ICT IN AGRICULTURE

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1 INTRODUCTION

Information and communication technologies are currently affecting all sectors of human activity. This is also the case in agriculture, forestry, water management, food industry, rural development, etc. According to the FAO, it has been demonstrated that the ability of the agricultural community to connect to knowledge databanks, networks and institutions through information and communication technologies will substantially improve its productivity. Such a model is generally referred to as e-Agriculture. The term e-Agriculture is therefore considered to be an emerging field geared to enhance agricultural and rural development through improved information and communication processes. In this context, information and communication technologies are used as an umbrella term covering all information and communication technologies, including devices, networks, mobile phones, services and applications. These range from innovative technologies on the Internet, sensors, agricultural machines and satellites to other existing utilities such as telephones, computers, TVs, radios, etc. ICT thus includes any device, tool or application that allows data exchange or collection via iteration and transmission , where ICT is an overarching concept that includes everything from a mobile phone through electronic payments to satellite imagery.

More specifically, e-Agriculture includes conceptualization, design, development, assessment and application of innovative ways of using ICT in a rural area with a primary focus on agriculture. The setting of standards, methods and tools, as well as the development of individual and institutional capacities and political support, are key components of e-Agriculture (FAO, 2016, FAO, 2017).

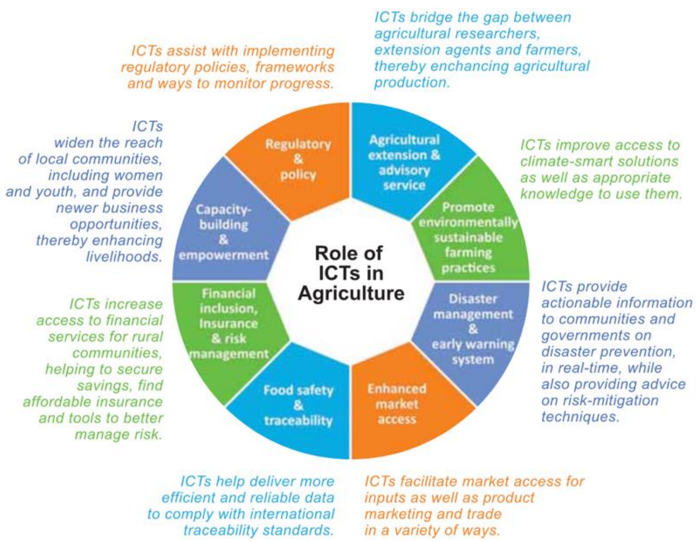

Figure 1. Role of ICT in agriculture (FAO, 2016).

The above picture shows that the role of ICT in agriculture is very broad. There is, however, a vast and largely untapped potential for practical use by farmers in the field of precision farming. For this reason, more attention will be paid to this specific area.

One of the key prerequisites for efficient use of information and communication technologies in the agricultural sector is the construction of high-speed networks and, in particular, the availability of high-speed Internet access from mobile devices. This applies not only to mobile phones but more so to various specialized devices that are usable in field conditions.

In 2015, the largest number of SIM cards per 100 inhabitants in EU was in Austria - 157.41 (International Telecommunication Union, 2017). The results for countries involved in the AgriTeach 4.0 project were as follows:

Country	Mobile-cellular subscriptions per 100 inhabitants	Mobile-broadband subscriptions per 100 inhabitants	Fixed (wired)-broadband subscriptions per 100 inhabitants
Czech Republic	115.5	76	27.9
Hungary	119.1	44.5	27.4
Macedonia	100.7	59	16.8
United Kingdom	122.3	91.4	37.4

Figure 2. Mobile cellular, mobile-broadband and fixed broadband subscriptions per 100 inhabitants in CZ, HU, MK, UK in 2016 (ITU, 2017).

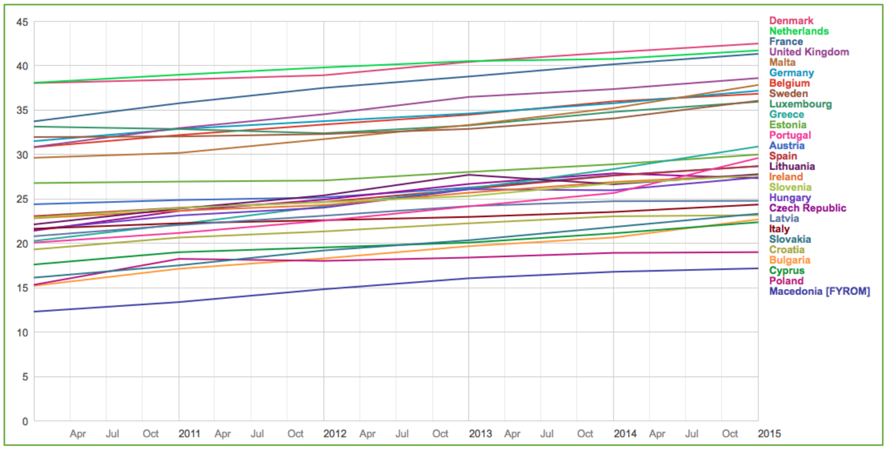

Figure 3. Fixed (wired)-broadband subscriptions per 100 inhabitants (ITU, 2017, powered by Google).

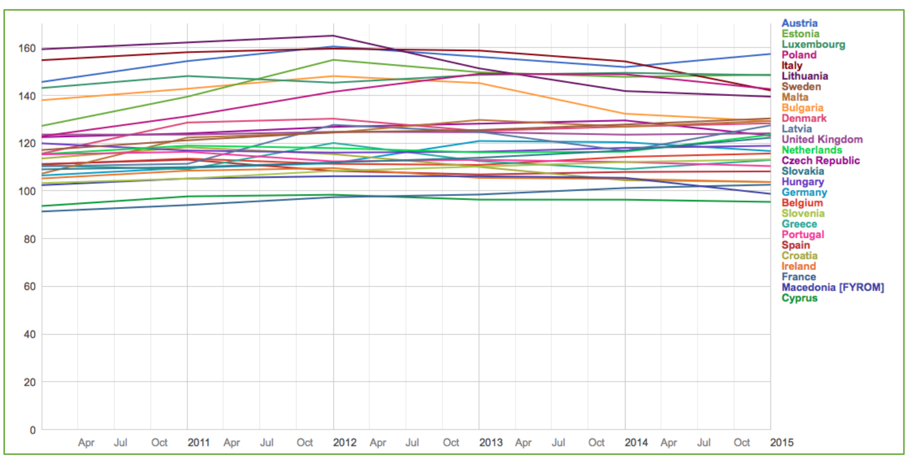

Figure 4. Mobile-cellular subscriptions per 100 inhabitants (ITU, 2017, powered by Google).

Although the various ICT activities and initiatives that bridge the digital divide are being widespread around the world, the World Summit of the Information Society in 2003 and 2005 established an e-Agriculture community where people from around the world exchange information, ideas and resources for the use of

ICT in sustainable agriculture and rural development. The community consists of more than 12,000 members from 170 countries and the members themselves are ICT professionals, researchers, farmers, students, policy makers, entrepreneurs, developers, and so on.

The goal of e-Agriculture is to serve as a catalyst for institutions and individuals in the field of agriculture and rural development to share knowledge, learn from others, and improve decision-making regarding the role of ICT in empowering rural communities, rural living and building sustainable agriculture and food security (e-Agriculture).

1.1 DIGITAL AGENDA FOR EUROPE

The Digital Agenda for Europe (published in May 2010) is one of the seven flagship initiatives of the Europe 2020 strategy, designed to define the crucial role that the use of information and communication technologies will have to play if Europe wants to succeed in its ambitions set for 2020. The general objective of the Digital Agenda is to ensure the sustainable economic and social benefits of a digital single market based on fast and ultra-fast internet and interoperable applications. The strategy focuses on seven main barriers that hinder the full development of the information society or jeopardize the full use of ICT in Europe. The Digital Agenda focuses on:

- creating a digital single market – for example the Digital Agenda has to:
    - set the date for the transition to on-line payments in the single market
    - facilitate the development of private and public e-commerce through the modernization of the e-signature rules in 2011 so that secure electronic verification is interoperable and recognized across member countries
    - strengthen citizens' rights and increase their confidence by updating the EU data protection regulatory framework
- improving the framework conditions for interoperability between ICT products and services – for example the Digital Agenda has to:
    - propose a legal solution for reforming the rules on the implementation of ICT standards in order to use certain standards developed by ICT forums and consortia
- enhancing confidence in the Internet and its security – for example the Digital Agenda has to:
    - establish a European system of rapid response to cyber-attacks
    - propose stricter laws to combat cyber attacks on information systems
    - support the establishment of hotlines where children and parents can report illegal online content
- guaranteeing a significantly faster Internet connection – for example the Digital Agenda has to:
    - ensure that by 2020 all Europeans can have access to a significantly faster Internet
- promoting investment in research and development – for example the Digital Agenda has to:
    - seek more private investments through pre-commercial procurement and through public-private partnerships
- increasing digital literacy, skills and inclusion – for example the Digital Agenda has to:
    - strive to bridge the digital divide by fostering greater coordination of ICT-related initiatives at a member state level, in particular, by proposing digital literacy and competences
    - support the supply and demand of ICT skills in the labour market
- the deployment of ICT to address societal challenges such as climate change, rising healthcare costs and the aging population – for example the Digital Agenda has to:
    - provide European citizens and businesses with day-to-day convenience when using e-government by creating a list of common cross-border services that will enable businesses and citizens to operate independently and live anywhere in the EU (EC, 2010)

2 PRECISION AGRICULTURE

There are many definitions for what Precision Agriculture (PA) is:

- Pierce et al. (1999) define PA as the application of technologies and principles to manage all aspects of agricultural production based on space and time variability to improve crop yealds and environmental quality.
- A similar approach is used by Gnip et al. (2002), defining the PA as a new agricultural technology based on the monitoring, analysis and control of crop production to optimize costs and environmental impacts.
- European Agricultural Machinery currently uses wider approach to PA , which includes:
  - high precision positioning systems (such as GPS) as a key technology to achieve field-specific precision
  - automatic control allowing to observe prescribed work trajectories, turning at the field edges, etc.
  - mapping to prepare accurate maps, including soil type, quantity of nutrients, etc.
  - earth sensors and remote sensing for data collection to assess soil condition and plant health; ground sensors can be stationary or can be mounted on machines
  - integrated electronic communication between components in the system, for example between tractor and farm office, farmer and dealer or between sprayer and spray tank
  - Variable Rate Technology (VRT) as the ability to adapt work parameters to the current state of soil or vegetation
- According to Oerke & GERHARDS PA focuses on:
  - intensive sensing of the state of the environment inside vegetation
  - extensive data processing
  - using Decision Support Systems (DSS)
  - controlling agricultural machinery in the field

Concept of modern agriculture management using digital technologies for monitoring and optimizing production processes in agriculture.

2.1 NAVIGATION AND AUTOMATIC STEERING

One of the numerous digital technologies used in PA is the automated steering of the tractor using GNSS. This technology can be applied to several basic types of technical equipment (listed sequentially according to the history of deployment and technological demands):

- optical indication of compliance with the desired motion trajectory (driver assistance)
- steering support (support for older tractor types) - this system is an intermediate stage because it eliminates the influence of the driver's error in the desired trajectory but does not achieve top reaction accuracy and speed due to the missing information about the current wheel angle
- automatic steering as part of the tractor system (automatic driving)
- Controlled Traffic - full control of the operation of agricultural machinery on land

2.2 EXPECTED ENVIRONMENTAL BENEFITS FROM MAIN PA PROCESSES AND TECHNIQUES

Process	Technique	Expected environmental benefit
Timely work under favorable weather conditions	Automatic machine guidance with GPS	Reduction of soil compaction, reducing carbon footprint (10% reduction in fuel consumption in the field)
Leaving permanent vegetation at key locations and at field boundaries	Automatic line guidance and cultivation on hilly terrain	Reduction of erosion (from 17t / ha / year to 1t / ha / year and possibly even lower), decrease of fertilizer runoff and reducing flood risks
Use of fertilizers and pesticides at recommended distances from watercourses	Automatic guidance based on geographic information - control of sprayer and fertilizer distribution	Eliminating direct river pollution

Figure 5. Environmental benefits of precision agriculture

PA uses satellite navigation and navigation positioning systems, as well as a number of other technologies. These include: automatic control, prescribed trajectories, automatic vehicle rotation, etc. Automatic control reduces human errors. It also contributes to efficient soil and parcel management. For example, automated vehicle turning could save between 2% and 10% of fuel consumption.

Moreover, the use of the Global Navigation Satellite System (GNSS), which is most commonly used in navigation / automatic tractor management and in the tracking of livestock, is increasing. It is estimated that GNSS usage for tractors in the EU will increase from approximately 7.5% in 2010 to 35% in 2020, with sales rising from about 100,000 units per year in 2010 to more than 500,000 units in 2020. Automatic steering and variable technologies will be two of its main uses (GSA, 2014).

In a survey of large farms in North Dakota, USA, Bora et al. (2012) found that 34% of farms using GPS guidance systems had shortened machine utilization times and fuel consumption by up to 6.04%, respectively 6.32%. 27% of farms using automatic steering further reduced machine usage time by 5.75% and fuel consumption by 5.33%. This is where cost savings in terms of fuel consumption and carbon footprint reduction are achieved.

According to prof. Godwin (2015) and his long-term research, it is possible to reduce costs by up to 950 CZK / ha. Another studies speak about up to 6.32% of fuel savings (Bora et al., 2012), or about a significant reduction in overlapping work operations (Macak et al., 2011, Kviz et al., 2104, Reckleben and Noack, 2012) or about reducing herbicide usage by up to 50% (Perez-Ruiz et al., 2013) using the autonomous management. This for example, assuming the fuel consumption is between 100,000-500,000 liters of diesel fuel on farms (which is the range for farms that manage most of the arable land), represents a significant economic saving that is reflected in the farm's profit. Saving fuel and chemicals also has a significant impact on the state of the environment. Reducing their consumption will result in a significant reduction in the environmental burden that agriculture produces. At the same time, it will support accurate and correct implantation under the Nitrates Directive and the WFD (Water Framework Directive).

2.3 PRINCIPLES OF GNSS

GNSS (Global Navigation Satellite System) systems

To simplify, satellite positioning systems can be described as a passive satellite radio-frequency distance measuring systems:

- The passive system sends information continuously
- The distance measuring system is such that the position of an object is calculated from the distances from points of known position (i.e. from individual satellites of the system)

- The radio system of the satellite broadcasts radio waves with time stamps (an other added information). Based on satellite signals (from at least 3 satellites), and based on timestamps, the satellite receiver measures the time of transmission of signals from the satellites, from which it calculates the distance from individual satellites and determines the position based on the multilateration.
- It is called a satellite system because the points with a known position are satellites circling the Earth. Therefore, the broadcasts must contain not only the time stamps, but also the tracking parameters of a given satellite, from which its position can be calculated (the receiver must know where the satellite was when the message was sent).

GPS

GPS is military navigation system developed by USA, sometimes referred to as its official name NAVSTAR GPS (Navigation Signal Timing And Ranging Global Positioning System). It is fully operational since July 17, 1995. For civilian use, the full-featured signal is available from 2000. The space segment consists of 24 satellites evenly distributed over six orbital planes.

GLONASS

GLONASS is a Russian military navigation system, developed since 1976, in operation in 2011. As with GPS, the complete GLONASS constellation consists of 24 satellites, 21 of which will be in operation and 3 will be backup (each in one of the three orbital planes).

EGNOS

System EGNOS (European Geostationary Navigation Overlay Service) is a European project that provides GPS signal correction in the form of a differential signal. Corrections are provided for Europe and are important for eliminating the errors inherent to the transmitted signals. Differential signal processing in the GNSS receiver results in more accurate positioning.

Galileo

Galileo is the European civilian navigation system, which is currently undergoing operational testing. The Galileo navigation system is a planned autonomous European Global Positioning System (GPS), which should be similar to the US Navstar GPS system and the Russian GLONASS system. Its construction is provided by the European Union (EU) represented by the European Commission (EC) and the European Space Agency (ESA). GNSS Galileo should have been operational from 2010. According to new plans, the release is scheduled for year 2018.

2.4 RTK IN EUROPE

The navigation systems themselves (with free access) do not achieve the precision required for use in Precision Agriculture. There are different ways of correct the positioning. Aside from proprietary systems supplied by machine manufacturers, the RTK system is the most important, since it makes possible to refine the position with a minimum deviation, so that it complies with the precision required by autopilots.

The following table contains an overview of most RTK networks in selected European countries. Information is from freely available sources. The benchmark price is the annual RTK signal price for a single receiver. A regional price is used where applicable, otherwise the listed costs are for the whole country. If the price is not listed, it means that it could not be ascertained from publicly available sources.

Country	Founder	Name	Link	Price per year per receiver in EUR	Comment
Austria	authority	APOS	http://www.bev.gv.at	---	
Austria	commercial	RTK CLUE	https://www.rtk-clue.com	---	local provider
Belgium	authority	GPSBru	www.ngi.be	free	
Belgium	authority	Walcors	http://gnss.wallonie.be/	free	
Belgium	authority	Flepos	www.flepos.be	free	
Belgium	commercial	SmartNet (Leica)	http://www.drivenby.be/	600	
Belgium	commercial	Trimble VRS	www.trimble.com	995	
Bulgaria	authority	BulipOs	http://www.bulipos.eu/	---	
Bulgaria	commercial	NAVITEQ RTK	http://www.naviteq.net/	--	
Bulgaria	commercial	SmartNet (Leica)	http://www.smartnet.bg/	820	
Croatia	authority	CROPOS	http://www.cropos.hr/	675	
Czech Republic	authority	CZEPOS	http://czepos.cuzk.cz/	925	
Czech Republic	commercial	Trimble VRS	www.trimble.com	1 335	
Czech Republic	commercial	TopNet	http://topnet.gb-geodezie.cz/topnet/	1 110	
Czech Republic	commercial	GEOORBIT	https://www.geoorbit.cz/	890	
Czech Republic	commercial	Leading farmers	http://www.leadingfarmers.cz/?	1 000	
Denmark	commercial	GPSnet.dk	www.GPSnet.dk	---	
Denmark	commercial	SmartNet (Leica)	http://dk.smartnet-eu.com/	1 620	
Denmark	commercial	TopNET	http://www.topnetlive.com	---	
Estonia	commercial	Trimble VRS	www.trimble.com	---	
Estonia	commercial	TopNET	http://www.topnetlive.com/	---	
Finland	authority	FinnRef	http://www.fgi.fi/	free	
Finland	commercial	SmartNet (Leica)	http://fi.smartnet-eu.com/	960	Agro RTK
France	commercial	TERIA RTK	http://www.reseau-teria.com	2 520	
France	commercial	ACTISAT RTK CORSE	http://www.actisat.fr	---	Corsica only
France	commercial	RTK CLUE	https://www.rtk-clue.com	---	no local provider
Germany	authority	SAPOS	http://www.sapos.de/		250 EUR per month
Germany	commercial	SmartNet (Leica)	http://de.smartnet-eu.com/	1 950	
Germany	commercial	RTK CLUE	https://www.rtk-clue.com	---	no local provider
Germany	commercial	Trimble VRS	www.trimble.com	---	
Germany	commercial	TopNET	http://www.topnetlive.com	---	

Germany	commercial	ASCOS	http://www.axio-net.eu/?id=161	---	
Greece	commercial	SmartNet (Leica)	http://gr.smartnet-eu.com/	600	
Greece	commercial	TopNET	http://www.topnetlive.com/	---	
Hungary	authority	gnssnet.hu	https://www.gnssnet.hu/	---	
Hungary	commercial	MAXI-NET	http://www.maxi-net.hu/	805	
Ireland	authority	Ordnance Survey Ireland	www.osi.ie	---	does not provide RTK
Ireland	commercial	SmartNet (Leica)	http://uk.smartnet-eu.com/	2 000	
Ireland	commercial	Trimble VRS	www.trimble.com	1 950	
Ireland	commercial	TopNET	http://www.topnetlive.com/	1 500	
Italy	authority	NetGEO	http://www.netgeo.it/	240	
Italy	commercial	SmartNet (Leica)	http://it.smartnet-eu.com/	320	
Latvia	authority	LATPOS	http://www.latpos.lgia.gov.lv/	690	
Latvia	authority	EUPOS-Rīga	http://www.rdpad.lv/geotelpiska-informacija/eupos-riga/	630	only Riga region
Latvia	commercial	Trimble VRS Now TEC		1 050	
Lithuania	authority	LITPOS	https://www.geoportal.lt/geoportal/web/litpos	---	
Lithuania	commercial	SmartNet (Leica)	http://lt.nrtk.eu/	---	
Moldova	authority	MOLDPOS	http://www.moldpos.eu/	---	
Netherlands	commercial	RTK CLUE	https://www.rtk-clue.com	---	local provider
Netherlands	authority	NETPOS	https://www.kadaster.nl/netpos	---	
Netherlands	commercial	Trimble VRS	www.trimble.com	---	
Netherlands	commercial	SmartNet (Leica)	http://nl.smartnet-eu.com/	---	
Netherlands	commercial	06-GPS	http://06-gps.nl/	1 500	
Netherlands	commercial	TopNET	http://www.topnetlive.com	---	
Norway	authority	CPOS	http://www.kartverket.no/Posisjonstjenester/CPOS/	1 240	
Norway	commercial	SmartNet (Leica)	http://no.smartnet-eu.com/	1 125	
Norway	commercial	TopNET	http://www.topnetlive.com	---	
Poland	authority	ASG-EUPOS	http://www.asgeupos.pl/	---	
Poland	commercial	SmartNet (Leica)	http://pl.smartnet-eu.com/	500	
Poland	commercial	RTK CLUE	https://www.rtk-clue.com	---	local provider
Poland	commercial	TopNET	http://www.topnetlive.com	---	
Portugal	authority	RENEP	http://www.dgterritorio.pt/	---	
Romania	authority	ROMPOS	http://rompos.ro/index.php?page=servicii	---	

Slovakia	authority	SKPOS	http://www.skpos.gku.sk/	50	50 EUR charge for each SIM in receiver
Slovakia	commercial	SmartNet (Leica)	http://www.smartnet.sk/	360	
Slovenia	authority	SIGNAL	www.gu-signal.si/	840	
Spain	authority	VISORGNSS	http://ntrip.rep-gnss.es/	---	
Spain	commercial	TopNET	http://www.topnetlive.com/	---	
Spain	commercial	SmartNet (Leica)	http://es.smartnet-eu.com/	380	depends on region, price range between 210-475 EUR
Sweden	authority	SWEPOS	swepos.lantmateriet.se	1 590	
Sweden	commercial	Trimble VRS	www.trimble.com	---	
Sweden	commercial	SmartNet (Leica)	http://se.smartnet-eu.com/	---	
Sweden	commercial	TopNET	http://www.topnetlive.com/	---	
United Kingdom	commercial	SmartNet (Leica)	http://uk.smartnet-eu.com/	2 500	
United Kingdom	commercial	Trimble VRS	www.trimble.com	1 000	
United Kingdom	commercial	RTK CLUE	https://www.rtk-clue.com	---	local provider

Figure 6. RTK in Europe.

The availability of the correction signal in European countries is ensured as follows:

- by a network built as part of the EUPOS European project, an initiative to create a unified DGNSS infrastructure, in Central and Eastern Europe primarily for geodetic needs. In the Czech Republic, the CZEPOS network is operated by the Land Survey Office, SKPOS is in Slovakia.
- by networks operated by multinational commercial operators – mostly geodetic companies that have built "pan-European networks" like LEICA - SmartNet, Topcon - TopNETlive network, Trimble - Trimble VRS network.
- by networks built by local commercial entities, such as GEOORBIT (operated by geoobchod.cz) in the Czech Republic or MAXINET-HU in Hungary, which is operated agricultural machinery dealer AXIAL.

3 REMOTE SENSING

The management of state's territory requires very good information background for decision-making, which can be supported by remote sensing. For planning activities, comparing the current state with the past, predicting weather behavior, or monitoring human influence, it is necessary to have a high-quality data base that can analyze the development of the monitored issue over time. Data (not just images) can be captured in a variety of ways: aerial, satellite, and unmanned vehicles (drones). Satellite technologies, and the European Copernicus program and its data sets in particular, bring a whole new level of spatial and temporal resolution. This concerns both current crop health status and long-term trends. A short period of data acquisition guarantees a statistically higher probability of obtaining data unobstructed by clouds for each monitored phenological phase.

3.1 PROGRAM COPERNICUS

The line of Sentinel satellites consists of several types of satellites, typically discharged in pairs to provide faster data acquisition. At present, the satellites of the first two missions are active and the third mission is in trial operation.

- First mission - Sentinel-1 is designed for radar mapping of the Earth's surface and for detecting information available through this type of sensor.
- Second mission - Sentinel-2 also has two satellites and provides image data in several spectral ranges.
- Third mission - Sentinel-3 has the first Sentinel-3A satellite in operation. The other is in the preparation stage.

Other satellites are in preparation, and their sending into orbit is a matter of next few years. Every Earth exploration mission must also provide ground operations in addition to the satellites. It is responsible for managing satellites, receiving and processing data, and for making data available. Copernicus has its ground section divided into three main parts (ESA):

1. **Core ground segment**

Core ground segment enables the systematic retrieval, processing and distribution of all Sentinel satellite data. It includes elements for tracking, managing satellites, and for downloading, processing, and spreading data to users. It also has mechanisms to monitor and control the quality of data products as well as data archiving. Infrastructure is "distributed", which means that different centers are in different places but are interconnected and coordinated. Despite the complexity of the system, users are offered a single virtual access point to find and download products.

2. **Coordinated data access system**

The overall space capacity, beyond the single missions, is coordinated through the Copernicus Space Component Data Access System. This is carried out in agreement with contributing data providers. The system provides comprehensive and coordinated access to space data, to:

- link transparently the different data providers and the various Copernicus services using specific coordinating functions;
- create synergy and sustainability across the various contributing missions;
- provide a simplified interface for advertisements and service desk rather than using multiple data providers' interfaces.

The system is the hub of an interoperable network of distributed European ground segments contributing to Copernicus, culminating in a harmonised, one-stop-shop for users. Data and services are accessible in the form of datasets, which are pre-defined collections of coherent (single and/or multimission) products that are derived from service requirements after trade-off considering the overall capacity of the space component.

3. Sentinel Collaborative Ground Segment

This ground section provides additional access to Sentinel data, or to specific data products or distribution channels. It consists of elements funded by third parties (i.e. Outside ESA / EU Copernicus) and provides a framework for international cooperation. Cooperation elements are expected to deliver specialized solutions that further extend the use of Sentinel missions in different areas.

Data sets

Each Sentinel mission produces a large amount of data that needs to be processed into a usable form. Typically, data is being cleaned and calibrated. The raw signal is corrected by spectrum corrections. Each data set represents image of a particular part of surface area of the Earth. Data sets are downloadable and usable free of charge. However, it is necessary to count on large data production, especially when it is constantly updated. The data is available through Sentinel and Landsat web sites. The basic idea is slightly different, given by local customs and views on open data. The data is available in a form that allows automatic downloading and subsequent machine processing. Everything is just a question of the ability of the subject who wants to explore and exploit the data. All data sets are available through https://scihub.copernicus.eu/ - access is for registered users only, but registration is very easy and access to the data is free. The program has set points of functionality which are being progressively completed.

Open Hub

Is an online interface available through a browser and requires registration to access the data (respecting the terms and conditions of course). The graphical interface is very good - simple and easy to use, and provides convenient use of the data sets.

API Hub

The API Hub is designed for automated download of data sets. It does not have a graphical interface and is made available on the basis of standardized reports. API Hub access is currently available for all SciHub registered users. The only limitation is in write-through of login credentials.

Landsat

Data from the Landsat satellite system is available at the website `https://landsat.gsfc.nasa.gov/data/`.

4 AGRICULTURE IN EU AND ICT

According to the European Commission and Eurostat (EC, 2017), GDP in the EU in 2016 was 14 820 936 million EUR, with an average GDP per capita of 29 000 EUR and an average growth of 1,9%. Trade in agricultural produce between EU countries and other countries amounted to 131 126 million EUR (exports) and 112 189 million EUR (imports). Domestic intra-EU trade in agricultural production amounted to 349 940 million EUR for exports and 346 924 million EUR for imports.

The European Commission is funding the ICT-AGRI program under the Seventh Framework Program for Research on ERA-NET. The objective of the ERA-NET program is to develop and strengthen the European research area by facilitating practical initiatives to coordinate regional, national and European research programs in specific areas. The ICT-AGRI-1 program started on 1 May 2009 and ran for 65 months until 30 September 2014. The ICT-AGRI-2 project started on 1 January 2014 and is scheduled for 4 years until the end of 2017.

The main objective of the ICT-AGRI program is to strengthen European research in the diverse field of precision agriculture and to develop a joint European research agenda on ICT and robotics in agriculture and to monitor the challenges of funding from the national research programs of the participating countries. The aim is to gather fragmented human and financial resources to improve both the efficiency and effectiveness of European research efforts.

The specific objectives of ERA-NET ICT-AGRI are:

- Mapping and analysis of existing research and future needs
- Developing tools and procedures for transnational funding
- Developing a strategic transnational research agenda and programs
- Establishing and maintaining international co-operation and networks

As mentioned in the chapter on the Digital Agenda for Europe, the Digital Single Market (DSM) is one of the main priorities of the "Juncker Commission". One of the objectives of the DSM package is to close the digital divide between urban and rural areas and provide fast (ultra-fast broadband) internet access throughout the EU by 2020.

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