Newsletter

March 2018-June 2018

"Interoperability as a Service" – Connecting IoT infrastructures and smart objects

Editorial

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You now have the 6th VICINITY newsletter in your hands – or on your screen. The VICINITY cloud gateway implementation is now finished which means we have achieved a crucial milestone. The source code is published on GitHub and can be downloaded and used by a broad public. Together with our first open call, we are significantly increasing the visibility and impact of VICINITY.

This newsletter gives you the latest developments: firstly, what is our unique selling point compared with other EPI projects, both to the general public and compared with commercial competitors? Secondly, we update you on the progress of our open call, and the outcome of our EC technical review in Brussels. There is plenty of other interesting news on VICINITY as well.

Enjoy reading!

Unique Selling Points of VICINITY

VICINITY's Unique Selling Points are:

- To enable **sharing of data at semantic level** between a wide variety of devices. It does this by ensuring semantic interoperability among devices at the metadata level, so that the content itself can follow a separate path from the VICINITY platform, to ensure privacy.
- **Users maintain ultimate control** of their data with no disclosure to 3rd parties. Data is not stored in a central infrastructure and users can decide with whom they share their data.
- **VICINITY is a GDPR-ready architecture**, built in accordance with the principles of 'privacy by design'.

VICINITY follows an **edge-computing** approach where processing occurs closer to where the data is generated, yielding **higher scalability and dependability.**

Latest News and Upcoming Events

Latest news

- GNOMON presented VICINITY at 6th Smart cities conference + EXPO, 9 March 2018, Athens, Greece.
- CAL presented VICINITY in the event Answering the scale-up challenge for Cities, Smart and Intelligent Cities Special Interest Group (SIG), 11 April 2018, Greenwich, UK.UNIKL participated in CPS Week 2018, 10-13 April 2018, Porto, Portugal.

- HITS represented VICINITY in ISO/IEC SC27 meeting, 16-20 April 2018, Wuhan, CN and contributed to ISO/IEC 27030 – Guidelines for security and privacy in Internet of Things (IoT).
- ATOS represented VICINITY in IoT Forum 2018, 25 April 2018, Madrid, Spain.
- UNIKL presented VICINITY in Hannover Messe, 23-27 April 2018, Hannover, Germany.
- UPM represented VICINITY in 2nd Internet of Things platforms and standardisation workshop, 27 April 2018, Brussels, Belgium.
- ATOS presented VICINITY in FIWARE Global Summit 2018, 8-9 May 2018, Porto, Portugal.
- IS participated in 4th UVP Technicom Conference, 23 May 2018, Košice, Slovakia.OTE presented VICINITY at 14th Artificial Intelligence Applications and Innovations Conference (AIAI 2018), 25 - 27 May, Rhodes, Greece.
- MPH presented VICINITY at the workshop Friendly Cities for People with Dementia" on 30 May 2018, in Thessaloniki, Greece
- ATOS, CAL, ENERC and UPM presented different aspects of VICINITY to the IoT Week, 4-8 June 2018, Bilbao, Spain.
- ATOS on behalf of VICINITY participated in Open Expo Madrid 6-7 June 2018, Madrid, Spain.HITS presented VICINITY in pHealth 2018, 12-14 June 2018, NTNU Gjøvik, Norway.
- OTE presented VICINITY at European Conference on Networks and Communications (EUCNC 2018), 18-21 June 2018, Ljubljana, Slovenia.

Upcoming events

- HITS will participate in Arendalsuka, 13-18 August 2018, Arendal, Norway.
- HITS will present VICINITY at Nordic Edge Expo, 25-27 September 2018, Stavanger, Norway.
- HITS will participate in ISO/IEC JTC1/SC27 Information Security, 30 September-4 October 2018, NTNU Gjøvik, Norway.
- Tinymesh plan to present the VICINITY interoperability mechanisms and USP to ETSI IoT Week, 22-26 October 2018, Sophia Antipolis, France.
- VICINITY partners plan to attend in the next IoT Week, 11-14 June 2019, Aarhus, Denmark.

Results of VICINITY 1st Open Call

VICINITY, which received funding from the EU's Horizon 2020 Framework Programme for Research and Innovation, launched its first Open call on March 15th 2018. This offered funding for the integration of existing IoT infrastructures into the VICINITY framework. The call closed on June 15th, 2018 at 17:00 Brussels time. 45 proposals were received originating from Cyprus, Denmark, Estonia, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Romania, Slovakia, Slovenia, Spain, Switzerland and United Kingdom. The proposers included universities, research centres and SMEs.
The evaluation of proposals by external experts and the final selection will be undertaken during June-July 2018.
Stay tuned, the second Open call focusing on infrastructure for IoT use cases will be launched at the end of 2019.

Results From Participation at Events

IoT Week, 4-8 June 2018, Bilbao, Spain.

Four VICINITY partners (ATOS, CAL, ENERC, and UPM) participated in IoT Week, Bilbao. Each partner focussed on a different aspect of the VICINITY IoT project:

- VICINITY was exhibited on the ATOS stand in which a rollup poster and information about the Open call was shown. VICINITY participated in the "Next Generation Internet Workshop: Turning Europe into a Service Platform". The workshop was organized by The NGI Move project with the main goal of discussing and making proposals about desirable European scenarios in the information technology domain.
- CAL presented the VICINITY use cases to the ETSI SAREF4CITY validation workshop. SAREF4CITY is developing standardised ontologies for Smart Cities and the workshop looked at use cases involving smart mobility, air quality, smart parking and assisted living (many of these were originally contributed from VICINITY). The workshop was organized by ETSI SmartM2M (with the involvement of UPM) and ATOS, CAL and ENERC participated actively during the workshop.

- ENERC presented to the Novel Business Models for Smart Cities session on 5 June. The session discussed new business models arising in urban ecosystems and the role of the relevant stakeholders. The impact of digital transformation and specifically IoT on cities worldwide and ways to improve service sustainability were presented and discussed, IoT and citizen participation, including the new energy models transforming the sector which directly affect the VICINITY pilot in Portugal. Four evolving business models arising from VICINITY were discussed.
- CAL presented work on "Why commercially viable cross-domain use cases will drive innovation and horizontalization of IoT-enabled smart cities" to the IoT Forum session on Building IoT Cross-Domain and Cross-Platform Interoperability on 6 June.
- ENERC organised 2 sessions on Sustainable and Resilient Cities in collaboration with Resilient Regions of Sweden. Both focused on resilience within the scope of climate change adaptation. The first session "In search of Resilient cities" summarised the concept of resilience, its impact and modes of operation. CAL presented the positive contribution of IoT towards Climate Change mitigation and adaptation. The second session "Cities are as smart as their citizens" focused on actors and citizens and new ways of self-organisation. ENERC introduced VICINITY as a peer-to-peer mechanism that will enable participation by citizens in various sectors with a focus on energy. There was a lively discussion of new evolving models which will be progressed in AIOTI WG12 Smart Energy.
- VICINITY was part of the workshop organised by ENSO titled "*Harvesting: A new challenge for powering IoT nodes"*. Following an introduction of the ENSO project, several use cases were presented ending with a round table to discuss collaboration among projects. Since ENSO is targeting low layers of IoT nodes, their contribution can enhance future functionalities and autonomy of IoT nodes. Moreover, the use cases presented, smart home, smart office and eHealth are relevant for the VICINITY project. In the roundtable, we had the opportunity to

present VICINITY objectives and the Open Call and also an instrument to foster collaboration among projects and partners contributing to the IoT ecosystem. During the Q&A, we also introduced how important it is simplify the access to technology creating inclusive and open environments that facilitate the development of services and the inclusion of new IoT infrastructures.

- A session of AIOTI WG08 Smart Cities was held during IoT Week. CAL presented a draft deliverable “Smart City Replication Guidelines Part 1: Cross-Domain/Application Use Cases” which was agreed and published. This had been led and edited by CAL based on work done in VICINITY.
- There was a session on IoT platform interoperability where the projects from the IoT-EPI and the Large Scale Pilots discussed this topic. During this session UPM presented the VICINITY interoperability approach and also the whitepaper produced in the IoT-EPI was presented (which includes contributions from VICINITY partners).
- The AIOTI General Assembly was also held in Bilbao during which Natalie Samovich of ENERC was introduced as the new elected leader of AIOTI WG12 on Smart Energy.

Sessions and speakers links:

- https://sites.grenadine.co/sites/iot/en/iot-week-2018/schedule/2252/In+Search+of+Sustainable+and+Resilient+Cities

- https://sites.grenadine.co/sites/iot/en/iot-week-2018/schedule/2262/Cities+are+as+smart+as+their+citizens

- https://sites.grenadine.co/sites/iot/en/iot-week-2018/schedule/2022/Novel+Business+Models+for+Smart+Cities

Interview with an SAB Member

Dr. Pantelis Angelidis

President, Thessaloniki Innovation Zone

Please highlight here the most relevant parts of your CV.

Dr. Pantelis Angelidis is currently the President of the Thessaloniki Innovation Zone. A telecommunications engineer by education, he ha worked as a technology expert in the areas of telemedicine and digita health for the past 25 years. He is the founder of VIDAVO, an innovati digital health SME in Greece and is Prof. on eHealth at UOWM and a visiting lecturer at UB Medical School. He is active in turning research results into profitable businesses focusing on technologies for prevent health and active ageing.

As an expert in digital health, we would like to know your opinior about the new EU data protection regulation (GDPR) and the imp has on IoT data, especially in the Health sector?

There's no doubt that any privacy regulation creates barriers to the sp of digital innovation by imposing procedures that in many cases the us themselves find annoying and unwanted. Nevertheless, protection of individual identity is important and regulations must be respected. Hov I believe that there is also a strong positive side and this is pushing developers and engineers to impose privacy by design principles in th IoT implementations.

How did you develop an interest in health devices? How long have you been working in this area?

Since my student years, I have been very interested to identify ways that ICT technologies could assist the medical sector and improve the quality of its services. This resulted in a career of already 25 years in the sector.

As the President of the Thessaloniki Innovation Zone, what would you recommend to SMEs participants in future VICINITY open calls?

I would recommend that they have a very good knowledge of the market landscape, their competition, the unique characteristics of their products, where they lag behind and what their future plans are, and to be very transparent and accurate on the information their submit with their application.

What motivated you to join the VICINITY Stakeholder Advisory Board?

The quality of the project partners and the technology subject VICINITY addresses.

What is your main area of interest in VICINITY and how do you wish to contribute to the project?

I guess this has to be openly discussed with the consortium and the other members of the Board, but we are definitely entering a new era in healthcare where the combination of IoT, big data analytics, machine learning and robots will disrupt the way we think around health and the delivery of care.

How much do users know about IoT and how VICINITY will change the conventional approach?

I don't think users care much about IoT as such. I think users are willing to adopt solutions that would make their life easier, more secure, more enjoyable and less stressful. I sincerely believe that VICINITY can help along these lines.

Health Data and General Data Protection Regulation

The 25th of May 2018 was an important date for the history of the Personal Data Protection law: it was at the same time the end of the two year deadline during which the interested parties had to comply with the Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (GDPR), and more importantly the date that GDPR was put into force for all European Countries.

One of the central subjects that are regulated by the GDPR is health data. The GDPR considers health data a special category of data and provides for this sensitive personal information a specific handling as far as its processing is concerned.

But, before all one should examine what is health data and which personal information it refers to. Health data includes all data pertaining to the health status of a person which reveals information relating to the past, current or future physical or mental health status of a natural person, including information about the provision of health care services. Health data is also a number, a symbol or a particular assigned to a natural person to uniquely identify the natural person for health purposes, information derived from the testing or examination of a body part or bodily substance, including from genetic data and biological samples and any information regarding a disease, a disability, a disease risk, medical history, clinical treatment or the physiological or biomedical state of the person independent of its source, for example from a physician or other health professional, a hospital, a medical device or an in vitro diagnostic test.

Health data can be found in a doctor's private practice, in a private clinic or a public hospital, in research and pharmaceutical organisations, in an insurance company, in the public sector, but also in other private organisations and businesses outside the health sector. The data can be processed in paper or electronical form, for example in Electronic Health Records (EHR), mobile applications, wearable sensor devices for quantifying self, other IoT, or healthcare blockchain.

The collection and processing of health data on the frame of the doctor patient relationship, which is otherwise protected by the shield of the medical profession secrecy, is usually limited in comparison to the rest of the above processes that could be considered as processing of health data on a large scale.

The processing of big health data, especially with new technologies, can result in numerous positive outcomes, regarding the handling of the patients, the cure, prediction and prevention of diseases or spread of epidemics, research, quality control, amelioration and healthcare innovation, the reduction and prediction of healthcare cost. At the same time processing big health data could create significant risks to a person's fundamental rights and freedoms, putting them at risk of unlawful processing that could discriminate them in a personal, social and/or labor market level and generally harm them monetary, psychologically and/or physically.

The GDPR provides that the processing of special categories of data is prohibited. This prohibition is not absolute, as the law foresees certain conditions under which health data can be lawfully processed. The most important exceptions is when the data subject has given its explicit consent to the processing of her health data for one or more specified purposes and the case that health data is processed for reasons of substantial public interest.

Moreover, the processing of health data should follow the rules that the GDPR provides regarding the handling and the security of the data.

According to the GDPR, in order for the consent for the processing of health data of the person to be binding, it has to be clearly distinguishable from any other matter. It has to be

formed using clear and plain language. The data subject shall have the right to withdraw his or her consent at any time as easily as to give consent. The person has to decide about consenting after being adequately informed and give her consent freely and explicitly. The GDPR does not demand that the consent has to be written, however a written consent proves easily that the person agrees to the processing operations.
According to the GDPR the processing of health data should follow the following principles and rules:

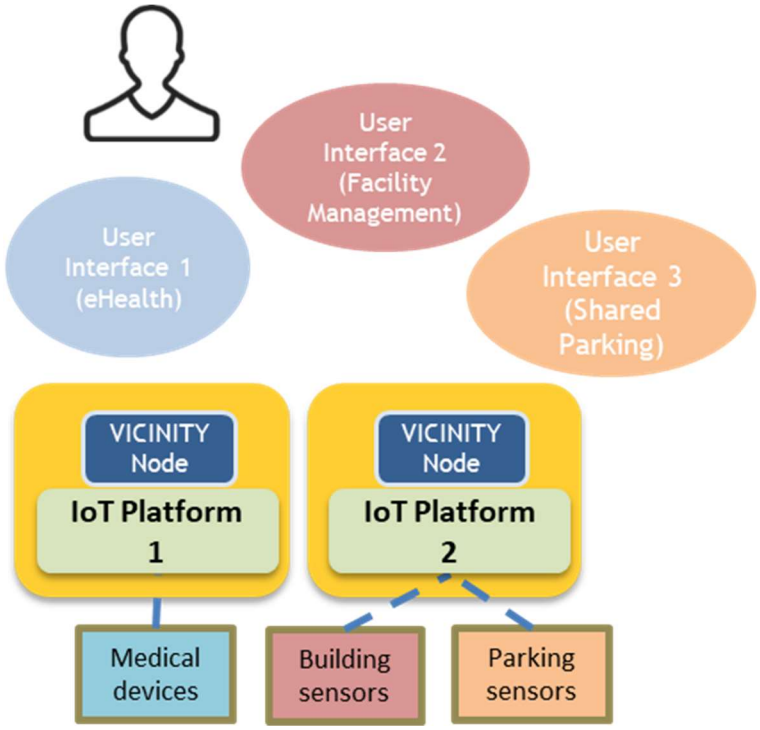
- Data processing has to take place in a transparent way as far as the data subjects are concerned (fairness and transparency).
- Data has to be collected for specified, explicit and legitimate purposes (purpose limitation).
- Data has to be adequate, relevant and limited to what the necessary in relation to the purposes for which they are processed (data minimisation).
- Data has to be accurate and updated (accuracy).
- Data has to be stored for specified time, and at any case no longer than needed (storage limitation).
- Data has to be secured and protected from unauthorised or unlawful processing, loss, destruction or damage (integrity and confidentiality).
- The controller has to prove compliance (accountability).
- The organization that processes the data has to take and apply the appropriate technical and organisational measures, such as pseudonymisation in order to protect data subjects rights and ensure that by default, only personal data which are necessary for each specific purpose of the processing are processed, as far as the amount of personal data collected, the extent of their processing, the period of their storage and their accessibility. Identification and authentication of system users, Access limitation and data classification are also techniques that can be used in order to protect data (Privacy by design/Privacy by default).
- The organization that collects and processes health data in a large scale, especially when using new technologies, has to carry out a Data Protection Impact Assessment (DPIA) prior to processing in order to assess the impact of the processing on the protection of personal data and take the adequate measures. The DPIA has to describe the processing operations, explain the purposes of the processing, and assess the necessity and proportionality of the processing operations in relation to the purposes, as well as the risks to the rights and freedoms of persons. The DPIA should also analyze the adopted measures to combat the risks, such as security measures for the protection of personal data in order to comply with the GDPR.
- The processing of health data on a large scale requires the assignment of a Data Protection Officer, who will monitor and support the organization at the compliance of the organization with the GDPR, by proposing measures and best practices especially at risky processing operations, as well as cooperating with the supervising authority.

The partners of the VICINITY Project are dedicated to the road of compliance with the GDPR and are taking measures to assess the processing operations of the health data that are collected by IoTs, and to safeguard the security of the data using innovative techniques for protecting data, such as anonymization, as well as the privacy of the persons, by informing

them adequately prior to their consenting at the processing operations.
The above measures safeguard the security and lawful process of the health data in the most adequate way and cultivate the trust of the persons to new technologies that is necessary in the fast developing digital era, which is necessary in order that people benefit from the new technologies in the health sector. The above measures safeguard the security and lawful process of the health data in the most adequate way and cultivate the trust of the persons to new technologies that is necessary in the fast developing digital era, which is necessary in order that people benefit from the new technologies in the health sector.

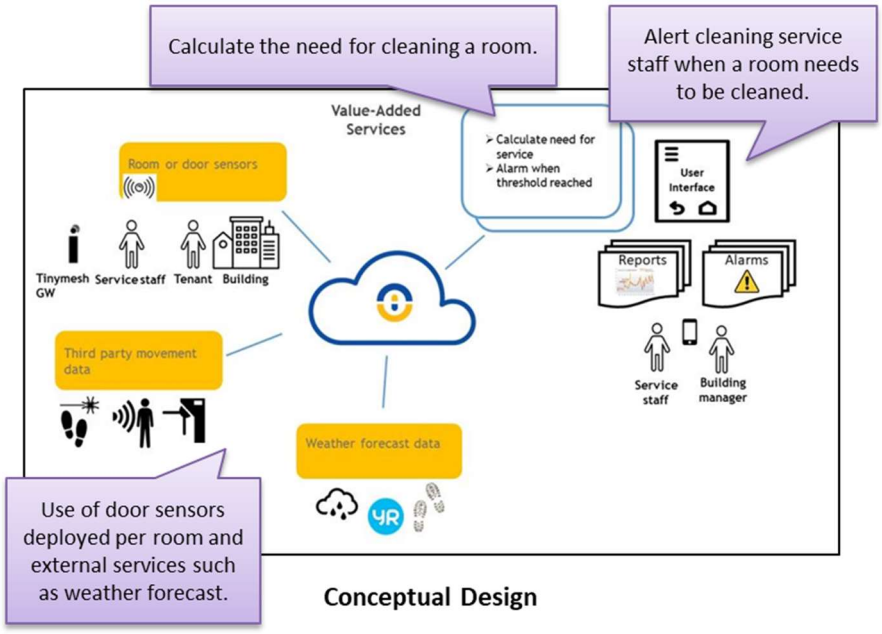
VICINITY Pilot Sites Implementation

VICINITY has pilots located at 4 sites. The use cases and value-added services (VAS) being deployed at these sites are descriped below.

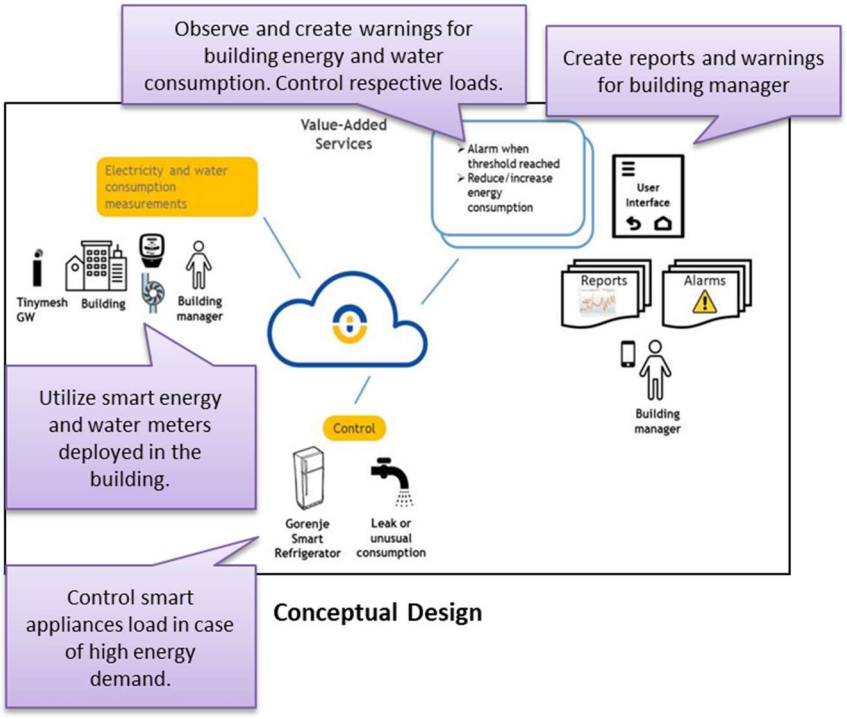


1. *Building Management in Oslo*
The VICINITY Adapters and business logic of the VAS are in the process of being implemented. The door, motion sensors and water and power meters being described in terms of the VICINITY ontology. Use cases are being mapped on to the VICINITY Platform roles such as Building Operator and Service Provider. A conceptual view of the Value-Added Services is shown below.

Predictive Operations

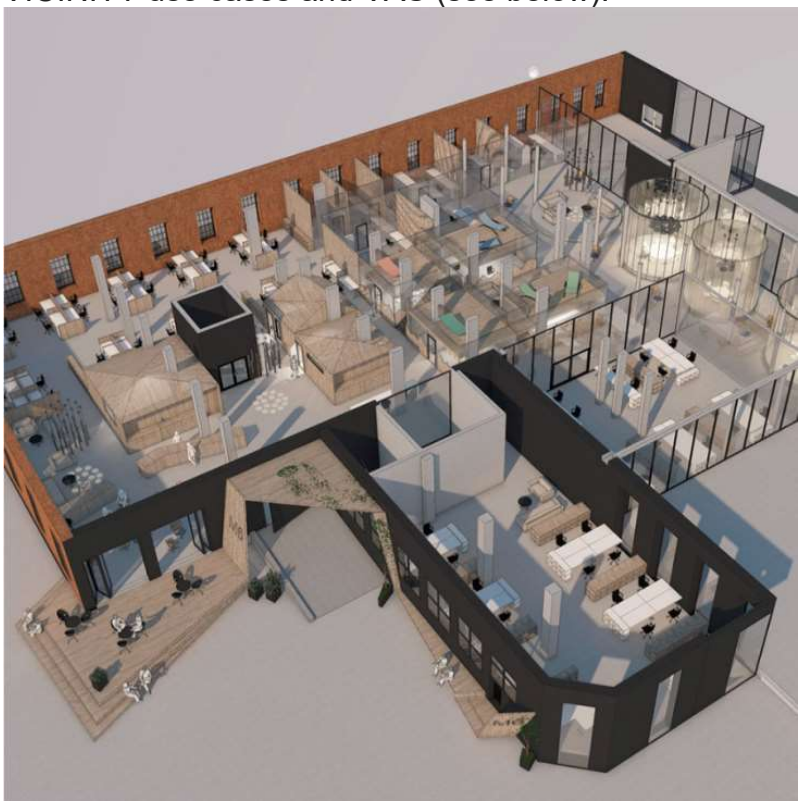


Resource management



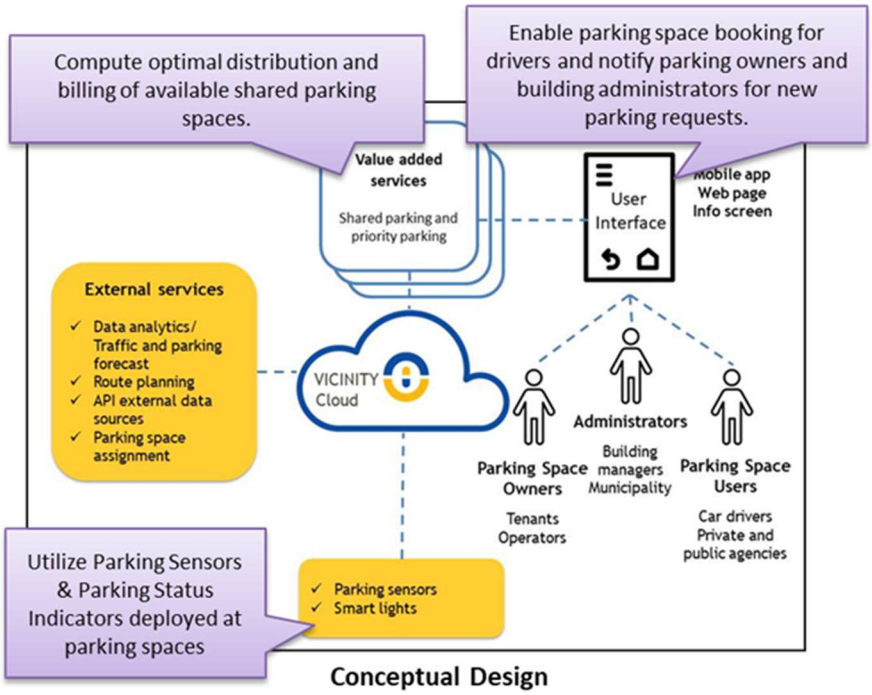
This VICINITY use cases are centred around using IoT technologies to improve resource management, resource consumption and predictive operations in buildings. Using wireless door sensors, as well as wireless electricity and water meters, the two VAS will inform the management team about typical and non-typical situations. The information (including alarms) will enable them to target their cleaning efforts, shed electricity loads, discover water leaks and track their resource consumption in real time, thus saving time and money.
Tinymesh has a tight collaboration with Iwmac, who will provide online information and status for the wireless electricity and water meters.
In Autumn 2018, the Oslo Pilot Site will be moved from Oslo Science Park to a new and renovated building in Oslo. This is the premises of Co Workers International which has

several similarities to Oslo Science Park and provides new opportunities to demonstrate the VICINITY use cases and VAS (see below).



2. *Smart Parking in* Tromsø

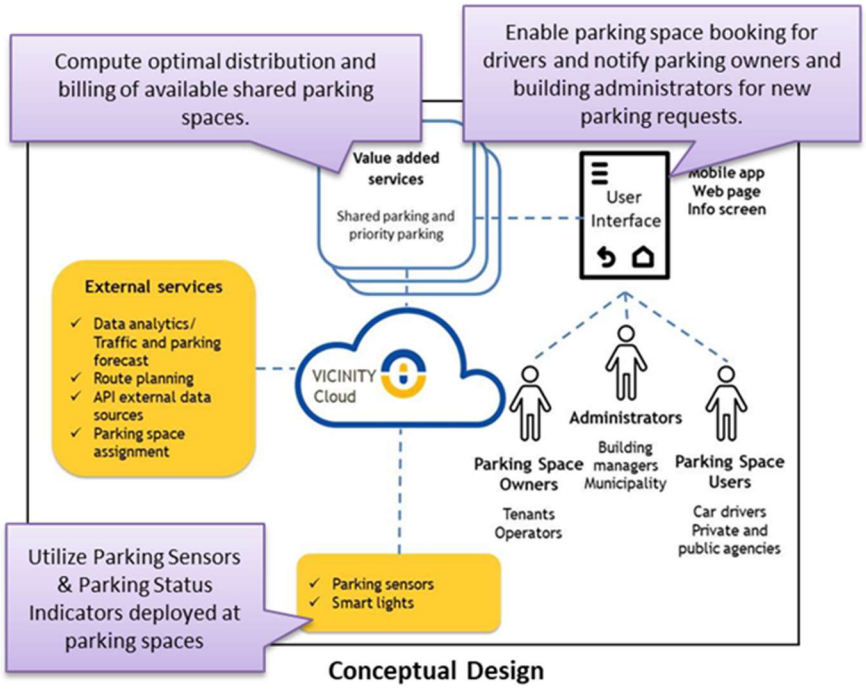
The IoT infrastructure needed for the implementation of the VAS is described in terms of the VICINITY ontology and roles in order integrate them into the VICINITY Platform. Parking sensors, smart lights, smart appliances and panic buttons will be deployed with the Building Manager, Parking space owners and parking users as the VICINITY roles.
A conceptual view of the VAS is shown below.



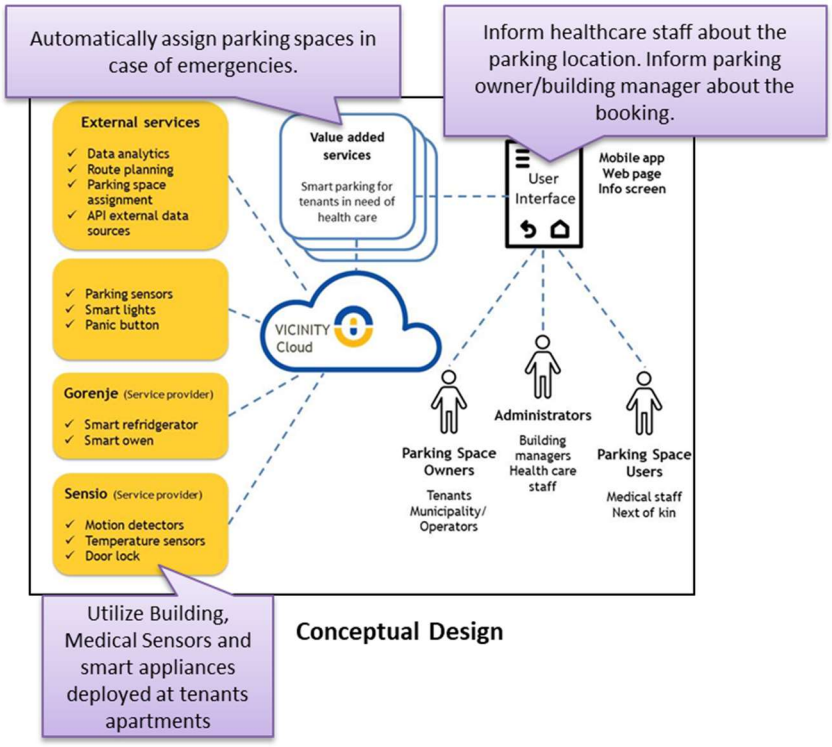
The above figure demonstrates the different sources that might provide data to the state machine that governs what actions the parking managing system shall take in case of certain

(emergency) events should occur.

Shared parking / priority parking



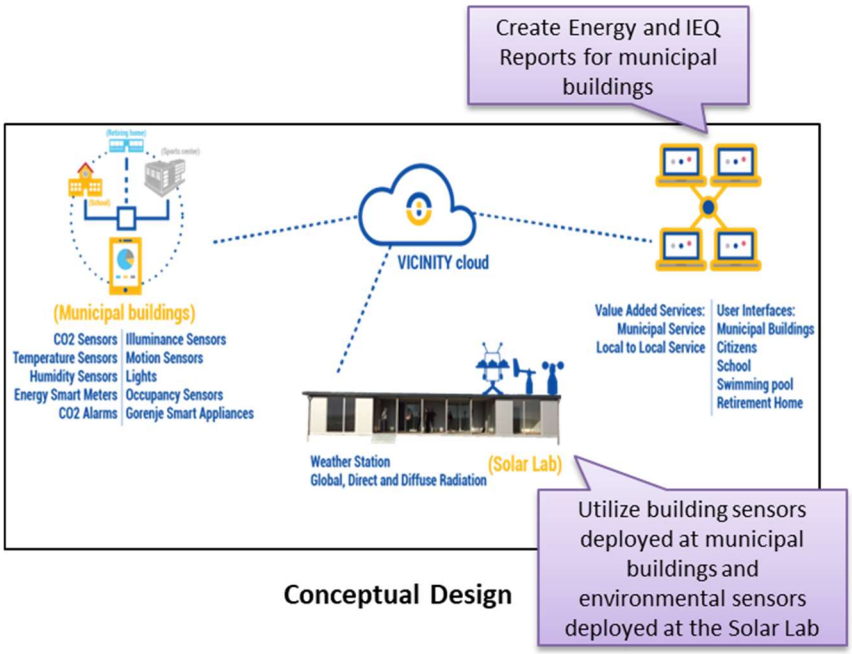
eHealth Emergency parking



3. *Energy* in Martim-Longo, Portugal

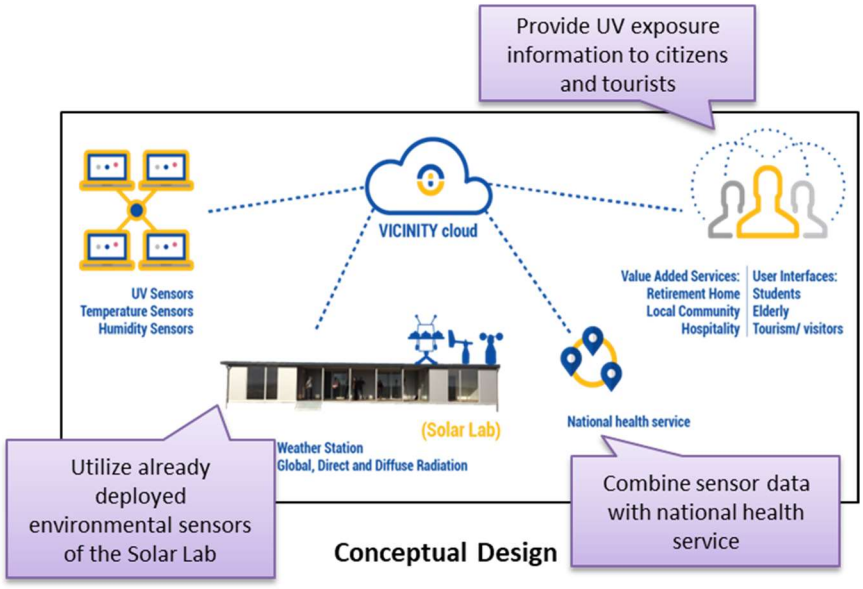
A conceptual view of the VAS is shown below.

Municipal Services



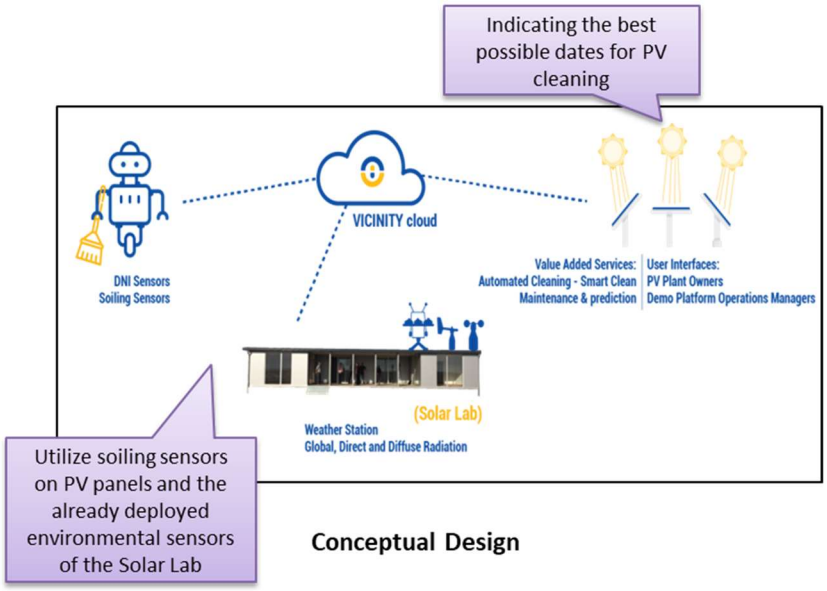
Conceptual Design

Local to Local Services



Conceptual Design

Platform Services



Conceptual Design

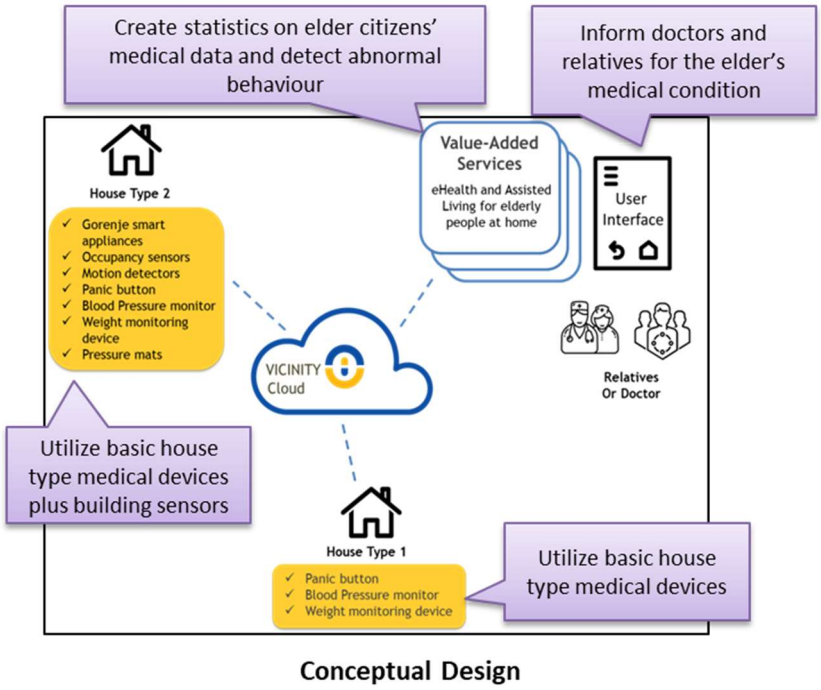
The solution will be presented to the Intra Municipal organization of the Algarve uniting 16 municipalities (AMAL). Outcomes of the Municipal Services are about to be presented to the regional government. For Local to Local Services existing IoT infrastructure will be used.

Finally, the solution of Platform Services could be licensed to O&M services providers improving efficiency and lowering the operating costs of PV Panels.
Environmental sensors, electricity, water meters, UV radiation and soil moisture sensor are described in order to be integrated to VICINITY. School, Nursing Home, sports Pavilion, Swimming Pool, Solar Lab are the Organizations for the needs of VICINITY.

4. eHealth in Pilea Hortiatis, Greece

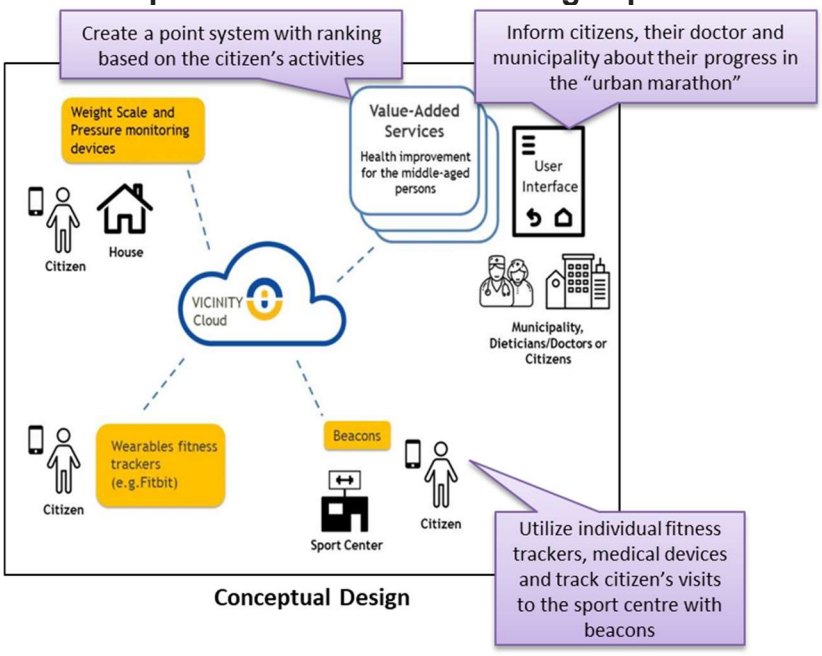
EHealth is promoted by the Greek government with the Municipalities and health care centres as potential clients. Blood-pressure meters, weight scales, panic buttons, activity trackers, motion sensors, door sensors, beacons are integrated to VICINITY for the needs of the two Greek Pilot use cases and being described in terms of the VICINITY Platform. Use Cases are mapped with VICINITY Platform roles such as Healthcare professionals, Elder Citizens, Guardians, Middle-aged Citizens being the Users and Organizations of the use cases.
More specifically, an IoTivity Adapter for medical devices has been implemented, with ITI Smarthome Adapter and VAS Adapters in progress. Implementation of the business logic of each VAS for these use cases is in progress.
A conceptual view of the Value-Added Services is shown below.

eHealth and Assisted Living for elderly people at home



Conceptual Design

Health improvement for the middle-aged persons



Conceptual Design

The eHealth and Assisted Living for elderly people at home use case will lead to a reduction of primary costs for both citizens and municipalities. IoT sensors and devices have been installed in homes in the Municipality of Pilaia-Hortiatis in order to assist elderly people to live at home.
Competitions such as the Urban Marathon in the second use case could be organized at a large scale including at National level. Citizens of the Municipality of Pilaia-Hortiatis will take part in the Urban Marathon in order to have a healthier lifestyle.

VICINITY Available on GitHub

VICINITY is approaching the end of its implementation phase for the Core components. This provides an opportunity for service provider, IoT infrastructure vendors and technically savvy IoT infrastructure owners to try out the beta version of the platform. To enable this, VICINITY software components have been made available on GitHub (https://github.com/vicinityh2020) and will be updated and maintained there. In the GitHub you will find an integration guide to integrate your adapters with the VICINITY Platform through the VICINITY Agent: https://github.com/vicinityh2020/vicinity-agent/blob/master/docs/ADAPTER.md. Furthermore, all the VICINITY ontologies can be accessed through a dedicated portal: http://vicinity.iot.linkeddata.es/vicinity/.

There are also examples of adapters for different IoT platforms:

- IoTivity (https://github.com/vicinityh2020/vicinity-adapter-CERTH-IoTivity),
- LinkSmart (https://github.com/vicinityh2020/vicinity-adapter-CERTH-LinkSmart),
- SiteWhere(https://github.com/vicinityh2020/vicinity-adapter-CERTH-SiteWhere),
- OpenHab (https://github.com/vicinityh2020/vicinity-adapter-openhab).

For more adventures, you can install your own implementations of:

- The VICINITY Neighbourhood Manager (https://github.com/vicinityh2020/vicinity-neighbourhood-manager);
- The VICINITY Communication Server with the VICINITY Open Gateway API (https://github.com/vicinityh2020/vicinity-communication-server).

In this way, service providers, IoT infrastructure vendors and others can interact with the VICINITY development team more directly through GitHub issues or make requests for specific contributions.

Outcomes of EC Technical Review

The main contributors and some members of the management board of VICINITY were in Brussels for an EC technical review on April, 19th. The reviewers confirmed that the project had achieved all its objectives so far, and all deliverables to March 31st were accepted.
In order to improve the project further, it was agreed that Distributed Ledger Techniques (DLT) (e.g. for improving privacy) would be investigated as these could add significant value to VICINITY. In particular, the academic partners are encouraged to investigate this approach, even if it goes beyond VICINITY‘s original scope. UNIKL has taken up this challenge and will investigate such an approach.
Over the next 6 months, we will also make our deliverables more concise and firm up on our exploitation plans.

Scientific and Technical Publications

- Hardware-in-the-loop Simulation for IoT Scenarios, J. Kölsch, C. Heinz, S. Schumb, C. Grimm, *CPS Week 2018*, 10-13 April 2018, Porto, Portugal.
- e-Health Services in the Context of IoT: The Case of the VICINITY Project, M. Belesioti, I. Chochliouros, S. Vanya, V. Oravec, N. Theologou, M. Koutli, A. Tryferidis, D. Tzovaras, *Artificial Intelligence Applications and Innovations. AIAI 2018. IFIP Advances in Information and Communication Technology, vol. 520, Springer*, May 2018.

- Enabling Interoperability-As-a-Service for Connected IoT Infrastructures and Smart Objects, A. Hovstø, Y. Guan, J. Vásquez, M. Savaghebi, J. Guerrero, M. Poveda-Villalón, R. García-Castro, *pHealth 2018*, 12-14 June 2018, NTNU Gjøvik, Norway.

Milestones

- EC Technical Review in Brussels, 19 April 2018.