# Autonomous machines and autonomous skilled workers in agriculture - Changing competences through digitalisation and networking

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***Abstract:*** *As part of the initiative „Vocational Education and Training 4.0 – Qualifications and Competences for Tomorrow's Digitised Work" launched by BMBF and BIBB in Germany, the question of how digital and networking technologies are currently affecting work tasks and competences in the dual system of vocational education and training (Dual VET) was examined. In the agricultural sector the recognised training occupations farmer and agricultural services specialist were examined. The central concern of the study was the question of how digital and networking technologies change occupation-specific activities and competences and how to react to this at curricular level. Based on a literature and sector analysis, the study consisted of a qualitative part with several case studies and expert interviews and a quantitative part in which an online survey was conducted. The survey showed that mobile devices in combination with apps, digital field data files, GPS steering systems and digital herd management systems are the most widespread. In crop production, precision farming is becoming increasingly important. In animal husbandry, in addition to digital herd management systems, there are animal-specific feeding systems and health monitoring or automatic milking systems. With regard to the change of activities and tasks, the handling of computer-controlled equipment and technologies is becoming an increasingly relevant factor in the daily practice of skilled workers. On the one hand, they make work physically easier, on the other hand, they become more complex in view of the increasing cognitive demands on operation and control. Increasing automation and networking are also leading to a shift from operative to controlling and monitoring activities. The organization of data flows in connection with the use of machines and systems is also becoming increasingly important. In addition to these IT-related skills, interdisciplinary skills are also be classified as particularly important in the future. In particular in dealing with living beings, specialist skills continue to be an essential basis for the vocational capacity to act, but must be supplemented by skills in dealing with the control of machines, equipment and installations as well as the evaluation and use of data for process management.*

***Keywords:*** *digitalisation – skills – qualification – skilled worker – Dual VET (Germany)*

## Introduction

The Federal Ministry of Education and Research (BMBF) and the Federal Institute for Vocational Education and Training (BIBB) launched a research initiative titled "Skilled worker qualifications and skills for the digitised work of tomorrow" in 2016. It was concluded at the end of 2018. Subject of this initiative were 14 recognised training occupations in the dual system of vocational education and training (Dual VET) in Germany. Central concern was the question of how digital and networking technologies change occupation-specific activities and competences and how to react to this at curricular level. The example of agriculture was used to illustrate the object of the study, the research questions and its design. Subsequently, key findings for the recognised training occupations of farmer and agricultural services specialist are presented. They are divided into technologies used, changed activities and skills, the perception of change by those concerned, the urgency of modernising the training occupations and the demand for skilled workers. Each section begins with results that are discussed afterwards. A short outlook on follow-up activities concludes the paper.

## Starting point

Despite dense settlement, around 80 percent of Germany's land area was used for agriculture and forestry in 2015. The number of agricultural enterprises fell from 1,146,900 to 275,400 between 1970 and 2016 (cf. BMEL, 2016: 7). This represents a decline of about 75 percent. At the same time, productivity has increased significantly due to increasing mechanisation, higher crop yields and improved performance in the production of animal products. While farmers today can feed 142 people, after the Second World War the number was only ten (cf. *ibid.*: 11). The use of digital applications and technologies now offers the prospect of a further improving operational processes through the collection and analysis of a wide range of farm data and digital decision-making tools. With regard to a reduced use of fertilisers and plant protection products and improved animal welfare, effects for more sustainability are also expected.

## Industry 4.0 and agriculture 4.0

This further development is based fundamentally on networking technologies in the frame of "Industry 4.0" - as it is called in Germany. "The term 'Industry 4.0' stands for the fourth industrial revolution, a new stage of organisation and control of the entire value-added chain over the life cycle of products ... The basis is the availability of all relevant information in real time by networking all instances involved in the value-added process and the ability to derive the optimum value-added flow at any given time from the data. By connecting people, objects and systems, dynamic, real-time optimised and self-organising, cross-company value-added networks are created, which can be optimised according to various criteria such as costs, availability and resource consumption" (BITKOM (Federal Association for Information Technology, Telecommunications and New Media), 2018 ).
However, a comparison of the framework conditions of industrial production with those of agricultural production reveals serious differences (cf. Bechar and Vigneault, 2016). With regard to the environmental conditions, it can be seen that industrial products are manufactured under relatively constant external factors, for example air temperature or air humidity are controlled in production facilities. Therefore, industrial conditions can be indicated as structured. In contrast, conditions in agriculture, especially outdoor, are unstructured due to abiotic and biotic factors. Nature itself and natural processes form the basis for agricultural production, so that production is shaped less by fixed determinants and more by probabilities. If we also look at the products in industry and agriculture, a difference can be seen here too in terms of their structure. While industrially manufactured products are usually made of inanimate and standardised matter, plants and animals are living individuals with individual characters. Consequently, environmental conditions as well as the "objects" are unstructured, so that the constructs "Industry 4.0" and "Agriculture 4.0" differ significantly from each other.

## Research questions, study design and methodological approach

Against this background, the study focused on the questions of which digital and networking technologies are used, how their use affects work processes and how competence-requirements change as a result. With regard to the suitability of existing means of regulation, the question of how these changed competence-requirements fit in with existing training occupations and whether these have to be adapted was investigated. A total of 14 recognised training occupations in the dual VET system were selected for this purpose with regard to different sectors, the particular impact of digitalisation, different numbers of apprentices and the date of the last reorganisation (see table 1), including the training occupations of farmer and agricultural services specialist. In total, almost a quarter of all apprentices in the dual VET system are trained in these 14 training occupations.
The dual VET system of vocational education and training in Germany is a central component of the educational system. It guarantees learning on the job and ensures that the demand for skilled workers

is met. It is called dual system, because training takes place in the company and at vocational school. There are no formal entry requirements for access. Apprentices are in the company three to four days a week and up to two days at vocational school. In accordance with The Vocational Training Act (BBiG), the aim of vocational education and training is to impart the skills and qualifications necessary for the exercise of a qualified activity in a changing world of work. It also aims to provide the necessary work experience. Company training contents are subject of a training regulation including a general training plan, which is specified in an in-company initial vocational training plan. The contents to be imparted at school are laid down in a framework curriculum structured according to learning fields. Both are coordinated with each other in terms of content and timing. Based on a vocational training contract between training company and trainee, about half a million training contracts are concluded annually. Companies pay a training allowance and assume the costs of in-company training. As a rule, the training period is three years. The successful completion of the training enables trainees to exercise his or her profession as a qualified specialist in one of currently 330 recognised training occupations.
The respective studies of these training occupations aimed to gain a broad insight into the changes of tasks and skills caused by digital and networking technologies.

| | **Selected training occupation** | **Training sector** | **Effective since** | **No. of apprentices (2017)** |
|---|---|---|---|---|
| 1 | Agricultural and construction machinery mechatronics technician | Trade & Industry / Crafts | 2008 | 8.436 |
| 2 | Agricultural services specialist | Agriculture | 2009 | 672 |
| 3 | Designer of digital and print media | Trade & Industry | 2013 | 7.836 |
| 4 | Farmer | Agriculture | 1995 | 9.306 |
| 5 | Industrial Clerk | Trade & Industry | 2000 | 49.089 |
| 6 | Machine and plant operator for food technology | Trade & Industry | 2004 | 391 |
| 7 | Machine and plant operator for textile / textile finishing | Trade & Industry | 2004 | 577 |
| 8 | Mechanic in plastic and rubber processing | Trade & Industry | 2012 | 6.591 |
| 9 | Media designer images and sound | Trade & Industry | 2006 | 1.731 |
| 10 | Orthopaedic technician | Crafts | 2013 | 1.551 |
| 11 | Plant mechanic for sanitary, heating and air conditioning services | Trade & Industry / Crafts | 2016 | 33.474 |
| 12 | Road builder | Trade & Industry / Crafts | 1999 | 3.750 |
| 13 | Sewage engeneering technician | Civil service / Trade & Industry | 2002 | 933 |
| 14 | Warehouse logistics operator | Trade & Industry | 2004 | 25.047 |

***Table 1. Recognised training occupations selected for the study.***

The vocational training regulation for farmers of 31st January 1995 reflects the different sectors in agriculture to a particular extent. There are 17 “branches” (see table 2), which are divided into plant production and animal husbandry. Paragraph 5 (2) of the regulation states that "at least two branches of plant and animal production must be taken as a basis for teaching the skills and knowledge referred to in this regulation" (Bundesgesetzblatt (BGBI), 1995). The recognised training occupation of agricultural services specialist was also included in the study due to the use of large agricultural machinery and the overlap with the issues of the project with regard to plant production. This training occupation is characterised by competences in the field of plant cultivation, the marketing of agricultural services and dealing with clients in the context of contractors. It is also a three-year training occupation, instead of "branches" it is structured around different kinds of so called "crops" (BGBl, 2009). These can essentially be allocated to the branches of plant production in the recognised training occupation of farmer.

| Branch of business: plant production | Branch of business: animal husbandry |
|---|---|
| cereal cultivation | dairy cattle farming |
| sugar beet cultivation | cattle raising and fattening |
| potato cultivation | sow husbandry and piglet production |
| grain maize cultivation | pig breeding or pig fattening |
| oilfruit cultivation | laying hen husbandry |
| legume cultivation | poultry breeding or poultry fattening |
| arable forage cultivation | sheep husbandry |
| grassland | horse husbandry |
| forestry | |

***Table 2. Branches of the training regulation farmer.***

The investigation carried out was divided into a qualitative and a quantitative part (see figure 1). The starting point was initially a literature and sectoral analysis in which the subject of the study with its special features for the agricultural sector was defined in more detail. On this basis, first interviews with experts were conducted in order to gain an overview of the operational developments in selected branches of plant production and animal husbandry sectors. This was followed by a workshop with representatives of professional organisations, federal institutions and competent bodies (Chambers of Agriculture). Identified findings up to that point were deepened, further questions were developed and a selection of further experts to be interviewed and of farms suitable for case studies was compiled.

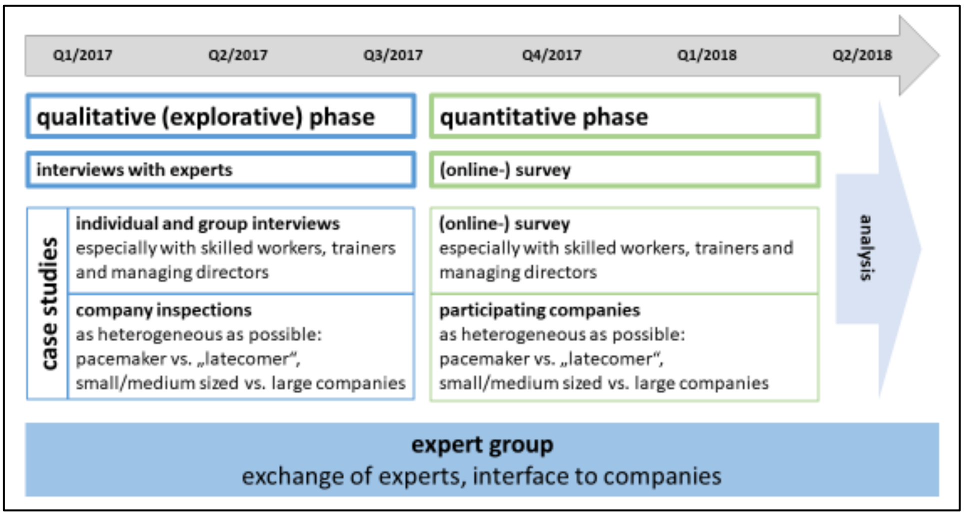


***Figure 1. Methodological approach.***

On the basis of interview guidelines, a total of 58 expert discussions took place, mainly within the framework of company case studies, but also with professional associations, competent bodies, research institutions and universities. In selecting the case studies, "pacemakers" were chosen. They were defined as companies that are already making particular use of the opportunities offered by digitalisation. They became part of the study because in such companies the effects of the digital applications and technologies used on the activities and the associated skills could be seen most clearly. An expert group provided indications to such companies. In order to gain an insight into practical operational processes, as an integral component company inspections were also carried out.

The questions asked were which digitalisation and networking approaches can be found in company practice, which activities and activity profiles result from digitalisation, which competences are required for skilled workers and how these activities and competences fit in with existing training occupations. The interviews in the companies took place as individual and group interviews with different target groups such as skilled workers, apprentices and trainers as well as managing directors. All available material was then evaluated by means of a qualitative content analysis (cf. Mayring, 2016). On this basis, for example, an overview of various skills and knowledge related to digitalisation could be elaborated (see figure 4). The results were successively discussed and used for the continuation of the qualitative part of the investigation.

On the basis of these results an online questionnaire was developed which was checked in a pretest. The questionnaire aimed at identifying current and future requirements and framework conditions for vocational education and training in the context of progressive digitalisation. The training regulations of the two recognised training occupations examined were the relevant reference point for the content of the questionnaire. The questions were directed at skilled workers, trainers as well as at managing directors in the selected training occupations. 88 persons participated for the training occupation farmer, 28 persons for the training occupation agricultural services specialist. The results of this part of the study served to substantiate and validate the findings of the interviews. For example, based on the mention in the interviews a choice of widely used digital and networking technologies was queried (see figure 2).

The study also looked at the extent to which companies already consider themselves to be digitised. The participants in the questionnaire were therefore asked to give their self-assessment of the level of digitisation in their company on a scale from "0" (= very low) to "100" (= very high). Across all participants in all sectors, a significant correlation between the applications and technologies used on the one hand and the subjective digitisation level on the other hand could be seen. Hence, the subjective assessment could be used as a reliable indicator for the digitisation level in the companies.

The presentation and discussion of the overall results took place in a concluding expert workshop. Based on the results of the qualitative and quantitative phase, recommendations for dealing with the phenomenon of digitalisation and networking in vocational education and training were formulated for each training occupation that was part of the study (cf. Bretschneider, 2019).

## Results

### Technologies used

As an introduction to that topic the cultivation of sugar beets is a good example to illustrate which different aspects along a digitised process chain can play a role and how digitalisation and networking of work processes can contribute to an optimisation of that chain. The following description is the result of a case study carried out in a machinery ring.

Digitalisation and networking in sugar beet cultivation are largely characterised by the fact that sugar is an industrial raw material that should be processed as freshly as possible. The economic benefit of this is all the greater the more efficiently the processes from harvesting, storage at the edge of the field, pre-cleaning, transport logistics and further processing in the sugar factory are coordinated. In addition, sugar beets have a comparatively large volume. Beyond soil cultivation, sowing technology and inventory management, coordinated cooperation between farmers, removal groups and sugar factories, which set the harvest dates as a clock generator to ensure continuous operation, are also increasingly being digitised. In the meantime, machinery rings, for example with regard to sugar beet harvesters and beet cleaning loaders, play as well a major role in this respect. Against this background, the production processes and thus also the activities of farmers have changed considerably, especially in the last 15 to 20 years. In particular, the mechanisation of the driver's cab has changed towards more control and monitoring activities. Digital technologies are also being used for crop management, where apps with alarm functions for leaf or pest infestation and apps with information on dosage and the optimal time to apply crop protection measures are becoming increasingly important. As early as Mid-July of each year, samples are taken as a basis for campaign planning, in order to be able to plan harvest volumes, size and location of interim storage places, and transport capacity requirements. Logistics programmes are used for this purpose in which, for example, access and removal routes are planned, even taking into account the condition of the ground. Suitable routes are automatically created on the basis of algorithms. In addition, an IT-supported order management system is used, which allows the current processing status and locations of sugar beet harvesters and beet cleaning loaders to be viewed. Finally, a dataset is used which "accompanies" the sugar beets on their way to the sugar factory and records quality- and accounting-relevant data from each process step. The data is exchanged via data portals and all data of a load can be viewed with a slight time delay. The aspect of data security and data protection - all of which are regulated by a sectoral agreement - is of particular importance.

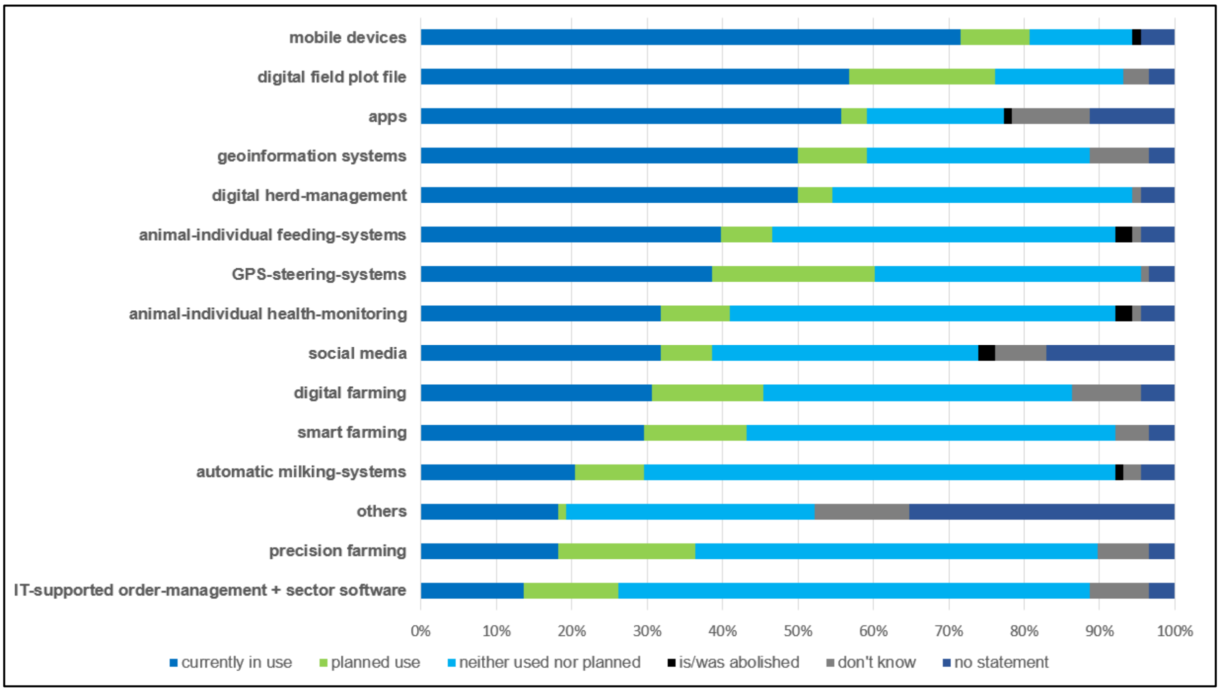


***Figure 2. Current and planned use of digital applications and technologies – farmer.***

Beyond the example of sugar beet cultivation, a number of other applications and technologies can be found. At the time of the study it became clear that mobile devices in combination with apps, digital field plot files, GPS guidance systems and digital herd management systems are the most common (see

figure 2). In crop production, precision farming is becoming increasingly important. To this end, information from different data sources are linked together, for example from soil mapping, biomass and yield maps, from which conclusions for management are then drawn, supplemented by knowledge and experience about the characteristics of arable land by the farmer himself. In animal husbandry, beyond digital herd management systems, there are animal-specific feeding systems and health monitoring or automatic milking systems. Farm management systems known as digital farming are also becoming increasingly widespread as a system for controlling the sub-systems. Digital decision-making in the sense of smart farming have so far been (still) much less widespread. With regard to the use of artificial intelligence, however, great potential is seen in this area in particular.
Concerning the degree of digitalisation in the area of agriculture about half of the companies show a medium degree and a quarter of each a low respectively high degree. As already mentioned, this is a subjective assessment based on the technologies used. All in all it can be seen that digitalisation is noticeable in all occupations but has a different impact depending on the branch of industry (see figure 3).

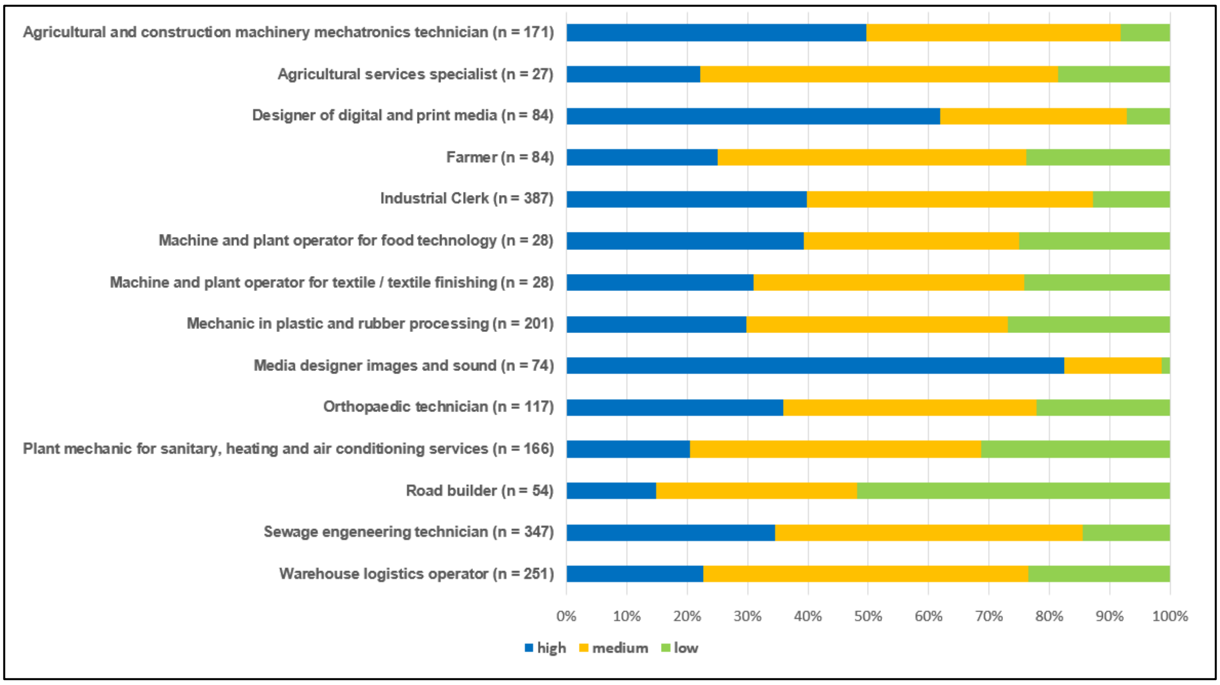


***Figure 3. Comparison of the digitalisation level of all occupations examined.***

## Changed activities and skills

With regard to the change of activities and tasks, the daily practice of skilled workers shows - unsurprisingly - the use of computer-controlled work equipment and technologies as an increasingly relevant factor. On the one hand, it makes work physically easier, on the other hand, work is becoming more cognitive demanding due to an increasing complexity in operation and control. Increasing automation and networking are also leading to a shift from operative to controlling and monitoring activities. Against this background, planning, controlling and documenting tasks and activities, ***i.e.*** activities in the context of farm and work organisation, are gaining importance. This is also reflected in the increasing importance of the use of data on operational processes and their optimisation. The handling and target-oriented use of systems increasingly requires skills in data-acquisition, -processing, and -interpretation (see figure 4). In this respect it is especially important to identify relevant data in the sense of filtering and evaluating and not getting lost in the flood of information (cf. also the Standing Conference of Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany, 2016).

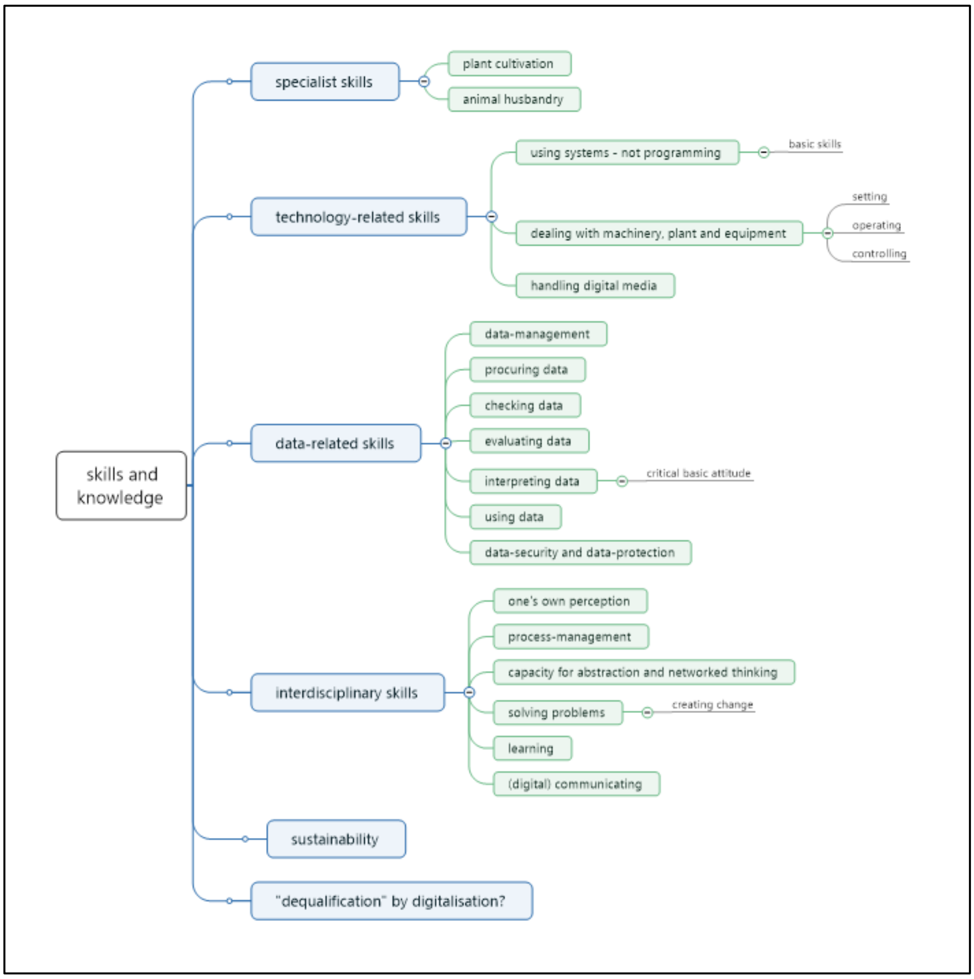


***Figure 4. Skills and knowledge in the context of digitalisation.***

Against this background, another important result is that almost all interviewed experts pointed out that skills and knowledge in plant production and animal husbandry will continue to be an essential basis for the ability of farmers and agricultural services specialists to act in their profession. This essentially also applies to the other skills and knowledge in the two currently valid training regulations. It could be seen as an indication of their continued functionality even under changing framework conditions.
Looking at the skills and knowledge perceived as "important" by the respondents of the questionnaire, a clear dichotomy between generic competences and IT-related competences is noticeable here (see table 3). Logical and analytical thinking as well as process understanding and willingness to learn already play an important role for farmers today, but it is expected that their importance will increase in the future. So far of less importance, but increasingly important, are the use of IT-systems, the targeted use of specialist software and media competence in general.

| | Constant significance | Growing significance |
|---|---|---|
| **Important** | • organisational skills<br>• perceiving processes with one's own senses<br>• specialist skills in animal husbandry and breeding | • thinking logical and analytical<br>• willingness to learn<br>• understanding processes |
| **Less important** | • problem-solving skills<br>• team skills<br>• specialist skills in plant production | • targeted use of specialist software<br>• using IT-systems<br>• checking plausibility of data<br>• media skills<br>• researching and critically evaluating information<br>• evaluating and using data<br>• communication skills |

***Table 3. Linking current and future value of skills and knowledge – farmer*.**

In this context, the experts interviewed pointed out time and again that data should not be blindly trusted, but should be critically examined for plausibility. Especially when dealing with living animals and plants, one's own perception is of great importance, a statement that could be found in a series of expert interviews. Consequently, skilled workers must continue to be able to perceive and recognise conditions, developments and possible dangers with their own senses. A competence which was already taken into account in 1995 in the framework training plan for the training of farmers. In addition, the proximity to plants and animals is a meaningful and thus identity-forming aspect in this occupational field.

In connection with the requirements for skilled workers attention is drawn to another issue in some of the interviews. With regard to the qualification of skilled workers, the question arises how competence development and, to an even greater extent, the maintenance of competence dealing with autonomous technologies can be ensured. Since machines are increasingly able to control complex processes autonomously the question of „de-qualification“ through digitalisation is raised. Linked to this is the question of how, with a high degree of digitalisation, differentiated experience in plant cultivation and animal husbandry can be acquired with all the senses, since "qualification in the process of work ... is only possible to a limited extend" (Hackel, 2017: 29) and how "the synaptic connections of our brain, which is always learning, are stimulated, which prevent us from regressing mentally in the name of technology" (Hofstetter, 2014: 252). This also applies against the background that competence requirements are significantly higher in the event of malfunctions than in the case of smooth processes. "There may be a point at which the level of automation actually introduces a latent risk of the operator being less able to regain control should the automation fail because their mental model of the situation has become incomplete" (Thody, 2018: 7). Here it is important to find the right mix between automatic control and expert control so that the systems can be used as real assistance systems.

## Evolution instead of revolution

In the case studies, company inspections and interviews it can be observed that the use of digital applications and technologies is not (at least so far) perceived as a break, but as a constant technological development. From the point of view of those "affected", this means that an evolution rather than a revolution is taking place. This picture also fits in with the insight that companies very often

have isolated digital solutions. Digitalisation is being developed with caution in the interplay between preconditions, benefits and limits as the results of the conducted interviews show (see figure 5).
It can also be observed, however, that companies and people who are more intensively involved in the field of digitalisation have a high affinity for technology, find an attraction in getting systems up and running and sometimes call themselves "IT freaks". Against this background, with a view to a possible adaptation of training regulations, it must be taken into account that, at least through the qualitative part of the study, findings have been obtained which relate to the "spearhead of the movement" and these cannot therefore be easily transferred to all companies or training companies. Modernising the training regulations could otherwise lead to a problem for training companies which due to inadequate technological equipment could no longer provide the proper provision of vocational training.

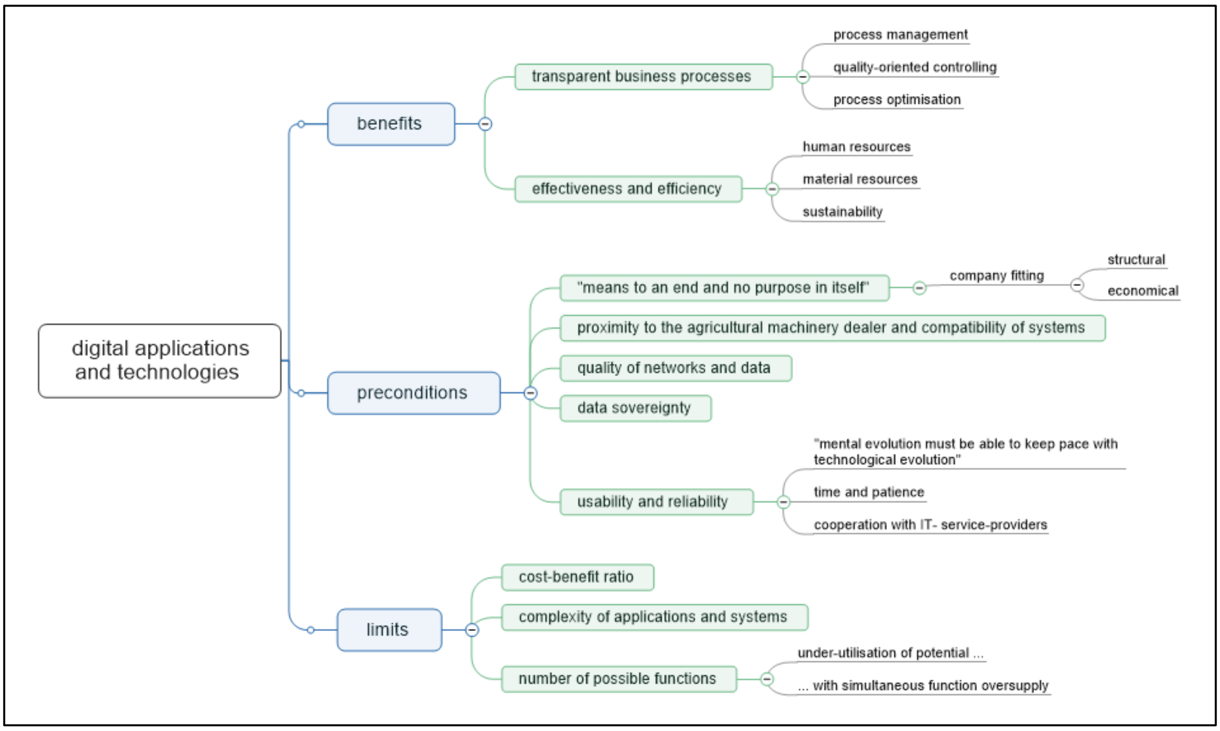


***Figure 5. Benefits, preconditions and limits of digital applications and technologies.***

### No urgent need for modernisation due to digitalisation and networking

The question of the need to modernise the two training occupations examined here can be answered to the extent that there is currently no urgent need at least not due to digitisation and networking. None of the respondents express themselves to that effect. If one considers that the training regulation for farmers is almost 25 years old, this result is initially surprising.
This is primarily related to the way training content is formulated in the company training framework plan. The high number of 17 different branches covered in the recognised training regulation for farmers (see table 2) and the resulting abstract wording of skills and knowledge in connection with the principle of technology-open wording constitutes a kind of "natural ageing protection". This can be illustrated, for example, by the occupational profile item "handling and maintenance of machines, equipment and plant facilities". Here the wording "operating tractors and means of transport, machinery and equipment in

compliance with safety precautions" can be found in the training framework plan for the second and third year of training. The same applies to "operating harvesting machines and equipment" for crop production and "operating feeding and watering equipment ..." for animal husbandry. Even though at the time of the last modernisation of the regulation in 1995 the current significance of digitalisation and networking could not be foreseen. The existing wording can still cover these developments.
Instead of a complete modernisation, the possibility of enriching existing content could also be considered as low-threshold access. Here an adaptation in the sense of the adaptation already implemented for the metal and electrical professions in 2018 could take place (see figure 6).

| | |
|---|---|
| a) | prepare order-related and technical documents with the aid of standard software |
| b) | maintain, exchange, save and archive data and documents |
| c) | enter, process, transmit, receive and analyse data |
| d) | apply data protection rules |
| e) | use information technology systems (IT systems) for order planning, order processing and deadline tracking |
| f) | research information sources and information in digital networks and retrieve and evaluate information from digital networks |
| g) | use digital learning media |
| h) | take into account the information technology protection objectives of availability, integrity, confidentiality and authenticity |
| i) | comply with operational guidelines for the use of data carriers, electronic mail, IT systems and internet pages |
| j) | recognise anomalies and irregularities in IT systems and take measures to eliminate them |
| k) | use assistance, simulation, diagnostic or visualization systems |
| l) | communicate, plan and collaborate in interdisciplinary teams |

***Figure 6. Standardized profile item "digitalisation of work, data protection and information security" for the digitalisation of industrial metal and electrical professions (2018).***

The teaching of the necessary skills in dealing with digital applications and technologies takes place essentially in the company in its specific natural environment and its infrastructure. Technological diversity can be achieved through exemplary and project-related learning, whereby - as in vocational school - a conflict of objectives between the available training time and growing content requirements is seen. Beyond the specialist skills an additional core competence must be taught. Digital media are increasingly being used in company and school-based training, for example in the form of smartboards, tablets, smartphones with corresponding apps, electronic learning platforms, moodle courses, webinars or blogs. In view of the central importance of process knowledge and understanding of processes described above, digitalisation as an in-company and school-based training content will require a didactic approach from general to specific. The view of the entire system is the starting point (cf. Zinke, 2019).
According to the estimation of the experts surveyed, the vocational school furthermore has the task of opening up the view of the diverse digital applications and technologies and the associated competences and of widening it from specific to general. In this sense, vocational school is described as a "compensating medium". This also applies to inter-company training institutions, which are apparently increasingly faced with the challenge of maintaining a machine park that enables the teaching of skills in dealing with the wide range of heterogeneous agricultural technology at a high technical level.

**No lower demand for skilled workers**

It is also clear for the two occupations studied that increasing digitalisation and networking are accompanied by a rising educational demand. In the case studies, company inspections and interviews it is consistently stated that skilled workers are indispensable due to the increasingly complex preparation, control and monitoring of machines, devices and operating equipment as well as to the regulatory intervention in case of malfunctions. This estimation is also supported by the quantitative part of the study, in which the vast majority of respondents see an at least constant, but generally growing need for skilled workers (see figure 7). If skilled workers are replaced, however, this is usually not done by people with higher qualifications, but by people who have at most the existing qualification level - according to the results of the study. The main reason for this is that qualified skilled workers are not available. This shows that the importance of skilled workers in the course of increasing digitalisation must also be considered with respect to a shortage of skilled workers already starting or already deployed.

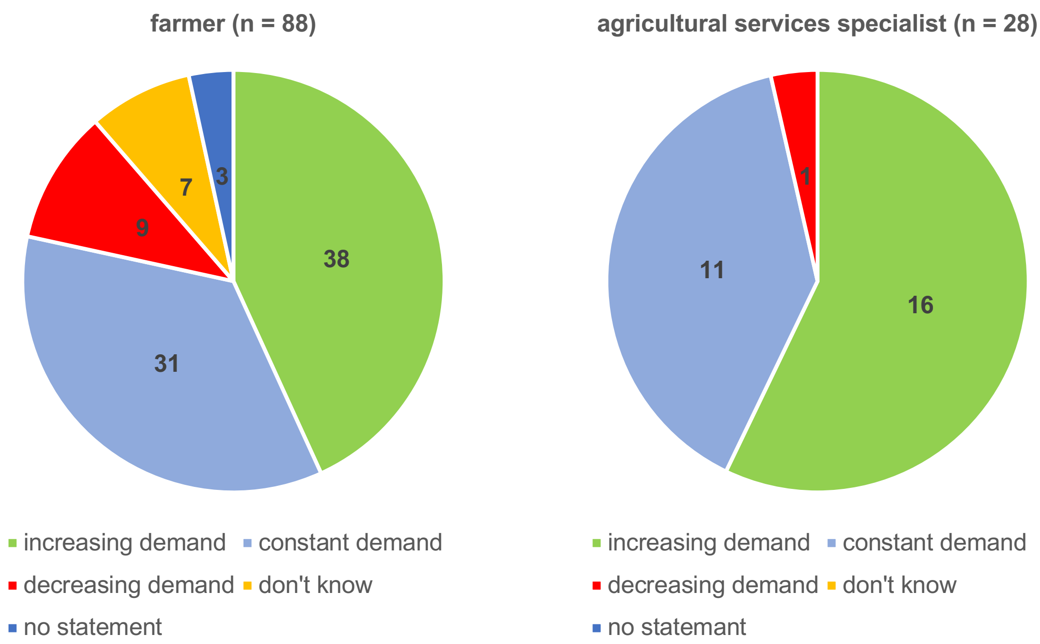


***Figure 7. Demand for skilled workers - farmers and agricultural services specialists (outcomes from the questionnaire).***

## Prospects

The results of the study carried out show that due to digital and networking technologies the activities and required competences of skilled workers have already changed and will continue to change in the future. Because of the special structure of the recognized training occupations farmer and agricultural services specialist and the resulting abstract wording, there is currently no compelling need to modernise the regulations. In this form, the existing regulations currently (still) make it possible to meet the needs of companies in terms of vocational training. Nevertheless, it is necessary to keep a close eye on further developments in order not to miss the right moment to modernise the regulations and to enable future skilled workers to be professionally capable of acting by setting an appropriate frame.

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