18/05/2020

BIM: Better Information Management

AVEVA

STEVEN WILLIAMS, TECHNICAL SALES CONSULTANT

AVEVA is united around
a singular mission:

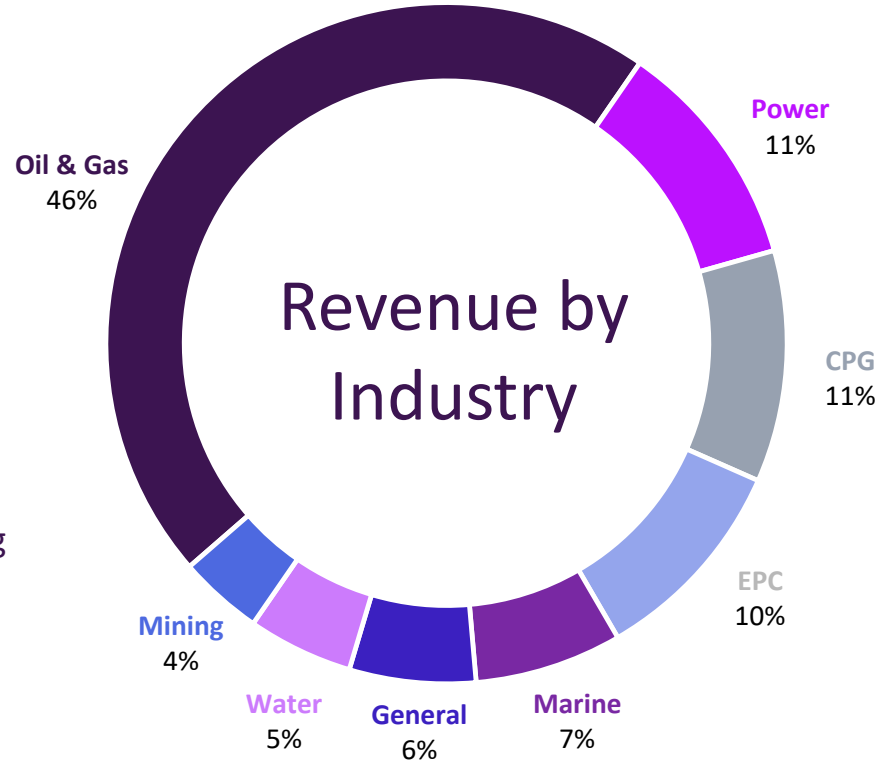
Create industrial technology that inspires people to shape the future.

AVEVA is a leader in industrial digital transformation

FTSE 100 listed on the London Stock Exchange

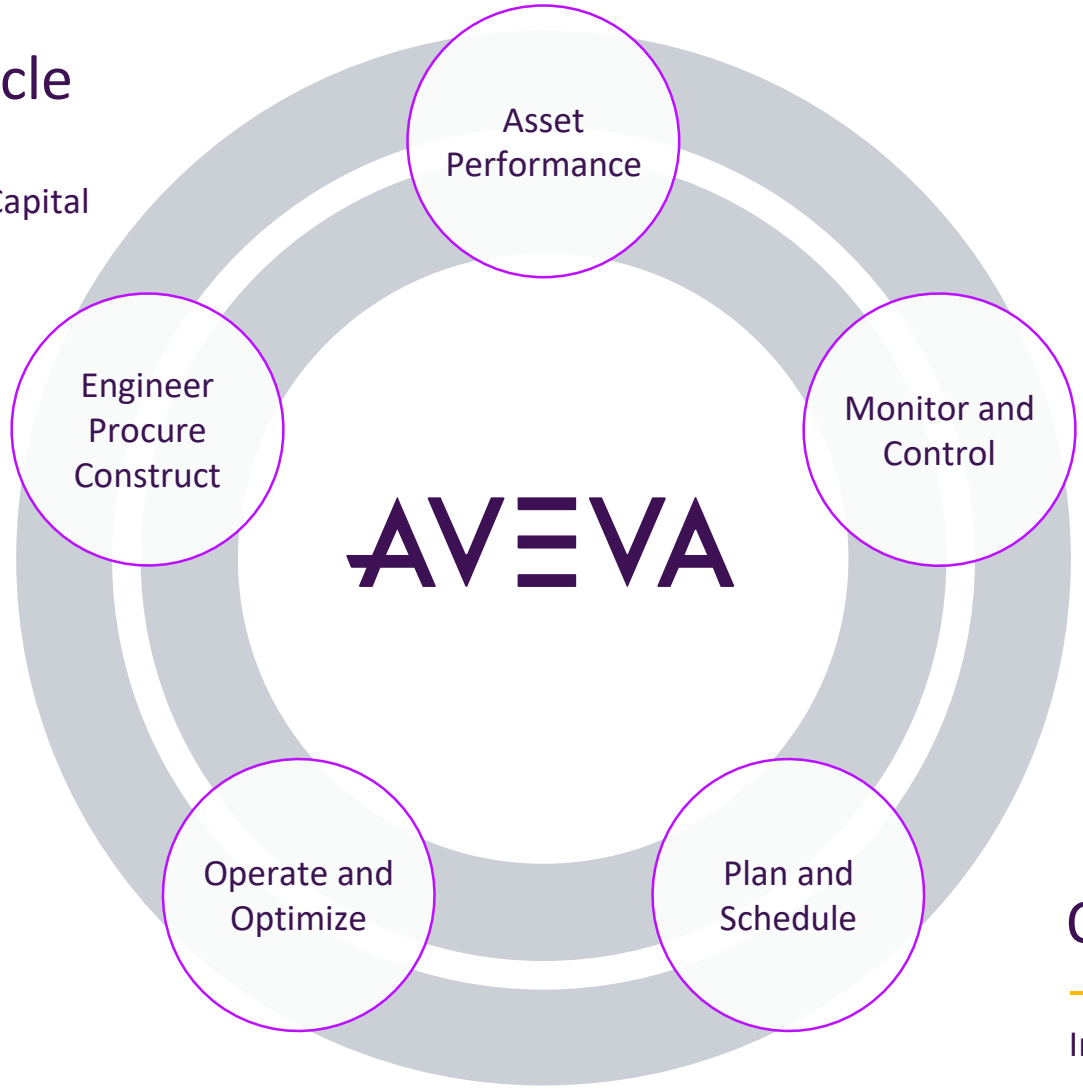
16,000+ customers	**10+** industries
4,600+ employees	**4,200** partners

20% reduction in capital projects	**100+ million** saved from preventing asset downtime
30%+ improvement in overall equipment effectiveness	**20%+** increase in efficiency



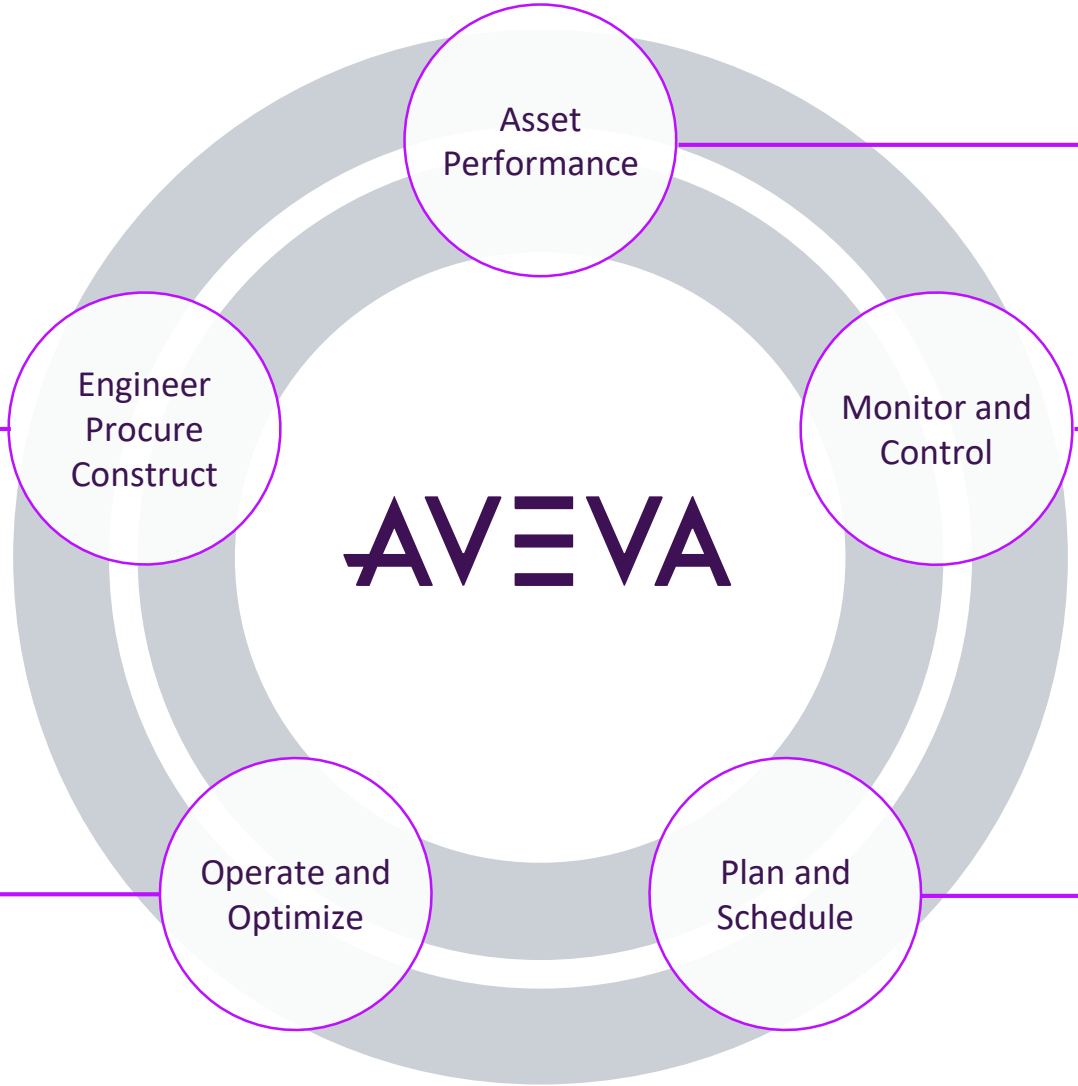
Asset Life Cycle

Improve Return On Capital



Operations Life Cycle

Improve Profitability



Maximize the economic return of industrial assets and reduce risk

Discover improved efficiency with edge-to-enterprise visibility, automation and control.

Enable collaboration and maximize profitability across the supply chain

Optimize operating processes to improve profitability

Improve time, cost and efficiency of capital projects

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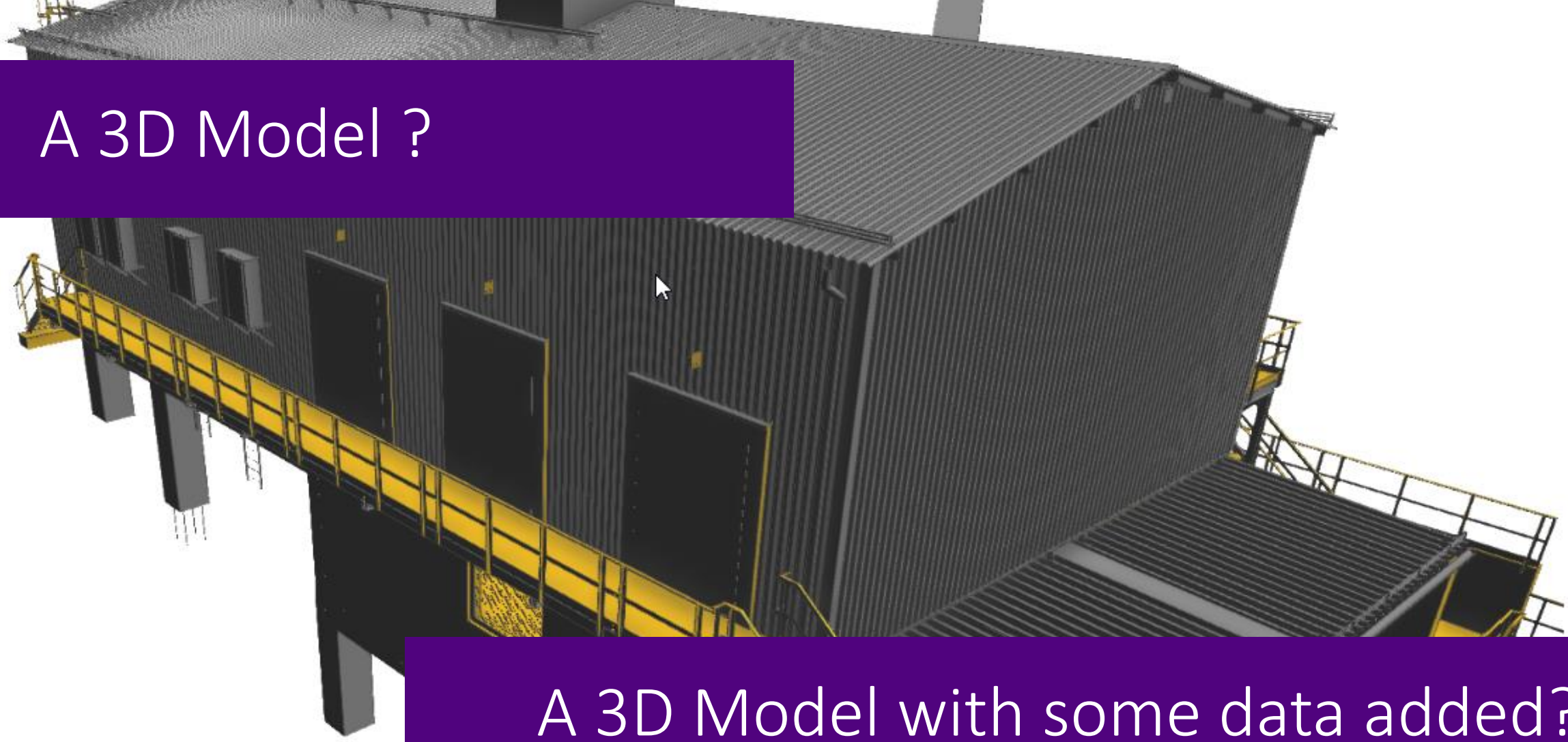
DIGITAL TRANSFORMATION

Enabling improved decision making across an organisation

A 3D Model ?



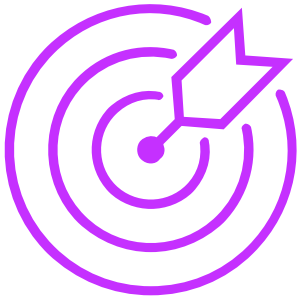
A 3D Model with some data added?

Shared Document Management?

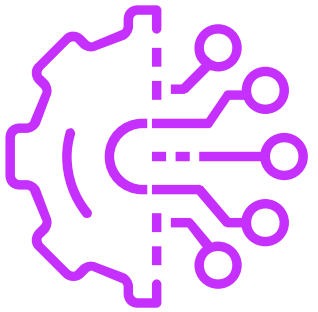
Better Information Management

BIM: Better Information Management

- A strategy and set of processes to build a connected digital information model supported by technology.



- Covering the definition, creation and management of information across the lifecycle.



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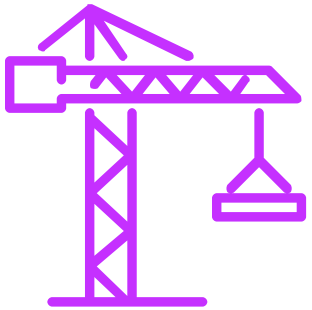
BIM: Better Information Management

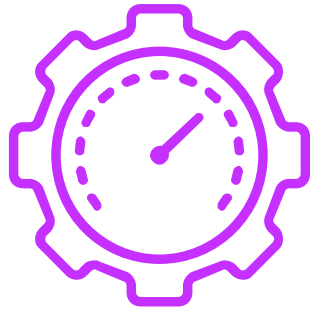
- **For the contractor:**

Enables efficient project engineering, design, construction and handover



- **For the operator:**

The foundation of a digital twin which can be augmented to provide efficient and effective operation via better maintenance, monitoring, control and analysis.



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Market Environment

- Commodity prices and oversupply
- Competition and consolidation
- Environment, quality, safety regulations
- Geopolitical uncertainties
- Generation shift
- Pace of change

Imperatives

- Capital expenditure constraints
- Compressed construction, engineering & design cycles
- Operational efficiency to drive profitability
- Asset reliability and availability
- Performance management and decision support
- Workforce evolution and capability

Technology Trends

- Cloud
- Industrial IoT/Edge
- Big Data
- Digital Twin
- Artificial Intelligence
- AR/VR

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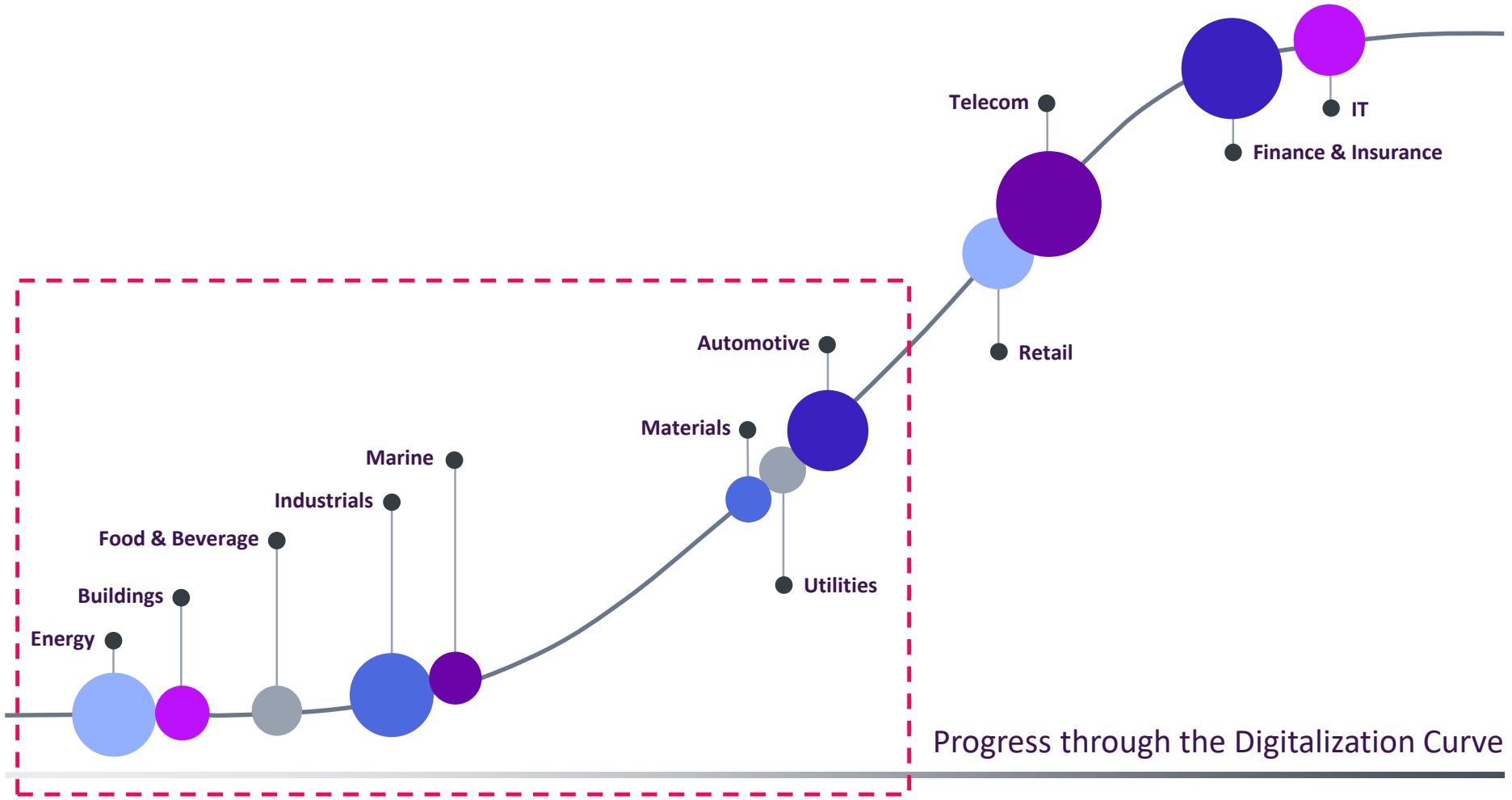
Industrial markets are facing rapid transformation



Source: AVEVA Market Insights

Consider how we would book air travel today compared to a few years ago

Is the boarding card the master or the data?
If you have a boarding card at all!

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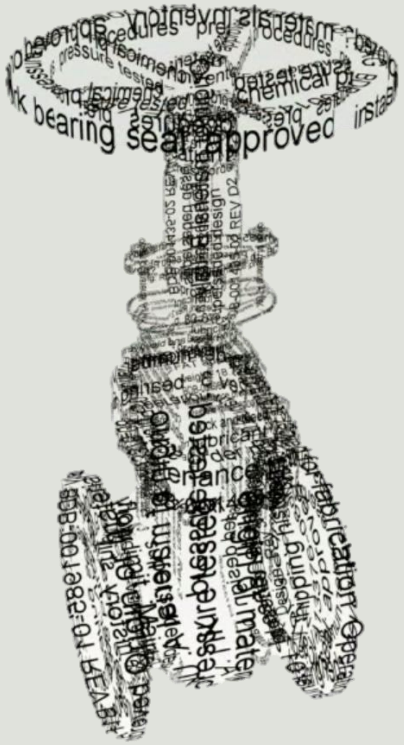
Think about the data and not just the document.

The assets are what we design, engineer, install, maintain and operate

To believe that…

For every Physical Asset

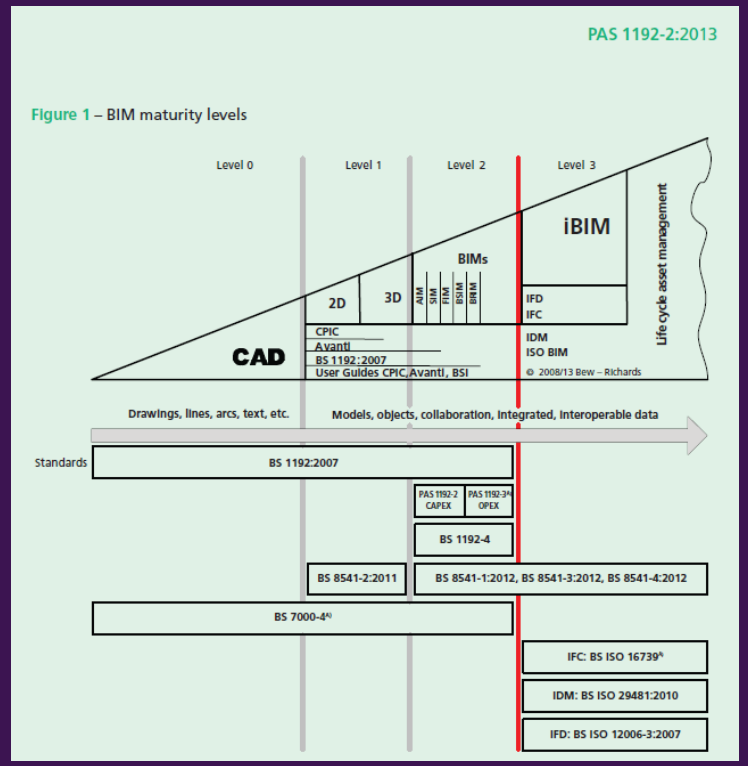


there must exist a Digital Asset

Building a BIM strategy

In the UK BS:1192 > ISO 19650

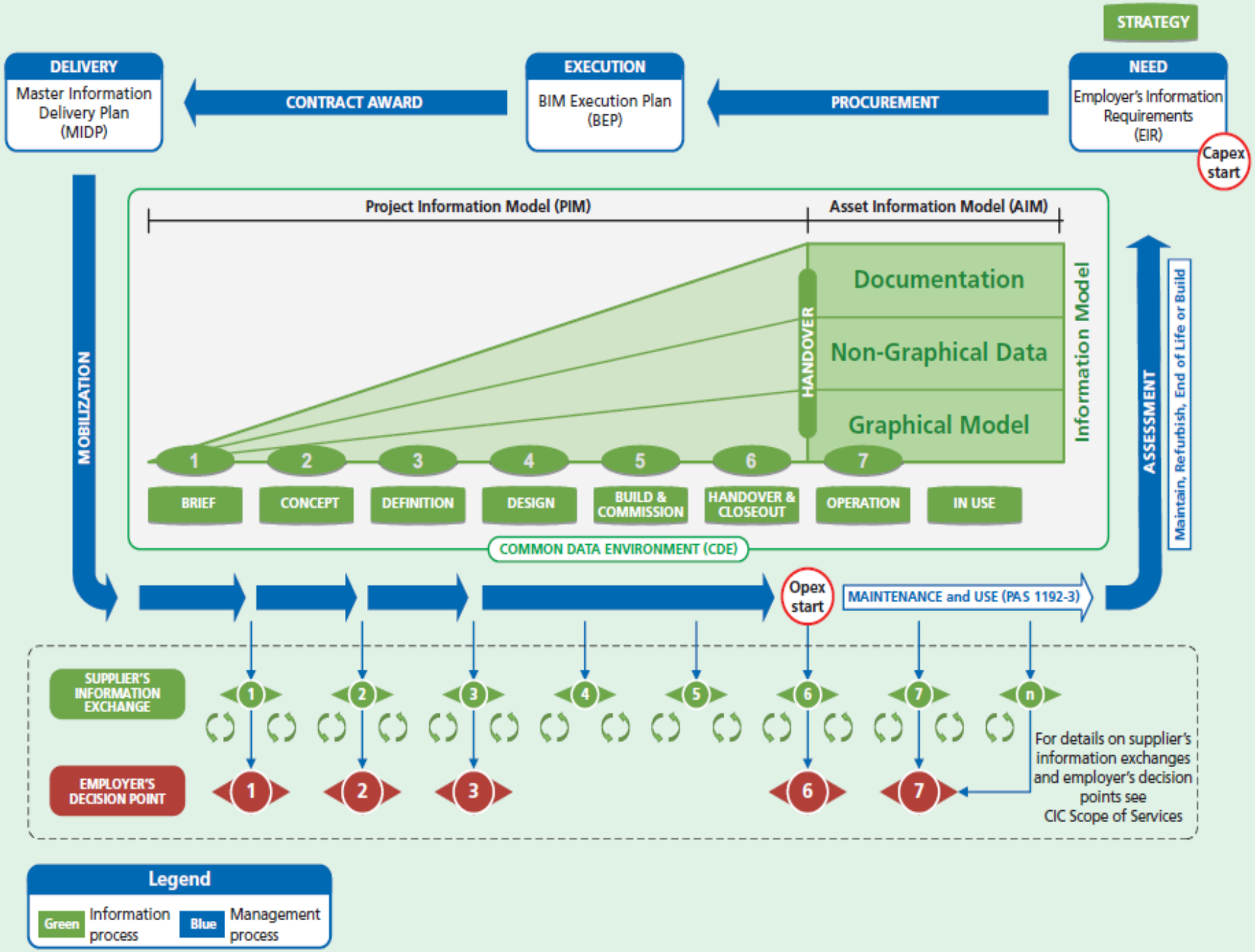
Designed to be implemented in stages



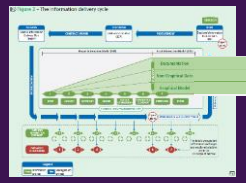
Level	
0	Unmanaged 2D CAD No collaboration
1	3D CAD for concept work 2D CAD for Production Information
2	Collaborative working Federated information model
3	Digital Built Britain

Moving from a purely unintelligent document perspective to a data centric perspective

Figure 2 – The information delivery cycle



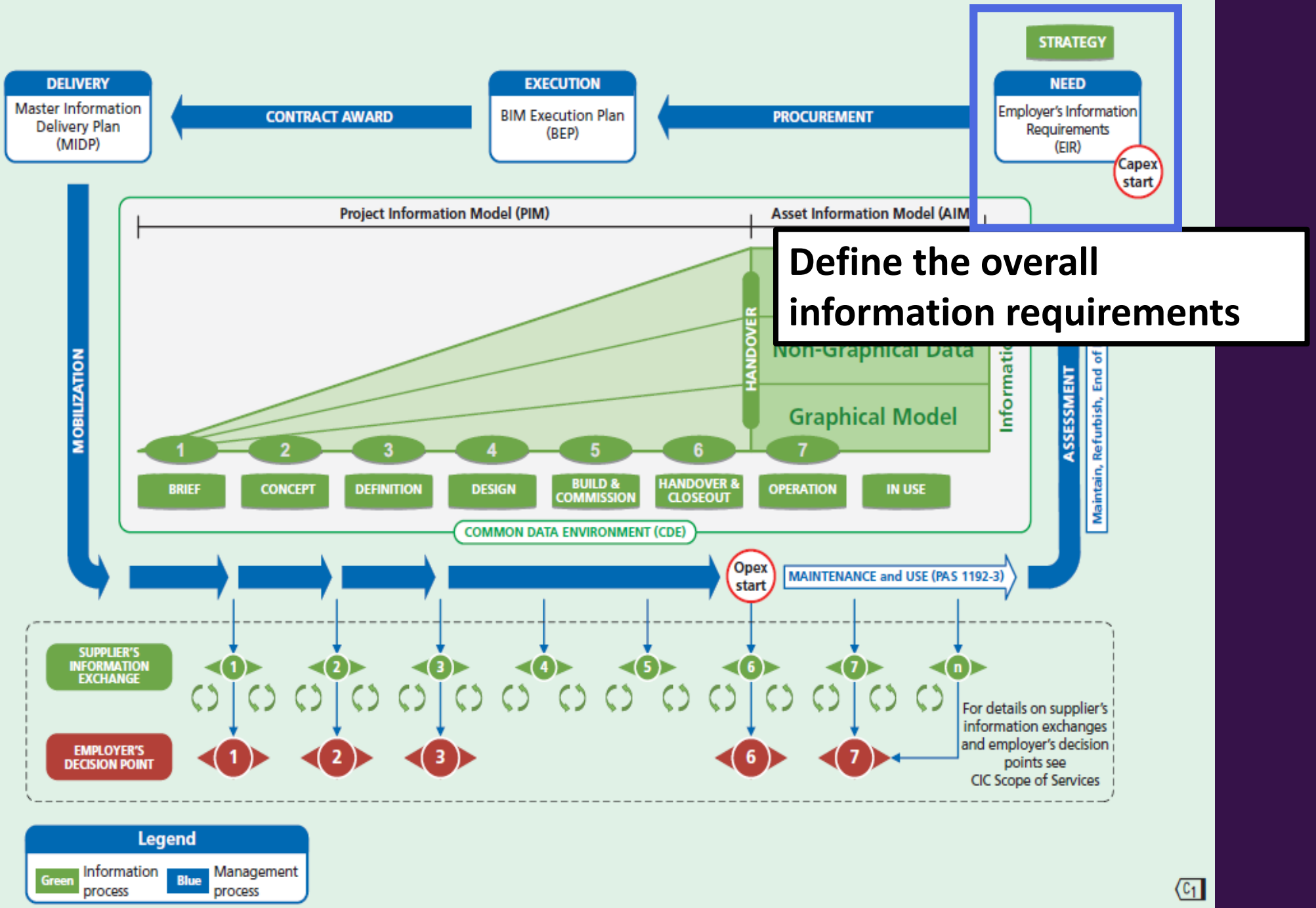
And to consider the entire Lifecycle…



Project
3 years

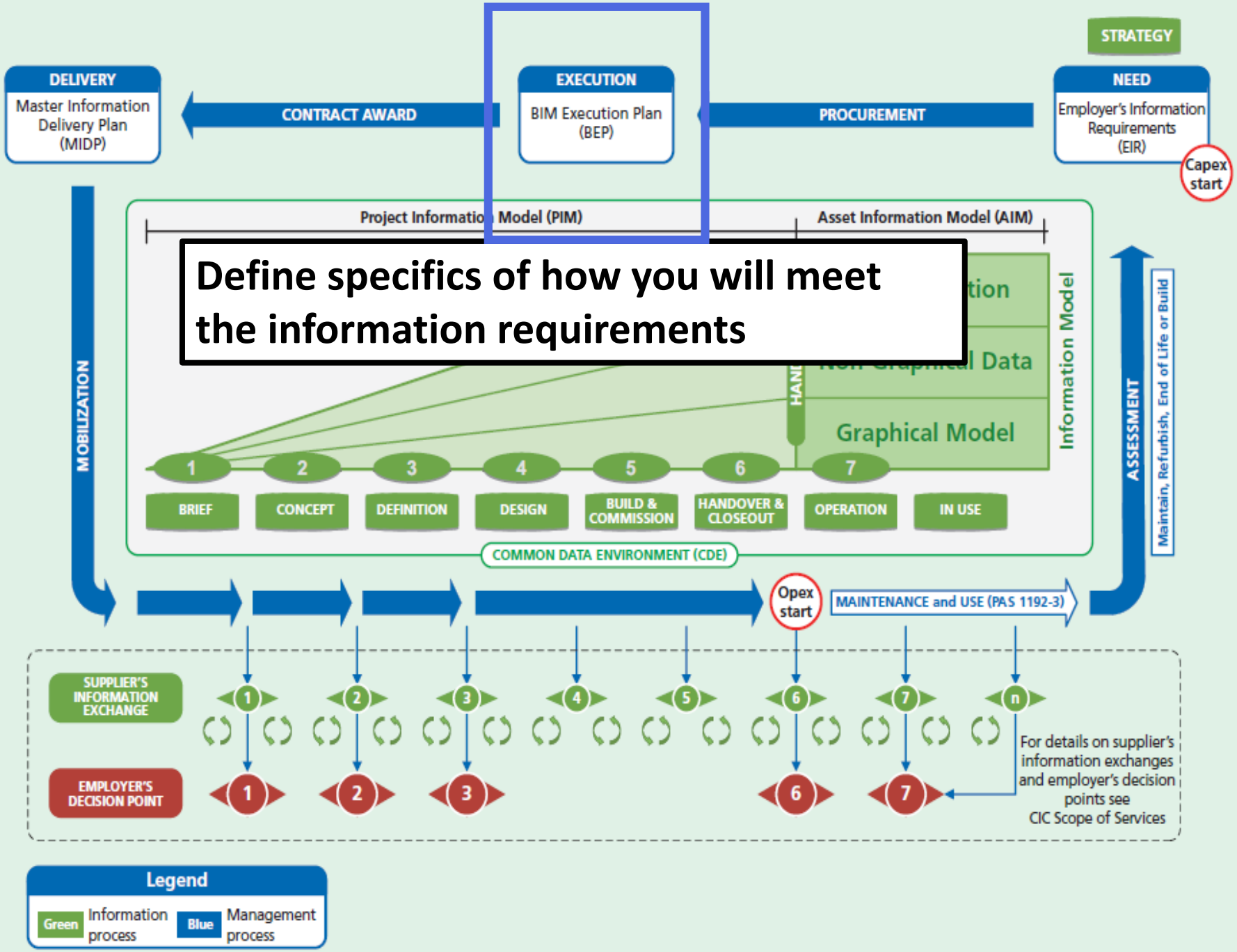
Operations
50+ years

C1 Figure 2 – The information delivery cycle

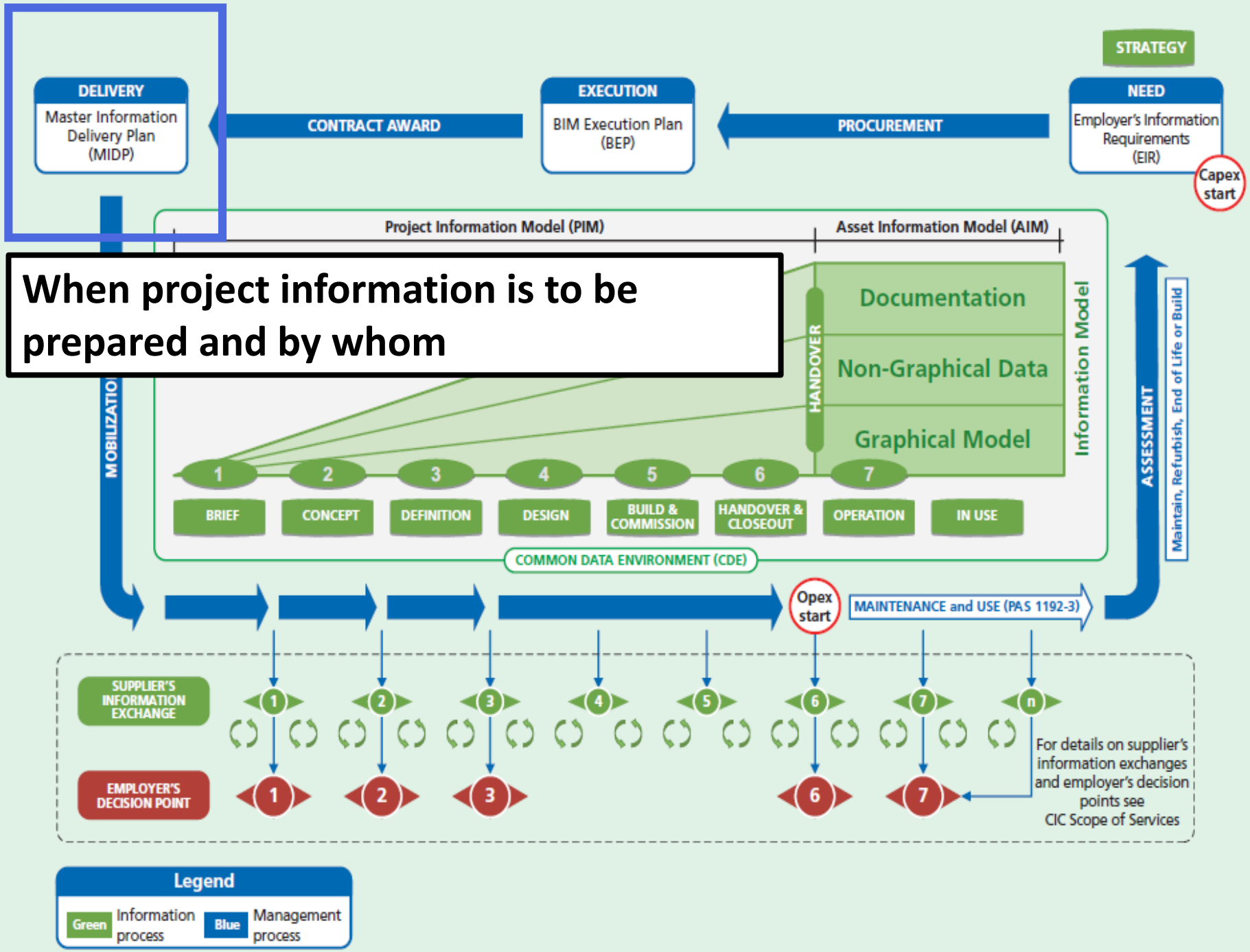


C1

Figure 2 – The information delivery cycle

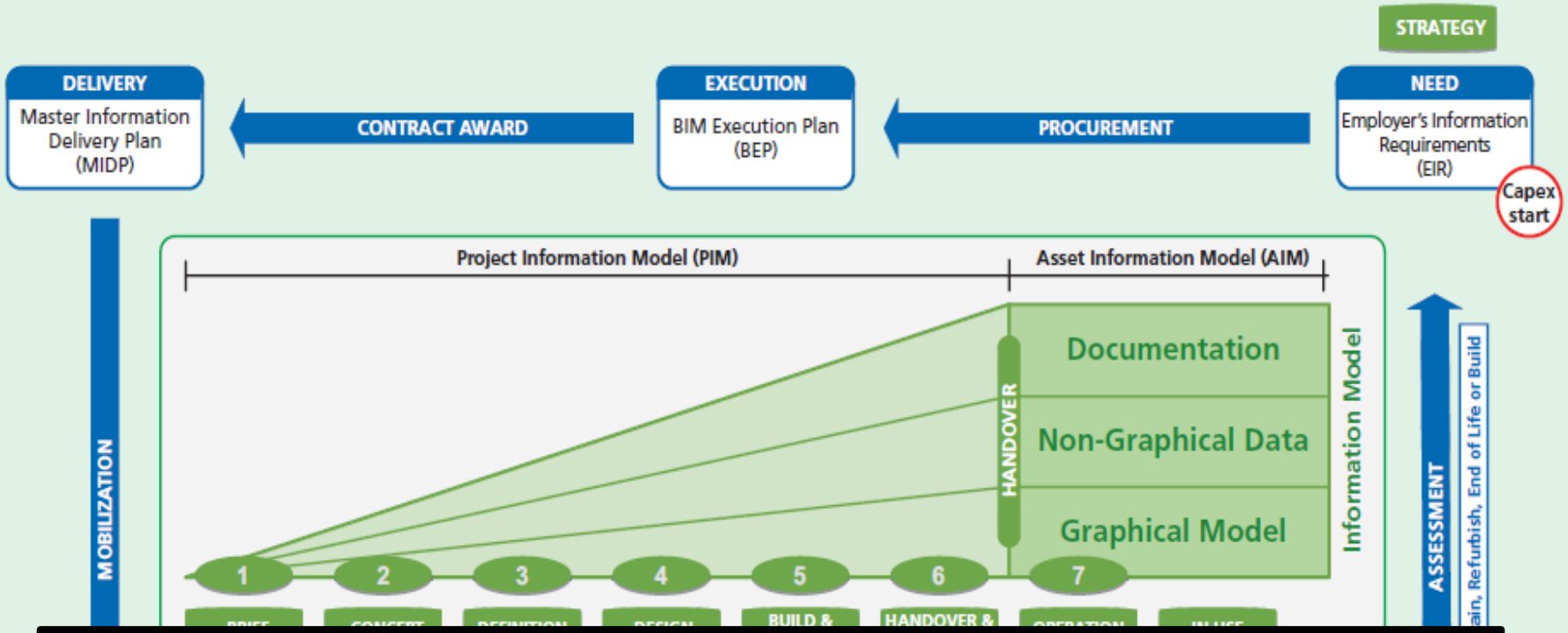


C1 Figure 2 – The information delivery cycle

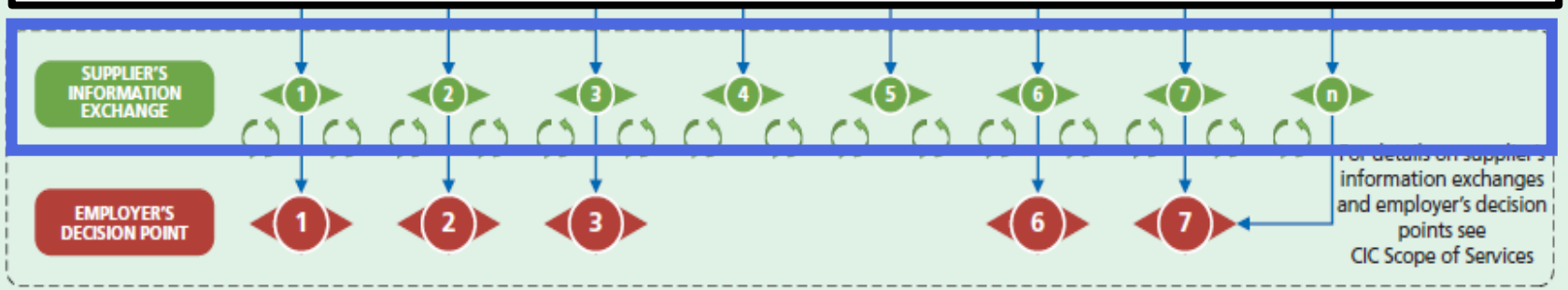


C1

C1 Figure 2 – The information delivery cycle



When project information is to be delivered, how it will be validated and what decisions need to be made



C1

THE CLIENT

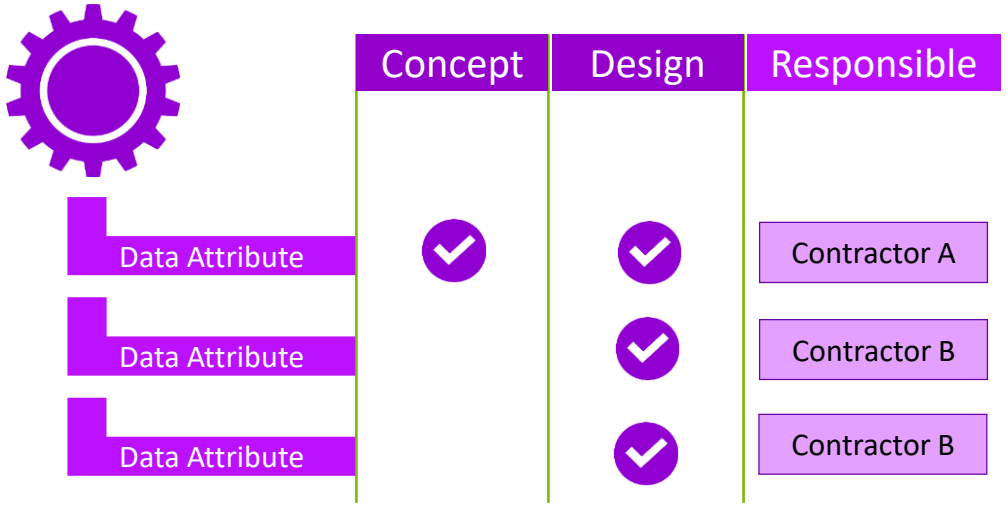
Define the overall information requirements

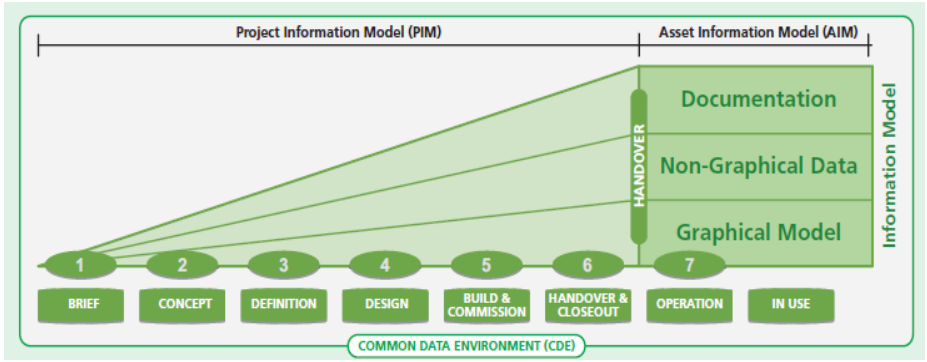
Develop and Asset Classification Library

Define requirements based on project phase and responsibility

Communicate information requirements in a ‘data’ centric form, not big pdf files

Provides a baseline for validation





Generated at 2016-02-10 16:16:10(UTC) - Based on content from 'MTR Demo Information Standard' (MTR_DEMO_01), version 0.0.0.2 (unofficial) from 2014-12-17

Permissible Attributes (112)

Attribute Group → Certification

Class Name (46)	Class Id	#Attributes	Certificate - Next Expiry Date	Certificate Type	Hazardous Area Cert Authority	Hazardous Area Cert Number	Hazardous Area Cert Standard	Hazardous Area Gas Group	Hazardous Area Protection	Hazardous Area Rating	Hazardous Area Temp Rating	IP Rating
#Classes →			7	7	12	11	12	12	11	12	12	13
Motor - Electric	EL_D_M	82			O	O	O	O	O	O	O	O
Control Equipment	EL_EC_EC	62			O	O	O	O		O	O	O
Electrical Cubicle	EL_EE_CU	51										O
Circuit Breaker	EL_EE_EA	52										
Battery	EL_EE_EB	57										
Contacter	EL_EE_ECT	55			O		O	O	O	O	O	
DC Switchgear & Distribution Boards	EL_EE_ED	62										
Emergency Power Generator Sets	EL_EE_EE	72										
Heater - Electrical	EL_EE_EF	83			O	O	O	O	O	O	O	
Generators	EL_EE_EG	74										
Switch Gear (Above 10 kV)	EL_EE_EH	67										
Navigational Aid	EL_EE_EI	61			O	O	O	O	O	O	O	O
Rectifiers / Invertor	EL_EE_EK	62										
Switchgear & Distribution Boards (U < Or	EL_EE_EL	55										
Main Power Generator Sets	EL_EE_EM	73										
Switchgear & Distribution Boards (U > 40	EL_EE_EN	67										
Earth Bar	EL_EE_EP	43										
Converters	EL_EE_EQ	62	O	O								
UPS / Frequency Converter	EL_EE_ER	71	O	O								
Lightning Arrestor	EL_EE_ES	42										
Starter	EL_EE_EST	55										
Transformer - Current	EL_EE_ETC	69										
Transformer - Voltage	EL_EE_ETV	72										

Attribute Group → Design Data

Class Name (46)	Class Id	Consumed Load Int kVAr	Consumed Load Int kW	Consumed Load Stby kVAr	Consumed Load Stby kW	Design Pressure	Design Pressure Max.	Design Pressure Min.	Design Temp (Max)	Design Temp (Min)	Material (Main)	Operating Mode (Duty / Standby)	Power - Absorbed	Power Consumption	Power Factor (Cos)	Power Output Rated	Power Rated Nameplate	Power Reactive (Consumption)	Rated Capacity	Voltage Level
#Classes →		11	11	11	11	1	1	1	1	1	7	22	1	20	14	18	18	16	26	1
Motor - Electric	EL_D_M	O	O	O	O						O	O		O	O	O	O	O	O	
Control Equipment	EL_EC_EC												O	O					O	
Electrical Cubicle	EL_EE_CU											O								
Circuit Breaker	EL_EE_EA											O							O	
Battery	EL_EE_EB													O		O			O	
Contacter	EL_EE_ECT											O							O	
DC Switchgear & Distribution Boards	EL_EE_ED	O	O	O	O									O		O	O		O	
Emergency Power Generator Sets	EL_EE_EE	O	O	O	O							O		O	O	O	O	O	O	
Heater - Electrical	EL_EE_EF	O	O	O	O	O	O	O	O	O	O	O		O	O	O	O	O	O	
Generators	EL_EE_EG	O	O	O	O						O	O		O	O	O	O	O	O	
Switch Gear (Above 10 kV)	EL_EE_EH	O	O	O	O							O				O	O	O	O	
Navigational Aid	EL_EE_EI										O	O		O					O	
Rectifiers / Invertor	EL_EE_EK											O		O	O	O	O	O	O	
Switchgear & Distribution Boards (U < Or	EL_EE_EL											O							O	
Main Power Generator Sets	EL_EE_EM	O	O	O	O							O		O	O	O	O	O	O	
Switchgear & Distribution Boards (U > 40	EL_EE_EN	O	O	O	O							O				O	O	O	O	
Earth Bar	EL_EE_EP										O								O	
Converters	EL_EE_EQ											O		O	O	O	O	O	O	
UPS / Frequency Converter	EL_EE_ER	O	O	O	O							O		O	O	O	O	O	O	
Lightning Arrestor	EL_EE_ES																			
Starter	EL_EE_EST											O		O	O	O	O	O	O	
Transformer - Current	EL_EE_ETC	O	O	O	O							O		O	O	O	O	O	O	
Transformer - Voltage	EL_EE_ETV	O	O	O	O							O		O	O	O	O	O	O	O

Attribute Group → Flags / General

Class Name (46)	Class Id	Electrical Load List Flag	Ex Rated Equipment Register (Haz Ar	MEL Member Flag	Safety Related Device (SRD) Index Fla	Construction - Month	Construction - Year	FireZone	Location (Facility Area Code)	Service Description	Status	System	Tag Number	Tag Originator
#Classes →		23	16	11	38	4	12	46	46	46	46	46	46	46
Motor - Electric	EL_D_M	O	O	O	O			R	R	R	R	R	R	R
Control Equipment	EL_EC_EC		O	O	O			R	R	R	R	R	R	R
Electrical Cubicle	EL_EE_CU					O	O	R	R	R	R	R	R	R
Circuit Breaker	EL_EE_EA	O			O			R	R	R	R	R	R	R
Battery	EL_EE_EB				O			R	R	R	R	R	R	R
Contacter	EL_EE_ECT	O	O		O			R	R	R	R	R	R	R
DC Switchgear & Distribution Boards	EL_EE_ED				O	O	O	R	R	R	R	R	R	R
Emergency Power Generator Sets	EL_EE_EE	O		O	O		O	R	R	R	R	R	R	R
Heater - Electrical	EL_EE_EF	O	O	O	O		O	R	R	R	R	R	R	R
Generators	EL_EE_EG	O		O	O		O	R	R	R	R	R	R	R
Switch Gear (Above 10 kV)	EL_EE_EH	O			O		O	R	R	R	R	R	R	R
Navigational Aid	EL_EE_EI	O	O		O			R	R	R	R	R	R	R
Rectifiers / Invertor	EL_EE_EK	O			O		O	R	R	R	R	R	R	R
Switchgear & Distribution Boards (U < Or	EL_EE_EL	O			O		O	R	R	R	R	R	R	R
Main Power Generator Sets	EL_EE_EM	O		O	O		O	R	R	R	R	R	R	R
Switchgear & Distribution Boards (U > 40	EL_EE_EN	O			O		O	R	R	R	R	R	R	R
Earth Bar	EL_EE_EP				O			R	R	R	R	R	R	R
Converters	EL_EE_EQ	O			O			R	R	R	R	R	R	R
UPS / Frequency Converter	EL_EE_ER	O			O			R	R	R	R	R	R	R
Lightning Arrestor	EL_EE_ES				O			R	R	R	R	R	R	R
Starter	EL_EE_EST	O	O		O			R	R	R	R	R	R	R
Transformer - Current	EL_EE_ETC	O	O		O			R	R	R	R	R	R	R
Transformer - Voltage	EL_EE_ETV	O	O	O	O			R	R	R	R	R	R	R

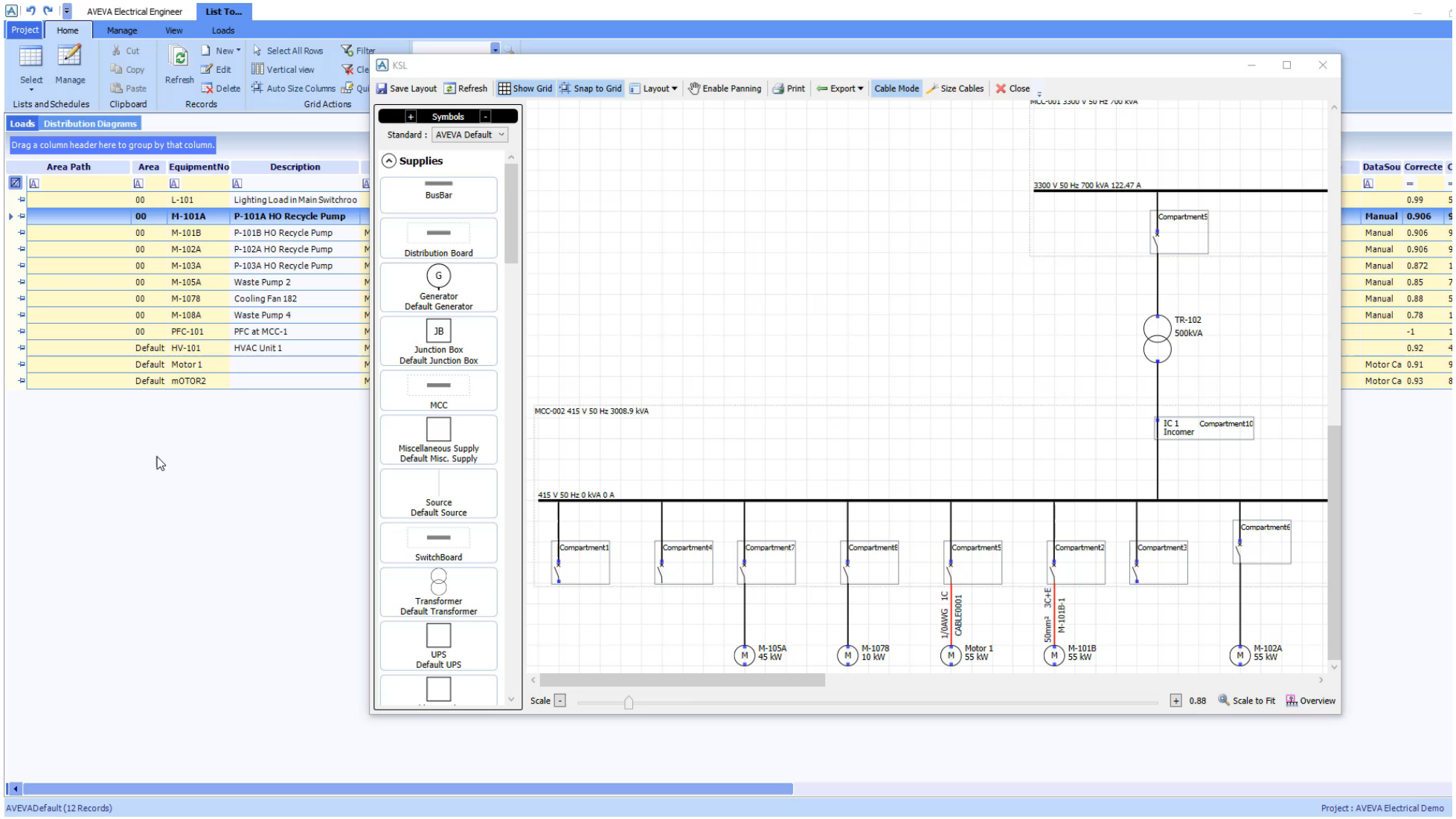
THE CONTRACTOR

Define how you will meet the requirements

How do we deliver data and information

Utilise tools that add ‘intelligence’

- Start to think as documents as reports on the data



How do we deliver data and information

Think about how we manage and track our assets and not just the documents

- Managing data and the assets rather than the documents, allows us to provide better communication across disciplines and throughout the project lifecycle
- Key is to develop a tagging strategy and be consistent.
- Validate this as data is added, returned
- keep a **master** tag registry for the project.
- ‘Not in Excel’

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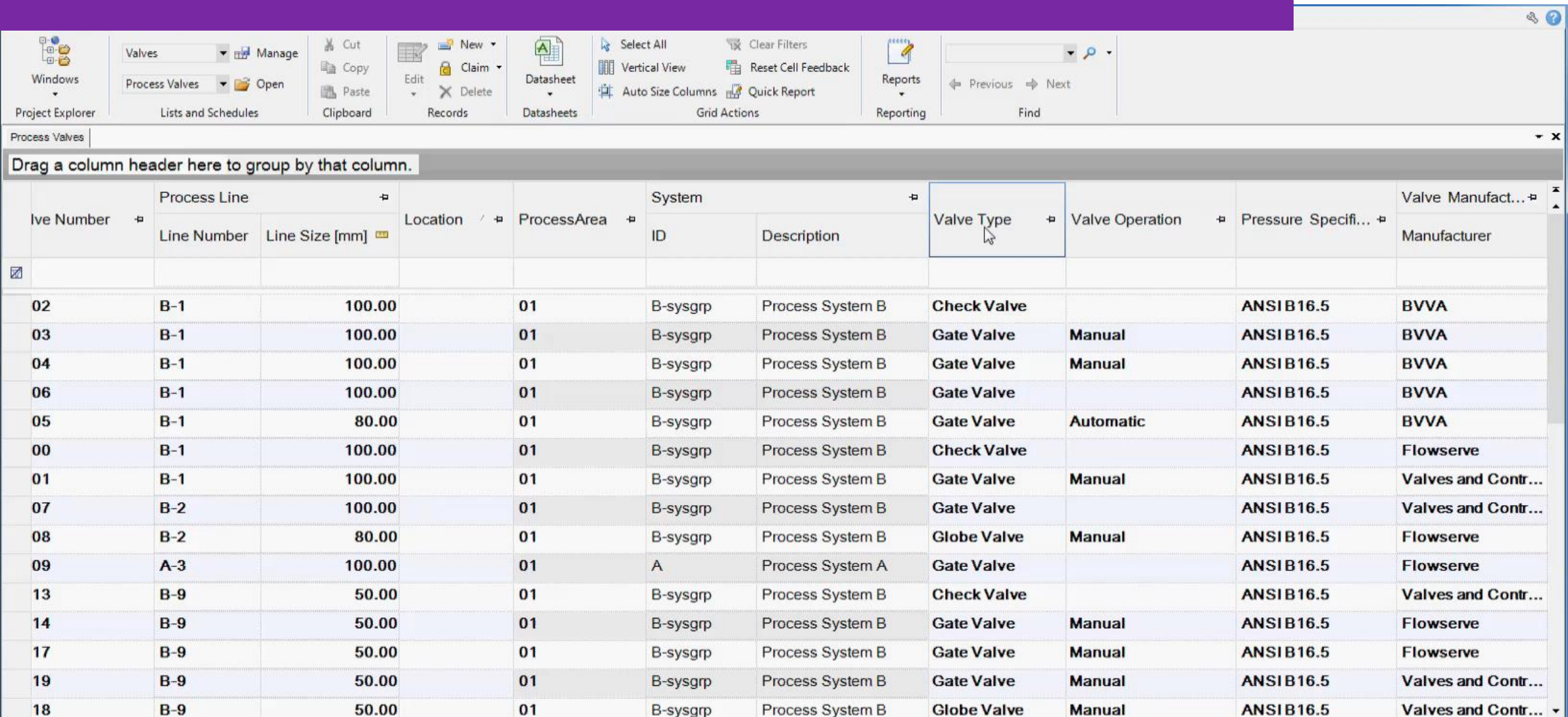
Master Tag Register



Ive Number	Process Line		Location	ProcessArea	System		Valve Type	Valve Operation	Pressure Specifi...	Valve Manufact...
	Line Number	Line Size [mm]			ID	Description				Manufacturer
02	B-1	100.00		01	B-sysgrp	Process System B	Check Valve		ANSI B16.5	BVVA
03	B-1	100.00		01	B-sysgrp	Process System B	Gate Valve	Manual	ANSI B16.5	BVVA
04	B-1	100.00		01	B-sysgrp	Process System B	Gate Valve	Manual	ANSI B16.5	BVVA
06	B-1	100.00		01	B-sysgrp	Process System B	Gate Valve		ANSI B16.5	BVVA
05	B-1	80.00		01	B-sysgrp	Process System B	Gate Valve	Automatic	ANSI B16.5	BVVA
00	B-1	100.00		01	B-sysgrp	Process System B	Check Valve		ANSI B16.5	Flowserve
01	B-1	100.00		01	B-sysgrp	Process System B	Gate Valve	Manual	ANSI B16.5	Valves and Contr...
07	B-2	100.00		01	B-sysgrp	Process System B	Gate Valve		ANSI B16.5	Valves and Contr...
08	B-2	80.00		01	B-sysgrp	Process System B	Globe Valve	Manual	ANSI B16.5	Flowserve
09	A-3	100.00		01	A	Process System A	Gate Valve		ANSI B16.5	Flowserve
13	B-9	50.00		01	B-sysgrp	Process System B	Check Valve		ANSI B16.5	Valves and Contr...
14	B-9	50.00		01	B-sysgrp	Process System B	Gate Valve	Manual	ANSI B16.5	Flowserve
17	B-9	50.00		01	B-sysgrp	Process System B	Gate Valve	Manual	ANSI B16.5	Flowserve
19	B-9	50.00		01	B-sysgrp	Process System B	Gate Valve	Manual	ANSI B16.5	Valves and Contr...
18	B-9	50.00		01	B-sysgrp	Process System B	Globe Valve	Manual	ANSI B16.5	Valves and Contr...

Master Tag Register

Consistent tagging allows us to track and manage our assets across a project

- We will see later how it enables us to use technology to automatically build a connected information model, with a focus on the assets and the data.
- Track assets across drawings, documents, data sources
- Every project will already do this for document numbering and tracking. We need to do it for all of the data
- It allows us to integrate and provide context across disciplines and project phases.
- Provide visibility across the project lifecycle

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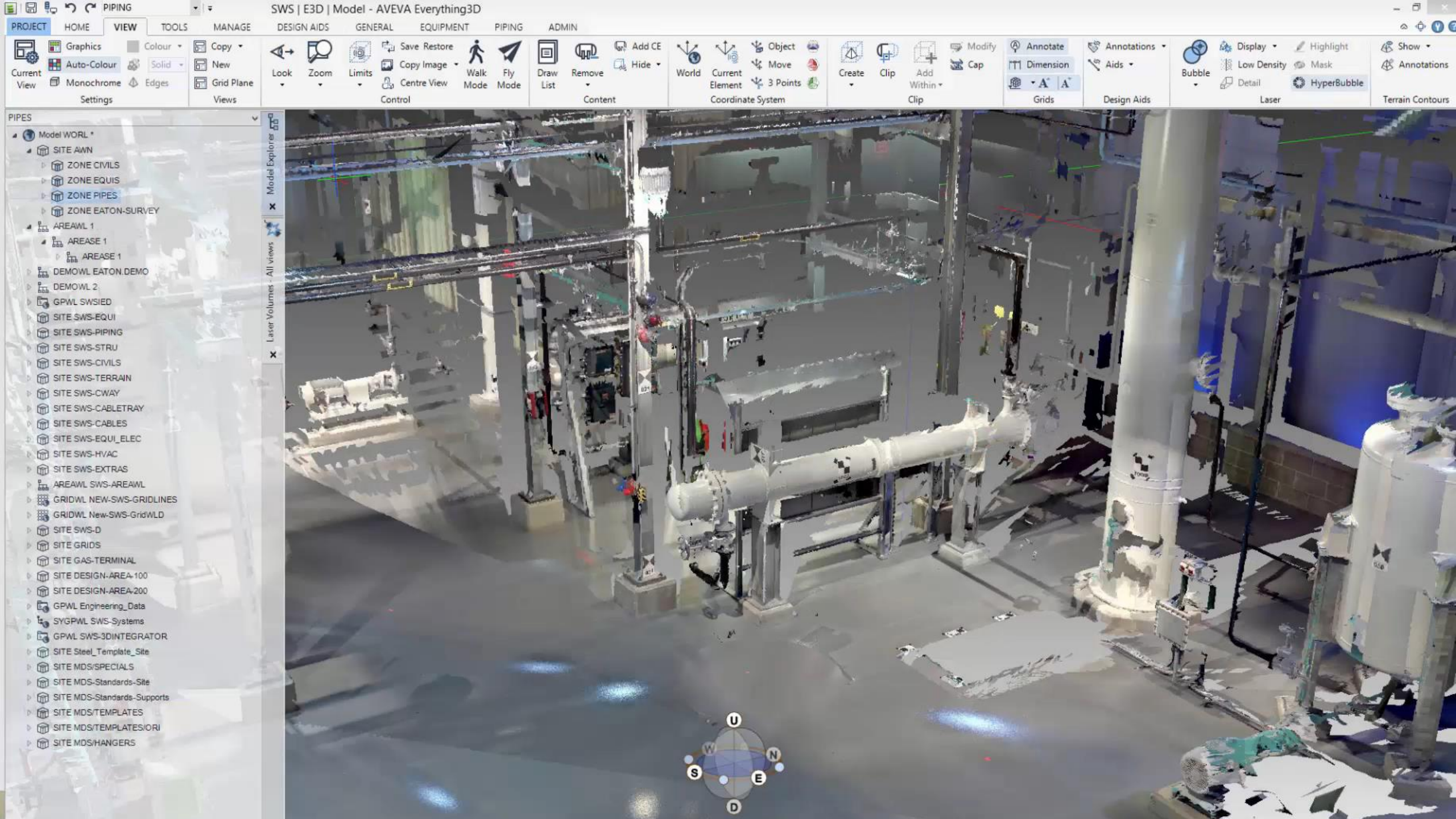
PIPING
SWS | E3D | Model - AVEVA Everything3D
PROJECT
HOME
VIEW
TOOLS
MANAGE
DESIGN AIDS
GENERAL
EQUIPMENT
PIPING
ADMIN
Current View
Graphics
Auto-Colour
Monochrome
Colour
Solid
Edges
Settings
Copy
New
Grid Plane
Views
Look
Zoom
Limits
Save Restore
Copy Image
Centre View
Walk Mode
Fly Mode
Control
Draw List
Remove
Add CE
Hide
Content
World
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Cap
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Grids
Annotations
Aids
Design Aids
Bubble
Display
Low Density
Detail
Highlight
Mask
HyperBubble
Laser
Show
Annotations
Terrain Contours
PIPES
Model WORL *
SITE AWN
ZONE CIVILS
ZONE EQUIS
ZONE PIPES
ZONE EATON-SURVEY
AREAWL 1
AREASE 1
AREASE 1
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GPWL SWSIED
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SITE SWS-STRU
SITE SWS-CIVILS
SITE SWS-TERRAIN
SITE SWS-CWAY
SITE SWS-CABLETRAY
SITE SWS-CABLES
SITE SWS-EQUI_ELEC
SITE SWS-HVAC
SITE SWS-EXTRAS
AREAWL SWS-AREAWL
GRIDWL NEW-SWS-GRIDLINES
GRIDWL New-SWS-GridWLD
SITE SWS-D
SITE GRIDS
SITE GAS-TERMINAL
SITE DESIGN-AREA-100
SITE DESIGN-AREA-200
GPWL Engineering_Data
SYGPWL SWS-Systems
GPWL SWS-3DINTEGRATOR
SITE Steel_Template_Site
SITE MDS/SPECIALS
SITE MDS-Standards-Site
SITE MDS-Standards-Supports
SITE MDS/TEMPLATES
SITE MDS/TEMPLATES/ORI
SITE MDS/HANGERS
Model Explorer
Laser Volumes - All views
U
W
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D

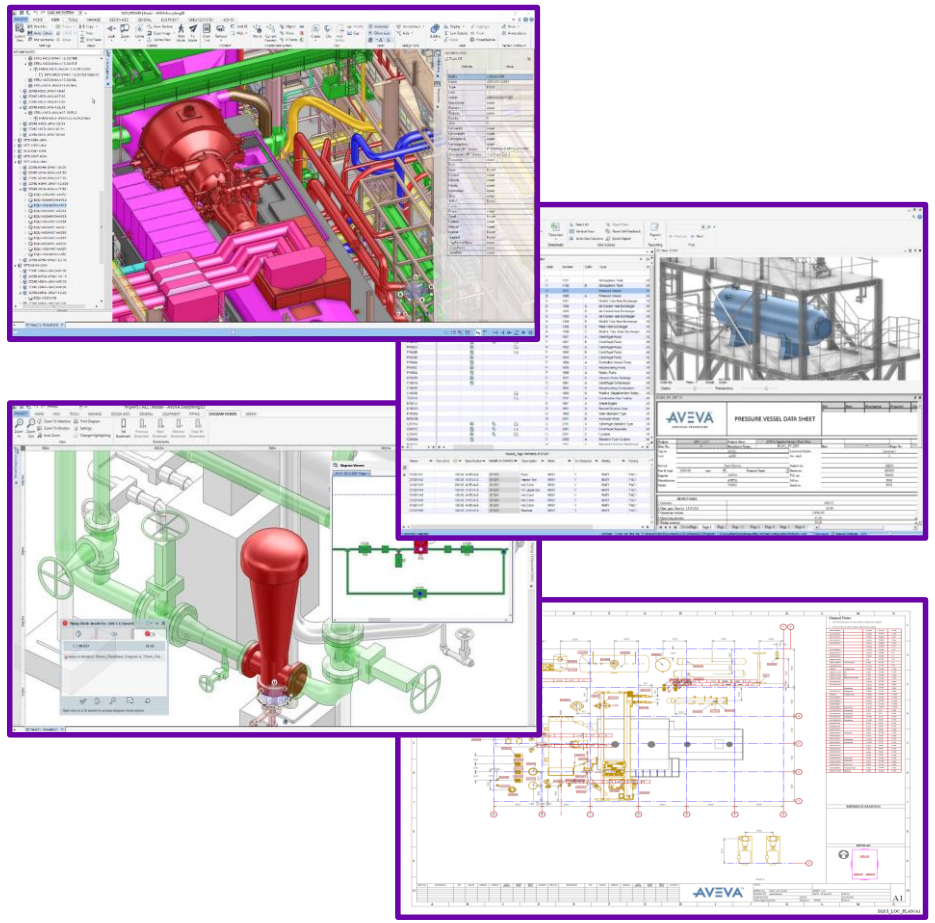
How do we deliver data and information

Transfer the data and not just the documents

- There is no perfect solution to this, however we are improving.
- For example IFC, DEXPI, CFIHOS, COBie, W3C OWL
- Mechanisms to transfer the data not just the documents.

FROM DOCUMENT TO DATA CENTRIC PROCESSES

- Improve project *efficiency* & *collaboration*
- Create *digitally connected data* as the users work
- Add value and open opportunities to *transform processes* throughout the lifecycle



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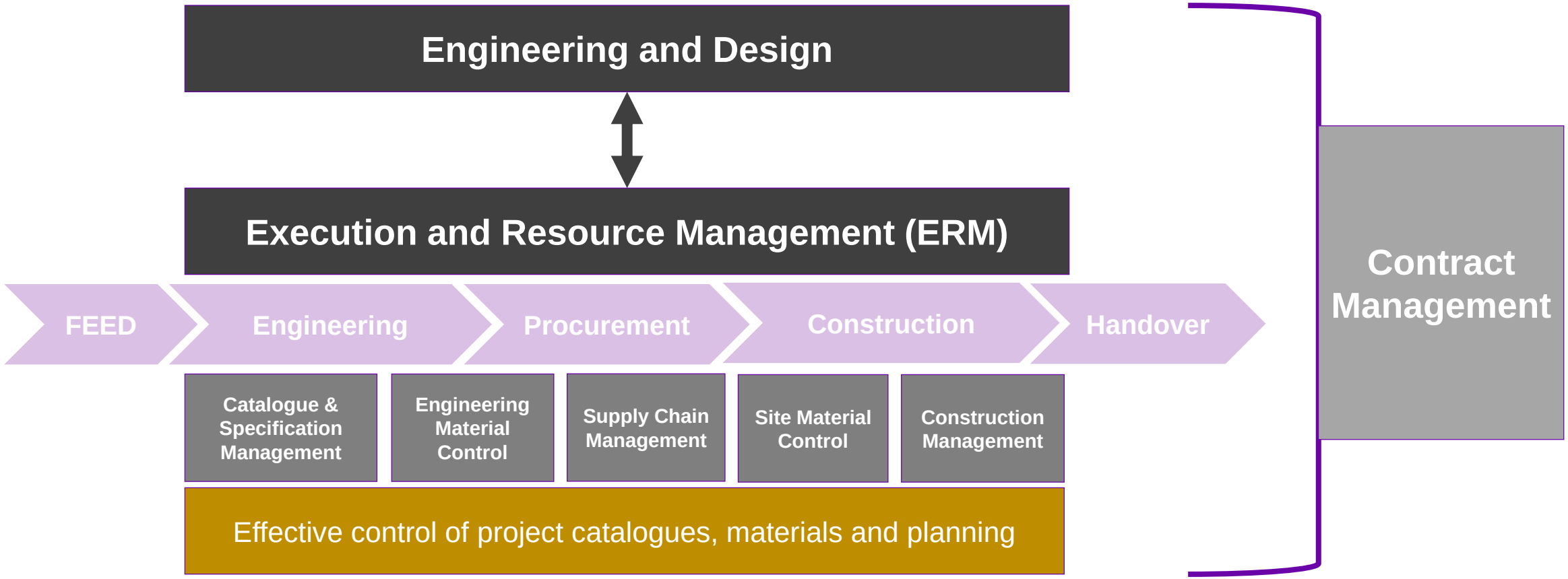
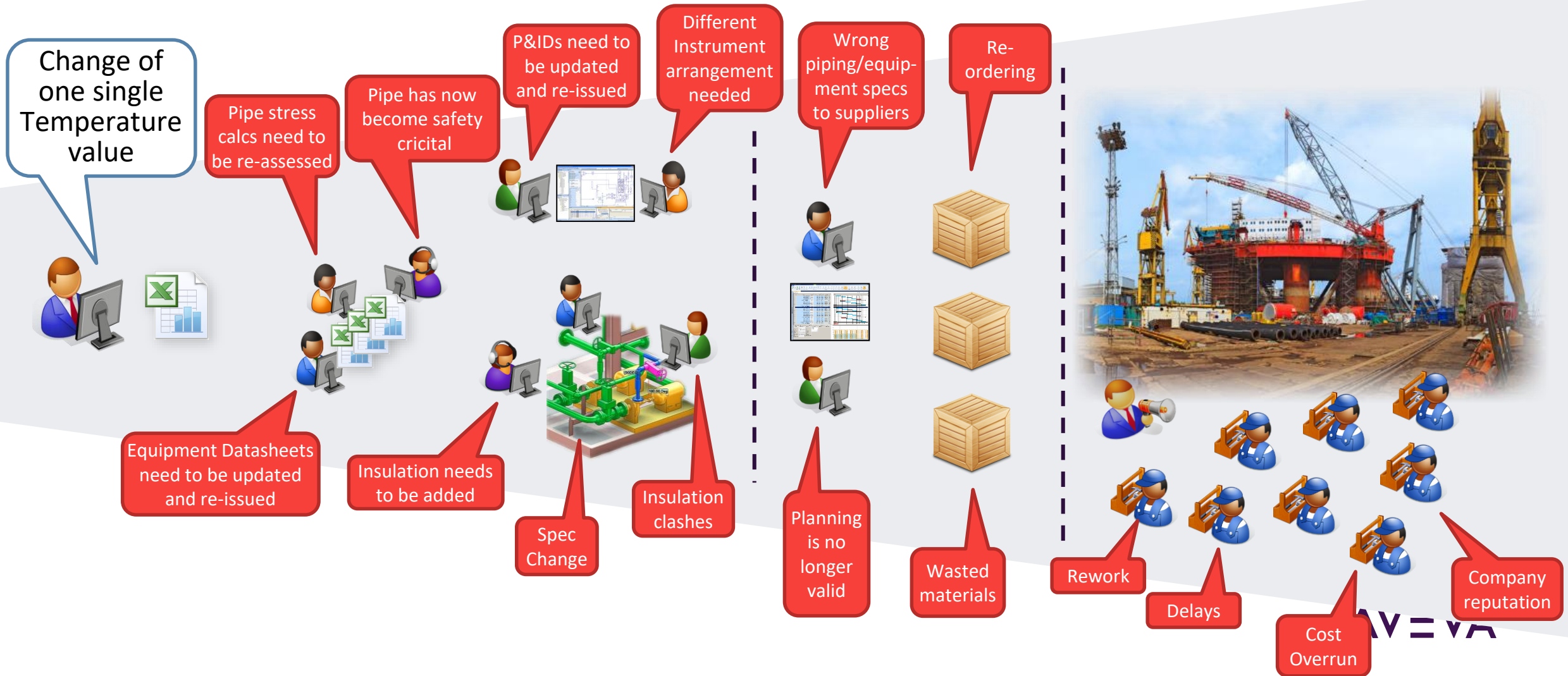
EPC 4.0

This builds a platform to transform the whole project lifecycle.

UNIFIED PROJECT EXECUTION



IMPACT OF CHANGE

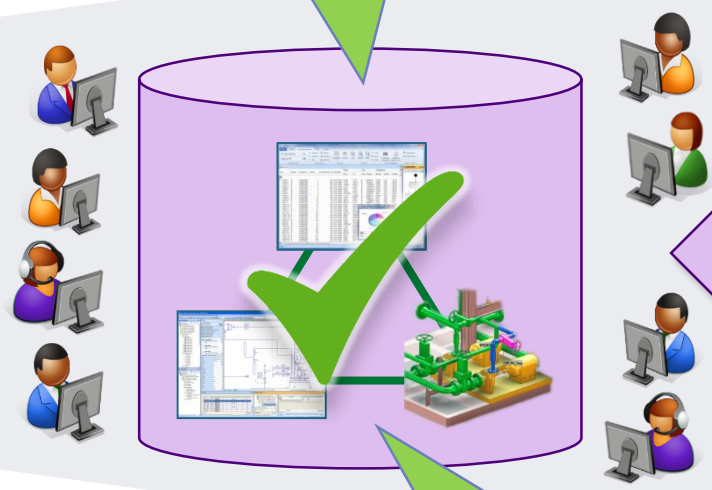


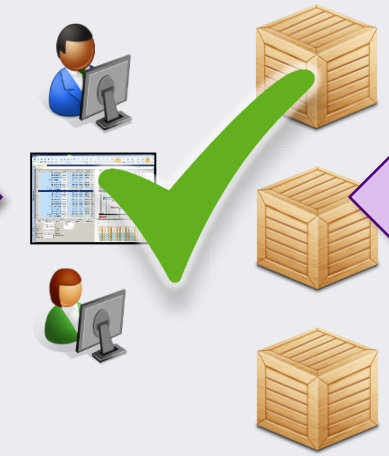
MANAGED CHANGE WITH COLLABORATION

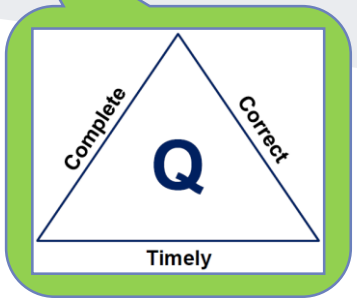
Engineering data is aligned and correct ensuring quality deliverables

Avoiding procurement errors and delays

Avoiding rework in construction







ALLOWS US TO WORK SMARTER

Example – advanced work packaging

AWP – The Digital equivalent of

Designing &
Constructing this

Using this methodology

…not this

AVEVA

AWP Conference
Houston, Texas | October 8-9, 2019

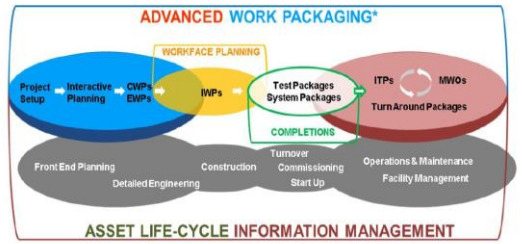
Construction Driven Engineering through the Language of Packages

Presenters:
Stewart White – Kiewit
Amr El Sersy - CCC
Joel Perez - ExxonMobil
Jacek Morawski - Wood

Rev.

Slide #

How can Advanced Work Packaging (AWP) help?



Rev.

Slide #

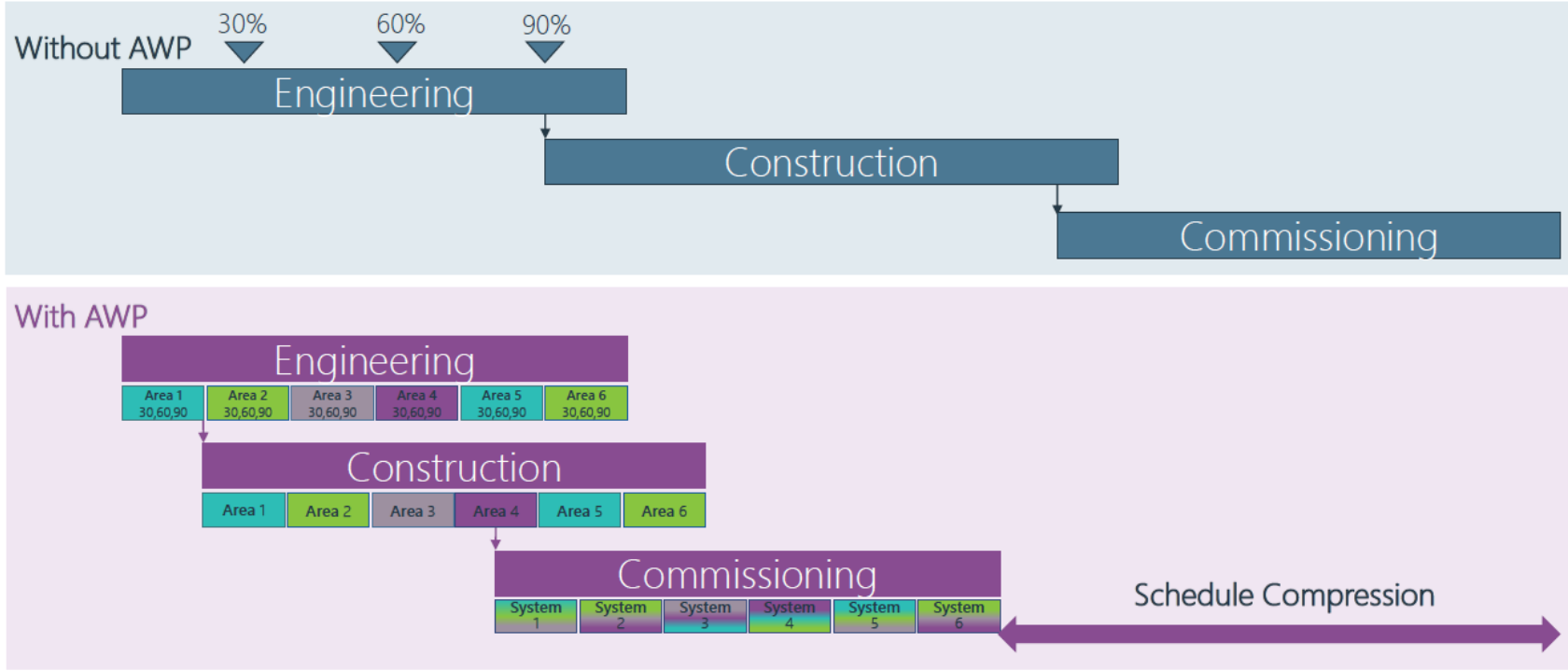
AWP Benefits

Project is De-risked & predictable	Increased probability of success	Progressive delivery
Change management awareness	Seamless transition from planning to execution	Early asset readiness opportunity (data management)
Quantified risk management – Safety & Performance	Improved Decision Making & Higher Morale	Consistent execution language enables AWP digital strategy

Rev. 2019-10-16

Slide # 16

AWP Will Compress your Schedule



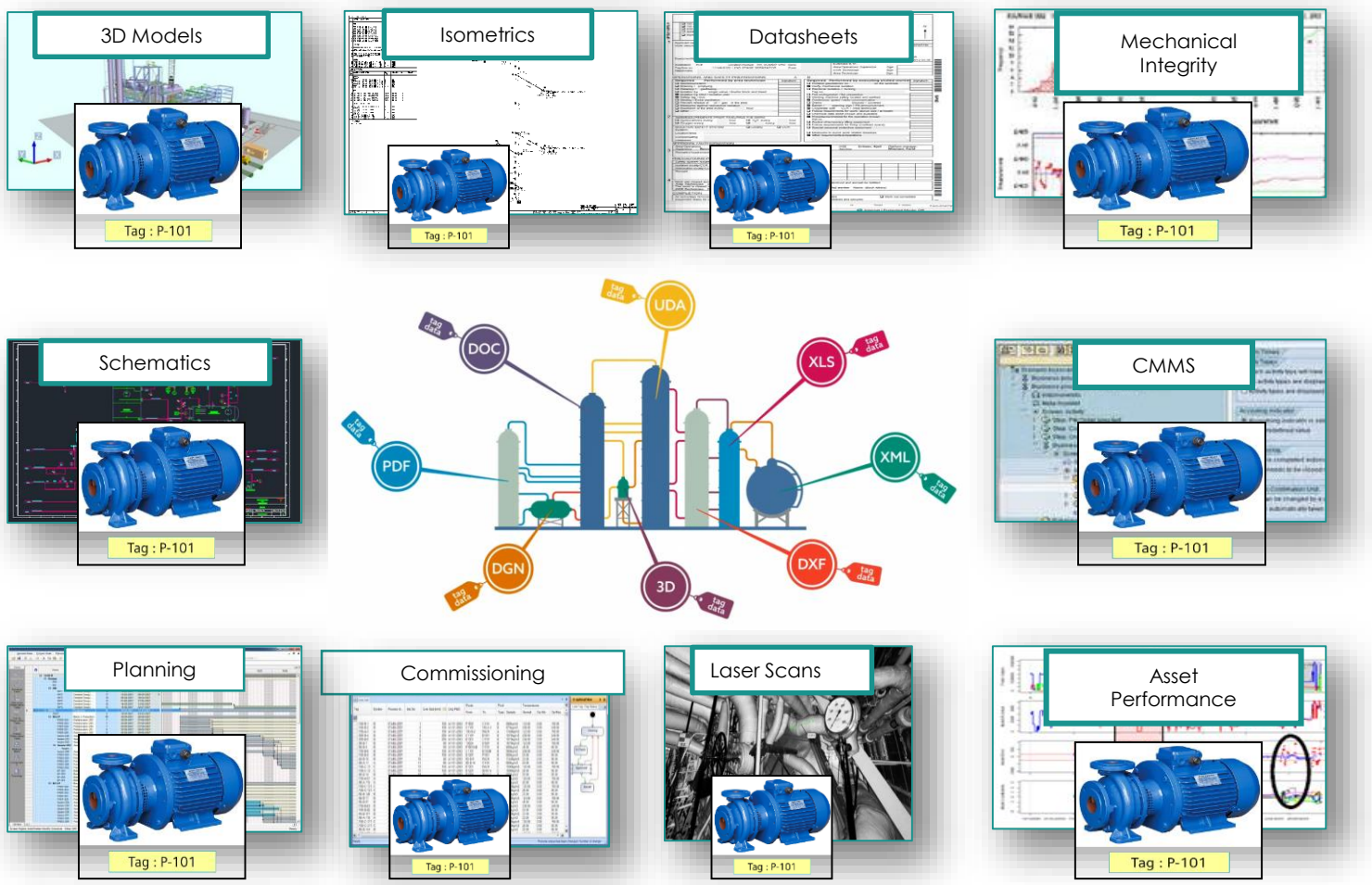
Rev. 2019-10-16

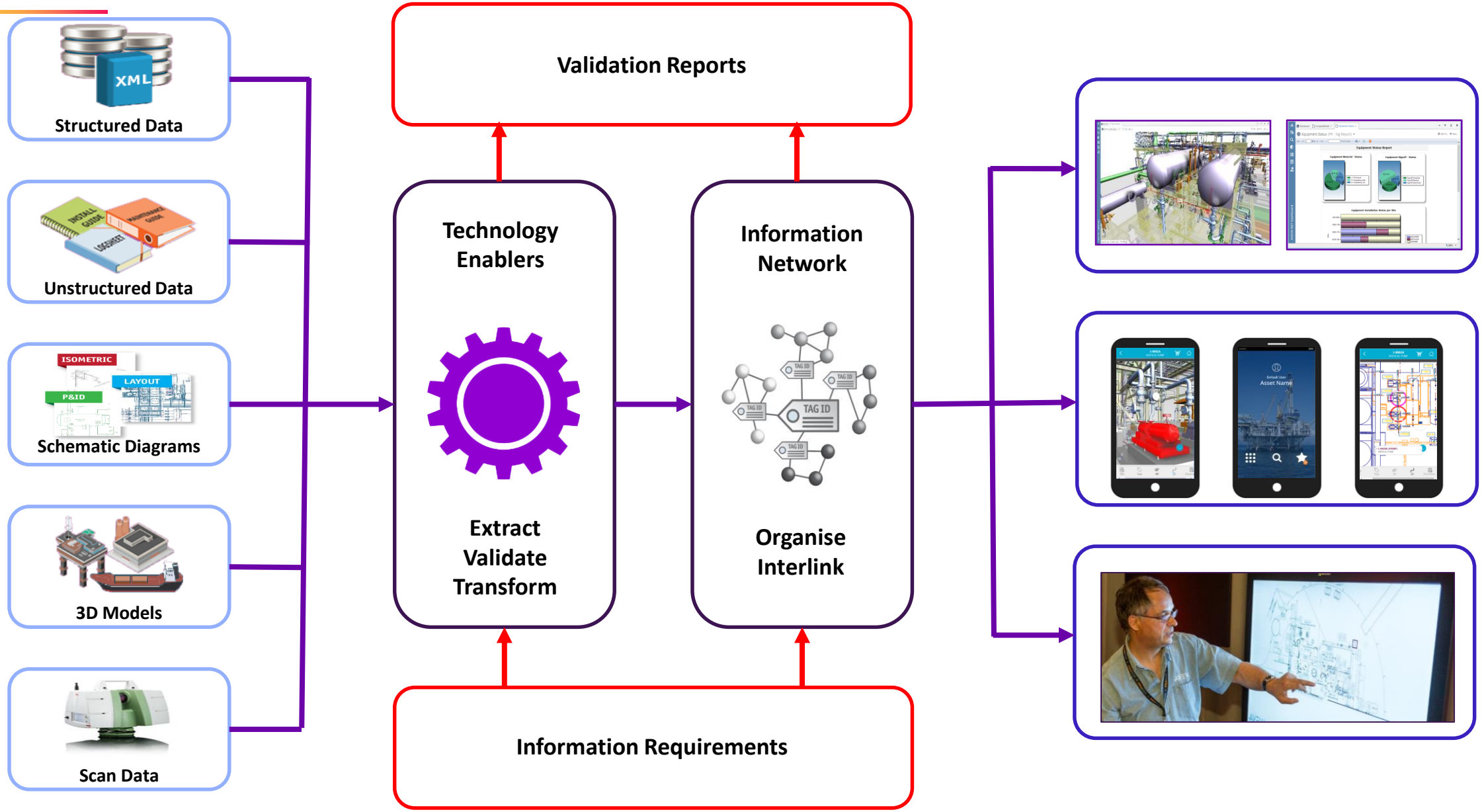
Slide # 15

AVEVA

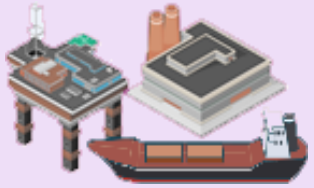
Validate, report and make decisions

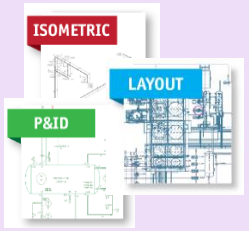
Connect and Integrate information together




Structured Data
XML
Unstructured Data
Schematic Diagrams
ISOMETRIC
LAYOUT
P&ID
3D Models
Scan Data
Validation Reports
Technology Enablers
Extract
Validate
Transform
Information Network
TAG ID
Organise
Interlink
Information Requirements
Asset Name

Information Silos

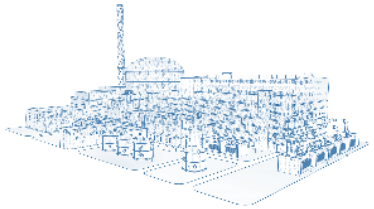




Structured Linked Available Information

Project Information Model

REPORT ON PROGRESS



Class Library Version: 2.0.3

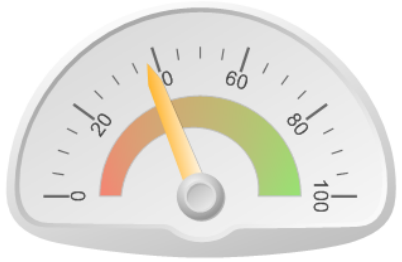
Date: 02/03/2015

Total No. of Tags: 28827

Expected No. of Attributes: 1292182

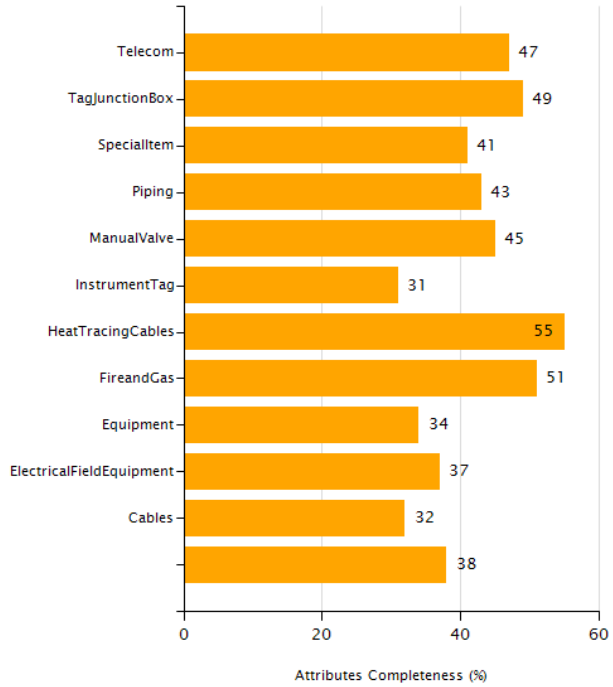
Actual No. of Attributes: 489888

Project Attribute Completeness Dashboard



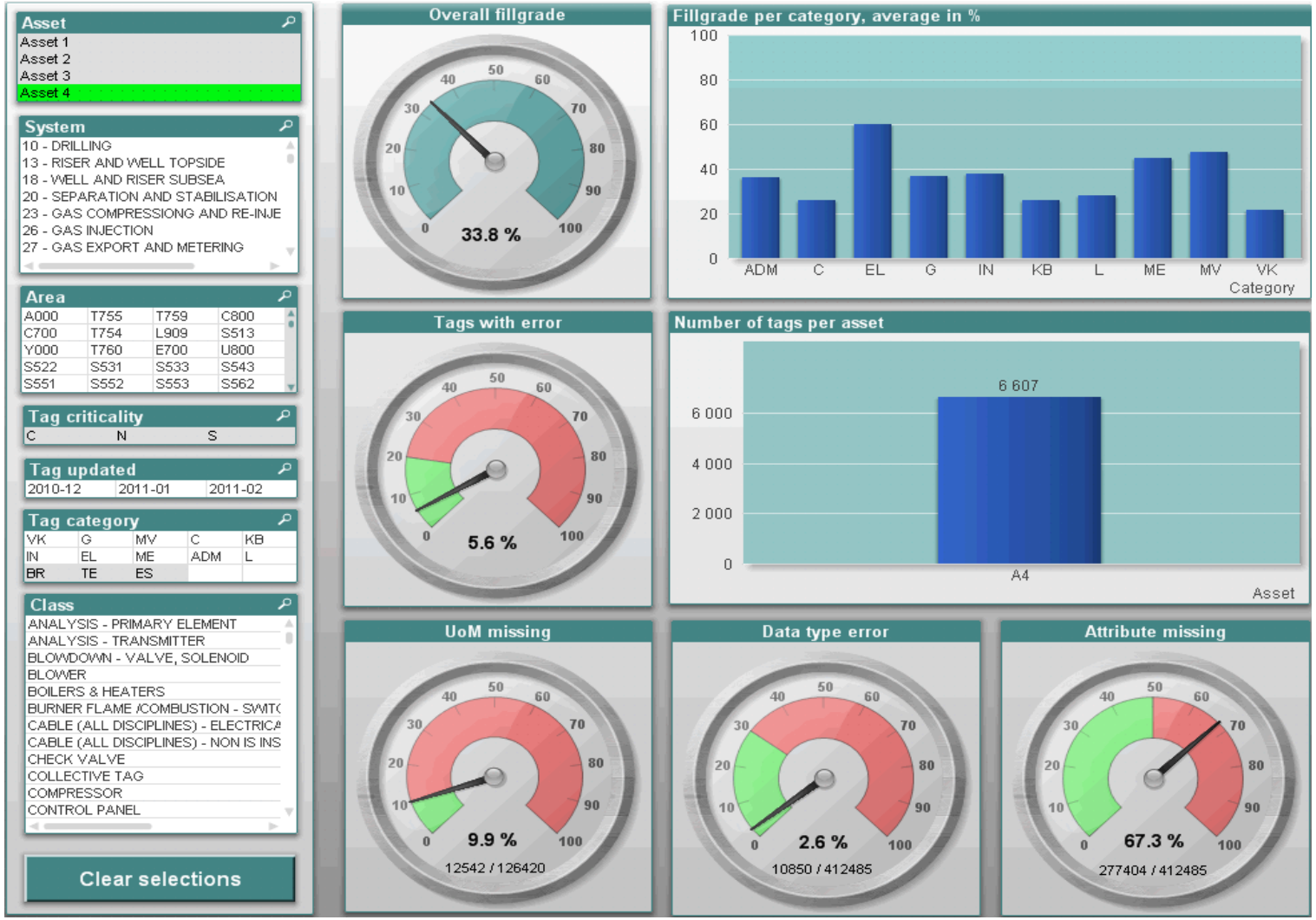
Project Attribute Completeness: 38%

Discipline	No. of Tags	Expected No. of Attributes	Actual No. of Attributes	% Complete
-	2116	76346	28772	38%
Cables	46	1702	544	32%
ElectricalFieldEquipment	3868	207588	77651	37%
Equipment	1449	79719	26797	34%
FireandGas	1592	37465	19107	51%
HeatTracingCables	968	37752	20868	55%
InstrumentTag	10954	511245	160768	31%
ManualValve	2914	104904	47063	45%
Piping	1981	95088	40943	43%
SpecialItem	36	1116	460	41%
TagJunctionBox	1473	78487	38187	49%
Telecom	1430	60770	28728	47%
Total	**28827**	**1292182**	**489888**	**38%**

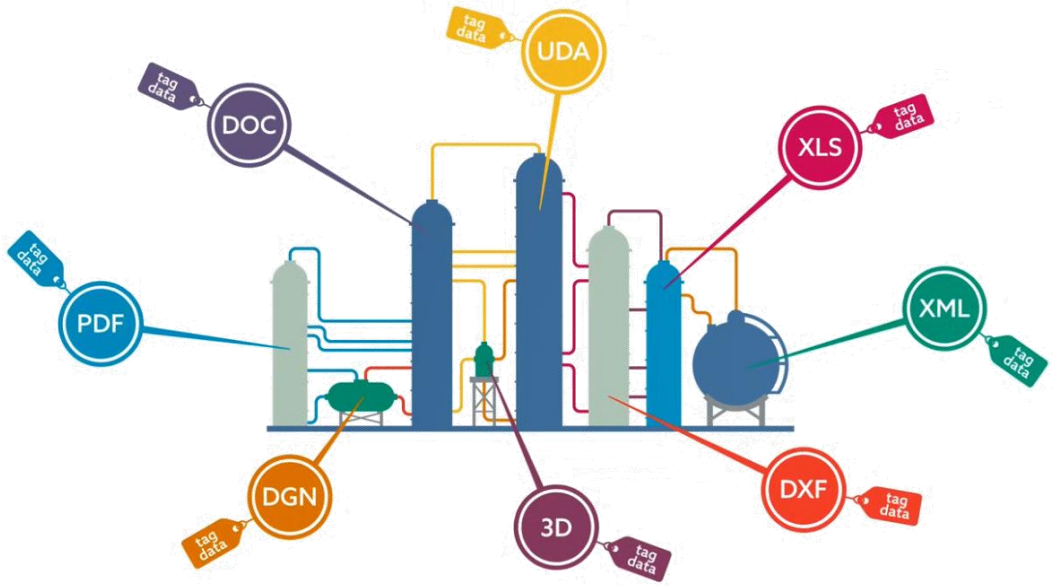


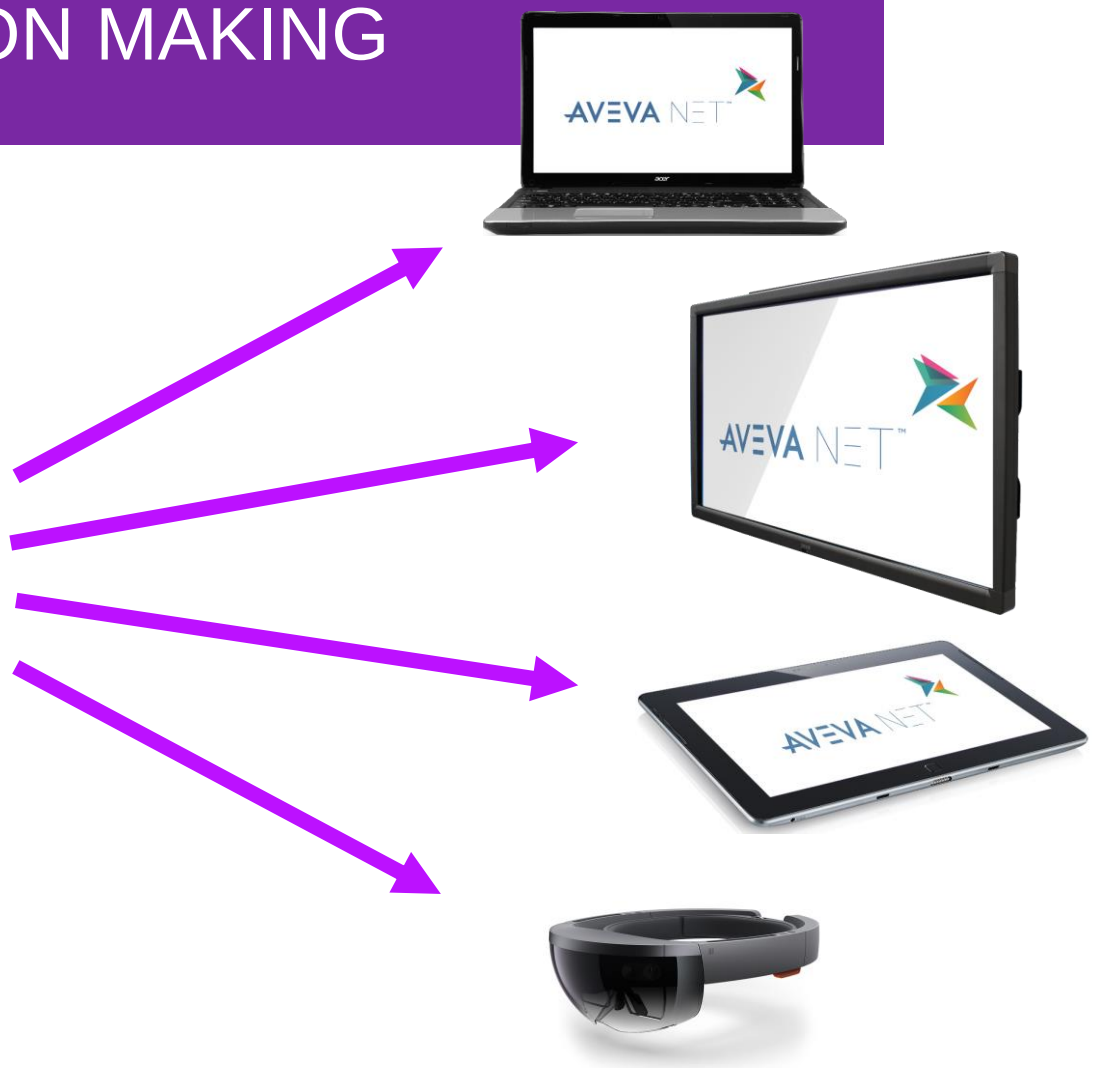
Attribute Completeness by Discipline

REPORT ON QUALITY



READY TO AID DECISION MAKING

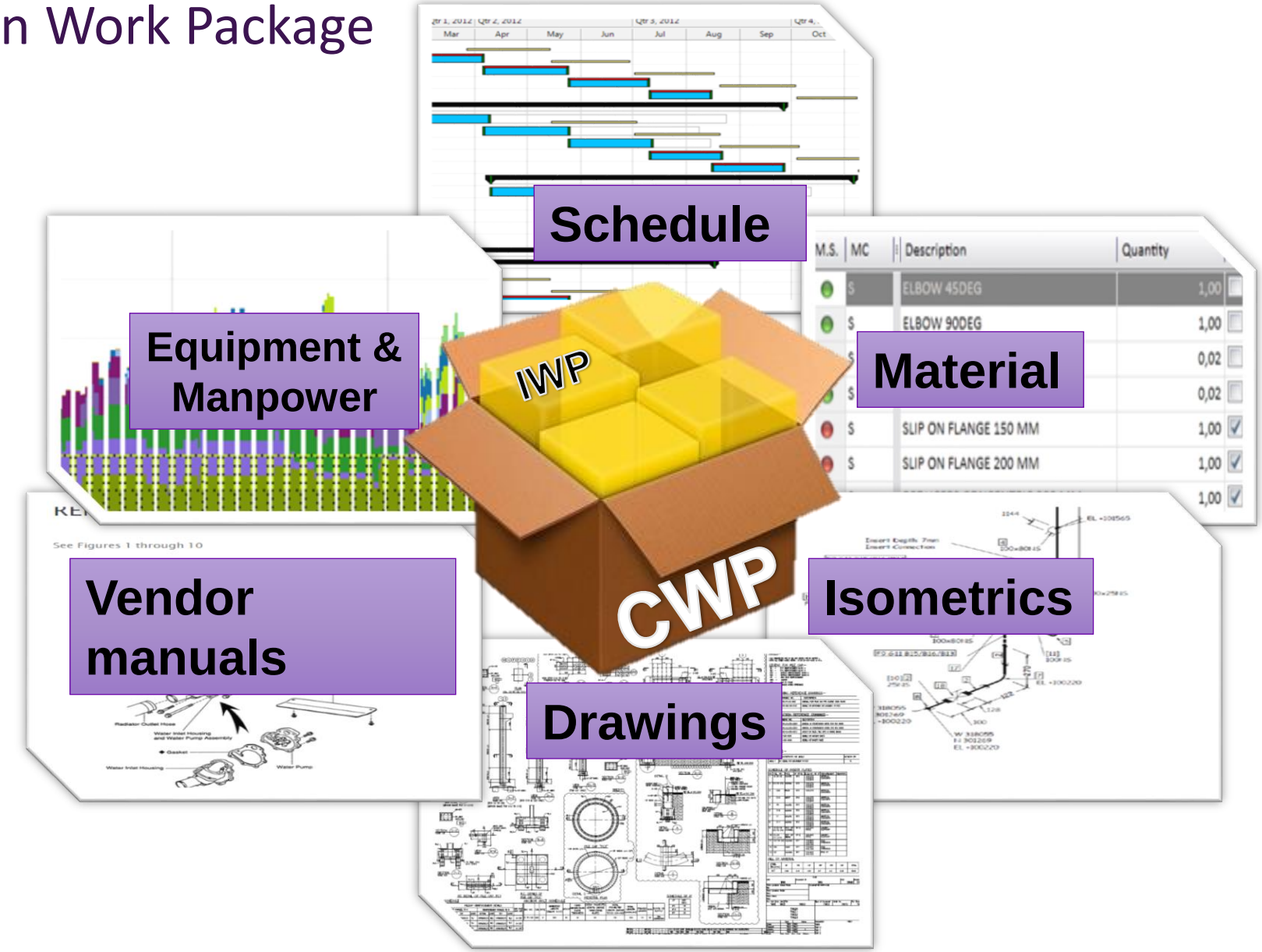




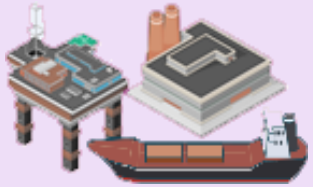
ALLOWS US TO WORK SMARTER

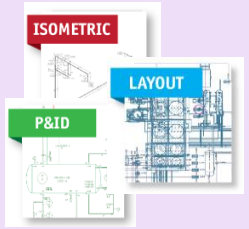
Example – advanced work packaging

Construction Work Package



Information Silos



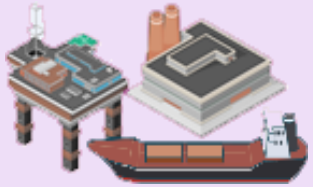


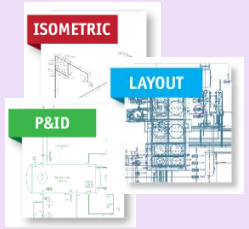
Operational Systems

Asset Information Model

AID HANDOVER AND COMMISSIONING

Information Silos





Operational Systems

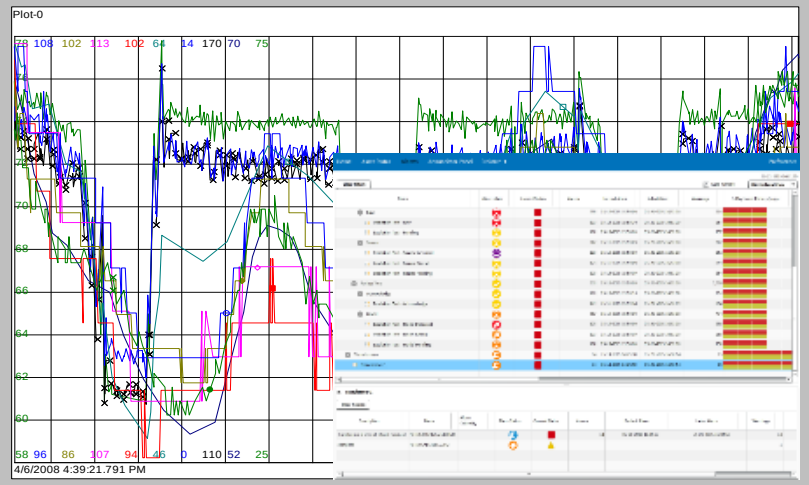
Asset Information Model

DECISION SUPPORT IN OPERATIONS

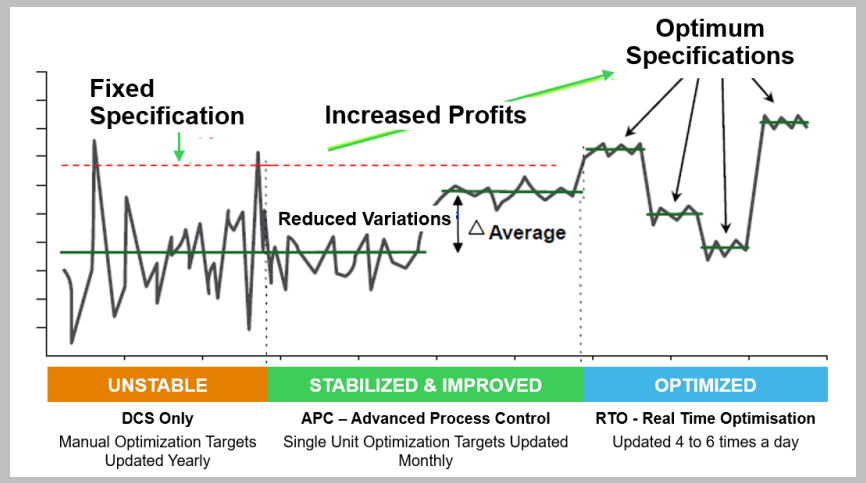

AVEVA ENGAGE
Search Within 3D Model
Visual Query
01 Status
02 Tags by Type
03 Systems
04 Manufacturers and Vendors
05 Discipline
06 Contractors
07 Documents
08 Primavera
09 Operations
Model
Reset View
Section
Measure
Visual Query
X-Ray
Walk
Extensions
Annotate
Snap
Collection
0

Integrate analytics and optimisation

Predictive Asset Analytics



Real Time Optimisation



New Operational Insights

ADNOC's Panorama Command Centre unifies data from its 14 companies


AVEVA Integrated Command and Control Center


AVEVA Integrated Command and Control Center
Energy and Utility Optimisation
KPI Monitoring
Engineering Information
Performance Optimisation
Planning and Scheduling
Monitor and Control
Asset Maintenance and Predictive Analytics

Better Information Management

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ABOUT AVEVA

AVEVA is a global leader in engineering and industrial software driving digital transformation across the entire asset and operational life cycle of capital-intensive industries.

The company's engineering, planning and operations, asset performance, and monitoring and control solutions deliver proven results to over 16,000 customers across the globe. Its customers are supported by the largest industrial software ecosystem, including 4,200 partners and 5,700 certified developers. AVEVA is headquartered in Cambridge, UK, with over 4,400 employees at 80 locations in over 40 countries.

aveva.com

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