Rock Island Arsenal MBE Capability Assessment

Prepared for the MBE Summit

April, 2017

- •**Background**
- •**Team**
- •**Assessment**
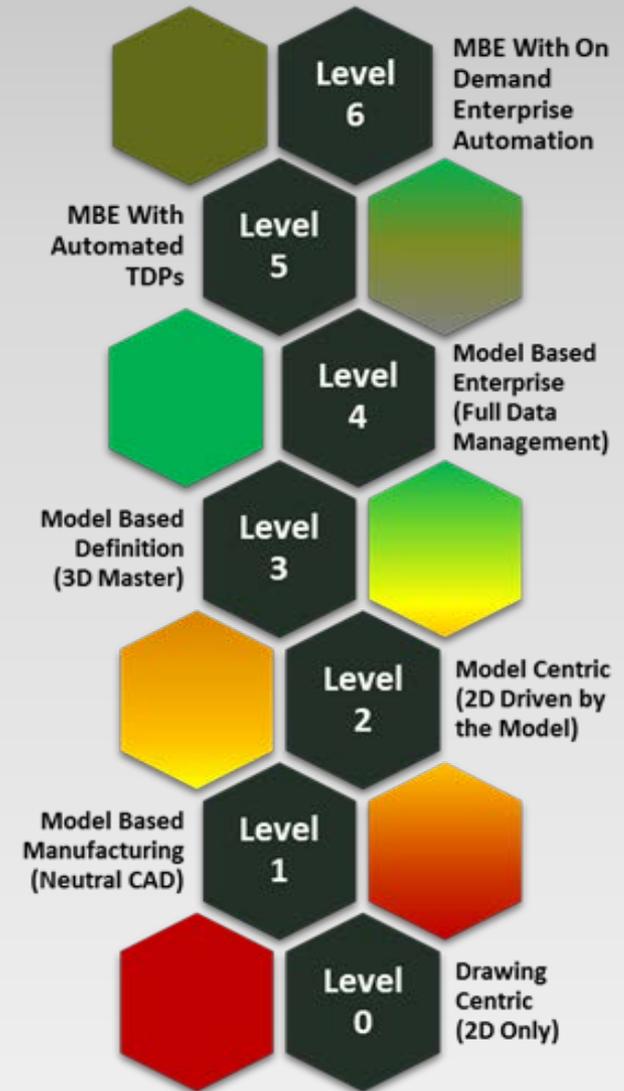- •**Roadmap**
- •**Conclusions**

Background

Program History and General Overview

Background

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Conclusions

- An unbiased review of an organizations capabilities in regard to utilization of 3D model or other digital product and process definition throughout a products lifecycle

- It is intended to reflect an organizations business model and thus there is no right or wrong score

- It is also intended to measure where an organization wishes to be in the future

Level 6 — MBE With On Demand Enterprise Automation

Level 5 — MBE With Automated TDPs

Level 4 — Model Based Enterprise (Full Data Management)

Level 3 — Model Based Definition (3D Master)

Level 2 — Model Centric (2D Driven by the Model)

Level 1 — Model Based Manufacturing (Neutral CAD)

Level 0 — Drawing Centric (2D Only)

- A tool developed by Army ManTech with industry input

- It consists of 5 process focus areas and a total of 25 sub areas each with a score ranging from 0 to 6

- Aggregate scores are derived for each focus area and overall

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The Army has made a substantial investment in MBE and this project is the realization of that investment

Net Centric MBE

Future Combat Systems

A3FAB

Industry

MBE Capabilities

Net Centric MBE Phase2
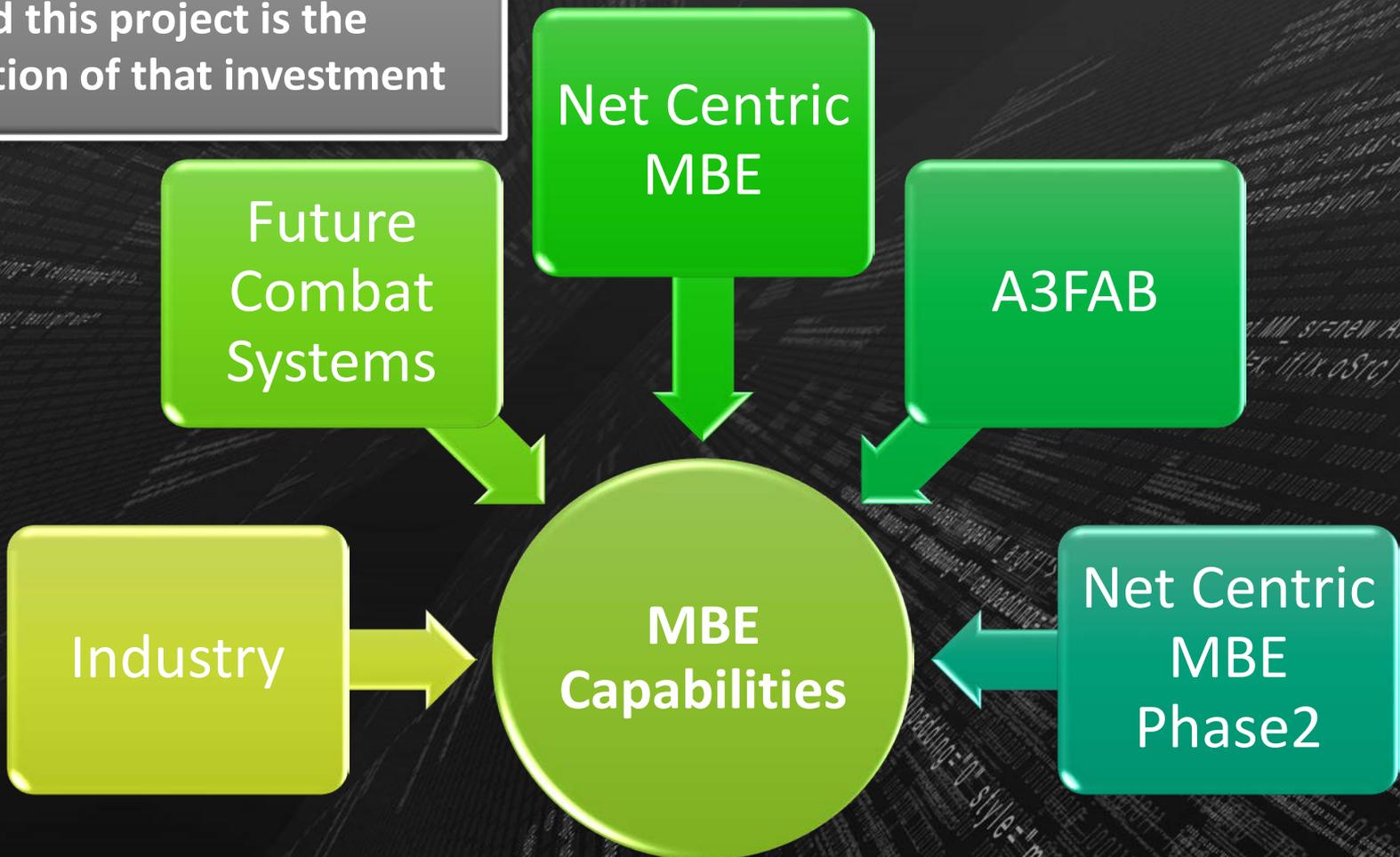
Team

The Assessment Team Members
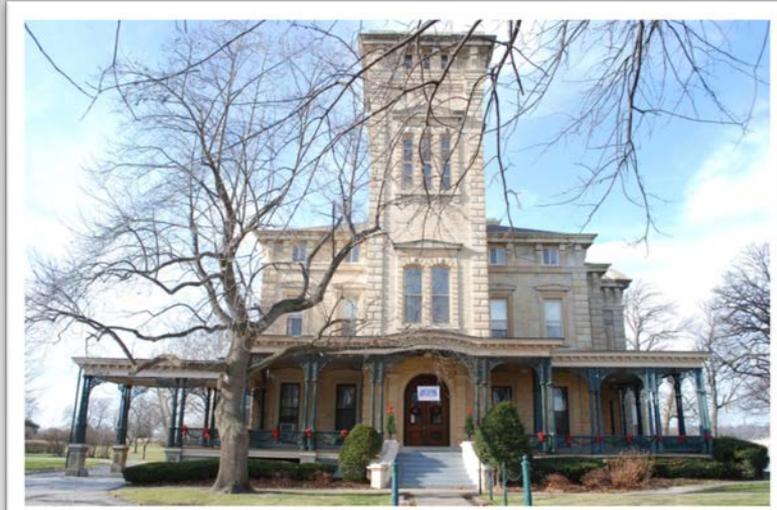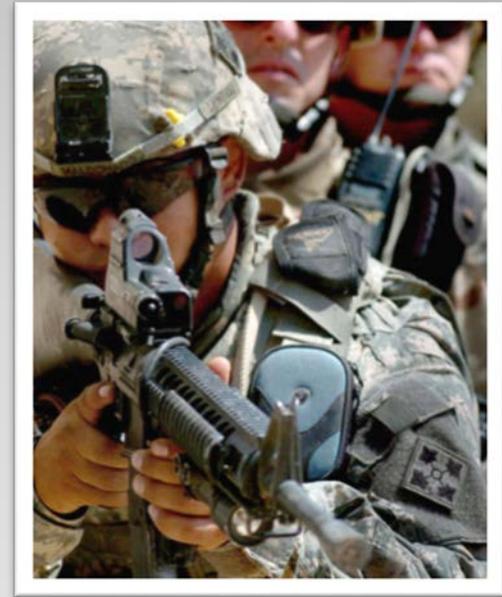
Background

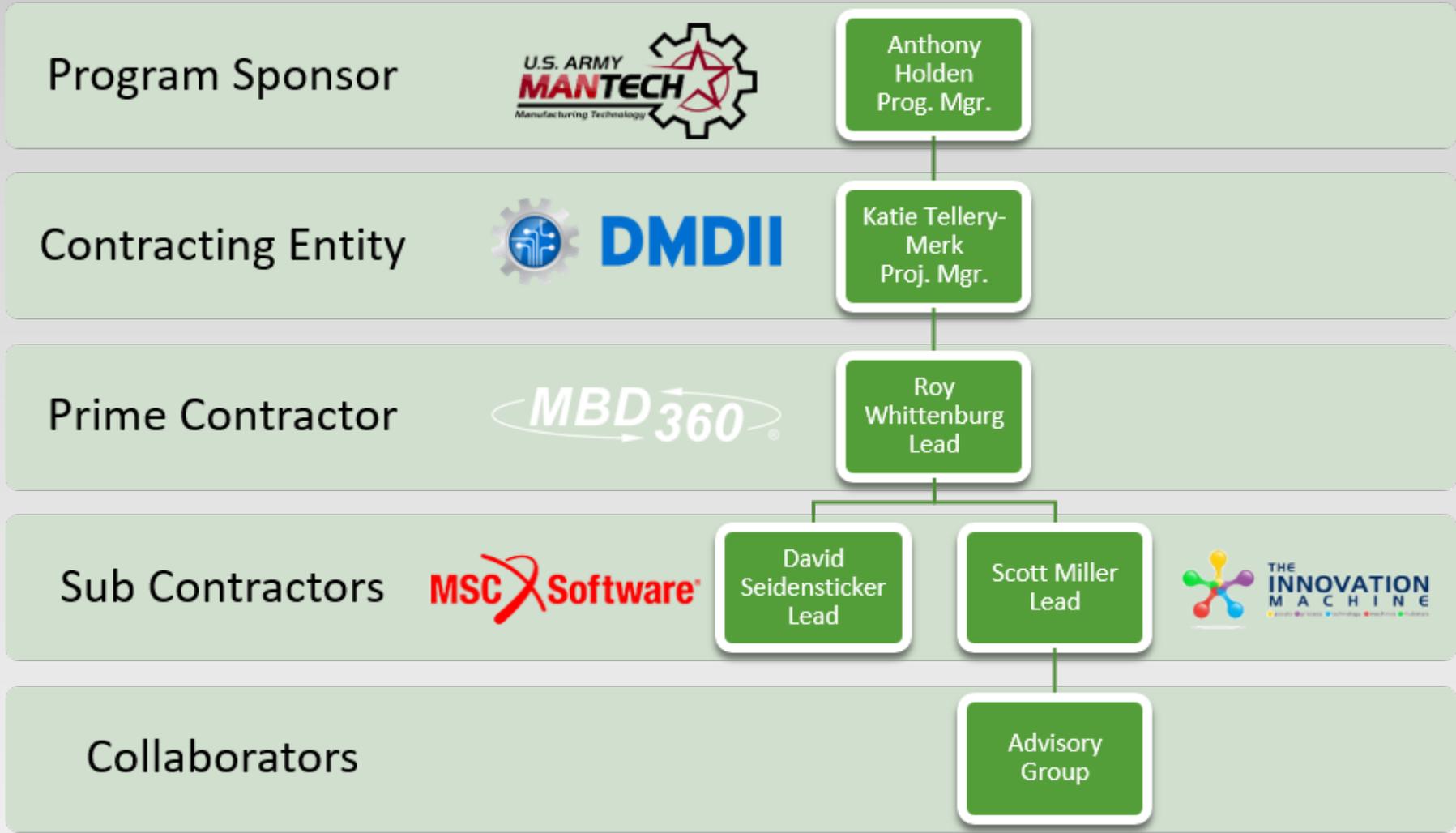Team

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The Rock Island Arsenal on the Mississippi River between the cities of Davenport, Iowa, and Rock Island, Illinois. It lies within the state of Illinois. It is home of First Army headquarters. Additionally, it is the home for both design and manufacture of many Army components.

The Rock Island Arsenal Joint Manufacturing and Technology Center occupies 1.5 million square feet of its Kingsbury Complex home. As the only multi-purpose and vertically integrated metal manufacturer in the Department of Defense, the center possesses the unique technical expertise and equipment to manufacture products high in quality and sustainability.

Program Sponsor	U.S. ARMY MANTECH *Manufacturing Technology*	Anthony Holden Prog. Mgr.
Contracting Entity	DMDII	Katie Tellery-Merk Proj. Mgr.
Prime Contractor	MBD360	Roy Whittenburg Lead
Sub Contractors	MSC Software	David Seidensticker Lead — Scott Miller Lead — THE INNOVATION MACHINE
Collaborators		Advisory Group

- America Makes
- Apriori
- Heartland Science & Technology Group
- Integris Group
- ITI
- Lucrum Group
- Manufacturing Laboratories Inc. (MLI)
- Microsoft
- Penn State
- PTC
- Siemens
- Spire Manufacturing Solutions
- Systems Insight
- Texas State University

A group of unpaid participants that provide a neutral input on the assessment results and recommendations

Assessment

Measuring MBE Capabilities

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Approach

Communicate
- Level set with all parties on goals, process and expectations

Learn
- Interview SMEs and other documentations to learn high level processes, data, and tools

Analyze
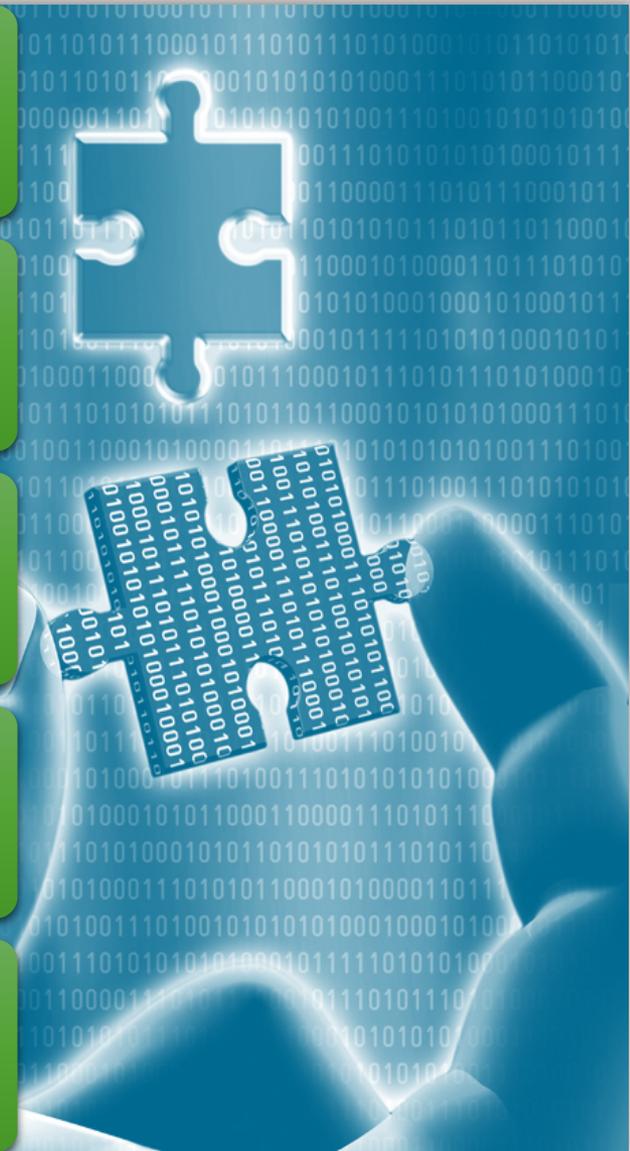- Review the facts in the context of the MBE Capability Index

Clarify
- Return to the SMEs to clarify any questions or issues from the analysis

Document
- Create detailed documentation of the assessment and review with the SMEs

- Held a kick off meeting with all major departments

- Conducted over 14 group SME interviews

- Several follow up one on one interviews

- Interview team consisted of 5 members from
  - MBD360
  - MSC Software
  - The Innovation Machine

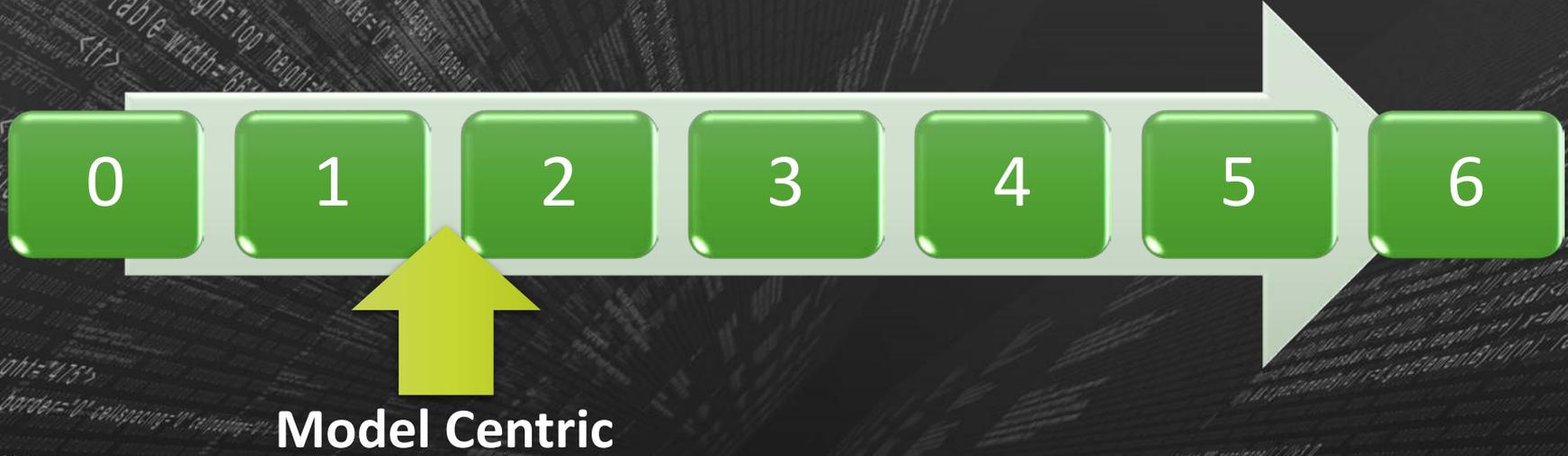Other items that were reviewed were:

- ISO Quality Manual
- Applications Lists
- Value Stream Maps
- Org Charts
- Process Flows
- Hands On Tours
- Websites

Focus	Sub Set	MBE Level						
		0	1	2	3	4	5	6
Design Activities	Product Definition	R	R					
	EBOM	R	R					
	Analysis	R	R					
	Checking and Model Quality	R						
CM/DM Activities	Release & Change Process	R	R	R				
	CM Vault Management	R						
	Collection of Elements In To TDP	R	R					
	Management of TDP	R	R					
Manufacturing Planning Activities	MBOM (Creation)	R	R	R				
	MFG Product Definition	R	R	R				
	MFG Process Definition	R	R	R				
	MFG Facilities	R						
	Tooling	R						
	Tapes (CNC/Other Programs)	R	R					
	Manufacturing Operations	R						
Quality Requirements, Planning Activities	Quality Planning	R	R	R				
	Quality/Inspection Code Generation	R	R	R				
	Quality Requirements DM	R	R					
	Receiving Inspection	R	R	R				
	Supplier Quality Certification	R	R	R				
Enterprise Activities	Logistics (Tech Manuals) (Out of Scope)							
	Logistics (Spares) (Out of Scope)							
	Procurement	R	R	R				
	Shipping	R	R					
	Reverse Engineering	R	R	R				

Model Centric

| Focus Category	MBE Level						
	0	1	2	3	4	5	6
Design Activities		1					
CM/DM Activities			1.5				
Manufacturing Planning Activities		1					
Quality Requirements, Planning Activities			1.8				
Enterprise Activities			2				
Overall MBE Capability			1.5				

An "as is" high-level baseline process was created to reflect the actual practices reflected during the fact finding portion of the assessment
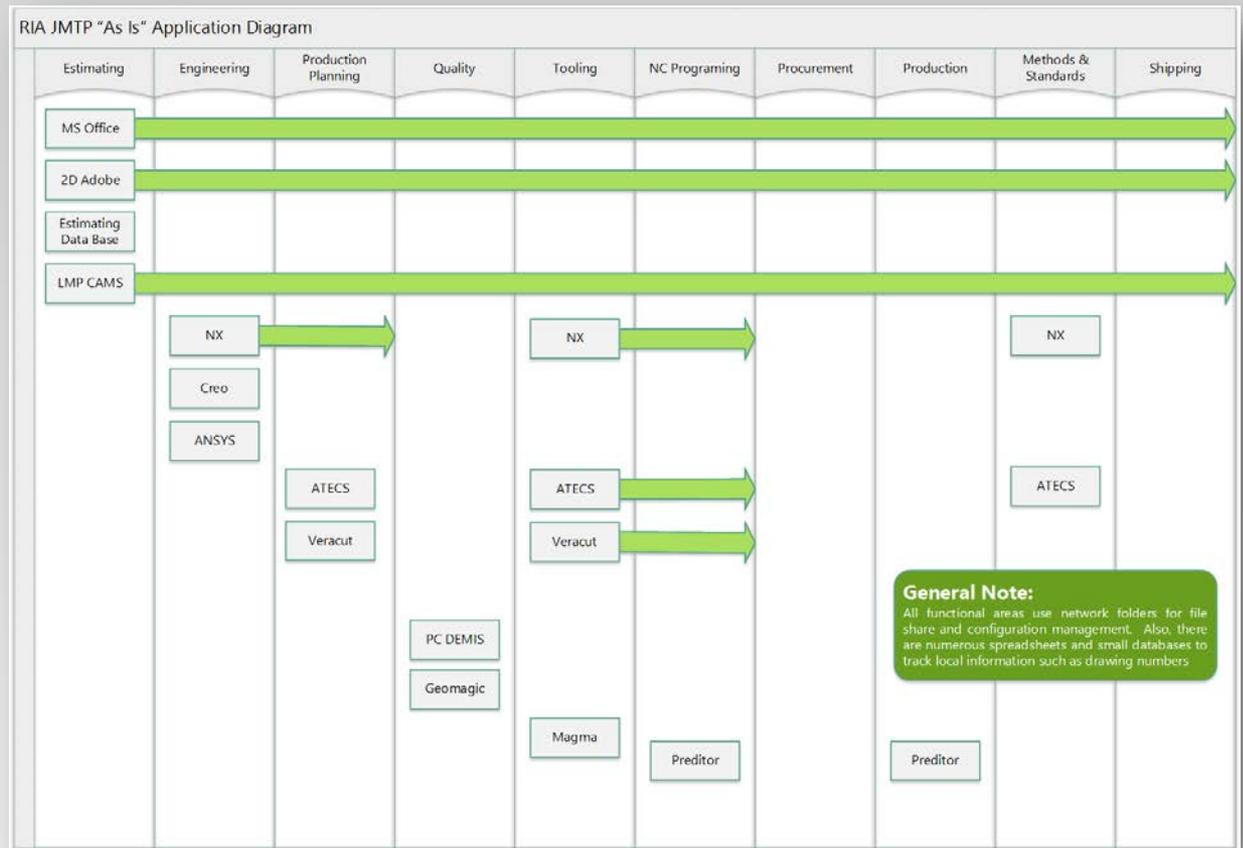

High Level Product Flow Through Stages
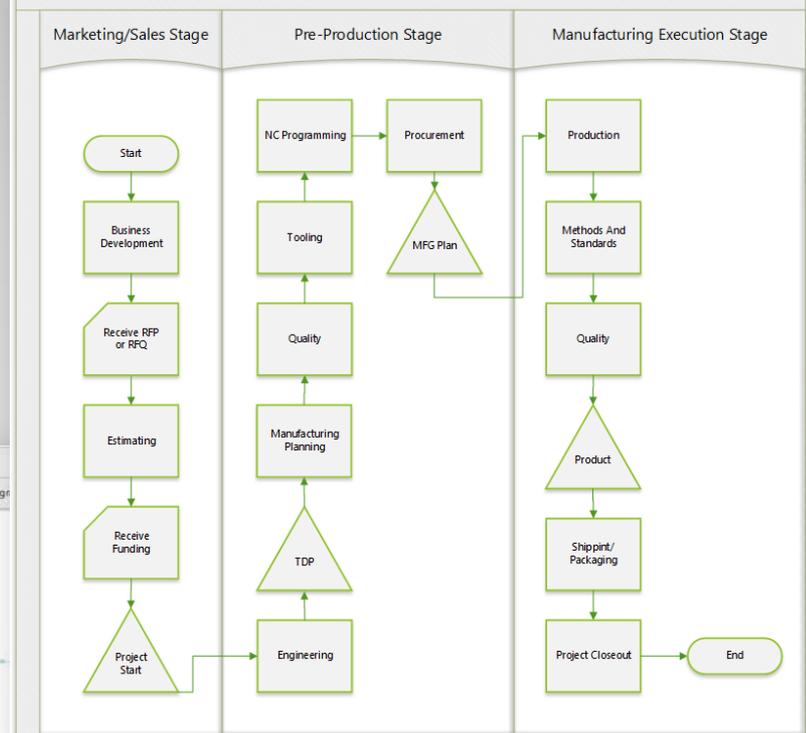
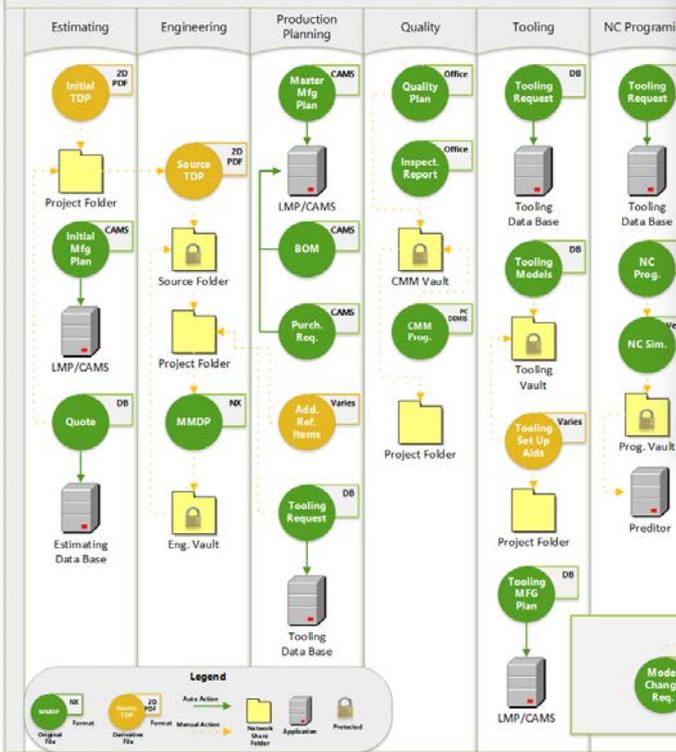High – Level Basic Process Flow for JMTC-RIA
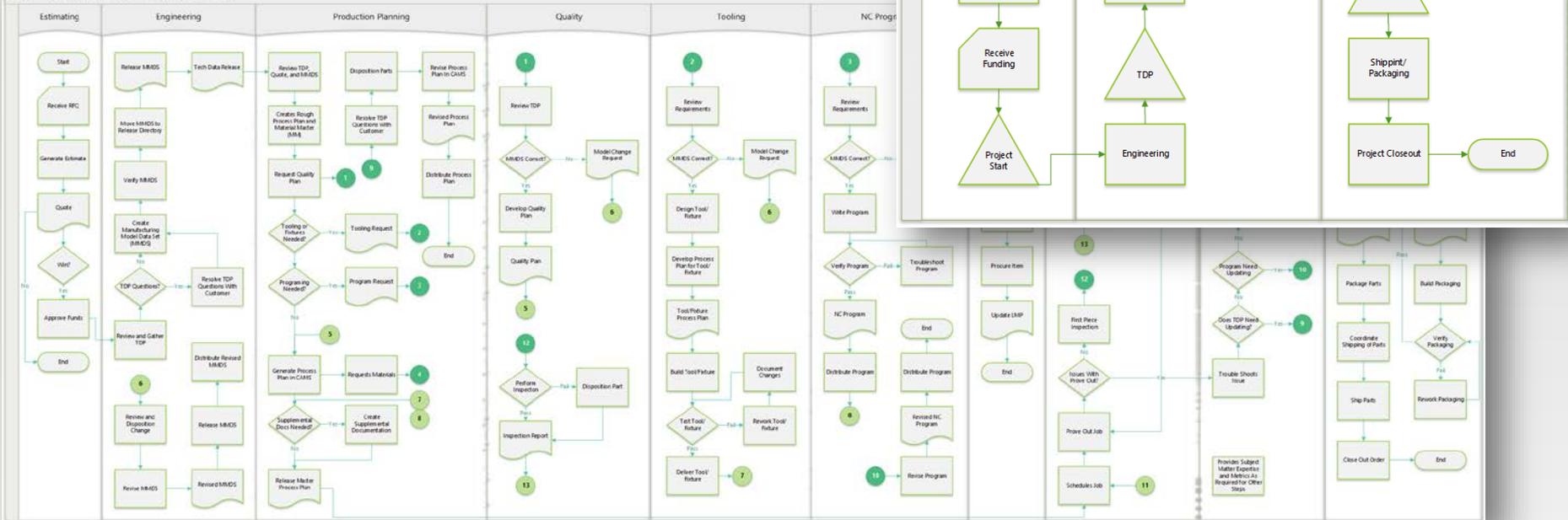
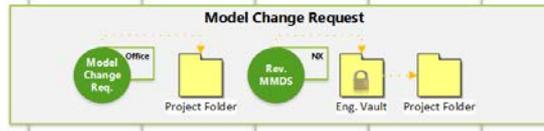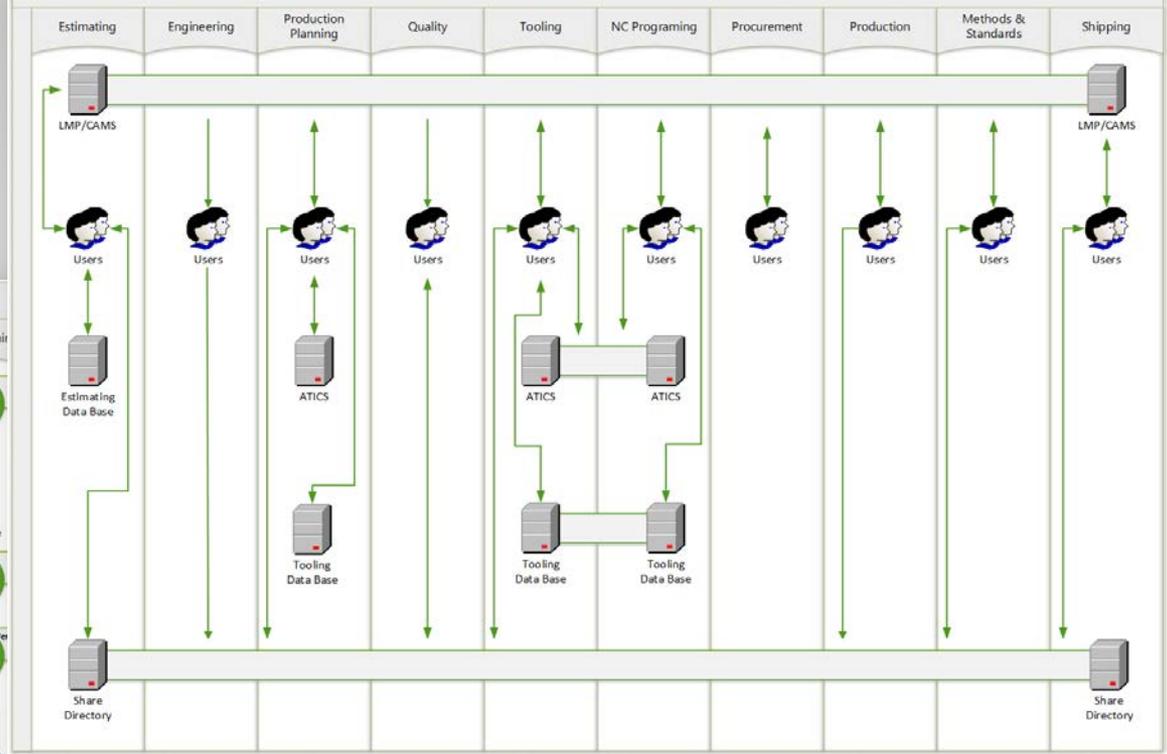All major applications were mapped to the departments that utilized them

Both data flow and access was mapped by department and order of work flow

Focus	Sub Set	MBE Level						
		0	1	2	3	4	5	6
Design Activities	Product Definition	red	red	blue	blue	blue	light green	light green
	EBOM	red	red	blue	blue	blue	light green	light green
	Analysis	red	red	blue	blue	blue	light green	light green
	Checking and Model Quality	red	blue	blue	blue	blue	green	green
CM/DM Activities	Release & Change Process	red	red	red	blue	blue	blue	green
	CM Vault Management	blue	blue	blue	blue	blue	green	green
	Collection of Elements In To TDP	red	red	blue	blue	blue	green	green
	Management of TDP	red	red	blue	blue	blue	green	green
Manufacturing Planning Activities	MBOM (Creation)	red	red	red	blue	blue	blue	green
	MFG Product Definition	red	red	red	blue	blue	blue	green
	MFG Process Definition	red	red	red	blue	blue	light green	green
	MFG Facilities	red	blue	blue	blue	blue	green	green
	Tooling	red	blue	blue	blue	blue	green	green
	Tapes (CNC/Other Programs)	red	blue	blue	blue	blue	green	green
	Manufacturing Operations	red	blue	blue	blue	blue	green	green
Quality Requirements, Planning Activities	Quality Planning	red	red	red	blue	blue	light green	green
	Quality/Inspection Code Generation	red	red	red	blue	blue	light green	green
	Quality Requirements DM	red	red	blue	blue	blue	blue	blue
	Receiving Inspection	red	red	red	blue	blue	light green	green
	Supplier Quality Certification	red	red	red	blue	blue	light green	green
Enterprise Activities	Logistics (Tech Manuals) (Out of Scope)	light green	light green	light green	light green	light green	light green	light green
	Logistics (Spares) (Out of Scope)	light green	light green	blue	blue	blue	light green	light green
	Procurement	red	red	red	blue	blue	light green	green
	Shipping	red	red	blue	blue	blue	green	green
	Reverse Engineering	red	red	red	blue	blue	light green	green

MBD360
MSC Software
The INNOVATION MACHINE
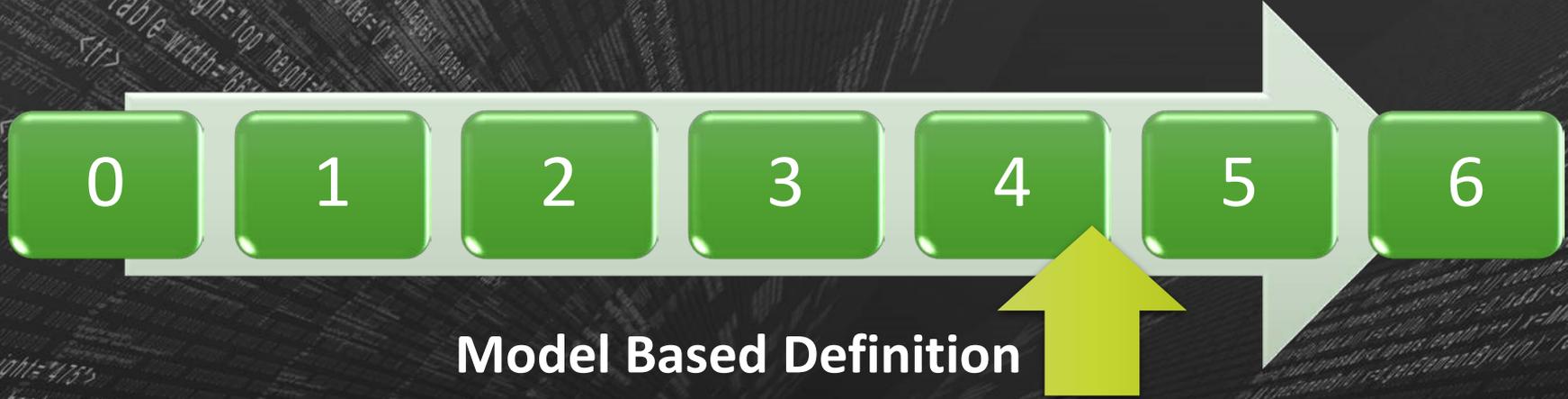
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |

Model Based Definition

| Focus Category	MBE Level						
	0	1	2	3	4	5	6
Design Activities		1			4		
CM/DM Activities			1.5			5	
Manufacturing Planning Activities		1				5	
Quality Requirements, Planning Activities			1.8		4		
Enterprise Activities			2		4		
Overall MBE Capability			1.5		4.3		

The "to be" state is characterized by the following:

- Introduction of PLM

- Automation of CAD model translation and verification

- Introduction of 3D visualization for all departments

- Automation of the quality process

- Increase in the use of analysis

- Smart production floor technology for monitoring and production planning
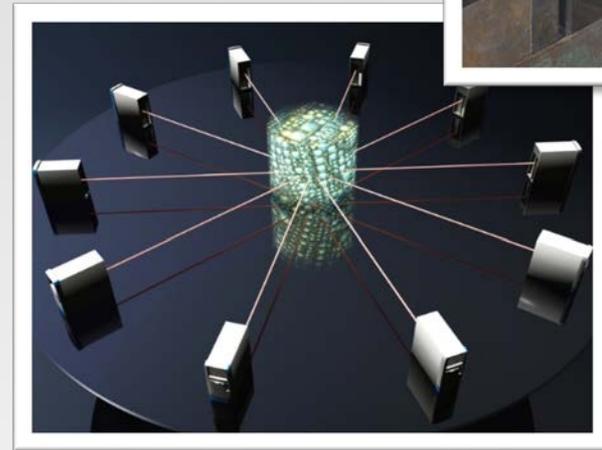
The "to be" features a 63% reduction in manual data transactions and utilizes automated workflows supported by PLM and ERP

RIA JMTP "As Is" Data Flow Diagram
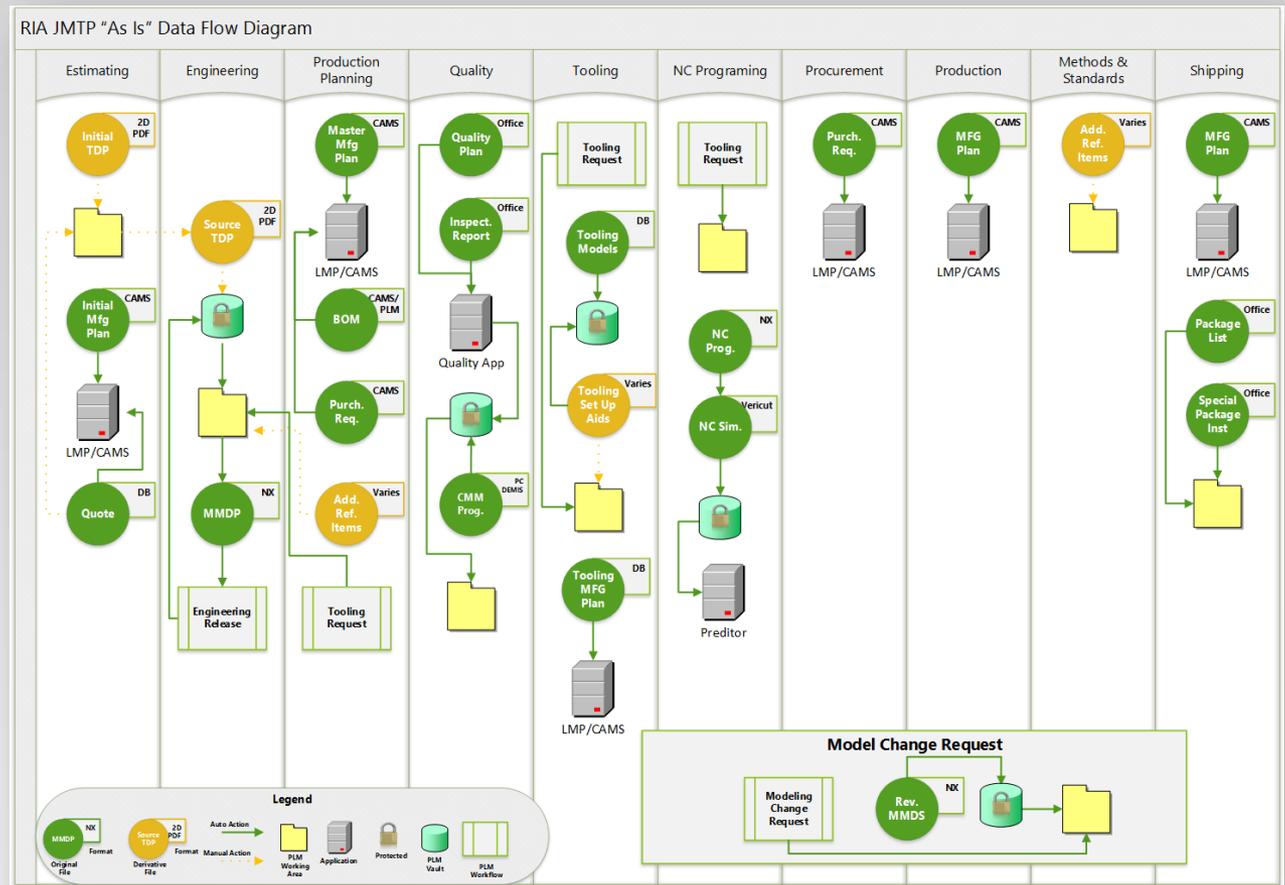
The "to be" data access is typified by the introduction of PLM for configuration management and workflow automation as well as integrated applications to aid in the reduction of manual work
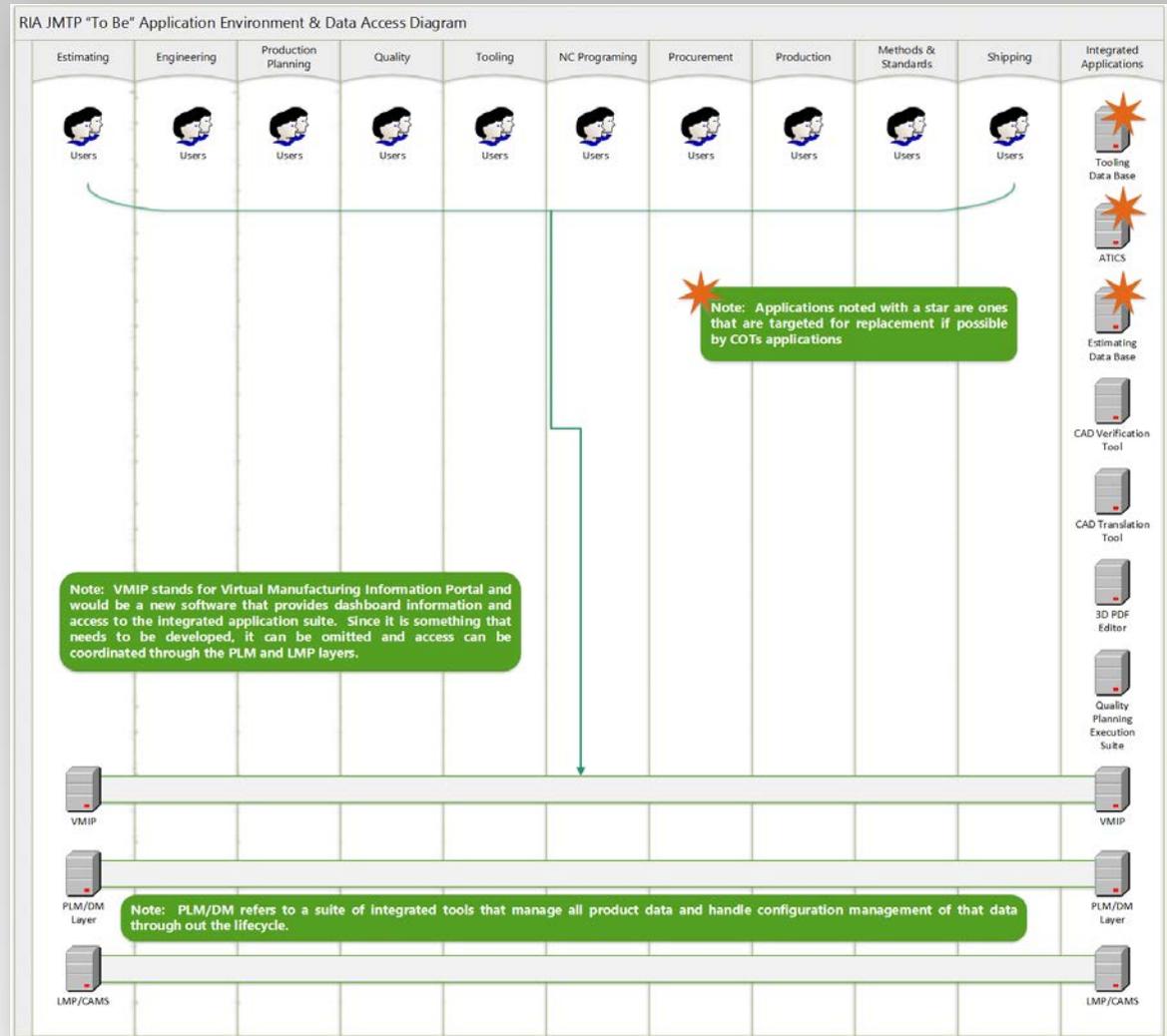
Roadmap

Charting a Path to Implementation

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- MSC Software is leading the documentation of the JMTC MBE Roadmap

- It will provide a detailed set of recommendations for achieving the "to be" state

- It will be broken down in near term and long term actions

- It will provide a list of research or gap areas that need to be addressed

- It will be tool neutral with input from the entire team including the advisory group

- The final review of the assessment report and the beginning of the roadmap document are currently under way

- The advisory group is reviewing the assessment report in order to provide input

- The final road map shall be completed in April of this year

Conclusions

Wrapping It Up…

Background

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- The MBE Capability Assessment of RIA-JMTC started in January

- The assessment report is under final review and the roadmap documentation is under development

- The "as is" state of RIA-JMTC is a 1.5 which is still drawing based but supplemented by manufacturing model data

- The "to be" state is a 4.3 where the product model shall drive most if not all downstream applications

Pending Distribution A