

FROM E-LEARNING ENVIRONMENT TO CYBER PHYSICAL SOCIAL SPACE

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DELCC EVOLUTION



Distributed
e-learning
environment

2004



Taking into account
the surrounding
physical world

2012



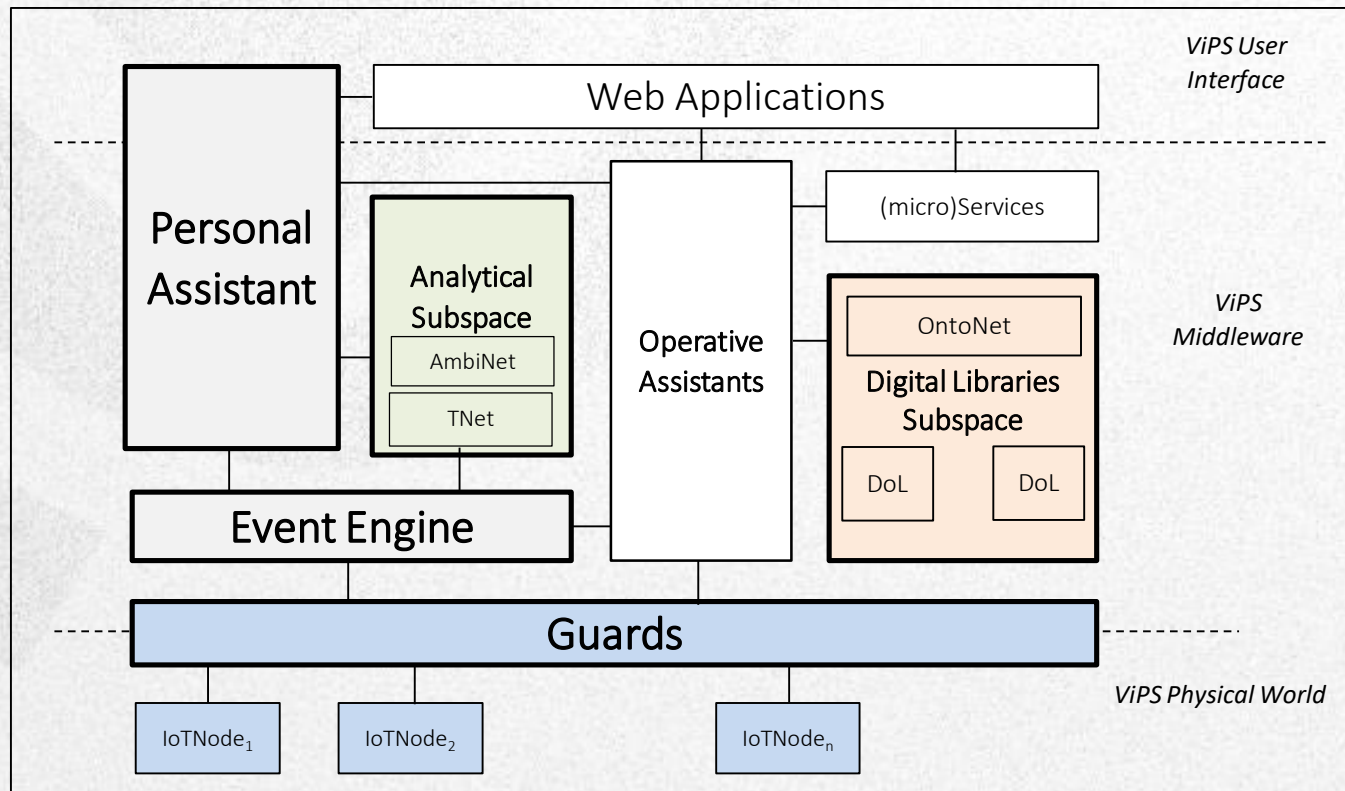
Reference
architecture for
CPSS applications

2017

CONCEPTS AND CHARACTERISTICS

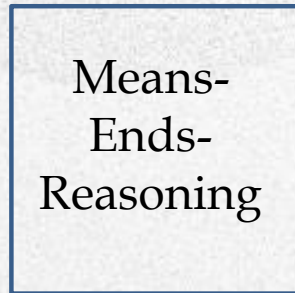
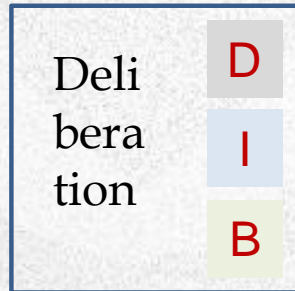
- Closely related concepts
 - CPSS (Cyber-Physical-Social **Systems**)
 - CPS (Cyber-Physical **Systems**)
 - IoT (Internet of Things)
- ViPS (Virtual Physical **Space**)
 - We emphasize agent-oriented architecture
- Main characteristics
 - User is in focus of attention
 - Virtualization of “things”
 - Integration virtual and physical worlds

VIPS

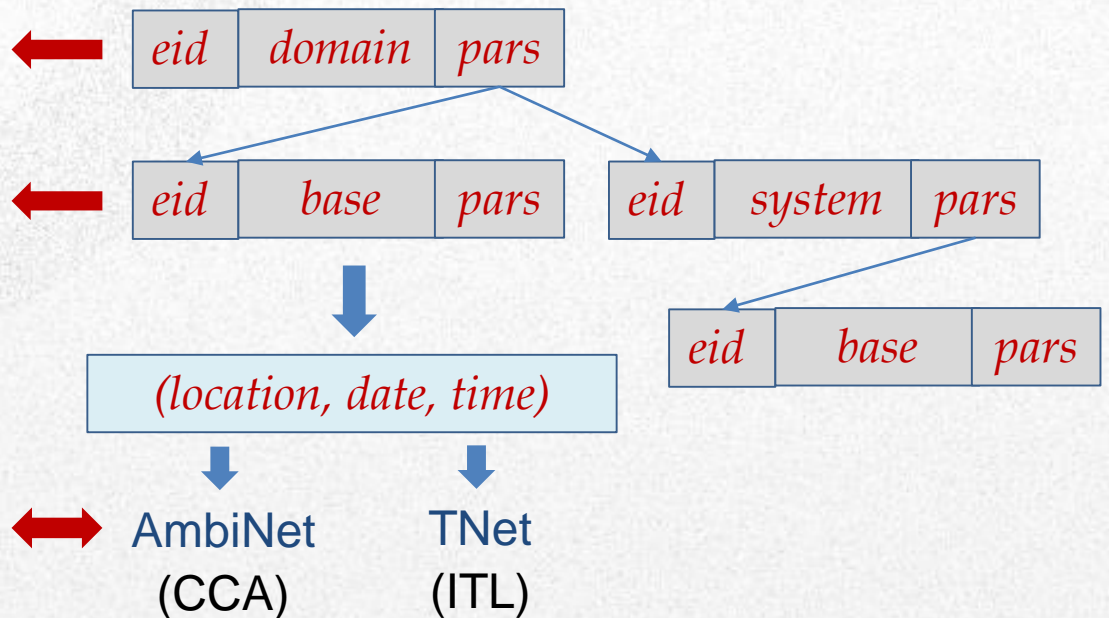


PA, EVENTS, TIME, SPACE (VIRTUALIZATION OF THINGS)

PA



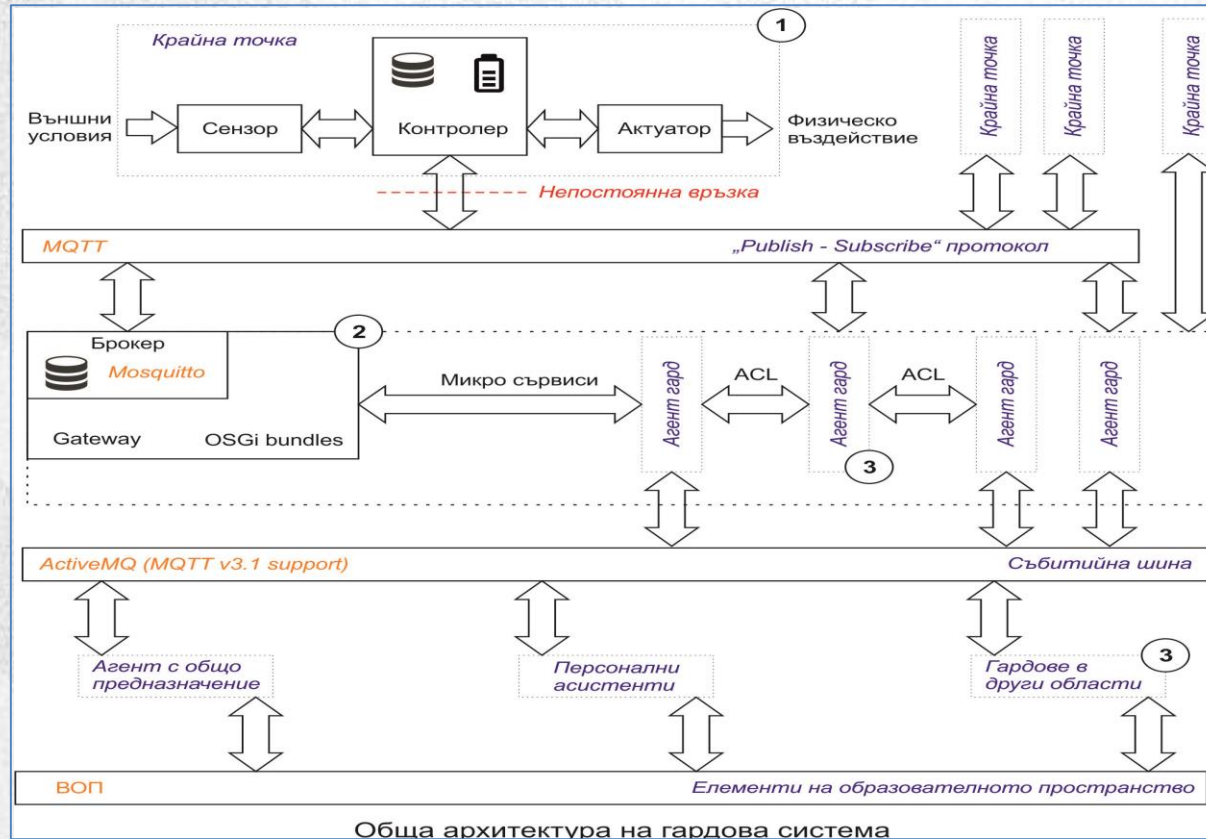
Event Engine



GUARDS

- Interface between virtual and physical worlds
- Emergency cases
- Protection
- Access control

MULTI-LEVEL GUARD SYSTEM



Edge
computing

Fog
computing

GENE ENVIRONMENT

- Standardized ViPS interface to various sensor devices
 - 200+
- Information channels
 - DB
 - Block chains
 - Google Cloud Services
 - E.g., Deep learning



GENE DESIGNER

- Designer is a tool for programming and connecting hardware devices, APIs and online services in a new and interesting way
- It provides a browser-based editor that facilitates linking streams together using a wide range of nodes in the palette that can be installed online (run-time runtime) with a single click
- JavaScript features can be created using a text editor
- A built-in library allows us to save useful features, templates, or reusable streams

GENE DESIGNER

The screenshot displays the Nucleic Designer interface for a flowchart titled "Weather". The interface is divided into several sections:

- Left Panel:** Contains navigation options: "NUCLEA", "Add new device", "Dashboard", and "Devices". Below these are "input" and "output" node categories, and an "advanced" section at the bottom.
- Main Canvas:** Shows a flowchart starting with a "Current Conditions" node connected to a "Current" node. The "Current" node branches into multiple nodes: "Summary", "Rain chance", "Rain intensity", "Ozone", "Cloud", "Temp", "Wind", "Dewpoint", "Wind deg", "Humidity", "Pressure", "Parse Icon", and "Obs time". Each of these nodes is connected to a corresponding data visualization or processing node, such as "for the hour", "rain prob - test", "rain intense", "ozone", "cloud cover", "temp chart", "temperature", "feelslike", "wind chart", "w/spd", "gusts", "dewpoint", "wind direction", "humidity", "pressure", "icon image", and "Last updated". There are also "restore" nodes and "save context" nodes connected to the "temp chart" and "wind chart" nodes.
- Right Panel:** Contains an "info" section with fields for "Flow" (ID: "f2e8c77a_0c0588"), "Name" (Weather), and "Status" (Enabled). Below this is a "Description" section.
- Bottom Panel:** Includes a "Darksky forecast" node and a "date" node.

GENE DESIGNER

The screenshot displays the Nucleic Designer interface. On the left is a sidebar with the NUCLEA logo and navigation options: 'Add new device', 'Dashboard', and 'Devices'. The main workspace is titled 'Nucleic Designer' and shows a flowchart for a device named 'Weather'. The flowchart starts with an 'inject' node connected to a function node 'f'. This function node is connected to five output nodes: 'Serial No abc', 'Name abc', 'Frequency abc', 'Last Update abc', and 'gauge'. A second function node 'f' is connected to a 'Nuclea Device' node, which then connects to another function node 'f'. This second function node is connected to four output nodes: 'Serial No abc', 'Name abc', 'Frequency abc', and 'Last Update abc'. On the right side, there is a 'dashboard' configuration panel with settings for 'Layout', 'Site', 'Angular', 'Primary' (indigo), 'Accents' (blue), 'Warnings' (red), 'Background' (grey), and 'Light / Dark' (Dark). At the bottom left of the sidebar, there is a purple button labeled 'Apps'.

GENE DESIGNER

The screenshot shows the Nucleic Designer application interface. On the left is a dark sidebar with the NUCLEA logo and navigation options: 'Add new device', 'Dashboard', 'Devices', and 'Apps'. The main area is titled 'Nucleic Designer' and 'Weather'. It displays a weather dashboard for Wednesday, August 28. Key data points include: rain probability of 2%, rain intensity of 0.0 in/hr, temperature of 32.8°C, humidity of 50%, and wind speed of 2.1 mph. A forecast summary indicates 'Clear throughout the day'. The interface also features a temperature line graph, a wind speed graph, and a map of the region. A 'Last Updated - 11:35' timestamp is visible at the bottom.

GENE DESIGNER

NUCLEA

Nucleic Designer

Logistics

Mike

| Delivery | Today |
|-------------|--------|
| Temperature | 17.2 C |
| Humidity | 55.1 % |
| Light | L |

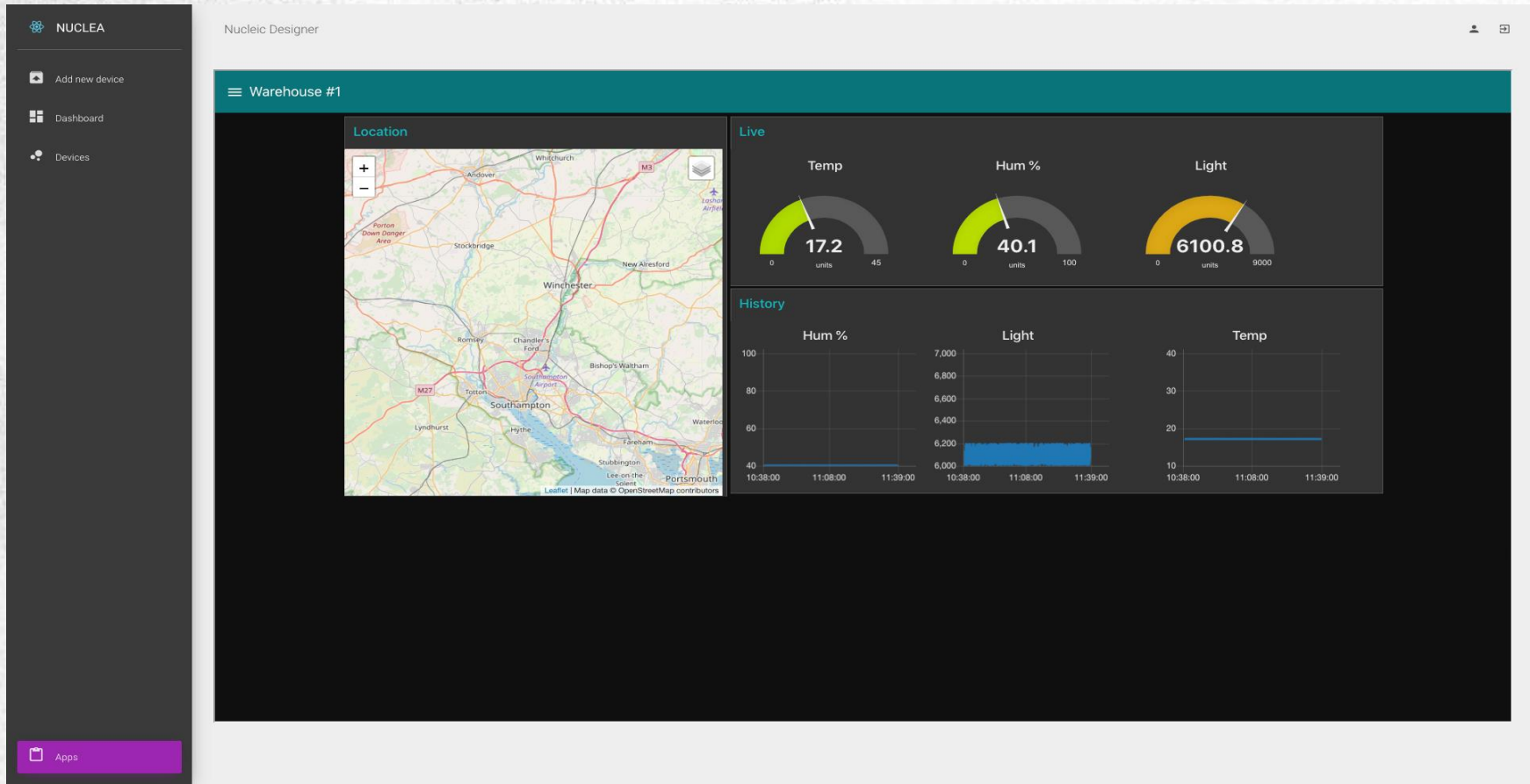
John

| Delivery | Today |
|-------------|----------|
| Temperature | 12.1 C |
| Humidity | 40.1 % |
| Light | 1700.0 L |

Eric

| Delivery | Today |
|-------------|---------|
| Temperature | 2.1 C |
| Humidity | 80.0 % |
| Light | 200.2 L |

GENE DESIGNER



DIGITAL LIBRARY SUBSPACE

- Domain-specific data warehouses - DoL (Domain Libraries)
 - Relational DB
 - NoSQL
 - Ontologies
- Operative assistants
 - Access to the information resources of ViPS
 - Intelligent search



Проект „BG05M2OP001-1.001-0003

„Център за върхови постижения по Информатика и информационни и комуникационни технологии“,
по Оперативна програма „Наука и образование за интелигентен растеж“ 2014 – 2020”

Center of Excellence for Informatics and Information and Communication Technology

Проект BG05M2OP001-1.001-0003-C01
(ЦВП по Информатика и ИКТ)



ЕВРОПЕЙСКИ СЪЮЗ
ЕВРОПЕЙСКИ СТРУКТУРНИ И
ИНВЕСТИЦИОННИ ФОНДОВЕ



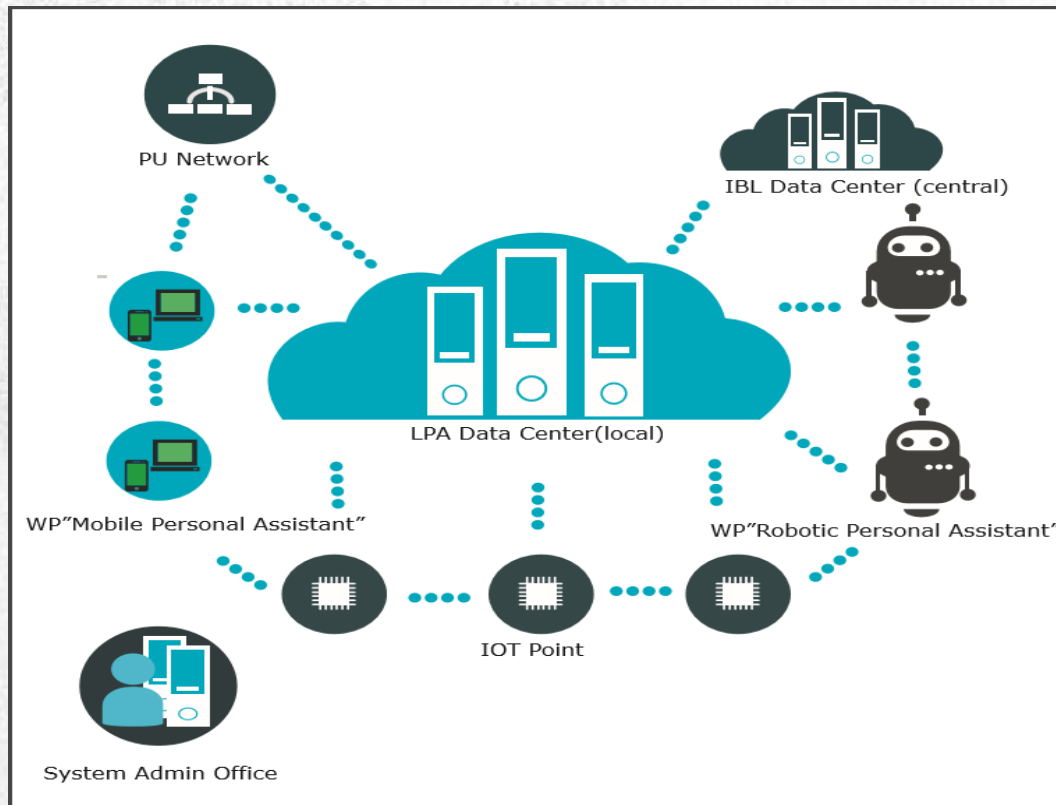
ОПЕРАТИВНА ПРОГРАМА
НАУКА И ОБРАЗОВАНИЕ ЗА
ИНТЕЛИГЕНТЕН РАСТЕЖ

Проектът се финансира по Оперативна програма „Наука и образование за интелигентен растеж“. Общият размер на безвъзмездната финансова помощ възлиза на 29 355 861.12 лева, от които 24 952 481.95 лева (85%) са предоставени от Европейския фонд за регионално развитие и 4 403 379.17 лева (15%) са национално съфинансирани. Над 75% от стойността на проекта е за изграждане на научна инфраструктура.

Начало на проекта: 3 август 2018 г.

Край на проекта: 31 декември 2023 г.

VIPS INFRASTRUCTURE

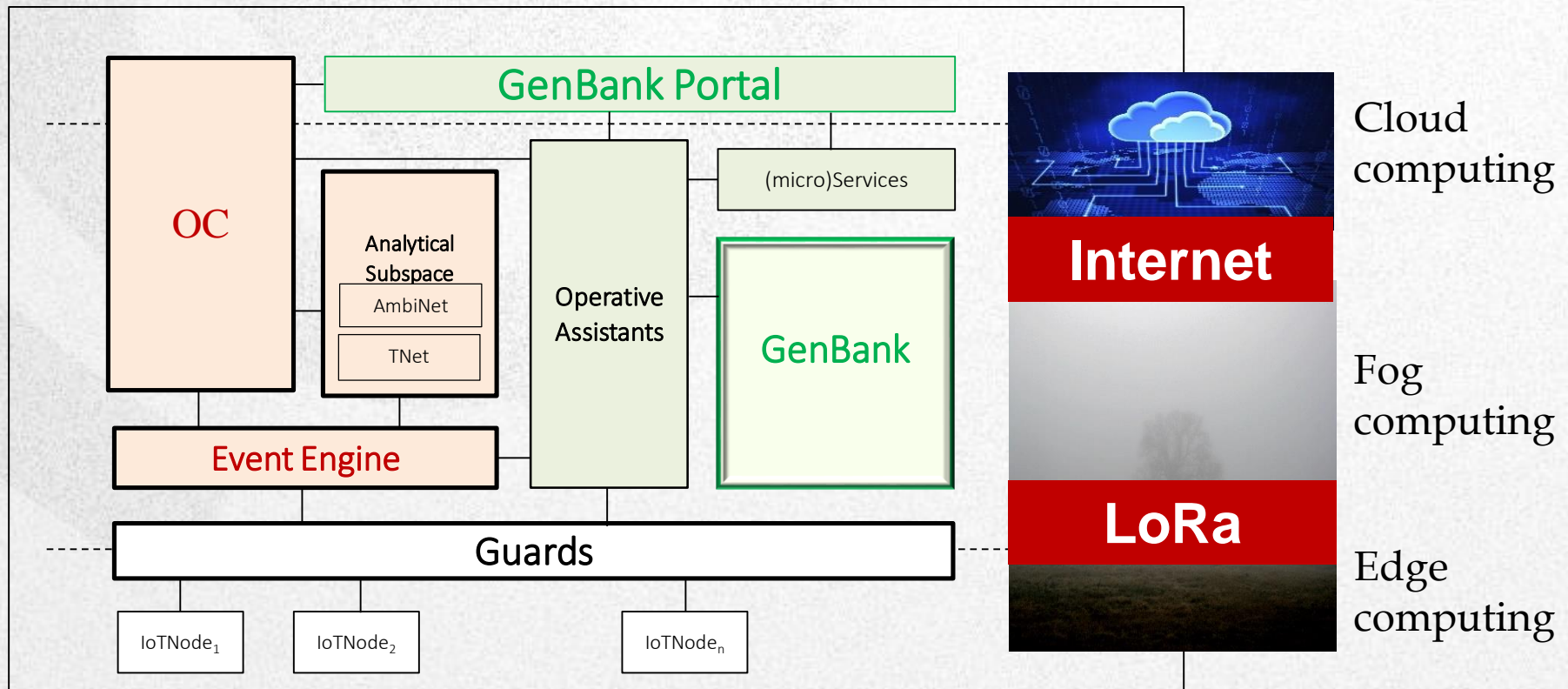




Grant No. D01-221/03.12.2018 for NCDSC – part of the Bulgarian National Roadmap on RIs.
“National Center for Highly Productive and Distributed Computing”


- To identify research domains of interest:
 - Intelligent agriculture and environment
 - Digitalization of Bulgarian culture-historical heritage
 - E-Learning

AGRICULTURE 2.0 - PLOVDIV





НАЦИОНАЛНА ЕКСПЕРТНА КРЪГЛА МАСА "ИНОВАТИВНИ СИСТЕМИ ЗА ИНТЕЛИГЕНТНО СЕЛСКО СТОПАНСТВО"

 Публикувана на 23 Март 2019



По инициатива на Председателя на Селскостопанска Академия проф. д-р Васил Николов на 19.03.2019 г. в Институт по растителни генетични ресурси „К. Малков“ се проведе Национална експертна кръгла маса на тема „Иновативни системи за интелигентно селско стопанство“. В срещата взеха участие преподаватели от Пловдивски Университет „Паисий Хилендарски“, факултет „Математика и информатика“, катедра „Компютърни системи“ и представители на институтите в системата на ССА, съхраняващи колекции растителни генетични ресурси.

Цел на кръглата маса беше да се представят прототип на цялостна информационна мрежа за управление на Националния растителен генофонд и интелигентни системи за оптимизиране на

различни процеси в селското стопанство.

Кръглата маса беше организирана в сградата на генетични ресурси на ССА, създадена в рамките на проект на Инициатива на Генетични ресурси на ООН през 1984 г.

Срещата беше открита от Проф. д-р Пенчо Малинов, Директор на Инициатива на Генетични ресурси на ООН в България. Ас. Пенчо Малинов представи презентация на тема „Проект

за създаване на национална информационна мрежа за управление на растителния генофонд и интелигентни системи за оптимизиране на процеси в селското стопанство“.

Предложената електронна система ще обедини и синхронизира информацията съгласно дескриптора на Европейския център за генетични ресурси на растенията (http://eurisco.ecpgr.org) и ще бъде публично достъпна за всички заинтересовани потребители. Всички дейности в т





EMULSION

“Development of a Generic Multi-Service Cloud-Based IoT Operational Platform (EMULSION)”
Start: 12.06.2019, End: 12.06.2022



EMULSION

- The main research activities of this project will target the development of a new-generation (of horizontal type) platform for use in the area of the Internet of Things (IoT), along with novel models and techniques for the effective provision of services, targeting the ‘smart environment protection’ and ‘smart health’ IoT domains
- The platform will be able to provide highly contextualized and personalized services, accessible through any kind of mobile devices via heterogeneous access wireless networks, **anytime-anywhere-anyhow**, and in the best possible way by taking into account the current network- and service context, and the users’ preferences

EMULSION

- Based on the platform, two pilot IoT systems will be designed, tested, and demonstrated:
 - **A smart air quality index (AQI) control system** – for providing live AQI environmental data, supplemented by forecasting information, as an input to the other pilot system, along with a corresponding mobile application serving patients with different health problems and assisting them in advanced (pro-active) route planning for travelling with a minimum health risk
 - **A smart ubiquitous health (uHealth) system** – for providing various healthcare services to different categories of patients.

THANK YOU!