


ISPE Carolina-South Atlantic Chapter Reliability Excellence Enterprise Asset Management Master Planning



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GenesisSolutions

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GenesisSolutions

A Fully Integrated Global EAM Service Provider

Agenda



Connecting a World of
Pharmaceutical Knowledge

Enterprise Asset Management Overview

Define: EAM Maturity Continuum

Measure: Current State Assessment

Analyze: EAM Master Plan Development

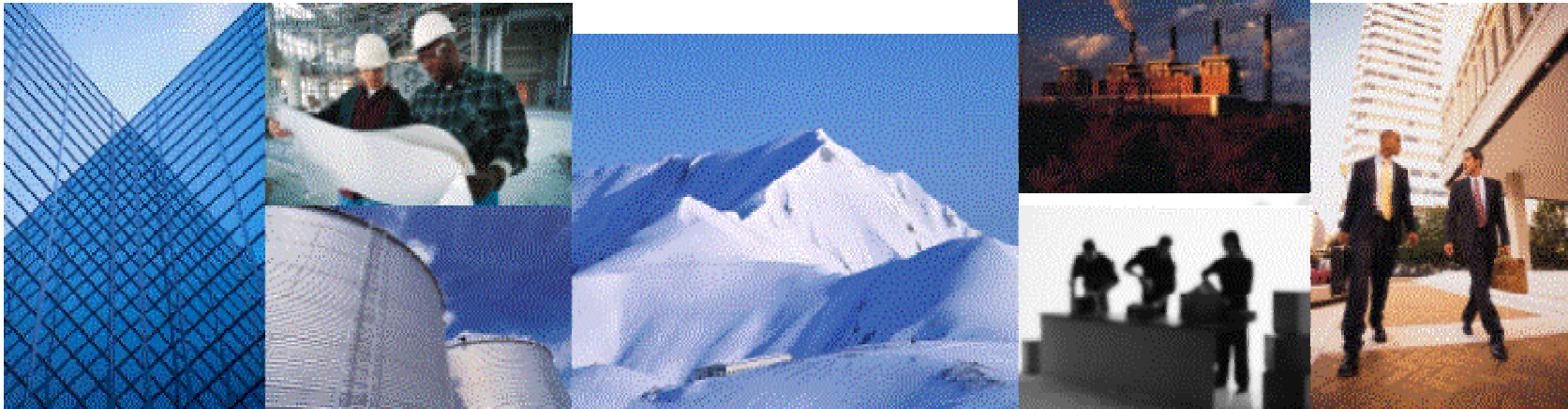
Improve: Implementation Models for EAM Excellence

Control: EAM Excellence Governance Model

Maximizing Return on Investment with EAM

Q&A Session

Enterprise Asset Management Overview

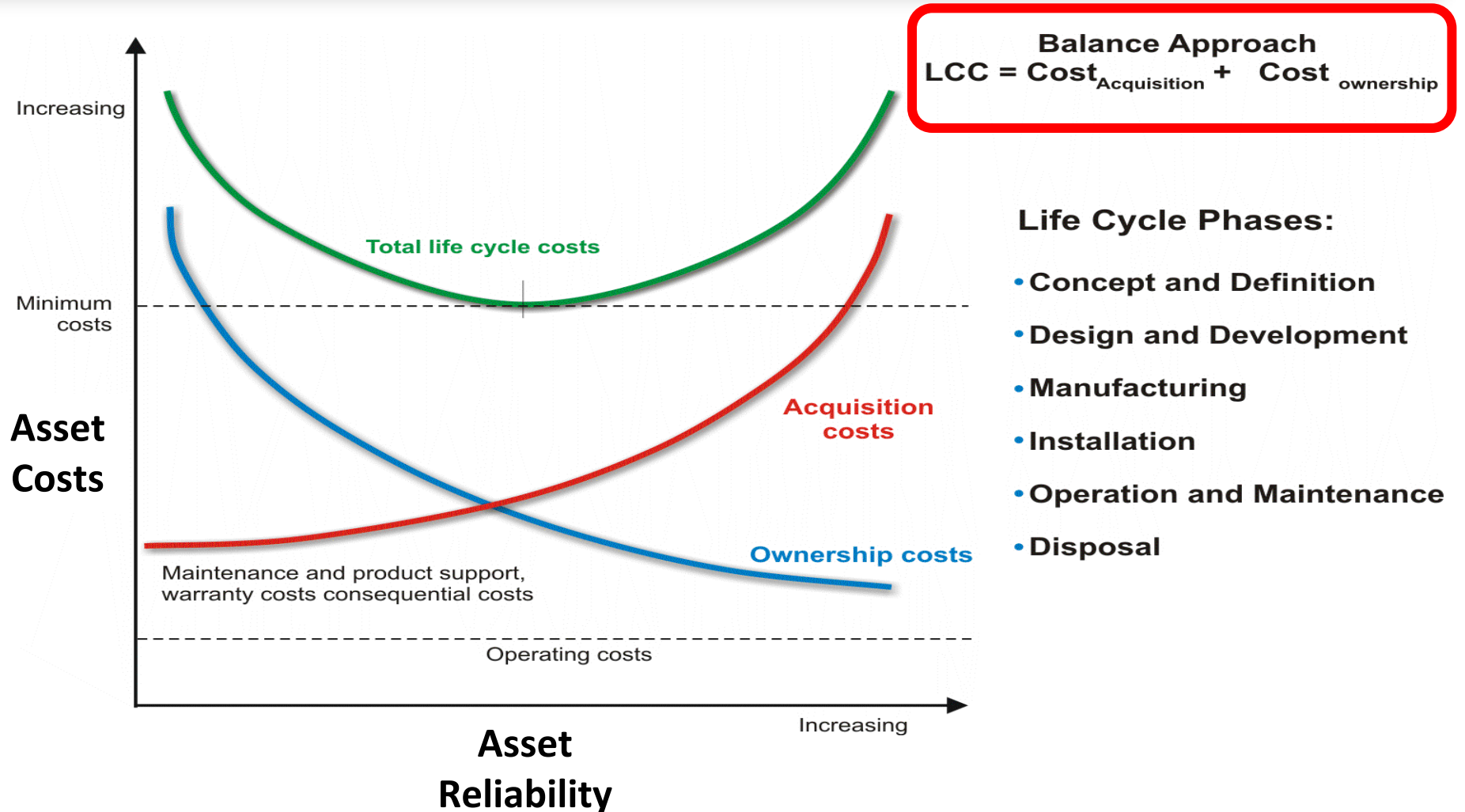


Defining EAM

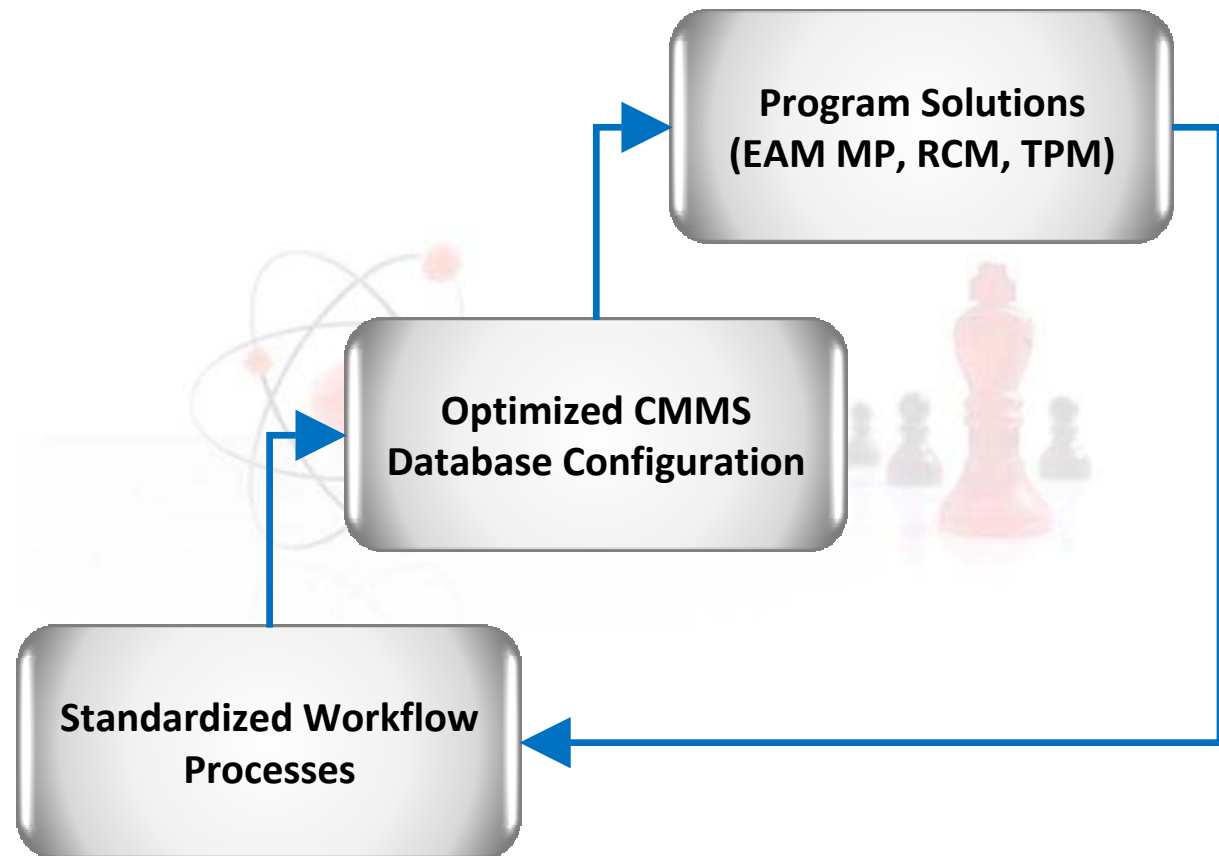
Enterprise Asset Management

- ***Whole life optimal management of the physical assets of an organization to maximize value***
- ***Covers design, construction, commissioning, operations, maintenance and decommissioning/replacement of plant, equipment and facilities***
- ***“Enterprise” refers to the management of the assets across departments, locations, facilities and business units***
- ***Managing assets across the facility, organizations will improve utilization and performance***

Understanding Enterprise Asset Management

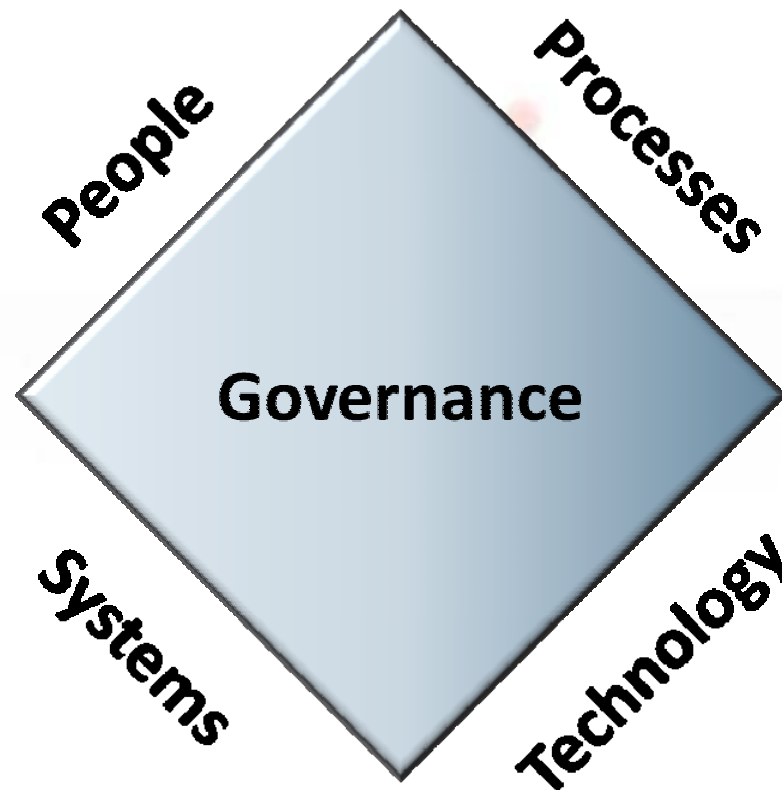


Critical Success Factors



EAM Leverage Points

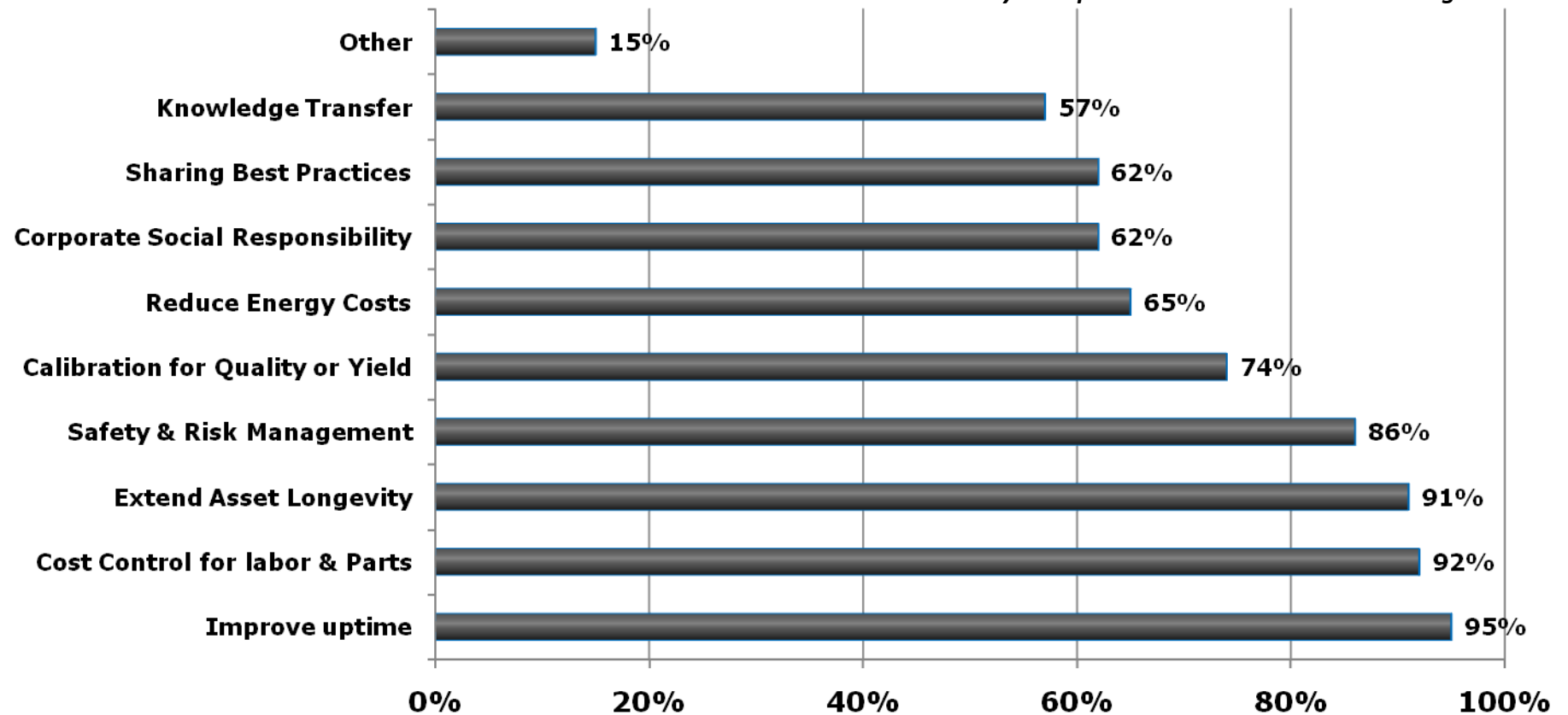
*Developing sustainable **Systems** to support the **People** responsible for optimizing the **Processes**, utilizing the latest **Technology** and providing the necessary **Governance** to monitor all functions with key metrics to ensure success.*



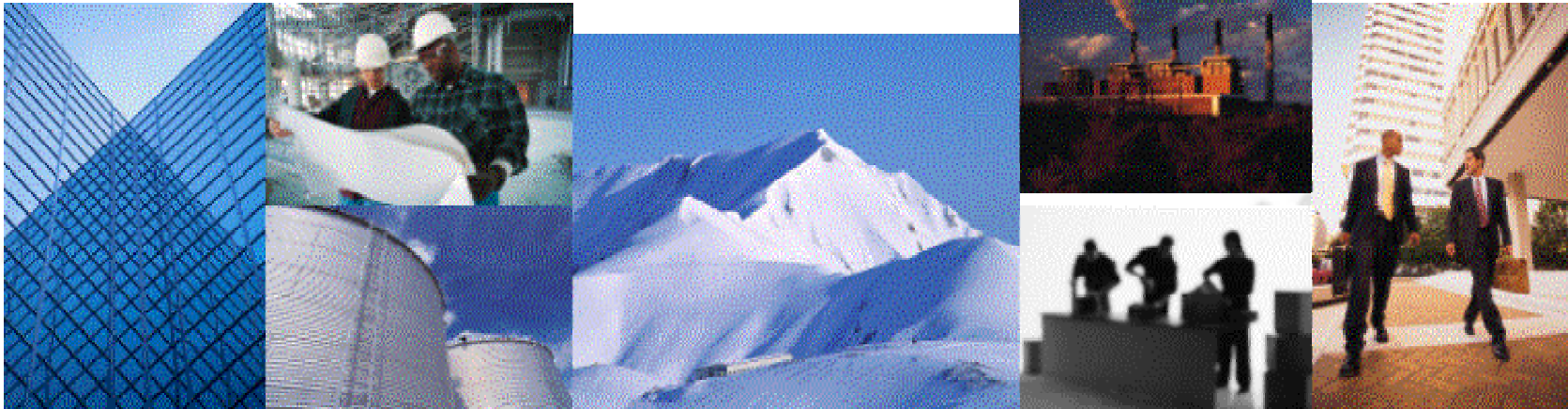
EAM Strategy Drivers

65 Participants / 1,300 (+) Plants / 463,000 (+) Employees

**ARC Advisory Group 2010 EAM and Field Service Mgt 09*



EAM Maturity Continuum



Levels of Asset Management Performance Progression



DMAIC Process Checklist - Define

Define

EAM Maturity Continuum

Define the progressive levels of Asset Management Performance

Measure

Current State Assessment

Measure where you are on the Maturity Continuum

Analyze

EAM Master Plan Development

Analyze your assessment and develop the path forward to achieve EAM Excellence

Improve

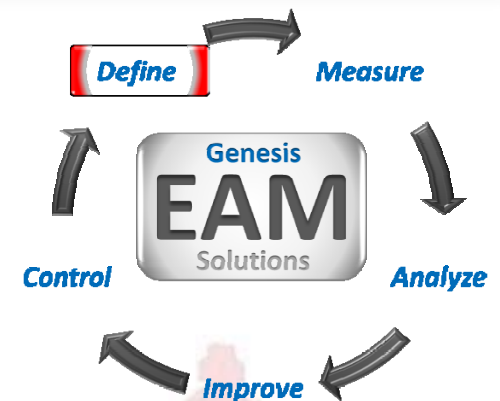
Implementation Models for EAM Excellence

Improve your success with proven EAM Master Plan Models

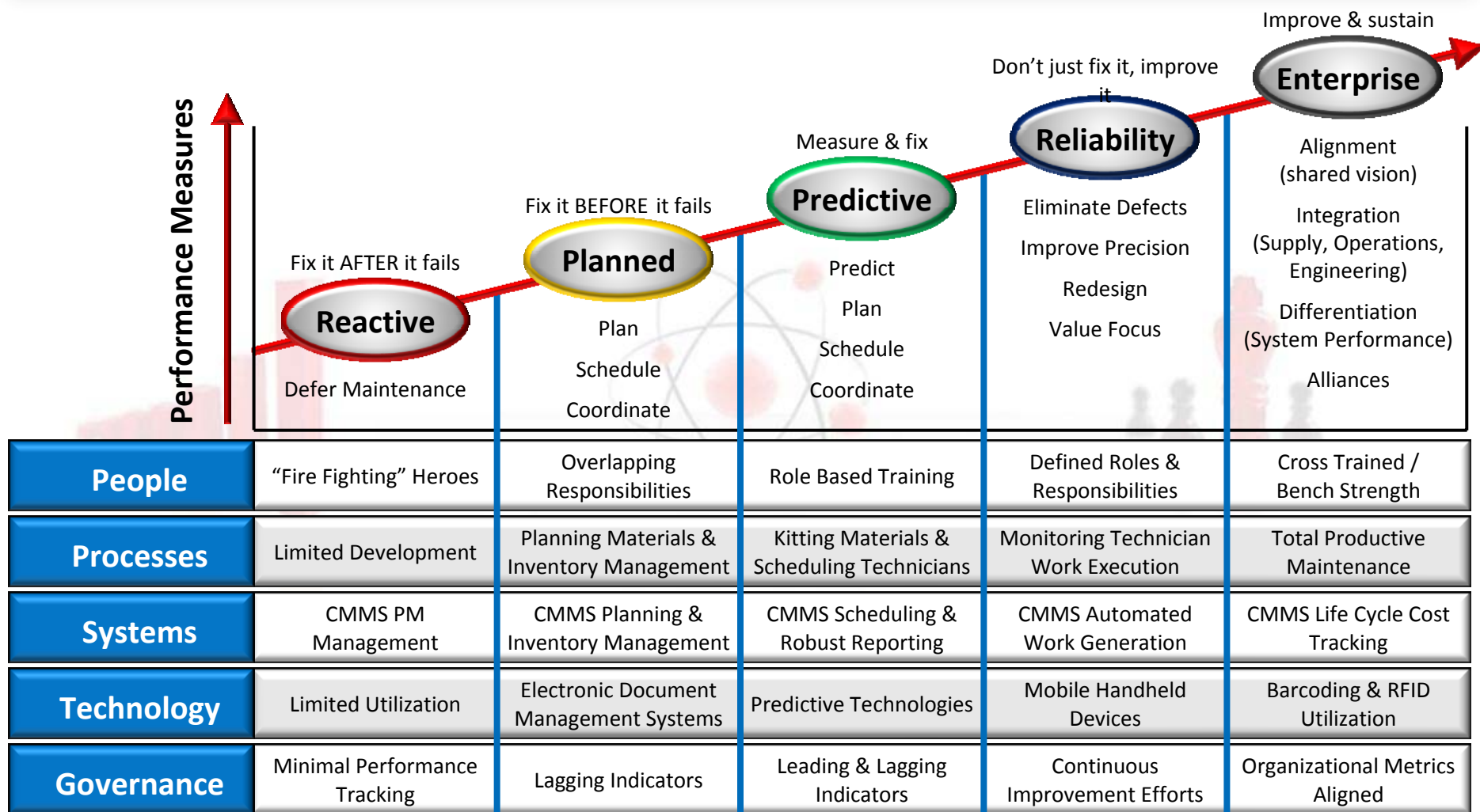
Control

EAM Excellence Governance Model

Control your improvements by measuring and sustaining success

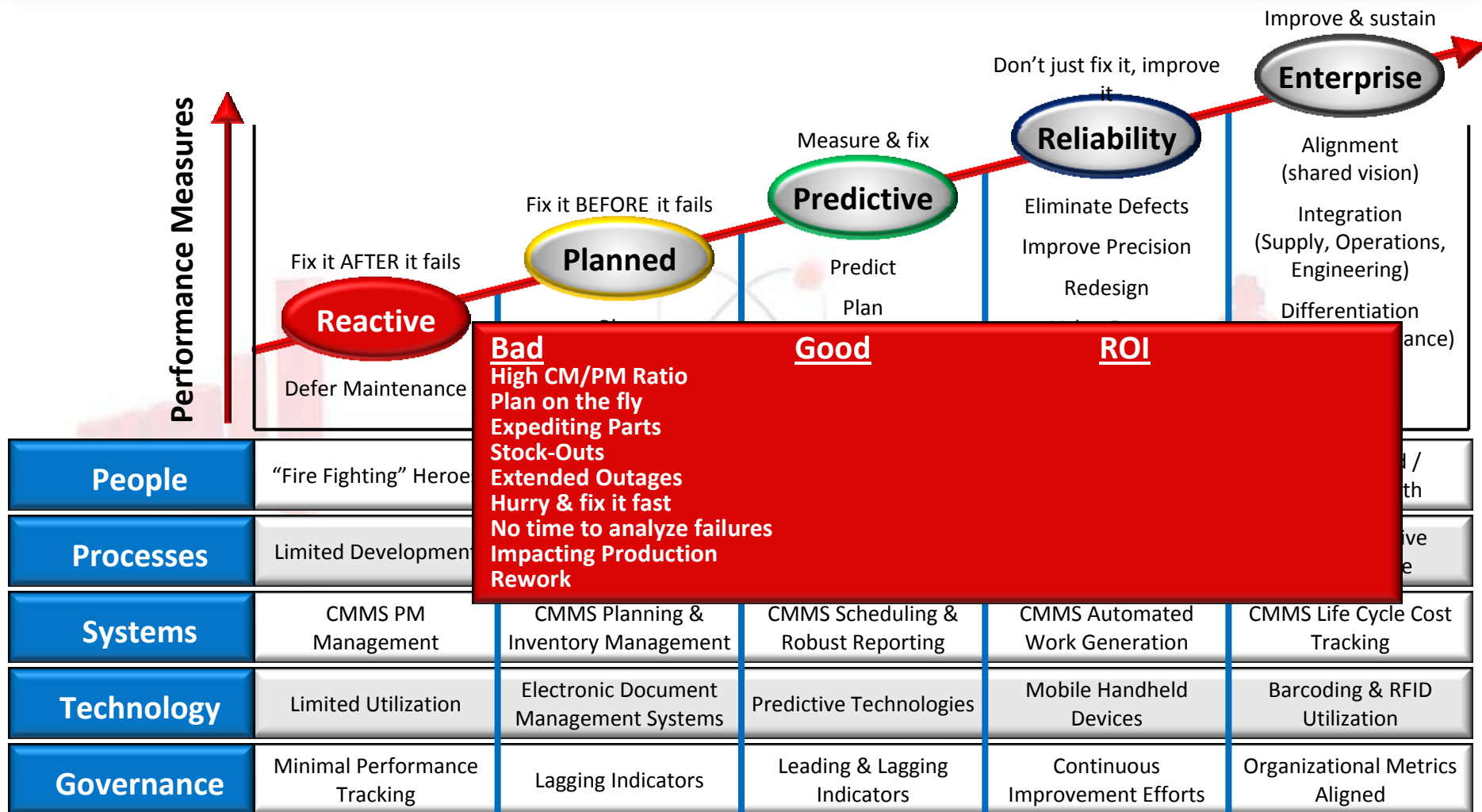


Maturity Continuum Progression



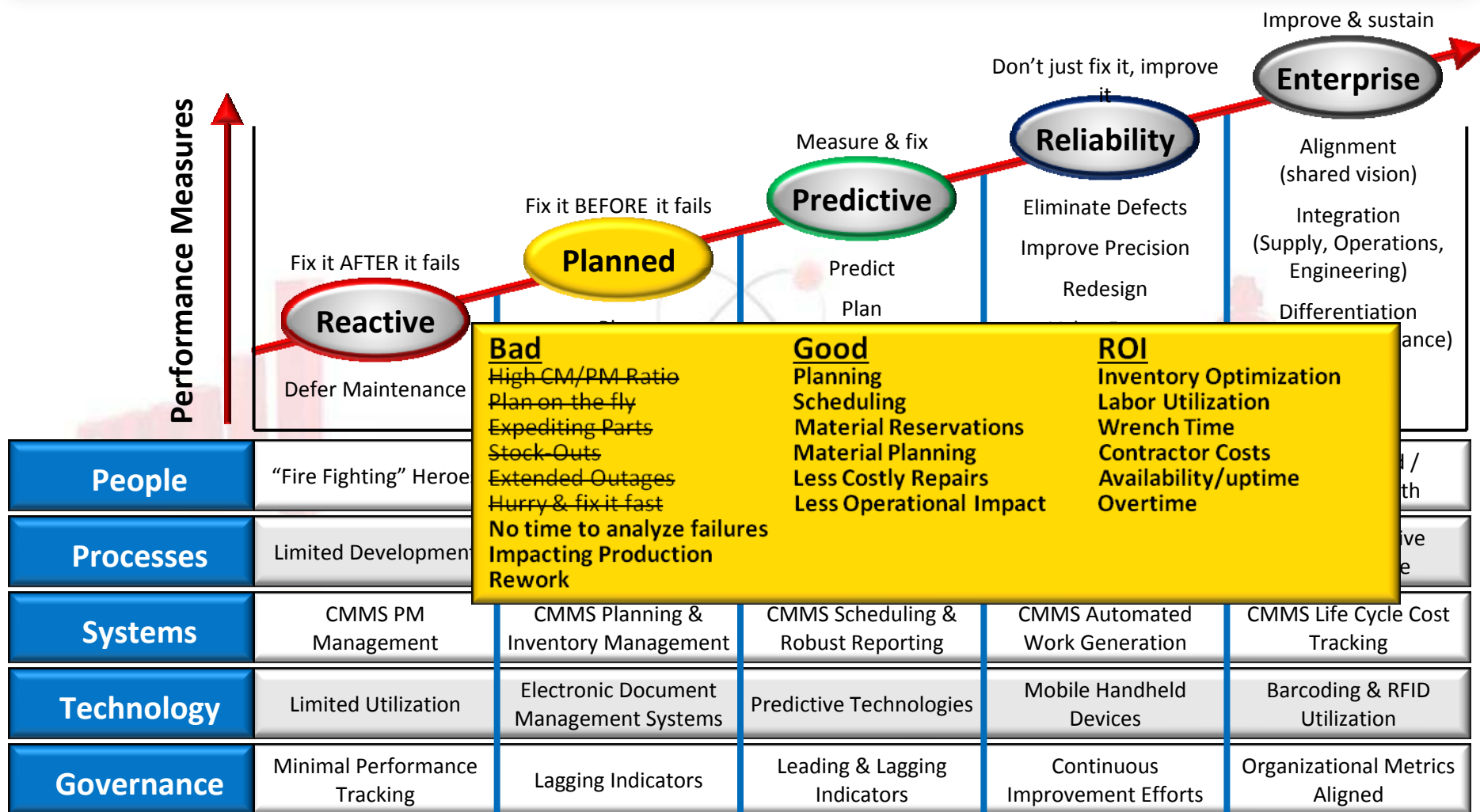
EAM Maturity Continuum

Reactive State



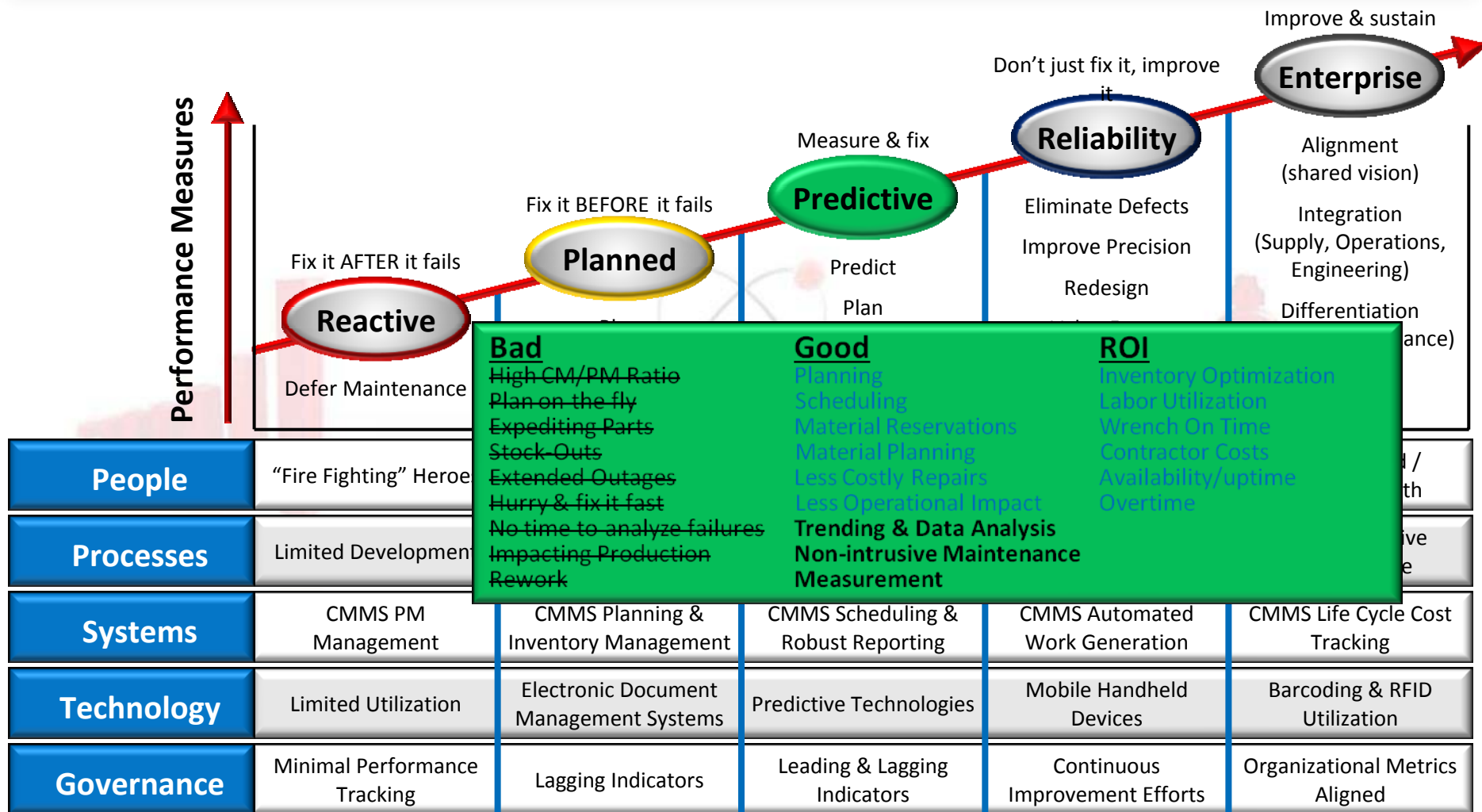
EAM Maturity Continuum

Planned State



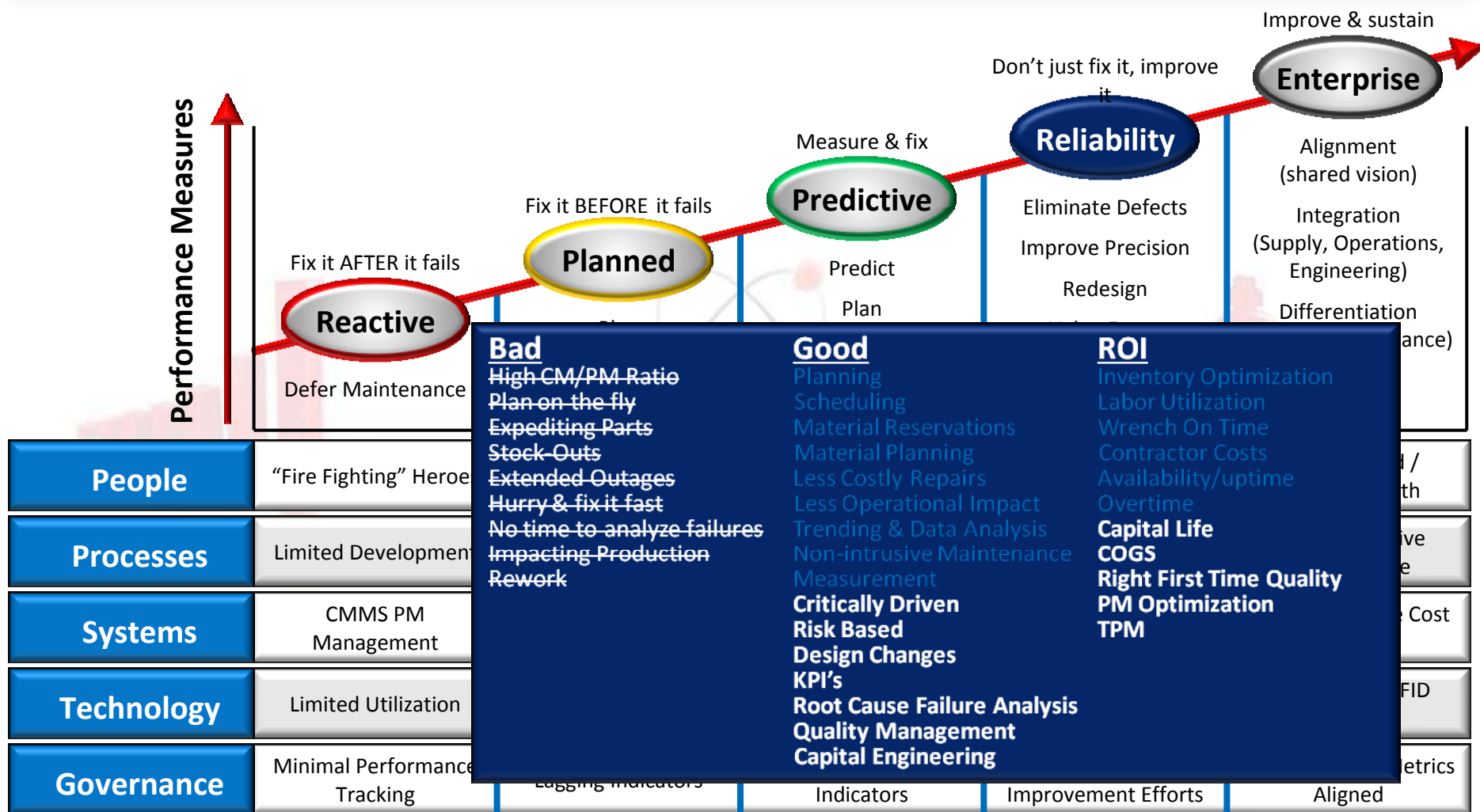
EAM Maturity Continuum

Predictive State



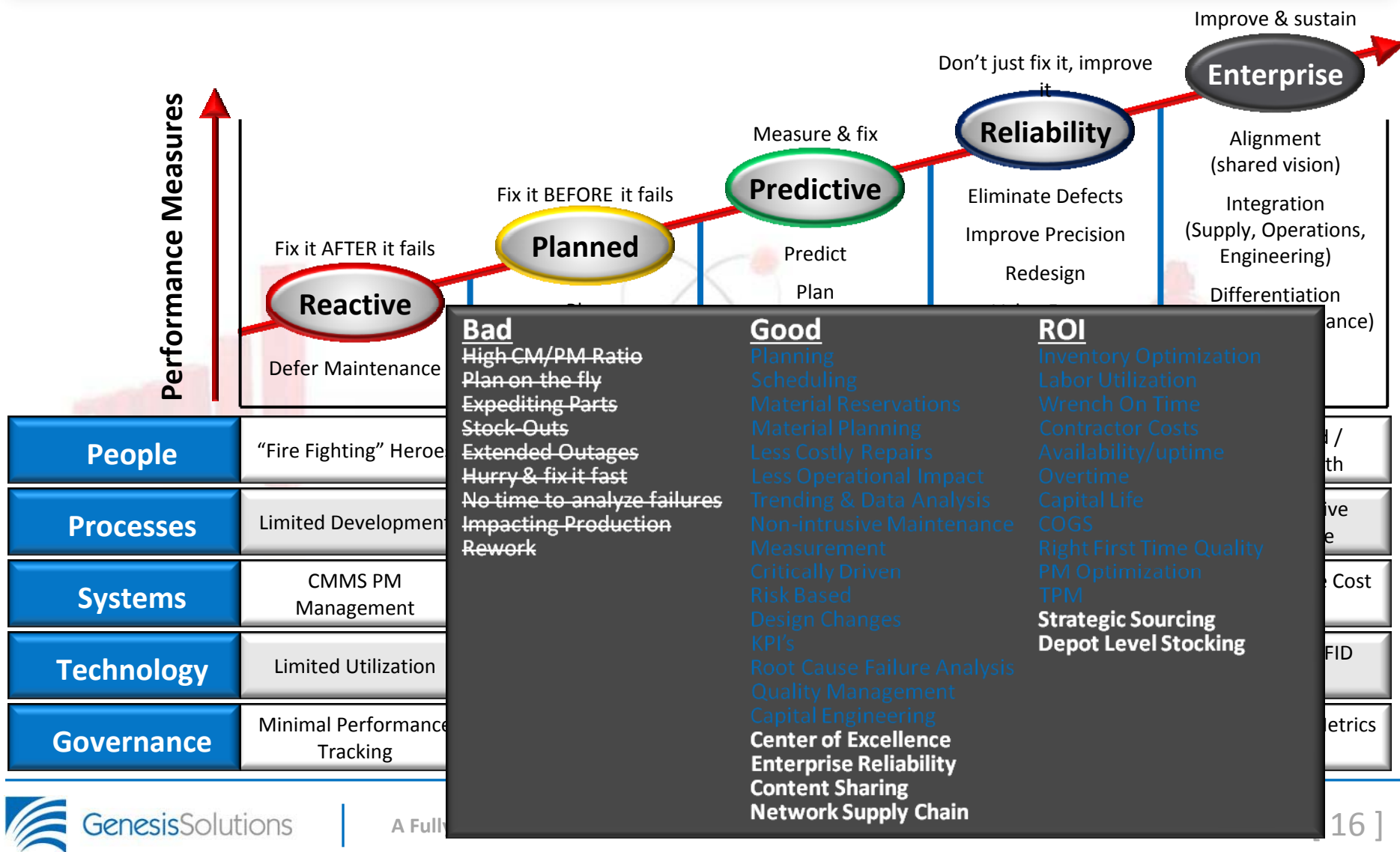
EAM Maturity Continuum

Reliability State



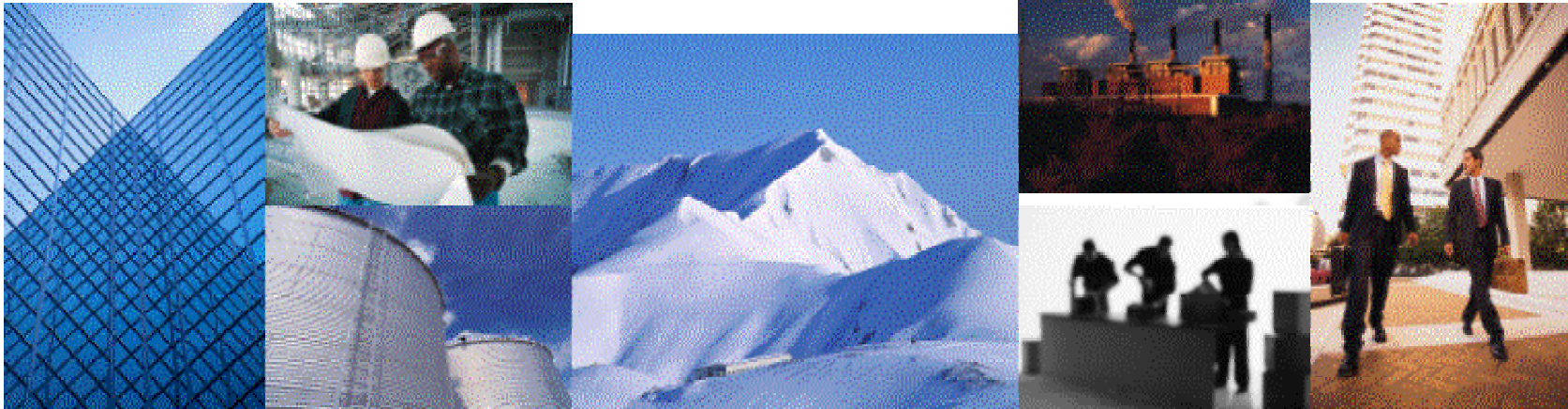
EAM Maturity Continuum

Enterprise State



Enterprise Asset Management Master Planning

Current State Assessment



Where are you on the Maturity Continuum?



DMAIIC Process Checklist - Measure

✓ Define

EAM Maturity Continuum

Define the progressive levels of Asset Management Performance

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EAM Master Plan Development

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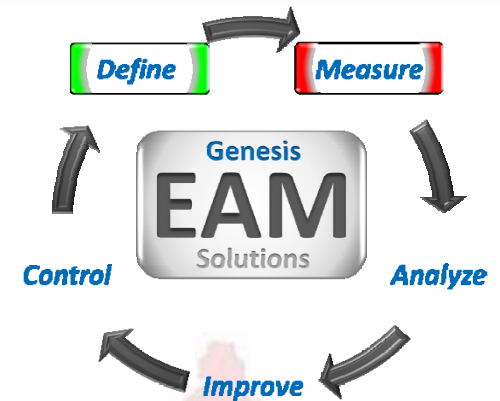
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Assessment Approach

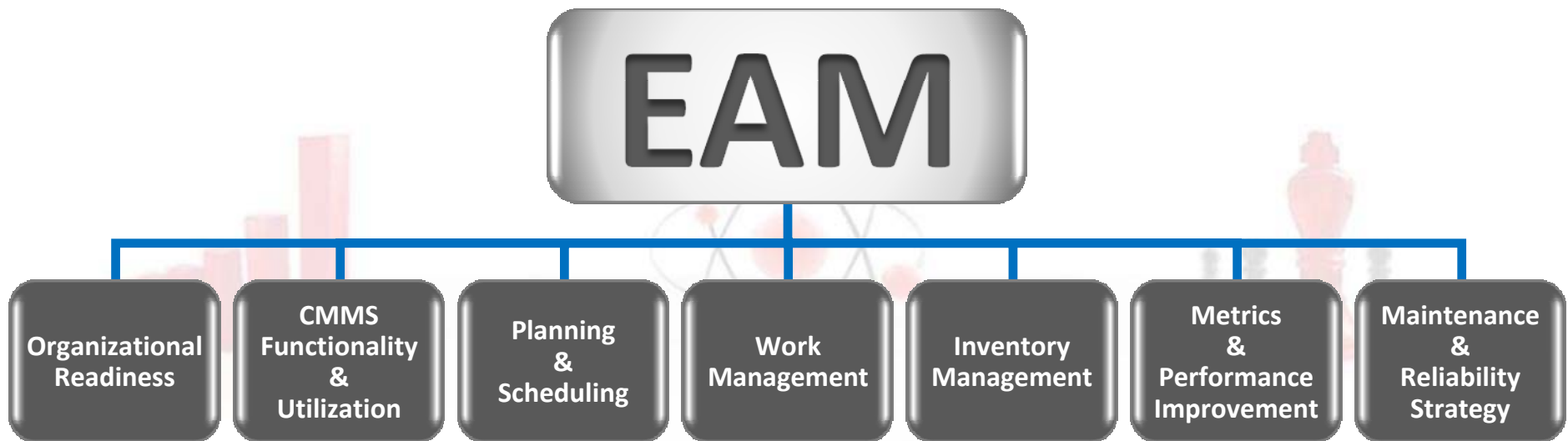
Data Collection

- CMMS data collection
- CMMS functional use
- Personnel interviews
- Personnel surveys
- Plant walk through
- Standard procedures review
- Technical document review

Data Analysis

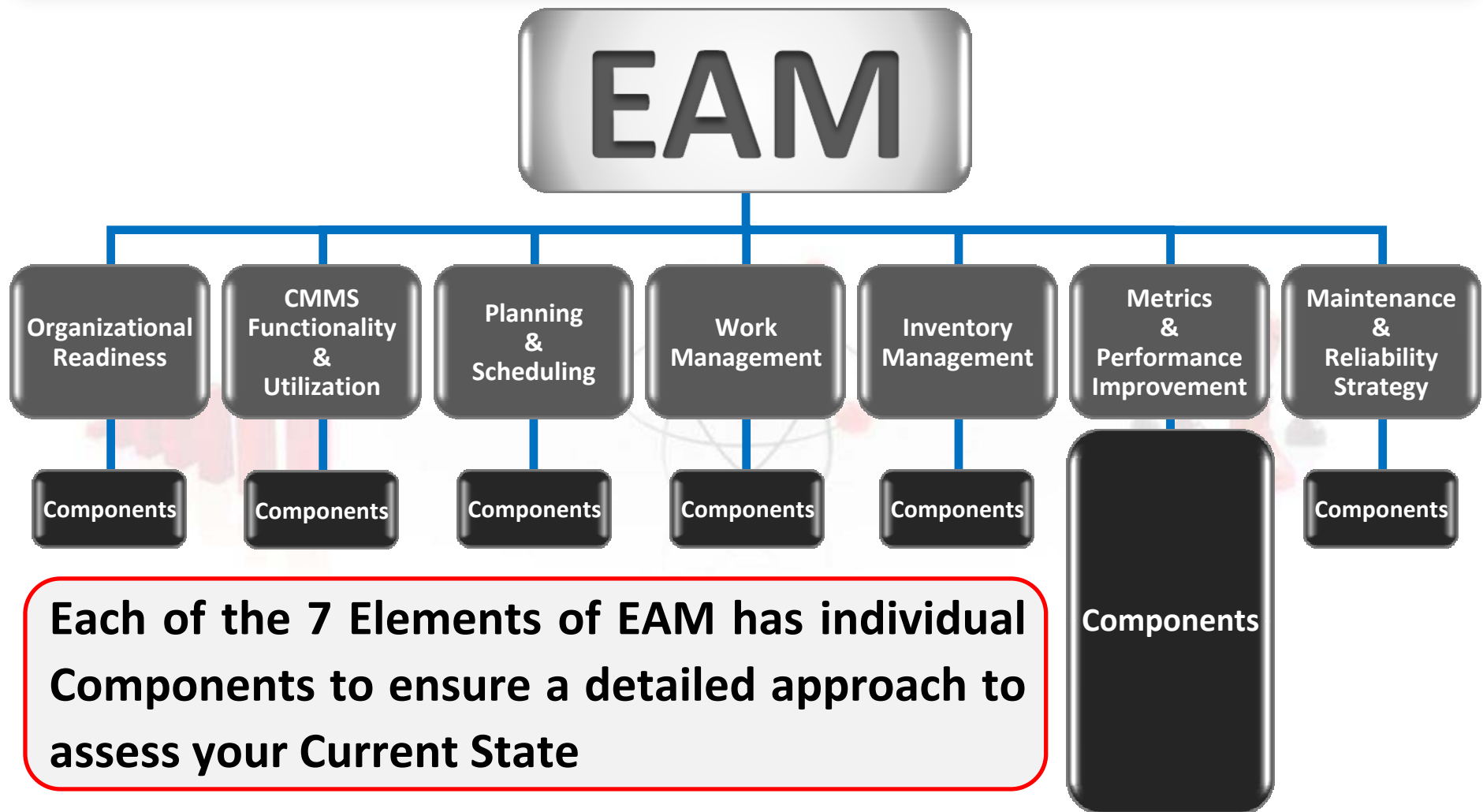
- Data and information analysis
- Scorecard completion
- Report development

Seven Elements of EAM



Current State Assessment

EAM Hierarchy



Current State Assessment

Assessment Component Examples

Organizational Readiness

- (OR-01) Key Reliability Staffing Roles and Responsibilities
- (OR-02) Asset Management Mission, Vision, and Values
- (OR-08) Collaborative Environment
- (OR-15) Senior Facility Leadership Involvement

CMMS Functionality & Utilization

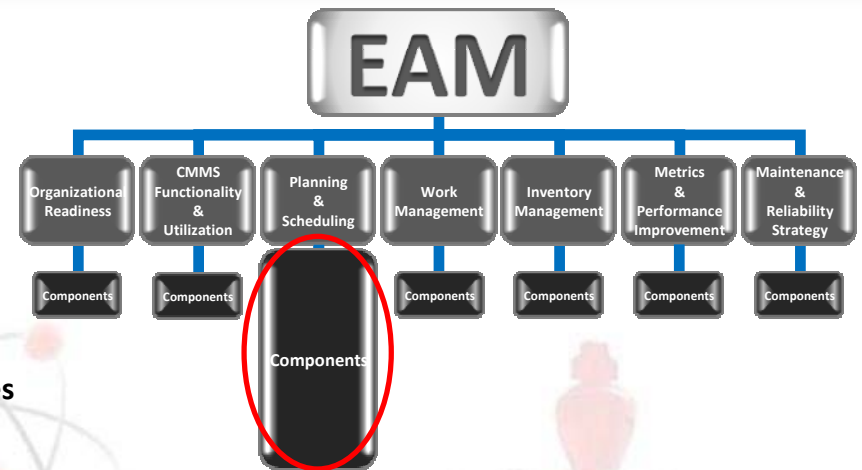
- (CM-01) Asset Bill of Materials
- (CM-04) Asset Hierarchies and Subassemblies
- (CM-05) Master Asset List
- (CM-09) CMMS Workflow Process

Planning & Scheduling

- (PS-02) Planned Materials Purchasing, Reservation, and Availability
- (PS-03) Planned Outages
- (PS-04) Proactive Planning and Scheduling
- (PS-10) Work Order Prioritization

Work Management

- (WM-01) Proactive Maintenance Program Management
- (WM-02) Work History Tracking
- (WM-04) Work Execution Review
- (WM-06) Process Management System

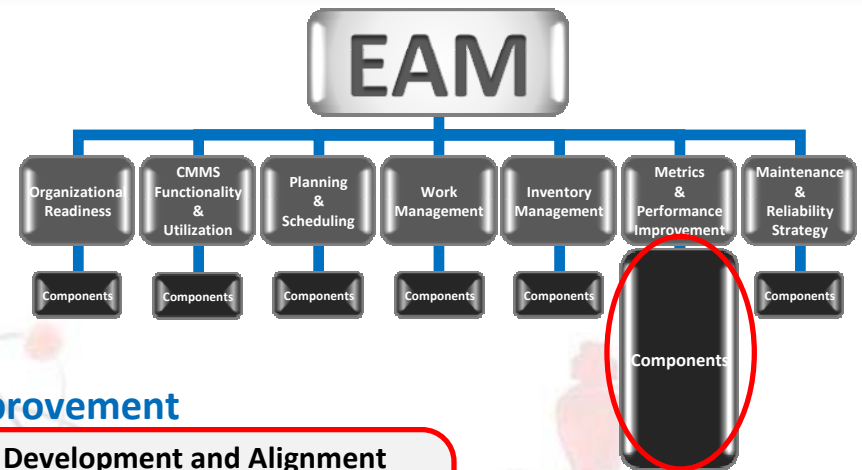


Current State Assessment

Assessment Component Examples (cont.)

Inventory Management

- (IM-01) Item Master List
- (IM-03) Inventory Control
- (IM-04) Vendor Managed Inventory
- (IM-05) Cycle Counts



Metrics & Performance Improvement

- (MP-01) Key Performance Indicator Development and Alignment
- (MP-02) Key Performance Indicator Tracking and Reporting
- (MP-04) Manufacturing Performance Data Collection
- (MP-09) Overtime Tracking and Goals

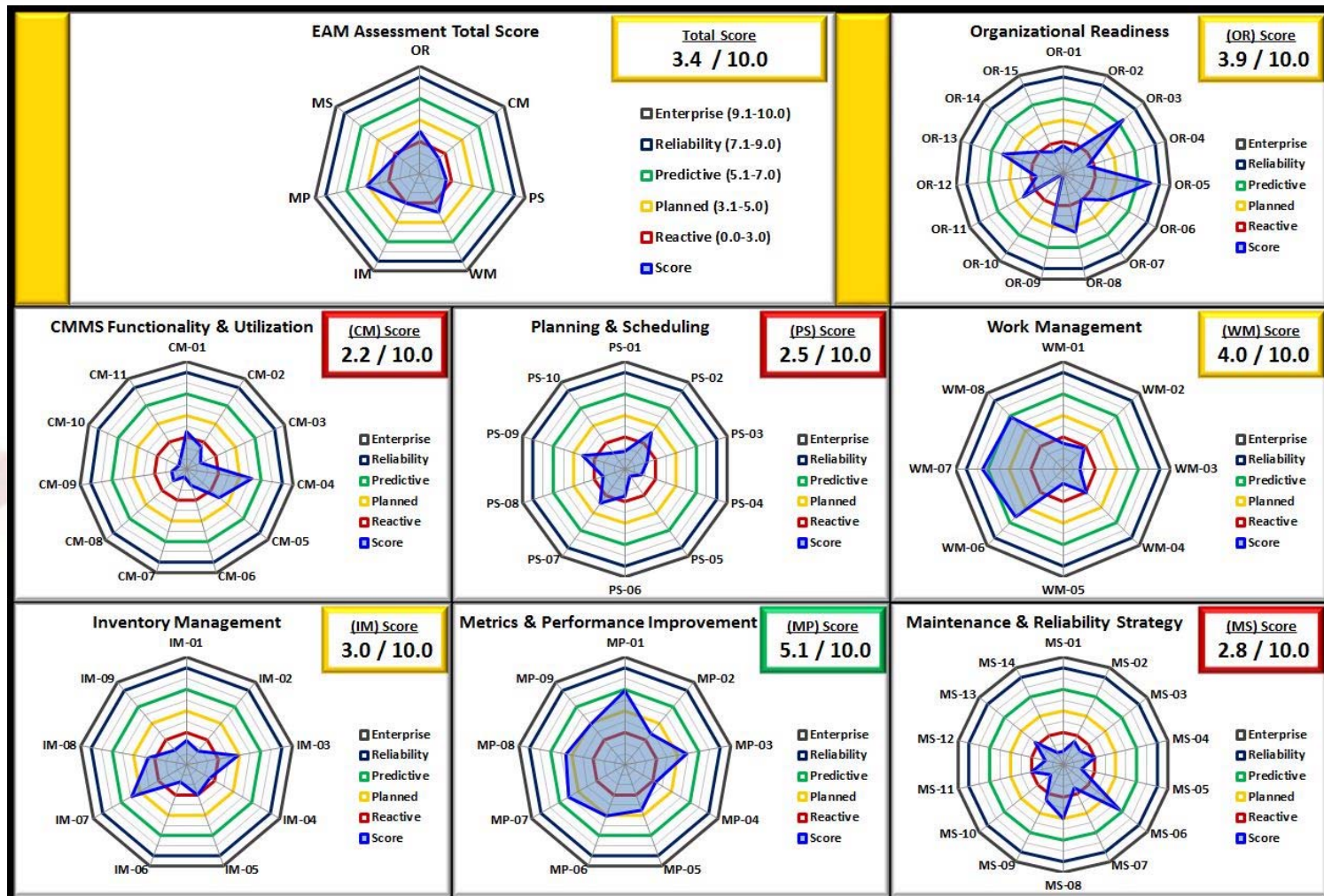
Performance is scored for 76 EAM Components against criteria aligned to the five states of Enterprise Asset Management Maturity

Maintenance & Reliability Strategy

- (MS-01) Asset Criticality Ranking
- (MS-02) Condition Based Maintenance
- (MS-04) Critical Spares
- (MS-07) Preventive Maintenance Optimization

Current State Assessment

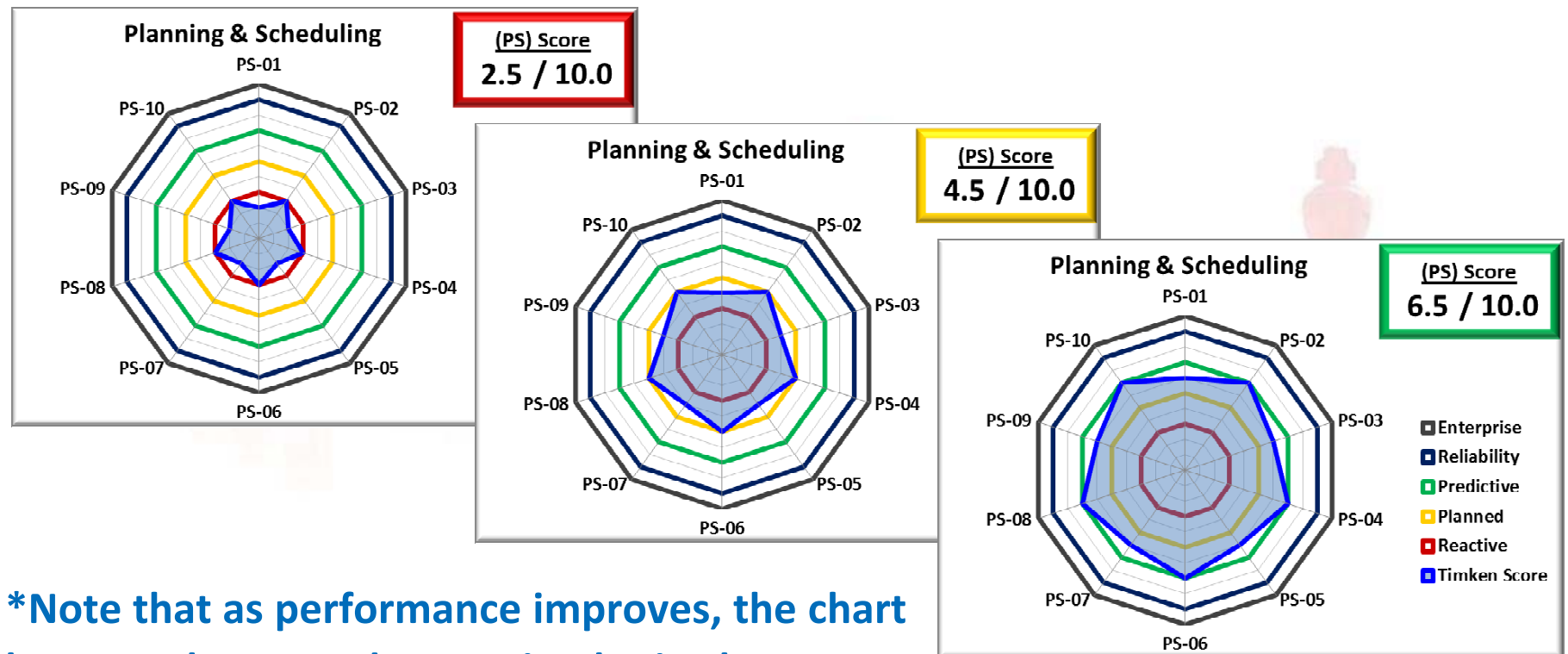
Assessment Results - Example



Current State Assessment

Understanding Assessment Results

The Assessment is designed to support development of an **EAM Master Plan**, act as the gap analysis tool, and track performance going forward



***Note that as performance improves, the chart becomes larger and more circular in shape**

Current State Assessment

Assessment Component Scoring

Components will have associated findings that detail the basis for the scores

Component	Component Description	Score	Assessment Findings
OR-01	Key Reliability Staffing Roles and Responsibilities	2.5	The four reliability organizations have functional roles for management, supervision, planning, scheduling, and analyzing but there are not clearly defined responsibilities with a tremendous amount of overlap in job duties. Job descriptions do not exist for all organizations and a review process did not appear to be present.
OR-02	Asset Management Mission, Vision, and Values	5.0	The mission, vision, and values for asset management have not been established but initial discussion has been initiated.
OR-03	Asset Management Council	5.5	There is no official forum in place to review organization asset management performance or path forward.
OR-04	Management of Change	2.0	There is no formal management of change process in place to effectively track asset changes or additions on PM's, job plans, and spare parts. There is a CAD drawing management of change process in place but the approval process has been communicated to be slow.
OR-05	Process Safety Management	7.5	A review of assets which impact process safety has been completed and those assets which qualify are governed under a comprehensive management program that integrates technologies, procedures, and practices.
OR-06	Housekeeping & Organization	4.2	The manufacturing floors are well maintained and orderly. There is evidence of a 5S program in place although there wasn't consistent organization in the workspaces and storage areas.

***The findings are used during the development of your EAM Master Plan to define your Current State**

Typical Situation

Do any of these apply to you?

- You've invested money into a powerful CMMS and feel you have fundamental control of it, but you wonder if it is really helping you improve your business.
 - Your spare part lists aren't accurate or updated.
 - You have what you think is a decent PM program but it has just sort of evolved and has not been rationalized or evaluated across other plants.
-
- A big chunk of your most experienced maintenance personnel are going to retire in the next 5-10 years.
 - Planning and scheduling is not well defined and many of the key components are not taking place (i.e. Job Steps, Material Kitting). You're not sure who is responsible for planning and who is responsible for scheduling in your organization.
 - You're not sure how well your inventory is managed. You don't truly know what and how much you have on hand and if you have all critical spare parts.

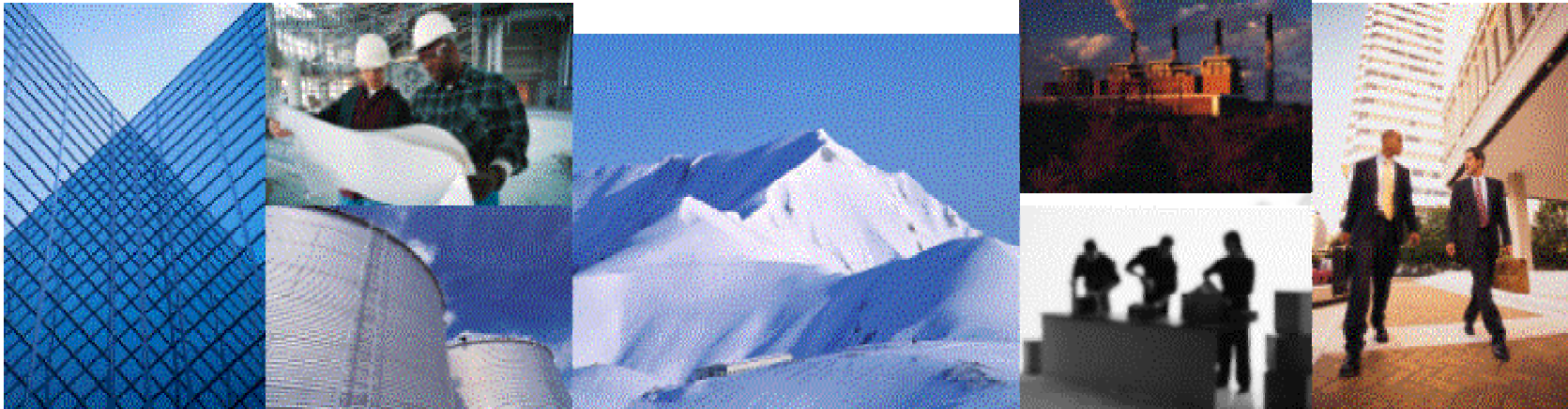
Benefits to Understanding your Current State

Measuring your Current State provides:

- A clear understanding of the **strengths and weaknesses of your asset management program**
- A **recommended list of detailed actions** that when implemented will improve performance
- The **foundation for developing your EAM Master Plan**
- A **tool for conducting a periodic gap analysis** that supports your EAM Master Plan
- A **tool for tracking progress and performance** of your EAM Master Plan execution

Enterprise Asset Management Master Planning

EAM Master Plan Development



Developing the path forward to achieving EAM Excellence



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DM**A**IC Process Checklist - Analyze

☑ **Define**

EAM Maturity Continuum

Define the progressive levels of Asset Management Performance

☑ **Measure**

Current State Assessment

Measure where you are on the Maturity Continuum

Analyze

EAM Master Plan Development

Analyze your assessment and develop the path forward to achieve EAM Excellence

Improve

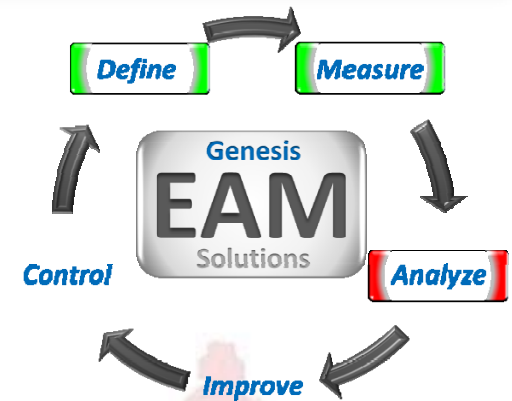
Implementation Models for EAM Excellence

Improve your success with proven EAM Master Plan Models

Control

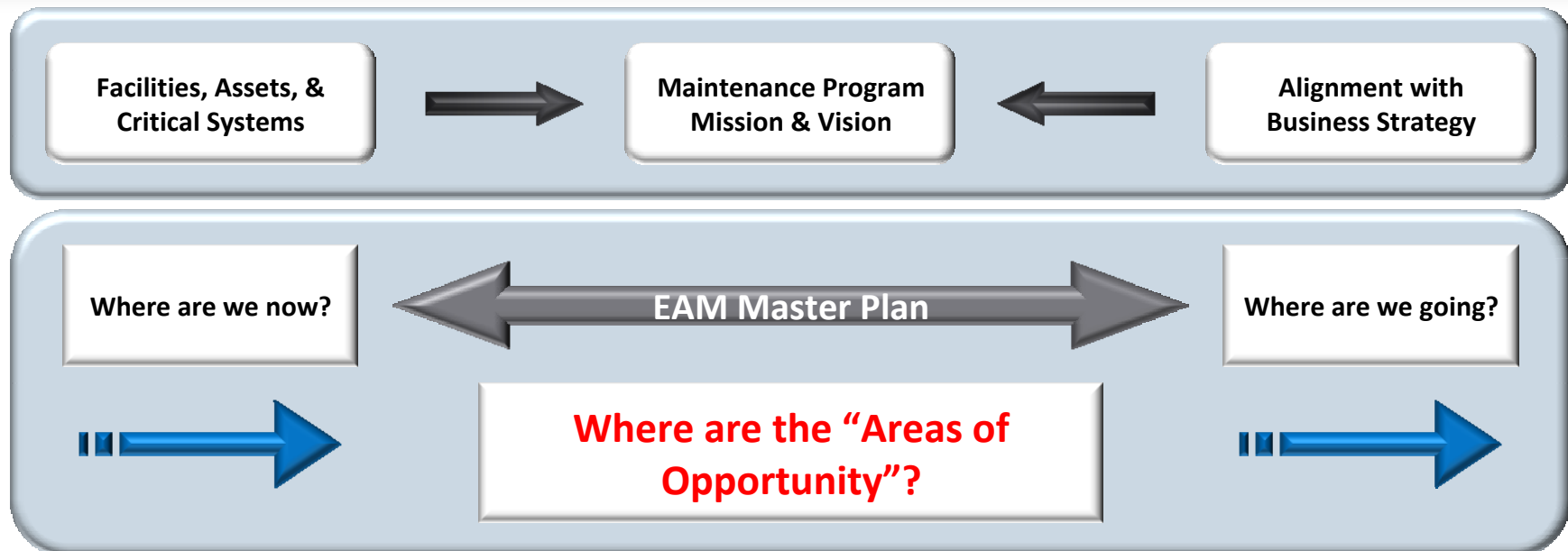
EAM Excellence Governance Model

Control your improvements by measuring and sustaining success



EAM Master Plan Development

Value Proposition



Current State

- Assessment Tool
- Benchmarking
- Gap Analysis

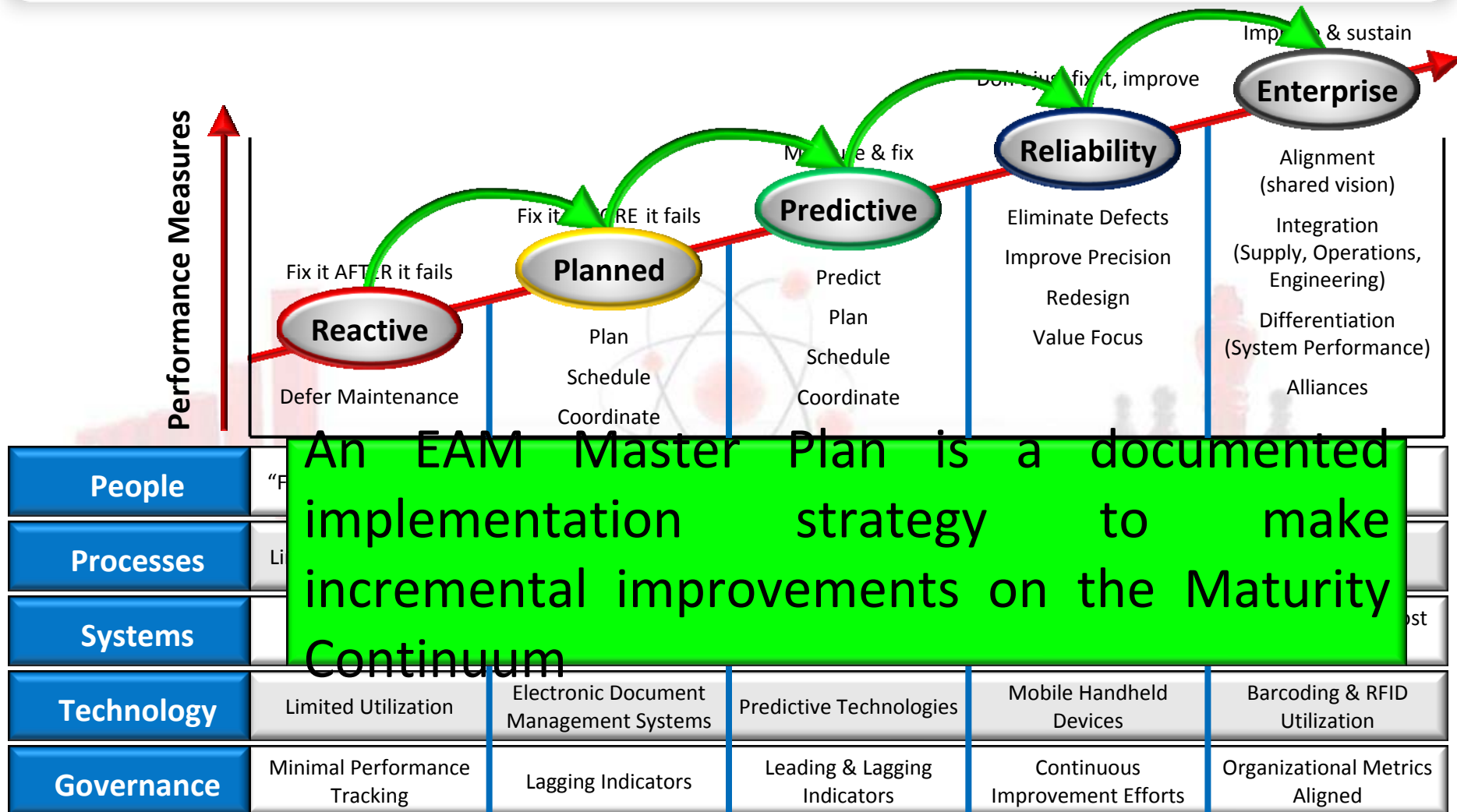
Closing the Gap

- Prioritization of Opportunities
- Criticality Analysis
- Predictive Maintenance Approach
- Organization Development
- Reliability Strategies
- Measurable Goals

Maintenance Excellence

- Only 5% of companies operate in this area
- 30% gain in production achievable
- 30% lower costs than competitors

Maturity Continuum Progression



EAM Master Plan Fundamentals

Why is EAM Master Planning important to us?

- Improve asset effectiveness and life cycle management through **higher Return on Assets**
- Developing and implementing an **EAM Master Plan** is an essential strategy for **maintaining competitiveness**
- A master plan should address **People, Process, Systems, Technology, and Governance**
- The ability to implement a CMMS or **leverage your current CMMS investment** is a fundamental element of the master plan
- Master planning begins with **defining and benchmarking your “Current State”** based upon a robust assessment tool
- The **prioritized objectives leading to a Future State** is the Road Map for your master plan

EAM Elements Synergy

The **Synergy** of all EAM Elements working together is critical to your program's success as the improvement of each Element directly impacts the success of the other Elements



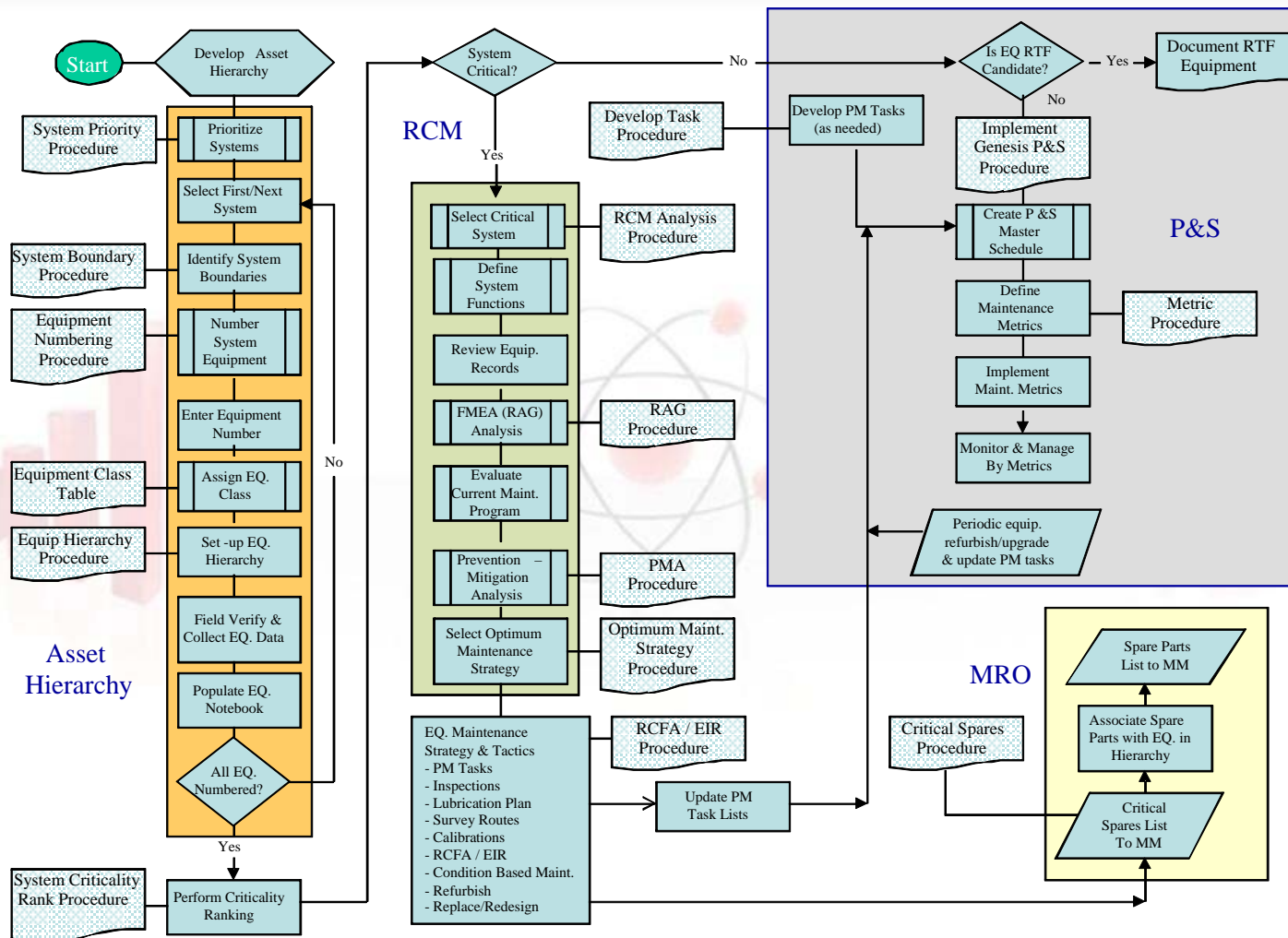
EAM Master Plan Development

EAM Master Plan - Example

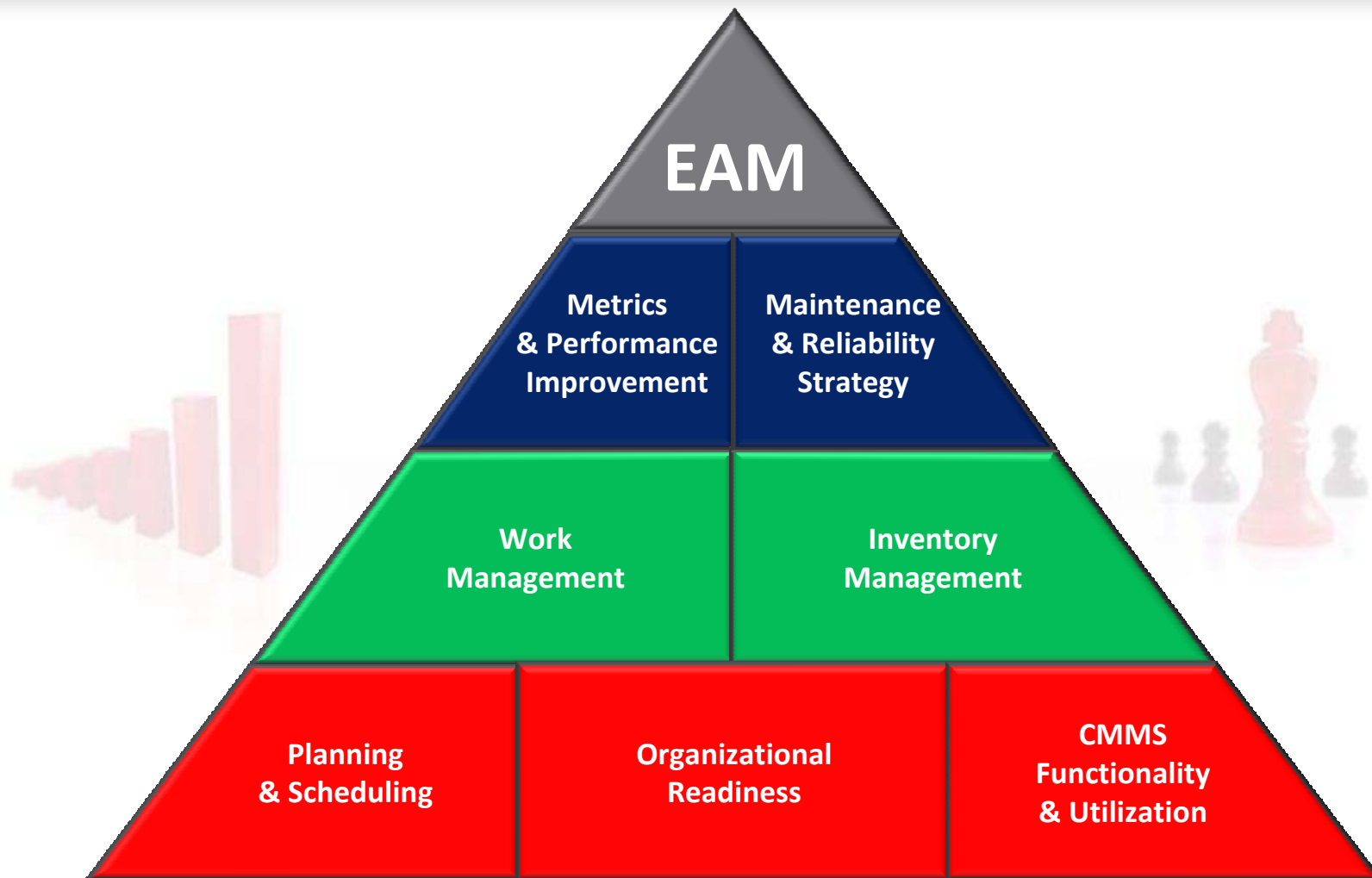
Asset Management Master Plan Implementation (Phase 1)	30 weeks	Mon 4/4/11	Fri 10/28/11	Resource
MRO Material & Service Data Tracking	60 days	Mon 5/2/11	Fri 7/22/11	Internal
Asset Standardization	55 days	Mon 4/4/11	Fri 6/17/11	External
Asset Criticality Ranking	45 days	Mon 4/25/11	Fri 6/24/11	Internal / External
Stockroom Standardization	90 days	Mon 5/2/11	Fri 9/2/11	Internal / External
Inventory Standardization	130 days	Mon 5/2/11	Fri 10/28/11	Internal / External
Business Process Development & CMMS Configuration	45 days	Mon 5/2/11	Fri 7/1/11	External
Preventive Maintenance Optimization (1st Quartile)	70 days	Mon 5/9/11	Fri 8/12/11	Internal / External
Condition Based Maintenance Implementation (1st Quartile)	50 days	Mon 6/27/11	Fri 9/2/11	External
Manufacturing Performance Tracking	40 days	Mon 7/4/11	Fri 8/26/11	External
Asset Management Master Plan Implementation (Phase 2)	19 weeks	Mon 11/14/11	Mon 3/26/12	Resource
Key Performance Indicators	45 days	Mon 11/21/11	Fri 1/20/12	Internal / External
Inventory Management	40 days	Mon 11/21/11	Fri 1/13/12	External
Organizational Structure / Roles & Responsibilities	55 days	Mon 11/21/11	Fri 2/3/12	Internal
Scheduling Coordination & Planning Improvement	46 days	Mon 1/23/12	Mon 3/26/12	External
Asset Bill of Materials & Critical Spare Part Identification (1st Quartile)	70 days	Mon 11/21/11	Fri 2/24/12	Internal / External
Preventive Maintenance Optimization (2nd Quartile)	35 days	Mon 11/21/11	Fri 1/6/12	Internal / External
Failure Modes & Effects Analysis	45 days	Mon 1/9/12	Fri 3/9/12	Internal / External
Work Execution	55 days	Mon 11/21/11	Fri 2/3/12	Internal
Instrumentation CCMS Maximo Migration	45 days	Mon 12/12/11	Fri 2/10/12	Internal / External
Asset Management Master Plan Implementation (Phase 3)	19 weeks	Tue 4/10/12	Mon 8/20/12	Resource
Preventive Maintenance Optimization (3rd Quartile)	35 days	Tue 4/17/12	Mon 6/4/12	Internal
Preventive Maintenance Program Management	30 days	Tue 4/17/12	Mon 5/28/12	External
Asset Bill of Materials & Critical Spare Part Identification (2nd Quartile)	65 days	Tue 4/17/12	Mon 7/16/12	Internal / External
Lubrication Program	90 days	Tue 4/17/12	Mon 8/20/12	Internal / External
Meter Reading & DCS Utilization (1st Quartile)	85 days	Tue 4/17/12	Mon 8/13/12	Internal
Asset Management Master Plan Implementation (Phase 4)	27 weeks	Tue 9/4/12	Mon 3/11/13	Resource
Preventive Maintenance Optimization (4th Quartile)	35 days	Tue 9/11/12	Mon 10/29/12	Internal
Asset Bill of Materials & Critical Spare Part Identification (3rd / 4th Quartile)	130 days	Tue 9/11/12	Mon 3/11/13	Internal
Skills Training Matrix & Apprenticeship Program	75 days	Tue 9/11/12	Mon 12/24/12	Internal / External

EAM Master Plan Development

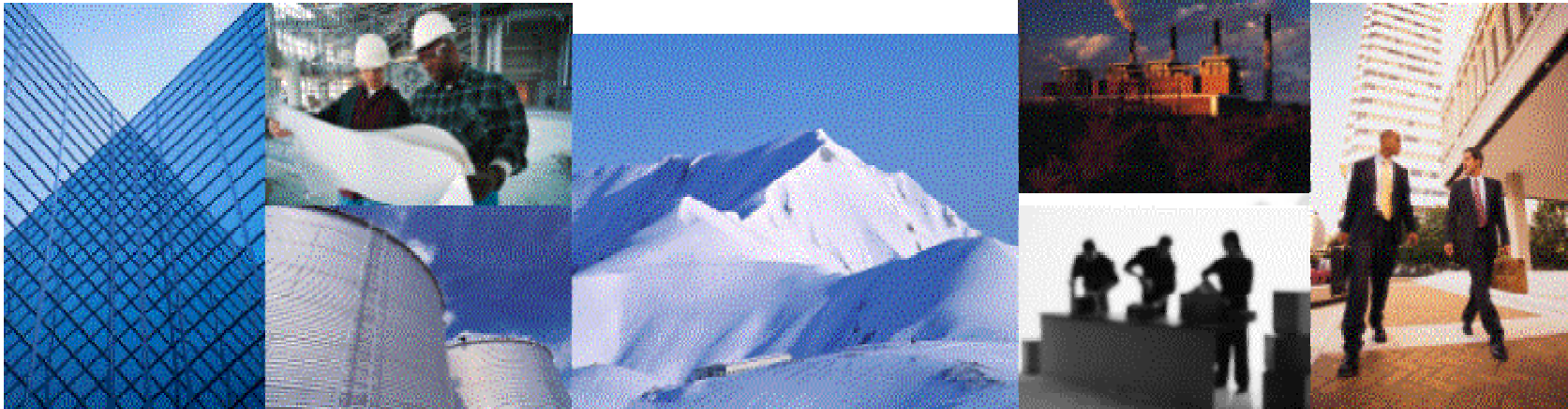
EAM Master Plan Flowchart



Enterprise Asset Management Pyramid



Implementation Models for EAM Excellence



Proven EAM Models



DMAIC Process Checklist - Improve

✓ Define

EAM Maturity Continuum

Define the progressive levels of Asset Management Performance

✓ Measure

Current State Assessment

Measure where you are on the Maturity Continuum

✓ Analyze

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Analyze your assessment and develop the path forward to achieve EAM Excellence

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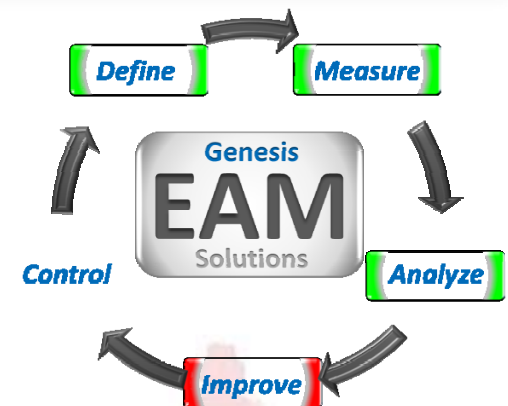
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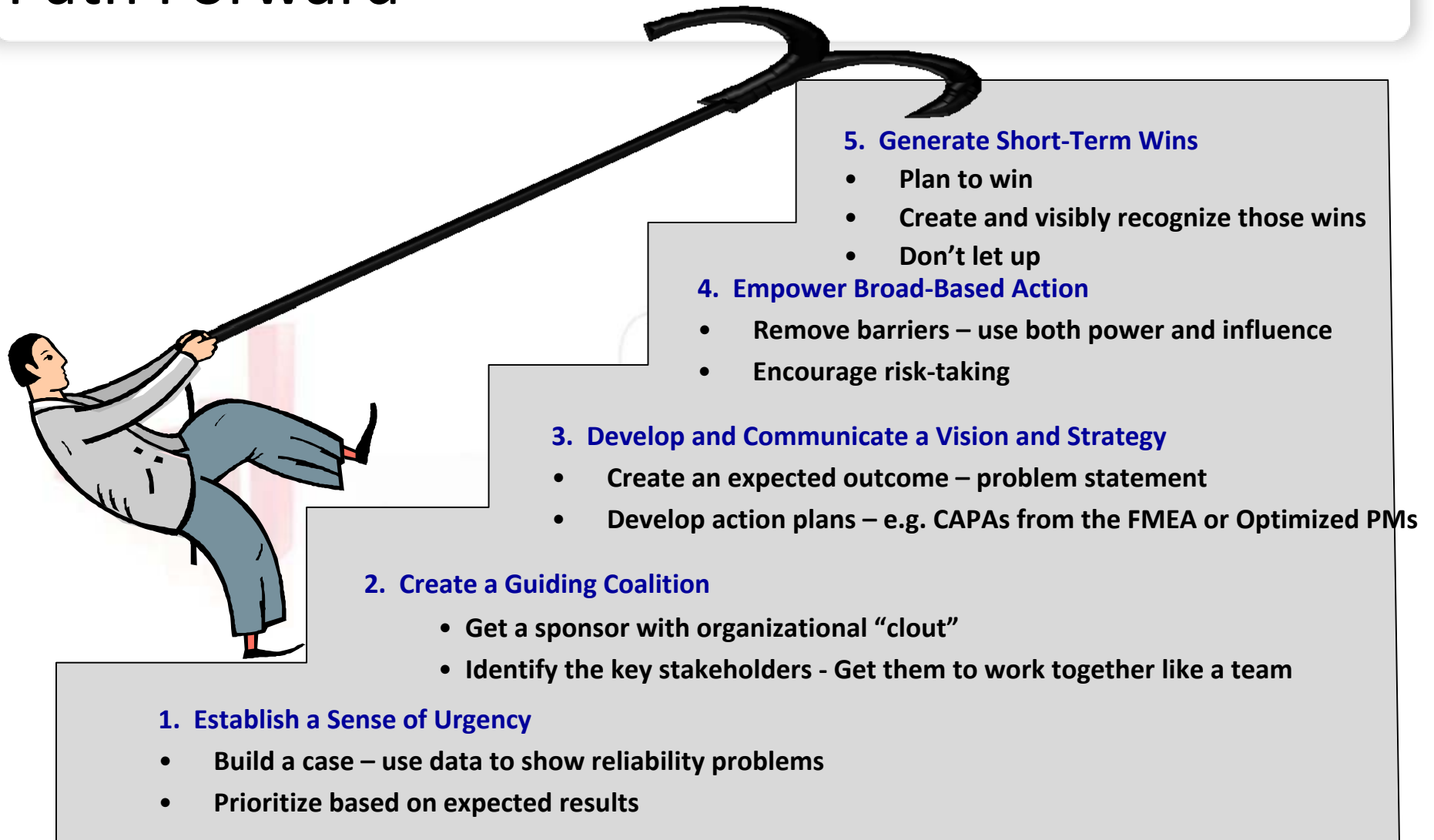
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Path Forward



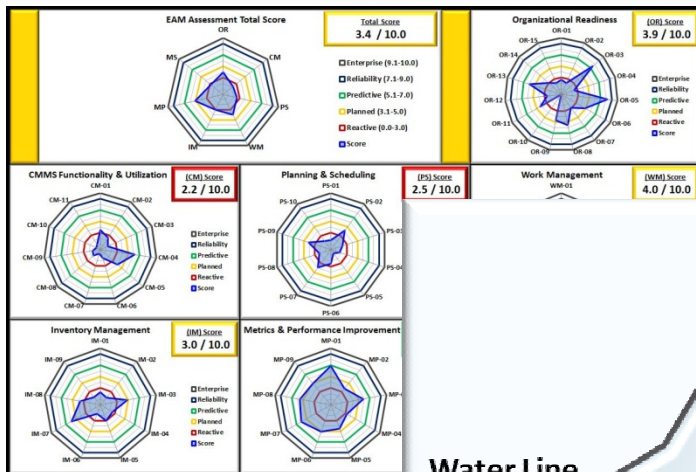
EAM Master Plan Implementation Flowchart



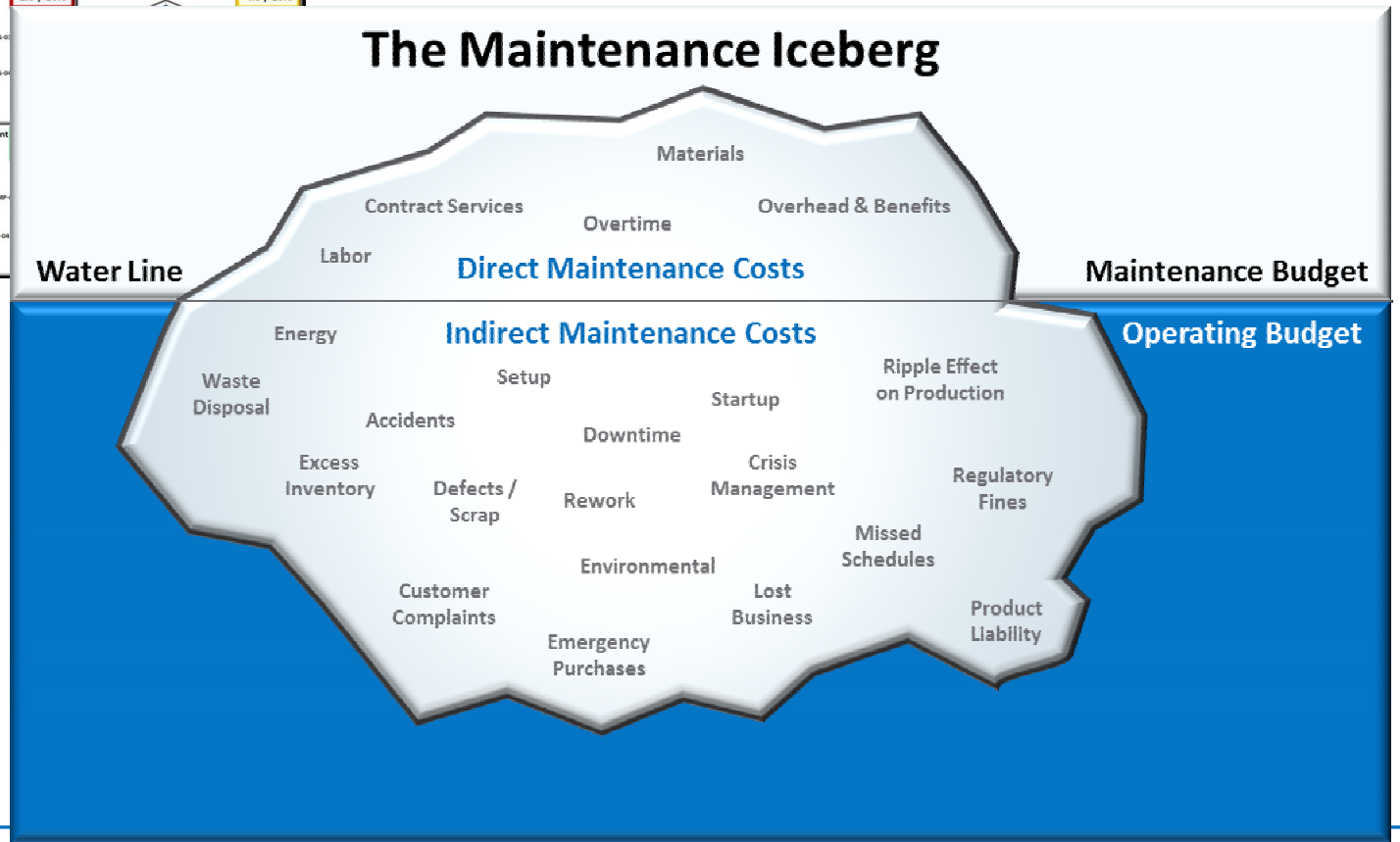
Transformation Process

Implementation Models for EAM Excellence

Value Proposition - Understanding Cost Impact



Each
Component of
your EAM
Master Plan will
impact your
bottom line,
either directly or
indirectly



EAM Excellence Value Proposition

To provide a competitive advantage by establishing and applying Best Practices to improve Facility and Asset Reliability, Operating Life, and Efficiency in the most cost effective manner possible.

EN 15341:

$$E4 = \frac{\text{Total Maintenance Cost}}{\text{Product Transformation Cost}} (\%)$$

Organizing & Resourcing the Implementation Plan

Steering Committee embraces the TPM concept of Total Participation by including: Safety, Engineering & Maintenance, Finance, Operations, IT, and the Shop Floor.

Components:

- ✓ **Charter (short, mid, & long term goals)**
- ✓ **Endorsements**
- ✓ **Training**
- ✓ **Pilot**
- ✓ **Communities of Practice**

Considerations for Resourcing Model

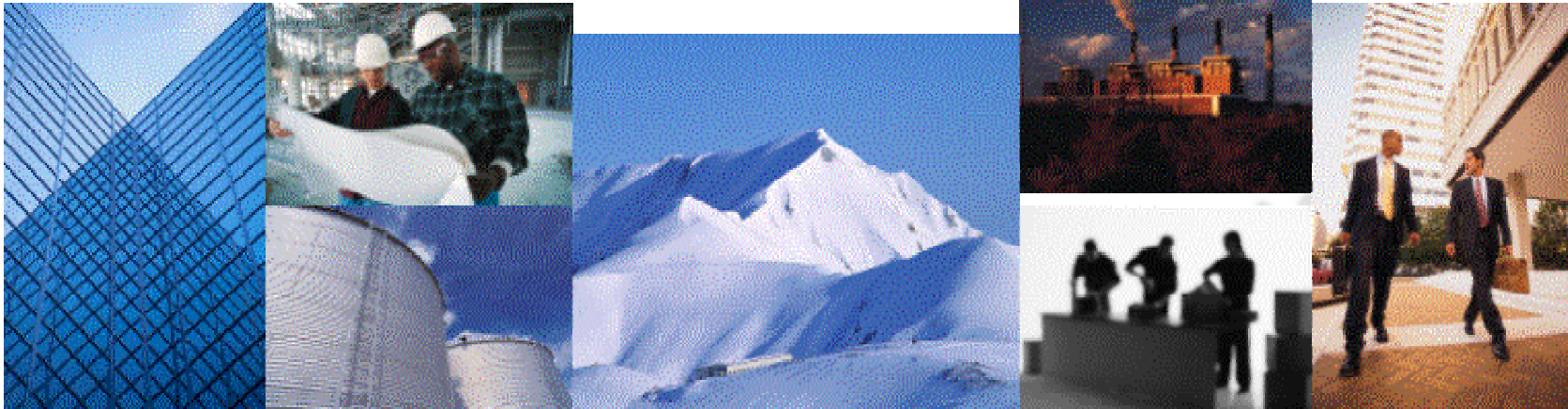
There are 3 Resourcing Models to consider when implementing an EAM Master Plan: **Internal**, **Hybrid**, and **Outsourced**.

- **Internal** - We have all the resources to “Run the Business” and “Improve the Business”.
- **Hybrid (Internal/Outsourced)** - We can’t dedicate all our resources; we have some SME gaps and don’t want to risk a false start.
- **Outsourced** - This is not our core expertise but we need to improve.



Enterprise Asset Management Master Planning

EAM Excellence Governance Model



Measuring and Sustaining Success



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[46]

DMAIC Process Checklist - Control

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✓ Analyze

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✓ Improve

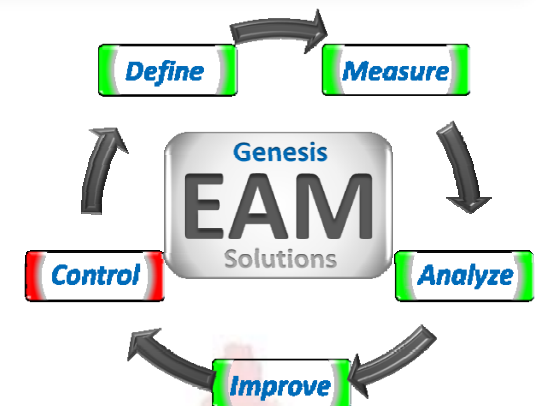
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Management Controls & Reporting Systems

Management Controls & Reporting Systems (MCRS) is a key component of the EAM Master Plan Governance:

- We want to ensure we have a sustainable and evolving continuous improvement effort to advance incrementally across the EAM Maturity Continuum
- Treat the master plan as an Engineering Project with a Budget, Timeline, Resources, Deliverables, Accountability, and Project Management Team to ensure success
- We need to measure our improvement and track our implementation status verses the EAM Master Plan
- Establishing milestones and reviewing: Schedule, Budget, Resource Deployment

Steering Committee

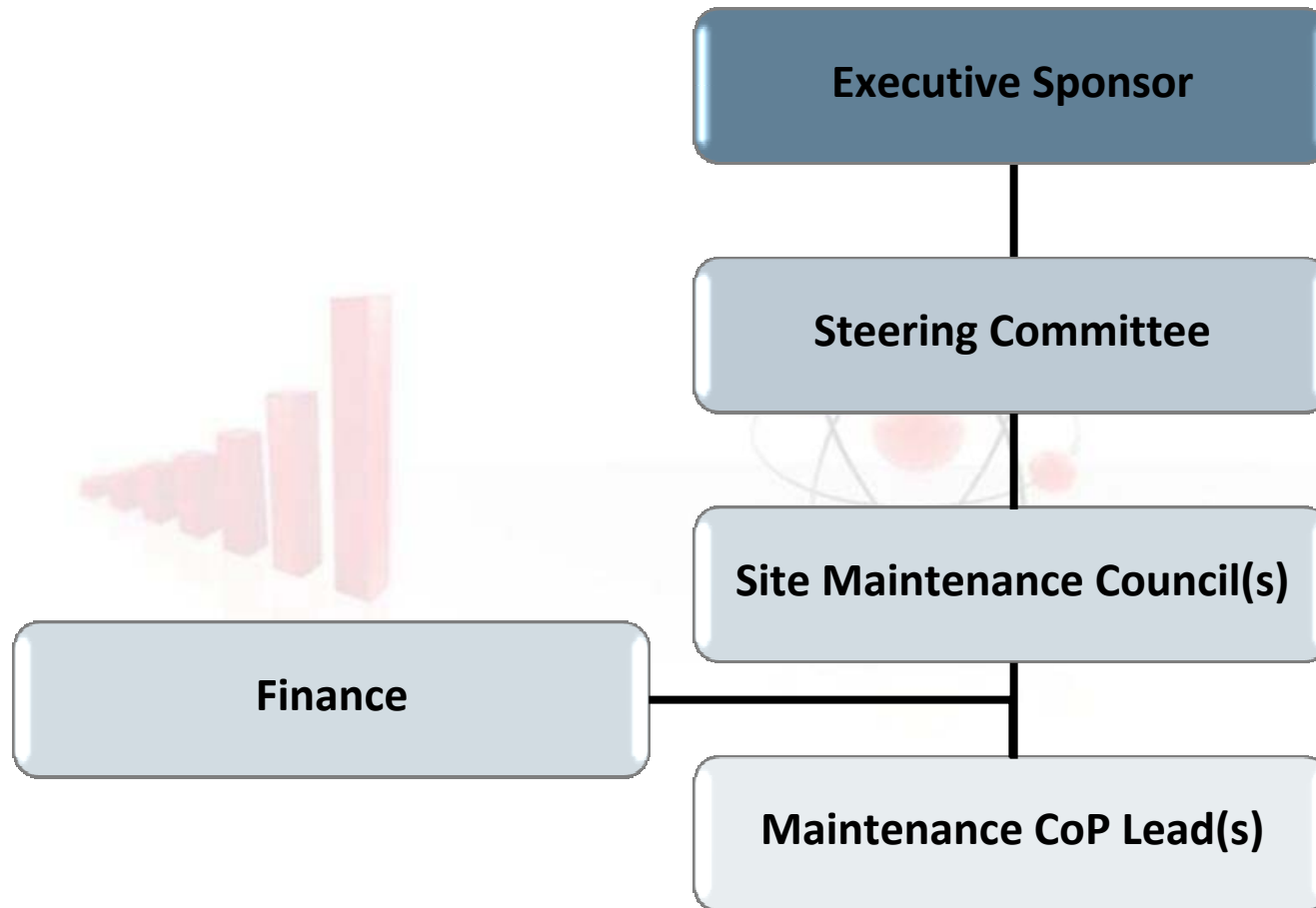
Steering Committee Components:

- Charter (Mission, Vision, Values)
- Senior Management endorsement (issue a support letter)
- Introductory EAM training to Steering Committee Members
- Establish activity objectives, goals, and policies/procedures
- Publish a 3 year EAM Master Plan
- Issue monthly and quarterly progress reports
- Publish pilot results, performance trends and Best Practices

Example of a EAM Excellence Vision statement:

“To provide a competitive advantage for ACME by establishing and utilizing Best Practices to improve Facility and Asset Reliability, Operating Life and Efficiencies in the most cost effective manner possible while enhancing Safety, Quality, and the Environment”

Organization Support Structure



Site Maintenance Council Charter

Example of a Site Maintenance Council Charter:

- Collaboratively develop and implement strategies that support the Commercial Portfolio, Site Master Plan, Business Objectives , Annual and Long Term Capital Plan, and the Annual Budget Plan.
- Conduct monthly routine cross-functional meetings. Review, trend, and analyze: Key Performance Indicators for commercial results, Maintenance Excellence metrics, capital projects, and operating budget. Identify action items to ensure alignment with the Site and Operating Unit network strategy.
- Communicate on a routine basis, utilizing agendas, meeting minutes, and action items which are distributed among council membership and corporate sponsors.
- The Council communicates decisions across the organization, providing leadership and direction to operators and mechanics, resulting in focused strategies.

Individual Site Scorecard Example

Metric	Month									
	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
PMO Completion										
Equipment	96%	92%	84%	68%	88%	79%	80%	89%	75%	93%
Calibration	100%	100%	97%	97%	97%	98%	98%	98%	97%	98%
Backlog Distribution										
<30 days open	20%	27%	33%	43%	26%	34%	35%	28%	31%	20%
30-60 days open	29%	14%	14%	12%	18%	15%	24%	25%	17%	21%
60-90 days open	22%	22%	10%	7%	11%	11%	9%	19%	18%	13%
>90 days open	29%	38%	44%	38%	46%	40%	32%	29%	34%	45%
Weeks	1.3	1.7	2.2	3.4	3.1	4.0	3.7	3.7	4.8	4.7
Proactive Work Profile										
Reactive Work Orders	25%	22%	22%	24%	12%	22%	41%	42%	23%	29%
Proactive Work Orders	75%	78%	78%	76%	88%	78%	59%	58%	77%	70%
Proactive Labor Hours	83%	84%	82%	82%	84%	85%	58%	58%	82%	75%
Stores Service Level										
Availability on request	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Utilities Performance										
Boiler Uptime	100%	99%	100%	100%	100%	100%	100%	100%	100%	100%
Chillers	100%	100%	100%	100%	100%	100%	100%	100%	100%	99%
Critical AHU Uptime	100%	100%	100%	98%	94%	98%	98%	100%	98%	99%
Power Distribution	100%	99%	100%	100%	100%	100%	100%	100%	100%	99%
Utilities MIR's	0	1	3	4	2	4	8	11	5	3
Quality Performance - QSE 12, 13 & 14										
Commitment Closures Rate	82%	94%	85%	90%	85%	85%	82%	95%	91%	79%
Total Engineering MIR's/LIR's	75%	50%	100%	57%	100%	100%	100%	100%	71%	71%
Out of Frequency Calibrations	0	3	16	19	16	13	15	19	25	18
Out of Frequency Equipment PM	21	51	64	138	86	143	181	74	169	42

Company Wide Dashboard Example

Global Site Summary													
Manufacturing Deviations													
Red = Increasing; Yellow = 0-10% Improvement; Green = >10% Improvement													
Operating Site	Month												YTD
	J	F	M	A	M	J	J	A	S	O	N	D	
Site A	1	0	1	1	0	0	0	1	1	2	1	0	8
Site B	18	10	11	12	15	27	20	29	27	29	24	19	241
Site C	18	37	22	17	21	19	24	15	14	18	12	10	227
Site D	22	22	23	21	32	22	15	12	14	16	10	7	216
Site E	20	23	27	16	19	20	17	12	13	8	9	6	190
Maintenance Proactivity (PM/PM +CM)													
Red = <65%; Yellow = <75%; Green = >75%													
Operating Site	Month												YTD
	J	F	M	A	M	J	J	A	S	O	N	D	
Site A	69%	79%	78%	74%	91%	78%	61%	76%	86%	77%	86%	83%	78%
Site B	80%	75%	77%	80%	84%	83%	90%	86%	86%	85%	84%	79%	82%
Site C	90%	87%	85%	86%	84%	83%	83%	92%	95%	92%	88%	83%	87%
Site D	53%	58%	64%	56%	58%	58%	57%	61%	75%	78%	79%	81%	65%
Site E	65%	61%	63%	79%	58%	68%	61%	55%	60%	59%	65%	73%	64%
Maintenance Downtime (Hours)													
Red = Deteriorating Trend; Yellow = Static Trend; Green = Improving Trend													
Operating Site	Month												YTD
	J	F	M	A	M	J	J	A	S	O	N	D	
Site A	17	16	15	16	22	16	17	19	15	12	13	10	188
Site B	153	209	141	202	150	160	159	230	168	167	145	133	2017
Site C	145	146	141	154	123	124	145	132	109	86	92	90	1487
Site D	123	90	87	67	54	58	60	56	34	37	32	35	733
Site E	339	424	520	264	262	335	211	314	295	286	343	276	3869

DMAIC Process Checklist Completion

✓ Define

EAM Maturity Continuum

Define the progressive levels of Asset Management Performance

✓ Measure

Current State Assessment

Measure where you are on the Maturity Continuum

✓ Analyze

EAM Master Plan Development

Analyze your assessment and develop the path forward to achieve EAM Excellence

✓ Improve

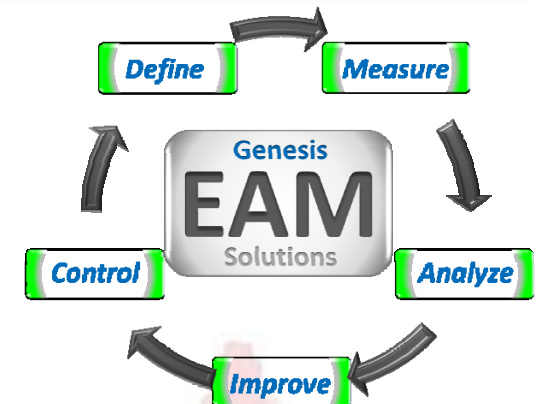
Implementation Models for EAM Excellence

Improve your success with proven EAM Master Plan Models

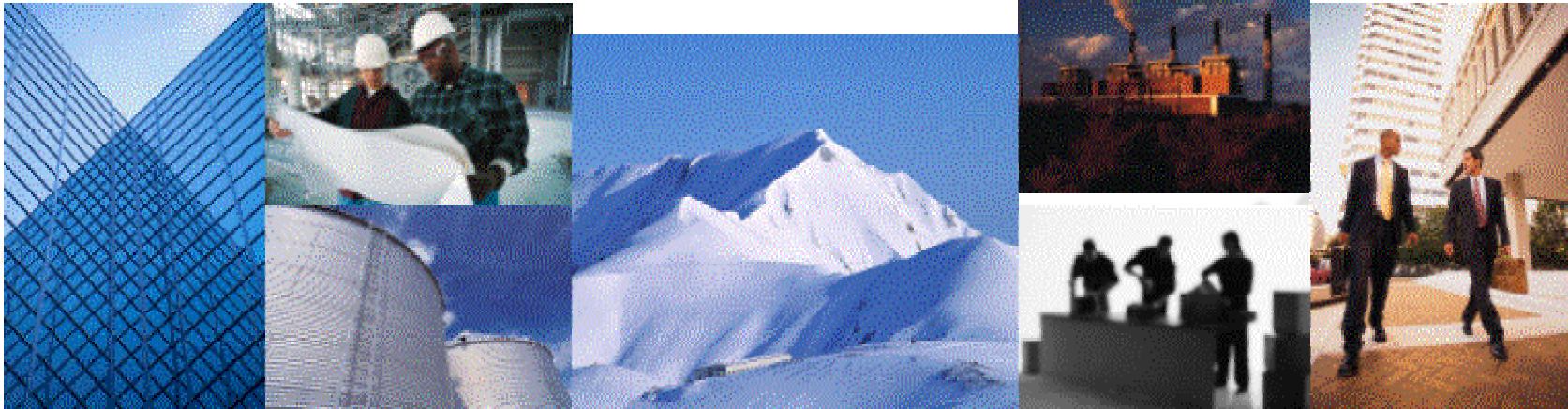
✓ Control

EAM Excellence Governance Model

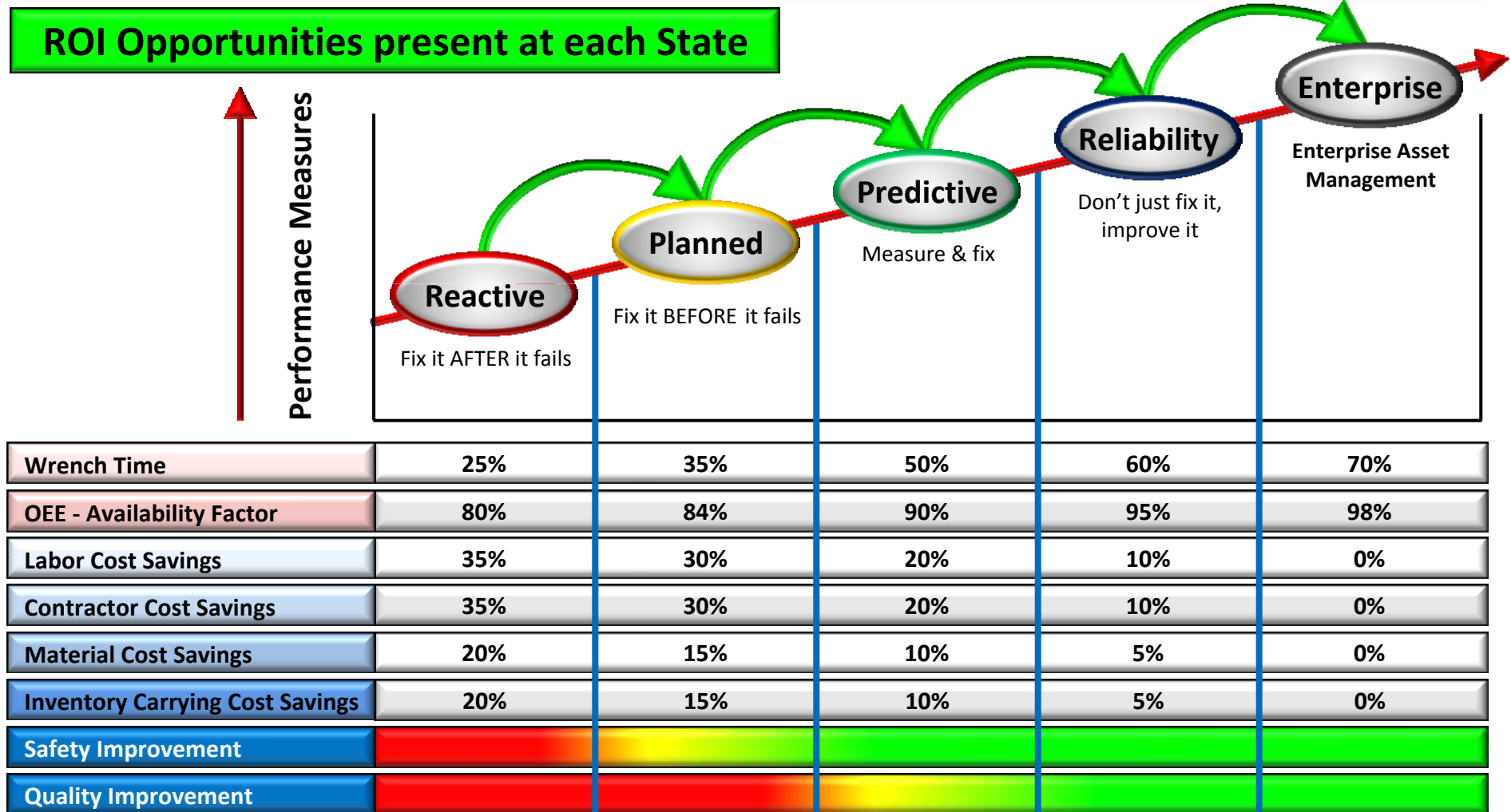
Control your improvements by measuring and sustaining success



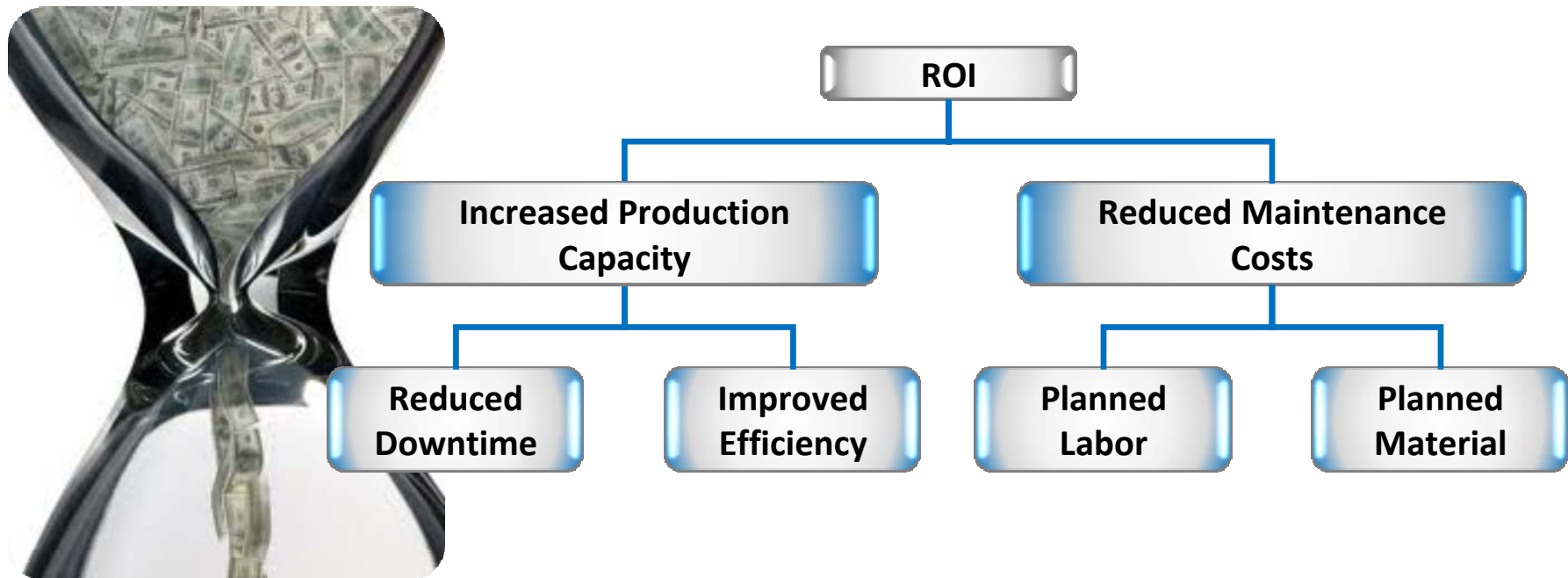
Maximizing Return on Investment with EAM



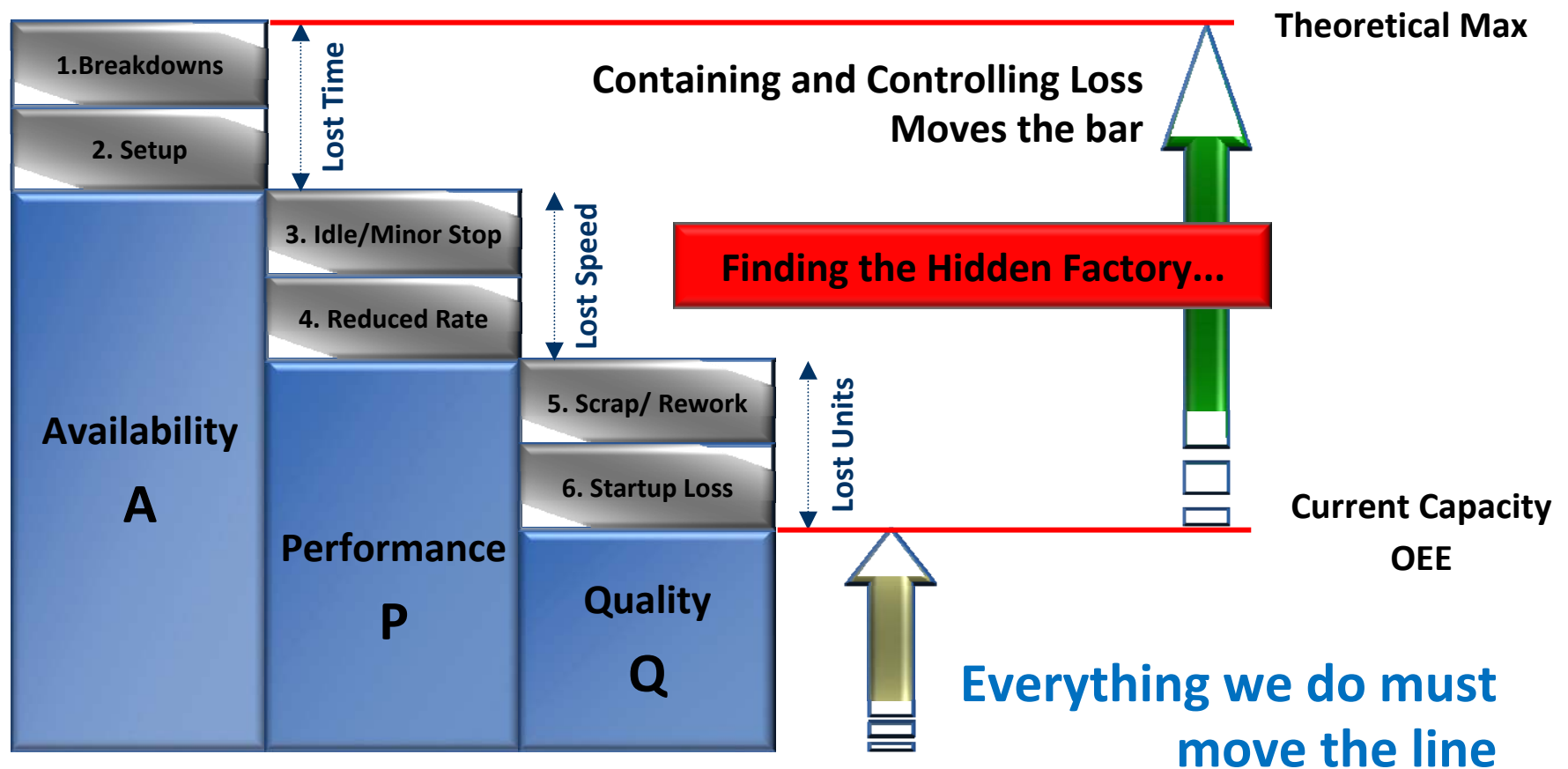
Asset Management ROI Opportunities



EAM Benefits



Impact of Reliability on OEE



Planning and Scheduling Efficiency

Typical Job Planned On-the-Run



Same job if Effectively Planned & Scheduled



Typical Maintenance Craftsman's Day Planned & Scheduled vs. On The Run

	Reactive WITHOUT Planning & Scheduling	Proactive with Planning & Scheduling
Receiving instructions	5%	3%
Obtaining Tools and materials	12%	5%
Travel to and from job (both with and w/o tools and materials)	15%	10%
Coordination Delays	8%	3%
Idle at job site	5%	2%
Late starts and early quits	5%	1%
Authorized breaks and relief	10%	10%
Excess personal time (extra breaks, phone calls, smoke breaks, slow return from lunch and breaks, etc.)	5%	1%
Sub-Total	65%	35%
Direct actual work accomplished (as a % of whole day)	35%	65%

Wrench Time Improvement

Maintenance Practice - Planning and Scheduling

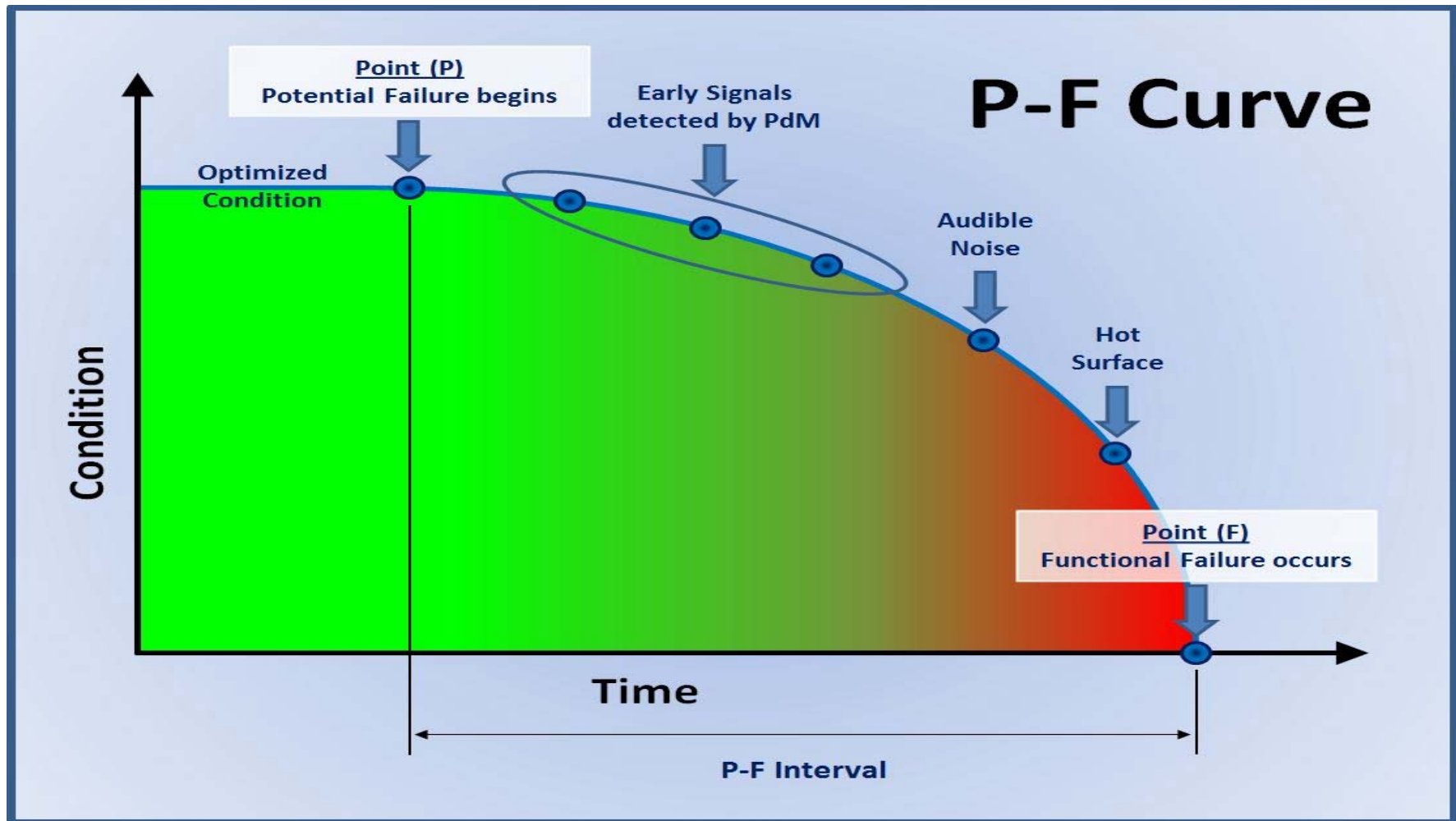
Without Planning and Scheduling



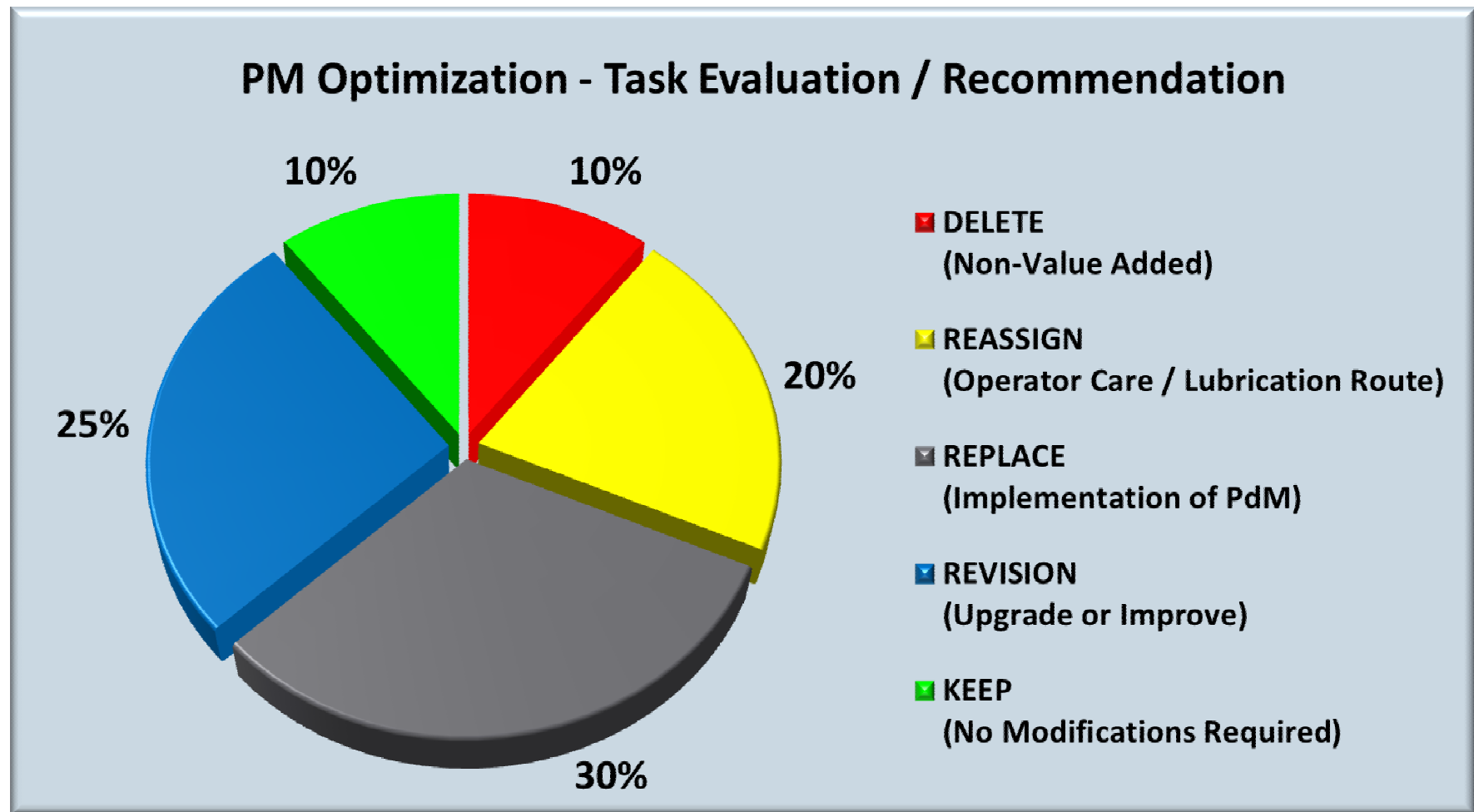
With Planning and Scheduling



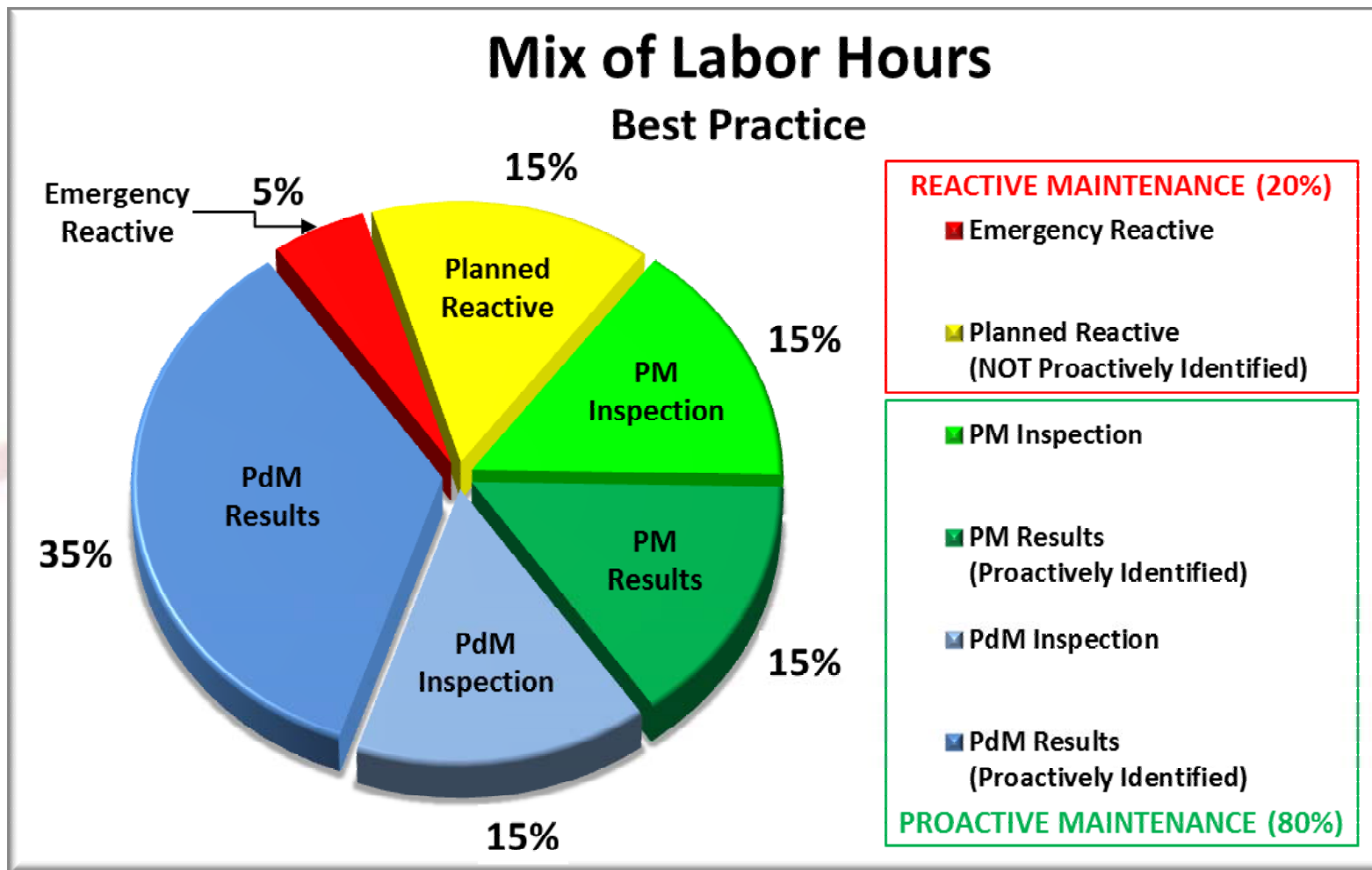
Potential Failure to Functional Failure (P-F Curve)



PM Optimization Standard Outcome



Labor Mix Best Practice



Enterprise Asset Management Master Planning Question & Answer Session



Connecting a World of
Pharmaceutical Knowledge



Questions?



GenesisSolutions

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