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CENTRE FOR
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HELLAS

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FOR SUSTAINABLE GROWTH

Tackling the pandemic effectively

CERTH at the forefront of Sars-CoV-2 diagnosis and the importance
of molecular diagnostic tests

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Fulfilling its mission for applied research with a social impact, INAB|CERTH responds to the urgent need for extensive molecular testing towards better management of the COVID-19 pandemic

INAB | CERTH at the forefront of Sars-CoV-2 diagnosis

The Institute of Applied Biosciences (INAB) of the Centre for Research and Technology Hellas (CERTH) has a leading role in the **diagnosis of Sars-CoV-2.** Indicatively, since the beginning of September almost **30,000 samples were tested** at the Institute under a contract with the National Public Health Organization.

THE IMPORTANCE OF MOLECULAR DIAGNOSTIC TESTS

Fulfilling its mission for applied research with a social impact, INAB|CERTH responds to the urgent need for extensive molecular testing towards better management of the COVID-19 pandemic. Referring to the importance of the test, Kostas Stamatopoulos, the Director of the Institute, emphasizes that: "*Conducting exten- sive molecular tests for Sars-CoV-2 is key to* *capturing accurately the spread of the virus in the community and effectively tackling the pandemic. In fact, this is acknowledged by the EU ad hoc Group on Research and Innovation Priorities in Covid-19 Control, according to which molecular testing is the strategy for re- turning to everyday life.*"

" Conducting **extensive molecular tests** for Sars-CoV-2 is key to **capturing** accurately **the spread of the virus in the community** and effectively tackling the pandemic**.,** Kostas Stamatopoulos , Director, INAB|CERTH

THE METHODOLOGY

INAB/CERTH deploys the molecular protocol developed in the framework of the Flagship Action for Sars-CoV-2 is deployed, which is supported by the General Secretariat for Research and Technology of Greece. According to Anastasia Chatzidimitriou, Senior Researcher of INAB|CERTH, *"proper collection of nasopharyngeal smear as well as transport and storage of samples in appropriate conditions* *is critical. The isolation of the virus genetic material is conducted in the laboratory under conditions of high P3 level biosafety. The last step in the process is to detect specific genetic sequences of the virus that, if present, confirm its presence in the test sample. Finally, the result of the experimental procedure is recorded in the laboratory report, where the steps followed must be described".*

" Proper collection of **nasopharyngeal smear** as well as **transport and storage** of samples in appropriate conditions is critical**.,** Anastasia Chatzidimitriou, Senior Researcher, INAB|CERTH

Thanks to the highly specialized, commited and motivated staff as well as the substantial support by the Administration of CERTH, INAB|CERTH will remain at the forefront of the battle against SARS-CoV-2, having the potential to test 2500 samples per day.

Heads of Diagnostics

Anastasia Chatzidimitriou, Senior Researcher, INAB|CERTH
Kostas Stamatopoulos, Director, INAB|CERTH

Detection system ensures high quality portable water

High quality, potable water is essential for people and their good health. Water networks alongside the technology needed for their daily operation are considered to be the most important critical infrastructure on a global basis. When water safety and security are compromised, people are exposed to high levels of risks and societies are faced with great threats and large-scale disasters. In order to successfully mitigate –if not fully eliminate– these threats, aqua3S is stepping in to propose standardization methods and strategies based on already existing technologies that will go beyond the state-of-the-art by being combined with the newly developed, customized aqua3S sensors.

TEXT: **ANASTASIOS KARAKOSTAS, ANASTASIA MOUMTZIDOU**
EDITING: **AMALIA DROSOU**

Aqua3S is a Horizon 2020 funded project which started in September 2019. Being coordinated by CERTH-ITI and involving 22 partners across Europe, the project aims at creating standardized methods and strategies for water safety and security for all involved stakeholders. Towards this goal, the project will develop new, innovative sensors that will be installed in key points of the existing water distribution network and the data collection taking place through them will be complemented by already existing market sensors and the measurements of SCADA legacy systems that will be integrated in the newly developed system. This data collection will be enriched by imagery collected from UAVs and satellites in order to successfully detect and evaluate harmful substances in the water network. Moreover, additional data from social media will be collected, mostly focusing on citizens' reports on water related matters. In this manner, a bottom-up approach is going to be introduced that will raise awareness and encourage interactive knowledge sharing.
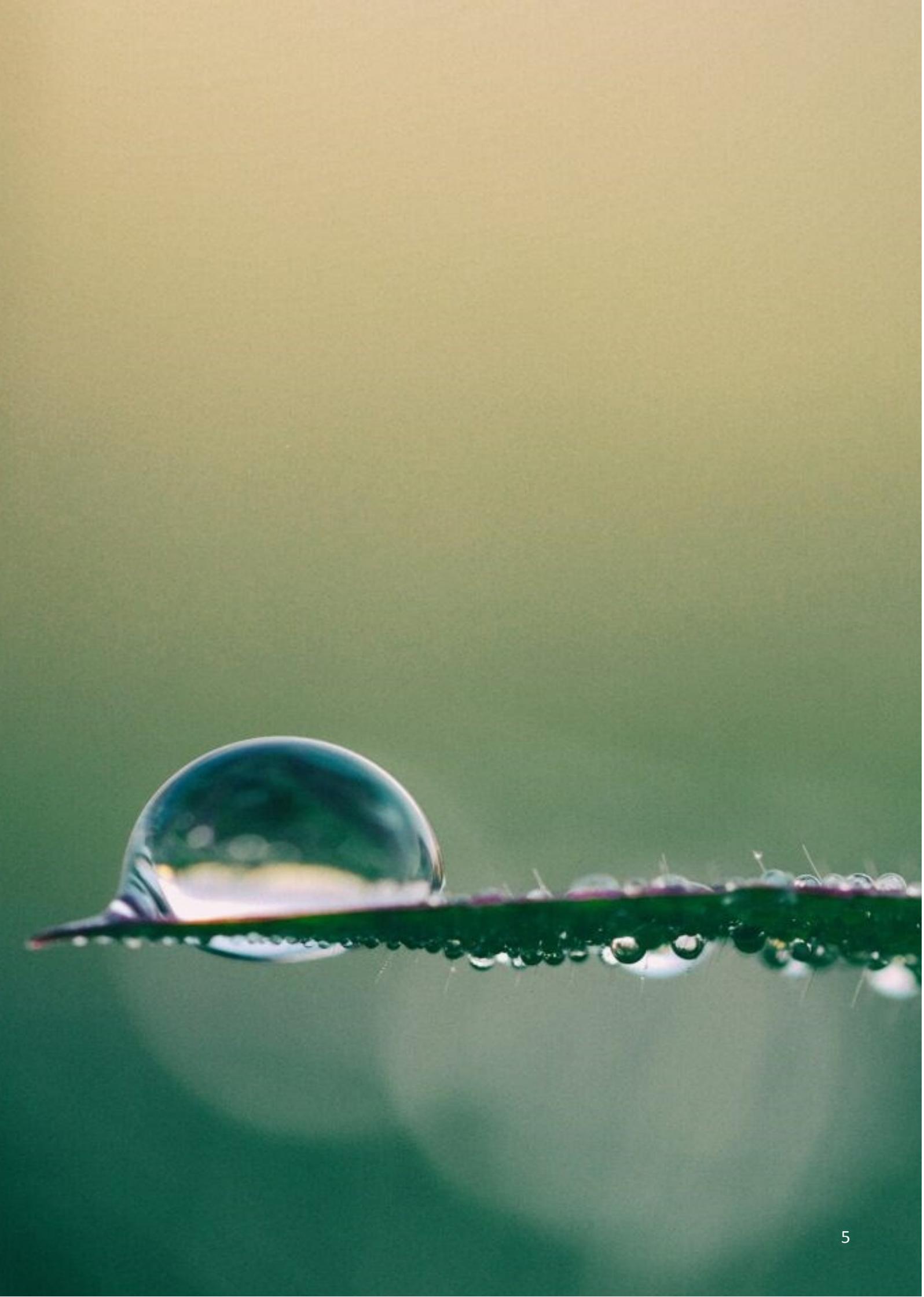
For the processing of the aforementioned data, aqua3S will semantically enrich the information it receives from all these sources while capitalizing on existing advanced knowledge representation and intelligent context-based reasoning solutions. This will potentially lead to the creation of a "smart" interconnection of the data produced from all the sources, the raising of alarms when anomalies are detected in terms of time and space, the real-time assessing for the crisis severity level, the forecasting of future performance of the water distribution networks under different scenarios and the modelling of the actions that should be taken in case of crises by considering past experience. This information will be visualized either in 3D that allows inspection of the system status and temporal variations or on top of a map as part of an intuitive and efficient interface that covers the needs of each end user. CERTH-ITI contributes to aqua3S in several stages of the framework. Specifically, it processes imagery collected from UAVs and satellites for detecting harmful substances, it uses information from social media for capturing citizen's feedback on water quality, it semantically enriches the information it receives from all sources and offers decision support, it provides real-time assessing for the crisis severity level, and finally it supports the visualization of all the information produced within aqua3S on of a map.

The partners of aqua3s during the kick off meeting at CERTH's premises

"Aqua3S is an important project with a high impact on the security of our society. The project will create much-needed standards to support the safety and the security of drinking water. Moreover, it is very innovative and challenging from a technological perspective since it combines sensor technologies with state-of-the-art detection and analytics mechanisms", underlines Dr. I Kompatsiaris, Researcher A', at ITI/CERTH

Finally, in order to ensure the system's functionality and interoperability, 7 pilots are going to take place throughout Europe – more specifically, in Italy, Greece, France, Cyprus, Belgium and Bulgaria.

The main goal is to create a complex collaborative system in which all involved parties can record problems and find new solutions, in a manner that will lead to standardized methods and strategies for water authorities and other relevant stakeholders. For this reason, aqua3S is seeking to spread the word and be involved in multiple clusters and fellow projects that are addressing the same issues. Despite its recent kick-off, aqua3S and its consortium have already become members of the ICT4Water European Cluster and have also teamed up with Fiware4Water, NAIDES, DigitalWater.City, Score-Water in order to create a fruitful and effective synergy that will help them achieve their objectives and disseminate the outcomes of their research to a broader audience.

Safe and sustainable Mediterranean food products for people all around the world

Faced with the challenges of satisfying consumer expectations for safe foods and meeting regulatory requirements, industry segments are evolving on separate, yet parallel paths to define their own traceability guidelines and address the supply chain-related aspects of food safety. A new research European under the coordination of CERTH project just started, aiming at at the provision of safer and more sustainable Mediterranean Food products for people all around the world.

TEXT **MARIA MPATSIOULA, PROF. YASSER GABER DESSOUKY**
EDITING: **AMALIA DROSOU**

Globally, the food industry recognizes the importance of traceability and food safety. Even though Mediterranean food products are generally recognized for their high nutritional and sensorial value, there is a lack of trust concerning the origin of raw materials (e.g. fruits, vegetables, livestock, fish) and the quality of the processes starting from cultivation and breeding until packaging and transport. Thus, faced with the challenges of satisfying consumer expectations for safe foods and meeting regulatory requirements, industry segments are evolving on separate, yet parallel paths to define their own traceability guidelines and address the supply chain-related aspects of food safety.

The Med Food TTHubs project

Med Food TTHubs is set on deploying trusted and transparent standardised approaches along with cutting-edge technologies to **support the implementation of full-path tracing practices through the whole distribution channel from seed to shelf**.

Seven Trace & Trust Hubs, which will form a permanent transnational network playing the role of a one-stop-shop for traceability and authenticity for 'added value' Mediterranean food products in each of the countries involved.
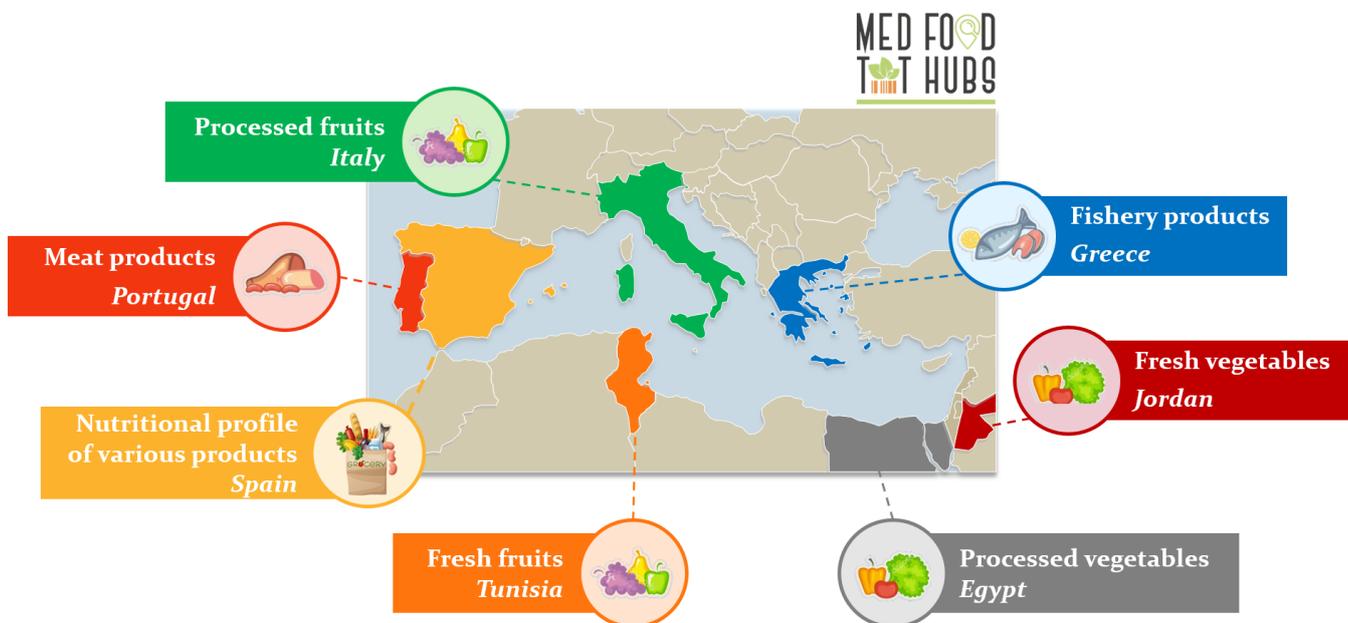
Pilot of Med Food TTHubs in 7 Mediterranean countries

> **"** MED Food TTHubs addresses a **holistic approach** which gears to achieve amongst other **the identification of food products, the capturing of process needs for different products, the evaluation of the information captured vs specified target, the introduction of a Common Authentication and Quality Assurance Protocol**, Dr. George Banias Researcher iBO | CERTH, Principal Investigator, and Coordinator of MED Food TThubs

Drawing inspiration from the widely applied GS1 Standards, Med Food TTHubs implements a **"Voluntary Scheme of Traceability (VST) of MED foods"**, as common protocol for the network of these Hubs, acting as a point of reference for the products of the different involved areas. This protocol includes detailed guidelines, audit procedures and KPIs in relation to practices and processes towards traceable, authenticated and of high nutritional quality products. In addition, an e-platform will fully support the operation of the TTHubs. The dedicated web-based platform, will encompass a number of modules in order to:

•Facilitate sharing of information across the whole food supply chain,

•Support the documentation of traceability and authenticity,

•Support the effective provision of more trustful processes for certification and quality control.

" The establishment of the seven (7) **Trace & Trust Hubs** that will be developed in Greece, Italy, Spain, Portugal, Tunisia, Egypt and Jordan will act as **permanent transnational network** playing the role of a **one-stop-shop for traceability and authenticity** for added value Mediterranean food products. , Dr. George Banias Researcher *iBO* | CERTH, Principal Investigator, and Coordinator of MED Food TThubs

"The COVID-19 pandemic outbreak revealed the need for safer and more sustainable Mediterranean food products for people around the world. In this light, our primary goal, as a consortium of MED Food TThubs project is to promote methodologies, IT tools and entities (Hubs) that will support the need for full transparency concerning the traceability and authenticity of food products towards the creation of an end-to-end trust-chain in the food sector. As such the primary objective of the MED Food TTHubs project is the development of an e-Platform that will support the monitoring of the whole supply chain from seed-to-shelf.

In brief, MED Food TThubs addresses a holistic approach which gears to achieve amongst other the identification of food products, the capturing of process needs for different products, the evaluation of the information captured vs specified target, the introduction of a Common Authentication and Quality Assurance Protocol (Genetic and genomics analysis; Isotope analysis; Nutritional profile), underlines George Banias, PI and coordinator of the project and goes on: "It should be highlighted that the establishment of the seven (7) Trace & Trust Hubs that will be developed in Greece, Italy, Spain, Portugal, Tunisia, Egypt and Jordan will act as permanent transnational network playing the role of a one-stop-shop for traceability and authenticity for 'added value' Mediterranean food products. These Hubs will directly affect the food industry with the creation of alternative business models and opportunities."

Ultimately, Med Food TTHubs vision is to support full transparency concerning the traceability and authenticity of Mediterranean food products towards the creation of an end-to-end trust-chain in the food sector.

The Med Food TTHubs e-platform will be piloted focusing on Mediterranean food products as key points in the reform of tracing and authenticity procedures of traditional Mediterranean foods. Covering a diverse set of use cases, it will add value to high quality food products by providing documented traceability of the whole "seed-to-shelf" supply chain, through proofs of authenticity for final products and ingredients and including detailed information on the nutritional profile of the product.

Med Food TTHubs is a 3-years project that started on the 1st April 2020, and is funded from the PRIMA (*Partnership for Research and Innovation in the Mediterranean Area*) Foundation under Horizon 2020 framework of the European Union.

The Med Food TTHubs consortium consists of 10 partners from 7 countries, covering a wide range of expertise,.

No-one left behind: Communication and digital empowerment for patients with the locked in syndrome

Almost two years after its completion , the European Research Project MAMEM, that enabled **human-computer interaction, using eye-gaze and mental commands**, continues to deliver significant impact at scientific as well as technical level

TEXT: **SPIROS NIKOLOPOULOS, YIANNIS KOMPATSIARIS**
EDITING: **AMALIA DROSOU**

MAMEM (Multimedia Authoring and Management using your Eyes and Mind) has been an EU-funded project coordinated by CERTH-ITI-MKLab that was granted with the promise to enable human-computer interaction using eye-gaze and mental commands. Its goal was to par-tially restore the lost ability of communication of those that (due to their diminished neuro-muscular condition) have no other means to communicate, and/or access the benefits of a digitizing society (i.e. social media, access to in-formation, education, entertainment).

What we consider most phenomenal is that MAMEM has **gained the attention of independent users**, that had absolutely no involvement in the activities of the project, requesting **to use the system for their own benefit** of improved communication and digital empowerment, Spiros Nikolopoulos, Senior Researcher, ITI | CERTH

In fulfilling this promise, during its lifetime, MAMEM delivered significant impact at technical level (i.e. by producing the software package [GazeTheWeb](#) allowing the use of a browser through eye-gaze and mental commands); at user-oriented level (i.e. by offering a solution that was installed at the home of 30 patients with neuromuscular disorders, to be used autonomously for one month); and at scientific level (i.e. by wining 6 prizes, publishing 29 conference and 13 journal papers, delivering 5 datasets and 1 processing toolbox).

However, what we consider as special about MAMEM is that almost two years after its completion, the project continues to deliver significant impact in all aforementioned aspects. In technical terms, GazeTheWeb has been further adopting the concept of multimodal interaction by delivering variations combining touch-and-gaze and speech-and-gaze. In scientific terms, 6 additional high impact journals and 11 top tier conferences have been published after the project completion, while an edited book on EEG and eye-controlled interfaces was recently published. However, what we consider most phenomenal is that MAMEM has gained the attention of independent users, that had absolutely no involvement in the activities of the project, requesting to use the system for their own benefit of improved communication and digital empowerment.

MAMEM is currently in use by 3 independent users that have been using the system for a period ranging from a couple of months to approximately one year. In fact, in the context of a recent application for having MAMEM considered for the Horizon Prize 2020 - Impact Award, we have solicited a number of testimonials that very vividly describe the phenomenal achievements of MAMEM including, among others, the partially restored ability of communication, the psychological boost and mental health improvement, the digital empowerment and social change. Below we provide excerpts from these testimonials.

Mr. S. M. husband of Ms. D. that has been diagnosed with ALS, has stated the following after his wife has been using the system for about 6 months.

"My wife was diagnosed with ALS 3 years ago. At the moment she moves nothing but her eyes. Dr. Nikolopoulos and his team introduced us the GazeTheWeb browser that resulted from the MAMEM project. We found it extremely useful in her life and put a smile in her face. She can communicate with us and outer world via internet and in a certain way improved her mental health."

Mr. P. D. husband of Ms. A. that has suffered a stroke and is currently under the locked in syndrome, has stated the following after his wife has been using the system for about 3 months.

"Dr. Nikolopoulos brought and installed in our house a piece of software developed with a research program, called MAMEM. It is an excellent assistive tool in many aspects that has proved to be of great assistance in A.'s case, a patient with locked in syndrome. The first and probably most important aid of the tool was the change in her psychological state due to the fact that she now has the opportunity to express herself, which proved to be the case as she learned to use it within a few days. Moreover, it offers excellent motivation to her daily routine as she can plan and complete several activities. Also, the program assists the brain, as now A. is constantly active and tries to maintain and process information. She has also the opportunity socialize not only with us around the house but also with other people. The program is easy to use and the user can learn how to use it quickly and effectively. I believe that the program did not display any shortcomings and that the assistance it offers compensates for any difficulties that may arise"
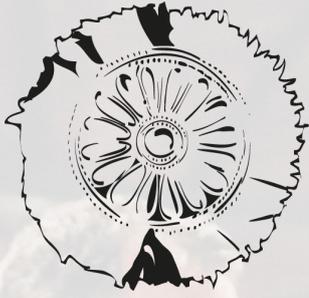
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The **Centre for Research and Technology-Hellas (CERTH)** founded in 2000 is one of the leading research centres in Greece and listed among the TOP-20 E.U. institutions with the highest participation in competitive research grants.

Today CERTH includes the following five institutes with indicated major fields of research:

- **Chemical Process and Energy Resources Institute (CPERI)** Sustainable & Clean Energy, Environmental Technologies, Chemical & Biochemical Processes, New Functional Materials

- **Information Technologies Institute (ITI)** Informatics, Telematics and Telecommunication Technologies, Safety and Security

- **Hellenic Institute of Transport (HIT)** Smart Sustainable Mobility, Transport Safety

- **Institute of Applied Biosciences (INAB)** Agri-biotechnology, Health Translational Research, Informatics for big bio-data

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