PLAYBOOK FOR

Modernizing an Aging Laboratory

A Lab Manager's guide to updating testing instruments and software

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Rubber Testing Solutions

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Introduction
Modernizing an Aging Laboratory

It's no secret that many rubber compounders and product manufacturers are operating on laboratory equipment that is outdated and becoming obsolete. It's also no secret that many believe they are on borrowed time in this way - and recognize the need for modernization.

The average lifespan of laboratory equipment is between 15-20 years, with the maximum lifespan possible being around 40 years. During the lifetime of an instrument software or hardware upgrades (or both) may be necessary to keep it compatible with current systems or other hardware - or to enhance its functionality.

Software upgrades typically advance the features and/or connectivity of a software. Depending on the current setup of a lab, it may be necessary to upgrade hardware / OS, based on the new software's requirements, before it can be implemented. Dated operating systems (such as Windows XP, Vista, and in some cases Windows 7) are often not supported by current software/ hardware, as they were designed to serve technology that was current when they were released / last updated. For example: cloud computing, data analytics, and IoT had not yet been developed at the time Windows XP received its last update, so naturally it is not readily equipped with the tools needed to make use of these applications. Using a dated OS can present other issues as well. Windows XP, for example, supports a maximum of 3.25GB of RAM - not much by today's standards. It also does not support many current motherboards, processors, and other components. Additionally, Windows XP is extremely vulnerable to hacking and malware - which is obviously an increasingly severe problem facing companies and individuals everywhere right now.

If a lab manager needs new software for their instruments, the instruments and computer hardware must be compatible with the software. Outdated instruments often use dated i/o peripherals that are incompatible with modern computers and require specialized components to enable connection with modern systems. Further challenges may be encountered if the new software does not support an instrument, or its type of connection. Modern lab management software analyzes data from various sources to paint a picture that cannot be seen just by looking at an individual data set. Test data must be available from all instruments to be collected and filtered through databases to effectively make use of modern lab management systems.

In addition these challenges, legacy instruments are facing parts shortages, maintenance issues, and other issues that cannot be fixed by simply updating software.

Two of the most common questions our customers have pertaining to laboratory upgrades are:

· *What will it take to keep my equipment running?*
· *How can we make sure that an upgrade will keep us going as we advance our manufacturing processes?*
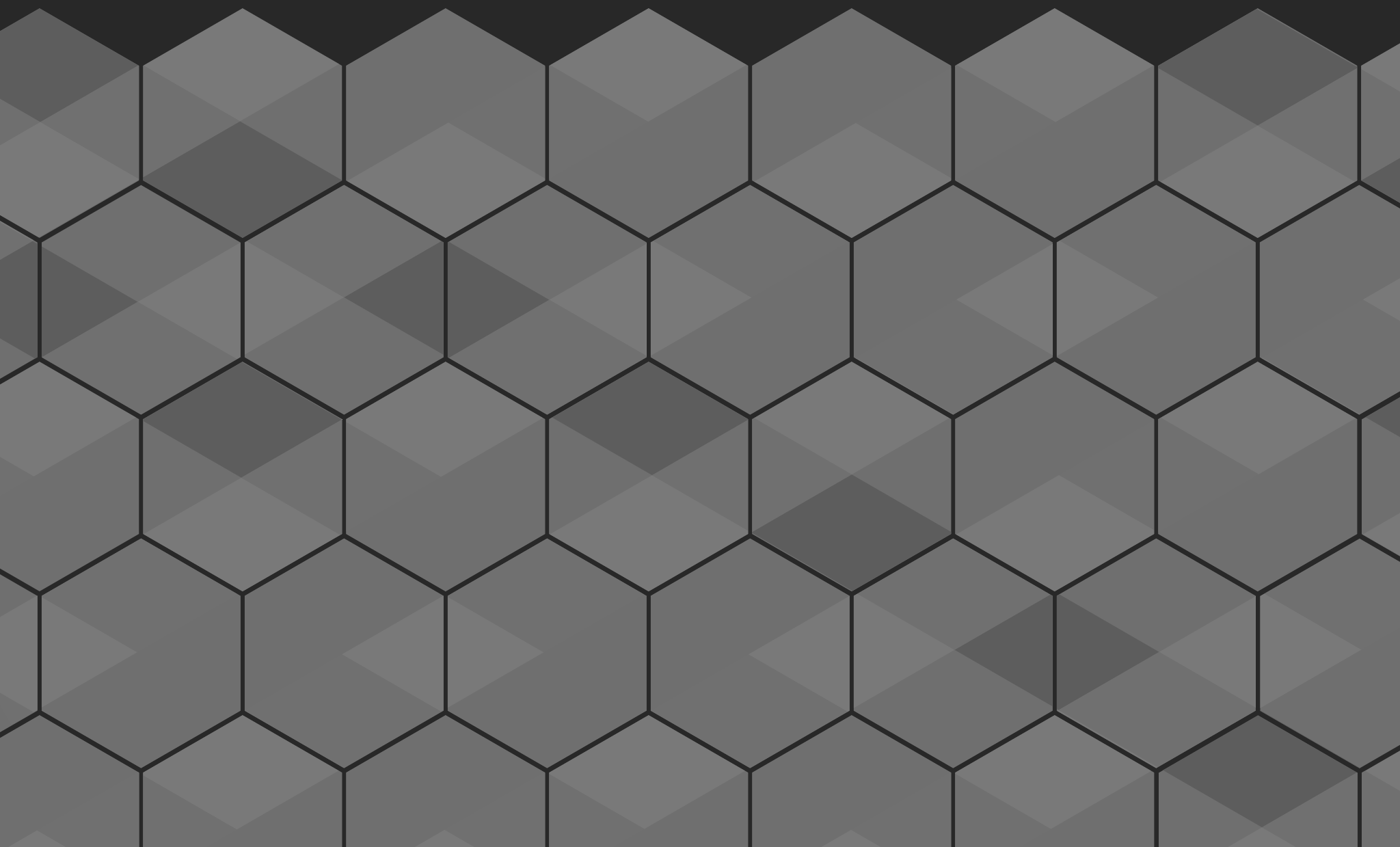
The goal of this eBook is to provide insights into:

· *Big picture technology changes coming to the rubber industry*
· *The questions you need to ask when considering software or hardware upgrades*

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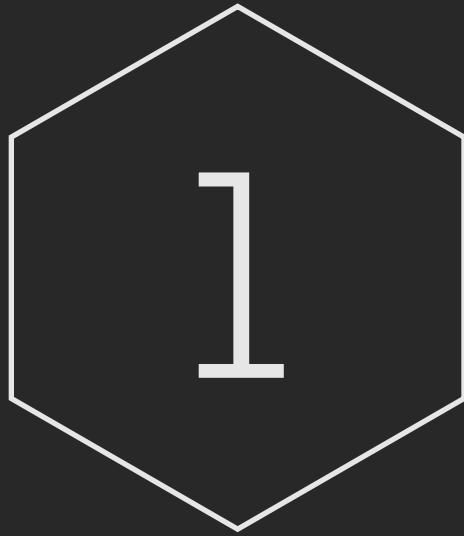
SECTION ONE

Industry 4.0 :
# Great Changes Coming to the Rubber Industry

Industry 4.0

Great Change Coming to the Rubber Industry

People in every industry can see there is a major shift happening that is being driven by advancements in a few key areas of technology. This shift is creating more automated, connected, and data driven industries. Across every industry, the goals are the same: to maximize efficiency and productivity, improve the quality of products and services, and to leverage analysis of data to make the right decisions and predict/minimize problems. Industry leaders call this Industry 4.0, smart manufacturing, or Internet/Industry of Things (IoT).

As with other industries - the rubber and polymer industry is not immune to these ongoing changes. There will inevitably be those who thrive in this new climate, and those who cannot keep up and are left behind. Succeeding will be reliant on effective planning and strategy that uses a holistic approach; utilizing new technology so every part of a company is connected and responsive to what is happening in other parts of the company. In rubber and polymer manufacturing, the laboratory - and the hardware and software of instruments being used - are part of that equation.

Most laboratories and their instruments exist as islands of information - meaning that their data is not being shared in meaningful and effective ways. Where data goes after a test is completed and how quickly it gets there means a lot. Equally important is knowing what to do with the data - how it can be used to make improvements to processes.

Upstream systems track events and values from laboratory data and align them with events and values from upstream and downstream processes. Practices like this can help to gain a better understanding of the relation test data has with other processes, to more quickly identify the origin of problems when they occur - and to identify where improvements can be made.
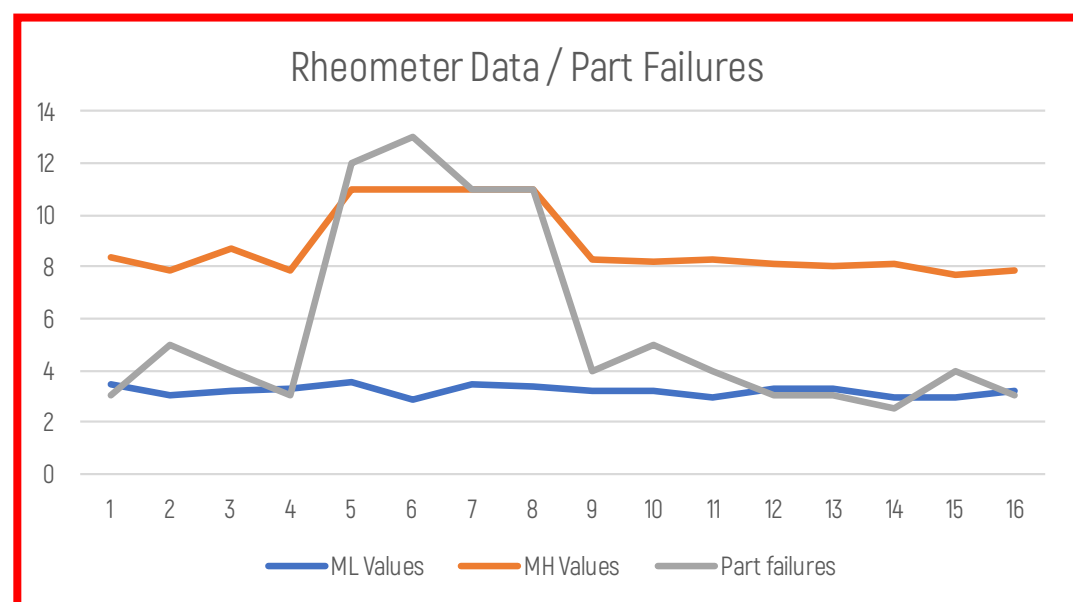
Tracking Events and Values: *Graph showing correlation between anomalies in rheometer test data and part failures data.*

ERP or MES systems, are examples of upstream systems that are used to track events and values to provide a better overall awareness of operations in a factory. These events and values tell you what happened, when it happened, and where it happened - as well as how it has affected other areas - so the problems can be fixed or given indicators to help guide how improvements can be made within the tiers below.
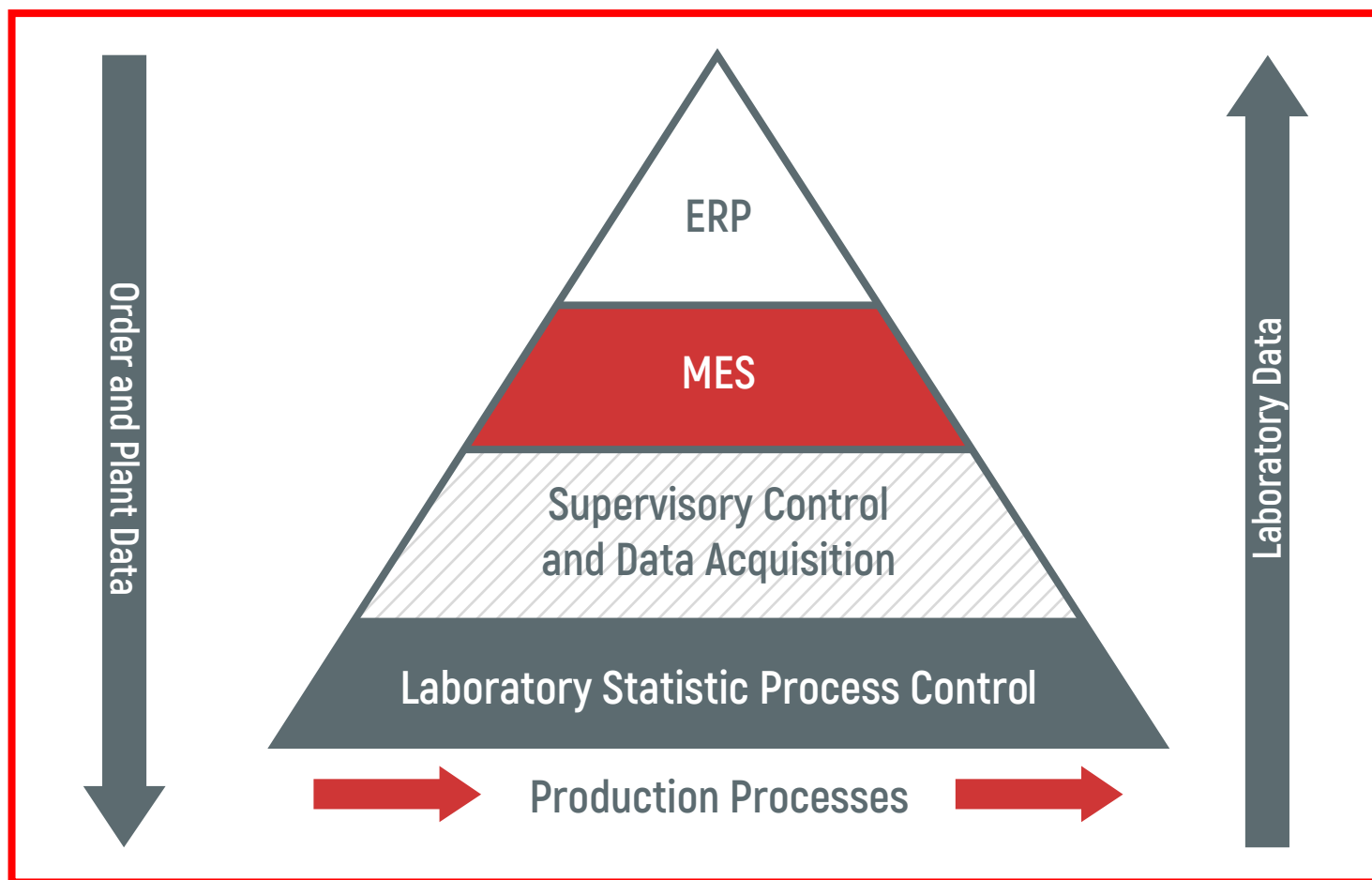
Upstream System Event and Value Tracking: *Visualization of the flow of plant data and laboratory data*

So, what does all of this mean for the laboratory?

Essentially, it means that by receiving data from / sending data back to an upstream system, it can be used to look at the big picture of how factory and lab operations are connected, and how to improve operations and any process that the data taps into.

More and more companies are adopting the use of analytical software and hardware, with the increasing usage of AI and business intelligence tools to help streamline all levels of factory operations. From our experience, these tools are being implemented rapidly and lab data plays a big role.

Data provided by testing can translate into events and values associated with any process, supply vendor, or finished product. In doing this, testing data is able to provide additional value when combined with data gathered elsewhere to provide further insight into a factory's operations. The primary test methods being used are:

- Oscillating Disk Rheometer (ODR) Cure Testing
- Moving Die Rheometer (MDR) Cure Testing
- Mooney Viscometer (MV) Testing
- Rubber Process Analyzer (RPA) Testing
- Tensile and Elongation
- Specific Gravity
- Hardness
- Dispersion Testing

While the methods for testing elastomers has largely remained unchanged, the data collected from these key quality and development instruments is clearly being used for a variety of new purposes. By turning the laboratory from an island with limited data usage into a translatable predictor new potential is unlocked for the uses of that data. It can be expected that as this trend is more widely adopted, further advancements in its applications will continue to be made.

So how do you know if your laboratory equipment can effecftively be used to catch all the values needed to help identify any challenges in your processes or attach ROI to improvement?
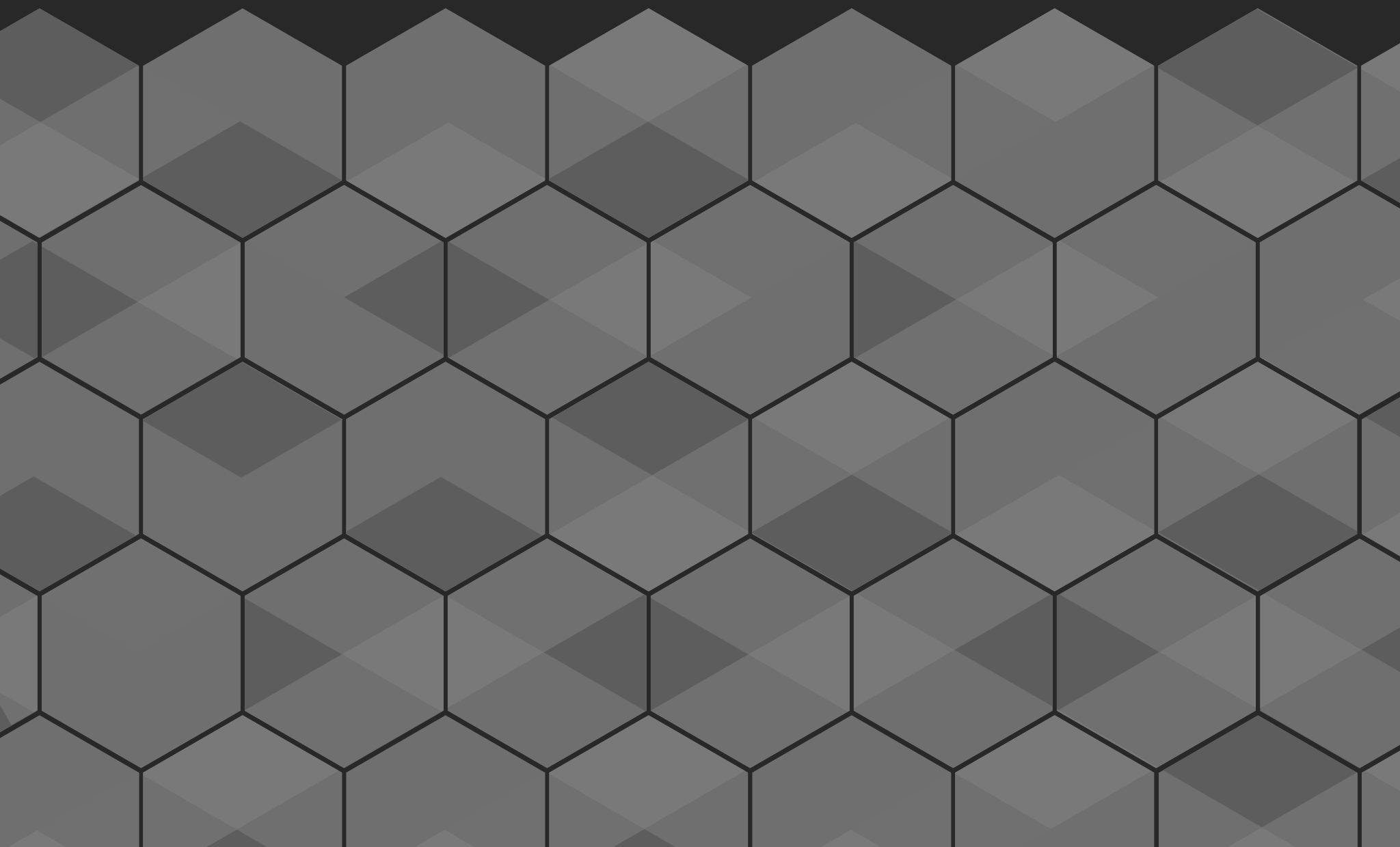
Hardware and software work together to accomplish these goals and depict how well you can do just that.

In the next section, we will be discussing what you need to ask before commiting upgrading instruments or software.

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Questions to Ask Before Comitting to Instrument Upgrades

Questions to Ask

Before Commiting to Laboratory Upgrades

Question 1: *What are the capabilities of the hardware and software currently being used?*

Laboratory personnel changes happen - and sometimes not everything gets passed along to the new guy. As a result, there could be capabilities of the instruments - including connectivity - that technicians and lab managers are unaware of. You never know, you may already have the solution you need right in front of you.

Question 2: *What are the limitations of our current software or instruments?*

If the age of an instrument is over five years, it is likely there have already been upgrades made to it. If this is the case, any limitations that are present won't be fixed by further upgrading it - and a new instrument may be required as the solution. To get a better understanding of what limitations you have, just ask around the laboratory. Your team is likely very familiar with an instrument's limitations.

Question 3: *What are the long-term goals of the factory/laboratory?*

Strategy is important, regardless of the business or industry. If industry 4.0 concepts are on the horizon or currently in play, then instrument connectivity, accuracy of data, and enabling data transformation are going to be important goals to be achieved.

Question 4: *Does the technology we have in the laboratory support these goals?*

The answer to this will come pretty quickly if you've been able to find answers to the previous questions. For additional insight, it can be helpful to talk to lab personnel, plant managers, and IT to make determinations of what is needed to move forward based on established goals.

Question 5: *Do we go with software upgrades, hardware, or both?*

While upgrading software alone is always a possibility, it is almost never the best option. You will likely still be dealing with the problems associated with aging instruments: parts shortages, slow depreciation of equipment knowledge, maintenance problems, and decreasing accuracy/reliability. Aging/obsolete hardware cannot be fixed by using better software. Essentially, this is like using a bandage when surgery is needed. It is not recommended to do software upgrades alone unless there are severe budgetary constraints. Even then, if at all possible, it is generally better to budget for the hardware and software upgrades together to get the full benefits of the investment.

Question 6: *What type of upgrades are available?*

Do your research on the types of upgrades available on the market – and get all the details. Not all upgrades are created equal. Make sure that the upgrade fits the needs of the laboratory / factory.

Question 7: *What other types of capabilities do we need?*

There is always a list of challenges faced by laboratory personnel, process engineers, and compounders. These challenges can be solved in a variety of ways, but limitations on test data can be an unnecessary obstacle if the instrument being used just doesn't meet the needs of the laboratory. It is important to have a good understanding of the capabilities of your instruments - an RPA can do a whole lot more than an MDR. It's best to look at the challenges being faced and assess whether the machines being used are the right ones to solve those challanges. Don't waste time and money upgrading current equipment if new equipment is what is really needed.

Whether or not upgrading instruments is a good alternative to purchasing new instruments is a good question to ask. When we build an instrument at **MonTech***, new or upgraded, we don't build it with today in mind - we engineer our equipment and software for industry advancements predicted in the years to come. There are a lot of changes coming to the industry and our goal is to make sure that you are prepared to navigate them, so your business can continue to grow and thrive.*

You can find more information on upgrades here: **www.montechusa.com/upgrades**

- or -

Contact us at **1-800-552-5115** or send us an email at **info@montechusa.com**

We're Here to Help.

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