DRIVEN-4

Company Overview

Overview

- DRIVEN-4 Introduction
- Our Capabilities
- Our Presence and Partners
- Customer Success Stories

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DRIVEN-4 Introduction

Company Overview

Why DRIVEN-4?

- **Industry leaders**
  DRIVEN-4 is made up of a group of Industry leaders that were in the same situation you're currently in
- **Technology leaders**
  We are technology leaders that have grown up in development and manufacturing organizations not consulting
- **We believe we can help you**
  in the areas of PLM, IoT and connected product development, manufacturing and service and cybersecurity like no-one else because for the past 15+ years we "Were You"

Company Overview

- **Driving competitive advantage**
  DRIVEN-4 is focused on driving competitive advantage for our customers by providing strategies, insights and proven implementations of integrated process and technology to deliver products and services (traditional or connected) to market
- **Holistic approach**
  We are technology leaders that have grown up in development and manufacturing organizations not consulting
- **Our team**
  is comprised of industry and technology professionals with global experience

Our Service Offerings

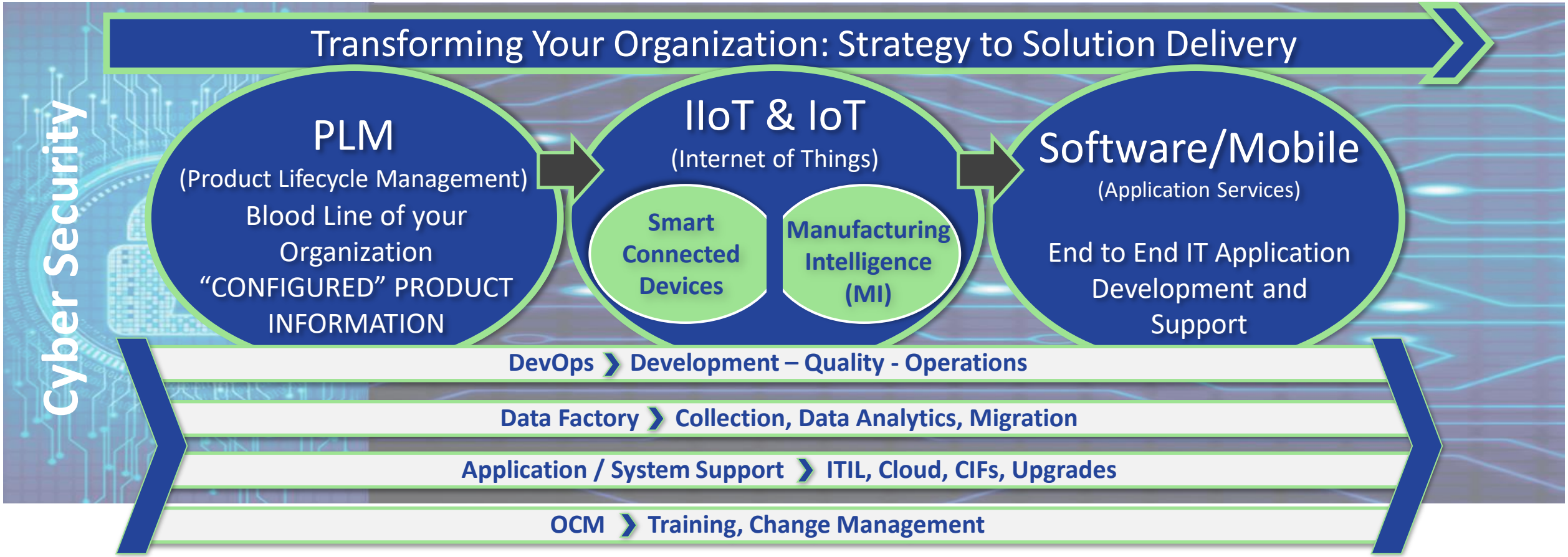
- **DRIVEN-4 offerings include:**
  - Strategic Insight and Direction
  - Process Development
  - Technology Implementations
  - Operational Support
- **Proven frameworks and solutions**
  DRIVEN-4 provides proven frameworks and solutions from a strategic and organizational approach, process integration and alignment, objective technology selection with a best practice implementation approach and the ability to provide world class operations
- **Key differentiators**
  is comprised of industry and technology professionals
  with global experience

Our Capabilities

Digital Transformation

The DRIVEN-4 core team benefits from a deep background in IoT and PLM implementations for manufacturing domains. Specialize in technologies and services that boost operational efficiency, improve collaboration and spark innovation.

Digital Transformation is a core focus for DRIVEN-4.



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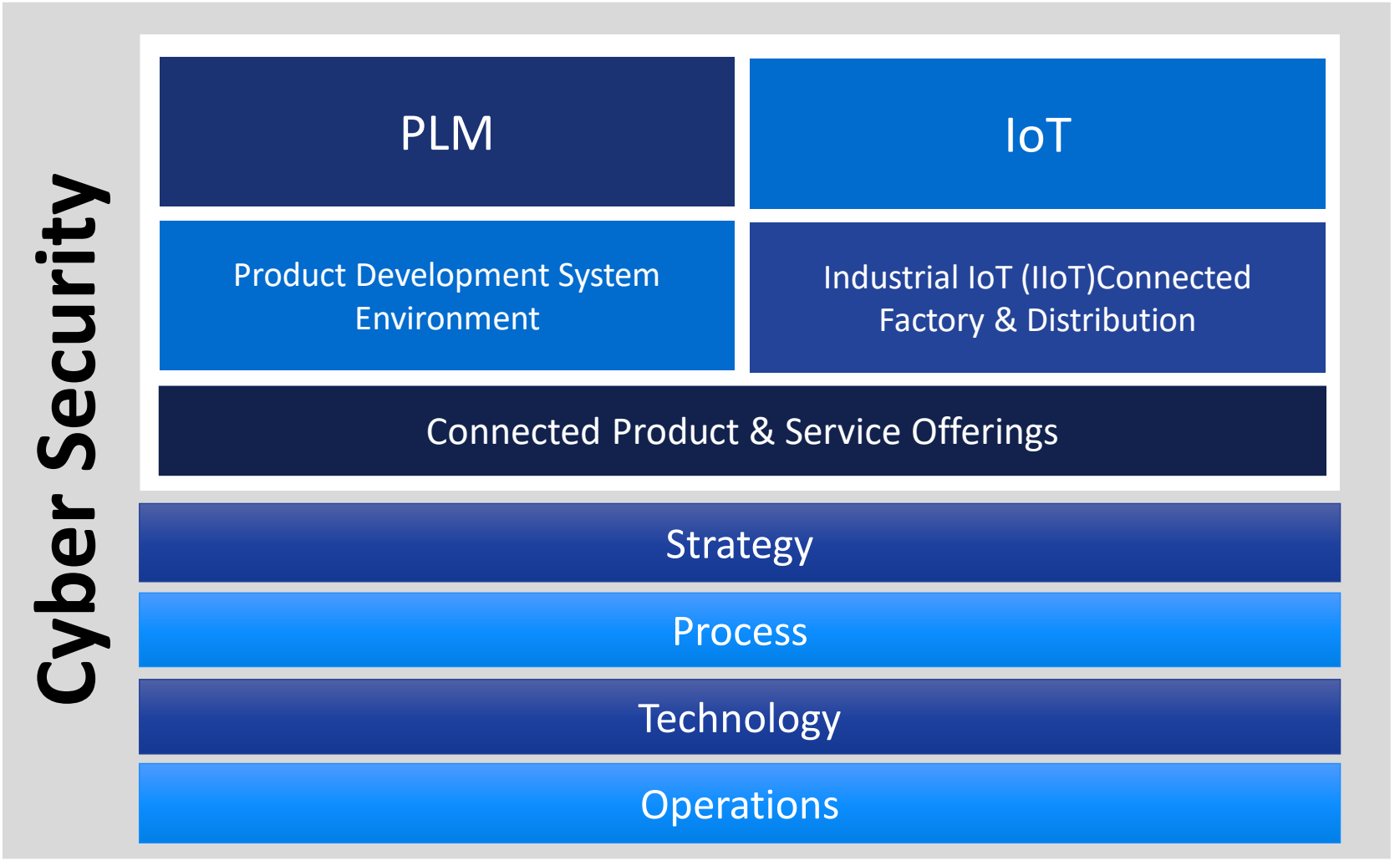
Areas of Expertise and Capabilities

Area of Expertise



Capabilities in the following Domains

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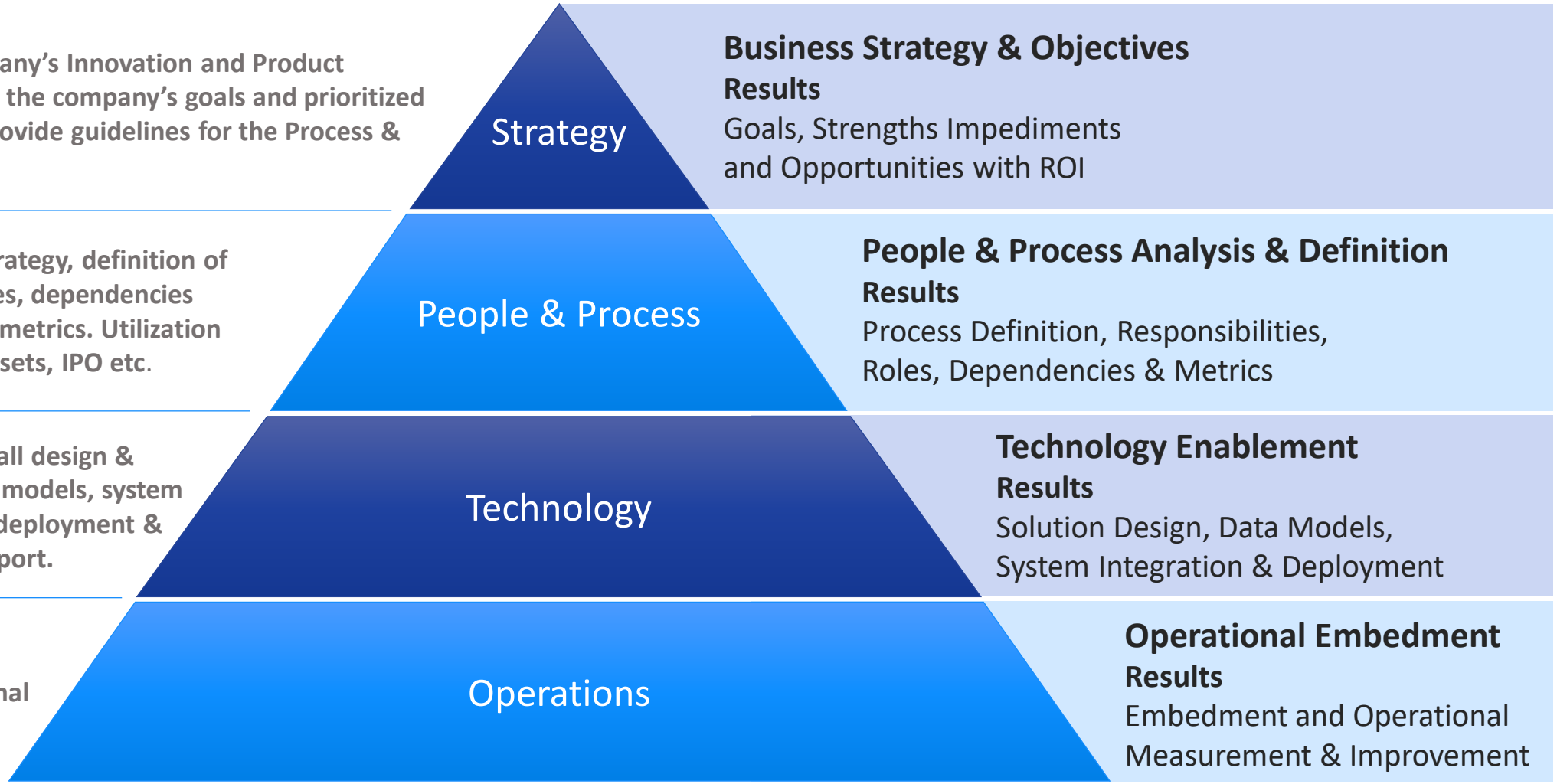
Our Hierarchical Methodology



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Product Lifecycle Management (PLM)

PORTFOLIO & PROJECT MANAGEMENT

Product Lifecycle Management starts with an idea and ends when the customer is serviced

INNOVATION PROCESS

IDEA GENERATION → *DEVELOP* → *PROTOTYPE* → *TEST* → *MARKET READY CONCEPT*

PRODUCT DEVELOPMENT PROCESS

DESIGN → *BUILD* → *TEST & VALIDATE* → *LAUNCH*

ENTERPRISE PROCESSES

\+ *MANUFACTURING* → *SERVICE*

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DRIVEN-4 Portfolio and Project Management

- To provide the organization with real time visibility to make key Product Development decisions, throughout:
  1. **Portfolio Planning**
     - Product and Technology Roadmaps
       - With accompanying Product Development and Technology Projects
       - Overall Demand versus Budget
       - "What if" scenario planning
  2. **Project Planning**
     - Detailed planning and analysis
       - Resources versus Demand – Resources, Facilities and Financials
       - Project Prioritization
  3. **Project Execution**
     - Analysis and Governance
       - Forecast versus Actual – Resources, Facilities and Financials
       - Resource Utilization and prioritization

Product Lifecycle Management (PLM)

INNOVATION FUNNEL

CONCEPT DESIGN

CONCEPT SELECTION

CONCEPT VALIDATION

READY FOR DEVELOPMENT

- **Product Categories**
- **Decision Criteria**
- **Technology Platforms**
- **Project Governance**

Product Development Enterprise Process

REQUIREMENTS MANAGEMENT	SOFTWARE DEVELOPMENT	STYLING PROCESSES	MANUFACTURING PROCESSES
CAD/CAM/CAE	CONTROLS DEVELOPMENT	MARKETING PROCESSES	PLANT & PROCESS SIMULATION
VALIDATION PROCESSES	PROCUREMENT PROCESSES	QUALITY PROCESSES	SERVICE PROCESSES

PORTFOLIO & PROJECT MANAGEMENT

ENTERPRISE ARCHITECTURE – PROCESS, TECHNOLOGY & DATA

ITEM DEFINITION

BILL OF MATERIAL MANAGEMENT

CONFIGURATION MANAGEMENT

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Our PLM Expertise

DISCOVER → **DERIVE** → **DEVELOP** → **DELIVER**

Strategy & Roadmap

- Business capability focused Strategy development
- Digestible initiative scope for quick return while building a holistic capability
- Financial plan & ROI

Process Development & Improvement

- LSS/DFSS expertise
- Metric driven process delivery
- Financial plan & ROI

Authoring Technology Implementations

- Best Practice methodology development
- MCAD - CREO / NX / Solidworks/ SolidEdge/ Catia
- ECAD - Cadence / Mentor / Allegro
- Simulation - Ansys/ MathCad , etc.
- Quality - QC Calc/Reliasoft / PQA / SaaS / PCDMIS
- Mfg Applications - Delcam / NX Cam / Mastercam / ICAM / Polyworks /Vericut

Process Technology Implementations

- Portfolio & Project Management
- Bill of Material Management –EBOM-MBOM-SBOM
- Configuration/Change Management
- Integration of ALM (S/W and H/W) into BOM and Change Management
- System Engineering
- Validation/Verification
  - PPAP / DVP / FMEA /FRACAS/CAPA
- Manufacturing Execution Systems (MES)

Deployment and Training Strategies

- Best Practice methodology training
- Organizational change management
- Hypercare
- Retrospects
- Embedment assessments

PLM Implementation Scenarios

1. **Creation and alignment of strategy**
2. **PLM Assessment and Roadmap**
3. **Enterprise-wide process definition and technology implementation for an integrated systems environment**
   - Item definition, bill of material management, product configuration management
4. **Functional process definition and technology implementation**
   - CAD Data Management
   - Software Configuration
   - Validation Process and System
5. **Integration of PLM with ERP**
   - An integrated Bill of Material Process – CAD BOM, EBOM, MFG and SBOM Views
   - Transactions and associated product information integration

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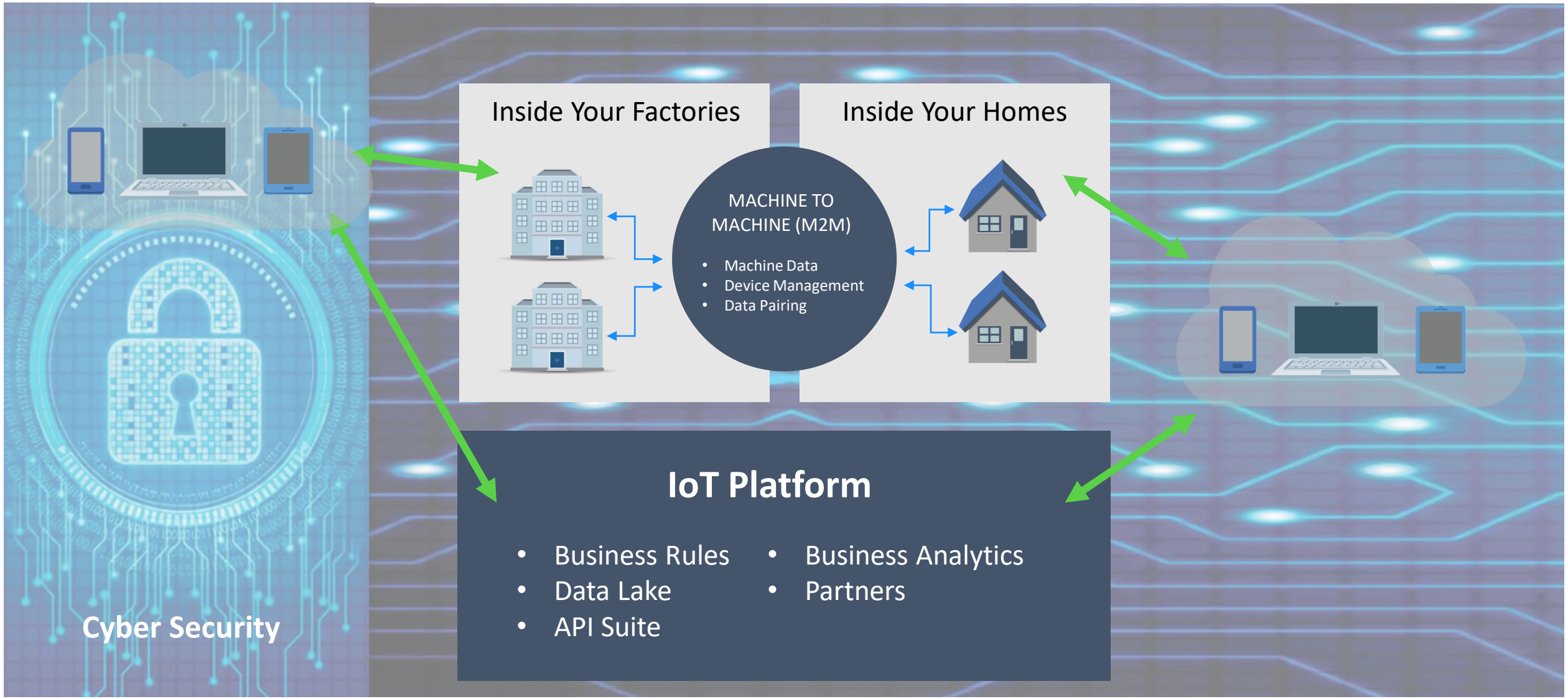
Top Reasons for Internet of Things (IoT)

1. **Preventive Maintenance** – Predict problems before they happen
2. **Remote Monitoring** – Constantly collecting data & measuring performance to be sure that processes are efficient and yielding high product quality.
3. **Remote Control** – Remote monitoring offers endless possibilities in manufacturing.
4. **Location-Based Services** – Including service, infrastructure, water management, transportation, emergency and disaster management.
5. **Auto-replenishment** – Maintain accuracy in inventory and ordering while saving on staffed resources
6. **New business revenue streams** – Additional features such as mobile pay, intermediary opportunities and prevention / service opportunities.

IoT Strategic Landscape



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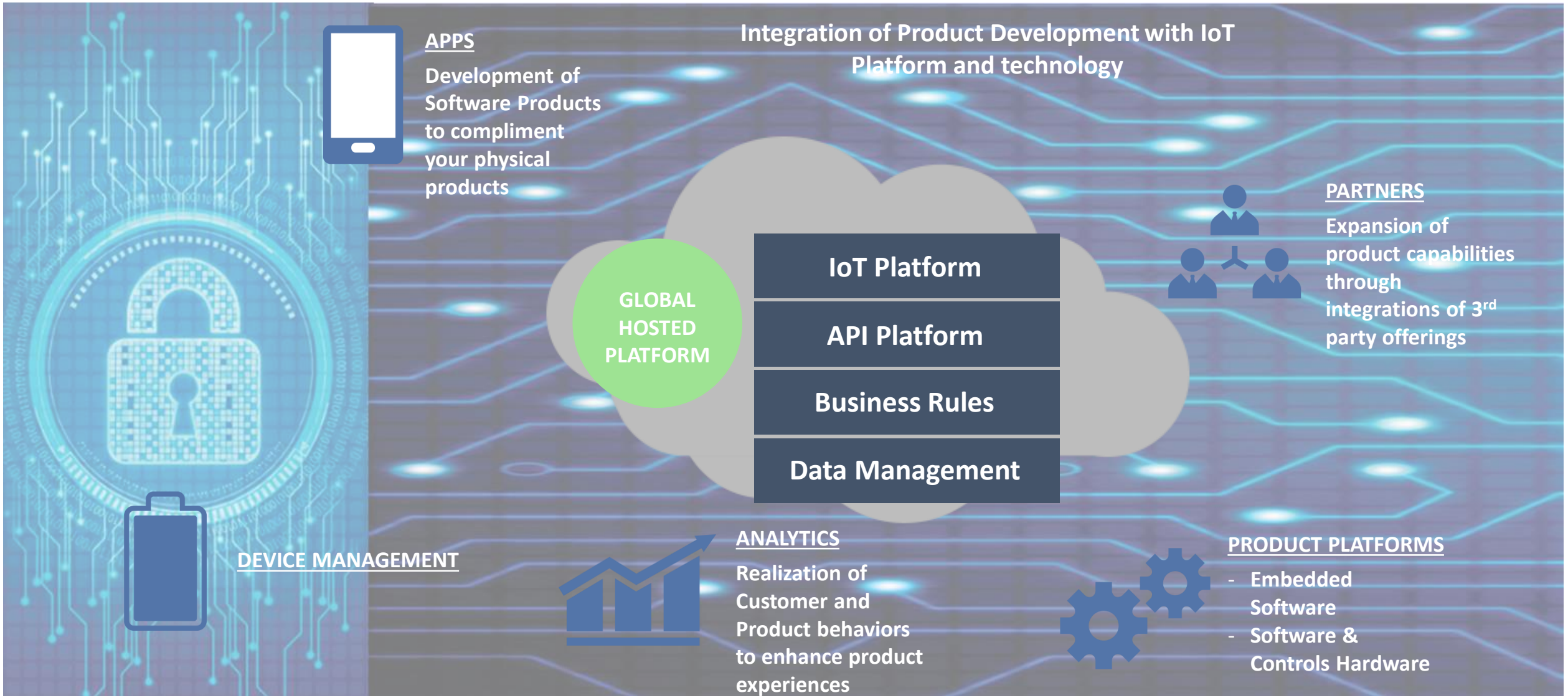
IoT Reference Model



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IoT Implementation Scenarios

1. **Creation of strategy and departmental alignment and roles**
2. **Enterprise wide Platform Implementation**
   - Smart Connected Manufacturing Operations
   - Smart Connected Consumer Products
3. **Development of additional software services/solutions to your product**
   - Native App Development and integration with your customers via 3rd party offerings
   - Product in-service performance
   - Integrated Service offerings
   - Analytics and Visualization
4. **Integration of Physical Product and Digital Products**
   - Long life products refreshed via software products
   - Customer interaction and intimacy

Connected Product Development

Development of a connected product environment by connecting the "physical" world with the "digital" world:

- **Throughout the development of the Product/Service**
  - Simulation of the digital product to the physical test specimens
  - Virtual commissioning of the process through simulation
  - Simulation of the software and controls
  - Simulation of product performance
- **During the Manufacturing of the Product**
  - Manufacturing floor real time connectivity, visualization and analytics for predictive measures and improved operational efficiency
- **Service of the Product / Service**
  - Product in-service performance to predict failure
  - Integrated Service offerings to improve customer service
  - Continuous customer interaction and intimacy

Cybersecurity Approach

- Our cybersecurity practice is focused on securing connected factories and connected product
- We conduct vulnerability assessments and penetration tests on those environments
- Based on the organization's risk posture we guide and recommend investments in the cybersecurity arena ensuring the critical assets are protected
- Educate and make your first line of defense your "employees"

Cybersecurity

- **Identify the risk:** What's my current posture identified from the Vulnerability Assessment, "what was found". We generate a report that shows the exact Vulnerabilities.
- **Asses the Risk:** "How bad is it, what does it take to remediate it?" Our report includes a Risk Level.
- **Control Risk:** "What is the guide to what controls or fixes I need to use to fix the vulnerability"? We identify what needs to be done by your IT team for remediation. Every assessment is unique, if support is need for remediation further discussions for this service can be conducted.
- **Review Controls:** "After the remediation is completed another scan can be conducted to see if the vulnerability is resolved and the risk has been mitigated."
- For companies preparing for government certification and/or compliancy, reports can be requested showing current PCI-DSS, GLBA, PII, and RMF (FISMA) posture.

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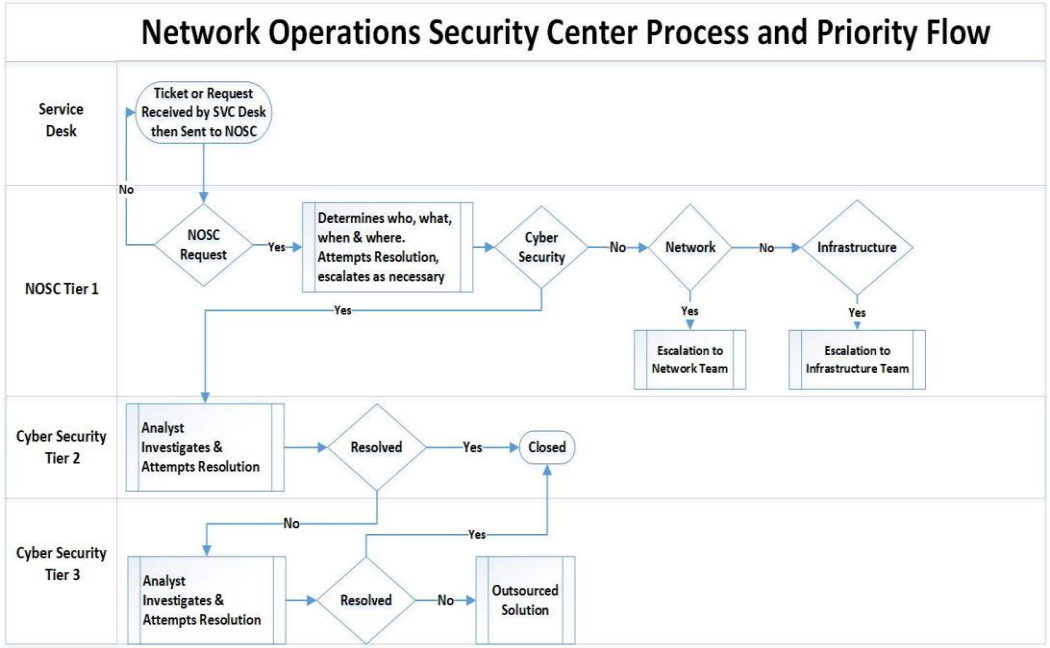
Cybersecurity – NOSC after "Go Live"

- Network Operations Security Center (NOSC)
- Monitoring Tools - Driven-4 conducts all vulnerability assessments and penetration testing utilizing secure and compliant tools.
- Nexpose / Metasploit / Kali and its Suite /Black Arch/SonarQube/Veracode (static code analysis)
- NOSC Team and Process Overview



Job Title	Duties
Tier 1 **Alert Analyst**	**Continuously monitors the alert queue; triages security alerts; monitors health of Network / security sensors and endpoints; collects data and context necessary to initiate Tier 2 work.**
Tier 2 **Incident Responder**	**Performs deep-dive incident analysis by correlating data from various sources; determines if a critical system or data set has been impacted; advises on remediation; provides support for new analytic methods for detecting threats.**
Tier 3 **Subject Matter Expert/ Hunter**	**Possesses in-depth knowledge on network, endpoint, threat intelligence, forensics and malware reverse engineering, as well as the functioning of specific applications or underlying IT infrastructure; acts as an incident "hunter," not waiting for escalated incidents; closely involved in developing, tuning and implementing threat detection analytics.**

Cybersecurity Scenarios

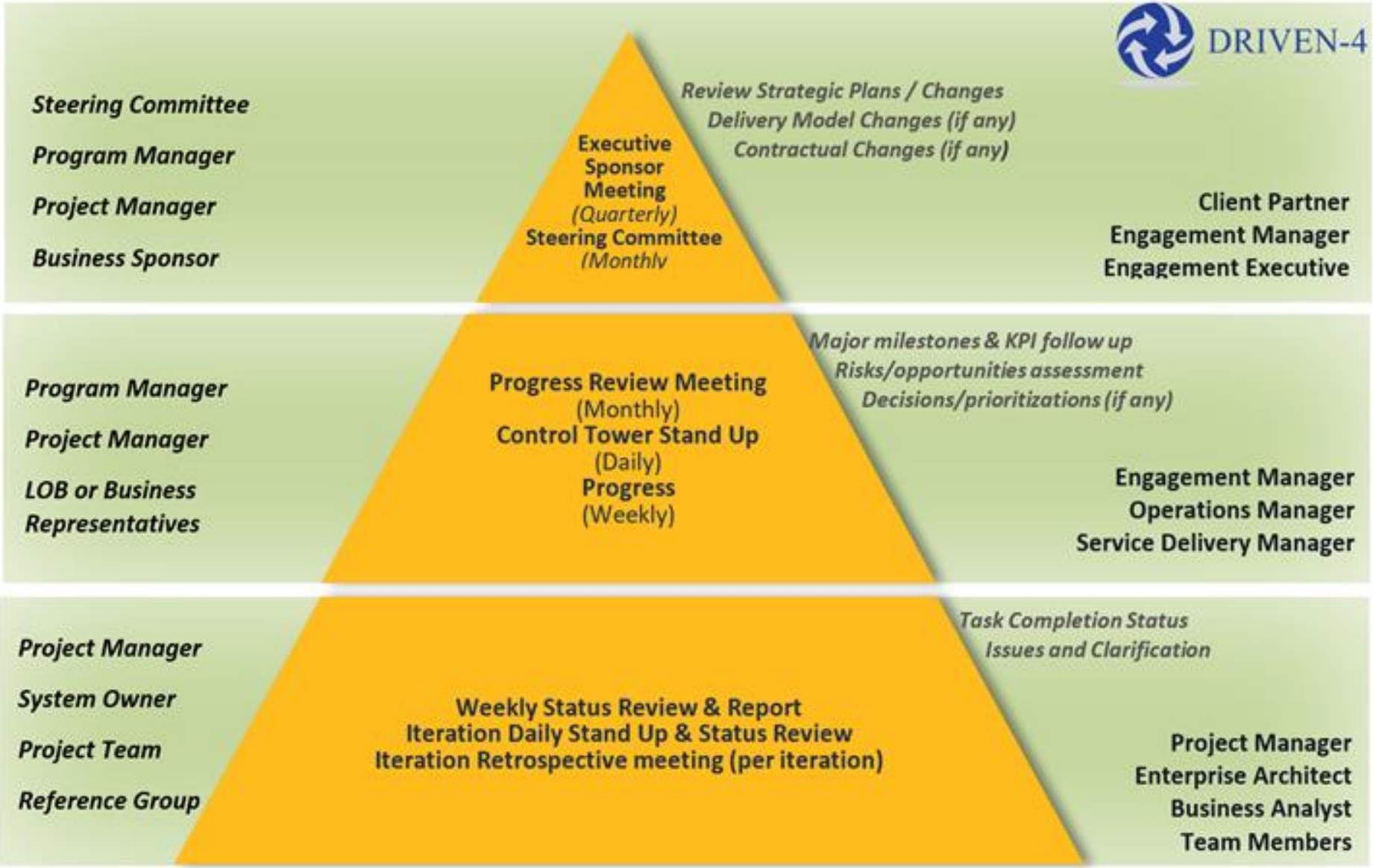
- Assessment based on Company goals and current environment
- Penetration Test & Vulnerability Assessments
- Plan of Mitigation
- Risk Management
- Compliance Roadmap
- Cyber Security Awareness Training
- Certification and Accreditation Packages

Operations

We can provide the needed infrastructure and personnel to provide a working platform and environment for your organization

1. **Operation and Management of your "Development" Environments**
   - Development, Test and Stage Environments
   - Testing & QA Capability
   - Dev – Ops Capability
2. **Operations and management of your "Production" Environment**
   - Performance Monitoring
   - Operating System, Database and Security Patches
   - Scaling and Sizing for optimum usability
3. **Operational SLA's, Backup / Recovery and Disaster Recovery**
   - Uptime measurements
   - Backup / Recovery resilience
   - Disaster Recovery capabilities
4. **System Continuous Improvement**
   - Bug Fix
   - New Feature Development and Introduction

Our Project Governance Process



Our Presence and Partners

DRIVEN-4 at glance

- 2017 DRIVEN-4 Started Sales office with PTC & Siemens partnership
- 2018 setup India Engineering & Technology Delivery excellence
- Listed as Top 20 IoT Solutions Provider in the US region
- Delivered Engineering & PLM offshore services for the US & EU customers
- DRIVEN-4's Engineering data migration framework "Rover" success
- Scaled operations in CAD, PLM, IIoT, Data, Cloud, Web & Mobile Applications
- Customer success with MBSE, PPM, FMEA, LIMS, DevOps process implementation

3+ delivery centers,
4 countries

We are small in numbers but **Big in experience**.
That makes us agile, value driven and easy going.

30+ clients for Engineering & PLM services

100+ engineers with **15+** years of average experience

3+ large deliveries with engineering & IT services

Partnerships with PTC, Siemens, Oracle, Planview, Planisware

$50 Million Business impact Delivered through services

Complaint Getting ISO 27000 certified

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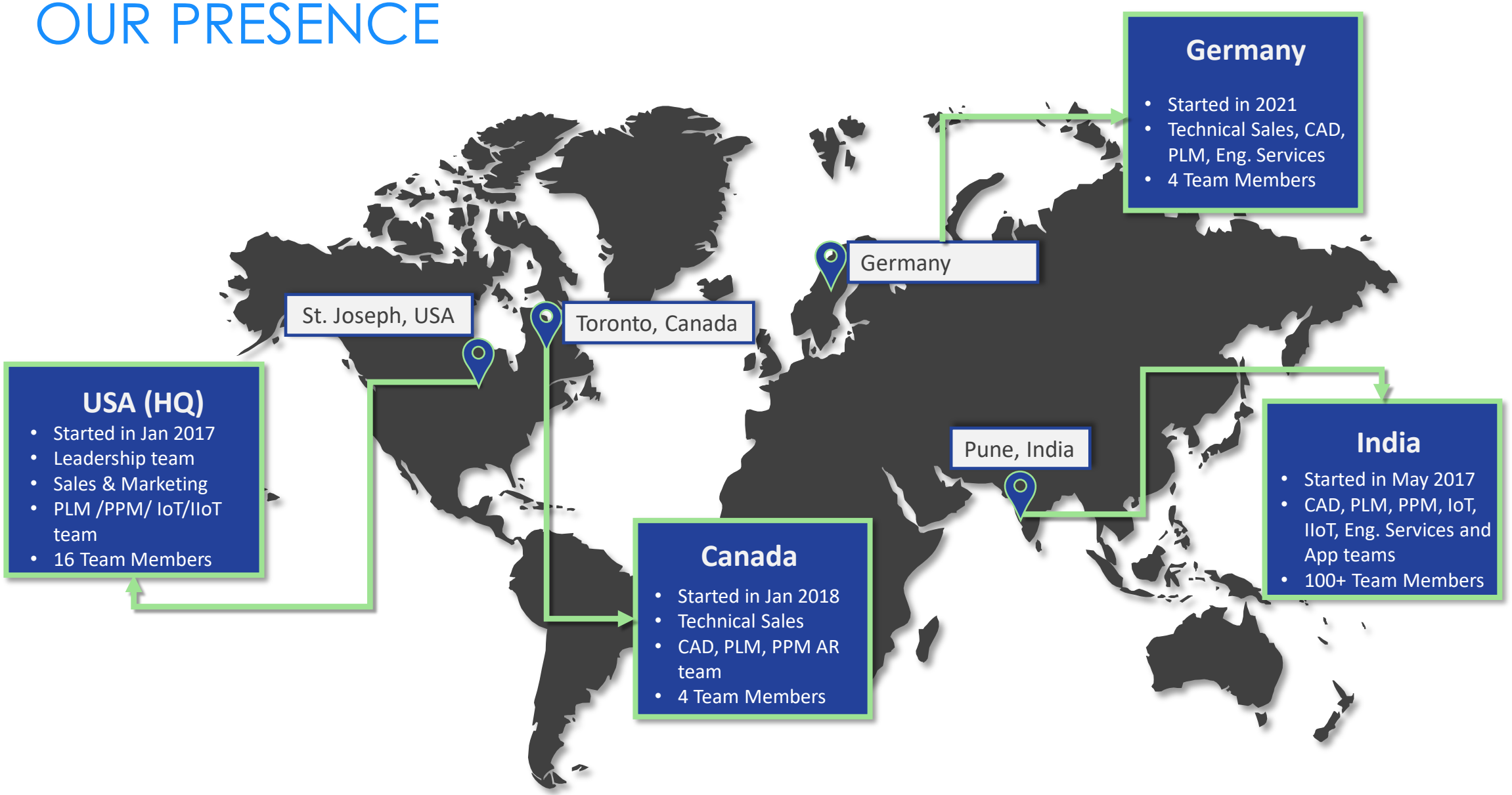
OUR PRESENCE



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Partners and Achievements

Partners

ptc

SIEMENS

planview

Planisware
Get innovation to market

jama software

IoTco

Microsoft

Technologies

PPM/PLM

planview

Planisware
Get innovation to market

jama software

aras

windchill

TEAMCENTER

predictronics

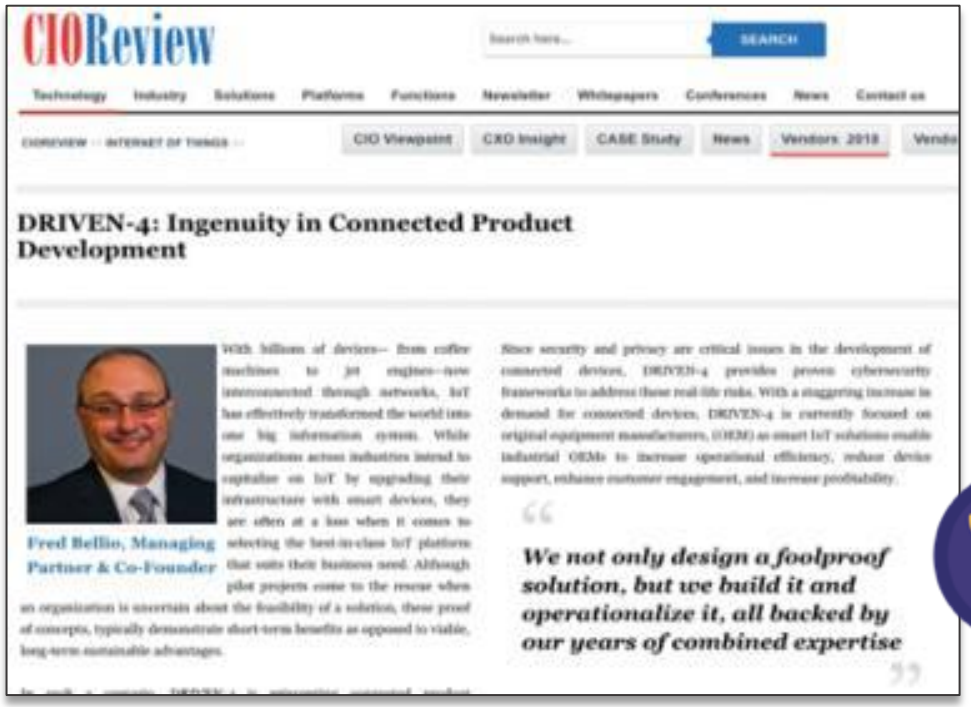
IoT

thingworx

MindSphere

pdx
A PREDICTRONICS PLATFORM

DRIVEN-4 Listed in 20 Most Promising IoT Solution Providers 2018


CIOReview

DRIVEN-4: Ingenuity in Connected Product Development

Fred Bellio, Managing Partner & Co-Founder

We not only design a foolproof solution, but we build it and operationalize it, all backed by our years of combined expertise

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Introduction – Our Leadership

Fred Ballio
Co-Founder & Managing Partner

Strong background on manufacturing and supply change.

Previously, EVP & CIO at Ashley Furnitures & CIO GPO at Whirlpool Home appliances. Responsible for strategies & implementing connected appliances, rolling out PLM program.

Bala Shetty
Co-Founder & Managing Partner

Bala has 23 years of hands on experience in manufacturing.

Previously, responsible for strategies & implementing smart factories, rolling out PLM program at Whirlpool. Bala was part of the leadership team which founded Brunswick`s Mercury PLM/Digital Services in 2008.

Carl Wendtlend
Co-Founder & Managing Partner

Carl has 23 years experience in Systems Development and Operations.

As the Technology Leader for the Internet of Things (IoT) global platform at Whirlpool, Carl was accountable for bringing connected consumer and commercial products to market.

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Customer Success Stories

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Windchill + Process Docs + Thingworx + Vuforia + SAP = Digital Instructions

PRODUCT → PROCESS → PROCEDURE → WORK INSTRUCTION

Consumer Products

Integration of enterprise information and product configuration – delivered to the manufacturing shop floor or service technician in real time via an AR mechanism

SAP® ERP

ENGINEERING PRODUCT INFORMATION

RQTS, CAD, ECAD, S/W, eBoM, DFMEA, DVPR, TEST RESULTS

+

MANUFACTURING PROCESS INFORMATION

TOOLING, mBoM, PFMEA, QUALITY DOCS, PROCESS DOCS, PPAP

+

SERVICE PRODUCT & PROCESS INFORMATION

SERVICE PROCESS DOCS, TECH DOCS, sBoM, SERVICE CALL CENTER DOCS

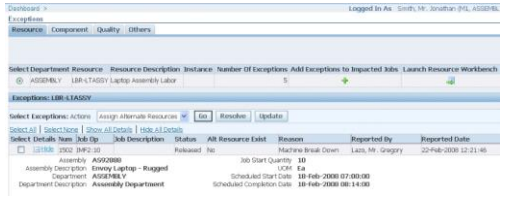
ENTERPRISE PRODUCT CONFIGURATION

CAD + 

BOM + 

PROCESS DOCS +

SCHEDULE



 = *DIGITAL WORK INSTRUCTIONS*

SBOM + *SERVICE DOCS* +

 = *DIGITAL SERVICE INSTRUCTIONS*

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Thingworx + Windchill + Vuforia + SAP = Digital Work Instructions

- **A Smart Digital Work Instruction System -** a solution for companies that need to improve their production quality and augment worker performance by integrating PTC Windchill, Thingworx and Vuforia with integration into SAP.
- App is **developed in Vuforia** with intuitive UI and it uses **Thingworx for connected operations to** deliver work and assembly information
- It also connects production actual delivery with Product specification and tolerances using **PTC's ThingWorx** and **Connection to PTC Windchill and SAP.**

Consumer Products

- Allows **integration** between engineering information and the shop floor
- Ability to **Deliver** digital work instructions and **Track** production floor performance to product specifications.
- Shop floor supervisor can **Monitor employee certification** to perform required tasks.
- **Manages** current and historical **production results** and provides production quality trending and performance.
- Integrates real time SAP execution schedules into the **digital work instruction system**
- Digital work instructions can be visualized via AR APP **utilizing Vuforia capabilities.**

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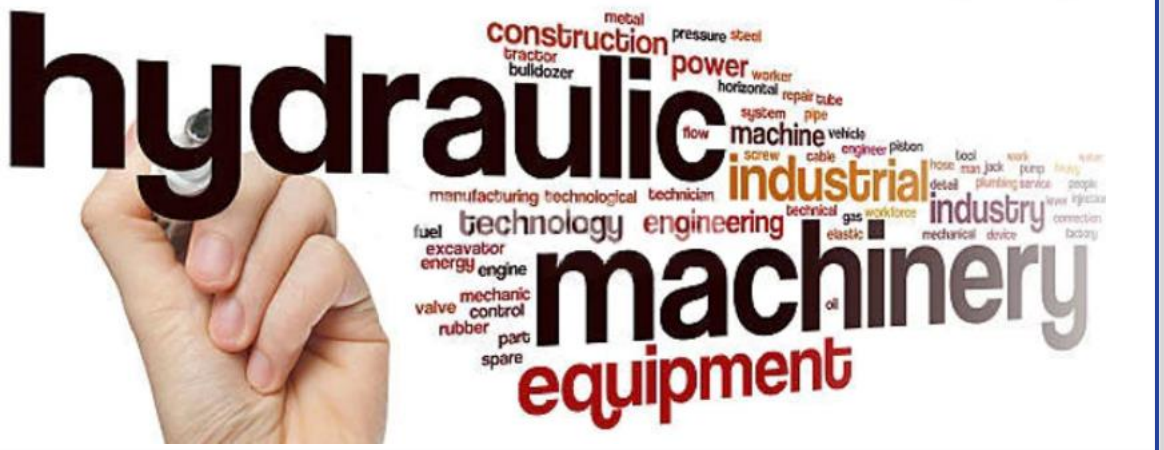
Windchill - Restructuring

Windchill Re-Implementation



Situation / Challenges

- Unorganized Product Data – data conflicts and corruption.
- Multi Org scenario, high number of Products and Libraries, uncontrolled folder – Poor user experience.
- Complex access control rules – administration nightmare.
- Region & products wise multiple ECNs – Process administrator.
- Challenges in implementing Part classification.
- Intricate to adopt EBOM management in system.
- Challenges in supporting business diversification / consolidation.

Solution

- Transform Multi org to Single org – consolidate and diversify data based on business needs.
- Redesigned Product Context based on CoE – logical segregation.
- Libraries based on engineering standards - common & standard parts, policies and procedures, specification and compliance.
- Subtype consolidation-based functions - Model, Components, Assemblies, Raw Material, Phantom.
- Enterprise wide ECN process and standard lifecycle states.
- Simplified access control separating access roles and process roles

Benefits / Results

- Improved and simplified User experience.
- Well organized product data management.
- Effective data classification and easy data search.
- Streamlined access control rules – less admin overheads.
- Standardized change processes – easy to report out & administer.
- Possible to manage and translate EBOM to MBOM.
- Data security compliance requirements with security labels.
- Better process and data visibility within the system.

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Windchill - BOM Management

Windchill BoM Management

Situation / Challenges

- Eng and Mfg have different perspective – eBOM ≠ mBOM .
- eBOM rarely fits Manufacturing constraints - different plants.
- Manage increased product variability and complexity.
- Shortened development schedule - Mfg can't wait until the complete eBOM is released to create an mBOM, which is critical to start Mfg planning.
- Small changes in Eng. have a large impact on Mfg. and Production.

Solution

- Create mBOMs directly from the eBOM and manage both BOMs within the same PLM system.
- Re-use of eBOM parts to a great extent – minimize part proliferation
- Use "consume from upstream BOM" while defining the process plan in order to automatically derive the mBOM
- Start the creation of the mBOM before design release and instill mBOM under formal configuration management.

Benefits / Results

- Provides Flexibility - Manufacturing equivalent parts, Plant specific BOMs, alternate BOMs
- Traceability - Bidirectional associativity
- Control and manage - Analyze and resolve BOM discrepancies, Change and Configuration Management
- Ability to compare side-by-side eBOM and mBOM in a single screen
- Concurrently develop BOMs - Ensure BOM conformity - Improve production planning

Thingworx Navigate + Project Link = Project Tracking System

- **Project Tracking App** is used for creating and tracking project plan, tasks and issues, while connecting PDM Link data.
- This is a **custom Thingworx Navigate App** – to avoid a cumbersome project link UI and provide a user-friendly graphical components.
- It leverages **Project Link functionalities** like Plan, Tasks, Issues, Teams access, discussion forums and notifications.

Actual Screens from Project Tracking System

- **Quick start Project Plan** – define tasks, issues and activities.
- Clean **Project dashboards** to track projects, plan activities, milestones, tasks and issues status.
- **Issue tracker** – access all issues for status, resolutions, risks, schedule impacts and cost impacts.
- **Intuitive project dashboard** - Simple, easy access to program status, project information and activity tracking.
- **Discussion forum** – collaborate across multi teams, discuss resolutions, record all inputs and tag it to tasks/ issues.
- **Notification and alerts** – highlight due dates, high-risk items, monitor cost impacts and sends alerts.

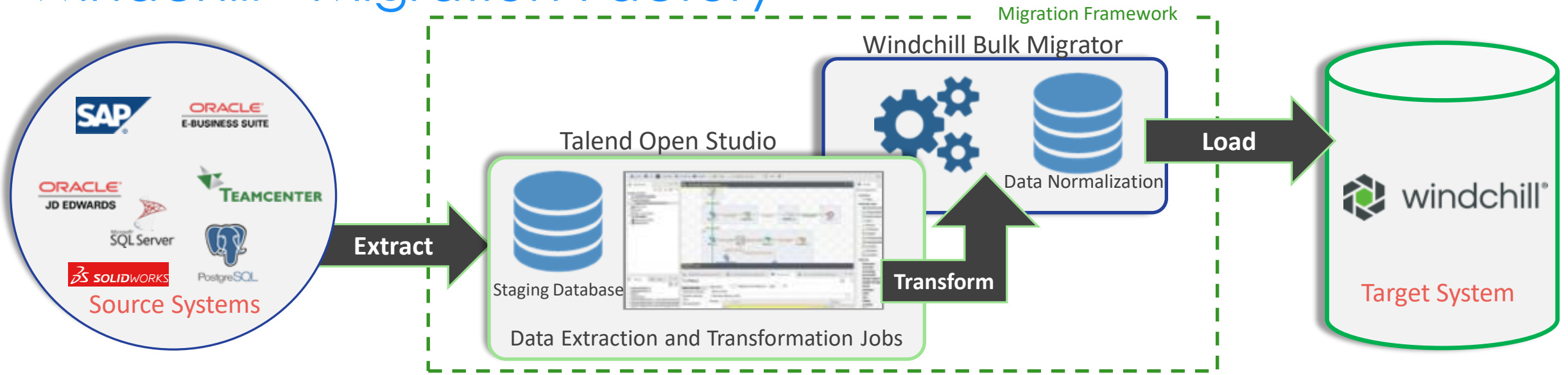
Thingworx Navigate + Change Process = Product Management Report

- **Product Management Reports (PMR)** provides live updates for management team, leads and users to track ECNs.
- It is created as a **custom Thingworx Navigate App** – it pulls CN, Deviation and Part Creation process real time data from Windchill.
- **Consists of 14 reports** showing Process information in different formats – process status, users wise, dates wise, priority tasks, delayed projects.

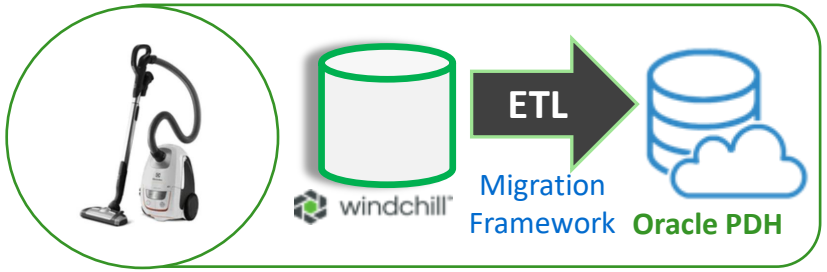
Actual Screens from PMR App

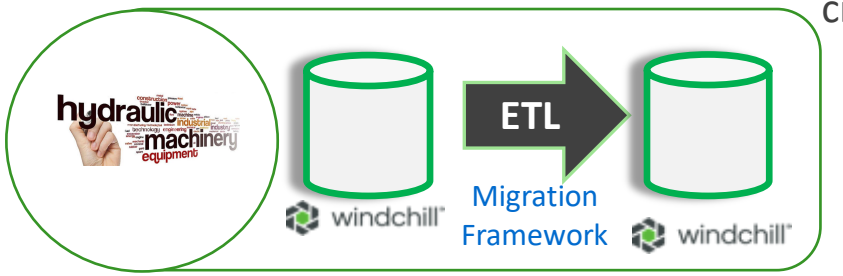
- **Govern Engineer Change** – Provides visibility on Change implementation across all projects in a organization.
- **Track Implementation Process** - Different types of reports to show change implementation progress–daily, weekly, monthly & quarterly
- **Resource management** – reports to groups change been implemented based on users, teams sand project in live system.
- **Intuitive dashboard** - simple, easy to access reports – hyperlink to objects in Windchill to access more details.
- **Help Analyse** – change data for impediments, product complexity and system effectiveness.
- **Notification and Alerts** – highlights due dates, high-risk items, product and project impacts.

Windchill - Migration Factory



Success Stories





Talend Open Studio provides Graphical design interface to design ETL process and automate execution.

- TOS has built connectors for SAP, Oracle EBS, Oracle DB, SQL Server, SFTP, LDAP.
- Provides integration with eclipse IDE to develop jobs, supports SQL statements, reports in CSV, HTML etc.

WBM converts extracted data in Windchill understandable format based on mapping jobs created in TOS.

- Data normalization repairs broken linkages, reports data integration issues and help sequence the loading process.
- Loader maintains data integrations, content metadata, preserves process states.
- Entire operation is automated – jobs, sequence, connections, validation, checklist created during rehearsal – to be reused for production cycle in auto pilot mode.

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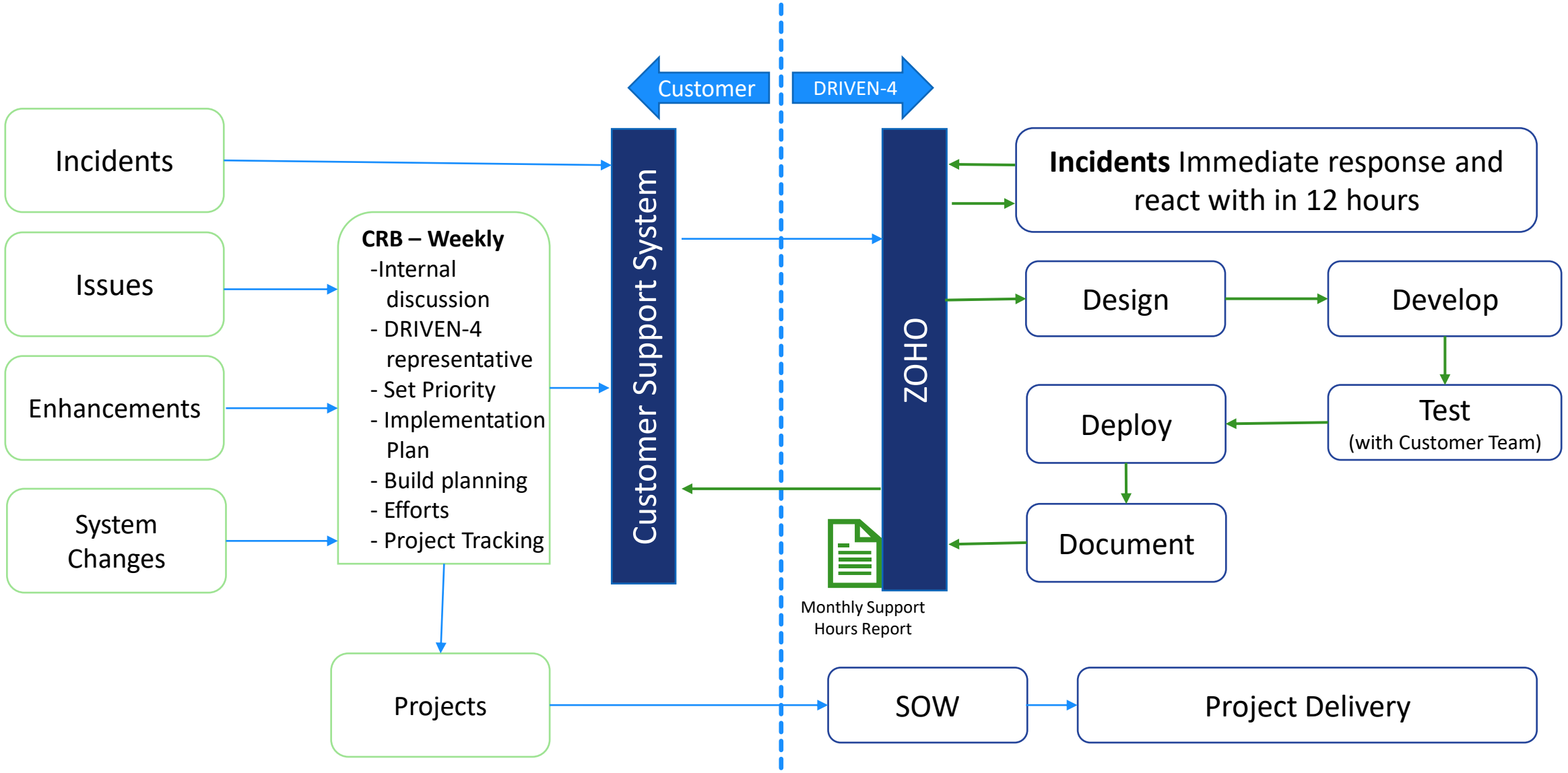
Windchill Application Managed Services



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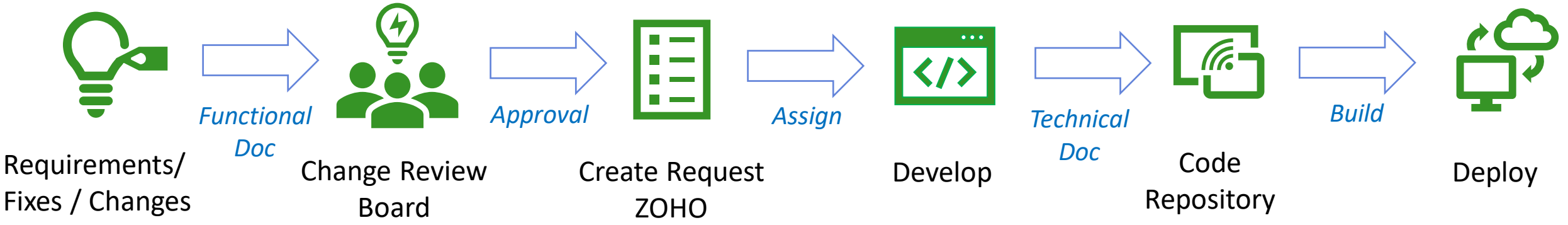
Windchill Application Managed Services



- **Changes** – All configuration, process, code, system changes are to be owned by CRB and documented.
- **CRB** – to approve, priories and discuss all changes in forum and recorded.
- **DARWIN** - incident for all changes. Record assignee, schedule, functional and technical document for closure.
- **Source Code Management** – all changes are preserved in repository with number for trackability.
    - Record changes - process, type attribute, access controls, code, system, interface, teams.
    - Day to day changes – user management, projects creation.
- **QA Deployment** – All changes are deployed and validated on QA system before production deployment.
- **Production deployment** - to be approved by CRB. Once in month deployment by dedicated deployment team.
    - Create cumulative source code build for deployment.
- **User Communication:** Email broadcast for critical changes

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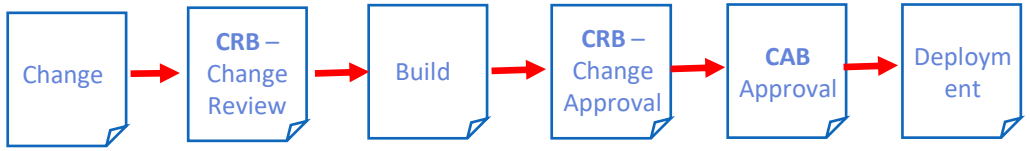
Windchill System Governance Approach

Off the shelf Windchill application is constantly enhanced to meet business needs. Over time multiple customizations, configurations and interfaces are developed around Windchill. Below is the process and strategy to manage a Windchill application.

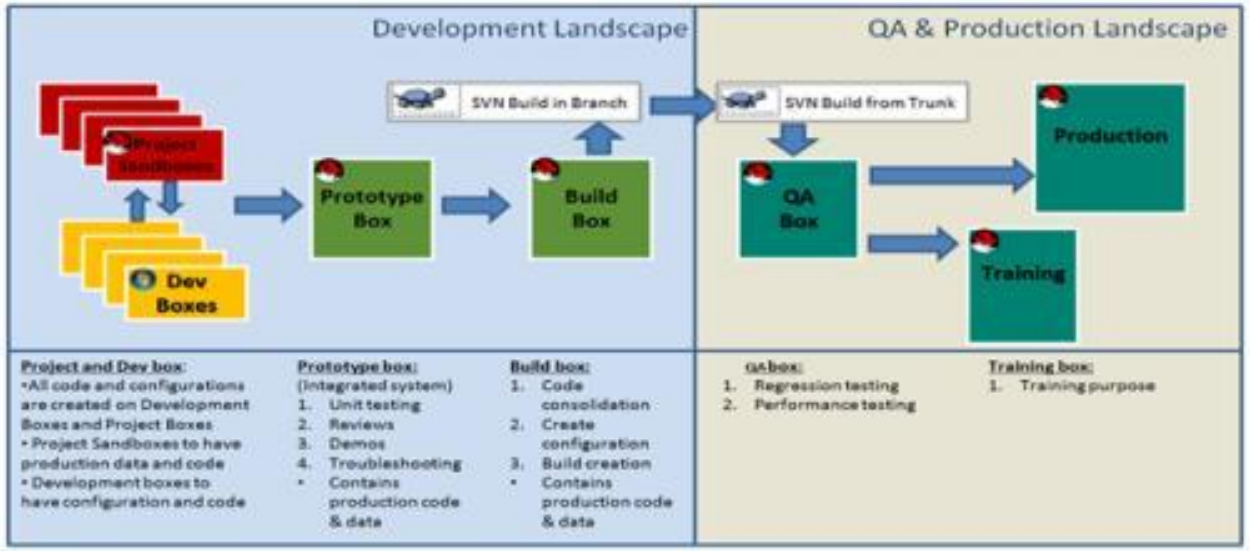
Governance Process:

Enterprise Applications - CAB (Change Approval Board): All application and system enhancements requires CAB approval before its deployment.



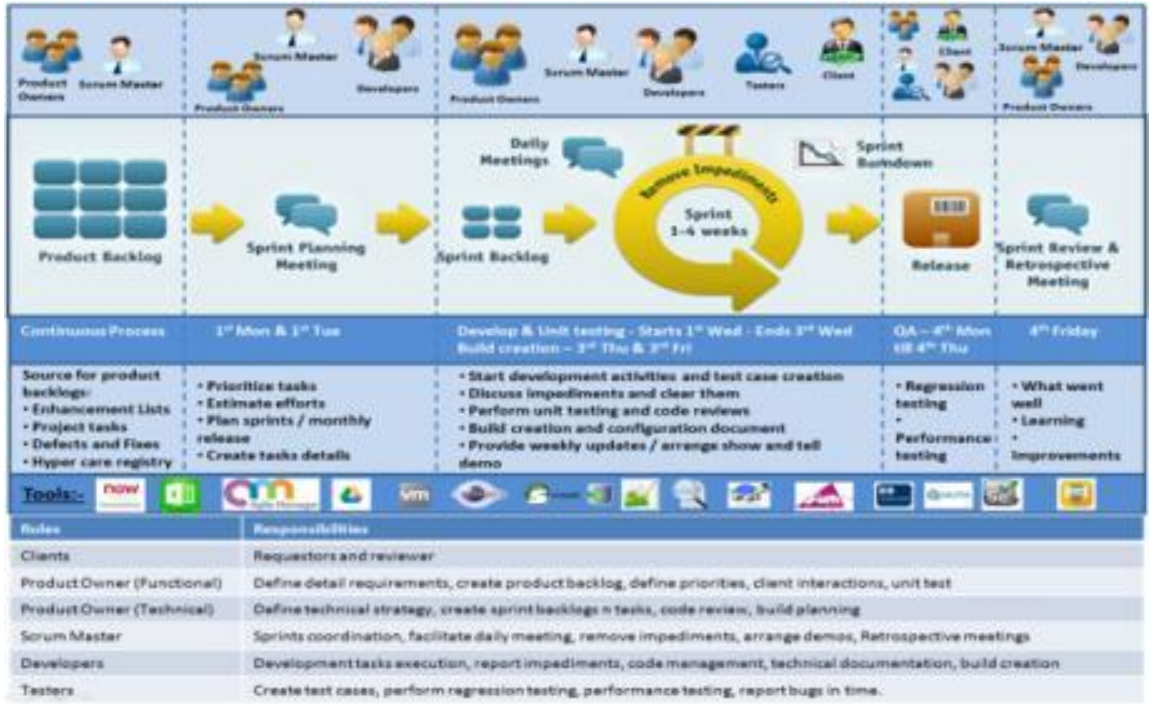
Deployment Process: Windchill deployment should be controlled process. Only Approved and Tested code to pushed to Production.

Source code management – Code merging – Build Creation - Deploy



Windchill - CRB (Change Review Board): All enhancements within GIS GPO are reviewed and approved by product owners before sending it to CAB approver.

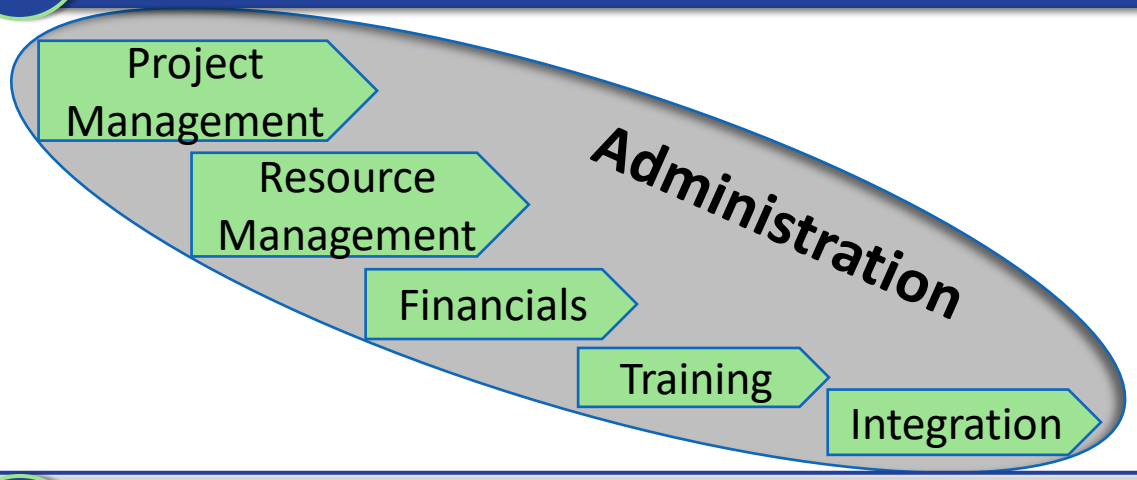
Development Process: Windchill application team follows Agile scrum process. Below picture explains the 4 weeks sprint process.



DRIVEN-4

Case Study: Auto Manufacturing OEM Customer

Planview Enterprise One PRM Deployment



Situation / Challenges

- Global manufacturer with regional business units and resource work locations (*USA, Mexico, Sweden, The Netherlands, Estonia, Brazil, India, China)* needing comprehensive project and resource management visibility and control
- IT organization looking for solution expertise to meet a variety of engineering business needs

Solution

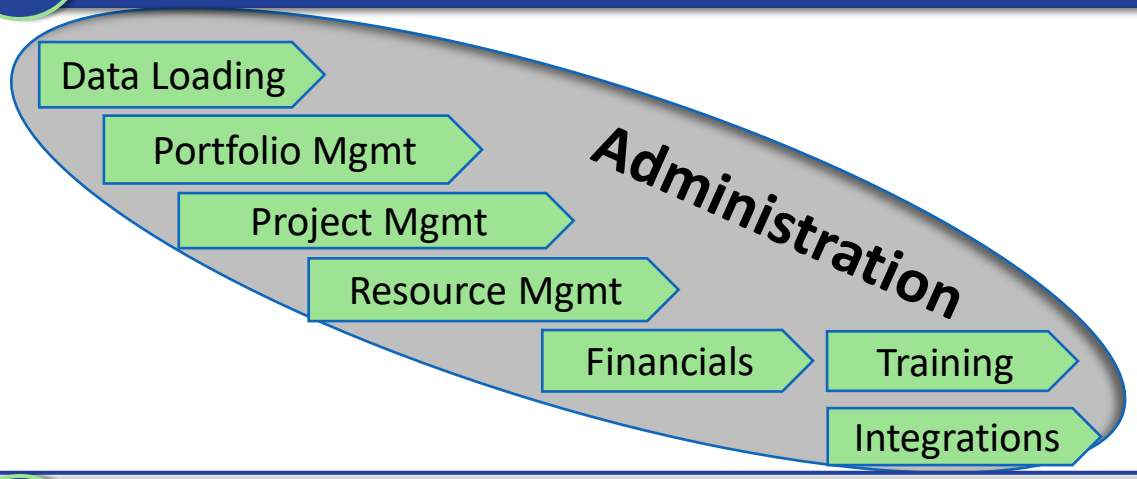
- Conducted business requirement gathering and impact analysis, technology evaluation and solution roadmap
- Deployed a global cloud-based PPM solution focusing on project management, resource management and financials
- Lead training to project and resource managers
- Lead global support including overall administration: user management, configurations, workflows, reports, integrations
- Leveraged development and testing environments with user acceptance before production implementation
- Evaluated, tested and upgraded to new versions

Benefits / Results

- Provided global visibility to projects (general information, schedule, issues, risks, changes) and resources, allowing improved decision making and control. "One source of the truth".
- Provided tools to analyze resource gaps, availability and utilization.
- Provided global collaboration on projects.

Case Study: Boat Manufacturer Customer

Planview PPM Pro Deployment



Situation / Challenges

- North American manufacturer with separate business units needing comprehensive project and resource management visibility and control
- IT organization looking for solution expertise to meet a variety of engineering business needs

Solution

- In process of deploying a global cloud-based PPM Solution focusing on portfolio management, project management, resource management and financials
- Configuring the system to specific process and data needs leveraging templates to drive project standards and ease data entry requirements
- Collecting and loading portfolio, project, resource data from the various units
- Implementing issue, risk and change processes
- Creating unit specific filters, dashboards and reports

Benefits / Results

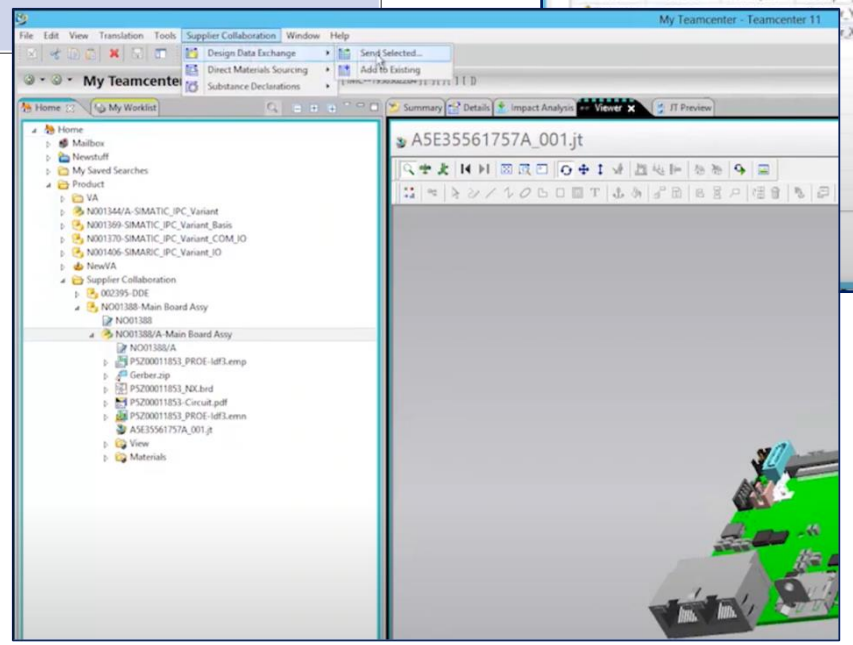
- Provides global visibility to projects (general information, schedule, issues, risks, changes) and resources, allowing improved decision making and control.
- Provides tools to analyze resource gaps, availability and utilization.
- Provides cross-unit and cross-functional collaboration on projects.

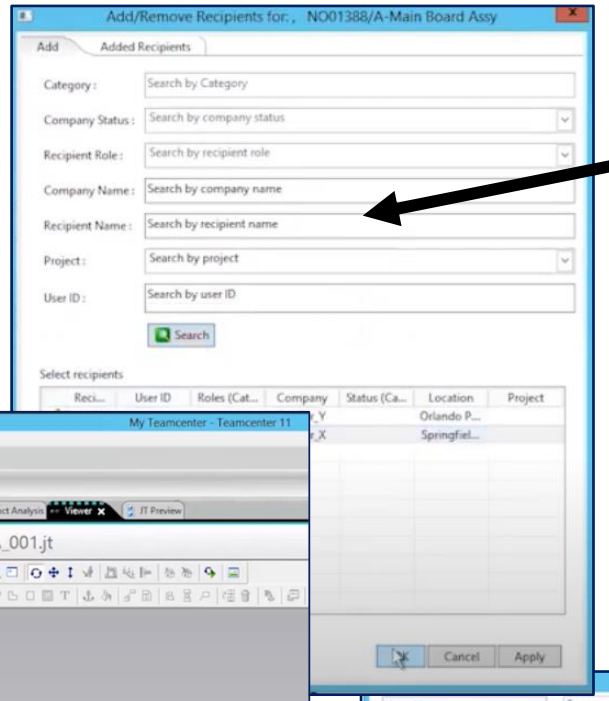
DRIVEN-4

Teamcenter Collaboration – Sharing Data With Suppliers

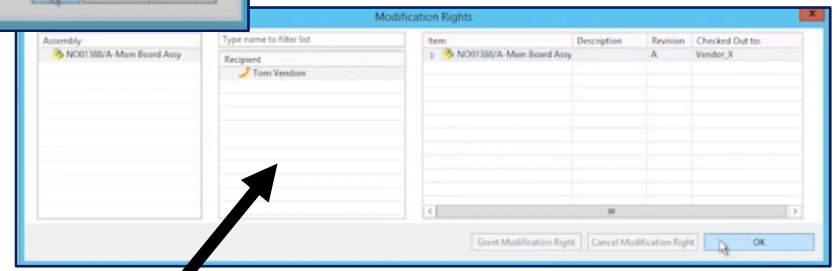
1. Design Data Exchange Module	2. Access rules and workflows
Specialized Siemens module to do data sharing	Custom solution we can design as per our needs.
Needs to buy separate license.	Use existing Teamcenter licenses.
For suppliers **outside** of your Teamcenter environment (supplier do not need Teamcenter)	For suppliers **inside** of your Teamcenter environment.
Suppliers use a secure **web portal** to receive requests and data packages from you and upload back.	suppliers use your **Teamcenter** to access data directly.
Efficient, secure, and scalable	Secure if VPN access. Depends on company IT policies.

- **TC Collaboration Tool**
  - Used to share the data with 3rd party for product development activities
    - You only select data which needs to be shared with the 3rd party





You can assign recipients as per company & its role

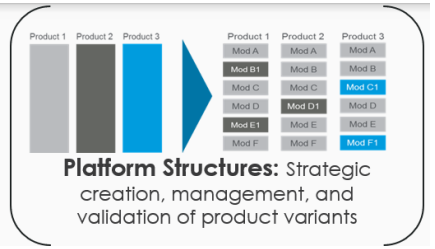


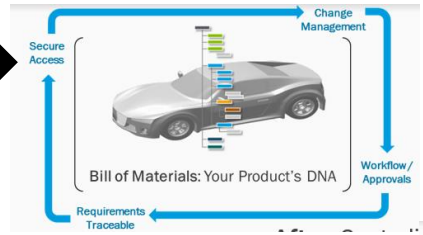
You can assign a person a modifications rights (if needed)

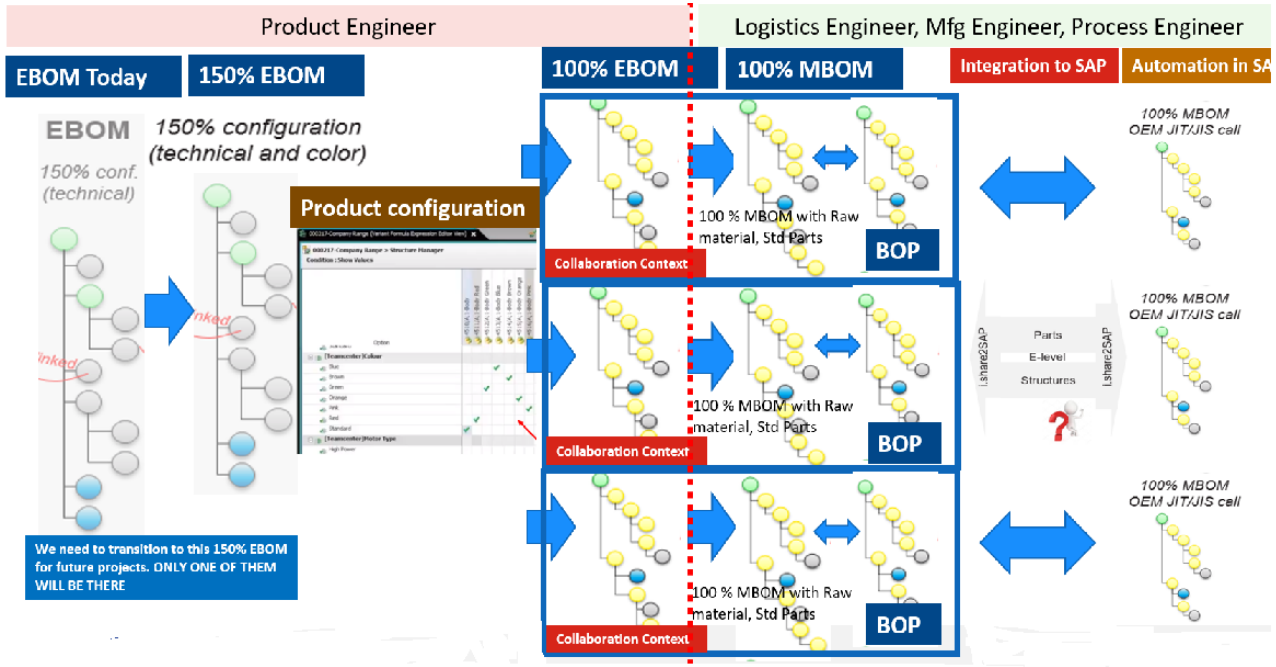
DRIVEN-4

Teamcenter – Managing Bill of Materials

- The development of the correct data model for Product Development within the Design Bill of Material (BOM) and Engineering Bill of Material (EBOM) and then the transition to the Manufacturing Bill of Material (MBOM
- To Manufactured Bill of Material - Process and Content
  - The creation of the needed Manufacturing product and process information that is needed to build the end OEM products. This will include the needed linkage and traceability between product and process.



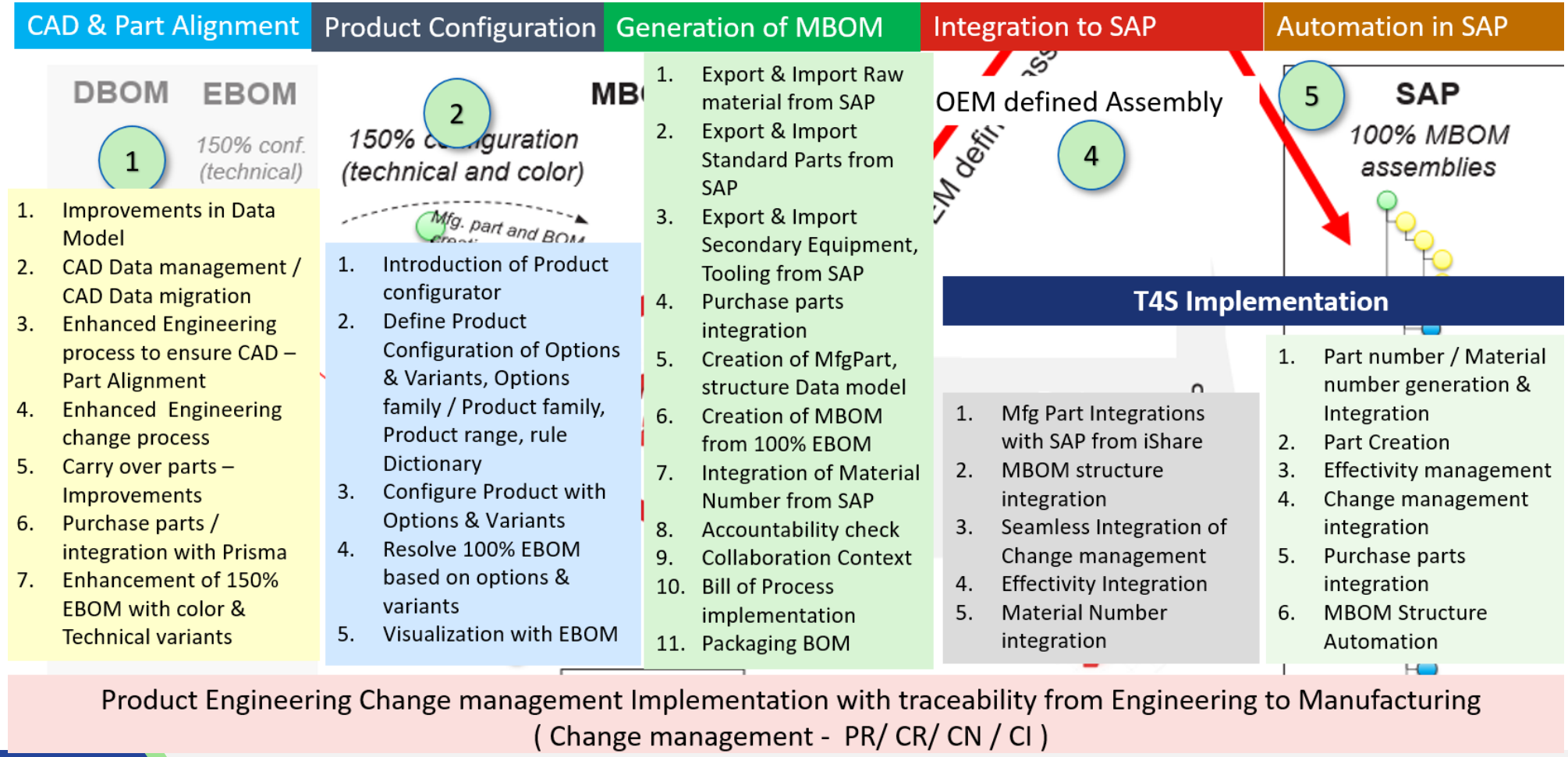




Teamcenter – Release Processes and Workflows

Holistic Product Change Management

- From CAD/Part *to* PRODUCT *to* MBOM *to* MBOM Automation



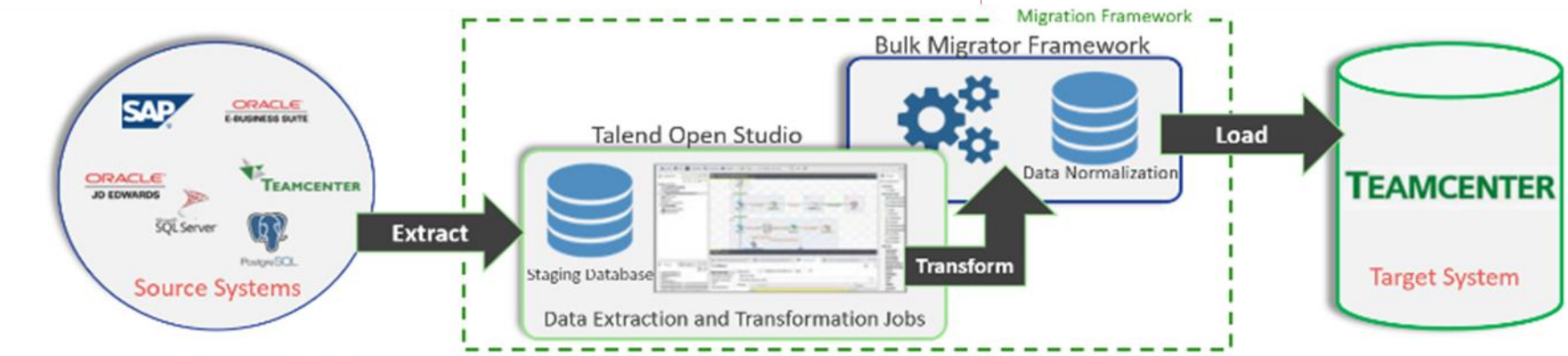
DRIVEN-4

Teamcenter – Data Migration

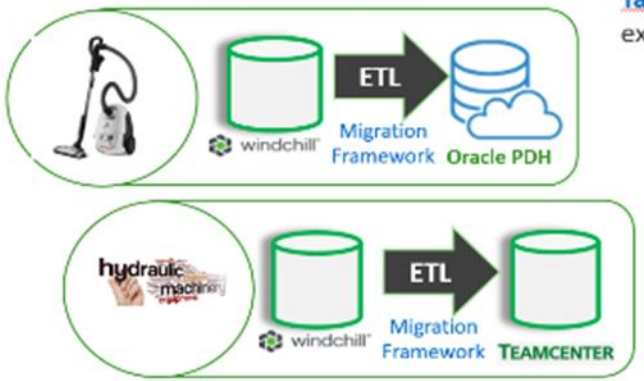
Solution overview

- PLM Data Migration/Transformation framework
- Graphical Design Interface to manage ETL process automation

Solution impact



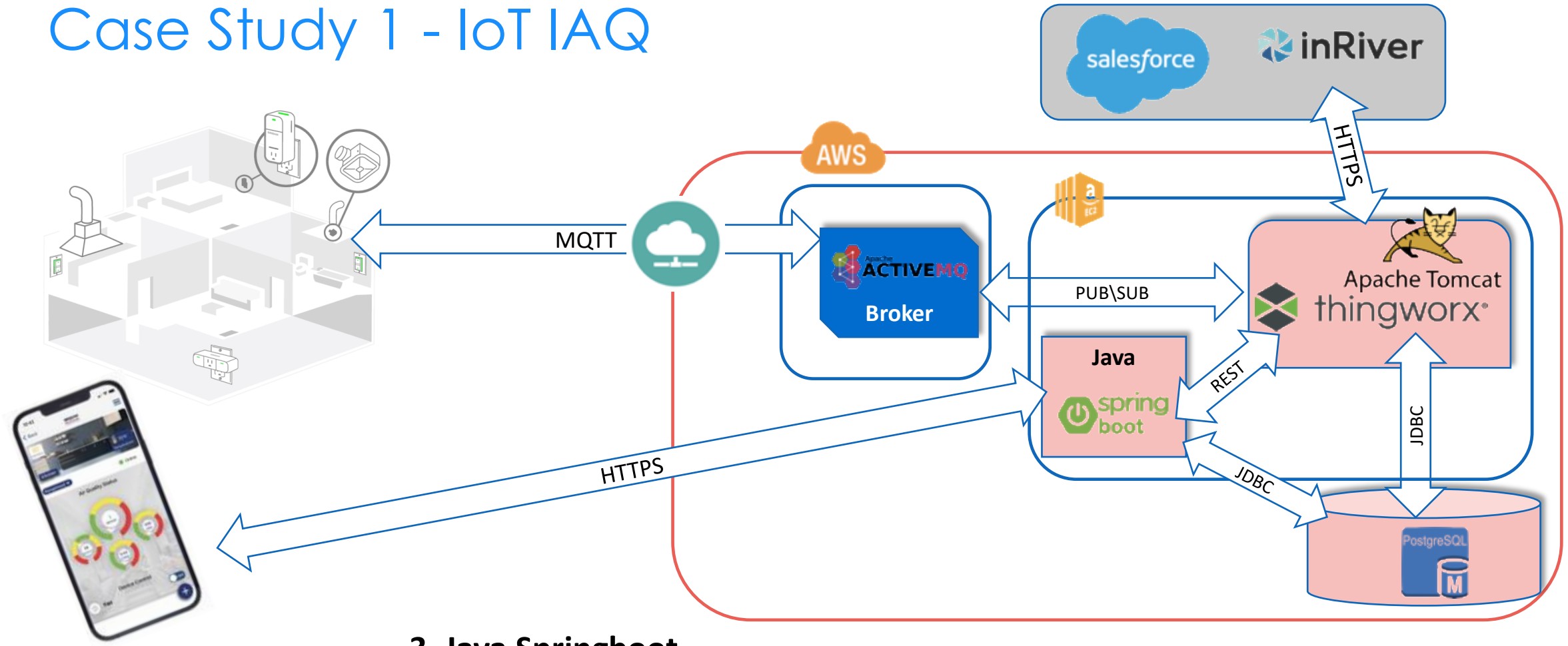
Success Stories



Talend Open Studio provides Graphical design interface to design ETL process and automate execution.

- TOS has **built connectors** for SAP, Oracle EBS, Oracle DB, SQL Server, SFTP, LDAP.
- Provides integration with eclipse IDE to develop jobs, supports SQL statements, reports in CSV, HTML etc.
- Data normalization repairs broken linkages, reports data integration issues and help sequence the loading process.
- Loader maintains data integrations, content metadata, preserves process states.
- Entire operation is automated – jobs, sequence, connections, validation, checklist created during rehearsal – to be reused for production cycle in auto pilot mode.

Case Study 1 - IoT IAQ



1. System:

- AWS EC2 Instance t2xlarge.
- Windows 2016 server
- VPC

3. Java Springboot

- Mobile App backend
- Customer Info
- Roles & Access
- REST Services
- Device ID Mapping

4. Thingworx IoT Platform:

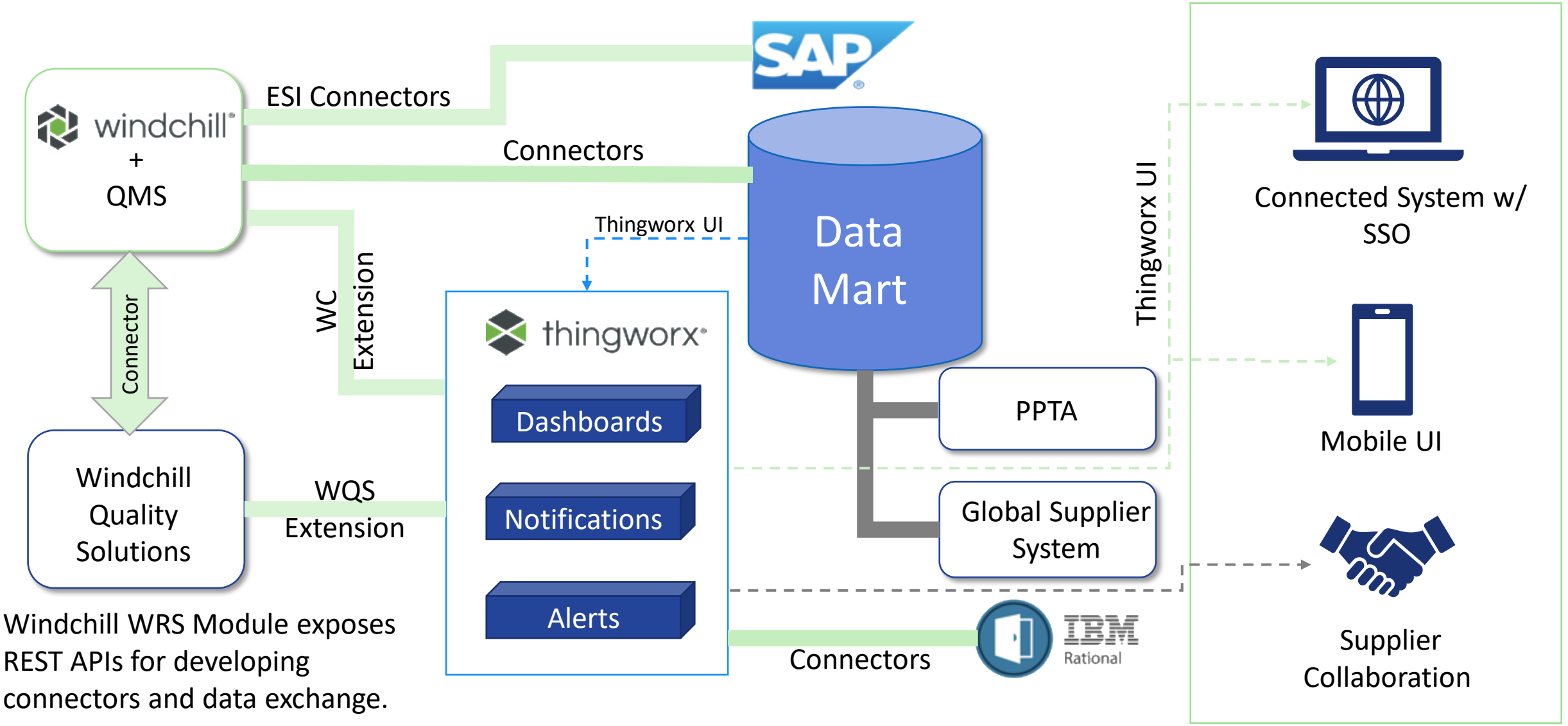
- Device Info
- Algorithm (Intelligence)
- Hardware ID
- Geo locations
-

5. Communication:

- MQTT to Device external IP
- MQTT to Twx - internal IP
- Java to Twx – internal IP
- Java to App – external IP

DRIVEN-4

Connected Engineering



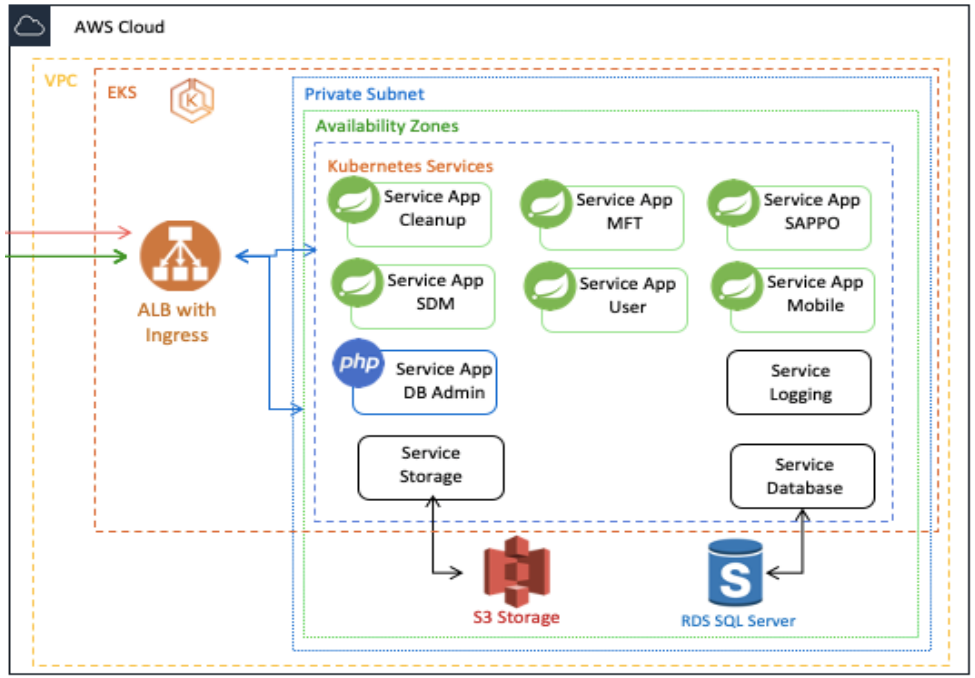
Windchill WRS Module exposes REST APIs for developing connectors and data exchange.

DRIVEN-4

Service Tools Migration on AWS EKS

- Service Tool is used by service technicians in the field to service non connected appliances.
- A hardware unit that connects to appliance control panel and mobile app to run diagnostics and collects logs
- Mobile app sends results to cloud application. Smart algorithm then triggers action to pull latest firmware from PLM
- The firmware file is then pushed to service technician's mobile device and then is flashed on to the appliance
- This helps in fast diagnostics, reduce product recalls and help resolves 90% of electronics issues on field

Architecture



Connected LIMS Solution – Manufacturing Lab

- **Smart Labs App is a Lab Information Management System (LIMS)** solution for companies that currently utilize PTC Windchill and incorporate the addition of Thingworx.
- App is **developed in Thingworx** with intuitive UI and it uses **Windchill in the background** for managing product information, test procedures, lab request workflow, users-roles, access rules and notifications.
- It connects with Lab equipment using **PTC's Kepware** and **ThingWorx Asset Advisor.**

Actual Screens from Smart LAB App

- Allows **Collaboration** between engineering teams and lab team.
- Ability to **Create** lab request, model shop request and **Track** progress. Lab admin can **Assign** resources, **Schedule** and **Submit** test reports.
- Requestor can **Monitor real-time** test information coming from connected lab equipment like 3D printers, compressors, test fixtures.
- **Manages** current and historical **test results** data associated with the parts and assemblies in Windchill. Solidifies part reuse and information.
- Help manage Lab process, test procedures, equipment information, lab schedules and resource information in a **centralized system**.
- Lab data generated can be used to determine **OEE, compliance audits and schedule maintenance.**

DRIVEN-4