22ο Συνέδριο InfoCom World 2020

ΕΠΙΣΤΗΜΟΝΙΚΗ ΕΝΟΤΗΤΑ

Transforming Greece - The 5G and Fiber Enablers- The Future is Now

Part 6 (Applications in Verticals Sectors, via 5G Enablers) – 6/11/2020 Time-Slot: 16h30' – 17h45'

C27."NBS, air quality, urban health and thermal comfort vs IoT, sensors and 5G, the case of H2020 projects: euPOLIS and D^2EPC"

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GEOSYSTEMS HELLAS S.A. [GSH] was established in November 2009 as the newest member of GEOSYSTEMS EU GROUP (www.geosystems-group.eu).

- From 2009 [GSH] is a leading National provider of information technologies that drive productivity and quality across geospatial and industrial enterprise applications. After 2014, operates globally in high-value, high technology areas focusing on helping clients to exploit new technologies and management styles. Its proven expertise has been gained from performing a broad range of projects. The solutions integrate sensors, software, domain knowledge and customer workflows into intelligent information ecosystems that deliver actionable information used in a broad range of vital industries. The patterns of change shaping our world are so powerful that their implications go far beyond anything remotely similar in our past. Strengths in image exploitation, processing, visualization and geospatial data management to meet a broader spectrum of customer needs in today's enterprise environment.

- [[GSH] is a member of the European Association of Remote Sensing Companies (EARSC), the Hellenic Association of Space Industries (HASI) and a funded member of si-cluster since 2014. Mrs Vasiliki (Betty) Charalampopoulou is an elected member of the si- cluster board, since last January and for the next two years.
- GSH quality system is based on ISO: 9001:2015 and largely compliant to ESA-ECSS Standards for software development.

- GSH shows the following core background:
- Remote Sensing and photogrammetry applications providing high level engineering and management consultancy in the space sector
- Software development for sensor simulators
- Big Data, Data Fusion and Data Analytics techniques, Engineering and Analysis as well as System and Software Engineering
- Airborne Lidar 3D monitoring techniques and applications, sensor calibration services
- Smart/Safe cities
- Blue / Green Growth - monitoring and applications
- GIS/WebGIS
- [GSH] is also involved in a number of international and National RTD projects funded by H2020, ESA, GSRT and MOU.

euPOLIS

euPOLIS - Integrated NBS-Based Urban Planning Methodology for Enhancing the Health and Well-Being of Citizens

http://eupolis-project.eu

- EU project, 869448 H2020
- Climate action, environment, resource efficiency and raw materials
- Integrated NBS-based Urban Planning Methodology for Enhancing the Health and Well-being of Citizens, 2020
- Duration 48 months
- Start: September 2020

The Challenge

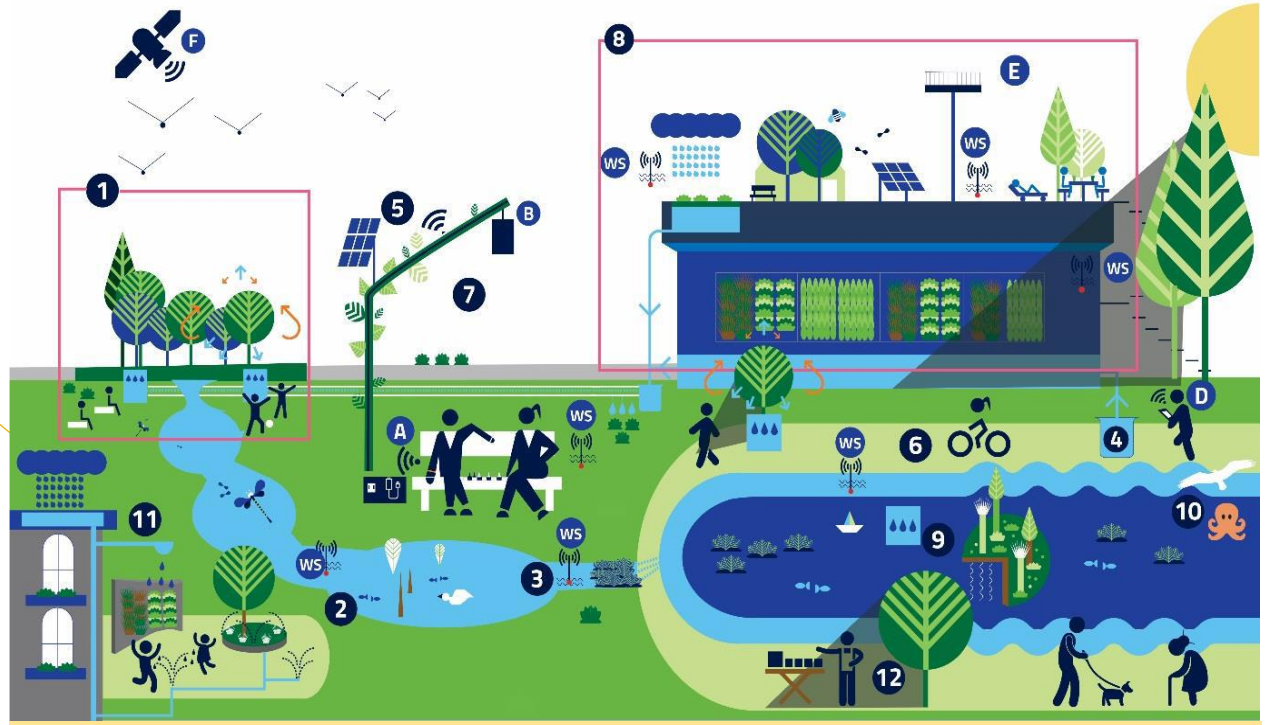
European cities face major social challenges due to global geopolitical, economical, climate and other changes; this puts **urban areas under a lot of stress to provide environments that support Public Health (PH) and Wellbeing (WB)**. The conventional approach to urban and revitalisation planning is based mostly on profit criteria with routine methodologies, often **lacking advanced integrated methods** and concepts with **emphasis on PH, WB and societal** aspects. Hence, the needs of **local communities'** are not recognized or neglected and cities end up with costly investments that are not **embraced by local communities** and therefore **lack sustainability**.

euPOLIS Aims to

- **systematically deploy Multi-Functional (MF)** natural systems to simultaneously enhance PH and WB
- **propose a structured approach to** activate the hidden possibilities and services of existing Natural and Engineered urban systems
- **regenerate and rehabilitate** urban ES to improve PH and WB
- **improve** urban resilience
- **create** inclusive and accessible urban spaces
- **create** cities-for-healthy-people
- **monitor and assess** the impact of all BG/NBS interventions

euPOLIS Nature Based Solutions (NBS) Urban Planning methodology offers the synergy of people-centered approach with significant environmental and economic benefits of Blue Green Solutions (BGS).

euPOLIS Concept



"euPOLIS' methodology identifies the **best proven concepts and technologies, enriches them with NBS** *and integrates them into a highly effective MF system"*

NBS Clusters/ interventions:

1. *NBS-based MF pocket parks accessed by NBS locally conditioned pathways and* shared spaces*,*
2. *Waterway with mini biotope nodes, aquatic biodiversity – fead from groundwater aquifer or purified surface runoff,*
3. *NBS for surface runoff quality and pluvial flood management,*
4. *Groundwater abstraction for water, energy, greenery nexus,*
5. *MF NBS canopy for socializing, „recharging electronics", or green bus stop" etc.,*
6. *MF Live vegetation shaded waterfront promenade,*
7. *Air pollution abatement shrubs, trees and vertical green curtains,*
8. *Metabolic hub with MF ecotechnology demonstration/promotion, roof garden and art and culutue performance,*
9. *MF floating island, river water purification,*
10. *Coastal sea bottom marine aquatic biotope with euPOLIS-NBS,*
11. *MF euPOLIS Urban square/streetscape and other NBS (biotopes, sensory garden, waterfall, biodiversity & kitchen garden for socialising, recreation),*
12. *Space for NBS business activation and promotion*

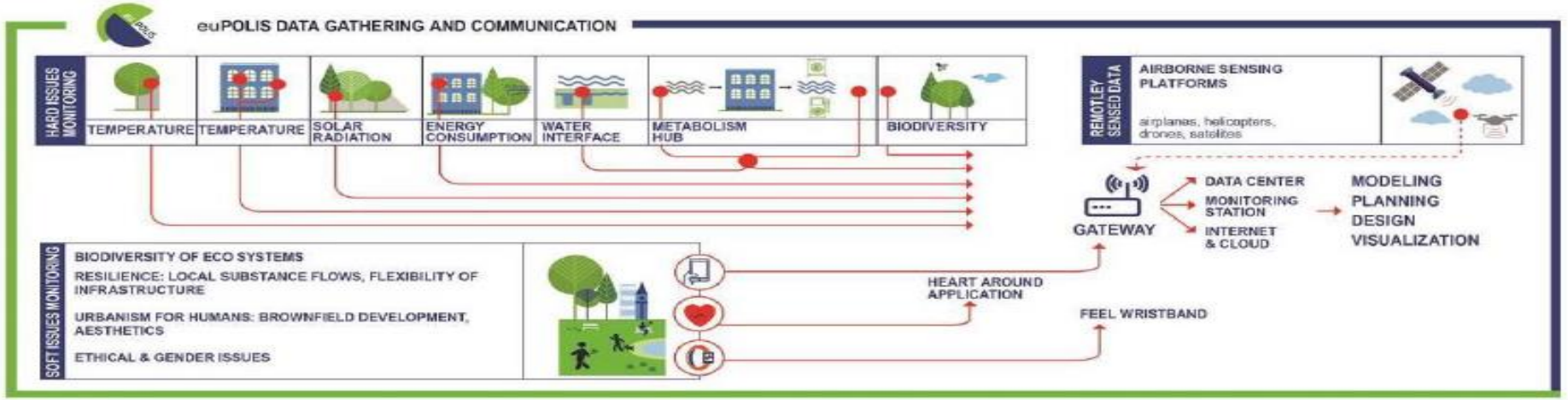
euPOLIS Deployment Scheme (1/3)

Social and Cultural platform and Creation of Urban Hubs

- euPOLIS' social agenda aims to upgrade citizens' relation to place and each other, instigate a sense of identity and empowerment and achieve new social equilibrium in the city ownership and management.
- euPOLIS will create dedicated spaces **Urban Hubs**, in which collaboration between experts and citizens will take place thus improving liveability and democratic co-governance

Citizens' Observatories and Integrated Monitoring Concept

- The deployment of ubiquitous **in-situ sensor networks** and **remote sensing** will allow a dense and smart monitoring, the breaking-down of results and will provide the required level of climatic, social, and other data.



euPOLIS Deployment Scheme (2/3)

Two types of monitoring will be implemented:

(i) **ad-hoc Intense Observation Periods (IOP's**) during the most relevant weather conditions
(ii) **permanent monitoring** with continuous data acquisition, processing and storage.

The necessary data modules will be developed/adapted for interfacing to in **Galileo, Copernicus, URBAN TEP and EuroCORDEX.**

- **Fusion of data from earth observation** through ground environmental and visual sensors, accurate hydrometeorological, environmental, PH and WB data with prediction of environmental NBS performance.

- **High-level fusion services for big-data** will be implemented in euPOLIS that forecast trends and future states based on processed **big-data spatio-temporal cubes**, with quantified uncertainties and adaptive corrections using ground reference observations.

euPOLIS Deployment Scheme (3/3)

Medical and Psychological Monitoring tools and Applications

- The euPOLIS mobile apps to support the online measurement of the effectiveness and to validate the impact of NBS on PH and WB of the citizens will be constructed with an attractive frontend interface

i. **the Feel wristband** will be used for ubiquitous monitoring of wearer's bio-signals and the monitoring and assessment of the emotional status and stress/anxiety levels.

ii. **the HeartAround application** will be integrated into euPOLIS, providing accurate recordings of vital signs, activity, presence, and other critical users' information, serving the changing needs of the health-centric communication services

EuPOLIS is focused on performing automated health assessment and intervention in everyday settings, such as smart homes, using ICT and AI including ambient sensors, networking, and Machine Learning (ML).

PIRAEUS case study

- **Population**: 163,688 (2011)- Medium-size city

- **Site Description**: The port of Piraeus is the largest port in Greece and the city is one of the most densely populated in Europe. In euPOLIS, will be used 3 interlinked neighbouring sites at the main harbour promenade (Mikolimano) area

i. Seaside Promenade Mikrolimano area,
ii. The riverine inland area in Akti Dilaveri
iii. The Ralio Complex Pilot School (RCPS)

- **Environmental/social/health issues:**

i. lack of open green spaces (approx. 0.83 m2/person) and parks
ii. high-density buildings
iii. narrow streets with small pedestrian free space
iv. high level of air pollution (due to the ships emissions
v. Marine aquatic environment close to the water promenade is “in the need of improvement”
vi. The riverine inland area (Akti Dilaveri) is underdeveloped with polluted water.

Demonstration activities

The existing construction project for Mikrolimano concerns the renovation of 15,600 m^2

- **Improvement of pedestrian accessibility of the beachfront front**

Mikrolimano Plan for Seaside Promenade and intervention - NBS Pocket Park –improvement of local microclimate

- **Rehabilitation of the coastal waterfront promenade of Mikrolimano**

NBS interventions in 3 areas: 1.Multifunctional (MF) Pocket park, 1.8. Locally conditioned access road, 1.3., 1.7. and 6. Tree lines and MF live vegetation with evaporative cooling, 5. MF canopy with climbing vegetation, 7. Green pads and vertical green curtains, 8.1. MF urban metabolic hub with 8.2. Eco-edu centre and 8.3. Vertical Farm with recycled grey water and 10. Coastal sea bottom marine aquatic biotope with euPOLIS /NBS and 12. NBS business promotion/ activation space

D^2EPC

Next-generation Dynamic Digital EPCs for Enhanced Quality and User Awareness

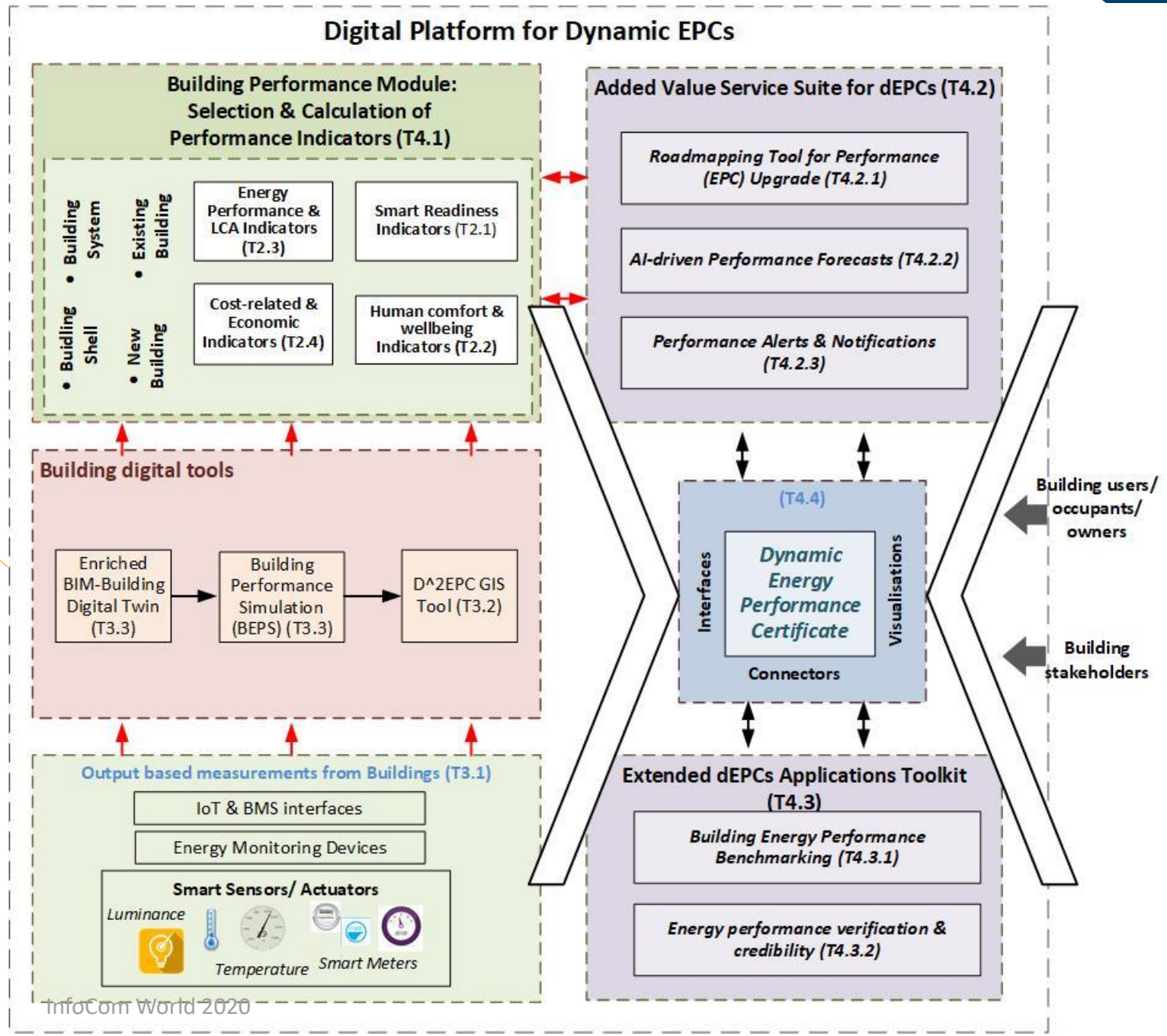
DYNAMIC
DIGITAL
ENERGY
PERFORMANCE
CERTIFICATES

https://www.d2epc.eu/en

- EU project, 892984 H2020
- Duration 36 months
- Start: September 2020

D²EPC aims to set the grounds for the next generation of dynamic Energy Performance Certificates (EPCs) for buildings. The proposed framework sets its foundations on the smart-readiness level of the buildings and the corresponding data collection infrastructure and management systems. It is fed by operational data and adopts the 'digital twin' concept to advance Building Information Modelling, calculate a novel set of energy, environmental, financial and human comfort/ wellbeing indicators, and through them the EPC classification of the building in question.

D^2EPC builds upon the need for buildings' decarbonisation and sets out a dynamic strategy to strengthen EPC in order to promote building performance improvements and have a crucial role in this process. The proposed dynamic EPCs can constitute an important driver for building performance monitoring, building energy management and building renovation planning and therefore reduce building energy consumption, decrease environmental impacts and improve inhabitant's quality of life.



Conceptual architecture & Task Relation

Digital twin BIM

D^2EPC aspires to set the grounds for the next generation dynamic Energy Performance Certificates (EPCs). The proposed framework engages actual measured data coming from smart devices and introduces a set of novel and user-friendly indicators. **For this we make use of 6D Level 3 BIM for producing a building's digital twin representation.** The proposed indicators for smart-readiness, sustainability, environmental, human comfort and financial aspects will make EPCs a realistic, accurate and comprehensive information source that can induce energy efficient behavioural change and stimulate towards smart buildings. The D^2EPC digital platform will enable the issuance of next generation EPCs on a regular basis and will be armored with additional services.

DEMONSTRATION CASES

Case Study 1: nZEB Smart House DIH

Case Study 2: Residential/ Multi-family building in Velten

Case Study 3: Tertiary building/Offices in Berlin

Case Study 4: Mixed-use building in Nicosia

Case Study 5: Multi-family home in Berlin

Case Study 6: Multi-family home in Berlin

The impact from D^2EPC

- Recalculation of the operational EPC with real-time performance data
- Enriched BIM and building digital twin
- SRI, LCA and human comfort indicators
- GIS environment visualisation
- Novel financial schemes-“polluter pays” concept
- Further to that, the project emphasizes on the vision of next generation EPCs being an extensive data source of building’s energy performance that can ultimately relief the pressure of building’s sector decarbonisation by introducing the following components:
- The Added Value Services Suite allows for the building’s performance upgrade by providing more detailed recommendation to promote extensive renovation, forecasting of building operating conditions to better monitor energy use and issuing reports and notifications in case of inefficient operation that could lead to EPC downgrade.
- The Extended Applications Toolkit compares building’s operation regarding particular metrics (i.e. human comfort, health-wellbeing, occupancy, energy use) and can indicate the potential paths for performance improvements, while on the same time ensuring the credibility and quality of the assessment process.

Thank you for your attention

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