



HEXAGON

Improving Plant Information Management: CFIHOS and Beyond

Adrian Park, VP Pre-Sales EMIA Region

Keith Denton, Executive Director Portfolio Strategy

Hexagon at a Glance

Our focus is **autonomy**

Leveraging data to its fullest potential— **moving beyond automation to autonomy**

Our commitment is **innovation**

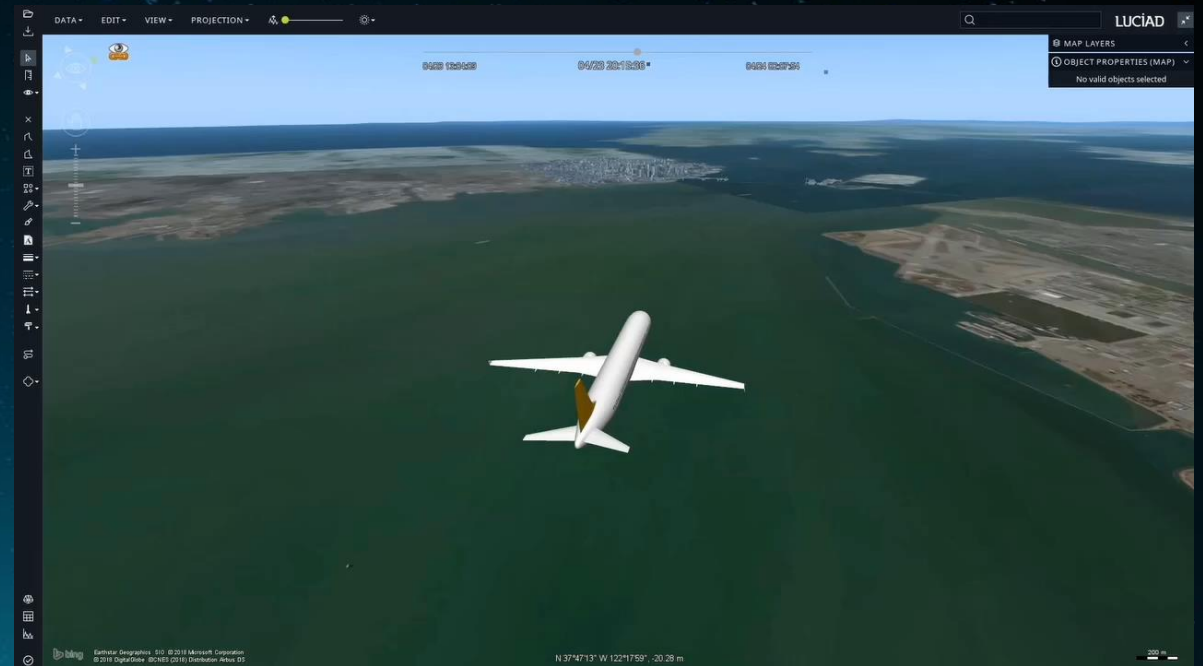
With **nearly 4,000 employees in R&D** and **more than 3,700 active patents**

Our value is **strategically vital**

Efficiency, productivity and quality results in **scalable sustainability**

Our stability is **consistently proven**

Sales growth from €500 million in 2000 to **€3.8 billion** in 2020 with **approximately 21,000 employees** across **50 countries**



The digital reality feedback loop

Hexagon's core technology competencies enable a digital reality feedback loop – creating freedom of insight so you can be proactive, preventative and event-predictive

Reality Capture

Digital capture of the physical world



Positioning

Location, tracking, navigation and/or control of anything, anywhere

Autonomous Technologies

Automation of any task, workflow, machine or decision – enabling action without human intervention

Digital Twin

Design & Simulation

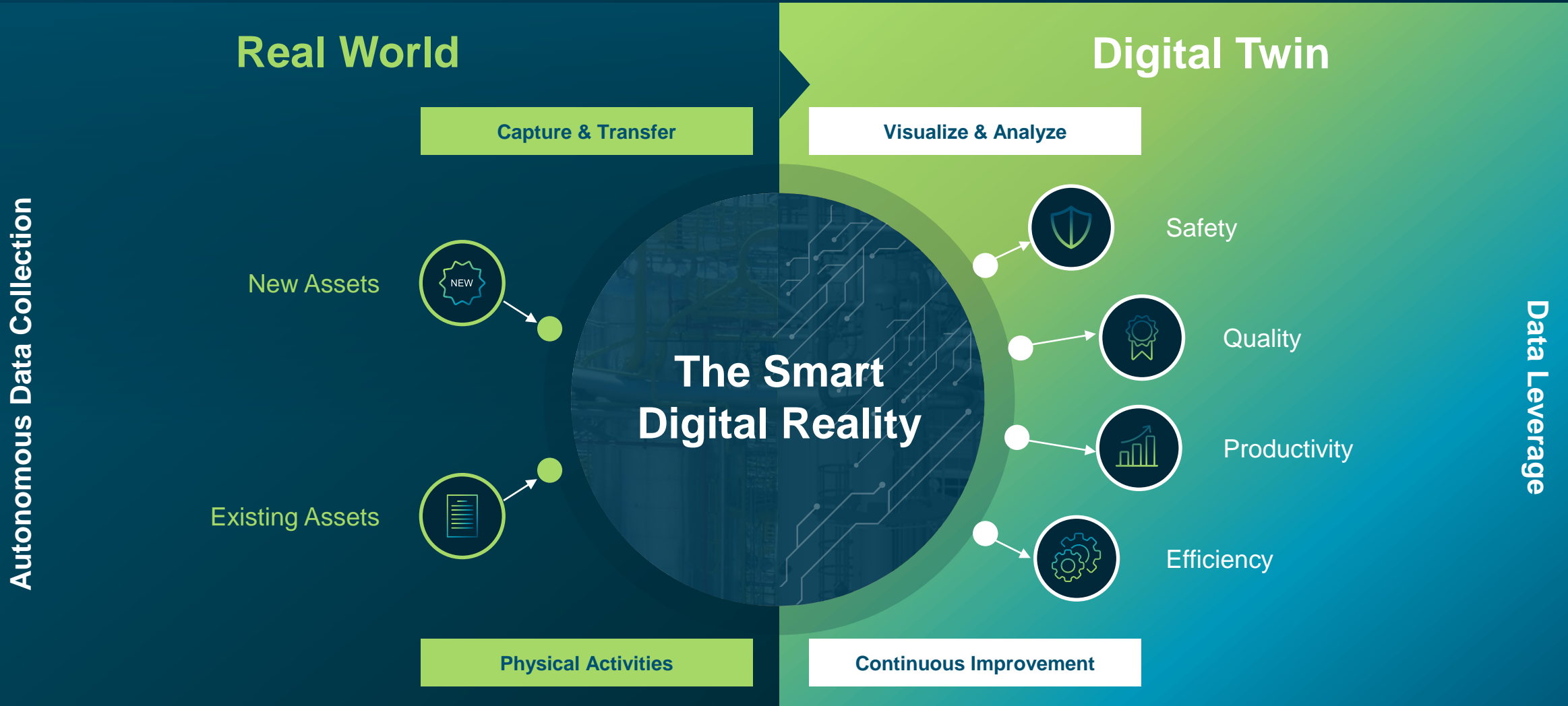
Design and replication of real-world scenarios



Location Intelligence

Active, geo-referenced intelligence of real-world situations

Industrial Facilities – Realizing Value from Your Data



Hexagon PPM – 40+ years of standards support

From CAD formats to Structured Data



- 1980s – 1990s
 - Advent of CAD; US Air Force required IGES
 - Advent of AutoCAD; Autodesk creates DXF
 - Advent of Intergraph Jupiter technology – Microsoft OLE4D&M



Hexagon PPM – 40+ years of standards support

From CAD formats to Structured Data

The great thing about standards:

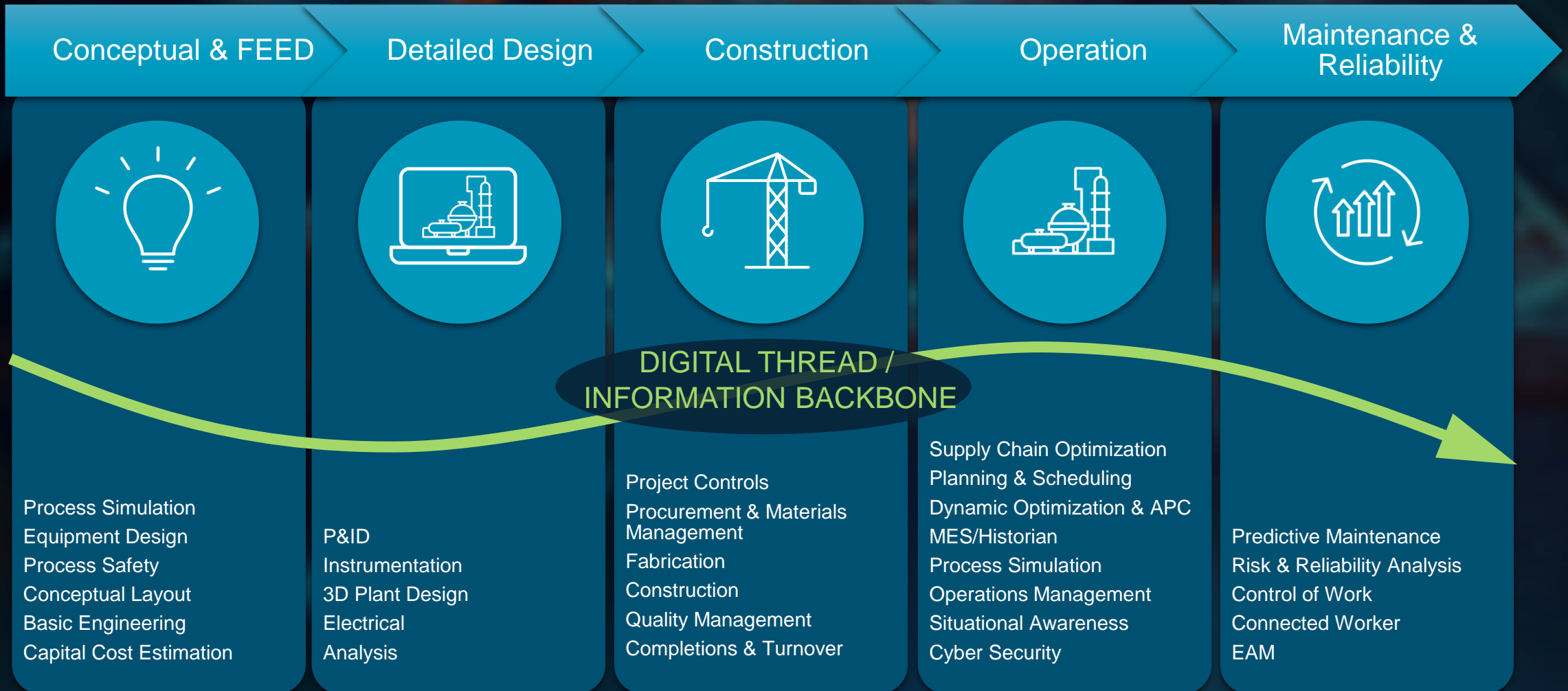
There are so many of them

There are always new ones to compete with the old ones

- 1980s – 1990s
 - Advent of CAD; US Air Force required IGES
 - Advent of AutoCAD; Autodesk creates DXF
 - Advent of Intergraph Jupiter technology – Microsoft OLE4D&M
- 1990s – 2000s
 - POSC Caesar
 - PlantSTEP / ISO10303
 - Application Protocols 221, 227, 232
 - CIMSteel & CIS/2
- 2000s - Today
 - ISO 15926
 - IFC
 - Industry-specific – KKS, RDS-PP, PIP, DEXPI. etc
 - CFIHOS

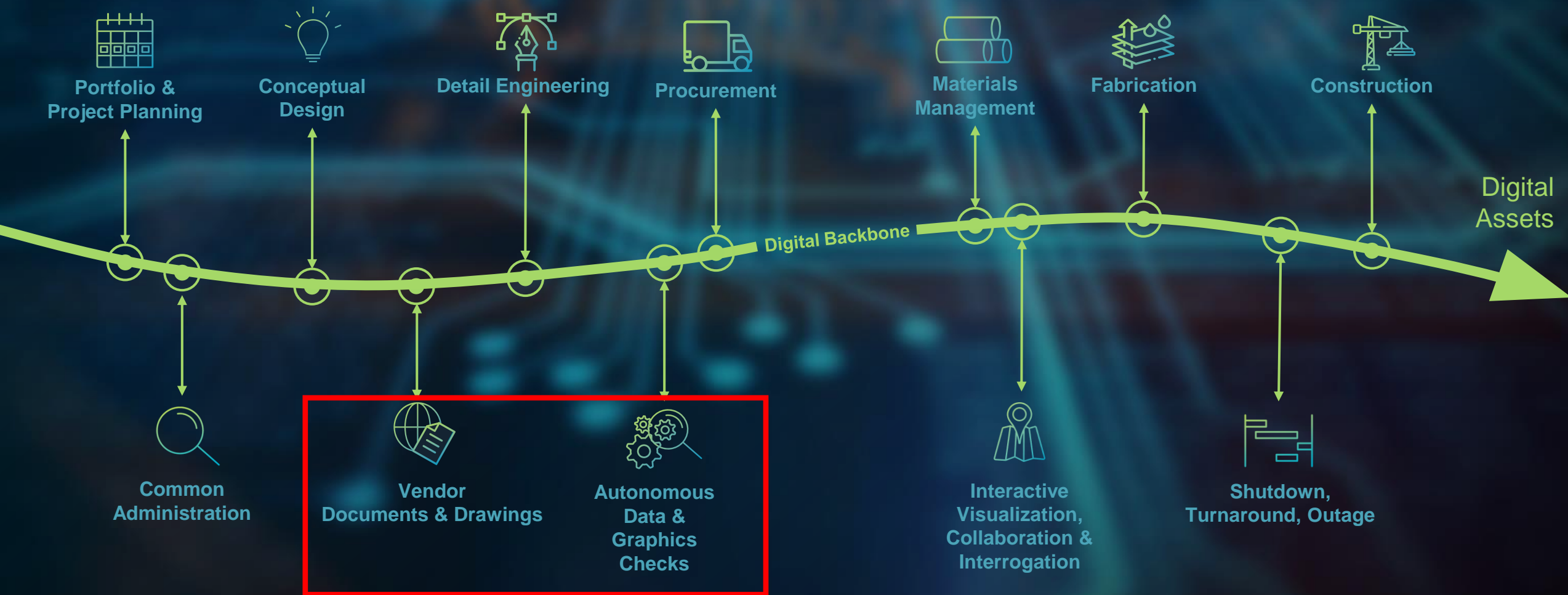


Lifecycle Digital Twin



Data Tourism & Exploitation across the Digital Asset Lifecycle

Digital Projects



Digital Assets

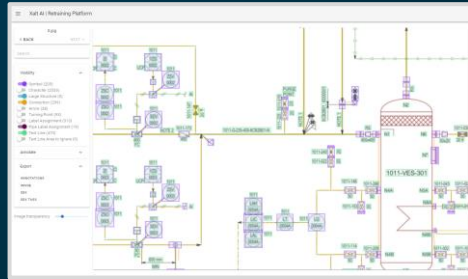




AI-based Handling for all External Project Data

AUTOTAGGING

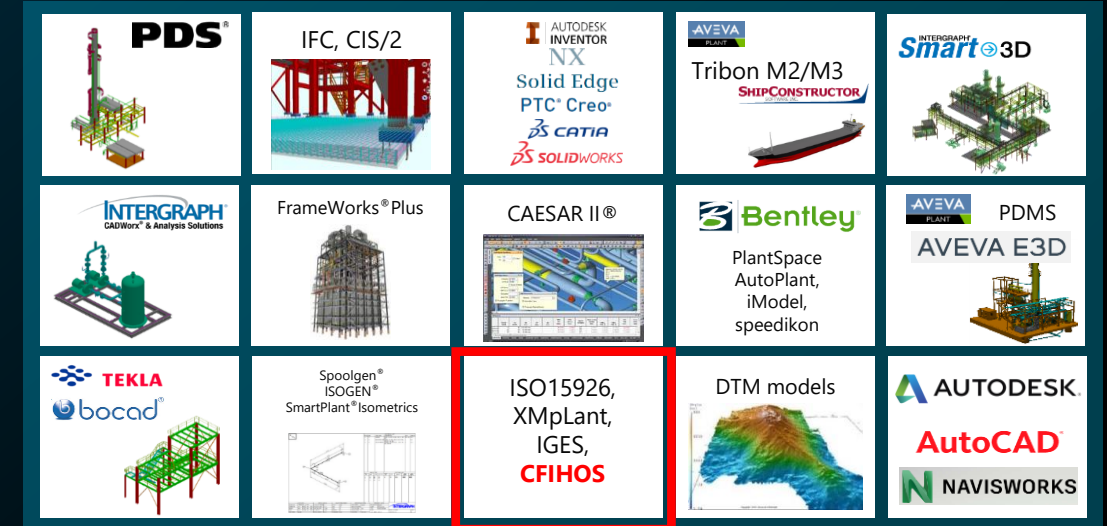
Vendor Drawing
Smartification



Vendor Document
Smartification



Skid Supplier Smartification
Pipe Fabrication Smartification
Steel Detailer Smartification



Programmatically Connecting Into Twin

CFIHOS Experience

CFIHOS delivered as default in SDx digital twin platform

- All class trees available:
 - Disciplines
 - Discipline Document Types (as Document Classes)
 - Tag classifications
 - Equipment classifications
 - Attribution (ie. Property-is-valid-for-class)

- ▼ Tag Types
 - ▼ equipment class, An artefact class that contains classes of artefacts or physical objects
 - ▼ drilling equipment, Equipment intended to enable the drilling of holes. Typical examples include:
 - bell nipple, A Bell nipple is a section of large diameter pipe fitted to the top of a drilling standpipe, A rigid metal conduit that provides the high-pressure fluid to the drill bit
 - iron roughneck, An integral part of the drilling process, iron roughnecks are used to connect and disconnect the drill pipe
 - pipe doping machine, A device that is designed for easy washing and drying of drill pipe
 - ▼ electrical equipment class, An equipment class that contains classes of electrical equipment
 - air conditioner, A physical object that is intended to bring air to a specific temperature
 - amplifier, A physical object for increasing the power of a signal

- ▼ Material Types
 - ▼ equipment class, An artefact class that contains classes of equipment
 - ▼ electrical equipment class, An equipment class that contains classes of electrical equipment
 - air conditioner, A physical object that is intended to bring air to a specific temperature
 - amplifier, A physical object for increasing the power of a signal
 - annunciator, An instrument intended to monitor the status of a system
 - battery back-up power supply unit, A direct current power supply unit that provides backup power
 - battery charger, A direct current power supply unit that charges a battery
 - busbar, An electrical conductor that is of low impedance
 - capacitor bank, A physical object that is a number of capacitors connected in parallel
 - chlorinator, A device used for the injection of chlorine into a water supply
 - circuit-breaker, A mechanical switching device that opens or closes a circuit

- ▼ CFIHOS
 - acceptance test procedure
 - accident report
 - accommodation philosophy
 - action list
 - active fire protection system data report
 - activity plan
 - alarm, trip setting list
 - alignment data
 - anchoring diagram
 - anchoring study
 - applicable standards list
 - application software
 - approval certificate

The screenshot shows a software interface with a dropdown menu for 'Document origin'. The dropdown is open, showing a list of codes: AA, BA, CB, CG, CI, CS, CX, EA, FA, HE, HH, HP, HS, HX, IN, JA, KA, LA. The 'Document origin' label is highlighted in blue. Below the dropdown, there are several input fields: 'Originating organization: *', 'Project deliverable:', 'Contract:', and 'Discipline:'.

Classification Trees - mechanism

- Data Validator enables you to load up class trees and the attribution:

pressure relief device	vacuum relief valve	A relief
pump	centrifugal pump	A dyna
pump	diaphragm pump	A recip
pump	educator	A form
pump	gear pump	A rotan
pump	piston pump	A recip
pump	plunger pump	A recip
pump	rod pump	A recip
pump	screw pump	A rotan
pump	vane pump	A rotan
reciprocating compressor	diaphragm compressor	A recip
reciprocating compressor	piston compressor	A recip
rotary compressor	liquid ring compressor	A rotan

Tag Types

Equipment Class

pump

centrifugal pump

P1

P2

P3

107	centrifugal compressor	process entrainments	2
108	centrifugal compressor	settle out pressure	2
109	centrifugal compressor	specific heat ratio Cp/Cv at inlet	2
110	centrifugal compressor	normal operating inlet temperature	2
111	centrifugal compressor	corrosive gas	2
112	centrifugal pump	H2S concentration	2
113	centrifugal pump	chloride concentration	2
114	centrifugal pump	corrosive liquid	SO 14224 2
115	centrifugal pump	erosive liquid	SO 14224 2
116	centrifugal pump	explosion protection gas group	EC 60529 2
117	centrifugal pump	immersed	SO 14224 2
118	centrifugal pump	explosion protection temperature class	EC 60529 2
119	centrifugal pump	normal operating specific gravity	2
120	centrifugal pump	liquid hazardous category	2
121	centrifugal pump	liquid name	SO 14224 2
122	centrifugal pump	lower limit operating temperature	2
123	centrifugal pump	lower limit operating volume flow rate	2
124	centrifugal pump	net positive suction head available	2
125	centrifugal pump	normal operating differential pressure	2
126	centrifugal pump	normal operating dynamic viscosity	2
127	centrifugal pump	normal operating outlet pressure	2
128	centrifugal pump	normal operating temperature	2
129	centrifugal pump	normal operating vapour pressure	2
130	centrifugal pump	normal volume flow rate	2
131	centrifugal pump	operation continuous/intermittent	2
132	centrifugal pump	operation single/parallel	2
133	centrifugal pump	rated volume flow rate	2
134	centrifugal pump	upper limit operating inlet pressure	2
135	centrifugal pump	upper limit operating temperature	2
136	centrifugal pump	explosion protection zone	EC 60529 2
137	centrifugal pump	normal operating inlet pressure	2
138	centrifuge	explosion protection gas group	IEC 60529 2
139	centrifuge	explosion protection zone	IEC 60529 2

Main details Procurement **Design**

▼ Design

Erosive liquid:

Lower limit operating volume flow rate: m³/s

Normal operating outlet pressure: Pa

Explosion protection temp class:

Normal operating vapour pressure: Pa

Liquid name:

Normal operating specific gravity:

Liquid hazardous category:

Explosion protection gas group:

Rated volume flow rate: m³/s

Corrosive liquid:

Operation continuous/intermittent:

H2s concentration: kg/kg



CFIHOS Importing Capabilities

- Data Validation methods have been setup to import and validate the CFIHOS registers
- Will support regular formats but RAW/inverted formats as well
- Can upload document metadata and their files
- Input formats examples for Tags:
 - Regular format:

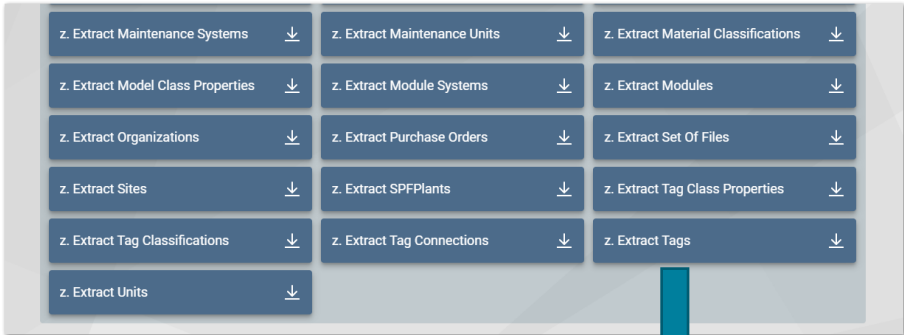
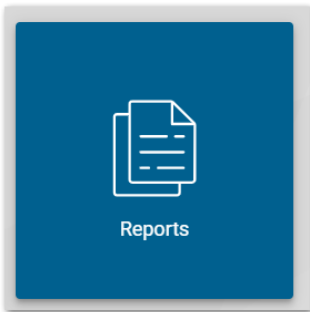
plant code	tag name	tag description	parent tag name	area code	process unit code	tag class name	tag status	requisition code	designed
CEX	P-0100	centrifugal pu...			CT	centrifugal pump	approved for c...	RQ1234	DC
CEX	P-0101	Pump			03	piston pump	approved for c...	RQ1234	DC
CEX	P-0102	Cent. Pump			CT	centrifugal pump	approved for c...	RQ1234	DC
CEX	P-0103	Screw Pump			CT	screw pump	approved for c...	RQ1234	DC
CEX	P-0200	Inlet Pump			CT	rod pump	approved for c...	RQ1234	DC
CEX	P-0201	Inlet Pump			CT	vane pump	approved for c...	RQ1234	DC

- RAW/Inverted format:

plant code	tag name	property name	property value	property value uom
CEX	P-0100	explosion protection gas group	IIC	
CEX	P-0100	explosion protection temperature class	T5	
CEX	P-0100	explosion protection zone	Zone 1	
CEX	P-0100	liquid hazardous category	Category 1	
CEX	P-0100	lower limit operating temperature	55	C
CEX	P-0100	upper limit operating temperature	70	C

CFIHOS Extracting Capabilities

- Ad Hoc reports have been setup to extract data from the system into CFIHOS formatted csv's
- Intention is to communicate data out of the system towards external contractors

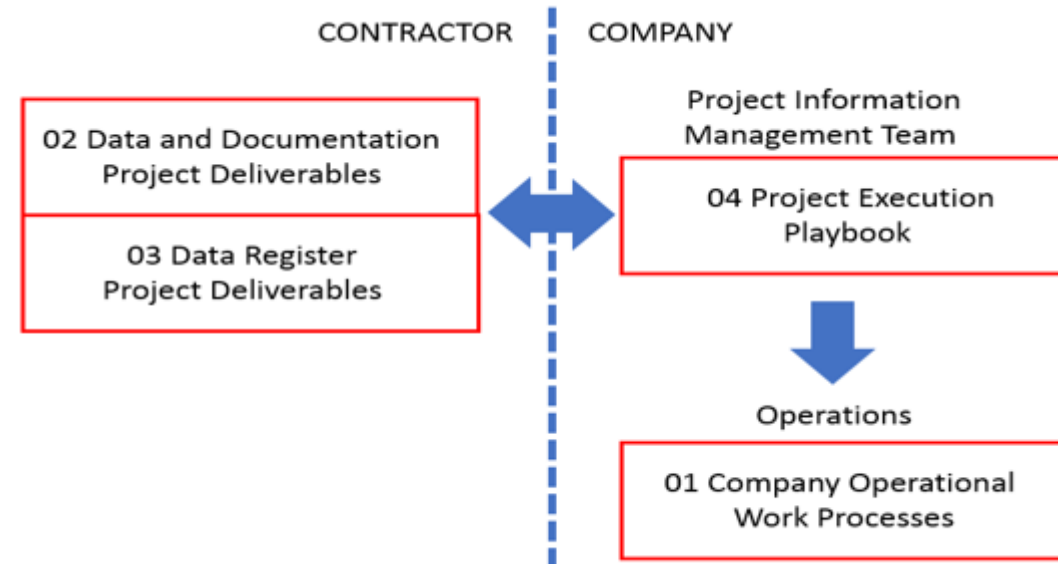


```
PDA-PO-CFIHOS v1.2 Tag Report-20190322_134625714.csv
1 "plant code","tag name","tag description","parent tag name","area code","process unit code","tag class name","tag status","requisition code"
2 "PDA-PO","1011-EXH-305-LCS1","LOCAL CONTROL STATION",,"01","1011","control panel","approved for construction","RQ-000122","COMP-001","COMP-001"
3 "PDA-PO","1011-EXH-305-LCS2","LOCAL CONTROL STATION",,"01","1011","control panel","approved for construction","RQ-000122","COMP-001","COMP-001"
4 "PDA-PO","1011-EXH-305-MTR1","1011-EXH-305-COMPRESSOR AFTERCOOLER FAN 1 - MOTOR",,"01","1011","fan","approved for construction","RQ-000122"
5 "PDA-PO","1011-EXH-305-MTR2","1011-EXH-305-COMPRESSOR AFTERCOOLER FAN 1 - MOTOR",,"01","1011","fan","approved for construction","RQ-000122"
6 "PDA-PO","1011-FAH-0008","Instrument 1",,"01","1011","instrument equipment","approved for construction","RQ-000122","COMP-001","COMP-001"
7 "PDA-PO","1011-FAL-0008","Instrument 2",,"01","1011","instrument equipment","approved for construction","RQ-000122","COMP-001","COMP-001"
8 "PDA-PO","1011-FCV-0015","Control valve 1",,"01","1011","control valve","approved for construction","RQ-000122","COMP-001","COMP-001"
9 "PDA-PO","1011-G-226-20-9SD0B01-N","pipeline",,"01","1011","pipeline","approved for construction","RQ-000122","COMP-001","COMP-001"
10 "PDA-PO","1011-G-226-350-9SD0B01-N","pipeline",,"01","1011","pipeline","approved for construction","RQ-000122","COMP-001","COMP-001"
11 "PDA-PO","1011-G-226-50-9SD0B01-N","pipeline",,"01","1011","pipeline","approved for construction","RQ-000122","COMP-001","COMP-001"
12 "PDA-PO","1011-G-228-20-9CB2B01-N","pipeline",,"01","1011","pipeline","approved for construction","RQ-000122","COMP-001","COMP-001"
13 "PDA-PO","1011-G-228-20-9CB2B01-N","pipeline",,"01","1011","pipeline","approved for construction","RQ-000122","COMP-001","COMP-001"
```



Hexagon CFIHOS Implementation Guidelines

- Detailed guidelines for «Company/Principal» and «Contractors»
- Based on previous handover guidelines
- Go beyond scope of CFIHOS e.g.
 - Organization/responsibilities
 - Set-up of seed files for design tools
 - 3D model guidelines
 - Management of vendor package scopes
 - Etc..
- Being updated to CFIHOS v1.5
- Available free of charge to customers – please contact Mika Hanninen
mika.hanninen@hexagon.com



Thank You

