Manager's Survival to Engineering Laboratory Automation

Manager's Survival Guide to Engineering Laboratory Automation

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Cat. No. DEL LAE – B001

October 2007

Published by Delphinus, Inc.

INTRODUCTION

A Manger's Survival Guide to Engineering Laboratory Automation

Too often laboratory automation is viewed in terms of technologies and products, the things people use to implement projects. What is overlooked is the planning that is needed on a management level [often senior management] to provide a basis for the *successful* development of laboratory automation *systems*. Laboratory managers are rarely trained in the basics of automation – college courses often do not touch on the subject and most short courses are focused on products and technologies; often by their vendors.

This book is the start of a process of establishing policies, practices, and operational models – all of which will evolve over time as labs change. These elements will provide an architectural basis for the definition, design, development and implementation of integrated lab automation systems. Successful systems, those that meet their objectives, are supportable and can be gracefully upgraded as needed. Those systems are not the result of fix-the-bottleneck methodologies. They are the result of design-against-a-plan methods.

That planning should be the province of lab management providing systems that enable those working in the lab to work to their highest level of capability. The material you are reading is the starting point.

Here are some points to consider:

That planning should be the province of lab management working to provide systems that will enable those working in the lab to work at their fullest level of capability, to be productive.

- In a small survey of 37 companies[1] 44% of the laboratory automation projects failed to deliver the expected results.

- The increasing complexity of laboratory instrumentation has resulted in most instrumentation designed to be used with a data station or to have data transfer capability. Automated equipment is a fact of life. Using it effectively requires planning and careful evaluation of how digital devices fit into the labs workflow.

- Managing automation systems is becoming increasingly complex, requiring you to work with groups that support instrumentation, networking, computer systems, security, and regulatory compliance.

- The initial applications for computing were in science and engineering in the 1940's. Yet graphic designers, animators, and

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office workers have greater flexibility and more effective workflow automation than laboratory workers have, even though those applications have only been in place since the mid-1980's.

Automation should no longer be viewed as a set of independent projects that relieve bottlenecks. It should be seen as interdependent systems that support and enhance lab workflows. Those systems should be designed and built according to a plan that includes supportability, upgrades, protection of the labs intellectual property, and integration.

Advancing the state of the art in laboratory automation is going to require three stages:

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- Planning for automation, laying the groundwork – policies and guidelines – and defining operational models for a lab's work that can assist in determining where automation can be applied with greatest effectiveness and return on investment. We also need to do a better job of identifying automation technology gaps and working to fill them.

- The availability of better trained people to design and implement systems – **Laboratory Automation Engineers (LAE)** who are trained in science, engineering, and technology, to applying engineering principles and procedures to defining, designing, and carrying projects to successful conclusions. This is more fully explored on our web site[2].

- Finally, a change in mind-set. Automation automatically introduces a production line into the lab – a miniature manufacturing line whose product's range from prepared samples to data and information. Realizing that, we can apply tested process development technologies to ensure product quality [statistical process control], upgradeable and supportable automated processes, evolutionary operations improvements [EVOP], as well as process modeling and optimization. This idea doesn't diminish the scientific nature of the work, but changes our approach and will realize the benefits we expected from automated systems. It applies to R&D as well as quality control.

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The material covered should be read by anyone doing work in laboratory automation. In particular it is intended for laboratory managers, R&D directors, those with management over-site on laboratory operation in research, development, quality control, clinical application, etc. It would also benefit scientists, engineers, program managers and those designing, implementing, and using laboratory automation systems.

The use of this material is not limited to new projects. The contents could provide a basis for the review and evaluation of existing systems and practices.

The issues discussed do not depend upon the size of the project. Size is simply a matter of scaling the effort; in large companies some of the points covered may require inter-departmental meetings, in smaller groups it may involve a discussion over a cup of coffee. It is the size of the mural in the preface. The intent is to help those working in laboratory automation to be successful in individual projects and in the integration of projects into larger systems – even if your initial project doesn't have integration as part of its goals, it should be planned for.

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