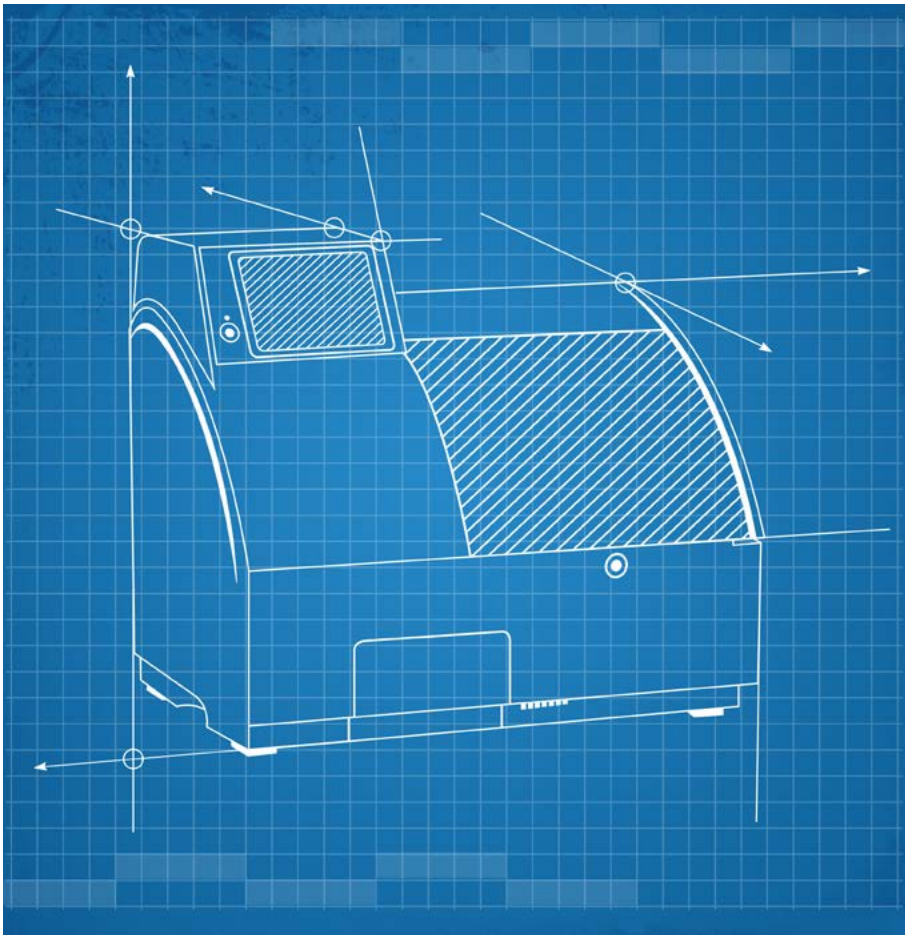
CRITICAL FACTORS IN LABORATORY AUTOMATION SELECTION PROCESS

A fundamental approach to identifying needs and solutions



By Nelson Barayuga, MBA, MT/CT(ASCP)

Selection of automated laboratory processes are based on three main considerations, namely: systems that are designed to produce a higher throughput at a lower cost, systems that eliminate manual repetitive tasks and systems that maintain consistent service efficiencies such as acceptable turn-around times (TATs).

The Decision to Automate

This is the most basic critical consideration. There are partial and fully automated systems, and since most automated systems are designed based on the laboratory's main operational needs, the decision to automate should include several basic aspects: why the lab requires automation; what testing setup will be used; what level of technical support is required; and what potential disadvantages might surface after installing such a system? Having decided to automate, administration must then examine what's available on the market.

A fundamental approach to the promise of automation is to identify a bottle neck in the testing process and determine whether automation can remove or

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Workcell Analyzers

These are instruments that eliminate certain manual processes. There are chemistry analyzers that will retrieve internally stored aliquots for repeat and add-on testing; and hematology analyzers with closed-tube sampling capabilities that will mix, identify and sample the specimen.

2

Interfaced and Direct Sampling Instruments

These instruments have optional robotic attachments and can be connected to a specimen worktable or transport system. Sampling stations can be defined so that these instruments with the appropriate modifications can access specimens directly from the transport system or other devices that will transfer specimens to a fixed sampling location.

3

Automated Support Devices

These are independent automation equipment and provide various functions that could decap, aliquot and sort samples into racks; to those that recap and arrange samples for storage and retrieval.

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minimize the problem.

The decision may also be based on a variety of needs:

- reducing labor costs or address staffing shortages
- tracking, testing and easily retrieving specimens
- consistent turnaround times, or minimal human factor intervention
- operating in a closed system and eliminating contamination (as in highly contagious and novel diseases—testing on Ebola, Zika, etc.)

The processes from pre- to post-testing should be listed and the corresponding automated alternative considered. While most labs would strive for fully automated systems, modular automated systems provide the greatest customization and are marketed in various configurations. The most basic is a device or program that performs a particular function.

Choices should be thoroughly evaluated along with the laboratory's current and intended operations, available platforms in the market, technical complexities and support systems.

Automation-friendly instrument design appears to be the norm whenever possible. Fortunately, most analyzers have evolved into a level of sophistication where automation is already in place and has become an integral part of daily laboratory life.

The Process of Implementation

Another critical factor in the selection process is to comprehend the steps needed to create the final system. This is the overall awareness of what the final operational structure should be.

The compromise between the department's services and the ideal workflow depends on how much automation can be incorporated within a defined and reasonable financial investment and the anticipated return. The return of investment presentation should highlight both financial as well as service efficiency targets. It could be a one-time outlay or phased-in approach. As the laboratory is akin to providing services within the healthcare industry, efficiency and quality should always be intermingled within the processes, and any deviation from budgeted expenses should be anticipated.

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The laboratory must be certain that an investment in one workcell will be compatible in future automation projects. This is where the modular approach to automation is attractive, particularly for laboratories that may need to fund the project in stages.

Filling in the Gaps

Modular systems address certain testing processes, and total laboratory automation is just a more complex structure of linking modular systems in place. Current workcells provide various degrees of automation, and human intervention can support operations where robotic systems are not practical.

Wrapping it together with information technology, there is the vital and usually behind-the-scenes need for a robust, flexible and easily maintained firmware and middleware to put all the processes in place and maintain operations.

Regulatory Requirements and Competencies

The requirements to monitor and report specimen and process integrity, as well as staffing competencies continue with automation. A common standard (for those with robotics in place) includes the staff training and annual competencies to operate, maintain and troubleshoot the automated system.

Depending on the scope and size of the operation, certain processes may require technical or clerical intervention. Technical oversight will still be needed in certain functions and depending on the time or technical complexity required, staffing responsibilities and roles may be modified. Anticipate a hiring mix that is specific to certain tasks and addresses the automated operations of the lab. Examples include specialty positions in laboratory information, quality assurance and, in certain cases, materials management.

Downtime Procedures

Downtime is always a critical consideration. In addition to scheduled maintenance, calibration and QC procedures, management must also consider the possibility of system downtime and keep a readily workable procedure in place to continue operations. This includes the transport system and individual workcell mechanics and upkeep; consumables (including water filtration and waste disposal); LIS and IT support; and staffing.

Backup methodology and operation should also be considered, especially if automation was put in place to reduce staffing and/or increase productivity. This may be considered a disadvantage—especially in a highly automated environment—because production levels will be beyond any manually-based, non-automated work capacity. This is a critical factor and outlines the importance of available outside support, technical cross training and the overall need to prevent or minimize the downtime situation. It is important to identify systems and provide due considerations to those that can drastically affect operations. Backup instrumentation and methodologies, as well as outside testing sites (if part of a health system) should be defined in advance.

A Different Outlook

Automation is the optimal way to remain competitive and efficient provided the testing volume and complexity warrants it. Another aspect to consider is the mindset of the department and its members, whereby instead of just operating an analyzer, the team operates the system. ■

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