

Process Benchmarking Drives WWTP Maintenance Optimization within the National Water and Wastewater Benchmarking Initiative

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Presentation Outline

- Performance Assessment Benchmarking in Canada for 12 years.
- Achieved early success, and we clearly addressed a need
- Metric Benchmarking Benchmarking is meaningless unless you do something with the results.
- Process Benchmarking is a vital tool for Performance Improvement
- Case Study to illustrate the example: Process Improvement in Water Wastewater Treatment Plant Maintenance
- At the end of the day, it is all about making organizational change, which is very hard to do

Benchmarking Canada's Water Sector



- Water and wastewater services are a municipal responsibility. Our utilities are mostly publically owned.
- Provincial government acts as Regulator. Little direct Federal Government involvement or funding.
- Water is still plentiful and inexpensive. Generally under valued and priced (but starting to change)
- Benchmarking began in 1998 due to a lack of industry standard performance indicators and a means to communicate “real” results with stakeholders.
- Has become a nationally recognized standard and a Best Practice

National Water and Wastewater



Early Key Success Factors

- Very high level of cooperation amongst utility partners;
- Open sharing of information and ideas; benchmarking data is not blinded;
- Willingness to experiment, and pilot new ideas. Change on the fly if necessary;
- Patience: Prepared to make investment of time and energy.

What We Have Learned

- While not technically difficult, it IS hard work
- This is a communication project
- It actually works! We can now measure progress with numbers and facts
- Metric Benchmarking on its own of limited use; you need a plan to begin Performance Improvement
- Breaking the habits of the past is hard, but it **MUST** start.

NWWBI Performance Indicator Framework

7 generic goals that are common to all utilities

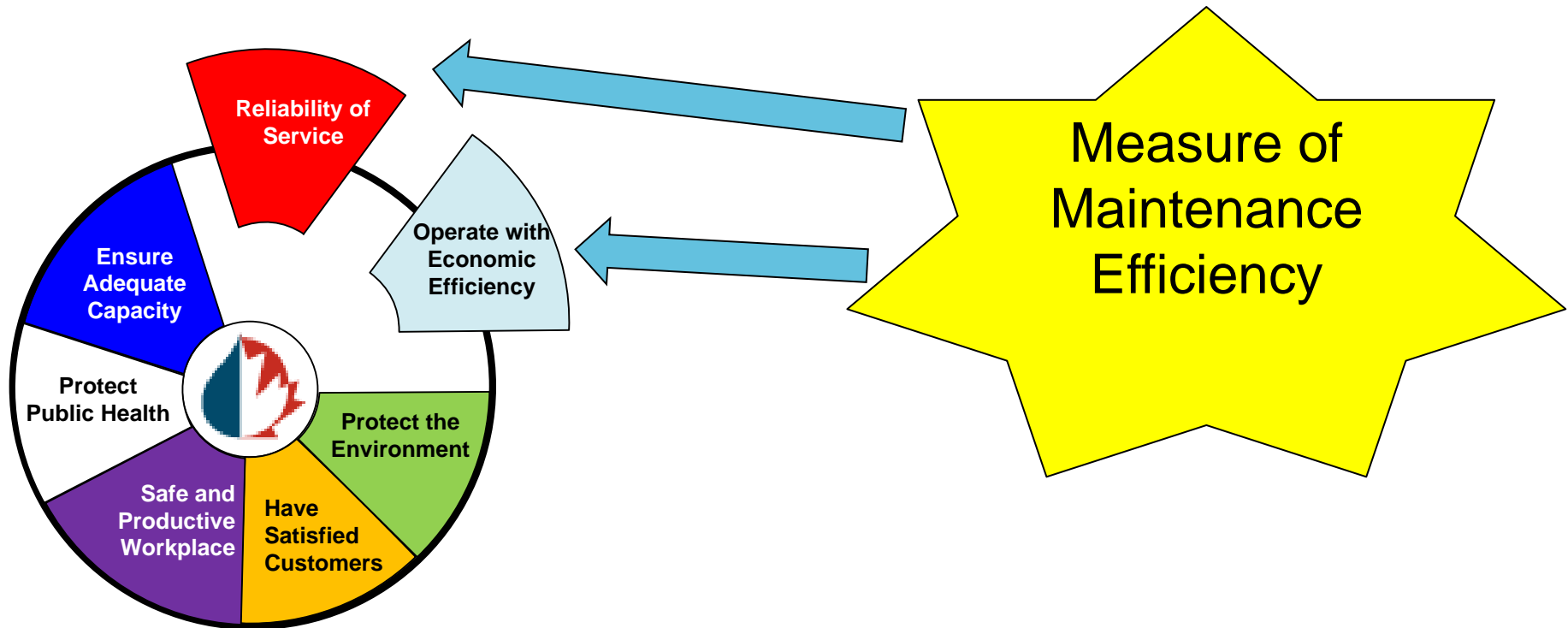


- Using performance indicators that measure attainment of each goal

- About 75 individual performance measures

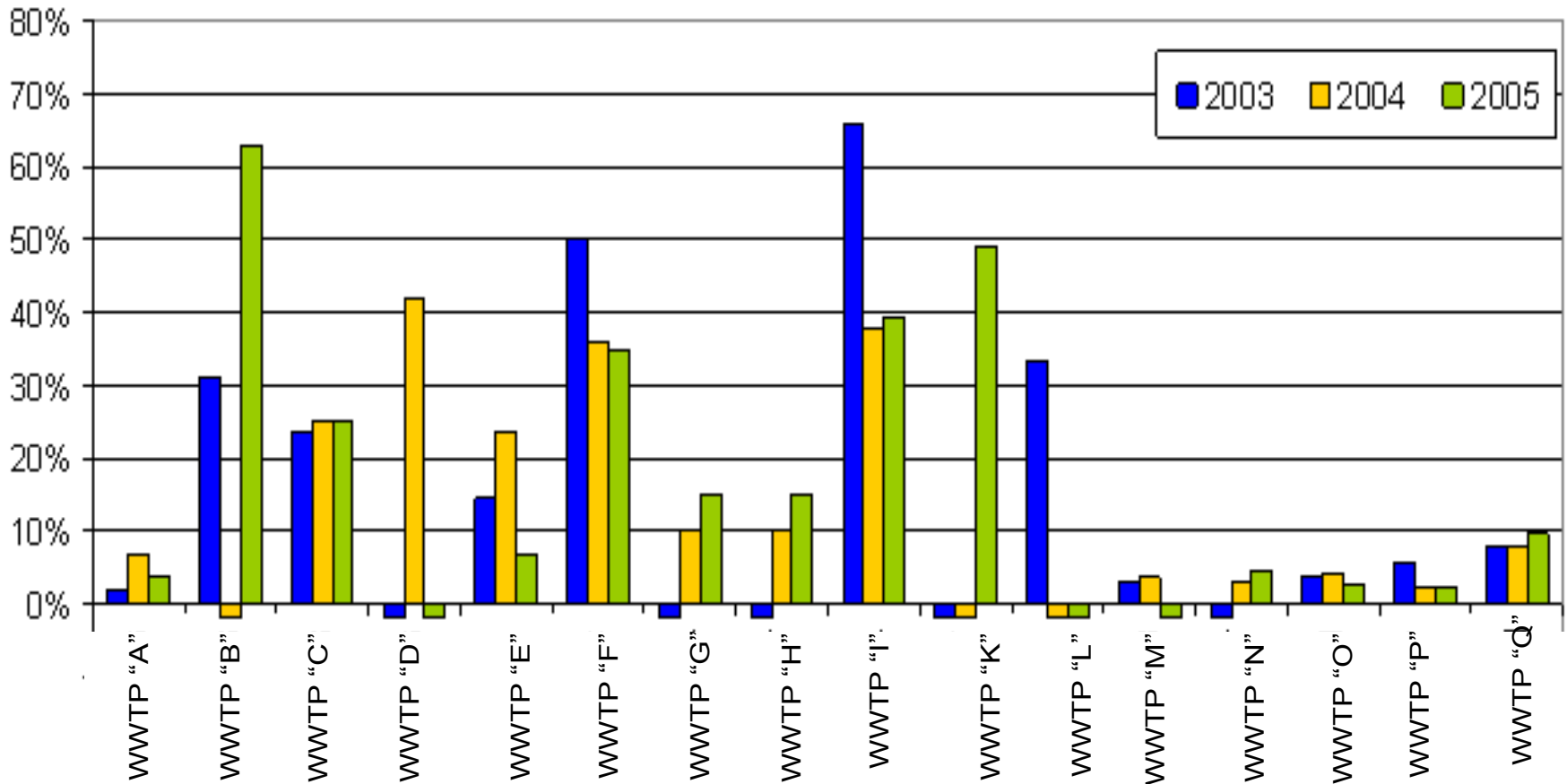
One of our first Performance Indicators

Reactive Maintenance Ratio = $\frac{\text{Unplanned Maintenance Hours}}{\text{Total Maintenance Hours}}$



Results: Meaningless?

Unplanned Maintenance Hours / Total Maintenance Hours
All WWTPs with AAF Above 80 ML/day

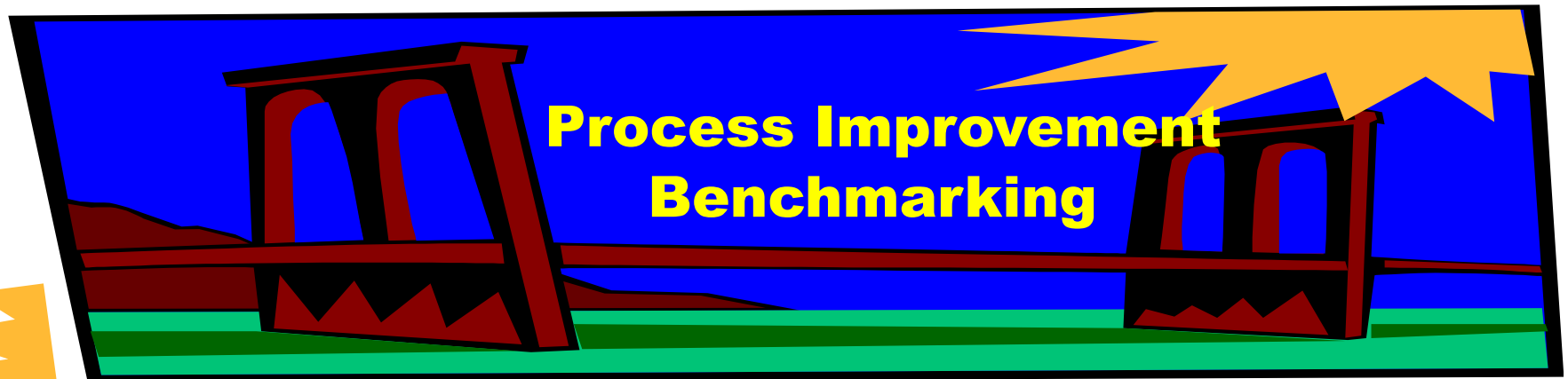


Negative Values - no data available
 X-axis - in order of increasing flow

Issues

- Well defined PI but something was missing
- This issue was the subject of a detailed debate at annual workshop
- Workshop was attended by “generalists” who were also confused
- Next Step? Drill down into process
- Establish a Task Force to conduct Process Improvement Benchmarking

Formal Transition to Process Improvement



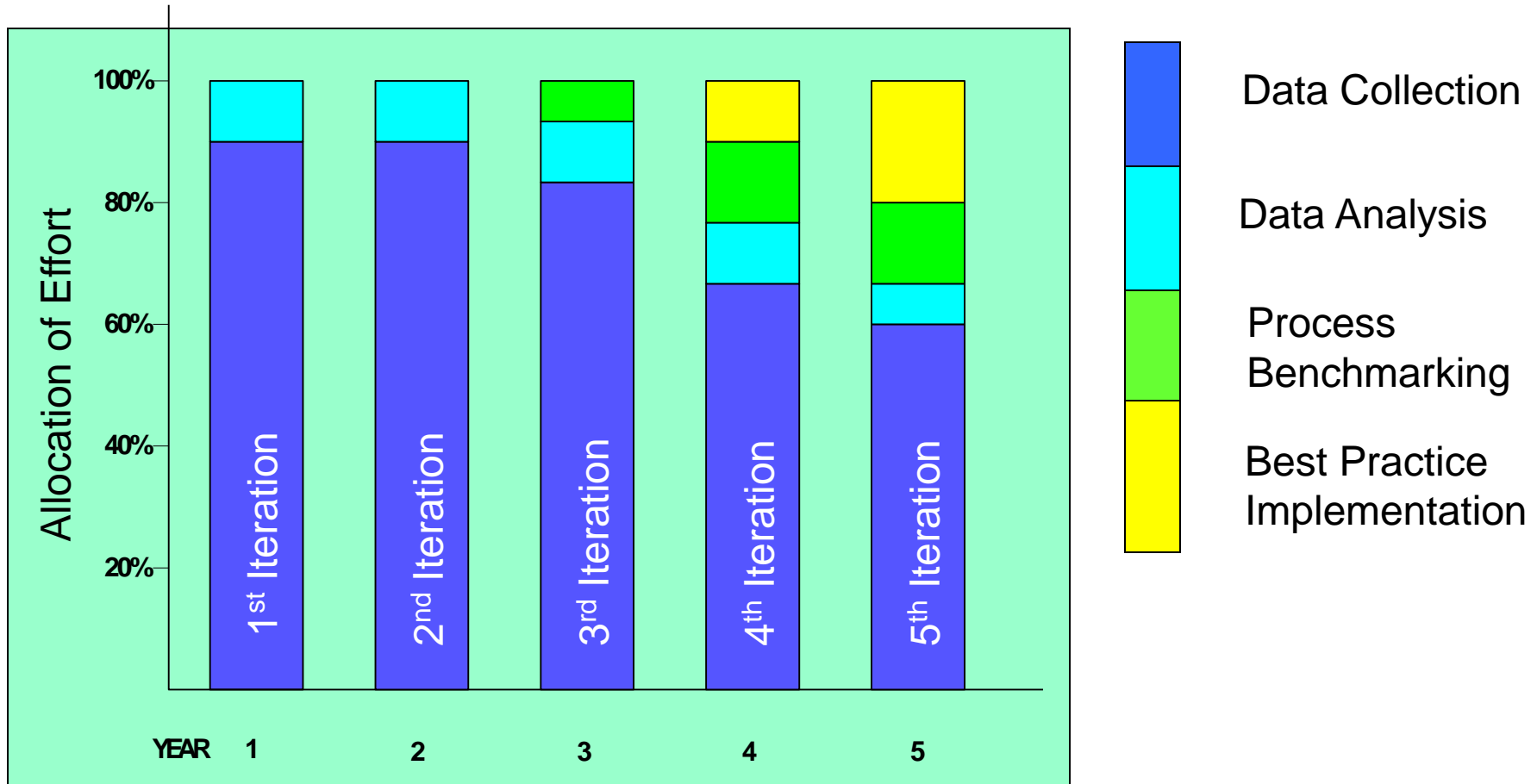
Metrics



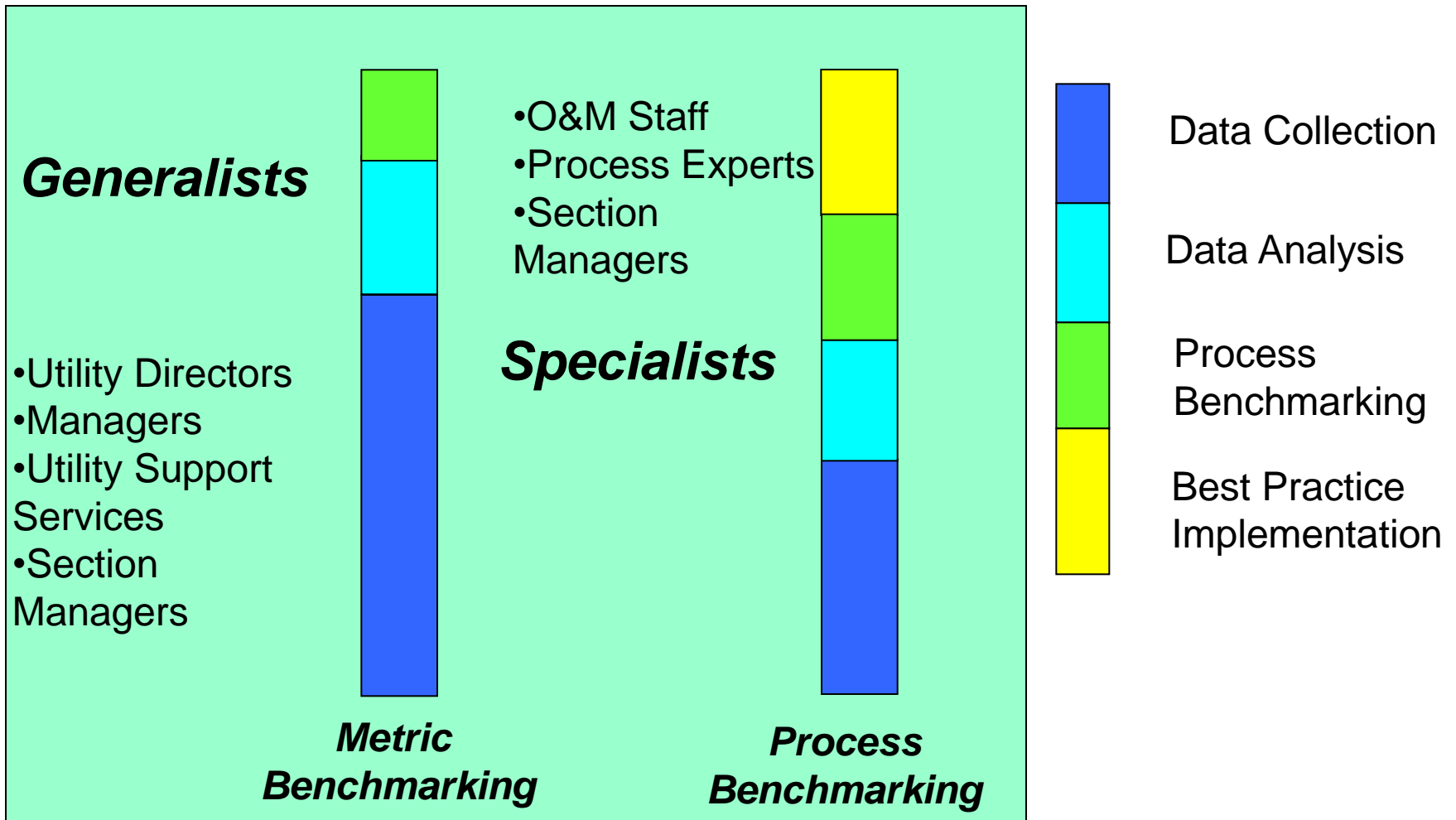
**Utility Goal
Attainment**

“If is it not formalized, it will stall when the hard work begins”

Performance Improvement from Metric Benchmarking Takes Time



Process Benchmarking Requires Different Skills from Metric Benchmarking



Process Improvement Task Force

- Task Force work moves to process specialists: In this case it was Maintenance Engineers and Maintenance Planners
- Establish Task Force Terms of Reference and Objectives
- Project Manager develops Workplan to achieve objectives
- Task Force participants take portions of the work and collaborate on results.

**Detailed but
focused
discussion**



The Challenge

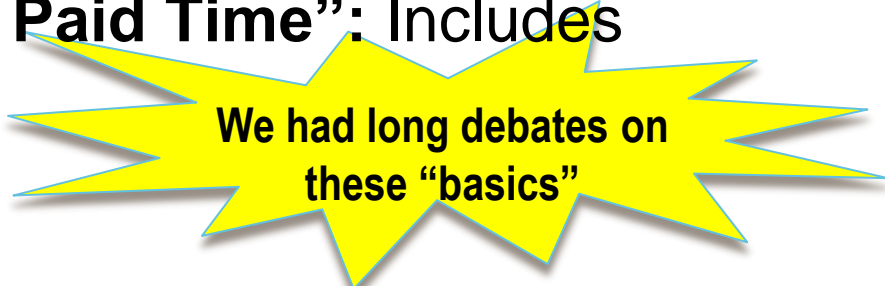
- How do we express our maintenance situation to City management to ensure that we are adequately resourced?
- How can we demonstrate that we are running maintenance efficiently and cost effectively?
- How can we forecast our future maintenance needs and requirements in specific terms?
- How will these plants be maintained after the retirement wave has passed?

Begin Addressing the Complete Maintenance Management Picture



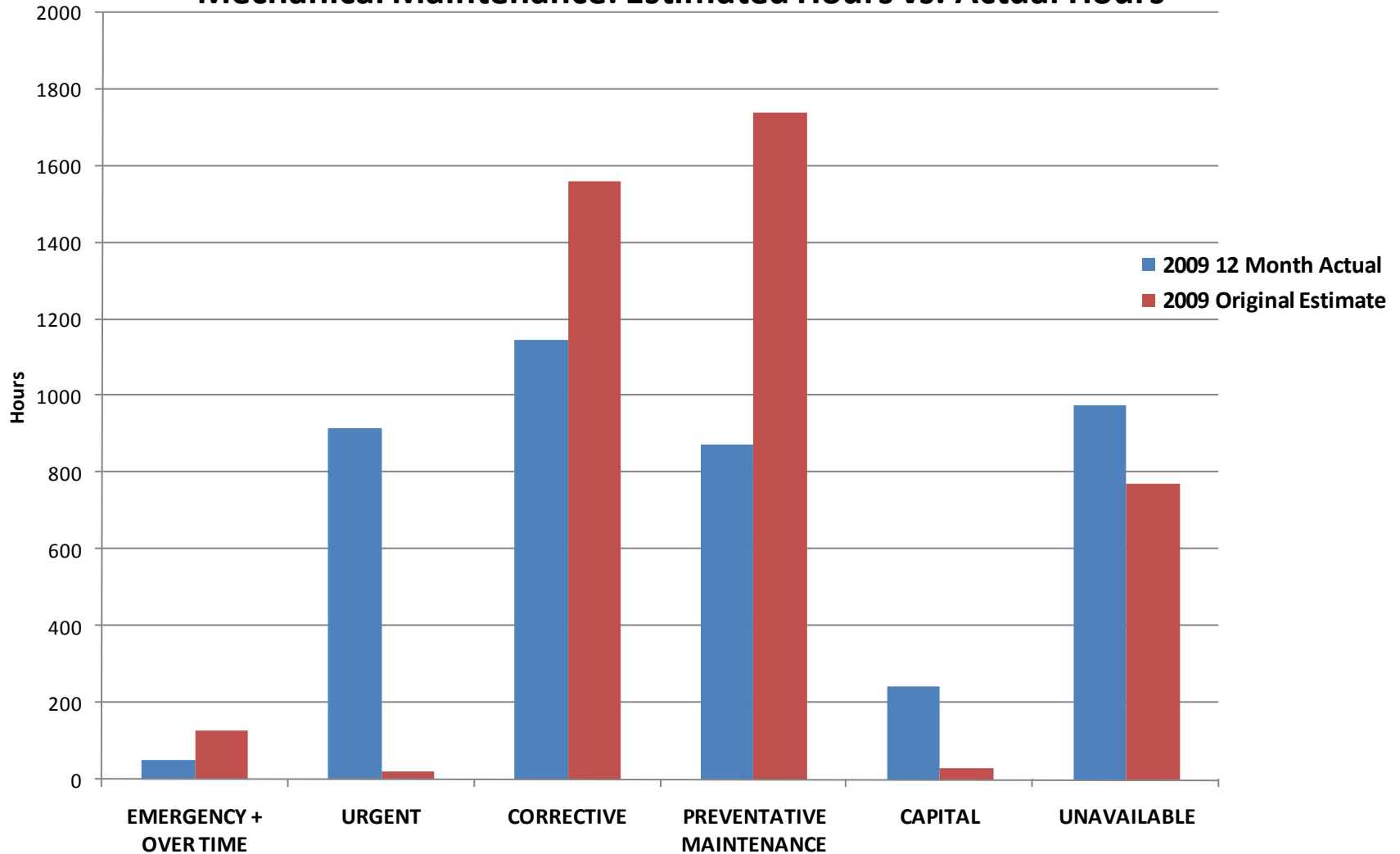
Step One: Agree on terminology basics

- **Reactive work** = Emergency and Urgent work
- **Reactive work** causes you to break your schedule
- **Corrective work** can be reactive or proactive
- **Preventive Work** is always proactive
- **Planning**: The act of scoping and planning a Work Order
- **Scheduling**: The act of organizing the Work Order to occur at an optimized and preplanned time.
- **Work is Proactive** if it is planned and scheduled
- **Account for “Unavailable but Paid Time”**: Includes vacation, sick, training etc.



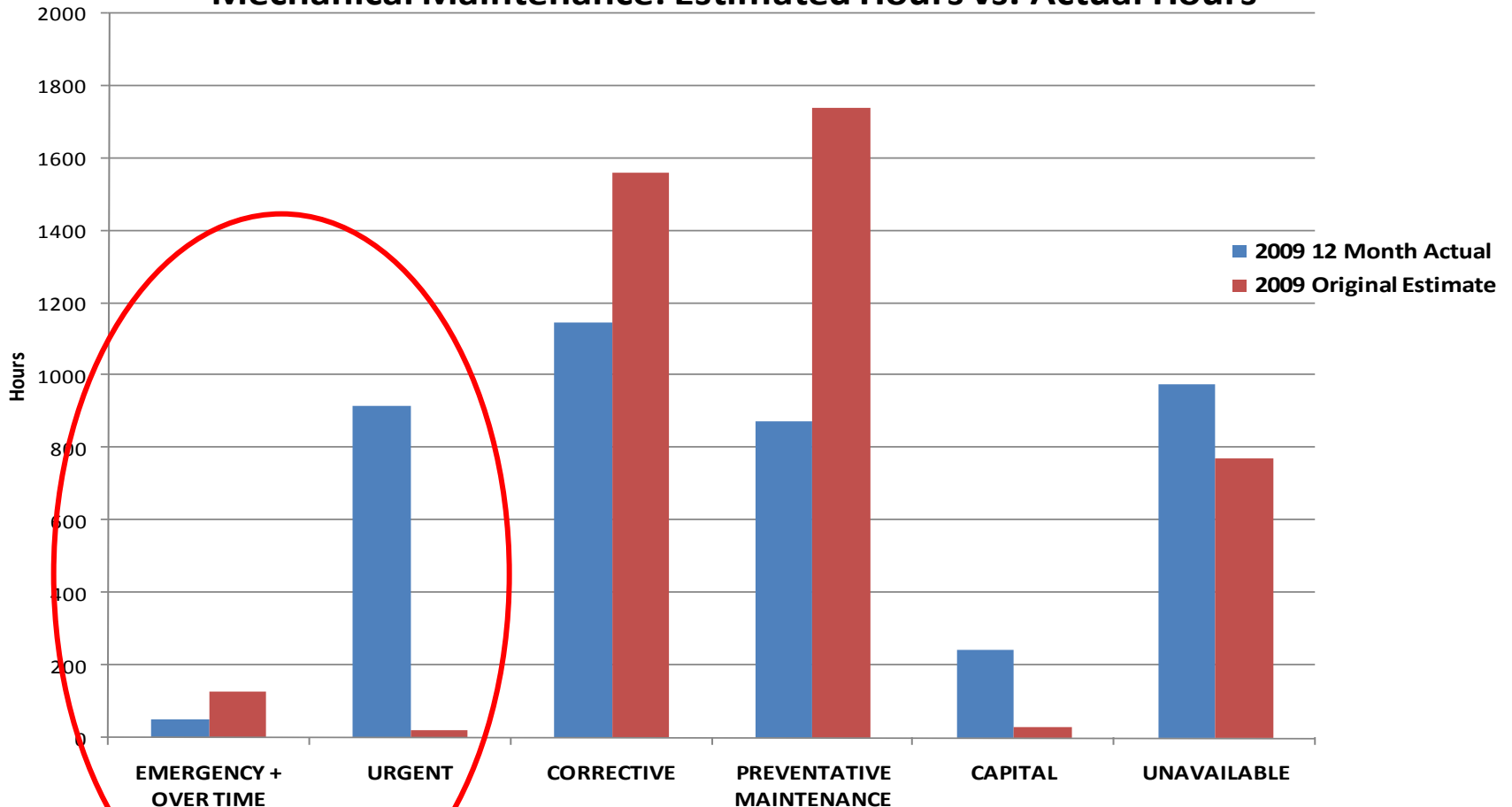
We had long debates on these “basics”

Example from Wastewater Treatment Plant: 2009 Mechanical Maintenance: Estimated Hours vs. Actual Hours



So, this facility has 23% Reactive Work...so what.

**Example from Wastewater Treatment Plant: 2009
Mechanical Maintenance: Estimated Hours vs. Actual Hours**



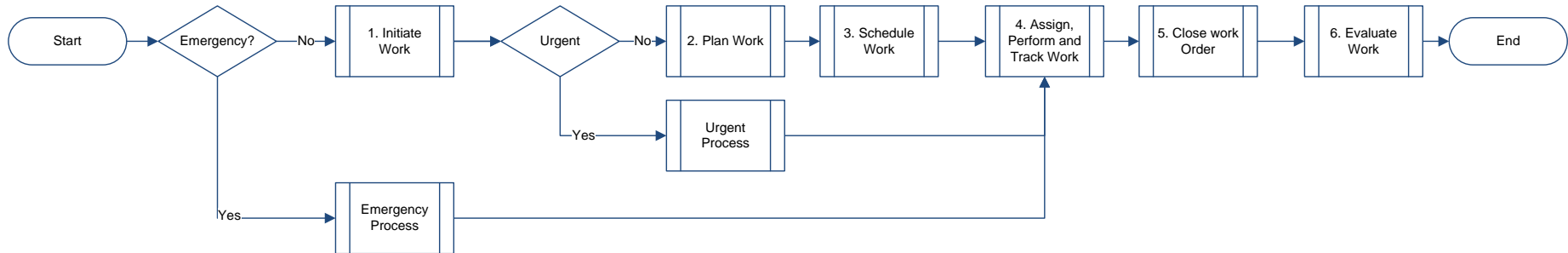
We can now isolate and quantify the problem

- This WWTP Facility is not completing its PM program. Less than 50% complete in fact
- Emergency work not a problem, but urgent work loads are much higher than estimated. What is the cause of this urgent work?
- Losing maintenance staff to capital work
- Slightly higher volume of unavailable time than estimated.
- Too much reactive corrective work is resulting in the PM program not being completed
 - Over a longer term, this is a serious situation

Step 2: Define the Business Process for Conducting Maintenance

- Process Task Force defined two distinct types of maintenance work; each requiring a well defined work process:
 - Corrective Maintenance
 - Preventive Maintenance

Corrective Work Order Process View

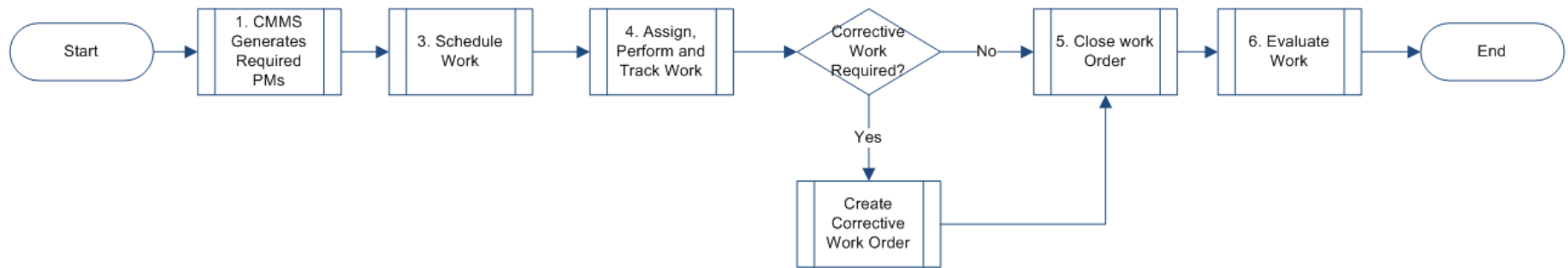


1. Initiate work with WO: Asset problem identification
2. Plan the work: Estimate work. Organize the work in advance
3. Schedule work
4. Conduct the Work
5. Close the WO with correct data: Failure code, delay code
6. Evaluate past work with use of failure, delay codes, etc.

Here are the Productivity Improvement Opportunities:

- Begin applying a standardized Failure Mode on all corrective WOs
 - Enables the application of asset management by building historical data to support the repair vs replace assessment
- Begin applying a standardized Work Order delay code on all WO that exceed the estimate by more than 15%
 - This is how you begin making systematic improvements in maintenance productivity.

Preventive Maintenance Work



1. CMMS generates weekly PMs
2. Schedule the PMs in association with other work
3. Conduct the PMs. New WO required?
4. Close the WO with correct data
5. Report % attainment of PM Program regularly

Conclusion

- Metric Benchmarking is not enough. It is only a good start. Process Benchmarking is the key to success.
- Process Benchmarking is exponentially more complex than Metric Benchmarking: Very few “quick wins”
 - Required different skills sets
 - Requires much more data to support
- Key Resources:
 - Internal staff who know their job
 - Best Practice documentation or experts (don't reinvent the wheel)
 - Project Manager to keep the progress on track: Process experts tend to get bogged down in details

This presentation is available for downloading at:

www.nationalbenchmarking.ca

**Public Report, Performance Measures Index, and
detailed glossaries are available at:**

<http://www.nationalbenchmarking.ca/public/about/methodology.htm>

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