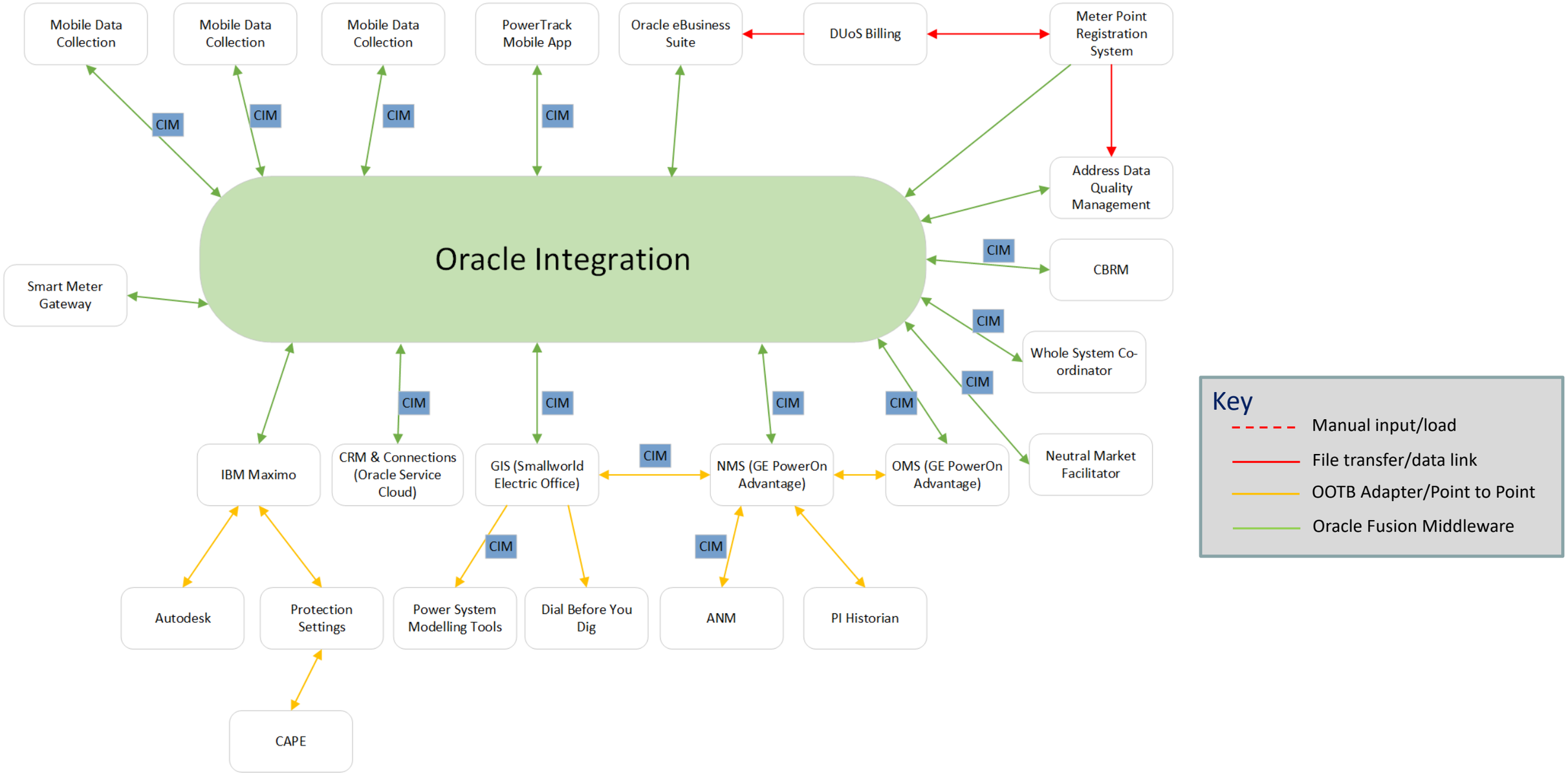
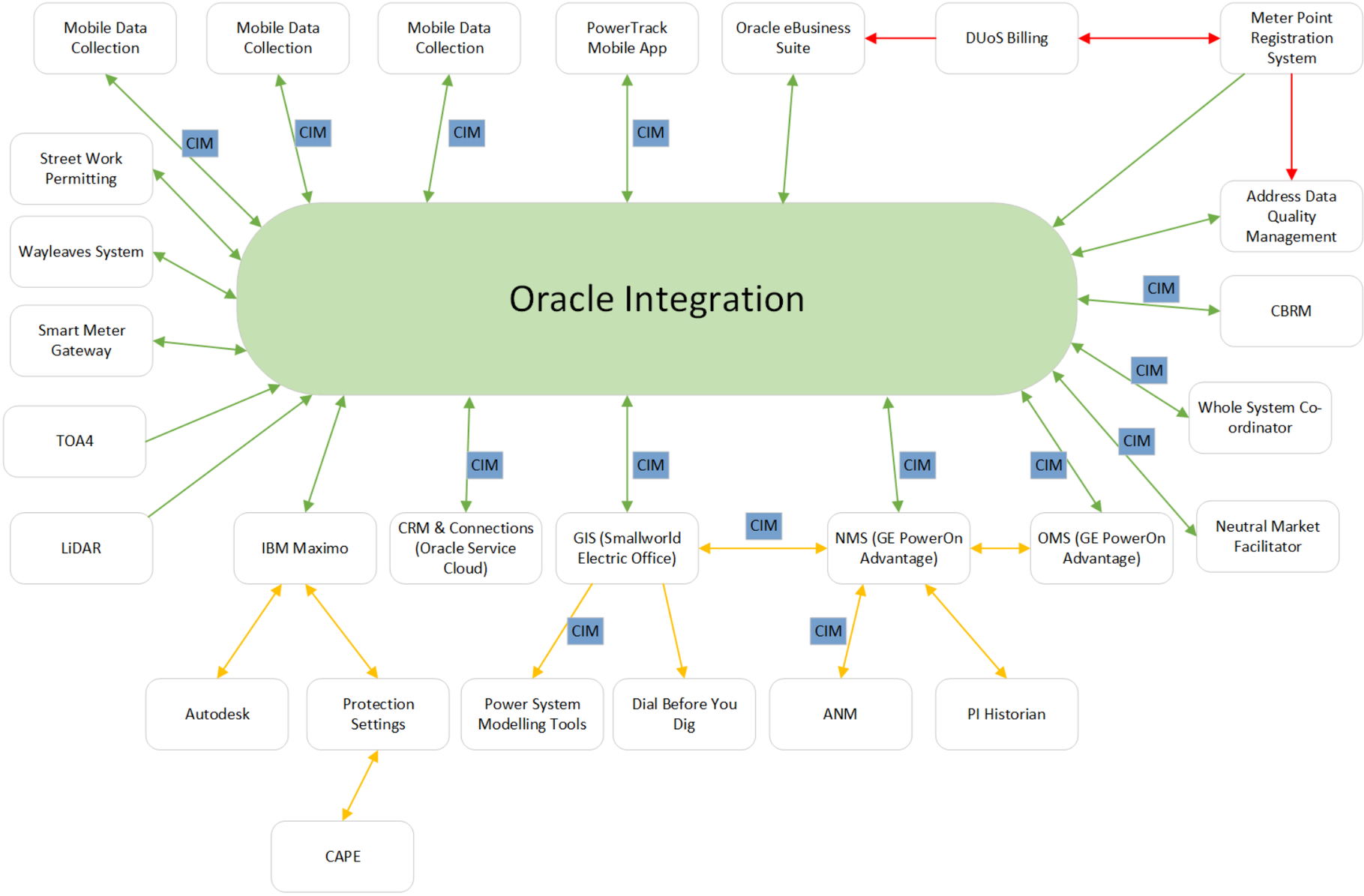
Integration using CIM – end 2021



Target integration view



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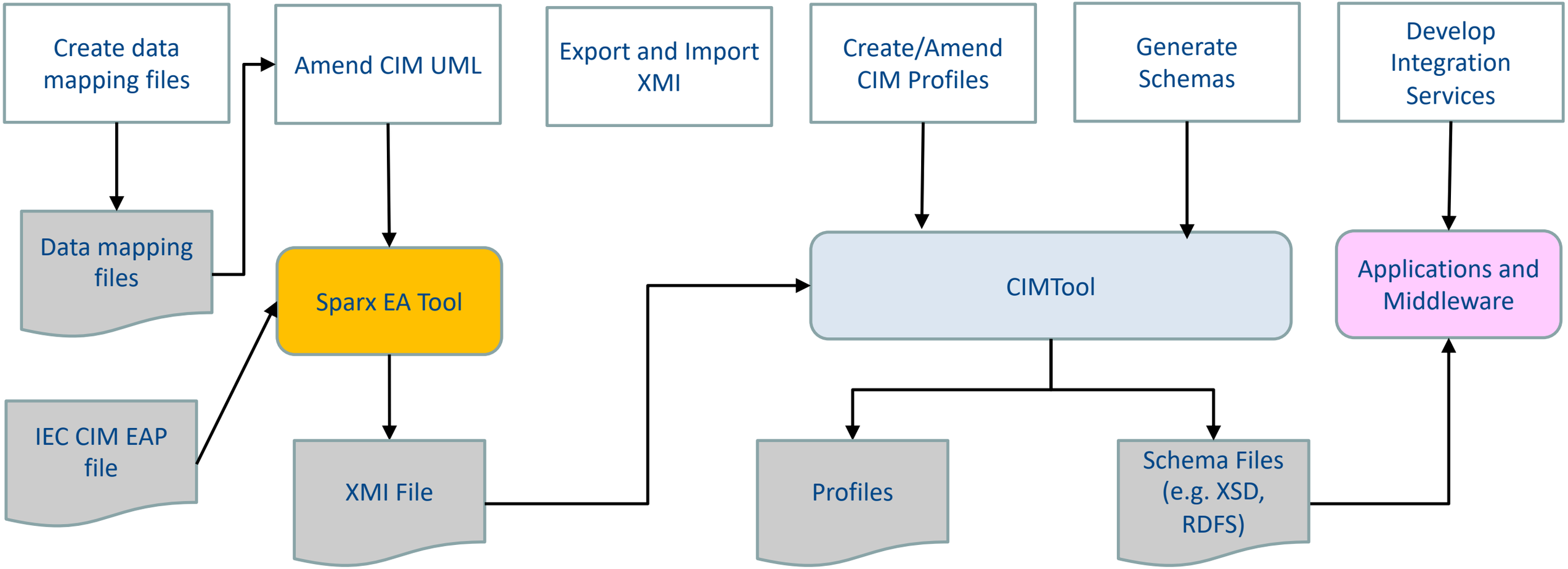
Lessons learned in the configuration of CIM and its role in integration

CIM Development Process



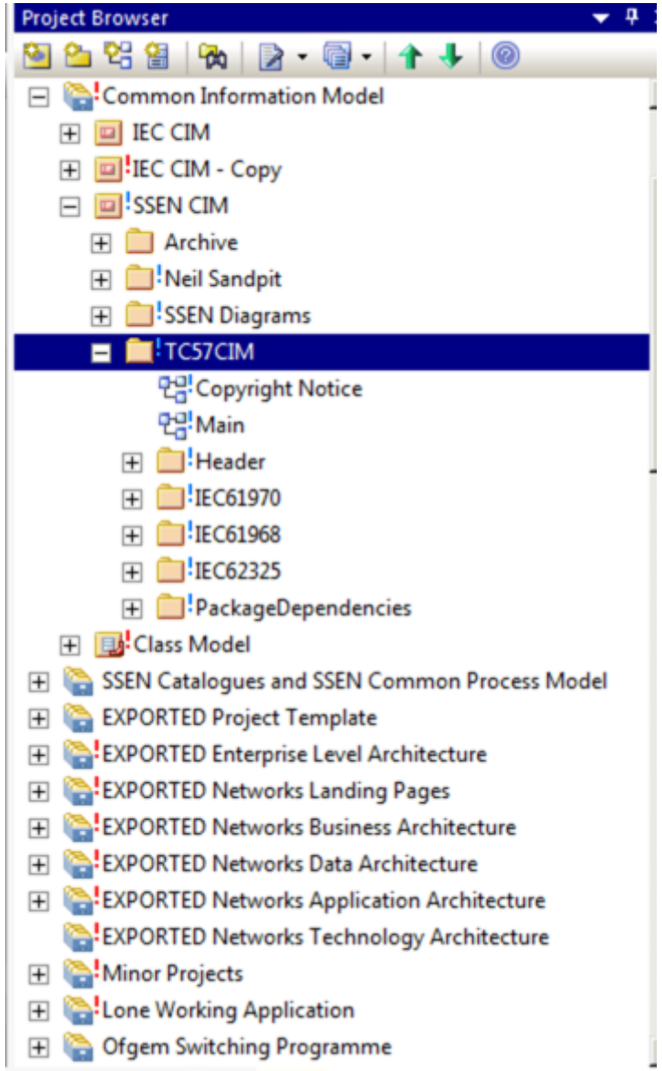
Data Mapping Example

Maximo Table	Maximo Attribute	CIM Class	CIM Element	CIM Extension Type	Target System Class	Target System Element
ASSET	ASSETTYPE	Asset	type	Existing	Asset	Asset Group
ASSET	ORGID	Organisation	mRID	Existing	Asset	Business Unit ID
ASSET	SSENCOMMDATE	Asset	lifecycle:Lifecycle Date	Existing	Asset	Commissioning Date
ASSET	GLACCOUNT	FinancialInfo	account	Existing	Asset	Location General Ledger Account
ASSET	SSENMIM	Medium	kind	Add additional enumerations	Asset	Main Insulation
LOCATIONSPEC	HIGHRISKNEIGHBOURS	UserAttribute	name and value	Existing	Asset	High Risk Neighbours
SSENRESTRICTION	SSENOPRESTCAT	OperationalRestriction	category	New element	Asset	Operational Restriction Applied

- Regardless of whether CIM is used, often the biggest challenge is to map data between source and target systems
- Mapping between business application data and CIM requires a combination of
  - Business knowledge of the electrical network model
  - IT knowledge of UML modelling
- Many packaged applications have no CIM compatibility and/or some allow business users to define name/value pairs

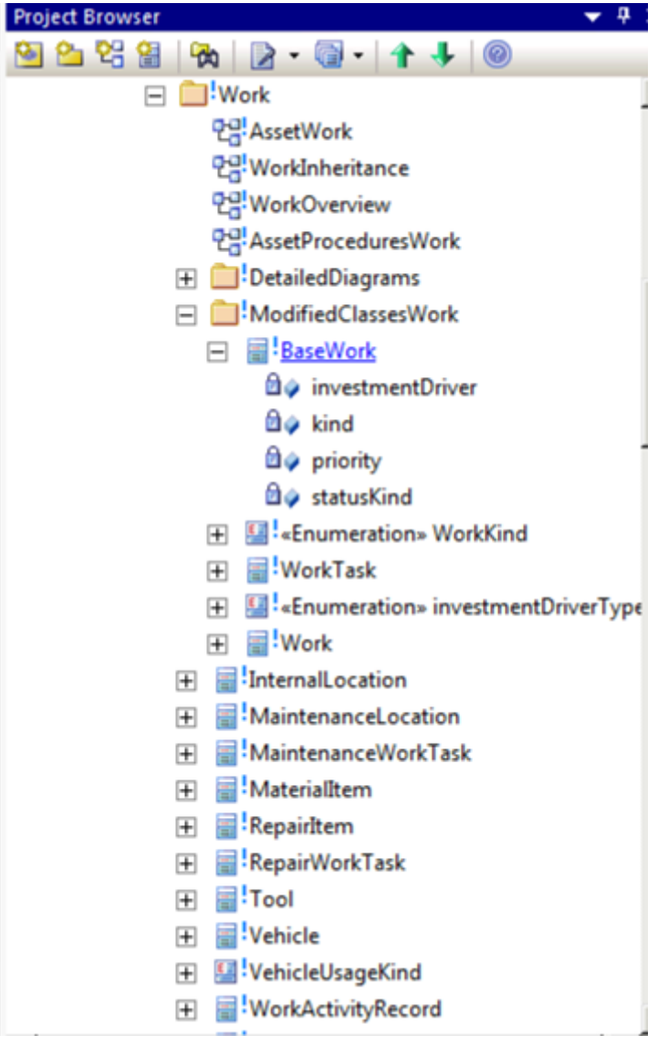
Managing CIM in Sparx EA – Models and Packages

A separate copy is made of the IEC model and amendments are made against this

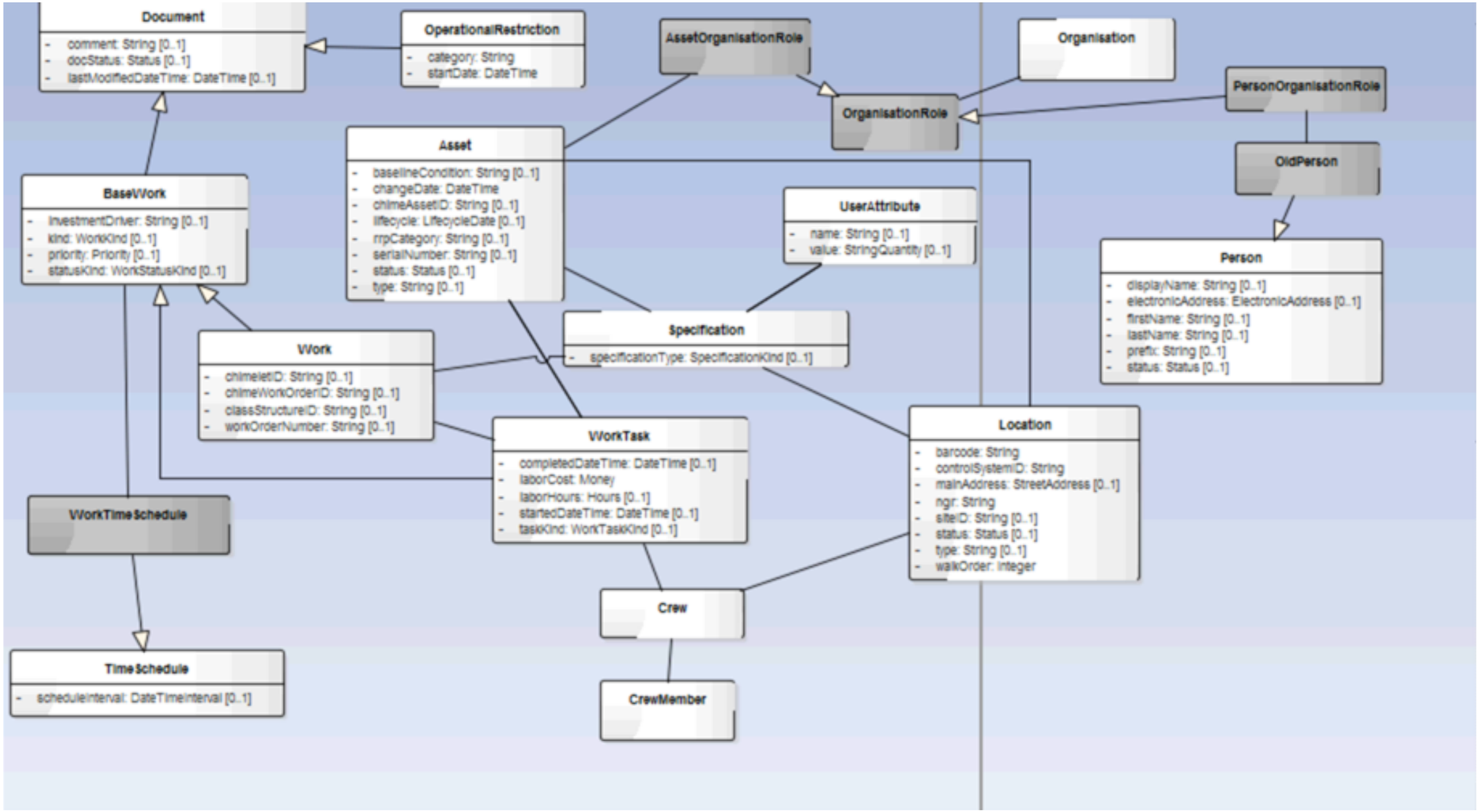


New or changed classes are moved to separate packages to enable easier impact analysis of future IEC model changes

The complete CIM model is extensive, so we are building up our tailored model on a project by project basis

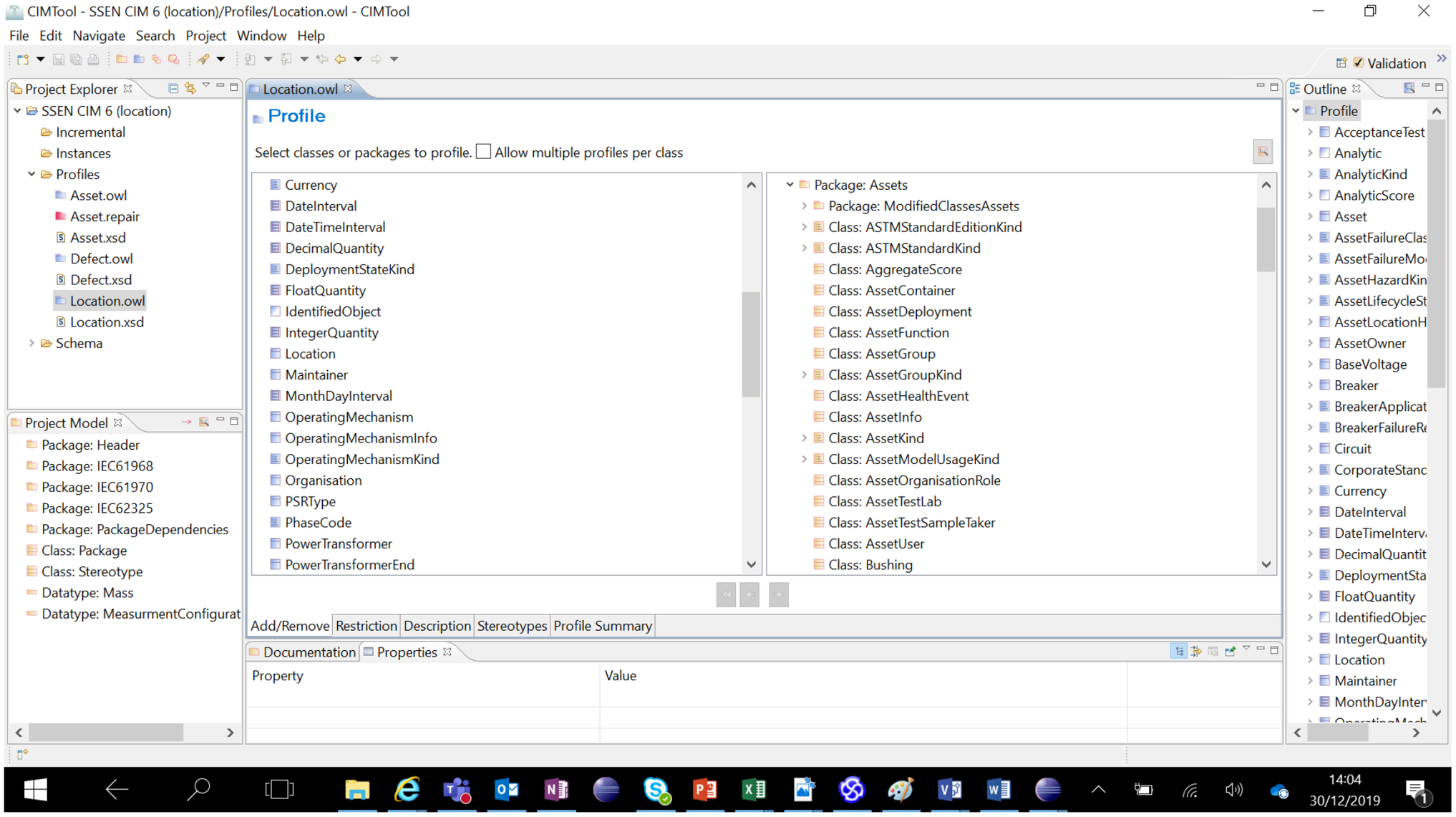


Managing CIM in Sparx EA – Profile Diagrams



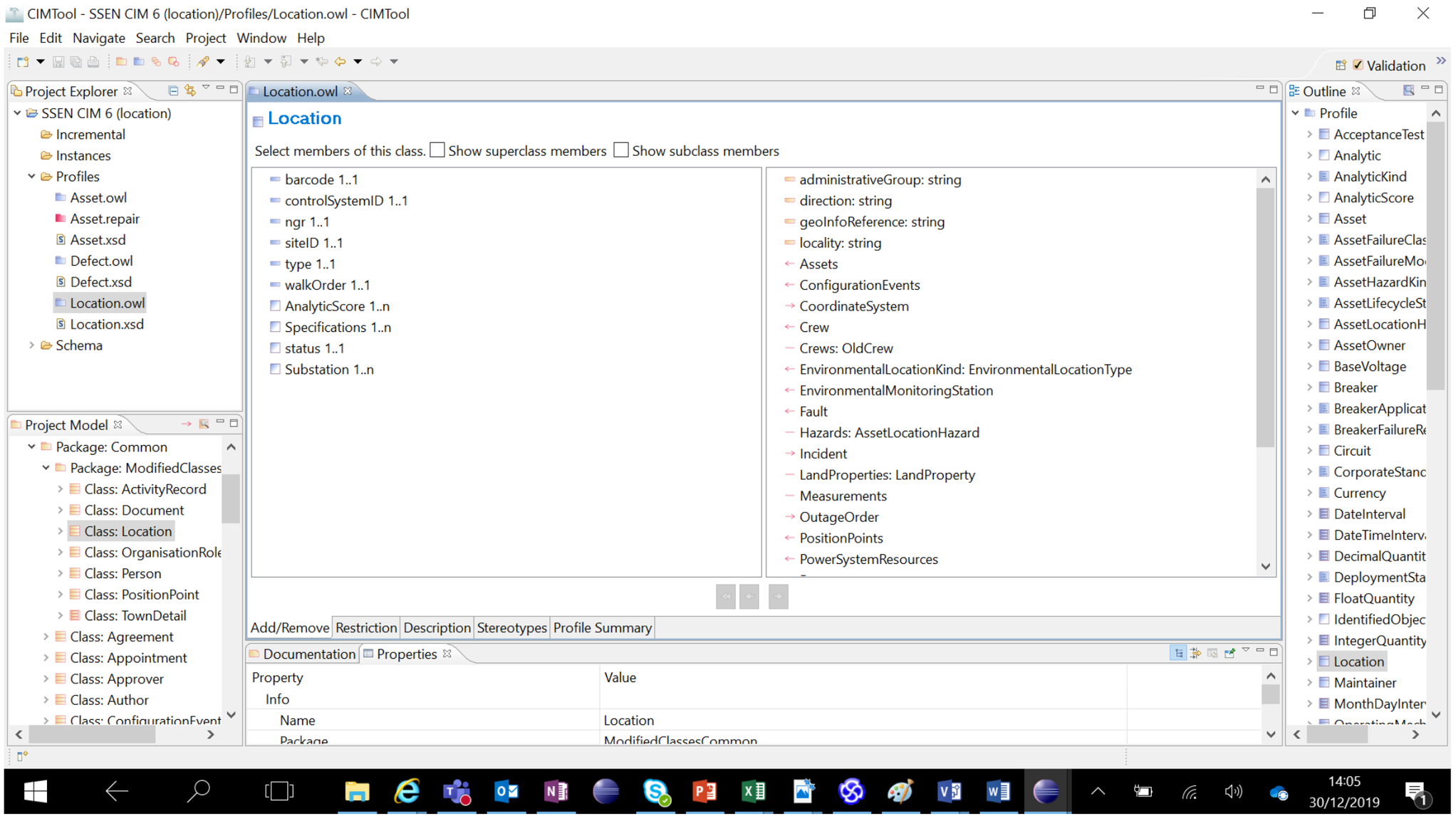
UML diagrams are created for each Profile showing only those classes and elements that are used. These aid understanding of the Profile contents.

Using CIMTool to Create Profiles #1



The required Classes are copied to the profile.

Using CIMTool to Create Profiles #2



The required Elements and Associations are copied to the profile.

Whilst not explicit in this screen, inherited elements are included in the generated schemas (e.g. IndentifiedObject.mRID)

A record should be kept of what classes, elements and associations are included, in case the Profile needs to be re-created

Change Log Example

Class	New Attributes	Changed attributes	New Associations	Changed Associations	Project requesting change	Rationale	Updated by	Date of change	Status
Asset	rrpCategory		Span		GIS	Alignment with Maximo asset classes	Neil Meredith	30/11/2018	Closed
BaseWork	investmentDriver				GIS	To align with Green Label process and RRP	Neil Meredith	30/11/2018	Closed
Circuit	nrn				GIS	Required to identify location on network	Neil Meredith	26/11/2018	Closed
CompositeSwitch				Association to Switch changed to 1.*	GIS	In IEC CIM this is an aggregation relationship. GIS needs an explicit association.	Neil Meredith	12/11/2018	Closed
Span	New Class				GIS	Alignment with Maximo asset classes	Neil Meredith	26/11/2018	Closed
UndergroundStructure		kind replaced with undergroundStructure Kind			GIS	Causes schema validation errors as not unique	Neil Meredith	26/11/2018	Closed

Making the case for CIM

- We encountered some initial resistance to this approach from some IT and business stakeholders, but an early live demo of Maximo-GIS integrated proved the benefits.
- A significant challenge has been to map data attributes between CIM-compatible systems (e.g. GIS) and a system that is not-CIM based (e.g. Maximo).
- However the automation of data exchange this provided has enabled a step-change in data quality, integrity and completeness.
- It has been well received by our business stakeholders and has enabled us to make a successful case to the SSEN Managing Director for further investment in integration technology and CIM.

Building in-house CIM expertise to ease the configuration process across different systems

Building an in-house CIM capability

Using CIM requires business and IT expertise

The full CIM is extensive and complex – start small and extend out

Data mapping between source and target systems can be difficult – requires collaboration across teams

ENTERPRISE ARCHITECT
SPARX SYSTEMS

A basic knowledge of Sparx EA is required

CIMTool

CIMTool help files are limited – we are developing an in-house guide

Close