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Optimizing Maintenance Through Data

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Introductions

Speaker

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Agenda

01 Introductions

02 Value Proposition of a Maintenance Program

03 Strategic Maintenance Management Program

04 Developing a Maintenance Program

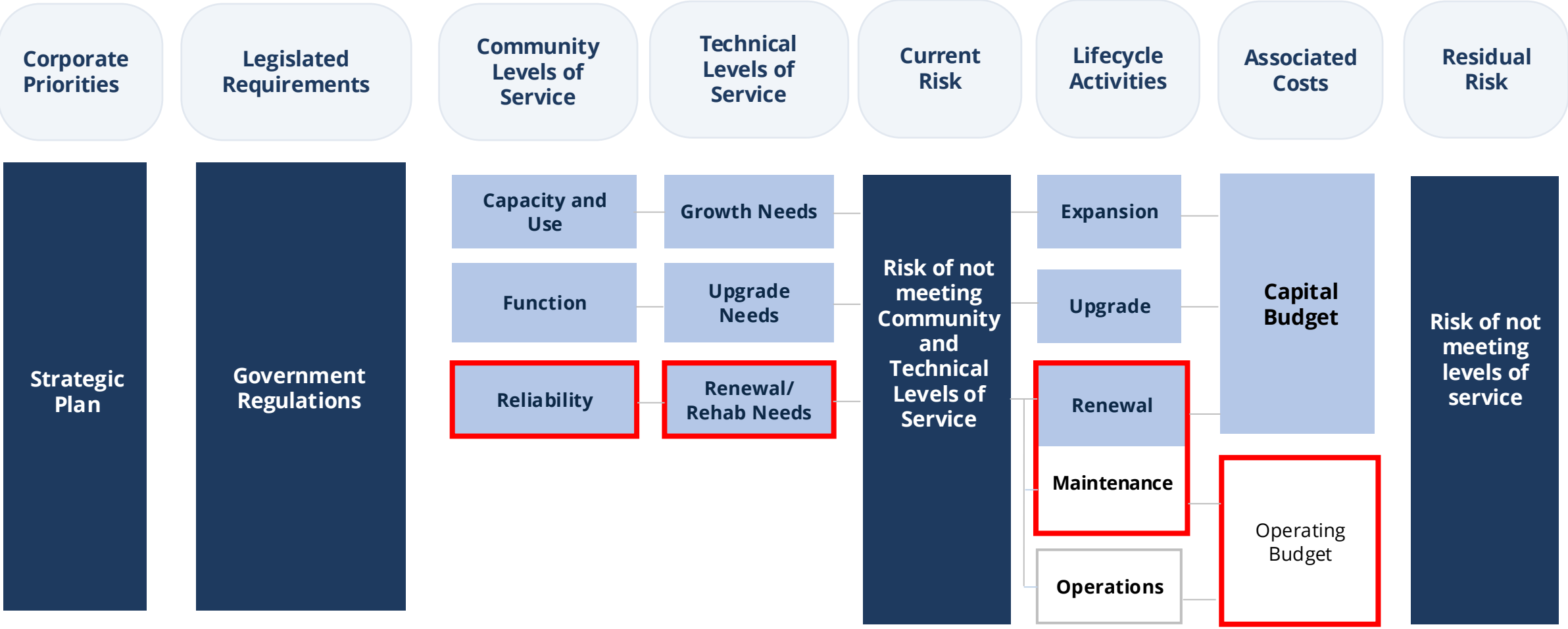
05 Using Data to Improve Maintenance

06 Selling the Maintenance Program

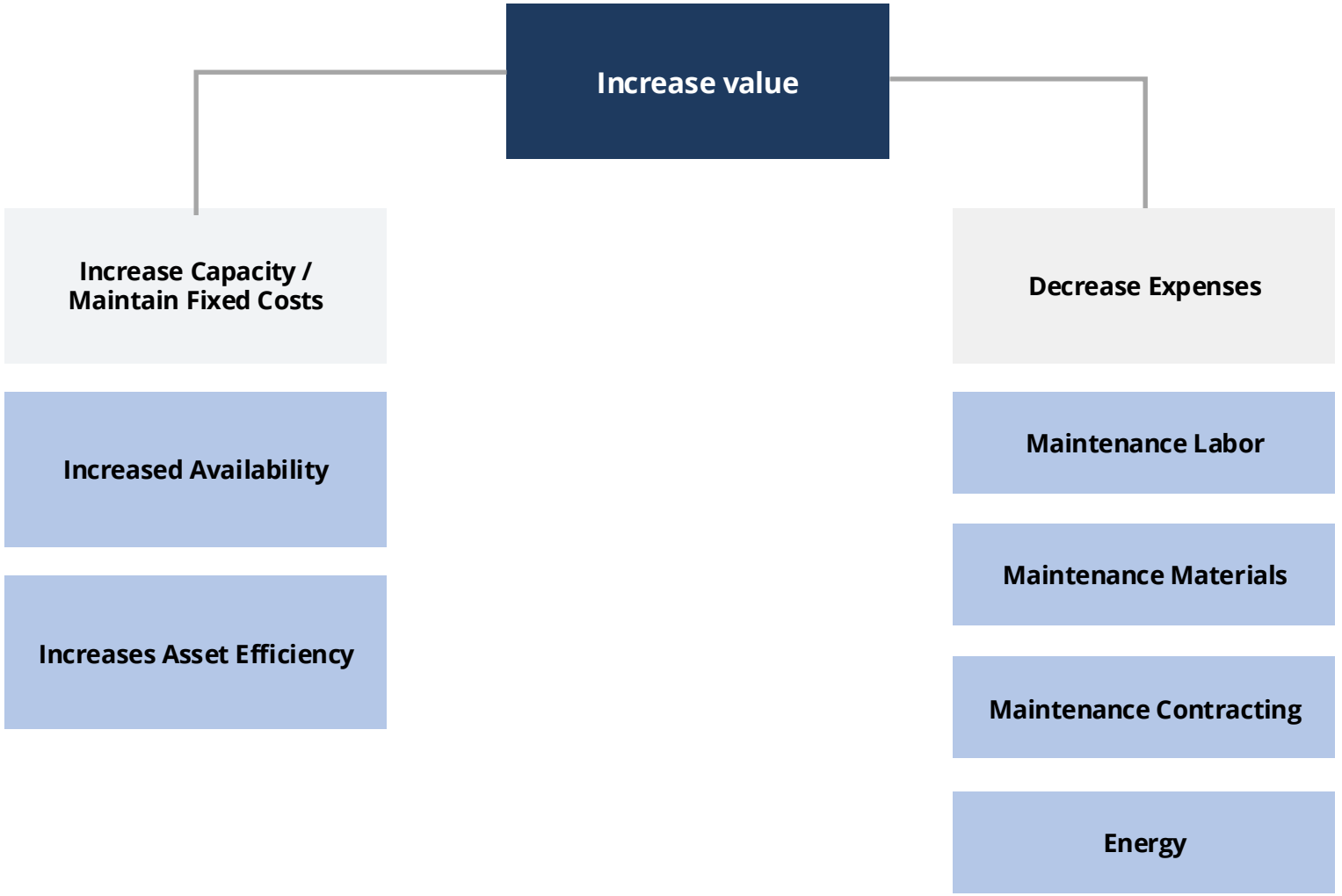
Value Proposition

Why Maintenance Matters & ROI

Value Proposition of Maintenance



Value Proposition of Maintenance



By the Numbers: Why Maintenance Matters

2-4hrs

Wrench Time

Typical actual work time per 8-hour shift due to inefficiencies and lack of resources

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1 : 5

Cost Ratio

Planned vs. Unplanned work cost.

No Planner/scheduler and planner/craft ratio is too high.

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1 : 5

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14%

Maintenance OT

Current average overtime rate.
Best practice target is < 5%.

12-18%

Cost Reduction

Savings from implementing planned maintenance

.

5-20%

Energy Savings

Reduction in energy consumption through optimization

.

30%

Inventory Costs

Carrying costs often high due to overstocking critical spares

Summary of Key Issues

Resource & Planning Issues

- **Lack of dedicated resources** for maintenance planning leads to reactive firefighting.
- **No specialized planner/scheduler** role, forcing supervisors to plan on the fly.
- **Planner-to-Craft ratio is too high**, reducing the quality of job plans and schedule accuracy.

Data & Process Gaps

- **Backlog is not tracked** or standardized, making workload visibility impossible.
- **PMs are static** and not consistently tied to asset performance history or condition data.
- **Failure codes exist but are inconsistent**, preventing meaningful reliability analysis.

Strategic Maintenance Management

Aligning Vision, Policy, and Execution

Strategic Maintenance Management Program

Strategic Plan

Strategic Direction

- Organizational Vision
- Strategic Goals
- Long-term Objectives
- Service Delivery Context

Maintenance Policy

Governance & Principles

Outline of core principles, requirements, and responsibilities for infrastructure service delivery.

Aligned with Outlook Plan

Maintenance Strategy & Plans

Value Creation

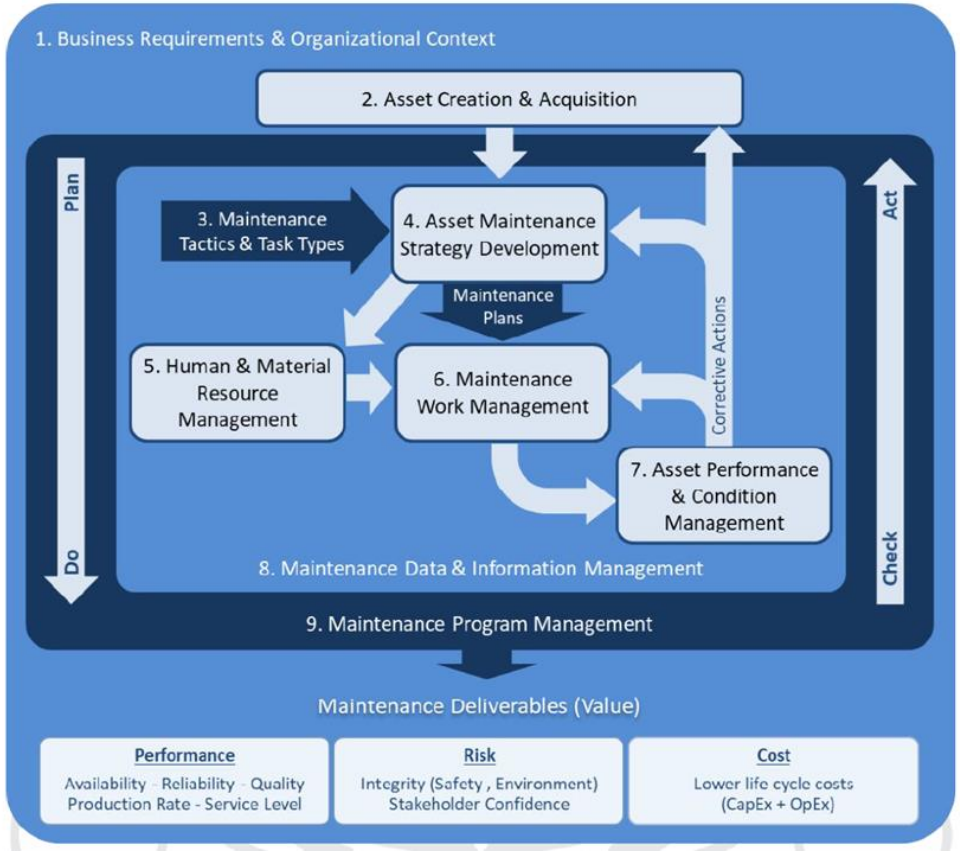
Specific initiatives and activities designed to enable the Asset Management Policy.

Financial | Risk Mgmt

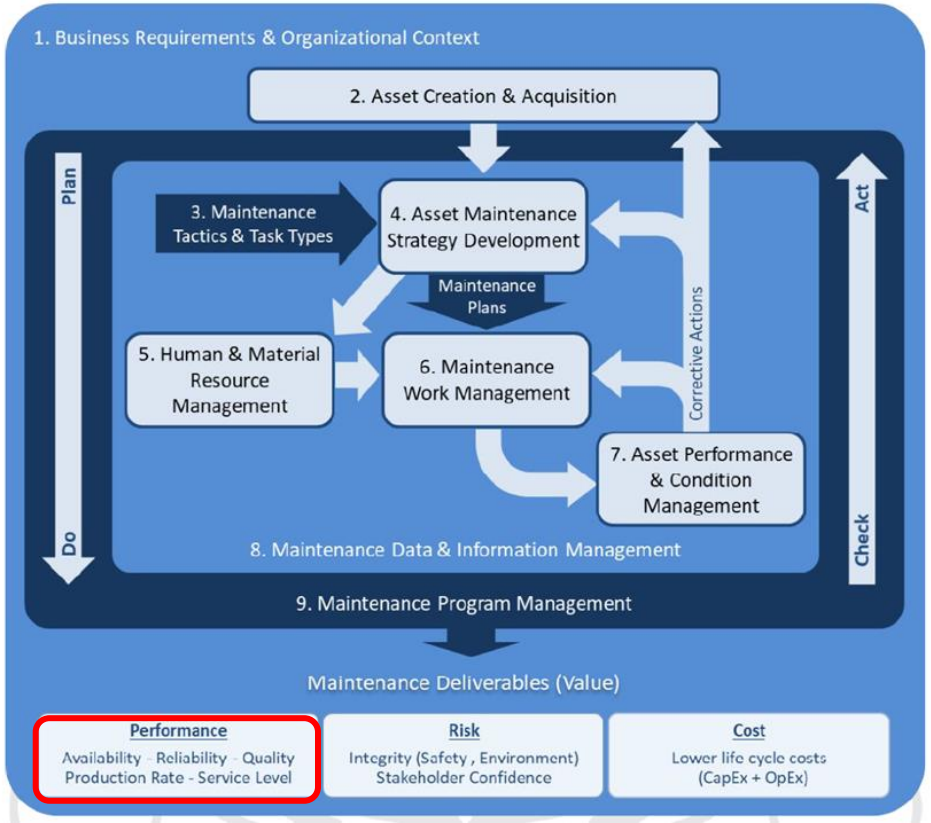
Strategic Maintenance Management Program

Global Forum on Maintenance & Asset Management (GFMAM)

Aligned framework for standardized asset management excellence

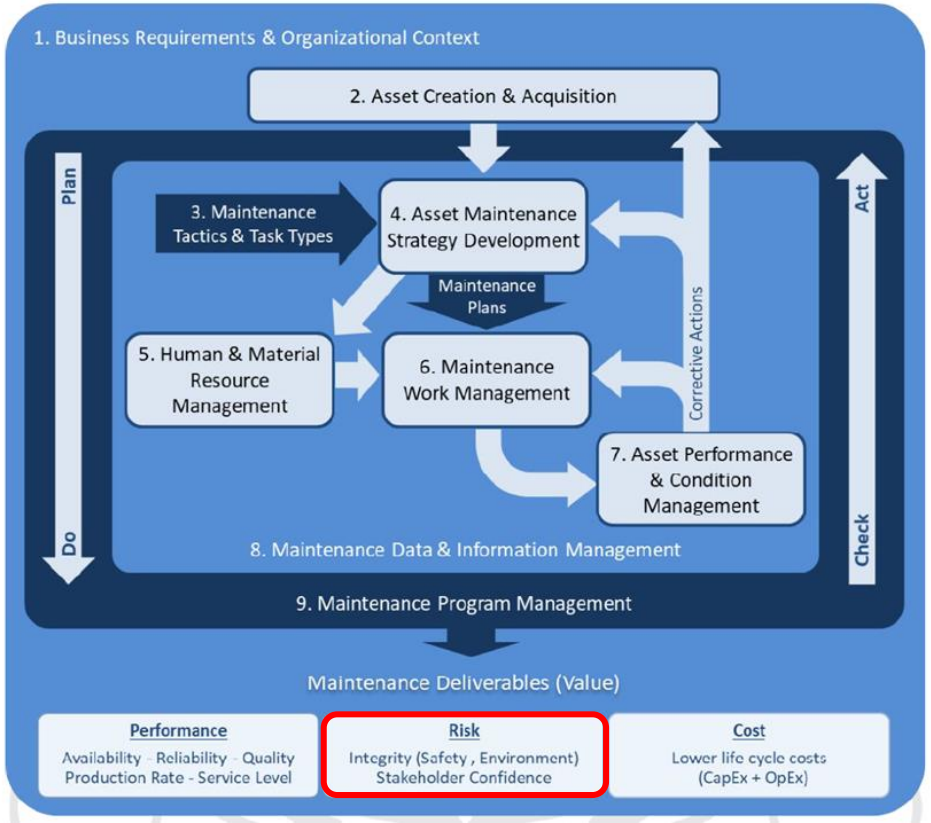


Strategic Maintenance Management Program



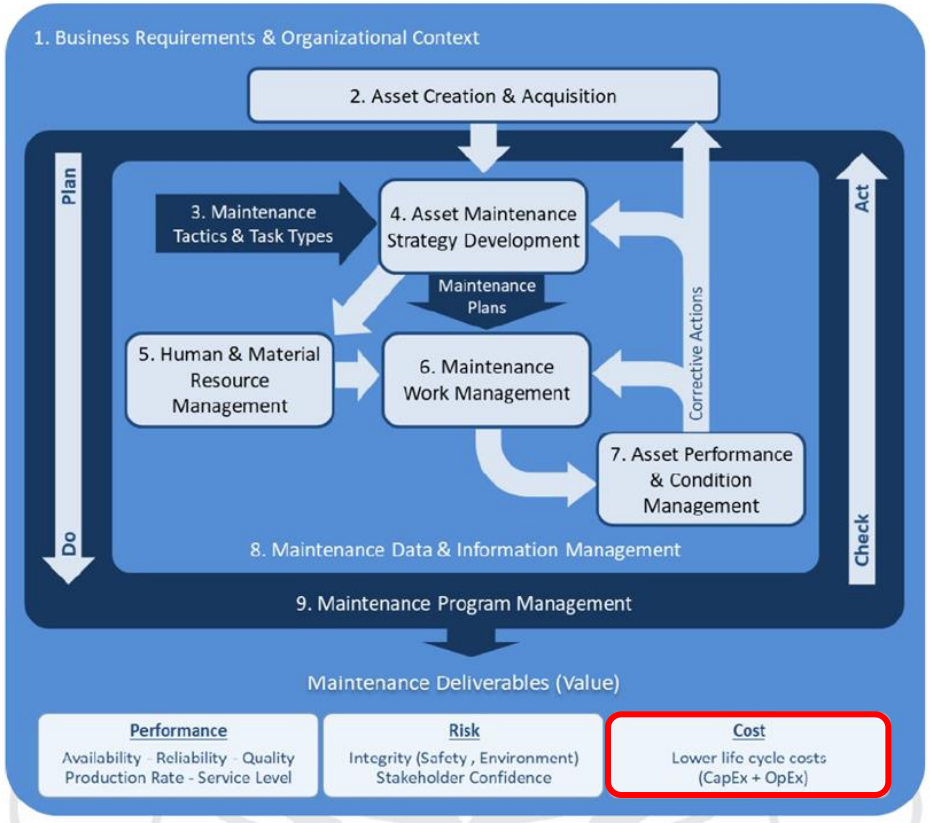
- Asset performance is directly tied to risk exposure
- Maintenance strategies reduce failure likelihood
- Well-maintained assets provide reliable, available services that meet service levels

Strategic Maintenance Management Program



- Reduces the likelihood of asset failure and supports reliable service delivery with minimal unplanned breakdowns
- Reduces exposure to safety, environmental, service-level, financial, and reputational risks

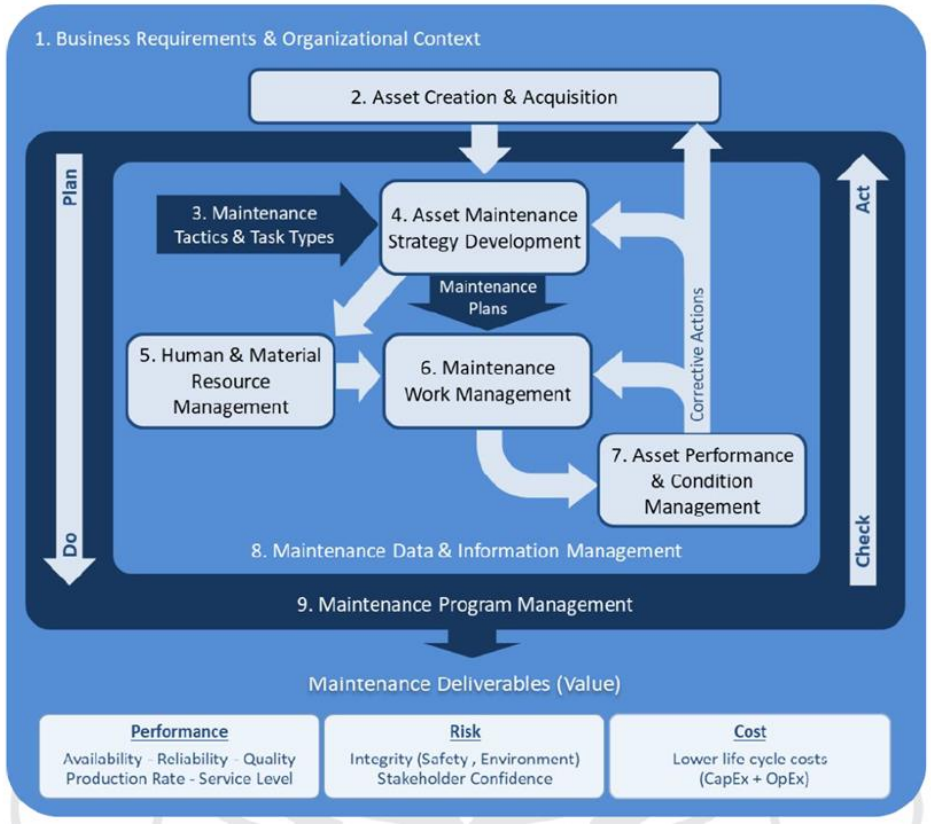
Strategic Maintenance Management Program



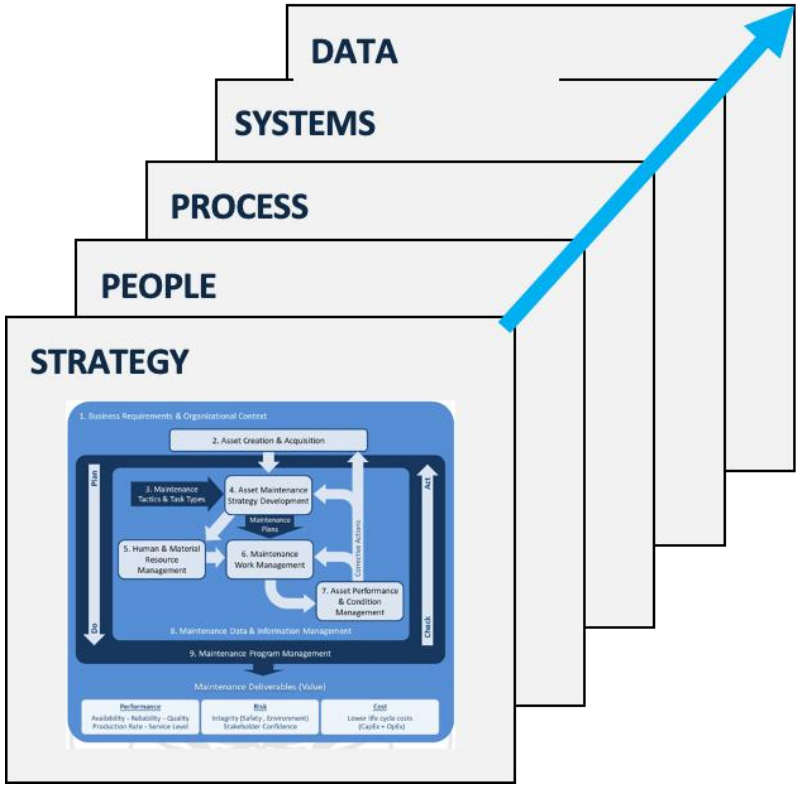
- Extends asset useful life and delays capital renewal through effective use of existing asset capacity
- Defers capital expansion by maximizing available asset performance and capacity
- High asset reliability reduces unplanned breakdown costs and lowers the need for system redundancy and excess spare inventory

Strategic Maintenance Management Program

GLOBAL FORUM FOR MAINTENANCE & AM (GFMAM) FRAMEWORK



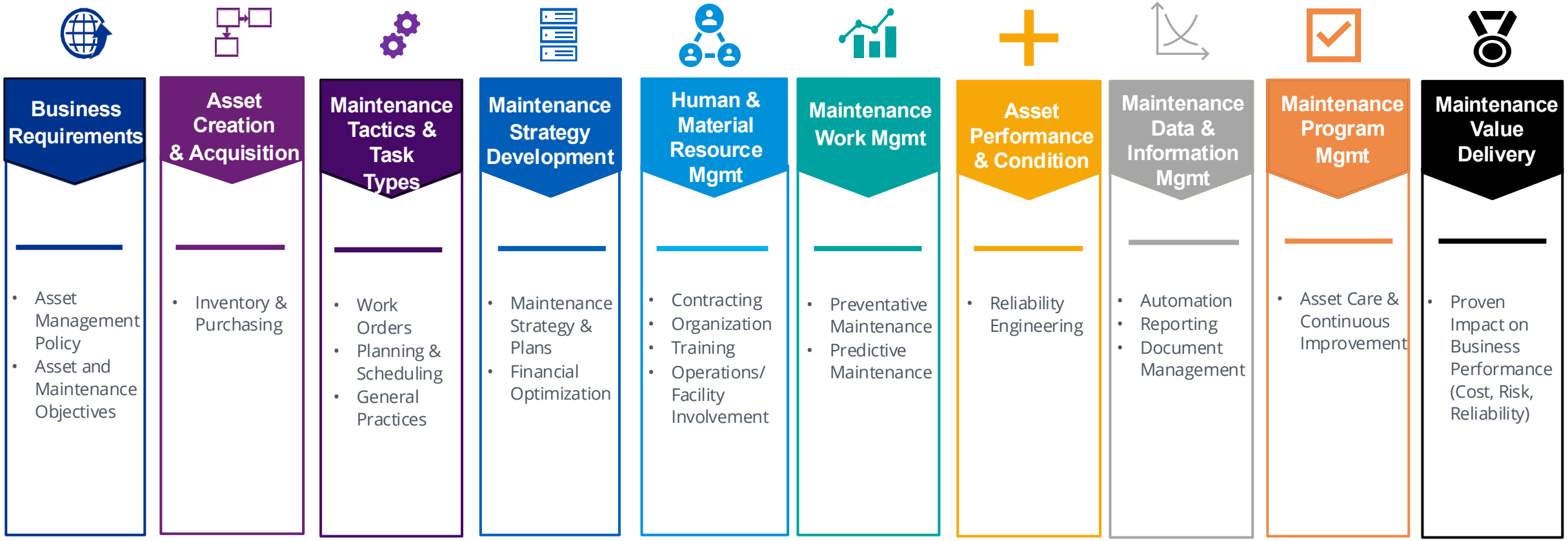
Target Operating Model for Maintenance



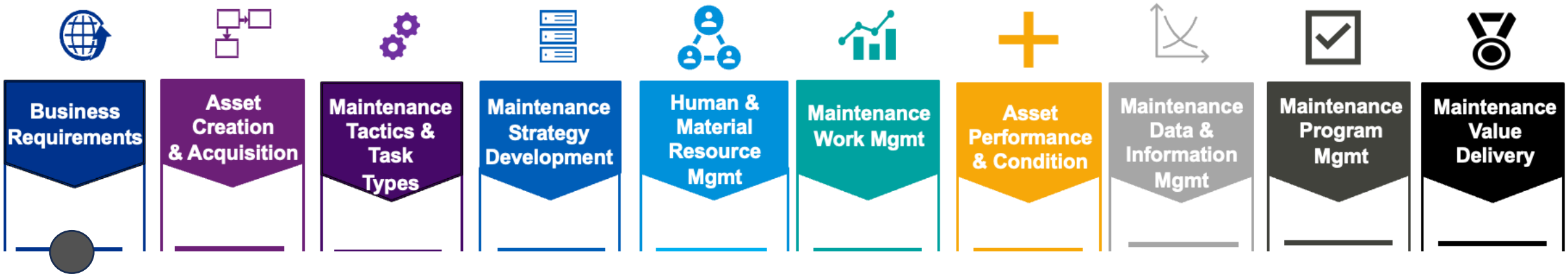
Maintenance Program

Structuring for Efficiency & Reliability

Maintenance Program

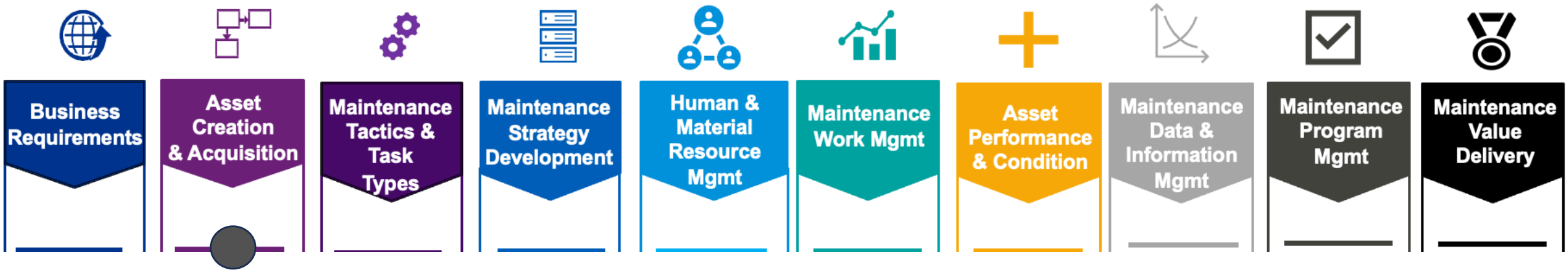


Maintenance Program



- Maintenance success factors clearly linked to strategic goals
- Maintenance positioned as a key enabler of Asset Management (AM), articulated in the Maintenance Policy and other corporate documents
- Defined Levels of Service (LOS) & performance targets

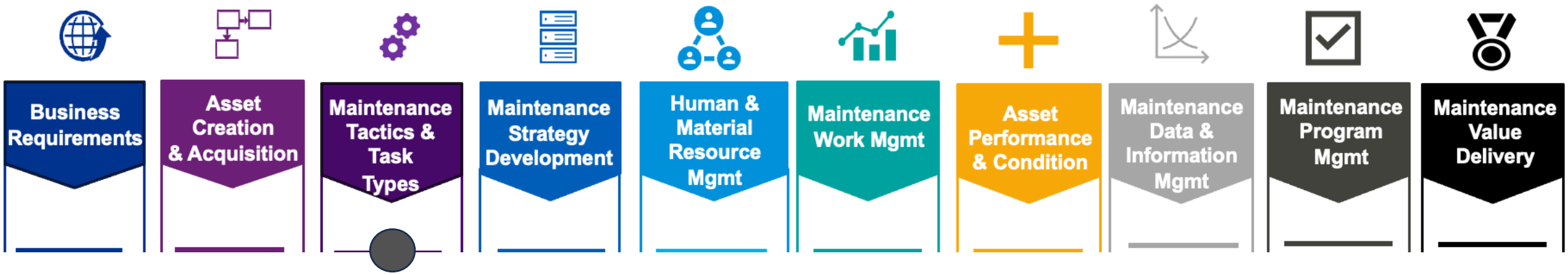
Maintenance Program



- Lifecycle value analysis (LVA) is completed and used in capital project decision-making
- Inputs from maintenance staff are included in the design and procurement process
- Asset data is complete at handover and commissioning

KPIs: % handover packages meeting data completeness and accuracy standards

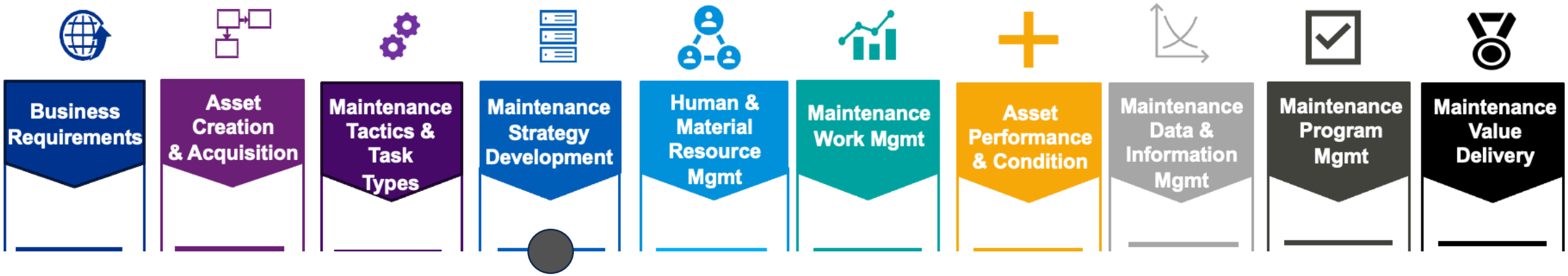
Maintenance Program



- Predictive maintenance (PdM) strategies are used to detect early signs of degradation before failures occur (e.g., thermography, vibration analysis, oil analysis)

KPIs: number of failures predicted

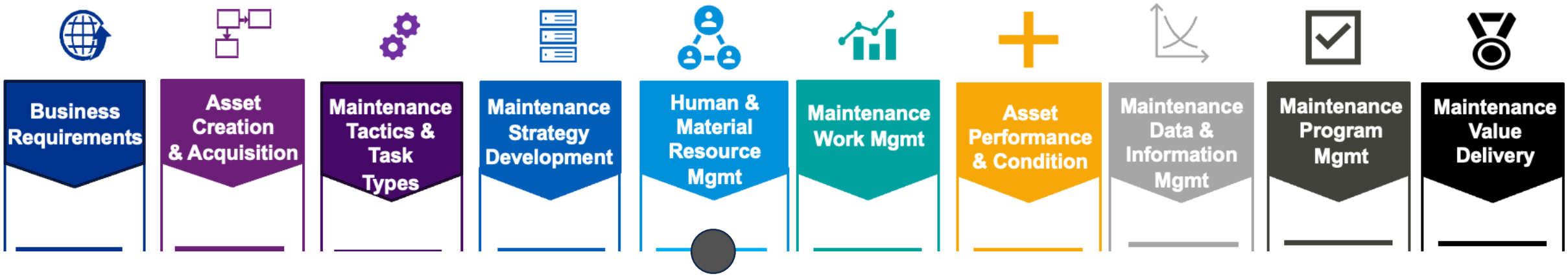
Maintenance Program



- Maintenance strategies per asset class are selected based on criticality and risk (e.g. run-to-failure vs. regular preventive maintenance)
- Maintenance plans include the frequency of work, triggers, and inspection methods

KPIs: asset availability (uptime), PM compliance, failure rate per asset class

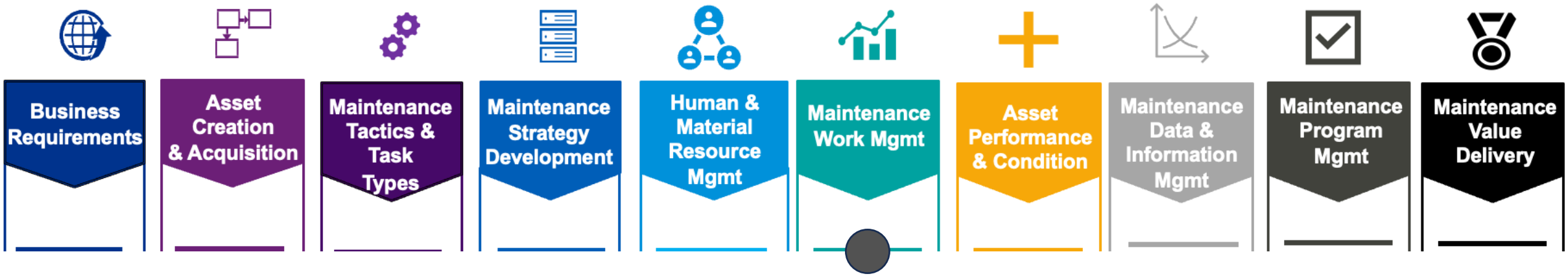
Maintenance Program



- Knowledge transfer, succession planning, regular refresher training
- Defined competency requirements and RACI matrix for each maintenance task
- Inventory & spare parts strategy focused on critical spares and service impact

KPIs: inventory turnover, carrying cost, training hours per maintenance employee

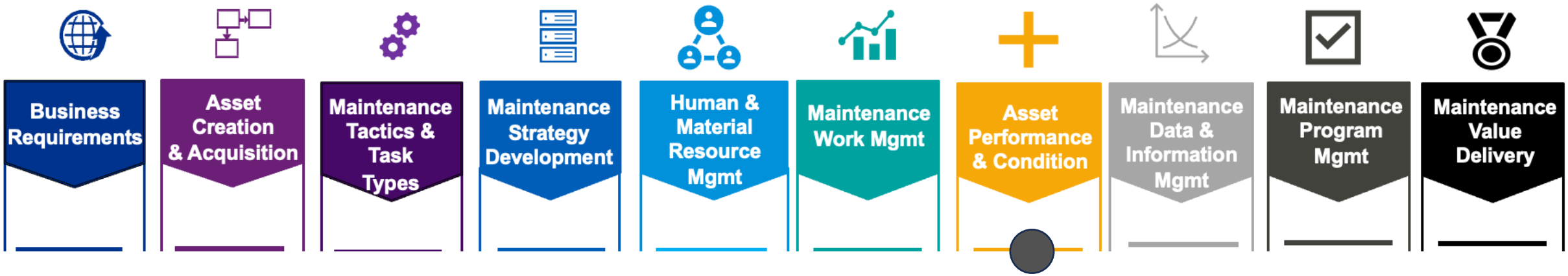
Maintenance Program



- Delineated accountability for planning, scheduling, executing, and supervising work
- Standardized job plans and SOPs for repeatable work
- Weekly schedules based on work prioritization and keeping a healthy backlog

KPIs: craft labour utilization (wrench time), PM schedule adherence, work order backlog

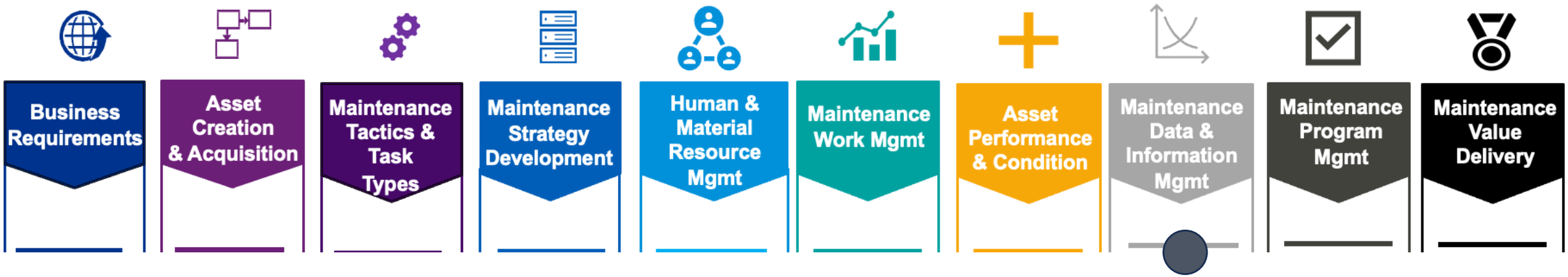
Maintenance Program



- Reliability engineering – conduct criticality assessments and Failure Modes and Effects Analysis (FMEA) to create a model that predicts asset performance using automated condition monitoring tools (e.g. sensors)

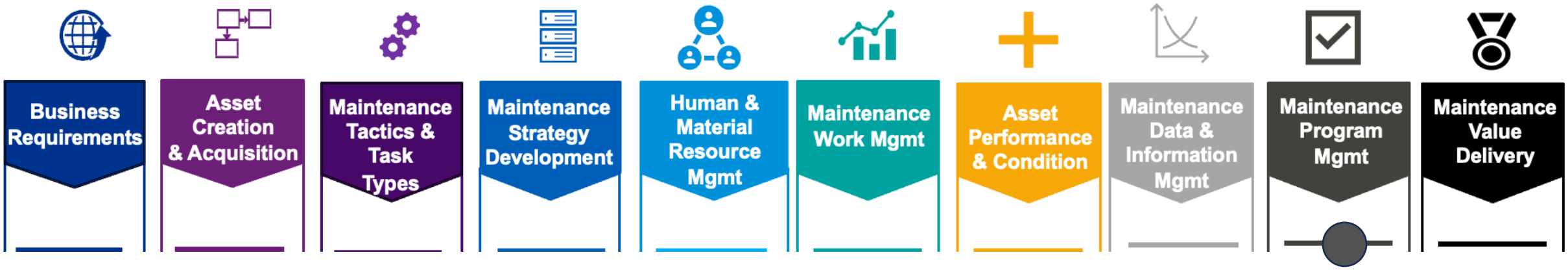
KPIs: mean time between failures (MTBF), % reduction in emergency work orders

Maintenance Program



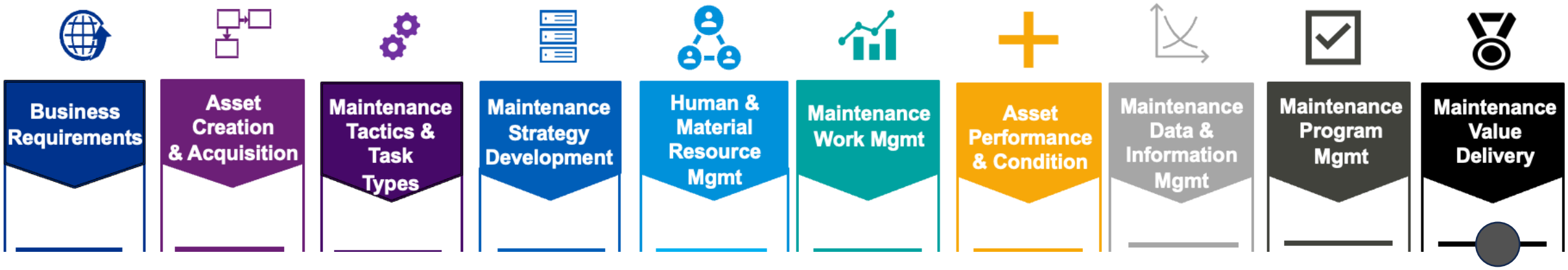
- Defined asset hierarchy
- Data standards and governance manual (asset registry fields, naming conventions, validation checklists, data audit protocols)
- Fit-for-purpose CMMS/EAMS technical and functional requirements that plan for future system integrations

Maintenance Program



- Continuous improvement through regular reviews of the PM program and Root Cause Analysis (RCA) after major failures

Maintenance Program



- Dashboarding and formal reporting on KPIs that demonstrate the value of maintenance for business impacts (cost, risk, reliability)

KPIs: return on maintenance investment (ROMI)

Using Data to Improve Maintenance

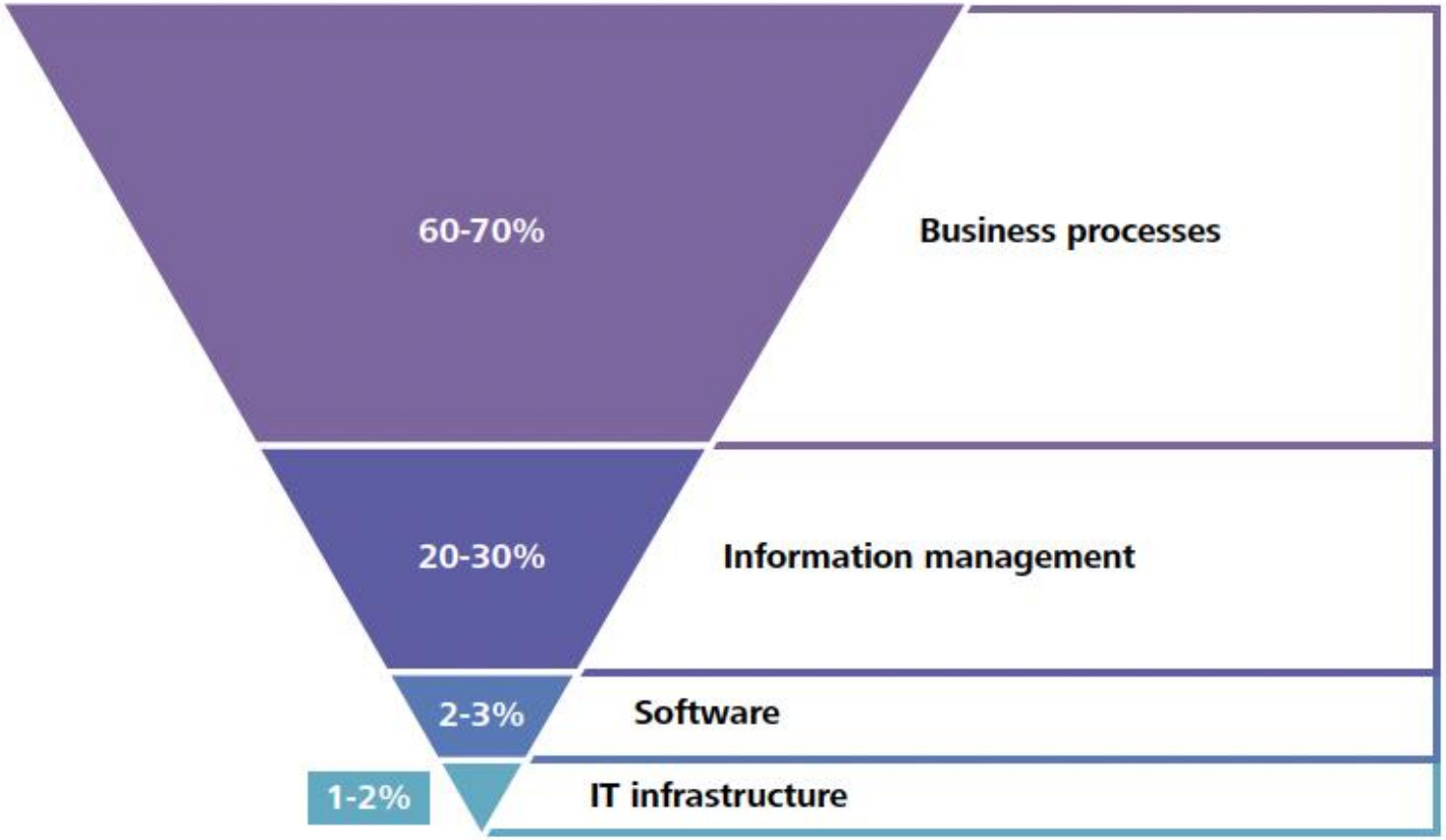
Turning Information into Action

Data Foundations & Trust

> ***"If planners or supervisors don’t trust the data, they won’t use it — that’s the biggest warning sign."***

Data Foundations & Trust

Operational Cost



Data Foundations & Trust

Evaluate Across 4 Dimensions

Completeness

Assets registered & WOs closed properly

Accuracy

Correct failure codes & ratings used

Consistency

Standards applied across all crews

Usability

Trusted for planning decisions

Data Foundations & Trust

Common Challenges

- **Heavy use of free text** instead of structured data fields limits analysis capabilities.
- **Failure codes** exist but are rarely used properly.
- **Tradition-based PMs** persist rather than adjusting based on performance history.
- **Inspection reports generated without action** indicate low data utility and wasted effort.
- **Goal:** Shift from reactive mode to proactive planning via better asset insight.

Data Maturity and a Practical Pathway

Maintenance Data Maturity Model

Reactive 1

- Limited asset data
- Focus on restoring
- Cost tracking only

Controlled 2

- Standard PMs
- Basic failure codes
- Backlog control

Proactive 3

- Trend analysis
- Data-driven PMs
- Resource planning

Predictive/Optimized 4

- Predictive indicators
- RCA updates PMs
- Strategy reliability

Data Maturity and a Practical Pathway

Practical Improvement Pathway

Standardize

Asset hierarchy
Naming
Failure codes

Make Useful

Clear job plans
Accurate durations
Consistent inspections

Close Loop

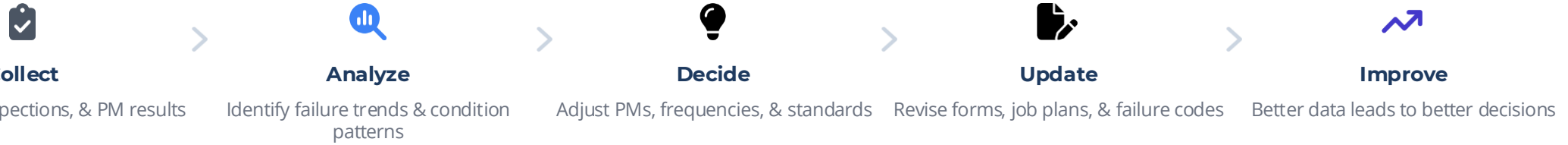
Refine PM tasks
Update frequencies
Update forms

Measure

PM compliance
Repeat failures
Downtime

From Data to Insight to Action

The Continuous Improvement Cycle



From Data to Insight to Action

Predictive & Condition Based Maintenance: Start Small

"Predictive maintenance begins with better data use, not just technology."

Focus inspections on meaningful indicators (vibration, heat)

Move beyond pass/fail results to quantitative data

Trend results over time to catch degradation early

Auto-flag repeats: Trigger work based on condition thresholds, not just calendar time

Maintenance data helps you:

- Eliminate low-value PMs
- Reduce unnecessary inspections
- Focus skilled labor on critical assets
- Improve planning accuracy
- Reduce emergency and reactive work

From Data to Insight to Action

What 'Good' Looks Like

Trusted Data

Asset and failure data is complete & reliable

Justified PMs

Tasks based on history & condition, not just habit

Action-Oriented KPIs

Metrics guide decisions, not just reporting

How to Sell the Maintenance Program

Selling the Value

Lead with the Business Case: Tie improvements directly to risk reduction, cost savings, and reliability.
Emphasize ROI (e.g., $1 PM avoids $4–$5 corrective).

Highlight Quick Wins: Build trust by showing reductions in overtime, unplanned work, and stabilizing backlog trends.

Use Visual Dashboards: Make performance visible to executives with simple before/after KPIs (MTBF, compliance, backlog).

Secure Champions: Use success stories from operations and finance to identify internal advocates.

Speak the Language of Finance: Use lifecycle cost models and heat maps to show avoided CAPEX and extended asset life.

Align with Strategic Priorities: Connect maintenance to corporate goals like sustainability, compliance, and ISO 55000.

Close the Loop: Use failures (RCA) to update PM tasks, frequencies, and failure codes. Every failure should improve the system.

Questions?

Open Floor for Discussion