

Siemens Digital Industries 2019 Rice Global E&C Forum

Siemens, by the numbers



Operating Companies

**Gas and
Power***

**Smart
Infrastructure**

**Digital
Industries**

65,000
Employees
€18.1bn
Revenue
4.0%
Adjusted EBITA margin

71,000
Employees
€14.4bn
Revenue
10.9%
Adjusted EBITA margin

75,000
Employees
€15.6bn
Revenue
18.6%
Adjusted EBITA margin

Strategic Companies

**Siemens
Mobility**

SIEMENS Gamesa
RENEWABLE ENERGY *

**SIEMENS
Healthineers**

59%**

85%**

34,200
Employees
€8.8bn
Revenue
10.9%
Adjusted EBITA margin

23,000
Employees
€9.1bn
Revenue
5.3%
Adjusted EBITA margin

50,000
Employees
€13.4bn
Revenue
16.5%
Adjusted EBITA margin

Service Companies (Financial Services, Global Business Services, Real Estate Services)

Corporate Development (e.g., IoT Services, CT, Next47, Portfolio Companies)

Governance units

*Partial spinoff of Gas and Power planned; transfer of majority stake in SGRE (59%) to new company planned

** Siemens' share in strategic companies

All figures based on FY18

Digitalization is key to achieving next level productivity



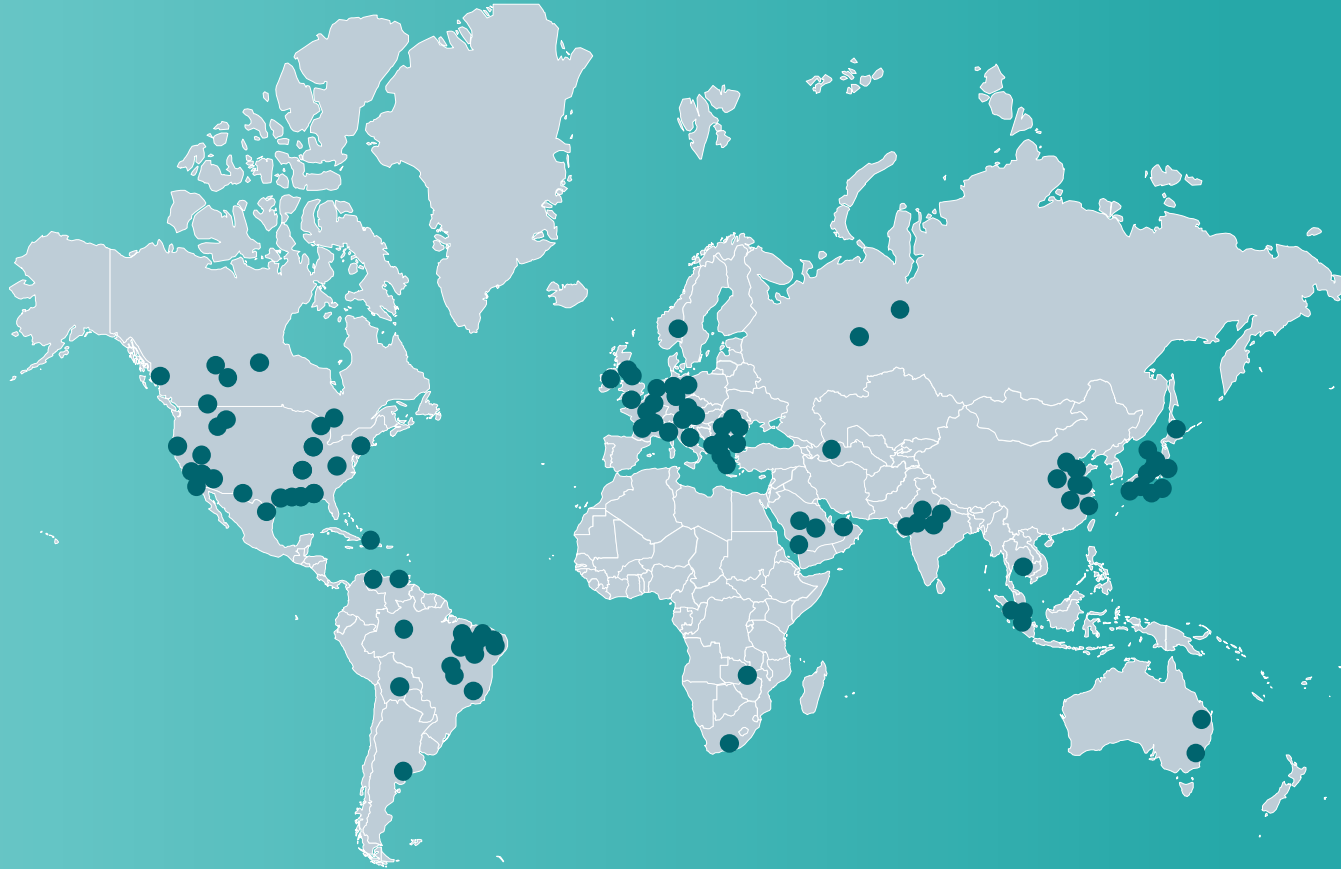
 **> \$11 billion investment**
26,000 Software engineers are shaping the digital transformation



¹⁾ Cooperation

O&G and Chemical Go-to-Market - from Products to Solutions -

SIEMENS
Ingenuity for life



- ✓ Strong footprint in the O&G and Chemical Industries
- ✓ Upstream, midstream and downstream applications
- ✓ Leading EPC and OO companies around the world use Siemens solutions for engineering and operations



Siemens digitalization technologies optimize businesses in the process industries along the entire asset lifecycle



Plant Design/ Engineering

Installation/ Commissioning

Operation/
Maintenance

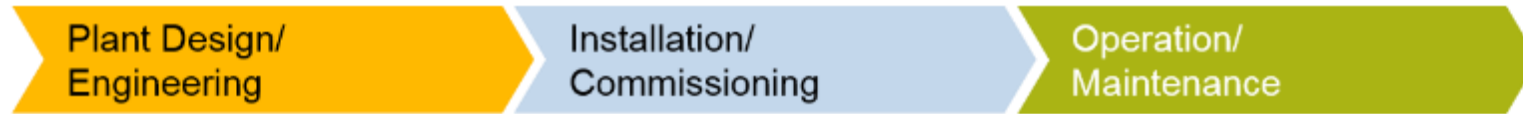
Optimization through Digitalization



Identical data for all lifecycle phases

One data model on all levels, consistency in communications

With digitalization Siemens connects engineering, commissioning, and operation seamlessly



Optimization through Digitalization

Digital plant design,
tools, and processes
with...



Production
excellence
with...

Integrated Engineering

Integrating engineering
Information and processes on the
basis of one data model with the
interface/interplay of different
engineering and automation systems.



Integrated Operation

Execution of operation and
maintenance tasks without media
breaks due to a seamless transition
and the consistent data flow between
engineering and plant operation.

Benefits

**Lower CAPEX
Optimal OPEX**

with ...

Optimum efficiency

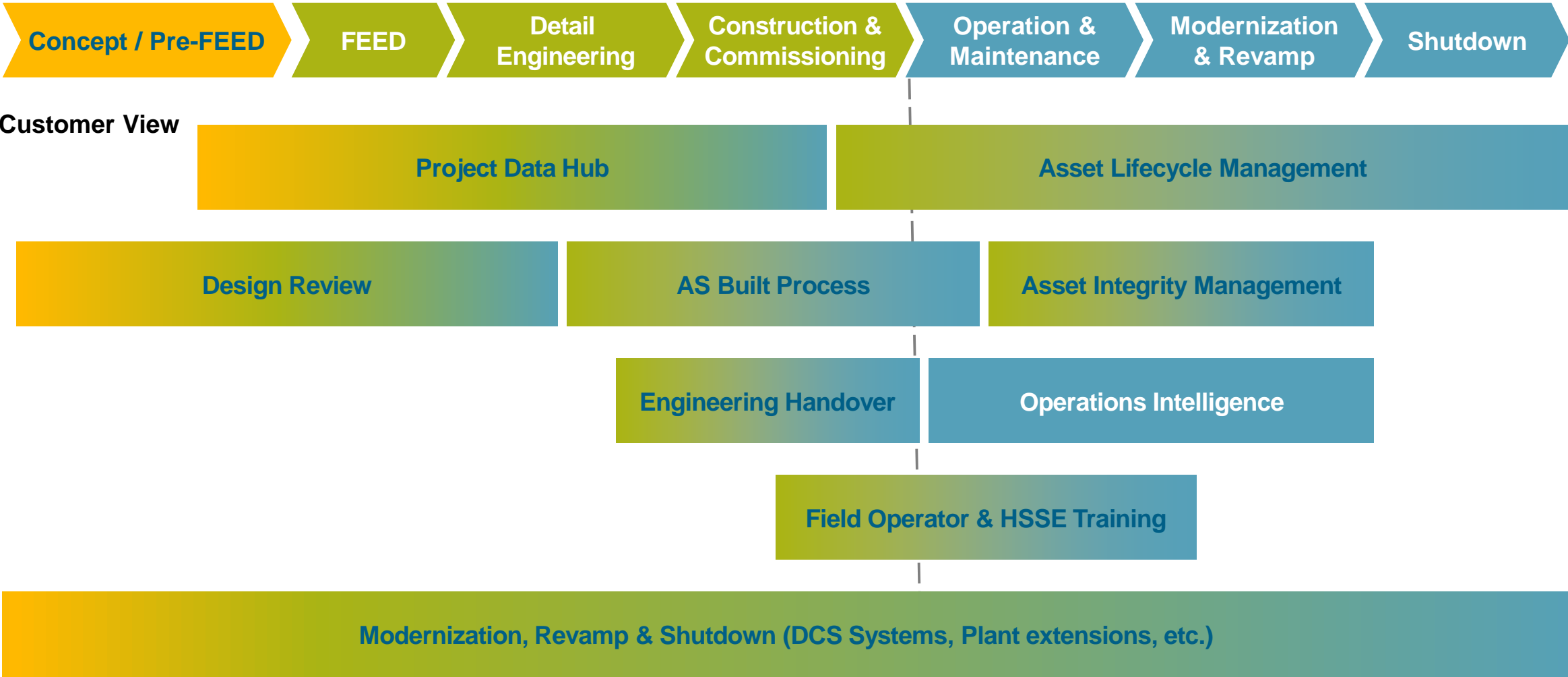
Increased reliability

Higher quality

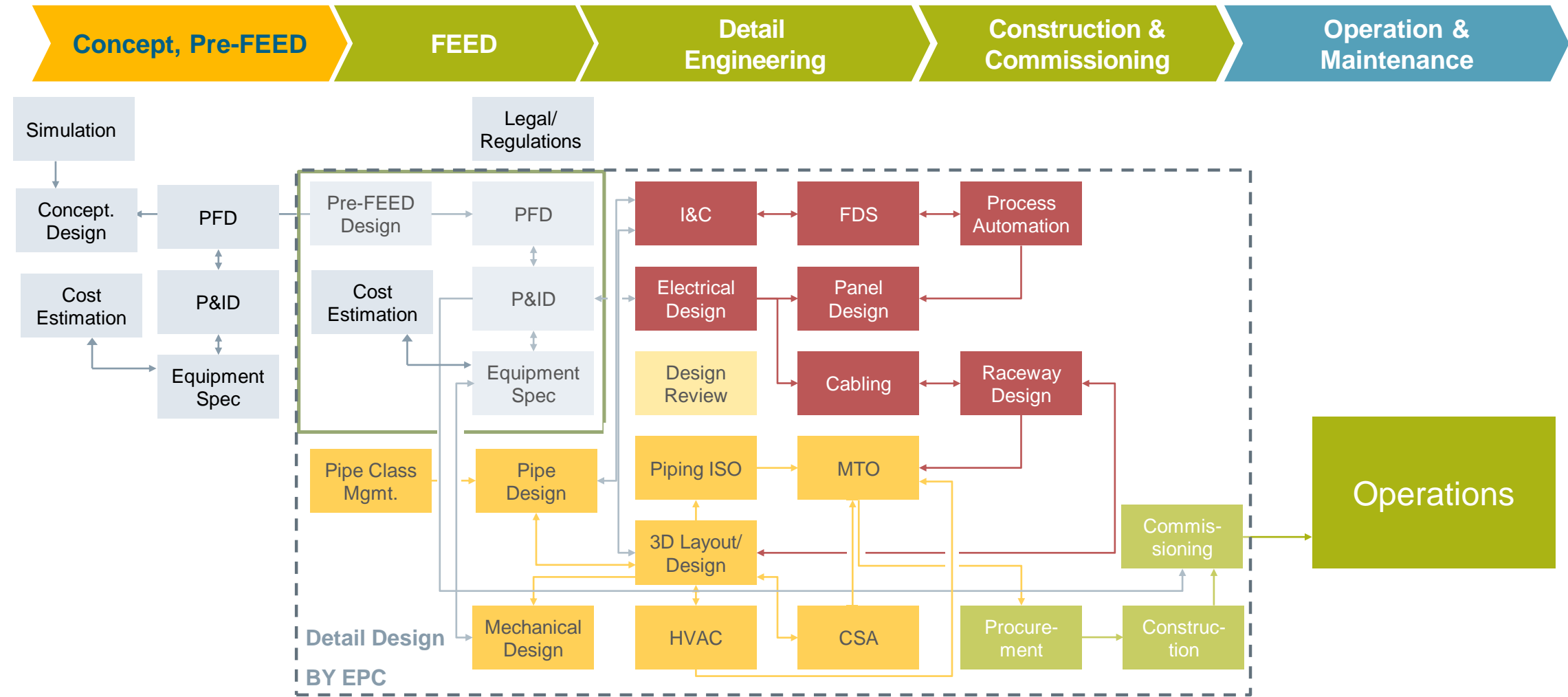
Smarter decisions

Greater flexibility
in optimization

Digitalization – The Integrated Approach






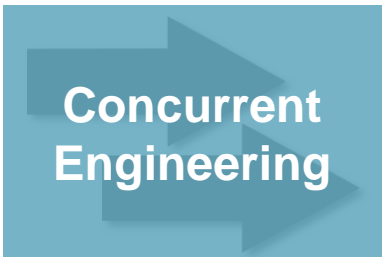

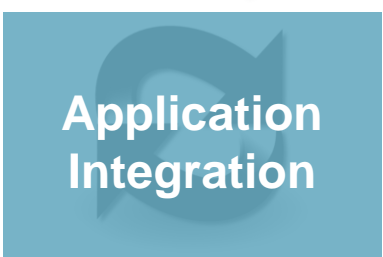



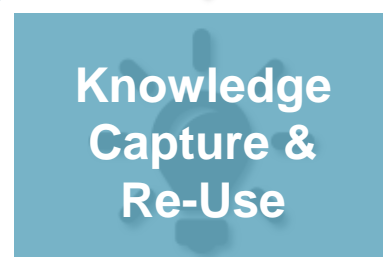


High Level Business Process



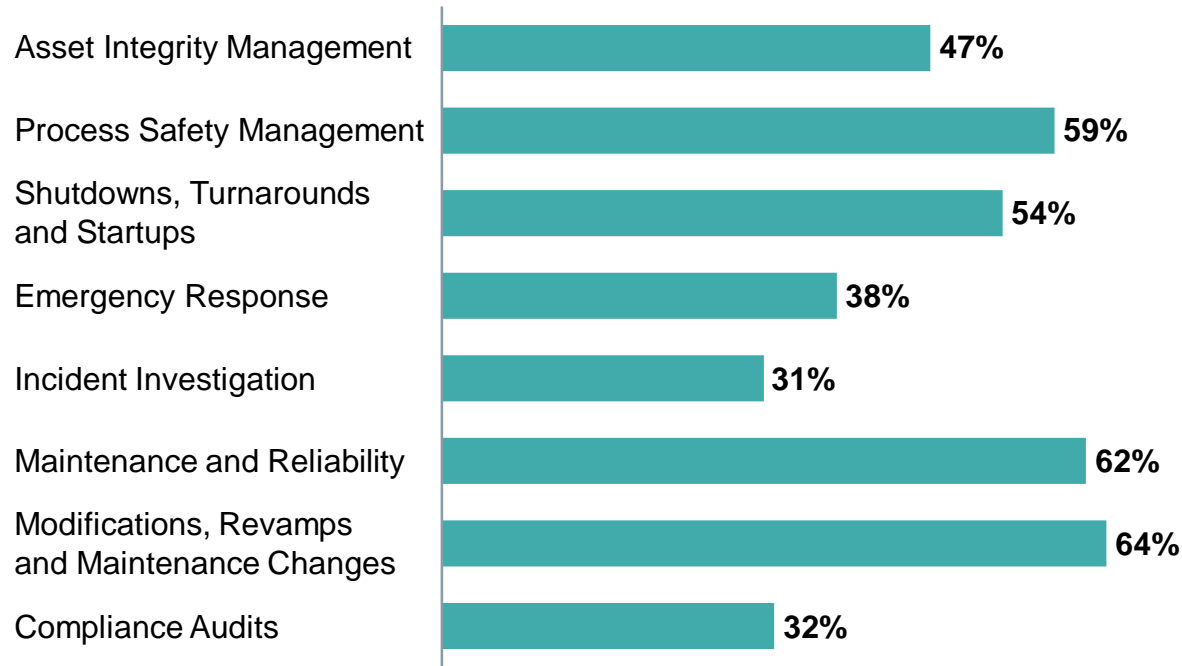
Challenges & Business Requirements for the Owner/Operator



 Actionable Insight	 HSE-Q Process Safety Management	 Technical & Business Process Integrity	 Operations Efficiency	 Staff Productivity
 Concurrent Engineering	Operative Engineering/ Modifications	Asset (Information) Lifecycle Management	Operation & Maintenance & Inspection	 Availability of AS-BUILT Documents & Plant Data
 Application Integration	 Industry/ In-house Standards	 Legal & Regulatory Requirements	 (Data) Supply Chain Management	 Knowledge Capture & Re-Use

For which plant activities is the need for ready access to trustworthy information most critical?

And what costs Owner/Operator for not having right data available?



Researched by  **TechValidate™**

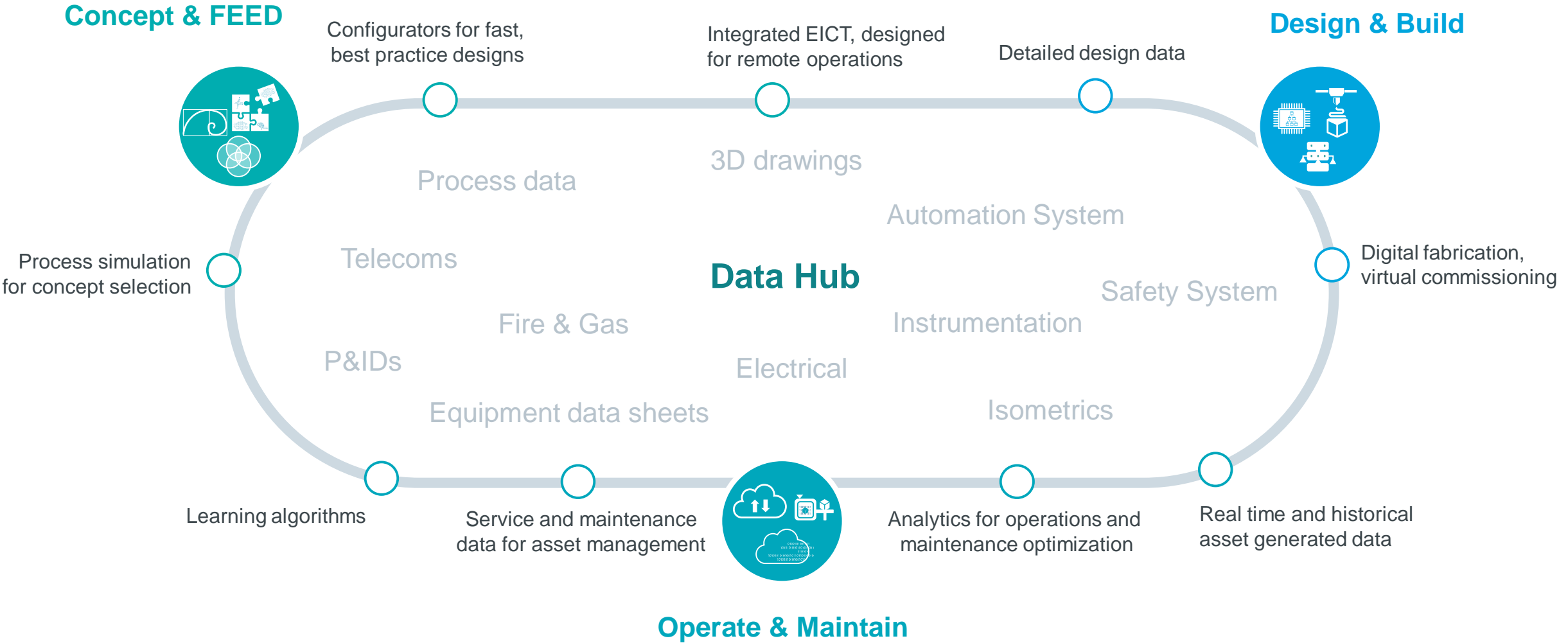
**1.5% of annual sales,
per year**

Includes losses from
availability, operating
inefficiencies, higher
CAPEX for modifications
and increased maintenance

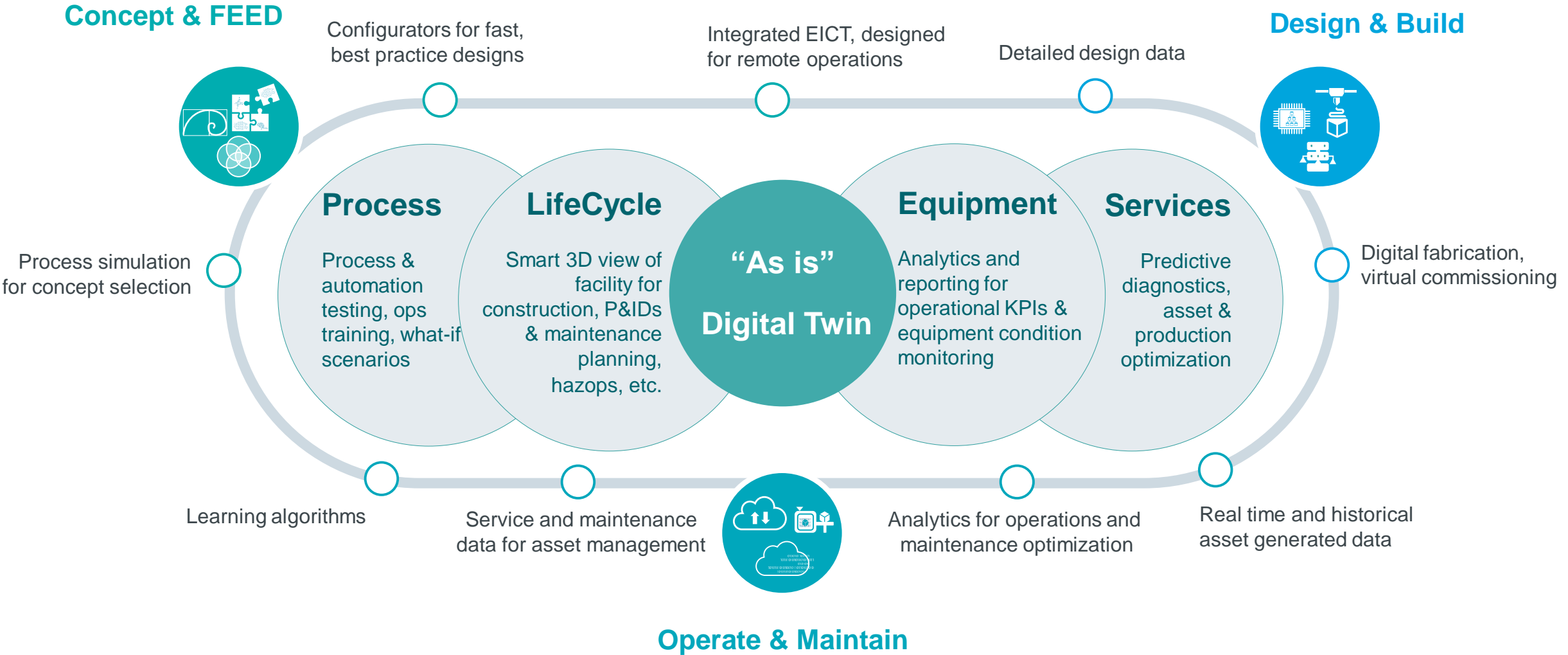


Source: Asset Information Management, Part I – The Case for Developing an AIM Strategy; ARC Advisory Group, July 2010

The Intelligent Digital Twin for Process Industries



The Intelligent Digital Twin for Process Industries

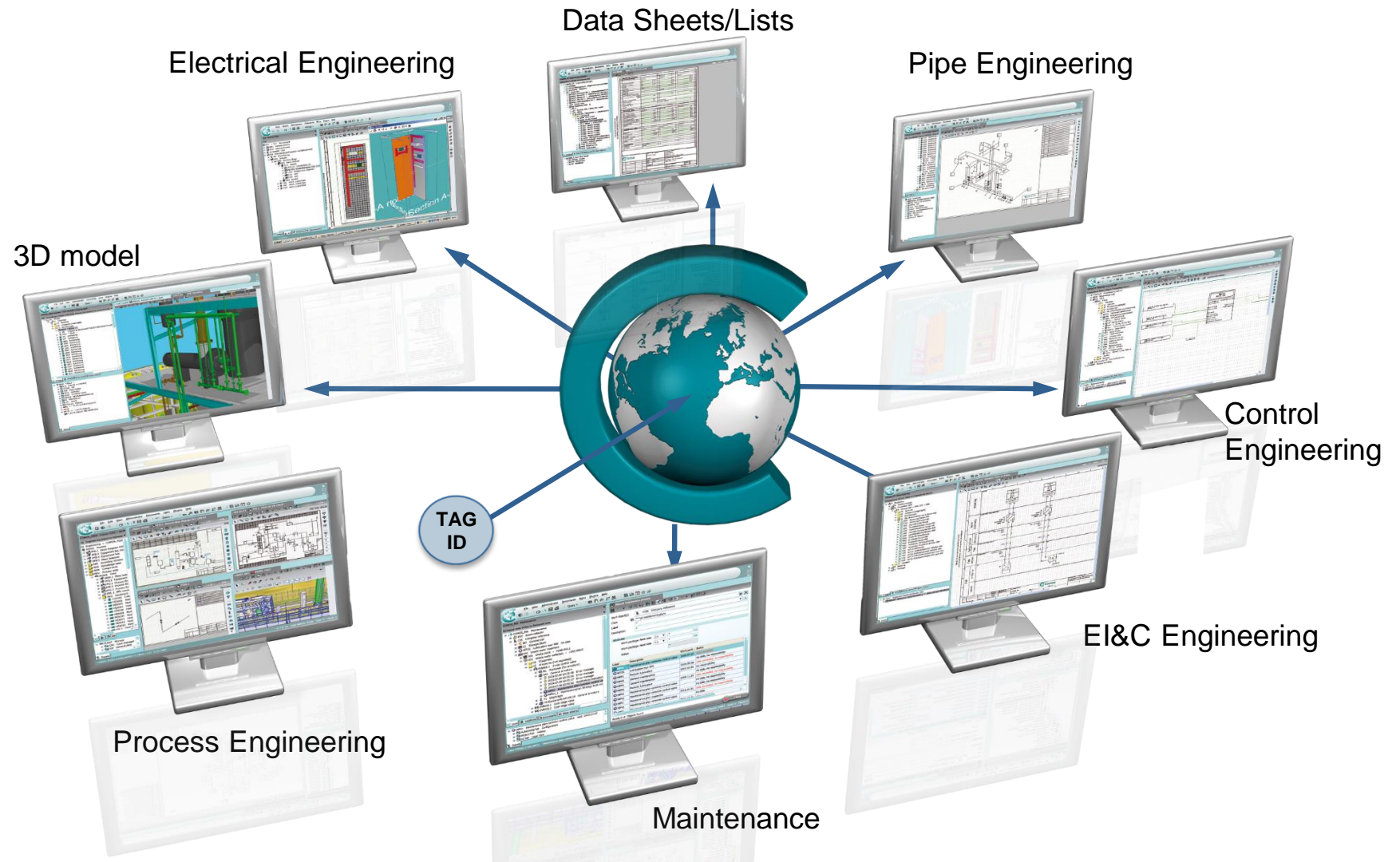


Digital Twin based on Common Object Model Database

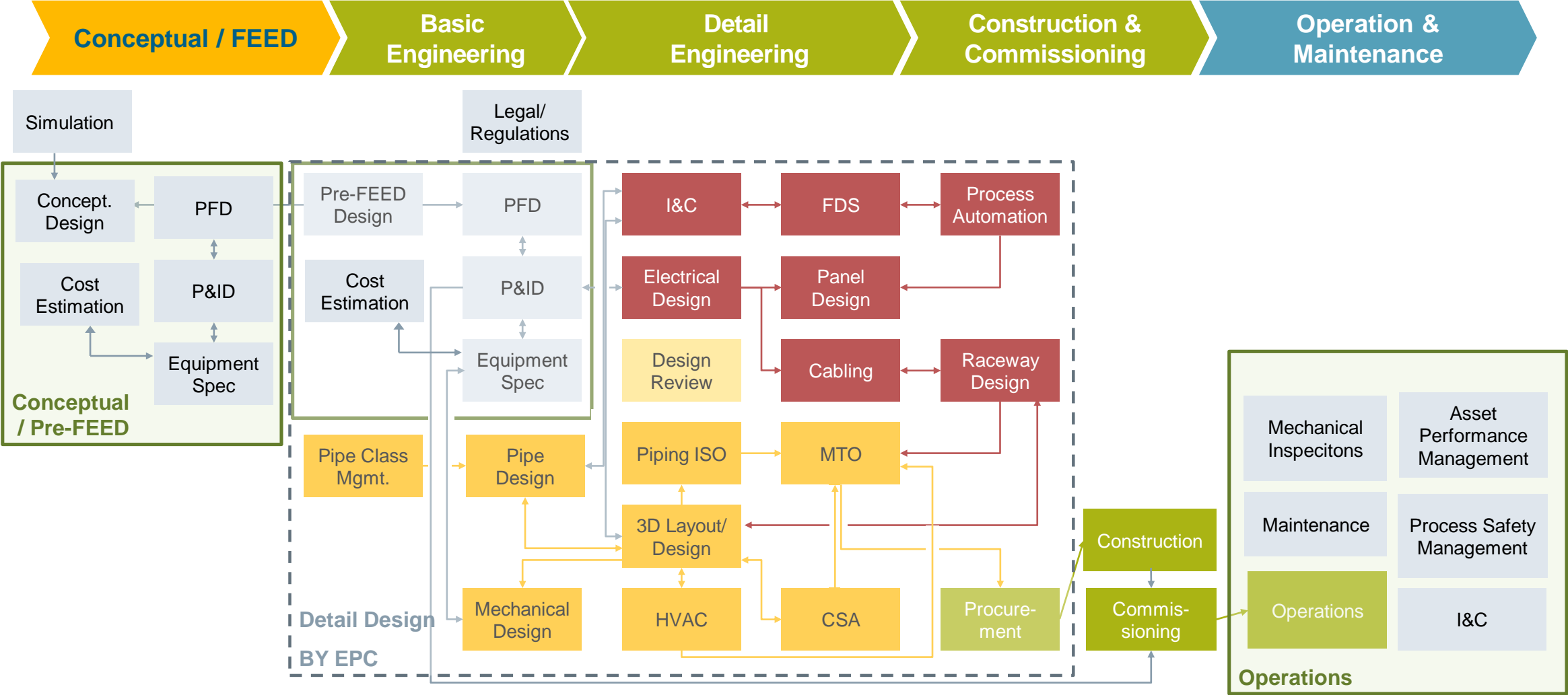
Integrated Data Platform - consistent data anytime, anywhere

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Ingenuity for life

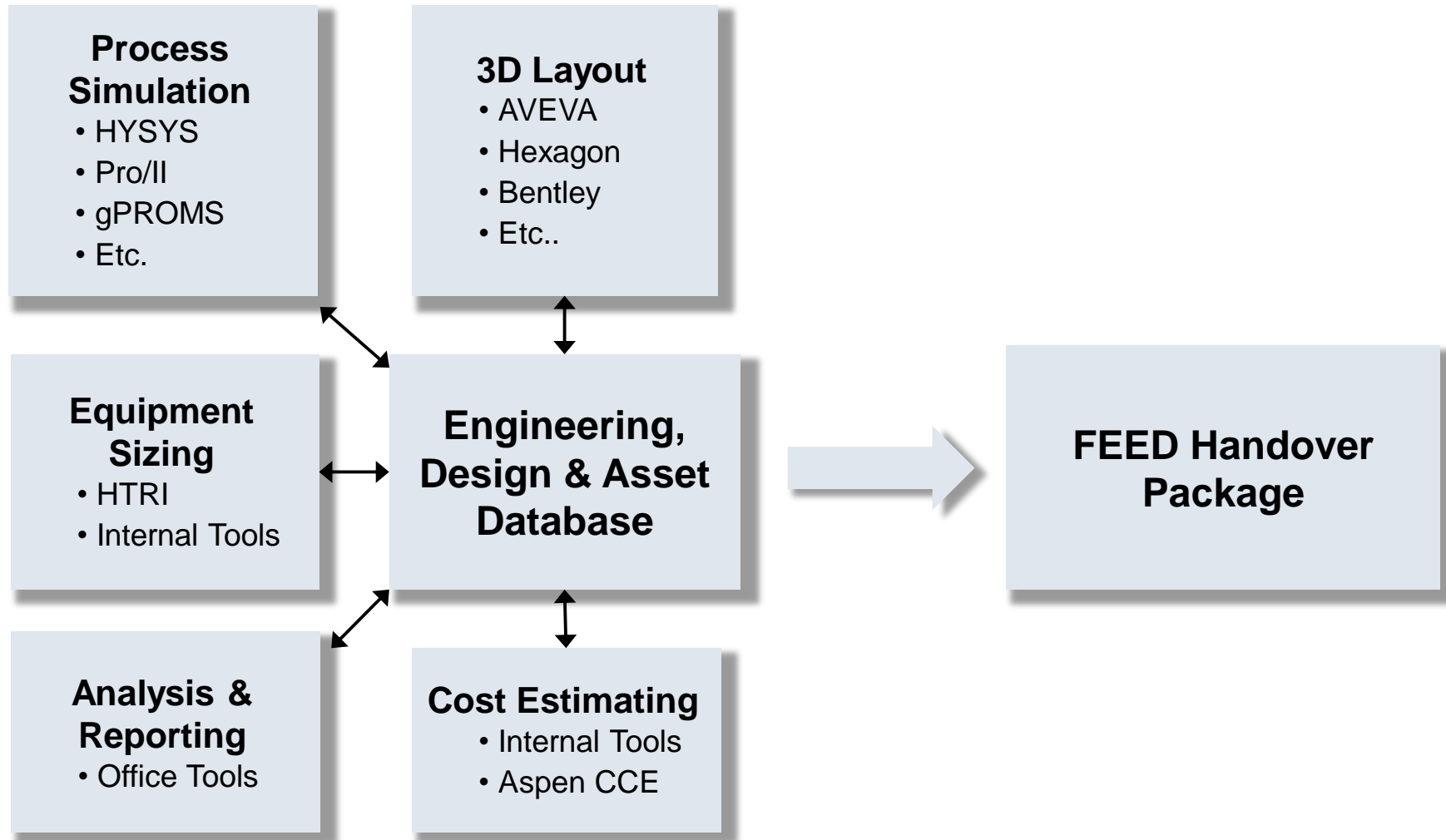
- Object oriented
- Single electronic source
- Open system architecture
- Global workspace



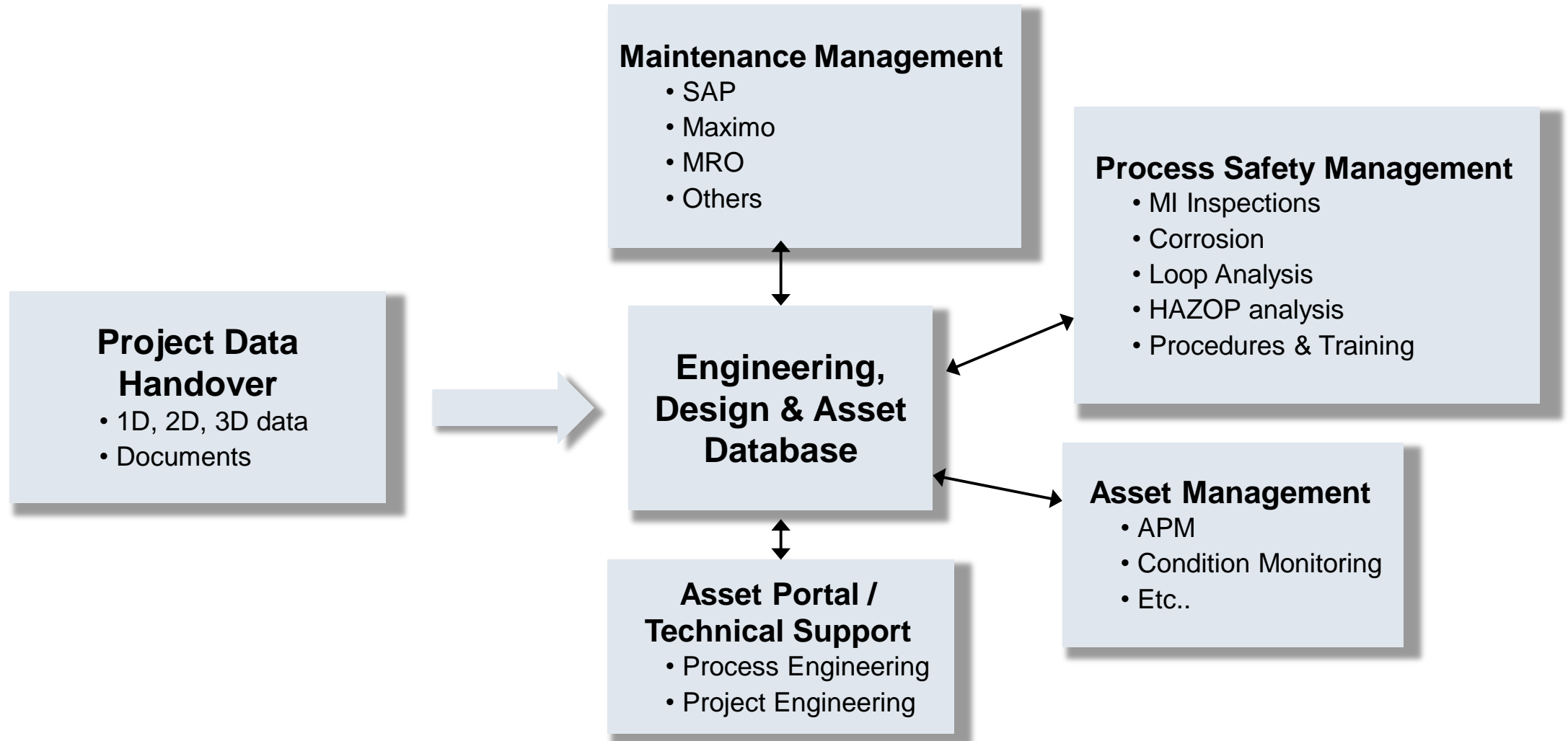
High Level Business Process



Conceptual Design / FEED Data Sources



Capital Project Data Handover Destinations



The scalable concept for the Digital Twin

Digital Enablement

Design Data

Simulation Data

1D / 2D / 3D Data

**Virtual
Plant**

Process Model Data

Forecast Data

Asset Data

Digitalization

Brings these worlds of
information together

- ✓ Quickly
- ✓ Reliably
- ✓ Consistently
- ✓ Seamlessly

Origins of data and
access to visualization tools
should be transparent to the user

Digital Reliability

Alert Data

Real Time Data

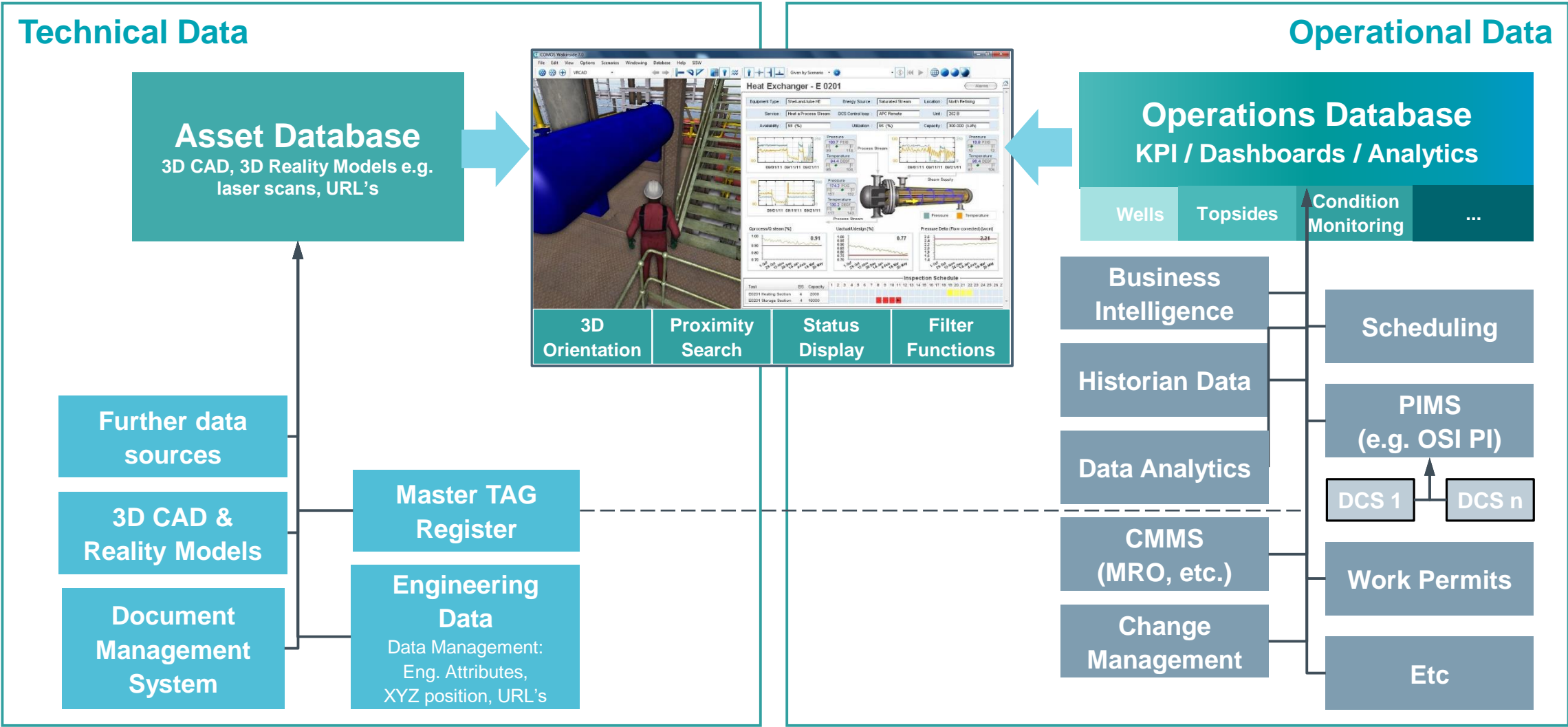
Historical Data

**Real
Plant**

Optimization Data

Equipment Data

eLog Data





Engineering Data

Technical Documents

3D Data

Real-Time Data

Maintenance Build & O/O Data Model



Siemens Digital Industries Software

Where today meets tomorrow.