Newsletter

January-November 2016

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

By 2020, the Internet of Things (IoT) is expected to have a value roughly 7.5x that of the Internet today. Interoperability in the IoT opens the way to wider adoption of the IoT in a range of applications and domains. For example, in eHEALTH to optimize resources and improve care by using social care alarms; in the BUILDING domain to reduce emissions and optimise energy usage; in ENERGY domain to reduce consumption and optimize resources, and in the MOBILITY domain to optimize usage.

“Cross domain data-driven services can be offered to B2C and B2B end-users to reduce in field of energy consumption through demand side management, use of renewable energy sources and innovative energy storage, buildings environment quality supporting health assistance services, advanced parking services considering drivers and vehicles profiles and parking purpose”

“Interoperability in the IoT provides the opportunity opens potential to use clean energy and further optimize the use of resources. Understanding how energy and resources (e.g. energy, water, heat, room occupancy availability of parking spaces) are produced and consumed creates the potential for dynamic pricing, better invoicing and better management of resources”.

Editorial: From VICINITY to the IoT

Prof. Dr. Christoph Grimm

Coordinator VICINITY project

Kaiserslautern

University of Technology

It is a pleasure to write this editorial for the first VICINITY newsletter. It should provide a lot of insight and information on things going on in the VICINITY project, the European Platform Initiative (EPI), and the IoT in general.

The IoT is created by networking things from our world from all kind of domains, including home, energy, work, traffic, healthcare, security. While the networking is the technical basis the IoT is more than just the capability to communicate. Its novelty lies in the ability to combine data and functionalities of different things, maybe even from different domains, and to create new value-added services on top of these.

The key to creation of such value-added services is interoperability among things, across silos created by different manufacturers, in different domains, or by relying on different standards or using different platforms. At the recent ETSI IoT/M2M workshop in Sophia Antipolis it was stated that open standards in IoT deployments would accelerate growth by 27% and reduce deployment costs by 30%. VICINITY has undertaken a thorough review of all existing standards and platforms, selecting those that are needed to build a service or to create some interoperability among different standards and platforms.

The newsletter includes a summary and overview of results from the VICINITY project in that direction, giving brief answers to questions such as: Which is the architecture of an IoT system? Which platforms are available for implementing the

components of it? Which standards are relevant for my project? How can we achieve interoperability?

While selection of platforms and standards is a key issue, the best solution would be to rely on interoperability. This is, what VICINITY offers us: interoperability as a service. The VICINITY project was started in January 2016, and we were busy capturing requirements from use-cases, stakeholders, sites, and to create based on this information the technical requirements and specifications that will lead us to an implementation in the coming years.

Overview of VICINITY

The VICINITY project will build and demonstrate a platform and ecosystem that provides “interoperability as a service” for infrastructures in the Internet-of-Things (IoT). The approach is bottom-up, decentralized and user-centric and involved in standardization without relying on a single standard. VICINITY aims to retain full control of the ownership and distribution of data across the different IoT domains.

VICINITY has introduced the concept of virtual neighbourhoods, where users can share access to their smart objects without losing the control over them. A virtual neighbourhood will be a part of an IoT infrastructure that offers decentralised interoperability, preventing the vendor lockins that are present in current IoT ecosystems.

The availability of large amounts of data in semantic formats generated by IoT devices and applications will also make possible new independent value added services across a range of IoT domains.

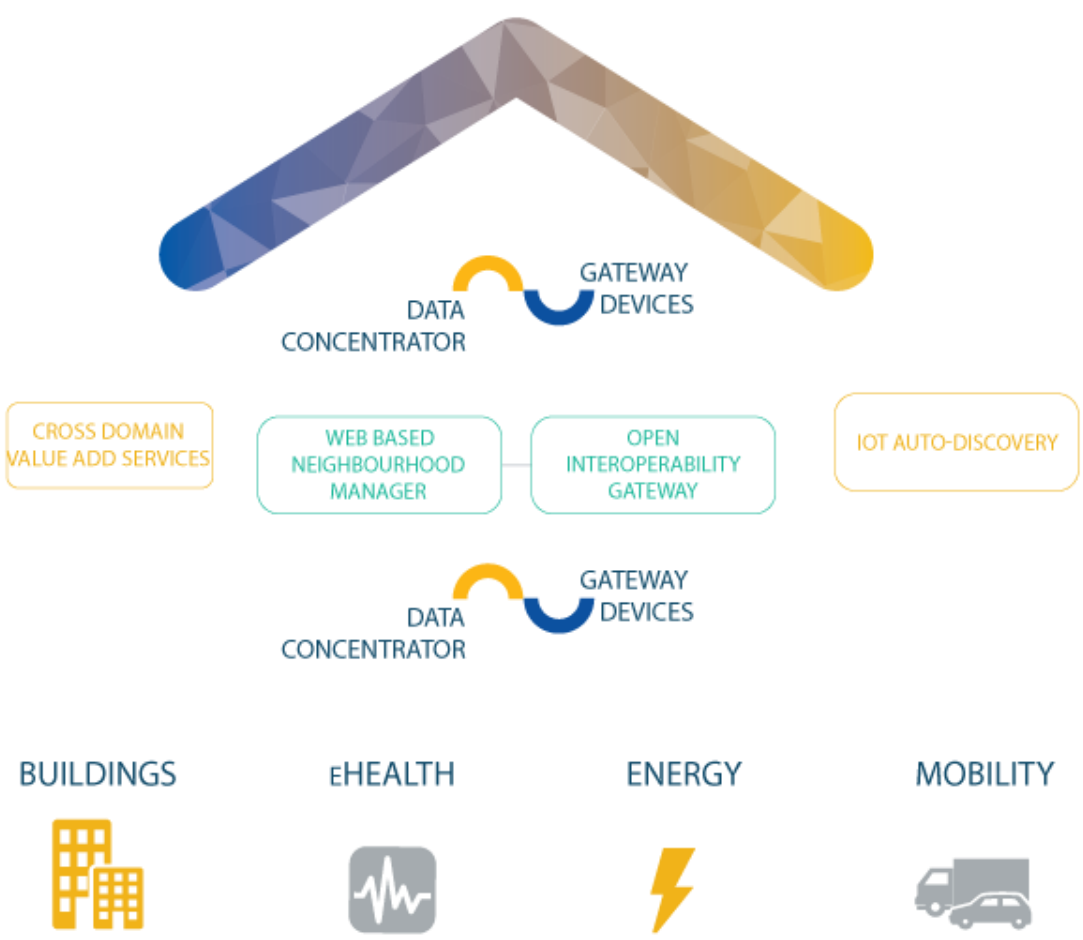

Figure 1: VICINITY bottom-up ecosystem.

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Standardization and Platforms

The IoT is a rapidly growing topic that has the potential to change the way people live, work, and think. However, evolution to the IoT will be a complicated process with many challenges. One of the main challenges is interoperability, either technical or at a higher, semantic level.

Technical interoperability allows communication of devices using different communication protocols while semantic interoperability allows communication of different infrastructures ("things") interpreting shared information in a correct way. Thus, IoT solution needs to be thought as end-to-end or device-to-cloud communication.

The key to achieving technical interoperability is the use of IoT gateways. IoT gateways are universal devices that translate different communication protocols to a common one that allows communication with the cloud. For the implementation of such devices it is always beneficial to use existing solutions than build new solutions from scratch.

Requirements for VICINITY standards can be divided into two main groups: the requirements of the underlying technology and foundations of the IoT ecosystem grouped as horizontal technologies and the requirements of the VICINITY Pilots in the domain of ehealth, smart transport, smart energy and smart parking, as shown in Fig.2.

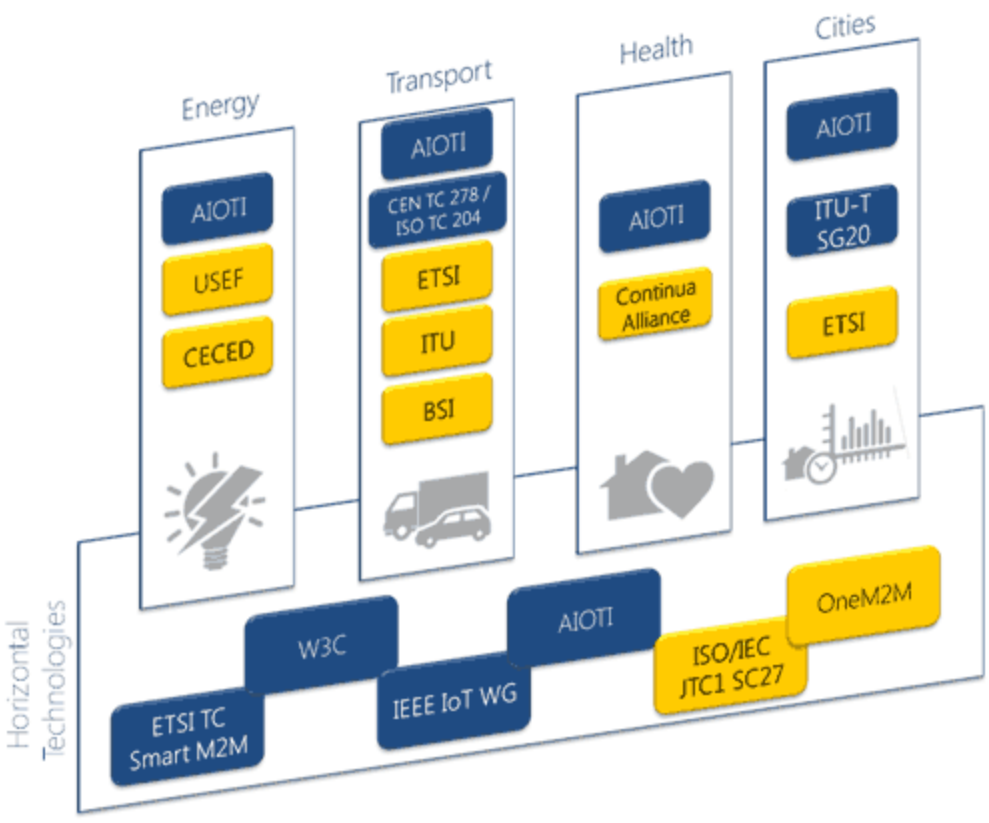


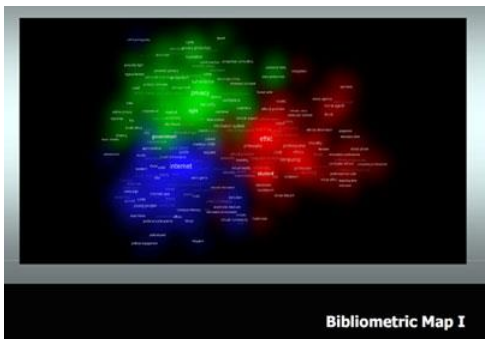
Figure 2: Landscape of IoT standards considered for VICINITY

From Web Summit to Industry Conferences, a warm welcome to the new concept: Ethics Everywhere

Natalie Samovich

VICINITY Ethics Board Chair with support by EB members

The topic of ethics and uncertainty in the development of trust-driven concepts in an increasingly digital technology driven society has featured prominently in keynotes and conference programmes across Europe in 2016. What are the biggest ethical challenges in the digitizing world? They range from data ownership questions, data sharing, privacy, to equality and value creation and distribution. The topic´s complexity and the importance of ethics is steadily rising to the point that "Data Hippocratic oath" is needed to uphold specific ethical standards. The idea was shared and discussed during the Future Societies conference at the Web Summit in Lisbon, signaling an overarching importance and relevance of the topic and pointing to the lack of consensus around it.



Source: ETICA "Ethics of Emerging ICT's" EU FP7, 2011

"From Generation Y sharing platforms, to data leaks and automated marketing, we discuss if privacy as we know it is on the brink of extinction." – as the Web Summit states in the title of the Future Societies conference. Ethics principles in relation to all these challenges, coupled with the new EU General Data Protection Regulation (GDPR), are guiding how these challenges are addressed.

European Utility week, Web Summit, Smart Cities events, and the Big Data analytics conferences might not have provided given all the answers to these questions, but the questions have been raised now and are at the forefront of our minds: "Will the world develop universal data protection laws across borders?", "Who should own consumer data?", "Who is preparing for the next wave of hacking…?".

If most of the assets we know today were available as a service, then the sole asset that is expected to remain would be our "digital identity" and as a result, privacy rights and knowledge of it would become an advantage. The relationship of trust between solution providers and users could be facilitated by certification of compliance when sanctions under the EU General Data Protection Regulation have come into force in 2018. Demonstration of compliance will not be sufficient to meet customers' expectations in an environment where 100% security is a major challenge. The systems of systems in the future would be expected to act ethically.

The VICINITY Ethics board will meet regularly to discuss the above issues, raising awareness of the consortium and incorporating principles in the solutions we are working on. Protecting data, maximizing the value received by VICINITY stakeholders, and raising awareness of what is being exchanged and on what level in a transparent and a secure way, is a major challenge that VICINITY aims to answer. We will build on previous studies from the FP7 program, as well as new commitments such as UK PETRAS IoT Hub which is focusing on privacy and trust among other topics.

Ethics Everywhere is a concept that would shape Data Everywhere and would need to drive the process and provide many answers impacting future development of the digitizing world.

Use case: Intelligent Building System

This use case will target the interconnection of smart objects under a “virtual neighbourhood” of intelligent buildings, addressing both geographic proximity as well as the use of energy profiles. These will allow neighbourhoods to negotiate as a group their potential forecast energy flexibility within a Smart Grid ecosystem, allowing the realisation of dynamic Demand Side Management (DSM) strategies. The use case will be deployed and demonstrated at Oslo Science Park consisting of four semi-independent buildings, as well as a basement parking garage, for a combined area of 55,000 square meters. The use cases at Oslo Science Park will have three main focuses. First, a use case on energy flexibility in buildings in a smart neighbourhood. The second use case is about Smart Parking/Booking/ Electric Vehicle (EV) charging and optimizating this across a local grid. The third use case is a Smart Grid use case to optimise local energy flexibility in a smart urban neigbourhood.

Ongoing activities:

The Oslo Science Park houses almost 2,400 office and laboratory workers. The use case explores and demonstrates how wireless sensors from Serinus Technology, EV chargers from Meshcrafts and general data capture can be utilized in a smart neighborhood setting. The goal is to spend less money on energy, while improving the indoor environment for the people who use the premises. Smart EV chargers will allow them to recharge their vehicles while parked.

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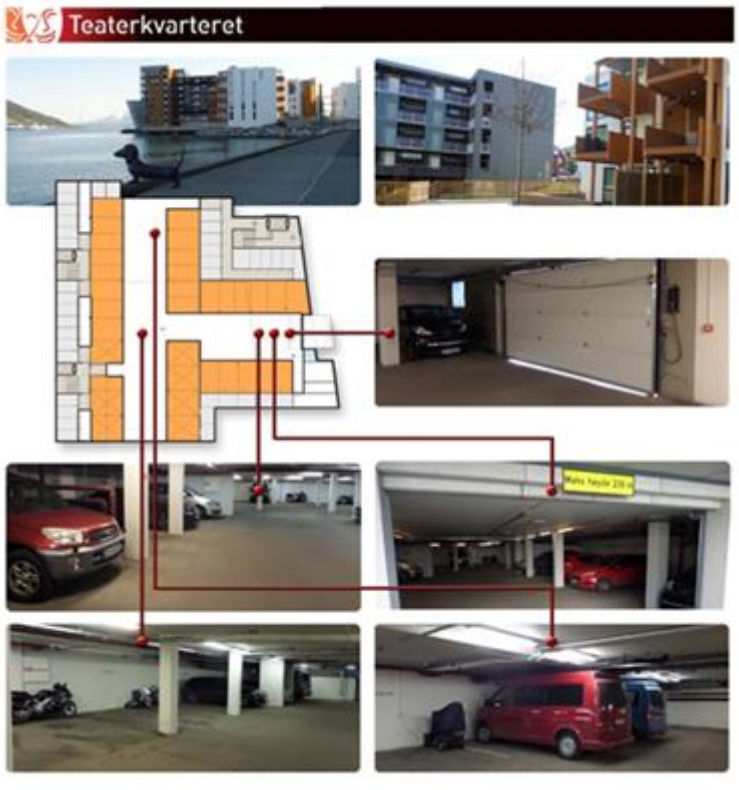
Use case: Smart Parking

The Smart parking demonstration is located in Tromsø, Norway offering an extendable service for sharing available parking space. The initial test site is located in a newly constructed cluster of a living community for residents, elderly and young people, some of them requiring health and assistive service from the municipality. The area is crowded with appartments, offices, theater and amusement activities with less and less outdoor parking space. The demo site is a small and manageable providing services for residents to be supported by IoT devices.



Ongoing activities

Most of the value-added opportunities that have been offered lies within sharing parking space for shorter and longer periods, when a resident wants to share his space. Health care personnel and ambulance/blue light agencies will be the first group to benefit from this new service. Also, sharing parking spaces will be offered when larger events, like conferences and concerts are taking place in this neighbourhood.

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Use case: Smart Energy System

The Use Case in Alcoutim, will target collaborative management of a community-scale energy ecosystem linking the Solar Lab, Demonstration Platform, Meteo Station and a cluster of Municipal buildings. This energy ecosystem will form a data exchange with flows from both the Generation and Demand sides. Data will be obtained from sensors and build information models that will allow for information to be generated upon which an environmental quality service can be provided for the Municipal Building Smartgrid environment including the School, Swimming Pool and Retirement Home as well as the SolarLab facility.

Ongoing activities:

An energy audit of the Municipal Buildings was performed by ENERC, with a view on identifying the current energy profile of the buildings, and understanding their historic energy performance. In a next step, sensor types will be selected based on the data requirements for each use case, and deployed along with a smart meter system for additional data output. Deployment of IOT enabled white goods from Gorenje is also under study to add to the cross domain use case environment, and further applicable use case implementation.

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Use case: Smart Health/Assistive Living System

This Use Case will demonstrate how sensors, actuators and integrated communication devices installed at home can provide assisted living to elderly people and people with long terms needs, allowing remote monitoring of end-users' health parameters and providing them direct means of communication with a 24-hours call centre with specialist staff in case assistance is needed.

Ongoing activities:

The Municipality of Pilea-Hortiatis is currently operating an eHealth at home scheme, installed and maintained by GNOMON partner, supporting around 50 registered homes in the municipality area. In its current state, the solution comprises of below equipment:

- A communication device, installed in-line with the user's regular telephone device.
- A pressure monitoring device and a weight monitoring device.
- A wearable "panic button", allowing contacting the call center with a single tap at any time of day.
- Special fall detection sensors, worn around the neck.
- A wearable GPS Positioning device for elderly people with dementia.

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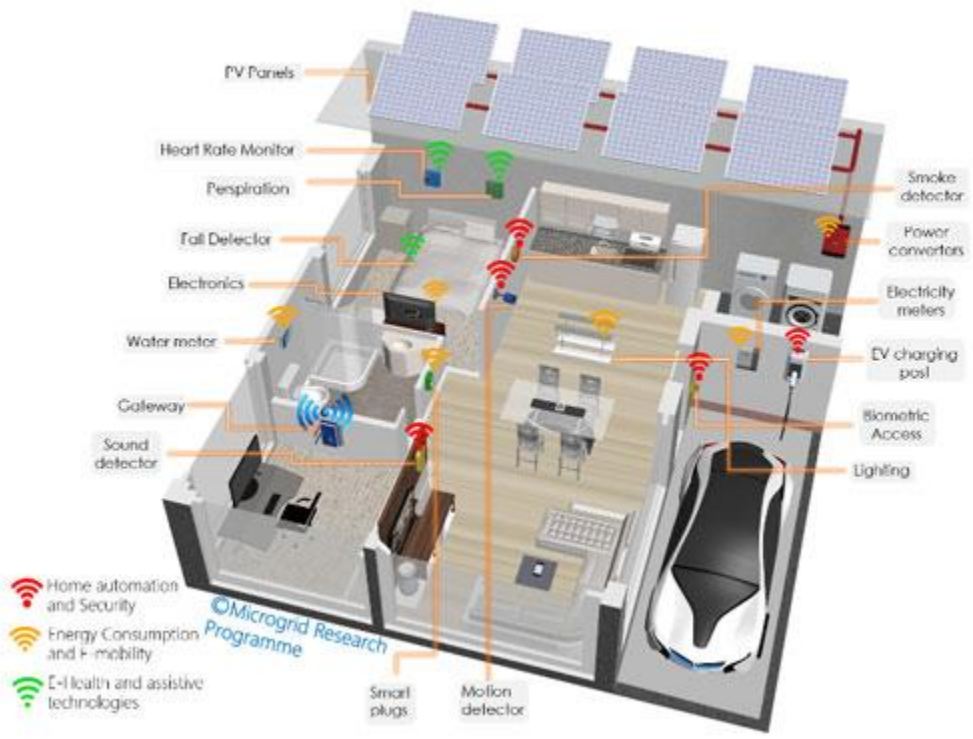
Lab tests

Lab test: AAU Microgrid IoT Laboratory

The AAU IoT home laboratory is located in Aalborg University, Aalborg, Denmark. It will be used as a demonstration of a home microgrid with smart devices for residential applications.

The Energy Management System (EMS) in addition with the smart devices will allow the user to have full-access to the system´s information, and also provides the user the option to remotely control the system. Smart devices will work and provide valuable information to the EMS as described, to manage efficiently the home microgrid. It is expected that the energy management system together with the smart products will enhance the overall system performance and users experience, reaching new levels of flexibility, controllability, comfort and efficiency.



Ongoing activities:

2 kW PV panels and a 2 kW wind turbine are installed on the roof of IoT home laboratory. Electronic appliances (laptops, cellphones, LED lights, home entertainment systems and white goods) are already placed in the living area and kitchen area of the home lab.

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Lab test: ATOS IoE Laboratory

The lab addresses technological contributions in the scope of IoT components, connectivity, platforms and services integration, fostering the usage of open and standard technologies, while also ensuring wider adoption and implementation of the IoT paradigm. The lab is moreover composed by a multidisciplinary technological team targeting embedded systems, sensorized devices, open web technologies and the application of best-practices, agile developments and continuous integration through a self-designed platform and integration services.

Ongoing activities:

ATOS lab could provide a heterogeneous cluster of different ARM platforms managed through an infrastructure and software management system; enabling developers to implement and test easily and simulating production environments.

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Lab test: UNIKL Test Laboratory

In order to validate the correct behaviour of the VICINITY in the early development phases, that is before actual deployment in the field, a model-based development process is reasonable. With the Test Lab at University of Kaiserslautern (UNIKL), this will be met to an extend, that “virtual” devices are connected to the VICINITY Server. That way real use-cases can be simulated, analysed and the correct behaviour can be validated before deployment. The overall structure is shown in figure 3:

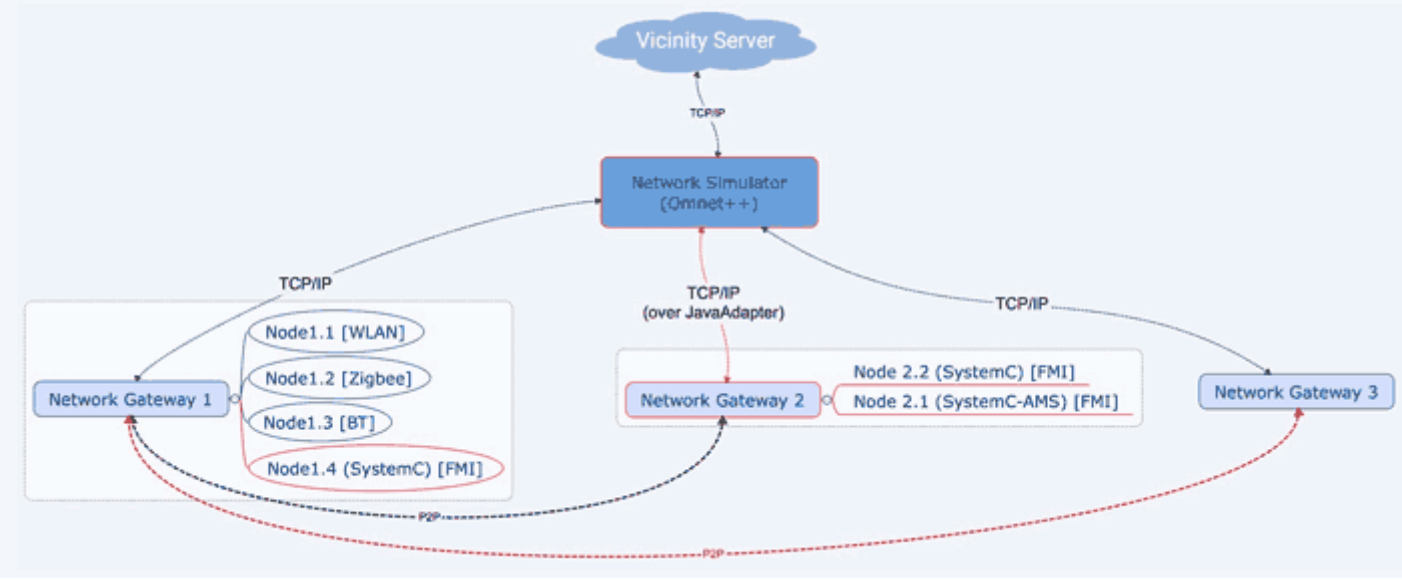


Figure 3: Overview of virtual Environment

A network Simulator is directly connected to the VICINITY-Server on one side, and to a variety of real and simulated devices on the other side. The devices themselves are communicating via different Network Gateways. They can be pure virtual devices/gateways (marked in red) or real existing ones. Both are integrated seamlessly into the VICINITY, enabling the simulation and evaluation of any possible IoT Scenario. Performance, scalability and runtime behaviour will be evaluated with the ultimate goal of simulating a "virtual Oslo" (see Use case – Intelligent Building System).

Ongoing activities:

Not all devices in the IoT are directly connected to the Internet. For those devices, an IoT Gateway is necessary to establish the connection between devices and the VICINITY (or any Cloud) Server.

Currently UNIKL is evaluating existing hardware- and software platforms for IoT Gateways. A full list of considered platforms is shown in Project deliverable D2.1.

Furthermore, an IoT Developer Survey from April 2016 by The Eclipse IoT Working Group, IEEE IoT and AGILE IoT showed, that the most dominant messaging protocols in existing IoT deployments are HTTP (REST) and MQTT. These will be analysed in terms of scalability and performance in order to evaluate their value and possible use for the VICINITY.

Lab test: CERTH Test Laboratory

CERTH Test laboratory comprises the Institute's main offices and a dedicated experimental Smart House. Both

buildings are equipped with numerous IoT sensors and automation infrastructure to facilitate the experimentation and test operation of the VICINITY framework at the early stages of its development. In particular:

- The offices building comprises of offices where CERTH personnel work and interact during their every-day operations. Most areas are fully equipped with IoT oriented devices and sensors allowing real-time monitoring of environmental, energy and consumption related information, further allowing interaction and control at device level. This building will be the primary test bed infrastructure for the VICINITY platform, allowing valuable information to be extracted during implementation and integration phase, rendering the evaluation and validation processes feasible and more close to real case scenarios.
- The Smart House is a real house simulation building where occupants can experience actual living scenarios, equipped with a vast variety of sensors, actuators and smart devices and intelligent robots, being capable to provide an useful test bed for the experimentation of all foreseen use case scenarios of the VICINITY framework.

Ongoing activities:

Different IoT sensors and infrastructures have already been promoted for integration in the Smart House, in particular for the eHealth use case, to be demonstrated in real housed of municipal citizens of the nearby Municipality of Pilea-Hortiatis in Greece.

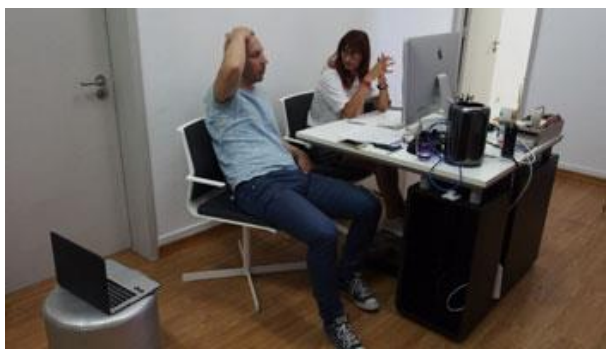
Pilot site visits

A number of site surveys took place during the year, so that the team could visit the site of future DEMO implementation. Teams from Enercoutim (ENERC), Tiny Mesh AS (TYNM), bAvenir s.r.o. (BVR) and HAFENSTROM AS (HITS) surveyed relevant parts of the site, participated in organised workshops with a range of stakeholders within each domain ecosystem and discussed the development of use cases in order to prepare for implementation. These face to face meetings and site visits resulted in a deeper understanding of user requirements, needs and expectations towards IoT implementations overall as well as what customers expect from VICINITY solution.

Visit 1: Martim Longo and Alcoutim, Portugal

1st - 3rd of August, 2016

The team visited the Municipality of Alcoutim and held discussion with the technical team, the Solar Lab at Solar Demonstration Platform, the Platform operations and maintenance facility as well as the Municipal buildings cluster.



Visit 2: Oslo Science Park and Municipality of As, Norway

22nd - 25th of August, 2016

TINYM hosted a site visit and workshop with Forskningsparken facilities management team that is overseeing building management. A visit to the Oslo Start-up Lab and discussions on the demonstration potential of the Lab were held with the lead team of this accelerator. Oslo Start-up Lab is an accelerator for more than 100 start up companies. It has IoT laboratory to provide access to the latest technology, allows for demonstration support and cross leverage of solutions. The VICINITY team also held discussions with Municipality of As and visited Renewable Energy cluster organisation to discuss dissemination and collaboration opportunities.



Visit 3: the Municipality of Pilea-Hortiatis Region, Greece

1st-2nd of September, 2016

The Municipality of Pilea Hortiatis together with CERTH organised a two-days' workshop in Thessaloniki, in order to bring together municipal health services and technical stuff, in order to properly address the challenges of the VICINITY eHealth Use Case demonstration. People from the assisted living services and social care personnel participated in the workshop giving the opportunity for a thorough analysis of the particular requirements and problems anticipated so far, together with interested lessons learned that should be taken into account. The scope of the workshop was to find ways to extend and broaden the scope of the use cases towards providing cross-domain and multi-functional services to the municipal citizens, further revealing the potential and added-value services that can be brought by the VICNITY infrastructure. Furthermore, a set of useful and challenging cross-domain value-added services where identified and drafted, to allow the demonstration of the VICINITY concept within real-life environment.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Visit 4: The Smart Parking site in Tromsø, Norway

4th of December 2016

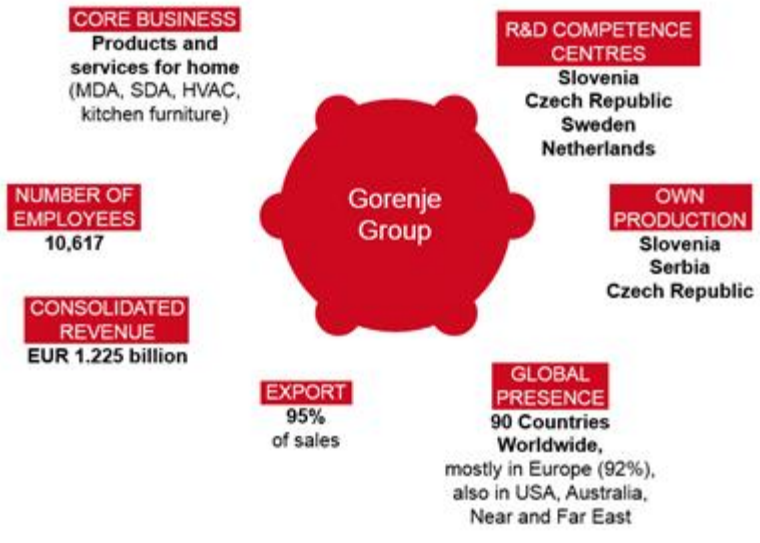
The VICINITY team traveled to Tromsø and visited a residential cluster of buildings where the location of the future smart parking site is. It is directly linked with recently built and functioning home care apartments. The team managing the apartments was engaged in prioritisation of needs discussions. A workshop was held with the regional government representatives in charge of international projects management during the visit as well. Cross dissemination and open discussion of all the use cases in VICINITY took place and further need for ecosystem building was recognised and supported by local stakeholders. This activity was positioned as part of continuous information exchange and visits to the demonstration sites.




Gorenje - Non-Technical challenges in VICINITY

Gorenje Group is moving from being a traditional manufacturer of white goods to services-oriented organization, through participation in various national and international R&D projects such as VICINITY. Gorenje is developing connected home appliances from premium and upper/mid segments, mobile application, and other IT solutions, as well as contemporary business solutions. Connected appliances are being developed but are not commercially available yet. These will be enabled by the services which are planned to be demonstrated by VICINITY. Using a holistic digital business transformation approach, Gorenje Group will enable provision of digital services for users of connected home appliances. Gorenje Group is taking this journey together with reliable technology partners with proven references through the VICINITY project.

One of Leading European Manufacturers of Products for Home



Business Transformation

IoT technology not only brings technological innovations but will change the business map in which consumers will be looking for comprehensive solutions and not just individual unconnected products or services.

The traditional product manufacturers will have to refine their business models towards service-oriented business models. In particular, solution providers will be strongly connected with providers from other, complementary industries.

The household appliances industry is already in the middle of intensive development in the direction of digitization of its solutions.

Expectations

IoT, in the term of connected home appliances and smart apps, along with modern business models will enable Gorenje Group to bridge the gap with consumers, i.e. establish the B2C relationship.

We will be able to understand how our products are used, what works and what doesn't, as well as what our customers' habits are and what solutions they need. Connected home appliances with complementary services will allow Gorenje Group to:

- Retain its existing sales and create new revenue from sales,
- Optimize the productivity of its business processes and the related operational costs.

Milestone

- IoT EPI Review Meeting
  13 Oct. 2016, Vienna
- VICINITY IoT-EPI Common Meeting and General Assembly
  21st to 24th of June 2016 Read More
- VICINITY project broadcast on German Television

21 January 2016 Read More

- VICINITY kick-off meeting: Starting the quest towards IoT connected virtual neighbourhoods!
  20-22 January 2016 Read More

State of the Union

Synergies with IoT EPI

The collaboration with IoT EPI offers VICINITY the potential to boost its reach while keeping costs under control. Collaboration among all ICT-30 projects and being represented in large events as a group provides VICINITY a higher visibility among IoT stakeholder, meaning not only big companies, but also developers and start-ups ecosystems.This collaboration has already taken place in events like IoT Week and IoT Meet-up in Belgrade and Vienna, and we are actually involved in the preparation of several events with different communities engaged.

VICINITY role in IoT EPI events

VICINITY as one of the RIAs is committed to contribute to the events with the material that is requested by the organisers. We have material available that includes the following assets already presented in previous sections of this document:

- Posters – covering project main message and description of the pilots
- Slidesets – providing deeper insights of the activities that are planned
- Videos – Summary of 2 min of the main activities of the project and the approach VICINITY follows.
- Leaflets – showcasing the pilots and the ecosystems

Introducing the Members of the VICINITY Stakeholders Advisory Board

We are delighted to announce the members of VICINITY's Stakeholders Advisory Board (SAB): a body that is intended to support, guide and challenge VICINITY during the project as we continue to influence and contribute to IoT.
The SAB consist of the following members (in alphabetical order):

Name	Role	Domain of expertise
Dr. Pantelis Angelidis	Founder & CEO of Vidavo	eHealth
David Boswarthick	ETSI Secretariat, Smart Cities and IoT	Smart Cities Standards
Charles Brookson OBE	Chair ETSI TC Cyber	Security Standards
John Davies	Chief Researcher at BT	Expert in Big data & IoT
Omar Elloumi	Nokia, Chair oneM2M Technical	M2M Standards
Mike Perry	Senior Consultant, Buildings Research Establishment	Smart Buildings
Dolores Ordoñez	Director of AnySolution	SmartCities / SmartDestinations
Prof. Antonio Ruano	Member of the Portuguese Associated Laboratory for Energy	Energy
Björne Grimsrud	Strategy and Development Director Statsbygg	Intelligent Buildings
Leif Næss	PhD, MBA, University college of Southeast Norway Campus Kongsberg	eMobility

Latest news and upcoming events

Latest news

- VICINITY project presented by CAL at "Boring but lucrative, the real Internet of Things" workshop on December 15, 2016 in Cambridge, UK.
- VICINITY participation in the ETSI IoT/M2M workshop in Sophia Antipolis, 15-17 November 2016.
- VICINITY project presented by AAU at IOT Solutions World Congress on October 27, 2016 in Barcelona, Spain.
- VICINITY project presented by CERTH, GNOMON and OTE partners at "eHealth FORUM 2016" on October 25, in Athens, Greece.
- IoT EPI Review Meeting on October 13, 2016 in Vienna, Austria.
- VICINITY workshop on "VICINITY eHealth Use Case definition" organised by CERTH on September 2, 2016 in Thessaloniki, Greece.
- VICINITY workshop on "Ways to strengthen e-health in Municipalities" supported by CERTH on July 27, 2016 in Thessaloniki, Greece.
- VICINITY project presented by ATOS at IoT Week on June 2, 2016 in Belgrade, Serbia.
- VICINITY project presented by UPM at “ifcOWL-SAREF-FIEMSER VoCamp” organised by SWIMing Project on March 22, 2016 in Dublin, Ireland.
- VICINITY project at “Internet of Things in the Smart Home” workshop organised by ETSI on March 21, 2016 in Sophia Antipolis, France.
- "Cyber Risk and Connected/Autonomous Vehicles" organised by GCHQ & CCAV, 22 Feb 2016, Oxford University, UK.
- VICINITY project presented by CERTH at AIOTI Open Day on February 8, 2016 in Athens, Greece.
- VICINITY presentation by Enercoutim at Startup Europe Week on February 4, 2016 in Martim Longo, Portugal.
- ENERC will co-organise Microgrid Forum and present VICINITY in November 2016 in Lisbon.

Upcoming events

- VICINITY General Assembly on January 24-25, 2017 in Bratislava.

Scientific and technical publications

Five scientific and technical papers have been published in international journals and magazines, and at international conferences.

- A knowledge discovery in databases approach for industrial microgrid planning. / Gamarra, Carlos; Guerrero, Josep M.; Montero , Eduardo. Renewable & Sustainable Energy Reviews, Vol. 60, 07.2016, p. 615–630.
- Optimal Real-time Dispatch for Integrated Energy Systems: An Ontology-Based Multi-Agent Approach. / Anvari-Moghaddam, Amjad; Rahimi-Kian, Ashkan; Mirian, Maryam S.; Guerrero, Josep M. 7th International Symposium on Power Electronics for Distributed Generation Systems (PEDG’16). IEEE Press, 2016. p. 1-7.
- An Efficient Multi-objective Approach for Designing of Communication Interfaces in Smart Grids. / Ghasemkhani, Amir; Anvari-Moghaddam, Amjad; Guerrero, Josep M.; Bak-Jensen, Birgitte. Proceedings of IEEE PES Innovative Smart Grid Technologies (ISGT 2016). IEEE Press, 2016. p. 1-6.
- Development and Integration of a HEMS with an Advanced Smart Metering Infrastructure. / Diaz, Enrique Rodriguez; Palacios-Garcia, Emilio; Savaghebi, Mehdi; Quintero, Juan Carlos Vasquez; Guerrero, Josep M. 2016 IEEE International Conference on Consumer Electronics (ICCE). 2016. p. 544 - 545.
- Intelligent DC Homes in Future Sustainable Energy Systems: When efficiency and Intelligence Work Together. / Diaz, Enrique Rodriguez; Quintero, Juan Carlos Vasquez; Guerrero, Josep M. IEEE Consumer Electronics Magazine, Vol. 5, No. 1, 03.2016, p. 74 - 80.
- European Patient Summary Guideline:Focus on Greece. / Alexander BERLERa,1 Anastassios Tagarisb and Catherine CHRONAKI. 13th International Conference on Wearable, Micro & Nano Technologies for Personalized Health (pHealth). 2016, p. 1-6.

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