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# GRACED – Two years into the project! Second validation about to start

As consumer demand for fresh fruits and vegetables (F&V) continues to increase, so does the risk of microbiological and chemical contamination. Currently, inspections for F&V are carried out at the production site or the food processing facility, based also on regulatory requirements. In most cases these are inspections of random batches using laboratory techniques, which may require up to two or more days before getting results. The time and cost per analysis leads to reduced checks and thus, elevated risks, even in countries with very efficient control mechanisms.

GRACED (EU funded project, entitled "*Ultra-compact, low-cost plasmo-photonic bimodal multiplexing sensor platforms as part of a holistic solution for food quality monitoring*") considers the aforementioned need and the limitations of current techniques and proposes a **novel solution for contaminants detection in all stages of the F&V industry value chains**.

At the current stage, the first integration testing phase has been completed. The scope of this has been to verify that all GRACED system components operate flawlessly in combination with each other and to fix various issues that could affect overall system functionality. Up to now:

- The first GRACED device prototype has been designed and developed in two versions: Portable device version, to be used as a benchtop instrument for controls in various parts of the F&V value chains and Internet-of-things (IoT) version to be used as a fully autonomous sensing device for irrigation water quality analysis.

- The first version of the GRACED novel plasmo-photonic sensors has also been delivered. This is the heart of the GRACED solution. It includes biosensing elements against up to seven contaminants of interest for the food industry, focusing in particular on the F&V sector needs. First tests have been conducted with biosensing elements against deoxynivalenol and imidacloprid.

- The first operational version of the GRACED smart Decision Support System (sDSS) has also been delivered and used in the first integration testing. It allows collecting measurements from the GRACED device and other sensors in the field, combining and analysing them to support the farmers in their everyday work and early intervention in case of problems.

Using the feedback from the first integrated system tests that took place in Belgium, the GRACED team is currently preparing the upgraded version of all system components, with the goal of testing the second version of the system towards March 2023. After that, the field-ready versions of the GRACED devices and sensors will be produced. The final version of the system will be tested and demonstrated in different production & distribution systems: a) a conventional farming system (in Italy) in open-air farms and the follow-up steps of food processing for preparing cooked meals and frozen vegetable packages, b) a novel, urban farming ecosystem (in France), producing F&V locally and using them in in-situ restaurants, c) a short value chain based on agroecology (in France) and direct distribution from farmers to consumers & restaurants, d) a semi-automatic farm producing mushrooms and distributing them to supermarkets & wholesalers (in Hungary).

GRACED is being developed by a multi-disciplinary team, coordinated by CyRIC, Cyprus Research and Innovation Center Ltd, in the framework of EU's Horizon 2020 Programme. The was launched on the 1st of

January 2021 and will run for three and a half years, to allow enough time for the development and real-world validation of the technology.

The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101007448. The project is an initiative of the Photonics Public Private Partnership. Project partners include: CyRIC - Cyprus Research and Innovation Centre (Cyprus), National Research Council (Italy), Tecnoalimenti S.C.P.A (Italy), Easy Global Market SAS (France), Bialoom Ltd (Cyprus), Mutitel (Belgium), Centre National De La Recherche Scientifique CNRS (France), Sous Les Fraises (France), Aristotle University of Thessalonini (Greece), Pour Une Agriculture Du Vivant (France), AMO GMBH (Germany), Pilze-Nagy Kereskedelmi Es Szolgaltato Kft (Hungary), ISS BioSense S.r.l. (Italy), Lumensia Sensors S.L. (Spain)

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Notes for editors:

1. Horizon 2020 is the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money will attract. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market.
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