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Abstract

The training process in manufacturing systems, especially in complex environments like MES dispatch, is vital for operational efficiency. At Medtronic's Juncos facility, current training practices have caused delays, inefficiencies, and increased error rates. This study investigates training challenges, including LMS transaction inefficiencies, manual data entry, and lengthy reconciliation times. Using the DMAIC (Define, Measure, Analyze, Improve, Control) methodology, the research targets process improvements, particularly for non-QMS documents configured with MES dispatch. Goals include reducing reconciliation lead times, minimizing errors, and improving overall efficiency. Key findings highlight automation, standardization, and real-time monitoring as essential solutions. The proposed improvements are scalable, enabling adoption across other business units to ensure consistent and efficient training practices throughout Medtronic. A significant anticipated outcome is reducing lead time from 134 minutes to 1 minute for 600 employees, accelerating change implementation and minimizing disruptions. Ultimately, the study emphasizes the value of structured problem-solving in advancing manufacturing training systems.

Key Terms — DMAIC method, MES Dispatch, Quality Management System, and Training Attendance Automation

Problem Statement

The current training process for MPR_QSM_WI_009105, particularly for documents configured with MES dispatch, presents several challenges. Trainees must complete a training attendance form, allowing trainers to grant training in Cornerstone and ensuring only authorized personnel perform tasks. As Medtronic's Juncos operations grow, this process has become more complex, leading to significant delays—up to 5 to 7 additional days—for LMS transactions and an increased risk of errors. These inefficiencies interrupt manufacturing operations and delay critical changes, such as New Product Introductions (NPI). The need to print and store numerous attendance forms further adds to overall inefficiency, while reconciliation of Non-QMS documents with MES dispatch remains time-consuming. Given these obstacles, there is a clear need to streamline the training process. This project, aligned with Improvement Excellence principles, uses problem-solving methodologies to uncover and eliminate root causes of inefficiency. The goal is to reduce lead time by 70%, resulting in a faster, more efficient, and sustainable training system.

Methodology

To design and implement the Training Attendance Verification Automation for the training team, the DMAIC methodology was applied. This methodology, part of the Six Sigma toolkit, is designed to drive continuous improvement in processes. The DMAIC acronym stands for the five phases that compose the methodology: define, measure, analyze, improve, and control. Table 2 provides a brief overview of these five phases in the DMAIC methodology.

Table 1 DMAIC Methodology Streamlining the Training Process

Phase	Definition
Define	Set clear goals and define the desired outcomes of the training process.
Measure	Assess the current training process to identify inefficiencies and bottlenecks.
Analyze	Examine the data to understand the root causes of inefficiencies and delays.
Improve	Develop and test improvements to the training process to address identified issues.
Control	Ensure that the improvements are sustained and that the new training process remains efficient over time.

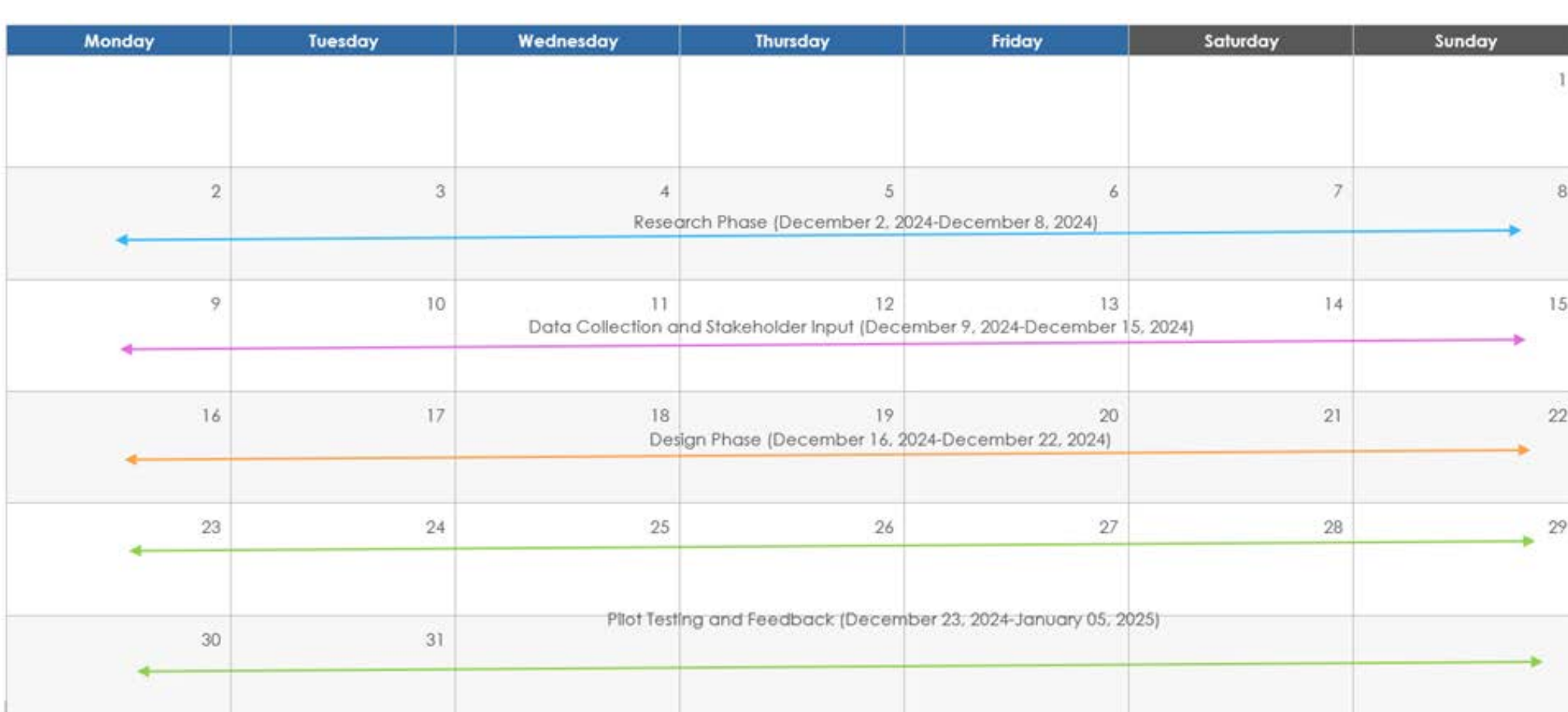


Figure 1: Project Timeline in December 2024.

Results and Discussion

DEFINE PHASE

Table 2: Project Charter	
Project Description	Design and implement an automated training attendance verification for Non-QMS documents with MES dispatch using DMAIC methodology.
Project timeline	December 2024 – January 2025
Project Goal	Reduce reconciliation lead times, minimizing errors, and improving overall efficiency.
Benefits	Lead Time - Expected 70% decrease in training reconciliation time (from 134 minutes to 1 minute for a population of 600 employees).
	Operational Efficiency - Fewer disruptions in manufacturing due to faster training updates and streamlined processes.
	Error Reduction - Less manual data entry lowers the risk of input errors.
	Cost Saving - Reduced printing and storage of physical training forms.
	Improved Compliance - Ensures only trained personnel access MES tasks, enhancing quality control.
Project Support	Leadership Buy-in: Support from Manufacturing and Quality management teams.
	IT & LMS Teams: Assistance with automation, system configuration, and data integration.
	Continuous Improvement Team: Guidance using the DMAIC methodology.
Project Member	C. Vazquez, C. Castro, E. Gonzalez and W. Sanchez

MEASURE PHASE

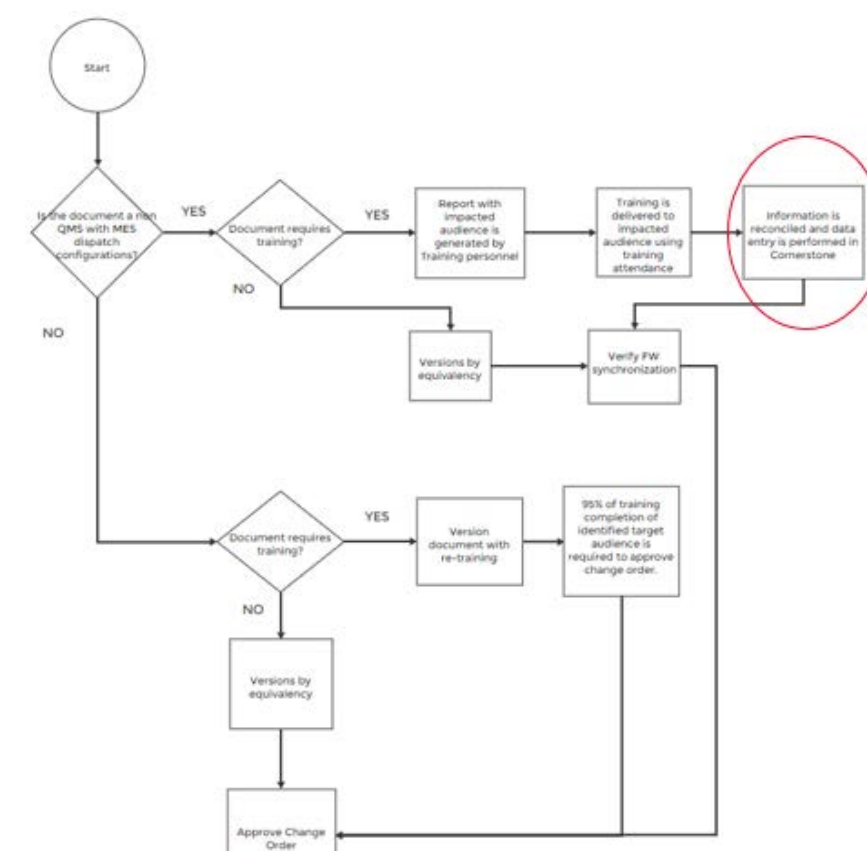


Figure 2: Process Map for Current Training Process non-QMS documents with MES Dispatch.

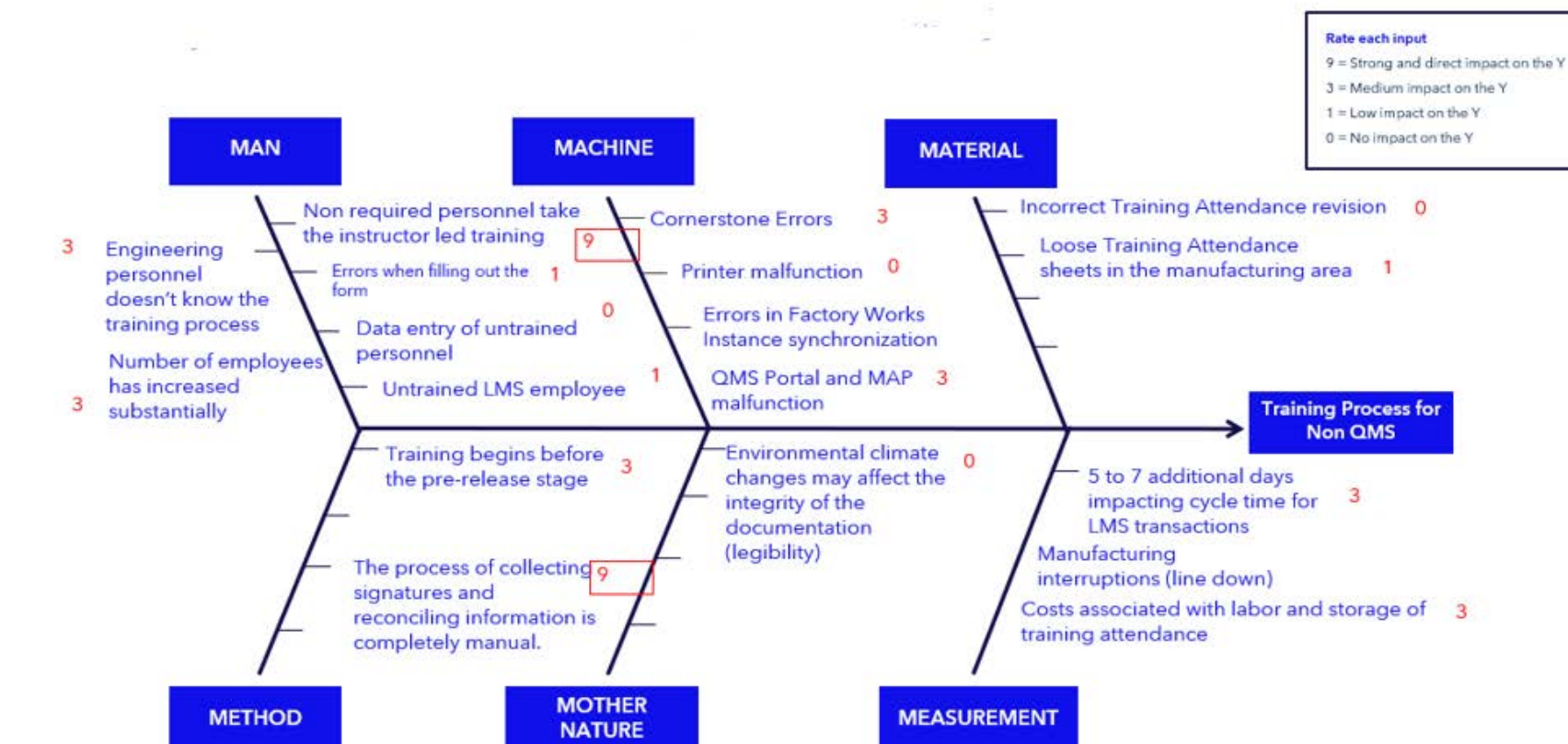


Figure 3: Likely Suspects Taken from Various Inputs Received

Table 3: Time Studies Performed (Training Process Without TAVA)

Description:	Sample (s)					Total	Total = 600 people	(min)
	1	2	3	4	5			
Time to complete training attendance	14	14	15	16	13	72	8640	144
Time for reconciliation process	13.3	14	13	14	13	67.3	8076	134.6
Target for training attendance completion	5	5	5	5	5			
Target for reconciliation process	3	3	3	3	3			
Total time (Reconciliation)	8073							
Population	600							
Avg time for reconciliation process	13.45455							

Results and Discussion cont.

ANALYZE PHASE

Table 4: Likely Suspects

Inputs	Evidence	Key?
Non required personnel take the instructor led training	17% of the audience didn't require the Instructor Led. This is 102 employees for an average population of 600. This is equal to 23 more minutes for the reconciliation process.	Yes
The process of collecting signatures and reconciling information is completely manual.	The lead time of the current reconciliation process is 13.4 sec. per employee. Average population is of 600 employees per Non QMS document with MES Configuration.	Yes

IMPROVE PHASE

Figure 4 & 5: Standard Work

Before No TAVA						After With TAVA & scanner										
Description:	Sample (s)					Total = 600 people	Description	Maestra (s)					Total = 600 people			
	1	2	3	4	5			1	2	3	4	5				
Time to complete training attendance	14	14	15	16	13	72	8640	144	3	3	4	2	3	15	1800	30
Time for reconciliation process	13.3	14	13	14	13	67.3	8076	134.6	0.1	0.1	0.1	0.1	0.1	0.5	40	1
Target for training attendance completion	5	5	5	5	5				5	5	5	5	5			
Target for reconciliation process	3	3	3	3	3				3	3	3	3	3			
Total time (Reconciliation)	8073															
Population	600															
Avg time for reconciliation process	13.45455															

Figure 6: Times Studies Before and After the Implementation of TAVA.

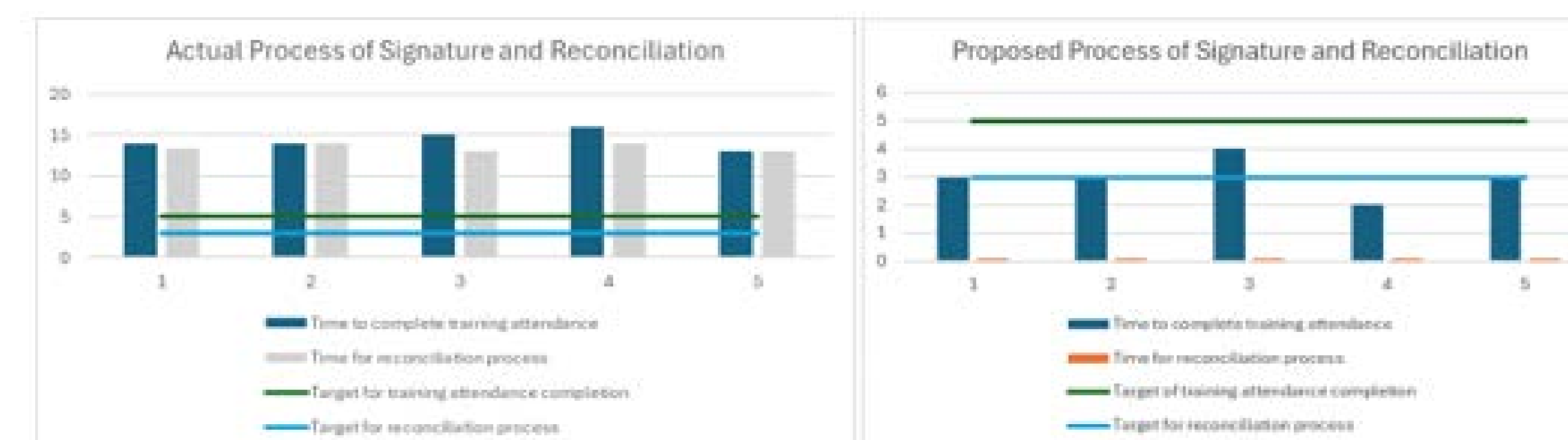


Figure 7: Times Studies Before and After the Implementation of TAVA.

Before implementing TAVA, the training attendance process took 14–16 seconds per person, totaling 144 minutes for 600 employees, while reconciliation averaged 13.46 seconds per person, reaching 134.6 minutes—well above the 3-second target. After introducing TAVA and a scanner, attendance time dropped to 3 seconds per person (30 minutes total), and reconciliation was reduced to just 0.1 seconds per person (1 minute total). This improvement greatly enhanced efficiency, reduced processing time, and ensured consistent compliance with performance targets.

Results and Discussion cont.

CONTROL PHASE

Y	X	Specification	Capability /Date	Documentation	Monitoring	Prevention	Reaction Plan
Lead Time	N/A	N/A	13.4/Aug2024	N/A	Monthly Monitoring System Controls	N/A	Monthly Work Evaluation System Controls Action Plan for Improvement
Lead Time	N/A	N/A	N/A	MPR_QSM_WI_009105 000919191	Monthly Monitoring System Controls	N/A	Monthly Work Evaluation System Controls Action Plan for Improvement
N/A	The process of collecting signatures and recording information is completely manual.	N/A	N/A	MPR_QSM_WI_009105 000919191	Monthly Monitoring System Controls	N/A	Monthly Work Evaluation System Controls Action Plan for Improvement

Conclusions

We can conclude that the tool has presented multiple benefits following its implementation. These benefits are summarized as follows:

This section outlines the benefits of designing and implementing the Training Attendance Verification Automation (TAVA) tool using the DMAIC methodology within the operations framework.

The tool brought immediate, measurable improvements to training attendance and reconciliation processes. Key benefits of TAVA include:

- A significant reduction in the time required for training attendance and reconciliation, with both processes now operating well below target thresholds
- Standardization of data collection through structured Excel templates, ensuring consistency and accuracy across sessions
- Real-time tracking and reconciliation, improving transparency and reliability in data management.

Although TAVA is a custom-built solution tailored to a specific process, it does not replace broader HR or training systems. Rather, it complements them by automating repetitive manual tasks, optimizing staff time, and reducing the likelihood of human error. Its Excel-based tracking also enables alternate access to critical data, particularly in environments where enterprise platforms are not readily available. Following its successful implementation, TAVA is under evaluation for expansion to other departments that require high-volume attendance tracking. The project has met operational efficiency goals and revealed opportunities for cross-functional collaboration, skill development in automation, and process control. It also identified potential leadership roles for sustaining and scaling improvements, reinforcing a culture of continuous improvement aligned with DMAIC principles.

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