MAINTENANCE MANAGEMENT FRAMEWORK

PEMAC Body of Knowledge Project Team

PLANT ENGINEERING AND MAINTENANCE ASSOCIATION OF CANADA

Subject Group	Subject Element	Subject Artefacts / Inclusions
1. Business and Organization Context	1.1. Requirements and Expectations	• AM Policy, Strategy and Plans. Commitments to comply. Desire to be a leader, pack, laggard; cutting edge or conservative…
	1.2. Enablers and Constraints	• Budget, available technology, policy, willingness to invest, management style • Identification methodologies • Corporate business risk assessment
	1.3. Management and Operational Frameworks	• Broad management concepts implemented at the organization level and having impacts on maintenance • Lean manufacturing, JIT, Quality Management, Safety Management, Risk and Loss Management
	1.4. Strategic Maintenance Plan	• Assessment, identify opportunity, improvement plans, define structure to be used.
2. Program Management	2.1. Maintenance Requirements	• Business requirements • Stakeholder requirements • Long Range and short term
	2.2. Organizational Structure	• Autonomous Maintenance / TPM / Operator Care, Operator performed maintenance, Operator driven Reliability, • centralized vs. decentralized vs. hybrid maintenance organization • plant vs. mobile
	2.3. Maintenance Program Models	Structure or "Model" used to organize maintenance approach. Influenced by Organizations overall management concepts (1.3) • Maintenance Framework "references" • "Uptime", "SAMI" GFMAM, PEMAC, internal corporate developed
	2.4. Maintenance Budgeting and Cost Control	• budgeting practices • Stewardship process
	2.5. Asset Identification and Hierarchy structure	Up Front decision processes about the assets to be managed and Hierarch structure • What is managed at the asset level vs. the hierarchy location level • Location hierarchy structure • Hierarchy structure, logical vs. physical structure, depth of Hierarchy, • Asset hierarchy structure • Asset components vs asset parts definition • nomenclature / taxonomy, master data requirements
	2.6. Asset Criticality Analysis	• Criticality criteria • Criticality assessment methodologies
	2.7. Program Measurement / KPIs	• Self-Assessments • Benchmarking
	2.8. Change Management	• People side of change

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Subject Group	Subject Element	Subject Artefacts / Inclusions
		• Methodologies
	2.9. Outsourcing	• Scoping, • Justification reasons for…, • Service level agreements • Management requirements,
3. Asset Strategy Management	3.1. Asset Maintenance Plans	Asset or Asset Grouping maintenance • Asset classification (ISO 14224) • Basic care plans • Standard Job Plans • Tactics determination processes • Long rang and short term asset plans
	3.2. Asset Strategy Performance Measurement & Optimisation	• Asset Availability, utilization, reliability, • Cost of capacity
4. Tools and Tactics	4.1. Reliability Centered Maintenance	• Keywords “RCM” & “FMEA”
	4.2. Preventive Maintenance Optimization	• Methodology • Application experience
	4.3. 5S/Housekeeping	• Methodology • Application experience
	4.4. Preventive Maintenance	• Keywords “Time-Based Maintenance”, “Scheduled Maintenance” & “Meter-Based Maintenance”
	4.5. Detective Maintenance	• Keywords “Fault-finding”, “Inspections” & “Hidden Failures”
	4.6. Condition Monitoring	• Keywords “Predictive maintenance” & “Condition-Based Maintenance” • Condition Monitoring Tools & Technologies • Mechanical Integrity Programs • Structural Integrity Programs • Risk-Based Inspections
	4.7. Operator Performed Maintenance	Operator Care, Operator performed maintenance, Operator driven Reliability
	4.8. Precision Maintenance Techniques	Development Implementation
5. Maintenance & Reliability Engineering	5.1. Statistical Analysis / Analytical Methods	• Keywords “Weibull Analysis”, “Simulation” &“Monte Carlo Analysis”
	5.2. Reliability Modelling	• Keywords “Reliability Block-Modelling,
	5.3. Failure Analysis	• Processes, practices, controls • Formal methods, facilitation, Apollo, PROACT, Kepner-Tregoe, TapRoot and others. • Keywords “RCA”, “RCFA”, “NDT”, “NDE”, etc.
	5.4. Critical Spares and Redundancy Analysis	• Processes, practices, controls • Assessment, methodology
	5.5. Reliability Sustainment	• Criticality, RCM, RCA/RCFA, RBM, ODR, PM Programs
	5.6. Reliability Performance Measurement	• Keywords “OEE”, “MTBF/MTTR”, “Uptime”, “Availability”, etc.

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6. **Work Management**	6.1. Work Identification	• Processes, practices, controls
	6.2. Work Planning	• Processes, practices, controls Includes planning of labour, parts, materials, tools, contractors, etc.
	6.3. Work Scheduling and Coordination	• Processes, practices, controls
	6.4. Work Execution and Closeout	• Processes, practices, controls Includes LOTO /COHE • Work completion information requirements • Roles and responsibilities
	6.5. Feedback and Analysis	• Processes, practices, controls
	6.6. Backlog management	• Processes, practices, controls • Use of Priority and Criticality, Backlog review, Feedback to Originators
	6.7. Shutdowns and Turnarounds	• Processes, practices, controls • Techniques for planning, scheduling, scope management, work execution, contractor management • Includes special requirements not covered in above
	6.8. Management of Change	• Management of Physical or process related changes • Documentation, procedures, practices, process diagrams, manuals, drawings, parts information, configuration, version control. • Documentation of physical changes
7. **Human Resource Management**	7.1. Education, Training and Development	• apprenticeships, specialties, pay for skill, Succession planning, personal development, professional development, professional association. • Succession Planning
	7.2. Skills and Qualification Management	• Keywords “Skills Matrix ”, etc.
	7.3. Roles and Responsibilities	• Process and RACI charts • On-boarding practices – new hire or transfer or promotion • Administrative Management of Change
	7.4. Contractor Management	• Contract management, scope definition, type of contract, performance expectations, win-win
8. Material Resource Management	8.1. Work Management Integration	• Integration of materials and work management processes, WO kitting, staging and delivery
	8.2. Inventory Management	• Processes, practices, controls • Min/Max control • Obsolescence management
	8.3. Lubricants Management	• Processes, practices, controls
	8.4. Spares Rebuild and Refurbishment	• Processes, practices, controls • Restore vs replace • Business case
	8.5. Tools and Equipment Management	• Processes, practices, controls • Requirements definition, tool crib, calibration, storage and maintenance

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9. Information Management	9.1. Information Systems	• Keywords "CMMS", "EAM", "ERP", "DCS", "SCADA" • Specialized T/A Shutdown management tools (Primavera)
	9.2. Standards and Specification	• HS&E requirements • Work specifications • Standard work practices
	9.3. Master Data	• Management processes and practices • master data requirements, • Master dates records structure • Can include management of master data for critical components and inventory items
	9.4. Document Management	• Drawings, Vendor Information • (anything not covered in above)
	9.5. Records Management	• Maintenance activity completion records • Quality records • Proof of compliance • Calibration documents
10. Continuous Improvement	10.1. Metrics / KPIs	• Definitions/Calculations • Books, benchmarks, Hoshin Kanri, Dashboard and KPI management systems
	10.2. Benchmarking	• Methods; Benchmark studies, peer group comparisons, industrial visits • Application experiences
	10.3. Maintenance Management Improvements	• KPIs vs. targets, audits, learning processes (conferences, training, certifications), project management, re-engineering, process improvement, strategy and plan improvements
	10.4. Maintenance Practices Improvements	• Reliability engineering, Life Cycle Cost Analysis, applying RCM / FMEA • Leveraging RCM outputs in support infrastructure
	10.5. Asset Reliability Improvements	• Lessons learned to engineering and operators, RCM outputs, RCFA, PMO

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REVISION TRACKING

Version	Date (MON-DD-YY)	Author(s)	Revision Notes
1.0	September 23, 2016	Alan Johnson/James Reyes-Picknell	Merged version incorporating JVRP presentation
2.0	October 03, 2016	Alan Johnson	Add Succession planning to artifacts/inclusions for 7.1 Table formatting corrected.
3.0	October 15, 2016	Alan Johnson	Add Framework Graphic to document
4.0	October 26, 2016	Alan Johnson	Removed BoK Taxonomy from title Removed "Design for reliability" from Maintenance & Reliability Engineering Subject Group (covered in the AM Landscape) Updated "Drill down" diagram Added "new" MM Framework Graphic
4.1	November 09, 2016	Alan Johnson	Corrected errors in subject numbering
5.0	December 05, 2016	Alan Johnson	Changed Subject Element 8.1 from "Materials Management" to "Work Management Integration" Changed Subject Element 9.3 from "Asset Register" to "Asset Master Data "
6.0	December 14, 2016	Alan Johnson	Correct spelling errors Reorder section 6 subjects Added cover page

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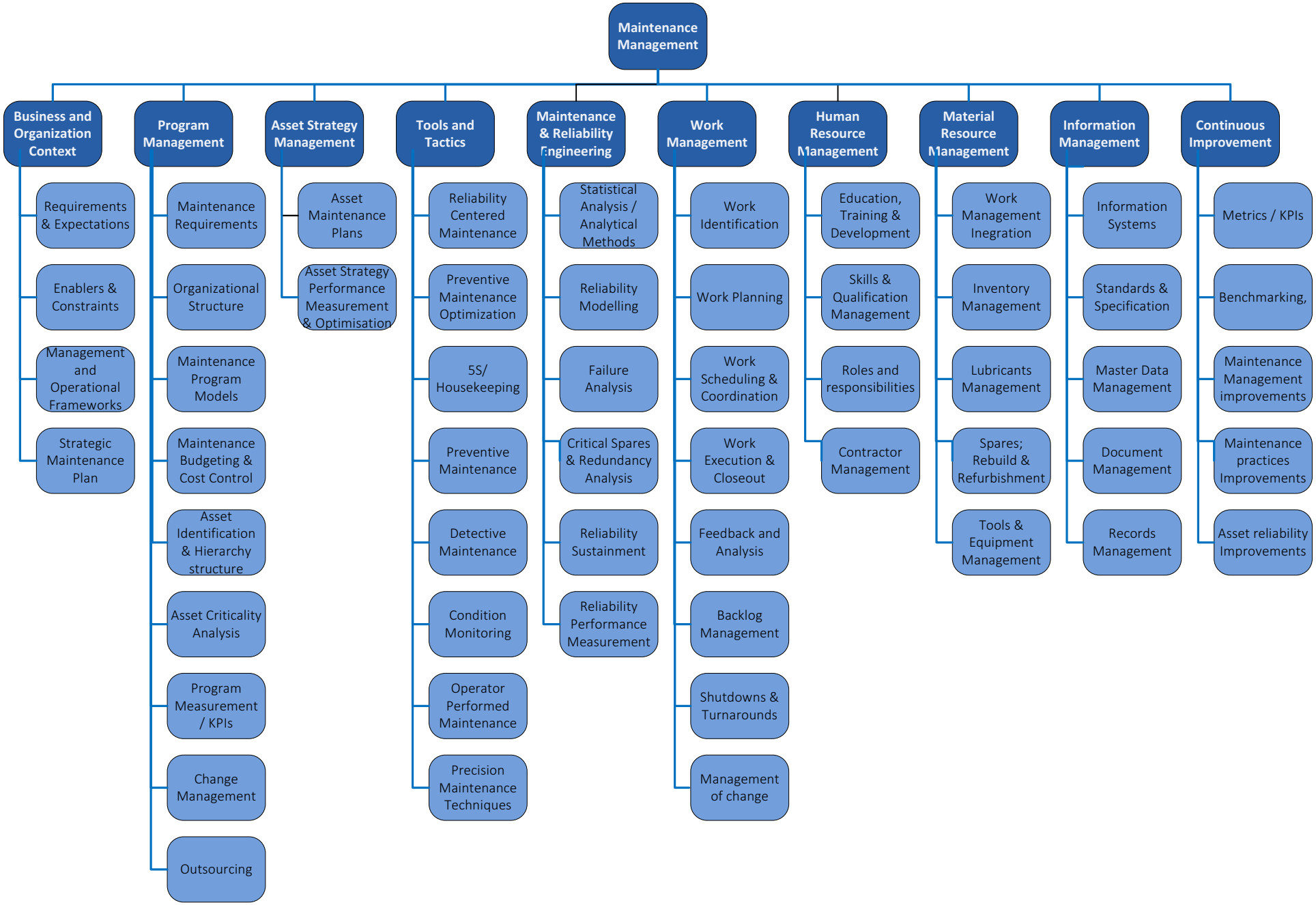
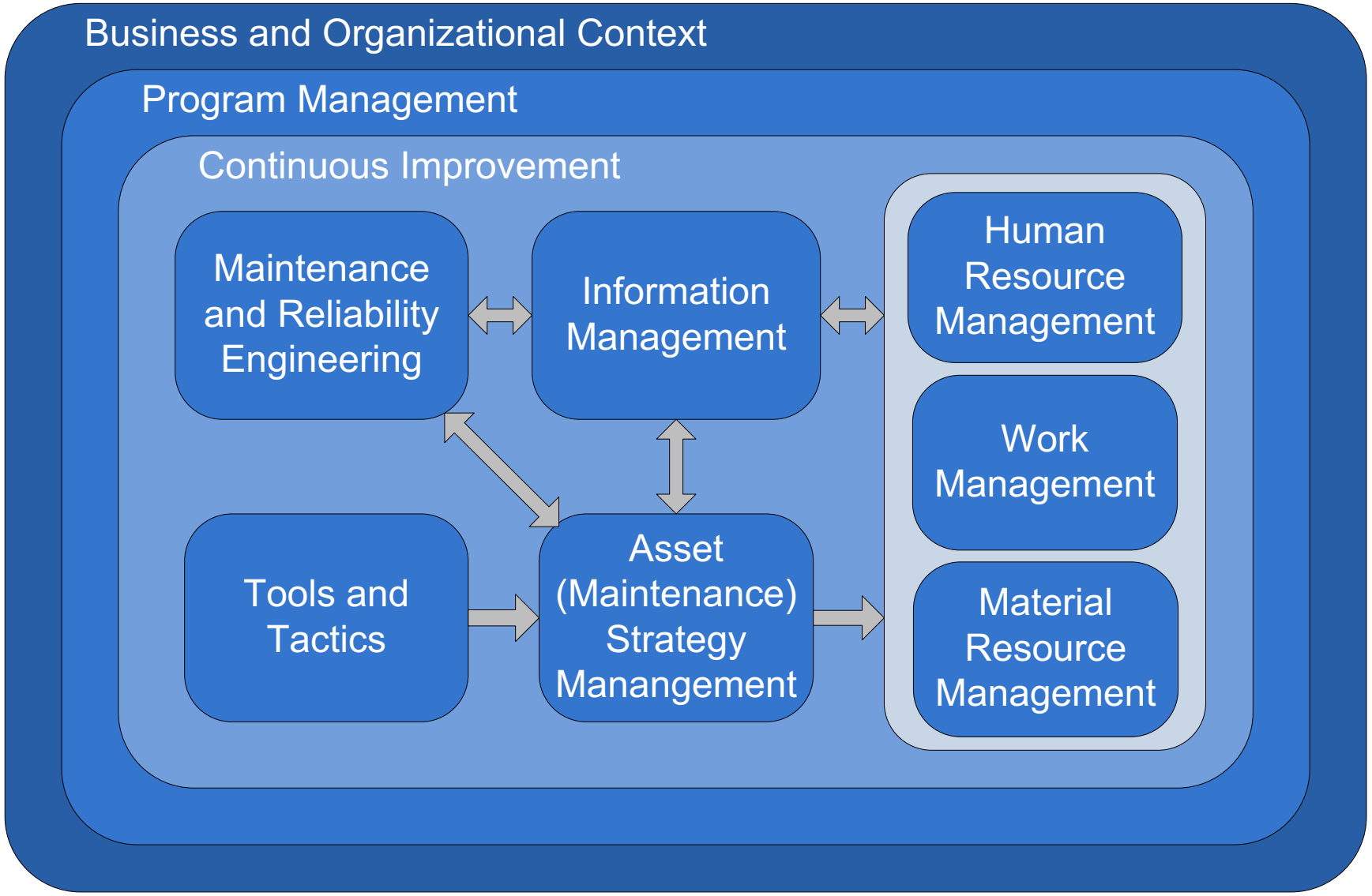
PEMAC MAINTENANCE MANAGEMENT FRAMEWORK



PEMAC Maintenance Management Framework
Subject Group Relationship Graphic