



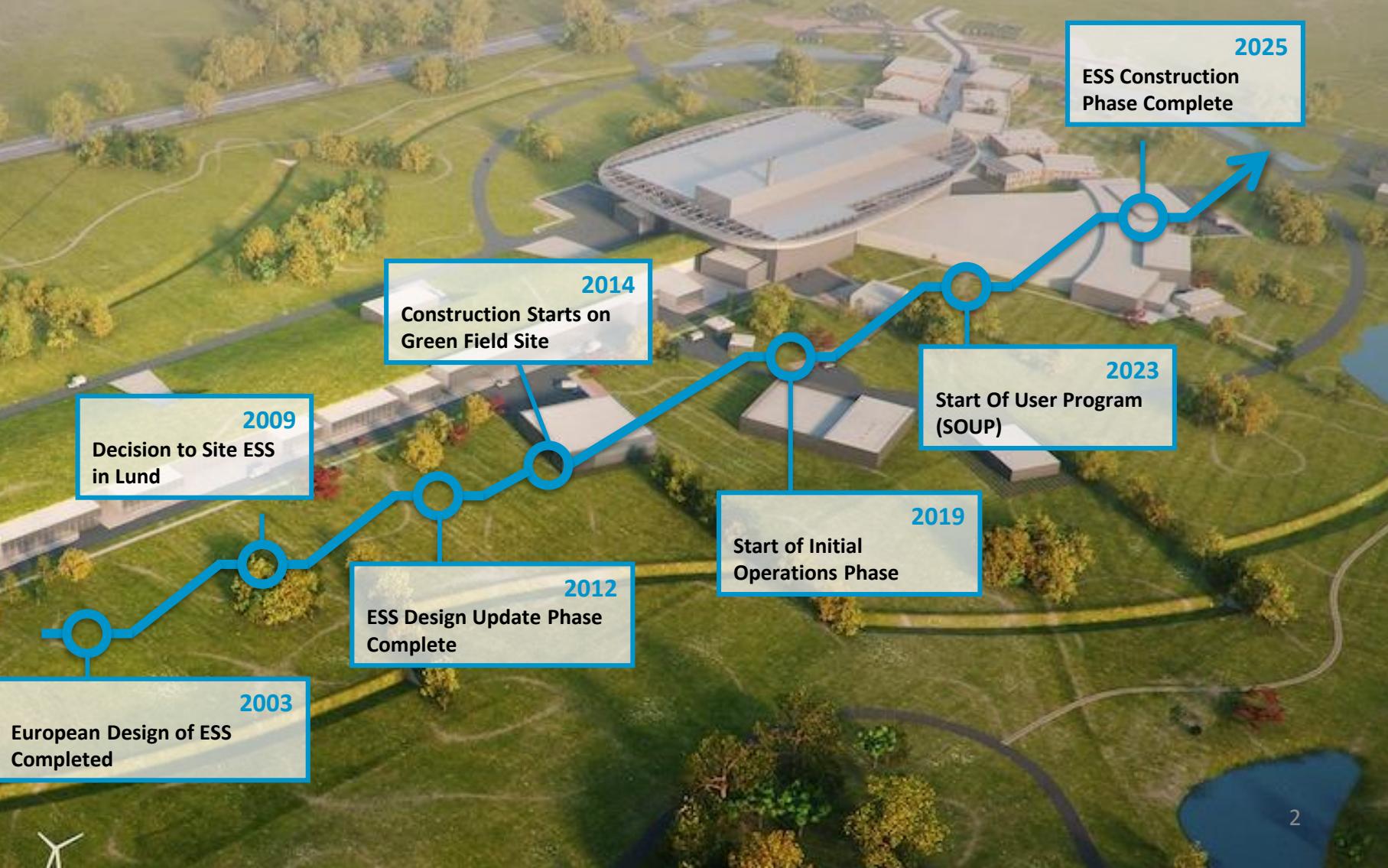
EUROPEAN
SPALLATION
SOURCE

European Spallation Source (ESS) – från Projektmodeller till Plant/Product Lifecycle Management

Peter Rådahl

HoD Engineering and Integration Support Division
PIM Manager

Journey to deliver the world's leading facility for research using neutrons



The European Spallation Source (ESS)

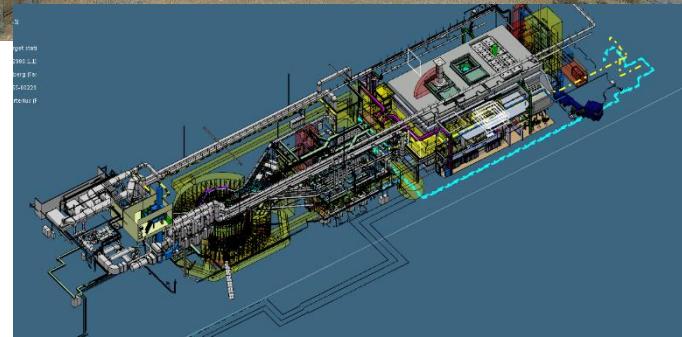
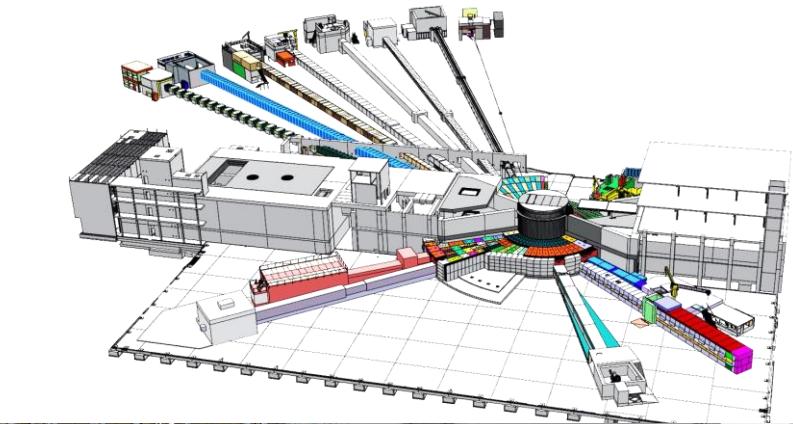
ESS is a neutron spallation source that is being built by a collaboration of 15 European countries.



Olika aspekter av ESS BIM/Plant/Product lifecycle management



- Utmaningar
 - Internationell kollaboration med anpassad projekt och finansieringsmodell
 - Greenfield dvs. tidig avsaknad av processer, organisation och mjukvara
 - Hantering av byggnader, plant-system och extrem produktdesign samtidigt och i en integrerad anläggning
 - Livscykler som spänner över hela spannet, från konceptuell design till drift/underhåll samtidigt
 - Multidisciplin organisation med olika erfarenheter av objekts-livscykelhantering
 - Förståelse mellan
 - Plant “Produkt” och Produktdesign
 - MEP vs Plant systems



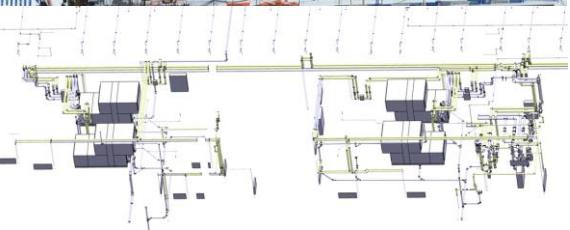
Olika aspekter av ESS BIM/Plant/Product lifecycle management



- ESS baserar anläggningsdokumentationen/datan och dess livscykelhantering på **en** PLM-plattform för alla discipliner och livscykelaspekter
 - Out of the box för Product Lifecycle management
 - Anpassningar för
 - Building lifecycle managemet
 - Plant lifecycle managemet
 - Gemensamt regelverk för referensdata (ISO 15926)

En integrerad anläggning

BUILDING



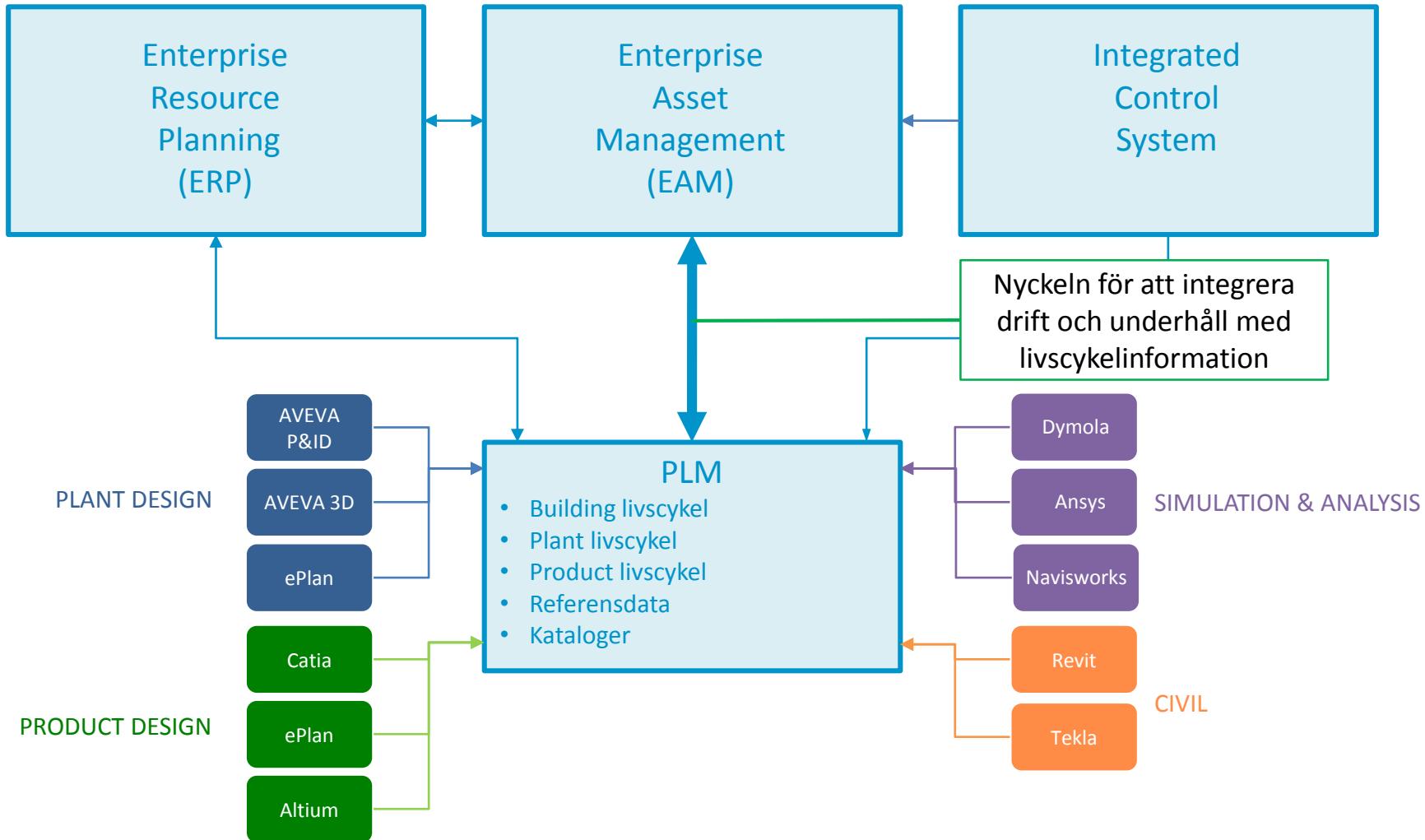
PLANT



PRODUCT



Systemkarta



Systemkarta

Core tools

CHESS Enovia-Dassault Systems	PLM platform <ul style="list-style-type: none"> • Building Lifecycle Management • Plant Lifecycle Management • Product Lifecycle management
Infor EAM	EAM Platform <ul style="list-style-type: none"> • Asset Management • Work-orders • Maintenance • Warehouse management
Catia V6 (Integrated with CHESS)	Mechanical design Spatial Integration
Dymola	Flow and systems simulation for different types of media and purposes
Ansys	Analysis tool for strength, stress simulations and fluids
ePLAN	Electrical design tool use for electrical circuits and systems design, electrical drawings and installations.
Aveva E3D Electrical	Cable routing, Cable dimensioning, Cable database and Cable raceways
Aveva E3D Mechanical	Piping and instrumentation diagrams (P&ID), Isometric drawings and 2D/3D piping
Altium	Electronic design
Revit	A/K Design, MEP design



infor EAM

Livscykler-ESS

INSTALLED

			State
1.	<input type="checkbox"/> ESS-0096382	Skid 345	1
2.	<input checked="" type="checkbox"/> ESS-0096383	Valve	1
3.	<input checked="" type="checkbox"/> ESS-0096384	Valve	1
4.	<input checked="" type="checkbox"/> ESS-0096385	Valve	1
5.	<input checked="" type="checkbox"/> ESS-0096386	Valve	1
6.	<input checked="" type="checkbox"/> ESS-0096387	Valve	1
7.	<input checked="" type="checkbox"/> ESS-0096388	Pump	1
8.	<input checked="" type="checkbox"/> ESS-0096389	Pump	1
9.	<input checked="" type="checkbox"/> ESS-0096390	Pump	1
10.	<input checked="" type="checkbox"/> ESS-0096391	Heat Exchanger	1
11.	<input checked="" type="checkbox"/> ESS-0096392	Heat Exchanger	1

Install & Commission

CATALOGUE

ATTRIBUTES

		Active ISO 15926 Classifications
1.	<input type="checkbox"/>	Classification
2.	<input type="checkbox"/>	Classification
3.	<input type="checkbox"/>	Classification
4.	<input type="checkbox"/>	Classification
5.	<input type="checkbox"/>	Classification
6.	<input type="checkbox"/>	Classification
7.	<input type="checkbox"/>	Classification
8.	<input type="checkbox"/>	Classification
9.	<input type="checkbox"/>	Classification
10.	<input type="checkbox"/>	Classification

Supply BOM



Supply & Logistics

Density	234	G_CM3
Design Pressure	250	bar (a)
Differential Head	46	bar (a)
Efficiency		NONE
Fluid		
Water		
Fluid Temperature (ess)	10	C
Head		Pa
Lower Limit Allowable Rotational Speed	60	Hz
Material	Steel	

Element

FBS

14.	<input type="checkbox"/>	G01	=E	Vacuum system	Vacuum System
15.	<input type="checkbox"/>	G01	=E	PLC System	Control System
16.	<input type="checkbox"/>	G01	=E	LEBT - Vacuum	Vacuum System
17.	<input type="checkbox"/>	G02	=ESS.ACC.G01.G02	RFQ - Vacuum	Vacuum System
18.	<input type="checkbox"/>	G03	=ESS.ACC.G01.G03	MEBT - Vacuum	Vacuum System
19.	<input type="checkbox"/>	G04	=ESS.ACC.G01.G04	DTL - Vacuum	Vacuum System
20.	<input type="checkbox"/>	G05	=ESS.ACC.G01.G05	SPK - Vacuum	Vacuum System
21.	<input type="checkbox"/>	G01	=ESS.ACC.G01.G05.G01	Vacuum System SPK-010, SPK-020	Vacuum System
22.	<input type="checkbox"/>	G02	=ESS.ACC.G01.G05.G02	Vacuum System SPK-030, SPK-040	Vacuum System
23.	<input type="checkbox"/>	KF01	=ESS.ACC.G01.G05.G02.KF01	Temperature Transmitter	Control System
24.	<input type="checkbox"/>	K01	=ESS.ACC.G01.G05.G02.K01	Gauge System	Gauge
25.	<input type="checkbox"/>	BP01	=ESS.ACC.G01.G05.G02.BP01	Pump System	Vacuum Pump
26.	<input type="checkbox"/>	GQ01	=ESS.ACC.G01.G05.G02.GQ01	Vacuum Non-Evaporable Getter Pump	Vacuum Non-Evaporable Getter Pump
27.	<input type="checkbox"/>	GQ05	=ESS.ACC.G01.G05.G02.GQ01.GQ05	Vacuum Non-Evaporable Getter Pump	Vacuum Non-Evaporable Getter Pump
28.	<input type="checkbox"/>	GQ06	=ESS.ACC.G01.G05.G02.GQ01.GQ06	Vacuum Pump	Vacuum Pump
29.	<input type="checkbox"/>	GQ01	=ESS.ACC.G01.G05.G02.GQ01.GQ01	Vacuum Pump	Vacuum Pump
30.	<input type="checkbox"/>	GQ02	=ESS.ACC.G01.G05.G02.GQ01.GQ02	Vacuum Pump	Vacuum Pump

LBS

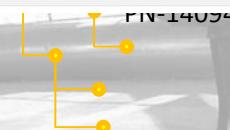
	Tag	Description	Type
1.	<input type="checkbox"/>	G02	Gallery Building
2.	<input type="checkbox"/>	G00	Building
3.	<input type="checkbox"/>	100	Level
4.	<input type="checkbox"/>	100	Room
5.	<input type="checkbox"/>	100	Cell
6.	<input type="checkbox"/>	101	Workshop
7.	<input type="checkbox"/>	102	Cell
8.	<input type="checkbox"/>	1002	TS2 Area
9.	<input type="checkbox"/>	1004	Room
10.	<input type="checkbox"/>	1005	Room
11.	<input type="checkbox"/>	1011	Room

- ESS.ACC.A06 Test Stand 2
- ESS.A06.W01 MBL or HBL CryoModule
- ESS.A06.F01 Concrete Blocks
- ESS.A06.T01 RF System 1
- ESS.A06.T01 Modulator
- ESS.A06.E02 RF System 2
- ESS.A06.E03 Test Stand 2 Water Cooling

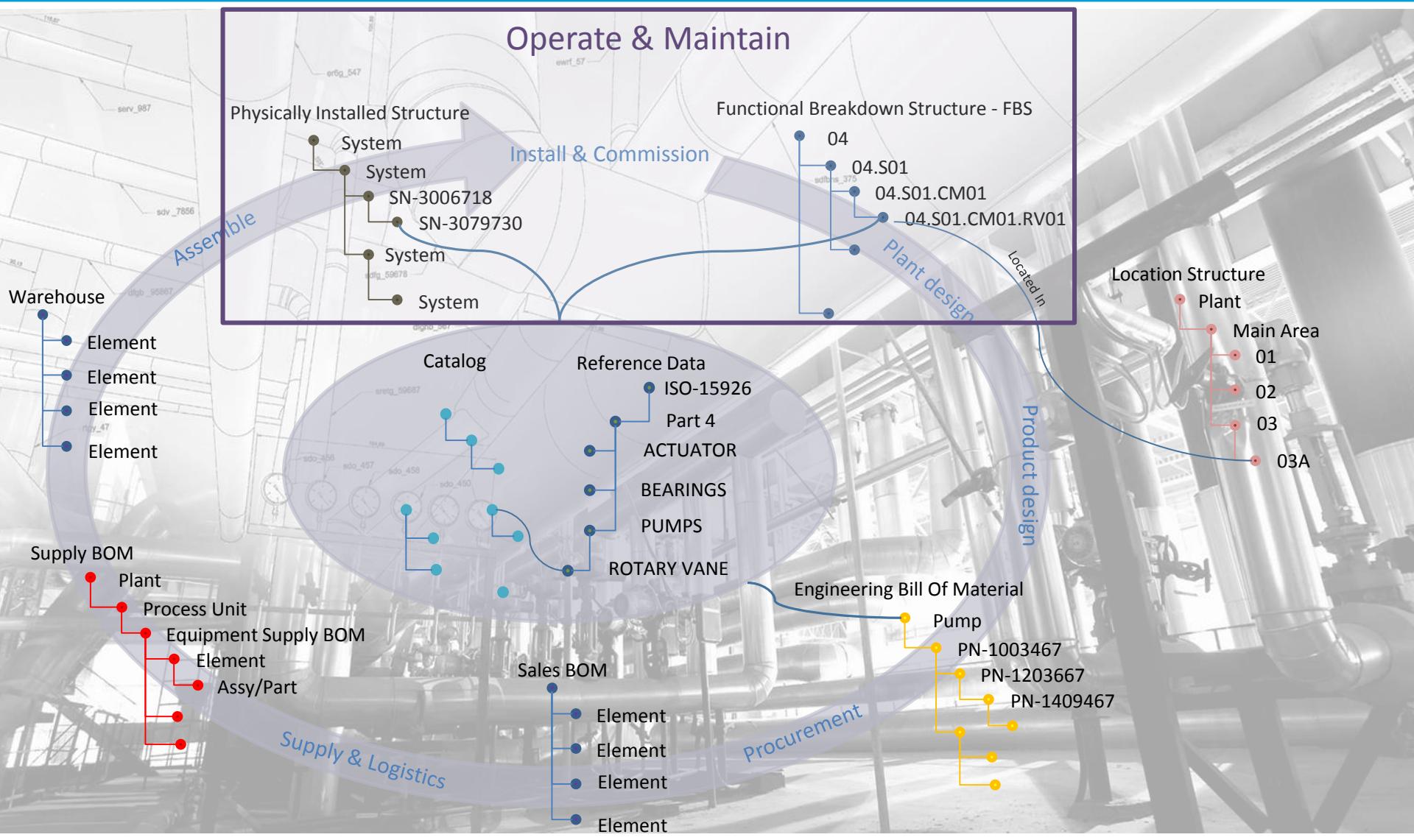
EBOM

	F/N	Type	Name	Rev	Description	Qty	UoM	State
1.	<input type="checkbox"/>	Part	ESS-0107252	1	MBL 010 CRM MedBetaCryomo... (more)	EA	In Work	
2.	<input type="checkbox"/>	Part	ESS-0107253	1		EA	In Work	

Procurement



Livscykler-ESS



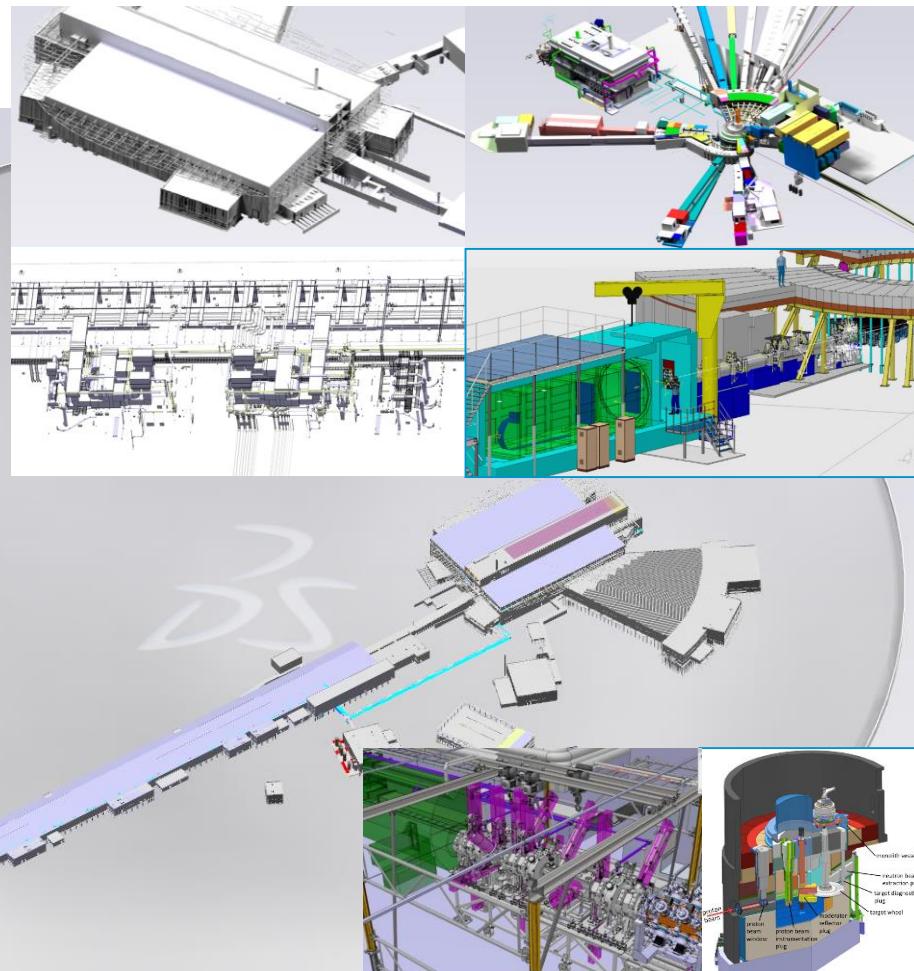
ESS Plant Layout-länken till information

- All information är kopplad och tillgänglig genom vår master 3D modell (EPL)

Buildings

 ESS Plant Layout TCS -ESS Plant Layout TCS -Preliminary -ESS-0016885 -1.0 -eleftherioszografos
-- -ESS-0016885.1 -- -Rev -1.0 -- -Preliminary -- -eleftherioszografos
 ESS Building Layout -ESS Building Layout -Frozen -ESS-0016886 -1.1 -eleftherioszografos (ESS-0016886.1)
 ESS Machine Layout -ESS Machine Layout -Preliminary -ESS-0016887 -1.0 -eleftherioszografos (ESS-0016887.1)
-- -ESS-0016887.1 -- -Rev -1.0 -- -Preliminary -- -eleftherioszografos
 ESS Target Layout -ESS Target Layout -Preliminary -ESS-0017896 -1.0 -mikaelanderson (ESS-0017896.1)
-- -ESS-0017896.1 -- -Rev -1.0 -- -Preliminary -- -mikaelanderson
 Target station Layout -Target Station Layout -Preliminary -ESS-0022980 -4.0 -rickardholmberg (Target station la
-- -ESS-0022980.1 -- -Rev -1.3 -- -Preliminary -- -rickardholmberg (ESS-0022980.1.1)
 TOP Monolith Assembly -TOP Monolith Assembly -Preliminary -ESS-0017679 -1.0 -rickardholmberg (Target
 Electrical and Piping -Electrical and Piping -Frozen -ESS-0022983 -1.20 -aitorbeitatellebea (ESS-0022983.1)
 Remote Handling Systems -Remote Handling Systems [12.6] -Frozen -ESS-0115640 -1.3 -pauerterius (Remo
 ESS Instrument Layout -ESS Instrument Layout -Preliminary -ESS-0017897 -1.0 -eleftherioszografos (ESS-0017897.1)
-- -ESS-0017897.1 -- -Rev -1.0 -- -Preliminary -- -eleftherioszografos
 Bunker Top Assm -BUNKER TOP ASSY. -Frozen -ESS-0047079 -1.5 -dawidpatrzalek (Instrument Layout.1)
 West Sector -West Sector -Preliminary -ESS-0055391 -1.0 -eleftherioszografos (ESS-0055391.1)
 North Sector -North Sector -Preliminary -ESS-0055392 -1.0 -eleftherioszografos (ESS-0055392.1)
 East Sector -East Sector -Preliminary -ESS-0055393 -1.0 -eleftherioszografos (ESS-0055393.1)
 South Sector -South Sector -Preliminary -ESS-0055394 -1.0 -eleftherioszografos (ESS-0055394.1)
 ESS Infrastructure Layout -ESS Infrastructure Layout -Preliminary -ESS-0017898 -1.0 -mikaelanderson (ESS-0017898.1)
 ESS Beam Instrumentation -ESS Beam Instrumentation -Preliminary -ESS-0017900 -1.0 -mikaelanderson (ESS-0017900.1)
 -ESS Accelerator -Frozen -ESS-0017965 -1.0 -daniellundgren (ESS-0017965.1)
-- -ESS-0017965.1 -- -Rev -1.0 -- -Frozen -- -daniellundgren
 ESS Level 100 RF Source Layout Front End Building FEB Contingency Test Stand -ESS Klystron Gallery Layout -Fr
G01_LvL090 -ESS Accelerator Tunnel Layout -Frozen -ESS-0017895 -1.4 -carljohanhardh (ESS-0017895.1)
-ESS Accelerator Cryogenics Layout -Frozen -ESS-0024864 -1.8 -carljohanhardh (ESS-0024864.1)
WP12_WP13_WP15_WP16_PSS_TSS_ALIGN_STRU -ESS Accelerator Infrastructure -Frozen -ESS-0017964 -1.2 -ca
-ESS Accelerator Installation -Frozen -ESS-0135306 -1.1 -carljohanhardh (ESS-0135306.1)
-ACCSYS Areas, Sections, Envelopes -Frozen -ESS-0025183 -1.8 -daniellundgren (ESS-0025183.1)

Plant &
Machine



Erfarenheter och råd

- Implementera **ett gemensamt teknisk ramverk** för alla aktörer och discipliner
 - Processer
 - Informations- och livscykelhantering
 - Organisation
- Sätt **tidiga och tydliga krav** på
 - Livscykler och benämningar
 - Hur information ska konsolideras, struktureras och utbytas
 - Tag/Namngivning
 - Format på design data
 - Konfiguration/Ändringshantering
 - Referensdata