

SEE AND UNDERSTAND YOUR DATA HOW TO MAKE BETTER DECISIONS IN YOUR LABORATORY

BUSINESS INSIGHTS FOR BETTER DECISION MAKING

Today, laboratories from different industries are tasked with finding ways to be more productive and efficient, cut costs, and do more with less. **Laboratory employees from directors, to managers to analysts/technicians are all required to make decisions which impact the productivity and efficiency of the lab.** In order to do this, it is necessary for the decision maker to *gather as much information as possible, of sufficient high quality*, and in a manner which allows them to *quickly grasp the insights* necessary to make the decision.

DECISIONS

All personnel who work in a laboratory face decisions. Lab directors who are responsible for setting strategy and making long term decisions may be concerned about what are some of the long term trends in a laboratory. Is test volume increasing or is there perhaps a particular category of testing I should invest in due to higher demand? Lab managers or supervisors responsible for the day to day management of the laboratory operations may be concerned about identifying bottlenecks in the laboratory process. Are there areas where work is queuing, reducing productivity in my lab? Or how do I justify new headcount? QA Managers may be concerned about why there are so many out of spec results for a given test. Laboratory Analysts may be wondering— am I meeting my goals, and if not, what do I need to do to improve? Or, I need some new instruments—how can I prove why I need these new instruments? Each of these questions requires data to answer.

DATA OVERLOAD

The challenge of today's laboratory is that there is a lot of data but not enough insights from this data. Every organization

has more data today than a year ago. Laboratories typically implement Laboratory Information Management Systems (LIMS) which hold lots and lots of transactional data. The LIMS captures data on each sample going through the system, tests run on these samples and the test results. There is also ancillary data regarding the customers, analysts, patients, instruments, tests, test methods, etc. A LIMS database can grow tremendously and hold data for years of laboratory transactions. However, do laboratories effectively use this data to make better decisions?

HIDDEN INSIGHTS, UNTAPPED OPPORTUNITIES

The data within a LIMS contains a treasure trove of insights related to a laboratory's operations. For example, in addition to capturing the sample and test results, the LIMS also captures metadata regarding the sample, such as when the sample was logged in, who logged it in, which equipment was used, when it moved to the next step in the workflow, etc. This metadata is stored as part of the transactional data, but looking at this data in aggregate can provide rich insights into the laboratory operations. For example, looking at the average time it takes a sample to be logged in over a period of weeks, months or over the year

may provide insights into improvements in laboratory intake. Data showing the average volume by analyst or equipment may provide insights into utilization of laboratory resources.

Looking at the data can also provide insights into what is causing a problem. For example, if the lab is consistently missing turnaround time, analyzing the data can provide insights into why the lab is missing turnaround times, whether it be a particular instrument that is not performing optimally, or an employee who is consistently missing expectations and needs some further training. The data can also identify opportunities for improvement. For example, analyzing workload data by employee may provide insights into the process flow within a lab and where there may be bottlenecks which need to be alleviated.

EXTRACTING INSIGHTS

So, how does an organization get insights from the rich data already stored within the LIMS? Modern LIMS solutions embed advanced analytics capabilities. This enables laboratories to easily extract data from the transactional LIMS database, aggregate and summarize the data and visualize it in an easy to understand manner. Advanced analytics solutions provide primarily 4 main components: (1) an in-memory database; (2) advanced visualization capabilities; (3) easy to use builder tools; and (4) a solution approach.

IN-MEMORY DATABASE

Transactional databases with large volumes of data are not ideally suited for summarizing and aggregating data. In reality, advanced analytics solutions do not need all of the data from the database—they only require a subset of the data. In addition, for the most part data required by laboratories for analytics does not need to be real-time. Depending on the needs of the organization, the data may be updated hourly, daily or weekly. After the data is extracted,

it is stored in an in-memory database. In-memory databases compress and store data in the RAM of the server allowing fast access. Thus, queries run against this data will run very quickly and without any performance burden on the database server.

ADVANCED VISUALIZATION

Advanced analytics solutions allow for data to be visualized with charts relevant to the data. There are many types of charts available and the solution auto guides you to pick the best visualization based on the data set you have. For example, data with a geographic location may be best visualized on a map. Scatter plots are useful for visualizing large data sets and looking for outliers in that data. Bar charts and pie charts are useful for comparisons. Seeing data in these types of visualizations allows the user to see insights which jump out at them and are difficult to see in a spreadsheet or detailed view. Using color, shape and size allow for further insights. Moreover, laying out these charts in a dashboard, which assembles 2 or more charts allows the users to see relationships between data sets, as well as use filters to focus in on the data they are specifically interested in. Finally, dashboards allow the users to drill down through different data sets, allowing them to tailor their search and see details of a summary data set.

BUILDER TOOLS

In today's world, executives are demanding analytics but IT departments may have an endless queue of report requests. At the same time, reports lead to more reports and there is growing frustration that the data is old. What is the solution?

Advanced analytics solutions enable users to create their own dashboards and visualizations. This is important as a

See key metrics for laboratory operations at a glance, and dynamically filter or drill down to see specific areas or departments.





See instrument or analyst utilization and variances.

vendor cannot provide out of the box solutions for every scenario, and the users may want to tailor dashboards for their own needs. Although many businesses in a related industry use similar KPIs, there are yet many KPIs and business processes specific to each organization which needs to be built in a custom manner. The builder tool needs to be robust enough to transform data through aggregations and calculations, as well as visualize the data in a variety of formats. The tool must also be easy to use for the average computer user.

SOLUTION APPROACH

The advanced analytics capabilities needs to be more than just a toolbox, it must be a solution tightly integrated with the LIMS, providing bi-directional access between the LIMS applications and the dashboards. The integration must be seamless. It is also necessary to incorporate security within the solution, to ensure that only people with the necessary access can see the data. The solution must provide an easy way to administer and manage the dashboards. As new dashboards are created, the solution must provide a way to easily publish that dashboard so others in the organization can utilize the dashboards, including the ability to provide source control. For an organization that is global in nature, multi-language support is key in order to support users in different countries.

Finally, customers are also making decisions on the go and would benefit from the ability to access the dashboards from mobile devices such as smartphones and tablets. The potential benefits of mobile analytics are significant. Analytics are no longer only needed when someone is at their desk or in front of their PC. Mobile devices allow analytics to be leveraged more closely to where work is

done: hallway conversations, stand-up meetings, executive briefings, and discussions with managers and analysts. It can also help in spreading analytics more widely throughout the organization, which can create a culture of data-driven decision making.

OLD VS NEW

The old way of running analytics involves having analysts run reports where an individual (presenter, idea owner, etc.) has tried to anticipate any possible questions. The individual then prepares for a presentation, printing multiple copies of a 25-page report, filled with charts, graphs, and bullet points. The audience then scans through the report as they hear the pitch. The audience asks questions that cannot be answered by the static report and makes an unfavorable decision about the request. At this point, the individual asks to run the report again with new numbers and to send it through email by the end of the day.

The new way of running analytics involves the use of interactive dashboards built to answer a wide variety of questions, always available from mobile devices. This features visually compelling maps, forecasts, and charts at an executive summary level, with the capacity to drill down into the most granular levels of the data with a single tap. The dashboard has filters for site, team, status, sample type, test, instrument, location and date. The presenter walks into the room and connects a mobile device to the projector. Any questions and concerns are addressed during the meeting as the presenter is able to look at different scenarios and aspects immediately from their mobile device. The new way of running analytics enables rapid decision making resulting in a more productive and efficient organization.



Use advanced visualizations, such as color coded floor maps of your lab, to quickly connect with your data and identify problem areas which need to be addressed.

CONCLUSION

A 2012 study published by the Harvard Business Review found that companies in the top third of their industry averaged 5% higher productivity and 6% higher profitability than their competitors because they used data to make decisions^[1]. Advanced analytics solutions expand the laboratory information management system in new ways, not just managing lab data, but also enabling labs to identify the root cause of problems faster and identify opportunities for improvement. With the insights provided by advanced analytics solutions, laboratories are able to make better, more informed decisions, increasing productivity and efficiency within a lab.

[1] Andrew McAfee and Erik Brynjolfsson, "Big Data: The Management Revolution," Harvard Business Review (2012).

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