newsletter

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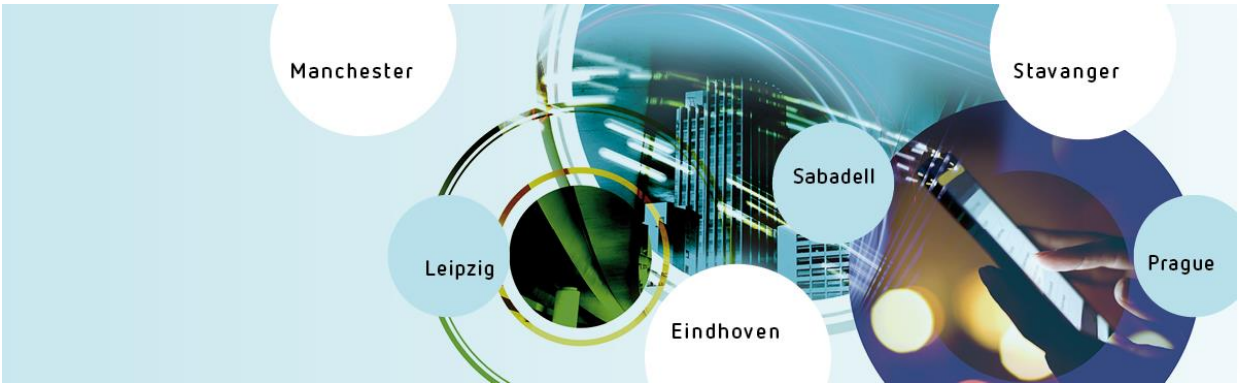

January 2020

Dear Friends and Followers of Triangulum,

That's it: on 31 January 2020, five years of Triangulum are coming to an end. While we are still busy with organizing workshops and webinars, with preparing publications and reports, it seems hard to believe that **this is truly our final month**. The 22 project partners of Triangulum have grown to be an intercultural and interdisciplinary family and we are a bit sad that our regular "family reunions" – be it in Stavanger or Barcelona - will now stop. But, "the show must go on", so let's not be melancholic. Instead, with this final newsletter, we are excited to **tell you about all our achievements and outcomes**, to help you transform your city into a more livable and more sustainable place as well. We want to tell you about our most inspiring and thus most meaningful outcomes, for each of our cities but also with respect to our monitoring & evaluation and replication methodologies. **Enjoy a few glimpses into our work on the following pages** or **read the entire articles** at our website. We are happy to share our results and learnings with you!

Triangulum has had a **visible impact** upon the daily life of each of the three **Lighthouse Cities.** Numerous electric assist cargo bikes are busy on the streets of **Manchester**. 195 houses have been renovated in **Eindhoven's** Eckart-Vaartbroek. In **Stavanger**, a central energy plant, producing energy from waste water, has been installed to heat the city's public swimming pool. And those are only three of overall **56 use cases** implemented in our three Lighthouse Cities during the past five years.

And our **Follower Cities** have been more than successful as well! **Leipzig** has taken the plunge and is now a Lighthouse City as part of the project SPARCs. **Prague** has taken considerable steps by developing a Smart Home Care Pilot and approach to address the soft aspects of smart planning and **Sabadell** strongly elaborated its Follower City Implementation Strategy.

We are truly proud of our achievements because, in the end, those achievements pave the (sometimes rocky) way towards a **greener, more climate-friendly and more sustainable future** – for all of us. **Thank you** for always being on our side during our very own (also rocky, but mostly wonderful) journey: the **Triangulum journey**.

Trinidad Fernandez

Trinidad Fernandez
Project Coordinator

P.S. As a resource for future learning, our website www.Triangulum-project.eu will stay online for a couple more years. Also, have a look at our project page at the SCIS database!

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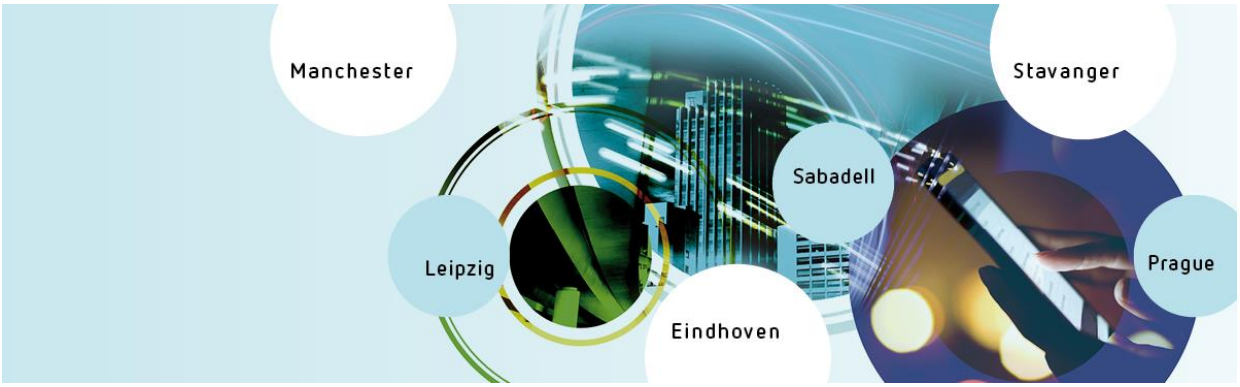

January 2020

Content

Triangulum ID

Title
Triangulum
Demonstrate, Disseminate, Replicate

Programme
European Union's Horizon 2020
Researched Innovation Programme

Duration
01/02/2015-31/01/2020

Budget
30 million Euro overall budget
25 million Euro funding from H2020

Project management
Fraunhofer Institute for Industrial Engineering (IAO), Universität Stuttgart, Steinbeis-Europa-Zentrum

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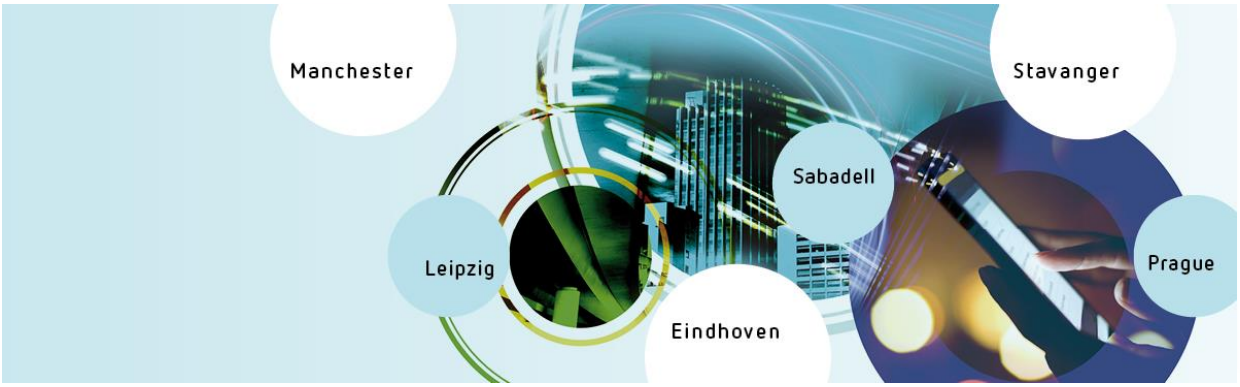

Triangulum 2015 – 2020

Were you ever wondering who the people behind Triangulum actually are? Wonder no longer! Have a look:

1st Triangulum General Assembly in Berlin, Germany in November 2015

5th (and final) Triangulum General Assembly in Prague, Czech Republic in October 2019

You can see that, over all these years, we proudly wore the blue colors of Triangulum, having the project always close to our hearts. ☺

(Credits: Steinbeis-Europa-Zentrum / Fraunhofer IAO)

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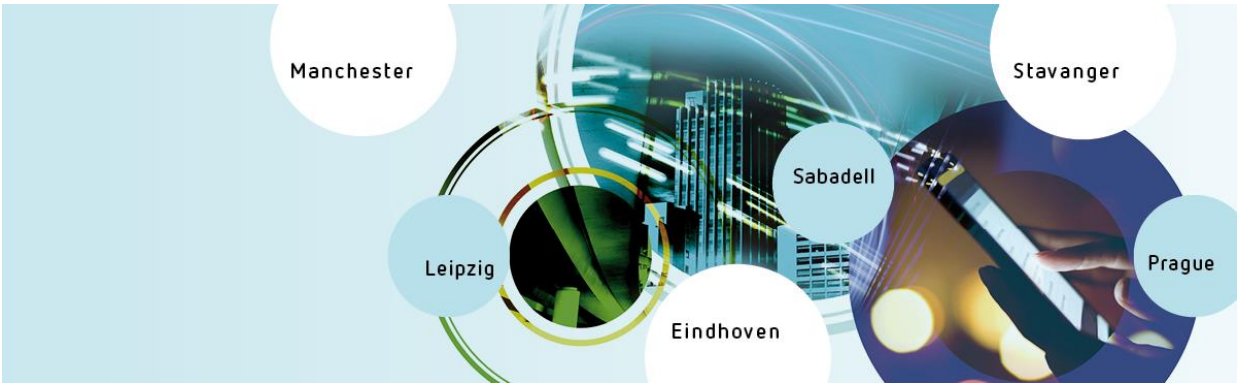

Monitoring & Evaluation of Triangulum Solutions

Triangulum Impacts

The following summary gives an overview of Triangulum impacts at the level of the demonstrators (modules), across the project as a whole, and at city level. Currently, these are still *draft* impacts as we are still checking and calculating final values. Look up our final impact report when it becomes publicly available (Deliverable 2.6, to be published here), which will contain further updates and details.

Module Level Impacts

257 impact indicators have been finalised across the 26 modules being implemented in the Lighthouse Cities. The overall impacts in the Lighthouse Cities are as follows:

- For **Manchester**, energy trials in the final year carried out showing significant potential for reducing energy demand and lowering GHGs, 10,300 m^2 optimised building space in MCC for smart energy interventions with over 400 tCO_2e avoided GHGs, and a further 35 tCO_2e avoided GHGs as a result of PV energy generation. The purchase of 10 Triangulum procured EVs has reduced GHG emissions by 35 tCO_2e since 2016, and the overall impact of Triangulum has been to increase university share of EVs in vehicle fleets from 5% to 25%, with reduced GHG emissions of over 125 tCO_2e, 11kg NOx, and 70kg CO. 4 cargo bikes have made 4,493 journeys and travelled 6,697 km over a three year period and saved 820 $kgCO_2e$. The Manchester-I data platform hosts 9 real time data feeds and has 4 organisational users and 307 users that have downloaded data 427 times. Over 50 people have attended the Innovation Challenges hosted in 2018 and 2019.

- For **Eindhoven**, in Strijp-S, biomass and Sanergy have replaced the old heating system and provided 100% renewable energy for heating. In 2019, 14% of all energy was generated by Sanergy. 14 EV charging stations have been implemented. The fiber-optic network has been expanded extensively with 350 home connections and 7,050 office connections. 40 sensors have been installed in Strijp-S. 28 SMEs from the iCity tender have been created, and €50m p.a. additional investment has been secured from partners since 2016. In Eckart-Vaartbroek, for social housing, 11,200 m^2 buildings have been renovated, reducing GHG emissions by 20%. The estimated energy bill reduction in 2019 was 55%. For the digital renovation platform of Woonconnect, 284 households (29%) used it, and 174 made a plan (scenario) for the renovation of their home. The Eindhoven open data platform has been viewed 96,000 times per month in 2019 and actively downloaded nearly 4,000 times per month.

Read entire article here

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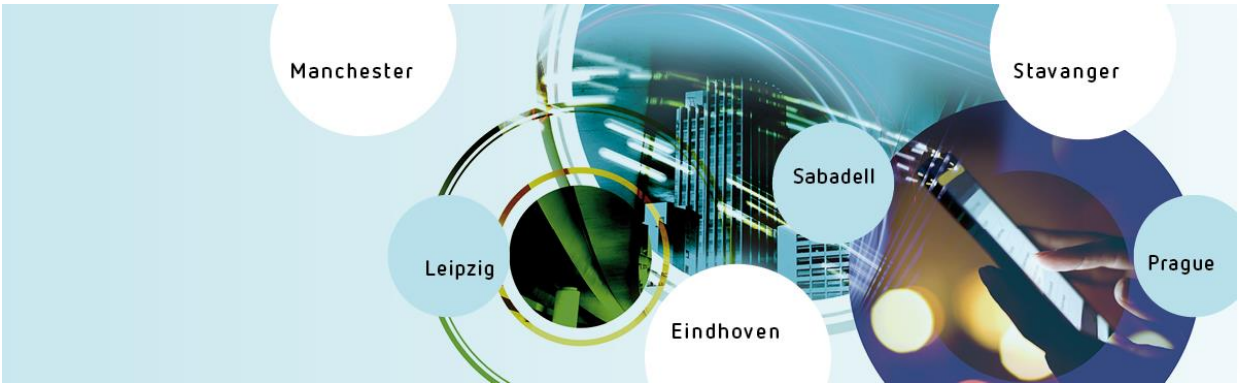


Replication of Triangulum Solutions

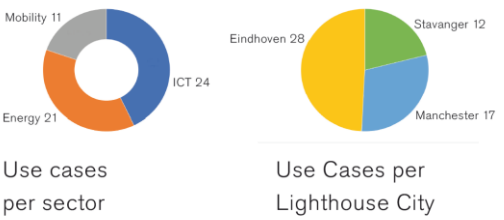
The replication work of Triangulum was based on three pillars:

- 1. Demonstration projects in the three Lighthouse Cities helped to showcase how public and private partners can collaborate to create solutions that make cities better places to live.
- 2. Triangulum assessed the demonstration projects to generate a robust evidence base describing their impacts and benefits.
- 3. Triangulum developed a business model based upon the value of these benefits that enables their replication without public funding in the Follower Cities and beyond.

The replication process of Triangulum has been structured in a customer centric approach, supporting the Implementation Strategies of the Follower Cities, and a technology transfer approach, that allows replication by other cities and interested partners.

As a tool for replication, Triangulum has developed the „Smart City Decision Making Tool". The aim of this tool is to foster replication of Triangulum Use Cases by enabling cities to find relevant examples from Triangulum that fit their needs.

Smart City Replication Framework (Credits: Fraunhofer)



Triangulum Use Cases (Credits: Fraunhofer)

As an example, the replication of the Use Case *Blink* was a real success story for Triangulum. The local Stavanger partner Lyse AS invited interested stakeholders from the consortium to Stavanger to demonstrate how Blink works and to further underline its potential. There were talks between Lyse As and the different city representatives as well as several demonstrations of the tool. After this first meeting, the stakeholders agreed to test the solution in the Triangulum Follower Cities Prague and Sabadell. There was thus a test run in both cities where minimal required adaptations were identified and subsequently realised by Lyse AS. As a result, the Use Case Blink could be successfully replicated in both Prague and Sabadell!

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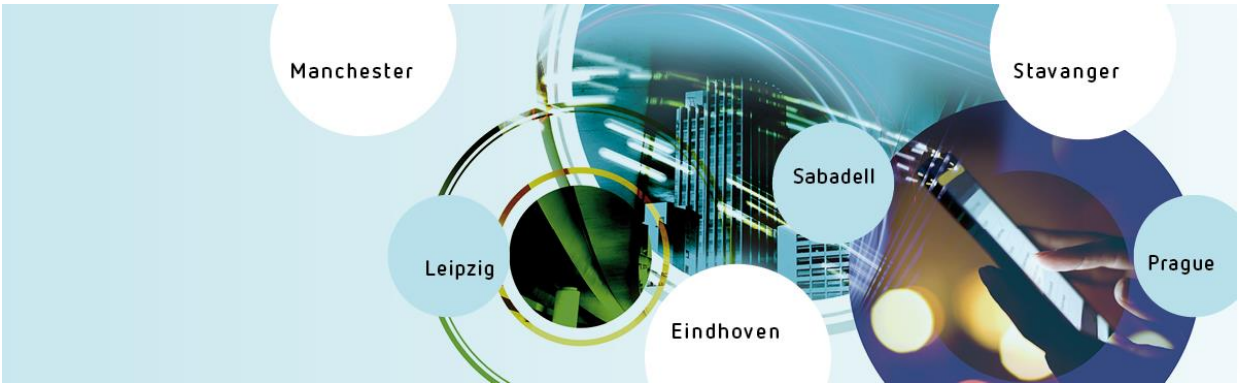


Lighthouse City Manchester

For Manchester, the achievements focus on developing energy storage combined with solar PV, optimising existing buildings, a study of microgrid independence, as well as a roll out of electric vehicles and "try-out" e-cargo bike scheme. Data from all of these has been incorporated into an open data platform – Manchester-i.

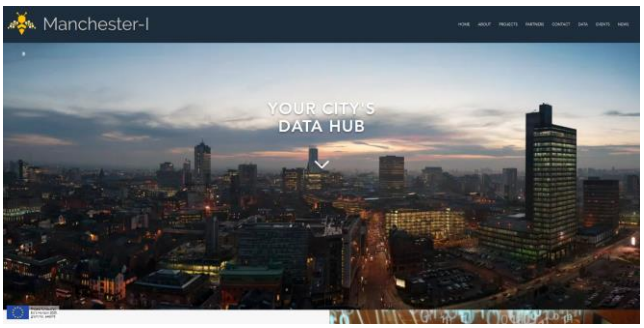
Innovation Challenge

All the Triangulum assets generated data but how can the city use it to make decisions and manage the city? Innovate4Manchester was a collaboration between the Triangulum Manchester partners, Ordnance Survey (the UK's national mapping agency) and their Geovation Team plus the Open Geospatial Commission. The work an improved 3D city models of the city's innovation district and workshop for different city departments to draw up a "wish list" on city issues.

A final event was an innovation challenge where participants were supported to generate and develop potential solutions and innovative ideas based on the city stakeholder workshop and the 3D model.

A new Manchester Observatory

Post project the Manchester-I platform will become a data solution for the Manchester Urban Observatory. The University of Manchester has been successful in obtaining funding for this as part of a UK wide project focused on the digital capture, mapping, sensing and monitoring of urban infrastructure systems. Funded by EPSRC as part of UKCRIC, the mission is to create an integrated research capability to underpin the renewal, sustainment and improvement of infrastructure for UK cities.



Manchester-I (Credits: https://www.manchester-i.com/)

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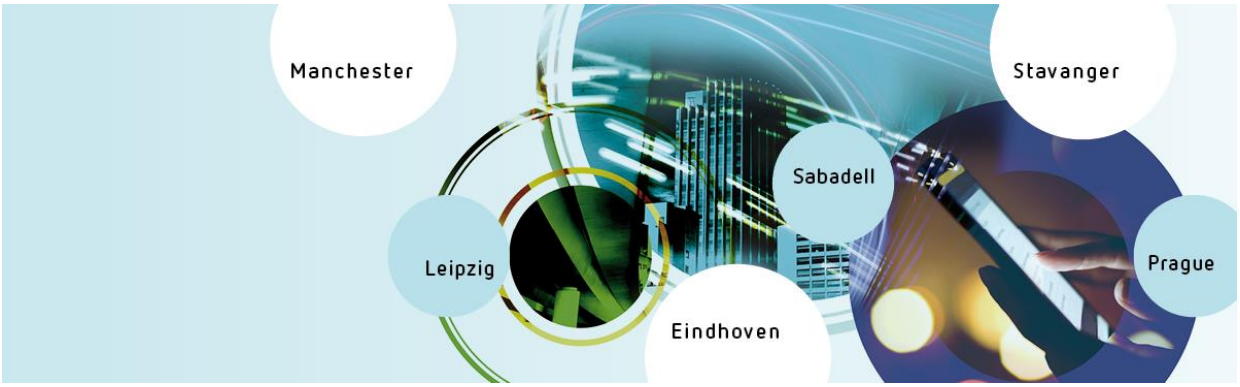

Lighthouse City Eindhoven

In Eindhoven, two districts have been transformed into living labs during the Triangulum implementation: Strijp-S and Eckart-Vaartbroek. The former Philips industrial complex Strijp-S has now a district-wide ICT solution to allow residents to access different kinds of infrastructure, such as booking electric vehicles **or an integrated parking reservation system.** The IT-based tool helps residents to develop sustainable patterns of energy and mobility behaviour. A different set of challenges is posed by the Eckart-Vaartbroek district, where energy-efficient renovations are carried out on rental and privately owned houses. To precisely calculate the energy savings**, the ICT tool** called WoonConnect is capable of modelling costs and savings. Just around the corner of these houses, a running route around two ponds was launched in 2017 to encourage residents to be active **and interacte with each other**.

Backbone at Strijp-S

In Strijp-S, Triangulum focusses on energy, mobility and ICT. Here, a fibre-optic backbone functions as a Smart City connectivity enabler, welcoming different services into a secure and manageable environment and making sure that dataflow/transport is at its highest possible availability level (currently 99,82%).

Traditionally, we see mobility as separate solutions delivered by different partners and via different portals. At Strijp-S, we decided to make the shift towards mobility as a platform. In short, we bring in a local brand that takes care of offering all types of available mobility solutions on both an on- and an offline platform. In Strijp-S, we implemented another tool for energy saving in combination with increased comfort of office-space by adding hard- & software (sensors, actuators, user feedback and data-analytics) on top of traditional energy systems.

Strijp-S (Credits: Municipality of Eindhoven)

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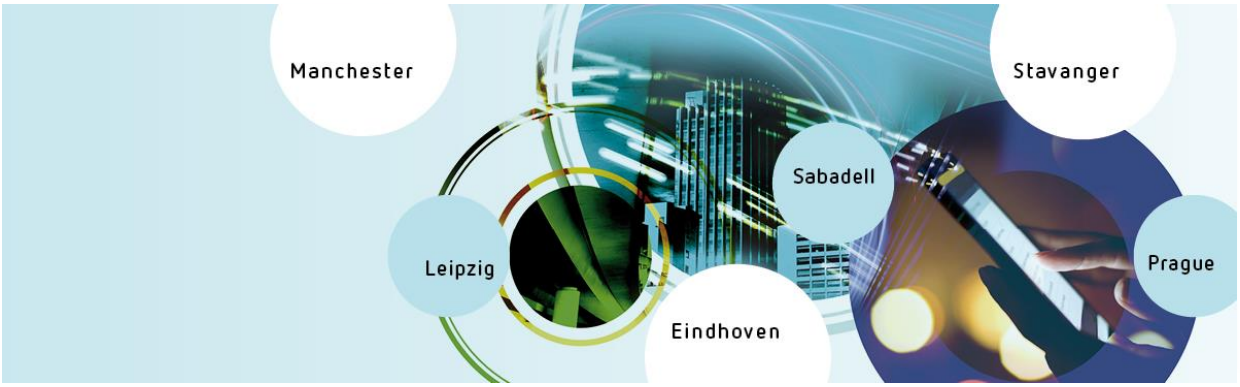

Lighthouse City Stavanger

With Stavanger as a Lighthouse City of Triangulum, the Stavanger region has developed new technology and interacted across the private and public sectors to cut CO_2 emissions, to create better transport and communication solutions, and to make energy use more efficient.

With the support of Kolumbus, Rogaland City Council has implemented emission-free electric buses in Stavanger, being the first in Norway. The City of Stavanger helped establish a central energy plant that uses heat from the city's wastewater to produce energy. The University of Stavanger has developed a data hub that can process, analyze and visualize large amounts of data. Lyse AS has developed new technologies for energy efficiency and management that have been tested in 100 homes, a gymnasium, and a nursing home. They have also developed Blink, a video system providing secure communication on different screens. Greater Stavanger has led the communication work to spread knowledge about these local projects nationally and internationally.

Electric Buses (Credits: Elisabeth Tønnessen)

The participation in Triangulum has laid the groundwork for active public and industrial engagement regarding smart cities developments. As a result, Stavanger Smart Region, a network and regular meeting arena for the 13 municipalities in the Greater Stavanger region has been formed. It has also contributed to creating an internationally renowned conference and exhibition, the Nordic Edge, as well as a national cluster, other proposals and project networks.

The University of Stavanger has initiated an international cooperation on smart city technology called CityZEN. Also, the university has become a European University as part of the European Consortium of Innovative Universities (ECIU). The new ECIU University will be based on solving challenges offered by public and private sector actors. This pilot project will concentrate on challenges related to UN Sustainability goal #11 – sustainable cities and communities. The City of Stavanger is a partner and has confirmed that they will provide three challenges for ECIU learners to be solved.

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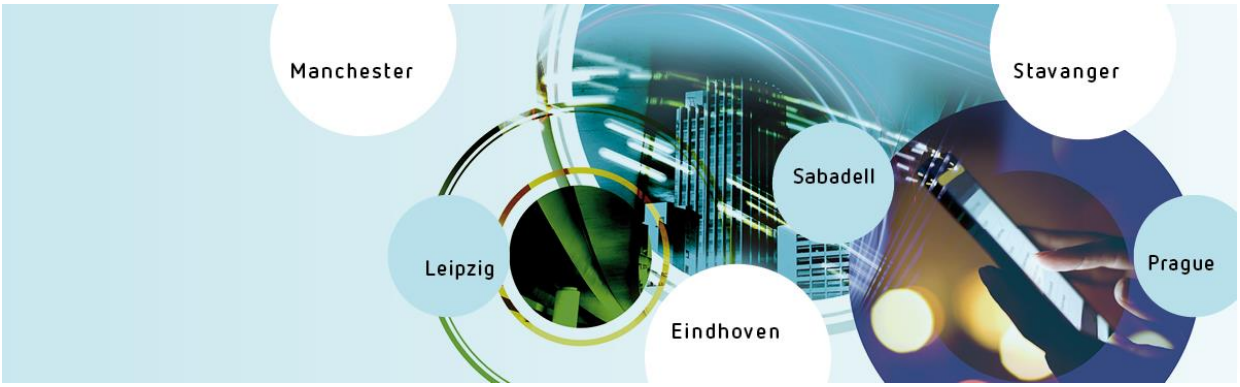

Follower City Leipzig

During the Triangulum project and the resulting knowledge exchange with the three Lighthouse Cities, it became clear that Leipzig needs to reorganise its internal working structures regarding Smart City and digitization issues. Starting in spring 2018, a dialogue has been initiated between the Department for General Services, the Department for Economic Affairs and Employment, the Mayor's Office and the Triangulum team to develop a new administrative structure for digitization issues within the City of Leipzig. As a result, a "Digital City Unit" was installed in the Department for Economy and Labour in April 2019, which was then renamed to "the Department for Economy, Labour and Digital Affairs" accordingly.

The "Digital City Unit" started its work in April 2019. An entire team now works on developing guidelines, drafting projects, creating different committees and networks within and outside the municipality as well as other topics.

Team Digital City Unit with Mayor Burkhard Jung (Credits: M. Korzer)

The new Digital City Unit is:

- a competence centre for digitization within and for the city administration as well as external actors such as enterprises, civil society and science,
- responsible for the development and implementation of innovation projects with the help of municipal budget but also financed by the EU and national funding (incl. development of funding proposal and grant management),
- an internal service provider for the city administration offering advice and support regarding funding opportunities and grant management,
- representing the City of Leipzig on national and international events and networks (e.g. German Smart City Network, EIP-SCC events),
- an interface function between the municipality and its subsidiaries (public utilities and other enterprises).

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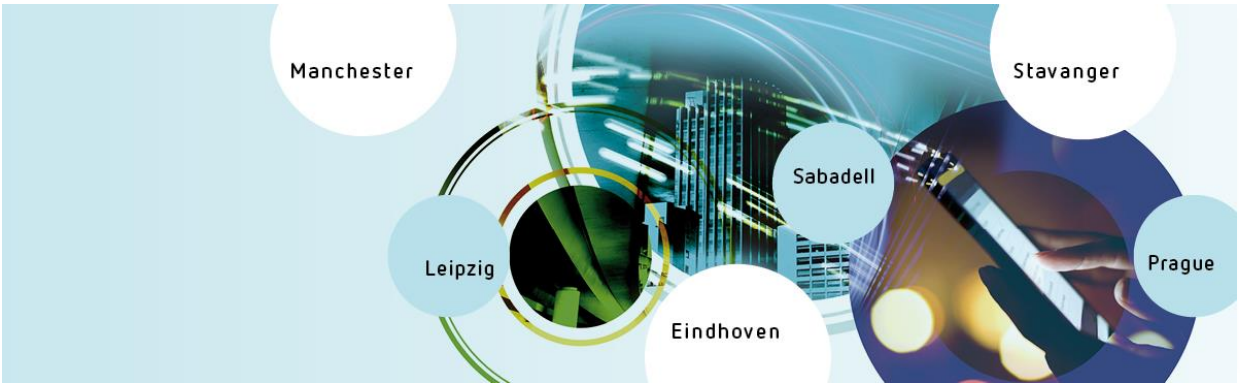

Follower City Prague

Info for the last Triangulum newsletter

Prague's main outcome is its Follower City Implementation Strategy, which comprises a collection of measures that were identified and developed during the Triangulum project. The measures are predominantly focusing on the development of the Smart Home Care pilot project in the district of Prague 7, but also includes a city-wide measure of a 3D-model and a cookbook about the culture of cooperation in the smart city development as such.

Outcomes of the Prague Implementation Strategy

Part 1

Smart Home Care Pilot Project

The Prague 7 Smart Home Care pilot project aims to increase the quality, availability and efficiency of services offered to senior citizens in their home environment using innovative technology. The following measures (that were defined as part of a participatory process with local stakeholders) focus on complex solutions in assistive technologies, ICT, energy efficiency and e-mobility.

System for support of integrated care

The system will consist of an integrated data platform, the digitization of the care center and the implementation of the case management: a collaborative process of assessment, planning, facilitation and care coordination. For this, a series of educational workshops took place in 2019. Next steps are currently being planned with the city hall and smart city organizations.

Service portal for senior citizens

It is planned to create an informative website which can serve as a marketplace of services for seniors and their peers. As a first step, the existing webpage of Prague 7 is currently extended with additional information.

Smart homes for seniors

There has been pilot testing of the Blink video communication device developed by the Stavanger partner LYSE AS, together with local service providers for seniors in Prague. The test lasted from 14.08.2019 – 31.12.2019. Its aim was to promote the benefits of smartification of households and to test its use in the Czech context.

Exhibition in Prague (Credits: IPR Praha)

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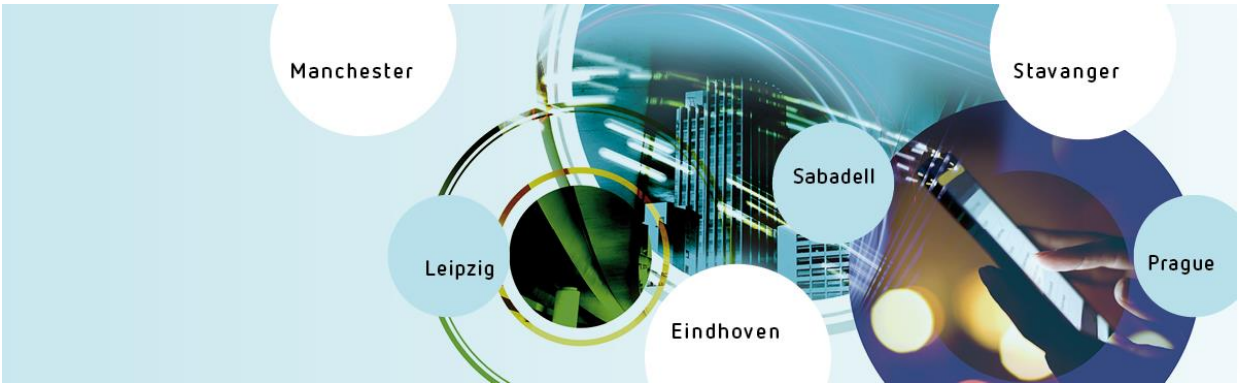

Follower City Sabadell

The Municipality of Sabadell has participated in the Triangulum project together with its linked third parties Habitatges Municipals de Sabadell, SA, Informàtica Ajuntament de Sabadell and Promoció Econòmica de Sabadell SL. It has received a European grant of around 400,000 €.

Sabadell's main outcome as part of Triangulum has been the elaboration of the city's Follower City Implementation Strategy (FCIS):

- 10 actions, 50% implemented on the 31st January 2020
- Based on a previous DPSIR analysis at the city level -108 indicators and action fields-, ideation and co-design work in 4-helix -3 workshops with the local innovation ecosystem in Sabadell, and receiving inspiration and training of the Lighthouse Cities - 2 visits, 6 workshops, >10 webinars- and all the Horizon 2020 SCC1 cities.
- Overall around 500 local stakeholders have been involved during the project

Focus on the main FCIS implemented actions:

- Cross-cutting real-time IoT data integration complying with the Triangulum ICT reference architecture ("Sentilo" open-source software). "Beta" version available at http://sentilo.ajsabadell.cat
- LYSE's Blink social & health remote care technology tested with 5 users of AVAN, non-profit Association Vallès Friends of Neurology, to be scaled-up to other Sabadell health/social local providers
- Virtual reality bike tour through Sabadell with the goal of urban mobility training / participatory urban planning (under study, advanced stage)
- Purchase of 67 e-cars/e-vans and 11 e-bikes/e-scooters during 2018-2019
- Sound sensors at the city centre public space to detect criminality/incivilities, connected with existing surveillance cameras and public lighting, and alerting the Local Police (under study, advanced stage)

More information on the Triangulum implementation in Sabadell: http://web.sabadell.cat/triangulum

Replication in Sabadell (Credits: City of Sabadell)

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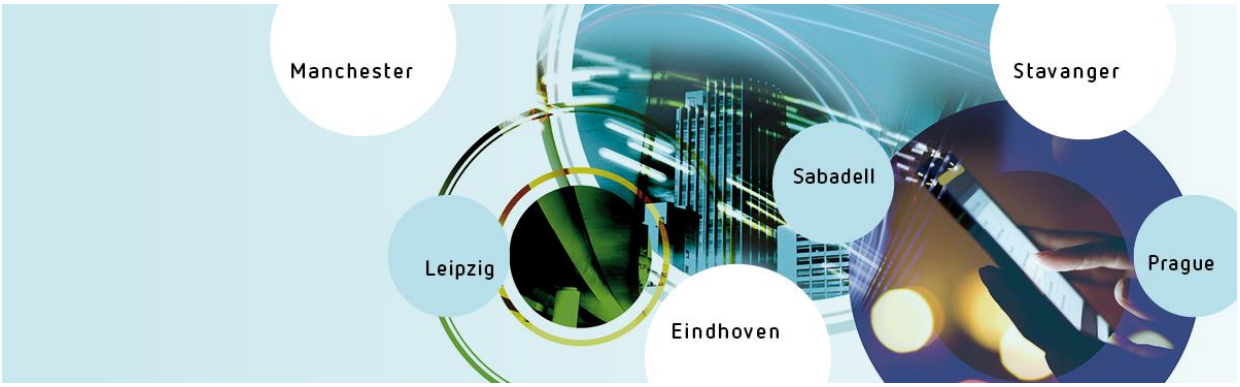

International Conference „Energising Cities"

On 23 and 24.09., Triangulum celebrated its international conference "Energising Cities: Innovations, Challenges & Solutions" in Stavanger, Norway, merging into the Nordic Edge Expo & Conference, taking place from 24-26.09. The event was a great success with overall 185 participants and 25 speakers from all over Europe.

Five years of project work in our three Lighthouse- and three Follower Cities have resulted in numerous outcomes and lessons learnt to be shared with the smart city community and the public, which we happily did at our international conference.

Tone Grindland of NHO Rogaland, who was already involved with Triangulum in the early proposal phases, moderated the conference. In the morning, the Mayor of Stavanger, Christine Sagen Helgø gave a very warm welcome to the international audience, talking about how Triangulum has shaped Stavanger and its smart city ambitions. Trinidad Fernandez then kicked off the event by presenting the project's objectives and ambitious targets before Jens Bartholmes from DG Energy of the European Commission talked about the goals and the purpose of the Horizon 2020 SCC1 programme, thus putting Triangulum into a larger context.

As one of the founding fathers of Triangulum, Steve Turner, Digital Cities Lead at Arup in Manchester, then drew a circle from the project's beginnings to where we are today, also discussing what needs to be done to be "shifting worlds": "Digital technologies are changing the way we live and work in cities. The cities which prove to be the most successful in the future will not be the largest, but those who are able to harness the full potential that these technologies present," he says.

The afternoon of "Energising Cities: Innovations, Challenges & Solutions" was all about sharing experiences and learnings from Triangulum and its cities: "In four interactive sessions, our Triangulum city coordinators, technical partners, replication experts and of course, especially invited external professionals, really had the chance to delve into the outcomes but also discuss the challenges of our innovative implementations across the project and their impact on the sustainable development of cities" says Trinidad Fernandez. The interactive sessions focused on the four topics climate change, governance, citizen engagement and investment & replication.

Impressions from the conference (Credits: Triangulum)

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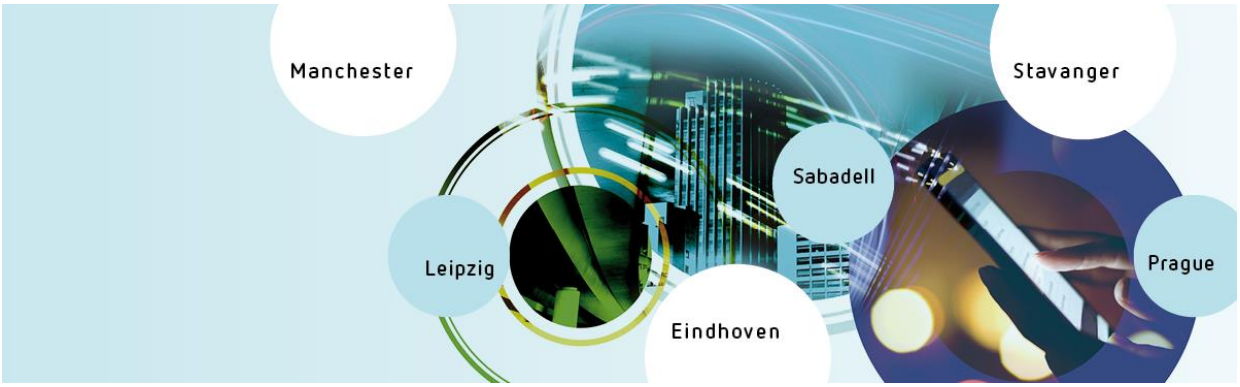

Joint Session „From Dream to Reality"

During the European Week of Regions and Cities, the first three Smart Cities and Communities projects GrowSmarter, Remourban and Triangulum, funded by the European Union's Horizon 2020 Research and Innovation Programme, hosted the session "From dream to reality: sharing experiences from leading European Smart Cities" at which more than 150 participants took part.

The goal of this joint session was to present major outcomes and to share lessons learnt from five years of smart city projects in different European regions, focusing on technical as well as political aspects of creating smart cities. High level politicians from five of the Lighthouse Cities discussed what is needed on an EU level to facilitate successful replication in the future. The overall consensus of this panel was that European support is needed to help get local initiatives off the ground.

The coordinators of all three projects demonstrated their main achievements in the areas of energy, mobility and ICT. Trinidad Fernandez, our Triangulum Coordinator, introduced the vision of Eindhoven to become Europe's and Netherlands' Brainport and innovation hub, along with an innovative example of ICT-based home renovation.



Pictures from the session(Credits: Flickr/EUREG)

Detailed insights on the daily work within the cities have been provided by overall six site managers from the various Lighthouse Cities of the three projects. They presented the biggest successes as well as the hardest failures from their individual demonstration sites. Amongst other achievements, Gerd Seehuus from the City of Stavanger (Triangulum) demonstrated the tremendous energy savings having been achieved through the development of a central energy plant based on 100 % renewable energy that now heats (and cools!) three administrative buildings as well as the city's public swimming pool and could thus already save over 1000 tons of CO2 since its implementation in 2017.

Download the joint policy paper or read entire article here

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SCC1 Project News

Three new SCC1 Projects: ATELIER, SPARCs and POCITYF

Since October 2019, overall three new SCC1 projects have been launched as a result of the H2020-LC-SC3-2018-2019-2020 call. The three new projects are ATELIER (AmsTErdam and BiLbao cItizen drivEn smaRt cities), SPARCs (Sustainable energy Positive & zero cARbon CommunitieS) and POCITYF (A Positive Energy CITY Transformation Framework). The community of Horizon 2020 European Smart Cities and Communities Lighthouse projects thus now comprises 17 projects, 46 Lighthouse Cities and 70 Fellow Cities.

Logos of three new SCC1 Projects
(Credits: ATELIER/SPARCs/POCITYF)

Triangulum is especially proud of welcoming these three projects to the family since several of the Triangulum project partners are also partners in the new projects: Most importantly, Leipzig was successful in becoming a Lighthouse City as part of SPARCs – congratulations to our City of Leipzig partners! Moreover, Fraunhofer IAO is responsible for replication in the same project and Steinbeis-Europa-Zentrum is doing Dissemination, Communication and Exploitation for ATELIER.

News from our sister projects

EIP-SCC Matchmaking Event Back to back with the *Covenant of Mayors Investment Forum,* the EIP-SCC Marketplace will organise its next Matchmaking event, which will take place on 20 February. The event will follow the familiar "Explore-Shape-Deal" format informing and stimulating innovation, networking, developing action plans and discussing investment opportunities for concrete Smart City projects. Read more

SmartEnCity Academy The Smart City project SmartEnCity invites you to participate in "The SmartEnCity Academy for Zero Carbon Transition", an online training course for cities, municipalities and smart decision making. Join us during 2020 on a series of four online training courses to learn from the experiences of the SmartEnCity project partners and cities as well as selected external professionals from the field. Read more

mySMARTLife A structure with a roof and walls: this is the minimal definition of a building. But to turn a building into a smart building, the central building services system must be networked and digitized. Then again, in a smart home, individual household appliances and room controls are networked. As part of mySMARTLife, both methods are being implemented. So let's explore them in more detail! Read more

This project has received funding from the European Union's Horizon 2020 Researchand Innovation Programme under Grant Agreement No 646578

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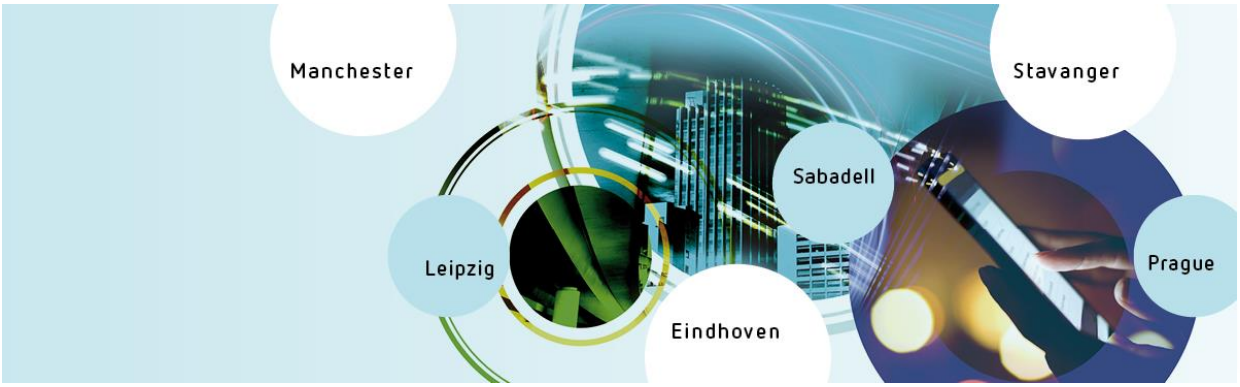

Past Events

Some of the events attended by Triangulum's project partners:

Smart City Solutions
- 17.-19.09.2019
- Stuttgart (Germany)
- Further information

Triangulum International Conference „Energising Cities: Innovations, Challenges & Solutions"
- 23.09.2019
- Stavanger (Norway)
- Further information

Nordic Edge Expo & Conference
- 24.-26.09.2019
- Stavanger (Norway)
- Further information

"From dream to reality: sharing experiences from leading European Smart Cities"
- 08.10.2019
- Brussels (Belgium)
- Further information

Smart City Expo World Congress
- 19.-21.11.2019
- Barcelona (Spain)
- Further information

Women4Energy
- 06.12.2019
- Stuttgart (Germany)
- Further information

Upcoming Events

Find Triangulum's partners at the following events in 2020:

EIP-SCC Matchmaking Event
- 20.02.2020
- Brussels (Belgium)
- Further information

URBIS Smart City Fair
- 03.-04.06.2020
- Brno (Czech Republic)
- Further information

EUSEW
- 22.-26.06.2020
- Brussels (Belgium)
- Further information

Nordic Edge Expo & Conference
- 22.-24.09.2020
- Stavanger (Norway)
- Further information

Smart City Expo World Congress
- 17.-19.11.2020
- Barcelona (Spain)
- Further information

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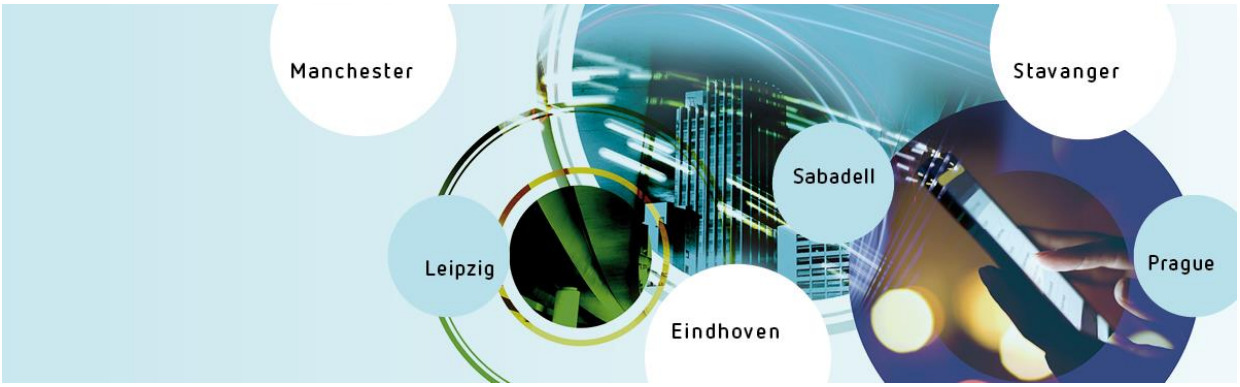

Contacts

Do you want to stay in touch with us after the project has ended? We would love to hear from you!

Project Coordinator	Trinidad Fernandez (Fraunhofer IAO) trinidad.fernandez@iao.fraunhofer.de
Deputy Coordinator Legal & Financials	Charlotte Schlicke (Steinbeis-Europa-Zentrum) schlicke@steinbeis-europa.de
Dissemination & Communication	Bettina Remmele (Steinbeis-Europa-Zentrum) remmele@steinbeis-europa.de
Lighthouse City Manchester	Martine Tommis (Manchester City Council) m.tommis@manchester.gov.uk
Lighthouse City Eindhoven	Delia Mitcan (City of Eindhoven) d.mitcan@eindhoven.nl
Lighthouse City Stavanger	Gerd Seehuus (City of Stavanger) gerd.seehuus@stavanger.kommune.no
Follower City Leipzig	Nadja Riedel (City of Leipzig) nadja.riedel@leipzig.de
Follower City Prague	Adam Pajgrt (Prague Institute of Planning and Development) pajgrt@ipr.praha.eu
Follower City Sabadell	Oriol Llevot (City of Sabadell) ollevot@ajsabadell.cat
Replication	Philipp Lämmel (Fraunhofer FOKUS) philipp.laemmel@fokus.fraunhofer.de
Monitoring & Evaluation	James Evans (University of Manchester) james.z.evans@manchester.ac.uk

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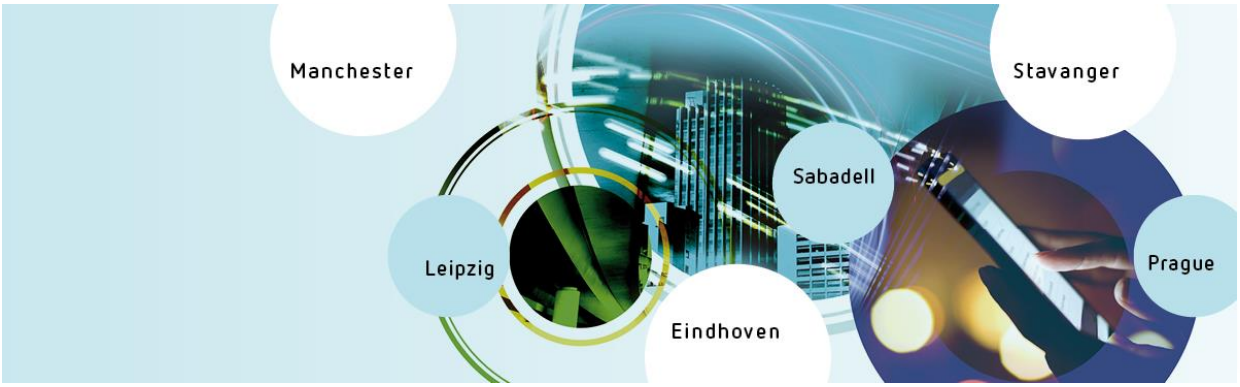

Partners

Project Management

Fraunhofer IAO · Universität Stuttgart · STEINBEIS-EUROPA-ZENTRUM

Eindhoven

EINDHOVEN · TU/e Technische Universiteit Eindhoven University of Technology · kpn · WOONBEDRIJF · VolkerWessels

Manchester

MANCHESTER CITY COUNCIL · MANCHESTER 1824 The University of Manchester · Manchester Metropolitan University · SIEMENS · Clicks+Links

Stavanger

STAVANGER KOMMUNE · GREATER STAVANGER · Universitetet i Stavanger · Rogaland County Council · Lyse

Replication

Fraunhofer FOKUS · IPR PRAHA · Ajuntament de Sabadell · Stadt Leipzig · TÜV SÜD

Follow us on Twitter: @Triangulum_EU

Contact:

Project Coordinator: Trinidad Fernandez, Fraunhofer IAO, trinidad.fernandez@iao.fraunhofer.de
Press: Bettina Remmele, Steinbeis-Europa-Zentrum, remmele@steinbeis-europa.de

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