The chemical and pharmaceutical industry must break with tradition

Tradition is standing in the way of digital transformation

The chemical and pharmaceutical industry makes innovative products, but businesses are often operated in a very traditional way. Efficiency, safety and being able to respond rapidly to the outside world are more important than ever. What benefits are offered by system and chain integration, big data and the cloud to help meet modern-day demands?

The digital transformation is in full swing, but companies in the chemical and pharmaceutical industry are lagging behind. In March 2017, KPMG conducted a comprehensive study of this sector*. Their results showed that 75% of companies in the industry consider themselves to be organized in a traditional way and 60% of companies do not have the necessary resources for digital transformation. In the bulk chemicals industry automation has generally acquired a firm foothold, but according to the study this is not the case in the fine chemicals sector.

This can be seen on the shop floor and in the planning and administration of many companies. Paper, Excel spreadsheets and various databases remain the linchpin of business operations. As a result, things regularly go wrong because business units are not well connected to each other. Companies in the chemical and pharmaceutical industry could make great strides by automating certain elements of their operations. KPMG's study shows that within 10 years, 46% of companies will have automated their internal and external logistics. At the same time, half of the companies want to start by automating data and analytics. These goals can only be reached if the internal production chain is digitally transformed, which will help them connect to an increasingly digitalized outside world.

More efficient and safer production and storage

We start the journey to a digital reality with storage. In chemical companies, some substances can't be stored together. For example, keeping acids and alkalis together can create an explosion hazard. There's a whole range of safety measures to deal with these situations. Maybe substance A can't be stored with substance B, except in Warehouse 1G which has thick walls. This kind of knowledge is often found only in the heads of people who have worked for the company for years. New staff may not know that sodium hydroxide and sulfuric acid can't be stored together and must be monitored. And of course special requirements also apply for explosive substances, solvents, and various other substances which create a potential hazard if stored together.

Incorporating staff members' substance knowledge into an integrated ERP system and automatically distributing this data improves efficiency and safety and means that companies can stop worrying so much about safety checks. For example, when a batch is scanned forklift drivers automatically receive instructions on their tablets, directing them to a place with the right protective measures such as a thick wall, foam fire extinguishing system or air extraction equipment. By linking RFID tags, beacons, sensors or GPS locators to this data, the drivers receive a signal and the system is alerted if they unexpectedly drive into the wrong warehouse.

This incident can then be recorded directly in the ERP system. Location management and warehouse management are thus combined and semi-automated, safety is guaranteed and inventory doesn't have to be physically checked.

Connecting machines to ERP has never been easier

Automation can improve safety and efficiency in many other ways. Around production machines and in storage facilities everything is measured, including temperature, air pressure, air humidity and many other parameters. This data is not usually stored in the ERP system. If it were, when critical values are detected the relevant people could be notified immediately via email or instant messaging, sometimes even before a problem arises. This makes the production process safer because people can intervene before a serious incident occurs. In many cases, it is simply a question of connecting the PLC systems to the ERP system.

There should be as little noise as possible in communications between the PLCs and the ERP system. Wasted time or errors due to data conversion are undesirable. Traditionally text files, XML files and other data files are transmitted and converted for each system. That takes extra time and can lead to errors. With the Application Interface Services (AIS) Server by JD Edwards communication is more direct, being transmitted through REST APIs and JSON. When a user sits at the screen he or she enters data and then saves it.

The AIS server does exactly the same. What's more, with this structure the business logic in the interfaces doesn't have to be reconstructed, which also cuts down on customization time. It makes business services and XML interfaces a thing of the past.

Improving continuity with machine data

This chain integration can increase continuity of the production process. An interesting example is when the air humidity around a pile of salt rises too high. This batch is immediately rejected in the ERP system, which means companies find out in time that not enough good raw materials are available. The ERP system can immediately send a purchase order to the planning department, but it can also immediately send an order to a supplier. This means that the production floor doesn't find out too late that the salt no longer complies with production standards.

Process technology data helps operators in the chemical and pharmaceutical industry get a much better grip on their business operations. By using all of the data in the ERP system such as temperature, air pressure and light intensity, the production process can be more tightly controlled. It will then be noticeable, for instance, that the raw materials from a certain supplier result in a longer production process and make the machines run at higher temperatures.

Make material requirements planning more efficient

With an ERP system, it's easier to compare production lines making the same products in different locations. If machine data is continuously monitored, it is possible to see what behavior causes a machine to malfunction or reduce its output. One example might be a difference in energy or water consumption. With this information service teams can be dispatched and consumables purchased before a faulty machine compromises the entire production chain.

It's not only internal chain information that can be used for more efficient production and deliveries. Big data from outside the company walls can also be used for these purposes. For example, by combining historical production data with weather forecasts, a company could anticipate a need for herbicides and pesticides. By and large, seasons run the same course each year, and peaks in demand occur around the same times. Using pattern recognition and information about sunshine hours, rainfall, and the forecasts for both, production could be increased or reduced. This information can help make production faster and more efficient, which means less energy is consumed and waste is reduced.

Cloud still a great unknown

For many mid-market companies in the chemical and pharmaceutical industry, the cloud is still a great unknown. Migrating to the cloud can be beneficial in multiple ways. Outsourcing both infrastructure and management makes a huge difference to startup and operating expenses alike. You no longer have to buy extra hardware to cope with a one-off peak load. If a seasonal peak means you have an increased or reduced demand for processing power, connections, or storage, you can scale up or down immediately.

The recipe is sacred, and of course that also applies to customer details and financial administration. A few years ago, with a public cloud you couldn't choose where this data would be stored, but these days that's no longer an issue. Organizations now have the freedom to choose the continent or country where their data will be stored. This means data can be compliant with local legislation.

The cloud provides flexibility

The cloud has a number of advantages in terms of flexibility compared to a personal data center. In an on-premises environment, licenses are not scalable and cannot be downgraded. Purchased licenses can't be returned once the seasonal peak has passed and you no longer need them. However, cloud licenses do provide this flexibility. The amount of IT support can be adjusted more easily to match the needs of the business.

Cloud computing also provides benefits in the area of IT management. A study by the employment agency Manpower shows that there's a worldwide shortage of well-trained IT personnel. Large multinationals often have the resources to attract good staff, but smaller companies find it more difficult. In theory, the cloud gives them access to top-level management without the enterprise price tag. The same applies to infrastructure, backups, and security. For this reason, many smaller organizations find it attractive to outsource all or part of their IT systems to the cloud.

Many organizations still assume on-premises data is safer than data in cloud storage. Nowadays, that's more of a 'gut feeling' than a well-reasoned position. Good technology and good people are expensive – sometimes, too expensive. A private or public cloud is protected by a specialized team. Because of their scale, cloud suppliers can put in place cheaper and better security than medium-to-large companies.

Cautious steps into the future
We are seeing more and more companies cautiously taking their first steps into a digital future, for instance by automating their material requirements planning. Unfortunately, we're also seeing many of these organizations paying scant regard to the need for follow-up when implementing system integration.

This means the intended result is not achieved and staff fall back into their old, less efficient work routines. So the sensible thing to do is not only provide follow-up, but also remove access to the old tools. That's the only way for the digital revolution to succeed.

According to the KPMG study cited earlier, a quarter of the companies surveyed are considering changing their services and product portfolio as part of the digital transformation process. On the other hand, nearly three-quarters of the chemical manufacturers surveyed do not expect to make any changes to their business model. The question is, in the future, who will be right? Historically, businesses operating in a traditional way have not generally won over the long term. So it would be sensible to at least investigate the potential ways in which your organization could benefit from digital transformation.