PROJECT OBJECTIVE

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TEAM ID	PNT2022TMID38289
PROJECT NAME	SMART FARMER-IOT ENABLED SMART FARMING APPLICATION
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MAXIMUM MARKS	4

OBJECTIVE:

Urbanization rates are gradually rising and it is estimated that by 2050 around 80% of the world's population will live in cities, while the total population of the earth is expected to increase by 3 billion. This upward trend can lead to food shortage, as arable land already cultivated to cover these feeding requirements amounts to 80% of available farmland.

Through smart farming though, larger food production is possible because the production can take place during the whole year without interruptions, while weather conditions in many cases have no impact on it. Apart from a possible future food crisis that may arise from poor environmental management, another issue that arises is that of high pollution caused by the use of fossil fuels due to the transportations; it is estimated that the produced goods travel thousands of kilometers on average before they reach our table.

Smart urban farming will also automatically nullify the distance from the production site to the table, providing a green solution to the above problem. Cultivation methods vary from crops in soil, terraces, gardens and balconies in our personal space to crops in community public spaces and gardens in suburban areas. We will focus on smart farming methods such as aquaponics that is the cultivation of fish and plants together in a constructed, recirculating ecosystem utilizing natural bacterial cycles to convert fish waste to plant nutrients.

It is an environmentally friendly, natural food- growing method that harnesses the best attributes of aquaculture and hydroponics without the need to discard any water or filtrate or add chemical fertilizers. It enables growing food for oneself, the community, or for the market without the use of harmful pesticides and herbicides, while using the least amount of resources, thereby leaving the smallest carbon footprint. In addition, aquaponics is suitable for environments with limited land and water, which makes it an urban-friendly technology as well as a sustainable farming technique. This modern idea of smart farming, whether it is performed in greenhouses or through indoor techniques, can be optimized by utilizing the controlled- environment agriculture (CEA) technology, where all environmental factors i.e. temperature, humidity, carbon dioxide, pH, etc. can be controlled and automated based on the Industry 4.0 trends.

Most importantly, smart farming systems do not require much prior expert knowledge in order to start your own cultivation; it requires resources like a backyard or a rooftop, and a hands-on approach combined with the right skills. Nevertheless, in most countries throughout Europe, they are still in an infantile stage, even though it is rapidly developing during the last few years.

Especially concerningthe project's participating countries (Bulgaria, Greece, Romania, Turkey and Cyprus) where farming and fishing are two very important – yet not as modernized – industries, new smart farming methods cannot be located in many curricula of VET organizations or HEIs, nor are there many large-scale establishments, either for profit or non-profit.

This is why the partners have come together to establish the "Smart Farming 4.0 All" consortium, in order to conduct extensive desk and field research addressed to a wide variety of relevant stakeholders and professionals, to create a Smart Farming Handbook and disseminate it freely toeverybody interested, and to develop specific training curricula that will be utilized to train experts from the participating organizations as "carriers" of innovation, in order to be able to spread and main stream this novel method back to their regions. Therefore, the project will have a wide consequent impact to different sectors and countries that, nonetheless, face similar challenges.

Also, taking under account the United Nations 2030 Agenda for Sustainable Development, the project'simplementation will provide a common set of tools that will be addressed and disseminated to everybody interested to – literally – get their hands dirty: young and adult students, entrepreneurs and fellow professionals, academics, trainers and even policymakers will be presented with the project's results and the ability to utilize them, each one for their respective purposes, but always with a view to sustainable development.The present report reflects the main findings and assessments presented by each responsible partner for its own country obtained through extensive field and desk research with the aim to identify and assess practices, policies, gaps and needs of target groups and stakeholders, and forms the basis for the preparation of the Smart Farming Handbook that will be delivered further during the project implementation.

The Smart Farming represents the application of modern Information and Communication Technology (ICT) in agriculture.

Following the plant production and genetics revolution, the third Green Revolution is starting to enforced in the agricultural world based on the implementation of ICT solutions as the precision equipment, The Internet of Things (IoT), the sensors and the actuators, the geo-tracking systems, the Big Data, the Unmanned Aerial Vehicles (UAV), the robotics etc.

The Smart Farming has a real potential to deliver more productive and sustainable agricultural production, based on a more accurate and efficient use of resources.

From the farmer's point of view, Smart Farming should provide the farmer with an added value in the form of better decision-making or more efficient operation and management of his farm.

The Smart Farming is closely linked to three interconnected Technology sectors:

• **Management Information Systems:** Programmed systems for the collection, processing, storage and dissemination of data in the form required for the execution of the tasks and functions of an agricultural enterprise.

• **Precision Agriculture:** Managing spatial and temporal variation to improve economic performance combined with reducing inputs and environmental impacts. Includes Decision Support Systems (DSS) for the entire management of farm in order to optimize the inputs while maintaining resources, which are characterized by the widespread use of geo-tracking systems (GPS, GNSS) ,

aerial photographs from UAVs and the latest generation of supernatural images provided by Sentinel satellites, resulting in spatial variability maps of various measurable variables (e.g. crop yield, soil characteristics / topography, organic matter, moisture levels, nitrogen levels, etc.).

• **Agricultural Automation and Robotics:** The process of applying robotics, automatic control and artificial intelligence techniques to all levels of agricultural production, including farmbots and farmdrones.

Smart Farming applications not only targeting to large, conventional farms, but could also act to stimulate other common or growing trends in farms, such as family farming (small or group farms, special farms and / or stock-farming, high quality or special varieties, etc.) and organic farming to promote agriculture as an industry that inspires respect and transparency for the European consumer, society and market consciousness. Smart Farming can also provide great benefits to the environment, for example, via more efficient use of water, or the optimization of agricultural practices.