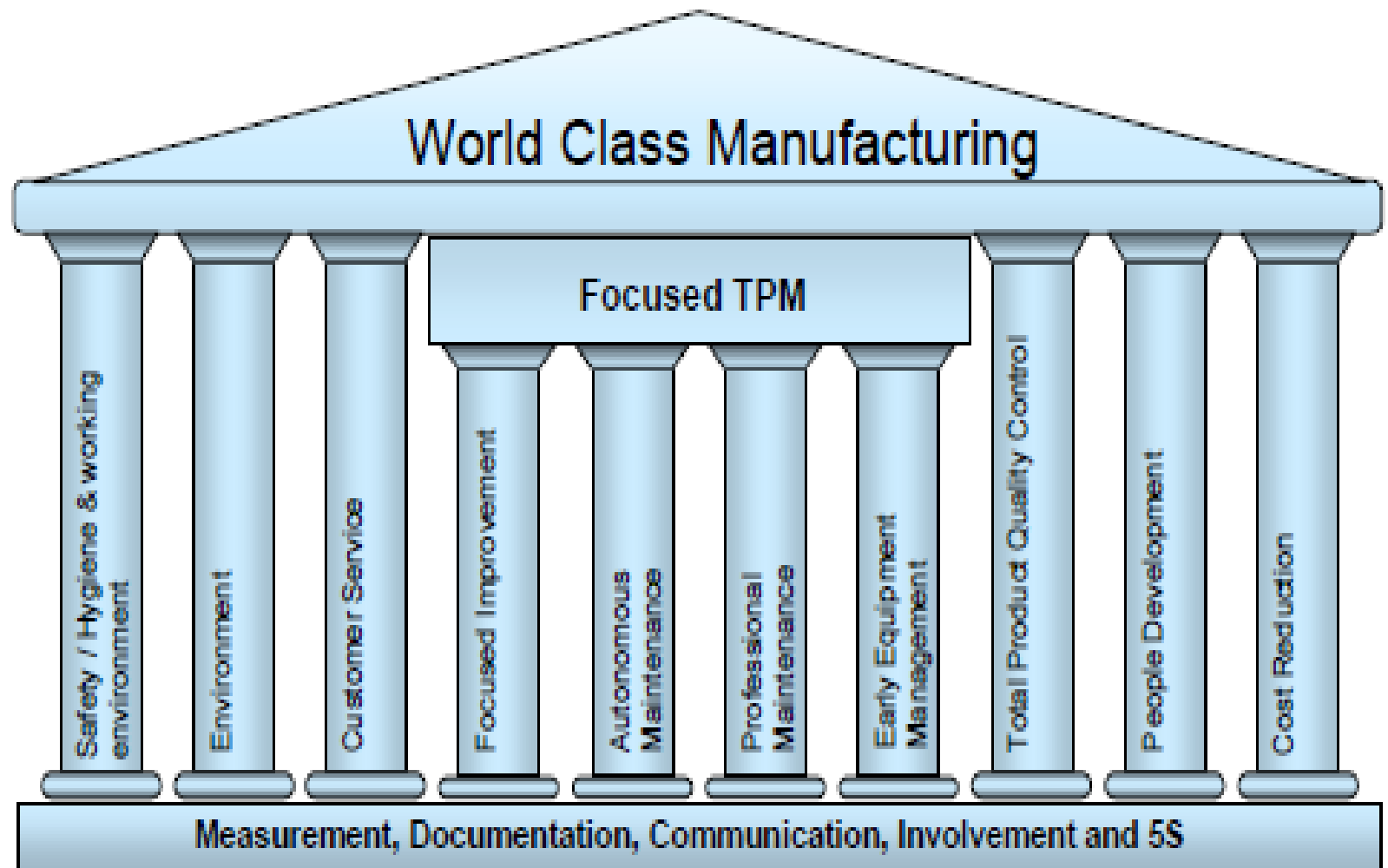


MAINTENANCE: PILLAR OF WORLD CLASS MANUFACTURING



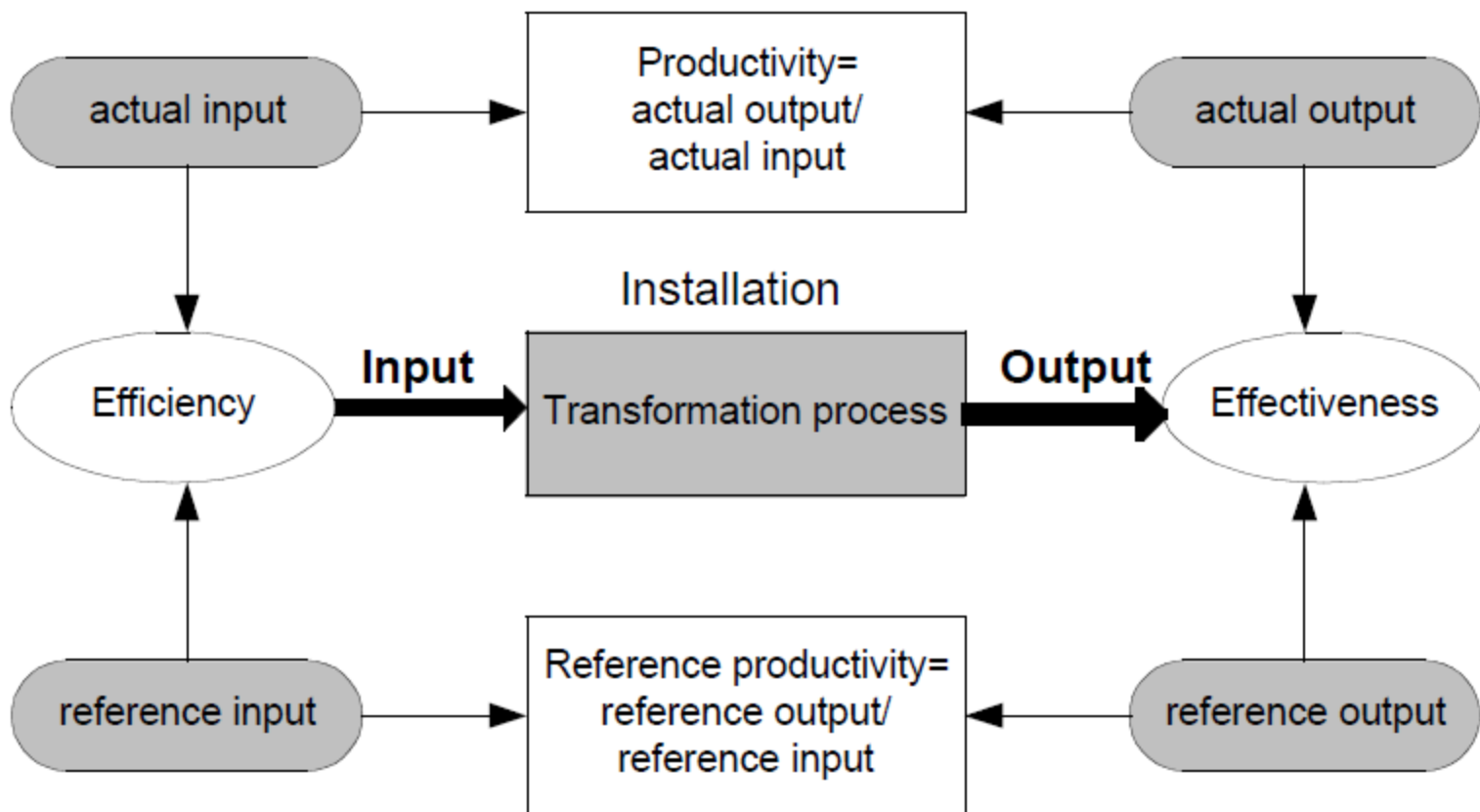


Measurements

If you cannot measure it, you cannot manage it.

Overall Equipment Effectiveness, or “OEE,” is a well known concept in maintenance and is a way of measuring the effectiveness of a machine.

It is the backbone of many techniques employed in asset management programs.

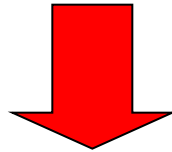


OEE, what is it?

- a best “practices” way to monitor and improve the effectiveness of the manufacturing processes (i.e. machines, manufacturing cells, assembly lines)
- simple and practical tools because it takes the most common and important sources of manufacturing productivity loss, place them into three primary categories and distills them into metrics that provide an excellent gauge for measuring where you are and how you can improve
- frequently used as a key metric in TPM and Lean Manufacturing programs and gives a consistent way to measure the effectiveness of TPM and other initiatives by providing an overall framework for measuring production efficiency.

Advantages of OEE

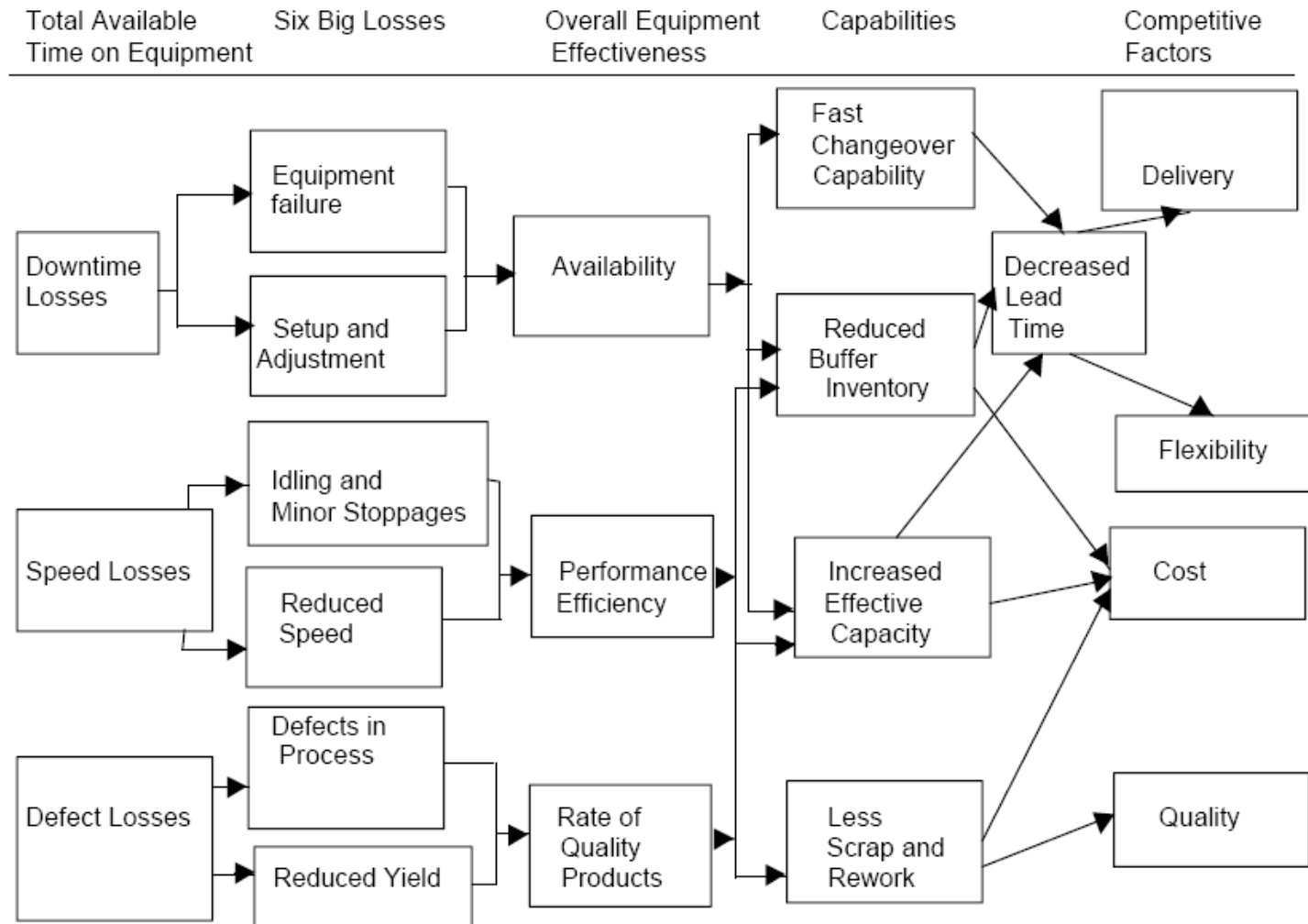
- correctly reduces complex production problem
- easy to follow steps in handling data and information
- methodically improve the processing using basic measurement
- can not be manipulated
- immediately indicates the current status of a manufacturing process
- becomes a multifaceted tool allowing to understand the effect of the various issues in the manufacturing process and how they affect the entire process
- allows the company to have separate business function by applying/using a single, easy to understand formula



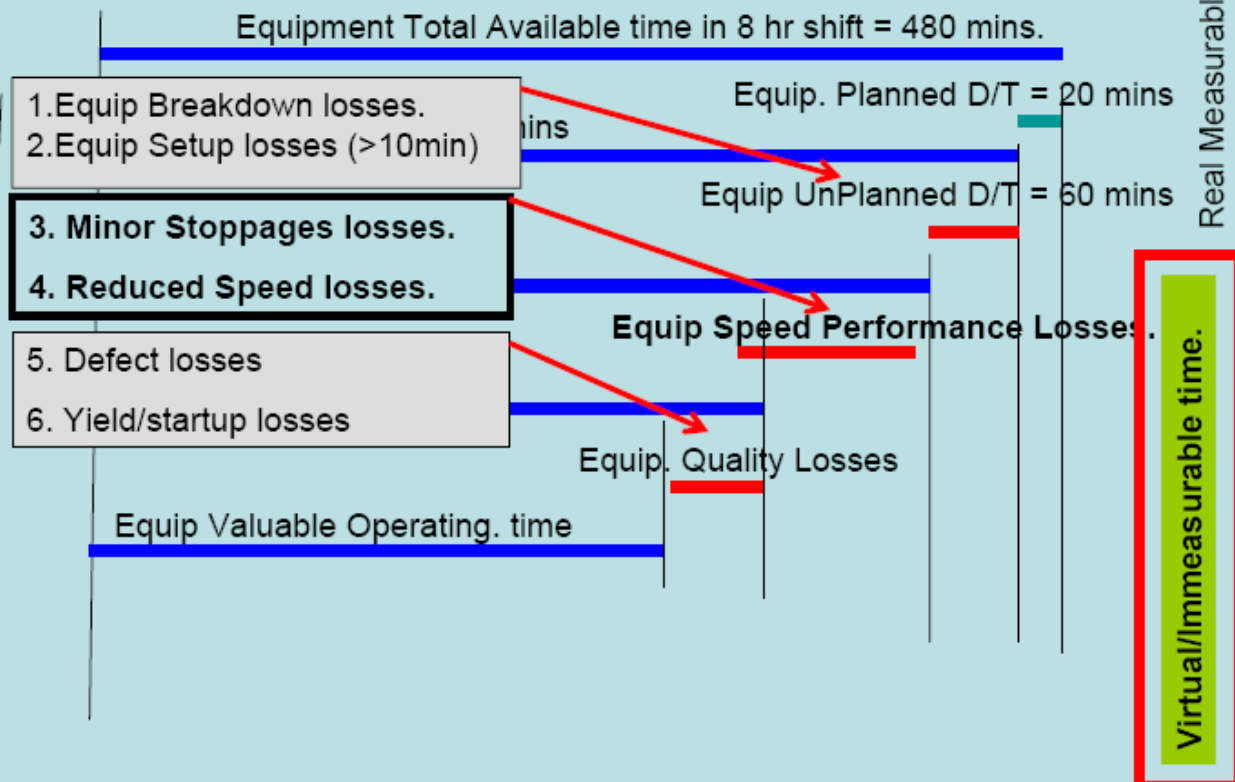
**OEE is the most effective benchmarking tool in making
sound management decision**

OEE consists of

- **Availability Ratio** — The share of the actual production time and the planned production time. All planned stops and breakdowns will reduce the availability ratio, including set-up times, preventive maintenance, breakdowns and lack of operators.
The only time that you may choose to deduct from the availability ratio is lack of orders.
- **Performance Ratio** — Loss of production due to under-utilization of the machinery. In other words, losses are incurred when the equipment is not run with full speed. Short, unregistered, stops may affect the performance ratio as well.
- **Quality Ratio** — The amount of the production that has to be discharged or scrapped



Equipment OEE Losses

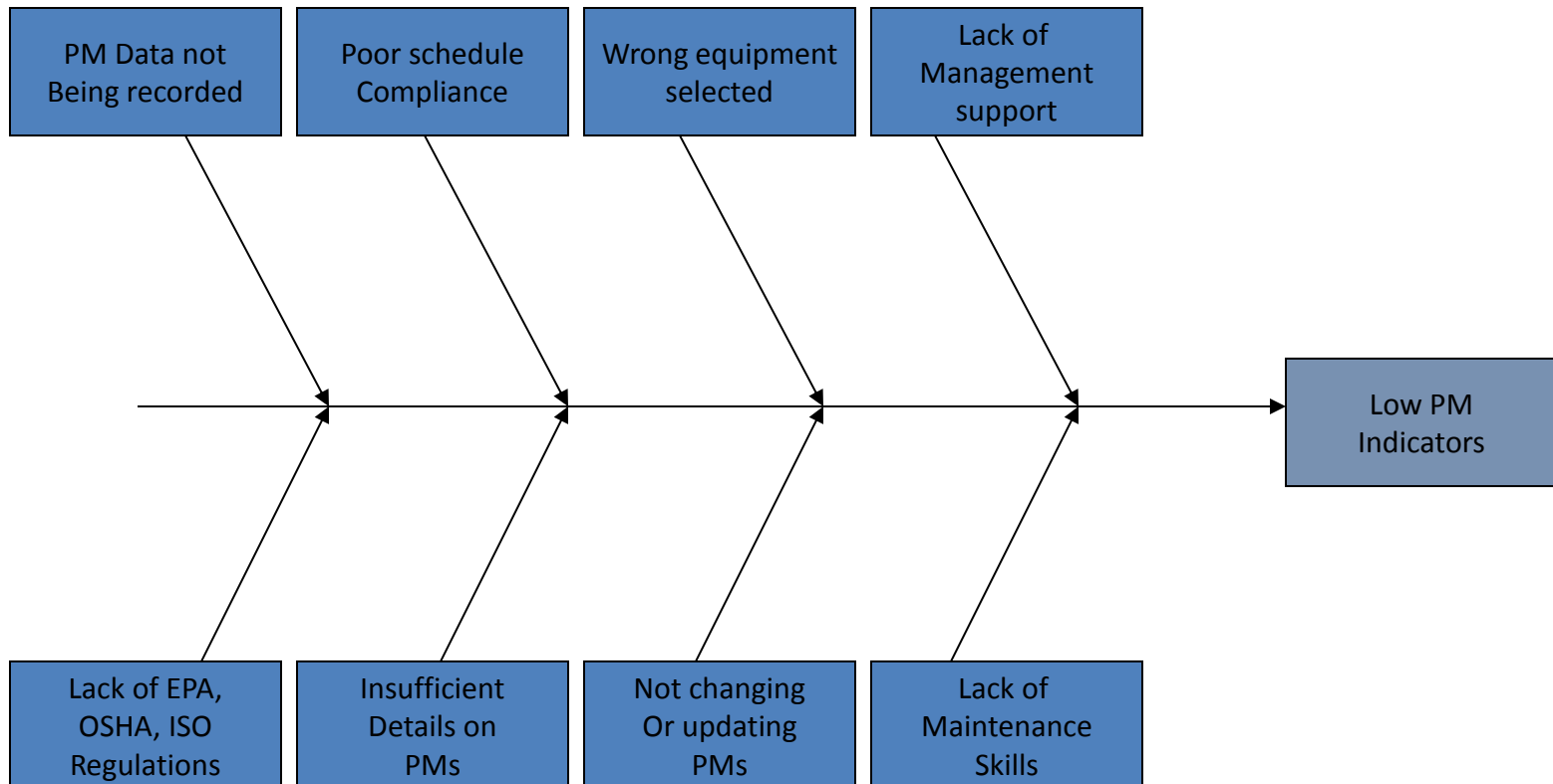


**OEE = actual output/theoretical maximum output
(OEE 100%)**

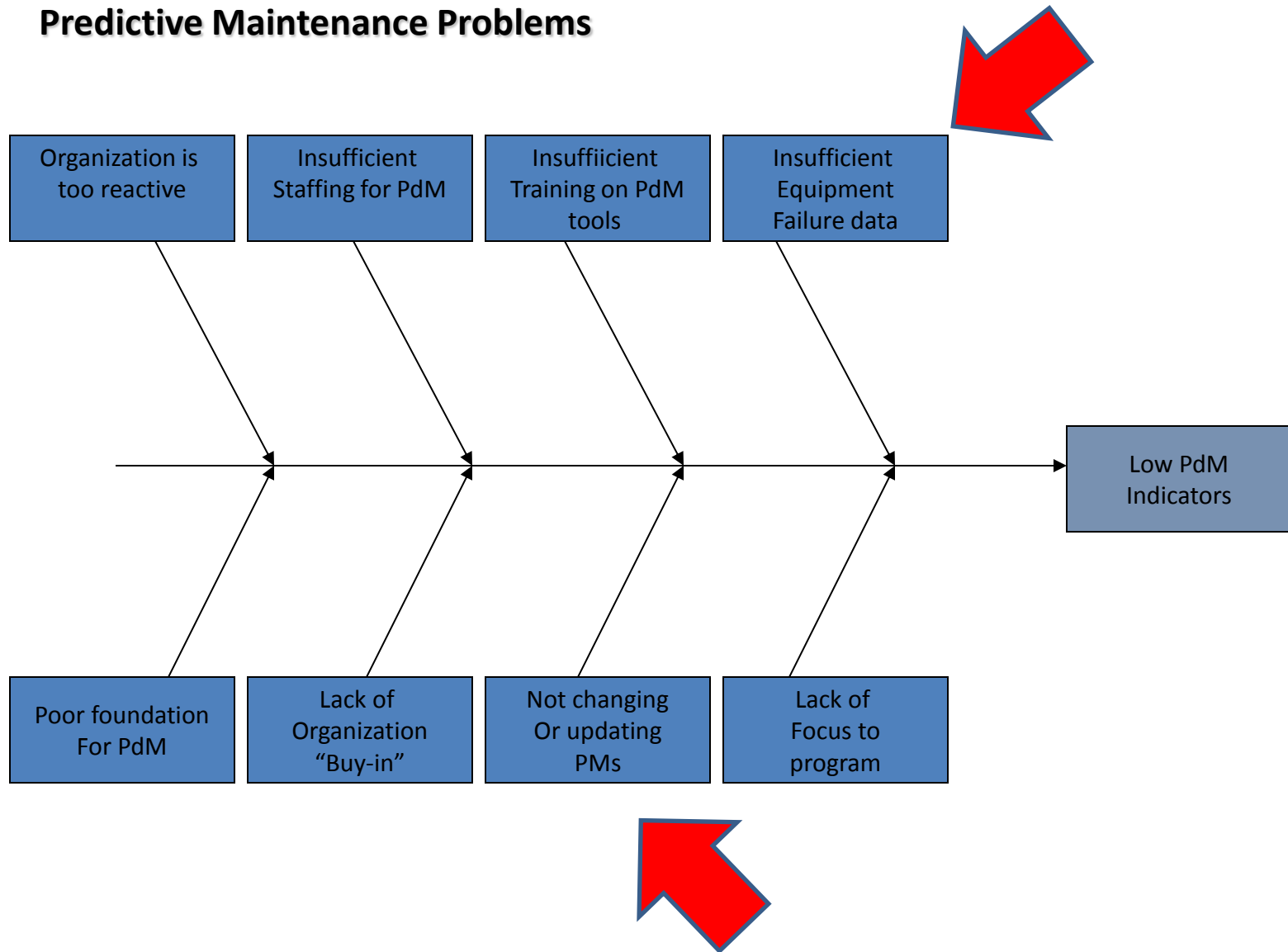
OEE = availability ratio x performance ratio x quality ratio

Documentation: one of the most weaknesses

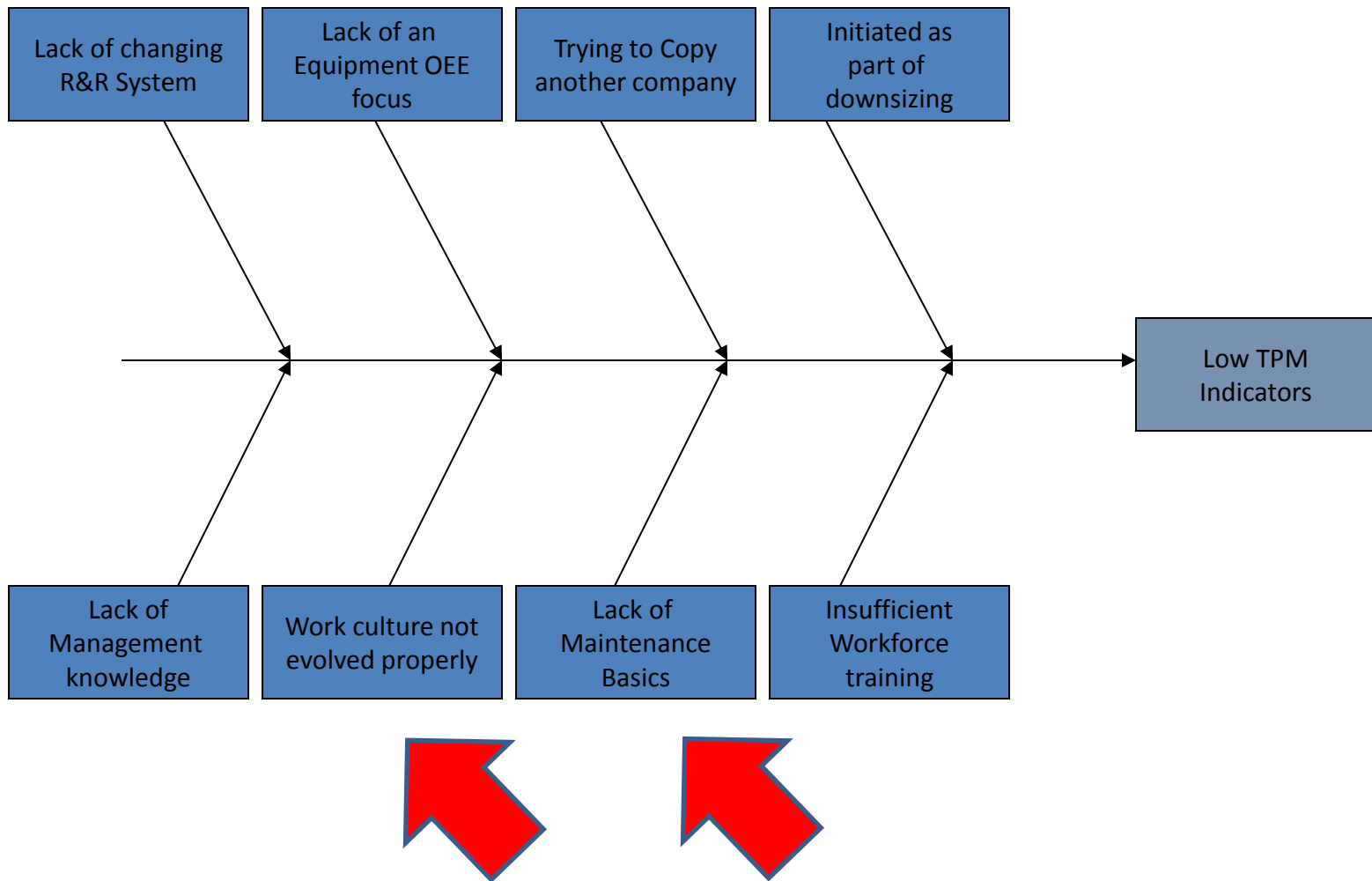
Preventive Maintenance Problems



Predictive Maintenance Problems



Total Productive Maintenance Problems



Communication and Involvement: Culture???

“TPM is about communication. It mandates that operators, maintenance people and engineers collectively collaborate and understand each other’s language.” —Ellis New, Productivity Inc.

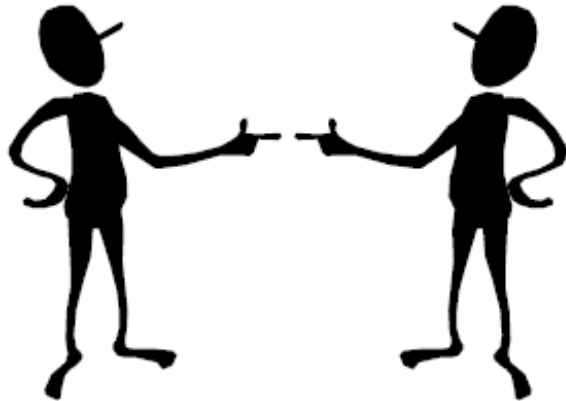
Old Attitude

“I operate, You fix”

“I fix, You design”

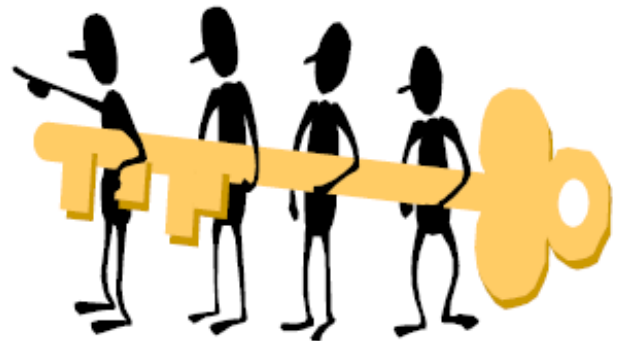
“I design, You manage”

“I manage, You ...”



New Attitude

“We are All
responsible for Our
equipment”



PEOPLE FIRST AT SCITOR

Roger Meade, founder and CEO at Scitor, a company that provides products and services in program management, systems engineering, and customized computer information systems, sees his employees as assets, and he looks out for them. He recognizes that people can get sick so he has instituted unlimited sick leave with no lost wages and no tracking of sick days taken, and there is a company-paid health care plan, along with a \$1,400 fund for each employee for dental and vision care and unreimbursed medical expenses. He recognizes that his employees have children, so new mothers get 12 weeks of paid maternity leave and the option of full or part-time work when they return. Meade understands that job sharing can make sense and that not everyone can be there between 8 a.m. and 5 p.m., so his company has job sharing and flextime and provides benefits to any employees who work at least 17.5 hours per week. He knows his employees like to have fun, so everybody gets tickets for the local's team games, and there are company organized picnics, ski trips, and road rallies. He knows people need to be excited about their company, so he holds an annual fiscal year kick-off meeting in a first-class resort that all employees attend. He pays for transportation, food, and lodging for each employee and his or her guest for the three day affair.

Why is Meade so seemingly lavish with his employees? He says, "Scitor is our people. Our success depends on them. Knowledge resides in their minds and their feet. Too many companies fail to grasp that feet can walk out of the door as easily as they walked in."

Meade sees his programs as investments not costs. He further explains, "People are your resources. Taking care of people's needs is the key to productivity. Every work-family program at Scitor is based upon analysis, not emotion. Our benefits exist because they support our attract-and-retain objectives. It isn't being generous. And it certainly isn't being liberal. It's simple economics."

Scitor has found, for example, that a \$2,400 investment to provide sick-care service for employees' children saves the company \$17,000 in lost customer billings. Meade says, "Everything we do is driven toward increasing our competitiveness and productivity."

Meade's human resource investments seem to be paying off. The company has had 13 years of profitable growth. However, Meade sees this success not as the result of setting some numerical goals and working hard to achieve them. Rather he refuses to set goals for growth or profitability. He explains, "Profits and growth are a byproduct of doing the job right and focusing on customer satisfaction. Satisfy the customers and make them successful, and we'll be successful."

5S : as basis

5S is a process of workplace organization and housekeeping which is carried out *gradually* and *systematically*

5S method is a structured program to be implemented in workplace organization and standardization

5S improves

- safety
- work efficiency
- productivity
- sense of ownership

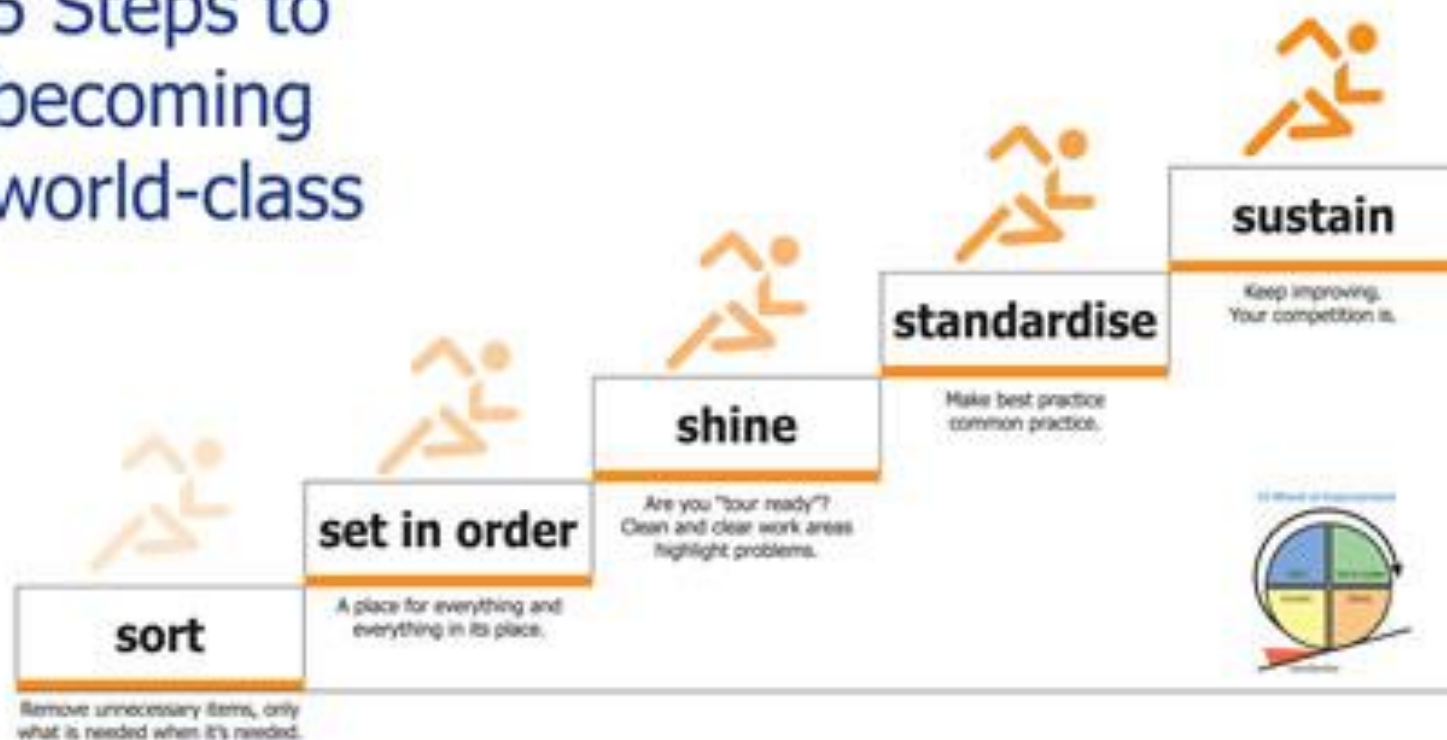
5S is originally developed in Japan but actually well known in many countries

- **Seiri** : **clearing-up**
- **Seiton** : **organizing**
- **Seiso** : **cleaning**
- **Seiketsu** : **standardizing**
- **Shitsuke** : **self-discipline**

5S

a place for everything and everything in its place

5 Steps to becoming world-class



making a real difference

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The Keys to be implement 5S successfully:

- **Get everyone involved**
- **Get company authorization**
- **Final responsibility rests with the President**
- **Make yourselves understood and aware of**
- **Do it all the way**
- **The President should inspect the gemba personally**
- **Don't stop halfway in establishing 5S**
- **5S is a halfway toward other improvements**