Newsletter

December 2017-March 2018

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

Editorial

Prof. Dr. Christoph Grimm

Coordinator VICINITY project
Kaiserslautern
University of Technology

The reader of this latest VICINITY newsletter will notice that we have achieved a lot in the few months since our last newsletter. And the newsletter shows that there will be more ahead.

Since our EC review in Brussels where we demonstrated our first operational prototype, we have participated in a large number of events and started preparing the test and integration infrastructure. This will be perhaps our most difficult year as systems either succeed or fail at the integration stage. We also issued on March, 15th an open call that will broaden the impact of VICINITY. You will find all the details overleaf!

Latest News and Upcoming Events

Latest news

- CERTH presented VICINITY at 2nd Digital Health Meet-up, 23 October 2017, Thessaloniki, Greece.
- CAL represented VICINITY in ITU-T Focus Group on Data Processing and Management to support IoT and Smart Cities & Communities, 20-25 October 2017, Geneva, Switzerland.
- VICINITY was presented by OTE in InfoCom World Conference, 25 October 2017, Athens, Greece.
- AAU presented VICINITY in a tutorial at IECON 2017 conference, 29 October-1 November 2017, Beijing, China.
- HITS and TINYM represented VICINITY through two separate presentations at IoT EPI Nordics Tour events, 14 November 2017, Tromsø and Oslo, Norway.
- IS presented VICINITY value added services in ITAPA 2017, 14 November 2017, Bratislava, Slovakia.
- CAL, ENERCOUTIM and UPM presented VICINITY to the Connected Smart Cities Conference, 11 January 2018, Brussels, Belgium.
- VICINTY was represented by ENERC at Regional Energy Strategy – Algarve 2030, 30 January 2018, Algarve, Portugal.
- ATOS, CAL, ENERC, HITS and UPM presented VICINITY in IoT EPI at Digital Catapult event, 5-6 February 2018, London, UK.
- CAL presented VICINITY to the ETSI ISG CDP (City Digital Profile) workshop, 5-6 February 2018, Greenwich, UK.
- HITS presented VICINITY through a tutorial in Arctic Alps event, 14 February 2018, Lyngen, Norway.
- HITS presented VICINITY during a pilot presentation in Arctic Smart City event, 15 February 2018, Tromsø, Norway.
- HITS on behalf of VICINITY held a tutorial in Internet Food and Farm (IOF2020) event, 1-2 March 2018, Almeria, Spain.

Upcoming events

- EC technical review in Brussels, 19 April 2018
- HITS plan to attend pHealth 2018, 12-14 June 2018, NTNU Gjøvik, Norway.
- InterOSS-IoT 2018: 3rd Workshop on Interoperability and Open-Source Solutions for the Internet of Things, 4-7 June 2018, Bilbao, Spain.

VICINITY Open Call

Announcement of an open call for recipients of financial support

The project VICINITY, co-funded from the European Union's Horizon 2020 research and innovation programme under grant agreement No 688467, foresees as an eligible activity the provision of financial support to third parties, as a means to achieve its own objectives.
The types of activities to perform that qualify for receiving financial support are:

- Integrate a new IoT infrastructure into VICINITY;
- Co-operate with the VICINITY partners to demonstrate of the open call project's results within the duration of the proposed project;
- The proposal must explain how the IoT infrastructure supports existing use-cases, services, and/or business models in VICINITY, or new ones, and/or undertake co-creation activities.

Financial support will be provided to individual SMEs, large companies, research institutes, and public authorities such as (city) communities, which are established in an EU Member State or in an Associated Country which is qualified and is compliant with the rules of participation H2020. Only one entity per proposal will be admitted, so activities in co-operation with other organisations will not be considered eligible.
Publication date: 15th March 2018
Deadline: 15th June 2018 at 17:00 (Brussels time)
Expected duration of participation: 6 Months
Maximum amount of financial support for each third party: 60.000 €
Call identifier: VICINITY 1st Open Call Third party IoT infrastructures.
Language in which proposal should be submitted: English
Web link for further information (full call text/proposal guidelines/call results) on your official project web site: http://vicinity2020.eu/vicinity/content/open-calls
Email address for further information: opencalls@vicinity2020.eu

Results From Participation at Events

IoT EPI at Digital Catapult, 5-6 February 2018, London.

Five VICINITY partners (ATOS, CAL, ENERC, HITS and UPM) participated in the final meeting of IoT-EPI hosted by Digital Catapult in London.

Digital Catapult is an example of rapid digital innovation, cutting edge immersive labs and leading tech development. It is an inspiring and beautiful place to work, experience technologies and discuss

related topics. The IoT EPI joint meeting brought together all IoT-EPI projects over a period of 2 days and sparked lively discussions on the way forward.

Business Models and Internationalization Task Force

At the core of innovation and business model creation lies a method of Value co-creation with its ramifications for stakeholder engagement in an ecosystem approach towards technology advancement. This approach was introduced by Digital Catapult and underwent adaptation and refinement over the past two years.

The pros and cons of four models from IoT-EPI projects (VICINITY, BIG IoT, Biotope, Tagit smart and Inter IoT) were discussed. These were Freemium, Multisided market, Whatever as a Service and Reciprocity (a rebranded barter model). Posts on social media related to this discussion generated high level of engagement, indicating the relevance and interest in the topic. Some commonalities were identified among all of the models and there were no “winners or losers”, and the list of pros and cons was equally long for all four, although some are more convenient for a particular project than others.

The Internationalisation Task Force workshop focused on a lively discussion of IoT developments across the world and ongoing efforts with the joint research projects of EU in Japan and Brazil. These will result in the extension of internationalisation to other continents, more collaborations and working on additional joint efforts. The group identified gaps and proposed the creation of a spin off initiative to create test beds and closer collaboration with existing initiatives.

The results of a survey to assess the maturity of value co-creation strategies within the IoT-EPI community were discussed.

Value co-creation mechanisms have been evaluated from two points of view: technological (open data license, open source license, where the project source code is stored, etc.), and non-technological (use of MOOC platforms, liaisons with educational/research bodies, external access to the platform, etc.). These were assessed for each project and the results will be shown in the value co-creation final deliverable.

Significant knowledge and experience of Open Calls has now been accumulated by the IoT-EPI community. This is valuable for VICINITY and we will be leveraging this and we will incorporate lessons learnt into the organization and evaluation processes on our upcoming open calls.

Interoperability Task Force

The Interoperability Task Force met for 2 hours on the final day under the chairmanship of Ovidiu Vermesan who is preparing a white paper on 'IoT Platforms Interoperability Approaches' which collects the interoperability approaches of all the IoT-EPI projects. A number of architecturally-different IoT platforms are being used in the different projects (e.g., Link Smart, Site Where, IoTivity, Gorenje, dSPACE, KURA and TinyMesh) and the whitepaper identifies how the different projects tackle the problem of semantic interoperability.

Raúl García-Castro, Assistant Professor of Computer Science at Universidad Politécnica de Madrid (UPM), explained the VICINITY architecture and how it achieves semantic interoperability. Cross-domain interoperability in VICINITY relies on:

• The VICINITY ontology as the common and abstract information model to be used, and which can be extended by VICINITY nodes;

• The Semantic agent platform as the semantic repository. The W3C Web of Things Thing Description (TD) is the framework to be used for describing any IoT object integrated in VICINITY;

• Gateway Adapter APIs that are 'semantic mediators' between the actual consumers, e.g., Adapters, and the repository of Thing Descriptions (TDs). These provide an interface for discovery requests and must also be able to specify discovery needs as semantic-based search criteria (SPARQL query).

At the end of the meeting, every delegate was given the chance to speak about their impressions of the work. David Faulkner of CAL said that the white paper does not appear to be converging on a single interoperability scheme which is not good for the IoT industry which will be dependent on heavy investment in sensor layer networks by municipalities and other infrastructure providers who typically need a lifetime of 25 years to justify the investment. He cited a problem the UK is having with smart electricity meter deployment to homes and businesses. The government is keen to promote the switching of energy supplier to increase competition and prevent 'supplier lock-in'. However, the meters

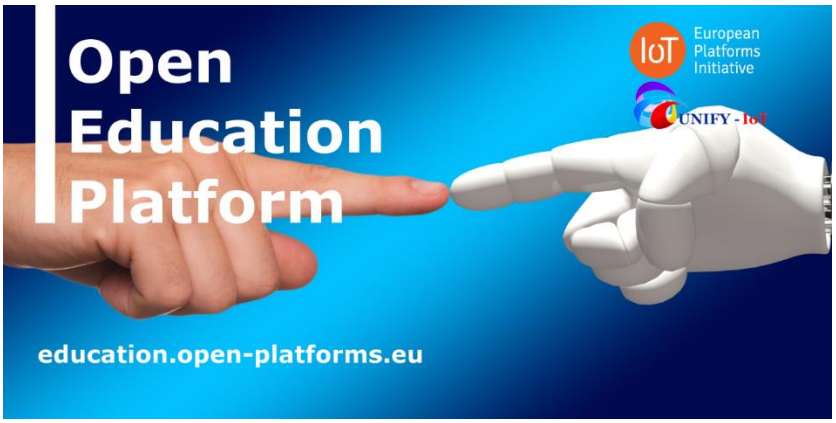
have not been standardised to allow portability between suppliers which can lead to the situation where a meter installed by supplier A will need to be replaced by a different meter if the consumer changes to supplier B. This raises costs for consumers as the suppliers need to recover around 250 Euros each time a meter is installed or replaced.

In his summing up, Ovidiu said that this Task Force is likely to merge with the EU Large Scale Pilots in the future.

Education Task Force

The Open Education Platform (OEP) proposes a comprehensive, coherent and standardized education offer on IoT. The user can provide or take a course, recommend a book, look for an event and much more. Furthermore, it is possible to use the search engine for exploring OEP database or browse among resource categories to sort contents. Once you have found what you are looking for, you can rate the resource and leave a comment.

If you cannot find what you are looking for, you can ask for help on the OEP Marketplace. If you have a specific issue you want to share, you can launch an OEP Challenge and let the OEP community find the right solution with you.



If you searched the platform but did not find the lesson you were looking for or you see any essential IoT-related topics which are not addressed, please let OEP know and they will identify the organisations, teachers and trainers who could provide you with adapted resources.

If you are an entrepreneur exploring new areas and willing to improve your proof of concept, or if you developed a solution and want to assess its field of applications, you can put your innovation between the hands of the IoT community and reinforce its value through co-creation.

Interview with Representative of EnSO project

Ramon Jane

Technology Programmes Manager in Gas Natural and Dissemination and Exploitation leader in ECSEL project EnSO.

VICINITY will allow users to be involved in the ecosystem without a technical background in an open and simple way, being able to connect different types of infrastructures on a global scale.

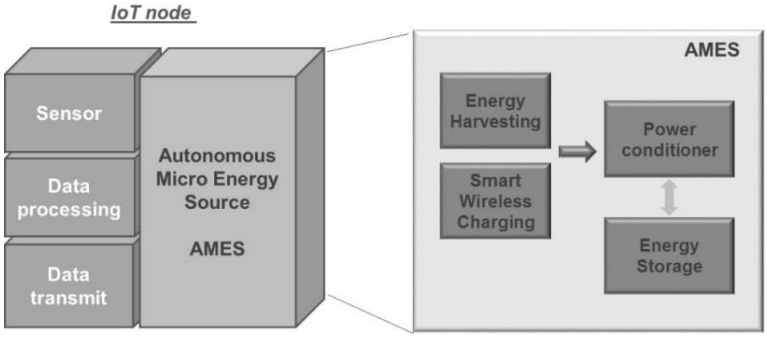
Please highlight here the most relevant parts of your CV.

– Dr. Ramon Jane received Telecommunication Engineering Master's and PhD degrees from Polytechnic University of Catalonia. He has over 25 years experience in the energy industry and R&D activities that provide a background on ICT technologies integrated in energy applications and processes such as metering, wireless networks, home automation and new services, sensors and actuators, control systems, microelectronics, modelling and simulation, data analytics and more recently in smart grids, smart communities and sustainable transport. He has more than 20 years experience in the coordination and leadership of European projects in the areas of energy, transport and ICT and is a member of several standardization committees, working groups and advisory boards.

Currently, you are the dissemination and exploitation leader of the ECSEL project EnSO. Could you explain the EnSO project main objectives?

– The main objective of EnSO is to develop and consolidate a unique European ecosystem in the field of Autonomous Micro Energy Sources (AMES), enabling European Electronic industries to develop innovative products, in particular for the IoT markets. This eco system will involve all the value chain from key materials and tools needed to meet expected cost and sufficient volumes, to a large number of demonstrators in different fields of application.

AMES is an "easy to use" solution integrating in the same device at least three elements: a microbattery, a combination of energy harvesters and a power conditioning IC. This energy solution will enable the development of new smart objects with the best performance/features and so push IoT market deployment.



Have you identified synergies between the EnSO and VICINITY projects? Have you identified any collaboration opportunities?

– Sure! Both projects are clearly complementary because one is hardware and the other more software oriented. EnSO use cases and pilots make available data coming from smart objects in different domains such as Smart Society, Smart health and Smart Mobility/Industry, while VICINITY is providing Platforms for connecting these smart objects. Furthermore, both projects focus on the same ecosystem (IoT); this allows us to identify a common portfolio of outcomes where it is easy to share efforts and to find synergies for improving dissemination and exploitation activities. After a first analysis, win-win collaborations were detected, such as the organization and joint participation in common stakeholder events and workshops, networking and clustering initiatives, collaboration in newsletters, or aligning our strategies in our participation in IoT Associations, Committees or Government bodies, among others.

What would you recommend to SMEs who participate in future VICINITY open calls? What type of IoT infrastructures could enrich the project?
– As far as I know, the project will call for third party system integrators and independent service providers to integrate preferably public IoT infrastructures under management of strategic industrial partner and involve into the existing and emerging IoT ecosystems. In the Smart Health domain EnSO have several SME partners offering IoT solutions for hospitals and medical assistance which data platforms seems quite necessary to offer value-added services in public infrastructures. In this way the open calls offered by VICINITY would be a nice opportunity to validate a wide range of different health services.

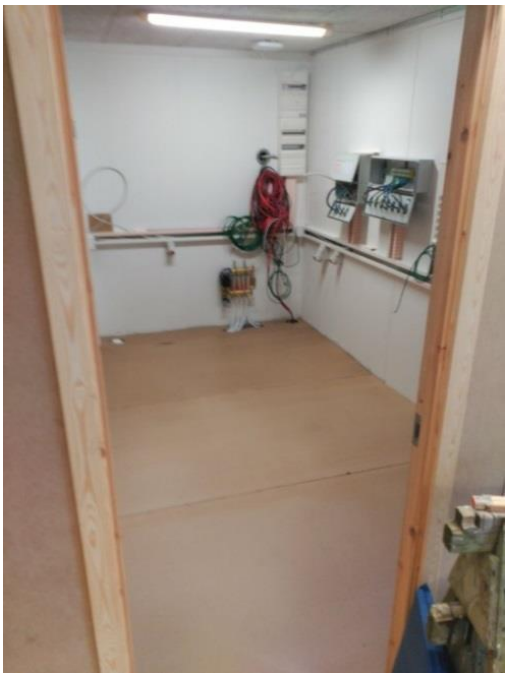
What, in your opinion, is the ultimate goal expected to be achieved with the help of VICINITY solution?
– Collaboration can bring many benefits, but the greatest one is to achieve a better dissemination and exploitation of the project and its results, increasing the impact of both projects in the European framework and at the same time increasing the possibilities of obtaining a greater value-added proposition to the stakeholders and real attractive/competitive solutions to the market.

How much do the users know about IoT and how VICINITY will change conventional approach?
– IoT is gaining more and more attention in industry and society. 24 billion connected devices are expected to operate worldwide by 2020. Considering how attractive this potential market is, competition is a big issue for European companies and it seems important to establish common strategies and technical or market collaboration. For instance, interoperability between IoT devices and systems is becoming a real challenge. VICINITY will have the ability to communicate all these devices through a single, decentralized platform, where infrastructure owners keep under control of their shared devices and data. This will allow users to be involved in the ecosystem without a technical background in an open and simple way, being able to connect different types of infrastructures on a global scale.

VICINITY Test Lab Preparation at AAU

The heating and electrical installations of AAU IoT Lab have been completed. As the first step, two water- and electrical-based under floor heating systems were installed, as in the photos below. The temperature can be independently controlled per room wirelessly.

(a)



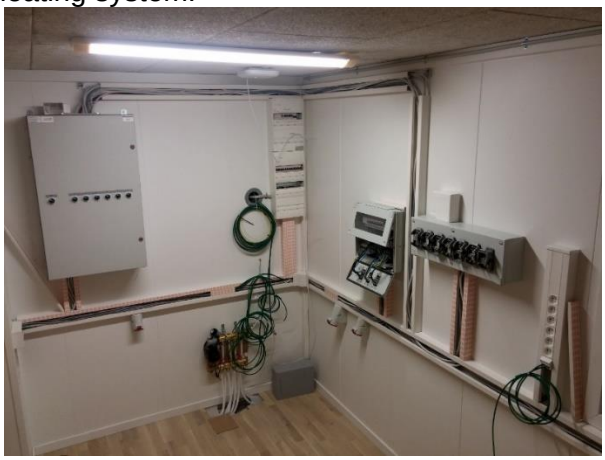
(b)

(c)

(d)

a) Electrical mats installed in first layer of the heating system
b) Covering of first layer of heating system
c) Second Layer of heating system being installed
d) Finalized view of the floor, totally covered

The second step was installing the electrical devices:
DC and AC Electrical Installation (distribution rings, power outlets in the four rooms, protections, electrical sockets for transformer connection to the grid).
Ethernet connection in the 4 zones of the IoT house. (to be finalized soon)
DC connection to AAU DC Microgrid lab.
A switchboard: this box will allow to flexibly connect the IoT home to the grid and the Renewable Energy System available (photovoltaic panels and a wind turbine) together with a uCHP unit, EV post and a Battery pack. An additional modification was carried out to connect the electrical underfloor heating system.



The Electrical DC & AC installed Panels

Distribution AC and DC rings installed around the IoT house

Sensors setup and testing
Several sensors from Fibaro and Serinus have been connected to the VICINITY cloud through TinyMesh gateways and have been configured. The next step will be to test them under several energy scenarios to identify any problems regarding safety, security or lack of functionality within the VICINITY framework before their deployment at the pilot sites. A Graphic User Interface (GUI) will be designed for monitoring and energy management purposes.

Smart Appliances
Smart appliances from VICINITY partners, including a smart oven and smart refrigerator (from ATAG) will also be installed at pilot sites, after first being tested in the AAU lab. They are connected to the internal cloud and are sending and receiving data. The next step will be to integrate them into the VICINITY cloud as well.

Sensors, gateways from Fibaro/Sensio & Serinus/Tiny Mesh and ATAG appliances located in AAU Lab

VICINITY value-added services definition, requirements and architectural

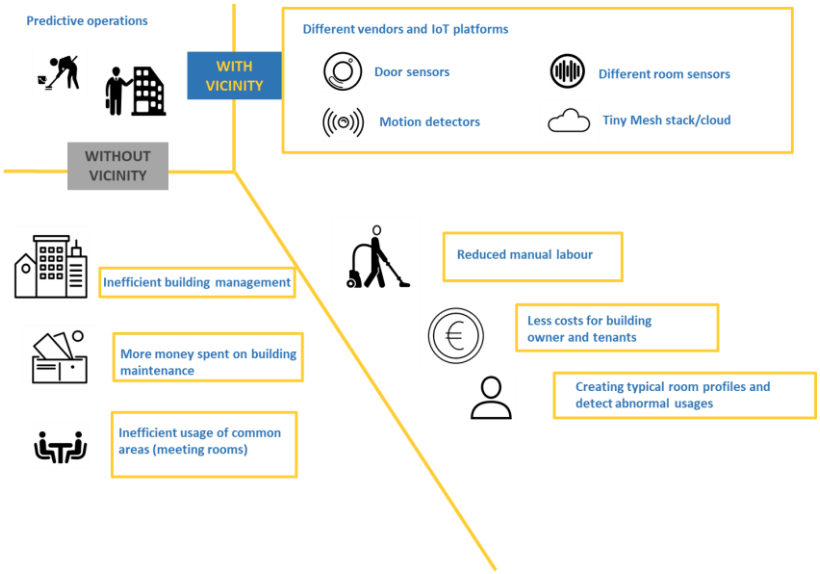
In December 2017, *D5.1 Value-added services definition requirements and architectural design* was submitted. This defines the value-added services (VAS) for each use case, domain and pilot as well as the architectural design of the use cases on each Pilot Site. After active collaboration between Pilot Site partners, a methodology proposed by CERTH was implemented in order to identify how advanced techniques can facilitate the creation of diverse services across IoT domains, and to define in detail the VAS for all Pilot Sites: *Tromsø*, *Martim Longo*, *Pylaia-Hortiatis* and *Oslo*.

A VAS could be defined as a piece of software that implements an algorithm (from a simple calculation/data processing to some advanced techniques such as clustering/big data analytics, data storage and auditing etc.). Moreover, there could be collaboration between the VAS including the exchange of data and outcomes from the algorithms already implemented by other VAS of the same use case. These services may also supply the user interfaces that each actor of the use case will be provided with in order to view notifications, statistical data, processed data etc. VAS collect data, in order to further process them, from the IoT infrastructure (IoT devices, sensors etc.) available in each use case. Therefore the VAS participates in the VICINITY Neighborhood taking place in “partnerships” with other VICINITY entities etc. It should further reveal a business model potential / commercial exploitation of such a service (e.g. for application developers, service operators).

The first use-case for the VICINITY platform will be demonstrated at the *Oslo Science Park* in Norway which will:

- improve resource management, resource consumption and predictive operations in buildings,
- use wireless door sensors, as well as wireless electricity- and water meters,
- inform and alarm the management team about typical and non-typical situations. The information and alarms will enable them to target their cleaning efforts, reduce electricity loads, discover water leaks and track their resource consumption in real time, thus saving time and money.

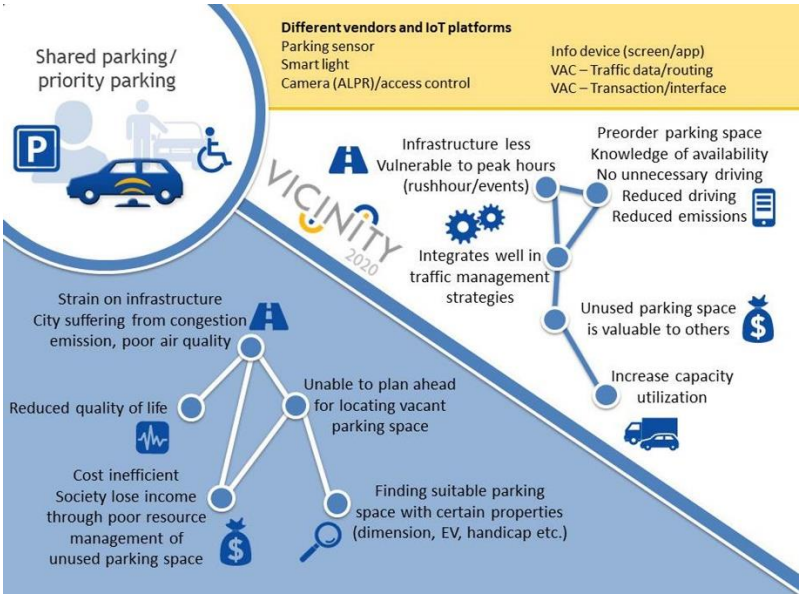
The following figure identifies the benefits that VICINITY brings for an indicative use case of the Pilot Site.



The second pilot will take place at the “Teaterkvarteret 1. akt” in *Tromsø*. The use-case will:

- focus on managed healthcare apartments,
- demonstrate how transport information and building data can be integrated with assisted living through agreements with parking space owners and other stakeholders.

The following figure reveals the benefits that VICINITY brings with an indicative use case of the Pilot Site.



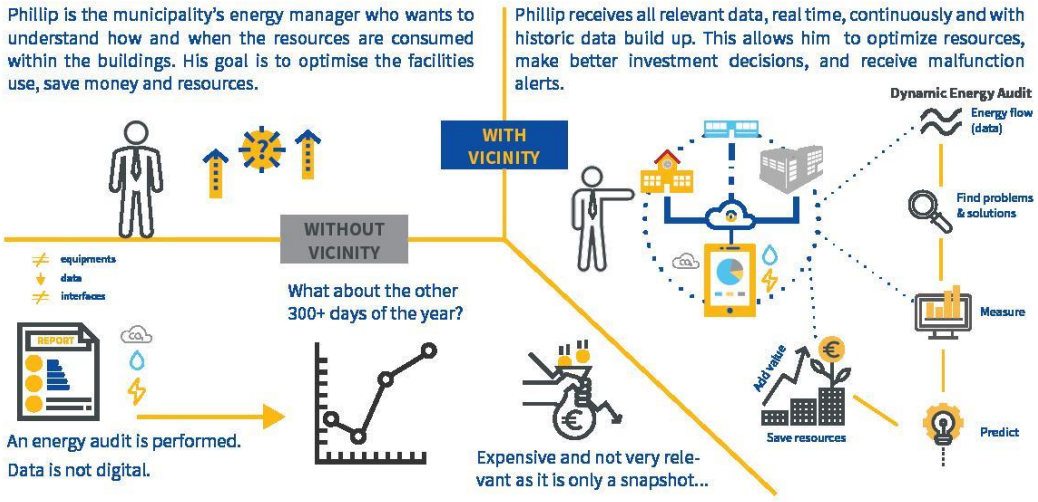
The third set of use cases at the *Martim Longo* pilot includes several buildings:

- the Solar Lab located on the Solar DEMO Platform,
- a cluster of the Municipality managed buildings - a secondary School,
- a Retirement home,
- a Sports Centre including a Swimming Pool, and a private home.

The three VAS of this use case are IoT enabled:

- Municipal Services,
- Local to Local Services,
- Platform Services.

The following figure identifies the benefits that VICINITY brings for an indicative use case of the Pilot Site.

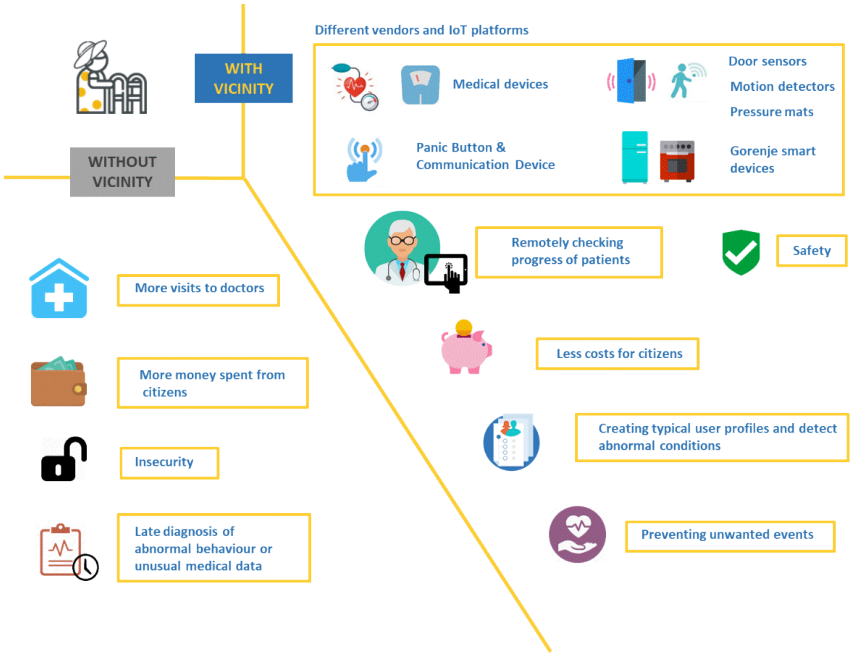


The fourth pilot will be demonstrated in the municipality of *Pilea-Hortiatis* in Northern Greece, with the participation of a number of targeted people, who will be identified by the municipality health care services.

In order to further improve the municipality's existing activities towards

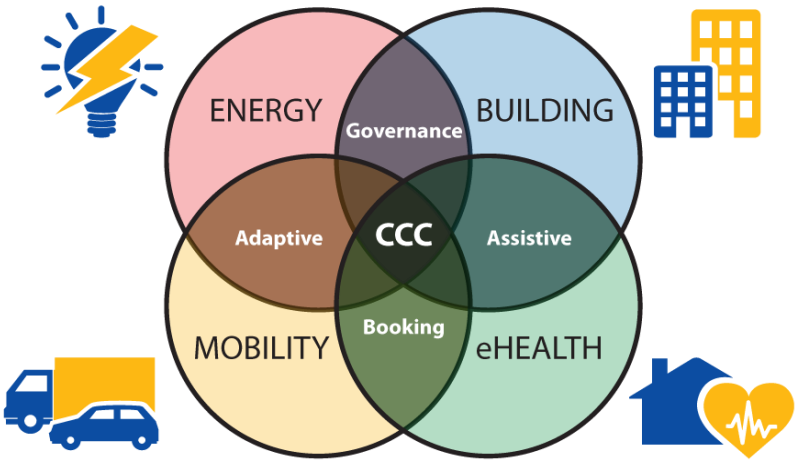
- assisted living for elderly people,
- preventive medicine and motivation for more citizens to participate at an Urban Marathon organized by the Municipality.

The following figure identifies the benefits that VICINITY brings for an indicative use case of the Pilot Site.



VICINITY Data Management Plan

The aim of the Data Management Plan (DMP) is to provide relevant information concerning the data that will be collected and used by the VICINITY partners. VICINITY will develop “Interoperability as a Service” which will be provided as part of the VICINITY open gateway. In order to achieve this, a platform for harvesting, converting and sharing data from IoT units will be implemented on the service layer of the network.



Domains and some functionalities the DMP has to cover

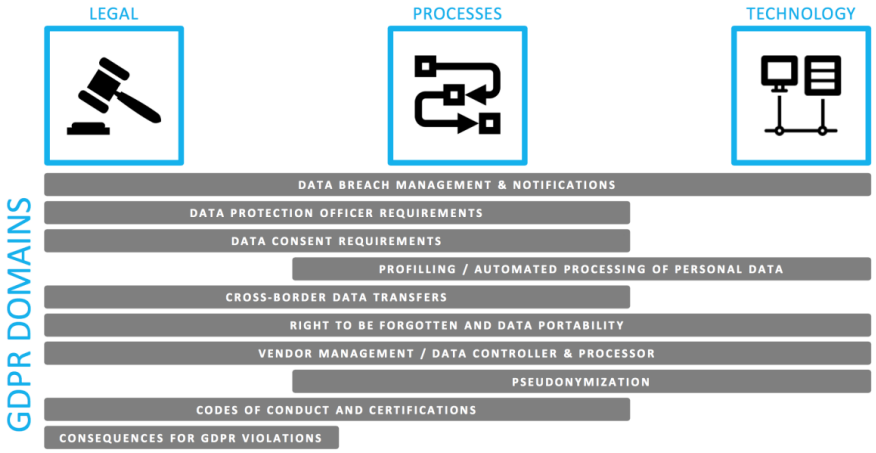
This all requires good documentation and implementation of descriptors, lookup-tables, privacy settings and intelligent conversion of data formats. The strength of having a cloud-based gateway is that it should be relatively simple to upgrade with new specifications and implement conversion, distribution and privacy strategies. In particular, the privacy part is considered an important aspect of the project, as VICINITY needs to follow and adhere to strict privacy policies. It will also be necessary to focus on possible ethical issues and access restrictions regarding personal data so that no regulations on sensitive information are violated.
The VICINITY Consortium has identified several areas that need to be addressed including protocol interoperability, identification tokens, encryption keys, data formats and packet size, as well as several issues related to latency, bandwidth and general architecture.
VICINITY’s activities involve human participants, as some of the pilots will be conducted in real homes with actual residents. For some of the activities to be carried out by the project, it will be necessary to collect basic personal data (e.g. name, background, contact details). Such data will be protected in accordance with the new GDPR regulation (see below) as well as the current EU Data Protection Directive 95/46/EC of the European Parliament and of the Council of 24th of October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data. National and local legislations applicable to the project will also be strictly applied with their support of GDPR from June 2018.
All personal data, or data directly related to the residents, will only be collected when the project has received a signed informed consent form from the subjects participating.

GDRP Relevance to IoT-Enabled Solutions in VICINITY and Beyond

Interest towards General Data Protection Regulation (GDPR) seems to be at an all-time high, given the timeline leading towards the 25th of May compliance day.
A quick search of upcoming GDPR related events yields hundreds of results in various formats from summits to workshops to webinars and conferences. Along with these events, there are many consulting and other specialist companies helping to navigate the field and producing various checklists, teasers and white papers.
Domain specialisation of these services is an established trend, and the latest event I attended in Lisbon was structured along vertical domains, such as Public sector, Healthcare, ICT, Pharmaceutical and Industrial.
Leading consulting and legal firms are actively taking part in helping to decipher the newly emerging field. The training providing institutes and organization are also active in helping building the required capacity and knowledge in the field. The data protection officer (DPO) position would require collaboration from many departments in the company to meet the requirements.
The entire field of GDPR compliance is expected to create many new jobs since organisations will have to have DPOs and auditors will need to supervise compliance.
There are numerous “how to comply” manuals and guides produced by traditional consulting and legal firms as well as new highly specialised firms.
“Breaking GDPR: Become a Master” ambitiously named conference organised in Lisbon on the 1st of February was focused on many data-intensive domains and attended by more than 1000 participants.

Lisbon, February 2018, Congress Centre

Significant challenges to the companies regarding GDPR compliance according to the national study presented by IDC at the event were related to the definition of the compliance processes, identification, classification and management of data, training of personnel and security procedures definition.
The public administration sector was identified as the least informed and prepared for the process, and overall only 2,5% of all organisations suggested that they are already compliant to the GDPR, while 43% expect that they would be ready after May 2018. Processes definition leading towards GDPR compliance was identified as the most challenging task within the organisations.
The graphic below depicts many relevant components under legal, procedural and technological domains that need to be managed by organisations internally leading towards GDPR compliance.



*Source: Axians

The graphic below gives an overview of the legislation and the related fields of Data privacy management and security. There are links between legal, process and technology enablement considerations to achieve compliance.

*Source: Garrigues

Within VICINITY there are articles on the GDPR that have been identified as the most relevant to the project. A greater focus is given to designing solutions corresponding to these articles.
Article 34. Communication of a personal data breach to the data subject
“The communication to the data subject referred to in paragraph 1 shall not be required if any of the following conditions are met: the controller has implemented appropriate technical and organisational protection measures, and those measures were applied to the personal data affected by the personal data breach, in particular, those that render the personal data unintelligible to any person who is not authorised to access it, such as encryption;”

The GDPR introduced a general mandatory notification regime in the event of personal data breaches. Data controllers will be required to report personal data breaches to their supervisory authority up to 72 hours after becoming aware of such breach and, will also be required to report such breaches to affected individuals. Data controllers using the IOT enabled systems will need to ensure that they are in a position to identify and react to security breaches in a way which complies with the requirements of the GDPR. VICINITY team is designing this process and will establish the procedure in each demonstration pilot site.

Article 25. Data protection by design and by default

“The controller shall, both at the time of the determination of the means for processing and at the time of the processing itself, implement appropriate technical and organisational measures.”
Privacy by design and privacy by default are not new concepts; both exist in current data protection legislation. GDPR will impose obligation to demonstrate their compliance with the requirements of the GDPR. These may include conducting data protection impact assessments, including system architecture. VICINITY architecture considered this goal from the onset of the system design.

Article 6. The lawful basis of processing “The controller shall, in order to ascertain whether processing for another purpose is compatible with the purpose for which the personal data are initially collected, take into account, inter alia: appropriate safeguards, which may include encryption or pseudonymisation.”
The data subject consent is expected to be clear and explicit as to processing of his or her personal data. The GDPR states that consent cannot be presumed through the inaction of the data subject. Free choice of withdrawing of consent is also mandatory and so-called opt in and opt out options should be readily available, simple to understand and manage. In case opt-out option is triggered, data portability becomes of relevance and also should be facilitated.
In addition to the data portability right mentioned above, the GDPR states specific rights on data subjects in relation to their personal data including the right to be forgotten and the right to object to automated decision making.

Considerable thought was given during the overall VICINITY architecture design phase and value-added services design phase as to whether the necessary capabilities have been built-in or considered to facilitate the exercise of these data subject rights in compliance with the GDPR. It is an ongoing exercise, given the complexity and many considerations that need to be taken into the account.
We will keep you informed as to our progress, our solutions and share our thoughts in the next newsletters.

Scientific and Technical Publications

- **Drivers, Standards and Platforms for the IoT: Towards a digital VICINITY**. Carna Radojicic, Aida Mynzhasova, Christopher Heinz, Christoph Grimm, Juan Rico, Keith Dickerson, *Intelligent Systems Conference (IntelliSys) 2017*, 7-8 September 2017, London, UK.

Milestones

- VICINITY General Assembly Meeting, 5-7 March 2018, Madrid, Spain.

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