

**CERTH**  
CENTRE FOR  
RESEARCH & TECHNOLOGY  
HELLAS

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RESEARCH - TECHNOLOGY - INNOVATION  
FOR SUSTAINABLE GROWTH

The art of healthy living

An end-to-end ecosystem will engage people to a healthy, pleasurable, nutritional and sustainable diet



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## The art of **healthy living**

A three-and-a-half year European Commission Horizon 2020 funded initiative will develop and supply **personalized nutrition and physical activity support using Artificial Intelligence (AI) information and techniques** so that people can make healthier choices based on their unique needs, behaviours and preferences.

**Text** Lazaros Gymnopoulos, Kosmas Dimitropoulos

**Editing** Amalia Drosou



**PROTEIN** (PeRsOnalized nutriTion for hEalthy livINg), a three-and-a-half year European Commission Horizon 2020 funded initiative, is supported by a consortium of 20 pan-European technology, research, consumer and industry partners. This research initiative will develop and supply personalized nutrition and physical activity support using Artificial Intelligence (AI) information and techniques so that people can make healthier choices based on their unique needs, behaviours and preferences.

Research has shown that that nutrition and physical activity patterns are important in pre-

venting and managing chronic diseases such as diabetes, heart disease and obesity. Developing tools and resources to help individuals develop and maintain healthy eating and physical activity patterns can be a path to reducing the burden of chronic diseases at the population level. However, since healthy eating and physical activity habit patterns depend on many individual, social and cultural factors, tools and resources need to be personalized and contextualized to meet consumer needs.

“ New advances in information technologies, particularly in wearable sensors, big data analysis and machine learning techniques, as well as in direct-to-consumer genetic testing, blood and gut microbiome analysis, **open up new opportunities** for researchers to monitor and collect information related to our dietary behaviors, **PROTEIN Project lead, Lazaros Gymnopoulos**

Researchers will assess what works best for particular people, and PROTEIN will deliver personalized support and resources to individual consumers making use of pioneering technologies which enable personalised recommendations.

*“New advances in information technologies, particularly in wearable sensors, big data analysis and machine learning techniques, as well as in direct-to-consumer genetic testing, blood and gut microbiome analysis, open up new opportunities for researchers to monitor and collect information related to our dietary behaviours,”* said PROTEIN project lead Lazaros Gymnopoulos, CERTH.

PROTEIN partners will engage consumers through grocery stores, online supermarkets, restaurants, and digital shops to develop a platform of tools and resources which can per-

sonalize dietary programs and physical activity plans. The project aims to provide a suite of tools individuals can use to personalize healthier grocery purchases and physical activity habits based on their own needs and preferences.

CERTH is the coordinator of the PROTEIN consortium consisting of 20 partners from 11 European countries. The main role of CERTH in the project is *“the development of an ensemble of Artificial Intelligence agents (the AI PROTEIN advisor) that will provide short and long-term dietary and physical activity plans as well as early-warnings related to eating deficiencies or allergies. This personalized and re-adaptable nutrition support will be tailored to users needs and driven by their personal preferences, physical activity levels, health status, physiological and socio-cultural characteristics”*.

“ The development of an **ensemble of Artificial Intelligence agents** (the AI PROTEIN advisor) that will provide short and long-term dietary and physical activity plans as well as early-warnings related to eating deficiencies or allergies, **PROTEIN Project Technical Manager, Kosmas Dimitropoulos**





**WELCOME  
TO PROTEIN**

Discover the nutrition and  
physical activity european project.



“ The research, development, and trials in the project will help us evaluate how the mobile app uses sensors and AI to inform the individual about appropriate selections that make online grocery shopping part of managing health for you and your family, **PROTEIN Project Technical Manager, Kosmas Dimitropoulos**

*“The PROTEIN project aims to support personalised choices when shopping for nutritious and enjoyable food, which contributes to a healthy lifestyle when combined with activity guidance. The research, development, and trials in the project will help us evaluate how the mobile app uses sensors and AI to inform the individual about appropriate selections that make online grocery shopping part of managing health for you and your family.” (Duncan Russell, Ocado Technology)*

The PROTEIN team is a unique and interdisciplinary group of people and organizations who want nothing less than to revolutionize the way citizens receive personalized healthy living advice. Experts from engineering and health sciences, including machine learning experts,

dietitians, medical clinicians, physical activity professionals, biomedical experts, and social scientists will work together to implement this innovative and enterprising research program. It is an ambitious project that aims to change the way we engage in healthy eating and physical activity across communities and within populations. Whether you are a person living with a chronic disease, an elite athlete or an ordinary citizen interested in improving your overall health and well-being, PROTEIN tools and resources could help you achieve your personal goals.

*Scientific Responsible of the PROTEIN project is Dr. Petros Daras*

# Innovative Technology for District Heating and Cooling

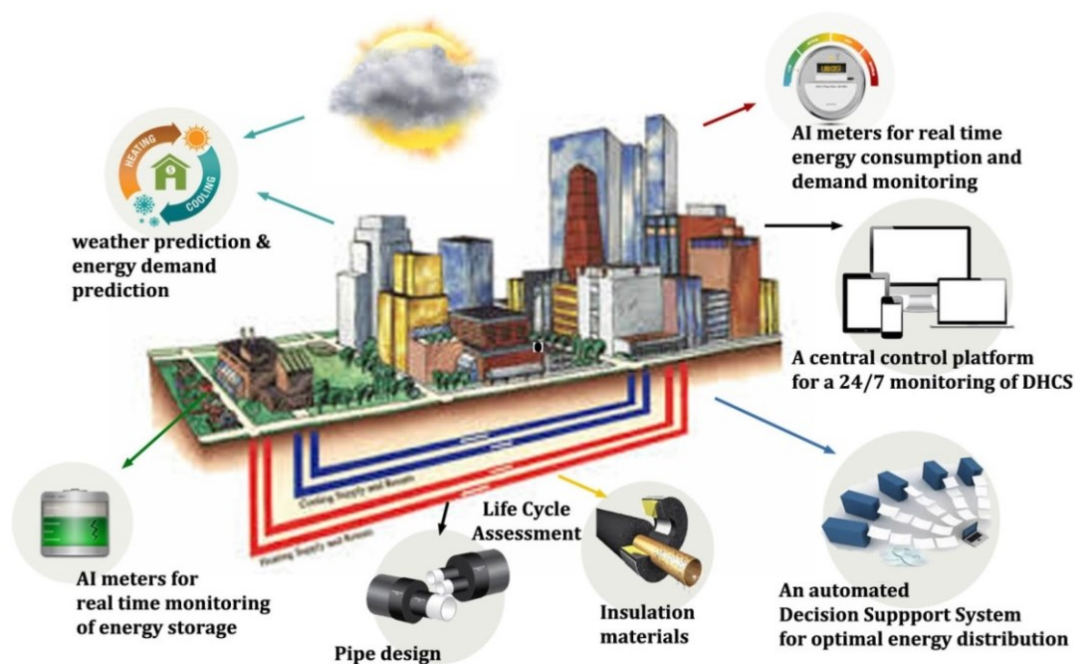
**Energy sustainability** is undoubtedly in the center of the global scientific community's interest. Given that **climate change** is already in our doorstep, and our dependence from fossil fuel creates issues of adequacy of our natural resources, the rational management of energy is considered as imperative. For this reason, a series of actions for large-scale solutions is required, which will lead to the **reduction of energy consumption from systems of district heating and cooling.**



*InDeal*

Aim of the InDeal project (GA No. 696174) is the development of a platform, that will include and highlight innovative technologies, capable of the optimization of the existing district heating and cooling networks' operation, aiming the reduction of the energy cost. This can be achieved with the adoption of a holistic solution that combines: (i) artificial intelligence, (ii) control and intelligent monitoring,

(iii) energy harvesting and (iv) innovative insulation materials. Main goal of InDeal is the development of automated solutions for the evolution and the modernization of existing district heating and cooling networks, with the simultaneous reduction of energy consumption, demand prediction, and knowledge of the network's operation.

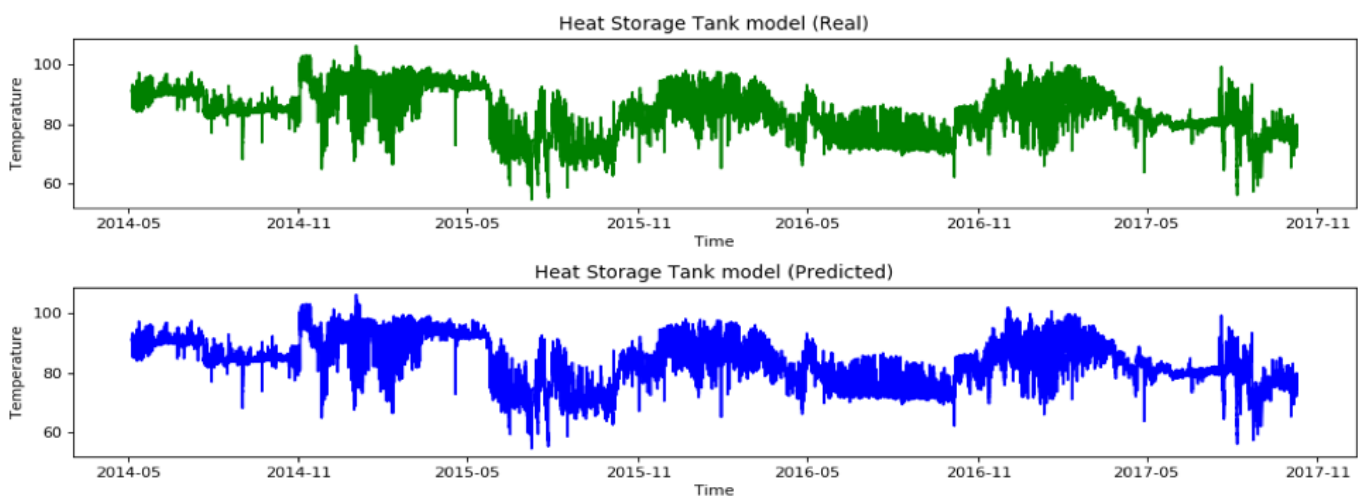


InDeal project's structure

The platform, which is in the final stages of development, is operating with energy consumption data that are collected by smart meters in real time. It has the capability to detect and evaluate the district heating and cooling network's needs per installation. Additionally, it predicts short-term weather conditions and energy demand from the network, it monitors the energy level that is stored in the storage tank of the station or substations and monitors and controls the whole network of district heating and cooling from a central control platform. Under this framework, energy harvesting solutions are developed for future implementation on autonomous sensors, as well as innovative piping solutions built with state-

of-the-art insulation materials that minimize thermal losses.

CERTH's Institute of Bio-Economy and Agri-Technology is responsible for developing a model for the operation of a heat storage tank, located in Vrankslovenia. Each system involved in the production, exchange and storage of energy was modelled separately, and finally an Energy Storage Framework was developed, where the systems' models were interconnected in order to model the entire operation. Advanced machine and deep learning algorithms were tested and evaluated based on their performance on each system separately as well as on the framework as a whole.



Real vs predicted output temperatures of the heat storage tank.

*InDeal project (Innovative technology for district heating and cooling) is funded by the Horizon 2020 Framework Programme (topic: H2020-EE-2015-2-RIA) of the European Union under grant agreement No. 696174. The InDeal consortium is comprised by eleven (11) partners from eight (8) countries of the European union.*



Presentation of CERTH/IBO's heat storage tank model for InDeal project from Mr. Anagnostis (Energaia conference, Montpellier)





## Transnational cooperation in the field of innovation in the Adriatic-Ionian region

**Text** Katerina Papadopoulou



**Zagreb, March 1<sup>st</sup>** - Representatives of six countries, partners of the project OISAIR- Establishment the Open Innovation System of the Adriatic Ionian Region, signed on March 1st in Zagreb the OIS-AIR Manifesto that formally declares intents towards the creation of a permanent transnational collaborative Network aimed to foster cooperation in the field of innovation and to boost economic growth and competitiveness in the Adriatic Ionian Region.

The OISAIR Network primary objective is to establish and develop a competitive and attractive transregional innovation system by connecting relevant partners and enabling transnational flows of knowledge, innovators and shared use of facilities and technologies. It will provide innovation services to SMEs and support the transnational collaboration between research sectors and SMEs by offering dedicated funding schemes in order to support their innovation projects.

The OIS-AIR Manifesto at the Innovators Interregional Forum in Zagreb was signed by: Science Park AREA Trieste, Italy, Technology Park Ljubljana, Slovenia, Croatian Chamber of Commerce, Science Technology Park Belgrade, Serbia, Centre for Research and Technology Hellas,

from Greece, Basilicata University, Italy and Ministry of Finance of Albania.

The document is conceived as a preparatory declaration in view of the signature of the OISAIR Framework Collaboration Agreement that will formalize the establishment of the Network, and which will be signed by the associate partners, too. Moreover, the Network will be open to other potential members, active actors in the fields of research and technology such as: innovation agencies, technology parks, public and private research institutions, universities, business support organization, incubators and accelerators, and similar.

During the Innovators Interregional Forum in Zagreb there was also presented the Pilot Transregional Smart Specialization Strategy of the Adriatic-Ionian Region (S3) that should provide an insight on the transnational value chains and competitive economic sectors of the Adriatic-Ionian Region.

### **About OIS-AIR project**

Project OISAIR- Establishment of the Open Innovation System of the Adriatic-Ionian Region, financed by Interreg Adrion EU programme, was launched in the beginning of 2018.

## CAPITAL and Crocodile 2 projects' participation in the 4<sup>th</sup> ITS-Hellas Conference and Exhibition



The [CAPITAL](#) - Collaborative cApacity Programme on ITS Training-educAtion and Liaison (HORIZON 2020) and Crocodile 2 projects participated in the 4<sup>th</sup> ITS-Hellas Conference and Exhibition entitled: “Intelligent Transport Systems in Greece: Latest developments” that was held on the 18<sup>th</sup> and 19<sup>th</sup> of December 2018 in Athens. Among others, the Conference was held under the auspices of CAPITAL project.



**CAPITAL**

The CAPITAL project, under the auspices of which the Conference was organized, aims at the design and implementation of a collaborative capacity development program in which the Hellenic Institute of Transport of the Centre for Research and Technology Hellas (CERTH-HIT) participates as a partner. Within the framework of the Conference, a training seminar on Intelligent (ITS) and Cooperative Intelligent Transport Systems (C-ITS) was organized with great success. At the seminar, attended by 60 representatives of public and private sector organizations, the e-learning platform developed

under the project was presented, followed by an interactive session where the participants were trained on the key capabilities of ITS and C-ITS. At the CAPITAL project exhibition booth, everyone interested was informed about the online training platform and the opportunities offered by the online courses. At the end of the first day of the Conference, a technical visit to the Traffic Control Center of Attiki Odos was also organized, where the participants learned about the practical implementation of the ITS systems and the operational processes in such a traffic management center.

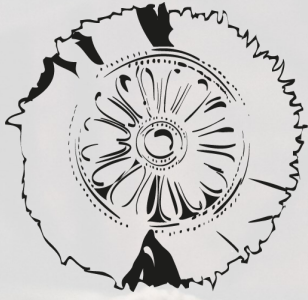


During the the 4<sup>th</sup> ITS-Hellas Conference and Exhibition, where Crocodile 2 project participated



**CROCODILE 2** involves public authorities, road administrations, and traffic information service providers in an effort to ensure coordinated traffic management and control, resulting in high quality traveler information services. The Greek Ministry of Infrastructure and Transport is the beneficiary of the project on behalf of Greece with CARTH-HIT being an implementing body and its main mission within the project is to design and create the [National Access Point](#) (NAP) of Greece. The NAP provides a single interface through which data from ITS and from various data providers are made accessible to the public.

Crocodile 2 was an exhibitor of the Conference. On the project's booth, visitors have the opportunity to be informed about the NAP. At the same time, they will be able to browse the NAP in order to explore the opportunities it offers, as well as the benefits that can bring to data providers and data consumers



# CERTH

CENTRE FOR  
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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
- **Institute for Bio-economy and Agri-Technology (IBO)** Bio-economy, Agri-technology

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