Lab 4.0

Opportunities for A Hyper-Connected Laboratory

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In this White Paper you will learn:

1 What is Lab 4.0 and what examples are there today?

2 What opportunities do the principles of lab 4.0 provide manufacturers of analytical equipment?

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As a scientific instruments professional, I have remained remarkably unconnected in this digital world.

It was never my intention. I always thought that I was tech-savvy, and my finger would be in-touch with the latest technology. However, until recently, I have been in denial of the value the digital revolution can bring. Yet, I think the moment of transformation is dawning in the scientific instrumentation world. For me, it began with an Air Fryer.

Save for our energy meters and a few smart lightbulbs, my home remains in a largely analogue world. It's not that I don't believe in the power of digital technology - I just didn't see its value to me.   The purchase of an energy crisis essential, the Air Fryer, changed everything! It made me question my own digital transformation journey – and enabled me to recognise potential for massive, dawning changes in my industry.

As an Air Fryer customer, I am delighted. Not only because air-frying appears to be a cooking technique that is vastly under-rated, but the black kitchen-top wonder chimes to my phone that it is ready for its chips and informs me to stay cosied on the sofa as there are still 8 minutes left. I cannot say it has revolutionized my world, but it certainly helps.

In today's environment, almost everything is connected: from washing machines, to pet cameras, garden sprinklers and a whole range of personal health products that monitor your heart and glucose. The "connected consumer" study by Vodafone estimates that by 2030 the average Briton will be interacting with a smart device every 18 seconds, that's 4800 times a day!

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Where are we now?

The manufacturing industry is accelerating towards this goal with Smart Manufacturing and IoT events commonplace with showcases of the robotics, artificial intelligence, cloud services and connectivity to deliver. But what about the laboratories that exist within these organizations?

Lab 4.0 takes the concept of Industry 4.0 and applies it to laboratories - the idea of connecting disparate data sets and hardware technologies is not new.

Driven by customer demand and improvements in computing processing power laboratory information systems (LIMS) gained traction in the 1990s and have since evolved to include LES (lab execution sytems), SDMS (scientific data management systems). Allowing customers, often within large multi-site organizations, or highly regulated industries, such as forensics and pharmaceuticals, drive lab data integrity, operational efficiencies, and scientific collaboration.

Additionally, technology that finds itself often with multi-instrument installations, such and chromatography or those requiring analysis critical data calibrations, for example those found in near infra-red testing (NIR) are often enabled with software that provides access via servers to enable cloning of instrument settings and monitoring of results and validation protocols.

Many of today's established solutions are centred on providing mission critical information via a traditional client and server software. Those that are web-enabled, requiring software to be installed on either the customers or the vendors servers and software located locally to the instrument to access.

More recently, instrument platform as a service provider (iPaaS) Scitara have utilized the core components of Lab 4.0, cloud based, integration and analytics to allow larger end customers to bring the disparate informatics systems together.

The now commonplace technologies to connect and share data are available, but individual instrument providers have yet to be able to bring these to fruition for all customers, not just those can have scale to invest in iPaaS.

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The Hyper-Connected Analytical Instrument

Few would argue that there is not a plethora of data; temperatures, currents, centreburst positions, residual values, software usage data. The list that could and probably should be made available is long and extends into instrument status and diagnostics, analytical validation, customer usage and preferences. The questions are where to start and what is most valuable both for the customer and for the business.

50%
The Equipment as a Service market is expected to grow at 50% a year until 2030
ref: Grand View Research

69%
Biggest impact of digital transformation is the ability to build better products

4800 interactions
with a connected device a day by 2030
ref: Vodaphone

If companies choose, there are several advantages of serving data both internally within the organization and externally.

- Greater productivity for customers
- Enhanced service offerings
- Product innovation through a greater understanding of how customers use instruments.

Furthermore, the essence of Industry 4.0 is to connect devices with devices, systems with systems and the cyber with the physical world. By integrating laboratory data with customer relationship management systems (CRM) databases, the detection device can be smart in its ordering of consumables, renewing contracts, ordering preventative maintenance, accessing technical and applications support.

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Providing users and leaders with Insights

Recent product introductions from companies such as Tecan with Introspect and Renishaw's InfiniAM Central for 3D printing demonstrate customer value that can be brought to bear. With the increase in automation in the analytical instruments market, being able to monitor the status of an instrument, check that it is on track for completion or to know if the equipment is free and ready to go increases productivity and provides reassurance for customers.

Both Renishaw's and Tecan's products support hardware that are both relatively large capital investments and run automated for long periods of time. But every lab investment must be carefully considered. Understanding if an instrument is available, how frequently it is used, what has been used, how often errors occur, when they occur, whether an error is likely to occur is extremely valuable.

For people wanting to use the instruments, managers making purchasing decisions or those ensuring lab continuity having this data delivered when and how they need it is empowering.

Novel, recurring revenue streams.

Analytical instruments organizations are challenged by a business model that centres on large, episodic equipment purchases and a, generally, smaller consumables, training, and service revenues. One strategy for generating sustainable growth in a market that is estimated to be a low-growth market (5-7%) is to focus on after sales.

With vast quantities of data now accessible from modern electronics and diagnostics combined with technical expertise or machine learning one can envisage a situation where service level contracts can be developed predicting potential failures and providing service in advance of unplanned down time. Organizations will be able to guarantee a level of up-time – setting a new precedent in analytical instruments.

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Monetising Applications Support

An analytical instrument purchase is the start of a customer in the journey to producing reliable, valid results. Even the most experienced analytical chemist may be presented with a new sample or asked a new question of a sample that will require a new way of working or experience in a new area.

Being unable to answer questions new analytical challenges pose are costly. A quick search of LinkedIn technology groups such as 'ICP-OES and ICP-MS' reveal the many questions experts are asking of each other. Naturally, many of these questions are directed to the email inbox of a supplier's local technical specialist or, for the more challenging questions within the research and development groups. Timely response to queries are essential at maintaining customer satisfaction but the time involved can disrupt development projects and or lead to burn-out for support staff.

By connecting devices with CRM systems, remote meeting tools, access to instrument settings and parameters, technical libraries analytical instrument companies can improve their response to difficult technical support questions and generating revenue from these highly skilled employees.

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New innovations driven by customary intimacy

> ❝ Above all, we know that an entrepreneurial strategy has more chance of success the more it starts with the users — their utilities, their values, their realities ... the test of an innovation is always what it does for the user...it is by no means hunch or gamble. But it is also not precisely science. Rather, it is judgment.
>
> Peter Drucker, Innovation and Entrepreneurship

One of the challenges for an instrument manufacturer is developing customer intimacy when products sell into diverse end markets, geographies, and customer types. The same product may be used in a mining lab in remote Australia, a biotechnology company in North Carolina and a teaching lab in Brighton. The challenge to the industry is how to increase customer intimacy whilst not in proximity of the customers.

Using customer usage patterns is not new. Many of our car insurance premiums are now based on how much and how well we drive. Big data and advanced analytics are now well established and being brought to bear in solutions to drive customer value in telecommunications (Ooereedo) and enable Netflix to predict how successful a given movie will be based.

Yes, data stewardship and attention to privacy issues must be addressed but ultimately sharing data can unlock value by improving existing offerings and creating new ones. Both mutually beneficial for both customers and the solution providers.

Accenture reports that 90% of B2B executives say customer experience is very important to achieving their organizations' strategic priorities. By collating and analysing where and how customers are using instruments, accessories, consumables and the challenges they face instrument providers will be better placed to make important and often significant investment decisions.

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Providing a new customer experience

Many of the discussions on connected devices have thus far focused on internal supplier benefits, however, ultimately a coherent digital platform with connected devices and integration of customer interfaces presents the opportunity for instrument manufacturers to revolutionize how customer experience their business.

Imagine a platform where customers can access information on their entire fleet of instruments; where they are in their analysis, when they were last calibrated, who is using the equipment. And an analytical researcher can access applications collateral or technical support to be able to solve their latest analytical challenge. Furthermore, the same software on their mobile phone, being able to deploy resources and plan projects around service visits and maintenance booked through the same software.

Many of today's analytical techniques are increasingly commoditized and manufacturers are seeking ways to differentiate and add value to customers and users' workflows. Yes, analytical performance, function, quality and ease of use are important for a laboratory instrument but we should be considering the wider ecosystem in which it is found. One in which the instrument is an important, yet part of a broader suite of tools used to understand materials, ensure safety, confirm quality push boundaries in scientific understanding. And one in which involve people and new projects and challenges, one in which leaders must be confident that a reliable result can be obtained at the right time... and ideally make investments based on what analytical results they need.

Perhaps the first suppliers to deliver responsive, intuitive connected devices will not only see incremental growth on the solution itself, but also obtain enough loyalty or "stickiness" from customers to drive significant market share gain. Just like my airfryer, am I going to buy their vacuum cleaner? I am certainly favouring the same supplier being connected through the same software makes life easier and more productive.

Which takes me back to my airfryer... which is pinging me... so it's time to make gravy. Are hyper-connected devices gravy? A nice to have but not essential. Not in my kitchen!

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Book a no obligation exploratory call with Sharon Palmer to learn more about connected laboratory projects.

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