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Research Report – Executive Summary

Digital transformation in the workplace of the European Chemicals Sector

A sector-specific study of the European chemical, pharmaceutical, rubber and plastics industry.

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Date
January 2019

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Executive Summary

This is the final report of the study on the **"Digital transformation in the workplace of the European Chemicals Sector – A sector-specific study on the European chemical, pharmaceutical, rubber and plastics industry"** on behalf of the *European Chemical Employers Group (ECEG)* and *industriAll European trade union*. The study was tasked to provide answers on the level of digital maturity of the sector, identify sector-specific challenges and, most importantly, determine the potential impacts of digital transformation on skills, qualifications, working patterns and health and safety.

The research builds upon a **strong empirical basis**, including a comprehensive online-survey with 500 respondents from across the European Member States, nearly 30 expert interviews, two conferences and additional steering group discussions and desk research and trend analysis. Research was performed from March 2018 to December 2018.

Digital transformation of work: skills, working patterns, health & safety

In the chemical, pharmaceutical and the rubber & plastics sector a **skills shift is clearly visible**. Overall, the chemical job of the future will require less manual and basic cognitive skills but more advanced digital and complex transversal digital skills that necessitate at least some basic technical and digital knowledge.

The research shows that **basic digital skills are already widely established** across the chemical workforce.[1] 70% of respondents assess the skills of using basic IT-tools (e.g. software to process and store information) as good or very good. However, more **advanced digital skills**, like programming (e.g. development and application of digital assistance systems or machine learning), or **IT-skills for the complex analysis** of large data sets **require more attention**. Currently lacking within the industry (poor to very poor assessment in 56% and 47% of the cases, respectively for programming and big data analysis), these advanced digital skills will become more important for employability in the coming five years.

The **social skills assessment** of the European chemical industry is overall **positive**. For all the listed skills, incl. managing interpersonal relations, self-organisation or initiative-taking, at least 85% of the respondents gave an acceptable or good assessment. In particular, **self-learning and multi-disciplinary work** will **gain in importance** in the coming 5 years - over 70% of the surveyed chemical industry stakeholders are expecting an increase. These findings correspond with the results in relation to the changing work environment and training needs (see below). Thus, additionally to the basic and advanced digital competencies, the industry needs to pay attention to the development of social competencies in course of the digital transformation of work.

The skills assessment indicates that **requirements are also increasingly focused on transversal digital skills[2]**, which are becoming more important in the age of digitalisation. Digital communication is widely established in the chemical industry, with approximately 45% of the survey participants assessing current competencies as being good or very good (87% even as acceptable or

[1] For better readability, we refer to the chemical industry including pharmaceuticals and rubber & plastics, if not otherwise stated.
[2] Transversal skills are skills that are typically considered as not specifically related to a particular job, task, academic discipline or area of knowledge and that can be used in a wide variety of situations and work settings (e.g. critical and innovative thinking).

better). Within a mobile working environment, where spatial and temporal ties between team members are changing, these skills will become progressively more important (~80% see an increase in importance in the next five years). In addition, **skills to implement digital solutions** are equally significant, though 30% estimate them to be poor to very poor, which could lead to a **shortage of these skills in the future**. This applies also to more creative skills categories, like design skills or non-technical competencies (e.g. system thinking or process understanding).

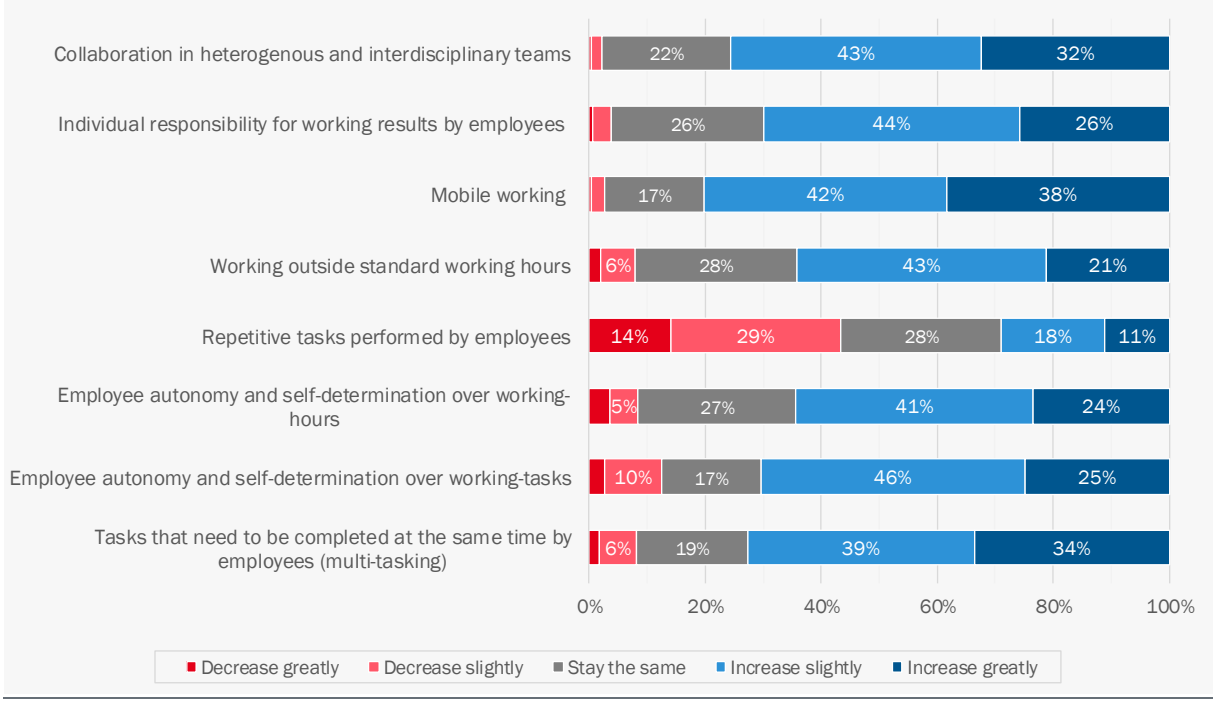
In addition, the analysis of skills across company sizes shows that there exists a **digital skills gap between SMEs and large enterprises**. Respondents from SMEs consistently assessed their technical and transversal competencies worse than large (>250 employees) or very large enterprises (>1000 employees).

Further, the research indicates that many employees already participate in **training measures for digital up-skilling**, but there are distinct variations in company sizes and **improvements regarding both the quality and quantity of training measures** are necessary. Overall, only a quarter of all respondents receive training measures in relation to digital up-skilling more than twice a year. One third of respondents working in a large or very large company reveal that the offer of training measures is insufficient and can lack in quality. For respondents working in SMEs, up to 43% indicate that the training offer is not appropriate to their needs or does not exist at all. If this trend is to continue, the digital skills gap between SMEs and large enterprises might deepen.

However, up-skilling and training is a private and public matter. The analysis shows that both managers and employees recognise their responsibility to invest time and/or financial means for digital up-skilling. Around 50% of the participating **managers strongly agree that companies should invest in training programmes** to keep their employees' digital skills up to date and 58% of **employees agree that they need to invest in digital training themselves** too. Furthermore, managers as well as employees find that the government and other public administrations can play an important role in securing digital skills - for instance, by providing incentives (~75% agree) or **investments for training programmes** (75-80% agree). Both respondent groups recognize the important role of **social partner cooperation** within this process. Over three-quarters of the surveyed employees and two-thirds of managers agree that social partners should negotiate new and/or revise existing training schemes.

The digital transformation contributes to the evolution of the **working environment** and changes the way activities are performed by both employers and employees. With differing intensity across company departments, **one of the predominant changes is related to mobile working** (see Figure 1). Overall, 80% of respondents expect an increase in remote working opportunities. This trend will have an important impact on the organisation of work, since spatial and temporal ties between workers will change. Further, the possibility of working outside the company requires fundamental trust between employers and employees and comes with an increasing responsibility and autonomy for employees regarding their working tasks, working hours and results. The trend towards more mobile working in the European chemicals sector has been confirmed in expert interviews by employees as well as employers.

Figure 1: Assessment of the impact of digitalisation on the working environment

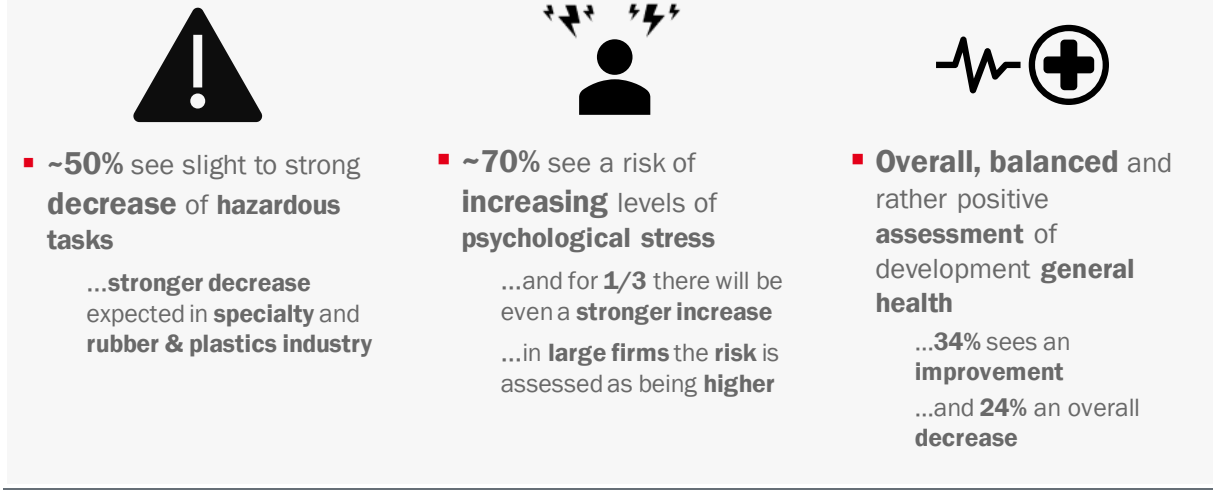


Source: European wide chemical industry stakeholder survey. n=440-451. ©Prognos AG

43% of respondents expect that their **share of day-to-day simple and repetitive tasks will further decline**, as they will increasingly be carried out by digital tools and technologies. At the same time, new technologies enable workers to carry out a greater number of more diversified activities. 73% of respondents see an increase (and 34% a strong one) in multi-tasking and, potentially, their works' complexity. **The increase of collaborations in heterogenous and interdisciplinary teams**, which has been affirmed by three-quarters of the respondents, is further evidence for greater work environment complexity in all chemical sectors. For example, whereas chemical process engineers previously optimised the production processes on their own, they now cooperate with computer scientists and data analysts that embody the necessary competencies of today.

Regarding health issues, employees, managers and other industry representatives are expecting a **significant increase in psychological stress at work** (see Figure 2). This is especially true for large to very large companies (>250 employees). Digitalisation, however, through developments in automation and new technical assistance systems, will help to decrease the number of hazardous tasks, thereby **reducing the risk of physical injuries and working accidents** in the sector (around half of the respondents). This is particularly apparent in the specialty and rubber & plastics sectors. Overall, there is a balanced and rather positive assessment of the impact on the **general health of the workforce**. Around 34% of respondents expect an increase in the workforces' general health, compared to 24% that expect an overall decrease. Most respondents (42%), however, see no major overall changes.

Figure 2: Expected effect of digitalisation on the health of the workforce in the European chemicals sector



Source: European wide chemical industry stakeholder survey. n=443-449. ©Prognos AG

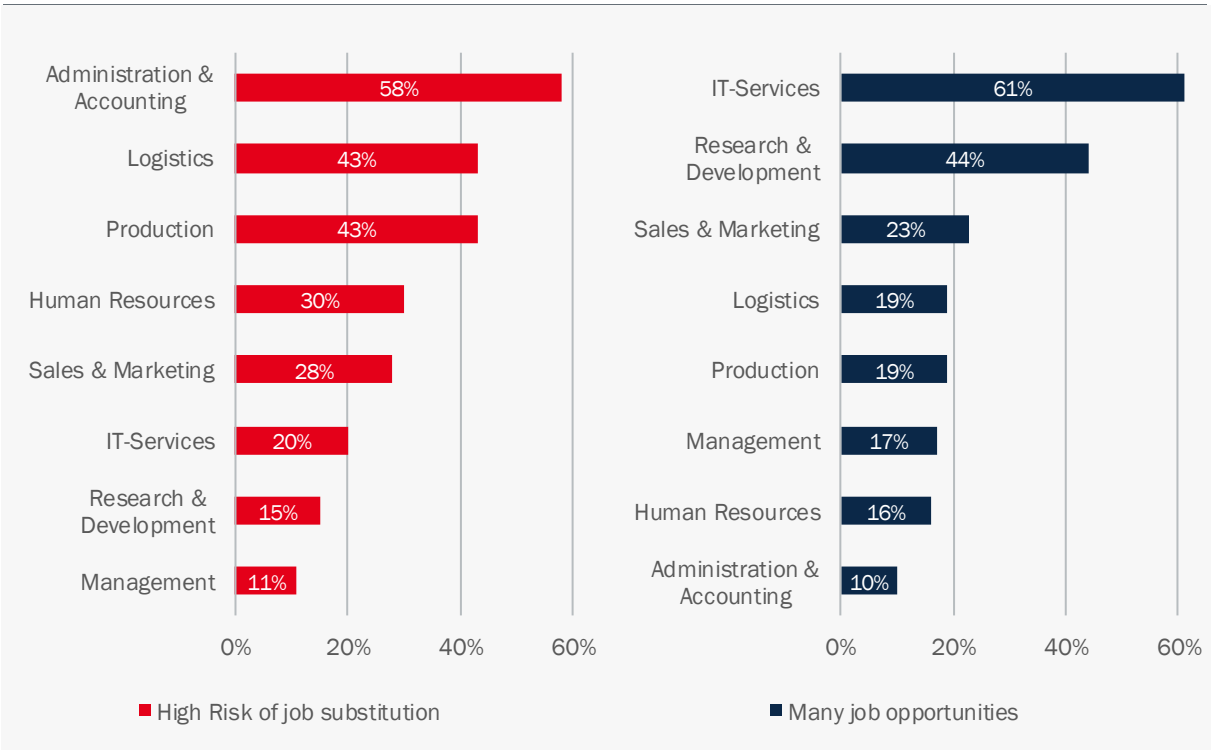
Regarding the **risk of workforce reduction**, it can be seen that **digitalisation bears (high) risks for some job profiles, but also brings many new opportunities** in the chemical, pharmaceutical and rubber & plastics industry, as most job profiles will not become fully obsolete or redundant. They will rather change with new technologies as they become available and it will request a new skills-set as discussed above.

According to the survey respondents, the **risk of a total workforce reduction is highest** in production, logistics and, **first and foremost, administration & accounting** (see Figure 3). For the latter, 58% think that there is a high risk for redundancies. In total, 90% consider employment in administration & accounting at (low to high) risk. In production and logistics, too, near 90% see an overall risk for workforce reduction by 2023, though a smaller share of respondents sees high risks (43%). This corresponds with findings on an expected reduction of repetitive tasks, that can more easily be automated and are prevalent in the above mentioned company departments.

At the same time, **opportunities are expected** to be created in sales & marketing, research & development and, **particularly, in IT related activities** (86% of the chemical industry stakeholders agree). For the department of research & development, close to 80% of survey respondents see new opportunities. Importantly, the results show that also around one fifth see many opportunities in the "threatened" departments of **production and logistics**. This can be a strong indication of a **structural transformation of profiles** in these departments.

The study indicates that **managers see more opportunities with digitalisation, whereas employees emphasize on risks**. This shows the importance of sound communication strategies between management and employees on the profound changes that come with digital transformation: a clear communication about actual risks, clarifying how a company and its workforce can embrace the transformation and reduce existing uncertainties.

Figure 3: Risk of reduction of the workforce and new job opportunities in the following company divisions in the next 5 years (by 2023)



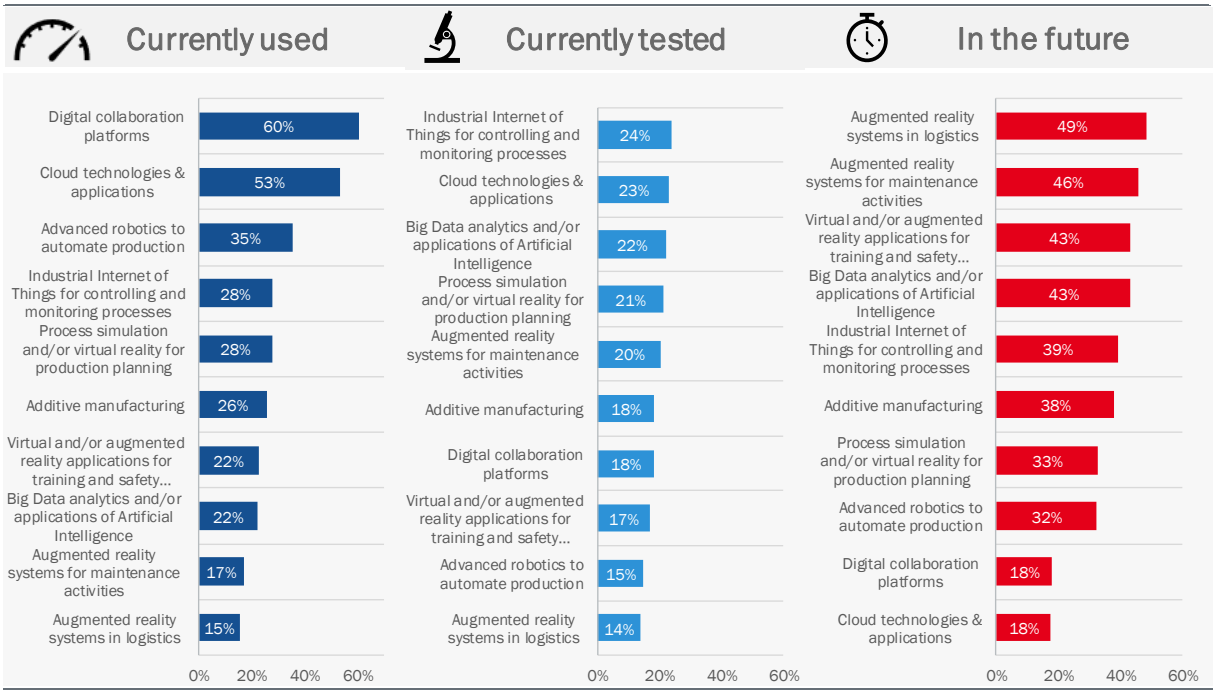
Source: European wide chemical industry stakeholder survey. n=391-452. ©Prognos AG

Technological transformation through digitalisation in the European chemicals sector

The research shows that the **1st wave of digital transformation** (i.e. digitising analogue data and integrating cloud solutions) is **successfully accomplished** in the European chemical, pharmaceutical and rubber & plastics industry. More than 75% of the chemical companies are currently using or testing cloud technologies and applications. Also, the use of digital collaboration platforms for internal communication and/or cooperation is widely spread. At the moment, around 80% are using or implementing technologies in this regard. Overall, the analysis did not find any significant differences across the different sectors. However, the **implementation rate increases with the company size:** especially the implementation rate for micro and small enterprises (<50 employees) is lagging behind here.

The 2nd wave of digital transformation in the chemical industry will be driven by Big Data analytics and applications of artificial intelligence (AI), the industrial internet of things (IIoT) as well as applications of augmented and virtual reality – and it **will come into effect shortly** (most likely in the next 5 years). From all sectors considered, the pharmaceuticals industry seems to be a frontrunner so far, especially regarding the use of IIoT and big data or AI applications, where the current application rate is significantly higher than for the other industries. The survey results also indicate that especially the **transformation around big data analytics and artificial intelligence might cause more drastic implementation gaps** between very large enterprises (>1000 employees) and SMEs. Whereas 63% of very large companies are already using or at least testing these kinds of applications, less than 30% of SMEs do so at this point.

Figure 4: Current use, testing or future application of digital technologies in the chemical industry



Source: European wide chemical industry stakeholder survey. n=290-376. ©Prognos AG

Employer-employee relationship and collective agreements in the digital age

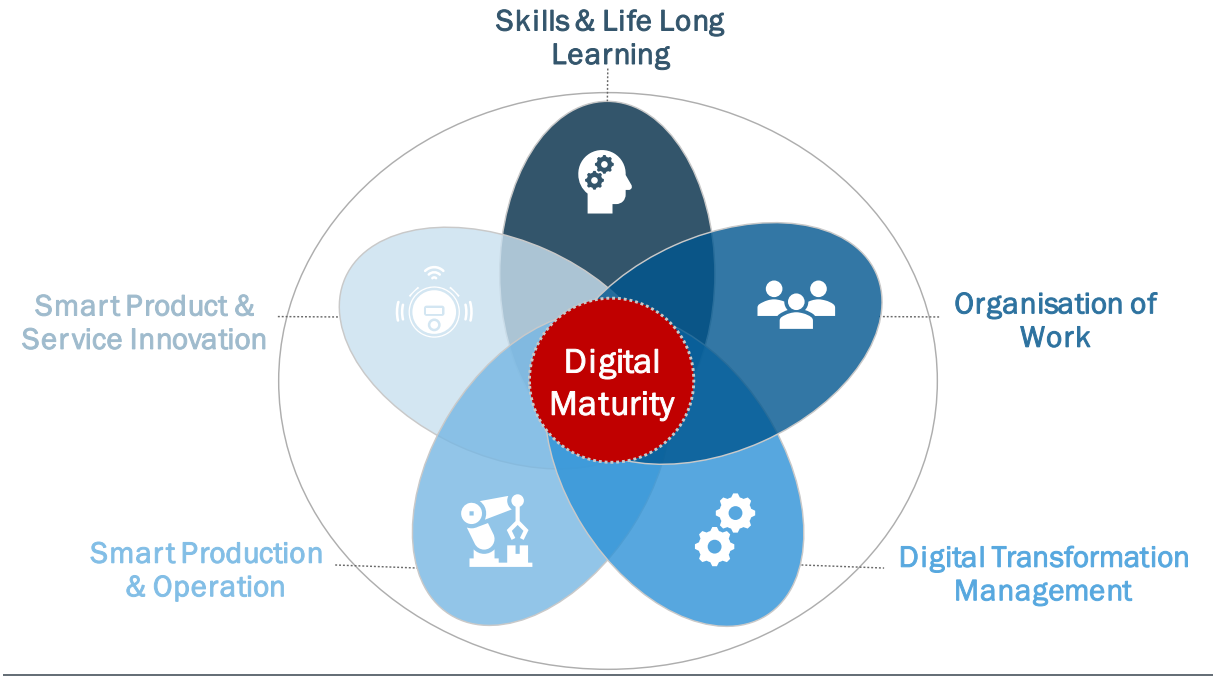
The research reveals that **several important aspects** in relation to the digital transformation **are so far moderately addressed by the current collective agreements**. Especially the topic of working hours seems to be covered well by the agreements in place. 80% of respondents agree that this issue, with respect to the digital transformation, is moderately or sufficiently addressed. Further, respondents are of the opinion that collective agreements cover (at least moderately) important issues like working time flexibility (60% agreement), occupational training (50% agreement), work-life balance (46% agreement) or mobile working (45% agreement). However, concerning these last three topics, i.e. occupational training, work-life balance and mobile working, it needs to be stressed that there are also between 10-17% of the stakeholders who indicate that these issues are currently not addressed at all.

At the same time, four aspects have been identified as those with the most **significant increase in importance in the next 5 years**: 60% of the survey respondents consider the aspect of **mobile work** particularly important, which is coherent with the changes of the current working environment. This is followed by **working-time flexibility** (58% indicate a strong increase), **work-life balance** (54% strong increase) and **occupational training** (53% strong increase). Nevertheless, the study also highlights other sensitive issues (e.g. data protection or performance monitoring) and that collective agreements can be flanked by other initiatives (e.g. open dialogue processes) for dealing with the challenges that come with the digital transformation in the workplace.

Digital Maturity of the European chemicals sector

In order to analyse the digital matureness of the chemical sector and its sub-sectors, a concept including 5 dimensions and 20 related indicators was established (see Figure 5). For each of these indicators, statements were formulated (indicating the highest possible digitalisation level) and for which survey participants were asked to indicate their agreement (from not at all to fully agree). Finally, the answers were translated into an ordinal scaling system from 0 to 5, with five being the highest degree of digitalisation.

Figure 5: The five dimensions of the digital maturity model for the European chemicals Sector



Source: Own research. Icons, copyright flaticon. ©Prognos AG

The maturity analysis shows that, overall, there are **no large differences in the maturity levels across the different dimensions**. Neither **does it reveal large differences in the overall maturity level across the different sectors**, even though the basic chemicals industry shows a somewhat higher digital maturity.

The most striking differences can be found across the 20 different maturity indicators. Some of the **best scores** exist for the **use of digital platforms** for interdisciplinary cooperation and exchange of information or the availability of **infrastructure for flexible working arrangements**. This is directly related to the previously mentioned accomplishment of the 1st wave of digitalisation in the chemicals industry. Indicators related to **change management** and the **involvement and support of employees** (e.g. concerning skills, lifelong learning or consideration of experience) received some of the lowest scores, which shows that this is currently **one of the biggest challenges** in the digital transformation process.

Survey respondents strongly agree that the outcomes of discussions between management and employees in the chemical industry help to improve a competitiveness. Thus, **dialogue** ought to be seen as **one of the industry's strengths**. **Change management and constructive dialogue will be key to a successful digital transformation** in the chemical industry and are vital for the industries' competitiveness in a fast-changing and volatile globalised world.

Outlook: key challenges and conclusions

The research findings show that the European chemicals industry has made visible progress in digital transformation, both in terms of technology and the "new world of work". But transformation processes, especially such with far-reaching implications as digitalisation, are always accompanied by uncertainty. In particular, three **key uncertainties** require attention in the future:

1. **Missing understanding about advantages of digitalisation:** across the board, managers, employees and industry organisations as well as union representatives, report a missing understanding or knowledge about the specific benefits of digitalisation for companies in the chemicals sector. This indicates that a more differentiated discussion about digital transformation in the sector is needed which prioritises thinking about the customer needs, business model and employee competencies and, in a second step, asks in how far digital solutions can be supportive.
2. **Return of digital investments often uncertain:** aligned with the above, especially managers in the chemicals sector are not fully confident about the returns on digital investments. Almost 50% of the survey respondents confirm this uncertainty. Besides technological complexities and ongoing R&D for many digital solutions, this finding underlines the need for a clear perspective on the purpose of digitalisation in any company's business model.
3. **Lack of methods and processes for the digital transformation:** for 40% of the 200 company representatives in the online survey, the "how" of digital transformation in terms of methods and processes is unclear. This finding clearly shows that transformation management competencies, alongside of a clear understanding of the desired digital transformation path (strategy), is absolutely crucial and will become even more crucial in the next few years given the enormous technological progress on digital solutions.

The findings of this study underline that **digital transformation** in the European chemicals sector needs to be addressed by a **holistic approach** as presented in the "Digital Maturity Model" of this project. It needs to be driven by a clear understanding of the customer needs (do digitalisation plans meet customer needs better?), the companies business model (is digitalisation improving the business model?) and the internal experiences and competencies of people. Knowledge is getting increasingly easier to access (online) and cheaper while digital tools are increasingly powerful. Qualifications and creativity of the workforce remain both the key differentiator and a competitive advantage of the sector. Investments in employees become ever more important. Further, it must be made sure that working conditions, co-determination and health & safety are equally addressed in a social dialogue that characterizes the European social market economy.

All in all, we need to remind ourselves that this digital transformation is not a technological but rather a cultural and social transformation and that it is not happening in a vacuum but in the context of global competition. Hence, adjustments to the future of work in the chemical industry need to be made with care and speed at the same time.

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Imprint

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Date: January 2019