

**TEST LAB
MANAGEMENT**

PRACTICAL MANAGEMENT SERIES BACKGROUND

UNDERSTANDING LAB MANAGEMENT

EXECUTIVE BRIEFING

Manufacturers' test labs face an increasing workload and demand for testing because of a steadily increasing number of products to test and standards to meet. This reality is driven by market forces (see the previous article in this background series "Market Forces".) Manufacturers' reactions to market forces increase organizational complexity which further aggravates discrete manufacturer's test lab management issues. There is a core uncertainty to product testing: When will the product or device be available to begin testing? This uncertainty is compounded in many instances by an additional uncertainty; what tests must be run? The impact on the organization is an increasing risk of delay in getting product to market thus incurring significant but avoidable costs.

There are opportunities for significant improvement. The path to realizing benefits begins with understanding lab management issues. A key issue for the organization is that, outside of the lab, management has only a passing knowledge of these lab issues and their significance to the organization as a whole. The goal of this background paper is to highlight organizational issues from the lab manager's perspective.

A test lab's goals are:

- Producing fast, accurate results
- Testing in accordance with lab procedures, knowing what happened and why, preventing costly and time consuming re-tests, avoiding nullifying test results after products go to market
- Improving service to users, real-time communication with customers and lab personnel
- Maximizing the usage of test lab equipment and personnel

And Avoiding:

- Delays in getting product to market
- Mistakes that result in producing faulty products
- Unnecessary downtime

Test Labs exhibit three universal problems:

Scheduling and rescheduling

- If you do not know the capabilities and availability of the resources, then you cannot schedule
- Re-Scheduling is often cited as the number one pain point for a lab

Knowing what happened and why

- Accountability
- Efficient re-use of results

Letting everyone know what happened

- Real time communication with customers and lab personnel
- Metrics

SUMMARY

The Evolution of Lab Management. When test lab workload is moderate, simple tools (white boards, spreadsheets, calendars, project software and electronic document repositories) are often sufficient for scheduling and work flow management. Increased workload, measured by a greater quantity of tests within any given time period, strains test lab resources. Increased workload also spawns significant ancillary demands on lab personnel as more customers chew up more time checking on the status and results of their tests. This situation is further exacerbated as the lab adds resources (personnel and equipment) and as external management demands metrics to ensure that resource usage is efficient. As a result, in their search for greater efficiency, lab managers often cobble together simple tools or build special purpose software to address a particular pain point (to handle test requests or to serve as report and data repositories.)

Three Universal Test Lab Problems. There are three test lab problem areas that lab managers must address.

The First Universal Lab Problem is **Scheduling and Re-Scheduling.**

While scheduling is often cited as the key problem, it is rescheduling that is the more common pain point. Why? You schedule tests one time but may reschedule the same tests many times. Scheduling is difficult principally because of the relationship between the test, the test workstation and the technician.

Scheduling and re-scheduling requires

- Knowledge of the details of a sequence of tests
- Knowledge of test methods and procedures
- An estimate of when the product to be tested will be available
- Awareness of the requestor's due date for the test data or the report
- Knowledge of test workstations and trained technician availability

A test is run on specified equipment (the test workstation) operated by a trained technician for some time period. The scheduler determines what lab is the most appropriate for the series of tests. Criteria to take into account are the geographic location of the lab in relation to the facility that is designing or producing the product to be tested, the accreditation of the lab and the lab's resources (test workstations and equipment). Usually there is an established preference; that is, to test a particular product, look first to the local lab.

Once the lab facility is identified, test workstation availability must be established by examining the already scheduled activity for the time period in question. Determining resource availability may be simple (for example, there is a 10 meter anechoic chamber in a facility that runs a single shift five days a week) or complex (there are 20 climatic chambers available 24 hours a day). In this case, a

view of the scheduled activity for just those resources appropriate to the test is key. Scheduled activity can include maintenance, calibration and validation, not just testing. Knowing scheduled activity is mandatory, but better yet is a view of the available time slots for the appropriate resources. For example, a view of the availability of 20 chambers covering a two week period three months from now. But this is only part of the resource scheduling problem.

Consider that the scheduler must overlay the test workstation availability with the availability of the people who are certified to perform that test. The scheduler must understand the resource requirements of the test as some tests require the complete attention of the test technician for the entire test period while other tests require only setup and monitoring. The scheduler must also be aware of technician's non-test activities of such as required training and time-off. Similar to equipment availability, knowing scheduled activity is mandatory, but better yet is a view of the available time slots for the appropriate resources.

Picture a view that combines the availability of 20 chambers and those technicians who are certified on those chambers for a two week period three months from now and you have an idea of what the scheduler is envisioning.

To Schedule, you must have knowledge of the:

- Test Plan
- Duration of each test
- Products you are testing
- Workstation availability (including calibration info on its component pieces of equipment and maintenance schedules)
- Technician's availability and certifications
- Necessary tests, tests offered by each lab, what tests can be performed on what workstations, and the test sequence
- Customer contact info, project/product info
- The equipment or device to be tested, product configuration (software builds, with or without power supply, physical orientation of the product during the test), and when product will be available
- Workstation work load and availability, equipment calibration schedules
- Technician work load and availability, which technicians are certified on which workstation

And just when the schedule is set, something changes.

Imagine having scheduled 90 tests in a sequence, and then the products you are to test are not available at the appointed time. So you move 90 tests out a couple of weeks, squeezing the tests in and around other scheduled tests, bumping other tests, finding available time slots amid maintenance and calibration activities and around work schedules.

Test by test, workstation by workstation, technician by technician.

Two weeks later the test units are still not ready. All 90 tests must be rescheduled again. This scenario is not unrealistic—it is a common occurrence. Re-scheduling is frequent and time-consuming. Labs must be very flexible and resourceful to meet their customers' needs and so that customers perceive the lab as “working with them.”

The Second Universal Lab Problem; Knowing **What, Why, When and Who**.

In this environment of uncertainty and frequent change, regulations and standards require documenting what was supposed to happen and what actually happened in a systemic fashion.

Focused on the test, the customer and lab personnel have real-time information needs such as:

- Has the test started?
- Is the schedule slipping?
- Is the test completed?
- What are the results?
- Have the results been reviewed?

From perspective of the customer, management, auditors and corporate counsel have a broad range of information needs, such as:

- What was agreed to?
- What was done?
- Were problems addressed in accordance with procedure?
- Why was there slippage or downtime?
- When did actions or events occur?
- What was the duration of those actions or events?
- What was the impact on the schedule?
- Who is accountable?
- Who reviewed what?

Lab management must be able to identify slippage, both for reporting lab performance and improving performance. Performance often comes down to identifying who is responsible for slippage. Did the customer deliver the products to be tested when promised? Did the lab have equipment or personnel problems or were priorities shifted?

Similarly, when there are testing failures or anomalies, those failures must, with a high level of certainty, be identified as due to the test lab, the test workstation, personnel or to the product being tested. If these issues are attributed to the test lab, then they must be addressed and the follow-up also documented.

The Third Universal Lab Problem: **Communication and Visibility**

Simply stated, communicate what is happening, as it happens. Due to the high frequency of re-scheduling, the technicians and customers need real time visibility over what is happening and what is going to happen. Management needs to know what's going on and what schedule changes occur. This visibility extends across time; from product tests that were performed years ago to those that are scheduled in the future.

Global dispersion of manufacturing activities has dispersed the constituencies (design engineers, product managers and external test labs among others) across time zones. Questions such as “did the tests of product X start on time?” cannot be addressed by a stroll down the hall. Even basic information about when the test started becomes non-trivial as the requestor's time zone and the lab's differ.

Uncertainty abounds related to test requirements and the timing of testing for products that are in design, validation, reliability and certification phases. Uncertainty leads to lab problems (e.g. testing mistakes, down-time). Communication is a requirement to reduce uncertainty. A significant portion of lab resources are diverted to communication and are diverted further when lab managers are not located within the lab.

Historical access is required for:

- Equipment calibration problems
- Failure analysis
- Compliance Audits
- Legal review for product liability purposes
- Reuse of results
- Responding easily to “special requests”

AWARENESS OF LAB MANAGEMENT ISSUES IS AN OVERARCHING ISSUE

Awareness of lab management issues is typically limited for those outside the lab. This lack of knowledge presents a real obstacle to lab problem solving. After all, test lab management is complex. Test workstations and qualified personnel are limiting factors in the lab environment. Environmental factors, such as when the products to be tested are really available for testing and what tests are actually necessary, cause huge uncertainty in the lab. This uncertainty leads to downtime for lab resources. It is not easily contained as it is primarily due to product immaturity and changing marketing priorities. Proactively managing in this environment of frequent change is complex. Yet, if external management is not knowledgeable regarding the issues, then the path to providing a solution must first break through this knowledge barrier.

Management, external to the lab, often has limited awareness of lab issues. Their vision is often focused on costs; personnel and equipment costs, as well as product recall and product liability costs.

Some form of crisis (downsizing, product recalls, a new product launch delayed due to problems in compliance testing, customers unhappy that test schedules were missed) usually provokes a scramble to address efficiency. Lab management then struggles to educate upper management about the factors that cause pain points. All too often, a few high profile factors are all that can be communicated; a scheduling and rescheduling problem, a database problem, too much down time, not enough equipment or personnel. The low visibility of the complexity of lab management issues is an obstacle to improving the workflow.

CONCLUSION

Test lab management's business needs are to test quickly and accurately, communicate activities and results, and identify bottlenecks and roadblocks before they impact the customer while improving:

- Personnel efficiency
- Equipment utilization
- Short term responsiveness
- Long range planning

There are numerous pain points. Where should attention be focused to maximize benefits?

What opportunities provide the greatest benefit to the discrete manufacturer?

These questions and others are explored and addressed in the **Practical Management Series** available at www.traxstar.com. Join us in exploring the third part of the **Background Series - Opportunities**.

ABOUT THE AUTHOR

Philip A. Irion is Vice President – Product Development at TraxStar Technologies, LLC (www.traxstar.com) in Walnut Creek, California where he works on TraxStar's QATrax Test Lab Management solution and works with discrete manufacturers to improve their lab efficiencies. He can be reached at pirion@traxstar.com.