

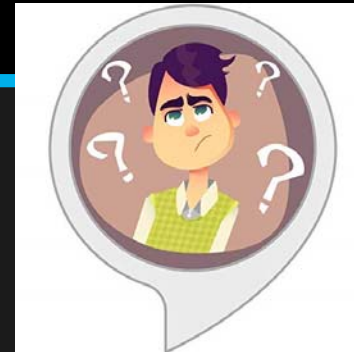
Use of Performance Metrics in an Environmental Testing Laboratory



Scott D. Siders | Best Management Practices for Environmental Laboratories | 2021 NEMC

Ask yourself. Do you find any of this occurring at your laboratory?

- Key decision making is difficult.
- Decisions based mostly on anecdotal information.
- Decisions are often reactive in nature.
- You say you are a good laboratory, sell yourself on high quality, exceptional customer service and meeting requested TAT but don't know if that's really true.
- You think your quality benchmark may be set too low. That is, you have done the minimum to maintain accreditation, "passed" audits and your lab passes PTs the majority of the time.
- You feel you need more, better and timely information/data to manage, keep eyes on critical matters and improve your laboratory or department.
- Feel there is a need for a change in management philosophy, because you realize you can't run the laboratory or your department the way it has been done in the past.



Then consider use of performance metrics and key performance indicators

What they can bring to the management team's table:

- Metrics allow management to understand precisely what's happening throughout a laboratory. What areas need improvement and who should be rewarded for high performance can be determined with the right metrics. Which in turn allow managers to intelligently guide their laboratory forward.
- Metrics provide objective measures of performance, and this captured data enables you to “manage by fact”. Evaluating laboratory performance is not about whether your people are working harder, longer hours or staying busy.
- They provide transparency around laboratory performance and gives employees a snapshot of the health of the laboratory, what improvements are needed and can empower them to be part of the laboratory's success.



So, you might ask, what are performance metrics (PMs) and key performance indicators (KPIs)?

- Definitions (that I like):
 - Performance metrics are used to measure the behavior, activities, and performance of an organization. This should be in the form of data that measures required data within a range, allowing a basis to be formed supporting the achievement of overall business goals. Measuring performance through metrics is key to seeing how well systems, processes and people are working and whether targets are being met. Using data to improve the management of your laboratory.
 - Key Performance Indicators (KPIs) are the critical (key) indicators of progress toward an intended result. KPIs provide a focus for strategic and operational improvement, create an analytical basis for decision making and help focus attention on what matters most. As Peter Drucker famously said, “What gets measured gets done.”

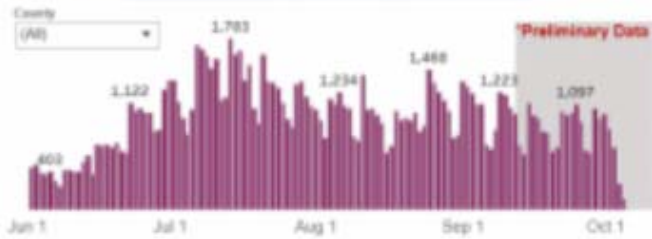
Things to initially consider and re-evaluate at times.

- Begin to **sell the idea and anticipate and prepare for pushback and culture shock**. Let them know metrics will tell them how well things were working or are not working. Let everyone know, if we do this right, they will know where they can improve and be even more successful. Metrics will allow you to see and quantify performance. Realize some areas of the lab may not want others to know how they are performing.
- **Construct your metrics**. Find the right performance measures and KPIs that work best for your laboratory. **Take risk into consideration when doing so**. This will take time and be a work in progress (trial and error). Decide on primary performance metrics (broad) and any secondary performance metrics (more specific). This phase can be a big obstacle to getting started.
- **Evaluate your LIMS, quality and accounting IT systems** to see if they are capable of automatically capturing the data needed. Determine if you need different or additional hardware and/or software to capture and report the data. This may take some investment in resources.
- Decide how you are going to **organize and report the data or information so it is timely (real time)** and you can be proactive more than reactive. **Dashboards** are the way-to-go to visualize performance, can use spreadsheets or database for this.

COVID-19 Dashboard <https://ohiohealth.com/ohio/covid19>

Daily Cases in Ohio

Daily reported COVID-19 cases in Ohio from the Ohio Department of Health **June 1, 2020 to October 8, 2020** <https://www.ohiohealth.com/ohio/covid19/cases>



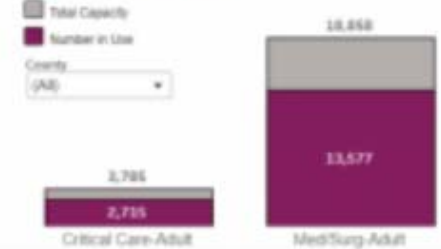
R(t) Numbers for Ohio

COVID-19 reproduction number over time in Ohio and select areas, less than 1.0 is desirable. Based on data from the Ohio Department of Health **June 1, 2020 to October 4, 2020**



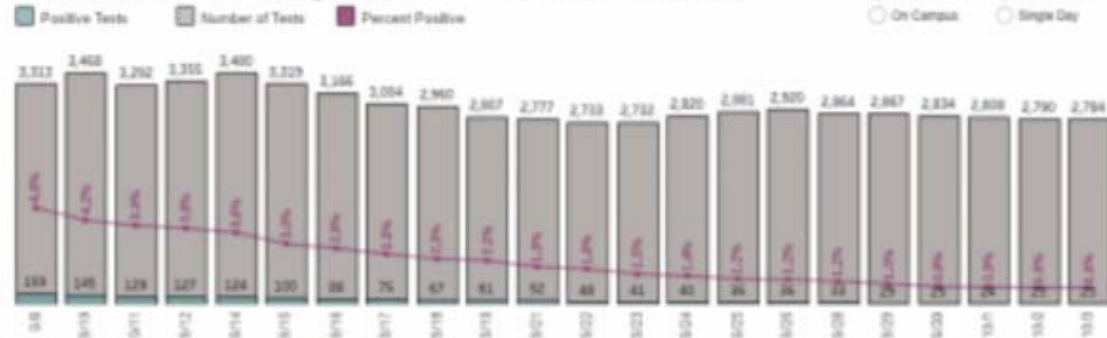
Hospital Capacity in Ohio

Hospital bed capacity in Ohio and beds occupied from the Wexner Medical Center **October 4, 2020**



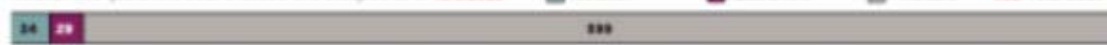
7-day Average Test Results for All Students by Test Date

Data as of **10/9/2020** with data available through **10/3/2020** 41 hours to results (7-day average)



Isolation and Quarantine

Isolation and quarantine beds available and occupied as of **10/3/2020**



Cumulative Tests



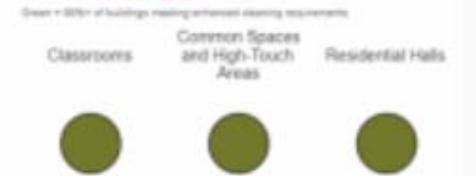
Personal Protective Equipment

Data as of **October 8, 2020**

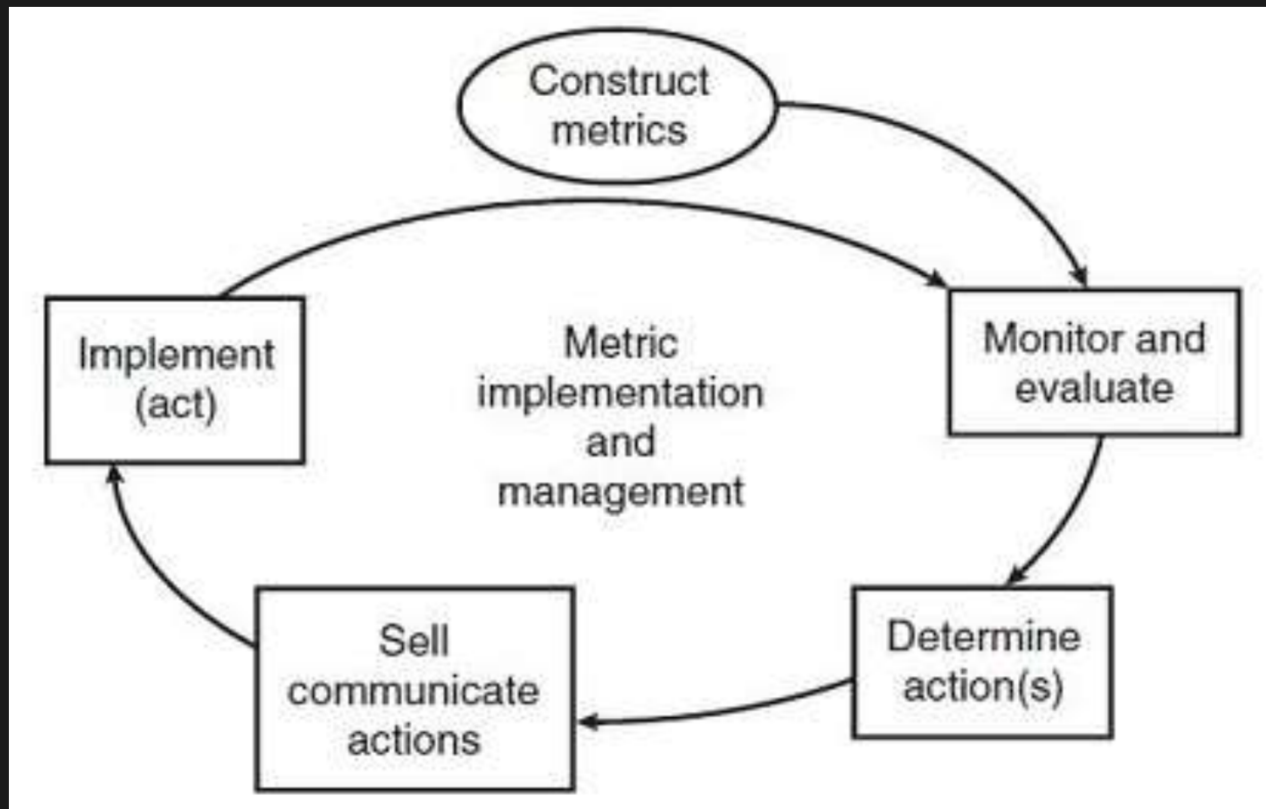


Enhanced Cleaning

Data as of **October 8, 2020**



Performance metrics implementation and management. [2]



About your performance metrics and KPIs you are constructing. ^[3]

- **Whatever the nature of your metrics, you need to make sure that they are:**
- **Specific:** be clear about what each metric will measure, and why it's important.
- **Measurable:** the metric must be measurable to a defined standard.
- **Achievable:** you must be able to deliver on the metric.
- **Relevant:** your metric must measure something that matters and improves performance.
- **Time-Bound:** it's achievable within an agreed time frame.

What might you need for each performance metric or KPI

Real World Example:

Revised Reports (primary metric)

For all metrics, in each category, total the scores and set objective/benchmark (e.g., % range) for a measure of overall laboratory performance: e.g., Excellent, Good, Fair, Poor.

Numerical objectives/benchmarks and scoring may change over time as they are re-evaluated and the laboratory changes. Be realistic, yet also push improvement!

Category (primary metric)	Period	Secondary Metrics & Numerical Objective (assign weighted score for achieving objective)
Revised Reports	Decide on Time Period (e.g., month)	Total # Reports for Current Month (563)
		Total # Reports Revised (include all revisions - both lab error & client error) (24)
		Total # Reports Revised Due to Lab Error (revisions for lab error only) (9)
		<2.0% Reports Revised Benchmark - Lab Error (2.0 pts)
		<8.0% Reports Revised Benchmark- Client Error (1.0 pts)
		Total Points Assigned This Period: 3 pts.

Examples of Performance Metrics found in Environmental Testing Laboratories

(Which ones or combinations are most impactful and critical to your laboratory?)

Quality Management System

- Scheduled Internal Audits Performed
- Audit Findings Reported
- Number of Audit Findings
- Number of Repeat Audit Findings
- Audit Corrective Actions Completed on Time
- Audits Closed
- PT Performance (Average Score)
- Repeat PT Analyte Failure Rate
- SOP Reviews and Revisions completed
- Corrective Actions Implemented on Time
- MDLs completed
- DOCs completed
- Systemic QC Failure Rate (e.g., LCS, Method Blank)
- Holding Time Violations (due to lab)
- QMS Review and Actions Completed
- Accreditation Renewals Ontime
- Accreditation Losses (entire methods and analytes)

Client Experience

- On Time Delivery (often a KPI)
- Data Recall
- Revised Reports
- Complaints
- Revised Invoices
- Timeliness/Response Time (e.g., return phone call, return email, respond to inquiry, sample acceptance issue resolution)
- Qualified Test Results (not due to matrix effect)
- Loss of Accreditation (due to PT performance, external audit)

Examples of Performance Metrics found in Environmental Testing Laboratories

(Which ones or combinations are most impactful and critical to your laboratory?)

Financial

- Revenue
- Revenue Growth
- Expenses
- Net Income
- Meeting Budget
- Capture Rate
- Sales
- Cash Flow
- Budget vs. Actual
- Accounts Receivable Aging
- Accounts Payable Aging
- Revenue per Analyst
- Profit Margin Ratio
- Debt to Income Ratio
- Churn Rate or Customer Retention

Laboratory Operations

- TAT
- Throughput and Available Capacity
- Return on Investment
- Rerun Rate (rework)
- Cost of Poor Quality (COPQ)
- Backlog (work in progress)
- Resource Utilization (staff, instrument, facility)
- Critical Instrument Downtime vs. Operating Time
- Cost of Ownership (instrument)
- Supply Costs
- Overtime Usage
- Material Handling Costs
- Inventory
- Training Completed
- Safety

Now you are up and running, what's next in the process.



This takes leadership and teamwork!

- Identify key issues on a daily, weekly and/or monthly basis. Real time should be a goal. Find out what frequency works best for you.
- Identify and discuss metrics that are of concern due to need for improvement or poor performance. Try to be proactive and not reactive.
- Evaluate the level of risk and develop corrective or preventive actions and/or improvement plans, especially for poor performance. Do not turn a blind eye to poor performance. Tackle it head-on in a positive and constructive manner.
- Identify information and resources needed for plans.
- Management commitment to and focus on metrics. Must fully support and lead by example!
- Establish responsibility and ensure accountability for actions and plans. For example, Laboratory Director holds Department Managers accountable. Vice President holds Directors accountable and so on.
- **Establish recognition, rewards and incentives for good performance and improvement. This is key and cannot be overemphasized!**
- Re-evaluate how well your metrics and KPIs are working and interrelating. Refinement over time.

Important take aways and selling points on using PMs and KPIs.

- You will see, as others have, **there is a correlation** between good performance in quality and client experience with operational and overall financial performance of your laboratory.
- If your performance in the areas of quality and client experience improves, then business performance tends to improve. **That is, if a laboratory has improving quality and client experience performance metrics (poor to good) then business performance if poor tends to also improve in time.** One tends to take care of the other. If you don't believe me talk to the multiple senior managers that can attest to this in their own organization.
- Key for metrics is making them visible and holding people accountable. Post the key metrics in the lunchroom and/or hallways for all to see. Recognize not all metrics are in control of the laboratory e.g., the work is not there.

Again, why use metrics. What researchers have found.

Environmental testing laboratory budgets are seemingly under constant pressure to reduce costs, while improving efficiency, quality and the customer experience. Performance metrics (PMs) and key performance indicators (KPIs) have an important role in this process as they provide a means to assess and improve performance.

PMs and KPIs have an important role in the laboratory as they provide objective quantification of the important aspects of the process or systems under consideration. They appear to be necessary to understand the performance of the process or system, to monitor and control efficiency and make improvements, to measure the effectiveness of decisions and to take suitable actions for maintaining competitiveness.

Paraphrased from [1]

To read and learn more on your own:

- <https://asq.org/quality-resources/metrics>
- <https://www.cmtc.com/blog/metrics-for-better-management>
- <https://www.linkedin.com/pulse/benefits-having-right-kpis-key-performance-indicators-stephen-lynch/>
- <https://www.isobudgets.com/7-performance-metrics-to-optimize-laboratory-quality-and-productivity/>
- <https://nemc.us/docs/2019/presentations/pdf/Tuesday-Best%20Practices%20for%20Managing%20Environmental%20Laboratories-9.2-Meadows.pdf>
- <https://www.profitwell.com/customer-churn/calculate-churn-rate>
- <https://www.bernardmarr.com/default.asp?contentID=657>

Works Cited

- [1]
- Eline R. Tsai, Andrei N. Tintu, Derya Demirtas, Richard J. Boucherie,
Robert de Jonge & Yolanda B. de Rijke (2019) A critical review of laboratory performance
indicators, *Critical Reviews in Clinical Laboratory Sciences*, 56:7, 458-471, DOI:
10.1080/10408363.2019.1641789
- [2]
- <https://asq.org/quality-resources/metrics>
- [3]
- https://www.mindtools.com/pages/article/newTMM_87.htm

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