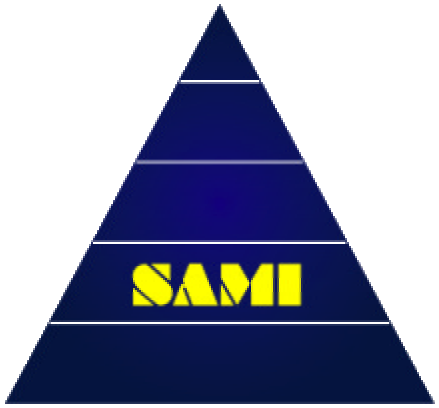
EuroMaintenance 2002
Effective Corporate Maintenance Councils

Successful Models and Development Strategies



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SAMI

Agenda

- ☑ – **Introduction of SAMI & Brad Peterson**
- – **Why Are Councils Formed and Barriers to Success**
- – **Three Successful Models and Company Examples**
  - Networking & Competency Development
  - Coaching for Change
  - Agents of Change
- – **A Development Plan for Each Model**
  - Improvement Models in General
  - Assessments & Implementations
- – **Conclusion**

SAMi

SAMI's Mission and Vision:

Mission: To comprehensively improve production equipment health, by tapping the desire, creativity and dedication of all plant staff. Results include an energized workforce, higher equipment utilization, lower costs and improved profits.

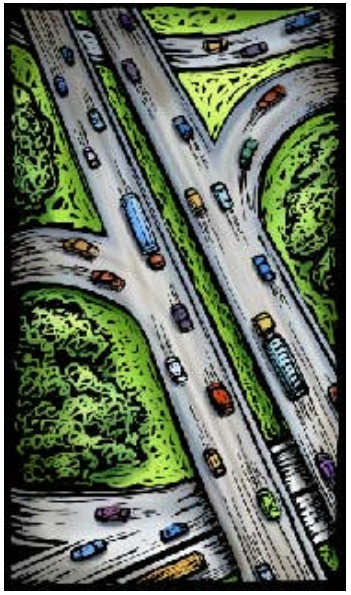
Vision: To be the firm consistently chosen by companies serious about making change; because our values of integrity, content knowledge, advanced practices and compassion for the workforce match the values of our clients.

Methods: We're a management consulting firm that introduces new processes and practices into an organization, through cross functional teams, accountability, and change management.

SAMI

Since We Started in September 1996….

- **A Representative Client List:**
  - Quaker Oats
  - Noranda Mining & Smelting
  - Kaiser Aluminum and Chemical Corp
  - Mobil Oil Corporation (4 locations)
  - British Petroleum
  - Detroit Edison
  - Trans Alta Utilities
  - Armco Industries
  - Iron Ore Company of Canada
  - Union Camp
  - Steelcase Corporation
  - Boeing Corporation
  - General Chemical
  - Columbian Chemicals
  - Tesoro Petroleum



- **Industry experience in refining, chemicals, automotive, fabrication and assembly, mining, smelting, aluminum, steel, air transport, paper, utilities**
- **We have led the industry with defining Asset Management. Mobil Oil has identified our work as a global "best practice" for reliability**
- **Have offices in Hartford, Corpus Christi, Stockholm and Jeddah, and have worked on four continents**
- **Maintained a growth rate of over 30% annually**
- **Sponsoring and leading SMRP's Professional Certification Committee**

SAMI

Brad Peterson, President and Founder of SAMI

Mr. Peterson is the founder and principal owner of Strategic Asset Management Inc.(SAMI). His motivation in starting SAMI was his belief that a higher level of performance in managing assets was possible and this process needed to be articulated. Development of these concepts has led SAMI to become the world leader in Asset Management consulting.

Mr. Peterson's contributions to industry include:

- Sponsored the creation of the Society of Maintenance & Reliability Professionals in 1992 and has served on the Board of Directors since that time
- Currently leads the Professional Certification Committee of SMRP
- Speaks extensively on the topic of Asset Management in the US, Canada, Europe, Australia and South America.
- Published author of the following articles:
  - Developing an Asset Management Strategy (Maintenance Technology, 1997)
  - The Central Issue: To Centralize or Decentralize Maintenance (Maintenance Technology, 1998)
  - Breaking the Bottleneck (MRO Today, 1998)
  - Defining Asset Management (Maintenance Technology, 1999)
  - Designing the Best Maintenance Organization (Maintenance Technology, 1999)
  - Developing an Asset Healthcare Program (maintenance Technology, 2000)

Mr. Peterson's experience has included practice leadership in two major management consulting firms, and his extensive includes working in refining, petrochemicals, pulp & paper, mining & minerals, steel, aluminum, automotive, office equipment fabrication, food processing, pipelines, utilities, carbon black, graphite electrodes production, government and transportation. His education includes an undergraduate (Phi Beta Kappa) and graduate degree in Physics and a Masters degree in Counseling Psychology.

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Why Are Councils (Whatever They May be Called) Formed? Top 10 Reasons:

- VP thinks maintenance managers need more to do
- Plant Manager wants MM's gone so they can get some work done
- Production Managers hope they never come back
- MM thinks he can save the world, if not his plant
- Orlando is a nice location to meet in the winter
- This would look good on a resume
- MM thinks maybe someone else <u>really</u> knows what he should be doing
- Would be good to get way from the Production Mgr and Plant Mgr
- A council may be a better way of cutting costs than being fired
- The company president read a book on teamwork in manufacturing

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Top 10 Reasons That Councils Fail

- VP wasn't really serious--no teeth, no budget, no authority
- Council members can't afford the trip
- Results are expected after the first meeting
- Plant managers want results, but don't want change
- Production manager thinks he should be in charge of council
- Council members aren't sure what the objectives are
- Council members aren't sure how to achieve objectives
- Council members don't have the skills to achieve objectives
- Council members don't have the resources to achieve objectives
- The bus gets hit visiting other companies to "benchmark"

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The Networking Model

What is it?

The council's primary purpose is education; learning from each other, creating specialist teams, problem-solving, sharing practices, etc.

Model's Strengths

- **Low Cost**
- **Builds Organizational Knowledge**
- **Increases Technical Skills**
- **Leads to Functional Improvements**
- **Can be done on a part-time basis**

Model's Weaknesses

- **Slow to Build Value**
- **Strengths may not exist in company**
- **May not influence operations/eng.**
- **Knowledge may not be implemented**

Successful Examples: Mobil Oil (Don't know who after Exxon merger); Lyondell-Equistar (Joe Fluder); International Paper (Ken Collins)

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The Coaching Model

What is it?

The council sets up a direct assistance organization, leading member plants in assessing their gaps, and coaching for change

Model's Strengths

- Can lead to significant value creation
- Cost billed to plants that want help
- Creates examples of success
- Raises visibility of maintenance in company

Model's Weaknesses

- Where to acquire & maintain skills?
- Change may be quite slow or nil
- Too limited assistance to drive change
- May not get high priority in plants
- Maintaining organizational visibility

Successful Examples: Alcoa (Bill Mathews); DuPont (Ralph Tewksbery); Weyerhaeuser (Rick Nelson, Pat DiGiuseppe)

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The Consulting Model

What is it?

The council's primary purpose is developing a corporate plan and structure for change and significant value creation

Model's Strengths

- Highest Value to Company
- Works best with large number of plants to support on-going organization
- Significant change agency for company
- Replaces need for external consulting

Model's Weaknesses

- High Cost
- High Leadership and Ownership Requirements
- High Skill Requirements
- May lose staff to outside interests

Successful Examples: Rohm & Haas (Dick Pettigrew), DuPont (in the early 90's)

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The Lifecycle of the Corporate Maintenance Council

Initiation

- Objective: Set Up for Success
- CSF: Leadership, orientation, structure, philosophy
- Activities:
  - Create Excitement
  - Recruit Sponsor and Leaders
  - Develop Charter
  - Create Structure
  - Assure Visibility
  - Identify Business Value
  - Initiate, educate members
- Measures:
  - Level of Sponsorship
  - Value of Business Case

Growth

- Objective: Early Successes
- CSF: Leadership, methods, value creation, visibility
- Activities:
  - Identify Initial Plant Sites
  - Assess Plant Status
  - Develop Business Case
  - Plan Implementation
  - Implement Gap Closures
  - Measure Success
- Measures:
  - Quantitative Results
  - Qualitative Results and generated support

Maturity

- Objective: Repeat Success
- CSF: Leadership, adaptability, marketing, financial integration
- Activities:
  - Create Permanent Team
  - Routinize Assessment & Implementation Methods
  - Develop & Execute internal & external Marketing Plan
  - Increase scope of value delivery
  - Integrate results with leadership rewards
- Measures:
  - Total Value Created
  - Increasing resonsibility

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Maintenance Cost is a Function of Defects Occurring at the Plant, vs. the Efficiency and Effectiveness of the Work Done

Reliability Program

- Optimized Maintenance
- Class-based Reliability
- Failure Analysis
- Operator Participation
- Reduced Breakers
- PM/PdM Development

Improved Maintenance Program

- Better Work Description
- Improved Planning
- Improved Scheduling
- Operator Involvement
- Parts Availability

WORK DONE!

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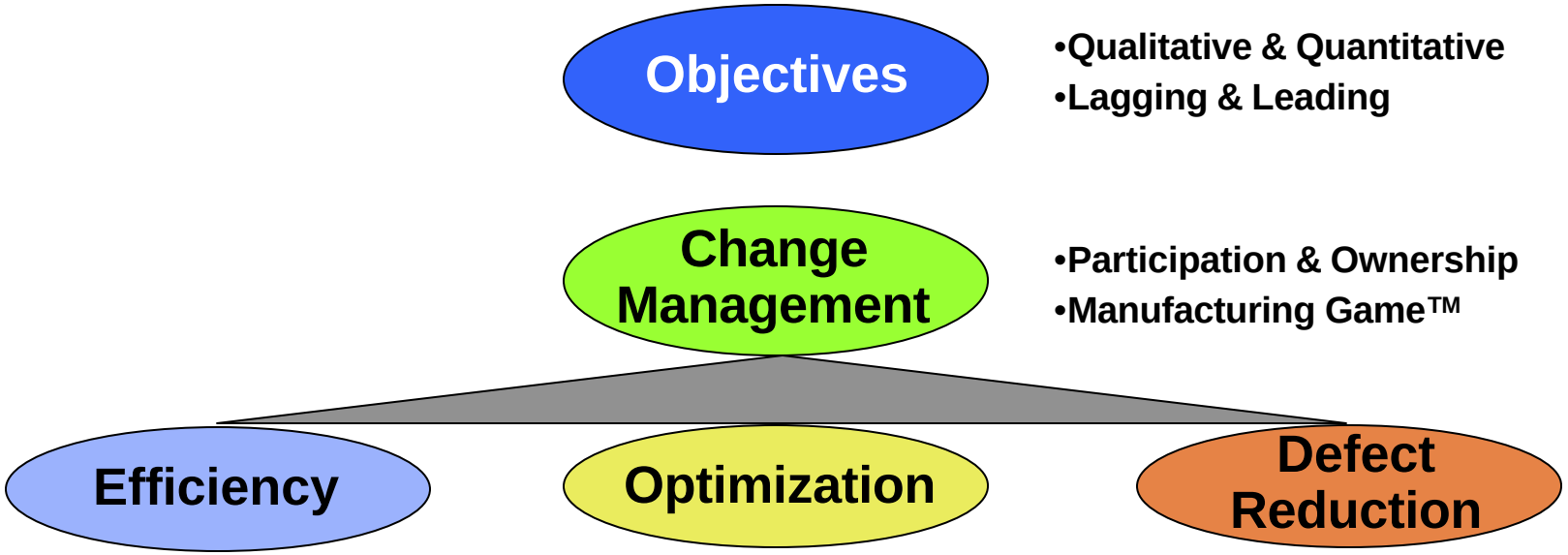
Change Management Methods Help Us Achieve the Goals of The Results Delivery Phase



	Efficiency	Optimization	Defect Reduction
Purpose	•Get More Work Done •With Fewer People	•Do the Right Maintenance •Stock Just the Right Spares	•Reduce Workload/Inc. Reliability •Operators do Operational Maint.
Methods	•Planning & Scheduling •Redesign Work Managem't	•Reliability Tools •Inventory Optimizat'n (SOS)	•Class-based Reliability •Preventive/Predictive Maint.
Measures	•Leading: % Planned Work •Lagging: Wrench Time	•Leading: % Stock-Outs •Lagging: % PM/PdM Hours	•Leading: % Equipment Covered •Lagging: Availability
CSF's	•Discipline	•Systems & Application	•Involvement/Cooperation

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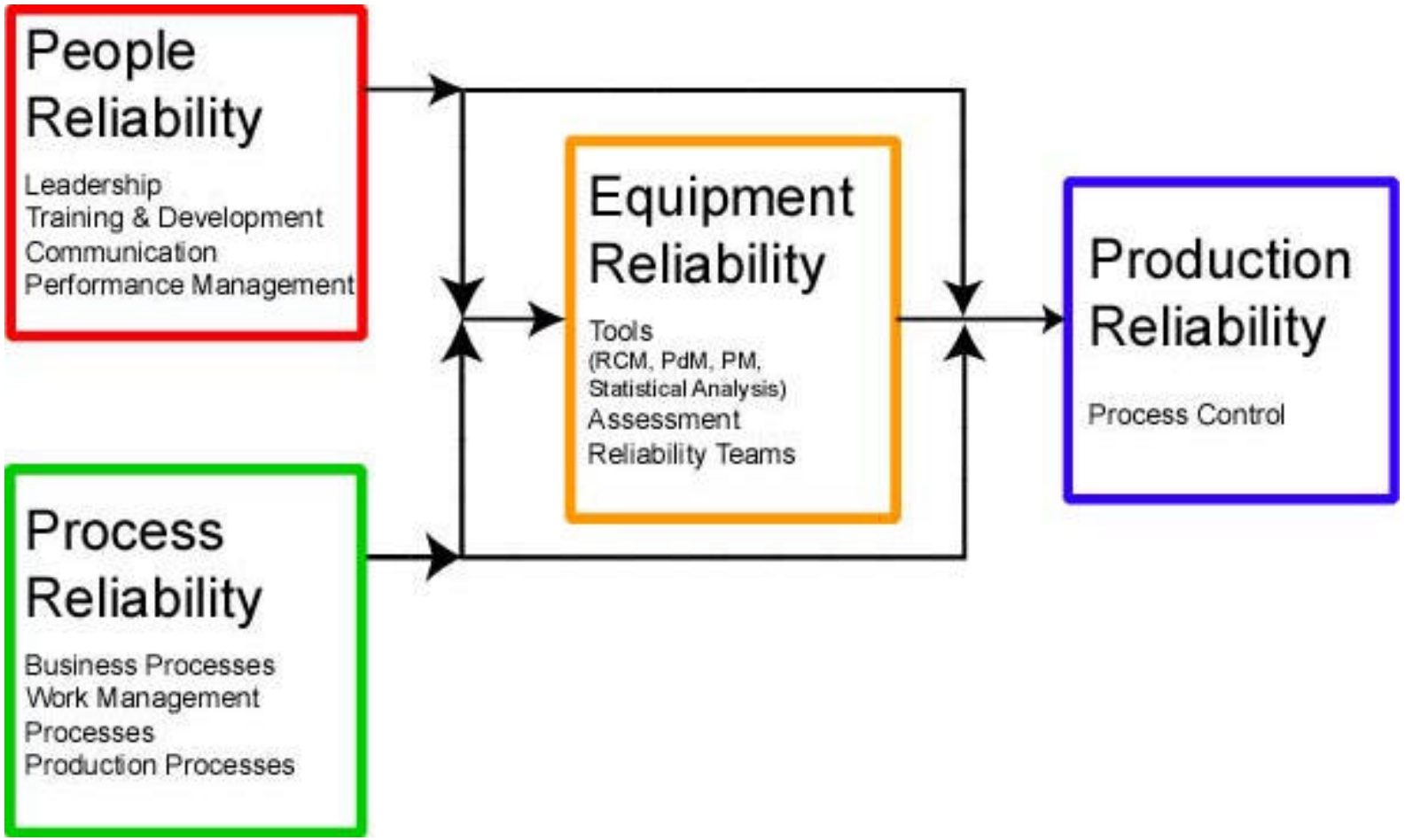
Production Reliability and Equipment Reliability Depend on People and the Processes They Follow



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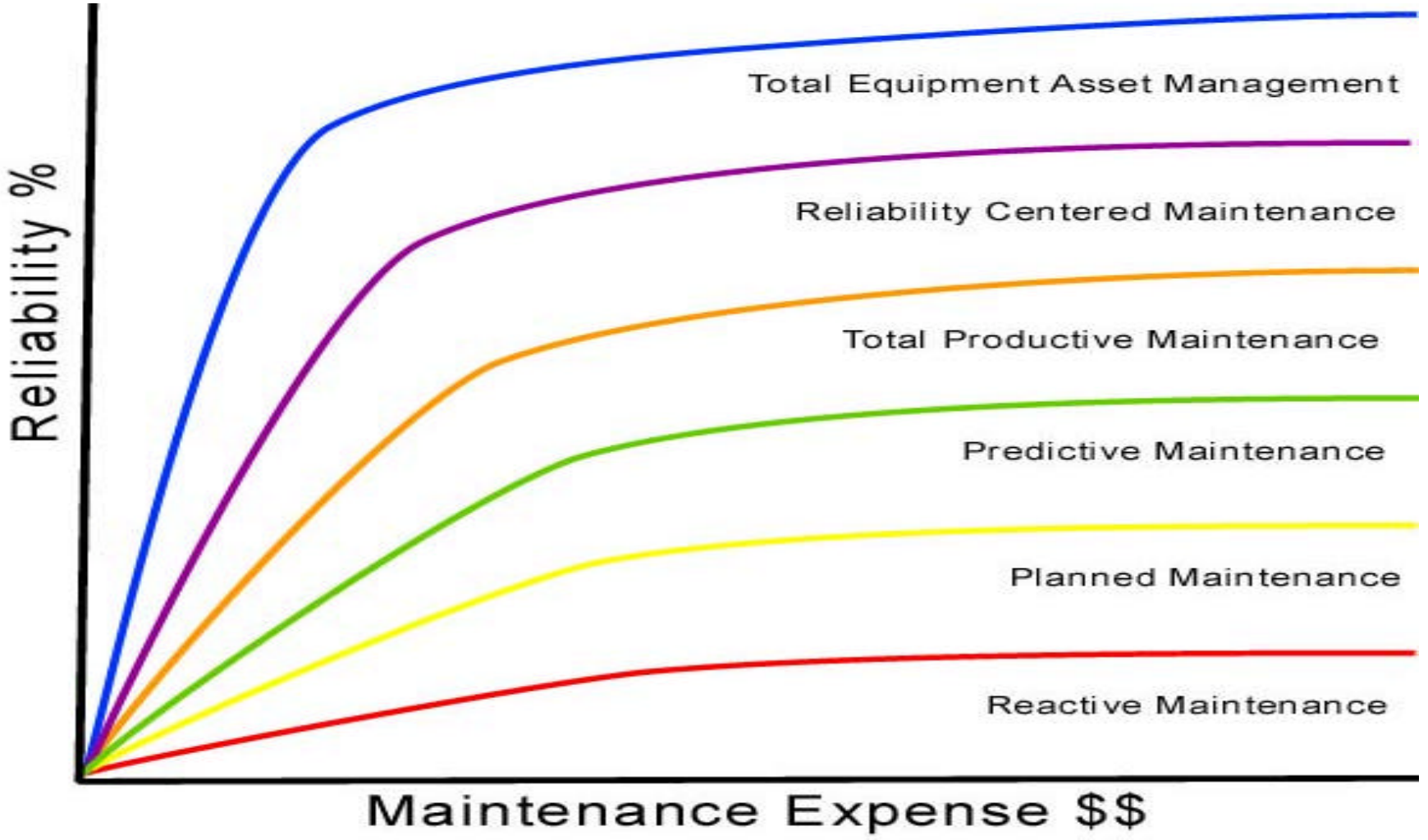
The First Question to Ask is What Should We Be Working On. Reliability Stable Domains



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The Operational Reliability Maturity Matrix Gauges Performance and Guides Future Improvements

Stage \ Class	Low Performing	Competent	High Performing
Stage 1 Daily Maintenance	• "Fires" determine priorities • Breakdowns frequent • Maintenance equates to repair • No work orders, plans, controls • Stores service levels low • Poor operator/maintenance relationships • Poor customer service levels	• Most work planned, scheduled • Preventive maintenance implemented • Trades competent at most repairs • Computerized work order system • Stores service levels fair • Operators prep for repairs • Expedited orders infrequent	• All work prioritized • PM hours and W.O.s exceed repairs • Maint. Mgmt. System utilized, integrated with Purchasing, Stores • JIT Stores; 2x minimum turns • Operators inspect, create WOs • Turnarounds well planned, executed
Stage 2 Proactive Maintenance	• Condition-monitoring equipment purchased, installed • Little analysis performed on data • No preventive action taken • No analysis done to identify candidate equipment • Benefit tracking anecdotal	• Condition-monitoring equipment installed, readings taken regularly • Information analyzed, work orders created • Candidate equipment has high value to production • Rational cost/benefit analysis	• Condition-monitoring intervals based on risk analysis • Predictive techniques minimize repair, out-of-service cost and time • Proactive techniques employed (e.g., high quality filtration) • PDM data integrated with CMMS
Stage 3 Organizational Excellence	• Training emphasis disconnected from real work practices • Quality Program ineffective in changing work behaviors • "Team" implementation creates chaos • Anarchy replaces hierarchy	• Natural Work Teams perform most daily maintenance effectively • Operators perform TPM activities • Some program integration (e.g., Quality, PSM, EPA, ISO, RCare) • Crafts flexibility high priority • MX philosophy adopted (e.g., TPM)	• Work teams flexible, self-directed • Continuous improvement process embraced, understood, working • Programs rationalized, integrated • Reward/Recognition support best results • Skills predominate over functions • All staff systems competent
Stage 4 Engineered Reliability	• RCM implementation creates confusion, increased downtime • Functional divisions prevent successful pooling of talent • Pedantic rigor creates paralysis through analysis • Vendor reduction — lower service levels	• Failure analysis routine activity • High-value production processes assessed via RCM techniques • Maintenance routines changed to increase value impact • Reliability becomes focus — not maintenance	• Concurrent engineering employed to ensure lifecycle, maintainability • Reporting systems tie reliability to financial results through OUE • Complete equipment histories are used to trend and predict failures • Vendors participate in reliability
Stage 5 Asset Management	• Executive and plant management fail to align and implement goals • Market pressures make short-term decisions predominate • Union recalcitrance makes high performance organization impossible	• Clear organizational alignment • Operational reliability is cross-functional responsibility. Reliability built into purchasing, production, engineering • Activity-based management implemented • Market impact of reliability valued	• Monitoring, process control, and information systems integrated. Automated, self-correcting process/equipment • Life expectancy analysis, lifecycle extension reengineering done • Automated, demand-driven plant production balancing implemented

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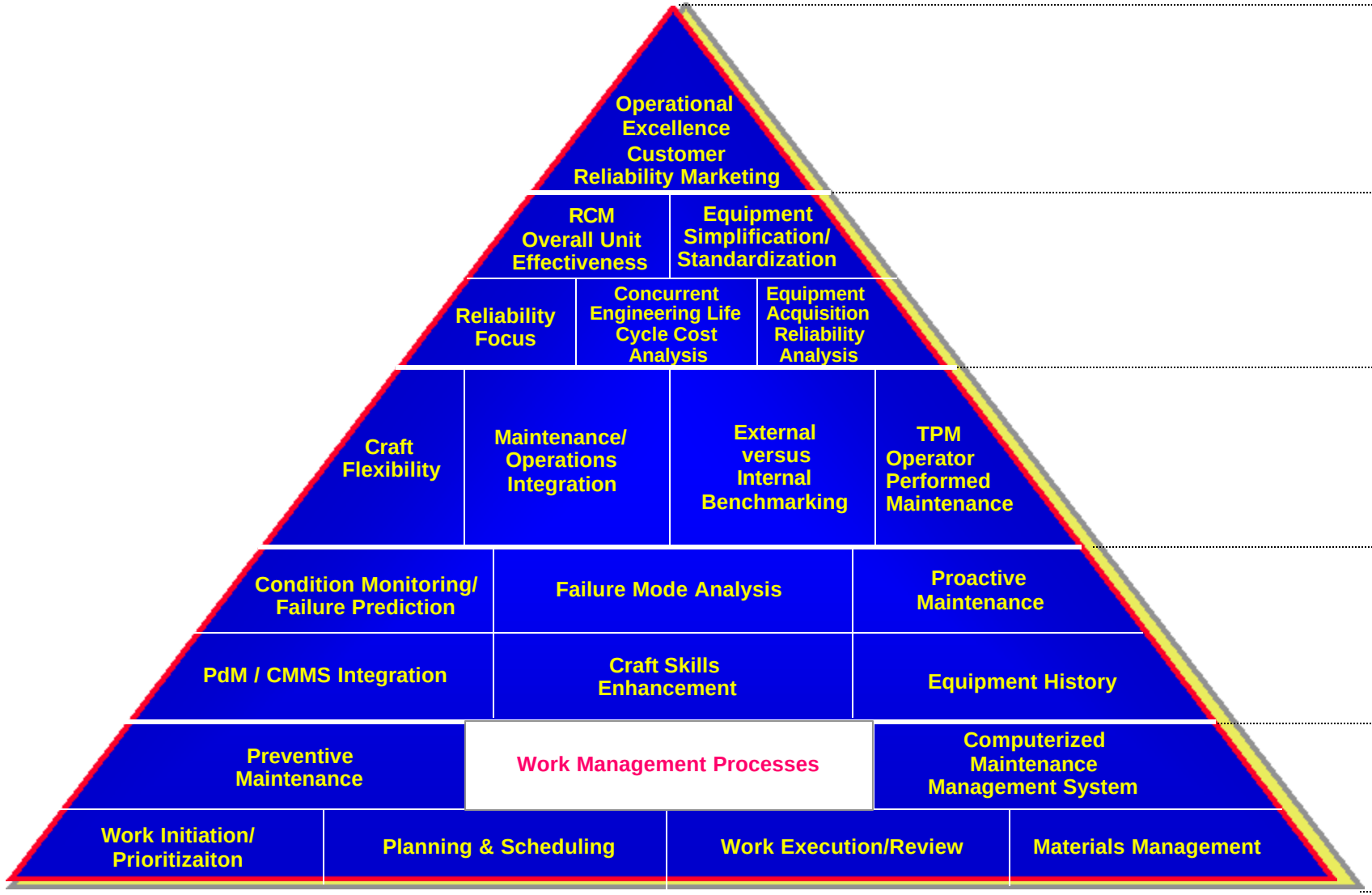
This Triangle Helps Identify What Elements Each Model Would Work On...



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Some Typical Teams Formed in the Networking Model

- **Work Management & CMMS**
- **Electrical & Instrumentation**
- **Stationary Equipment Performance (Reliability & Asset Care)**
  - **Vessels, Pipes, Valves and Other Equipment Equipment**
- **Rotating Equipment Performance (Reliability & Asset Care)**
- **Utilities**
- **Corrosion & Metalurgy**
- **Process Safety, Hazops, Risk Management**
- **Turnarounds and Project Management**

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Typical Products of the Networking Model

- **"Best Practices" Documentation**
- **Process and Rules Development--e.g. How and When to Apply the Best Practices**
- **Standards & Benchmarks**
  - **Equipment Performance**
  - **Key Indicators/Measures**
  - **Capacity**
  - **Work Process Measures**
- **Training Materials & Classroom experience**

Real success <u>begins</u> with documentation, but doesn't end there. The successful networking group implements and demonstrates results.

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Success Requirements for the Networking Model

- Like the other models, an Executive champion
- A leader/coordinator (10 hours per week) for each group
- Cross-Functional Team (Operations brings credibility)
- A development plan and a budget
- Deliverables (see prior page)
- Successful Application of the Practices
- Maintaining Documentation as Knowledge Grows
- Communications and Information Storage Vehicle
- Marketing Success!

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A Business Process For The Coaching & Consulting Model

Business Issue Identification → **Asset Management Assessment** → **Results Delivery**

- Learn Plant Objectives
- Identify Readiness to Proceed
- Gain Organizational Commitment

1-4 Weeks

- Presentation of Approach. Identify plant for work Interview hourly & management
- Survey production & maintenance
- Map current maintenance & stores, turnaround process
- Benchmark performance in variety of categories using KPI's
- Perform plant throughput analysis and develop gaps
- Perform Preventable Maintenance Exercise
- Develop Cost/Benefit Analysis
- Design implementation project

6-12 Months

- On-board and train joint team
- Develop & implement detailed "To Be" best maintenance processes, procedures and practices
- Identify & implement optimized maintenance program based on value
- Identify & Implement reliability practices
- Identify appropriate operational maintenance activities for operators
- Optimize stores
- Implement systems enhancements
- Develop and provide related training
- Implement performance management and control systems
- Manage/review implementation progress

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Understanding Current Performance Levels Tells Us Where We Can Improve

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Benchmarking Quantitative Measures of KPI's Against Others in the Industry Helps Us Establish the Starting Point

Leading Indicators

- Work request quality
- Work approval effectiveness
- Priority system effectiveness
- Planned work ratio
- Job estimating accuracy
- Inventory accuracy
- Maintenance work conducted by operators ratio
- Craft to supervisor ratio
- Total backlog
- Preventive and predictive ratio
- Failure analysis

Lagging Indicators

- Maintenance cost / replacement asset value ratio
- Wrench time
- Emergency work ratio
- Equipment availability
- Re-work
- Equipment history quality
- Material / equipment stock-outs
- Inventory turn-over

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These Indicators Present Gaps within Maintenance & Stores

Performance Indicators	Measurement	Best in Class[1]	SAMI Experience[2]	Client[3]
Work Request (Work Order) Quality	Percent Conformance to Standard for Quality Work Request/Order	100%	90%	
Priority System Effectiveness	Priority System Exists Rules consistently Followed	Yes Yes	Yes Yes	
Planned Work Ratio	Maintenance Hours Worked on Planned Jobs / Total Maintenance Hours	90%	80 - 85%	
Scheduled Compliance	Hours of Scheduled Work Completed / Total Hours Scheduled Work	100%	100%	
Job Estimating Accuracy	Percent of Jobs Planned within +/- 20% Estimating Accuracy	90%	70 - 80%	
Inventory Accuracy	Percent of Items Actually Found During Physical Inventory	99%	90 - 95%	

1. International Benchmarking Clearinghouse and SAMI experience in continuous process industry
2. SAMI experience after re-engineering when a 'steady' state achieved
3. Most measures not tracked. Client Plant estimates based on first three weeks of Assessment diagnostics and interviews

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Maintenance Management Lagging Indicators

Performance Indicators	Measurement	Best in Class[1]	SAMI Experience[2]	Client[3]
Maintenance Cost Per Replacement Asset Value Ratio	Annual Maintenance Cost (Labor, Materials, Contract) / Estimated Plant Replacement Value	< 2.0%	2.0 - 3.0 %	
Value-Added Time (Wrench Time)	Total Hours Craftsman Doing Value-Added Work / Total Available Hours	70%	50 - 60%	
Emergency Work Ratio	Maintenance Hours Worked on Emergency Jobs / Total Maintenance Hours	< 10%	< 20%	
Rework	Percent Jobs Needed to Be Redone Due to Maintenance or Operator Error	< 5%	< 10%	
Equipment History Quality	Percent of Equipment with Meaningful History	80 - 90%	Process in Place	
Material "Stock-outs"	Number of Times Parts Not Available / Number of Requests	< 2%	< 5%	

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Implementation Is All About Ownership of Results. This Comes Through Involvement and Excitement!

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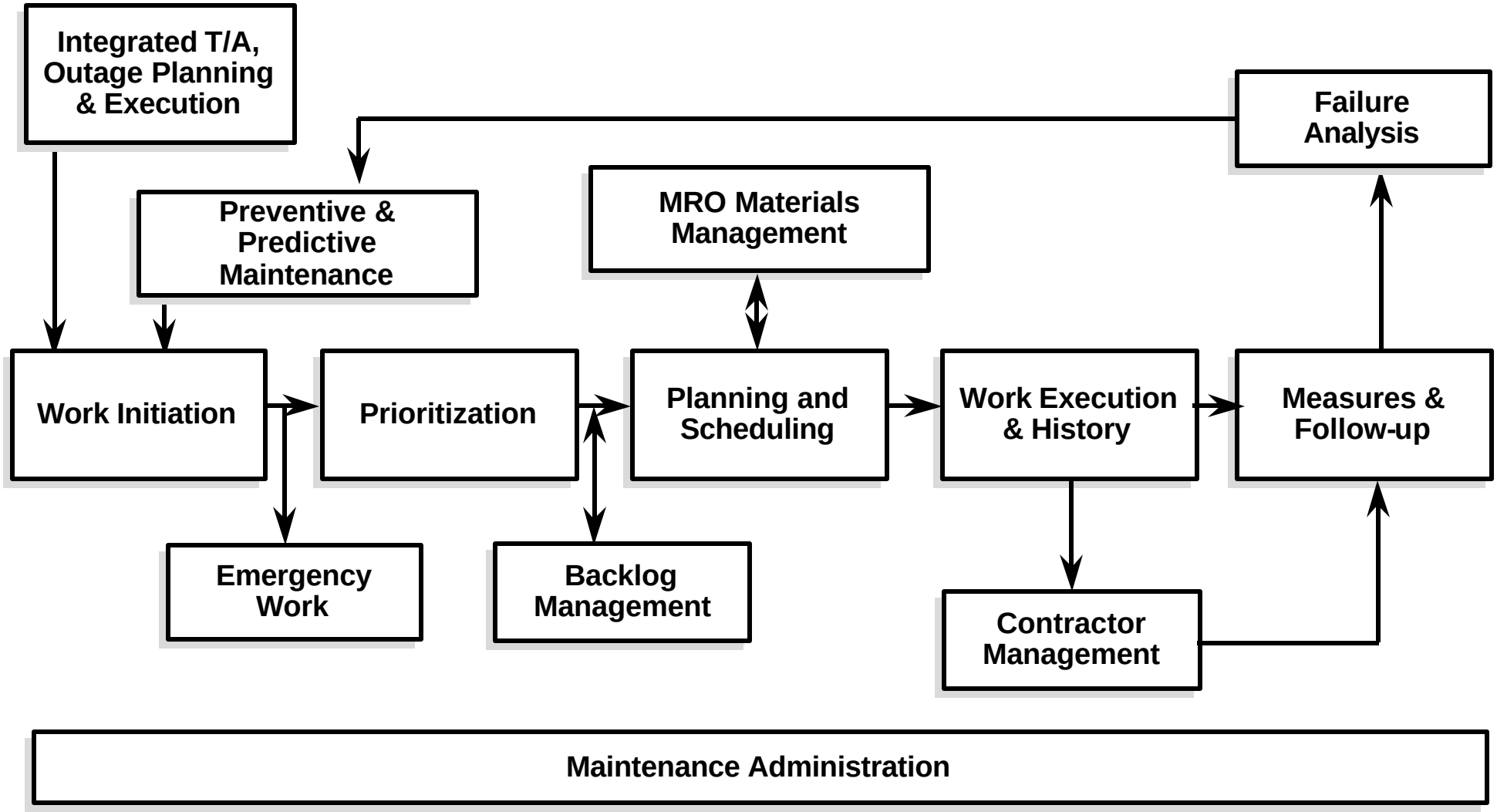
We Focus Attention on All Aspects of Planned Maintenance



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Presenting Results in a Consistent Fashion is Critical: A Scorecard Strawmodel