



**LEAN AND  
SIX SIGMA**  
CONFERENCE

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# DMAIC and Agile Scrum: Collusion of Methods

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**NEW FRONTIERS**  
for LEAN AND SIX SIGMA

# Session Objectives



# Session Overview

- Projects for continuous improvement rely on a data-based LSS (Lean Six Sigma) DMAIC process methodology.
- Additional methods include Agile Scrum.
- This session presents a case study application for the collusion of DMAIC and Agile Scrum to streamline the time to customer for an engineered, low volume product.
- Included in this discussion are recommendations for this methodology to be structured and applied.

# Case Study Application



# Application Product

- Large Electric AC/DC Motors have varied uses for primary and secondary power supplies requiring dependability and durability.
- Unique to the application, most motors are engineering design specific.



Typical Large AC Motor, 500 HP, 1800 lbs weight

# Application

## Current State

- Production of large electric motors involves product families with numerous variables for components, assembly, and testing.
- Process bottlenecks occur in assembly due to shared resources and variable cycle times.
- Certification testing is required for all products on shared equipment with extensive set-up and calibration.
- Excessive lead and cycle times result with additional wastes for excessive waiting, transfer and travel, and over-processing.

# Application Situation

- Emerging market channels have a demand for point of use installation with reduced delivery time resulting in increased costs for labor, inventories, and expedite.
- Target State with dedicated “build on demand” process will result in meeting customer takt time, market gains, and improved operational margin.
- Implementation of 90 days is a critical objective.

# Methodologies

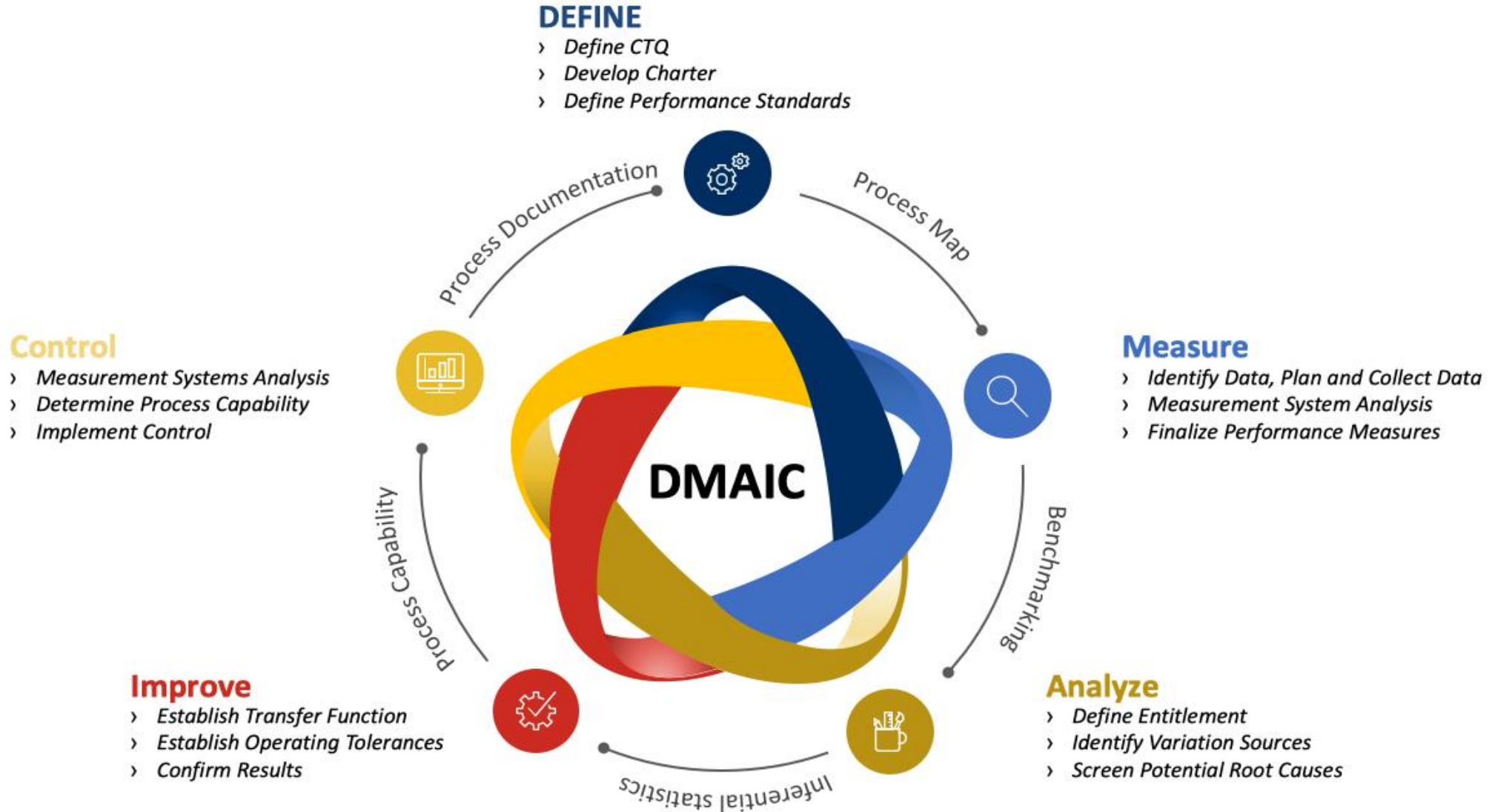
- Two approaches applied to this project:
  - DMAIC, the standard “gate-based” method
    - Most often associated with LSS improvement events
  - Agile Scrum, a team focused, “interval” format
    - Aligned with software releases and revisions
- Evaluation of the two approaches was based on:
  - Project time to completion requirement
  - Response to “variance events” in the project
  - Sustainment after deployment



# DMAIC

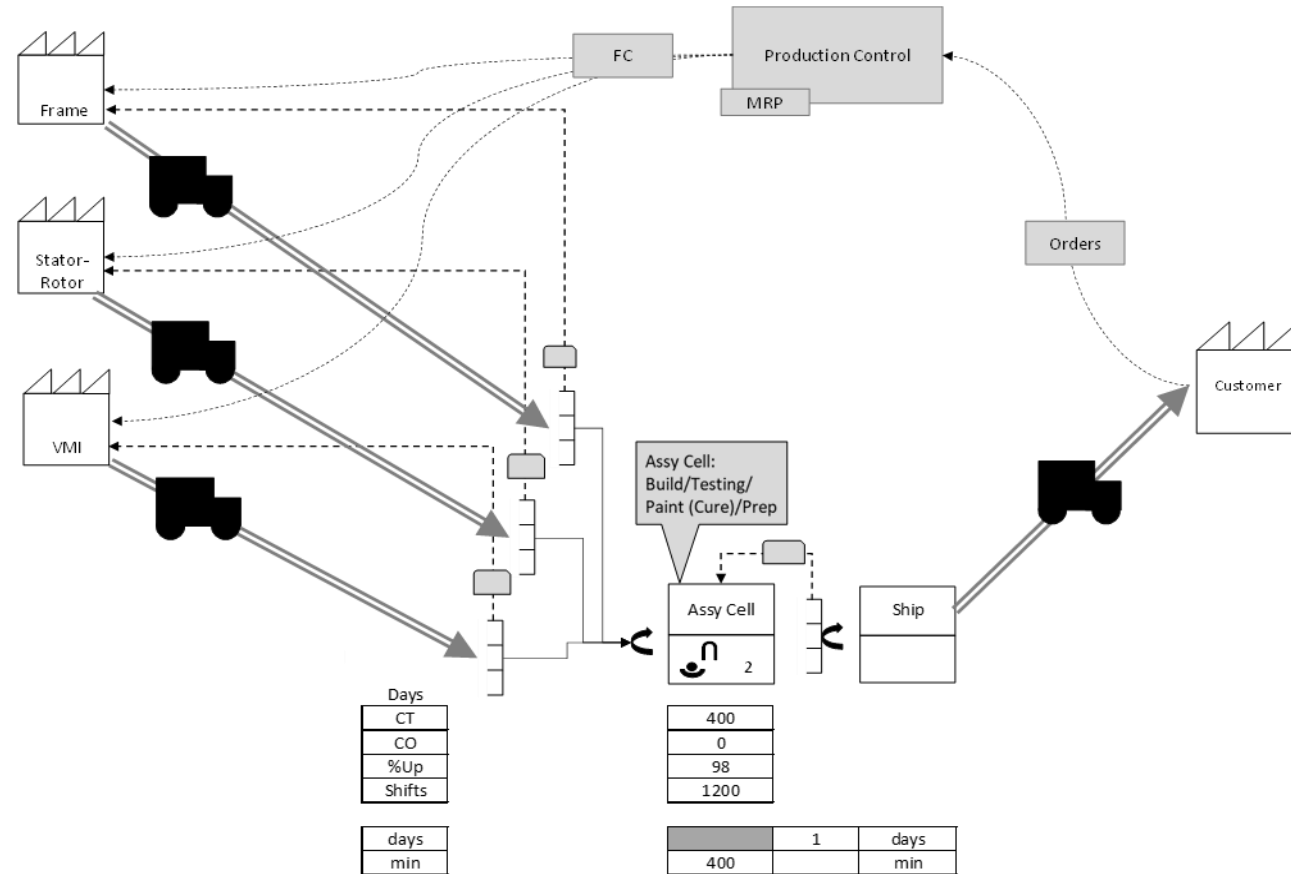
- Most common process applied for LSS Continuous Improvement projects.
- Step-by-step progression of the process:
  - **Define**
  - **Measure**
  - **Analysis**
  - **Improve**
  - **Control**
- Invites participation from champions, sponsors, customers.
- Provides training for LSS Belts for continued learning.

# DMAIC Process



# Application: Target State

- Develop standard work methods and SMEDs
- Material (Internal/External) Supermarkets
- Level-loading
- Optimize WIP and FG
- VMI with kanban for replenishment



# Application: Waterfall Chart

ID	X = Update Due	Task Mod	Cont	Task Name	% Comp	Notes	Start	Finish	Resource Names	Qtr 2, 2019	Qtr 3, 2019	Qtr 4, 2019	Qtr 1, 2020	Qtr 2, 2020	Qtr 3, 2020
157	X			Preview BOD Layout (including Assm, Palm, Test, Finish)	23%	Update 8/9. Summarize layout locations, dimensions, utilities, product flow.	Mon 4/22/19	Thu 9/12/19	C. Fleming, J. Riggs, S. Hamrick						
158	X			Safety Review of New Layout	0%	Block out stations for evaluation (asm, test)	Fri 6/13/19	Fri 6/13/19	C. Fleming, W. Hamrick						

## Initial Project Schedule:

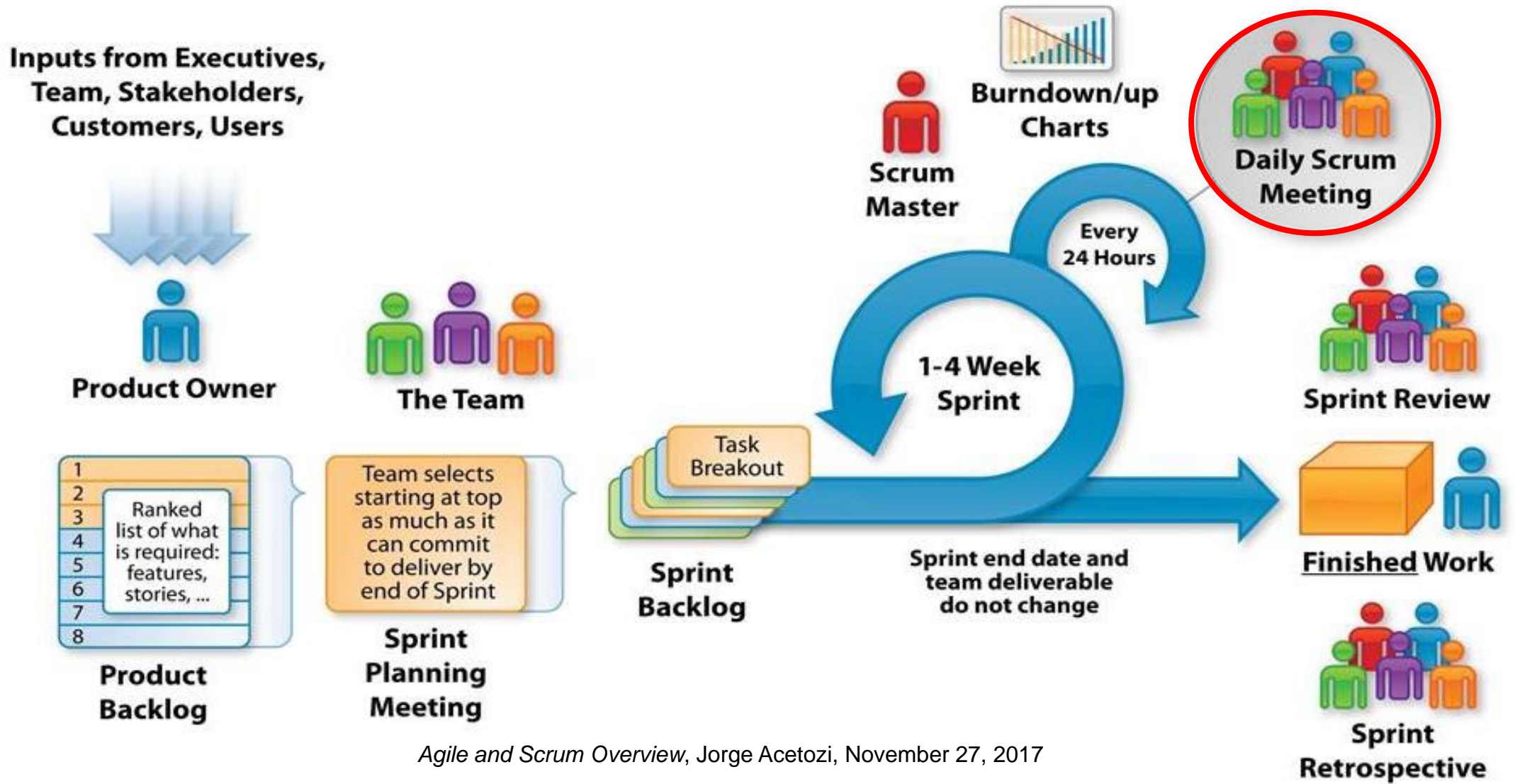
- Exceeds Implementation Target (90 days)
- Critical Path Item 1: Tester Trials (160 days)

177	X			Balancer (Light and Heavy)	0%		Fri 10/18/19	Thu 12/5/19	Hamrick						
174	X			Balancer-Light Design Approval	0%	14 wk LT from approval.	Wed 8/7/19	Fri 9/13/19	C. Fleming						
176	X			Balancer-Light Delivery	0%		Thu 11/21/19	Mon 11/25/19	C. Fleming						
177	X			Balancer-Light & Heavy Functional	0%		Tue 11/26/19	Wed 11/27/19	C. Fleming						
177	X			Balancer Release to Production	0%		Mon 12/2/19	Mon 12/2/19	C. Fleming, D. Drum						

# Agile Scrum

- Recognized approach from software and firmware developments.
- Team focused process with intervals (or sprints) to complete daily and weekly with:
  - **Product Owner** representing Stakeholders' needs and priorities
  - **Development Team** to define and complete tasks
  - **Scrum Master** to facilitate the overall process and remove obstacles
- Prioritized tasks are sized to fit sprints with daily team updates.
- Each sprint results in a ready to use product.
- Review each sprint for feedback and improvement.

# Agile Scrum Process



# DMAIC and Agile Scrum: Overlap in Principles

<b>DMAIC</b>		<b>Agile-Scrum</b>
Develop Charter	↔	Welcome Change
Performance Measures	↔	Working Solutions
Reduce Variation	↔	Process Simplicity
Process Transformation	↔	Frequent Delivery
Process Capability	↔	Reflect & Adjust

*Lean & Agile Are Friends, Chris Mundt, January 2021*

# Application: Daily Scrum

- Key element of Agile Scrum.
- Brief daily update of progress with focus on roadblocks.
- Performed by Development Team.
- References Sprint Backlog tasks assigned to the current Sprint.
- Provides opportunities to evaluate and optimize the project schedule.



Daily Scrum Meeting



**People**



# Project Leader

- Typically, LSS Certified.
- Develops the Project Scope.
- Provides LSS expertise to the Team.
- Arranges updates to shareholders.
- Documents project results including standard work.
- Supports controls for sustainment.



With Stakeholders: Customer, Sales, Production, QA

# Product Owner

- Agile Scrum Certified (CPO).
- Represents Stakeholder's needs and priorities.
- Defines Team members.
- Maintains product/project process.
- Coordinates retrospect of Sprints and Projects with Scrum Master.



With Development Team and Scrum Master

# Development Team

- Representatives of product/process.
- Varied skills and experience.
- Receptive to change and sustainability.
- Strong team and interpersonal skills.



Assembler A, LSSWB  
Assembler B, LSSWB  
QA Tech, LSSYB  
Mfg Engr, LSSGB  
Parts Vendor

# Scrum Master

- Agile Scrum Certified (CSM).
- Interacts with Product Owner.
- Facilitator of the product/project.
- Supports Agile approach.
- Provides support to Team.



With Development Team

# Results



# Application: Results



- Met all Target State objectives including standard work, level-loading and flow with takt time attainment.
- Deployed interim FIFO testing as shared resource.

# Application: Results (2)



- Inclusion of suppliers to Team improved IM stocking and VMI process with kanbans.
- Team led Daily Scrum optimized timeline to complete project in 60 days (ahead of schedule).



# Summary



# Stakeholders

- Stakeholders define the project scope is initiated by the customer (external and/or internal).
- Stakeholders utilize the Product/Project Owner at the contact to the Team.
- PO coordinates this process and anticipates additional changes from Stakeholders and applies it to the Sprints.

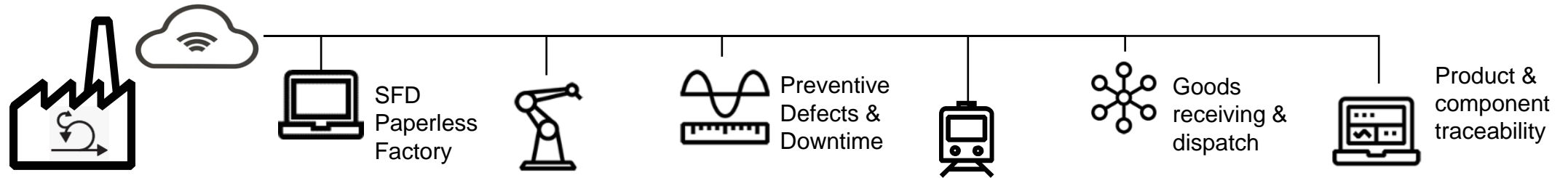
# Team Building

- Critical factor of the DMAIC/Agile Scrum method is the Team.
- The Product Owner must communicate the overall objectives and the impact to each Team member.
- Team building must include:
  - **Awareness** (What's in it for me?)
  - **Desire** (Engagement)
  - **Knowledge** (Understand the change)
  - **Ability** (Provide any needed skills)
  - **Reinforcement** (Sustainability)

# Applicability

- Collusion of DMAIC and Agile Scrum is a significant method to consider.
- LSS centered events likely do not need Agile Scrum.
- Agile projects with software and firmware are likely not to require DMAIC tools.
- Where projects require quick changes to tasks and timing critical, DMAIC/Agile Scrum is an option to consider.

# Current Application



- DMAIC/Agile Scrum is adaptable for change projects including Smart Factory 4.0/ Quality 4.0 deployment at global sites.
- Each site is defining deployments with this approach.
- Provides an engaged, time efficient, and standardized method.

# References



# References

- ***Embracing Agile***, Darrell Rigby, Jeff Sutherland, Hirotaka Takeuchi, Harvard Business Journal, May 2016.
- ***Lean & Agile are Friends***, Chris Mundt, LinkedIn Publications, January 8, 2021.
- ***Six Sigma DMAIC***, Leanmanufacturing.com, January 29, 2021.
- ***Agile and Scrum Overview***, Jorge Acetozi, November 27, 2017.



**Thank You**