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BACKGROUND

Engineering Services (ES) is a team of engineers, architects, and records staff that is responsible for all UW community operations, maintenance, and other engineering supports.

MAINTENANCE | ENGINEERING | CONSTRUCTION

PROBLEM OVERVIEW

Engineering Services Initial Internal Flowchart

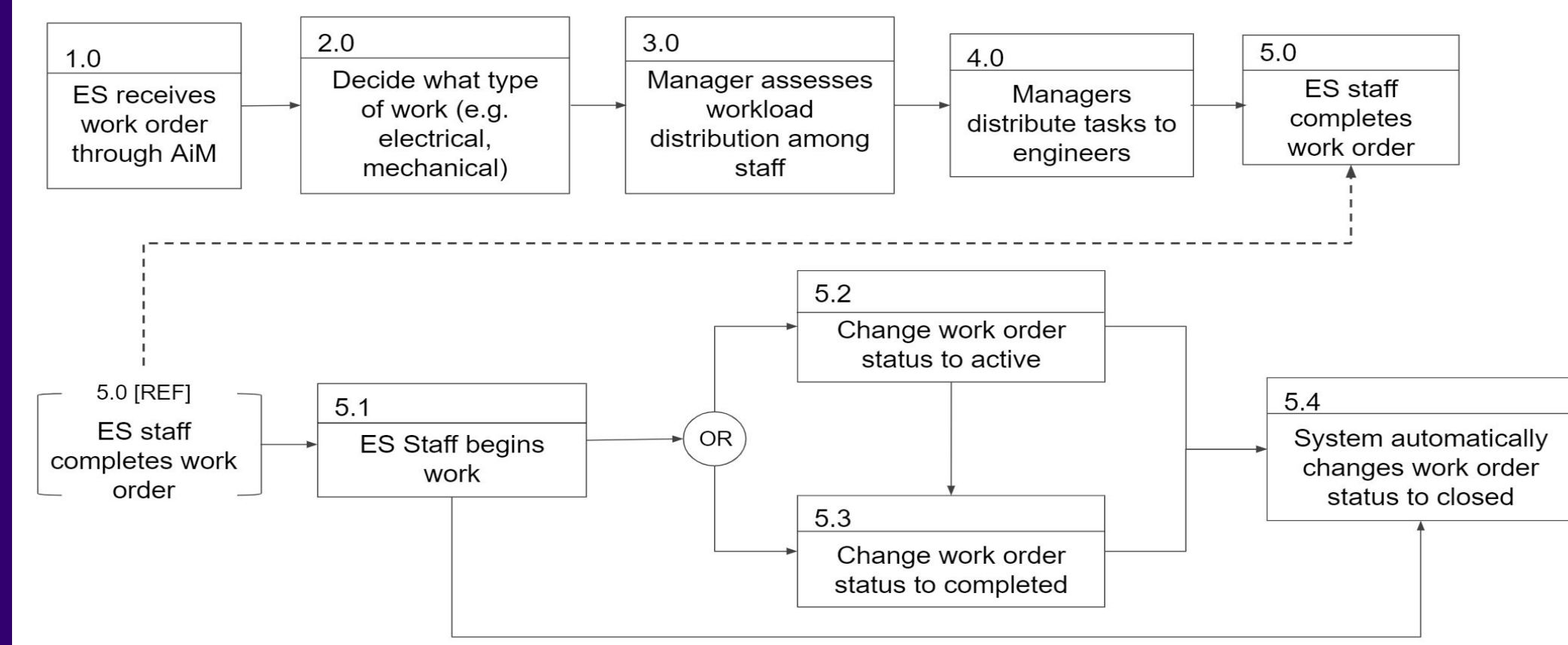


Figure 1: Initial System Flow Chart

Current State	Opportunities
<ul style="list-style-type: none"> Lack of immediate problem identification and definition <ul style="list-style-type: none"> No departmental work performance measures Lack of standardized processes <ul style="list-style-type: none"> Work orders (WOs) are done intuitively based on experience Inconsistent use of status change on AiM 	<ul style="list-style-type: none"> Implement accurate work performance feedback system Implement Six Sigma concepts Implement standard operating procedures Introduce process controls through a work order prioritization scheme

GOAL STATEMENT

To maximize ES value to the UW community by providing more effective services through data-driven decision making, process standardization, and work performance review.

DELIVERABLES

- Prioritized List Generator
- Performance Report Generator
- Work Order Process Standard Operating Procedures & Manuals

CONSTRAINTS

- Work dependency on other UWF departments
- Limited access to work order database (AiM)
- Variability in ES work orders due to different timelines: maintenance, engineering, and construction

ES STAFF SURVEY RESPONSE

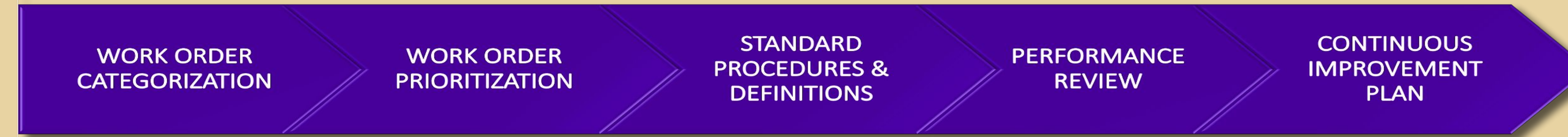
"It's **unclear how to prioritize** internal projects against client work orders, especially when some of these **work orders** have been **open for months or even years.**" - ES Staff (2020)

"It **feels somewhat disjointed** at times, I would like to see it become more **cohesive**" - ES Staff (2020)

SYSTEM CREATION

REQUIREMENTS

Our system shall provide...



WORK ORDERS CATEGORIZATION & PRIORITIZATION

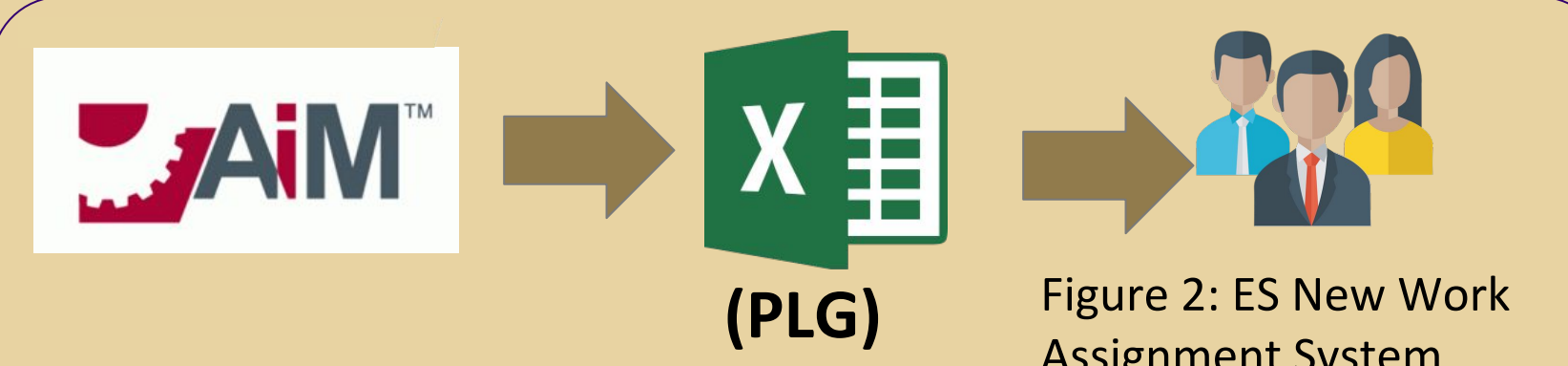


Figure 2: ES New Work Assignment System

ES Work Order Risk Level	Risk Score (/0.67)
100 (High) - Environmental, Health & Safety risks OR Project with ≤ 1-week deadline.	0.670
200 (Moderate) - Regulatory risks OR Project with 2-4 weeks deadline.	0.330
300 (Low) - Low risks OR Projects with no specified deadline OR > 4 weeks deadline.	0.294

Work Order Category	Assessment Time	Expected Completion Time
Maintenance	30 Days	90 Days
Construction	60 Days	270 Days
Engineering	60 Days	270 Days

Table 1: Assessment and expected completion time of WO Categories

Work Order	Risk Level	Phase Shop	Order Type	Entry Date	Days Open	Time Open	Risk Score (/0.33)	Priority Score (/1)
708547	100 - Environmental, Health and Safety Risks	78 ELECTRICAL ENGINEERING	MAINTENANCE	3/31/2020 11:50:03 AM	35	0.04	0.67	0.71
708546	100 - Environmental, Health and Safety Risks	78 ELECTRICAL ENGINEERING	MAINTENANCE	3/31/2020 11:51:06 AM	35	0.04	0.67	0.71
708548	100 - Environmental, Health and Safety Risks	78 ELECTRICAL ENGINEERING	MAINTENANCE	3/31/2020 11:51:59 AM	35	0.04	0.67	0.71
727283	100 - Environmental, Health and Safety Risks	78 MECHANICAL ENGINEERING	ENGINEERING	4/2/2020 8:40:25 AM	33	0.04	0.67	0.71
586730	300 - All other work orders	78 ELECTRICAL ENGINEERING	CONSTRUCTION	5/2/2018 9:16:30 AM	280	0.33	0.29	0.62
586732	300 - All other work orders	78 ELECTRICAL ENGINEERING	CONSTRUCTION	5/2/2018 9:18:50 AM	280	0.33	0.29	0.62

Table 2: Example of Prioritized List (Yellow indicates WOs that have reached assessment time, Blue indicates WOs that have not reached assessment time)

Prioritized List Generator (PLG):

- Produces prioritized list of WOs that promotes timely completion of work orders and better task overview
- A work order priority score is weighted based on:
 - risk level (67%) and time opened (33%)
- WOs will be sorted from highest to lowest priority score
- Open and Active WOs that have reached assessment time (Table 1) would be highlighted on the prioritized list (Table 2) to gain staffers attention and prompt the progress of the WO

STANDARD PROCEDURES & DEFINITION

- Current AiM status usage is inconsistent and not actively performed
- Figure 3 shows obvious lack of status change

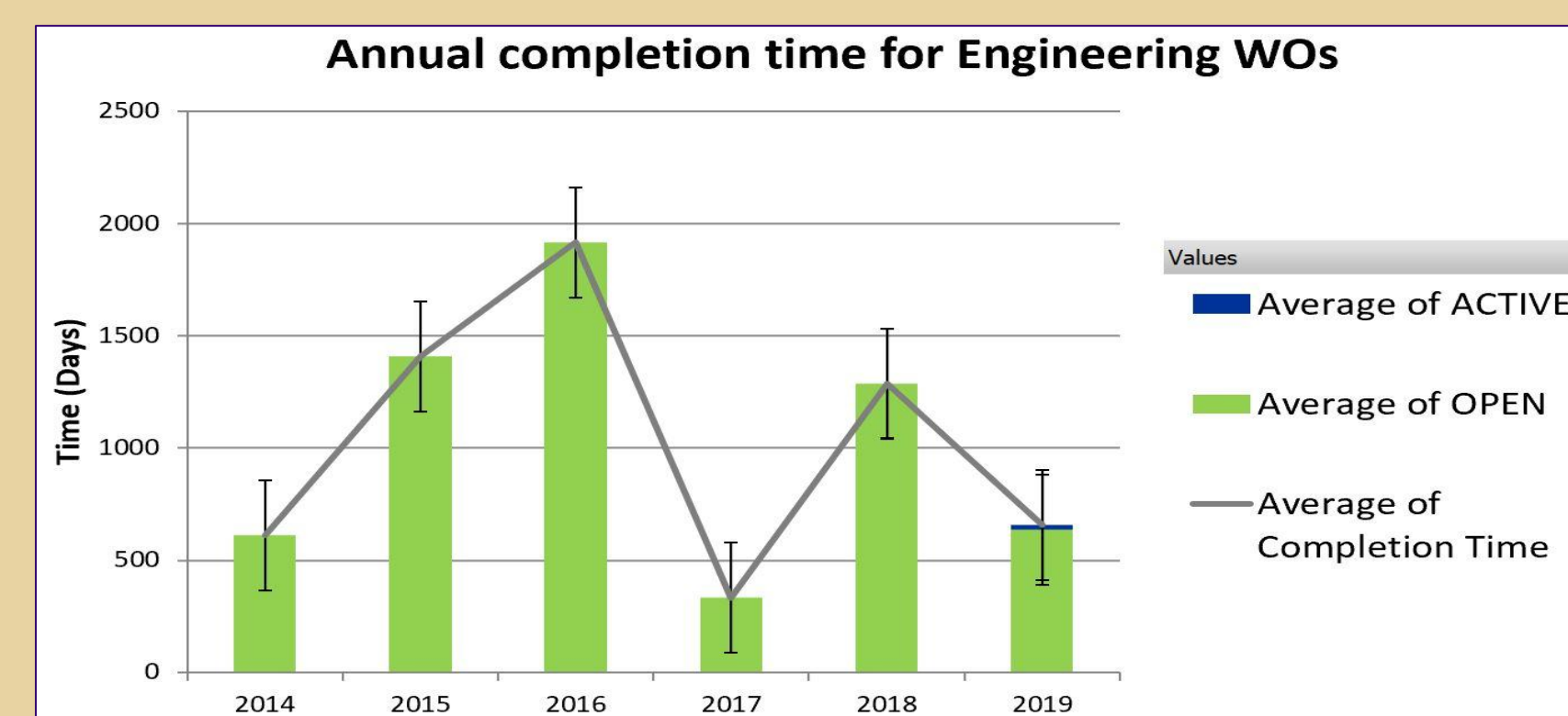


Figure 3: Example of generated chart on annual performance report

- Newly defined operational definitions allow better work overview

ES AiM Operational Definition

Open - Work order received **may/may not** be assigned; work execution has **not** begun.

Active - Work order is assigned to staff and work execution has begun for completion or rework.

Work Complete - All tasks required for a work order are completed. No status transitions are permitted once the work order is completed EXCEPT rework

PERFORMANCE REVIEW

- Produces quarterly and annual reports on PPT based on:
 - Order category (maintenance/ engineering/ construction)
 - ES Departments (e.g. electrical/mechanical)
- Helps managers identify areas of improvement
 - Allow manager to assess ES workforce capacity
 - Analyze which engineering department is not performing up to standard
- Report generator is completely automated

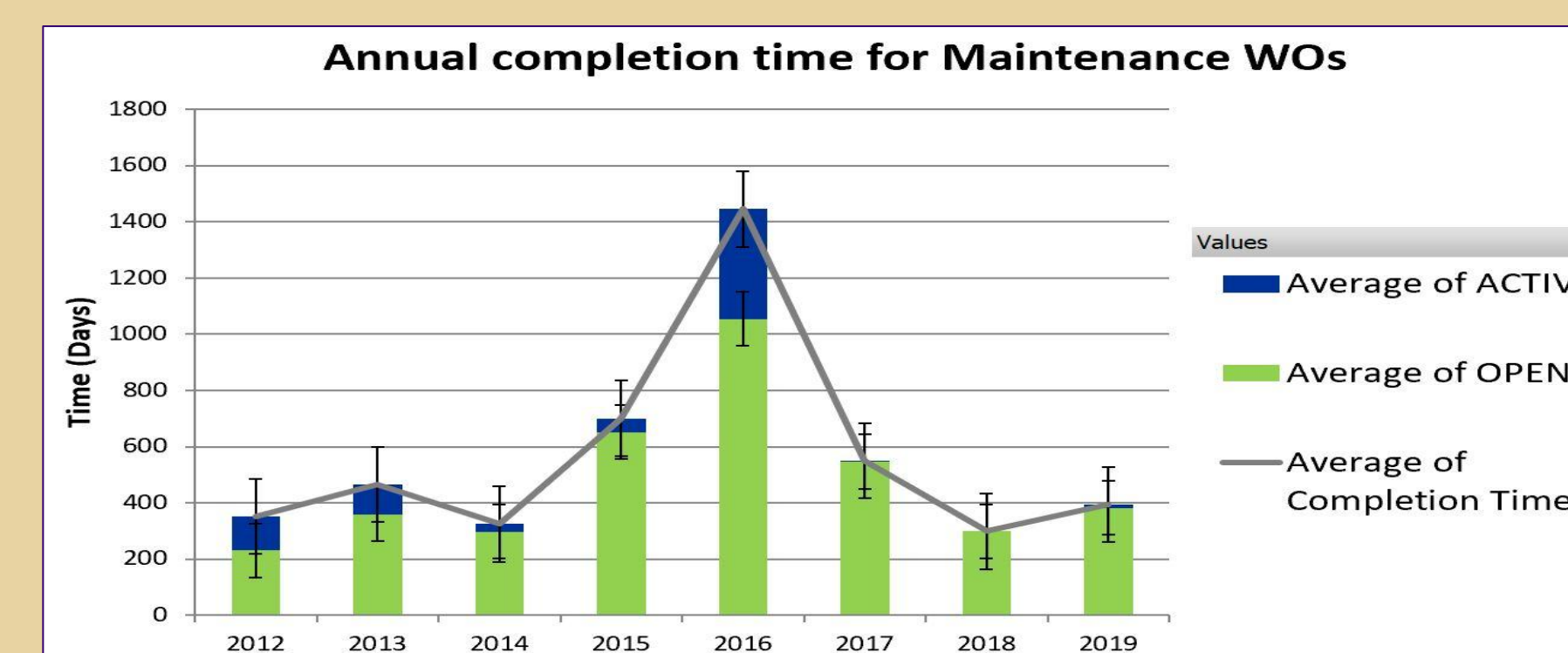


Figure 4: Example of generated chart on annual performance report

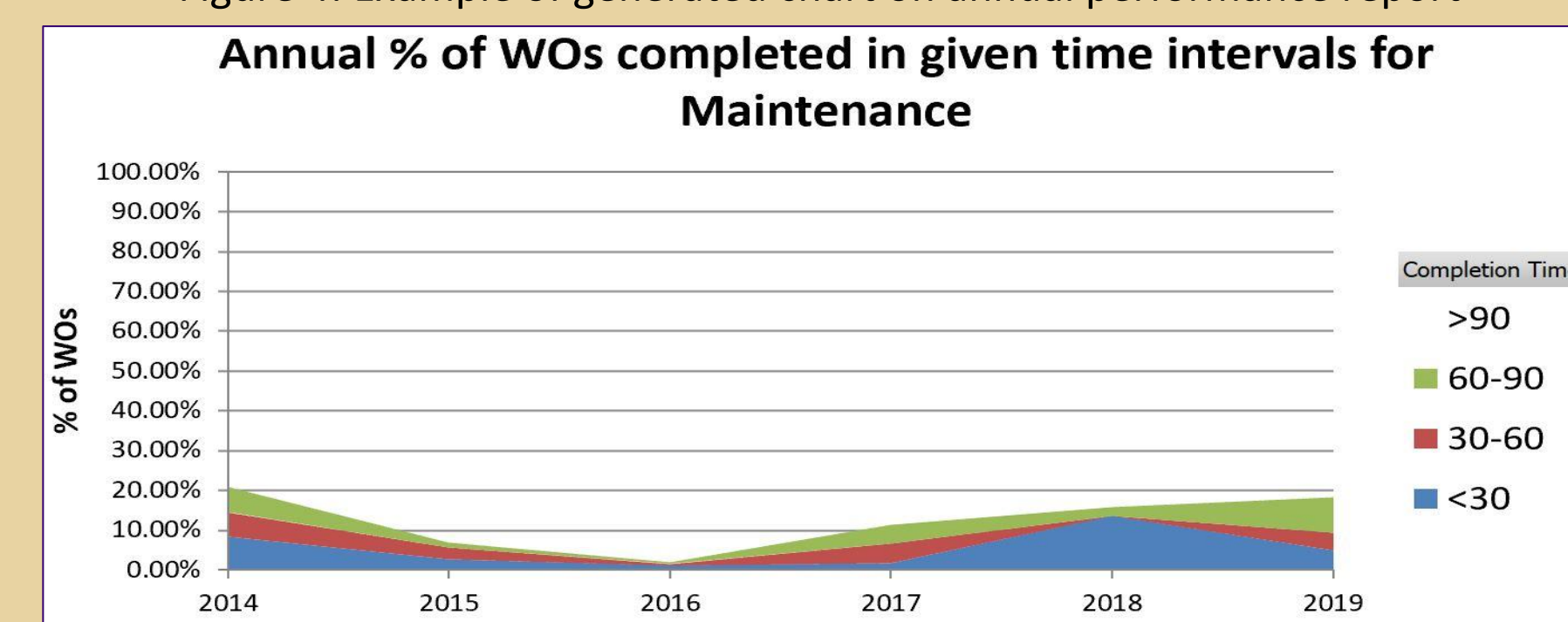
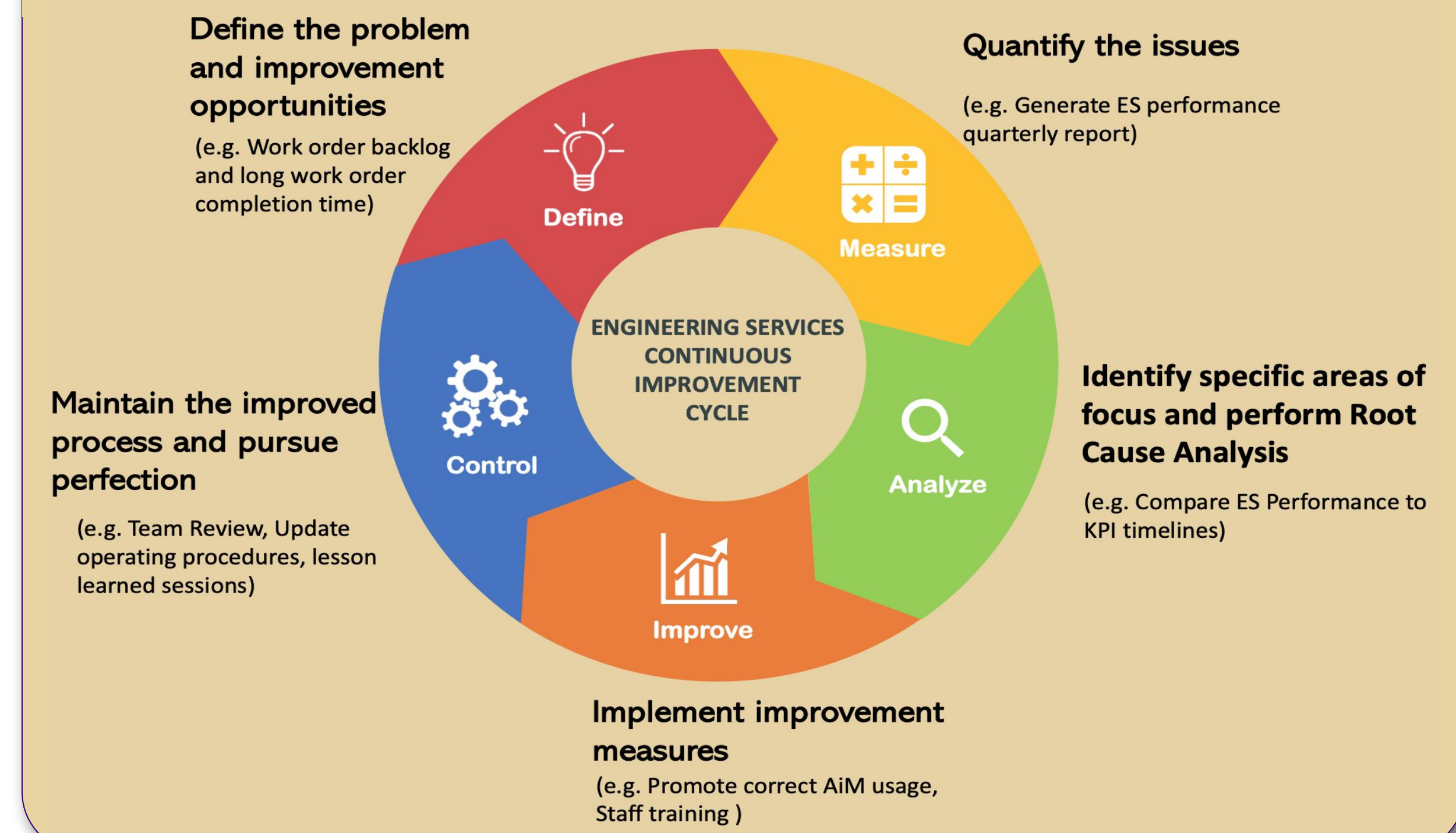


Figure 5: Example of generated chart on annual performance report

CONTINUOUS IMPROVEMENT PLAN



IMPACT ANALYSIS

Engineering Services Improved Internal Flowchart

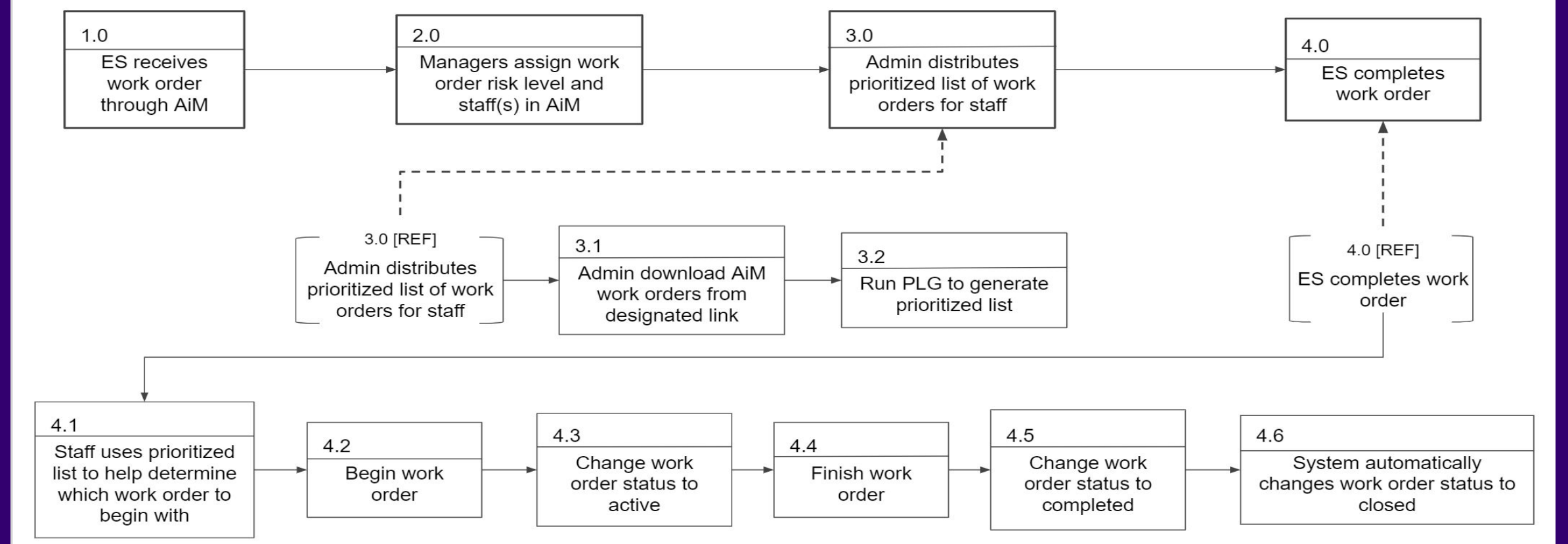


Figure 6: Improved System Flow Chart

Assumptions:

- Analysis uses **adjusted historical time** which is a 25% completion time reduction relative to historical data based on:
 - New status update procedures
 - Emphasis on early work assessments
- Historical Open time only accounts for 25% of **adjusted historical time** due to **new status definitions**
- Adjusted Open time would be equal to the PLG assessment time (Table 1) due to **prioritization of work orders**
- Historical Open time and adjusted open time are used to estimate the reduction in Open time

Expected Impacts:

Work Order Category	Est. Reduction in Completion Time vs. 2019 Avg. (Days)	Est. Reduction in Completion Time vs. 2019 Avg. (%)
Maintenance	52	17%
Construction	46	3%
Engineering	133	27%

Table 3: Expected Impacts by WO Category

- Average completion times will decrease (refer to Table 3)
- Improved process oversight and data collection through the adoption of key performance indicators
- Continuous improvement processes are expected to yield further process improvements

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