

# Newsletter

January 2019 - March 2019



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

## Editorial

Dear VICINITY partners & friends,

You get this newsletter in a moment where VICINITY has reached the most important milestones: we have successfully implemented the platform; and the deployment to the demo sites is mostly done. Based on this we have investigated a set of business and exploitation models, and defined our unique selling points. We have been reviewed with very good outcomes and advices by the reviewers (read the summary below!).

Now, we have to disseminate and exploit the platform – and to improve the main USP to achieve leadership there. We hence face a number of events to “sell” our platform to a broad audience.



**Prof. Dr. Christoph Grimm**

*Coordinator of VICINITY project  
Technische Universität Kaiserslautern*

And, last but not least, there is a second open call ahead of us – find enclosed a brief status update.

I wish you and all our VICINITY a happy Easter.

## Latest News and Upcoming Events

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### Latest news

- VICINITY #7 General Assembly Meeting was held, 16<sup>th</sup> - 17<sup>th</sup> Jan. 2019, London, England.
- [ATOS organised a workshop - “Madrid ATOS EIT” and presented VICINITY project, 10<sup>th</sup> Jan. 2019, Madrid, Spain.](#)
- [Second Open Call Webinar was held on 31<sup>st</sup> January 2019.](#)
- [VICINITY output regarding Platform, Value-Added Services and Adapters on VICINITY Catalogue that has been added to VICINITY Website.](#)
- EC VICINITY review meeting was successfully held, 1<sup>st</sup> March 2019, Brussels, Belgium.
- [VICINITY Participation in Industry 4.0 Hackathon, 8<sup>th</sup>-9<sup>th</sup> March 2019, Prague, Czech Republic.](#)
- Enercoutim organised two stakeholder workshops and presented VICINITY project, 28<sup>th</sup> March 2019, Martim Longo, Portugal.
- VICINITY partners joined Urban marathon, 31<sup>st</sup> March 2019, Pilea-Hortiatis, Greece.

### Upcoming events

- [OTE as one of the Technical Program Committees is co-organizing the 1<sup>st</sup> International Workshop on Security and Reliability of IoT Systems in which](#)

[VICINITY project has a special session. The workshop will be held on 29<sup>th</sup> - 31<sup>st</sup> May 2019, Santorini Island, Greece.](#)

- [VICINITY project will join IoT week 2019, 17<sup>th</sup> - 21<sup>st</sup> June 2019, Aarhus, Denmark.](#)

## Reviewers give positive feedback

We had a successful review meeting on 1<sup>st</sup> March 2019 in Brussels.

**Overall assessment:** Project has fully achieved its objectives and milestones for the period.

**General comments:** Since the last review, the project has been progressing as planned and has adequately implemented recommendations from previous reviews. It has been a critical but very productive period for the project with major deliverables on the development leading to several deployments. The project is now gearing towards the testing phase with promising results on the horizon. The open calls are interesting and show that there is interest in the idea with a new open call launched at the end of last year. The quality of the documentation delivered is high and has improved a lot during project's duration.

- The main challenge addressed by the project lays in interoperability, which shall allow connecting different IoT "islands" to foster cooperation between smaller and bigger stakeholders in IoT domain. This approach could become a real alternative to the current standard practice of vendor lock in. VICINITY's core contributions are on the open platform and gateway to offer interoperability. The specific mechanism used is P2P between VICINITY devices. ... The overall implementation of the core components is managed very well by Bavenir and has progressed according to the DOA.

- All deliverables and milestones have been submitted on time or with little delay, there is no concern for any delays or issues. All deliverables up to and including month 36 are considered accepted as well as Milestones 3, 5, 6 and 7 are recognised as completed. The project has focused a lot on quality control and delivers to a high standard often elaborating results well and beyond expectations.
- Management of the project and partners is adequate and matches the complexity of the project. Management reporting is excellent.

With excellent progress and implementations shown, the main challenge of the project for the last period lays now in the business case, exploitation and enhanced privacy issues.”



## VICINITY partners joined Urban marathon in Pilea-Hortiatis

The most innovative City Marathon ever taking place, the URBAN MARATHON of the Municipality of Pilea- Hortiatis, made its first event possible on Sunday March 31, 2019 with its participation in the 5th “Panorama Charity Fun Run”. The participants of the European pilot project “VICINITY- Open virtual neighbourhood network to connect IoT

infrastructures and smart objects”, met with the rest of the 3,000 participants in the charity activity at the endpoint.

The entrants were found at the starting point of 2km with lots of eagerness and received the stickers with the “VICINITY- URBAN MARATHON” logo. With their wearable 'fitness tracker' that keeps track of their daily exercise as well as their total points and a beacon that detects their presence through Bluetooth, they gained additional points for their participation in the 5th charity marathon of the municipality, which this year broke a record for participation. This, the first collective action of the participants for the promotion of the URBAN MARATHON program was made with enthusiasm. The participants took photos and received a commemorative diploma and a participation medal with the logo of the Municipality of Pilea-Hortiatis.

The "Panorama Charity Fun Run" is the first of the sporting events of the municipality to be held through the URBAN MARATHON, giving the participants the chance to win extra points and climb in ranking.

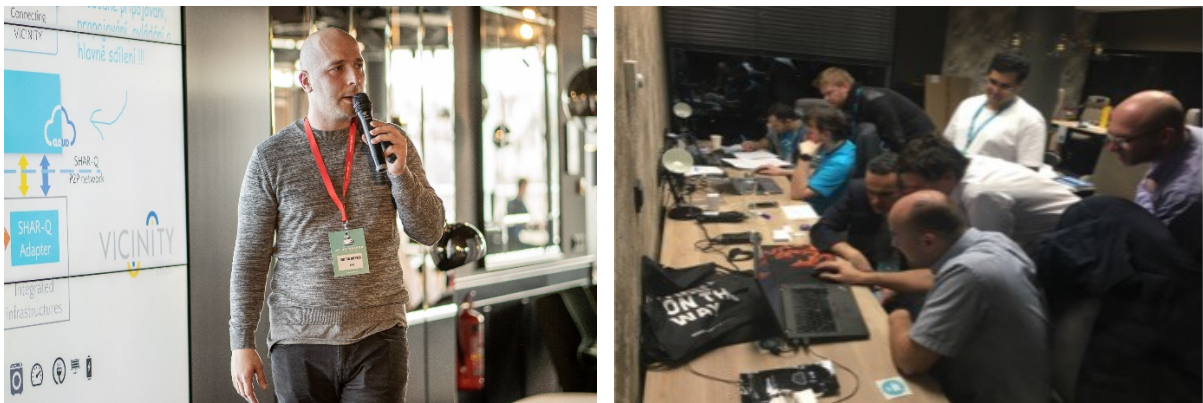


## VICINITY Participation in Industry 4.0 Hackathon

Top Industry 4.0 players in Czech Republic like Skoda, Siemens, SKANSKA, e-on and ATOS Czech Republic organized a 24 hour 1st Industry 4.0 Hackathon in Prague from 8-9 March 2019 to solve today's tough issues for industry (<https://www.iotea.cz>).

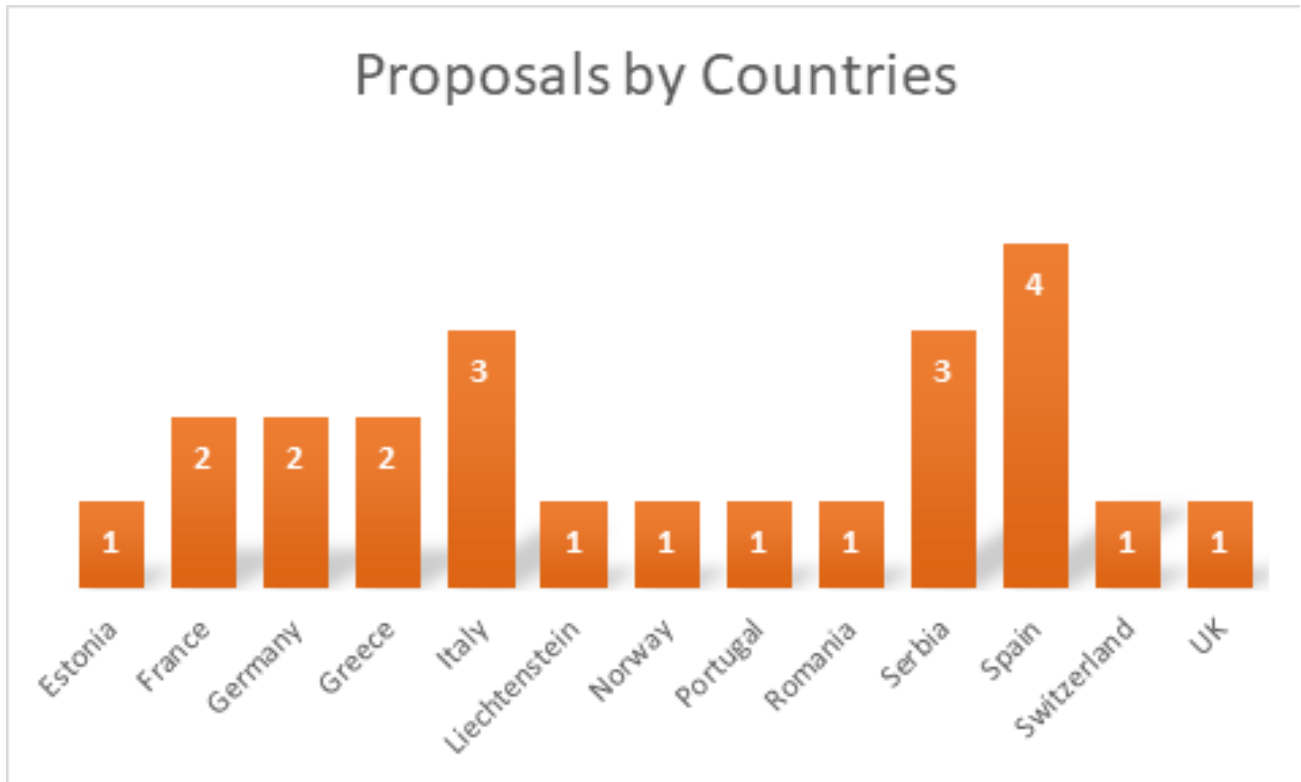
One of the eight challenges was focused on the energy domain to improve energy efficiency of powerplants. In this ATOS Czech Republic together with bAvenir opened with the "Connectathon" challenge to connect smart energy components to the "SHAR-Q energy collaboration peer-to-peer platform" and implement value-added services for available devices. Whilst the SHAR-Q Energy collaboration platform is built on top of VICINITY platform, it was great opportunity to test our IoT platform in real-life. One team

selected our challenge, where they decided to connect: Fronius photovoltaics in the platform implementing simple HTTP REST API adapter; Energy load data logger using MQTT adapter and a simple monitoring Value-Added Service using Siemens Mindshere tools set. With mentoring from bAvenir, ATOS Czech Republic and SIEMENS Mindsphere, the team presented integrated “prove of concept” with key innovation potential in the simplicity and openness of “VICINITY devices connectivity service” for industry 4.0 platforms.

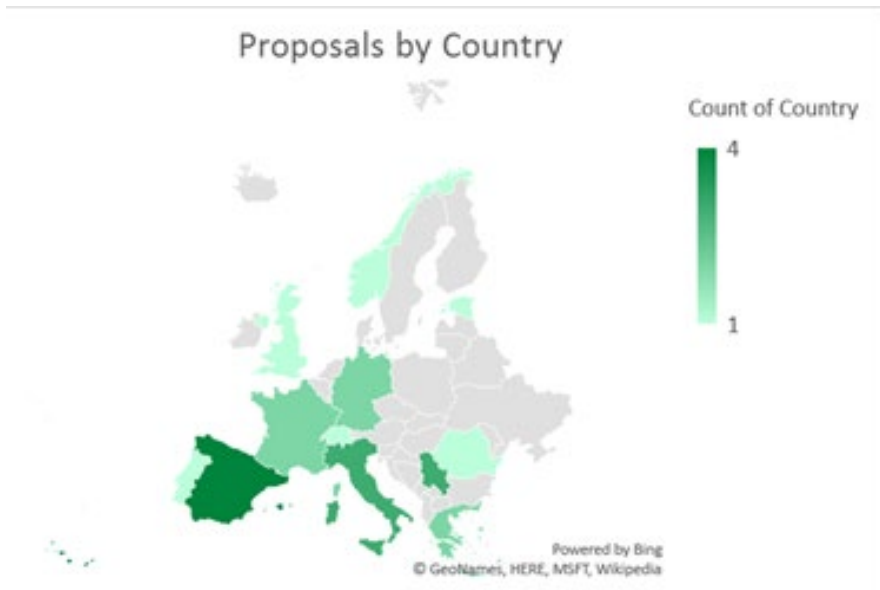


## 2<sup>nd</sup> Open call is closed

The deadline for the 2<sup>nd</sup> Open call was March, 15<sup>th</sup> 2019. Within this deadline 23 eligible proposals were submitted through the F6S platform, from applicants coming from 13 countries across Europe. The following figures give an overview of the origin countries within the EC and associated states, and of the domains of the proposals.

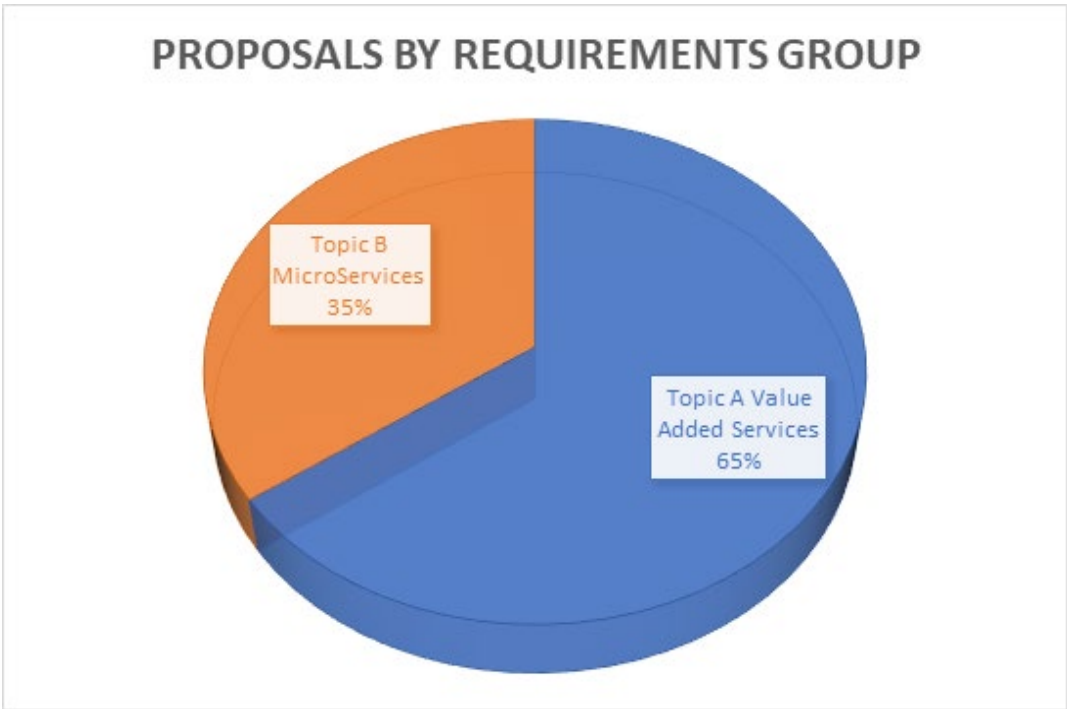


Proposals by Countries

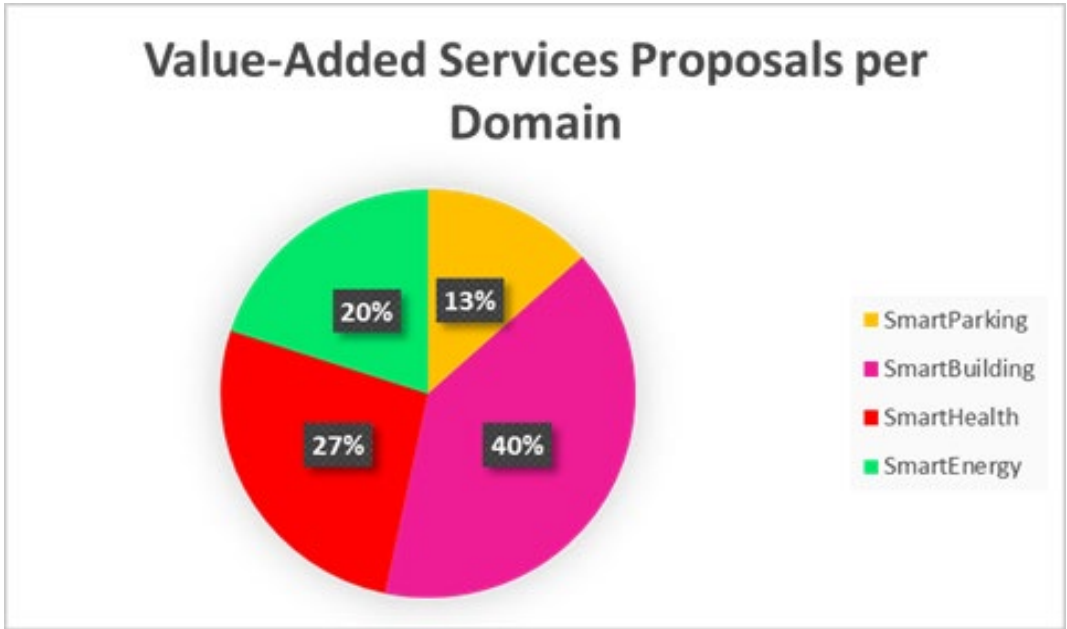




The proposals were covered the topics with the following distribution:



Requirements group per proposal



Value Added Services Proposals per Domain

Thank you all for your interest and your participation in our 2nd Open Call!

The evaluation process with external experts is still running. They support us in selecting the best applicants by highlighting the project proposals with the most potential impact. We would like to thank the evaluators for their tremendous effort.

## **Interview with one of 1<sup>st</sup> Open call winners – SaMMY**

### **Brief introduction about your company.**

SaMMY is a startup (spin off activity of Optionsnet) Company which offer IoT cloud-based services solutions for the Yachting Marina ecosystem, enabling the Marinas to efficiently manage their resources, attract and efficiently service more yachts and support the local markets by linking them with the yachting community. Its main goal is to simplify Yachting Marinas' operational processes, strengthening the yachters' engagement with them as well as with the surrounding economies and also offer easy-to-use online services to yachters and skippers.



### **Brief introduction about your project.**

SaMMY's architecture includes: a sensor grid network, gateways and data collectors, customised communication protocols between devices and systems, a unified RESTful-based data model and a series of services through web interfaces, plus a mobile

application (iOS and Android). The sensor data are processed so as to become suitable for the Marina Management's needs and also for the yachters/skippers/crew members. The network infrastructure and the low-level software components (agents and collectors) are used to transfer the data into the Cloud, which acts as the data storage pool for the various end-user services. The architecture of the platform enables interoperability with other IoT providers or systems, using open-source technologies and application-agnostic data models (RESTful-JSON).

During the implementation phase the SaMMY IoT infrastructure is planned to be integrated into VICINITY framework. A dedicated environment will be set up where a VICINITY Node is running. The SaMMY IoT infrastructure will be connected to VICINITY through the VICINITY Gateway API and VICINITY Adapter, parts of the VICINITY node, to provide support and cooperation with connected devices, IoT ecosystems throughout the project. A real time monitoring application will be developed, using the resources through the VICINITY Cloud in order to demonstrate the results of the project.

**How did you develop an interest in the VICINITY Open call? What motivated you to join the VICINITY project?**

The VICINITY Open Call was a very challenging opportunity to participate in an open platform from 15 experienced EU organizations from 9 countries and this partnership is well-linked with large telecom organizations that can be a catalyst to scale-up in world markets.

The global positioning of the platform, the range of the provisioned services, and the main target to accelerate the interoperability between different applications and service providers were the biggest motivators to participate in the VICINITY Open call.

**Tell us about your experience preparing the proposal.**

The preparation of the proposal required an understanding of the technological elements and infrastructure offered by the VICINITY platform. According to the guides and the help material provided by the VICINITY open-call website, the information that had to be presented in the different parts of the proposal was clear and well defined. Finally, the submission itself was a simple process through the online form provided in open-call website.

**What would you recommend to other participants in future open calls?**

VICINITY is a technological platform which offers a set of capabilities and technological infrastructure to build and demonstrate a bottom-up ecosystem of decentralised interoperability of IoT infrastructures called virtual neighbourhood, where users can share access to their smart objects without losing the control over them. It's worthwhile for future participants to explore the opportunities and technologies offered by the platform and try to join the VICINITY ecosystem.

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

SaMMY can definitely contribute to any IoT 'Smart City' or/and 'Smart Yachting' ecosystem, enhancing the availability of Yachting-Marina sector data resources. In this way cross-domain applications will be attracted to use these resources in order to provide added-value services and applications. VICINITY offers exactly what is needed for SaMMY to become a part of a unified, cross-domain data and information resource pool, extending its usage to new applications and services which combine Smart City, Smart Mobility and Smart Yachting related data and provide valuable services to its customers or other companies.

**What is, in your opinion, the ultimate goal expected to be achieved with help of VICINITY solution?**

The compliance gained by making the SaMMY platform an extension node of the VICINITY ecosystem, gives us the opportunity to interact with new platforms, in order to create and deliver new services for the specific target market (yachting and marine). The new services, based on the interaction between different vertical IoT platforms, will add value to our services and enable the use of its resources to VICINITY federation members or future potential third-party integrators. On the other hand, the VICINITY ecosystem will be able to build a database that may have multiple benefits for its members and also for the end-users or future service providers that may develop upon VICINITY's platform technology and results.

**Tell us about your experience participating in the project.**

Participating in the project is an excellent experience. There is very good cooperation both in technical and administrative domains, in order to achieve the objectives for the implementation of the project as well as the necessary procedures required at the administrative level.



**Interview with one of 1<sup>st</sup> Open call winners – Thinkinside**

**Brief introduction about your company.**

Thinkinside (<http://thinkin.io>) is an innovative startup headquartered in Trento, a high-tech hub in Northern Italy. The mission of ThinkInside is to transform indoor spaces in

measurable and interactive environments with, for example, location-based services. ThinkIN, the flagship technology developed and commercialized by ThinkInside, is an off-the-shelf solution able to monitor in an unobtrusive and privacy-preserving way the behaviour and position of people and assets throughout indoor environments; such data is processed to extract actionable KPIs and so to effectively drive business decisions and to support the delivery of real-time context-aware contents and services.



**How did you develop an interest in the VICINITY Open call? What motivated you to join the VICINITY project?**

The overall concept of VICINITY, and the interoperability as a service makes a lot of sense for us. Given our experience in the IoT indoor location area, which is characterised by a high degree of fragmentation and where each vendor is basically providing their own interfaces (with their own data model), an approach like the VICINITY one would have the potential to enormously speed up the development and integration process, as well as lowering the barrier for high-tech startups and innovative SMEs to enter the market. While we remain rather skeptical on the cross-domain use cases (we never saw actual market demand for any!) we do acknowledge that the re-use of the same IoT infrastructure across different use cases (and by different service provider) is a key element in the sustainable growth of the overall IoT ecosystem.

**Tell us about your experience preparing the proposal.**

The overall proposal preparation was rather smooth. All the relevant information to better understand the VICINITY concept and its technical documentation was available on the

VICINITY web site. The proposal template was well structured and organised, making it easy to understand the expected contributions.

**What would you recommend to other participants in future open calls?**

What I believe is important is to have a very quick start into the projects. Seminars, workshops and F2F meetings can play a fundamental role in getting all open call winners up to speed, and focus on the technical developments of the projects. Complete software examples, and code reviews can be of additional help in this.

**What is your area of interest in VICINITY and how do you think you will contribute to the project?**

We are interested in providing a set of standard and actionable APIs (based upon the VICINITY ones) which are able to overcome fragmentation of technologies and services in the indoor positioning area, enabling interoperability across IoT technology, platforms and domains with the aim of unlocking the full potential of IoT applications.

**What is, in your opinion, the ultimate goal expected to be achieved with help of VICINITY solution?**

The ultimate goal of INCANT project is to provide a Location as a Service (LAAS) platform fully integrated into the VICINITY ecosystem. This will consist of a complete set of software tools and services required to design, deploy and manage indoor location-based services in different application scenarios and domains.

**Tell us about your experience participating in the project.**

Experience has been very positive. We have been incrementally diving into the project, both at the conceptual and development level. Participating to the plenary meeting in London was very helpful to get to know project partners, understand and discuss technical aspects, and discuss possible co-creation scenarios.

## Interview with one of 1<sup>st</sup> Open call winners – PilotThings

### **Brief introduction about your company.**

Pilot Things ([www.pilot-things.com](http://www.pilot-things.com)) focus is IoT Data as a service: we transform sensors to structured data. Our novel approach helps cities and industries to leverage IoT. Our software Pilot Things is compliant with the oneM2M worldwide standard since its the origin thanks to a collaboration with the research laboratory LAAS-CNRS. oneM2M is based on a centralized architecture with interworking and semantic representation capabilities. oneM2M suits very well the integration of multiple buildings protocols.



### **Brief introduction about your project.**

Our project fits in the smart building and energy management use case. The main objective is to build an infrastructure for facility management companies to help them deliver energy management services.

### **How did you develop an interest in the VICINITY Open call? What motivated you to join the VICINITY project?**

Before joining VICINITY, we used the oneM2M standard to collect building energy consumption data. Building a demand-response energy infrastructure is all about ecosystems. We see in VICINITY an easy way to build an ecosystem using their innovative neighbourhood concept.



**Tell us about your experience preparing the proposal.**

Our experience was great! The VICINITY team did a fantastic job with the open call webinar session and the awesome materials. It helps very much to understand the concepts and the objectives of the open call.

**What would you recommend to other participants in future open calls?**

We recommend the future participants to bring new data to the existing use cases. We strongly believe that the value of VICINITY is to foster data exchange. It is easier and valuable to exchange data from different sources in the same area of interest.

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

Our main interest is energy saving which is key for our customers like cities and building management companies. We believe our main contribution is to bring the oneM2M standard bridge to VICINITY.

**What is, in your opinion, the ultimate goal expected to be achieved with help of VICINITY solution?**

The ultimate goal would be to share data as easy as water... which makes “data liquid” !

**Tell us about your experience participating in the project.**

The project is very well organized and give us flexibility in the same time which is key for innovation.

**Interview with one of 1<sup>st</sup> Open call winners –  
WearHealth**

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**Brief introduction about your company.**

WearHealth helps industrial companies to improve workers' safety, health and productivity by detecting emergencies and hidden risk factors in real-time with AI and IoT/Wearables.



**Brief introduction about your project.**

The goal of our project within VICINITY is to demonstrate the advances in the IoT interoperability of new value-added services. To do so, we connect our interoperable AI platform through the VICINITY open gateway API; and showcase how different wearable devices geared towards improving workers' safety and health, can be accessed and controlled remotely.

**How did you develop an interest in the VICINITY Open call? What motivated you to join the VICINITY project?**

The VICINITY Open call was very interesting for us because our products are based on an AI platform that analyses data from wearable / IoT devices in real time, and they are implemented in industrial environments. Consequently, one of our key challenges is wireless IoT communication. In this regard, we were motivated to join the project because the VICINITY IoT gateway/technology could be key for us as it will allow us to better control the core of our products in terms of interoperability, security, data privacy, hardware configuration and software integration.

**Tell us about your experience preparing the proposal.**

The experience of preparing the proposal was very straightforward because the supporting documentation was available from the beginning and we understood very clearly how WearHealth and VICINITY could cooperate to add value for end users.

**What would you recommend to other participants in future open calls?**

If they are working on IoT-based services, we would definitely recommend them to explore the potential of VICINITY because decentralization and interoperability are key aspects in the development of sensor-driven solutions.

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

Our main interest is to manage different IoT and Wearable devices with VICINITY, so we have developed connectors for such devices that are able to communicate directly with the VICINITY Cloud. By doing so, we expect to contribute not only to improving our safety and health solutions but to other companies that want to develop additional services with similar IoT devices.

**What is, in your opinion, the ultimate goal expected to be achieved with help of VICINITY solution?**

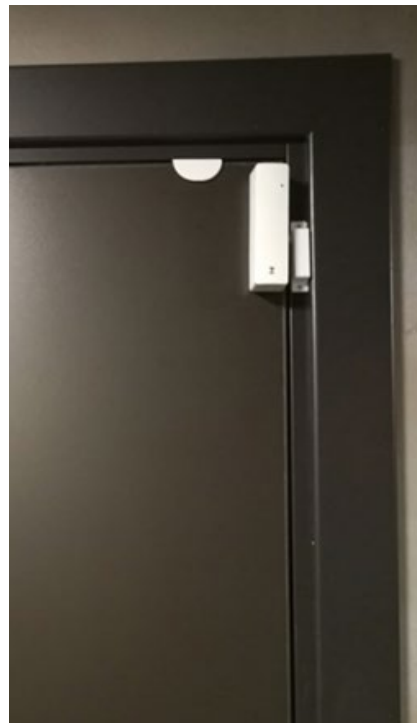
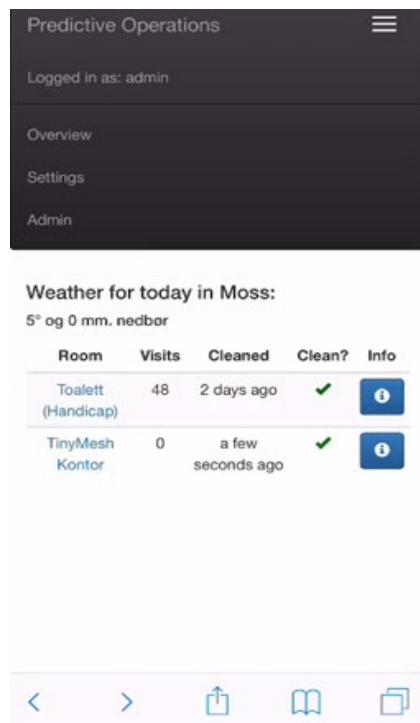
The ultimate goal for us is that Industrial IoT applications or services are based on a decentralized and interoperable IoT infrastructure.

**Tell us about your experience participating in the project.**

The VICINITY documentation and the support from the technical team was key to achieve our goals. We are very thankful for their commitment and support helping us solve problems.

## Oslo Pilot Site (NO) – Buildings

The Oslo Pilot Site focuses on improving resource management, resource consumption and enables predictive operations in buildings by using wireless door sensors, as well as wireless power sensors. The two Value-Added Services will inform and send alarm messages to the management team if a threshold has been passed. The information will enable them to prioritise their cleaning efforts, regulate the power supply or more generally track their resource consumption, all in real-time, thus saving time and money.



Use Case 1a.1 - Room Usage Predictive Operation

The Pilot Site's Value-Added Services, as well as all IoT devices related to their respective use cases, have been deployed. The software had undergone rigorous testing, which has been a formal requirement to ensure uninterrupted operation. Use Case 1a.1 - Predictive Operation (shown above) has been up-and-running and is currently being taken for a test-drive by a cleaning company - Den Lille Hjelperen.

We are excited to inform that we are working on adding more sensor devices and new functionality to extend the capabilities and the benefits provided by the Pilot Site. The collected feedback from Use Case 1a.1 - Predictive Operation assessment trial will serve as a basis for further improvements to the design, features and the quality.

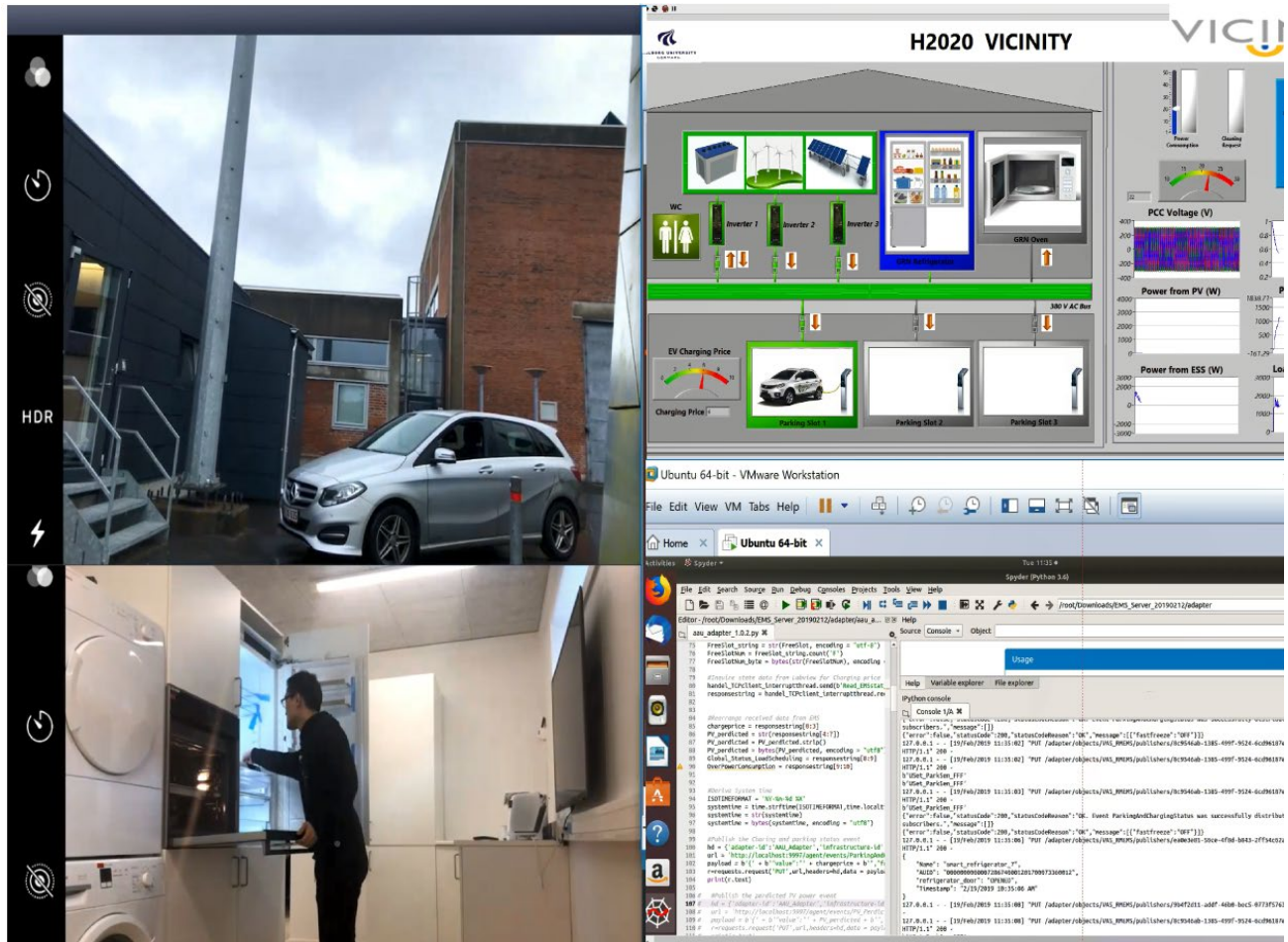
## **VICINITY testbed deployment, including Validation, Parameterization and Testing**

In order to further ensure that the VICINITY platform operates correctly from a technical perspective prior to deployment at the pilot sites. Intensive and iterative Lab tests have been conducted on the Hardware-in-the-Loop/experimental platform in four different lab setups (AAU microgrid-IoT lab, CERTH/ITI Smart House, ATOS IoE lab, and UNIKL lab). Two kinds of testing plans (edge cases and internal point cases) were designed and performed based on Edge Case Testing Methodology to have a good coverage over the range of values.

The edge testing cases consist of 3 testing scenarios. The first test focused on stress registration properties and it has been verified that the VICINITY prototype can successfully deal with a registration with at least 10,000 properties. The second test is to identify the limit of parallel registrations. The testing results show that 64 adapters in parallel is the Limit of simultaneous registration in current VICINITY platform with light payload. The third test is to validate the platform performance for a GET request with large size of payload. The testing results verify that the VICINITY platform can successfully manage a GET request with 200,000 data.

The internal testing points track the use-cases defined for the pilot sites to verify the functional performance of VICINITY core components, adapters and value-added services (VAS), and ensure the expected operation. The tests cover mobility, building, energy, and

eHealth domains and refer to privacy, GDPR VAS, LoRa, and FIWARE-compliant devices, an Omnet++ network simulator and the homomorphic encryption method. Moreover, it should be noticed that all the tests were passed directly or passed after corrections.



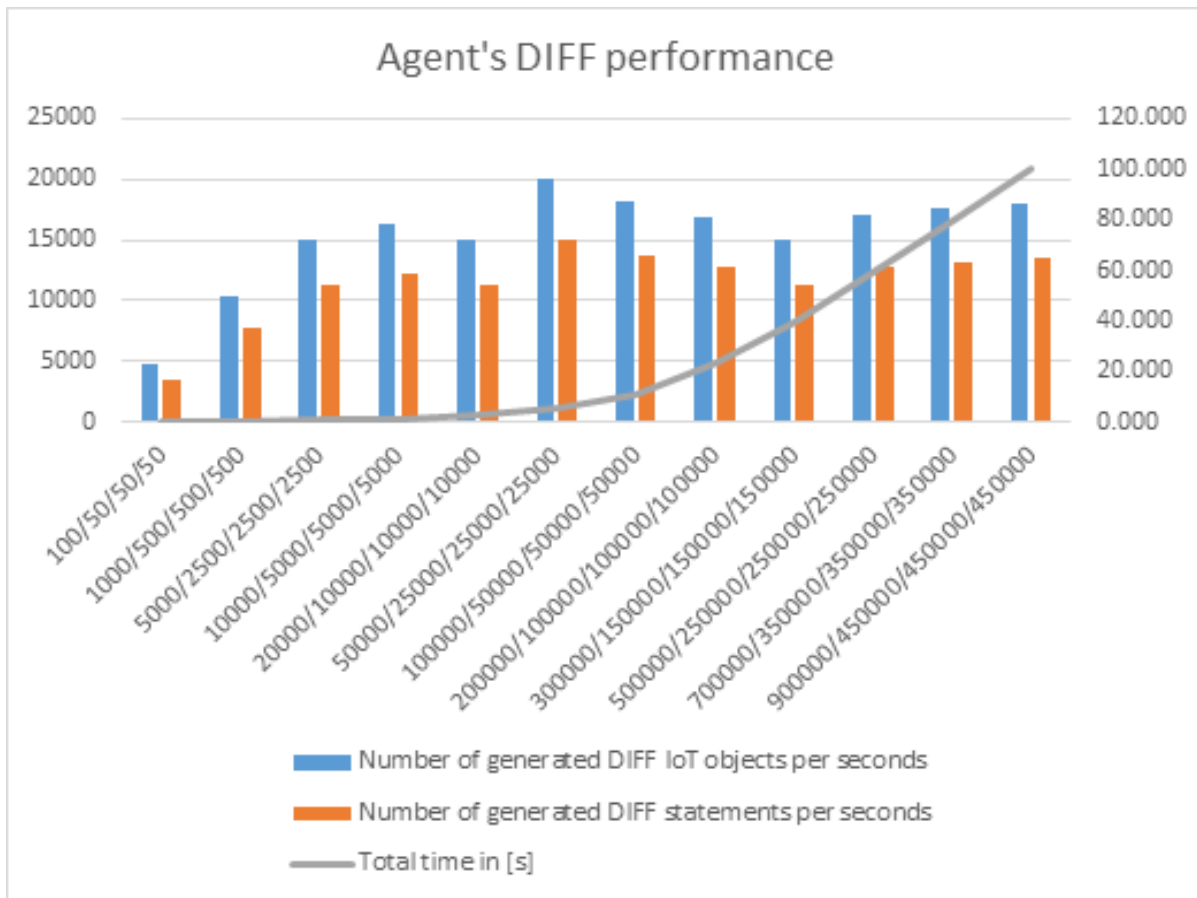
An internal testing case with a hybrid residential microgrid, GORENJE smart appliances, and three parking sensors in Microgrid-IoT laboratory of Aalborg University

## Auto-Discovery space deployment validation report

Semantic interoperability in the VICINITY platform relies on the VICINITY Agents at the client/node side, the Semantic Discovery process and the Agent Configuration Platform (SDACP) at the server/cloud side. SDACP in turn consists of semantic triplestore and the service that provides the API for manipulating IoT object descriptions stored in the triplestore.

During the validation process it was proved that:

- The auto-discovery process of the devices described in the VICINITY ontology is fully functional and accessible for the IoT platform adapters connected to the VICINITY Agent.
- The current implementation of the SDACP platform uses a Semantic graph database GraphDB for storing semantic triplestores. The GraphDB manages appropriate level of load generated by dozens of IoT objects per adapter and dozens of adapters per one VICINITY Agent.
- The core functionality of the Agent, which is responsible for updating the semantic repository, can perform 10 000+ DIFF statements per second and 15 000+ IoT objects per second (see the figure below)
- The Semantic repository available via the Semantic discovery, and configuration service, offers an average processing time for one insert operation of 0.09s, for one update operation 0.79s, and one delete operation 0.02s. However, the current development and testing installation of SDACP is based on the free licensed version of the GraphDB store that is limited to two parallel client sessions. This setup can dramatically reduce the scalability, which can be further enhanced by unlimited commercial version of GraphDB.



In the figure the X/C/U/D values on the x-axes have the following meaning – X is number of IoT objects in the Neighbourhood Manager (NM) for the given agent and its adapter. C is number of IoT objects to be created after the DIFF operation, U is number of the IoT objects to be updated and D is number of IoT objects to be deleted in the NM.

**IoT enabled solutions for Climate change adaptation and digital Solar futures within Martim Longo Demonstration pilot**





*Interview with Xander van Mechelen, CTO Kipp & Zonen, by VICINITY - Natalie Samovich, Head R&I, Enercoutim, demo pilot manager.*



Installation of UV-E sensor at SOLAR Lab 1

Enercoutim team is co-creating a number of solutions to launch data marketplaces enabled by Kipp & Zonen equipment and the VICINITY platform. Enercoutim is working on providing value-added advisory services for citizens on safe limits of solar exposure and on optimisation of resources mobilization for PV panels washing, leading to OPEX reduction and improved solar yield.

**Natalie Samovich** - The solar energy industry is digitising rapidly and most of the conferences and the latest reports emphasise the digital component that consists of ICT solutions, connectivity and IoT technologies. Kipp & Zonen is known to be a leading quality

solutions provider. Do you feel these new opportunities put more pressure onto your innovation cycle? Would collaborations help to keep up with this growth?

**Xander van Mechelen** - Kipp & Zonen is indeed very active in the field of ICT solutions, including IoT. Our main product for solar energy is still the pyranometer. This is used as an undisputed reference for the actual irradiance from the sun coming into a PV power plant. Nevertheless, as the solar energy sector matures, we see that there is much more pressure on optimization. This requires more data in three ways; from current types of instruments, for additional parameters, and to confirm that the readings are valid.

We thus see a trend towards measuring more parameters and at more locations across a utility-scale PV plant. Along with solar radiation, we see an increased need for reliable module soiling measurements. New plants are installing soiling, irradiance, and PV module temperature sensors at multiple locations to get a good understanding both for performance analysis and for corrective maintenance actions. Other environmental measurements; wind speed, wind direction, ambient temperature, humidity, precipitation and dew detection are parameters of increasing interest. These can be also used to explain unusual observations from instruments (validation).

As part of the optimization trend, industry is also looking more sharply at costs, so these derivative parameters should be delivered as a solution, turn-key 'all-in-one' and at low cost. Yes, this all puts pressure on innovation. Since OTT HydroMet acquired Kipp & Zonen at the end of 2017 partnering can be within the group of companies to provide total solutions.

We are particularly looking at opportunities to leverage the capabilities of MeteoStar, OTT's USA based company that is a leader in the collection and display of weather (forecast) data, another growing request from the solar energy industry. Some parts of the

world are becoming very interested in nowcasting to predict the power yield in the coming few hours, others are not.

The measurement instruments themselves are becoming smarter. Customers want to be confident in the data coming out, backed by status and quality information, and these requirements do indeed put another load on the product innovation cycle.

Kipp & Zonen is experimenting with IoT solutions, though solar energy customers typically do not need wireless sensors at PV plants, since cables are everywhere and our instruments are part of the inputs collected continuously in real-time and then processed and displayed in the plant management systems. In that perspective, the role of IoT is limited in large-scale solar energy at present. Other OTT companies however, are exploring 'Big Data' possibilities, so we'll be ready to jump on that train when the solar energy industry starts to demand such solutions, or we see an opportunity ourselves to pilot with customers.

Another aspect of IoT is that with the increasing number of measurement locations, the maintenance of the sensors themselves becomes a hot topic. The target of maintenance-free design is an important aspect in the innovation cycle of Kipp & Zonen, as well as for other instrument manufacturers.

A new solar energy application is the increasing interest in the potential efficiency advantages of bifacial PV modules converting solar radiation reflected and scattered by the surface below. Another trend for improved yield is the use of single-axis 'rocking' trackers, pointing PV modules more accurately at the sun can give several percent increase in the power output.

The combination of Kipp & Zonen instruments, scientific understanding, and good engineering can lead to a greater optimization of solar plant power production using all the available radiation from the sun, sky and ground.

**Natalie Samovich** - Kipp & Zonen is a company with a long history, yet always managing to balance cutting edge technology and quality, and is represented across the world delivering insights into many climate change related issues. Do you see greater importance and relevance of this within the upcoming years?

**Xander van Mechelen** - Making robust and reliable outdoor sensors that are accurate for both scientific and industrial use is an expertise of Kipp & Zonen and even after decades of experience and product leadership it remains a challenge and a critical focus point. An instrument providing trusted measurement data is the source of all that follows, data transfer (including IoT), data analysis and data validation; as a closed loop leading to control actions. So, while the innovation of new sensors is the core role of Kipp & Zonen, we also recognize the huge potential of the data use and software models.

Right now, solar energy plants have no commercial benefit in sharing data with us, so Big Data analysis based on our 60,000+ pyranometers out in the field is impossible at the moment. Opportunities for customers themselves are to be found with installation, maintenance and calibration advice and other support. Abnormal data detection and alarming, cross-correlation of radiation and soiling data across plants, and anonymously giving feedback on their performance compared to others. Other possibilities can also be imagined using software models to combine the measurements from different instruments to derive other parameters and to predict outcomes that could be useful for customers.

The threshold to share data in order to facilitate 'science', Big Data analysis and the application of the same data in other areas, is the 'unknown'. It requires a guarantee that the data cannot be traced back to a plant and cannot be of commercial use to others

(competitors) who might perform clever further analysis that is not foreseen. The fact that one cannot oversee the implications of sharing data is, and will continue to be, a hurdle for analysts in finding new correlations and insights, and thus new possible applications.

For the limited size of commercial rooftop PV installations, the benefits of IoT instruments are much more evident. Solar production is not the core activity of the building and when a Kipp & Zonen rooftop sensor in Mumbai shoots data into the cloud in the future, showing soiling effects or other parameters that are important for maintenance (cleaning of modules or repairs), then other solar rooftop owners in the same area could be notified. Most likely similar cleaning advice is valid for them as well, even without measuring their own PV installations.

Another trend and opportunity is the combination of data coming from a network of high quality instruments, like those from Kipp & Zonen, combined with lower quality information such as data from smartphones. Using statistics, and the high-end sensors as a reference to calibrate other data points, the combined data can give a reliable area coverage map. B2C and B2B measurements could make  $1+1=3!$  For example, The Royal Netherlands Meteorological Institute (KNMI) is using such models. However, right now there is very limited access to most pyranometer data and the opportunities remain undeveloped.

Within OTT climate change is a huge topic and is the core of the mission statement. Many solutions are being considered and designed to support customers to deal with the effects of climate change and more extreme weather. Critical event warning of storms, flooding, heavy snow, hurricanes and more, are a hot topic all over the world. The combination of good and reliable instrument measurements with software models and third party information is key to predictions to alert emergency services and others to take timely action.

**Natalie Samovich** - The commitment by the European Union and many other parts of the world to integrating a greater amount of distributed solar energy generation means increasing markets for Kipp & Zonen. What would we be able to do with your equipment differently in 5 to 10 years compared to today? Do you see a role for VICINITY as a platform in this evolution?

**Xander van Mechelen** - Making as many data locations as possible 'open source' means better predictions and feed-forward information for open or closed loop controls; such as building automation, energy storage control, grid balancing, electrical car charging, etc.

Rooftop IoT sensors with data sharing and processing software could help all rooftop owners in crowded areas to optimize their production, supported by advice and alarms and further insights coming from the instrument outputs. We see VICINITY as a significant route to enabling this future.



**About the product: SUV-E UV Radiometer<sup>1</sup>**

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and further insights coming from the instrument outputs. We see VICINITY as a significant route to enabling this future.

### **What is ultraviolet radiation?**

Ultraviolet (UV) radiation is part of the Sun's light spectrum that reaches the earth. UV radiation breaks down into wavelengths that are invisible to the naked eye. There are three types of UV rays: UVA, UVB and UVC. They decrease in wavelength from A to C but increase in intensity, meaning that the shorter the wavelength, the more potential for damage. Fortunately, only UVA and UVB rays can penetrate the earth's atmosphere. With the new SUV-A and SUV-B you can measure both single wavelengths.

### **UVE**

- Limited amount reaches the earth's surface (mainly absorbed by atmosphere)
- Is considered a risk factor for skin cancer Corresponds with the sensitivity of the human skin
- Corresponds with the sensitivity of the human skin
- Is found in man-made sources of UVC radiation (mercury lamps, welding torches)
- Is used in to calculate the UV-index

<sup>1</sup>Source [Kipp & Zonen](#),

## **Evaluation of VICINITY**

A report entitled "Business Scenarios & Evaluation Framework" has been published on the Project Website <https://vicinity2020.eu/vicinity/public-deliverables>. See the Link to D8.1 Pilot Evaluation Framework Definition. The methodology is based on the principles of the European Telecommunications Standards Institute (ETSI) Standard TS 103 463 V1.1.1 (2017-07) Key Performance Indicators for Sustainable Digital Multiservice Cities. It

includes multiple domains, provides a basis for comparative assessments over time and shows how to use the five-point Likert scale when posing questions for stakeholder surveys with examples.

‘Interoperability as a service’ is a main goal of VICINITY. This report describes how data will be collected from stakeholder surveys and autonomously from the IoT devices connected to the VICINITY platform. An evaluation checklist has been provided summarizing the key steps needed to make a VICINITY evaluation. Both technical and business evaluations will be performed to establish whether the VICINITY platform and its pilots are ‘fit for purpose’ and to evaluate the ‘perception’ of the unique selling points by the users / stakeholders.

## Milestones

- First integrated VICINITY prototype has been available since the end of 2018.
- The VICINITY Catalogue has been established in VICINITY Website.







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