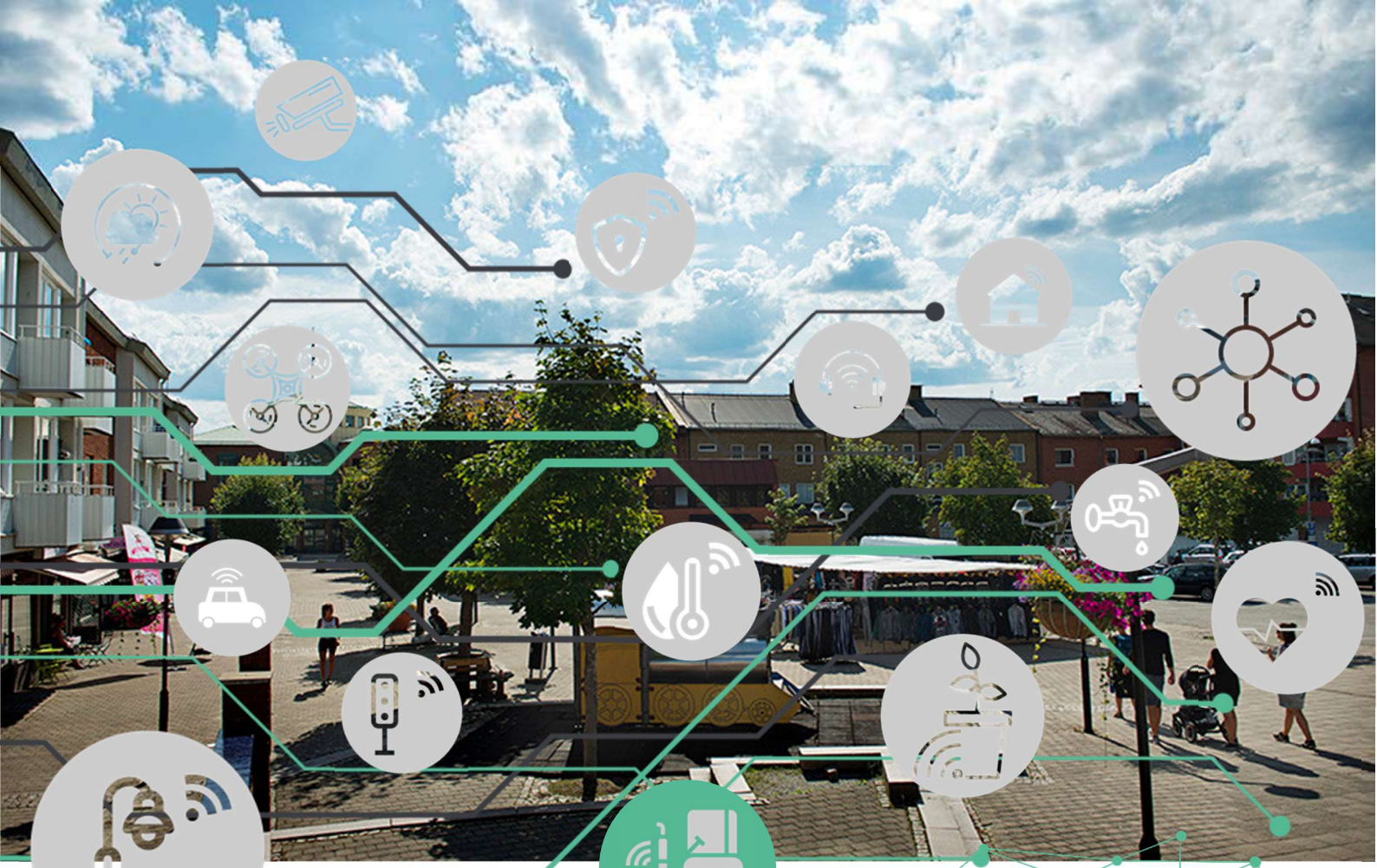

IoTXchange
CONNECTING CITIES FOR BETTER LIFE

Case Study

ServaNet – Regional Open Fiber Network

www.servanet.se

April 2021

ServaNet
DITT LOKALA FIBERNÄT

European Union

URBACT
Driving change for better cities

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1. About IoTxChange

IoTXchange is an URBACT Action Planning Network with focus on the crucial role that Information Technologies and in particular Internet of Things (IoT) will inevitably play in urban development in the forthcoming years, and that alone makes it extremely relevant within the framework of Urban Strategies in Europe.

The IoTXchange partnership is built around a common interest to place IoT as a policy instrument for the sustainable development of small and medium-sized cities, capable of increasing the competitiveness of the local economy, promoting quality of life, sustainable environments, and the delivery of connected services to citizens and visitors.

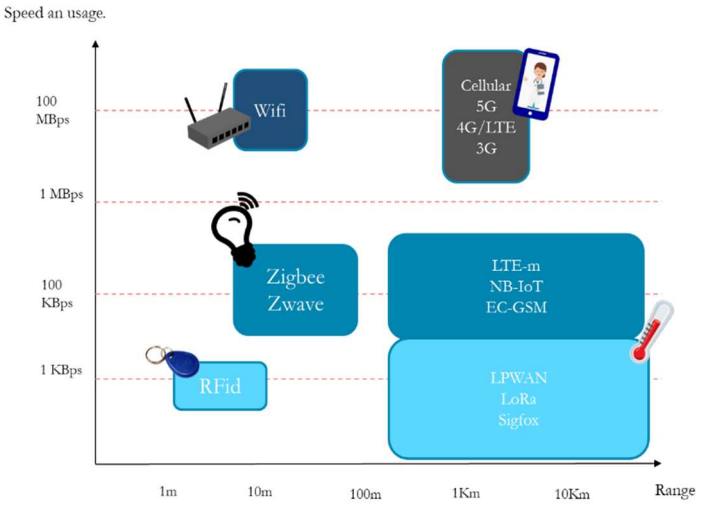
The initial network of 9 partners, of which 7 are small cities or agglomeration of small cities (such as Jelgava Local Municipality or Nevers Agglomeration), one a regional agency and one university, resulted from a careful selection from an initial group of 35 partners that manifested their interest in the idea promoted by Fundão, as Lead Applicant.

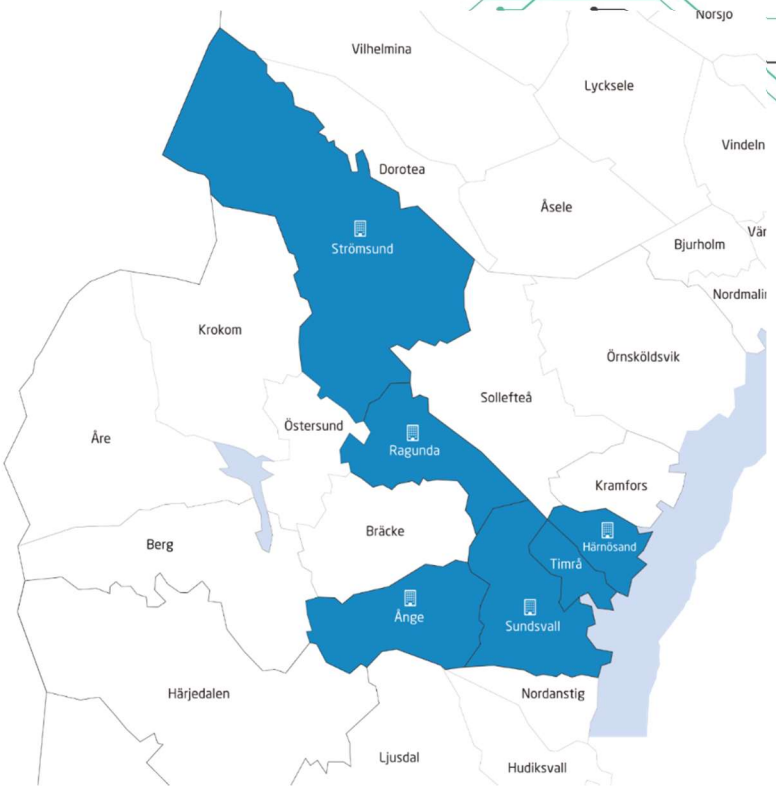
The network is composed on 8 partners, of which 7 are small cities, with Fundão in Portugal as Lead Partner, teaming up with other six small cities (Ånge in Sweden, Dodoni in Greece, Jelgava Local Municipality in Latvia, Kežmarok in Slovakia, Nevers Agglomération in France and Razlog in Bulgaria) and one university (Åbo Akademi University in Vaasa, Finland).

To know more about the project and how encourages the creation digitalization plans based on Internet of Things (IoT) solutions to increase the quality of life in small and medium sized EU cities, you can visit [IoTXchange | URBACT]

2. Scope & Methodology

Internet of Things (IoT in short) is just the technology that can help a city become big, in this sense of helping its citizens, its companies and institutions, to feel big. Is all about connection – connection of all things – and this is of course only possible in an urban environment with a suitable technological infrastructure. This is a process that implies time and serious investments, both public and private, in different technologies, as can be seen in the image.





The **Scope** of this case study is about municipalities in the same territory sharing the costs of developing a technological infrastructure, like it happens in the Västernorrland county in Sweden that includes Ånge and other 6 rural municipalities. The 7 municipalities are co-owners of ServaNet, a regional broadband service provider, that is also implementing other low-cost/low range solutions for IoT networks, such as LoRa.

ServaNet is a good example of a metropolitan area network, i.e. a broadband network available locally in one or more municipalities. ServaNet, like most other urban networks, is mostly built with fiber optics and is a so-called open net. It supplies fiber networks in the municipalities: Sundsvall, Härnösand, Timrå, Ånge, Strömsund and Ragunda, and is owned by the municipalities, or in some cases by utilities in municipalities, providing its inhabitants with access to the sharpest options in the Internet, television and smart services for the connected home, and ensuring the coordination of the offer across a vast region.

The **Methodology** to develop the case study was built in 3 steps:

- Desk research of all the information developed until end of March by the project, in particular de Baseline Study;
- Online interview to the project Lead Expert, Mr. Eurico Neves;
- 2 online meetings to Mr Göran Sörell, ServaNet Managing director:
    - First meeting to collect information to build a questionnaire for ServaNet;
    - Second meeting for finetuning the case study draft version.

3. ServaNet – Regional Open Fiber Network

3.1 ServaNet Timeline

In 1998, Sundsvall Elnät received a question from IBM about connecting computer networks between two office addresses. Sundsvall Elnät got the assignment to do this. This was the starting point for the city network operations. The following year, all universities in Sweden made a procurement to link all sites together.

The Swedish Rail Administration had fiber in the embankments and they now wanted fiber from the embankment to Mid Sweden University in Sundsvall. Sundsvall Elnät received that assignment. Sundsvall Elnät saw the possibility of fiber expansion and city networks. The company initially built fiber connections based on the needs of private property owners.

Around the same time, in 1998, Härnösand and Ånge also began to build fiber connections in their municipalities.

In 2000, the company Norrsken was formed by Sundsvall Elnät, HEMAB, Jämtkraft and Borlänge Energi together with a municipal association in Gävleborg. The purpose was to gain access to the same range of services as in Stockholm and at the same prices. To get Sundsvall into the Norrsken network, Sundsvall Elnät connected to a drop-off point from Svenska kraftnät. To get to Härnösand they rented a fiber connection from Sydkraft to Timrå, where the networks were connected.

Servanet	
Name of organisation	ServaNet AB
Postal code	85185
Town/City/Country	Sundsvall
Area covered in Km²	31472
Website address	www.servanet.se
Number of employees	42
Number of services provided	Internet: 17 Phone: 4 IPTV: 10 Security: 6 IoT and welfare: 5
Number of clients/users	30 000 connected to the open network plus unknown number of end customers in apartment buildings connected with dark fiber
Turnover 2019/2020	160 million SEK
Servanet Shareholders	Bergs Tingslags Elektriska AB (BTEA) Municipality of Ånge Sundsvall Elnät AB Härnösand Energi & Miljö AB (HEMAB) Municipality of Timrå Municipality of Ragunda Municipality of Strömsund

In 2000, the grant "Broadband for all" was introduced with purpose to expand the fiber networks in sparsely populated areas. The municipalities made procurements and those who won could build with grants from the government. In our region it was also additional grants from the EU. As Sundsvall Elnät already had fiber in Sundsvall and Timrå, the company offered in those municipalities. Sundsvall Elnät was commissioned in two municipalities, Sundsvall

and Timrå and in Ånge as a subcontractor to Ånge Energi. In Härnösand, the municipality chose to entrust the assignment to Telia. In Ånge municipality, Ånge Energi discontinued the district heating operations. The technical administration was given responsibility for the fiber network that Sundsvall Elnät operated for the municipality.

In 2007, discussions were held between HEMAB and Sundsvall Elnät to merge broadband operations in Härnösand and Sundsvall. A feasibility study was carried out which showed that in-depth cooperation would entail several benefits. In the autumn of 2008, ServaNet was formed.

Enabler

In both cases, it is a matter of geographically dispersed cable networks that basically require the same competence to construct, maintain and operate. This means that the same organization can handle both networks. What is different is the market conditions. Electricity networks constitute natural monopolies, while city networks operate in markets with fierce competition.

At this time, the fiber network was relatively well developed in the rural areas of Sundsvall, Ånge and Timrå. In Härnösand, the urban area had fiber, while other parts of the municipality had not. At this stage, a close dialogue was held with Ånge where the municipality was informed about the possibility of becoming a partner in the company. In 2011, Ånge municipality stepped in as a partner in ServaNet.

In the county of Jämtland, the grant-financed networks were built by state-owned Teracom in all municipalities except in Östersund. With the network that was built, telecommunications stations were connected with radio link and customers were connected via ADSL, which was leased from Telia. The agreement meant that Teracom should operate the networks for ten years. When they finished building, they sold the network to CS IT, which was transformed into Quadracom.

Disruptive event

Their message to the Jämtland municipalities was that they planned to close down the business after ten years of operation. This meant that the municipalities that chose Teracom would be without networks for their citizens and that broadband coverage would be close to zero in these municipalities.

ServaNet met Ragunda municipality who was positive about a collaboration. The municipalities of Strömsund and Berg also expressed interest in co-ownership and the three municipalities became co-owners in 2014. At that time, ServaNet took over the operation of the ADSL network and began with fiber expansion.

In 2014, the opportunity came for new grant financing and ServaNet applied for grants for local backbone networks and access networks. In Jämtland, ServaNet ran the project and in Västernorrland, the county administrative board ran the Dig 2020 project. Timrå then became interested in participating in the county-wide project. Timrå joined ServaNet in 2016 as a partner. In 2018, Bergs municipality sold the fiber network to IP-Only and they will sell the shares during the year of 2021.

3.2 ServaNet Infrastruture for Operators

ServaNet does not own its own fiber network. In the territory covered by ServaNet, the following players own the fiber networks and are co-owners:

- Bergs Tingslags Elektriska AB (BTEA)
- Municipality of Ånge
- Sundsvall Elnät AB
- Härnösand Energi & Miljö AB (HEMAB)
- Municipality of Timrå
- Municipality of Ragunda
- Municipality of Strömsund

The above-mentioned players are network owners. They own all the fiber and premises to connect the fiber. In everyday speech, ServaNet manager calls it the “passive network”.

ServaNet owns the active equipment, ie the technology that activates the fiber with light. An example of this is the switches that connect customers. ServaNet also owns in most cases the equipment needed to cool the switches and the batteries and equipment needed to keep the network running during a power outage. We call this in everyday speech the active equipment.

The fiber network, equipment and technology are available to **“Operators”** that develop services on top it and put it available to the users on the territory. Some examples of those services are:

- Internet
- Telephony
- IPTV
- Security
- IoT
- Welfare services
- Sensor network (LoRaWAN)

To support the **“Operators”** and keep running their services with quality, ServaNet has an Operation and maintenance 24h/7 days service. Joint operating organization for the electricity network operations of Sundsvall Elnät AB and ServaNet’s broadband operations

that is available 24/7/365. The contingency force consists of an operations manager, an IT technician and three field service technicians. They work on a seven-week schedule, which means that a total of 35 people is included in our contingency force.

ServaNet claims to be faster and more flexible than traditional telecommunications companies and to have an adapted offer to customers' needs and conditions. The local presence makes ServaNet a local supplier with familiar people and not an anonymous supplier far away. Customers also know that their money stays locally and benefits local businesses.

In the next five years, much of the development will be concentrated on IoT and welfare services. The welfare services will primarily be purchased by municipalities (social services) and regions (healthcare). An important deal for ServaNet is to connect mobile masts with optical fiber. ServaNet assumes, that delivering the infrastructure for the **5G expansion** will be future business opportunity for them.

3.3 ServaNet Business Model & Sustainability

ServaNet business model, as an open city network is an infrastructure that is accessible to all players in the market on equal terms. The network is open to anyone who wants to rent black fiber or data links and to anyone who wants to offer services in the active network where communication services are provided. In the open city networks, the service providers compete with service content.

The network owner provides dark fiber and data links, for example, to service providers. The fact that the network owner does not provide its own service content ensures an interest in attracting new service providers to the network.

Network fee

ServaNet works with a network fee that is invoiced by ServaNet to the end customer. This is the fee that the customer pays to use our cables.

Yearly Budget for Investment

Before each year, ServaNet makes a **yearly budget** together with the network owner to agree on how much will be built in the coming years. Within this budget, ServaNet makes transactions that are profitable, either during the contract period (corporate transactions), or have a positive cash flow after ten years (private customers).

In the normal case when ServaNet does business, the investment is covered by the rent that ServaNet pays to the network owner. This applies if the transactions show a positive cash flow during the contract period, or at the latest after 10 years for private homes. If the investment is SEK 1 million and the network owner has a depreciation period of 25 years, the annual cost for the network owner is SEK 1,000,000 / 25 years = SEK 40,000. We assume that the interest rate is 2 percent (the interest rate on the lease is set annually by ServaNet's Board based on the market interest rate with a risk premium). SEK 1,000,000 * 0.02 = SEK 20,000. What constitutes the lease is SEK 40,000 + SEK 20,000 = SEK 60,000. Next year, only SEK 960,000 is

the basis for the interest calculation, as a depreciation of SEK 40,000 was made in the first year.

Investment of Public Interest

The transactions that do not have a positive cash flow according to the rules we mentioned above, ServaNet has a dialogue with the network owner about. The network owner has the opportunity to provide funds to still do the business. For example, it may be of strategic importance that a fiber network is built. This means that additional costs are outside the rent that ServaNet pays to the network owner.

It may also be the case that the network owner sees that a residential area or a new industrial area is to be built, but there are still no customers who make the project profitable. Then the network owner can choose to run the project anyway. This also means that the costs for the network owner are greater than the rent that ServaNet pays the firs years.

There are various sources that can provide financing for projects:

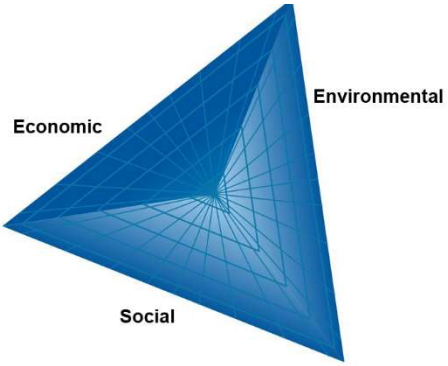
- The customer's connection fee
- Contribution from the Swedish Agency for Economic and Regional Growth
- Contribution from the Swedish Post and Telecom Authority
- EU grants
- Financing from network owners; entitled to lease
- Financing from network owners; not eligible for lease

One of the major challenges is that there are not enough people living in the projected areas. Then grant financing is needed and sometimes also money from the network owner that is not covered by the lease.

Return on Investment

ServaNet's ownership model is very open with the opportunity for the shareholders to have a dialogue about what is eligible for lease and what is not. A network owner has every opportunity to make strategic decisions, but these are not always eligible for lease. The shareholders in ServaNet take a certain profit in the lease and also take part of the profit in the company ServaNet AB. How large a share each shareholder has in ServaNet depends on the population in each municipaity and turnover on the network that exists within the own municipality.

Sustainability for ServaNet is based on the sustainable development triangle described on the following dimensions: Social, Economic and Environmental.



Social sustainability benefits from the fact that ServaNet provide good conditions for living and working in the region, including rural areas. Reducing vulnerability and maintaining the health (i.e., resilience, vigor and organization) of social and cultural systems.

Also, is **Economic sustainable** and gives to the cities a return on their investments in the fiber networks. Economic efficiency plays a key role in ensuring optimal use of the services provided. The **Environmental sustainability** focus on measurement of environmental impact of our activity, in terms of mobility, land works and CO2 emissions.

Five years ago, world leaders committed themselves to the 17 Sustainable Development Goals[1] to achieve three important things by 2030: *eliminating extreme poverty, reducing inequalities and injustices in the world, and resolving the climate crisis*. ServaNet's ambition is to contribute to 8 of the 17 goals.

- **GOAL 3: Good Health and Well-being:** The focus for ServaNet has been to safeguard the health and well-being of staff and to follow the health authority's recommendations.
- **GOAL 4: Quality Education:** ServaNet focuses on our end customers and on its own staff. Good study environments require good broadband connections, which are made possible by ServaNet's fiber connections.
- **GOAL 5: Gender Equality:** ServaNet works for a gender equality organization without discrimination.
- **GOAL 7: Affordable and Clean Energy:** We work to ensure that everyone has access to reliable and secure broadband infrastructure, which contributes to society's energy transition.
- **GOAL 9: Industry, Innovation and Infrastructure:** The company works to ensure that society has access to a robust and secure infrastructure with high transmission capacity, which is the basis for being able to follow digital development.
- **GOAL 10: Reduced Inequality:** ServaNet works to make the effects of digital exclusion visible and we have pointed out the differences in broadband access in sparsely populated areas versus urban areas and cities. We have therefore actively contributed to fiber expansion in rural areas.
- **GOAL 11: Sustainable Cities and Communities:** Open fiber networks create new opportunities for smart cities. The company is actively working to establish a wide range of services from a number of service providers that can be used in the expansion of 5G networks, among other things.
- **GOAL 12: Responsible Consumption and Production:** ServaNet always considers these aspects in the business and in our procurements.

[1] THE 17 GOALS | Sustainable Development (un.org)

4. Transfer Potential

To leverage the ServaNet good practice knowledge and to make it transferable to other EU regions and cities it is important to assess the transfer potential and to follow a three steps model:

- **Understand**: the importance of developing a detailed, shared understanding of the different facets of the ServaNet good practice.
- **Adapt**: transfer is not a copy and paste process. In most cases, the IoTXchange cities must redesigned elements of the good practice to fit their own needs and environment.
- **Reuse**: each IoTXchange city, in case of interest, should implement their own adapted version of ServaNet good practice.

ServaNet model can be applied to other European regions, however, the degree of maturity of suitable technological infrastructures in place and IoT ecosystems, will influence the transfer potential. Small towns, villages and rural regions can benefit of owning a regional open fiber network.

Investing in regional open fiber network is a proven game-changer for any given ecosystem. In fact, investing in open access fiber could benefit the economy, end-users, investors, and operators by enabling: "macroeconomic benefit to the region/cities, higher valuations/returns to shareholders, better efficiency and commercialization success to operators and gigabit speeds at affordable prices."

Also, the investment needs can be shared, and this will be extremely beneficial for the "Operators" sector as open-access fiber would attract new investments from traditionally non-telecom players.

The network democratization enables more affordable prices and more oriented to real needs of the region and not only focus on profit. This, also opens a better end-user experience. Aside from the ultra-high-speeds, they increase the actual quality of services in the way that it provides the "Operators" with an opportunity to up-sell new partner content. Partner content in this case could include streaming services, TV bundles, or other OTT content, which would be beneficial for both sides of the equation.

The IoT competences in the network is not the same, same cities is already using IoT, others intend to use IoT in multiple applications. So, for those that see on ServaNet good practice an opportunity for their region or city, must take in consideration the following transfer recommendations:

- **… *make it realistic*, as some good practices may, in theory, have a high impact, but are actually difficultly applicable outside of their home context.**

- **… *make it context-specific*, i.e. guarantee a certain degree of similarity exists with regards to the geographical, socio-economic and institutional preconditions of participating cities.**
- **… *make it concrete*, i.e. focusing on practices that can actually be concretely changed or influenced at the cities end.**
- **… *make it incremental*, as new practices need to be embedded to current practices and future prospects.**
- **… *make it critically reviewed*, as even the most obvious success story can never be fully transposed elsewhere without being adapted.**

Acknowledgment

The project team from Ånge will be led by Petra Malmberg (Head of IT),

Göran Sörell - Managing director

About the author

Miguel Sousa

- *Urbact Lead Expert and Urban Innovative Action Expert*
- miguel.sousa@inovamais.pt
- +351964063307
- linkedin.com/in/miguelsousapt