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Blog Article

Digitalization: the landscape and needs of chemical plants

What chemical producers really want and need

The digital landscape in chemicals: an overview

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Over the past few months, Navigance has been talking extensively with professionals across chemical manufacturing – especially those with continuous processes – to capture the realities of their daily plant operations, their needs and goals, and any overarching trends affecting them.

Our comprehensive study explored plants' immediate priorities, the challenges they face in achieving them, and how all of that affects where they are on their journey to digitalization. Crucially, we asked not just what they're doing now, but also where they feel 'digital' could help them further.

WHAT'S IN THIS ARTICLE?

In this article we've summarized our findings, including the variety of needs and investment choices chemical producers face at each stage of the digital journey.

WHAT CHEMICAL PRODUCERS REALLY WANT AND NEED

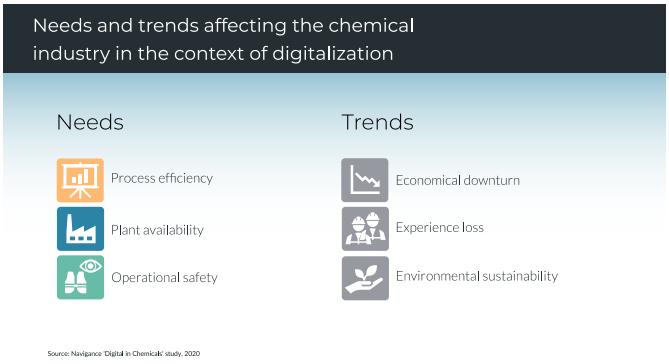
To get an up-to-date picture once again, we recently spent hours interviewing close to 40 experts in operations across Europe, the Middle East, Africa, India and North America. Their roles ranged from process engineers and plant managers to corporate digital and high-level management team members.

These highly experienced professionals work in fields such as the production of ammonia, methanol, ethylene oxide, maleic anhydride, fatty alcohols, formaldehyde, additives, as well as in refineries. We also spoke to various technology vendors.

This research was vital to revisit and verify the realities of day-to-day operations in chemical plants, the challenges they present, the priorities, opinions, and concerns of those running them, and the suitability of any approach designed to address them.

So, what did we discover?

Shared priorities



Across the board, the top priority for all interviewees we spoke to was – not surprisingly –safety. This fundamental building block for today's chemical operations continues to rely on the individual responsibility of people and robust processes.

100%
For everyone operational safety is the top priority.

Process safety is generally very advanced. As a result, improvement activities often focus on people-related topics, with little role to play for digital technologies – at least right now.

Safety is also a prerequisite for achieving other priorities we found were common across the industry: delivering the agreed output levels, and doing so within the budgeted cost.

Without safety, these objectives would be at risk too. By keeping the lost time incident rate (a very common measure for safety in plants) as low as possible, ideally at zero, those responsible for operations can not only keep their plants up and running, but also focus on what's needed to hit their cost targets.

In terms of operational needs, these additional priorities translate into 'plant availability' and 'process efficiency'. And it's here chemical producers can see more clearly the added value digital can bring to their operations.

Most recognize digital technologies can increase the visibility and usability of their plant data. Doing so helps them make more informed, proactive, collaborative, and effective decisions. It also creates the platform they need for increasing plant availability and efficiency.

But the extent to which producers appreciate this potential, their operational readiness to realize the rewards, and what's most important to them right now can differ greatly.

THE DIGITAL LANDSCAPE IN CHEMICALS

Chemical manufacturing is a sector of wide variations: from the chemicals produced to the size of the operations making them, their digital maturity, and their most pressing needs.

Some chemical plants – often belonging to larger, pure chemical companies and global integrated players – are already ahead of the curve. They've invested readily and regularly in equipment

and are capturing their operational data via DCS1 or MES2 systems.

Now they are embracing artificial intelligence, cloud-based services, and other advanced digital technologies to help reach their operational goals of meeting their production targets at the agreed cost. These technologies can uncover opportunities that aren't captured by their existing systems and can be hard to detect and realize with busy human eyes alone.

Other, smaller chemical players are meanwhile taking their first steps into digital ways of working. With day-to-day operations to run, the time and money to do anything more is hard to come by.

Different stages, different needs

Plants in the earliest stages of digitalization have historically invested little into equipment and digital technologies. They may only recently have started gathering and storing data from across their operations.

In most cases, they've recently put process control systems (PCSs), and, in some cases, data historians in place. If they're analyzing their data at all, it's usually with basic tools such as Excel. In addition, we found that, generally, they don't yet see the benefit in using cloud-based services.

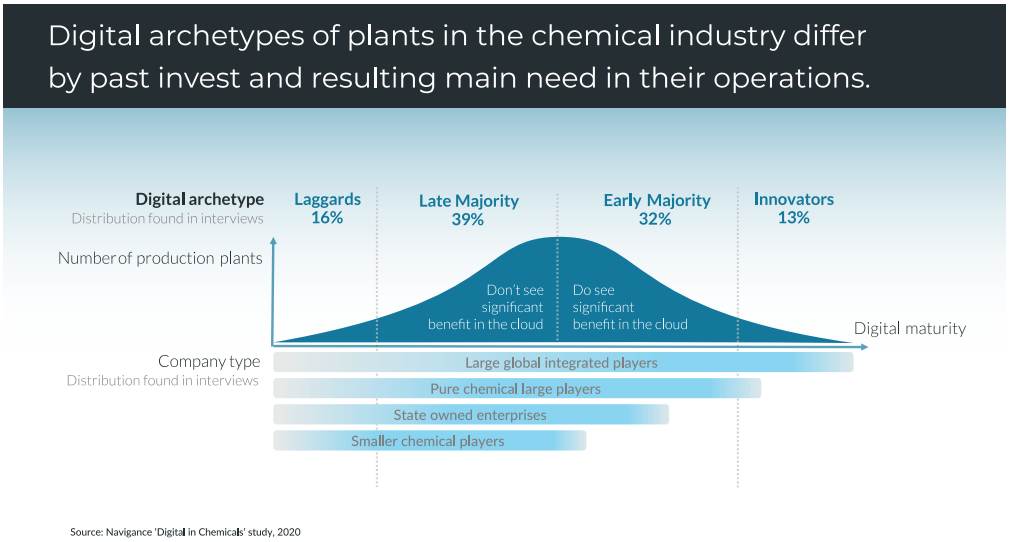
What this group needs most now – largely due to their low investment in plant equipment – is to increase the availability of their plants. Growing it to a sufficient and sustained level so they can meet their agreed output and cost goals. Most commonly, plant availability is expressed in Operational Equipment Effectiveness (OEE). In plants lagging behind in the digital maturity, a typical indicator of performance is an OEE of <90%.

82% of the participants in our study consider sufficient plant availability as basis for efficiency improvement.

Our research suggests most of today's chemical producers are already further along than this. Their plants have had local data historians in place for a while, operate with an OEE of >90% and now use on-premise software beyond Excel to draw some useful insights from the data they gather. The key need for this majority group is to not only maintain the high levels of availability they're usually delivering, but also reduce the cost of maintenance needed to do so.

The more advanced plants or companies within this group see the benefits of introducing cloud-based services to do more with their data. In fact, many widely used chemical processes have developed over several decades and today are using broadly similar technology. They are ideal candidates for cloud-based working, where we found most companies are very open to adopting third-party support. One common reason for this is they expect to gain insights and expert support beyond their own in-house capabilities, to ultimately benefit from better plant operation.

Digital archetypes of plants in the chemical industry differ by past invest and resulting main need in their operations.



Source: Navigance 'Digital in Chemicals' study, 2020

While acceptance of third-party support was high, we found the exception are producers with commercially sensitive processes requiring very specific know-how. For these processes, producers are less willing to share business critical data outside their own premises, at least for now.

50% of interviewed experts see significant benefit in putting their plant data into the cloud.

Lastly, we have the operators furthest along the digitalization journey – let's call them the innovators. With a high level of digital maturity and solid plant availability already secured, they have moved to cloud-based enterprise historians and software services. In their sights next is the ability to continuously optimize their process efficiency.

Decisions, decisions

So, whatever stage of the digitalization journey chemical producers find themselves at, they face different investment decisions in order to meet their 'here and now' needs.

Those whose greatest need is to increase plant availability may look to invest in physical equipment rather than digital technologies, boosting reliability and uptime and minimizing downtimes from failures through mechanical means.

In contrast, those eager to cut maintenance costs may complement the physical layer with a digital one, introducing self-service troubleshooting tools or implementing connected services to get third party support. And those with an already firm grip on their maintenance spend may now be going a step further, adding real-time optimization tools to increase process efficiency.

76% of respondents perceive artificial intelligence as a technology to have the potential to add value for efficiency improvements.

Adding to the complexity in the sector, lots of different digital service and solution providers have emerged purporting to offer answers to those different needs, with some operations already using their tools.

So how can you be sure the investment choices and the steps you take now next – as well as those that come later – will be right for your needs and the changes and challenges forecast for the industry in the years ahead?

Different needs, shared roadmap

Despite the varied picture of the sector our study has revealed, we found it's possible to follow some common steps to digitalize your operation the right way and at the right pace. The three steps comprise:

I. Advanced data visualization and sharing

II. Digital tools to support with increasing and maintaining plant availability

III. Continuous optimization of process efficiency

It's a roadmap for success based on process data analytics in chemical plants. You can adopt it now, whatever your starting point. And there are options available that won't place a huge demand on your own in-house resources.

What's more, we can provide the digital technology, expertise, and ongoing support to help you take each step smoothly and successfully when the time's right. Complementing and enhancing your investment choices and go-to tools, for a journey to digital that's bump-free.

We'll walk through these three steps to fully realize the potential of digitalization in your plant in more detail in our next article.

IT'S TIME TO OPTIMIZE YOUR OPERATION.

We already have a Navigance base solution that's ready to go.

It works with any technology license and catalyst. And we can't wait to show what it could mean for you.

So let's talk about your plant's setup and needs and tailor it to suit.

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