

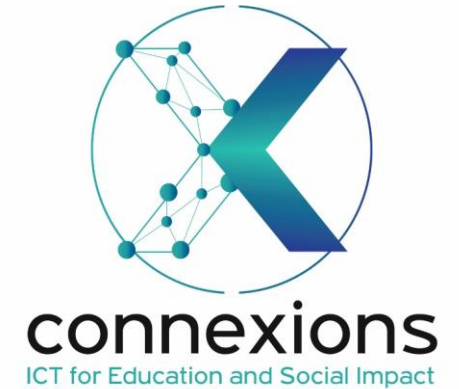
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## Module 1

# Introduction to the Digitalisation in the Agriculture



# Partners



Wissenschaftsinitiative  
Niederösterreich  

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Science Initiative Lower Austria



Co-funded by  
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# Modules

1. Introduction to the Digitisation in the Agriculture
2. Digital Skills for Improving the Agricultural Business
3. Managing the Agricultural Business in the Digital Economy
4. Building Economical Value Chain in Agricultural Using Digital Technologies
5. Financing the Digital Transformation of the Agricultural Business



## Learning Objectives of Module 1

After completing this module, you will:

- ✓ Understand what digitalisation in agriculture is,
- ✓ Learn what changes it will bring,
- ✓ Learn about digital technologies in the field of agriculture,
- ✓ Understand what kind of challenges it can bring.





Unit 1

# Why Should You Learn about Digitalisation in Agriculture?

## Objectives

- ✓ Learn about the main disruptions in the field of agriculture.
- ✓ Discover what the digitalisation actually is.
- ✓ Learn about farms who are pioneers in digitalization.



### Agriculture – the Cradle of Civilisation

*I think having land and not ruining it is the most beautiful art that anybody could ever want to own*

*Andy Warhol, an artist*

Agriculture represents a basis for humankind. Using natural resources, it produces commodities that sustain life and civilisation.

As humans change, agriculture also needs to adapt. In this unit, you will learn what digitalisation is and how it might change your work, everyday life and the environment around you.



### Agriculture is Adapting ...

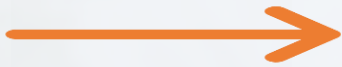
Agriculture is going through a significant transformation. The world is becoming more and more globalised, and there are many challenges and disruptions, with many of them more pronounced in the last years:

- COVID-19 provided supermarket shortages on a global scale;
- War in Ukraine additionally worsened the situation in the global food market;
- Consumers continue to show a growing preference for a healthier lifestyle;
- The population is growing and reached more than 8 billion people;
- The world population is battling the climate crisis.

An emerging gap is more and more visible between trendsetters and price-sensitive consumers. Therefore, it's essential to understand what technology and digitalisation can bring to your farm to tackle these challenges!



**LEARN MORE ABOUT THE  
NEW AGRICULTURAL  
CONCEPTS!**





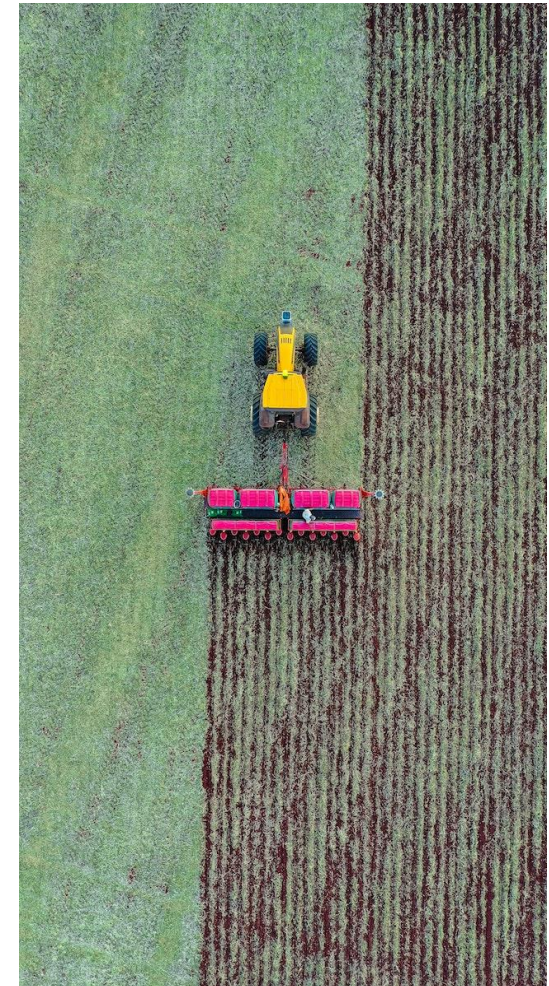
### Precision Farming

Precision farming is a concept based on observing, measuring, and improving crop yields and raising livestock. Farmers can use technology sensors and analysis tools such as GPS, drones, remote sensing, soil sampling, etc. to optimize their crop production. Precision farming practices can include variable rate planting, precision nutrient management, yield mapping, and soil mapping.

The main goal of precision farming is optimization. It will improve the quality of land, get better insights into the plant needs and soil health, increase production, minimize the negative impact on the environment, and ensure efficient process management.

#### EXAMPLE

Instead of using the traditional way for applying an equal amount of fertilisers over a field, a farmer can use GPS-guided equipment to apply fertilizer and pesticides to specific areas of a field only where they are needed, reducing waste, saving costs and conserving resources.



### Smart Farming

Smart farming is focused on collecting, tracking, monitoring, and analysing a vast amount of data by farmers to make informed decisions about planting, harvesting, and crop management. This concept is suitable for big and small farms. It encompasses precision farming, including many advanced technologies, including IoT (Internet of Things), drones, artificial intelligence, cloud, and machine learning. The goal of smart farming is to improve the quality of food products and reduce the negative environmental impact of farming practices. As a result, it enhances the sustainability and profitability of agriculture.

#### EXAMPLE

A farmer can use smart farming techniques to get real-time data for monitoring soil moisture levels, crop health, and water usage. If the sensors detect that a certain area of the field is getting too dry, the farmer can use a drone to irrigate just that area. If sensors detect disease in the plants, the farmer can take care of a single plant or the entire field. The whole process is software-managed and sensor-monitored. In this way, a farmer can increase yields and quality while saving labour and resources.



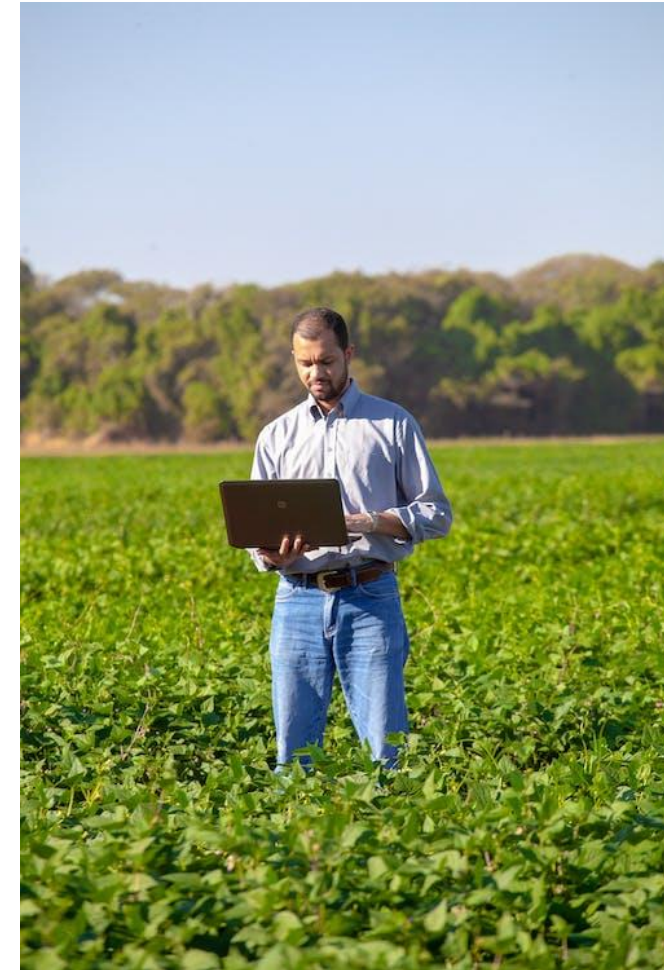
## Digital Farming

Digital farming refers to the use of digital technologies, including precision farming and smart farming technologies to improve efficiency, sustainability, and productivity in agriculture. The goal of digital farming is to support data-driven decision-making and to create value for the future. Farmers can increase their production, save costs in the long-term, and eliminate risks.

### EXAMPLE

A farmer can use technology with machine learning algorithms to predict crop yields and weather conditions. They can apply the algorithms to large datasets of crops and weather patterns to make more accurate predictions. This action will allow the farmer to make informed decisions about planting, harvesting, and crop management. As a result, his efficiency and profits will increase.

**Digital farming, smart farming, and precision farming are related but three of them are different farming concepts.**



**TECHNOLOGY IS  
CHANGING THE WORLD  
OF AGRICULTURE!**

**Learn how! →**

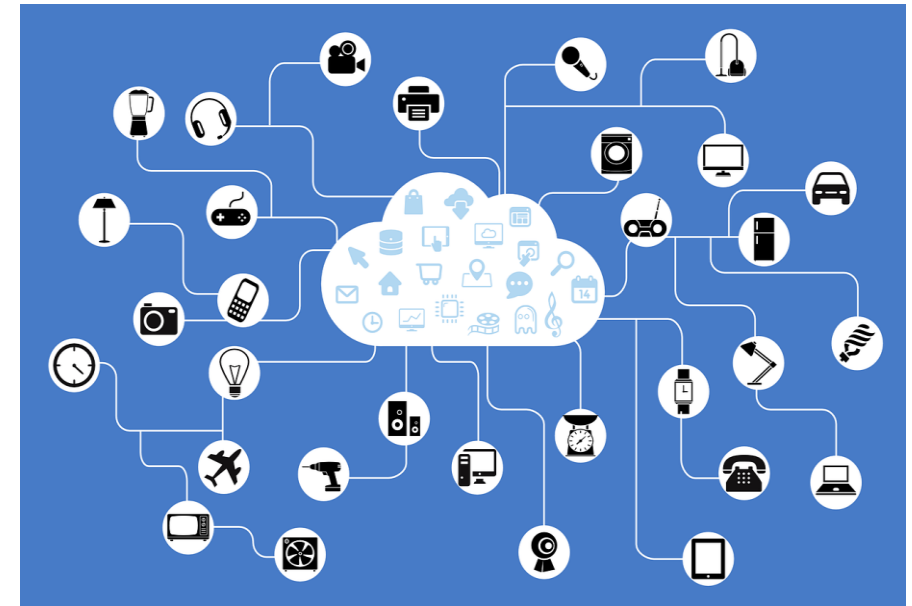


## Internet of Things for Enhancing Agriculture Yield

**The Internet of Things (IoT)** refers to infrastructure, that is, devices located in the field equipped with sensors as well as networking and processing capabilities, data networks, servers, and software, which allow for data exchange, processing/analysing over communication networks and/or the Internet.

### USE IN AGRICULTURE

With the recent implementations, IoT has already brought benefits, like an efficient use of water, optimisation of inputs, reduced waste, etc.



### Usage of Drones for Better Productivity and Crop Yield

A drone is an unmanned aerial vehicle (UAV). Similar to sensor technology, drones represent hardware tools that can be used to gain a competitive advantage over competitors.

#### USE IN AGRICULTURE

Drones can increase accuracy, reduce the cost of on-the-ground crop surveys, increase efficiency and crop yields, and reduce CO2 Emissions.



## Big Data for Better Decisions

While IoT devices collect a large amount of complex data and information, Big Data refers to the massive data set that no conventional data management tool can handle.

Big data has become one of the leading technologies in various sectors.

### USE IN AGRICULTURE

Big data is now being increasingly applied to agriculture as it enables real-time analysis of the data generated by IoT.

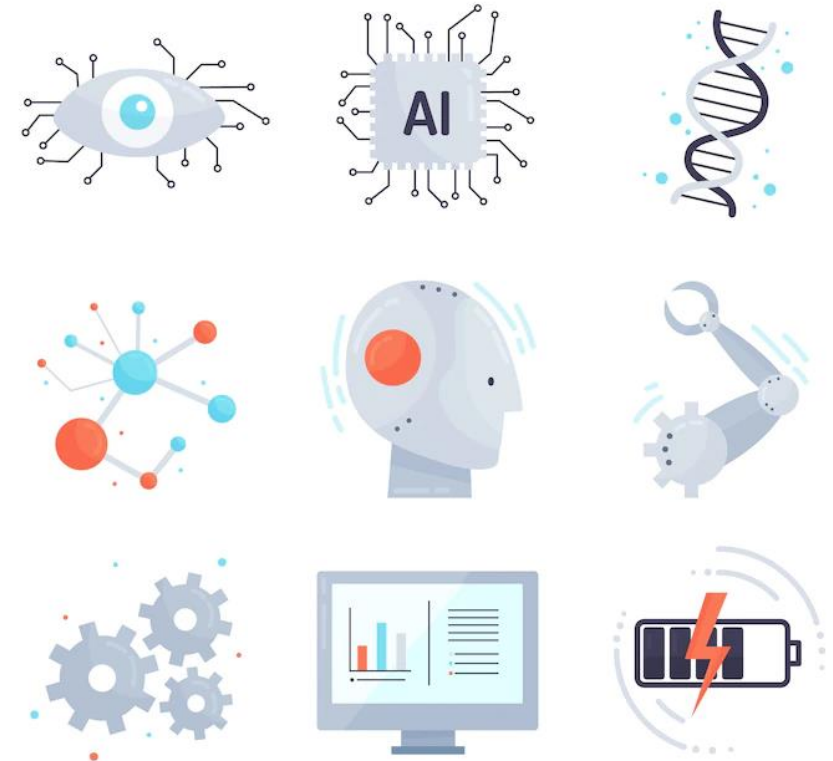


### Artificial Intelligence for Better Efficiency

Artificial Intelligence (AI) consists of systems or machines that mimic human intelligence to perform tasks and can iteratively improve themselves based on the information they collect.

#### USE IN AGRICULTURE

While numerous agricultural data analysis systems have been developed, AI enables them to take a significant leap forward in enhancing predictive capabilities and making data-driven decisions.



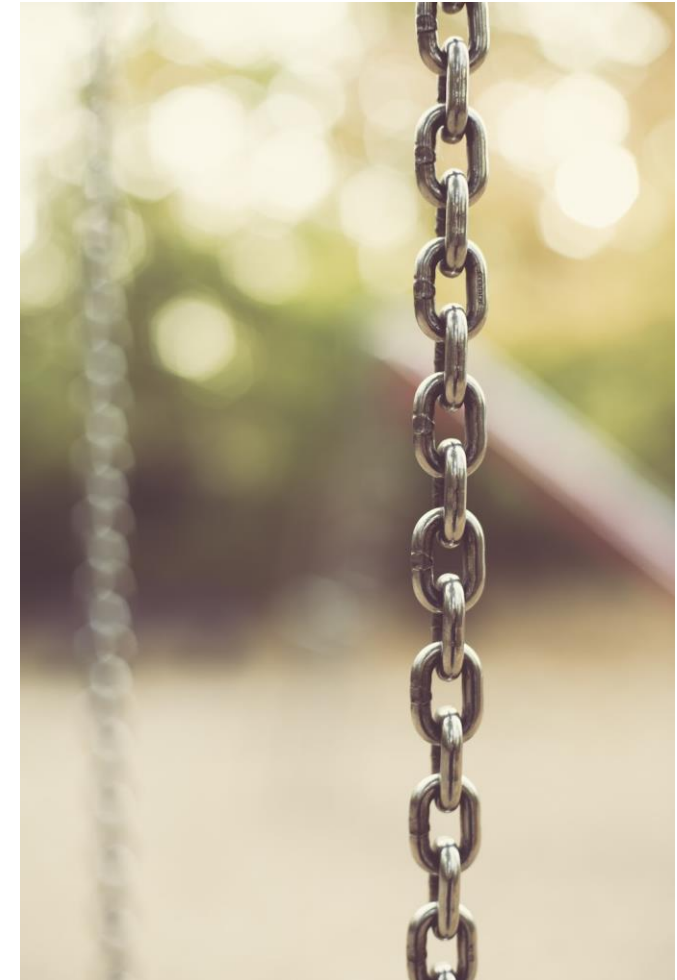


### Blockchain for Better Transparency

Blockchain is a system of recording information in a way that makes it difficult or impossible to change, hack, or cheat. A key difference between a typical database and a blockchain is how the data is structured. A blockchain collects information together in groups, known as blocks, that hold sets of information.

#### USE IN AGRICULTURE

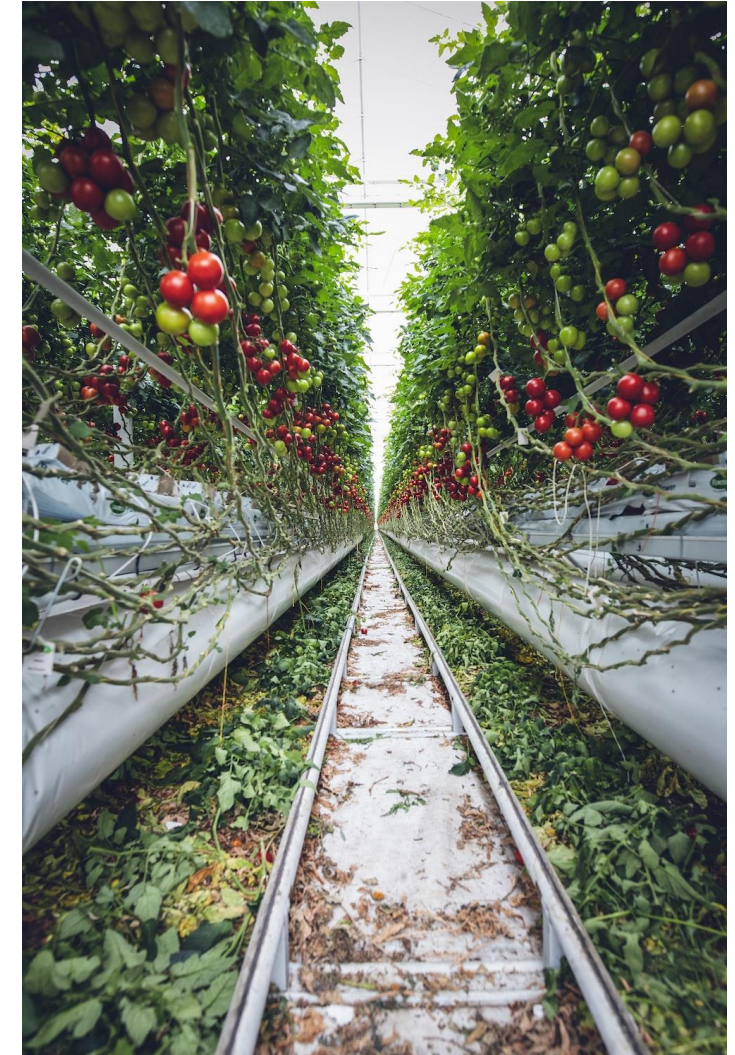
Blockchain technologies can track and store all kinds of plant information, including the seed quality and how crops grow, and even create a record of a plant's journey once it leaves the farm. This data can increase the transparency of supply chains and reduce issues related to illegal and unethical production.



### Vertical Farming for Better Use of Space

Vertical farming takes the controlled environment of a modern commercial greenhouse to the next level. By stacking plants vertically on shelves or tall pillars, vertical farming allows ten times the yield for a given land area.

Plants are cultivated within entirely enclosed environments, where LED lights serve as substitutes for natural sunlight, and a closed-loop water recycling system is employed. There is no need for pesticides since the indoor space is already free of bugs, and plants can be grown in such clean conditions that there is no need to wash them before eating.





### Activity:

*Think about the mentioned technologies:*

- 1. Do you think that you understand their meaning and consequences?*
- 2. Do you think that small-scale farmers can adopt these technologies?*



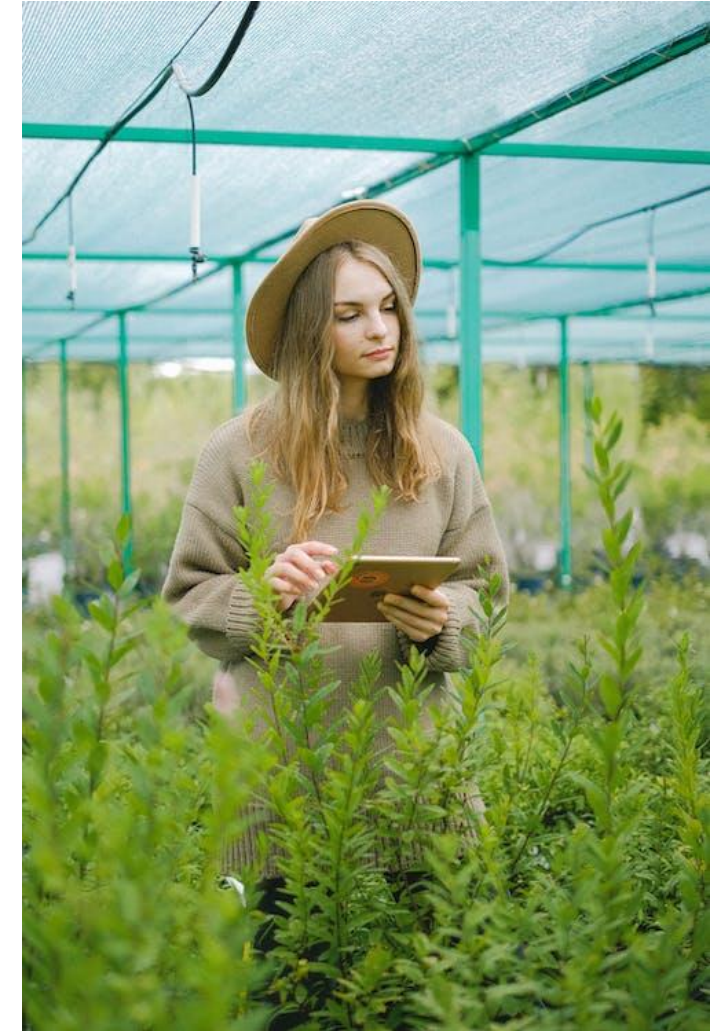
### Does Technology Automatically Brings Digitalisation?

Digitalization presents an opportunity to tackle the productivity, sustainability, and resilience challenges that confront the agricultural sector.

Describing digitalization isn't simple, as it encompasses not only emerging technologies but also novel concepts like precision farming and smart agriculture.

**Beyond applying technology directly to farming practices—utilizing tools such as drones, sensors, and the Internet of Things—digitalization extends to distribution, marketing, sales, and customer services.**

Digitalization poses new challenges for farmers and farm managers. New skills are needed to be effective in their work and to use the full potential of new technologies.



## 6 Necessary Skills for a Digital Era

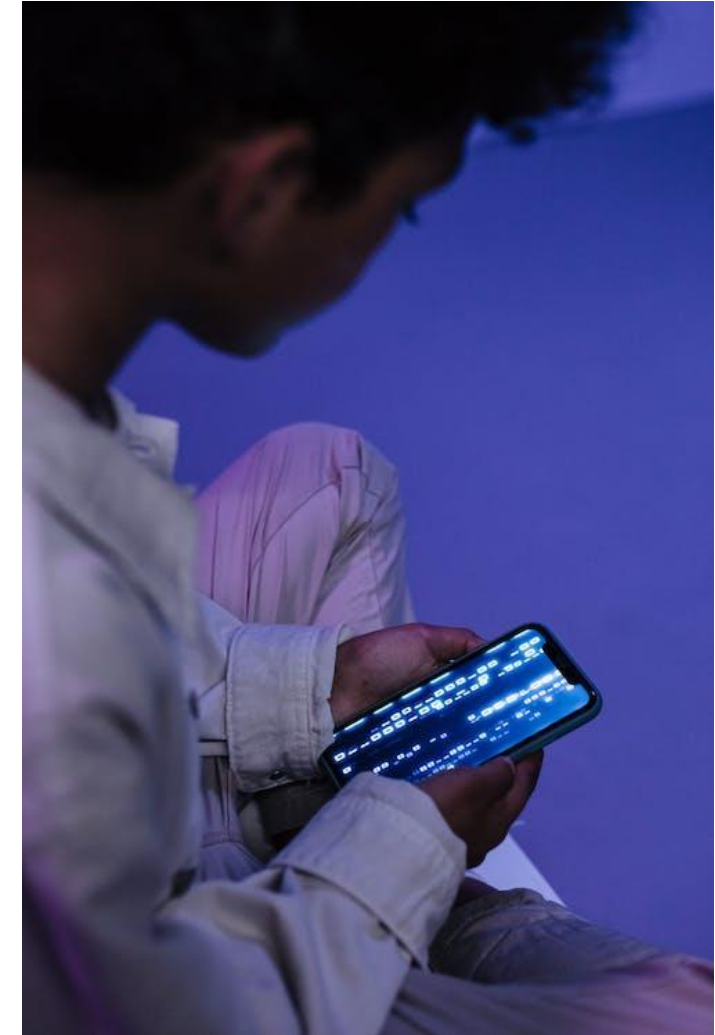
- 1 Attitude and open-mindedness
- 2 Comprehensive management
- 3 Communication and collaboration
- 4 Bridging
- 5 Digital literacy
- 6 Advanced digital skills



 You will delve deeper into essential digital skills in **Module 2** of this training course.

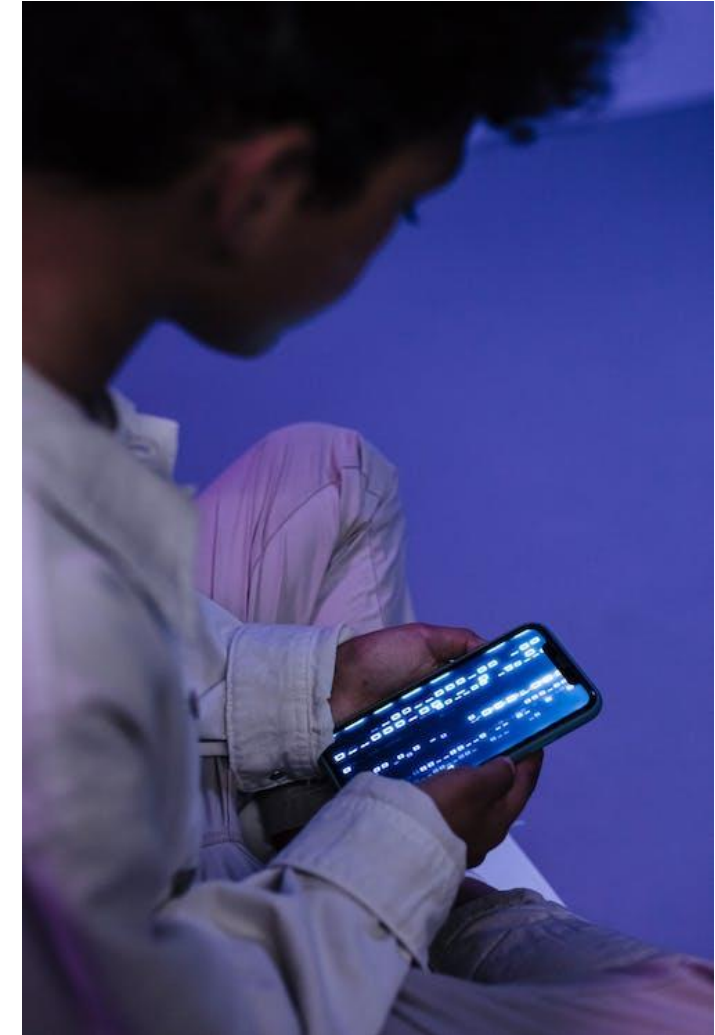
## The Main Advantages of Digitalisation (1)

- 1 Improved management and decision-making processes
- 2 Improved efficiency through more target applications
- 3 An increase in productivity and profit
- 4 Improved marketing



## The Main Advantages of Digitalisation (2)

- 5 Real-time information
- 6 Advancements in record keeping
- 7 Management of risks and uncertainties
- 8 A reduction in regulatory burden



## But Where Are the Challenges? (1)

- 1 High costs of maintenance
- 2 Digital illiteracy
- 3 Compatibility and adequacy of equipment
- 4 Bad broadband (internet) coverage





## But Where Are the Challenges? (2)

5

Possible misuse of data

6

Lack of expertise by the consultants

7

Fear of using digital technologies (security of digital data)





**LEARN HOW THE OTHERS ARE DOING IT! →**

### Circle (Italy)

THE CIRCLE is a farm based on a sustainable and competitive model, producing food and energy without any environmental impact.

- 👍 More water saved
- 👍 Less CO2 emissions
- 👍 0 % input emissions
- 👍 Zero herbicides, synthetic fertilisers, or insecticides
- 👍 Higher yields, more rapid growth
- 👍 High-quality food for restaurants
- 👍 150 % growth in the last 3 years



[www.thecircle.global](http://www.thecircle.global)

### Mein Schwein (Austria)

Engaging customers and farmers in sustainable pig farming:

Here, consumers can directly control the pig fattening and rearing. This opportunity helps farmers to reach the consumers (especially the younger ones) on the level of 100% trust. Thus, they create a new kind of collaboration and sales network:

- 👍 The network is designed as a franchise system;
- 👍 Digital platform and app are used;
- 👍 Customers can virtually feed the pigs and follow their evolution 24/7;
- 👍 Customer know where their food comes from.



[meinschwein.at](https://meinschwein.at)

### Sa Perda Marcada (Italy)

Young female entrepreneurs transition their family farm into a multifunctional operation, promoting rural culture and tradition in Sardinia:

- 👍 They organize experiential, rural education workshops for tourists and local schools;
- 👍 Focused on traditional cultural heritage;
- 👍 Marketing on social media and e-commerce channels;
- 👍 Edutainment approach - play and creativity approach.



[www.saperdamarcada.it](http://www.saperdamarcada.it)

### Hofladen Box (Germany)

In 2017, two working mothers, dealing with the hassle of visiting individual farm shops, birthed the idea of the digital farmers' market, Hofladen Box.

- 👍 The founders recognized the importance of supporting small farms and farmers in their area;
- 👍 By fostering awareness of the origins of food, the platform enhances appreciation for the local region.
- 👍 Sustainability, fairness, and transparency have been foundational principles;
- 👍 The customers know precisely where their food is harvested, baked, and produced.



➔ [hofladenbox.de](https://hofladenbox.de)

### Want to Learn More? Follow These Vlogs!

1

#### **George Saunders**

Farming Machinery Guru who shows his daily job and the machins that he operates.

[www.youtube.com/@GeorgeSaunders](http://www.youtube.com/@GeorgeSaunders)

2

#### **Olly's Farm**

A young farmer from England who has published many different aspects of farming, including many machinery reviews!

[www.youtube.com/@OllysFarmLtd](http://www.youtube.com/@OllysFarmLtd)

3

#### **Cole**

The Cornstar Cole is a young farmer and an excellent example of the new generation of farming YouTubers

[www.youtube.com/@ColeTheCornstar](http://www.youtube.com/@ColeTheCornstar)



## Unit 2

# Ethics of Digitalisation in Agriculture

## Objectives

- ✓ Understand how the farms (and your life) will change due to digitalization.
- ✓ Learn if you should be worried about the consequences of digitalization.





### Why Do We Talk about Ethics?

New emerging technologies are often viewed as beneficial for humanity, promising enhanced water management, increased production, and higher crop yields. Everything appears promising!

However, with every positive transformation come accompanying challenges. The field of agriculture is no exception. In the next unit, our attention will be directed towards exploring these areas.

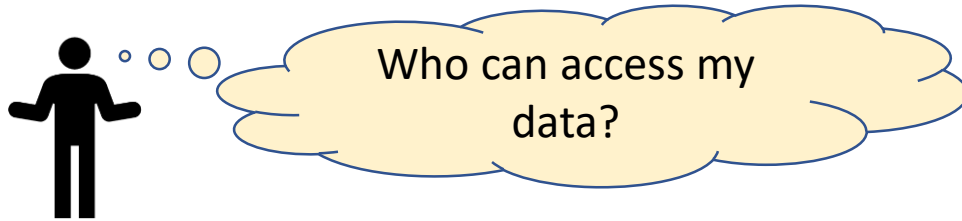


## Main Topics to Talk About

According to the experts from the Wageningen University, current ethical discussions mostly place an emphasis on the following topics:

- 1 Data ownership and access
- 2 Distribution of power
- 3 Impacts on human life and society

### Data Ownership and Access (1)



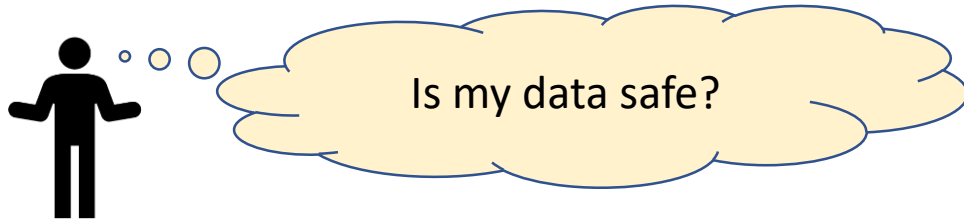
As you delve into the realm of big data, you may find yourself pondering the following question: Does this data still belong solely to me?

The information you provide to large corporations could find applications beyond its original intent, such as trend analysis, stock market predictions, targeted marketing, and more. Always check the further use of your data!

**Reconsider:** Should you trust big players or not? Who has the right to use the data, and for what purposes?



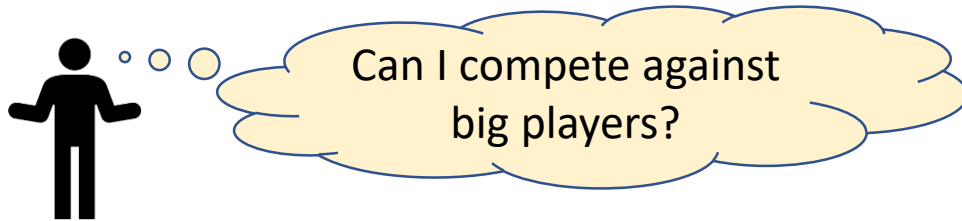
## Data Ownership and Access (2)



Don't forget to secure your data when you work in the cloud. Always use strong passwords, and don't forget to install antivirus protection! Data encryption is essential when securing data.



### Distribution of Market Power (1)

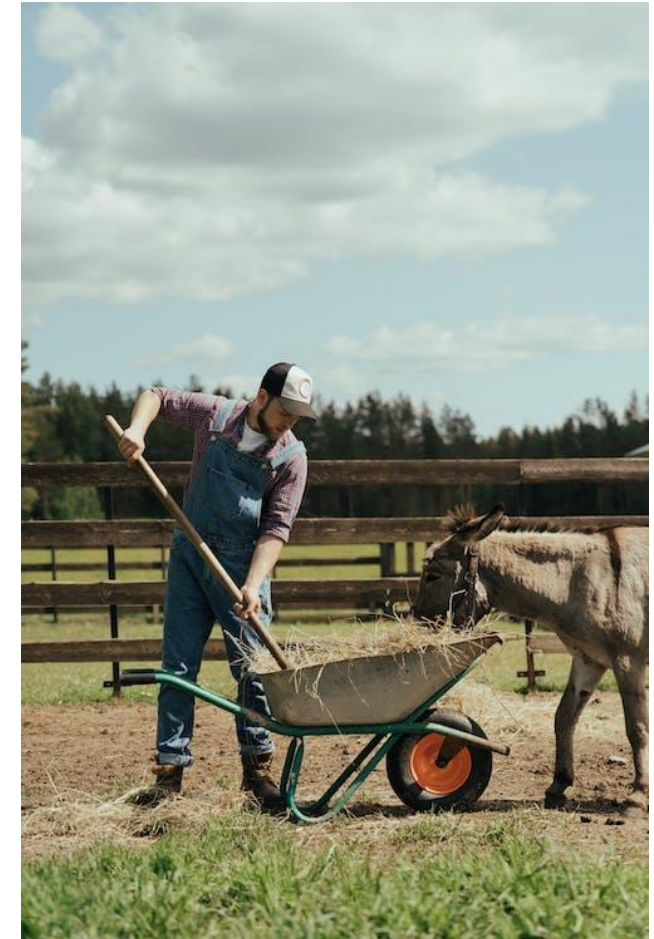


Any change in the farm inevitably leads to a change in the power to fight the competition. However, some challenge can arise: If you live in rural areas, you may not be able to adapt your agricultural business to digitization due to limitations such as poor or non-existent internet connection. If you focus in the wrong direction, you may lose the competition against the big players.

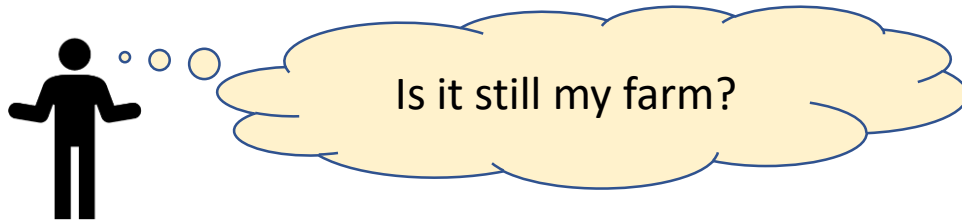
**Reconsider:** Don't rush digitalisation without consideration. For example, you can focus more on digital marketing but continue with the old traditional farming. Customers will love it!



**Learn how to build value generation chains in Module 4 of the training course!**

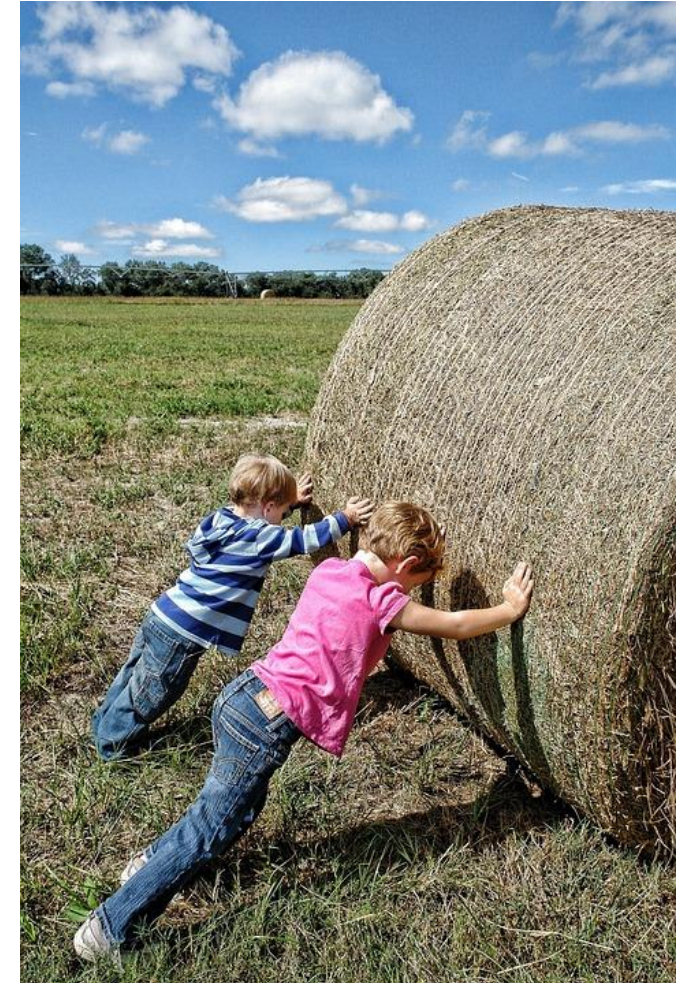


### Distribution of Market Power (2)



In the digital world, the focus is on collaboration. If you're used to managing the farm independently, you will probably experience decisions where you must collaborate with others. Collaboration is often the only way to compete against big players.

**Reconsider:** When you search for partners and collaborators, always be careful about the conditions and contracts. Although you need to collaborate, choose wisely!



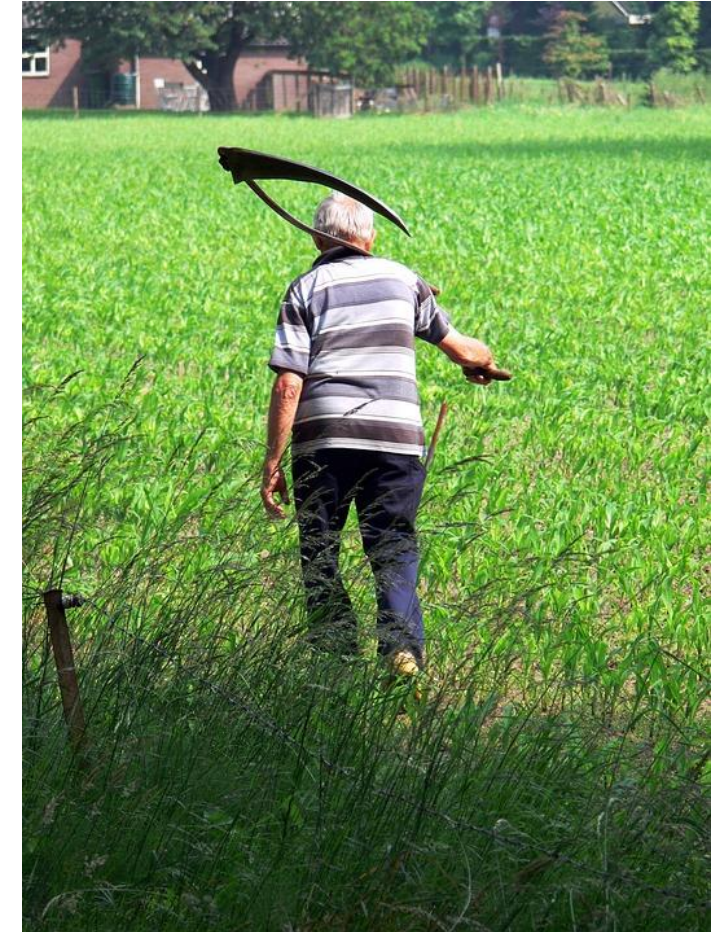
### Impacts on Human Life and Society of Power (1)



My grandfather was a farmer; my father was too. And I am ... an office worker?

With modernisation, your farm might change. It's not a traditional farm anymore, which had been there for centuries. It doesn't need to be the case. You can always find your path, but keep your focus on traditional skills and safeguarding cultural heritage.

**Reconsider:** Discover inspirational good practices. You can read some already within this unit and many more in [AgriSkills Guidebook](#). Keep an eye also on our webpage!



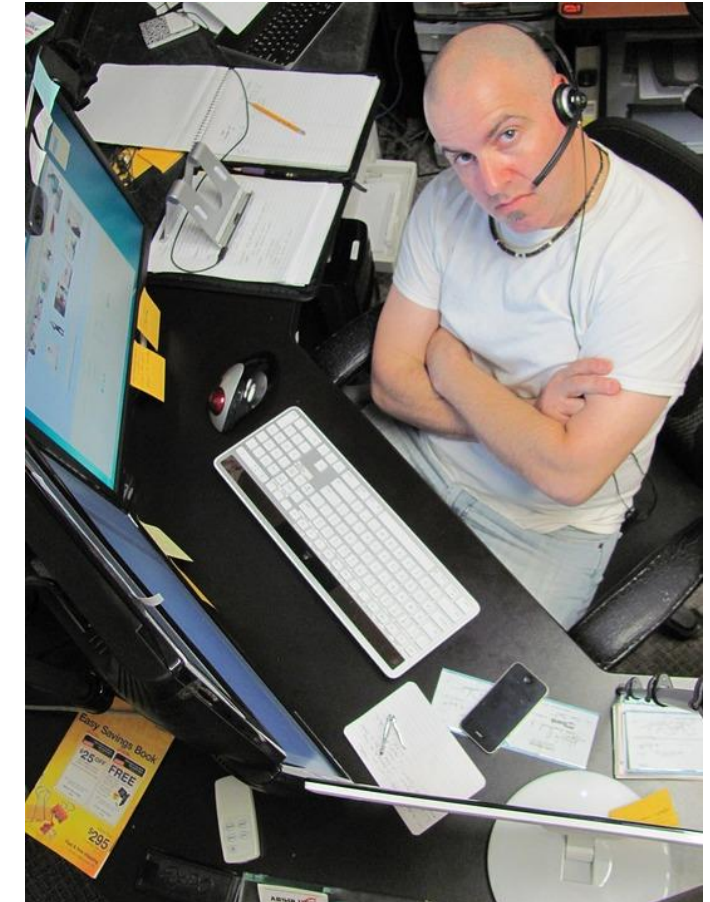
### Impacts on Human Life and Society of Power (2)



Am I becoming a robot? What is a difference between me and urban people?

It's not just your farm that will change by the digitalisation process. It's also you, as a farmer, who will probably need to change (or at least adapt). In some way, farms are becoming more and more urban type. Nowadays, the difference between rural and urban characteristics is not as big as it was in the past. There will be much more work with numbers and less physical work. For some, this might bring positive changes, and for others, negative.

**Reconsider:** In the 21st Century, many participate on social media platforms. You can find a lot of enjoyable channels, videos, and pages. Or share your own experience with others!





## Are You Prepared for the Digitalisation?

We're at the end of Module 1!  
But before we finish, there are some closing questions where you can test your knowledge!

Don't worry; it won't be difficult if you have followed the course!





Check Your Knowledge!



**Which mentioned challenge DID NOT bring any bigger changes to agriculture in the last years?**

*Only one answer is correct!*

A. COVID crisis

B. War in Ukraine

C. Consumers want better products

D. Space race

## What is precision farming?

*Only one answer is correct!*

A. Dynamic management system using modern technologies in farming

B. Traditional way of farming

C. Farming, based on the geometrical composition of the fields

D. A special bidding system for farming

**What is a benefit of the precision farming?**

*Only one answer is correct!*

A. More physical work

B. Better insight on the plant needs  
and soil health

C. Cheap workers on the farm

D. Constantly sunny weather

## What is a blockchain?

*Only one answer is correct!*

A. A type of cryptocurrency

B. A stock exchange

C. A special type of chain for your tractor.

D. A system of recording information in a secure way

**Which is a disadvantage of digitalisation?**

*Only one answer is correct!*

A. An increase in productivity

B. Improved marketing

C. Possible misuse of data

D. Improved management

**Which of the following is an important topic within the ethics of digitalisation in agriculture?**

*Only one answer is correct!*

A. Duration of the work day

B. Government support

C. Impacts on human life and society of power

D. Free tickets for theatre



**Which application do you need to use to secure your data?**

*Only one answer is correct!*

A. Antivirus

B. Farmer Tycoon 2020

C. Video Editor

D. Graphics editor

**What is ESSENTIAL for the digital farming?**

*Only one answer is correct!*

A. Plasma TV

B. Most powerful tractor in the village

C. Netflix account

D. Internet connection

## Authors of the Module

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## Contributors

- *Angela Ivanova (INI-Novation)*

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# AgriSkills



Visit our Website!



Entrepreneurial Skills  
for Digitization  
of Rural Agriculture



MACEDONIAN ENTERPRISE  
DEVELOPMENT FOUNDATION



ID20



Wissenschaftsinitiative  
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Science Initiative Lower Austria

## About the Project

*AgriSkills – Entrepreneurial Skills for Digitalization of Rural Agriculture* is a European project funded by Erasmus+ Program. Our goal is to raise awareness about the digital transformation in agriculture and to provide a training program for entrepreneurial skills in digital, precision and smart farming. Digital agriculture, smart and precision agriculture are important to improve the sustainability of the food industry.

The results of the project stimulate the awareness, knowledge, and skills of learners and trainers in the field on the issues of digitalisation and digital farming:

- *Survey* on the real needs in skills, knowledge and competence development.
- *AgriSkills Training Program*. Developed training program organised like a “guided tour” through the whole range of digital opportunities in agriculture and introducing the needed skills and competencies implemented into a complete training.
- *AgriSkills Reference Catalogue* with collected good practices. AgriSkills will showcase many inspiring initiatives as practical examples, technologies and business models that can be applied in practice.
- *E-learning Platform* as a completely new training approach for digital farming topics for our target groups. Link to the platform: <https://training.agriskills40.com>.

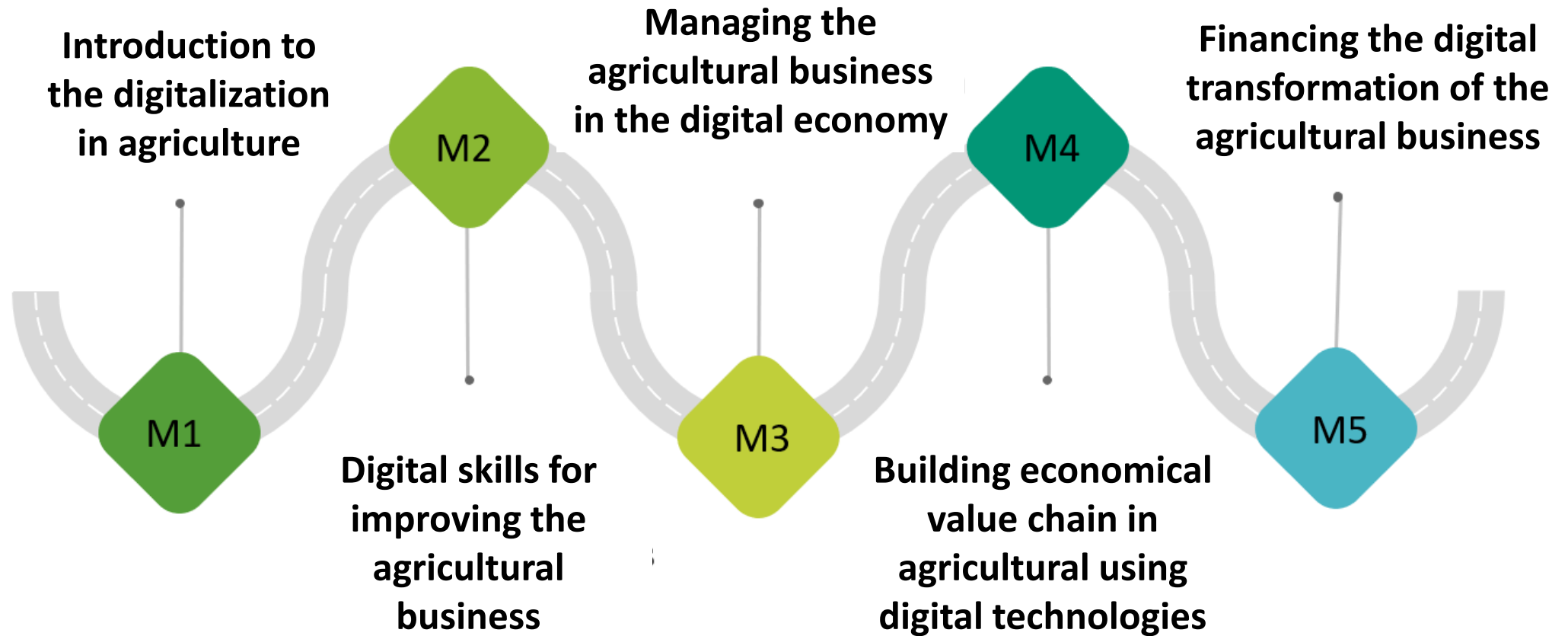


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## AgriSkills Learning Roadmap





# Agriskills

Congratulations!  
You have completed this Module!



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