INDUSTRY 4.0

GERMAN INDUSTRY 4.0 INDEX 2016

A study by Staufen AG and Staufen Digital Workx GmbH

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Content

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Editorial

Thomas Rohrbach, Managing Director, Staufen Digital Workx

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Three years ago, Futurologist Lars Thomsen, held a speech at the BestPractice Day of Staufen AG, with the topic "The end of foolishness", the attendees were hanging on his lips, banished. His remarkable 520-Week forecast was one of the triggers for Staufen AG to create the "Germany Industry 4.0 Index". After 2014 and 2015, now in 2016 we have felt, a third time in a row, on the digital pulse of the German industrial companies. Enough reason for us to let Thomsen review his speech and – key word futurologist – of course let him look far ahead in the future (Page 6).

This new wake-up call seem highly necessary. Still a lot of companies misinterpret Industry 4.0 as a mere technology update of their fabrication and warehouse plants. New business models, apart from the classical production and maintenance of industrial products, are only present at a few pioneer companies. As the results of this year's study emphasize, the key for a real digital transformation is located in the heads of the employees - managers included. Increasing the potential of "creativity, intuition and imagination" (Thomsen) can only happen with new and efficient leadership techniques, as well as an accompanying cultural change of the company. At the same time, new colleagues with new skills from the areas IT and Data Science will join in. This will require a lot of tolerance and integrative capacity from companies who are traditionally set up.

A lot of industrial companies have absolutely noticed this challenge. Such as digitalization, comparing to last year (35 percent), 40 percent of the companies implement it in a large-scale, or in operational single projects. And the number of the companies who still haven't occupied themselves with Industry 4.0 has been reduced in half. This is noticeable looking at the results of the Industry 4.0 Index, surveyed by Staufen AG: the valor, on a scale from 0 to 100, was 16 in 2014, last year 30 and in the middle of 2016 it stood already at 25. The conclusion is simple; Industry 4.0 has arrived in Germany. Now it is time to increase implementation pace and not forget about going different paths, apart from the mere production lines. The Staufen group take account, of the growth area "Digitalization of the value added", with the foundation of Staufen Digital Worx GmbH. Tested-bed and solutions partners are orchestrated and integrated into the Staufen system. Based on the Lean Enterprise, our customers will be actively advised, in notorious Staufen AG quality, through their development into a Smart Enterprise.

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Experts about Industry 4.0

INNOVATION IS A LEADERSHIP TASK – INTERVIEW WITH FUTUROLOGIST LARS THOMSEN

The founder and Chief Futurist of the Think-Tank "future matters", belongs to the worldwide leading futurologists. He advises numerous companies, institutions and authorities closes to governments about the development of future strategies, he also is a requested Keynote-speaker on conferences and congresses all around the world, as well as, a personal counselor to multiple investors and company leaders.

There is barely another topic that is more discussed on the company landscape than Industry 4.0. Futurologist Lars Thomsen deal, since a lot of years, with the technological paradigm change and their impact on the economy and society. He expects massive changes and complicated tasks for the Germany industry in the near future. Less the technology and more the, still predominant company culture in the factories, is a thing he is worried about.

Mister Thomsen, strictly speaking: What are the most important technological paradigm changes that the economy and society are obligated to deal within the next year?

Two topics are going to make an impact on the next decade: the internet of things and the AI (Artificial Intelligence). Currently there are being connected eighty times more things to the internet than persons, meaning machines, switches, thermostats, cars and so on. We are experiencing an enormous worldwide, finely woven cross-linking – practically we are giving the world a digital nervous system. At the same time, machines are learning to think. They recognize correlation ships and can analyze big data on patterns and learn from it. What, until now, our brains had to deal with, is going to be managed by computers, from driving a car to analyze a market. With this, we stand in front of profound changes.

Which are already triggering anxiety in the society.

I think the people know instinctively that a big change is imminent. Of course a cab driver asks himself if he is needed in a few years, when cars drive all by themselves around the urban traffic. But also workers who weren't really threatened by automation, are more and more confronted with fear of the future. What are the conclusion for an analyst in the financial area if Robobanking offers better results than a human observer? Essentially, we are witnessing the existential fear which has been brought by every industrial revolution.

Former industrial revolutions, created a big range of new professions. Aren't we now dealing with a new type of quality which will make a human replaceable in almost every way?

We will definitely have to confront ourselves to the definition of work. There will be new professions and new ways of working, but it will change our social way of understanding work: 5 days a week, six weeks of vacations a year until you retire, full employment – this system will not continue to work in this manner. The economic value of an employee will not be determined by how long he stay at his working place. Talents and defined goals are going to be the new scale unit. The entire society has to deal with how the generated benefits are going to be distributed. There are a lot of questions to be answered in a social and legislative frame, if only every tenth can be employed as now. Do we need something like a digital dividend? And how can we organize and distribute work in a reasonable manner?

How are the companies prepared for this? Don't we need a new type of leadership for this change?

The rules of the game changes under the growing innovation pressure. Companies have to be more agile. For this a leadership which manage fewer people, exemplifies certain values, inspire new goals and leave employees scope for development, to try themselves and be creative is needed. In terms of innovation, strict hierarchy rules are clearly counterproductive.

For a lot of companies, with a long tradition and grown structures it may be difficult to reinvent themselves.

Correct, disruptive development and new paradigms place companies with a long tradition in a complicated position. They get slowed down by dependencies. There is the actual customer base, the current developing team or effected inversions in another direction. If you look on the industrial history, they were usually the losers of a paradigm change. Kodak was market leader, as long as pictures were taken analog, but they lost when digital pictures became a cheaper and better alternative. The car was not invented by the carriage builders either.

In addition, established companies do not encourage the enterprising type, but more the management type. It is all about managing the established system in an efficient way. The bigger a company is, the less the leaders are willing to take a risk. A lot of them loses their sense for the real needs of their customers on their way to the top hierarchy position. As well as their curiosity.

Your point of view is: The future is no coincidence, it can be calculated. What exactly do you mean with this?

Development is often based on a very simple logic. For example, in the technological area we find a recurring pattern: A new, innovative technology is not really fully developed when launched, as well as more expensive than the conventional solutions due to their missing mass production. But, contrary to the conventional technology, the new one has shorter innovation cycles, and makes more progress. It comes to the point where the new technology is better and cheaper than the conventional paradigm. We call this point "Tipping point", a point where the market tip over.

Lars Thomsen, Futurologist

The connected scale effect and learning curve follow similar rules. These allows quite solid prognoses, if you make an effort to understand the technologic and economic basis.

How can it be, that even market leaders, just oversleeps these developments?

A lot of companies are occupied with the update of the already known – incremental innovation. Of course, a lot of employees have their thoughts, but disruptive ideas are not well seen in the day-to-day workflow. After all you may question a part of the company itself. Here is a cultural change necessary. It is not done with a one-a-year idea workshop; it must be allowed to think laterally during the day-to-day work. Finally, innovation is a leader and culture topic. Innovation must be promoted and expected.
Companies should not just set goals by numbers, but define qualitative development: Which new markets we want to take part? Do we produce products or solutions? How do we want to be considered from our customers and suppliers?
Leaders must allow employees to take new paths and sometimes fail – that is the way innovation works. The technological paradigm change is less a problem than the often, hostile, innovation culture of the company.

At the end one personal question. Do you fear to be replaced as a futurologist, looking on how fast the innovation goes forward in the area of AI (Artificial Intelligence)?

No, not at the moment. Machines are going to fulfill routine jobs in the near future. Artificial intelligent machines are not able to have skills like creativity, intuition and imagination, yet. It will take a long time until that point. Ironically, these are actually human skills that are underrated in the company world. For myself i fear most that at some point i lose my curiosity.

MASS PERSONALIZATION

UNIV.-PROF. DR.-ING. THOMAS BAUERNHANSL

Deputy Director of the Fraunhofer Institute for Industrial Engineering and Automation IPA and of the Institute for Industrial Fabrication and Plant Operation (IFF) at the University of Stuttgart

Univ.-Prof. Dr.-Ing. Thomas Bauernhansl, Deputy Director of the Fraunhofer Institute for Industrial Engineering and Automation IPA

The needs of our customers are getting much more individually. Everyone wants to get served fast and cheap with personalized services and products. This ends up in hybrid bundle services (products + maintenance), which are exactly defined to meet our customer requests.

Through the individualization, the complexity costs are highly increased. The more accurate a company tries to fulfill the customer request, the more they have to analyze and transfer this knowledge to their products and services. This is linked to raising cost in indirect areas, such as sales, in development, in the supply chain management and in the planning.

The digital transformation, particularly the connectivity over the internet of things (IoT) and services, enables in future, a new approach to customers and production factors. We are speaking of an Access Economy.

The people are surrounded by a lot of things, which are equipped with sensor technology and interactive elements. The most common things today are smartphones or wearables (for example health trackers or smartwatches). Cars and household aids are joining in in a future. These is a chance for companies, on the one hand, automatically analyze customer request and bearing, and

on the other hand integrate the customer in the process of creating services. The customer can be placed in the position to join the development, the configuration, the order and the development of a product. Or engage in the value added chain by themselves. The consumer gets active in the value added chain as an added player and transforms to a prosumer (producer + consumer).

The processes which originate complexity cost now can be transferred to the customer. Adding to it, development and transaction cost can be sensibly reduced due to the internet of things, by publishing producing factors on platforms and making them available to the own value added chain. Assets can be opened by using Crowd Funding sources or federal resources, obtain development services by using open source or open innovation and make use of the infrastructure as a service. OpenX, XaaS and the sharing economy are ruling the economic efficacy of new business models: everything becomes a service for everyone, therefore also – or rather particularly – for small and medium-sized enterprises.

With IoT based approach to the customers and the resources, the complexity and fixed costs for personalized services shrinks and CAPEX (capital expenses) convert to OPEX (operational expenses). Consequently, companies can offer highly personalized services, to costs which are near to mass production. A product can be developed and manufactured for a customer, and from start to end of the products life cycle added with extra services. Mass personalization takes the exploit of the customer in the spotlight. Not technology or cost calculation makes the difference, but the utility function. Those who can offer the most useful product to a customer, maybe even without the customer formulate the exact specification, those will have the highest utility function. There always will be a need for technology, but mere as a means to an end, a resource for a superior service bundle.

The main driver of Mass Personalization is the digitalization, particularly the connectivity in real time, in a future the automatization is going to be important. Meant are, production systems which are going to be modified to the customer request by using machine learning. We, at the Frauenhofer Institute in cooperation with our research partners from the university of Stuttgart and the university of Tubingen as well as companies from the region, are working to fulfill this approach on the areas of need such as health, living or mobility. The area of mobility is understood as the sum of services which a customer makes use of it to get from A to B. Health in terms of prevention, diagnosis and therapy, which is aligned with the genetics and environmental living of the patient. And living in terms of adapted living spaces differentiating exactly each phase of life (such as being single, a couple, a family or a senior). The capacity of Mass Personalization is going to be a decisive factor for the classical German companies, according to the Stuttgarter Frauenhofer Institute.

Who wants to take part of the initiative and use Mass Personalization for themselves, finds among **www.ipa.fraunhofer.de / http://www.ipa.fraunhofer.de/personalisierungalswachstumstreibernutzen.html** contact information and the joint study of the Fraunhofer Institute IAO, IBP, IGB, IRB, IPA in Stuttgart.

WORK 4.0 – SHAPE THE NEW WORK ENVIRONMENT

JÖRG HOFMANN

First chairman of IG Metall

Jörg Hofmann, First chairman of IG Metall

Digitalization is a continuous, not stoppable process, which will change the production and the competition in a sustainable way. From a labor union point of view, we have to guide the digitalization towards a direction where the companies as well as the employees are benefitted. This requires not to think first about how we can implement as much as technology possible in the production and processes. Much useful is another MO (Modus operandi): We first have to ask, what problems have the companies and in which direction will they evolve their business models. Taking this initial point as a benchmark, we can answer the question of usability and contribution of technologies to improve the working conditions and the sustainability of the companies.

This discussion needs to be held between the labor unions and shop councils with the company management and at this juncture they have to work out the chances of digitalization. There won't be a standard solution. Considering the competitive situation, every company will take their own path into the working

world of the future. For one company, that could be the connectivity of their products with a digitalized service, for another company the expansion into variant amount or an interface free engineering.
From a labor union point of view, digitalization is inseparably linked with the goal of humanizing the work. New technologies have a lot of possibilities to improve ergonomically several working processes, as well as relieve us from tedious routine jobs. To use these chances, the improvement of the quality of working conditions have to be considered during the implementation process. During the internal planning processes, technologies and their use, have to be chosen keeping in mind what contribution they make for fairer working conditions.

Among other things:

- A relieve from monotonous and hard work, instead of new burden
- A higher time sovereignty instead of a flexibility which is only determined from the company and the technology.
- Challenging and teaching working tasks instead of a disqualification

A very important field is, besides the working time organization, the qualification. Working places have to evolve to learning places, where employees have the possibility to learn to handle the new technologies. These tasks can overstrain easily a single company, the reason why it is reasonable to upgrade the offers from learning factories or organize learning processes in cooperation with another companies. From the employees point of view learning time is needed to acquire knowledge in new working fields. The crucial point is that nobody gets left behind from the learning possibilities of the new technologies, because knowledge is the key to take part in a modernizing working world.

For the labor union, the shaping of the digital working processes is a learning process. Taking as a starting point improving working conditions, the IG Metall takes part intensively in research projects and organize networks of multiplicities, which are nowadays integrated in the shaping. To which extent it will be possible to use the changes of digitalization is decided in the companies. As leading players, the shop councils are depending on a supporting infrastructure. Therefore, labor unions are organizing extensive learning opportunities as well as advisement and process support. Only this way this challenging task, shaping technologies, organization and people, can be coped with success. An important basis is the dialogue with the employees. A real democratic participation is needed, to ensure the acceptancy and the willing to optimize the workforce. Those who give their employees a vote in the process of modernization, who credibly takes care of worries and expectations, are also contributing to ensure the innovation and changing faculties of the company.

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About the Study

For the “German Industry 4.0 Index 2016” the consultancy Staufen surveyed a total of 277 industrial enterprises in Germany to the topic “Industry 4.0”. The survey was realized between mid of June to beginning of July 2016.
Around 70 percent of the surveyed companies are from the mechanical engineering, plant engineering and construction, the electronic and the automobile industry.

BACKGROUND AND FRAME OF THE STUDY

Industry 4.0 is unalterably a big topic for the German economy. Basing on a solid Lean Enterprise base, nearly all companies are developing towards Smart Enterprise. The view stays positive, Industry 4.0 is seen as a big chance. Even if no company has arrived yet at the end of the "digital journey", the goal is getting clearer and nearer judging by the growing numbers of 4.0-projects. While some companies are still behaving very hesitant, some other already have realized first potentials. However, there are only a few companies which implement consistently the principles of an Industry 4.0. Nevertheless, the numbers are increasing, and more and more companies adventure into the smart business world with single projects.

Particularly in the mid-size enterprises is a lack of a strategical approach to the topic Industry 4.0. It is not enough to use IT to succeed in the digital future, the whole enterprise organization has to be on the test bench. A concept that frighten off a lot of companies. The responsible managers are not ready for the Industry 4.0, as shown in this study. It will be decisive to build an enterprise culture where, so far successful structures and approaches, are going to be questioned and all the workforce is taken along into a digitalized and connected industry world.

Alarming is that the innovation potential of Industry 4.0 is left aside – companies are working rarely on developing new business models. Instead they hang on their known strength and trust on their successes from the past. The companies underestimate the speed of growing disruptive competitors, due to shorter product and innovation cycles. Also on this point new thinking is needed as well as increase significantly the pace.

4

The German Industry 4.0 Index

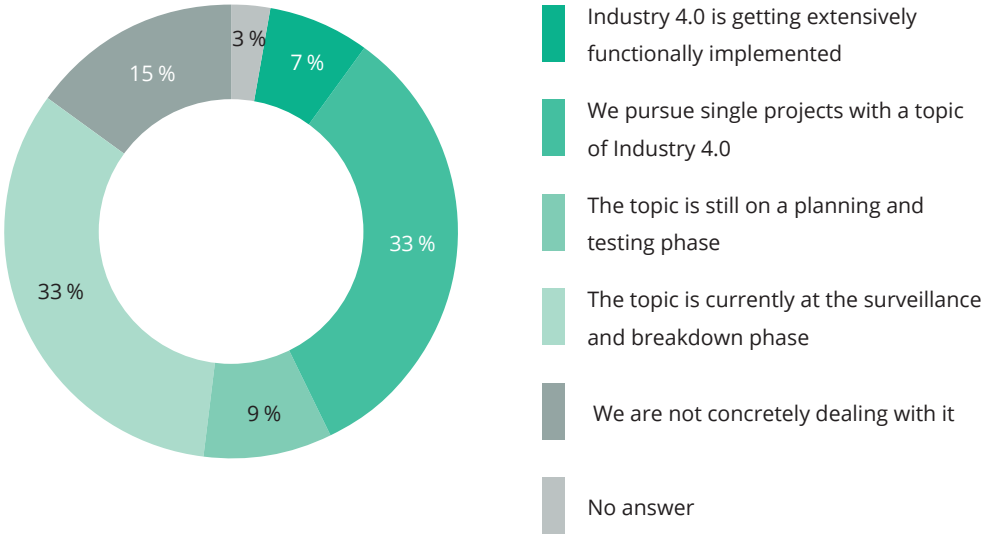
4.1 The trend towards "Smart Factory" gets concrete

After the German industry made big step towards digitalization and connectivity in 2015, the development pace slowed down in 2016. Maybe the pace has slowed down, but the tendency substantiated: the proportion of companies who have not bother themselves with Industry 4.0 fell another four percent to 15 percent. Especially small companies, up to an annual turnover of 50 million euros, show little commitment.

About 40 percent of the study participants are preparing themselves for Industry 4.0 – they observe and analyze (33 percent) the situation or rather are already at the planning and test phase (9 percent). About the same part are gathering experience with Smart Economy, however predominantly with single projects. Only 7 percent allege that they have implemented Industry 4.0 on an operational basis. After all, a duplication from last year. The Staufen AG index, surveyed the last three years offer the subsequent trend: on a scale from 0 to 100, the value in 2014 was 16 points, in 2015 30 points and already at the middle of 2016 it was 35 points.

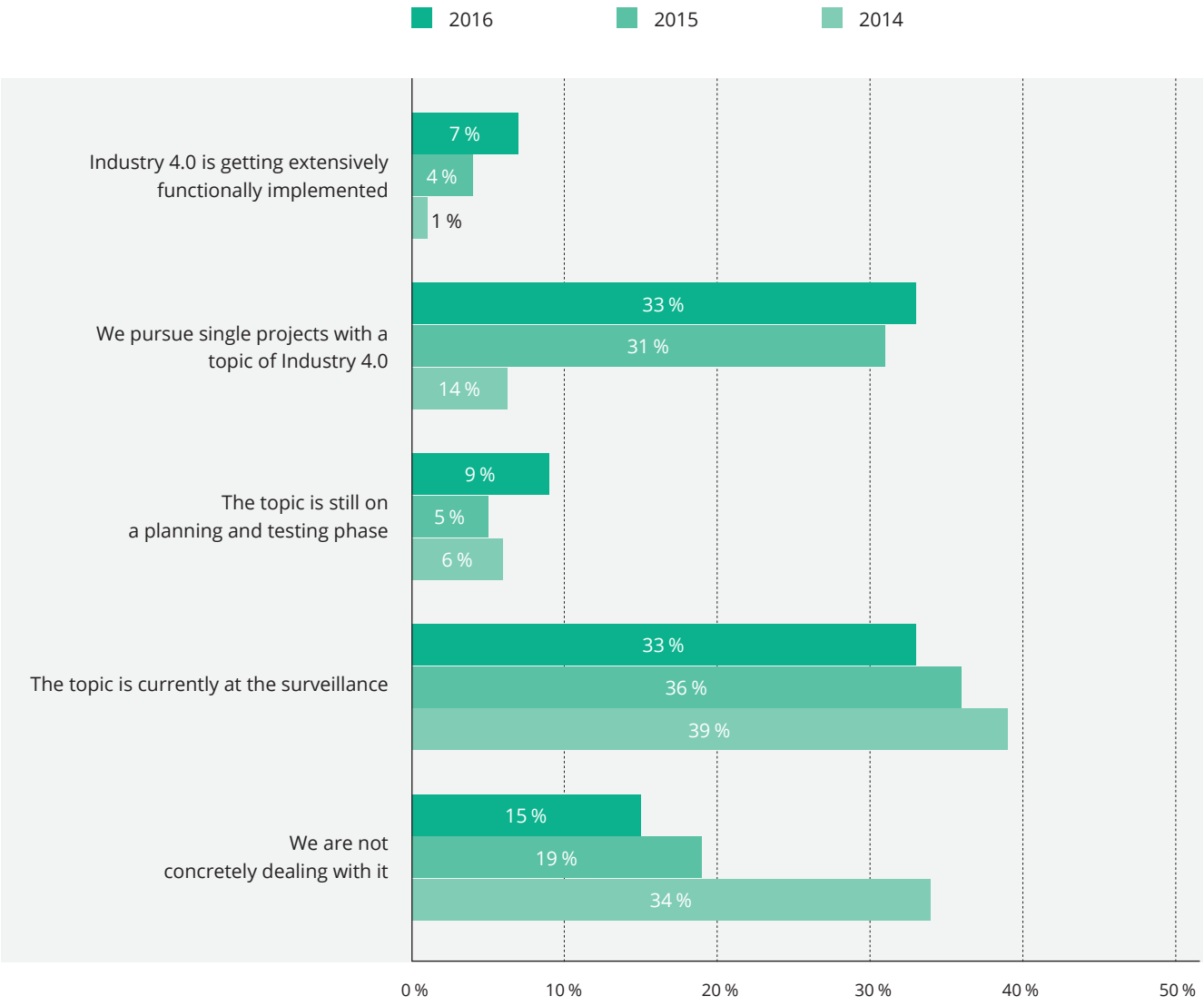

16
2014
30
2015
35
2016

Industry 4.0 / Digitalization is the top topic nowadays. How far is your company on the way to "Smart Factory"?



The view on the different industries is interesting: Especially in the electronic industry a lot of companies are done with the surveillance and analyze phase, six from ten companies are actually pursuing operational single projects. In mechanical engineering the situation is quite different: Here is seen a bigger spread. There are a lot of companies who are still waiting, and on the other side a big part of 15 percent that is already past the phase of single projects.

Industry 4.0 / Digitalization is the top topic nowadays. How far is your company on the path to "Smart Factory"?



"No answer" and "do not know" are not captured on this diagram

4.2
Indirect areas rise

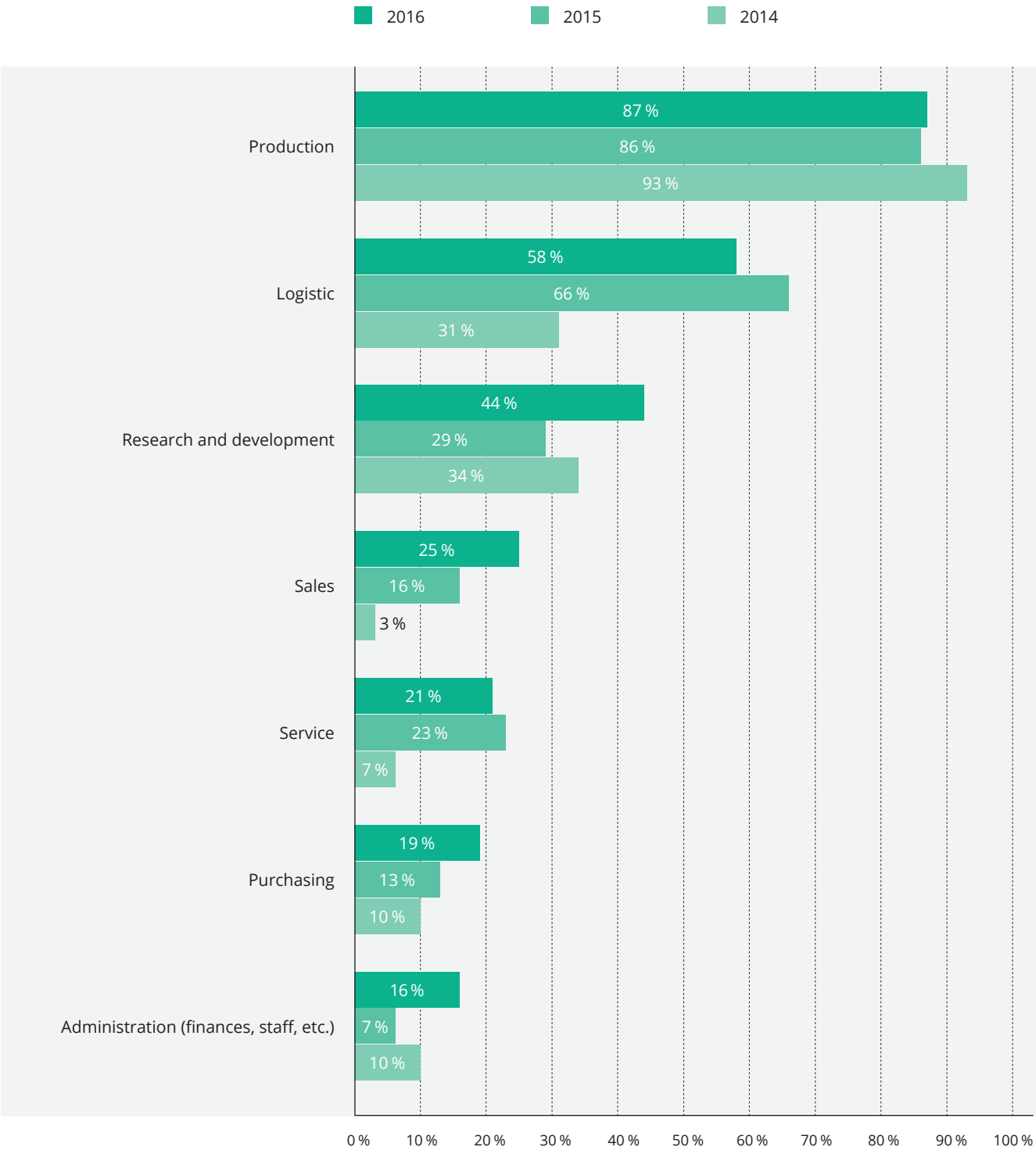
Also in the middle of 2016 the focus is on implementing Industry 4.0 measures into the production (87 percent) as well as logistic and warehousing (58 percent). The companies recognize more and more that smart factory is an overall concept and also has to include the indirect areas.

In particular, this is seen in the research and development: 44 percent of the companies are using Industry 4.0. Considerably increased has also the sales, where nearly every fourth asked works already "smart". The expansion of the After-Sales area should be one of the main factors. Increases are also seen in the purchase and administration areas.

"We do not only need Industry 4.0 products and solutions, but also business models. We have a lot of backlog at this point. We hear too often on conferences and exhibitions ‚How can we earn money with digitalization?'"

Robert Tordy, Deputy Director R&D, Hirschmann Automation and Control GmbH

In which company areas are you already using Industry 4.0 / Digitalization or rather do you are planning to use it?

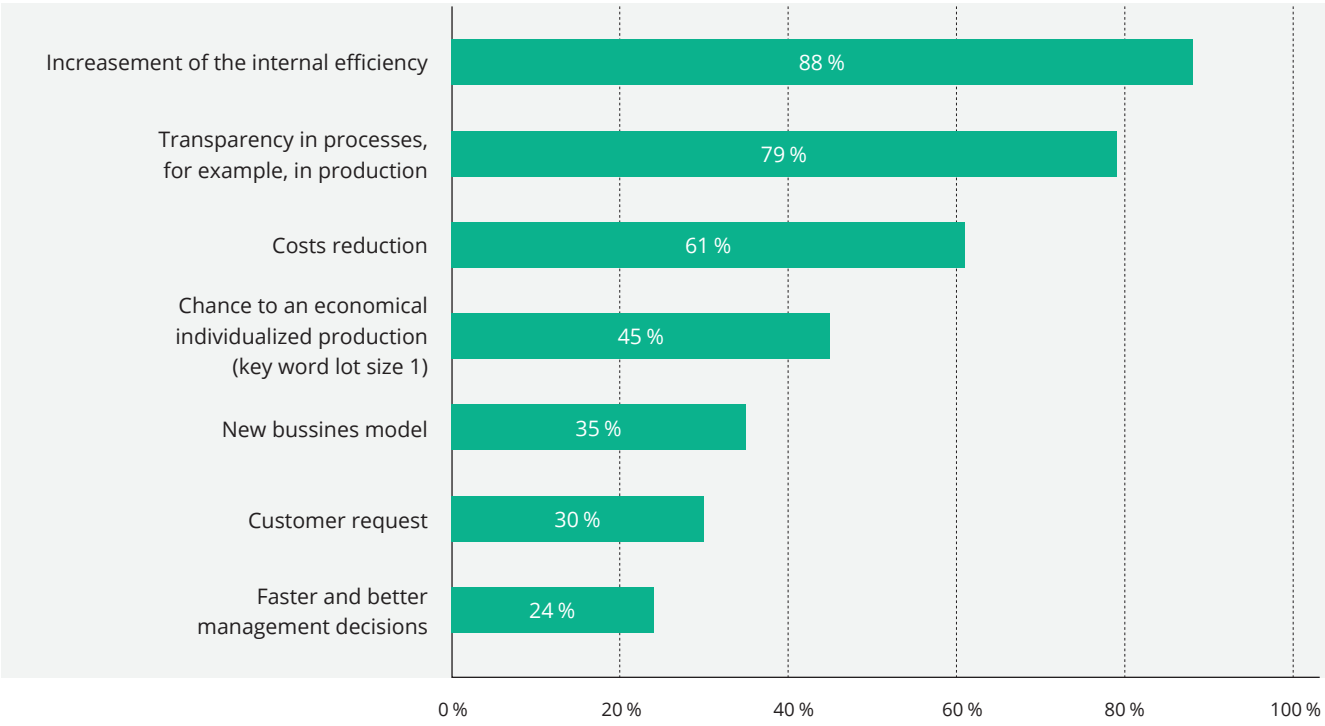


4.3 The motives remain conservative

The step into a new industry world follows classical and obvious commercial motives: Specially the internal company efficiency (88 percent) and the transparency (79 percent) should be strengthened as well as the cost (61 percent) reduced.
So far then, companies are not really pursuing innovation and long term goals with their Industry 4.0 projects. The individualization of the manufacturing – with their extreme value of lot size 1 – is not a factor for nearly half of the surveyed, only a little bit more than a third sees new business models as a factor to mention.

Surprising is the number of companies who mention customer request as a motive for Industry 4.0 measures. It is only 30 percent, with one exception, the electronic industry who claims 64 percent.

Motives for Industry 4.0 / Digitalization procedure in the company

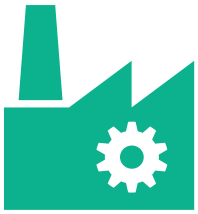


Chance to an economical individualized production (key word: lot size 1)

”Digitalization helps us in the quality improvement and cost saving in the value added chain, allowing us to secure our production in Germany”.

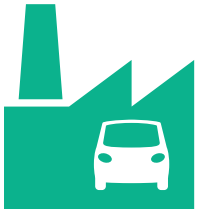
André Irle, production management Germany, Viega GmbH & Co. KG

Motives for Industry 4.0 / Digitalization procedure in the company



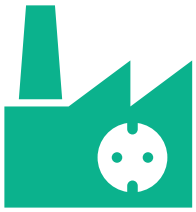
Mechanical and plant engineering companies

Increasement of the internal efficiency	83 %
Transparency in the processes, production for example and chances to an economical individualized production (key word lot size 1)	65 %
Cost reductions and new business models	34 %



Automobile industry

Increasement of the internal efficiency	100 %
Transparency in processes, for example in the production	92 %
Costs reductions	67 %



Electrical industry

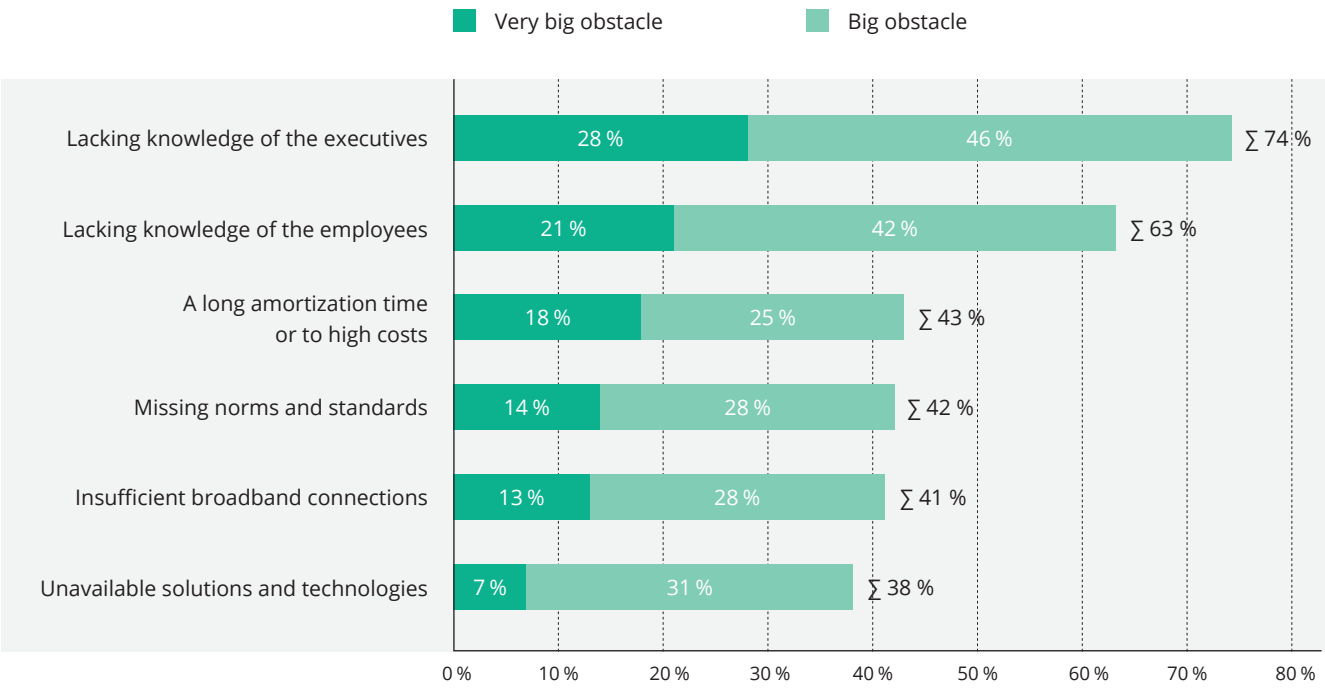
Transparency in processes, for example in the production and Increasement of the internal efficiency	91 %
Costs reductions	73 %
Chance to an economical individualized production (key word lot size 1) and customer request	64 %

4.4 Lacking competence of the employees slows down the development

It becomes more evident: the technology is a significant smaller problem for Industry 4.0. Way more decisive are the people. This is shown on the results of the study this year. The surveyed are seeing the biggest problem in the lacking knowledge of the management. 74 percent sees deficits here. Crucial are the establishment of a digital and smart-data competence, as well as a new understanding of leadership. These includes to allow a company structure based on innovation.

A little bit better, but not really good, is the evaluation of the qualification of the coworkers. There is a lack of IT and automatization skills and an overall knowledge about integrated systems. Compared with this, the companies have fewer problems with missing rules, insufficient broadband net and missing technologies. But still so, the economy and politics should not reduce their effort, because still four of ten companies claim considerable obstacles.

Obstacles on the path to Industry 4.0 in Germany



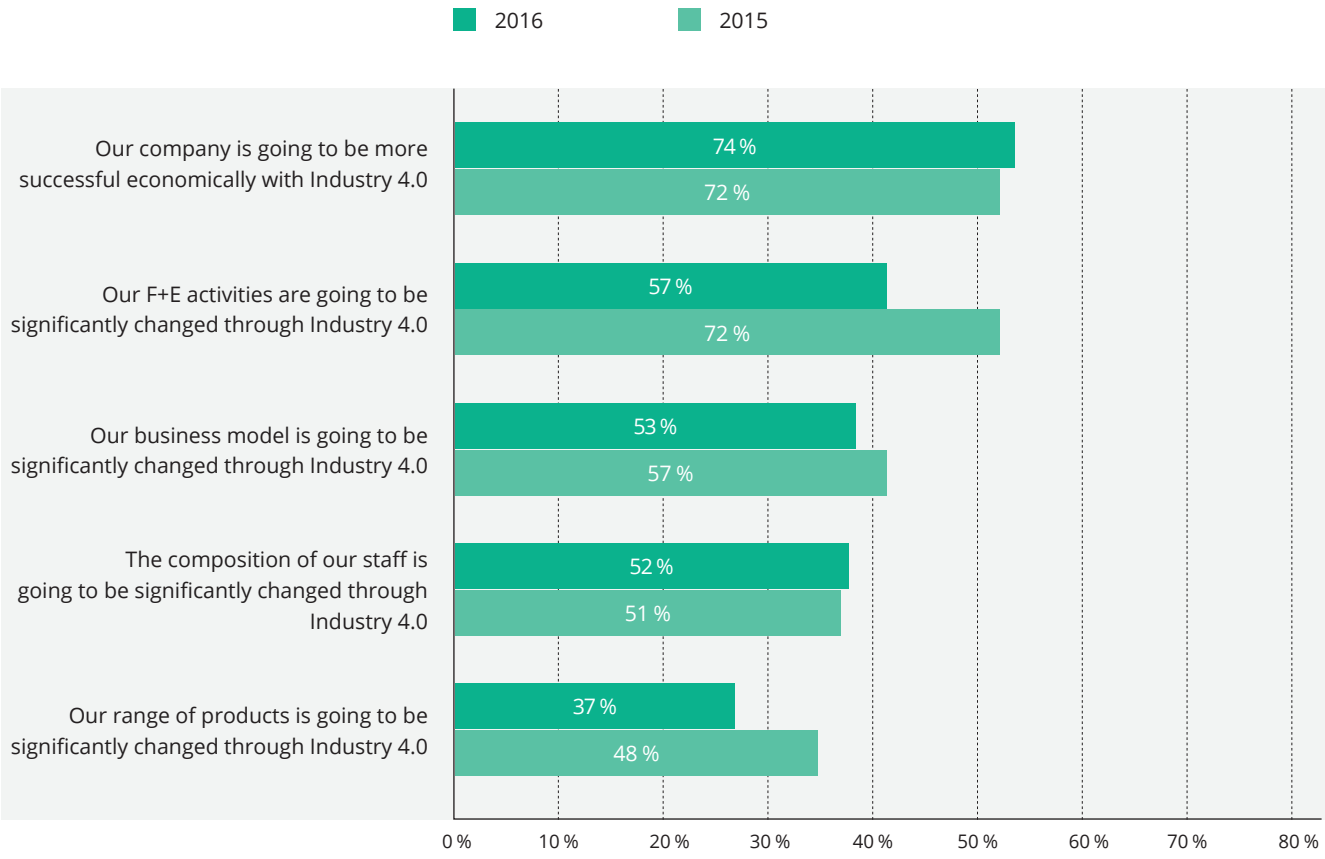
4.5 Companies expect significant successes

The companies in Germany are furthermore looking optimistically into the Industry 4.0 future. 74 percent are sure that they will be more successful, a little rise compared to the also positive forecast from last year.

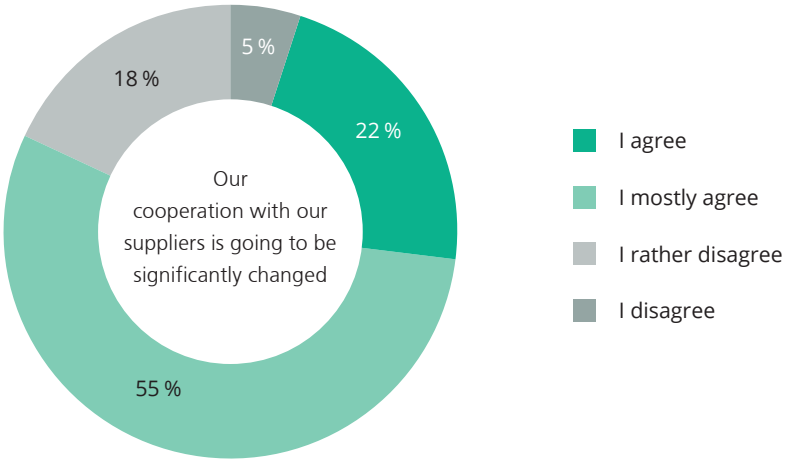
On the other hand, changes in the companies are seen more skeptical than in 2015. Only 67 percent expect a noticeable change in the research and development activities in the next five years – in 2015 it was 72 percent. These reduction is surprising due to the actually growing number of companies who bet on this area in their Industry 4.0 concepts. Maybe here is shown a little bit of insecurity in the companies after the initial euphoria. Asked about how the Industry 4.0 is going to change their business models the surveyed are split in half: around half of them are inclined to stability and the other half to changes.

They have also a divergent opinion about the effects on the workforce. About five from ten think there will be a noticeable change – but also half of them think that the workforce will stay constant. Facing the fact that the companies say their workforce still lack in Industry 4.0 knowledge, there will be betting on upskilling.

How your company is going to be affected by the Industry 4.0 / Digitalization in the next five years?



Cooperation with suppliers



The companies are planning especially big steps with their suppliers, they have recognized that the Industry 4.0 thought does not stop at the end of the own company, but more the whole value added chain should be implied. 77 percent are saying that they expect a noticeable change with the cooperation with their suppliers.

"The train 'Industry 4.0 / Digitalization' departures. Everybody can decide by themselves how far they want to go with. However, this only work out if you get on in time!"

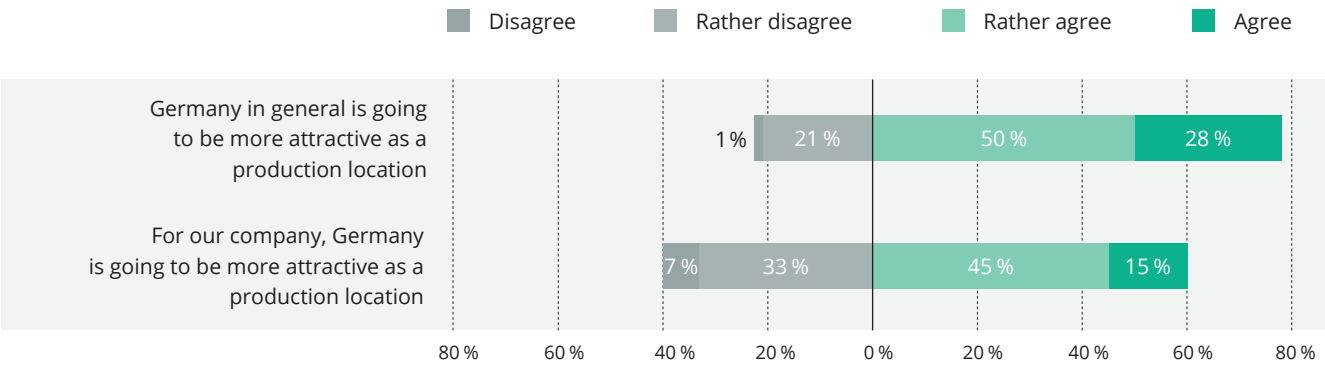
Jörg Krieger, Managing Director, Eugen Forschner GmbH

4.6
Location chance for high-wage countries

While during the last years the relocation of production places were unbroken, and even gained share, Industry 4.0 could be a reason to make Germany and other high-wage countries more attractive again. Nearly eight from ten companies believe in a strengthened domestic location. The reason: wage is not that much of a reason in smart factory than in the "traditional" industry. A market nearer production would solve another problem for the industry companies: long supply chains are distinguished for lacking flexibility – in increasing volatile markets companies must adapt fast. In addition: also in low-wage countries the production costs are increasing. The Industry 4.0 could be a game changing factor for the backsourcing. Some companies in different industries are already thinking about it. Such as Adidas, who is bringing back the production back home – 23 years after they closed their last own production factories in Germany.

Asked about the own company, the perception is a bit more cautious, but nevertheless 60 percent of the study participants thinks that the production location Germany could be more attractive to them in the future.

Following your perception, does Industry 4.0 / Digitalization opens up new possibilities to bring back production places back to Europe and Germany?

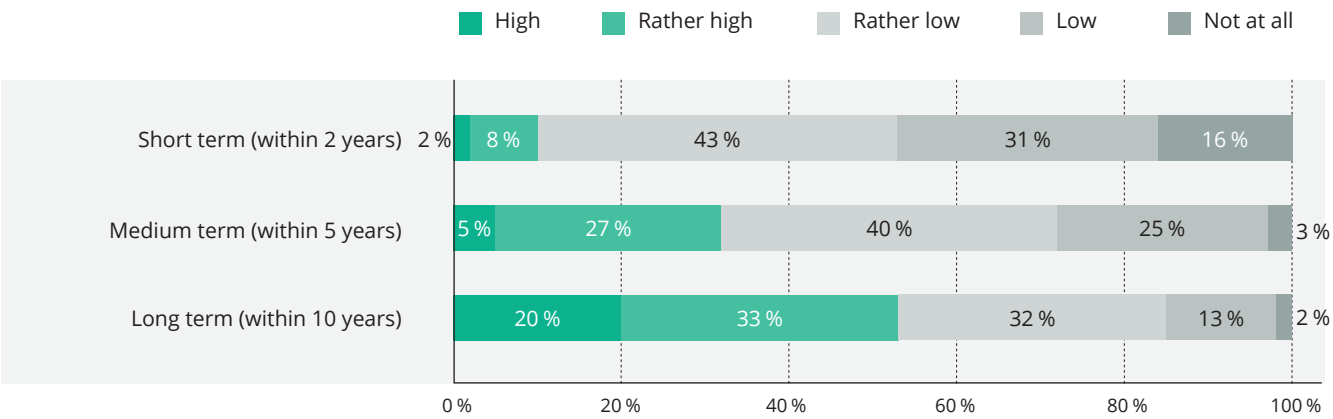


4.7

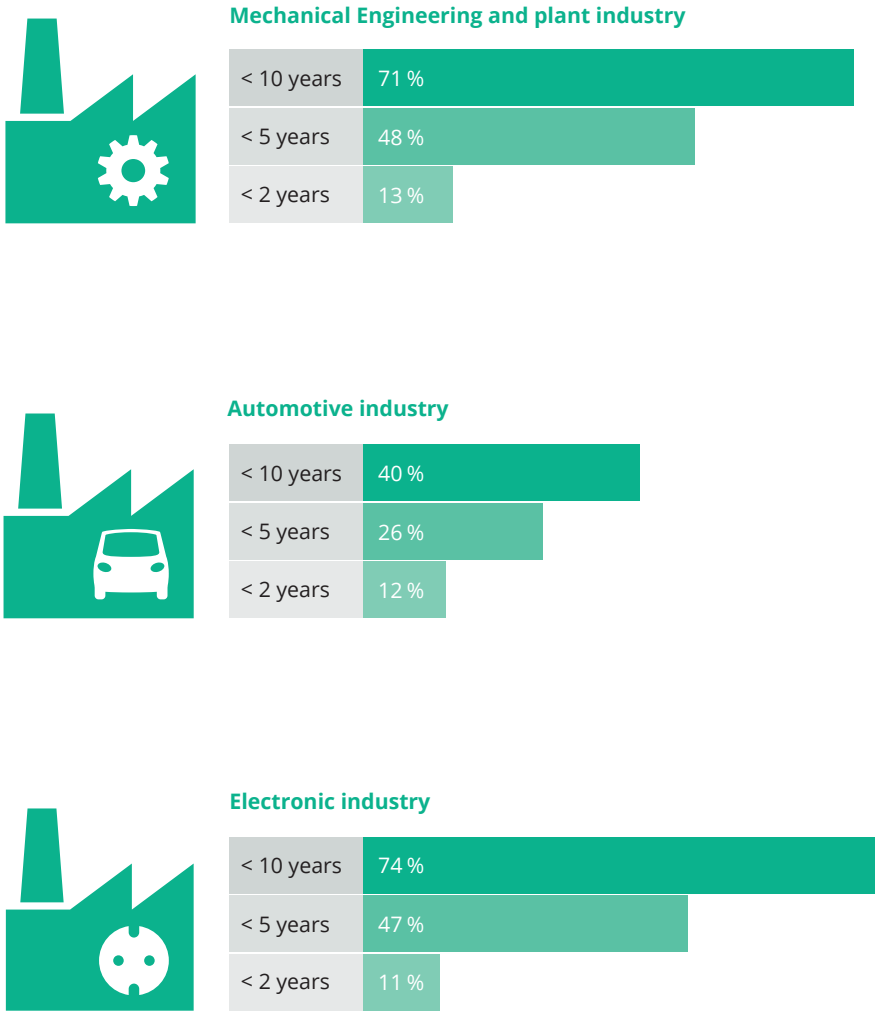
The speed of disruptive processes is being underestimated

Changing technological paradigms are one of the best chances that new market players can attack established companies. Regarding the near future, the companies are still relaxed: only every tenth surveyed has fear of being attacked during the next two years from new competitors. If extended to a five-year period of time, 32 percent of them have this thought. Looking on a decade period of time nearly half of them see a threat through new competitors. In particular, mid-size companies sees more probably that they get attacked by new competitors in their business field.

Probability that a new competitor with Industry 4.0 / Digitalization innovation attacks the business



Probability that a new competitor with Industry 4.0 / Digitalization innovation attacks the business

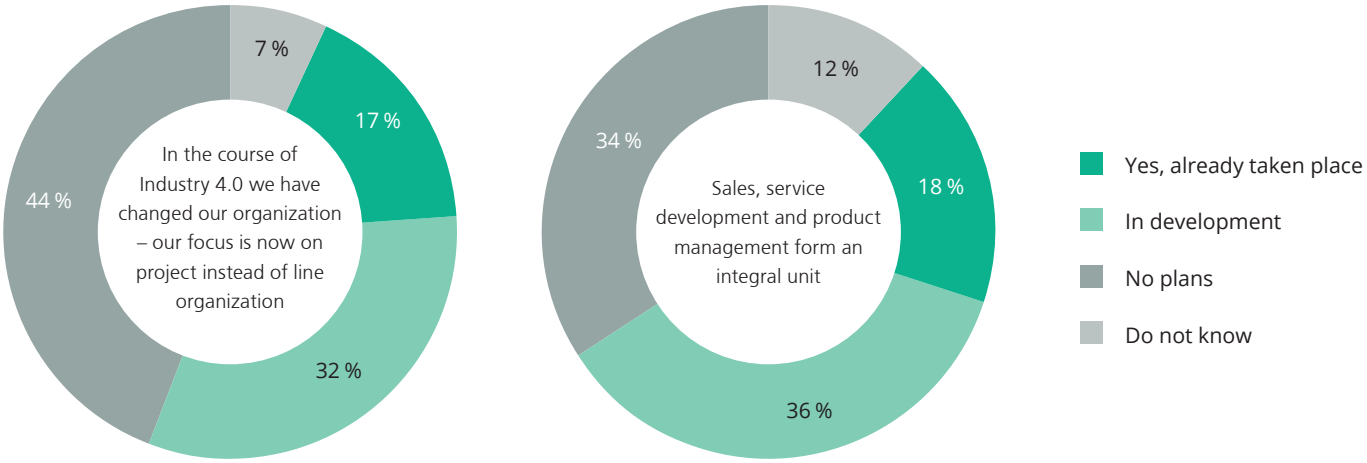


The risk that Industry 4.0 could inspire the competition is present by all means in the mind of the surveyed. Though most of them still underestimate the speed of disruptive processes. It takes an average of two years that a company notice a competitor. In the era of digitalization this is an eternity. Uber and Airbnb have changed their market radically in only two years. Innovation radar, trend scouts and awareness should be readjusted. The dynamic digital innovation pace could surprise unpleasantly companies who thinks that it will take ten years to have a serious competitor. Interestingly enough: specially the automobile industry is quite serene. Even for the longest period of time asked, only four of the companies think that they are going to get in trouble through new competitors.

4.8 Company organization are predominantly not prepared

Such as so profound technological changes as the conversion to Industry 4.0 require an adaptation of the company organization. It is not done by buying new machines. But Germany companies still act quite reluctant. Only every sixth company has changed from line to project organization in the course of Industry 4.0, every third has corresponding plans. 44 percent of the companies do not pursue that target. It is likely that especially personnel aspects are a factor for the reluctant attitude of the companies. Because, the management, employee representatives and employees have to go along with.

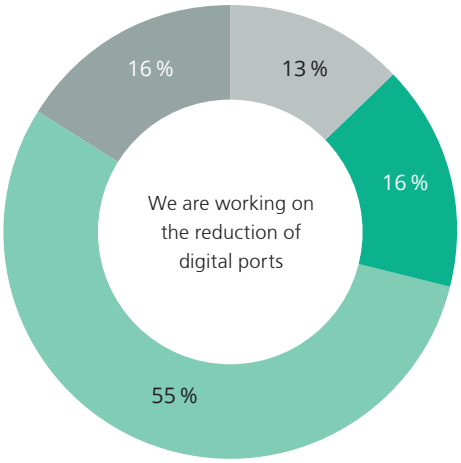
Impact of Industry 4.0 / Digitalization on the company organization

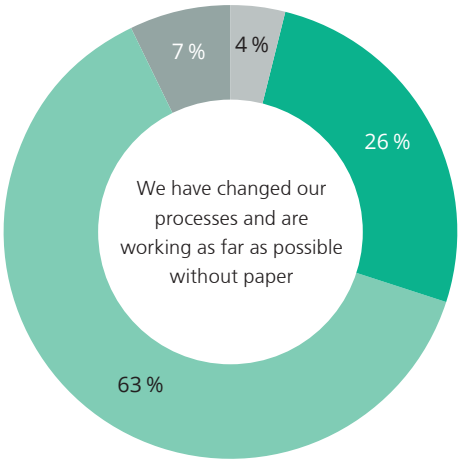


The all-embracing digitalization of company processes offers different areas the possibility to increase their efficacy and develop new synergies. In this context in nearly every fifth company the sales, service, development and product management makes an integral unit. An additional 36 percent of the surveyed are working toward this goal.
As it always has been: a lean IT-infrastructure leads considerably to a higher effectivity and reduced costs. The requirement to reduce digital ports has now gained even more importance. In accordance with this the companies have actuate: 16 percent have already reduced significantly their digital port, more than half of them are planning to do this step. The fact that a lot of companies are still aiming for this objective has to do with the over the years expanding heterogeneous IT structures.

Also the complete digitalization of analog processes still is going to take time for the companies: only a quarter are working paper-free. 63 percent are at least planning it, to depict their processes completely digital.

The detailed analysis shows, that companies, who have already Industry 4.0 experience are significantly farer ahead in the changing of their structures. In 70 percent of the companies, who are already ahead of the single projects phase, different areas build an integral unity. Nearly two thirds of the companies are betting on project organization and 90 percent of them work paper free.





Yes, already taken place
In development
No plans
Do not know

4.9 Added value shift in favor of machines

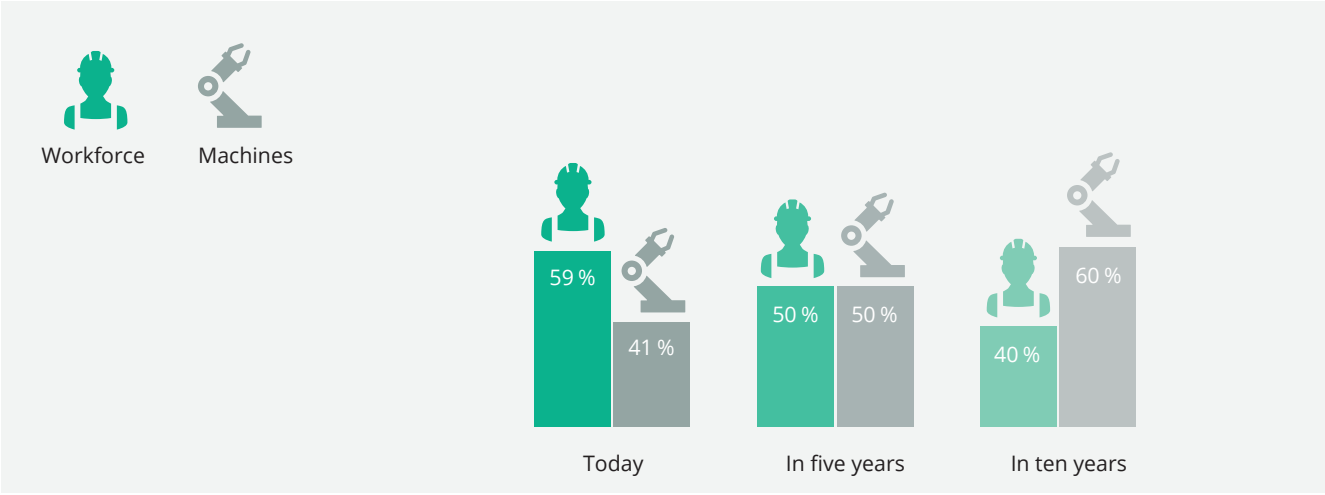
Already nowadays the percentage of the machines in the value added is considerable. But the companies still consider the workforce being above, with 59 percent. In the next five years, the surveyed think that the machines will catch up. Another five years later, workforce is only going to be responsible for 40 percent of the value added, according to the management from Germany industry companies. In the automobile industry they are calculating with an even lower value: not even more than a third of the value added will be generated by workforce in ten years.

Nevertheless, Industry 4.0 is not going to banish people from the factory workshops. The people will remain an important decision-making authority. But a new type of employee is required. It is time for the companies to prepare their employees to meet the new requirements. And to reduce the fear amongst them to be replaced by a machine.

More severe than in the companies, the society will notice this change. In a long-term the economy will be forced to face a new definition of work and employment.

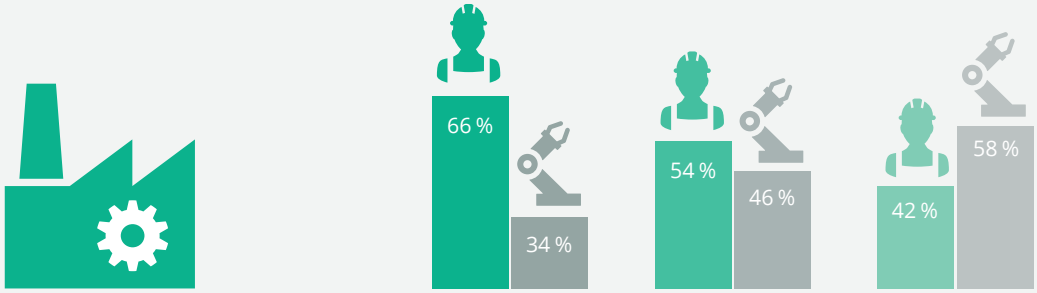
Estimated percentage of workforce in the value added today and in future

Average values



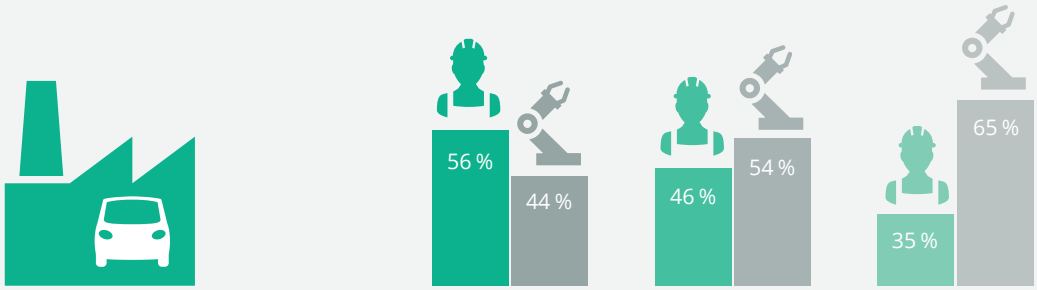
"The brain of our employees is the most powerful CPU we have on the Shopfloor. Industry 4.0 allows us to use these more consistently and establish dynamic pull principles over value added chain."

Dr. Nils Macke, Senior Manager ZF Group/Head of Production Network Solutions, ZF Friedrichshafen AG



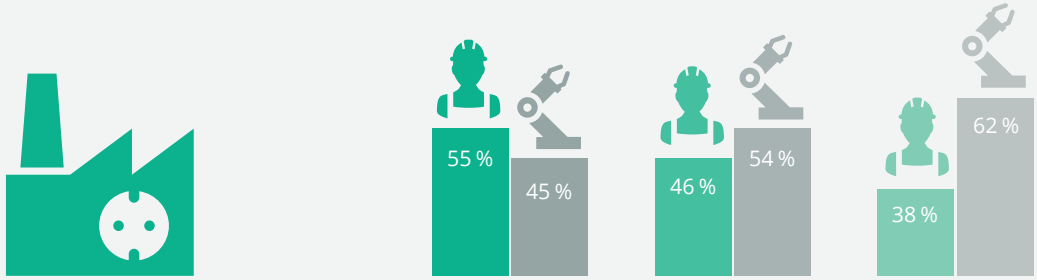
Mechanical Engineering and Plant industry

Today | In five years | In ten years



Automotive industry

Today | In five years | In ten years



Electrical industry

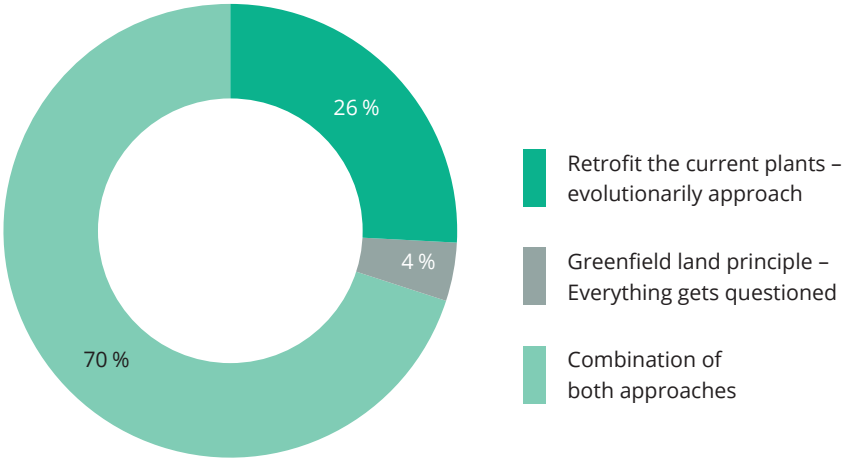
Today | In five years | In ten years

4.10 Industry 4.0 does not origin on a "greenfield land"

How do companies approach the technological implementation of Industry 4.0? Only a few, 5 percent, thinks that everything has to be questioned, so called "greenfield land" principle. Solely the electric industry thinks more revolutionary. A fifth of the companies follows the evolutionary concept and upgrade existing plants. The substantial majority works in both ways: 70 percent are planning new connected and digitalized plants and factories, but also forge the base for Industry 4.0 on their existent locations. In this manner they maintain their investments made in the past and build on the known facts their Industry 4.0 competence.

Although it is impossible to achieve a fully automatic and smart production only through upgrade, but this way new technologies and features can be used in certain sections. The so called retrofitting is therefore a useful step. Plant are upgraded in a periodic time anyway, so elements of the Industry 4.0 can be fitted.

Technological approach to the topic Industry 4.0 / Digitalization



4.11 Chance Smart Data – Currently massively underrated

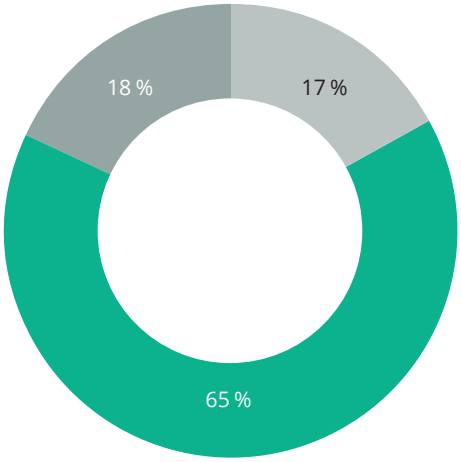
On the fundamental skills to be successful in the Industry 4.0 environment is the ability to manage big amounts of data and analyze them purposefully. 78 percent of the companies have already occupied themselves with the analysis and usage of corresponding data. However, only two thirds of them assume that they dispose of the necessary know-how.
But even lacking of the necessary know how, only every twentieth company deliver the data analysis to a professional service provider. Most likely the safety concerns are the main reason that companies do not claim external support. After all a substantial majority are aware of the big potential in this area. An example is the predictive maintenance, therefore maintenance is based on the proactive data analysis. Two thirds of the surveyed see this as a future value driver.

Analysis of the data, which is originated by the digitalization and connectivity

Additional results

65 % Have the know-how for an intelligent data analyze and exploitation

6 % Deliver the data to third parties to analyze them, such as professional providers



5

Conclusion

The results of this study shows a continuous trend towards Industry 4.0. Especially in the areas beyond the production the companies have made a big step forward. The majority expects furthermore financial achievements with the next digital level.
Simultaneously, realism has caught up after the first pioneer phase. The companies have realized that not every change can be implemented with the, in first place, expected pace. As biggest obstacle has emerged the people, more than the technology aspects. As the study has proven, people are not as prepared as thought for the smart economy world.
Especially lacking knowledge and insufficient qualification on the management side turned out to be a retardant. Industry 4.0 will not change companies in successful manner until these made a conversion from stock and employees administrators to managers whom exemplify innovation willingness and trigger enthusiasm for change.

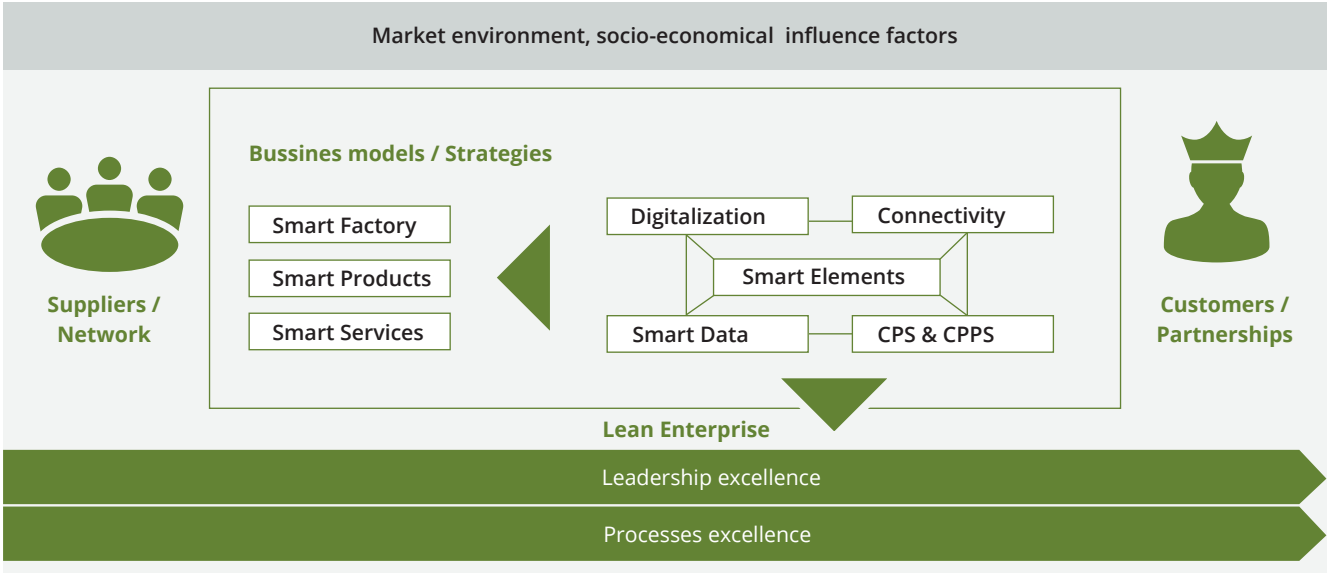
"We are going to use the digitalization, with the creativity and flexibility of our employees, to mold the location Germany as desirable, to ensure the future of our children."

Hans Erhard Timm, Plant Manager Cuxhaven, Siemens AG

6

STAUFEN 4.0 SYSTEM –

An assembling kit for top performance



The STAUFEN 4.0 SYSTEM consider a company as a single entity, therefore takes into account the overall scope of action of a company. This approach goes far ahead of simple process improvement in the production through digitalization and connectivity. Smart Factory is only to consider as one element of the Industry 4.0 strategy of a company. It is equally important to develop smart products and smart services. The survival is not guaranteed by a digitalized and highly efficient production, when new competitors attack the business model with ground-breaking strategies. Keeping the sovereignty over the data and use it in an intelligent manner in service – key word predictive maintenance – has a fundamental importance.
The STAUFEN 4.0 SYSTEM take into consideration the horizontal value added chain, apart from the vertical digitalization, such as the consistent information and data flow over all areas of a company. Because with the digitalization suppliers, customers and other network partner move together even more. Therefore, it is a must to integrate and optimize the information as well as the product flow from customers, over the own company towards the supplier and backwards.

Technology alone does not secure the success in the smart industry world. The human is crucial. The managers are those who, with new knowledge and new skills, have to make the right choices and take the workforce onto the path of Industry 4.0. The STAUFEN 4.0 SYSTEM provides therefore, beside process excellency, in particular leadership excellency in a company.

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