



# Improving Integration of External Contractor Activities into the Lead Maintenance Activity Integrated Production Schedule

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## Abstract

This project evaluated the integration of external contractor activities into the Lead Maintenance Activity Integrated Production Schedule at FDRMC Rota to improve compliance with NAVSEA Standard Item 009-060, using the DMAIC methodology. Baseline analysis showed contractor integration performance was approximately 60%, significantly below the 95% target. Pareto and Fishbone analyses identified late submissions, deficient data quality, missing logical relationships, and lack of a centralized Work Integration Manager role as the primary contributors to integration deficiencies. A structured improvement framework was developed to improve schedule visibility, coordination, and long-term compliance.

## Introduction

NAVSEA Standard Item (NSI) 009-060 requires all maintenance activities to be integrated into the Integrated Production Schedule (IPS) using logically linked CPM scheduling principles. At FDRMC Rota, contractor schedules were frequently submitted late, incomplete, or without proper logic relationships, reducing schedule visibility and coordination effectiveness during maintenance availabilities.

## Literature Review

- NSI 009-060 requires logically linked IPS integration using CPM principles [1].
- Integrated scheduling improves coordination and execution effectiveness [3].
- DMAIC and Lean Six Sigma support structured process improvement [5].

## Methodology

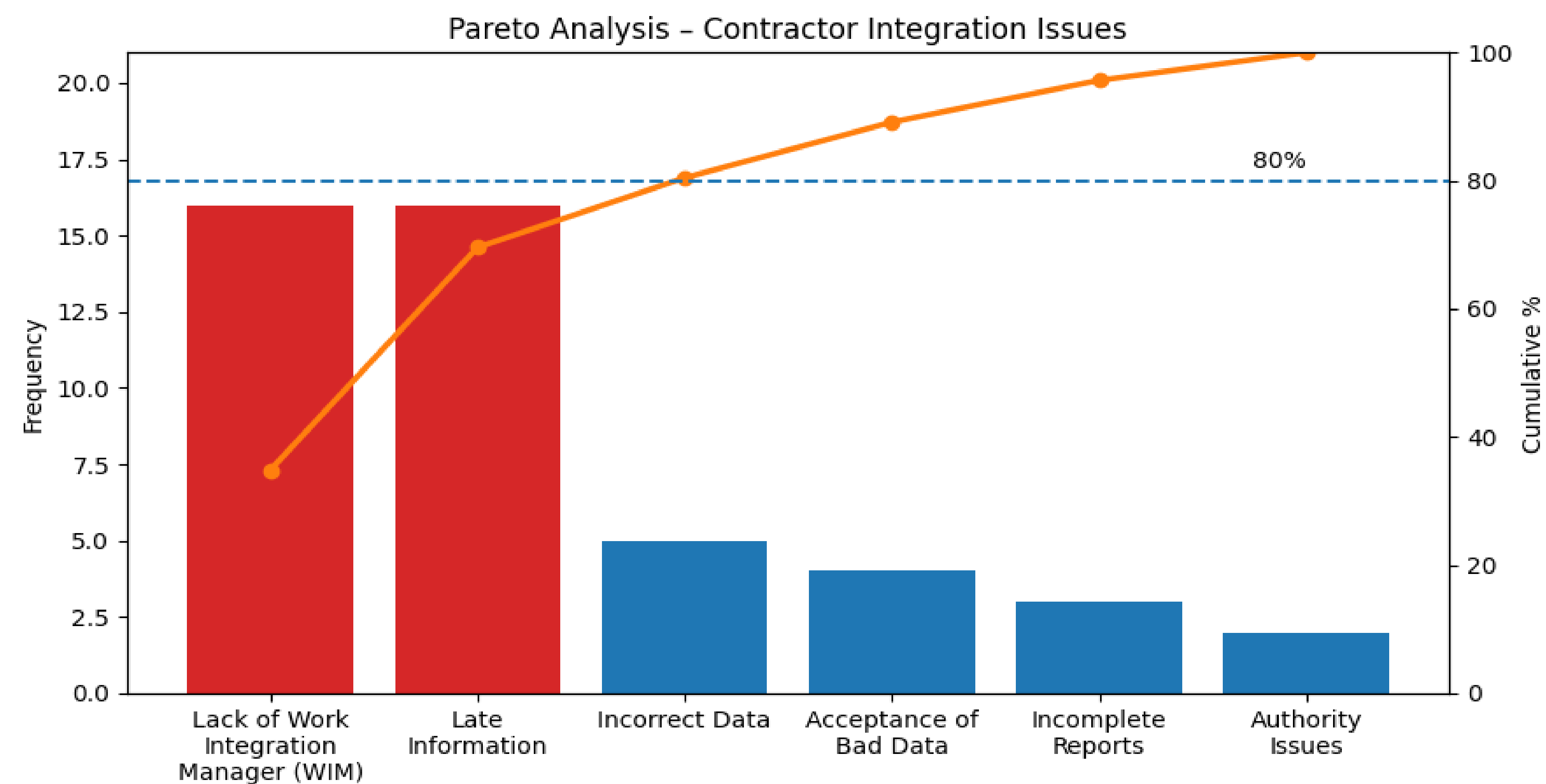
Define	Measure	Analyze	Improve	Control
Problem ID	CIR Data	Pareto / Fishbone	WIM Framework	Monitoring

$$CIR = (N_{integrated} / N_{total}) \times 100$$

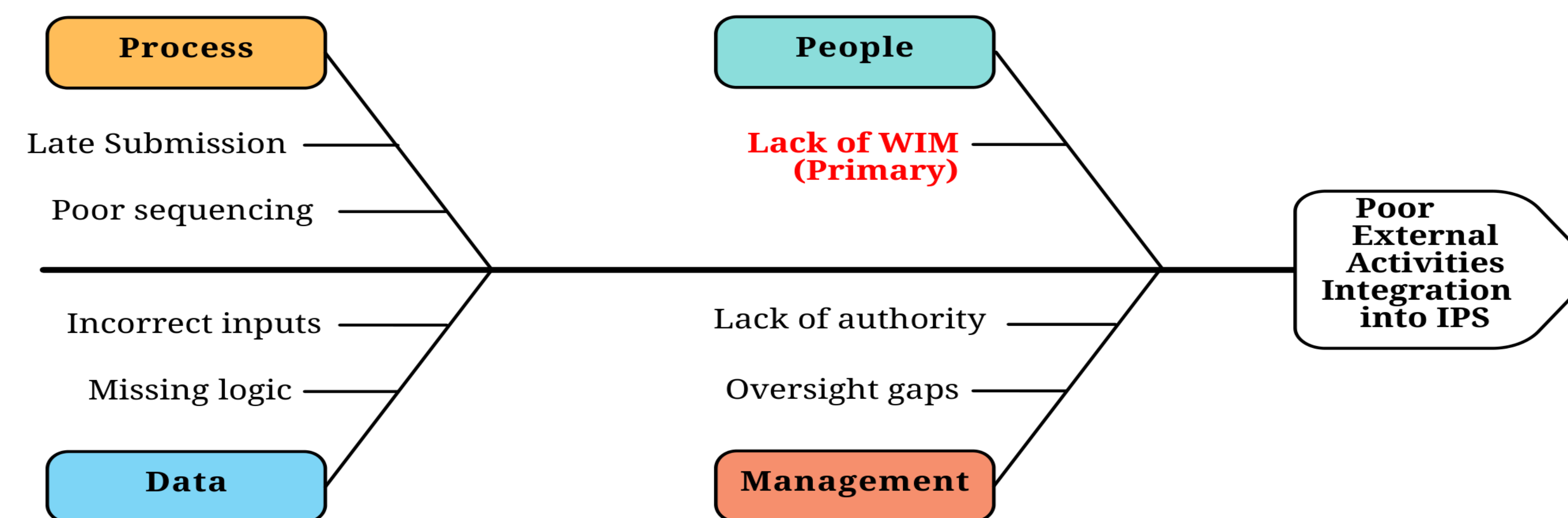
$N_{integrated}$  = contractor activities integrated into the IPS  
 $N_{total}$  = total contractor activities identified

This project applied the DMAIC (Define, Measure, Analyze, Improve, Control) methodology to evaluate and improve the integration of external contractor activities into the Lead Maintenance Activity (LMA) IPS. Baseline data were collected from IPS records and contractor schedule submissions to determine the Contractor Integration Rate (CIR) and identify integration deficiencies. During the Analyze phase, SIPOC, Pareto, and Fishbone analyses were used to identify the principal root causes affecting contractor schedule integration. Based on the findings, potential corrective actions were developed, including standardized contractor schedule templates, defined submission milestones, integration review checkpoints, enhanced coordination mechanisms, and the implementation of a Work Integration Manager (WIM) role to support long-term compliance with NAVSEA Standard Item 009-060 requirements.

SIPOC for Contractor Schedule Integration				
Suppliers	Inputs	Process	Outputs	Customers
Contractors	Schedules	Review & Validate	Updated IPS	LMA
AITs	Activity Data	Integrated into IPS	Logic Links	FDRMC
Planners	NSI 009-060	Monitor Compliance	Visibility	Stakeholders



## Root Cause (Fishbone)



## Key Findings

- WIM identified as primary systemic root cause.
- CIR baseline  $\approx$  60%
- Target Integration Rate  $\geq$  95%
- Late schedule submissions occurred in most cases reviewed.
- Baseline analysis showed incomplete or incorrect contractor data in approximately 50% of cases.
- Missing logic relationships reduced schedule visibility and coordination effectiveness.

## Results

Baseline analysis showed that contractor integration performance was approximately 60%, significantly below the target integration rate of 95%. The analysis identified recurring deficiencies, including late schedule submissions, incomplete or inaccurate contractor data, missing predecessor-successor logic relationships, and limited oversight of integration. Baseline performance metrics further showed that late schedule submissions occurred in nearly all cases reviewed, while incomplete or incorrect contractor data affected approximately 50% of the activities evaluated. Pareto and Fishbone analyses confirmed that these deficiencies were associated with repeatable process weaknesses rather than isolated events.

### Proposed Improvement Framework

- Standardized contractor schedule templates.
- Defined submission milestones.
- Integration review checkpoints.
- Enhanced coordination mechanisms.
- Centralized WIM oversight.
- Monitoring recommendations and process controls.

### Baseline Performance Metrics

Metric	Baseline	Target
Contractor Integration Rate (CIR)	60%	$\geq$ 95%
Late Schedule Submissions	100%	$\leq$ 10%
Incomplete or Incorrect Data	50%	$\leq$ 10%
Logic Compliance	Low	100%

## Conclusions

This study identified measurable deficiencies in the integration of external contractor activities into the LMA IPS at FDRMC Rota relative to NSI 009-060 requirements. The DMAIC methodology supported the identification of repeatable process weaknesses, including late schedule submissions, deficient data quality, missing logical relationships, and limited oversight of integration. The analysis demonstrated that these deficiencies negatively affected schedule visibility, coordination, and execution effectiveness. The proposed improvement framework, including standardized integration procedures and the implementation of a WIM role, provides a practical approach for improving contractor schedule integration and supporting long-term compliance with NSI 009-060 requirements.

## References

[1] Naval Sea Systems Command, "NAVSEA Standard Item 009-060: Schedule and Associated Report for CNO Availability," FY-26, Oct. 2024.  
 [2] Commander, U.S. Fleet Forces Command, "Joint Fleet Maintenance Manual (COMUSFLTFORCOMINST 4790.3), Rev. D, Change 5," Jun. 2025.  
 [3] T. P. Fahrenkrug, "Total Integrated Fleet Maintenance and Support Database," Naval Engineers Journal, vol. 105, no. 2, pp. 53–58, 1993.  
 [4] S. Ju and J. H. Woo, "Integration of long-term planning and mid-term scheduling of shipbuilding," Production Planning & Control, vol. 34, no. 6, pp. 524–542, 2023.  
 [5] Department of Defense, "DoD Directive 5010.42: Continuous Process Improvement / Lean Six Sigma Program," May 2008.