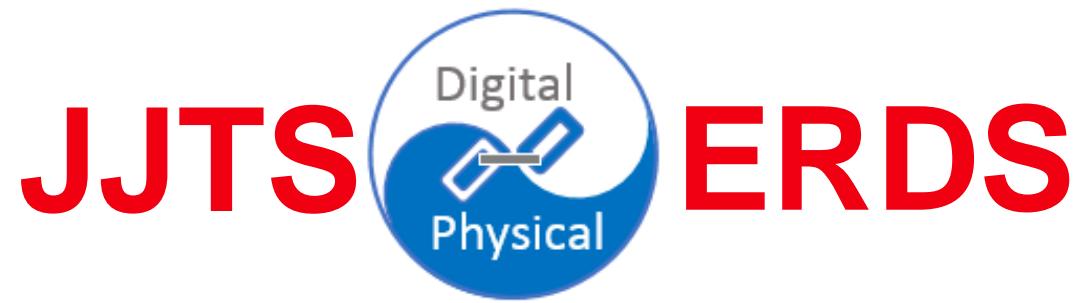


Engineering and R&D Services



Connecting our Digital and Physical worlds

August 2019

# Agenda

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**01** Introduction

**02** Operating Model and Flow

**03** Capabilities & Services

**04** Wrap Up

# Agenda

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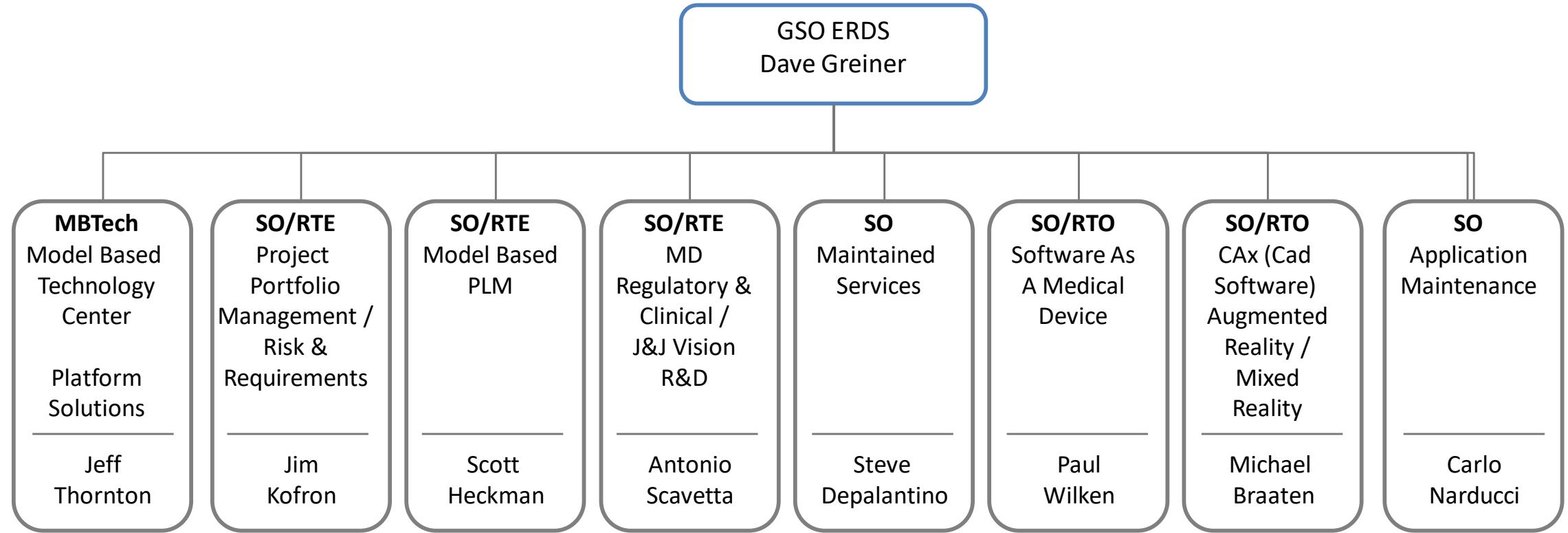
**01** Introduction

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# 01 - Introduction - Engineering and R&D Services (ERDS) Offerings



Technology Center



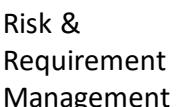
Base Business



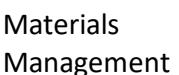
Dev & Ops



Product Portfolio Management



Risk & Requirement Management



Materials Management



Model Based R&D Services



Product Lifecycle Management



JJ Vision R&D Services



MD Clinical and Regulatory Affairs



Maintained Applications



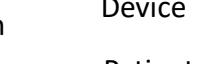
Data Migration



Emerging Technologies



Software as a Medical Device



Patient Specific Implants/Tools



CAx Tools & Data Management



3D Printing

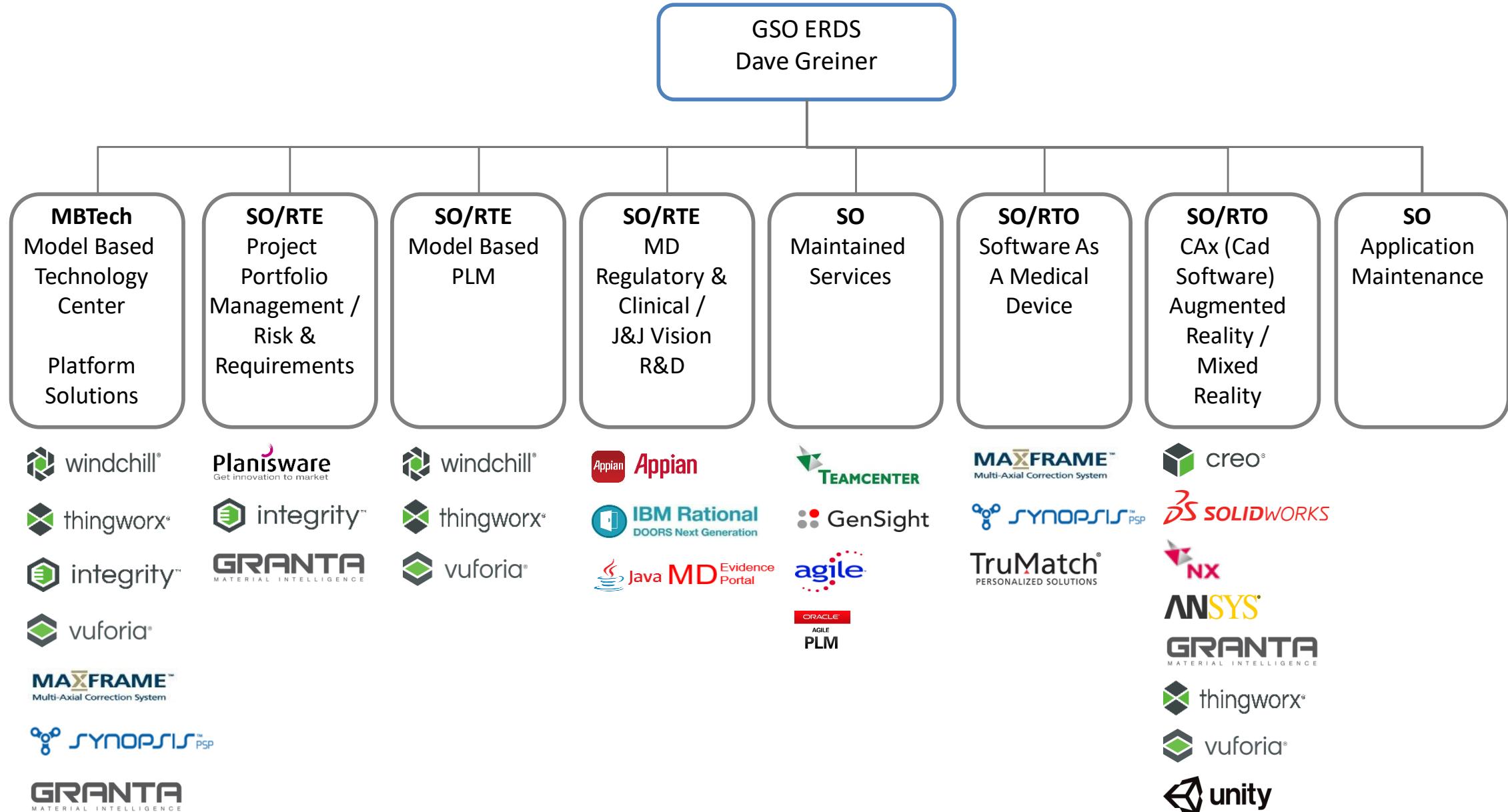


Model Based AR / VR



Application Maintenance

# 01 - Introduction - Engineering and R&D Services (ERDS) Offerings



# 01 - Introduction - Connecting our Digital and Physical worlds

## Model Based Enterprise Across the Value Chain

MBE is a product development strategy in which a variety of 'models' serve as a product's authoritative source of identity, information and behavior across its lifecycle

### Requirements Definition

#### Digital Twin

1. 3D Solid Model
2. Multi-Physical Model
3. Descriptive Model
4. Advanced Analytic Model
5. Reality Model

#### 3D Digital Manufacture

#### Physical Product

1. Model for Validation
2. Model for Use

#### Patient



IDEA



INNOVATE



DEFINE



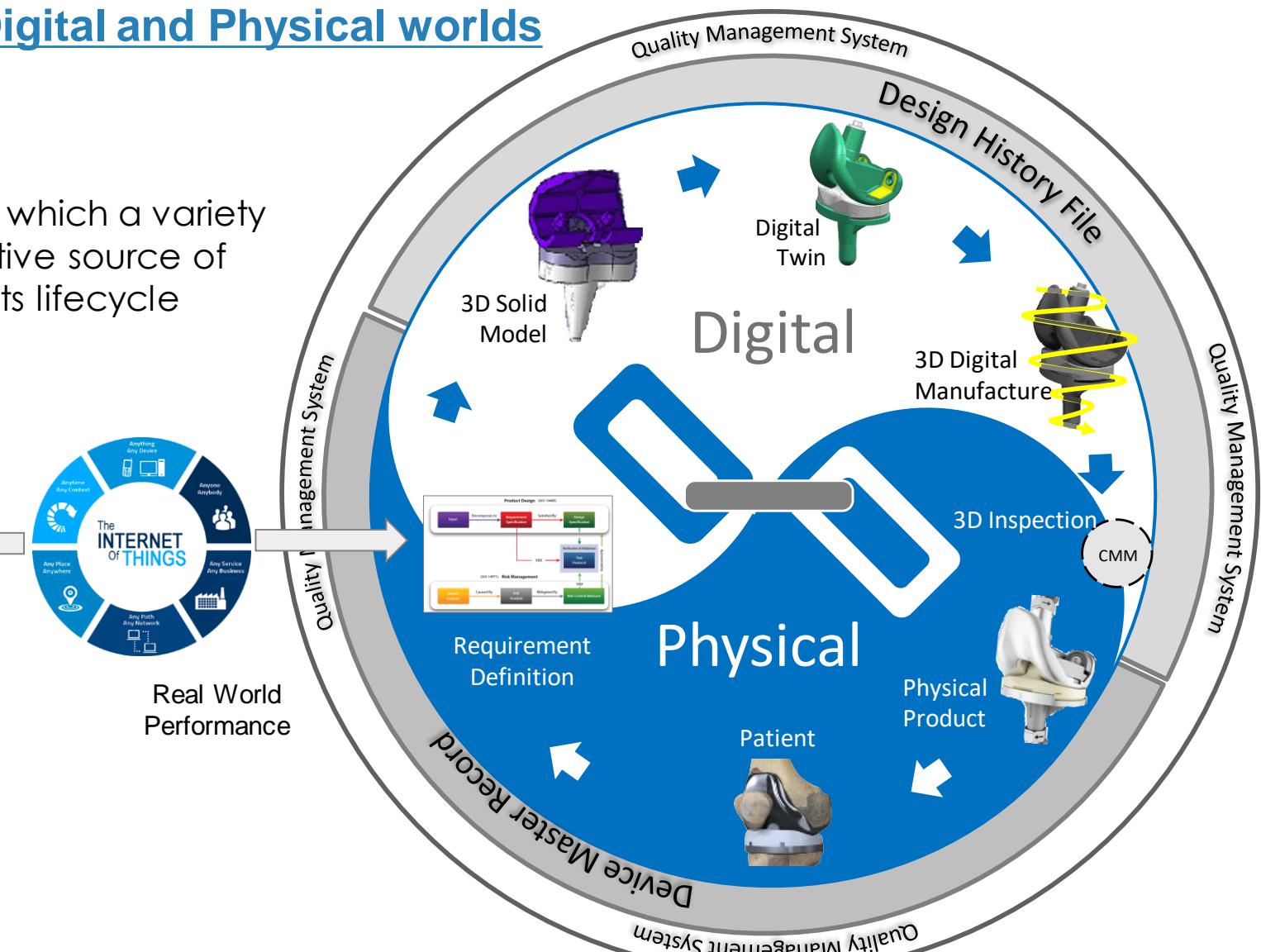
MANUFACTURE



VERIFY



IMPLANT



# 01 - Introduction - Engineering and R&D Services (ERDS) Offerings



## Model Based Technology Center



Our Technology Center supports End to End (E2E) flow, in collaboration with our BUIT & Business partners, spanning idea through development, delivery & support. Capabilities enable R&D products to be planned, developed, virtually simulated, physically prototyped, tested, manufactured and controlled throughout their entire life.



## Software as a Medical Device

We provide technology, architecture and build services to meet SaMD class I, II and III project needs, whether new development or enhancement of existing applications. We partner very closely with other TS service providers, Regulatory Affairs and Compliance, Security and Privacy to provide a holistic, full-spectrum approach to project needs.



## Model Based Engineering, CAx & AR

Model Based Engineering (MBE) Service provides product development, manufacturing and life cycle support that uses a digital model to drive all engineering activities. Computer-aided engineering design and analysis tools (CAx) service provides the tools and platforms to design, simulate, analyse and manufacture new or existing products. AR provides model visualization overlaid in the real world.



## MD Clinical and Regulatory Affairs

Our team provides Regulatory and Clinical development services for the MD & Pharma R&D groups. We provide services to enhance and maintain the Regulatory and Clinical processes in addition to information exchange and integration with other systems. We utilize Agile principles to minimize investment for the maximum value



## Data Migration

Data Migration is an enterprise-wide service that uses standard processes and tools, created by combining experiences from previous data migrations with cutting edge technologies, to maximize efficiency and minimize costs associated with moving data between different IT systems.



## Product Portfolio Management

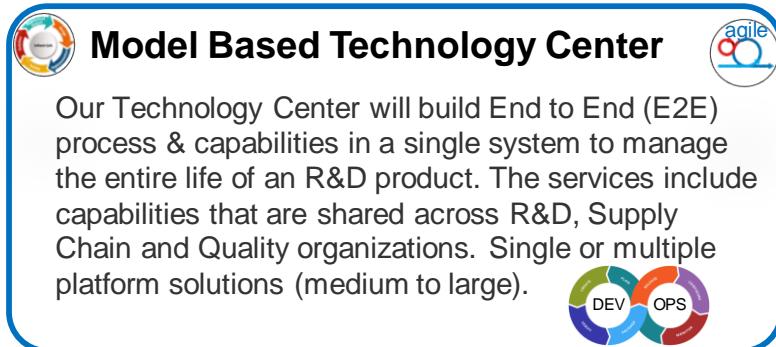
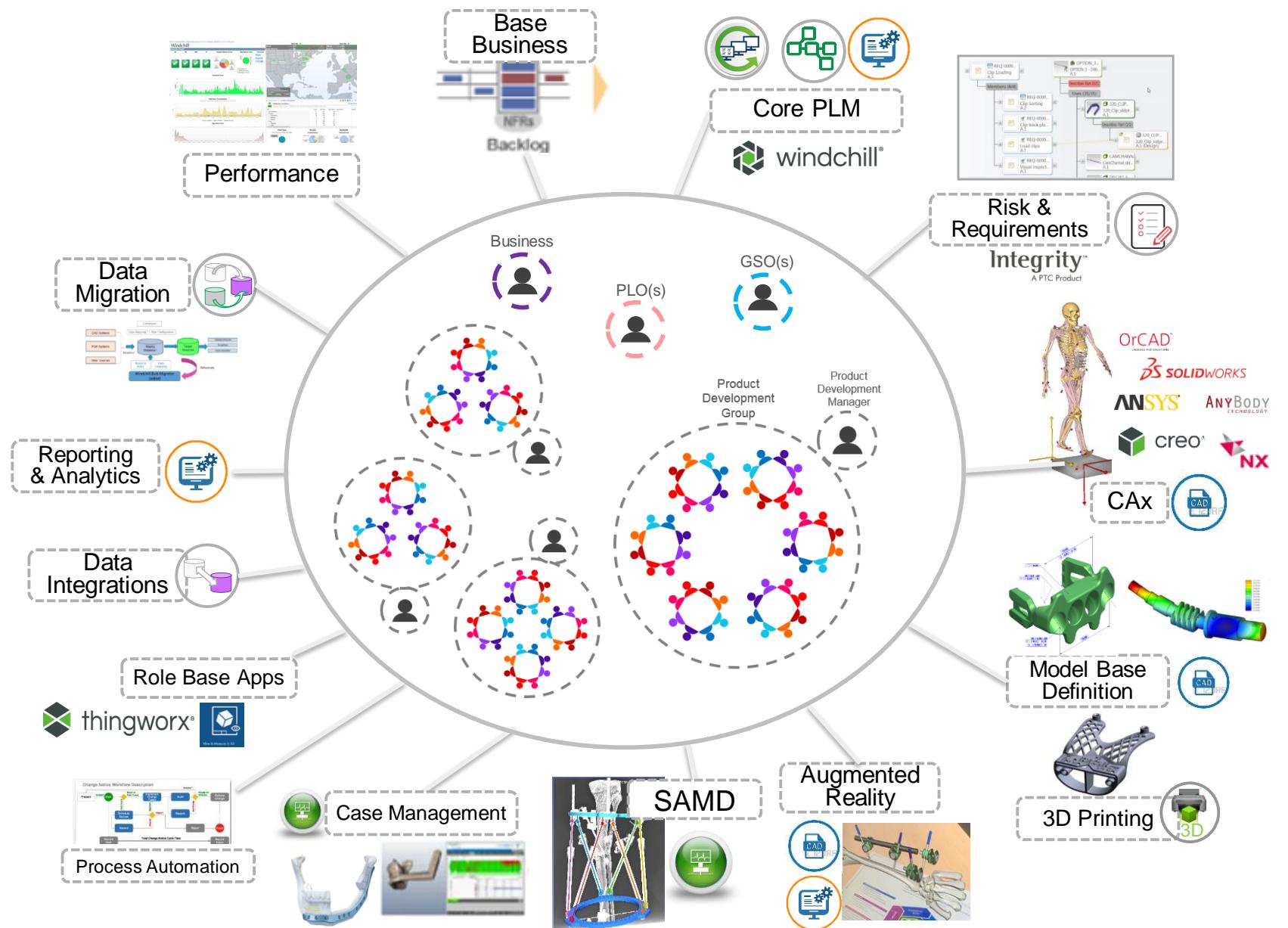
Our team provides development services for Portfolio and Project Management for the R&D groups to effectively manage their portfolio and projects.



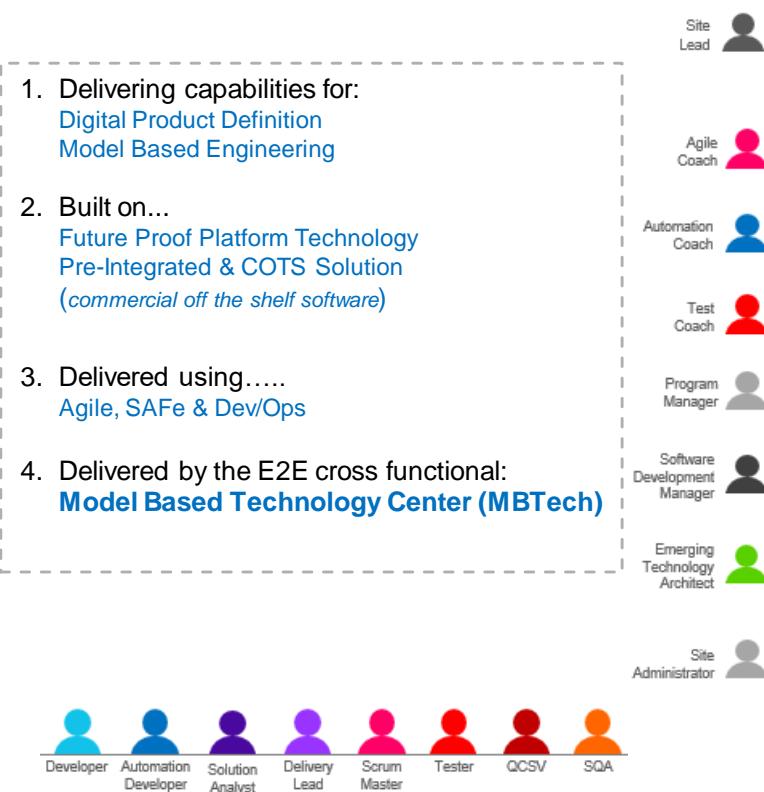
## Risk & Requirement Management

We provide services for Requirements, Risk, and Testing. Requirements data entry is one time and relates back to other items, e.g., Testing and Risk Analysis. Connections are visible and complete, eliminating paperwork & manual tracing back. For Digital Surgery it's a game changer.

# 01 - Introduction - GSOs & Tech Center support delivering Integrated Services



1. Delivering capabilities for:  
Digital Product Definition  
Model Based Engineering
2. Built on...  
Future Proof Platform Technology  
Pre-Integrated & COTS Solution  
(commercial off the shelf software)
3. Delivered using.....  
Agile, SAFe & Dev/Ops
4. Delivered by the E2E cross functional:  
**Model Based Technology Center (MBTech)**



# 01 - Introduction - Metric Tracking : Monthly Business Report: TS MD R&D – July 2019

## People

Internal = 43

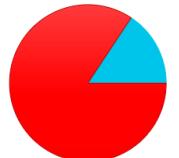
Contractors = 239

Total = 282

15% Internal / 85% External

Fully Recovered for 2019

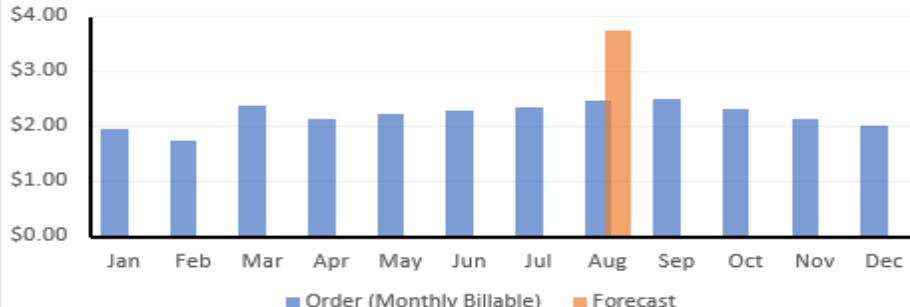
## Locations



## Demand

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Order (Monthly Billable)	\$1.95	\$1.74	\$2.38	\$2.14	\$2.25	\$2.29	\$2.36	\$2.49	\$2.52	\$2.34	\$2.14	\$2.03	\$26.58
2019 Current Forecast													\$3.74
2019 Total													\$30.32

## 2019 Orders and Forecast (\$MM)



## Pipeline

Agile e6 MDR/Tech doc MVP 2 Release 1
Agile e6 MDR/Tech doc MVP 2 Release 2
MDR Tech File TDR
J&J Surgical Vision - IoT Device Analytics
2019 Cadence PPM Upgrade
Supplier Collaboration Spec Management
Smart Find - Windchill Feed Enhancements
Digital Twin POC
AR Experience Cerranovus
AR Experience Joints Surgical Tray
Integrity 1.1 (2020)
Evidence Portal (MD Clinical)
2019 Cadence PPM Upgrade
MDRIM - Acquisition Tool
JJ Vision Engineering drawing
Megadyne Functional Release (Granta)
MAXFRAME 2.0 for 2020
Mandible Graft Cage
Scan2Health 2020

## Project Risks:

- None

## Projects

## In Progress

Albuquerque site closure
ALM remediation for Teamcenter Single Sign On (Vision Care KM)
ALM Remediation of Med Device Teamcenter Single Sign-on
Epicenter - Interface to Jabil's ComplianceWire
A Integrity 1.0.1 Capabilities
A Integrity 1.0.1 Data Migration
Integrity Sustaining (RRM Pilot)
Integrity - Data Visualization Strategy - Phase 0
Integrity - Next Release Strategy - Phase 0
Integrity - Jams Integration for VERB
J&J Surgical Vision - Automated Testing for R&D
Jabil - Agile e6
Jabil - WC, Cax, SaMD Waves 3 & 4
Jabil - additional Resource for Jabil service tickets
MD Reg - P360 & Reg Stat Archiving
MD Reg - Trackwise Archiving
J A MDR - Tech Doc App Layer (TDAL)
J A MDRIM - Record Level Segregation Capability
J A OneMD PLM - Release Train 2 / WC 11.1 Upgrade / Creo upgrade
A OneMD PLM - Dashboards for Change Management Cycle Time
A OneMD PLM - Megadyne OptCo Onboarding & Data Migration
A OneMD PLM - NeuWave On-boarding & Data Migration
A OneMD PLM - Canada BQ/LOC On-boarding
A OneMD PLM - JKK BQ/LOC On-boarding
OneMD PLM - EPICenter & Teamcenter UA - Data Migration
OneMD PLM - ADAPTIV-DS - Data Migration
OneMD PLM - Omrix/Trackwise Archival
J A PPM - SC Strategic PM Tool Implementation
Protocol Management + eDHDR Integration Modifications
TruMatch Knee 3.0 - Independence - Global Launch
TruMatch Knee 3.0 - Windows 10 Testing
Vision Care KM Teamcenter ALM Remediation
Vision Care PLM Enhancements to support audits
Vision Care PLM Enhancements to support audits
MAXFRAME - New Release/2.0
Synopsis - Win 10 Remediation/Decommission
Magics, Mimics, Freeform Win 10 Remediation

## 2019 Completed

\$ Agile e6 - SDDC Upgrade/Move
Agile e6 - MDR 2 Updates
Cadence PPM - Supply Chain Enhancements
CodOASIS multi national currency issue
SA Modify Epicenter -Restricted access - Jabil
GenSight Upgrade
Jabil - WC, Cax, SaMD Wave 2
Jabil - EPICenter
MDR POC 2
Online Toric Calculator (upgrade)
SA OneMD PLM - Bioseal OptCo Onboarding
A OneMD PLM - RT01 Capabilities
A Windchill Base Business (9 releases as of July)
Jabil - additional Resource for Jabil service tickets
MD Reg - P360 & Reg Stat Archiving
MD Reg - Trackwise Archiving
J A MDR - Tech Doc App Layer (TDAL)
J A MDRIM - Record Level Segregation Capability
J A OneMD PLM - Release Train 2 / WC 11.1 Upgrade / Creo upgrade
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OneMD PLM - ADAPTIV-DS - Data Migration
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Vision Care KM Teamcenter ALM Remediation
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Vision Care PLM Enhancements to support audits
MAXFRAME - New Release/2.0
Synopsis - Win 10 Remediation/Decommission
Magics, Mimics, Freeform Win 10 Remediation

\$ - Denotes Projects > \$0.5MM

A - Denotes Agile Project

as of 1-Aug-2019

## Talent Development

### Completed

- PTC 2019 Winter User Conference (Jan)
- SAFe Program Execution Workshop - MD PLM (Feb)
- Diploma of Advanced Studies (DAS) (Feb)
- SAFe for Agile Teams (Feb)
- Introduction to ThingWorx (Mar)
- ThingWorx Advanced Modeling (Mar)
- Leaders Developing Leaders – NA (Mar)
- Safe for Agile Teams (Mar)
- SAFe - PI Planning (Mar)
- ThingWorx – Analytics (Mar)
- Energy for Performance (E4P) (Mar)
- ThingWorx - Platform Admin/UI Development (Apr)
- Scaled Agile Leading SAFe Certification (Apr)
- ThingWorx - Building Custom Integrations (Apr)
- Kepner Tragoe RCA (May)
- Liveworx (Jun)
- Service Owner Workshop (Jun)
- ThingWorx – Analytics (Jul)
- Scrum Master Recertification (Jul)

### Planned

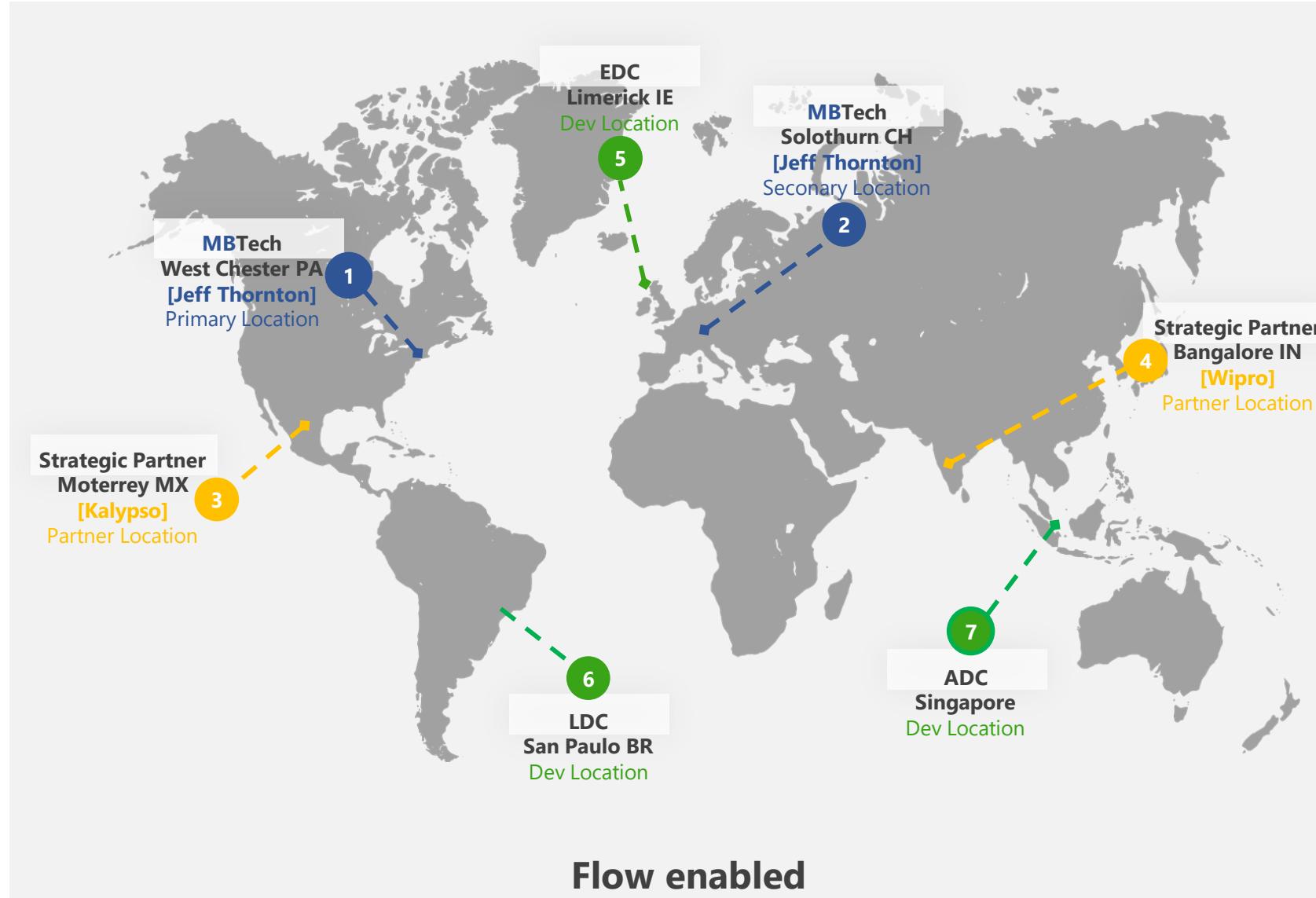
- SAFe Release Train Engineer (Dec)
- DevOps (Dec)
- AppianWorld (Dec)
- Windchill Development Training (Dec)
- Windchill Admin training (Dec)
- Introduction to Thingworks (Dec)
- ThingWorx – Analytics (Dec)
- Leaders Developing Leaders – NA (Dec)
- ThingWorx - Platform Admin/UI Development (Dec)
- OS Training Linux (Dec)
- SAFe for Agile Teams (Dec)

	Mentoring	<input checked="" type="radio"/>
	Knowledge Transfer	<input type="radio"/>
	Development Planning	<input type="radio"/>
	Self Development	<input type="radio"/>

## Opportunities/Other Work:

- Talent – continued engagement with Entech for 'Gradtech' program.

# Geographically diverse locations



Scale the MBTC network to encompass Global footprint, supporting 14,000+ user base across the world

- Dark Blue – MBTech primary & secondary locations
- Orange - Strategic Partners - flex capacity of MBTech
- Green – Primary dev centers, J&J Global xDC network

# Agenda

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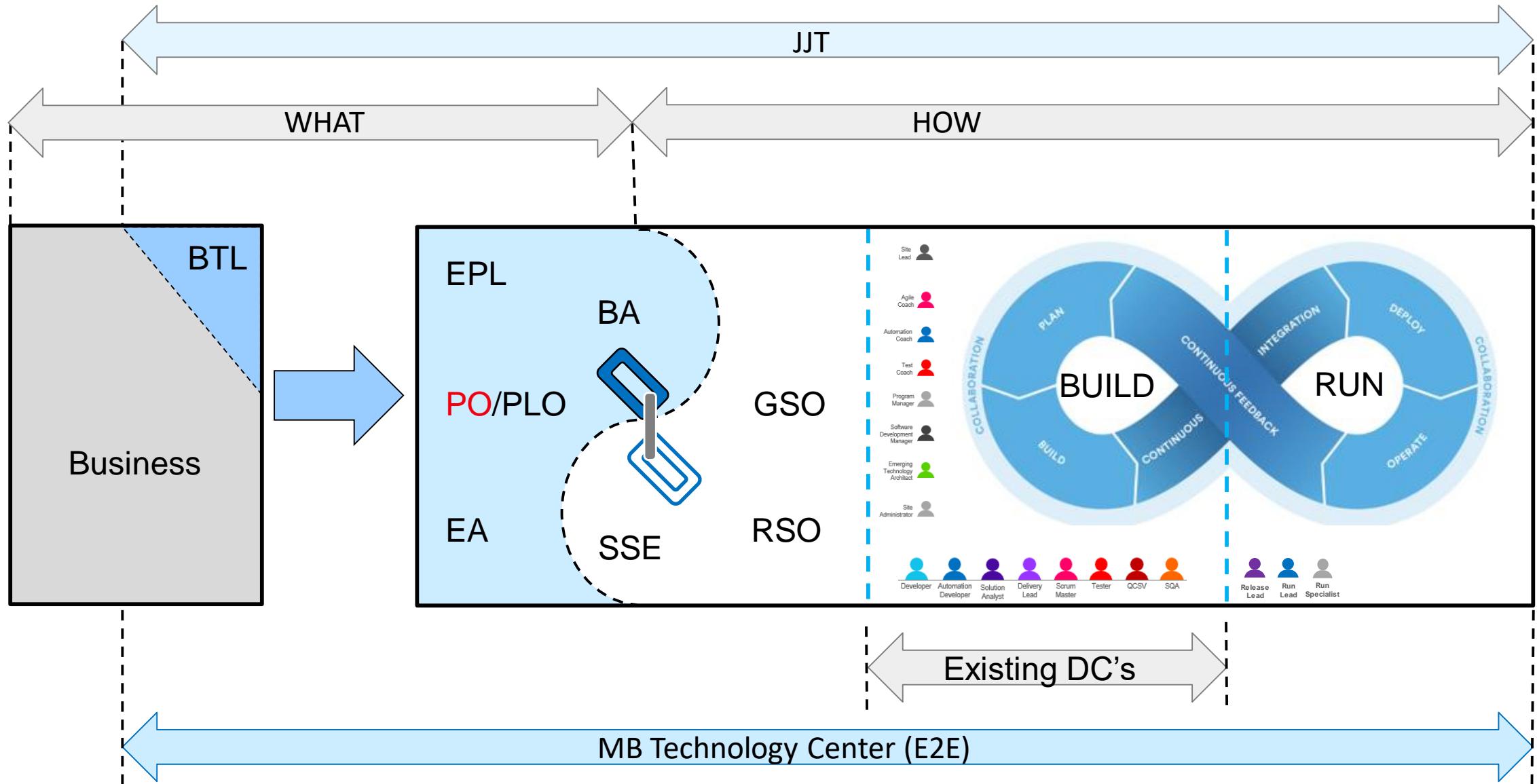
**01** Introduction

**02** Operating Model and Flow

**03** Capabilities & Services

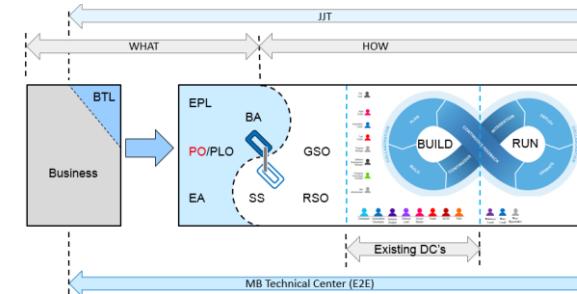
**04** Wrap Up

## 02 - Operating Model and Flow - MBTech Operating Model

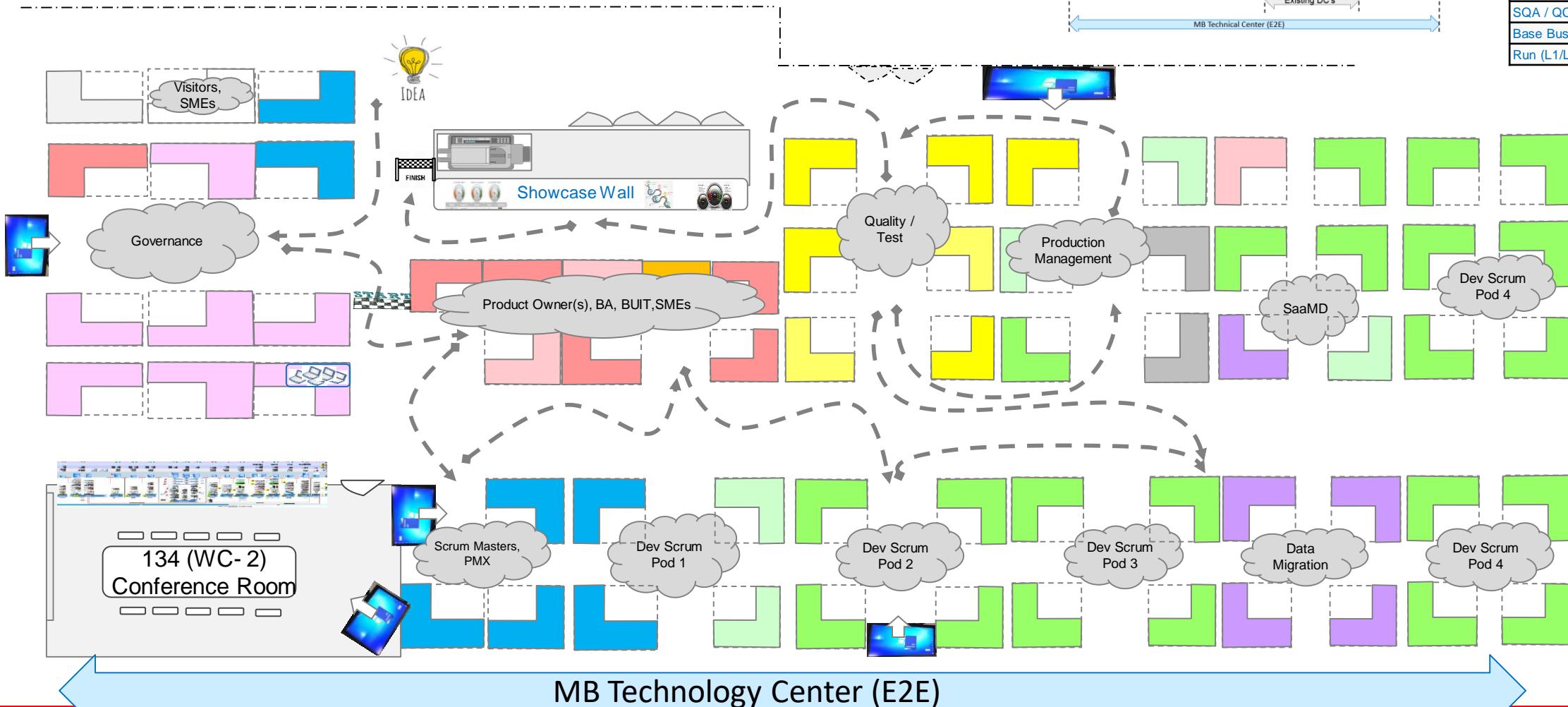


## 02 - Operating Model and Flow - Office Layout and Physical Workflow

1. Multiple Cross functional Scrum Teams
2. All TS Service Groups embedded with BUIT & Business

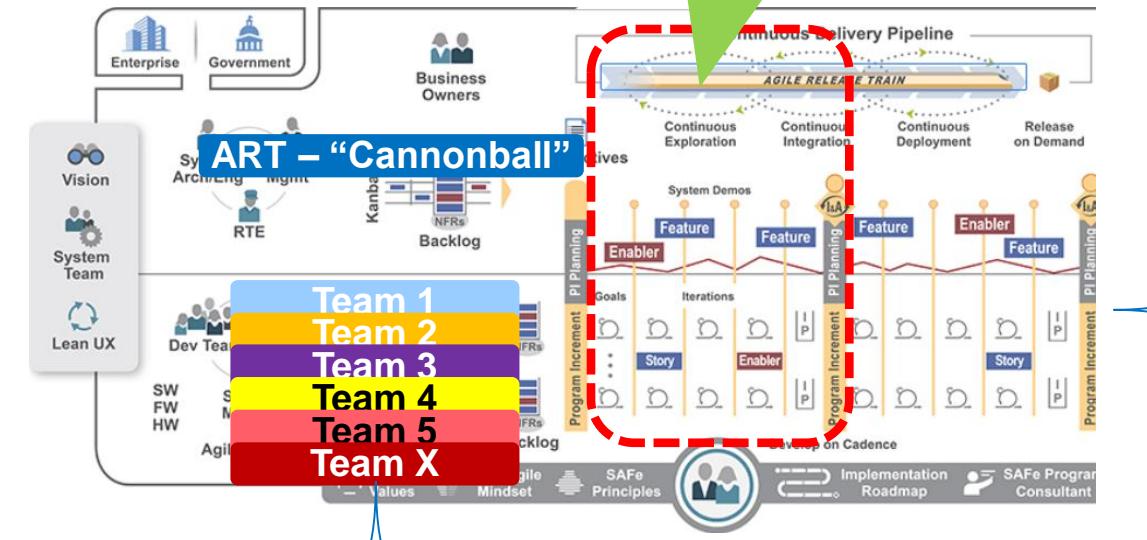


Role	
PLO / GSO / Governance	
BA / BUIT	
Product Owner / Bus.	
PMX / Scrum	
CPI / rRDS	
Development	
Data Migration	
SQA / QCSV / Test	
Base Business	
Run (L1/L2)	



## 02 - Operating Model and Flow - MBTech – SAFE adoption for Large Teams

### SAFe® for Lean Enterprises



During The Program Increment (PI) workshop TEAMS plan features / stories and dependencies  
- PI is about planning 8-10 weeks not a release

Synchronous....

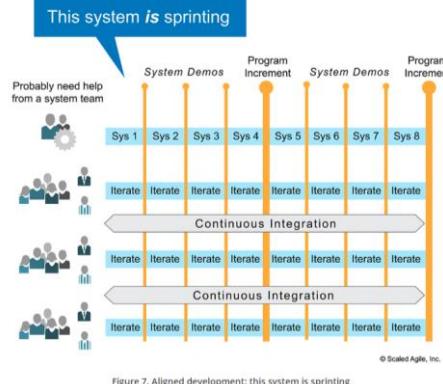
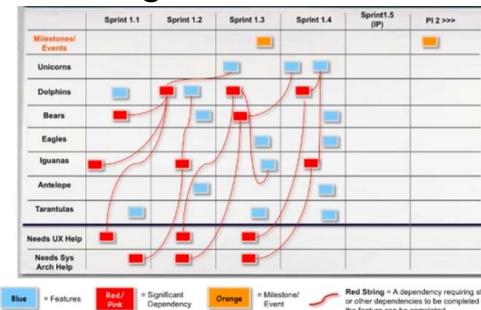
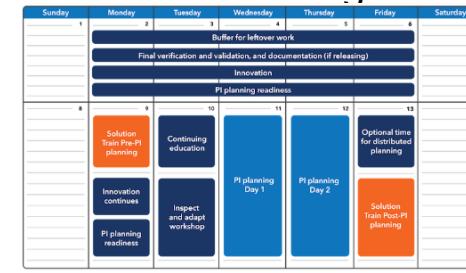


Figure 7. Aligned development: this system is sprinting

Program Board



Innovation & Planning Iteration

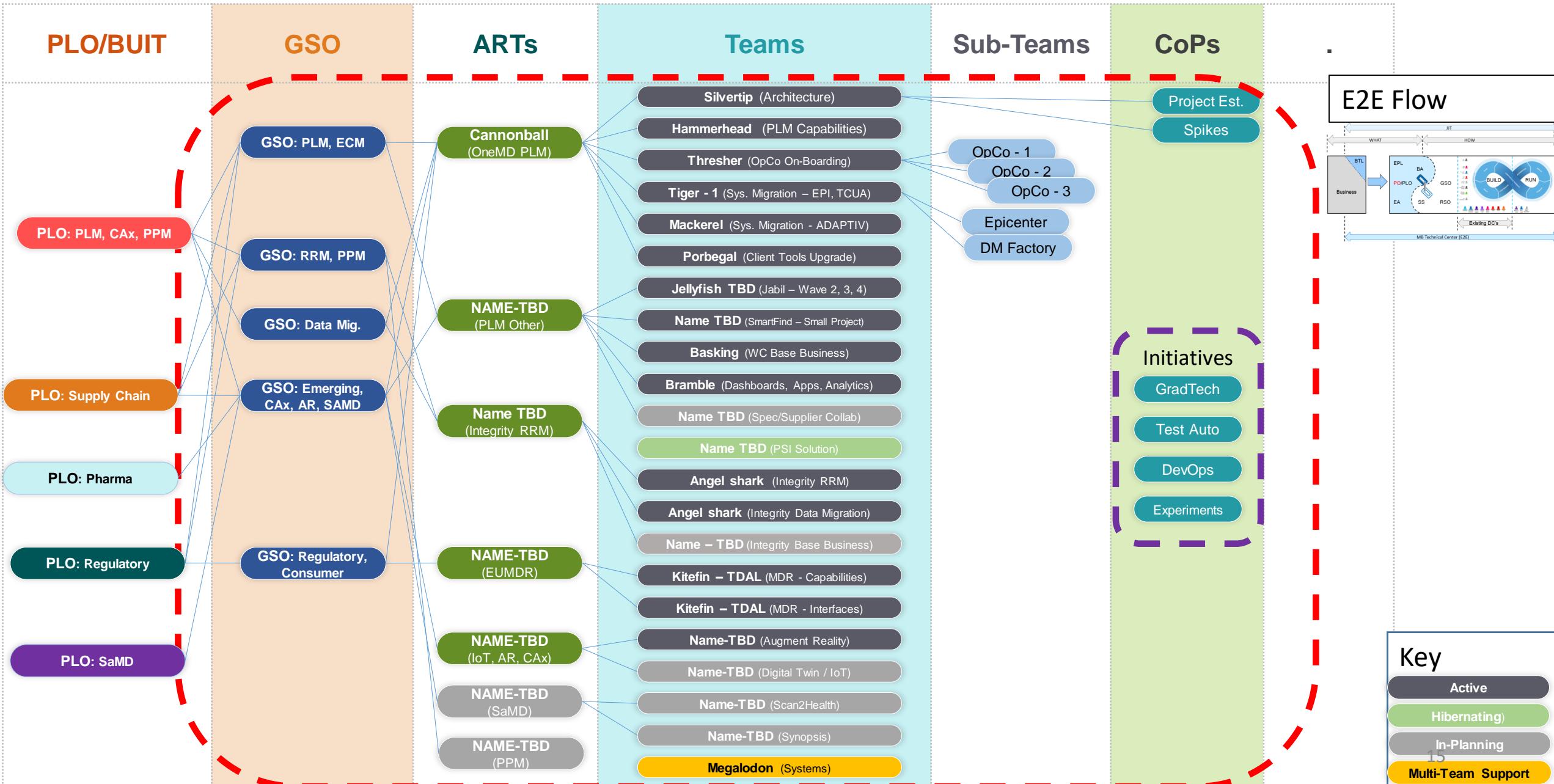


Team Names - have fun / use themes  
Shark Names

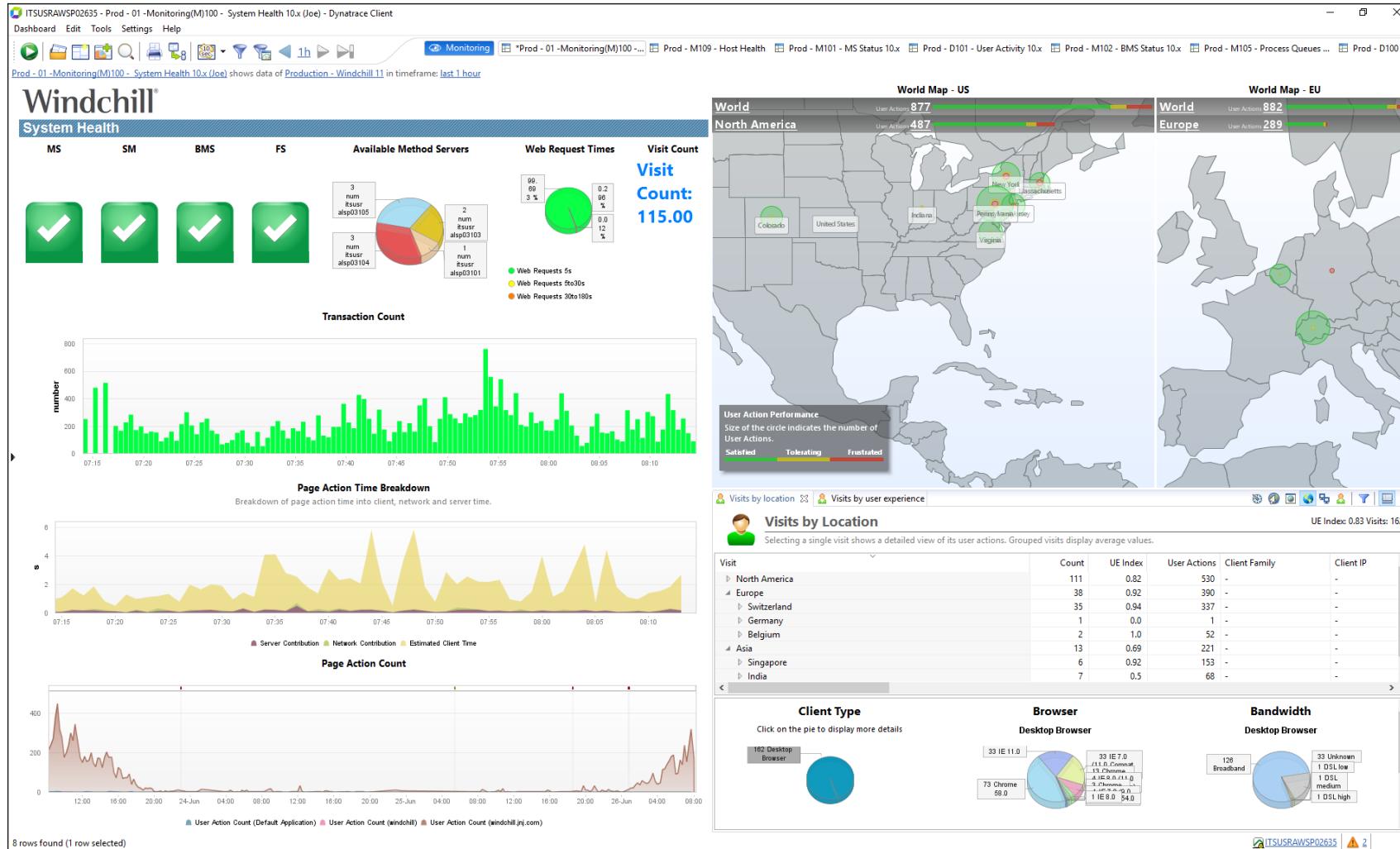
### Key Points / Team Alignment

- Program Increment (PI)**  
- all teams, earlier ID of issues
- Increment/Sprint duration (2 weeks)**  
→ all teams, earlier ID of issues
- Teams have**  
→ clear Mission & Objectives  
clarifies boundaries & priorities  
→ stable team members
- Increments have specific Objectives**  
→ Guide decision making
- Process Guidelines**  
→ Continuous improvements  
→ Scrum of Scrum (SoS)
- Improvement Ideas and Actions:**  
→ Retrospectives and IP Iteration
- Metrics**  
→ transparency for leadership  
→ insights into team performance
- Teams Health:**
  - Health Monitors / Assessments
  - Communication (i.e. Town Halls)
  - Relationship building events
  - "Time to sharpen the saw"  
(continuous improvement and renewal, rotational opportunities)

## 02 - Operating Model and Flow - MBTech Center – Team Network



## 02 - Operating Model and Flow - User Experience Management



### Key Points:

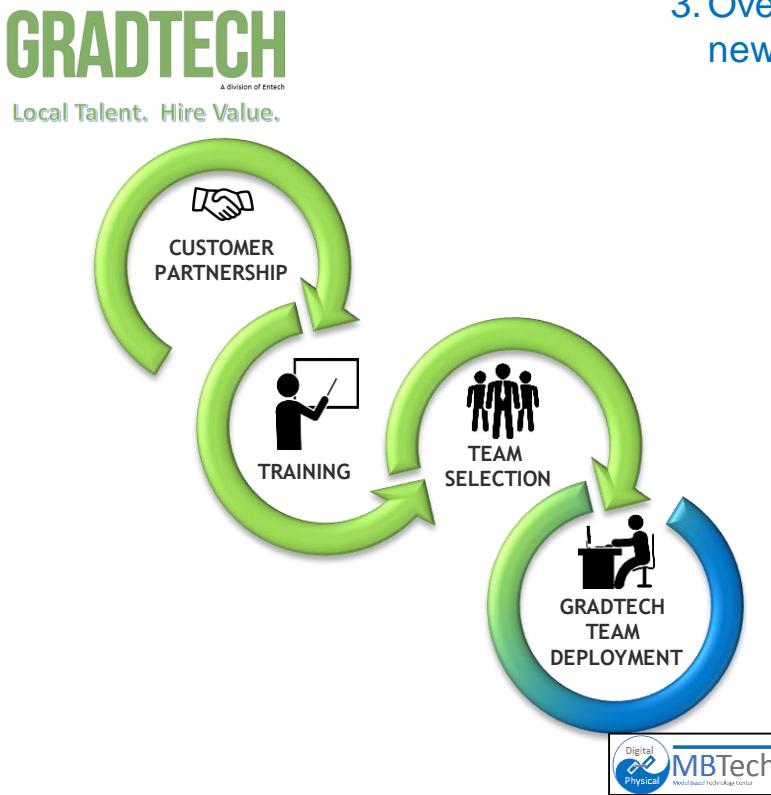
1. Real time user experience visualization. Helps us know our user base
2. Full transaction loop trace (desktop, network, system/application)
3. Prepackaged by the vendors (DynaTrace and PTC)
4. Leveraged by the Dev/Ops team for everything from strategic planning to troubleshooting

• Huge Value

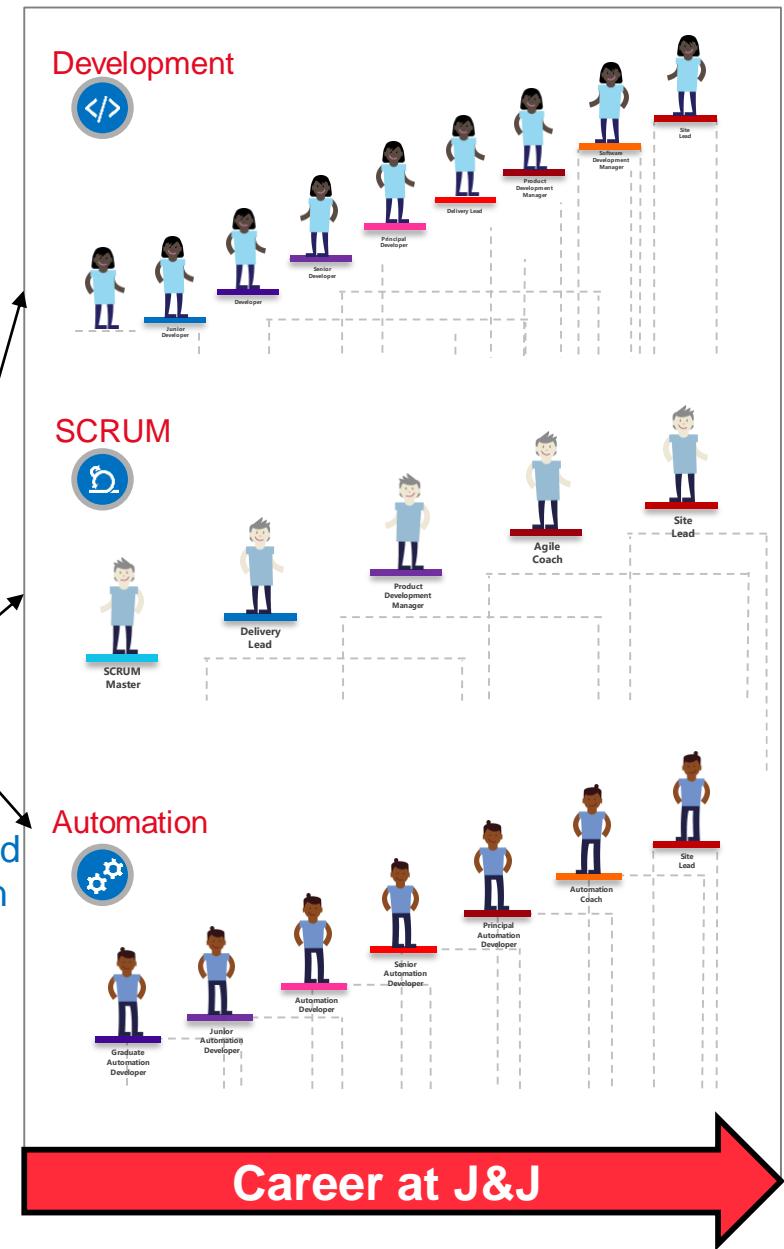
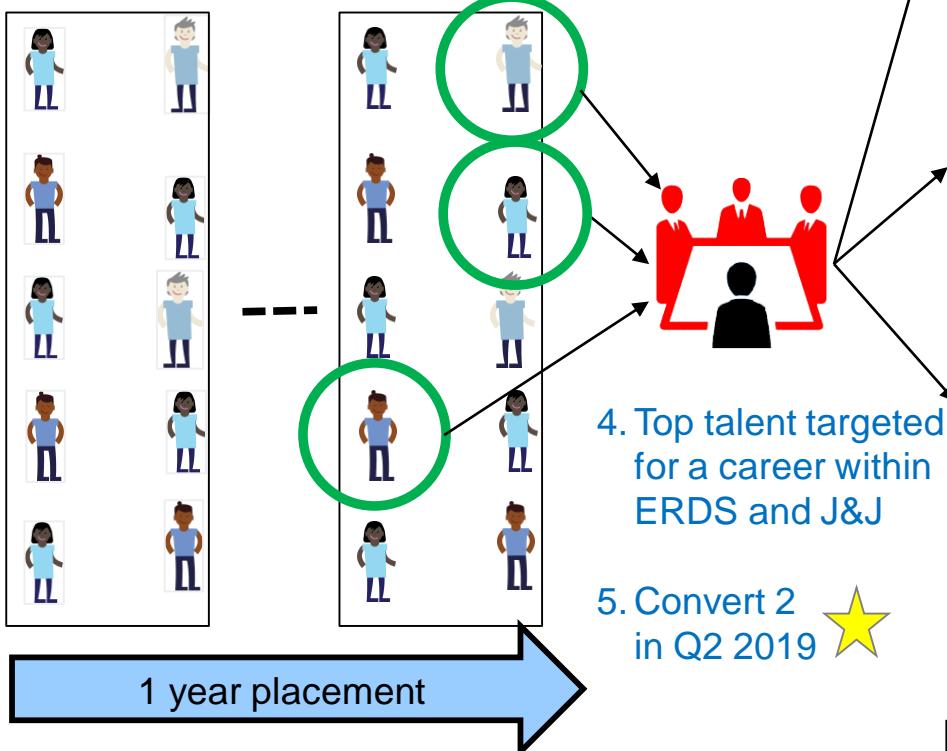
## 02 - Operating Model and Flow - Invest in Learning - GradTech Program

To deliver on the needs of our business requires some specialist skillsets. The technology is, by default, not a subject taught within education making a challenge to recruit fresh talent.

1. Partnering with local company (Entech) and their GradTech Program, we plan to address this by resourcing an on-site development team of diverse graduates led by an Entech mentor.
2. These graduates gain an opportunity to work in a real environment, acquiring unique agile skillsets

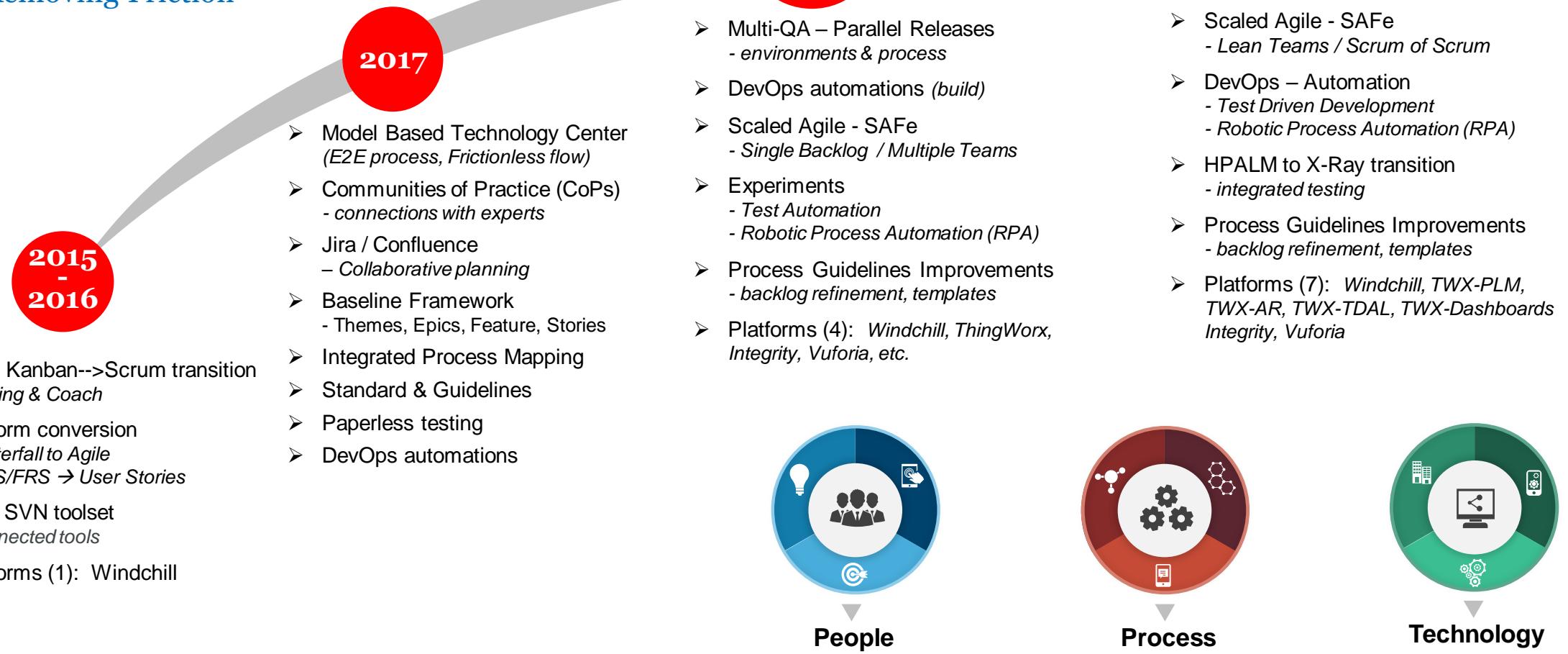


3. Over the course of a year, J&J gains exposure to new and diverse talent delivering against our goals.



## 02 - Operating Model and Flow - Continuous Flow of Change

1. Inspect and Adapt
2. Innovation Ideas
3. Removing Friction



# Agenda

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**01** Introduction

**02** Operating Model and Flow

**03** Capabilities & Services

**04** Wrap Up

# MB PLM Platform - Opportunities

**Major Platform** increasing business reliance on the skills and expertise in West Chester

**Model Based Enterprise** - 3D models help digital manufacturers better assess the appropriate production and assembly techniques, and product testing relative to their 2D counterparts

Growing needs for **3D Modelling** capabilities

- Virtual Reality for surgeon training etc.
- Augmented Reality

Drive towards **Role Based App**

Enabling **Mass Customization**, starting with Patient Specific Implants

**Product Lifecycle Management** (Increased Maturity)

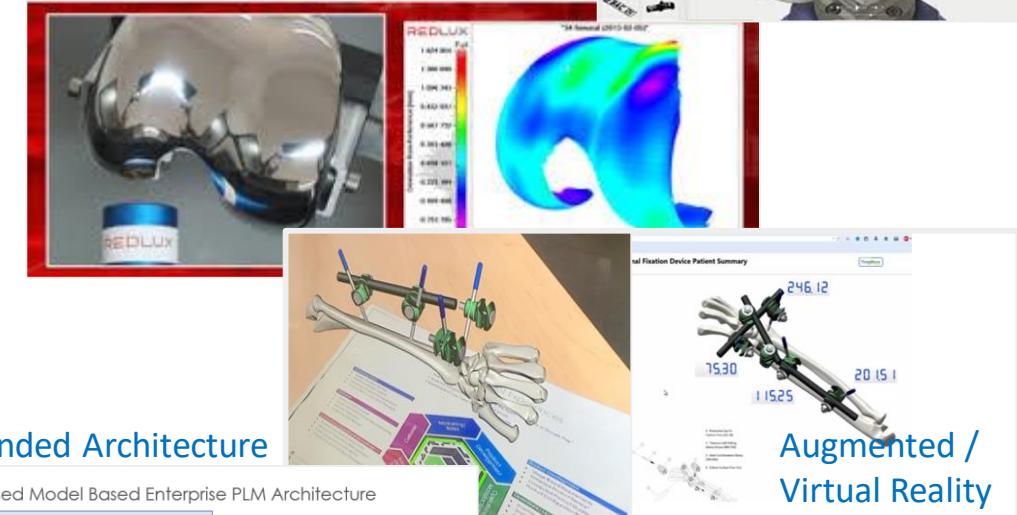
- Support Model Based Enterprise
- Change Management
- Connects R&D, Quality & Manufacturing

**Software as a Medical Device** (known demand)

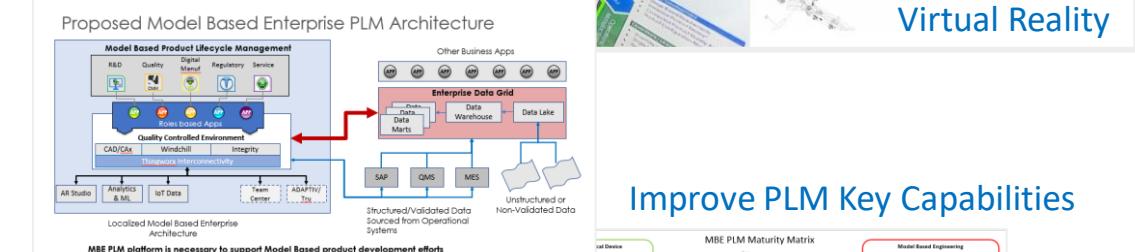
- Synopsis 1.3 (2018)
- Scan2Health PoC (2018)
- TruMatch 3.0 (2018)
- TruMatch Titanium 3D (2018)
- Bone Graft Cage - Long Bone (2019)
- MAXFrame 2.0 (2019)
- Bone Graft Cage - Mandible (2019)
- TruMatch Plan Only (2019)
- TruMatch PS Distractor (2019)
- TruMatch Shoulder (2019)
- MAXFrame 3.0 (2020)
- Smart Plate (2020)
- Distal Targeting (Smart Drill) (2020)



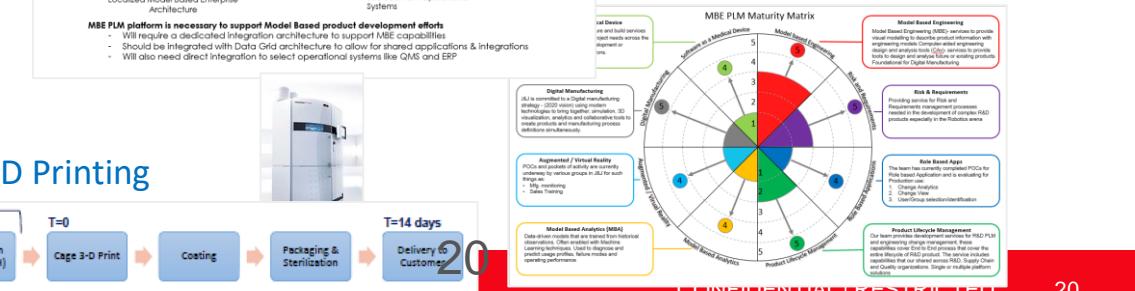
Co-ordinate Measurement



Expanded Architecture



Improve PLM Key Capabilities



PSI with 3D Printing



## 03 - Capabilities & Services - Patient Specific Implants Process Flow (SaMD)



## 03 - Capabilities & Services - MAXFrame – Software as a Medical Device (SaMD)



The MAXFRAME System simplifies treatment for patients with orthopedic deformities, malunions, non-unions, and complex fractures

ACCURACY ➤ EFFICIENCY ➤ OUTCOMES

### 3D PROBLEMS NEED 3D SOLUTIONS

MAXFRAME is a comprehensive system for treatment of difficult fractures and deformities, reducing the burden of treatment for surgeons, patients, and caregivers.

The MAXFRAME hardware is designed to improve surgical workflow and simplify patient adjustments.



MAXFRAME 3D Software is designed to simplify the planning process and to improve the accuracy of the correction plan, potentially reducing the need for replanning.

**MAXFRAME™**  
Multi-Axial Correction System  
➤ See Success in 3D

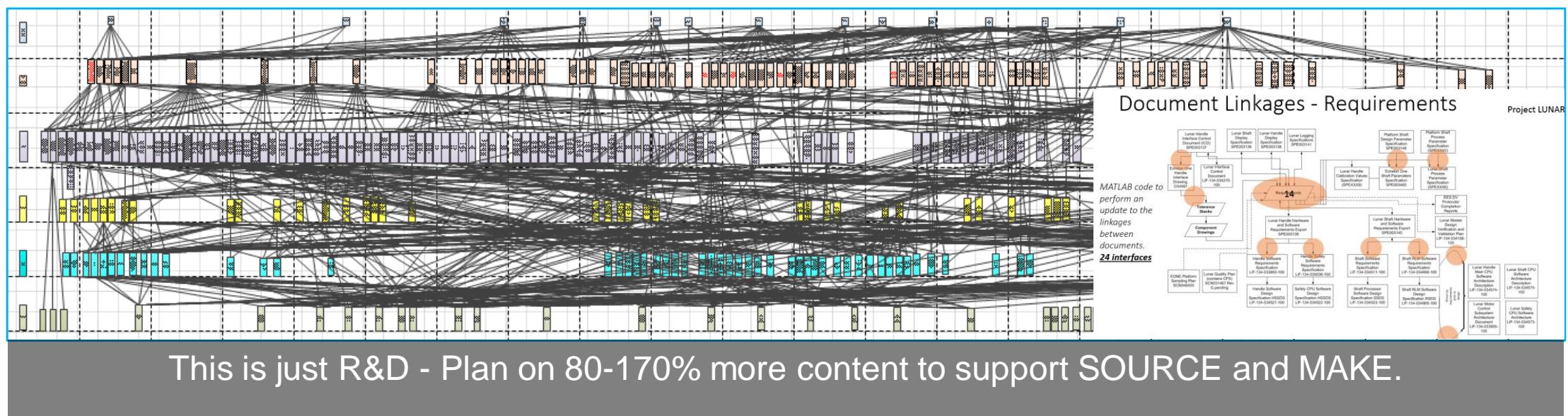
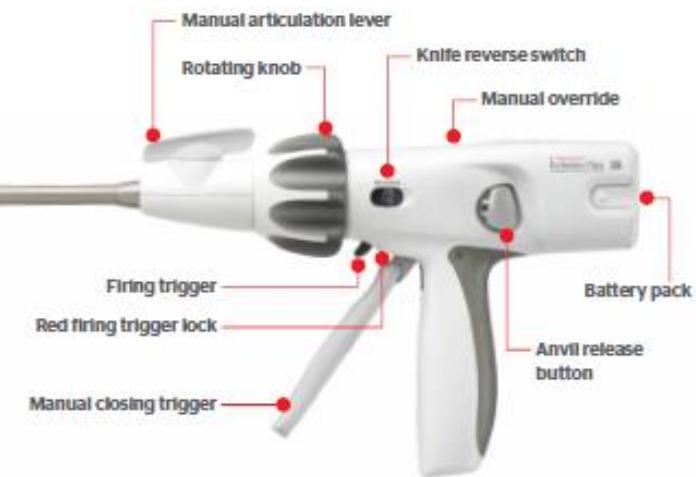
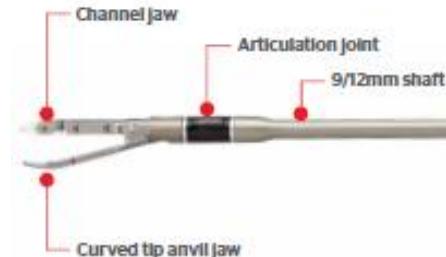
### Quick Facts

- Integration of 3 separate Quality systems to produce a single product.
- Design, Development, and Verification integration across time zones and companies.
- First time leveraging J&J Infrastructure to host SaMD.
- Core SW and IP internally developed by Innomedic
- 4,300+ Requirements
- 46,000+ Tasks
- 150,000+ Lines of code
- 930+ Verification Protocols
- Surgeons involved from the beginning, including 5 Surgeon labs (combined wet labs + software)

## 03 - Capabilities & Services - Requirements Cascade Reality in R&D

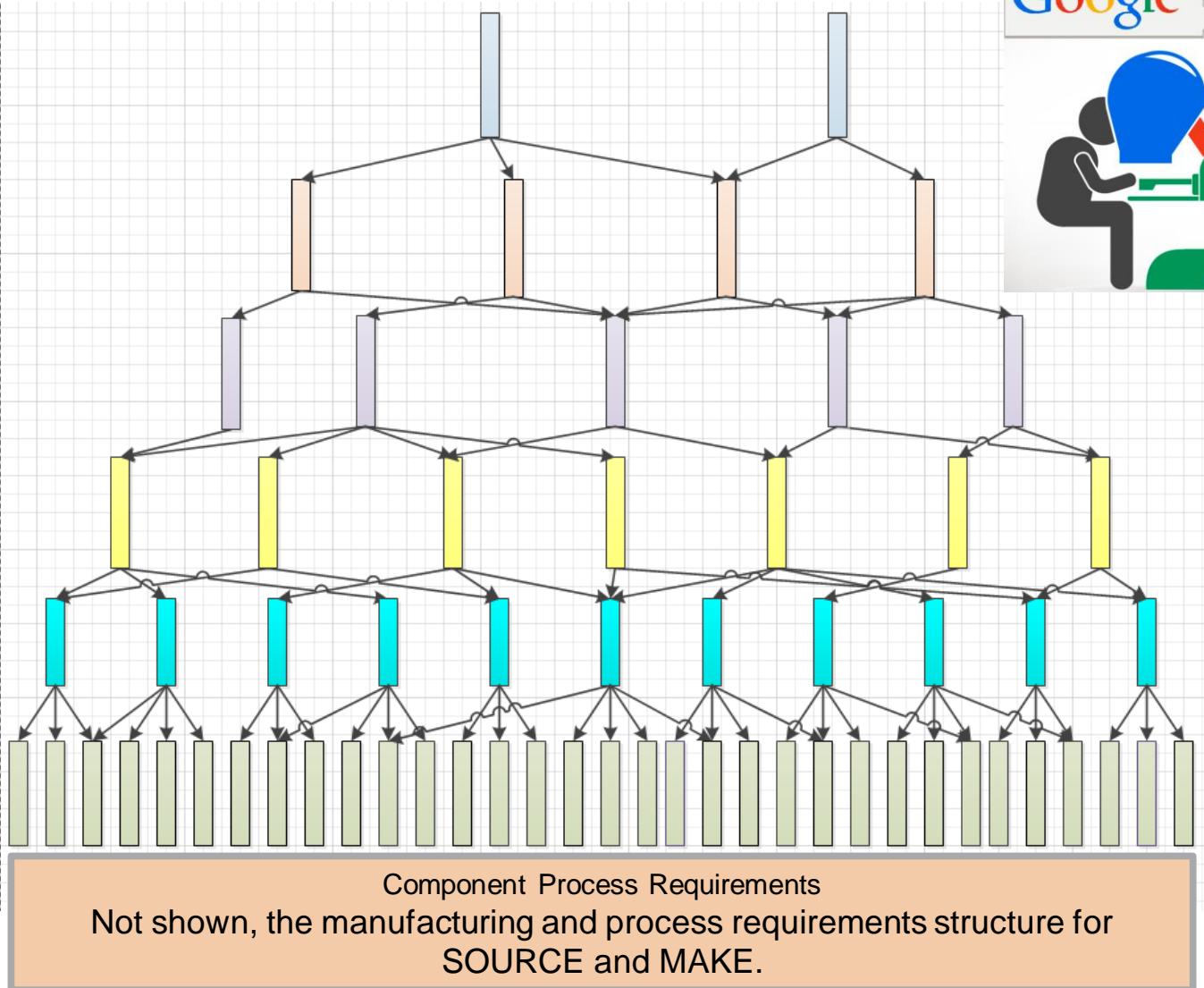
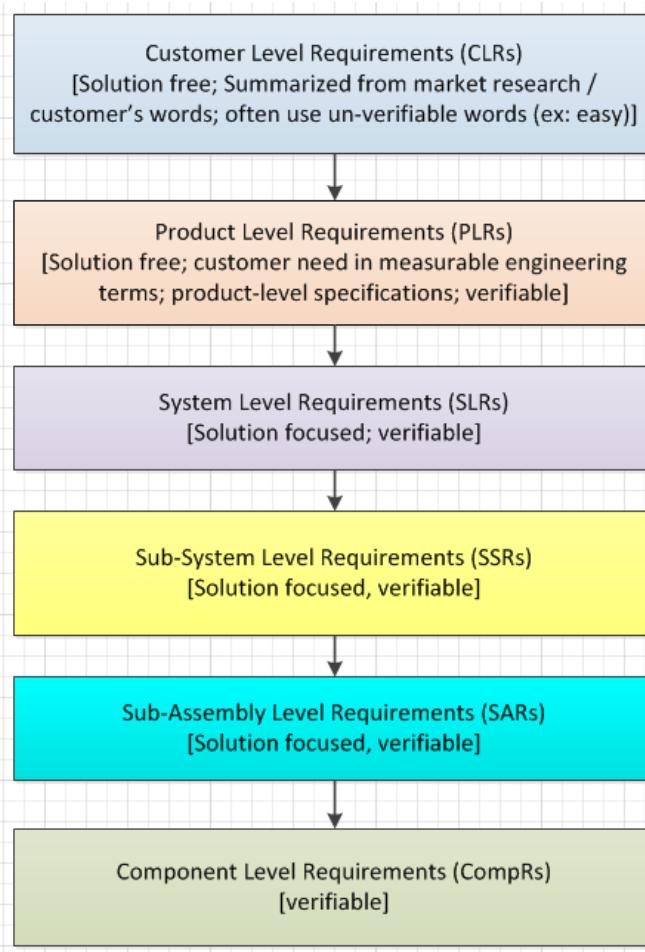
1. R&D Project "Wiley" powered vascular stapler.
2. Less Complex than Lunar/VESTA and a fraction of what is being developed in Digital Surgery.
3. Excel & manual traceability
  - Major Risk & Complexity Reduction

### Nomenclature



This is just R&D - Plan on 80-170% more content to support SOURCE and MAKE.

## 03 - Capabilities & Services - Requirements Cascade for R&D



Time Permitting: R&D Testimonial Video

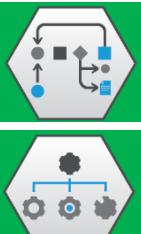
## 03 - Capabilities & Services - Integrity – Risk & Requirement Solution

- COTS Software configured for R&D
  - Part of mega-brand PLM E2E solution
- Transitioning from excel & manual traceability
  - Major Risk & Complexity Reduction

### SYSTEMS ENGINEERING

#### MODEL-BASED SYSTEMS ENGINEERING

Systems Design



#### REQUIREMENTS AND VALIDATION

Requirements Management

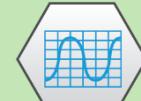


#### GLOBAL SOFTWARE DEVELOPMENT

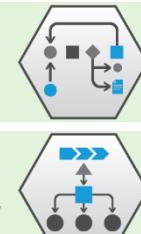
Product Line Engineering



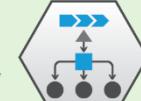
Test Management



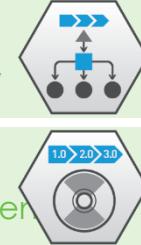
Software Design



Software Process & Workflow



Configuration and Release Management

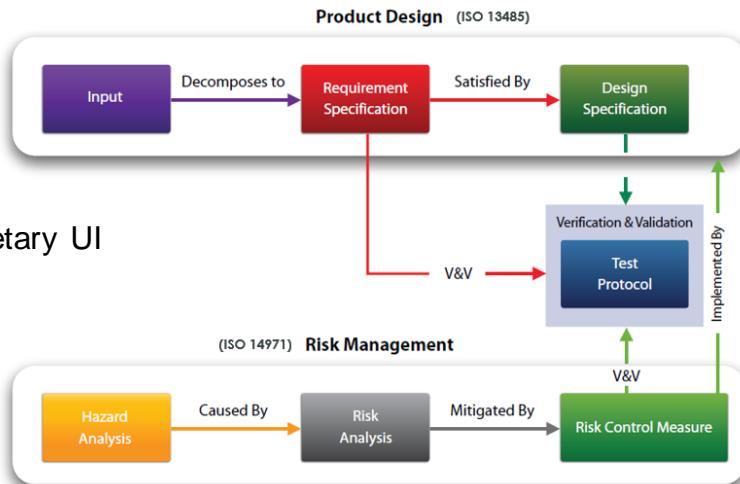


### Project X:

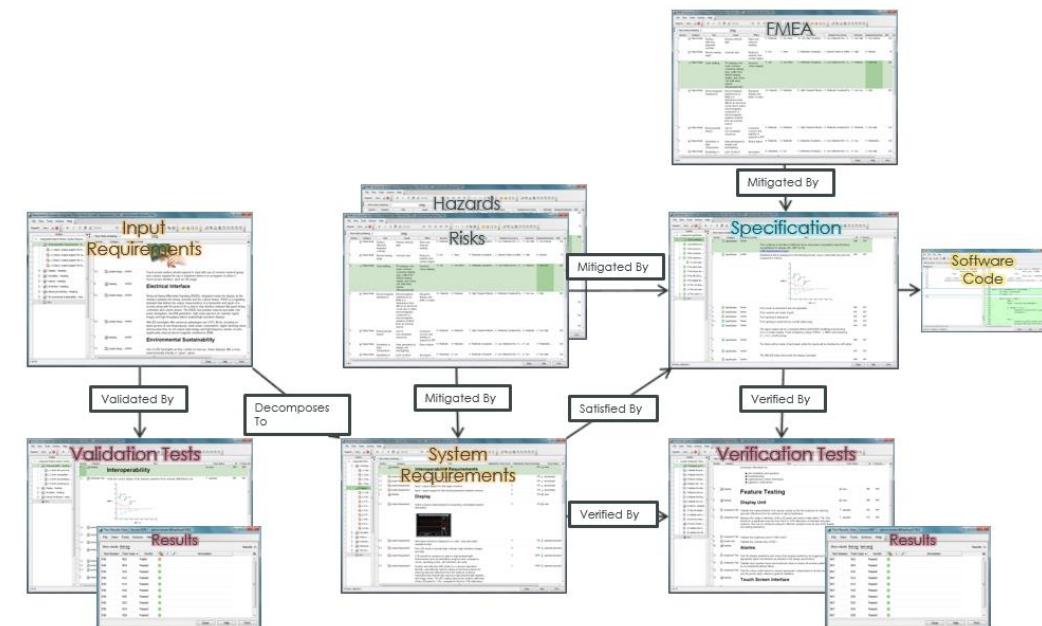
1. 2 project teams (60 people)
2. 6 product codes, 2 motors and LCD display
3. Software footprint is significant

### Project Y:

1. 8 project teams (128 people)
2. ~21+ product codes & 6-24 motors & a proprietary UI
3. Large amount of external collaboration
4. Multiple software applications in development

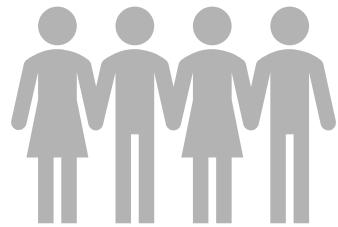


### APPLICATION LIFECYCLE MANAGEMENT (ALM)

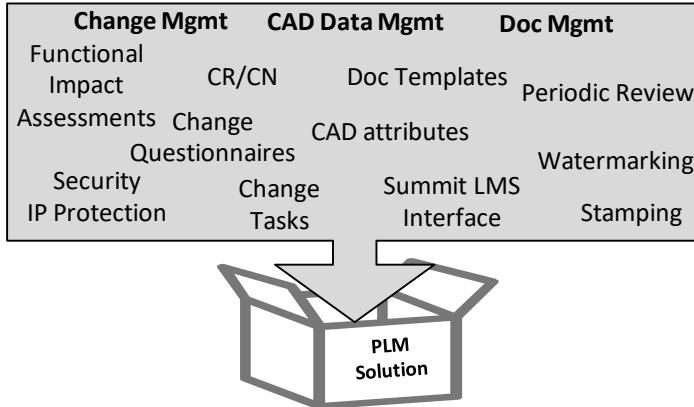


## 03 - Capabilities & Services - Model Based PLM - Release 1

**90+** Project Team Members

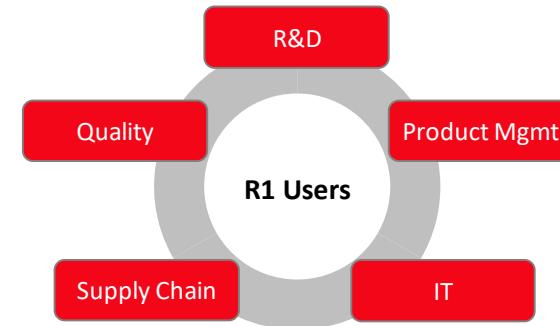


**47** Features supporting PLM Business Processes & Capabilities



**5**

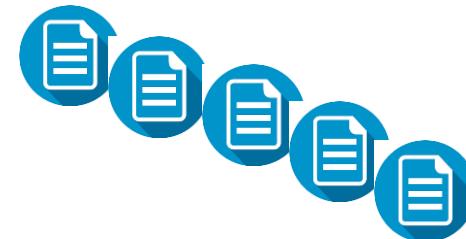
Functional Areas



**180** User Stories



**3,000,000+**  
Records Transformed



**24**

Training Servers – educating



**2000+**

users

**850**

Users Active on Yammer during Hypercare

# Application Maintenance/Reliability Overview

## **Corporate Business Technology**

Applications supporting shared services - Human Resources, Finance, Procurement

Portfolio: \$16MM Global

## **Data & Analytics**

Enable strategic business insights by operating enterprise platforms and applications which aggregate, translate and visualize data through historical, current and predictive views across Consumer, Vision Care, Hospital Medical devices, Pharma and Corporate/HR business functions.

Portfolio: \$36MM Global

## **Digital & E-Commerce, Social & Collaboration**

Enable enterprise end user, customer, and partner experiences by operating and maintaining J&J websites, E-commerce portals, SharePoint sites across Consumer, Vision Care, Hospital Medical devices, Pharma and Corporate/HR business functions.

Portfolio: \$ 13.9M Global



**Total: \$217 MM Global**

## **Customer & Sales**

Enable enterprise end user, customer, and partner experiences by operating and maintaining J&J customer & sales force capabilities across Consumer, Vision Care, Hospital Medical devices, Pharma and Corporate/HR business functions.

Portfolio: \$8MM Global

## **QRDS**

R&D Applications supporting Clinical Affairs, Regulatory, Computer Aided Engineering, Engineering Change Management, New Product Dev, Lab Systems,, Project/Portfolio Management, Model-based Technologies and Software as a Medical Device. Quality applications Complaint management, Non-Conformance, CAPA, audit, and PLM.

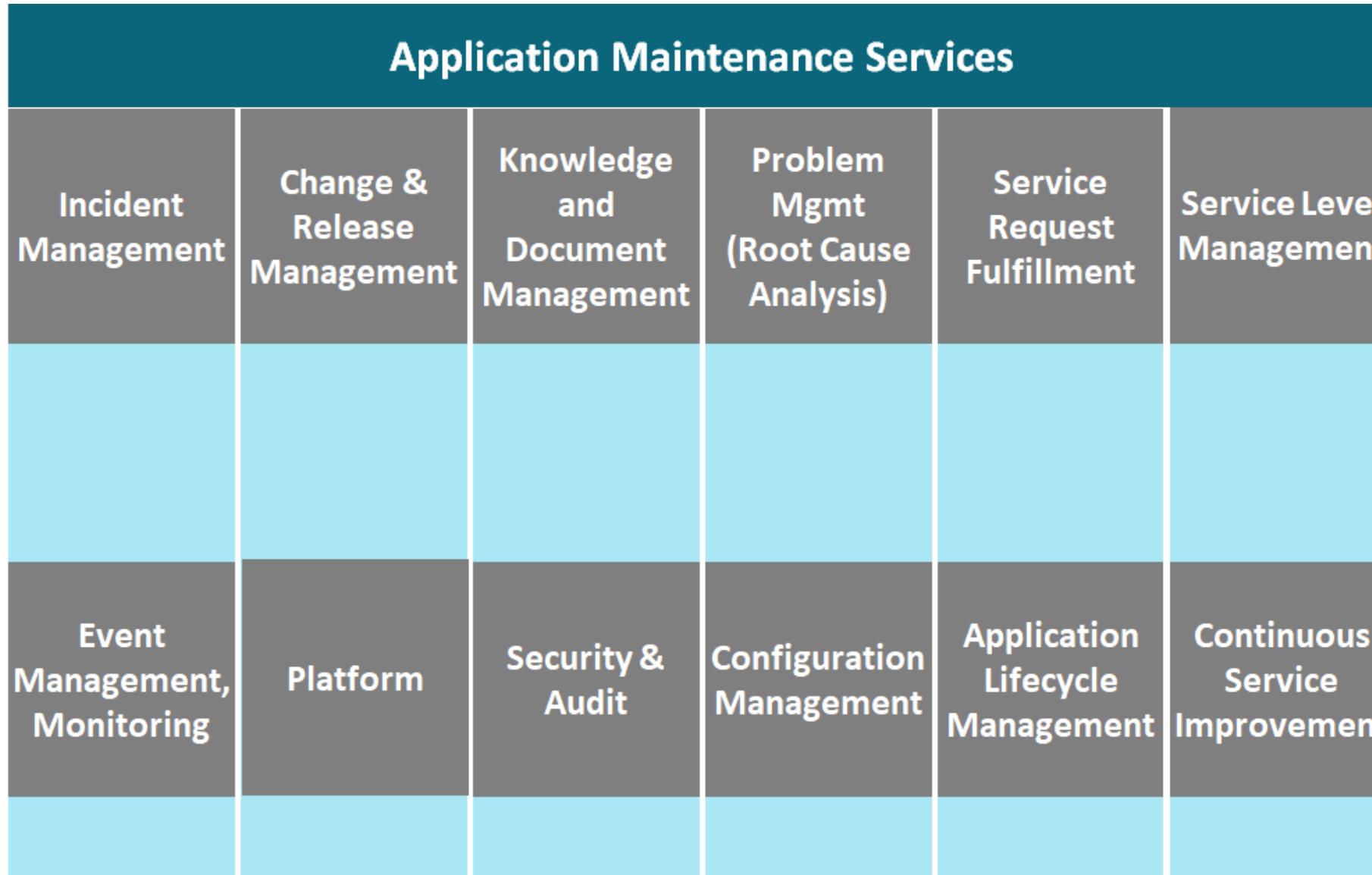
Portfolio: \$29.8 MM Global, 13MM R&D

## **Supply Chain**

ERP (Enterprise Resource Planning) applications (including ERP bolt-on applications) supporting the major supply chain functions (plan, source, make, deliver, etc.)

Portfolio: \$113 MM Global

# Application Maintenance – Our Services



### What we do...

Data Migration is an enterprise-wide service that uses standard processes and tools, created by combining experiences from previous data migrations with cutting edge technologies, to maximize efficiency and minimize costs associated with moving data between different IT systems.

### How we do it...

We utilize both standard and home grown tools that have been developed and validated for GxP systems. We provide direct mapping to in-house services like the EDL and EDG, to take advantage of cutting edge machine learning and data analysis techniques.

### Where we are...

Currently we are servicing the following areas/projects:

**Medical Devices**  
Project: OneMD  
2019 revenue: 560k

**A&D**  
Project: LifeScan  
2019 revenue: 572k

**Supply Chain**  
Project: NextGen  
2019 revenue: 500k

**Vision Care**  
Project: Game  
2019 potential  
revenue: 200k

*Currently in discussion*

## 03 - Capabilities & Services - Model Based Augmented & Mixed Reality

### Business Value

- Model based AR/MR creates business value by improving performance across the value chain—in product development, manufacturing, marketing, service, training and numerous other areas.

### Foundation

- 3D Engineering models are at the core of model based experiences. We manage those product & equipment models, along with associated virtual engineering simulations and manufacturing process artifacts.

### Tools

- Industry leading tools: Creo/Illustrate, ThingWorx, Vuforia Studio, Unity, ARKit/Swift
- Experiences can be viewed on any platform: Smart Phone, Tablet, Head worn

### Where We Are – Launch Process

- Service Offering - SLiM Process utilized
- Architecture established; Infrastructure (internal access) in place
- We can create and publish experiences now



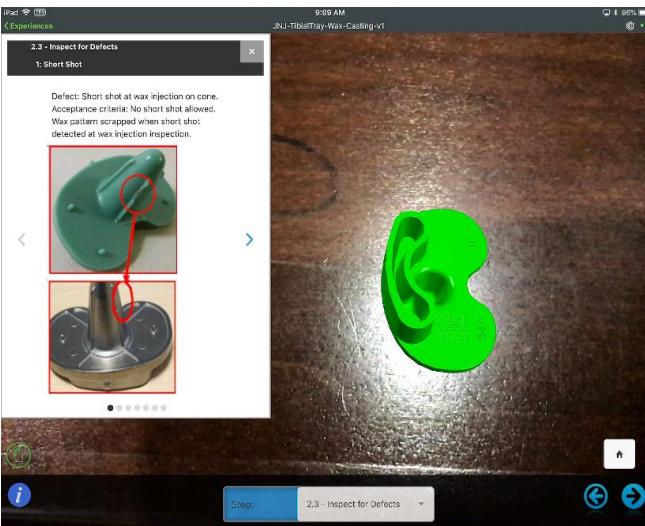
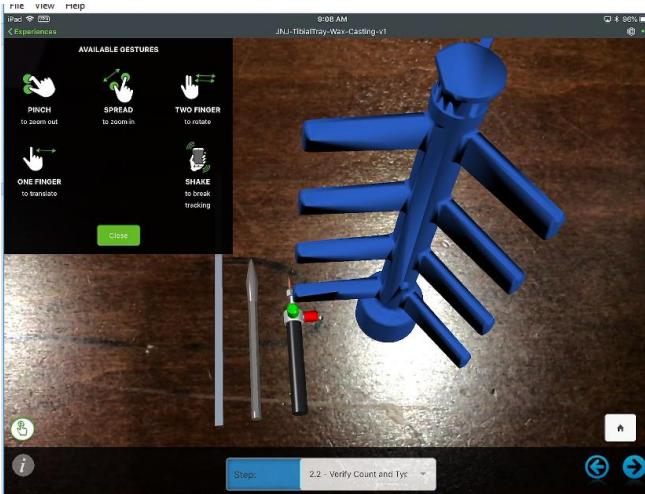
### Sample Projects/PoC's

- Heat Sealer
- External Fixation (Advanced MAXFrame)
- Tibial Plate Wax Assembly Process
- Surgical Instrument Assembly in OR



## 03 - Capabilities & Services - The AR/MR Service - Product, Process, Equipment and Plant

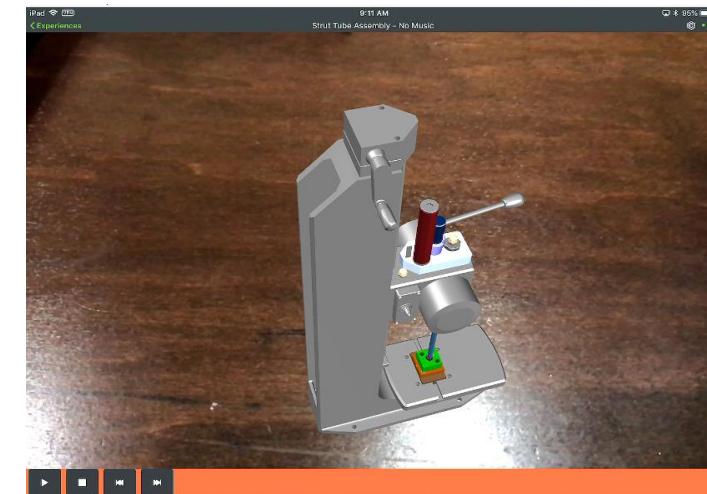
### Wax Assembly



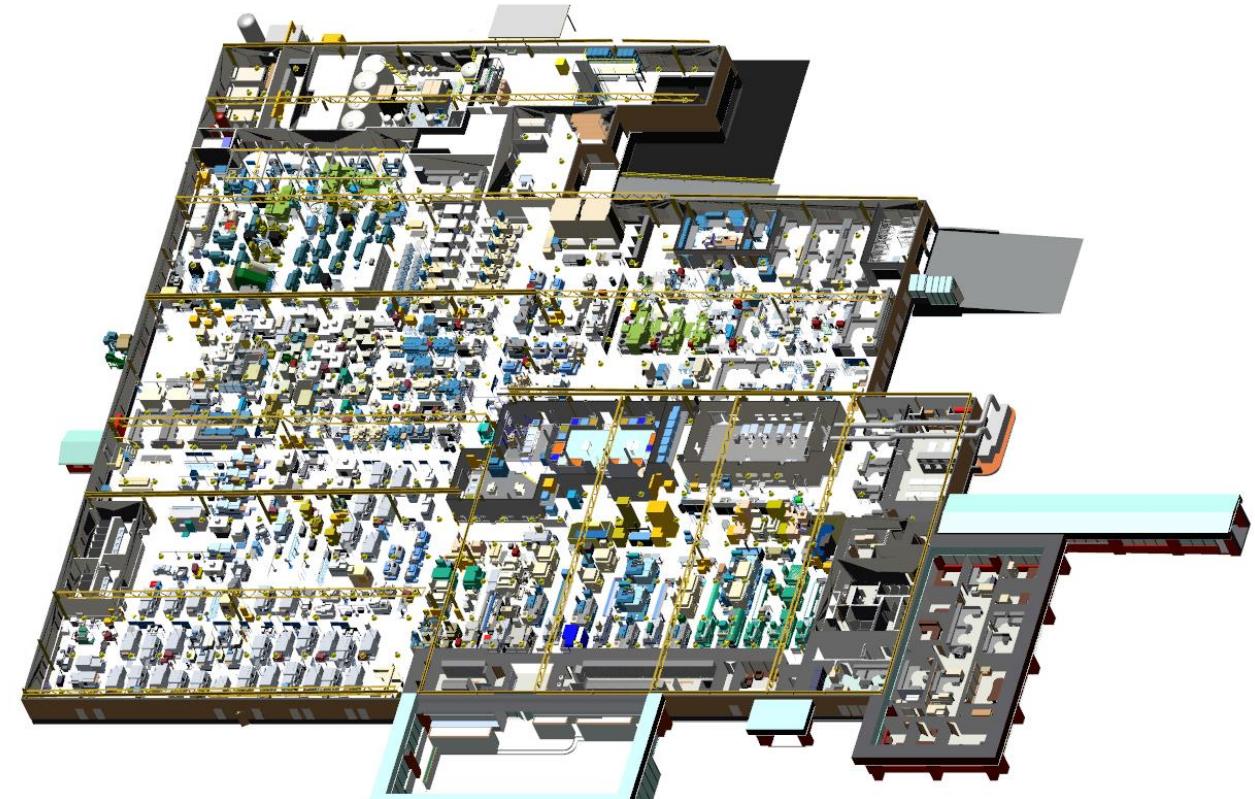
### Heat Sealer



### Strut Assembly - MAXFrame



## 03 - Capabilities & Services - The AR/MR Service - Product, Process, Equipment and Plant



# Agenda

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**01** Introduction

**02** Operating Model and Flow

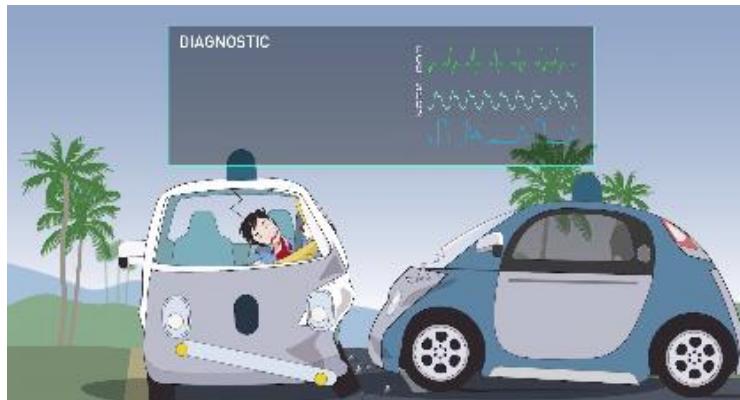
**03** Capabilities & Services

**04** Wrap Up

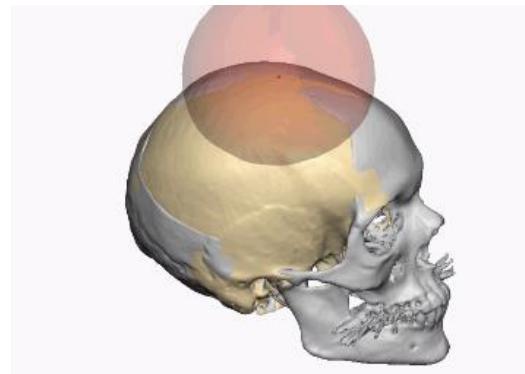
# Questions?

# Backup

# Videos



Digital Mfg – Scan to Health



ERDS – 3D Model Utilization



Testimonial – Integrity Solution

# TruMatch CMF Patient Specific Implant Case Management Solution in Windchill

An example of how the Global Windchill PLM platform was utilized to boost efficiency , provide reliability and global visibility for TruMatch CMF Patient Specific Implant product line, enabling design and manufacturing within short time lines.

## Project Description

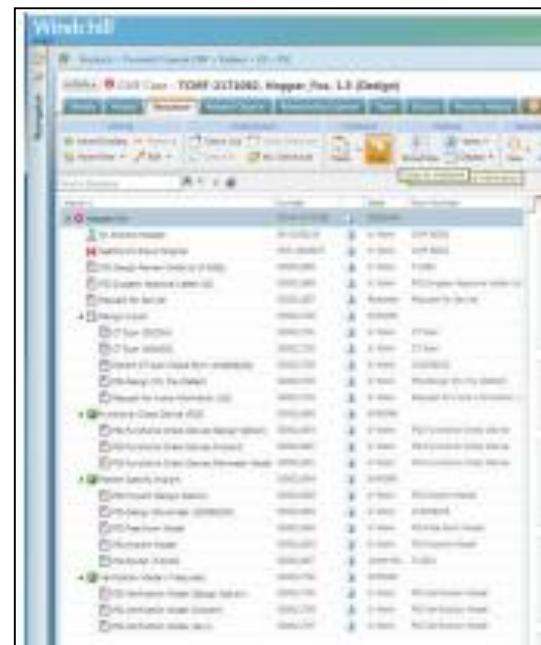
- Extended core system capability
  - Create and manage Patient "Case" work orders including parts and design deliverables from surgeon request through manufacturing
  - **Delivery of the patient specific implant can be in 5 days or less**
- Rapid deliverable creation enabled by
  - Creation and pre-population of case information into design documents specific to the product line and region
  - Change control with automated approval matrix and composite PDF document renderings
  - Real time case status tracking

## Business Value

- Replaced 2 older, regional databases built on MS Access with a single scalable global robust and reliable platform
- Eliminated the frequent outages that threatened the ability to meet patient surgery schedules
- Enabled communication and resource sharing at design locations in Europe and US, expanded hours of service to meet the increasing custom demand
- Case history capability provides extensive audit trail information (closed a pre-existing CAPA)

## Advanced Capabilities: .....highlighting a blend of technologies

- Business Processes Automation
  - Batch creation of sets of Case Artifacts (Parts, Documents, Structure)
  - Change Control with Automated Approval Matrix
- Patient Specific (*meta-data & scan data*)
- Plate Design - **CAD App**
- Plate Machining Direct From the Model - **CAM**
- Documentation – from **Office Templates** (moved to paperless)
- Integrations – **Microsoft Office, Email Templates**
- Data Structure Management - **DHF, DMR**
- Business Reporting – **Case Workload Management, Metrics**
- Re-Use (Platform) & Capabilities:
  - Product Structure – Batch Creation
  - CN & Approval Automation
  - Doc Templates
- New Product Line Capabilities
  - New Business Objects
  - Business Process Automation
  - Tracking Reports
  - Cascading Attributes
  - Form Emails



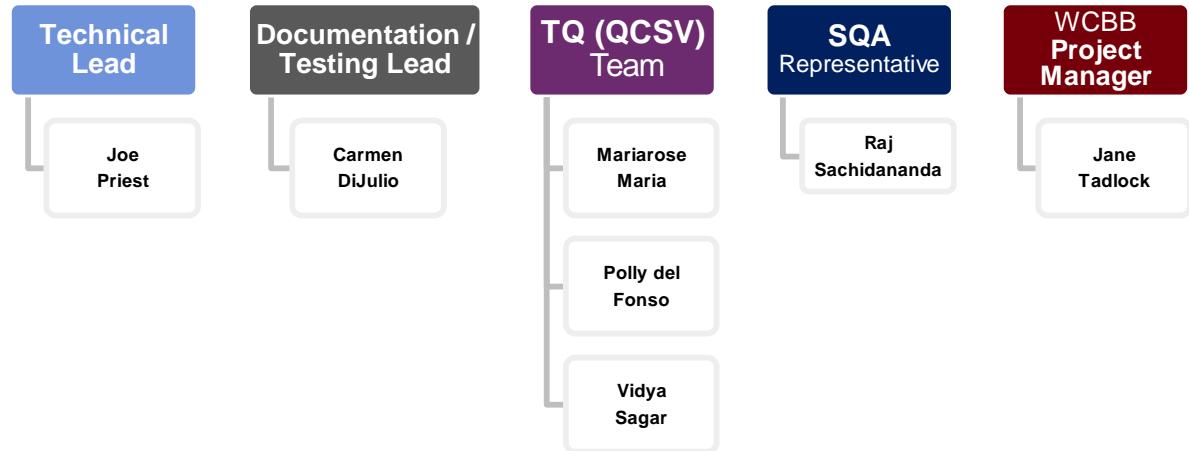
# Multi-QA Project

## Project Objective

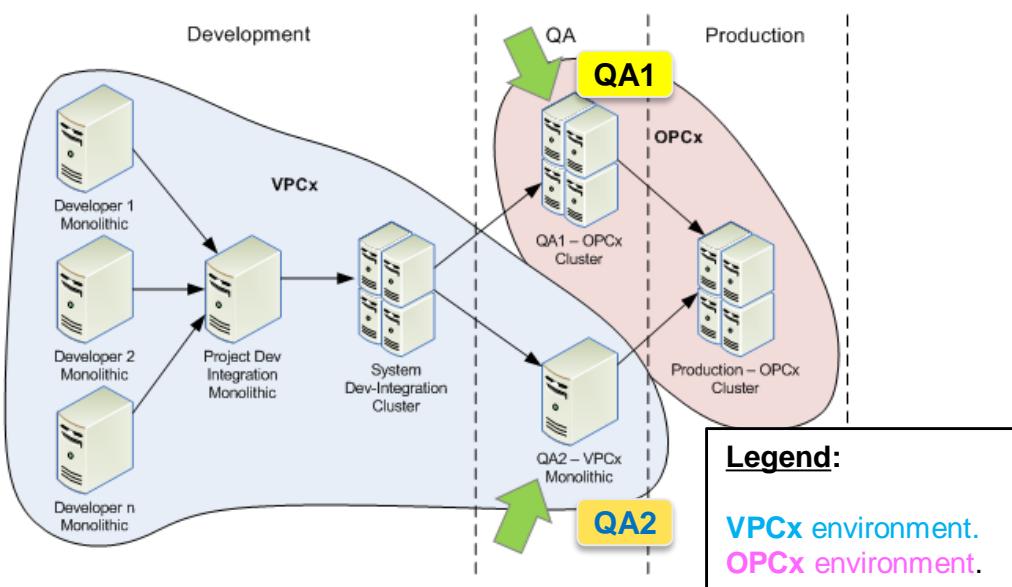
Deliver a validated QA2 environment for Windchill PLM including:

- ✓ Setup, documentation and testing for initial deployment of QA2
- ✓ Define expectations, process flow for assessing and executing changes in parallel using two QA environments
- ✓ Define the methods and procedures that will be followed to ensure synchronicity between QA1, QA2 and Production environments

## Project Team



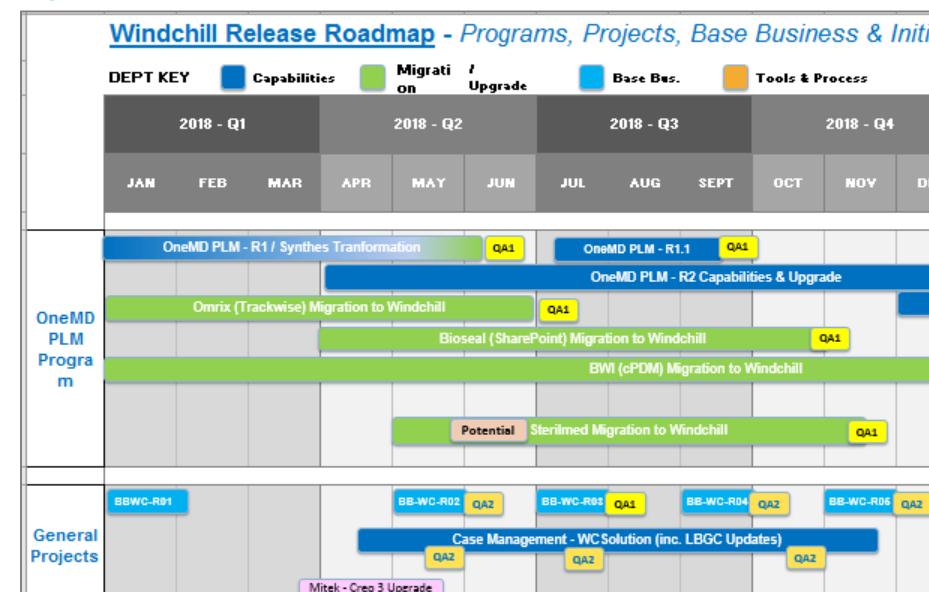
## Multi-QA Environment



## Benefits to Delivery

### Business Value:

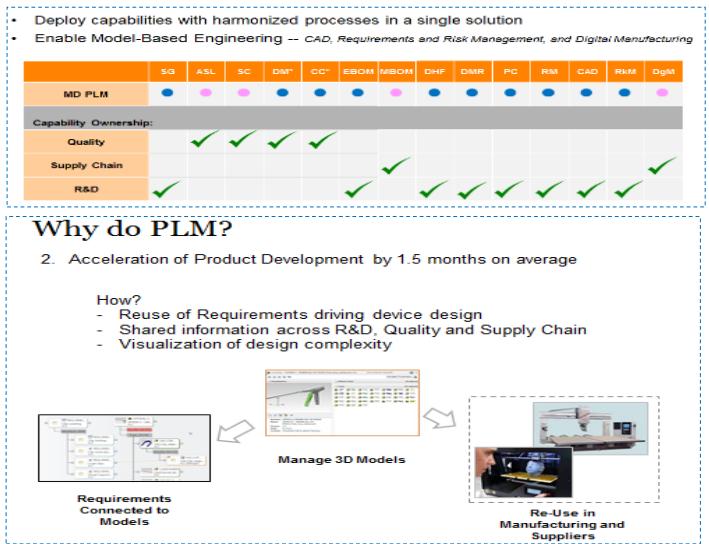
1. Avoids bottlenecks from long duration validations (data migration)
2. Rapid Response for critical break/fix work
3. Improved Planning – short and long term
4. Reduces impact of a single projects timeline affecting others.



# R&D PLM - *Product Line Complexity*

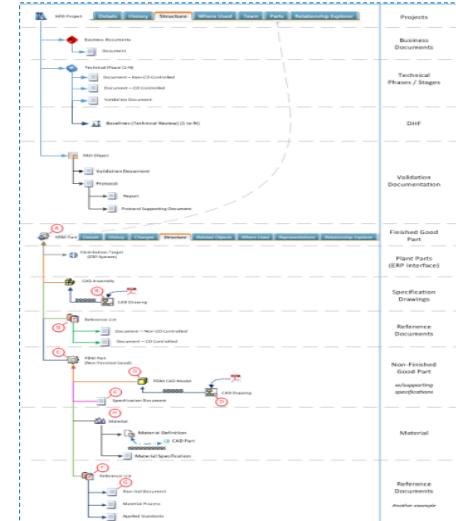
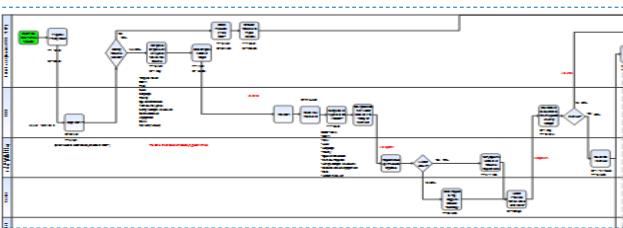
## Capabilities

1. Broad Spectrum of Inter-active Capabilities
2. New & Enhanced Capabilities
3. Higher Maturity Levels aligned to increasing Production Complexity (*i.e. Robotics*)
4. Key Benefits
  1. Time to Market
  2. Model Based



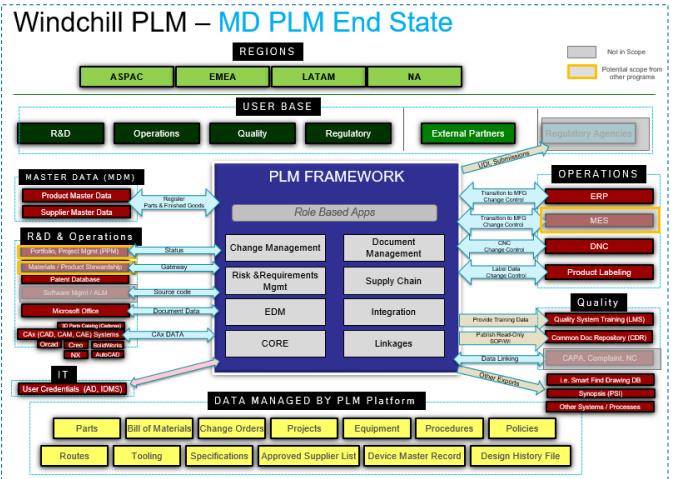
## Process & Data Structure

1. Common Processes
  1. CPI Mapping (As Is vs. Future) - KPIs
2. Common Data Structures
  1. Easily extensible data model
  2. Extensive, flexible data relationships
  3. Multiple Maturity Levels supported



## Interfaces

1. Authoring & Simulation Apps
  1. CAD, CAM, CAE
  2. Microsoft Office
  3. Requirements
2. Engineering Interfaces
  1. Materials, Templates, etc.)
3. MDM & ERP Interfaces
4. QMS Interfaces
5. Role Base Apps / Cross System Views



## System Retirements

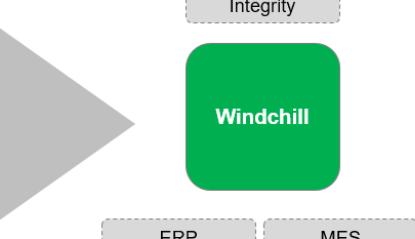
1. Retire 13+ systems
2. Paper / Scan Conversion
3. Data Migration Factory
  1. Systems / Rehearsals
  2. Data Cleansing
  3. Data Transformation (*Structure Changes*)
4. Archive Legacy Platforms
5. Streamline Support Services
6. Reduce TCO

## Why Do PLM ?

**Current State\***  
Fragmented PLM landscape with disparate data management



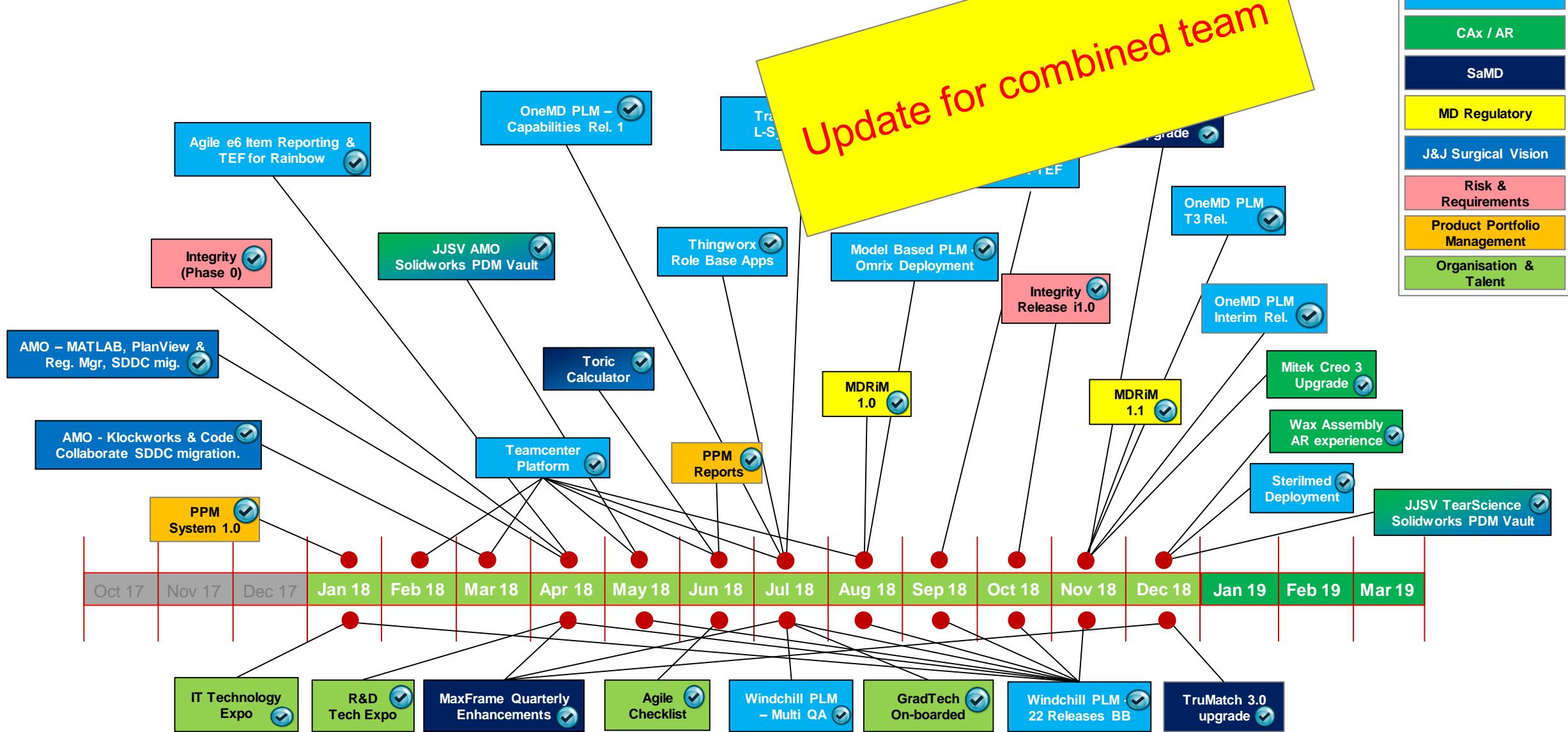
**Future State\***  
Integrated PLM System across OpCos as a single source of truth for product data



Consolidation of 13 different systems into a single platform reducing IT cost by \$11MM per year

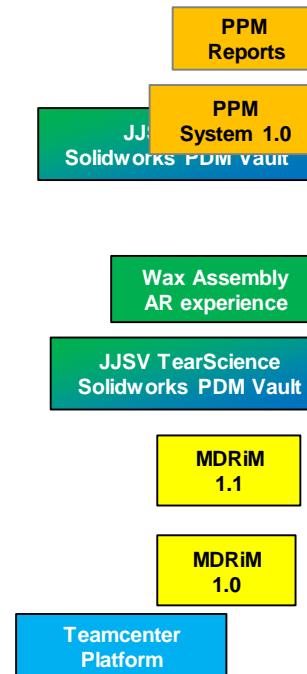
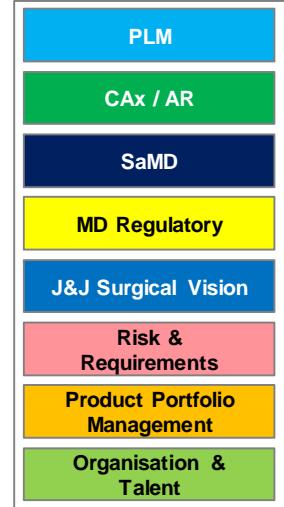
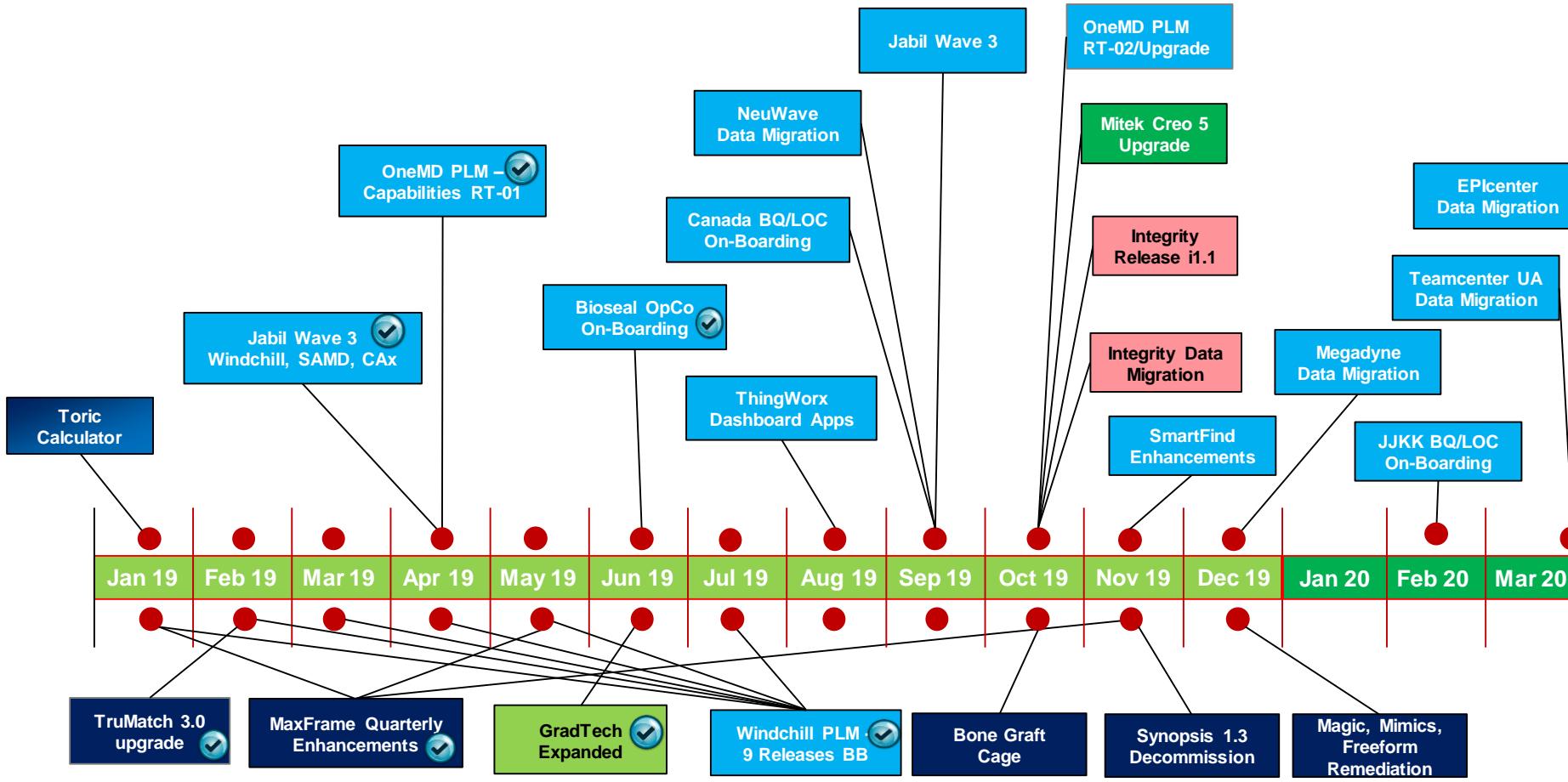
Drives need for a comprehensive platform focus

# 2018 Accomplishments



# 2019 Accomplishments

Update for 2019, including projected through year end, and combined team.



# COTS Focused

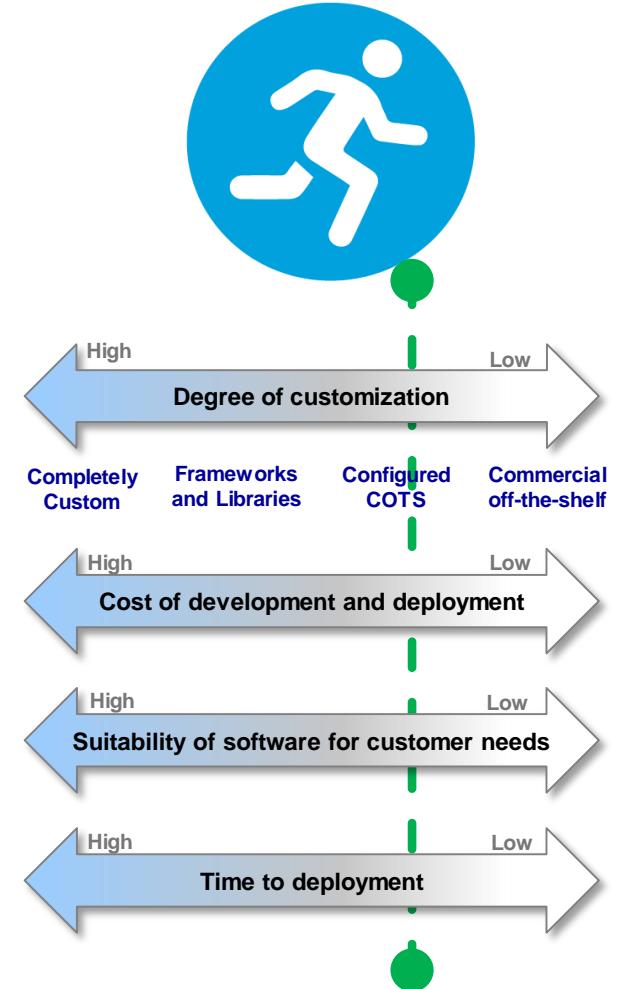
We are Commercial Off The Shelf (**COTS**) software solution focused:

1. Leveraging standard configured solution
2. Benefit from vendor development investments (i.e. model based 3D printing)
3. Pre-integrated solutions
4. Faster time to Value, Speed to Market
5. Reduces business risk of custom applications
6. Driving new ideas into the standard software solution
7. Collaborating with the business on how to best leverage standard
8. Protects J&J's Intellectual Property (IP) - J&J employee based ownership

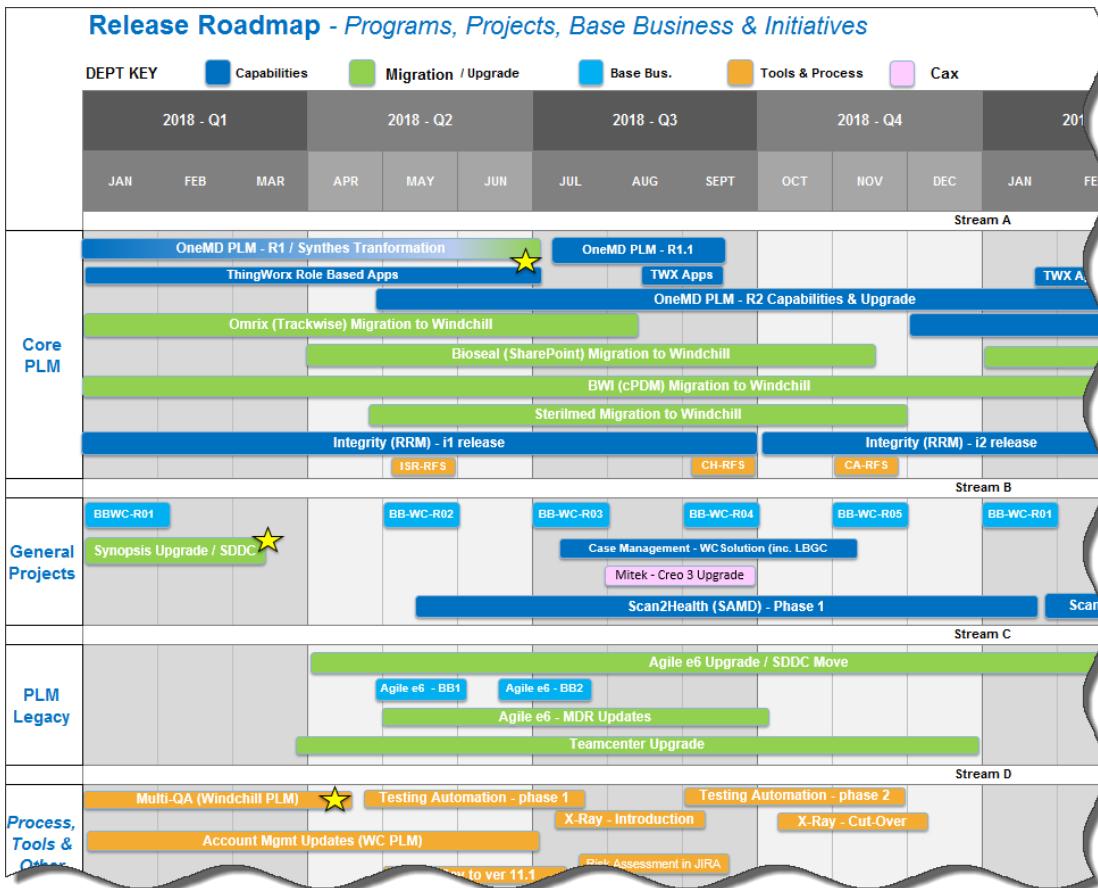


**FASTER**

*Time to Value, Speed to Market*

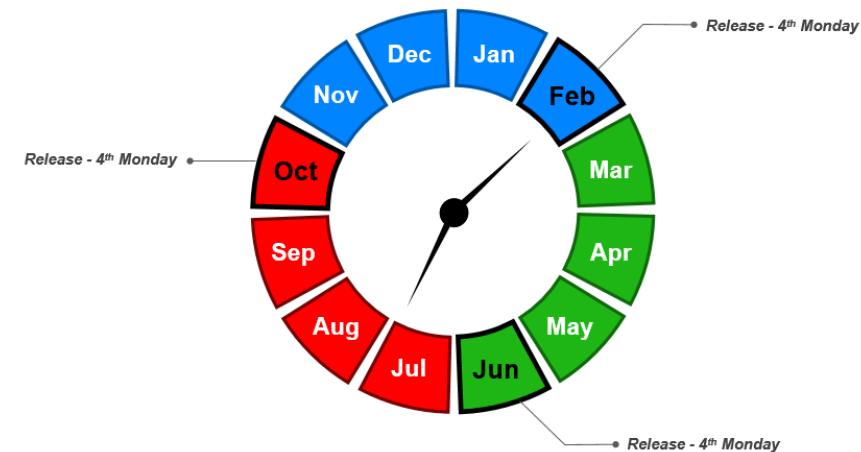


# Release Roadmap

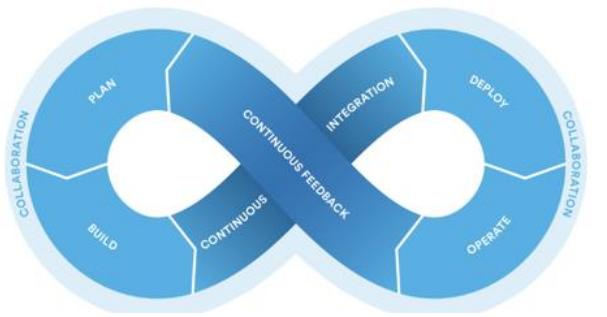


## Key Points:

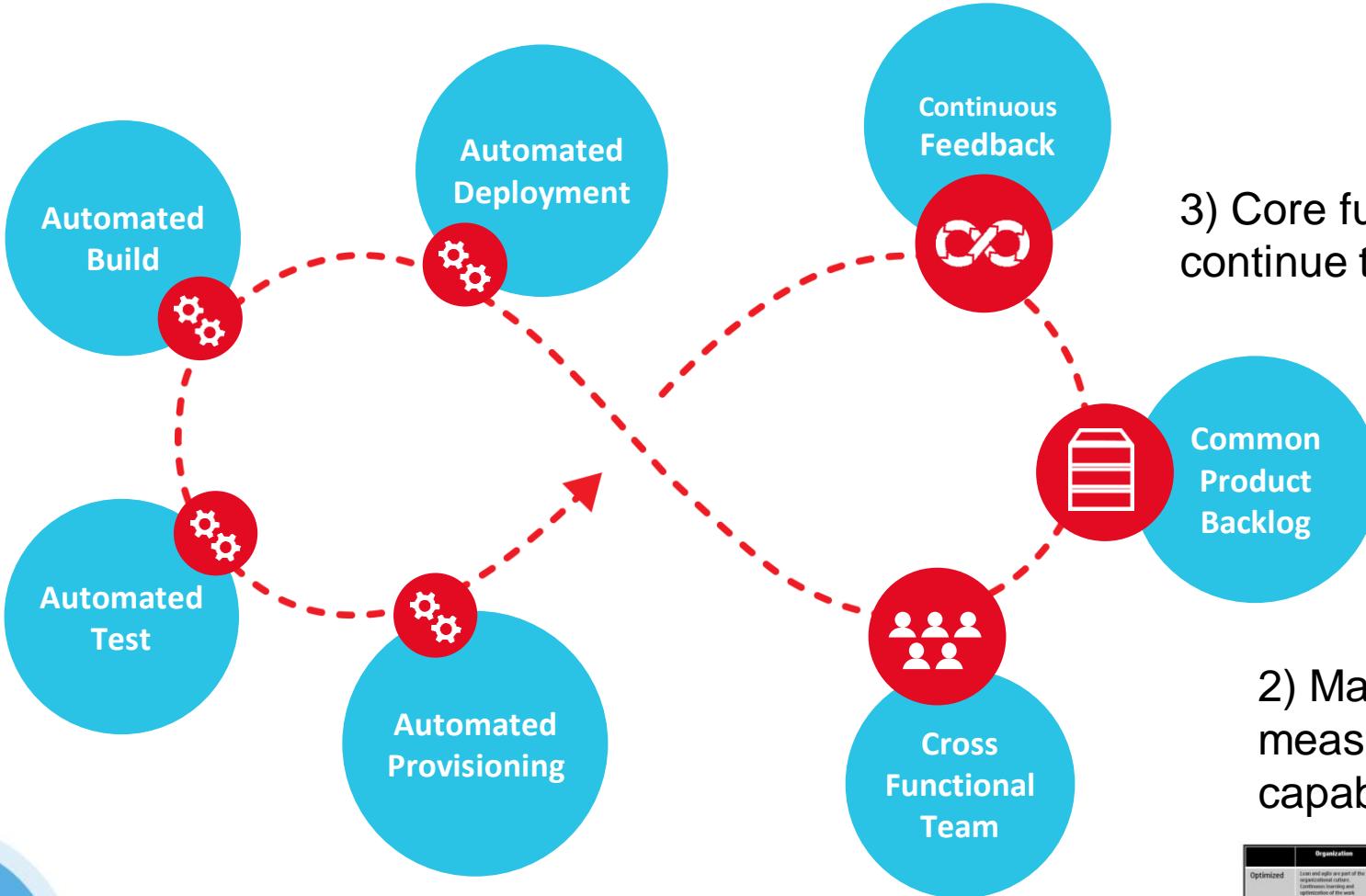
1. Diverse Activity / Growing rapidly
2. Global Teams collaborating on delivery
3. Majority of work is a composite of Integrated services. Capabilities are diverse
4. New Demand: Services Opportunities
  - New technology; AR, 3D Printing
  - Role Based Apps
  - “Model” and Product related services being requested



# Dev / Ops Evolution



1) Dev/Ops is our operating model



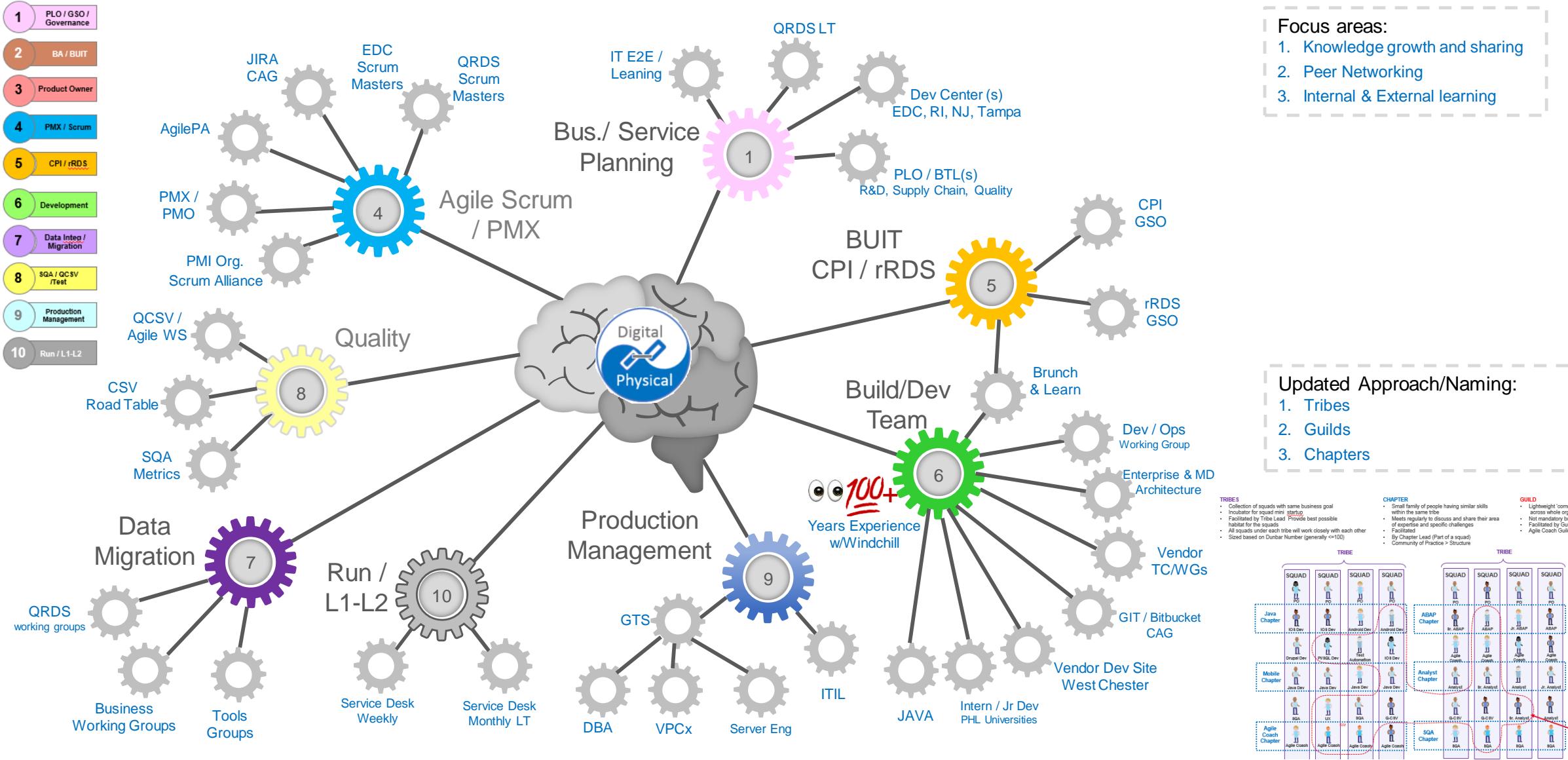
3) Core functions we continue to evolve

2) Maturity - We continuously measure our maturity and capabilities

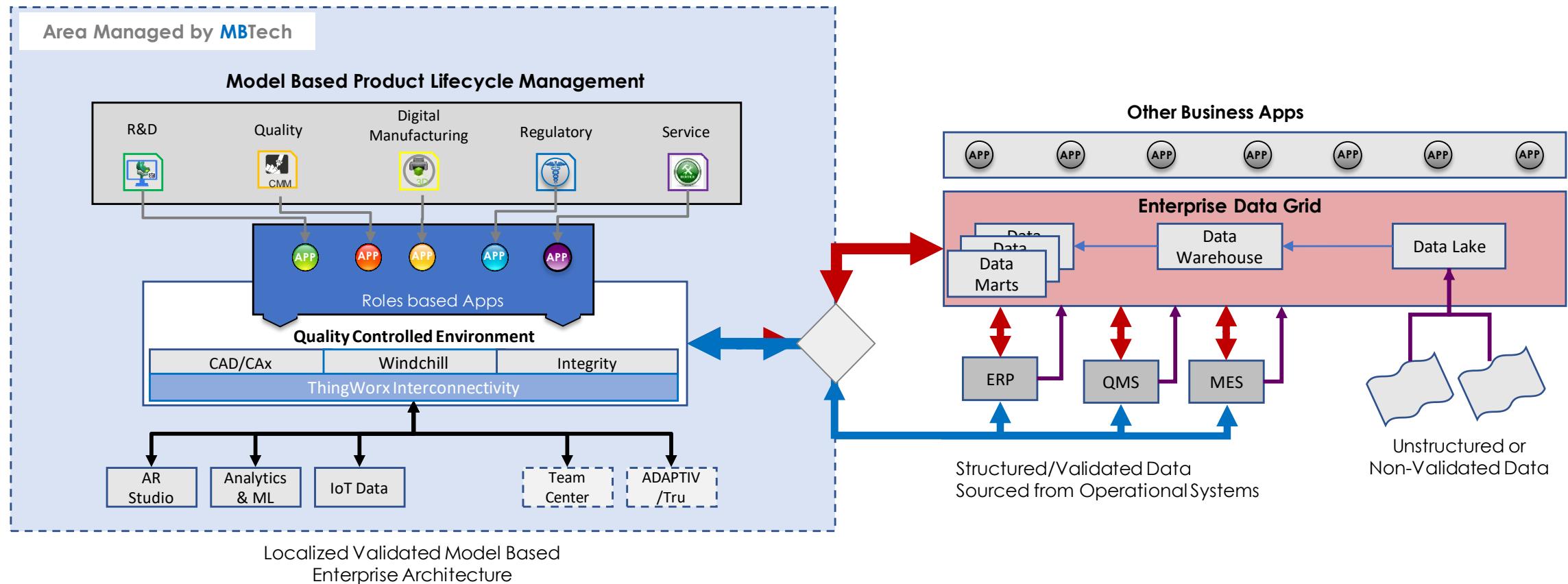
	Organization	Teamwork	Build Management / Continuous Integration	Continuous Delivery / Deployment	Life Cycle Management / Compliance	Testing	Data & Integration Management
Optimized	Learn and value are part of the organizational culture. Continuous improvement and optimization of the work processes.	Effective knowledge sharing and individual empowerment.	Build metrics are used to detect integration problems. Feedback loops are established between development, test, and operations.	Feedback loops are established between development, test, and operations.	Deployment is automated. Configuration management is in place.	Testing is fully automated. Acceptance tests are run automatically. Deployment scripts are verified and reviewed.	Relies on extensive feedback loops of database integration, source code management, and deployment processes.
Measured	Communities of practice mature by defining the organization's mission and vision. Standardized systems are in place to measure performance.	Effective communication and collaboration between teams in multiple locations. Incentives are provided to encourage innovation and recognize achievement.	Build metrics are gathered and analyzed. Feedback loops are established between development, test, and operations.	Deployment is orchestrated. Configuration management is in place.	Deployment is automated. Configuration management is in place.	Testing is fully automated. Acceptance tests are run automatically. Deployment scripts are verified and reviewed.	Database upgrades and migrations are done very quickly. Database integration, source code management, and deployment processes are automated immediately.
Defined	Disciplined self-adaptive processes and practices are implemented in place. Appropriate governance is in place.	Co-located development, testing and operations teams are involved in the delivery of the system. Standardized processes and practices are defined and communicated.	Code review, unit testing, and integration testing are in place. Continuous integration is in place.	Deployment is automated. Configuration management is in place.	Configuration management is in place. Change management and configuration control are in place. Deployment processes are used to verify every deployment.	Acceptance tests will be run automatically. Testing is performed on the code and artifacts before deployment.	Database upgrades and migrations are done very quickly. Database integration, source code management, and deployment processes are automated immediately.
Managed	The organization is starting to move towards having within silos, which still serve as separate, competing environments. Governance is variable.	Some knowledge sharing activities get underway. Development, test, and operations are within silos. Configuration management tools are initiated across the organization.	Automated build and test phases, but no integration testing. Some infrastructure is in place.	Deployment is partially automated. Configuration management is in place.	Lifecycle management is performed and integrated with configuration management. Configuration management is used for automating some tasks.	Test scripts and test data are generated as part of the deployment process.	Database changes are done through the use of automated migration tools associated with applications. An integration bus is used for database integration.
Initial	Development teams work in isolation and use their own tools, infrastructure and components to deliver the work.	Point-to-point, ad-hoc communication & collaboration. Little sharing. Success is determined through face-to-face meetings.	No build and test processes. Little management, documentation, source code, automated.	Deployment is manual initially, using environment specific builds. Deployment is uncoordinated.	Deployment is manual initially, using environment specific builds. Software quality teams are in the workflow.	Manual testing, test scripts and test data. Typically done after development.	Database integration is performed manually. Integration tools are used for database integration.

# Communities of Practices

Networks Enabling Continuous Improvement .



# Model Based Enterprise PLM Architecture



## MBE PLM platform is necessary to support Model Based product development efforts

- Will require a dedicated integration architecture to support MBE capabilities
- Will also need direct integration to select operational systems like QMS and ERP
- Will be integrated with Data Grid architecture to allow for shared applications & integrations

# MBE PLM Maturity Matrix

## Software as a Medical Device

We provide technology, architecture and build services to meet SaMD class I, II and III project needs across the J&J enterprise, whether new development or enhancement of existing applications. We partner very closely with other TS service providers and partners to provide a holistic, full-spectrum approach

## Digital Manufacturing

We provide foundational support for the J&J commitment to a Digital Manufacturing strategy (2020 vision). Using modern, advanced technologies we bring together design, simulation, 3D visualization, analytics and collaborative tools to create new products and manufacturing process definitions simultaneously.

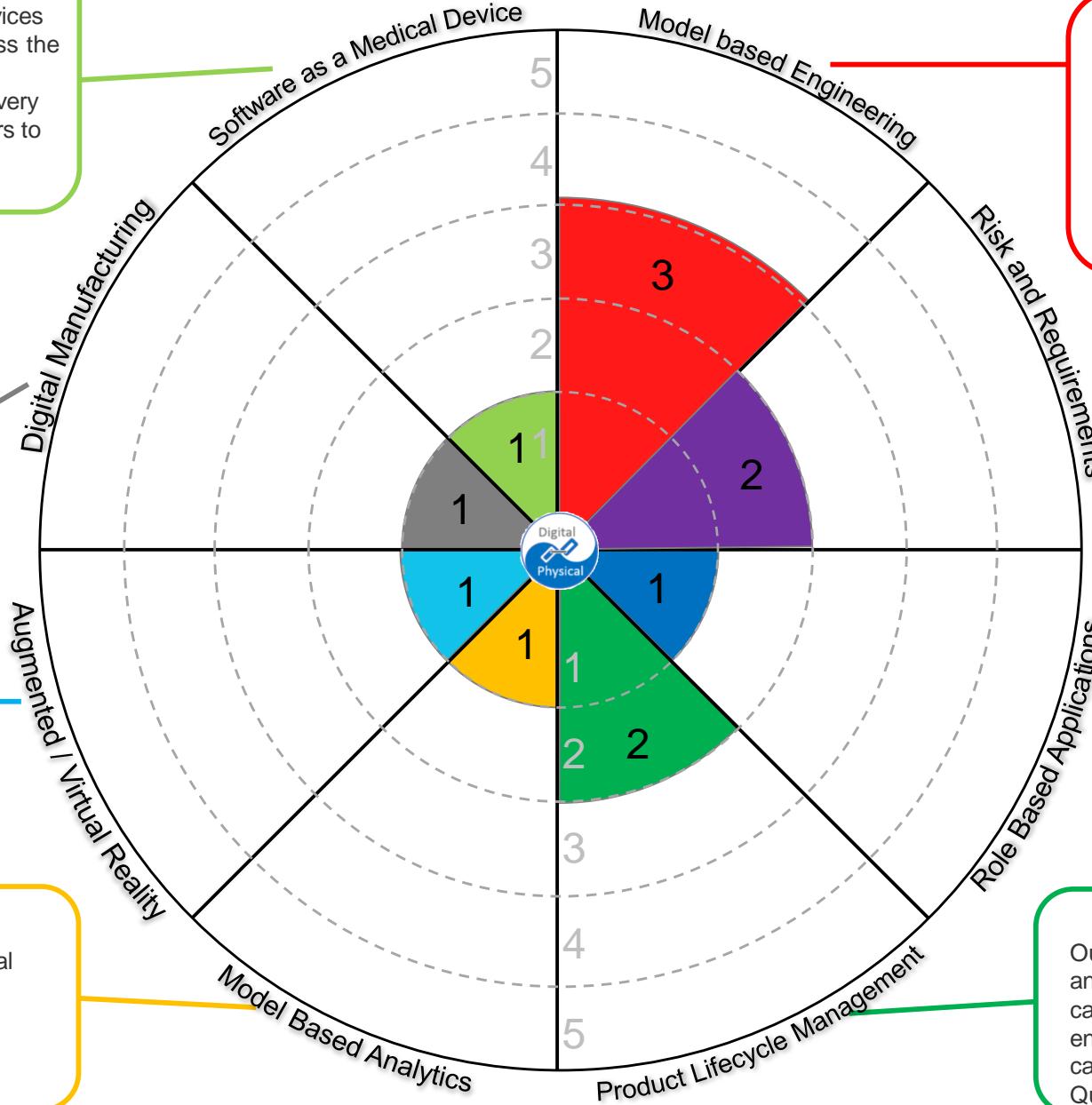
## Augmented / Virtual Reality

POCs and pockets of activity are currently underway by various groups in J&J for such things as:

- Mfg. monitoring
- Sales Product Training
- Equipment maintenance procedures

## Model Based Analytics (MBA)

Data-driven models that are trained from historical observations. Often enabled with Machine Learning techniques. Used to diagnose and predict usage profiles, failure modes and operating performance



## Model Based Engineering

Model Based Engineering (MBE) Service provides product development, manufacturing and life cycle support that uses a digital model to drive all engineering activities. Computer-aided engineering design and analysis tools (CAx) service provides the tools and platforms to design, simulate, analyse and manufacture new or existing products. Foundational for Digital Manufacturing

## Risk & Requirements

Providing service for Risk and Requirements management processes needed in the development of complex R&D products especially in the Robotics arena

## Role Based Apps

The team has completed POCs for Role Based Application and is deploying some for Production use:

1. Change Analytics
2. Complex Change Visualization
3. User/Group selection/identification (IDMS)

## Product Lifecycle Management

Our team provides development services for R&D PLM and engineering change management. These capabilities cover End to End processes covering the entire lifecycle of R&D products. The service includes capabilities shared across the R&D, Supply Chain and Quality orgs. Single or multiple platform solutions