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The Urban Lab of Europe !

The AVEIRO STEAM CITY Project
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*Project led by the **City of Aveiro***

JOBS & SKILLS
IN THE LOCAL ECONOMY

European Union
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Aveiro STEAM City project

The port-city of Aveiro in northwest Portugal is commonly referred to as the "Venice of Portugal", since it is crossed by canals and moliceiros (local picturesque boats). It is also known for being a colourful city, with charming Art Nouveau houses. Only a 50 minutes' drive from Porto, Aveiro is the home of some of the most innovative companies in Portugal and is also well known for pioneering telecommunication research and digital transition.

Since being named Portugal's first "Digital City" back in 2003, the municipality has always been considered as a digital cluster and a territory of innovation. It is home of one of the top-100 universities in Europe less than 50 years old, of the R&D centre of one of the continent largest telecom companies and of several innovative firms, both in digital and traditional sectors.

Once better known for the ceramic sector, Aveiro is currently involved in the main projects in the field of 5G and of smart cities, so it is no surprise that it also wants to be one of the most technological cities in the country.

It was chosen in 2018, among other twenty-two cities, for the Urban Innovative Actions Program with the Aveiro STEAM city project that was, at that time, the only project funded by the UIA initiative in Portugal.

"Aveiro STEAM city" intends to implement a technological revolution by boosting the use of new technologies in the public space. The project can count on the strong educational offer of the city, and in particular of the University of Aveiro, to produce a new range of talents – including artistic, creative and human sciences areas – with a STEAM approach (adding the "A" for Arts and creativity to the domains of Science, Technology, Engineering and Maths) and ensuring that supply and demand for new digital skills and competences are matched, in order to contribute in terms of added-value produced by employees in the city.

Together with educational activities, the project will enable a testbed for IoT and smart city technologies, based on 5G infrastructure and optical fibre, developing a number of use cases in 3 main areas: mobility, environment and energy. All data gathered by use cases will convey into a new urban digital platform.

Partnership

- City of Aveiro
- Instituto de Telecomunicações - R&D Institute
- Altice Labs - R&D Institute
- Universidade de Aveiro - Universities and Research Centre
- CEDES - Universities and Research Centre
- INOVARIA - association of businesses

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1 EXECUTIVE SUMMARY

Approved under the topic “Jobs & Skills”, Aveiro STEAM city seeks to improve the technological infrastructure of the city in order to enable local economy, to educate and re-skill local workers, to collect and share data useful for decision makers, companies and citizens, that will gain access to information, open data and open services.

The project represents a strong investment of 6.1 million euros, with funding from the European Commission through the UIA initiative of 4.9 million euros.

This project is expected to generate in the City a new technological revolution, with the adoption of 5G and IoT - Internet of Things technologies and infrastructures and will contribute to the transition of Aveiro into a knowledge-based economy.

The CMA (Camara Municipal do Aveiro) Application was one of 22 chosen from the 184 that applied to the third UIA call and resulted from a strong institutional partnership, led by the CMA, with the participation of Altice Labs, the Instituto de Telecomunicações (Telecommunications Institute), the University of Aveiro, INOVARIA and the Association for a Centre for Sustainable Development Studies (CEDES).

“STEAM-City project aims to help companies to rethink the resources they need to innovate, grow and establish means to attract a new range of talent – including in the artistic, creative and human sciences areas – to the new digital opportunities in a STEAM approach. At the same time, the project will develop a first-mover strategy towards a radically new technological infrastructure.”, stated the City Mayor.

1.1 Addressed challenges

Portugal traditionally has had high migration outflows, but emigration has been increasing in recent years. The rise of unemployment, job insecurity and precariousness, combined with deteriorating working conditions set against the backdrop of the financial crisis, has led to a fast and significant increase in emigration. An increasing proportion of those leaving are young, female and highly qualified. Portugal, in particular, has the highest emigration rate as a proportion of population in the European Union. More than two million Portuguese people (20% of the population) now live outside the country. It is estimated that more than 485,000 workers left Portugal between 2011 and 2014 to seek better living and working conditions. The demographics have changed recently, with a greater proportion of emigrants having higher qualifications. This is closely linked with the destruction of jobs and labour market deterioration, which has resulted in very high unemployment.

The emigration of highly qualified (and mostly young) men and women has also been an issue in policy debate. Researcher stress that even though most Portuguese emigrants are unqualified, this level of emigration should concern policymakers. Brain drain has thus become a specific matter of concern. Results from the study “Brain drain and academic mobility from Portugal to Europe” show that the emigration of the skilled Portuguese population has been increasing significantly.

Since 2008, more than 20,000 skilled individuals have left the country seeking work, against 8,000 in 2007 (EC, 2016).

Aveiro STEAM city tackles this crucial challenge, with a number of interventions placed on different layers: education, training, ICT enabling infrastructure, tech sensors and devices, urban data platform.

As mentioned by the Mayor, Aveiro aims at competing with the stronger national economic centres, being able to attract and retain the necessary talents for local economy to grow, making Aveiro a more competitive city globally. Then the true challenge of Aveiro STEAM City is not how to create more jobs, but how to improve the added-value and socio-economic wealth produced by the jobs created.

In order to address such a complex and up to date challenge, local firms will be helped to rethink the resources they need to innovate and grow, through a Labour Observatory, and that may not be just those traditionally associated with functions like engineers, coders, etc., but other creative roles equipped with the necessary digital competences.

1.2 Project's main actions in short:

1. **Education and training courses provided by the University of Aveiro and the City of Aveiro**, through a brand-new service: The Labour Observatory. It will investigate, monitor and provide education and training on the so called "future jobs". The recipients of this action will vary from students of the primary schools (through the provision in every school of brand new "tech labs") to graduated trainee engaged through the "tech city bootcamps", 14 weeks training programs plus 14 weeks of internship in local companies.

2. **5G connectivity plus fibre infrastructure**: through this activity Aveiro will become one of the first cities in Portugal with a commercial 5G services offer and the first city that will make this technology available for research and pilot testing. The digital testbed will cover 5 squared kms, supported by 13 linear kms of fibre links and 25 reconfigurable radio units of different communication technologies. The UIA project funds 7 linear kms of fibre + 25 radio units belonging to the digital testbed. The 5G connectivity and the fibre infrastructure will enable the project's use cases.

3. **Project Use Cases**: on mobility, environment and energy. The use case of mobility aims to understand citizens' behaviours within the city, to provide new solutions towards an efficient traffic management. The use case of environment will focus on the assessment of the impact of the transport planning on the city air quality, thus providing useful information towards new environmental-friendly solutions. The energy use case will provide new solutions regarding the use of electrical vehicles (traditional gondolas called "moliceiros") in the water canals.

4. **Urban digital platform and the Aveiro Tech Hub**: all data captured through sensors and other IoT devices installed for the three use cases, together with data that, at the moment, are collected by the municipality without any automized or interoperable tool, will convey into the new urban digital platform and will be showed thanks to the new **Aveiro Tech Hub**, that will be placed in the public library at "Fernando Tavora Building". The tech hub will have innovative interactive displays that will provide an immersive UX for its visitors. Citizens and tourists will be able to better understand the outputs from Aveiro STEAM-City, obtain useful information related with the activities being implemented and permanent access to data related with use-cases. As example, a user will be able to know the air quality in the urban area, based on the information from Use-Case Environment.

2 OVERCOMING CHALLENGES

2.1 Leadership

Aveiro STEAM city does not lack in terms of leadership: the municipality is very engaged into the project and during this first year of running activities it demonstrated this commitment clearly.

As the first Portuguese project approved under the UIA Initiative, Aveiro STEAM City has been in the spotlight. In the 14th of June the city has received the official visit of the Portuguese Secretary of State for Communications, Mr. Alberto Souto de Miranda, who was given a detailed presentation of the project, followed by a press conference with the Mayor of the City of Aveiro, Mr. José Ribau Esteves. This interest of the Portuguese government in Aveiro STEAM City leverages the responsibility of the project's partners and the relevance of the project´s outcomes and subsequent impact in the socio-economic landscape of the region.

The city mayor follows the project's updates meetings in person – through the general board – every six month, and the project's steering committee meets regularly every three months.

A good political stability is expected to last and the communication flow among the project manager, the mayor's office, the WP leaders and all partners in general is fluent and frequent.

In this context, Aveiro STEAM city represents the backbone of the municipal program, strongly supported by the mayor, called "Aveiro Tech city". Aveiro Tech City is an initiative promoted by the City of Aveiro that aims at transforming the urban area in a living lab, in other words a testbed where businesses, projects and services are developed, trialled and implemented.

This initiative is based in four central pillars:

1) Technology, services and Apps: technology-based services and products focused in the improvement of city's quality.

2) Training: through the development of talents underpinned by STEAM competences, preparing students and interns towards the requirements of the present and future of labour market.

3) Education: preparing new generations, professors and pupils with multidisciplinary skills required to succeed in the digital era.

4) Challenges: challenge companies, universities and citizens to propose and implement new ideas, products and services capable to transform the city and to address issues identified by the local community.

2.2 Procurement

In terms of procurement, it is emblematic the energy use case, aiming at transforming local touristic boats that navigate along the canals into electric ones.

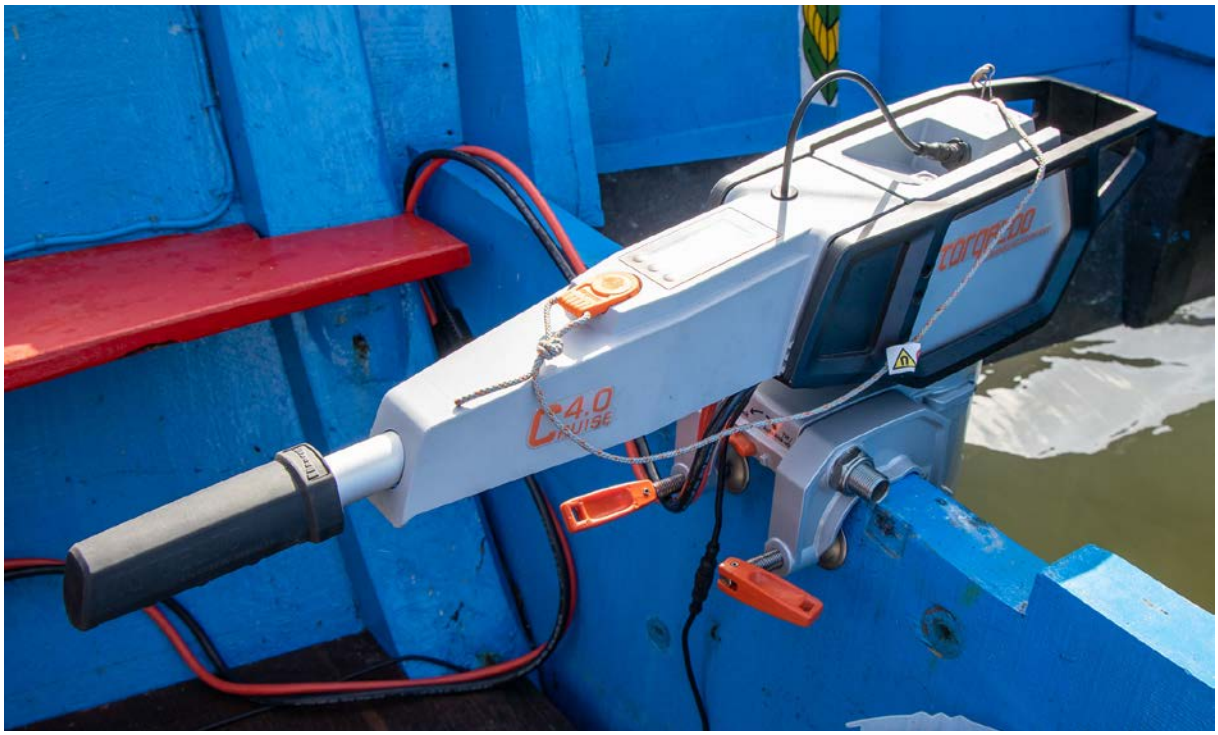
Once used by agriculture and salt industries, currently there are 27 vessels operating daily in the urban canals of Aveiro, for touristic and sightseeing purposes. These boats operate 8 hours/day and transport up to 35 people in a 45 minutes ride, which annually represents the transportation of over 1.1 million tourists. At the moment, the engines are either petrol or diesel, covering a shifting catalogue of power, consumption and models, realising to the atmosphere approximately 400 tonnes of CO2 every year.

The municipality is in charge of the infrastructure of the canals with electric charging stations and sustains the correlated costs. On the other hand, touristic companies managing the boats, in order to apply and be eligible to the call for getting the new licences to operate until 2021, had to accept to change the normal engines into electric ones.

Apparently, there was not a convenient technological solution for the new electric engines, immediately available to be procured. So, the municipality did internal research and created contacts with a German company, Torqueedo, who produces a special type of electric engine, that resulted to be particularly efficient for the local Portuguese boats. Hence, the municipality was able to run a pilot propaedeutic to get all the correct info in order to write the tender dedicated to touristic companies that manage the boats. This process, even though not formally comparable with a PPI scheme, according to the EU law, resulted in practice both innovative and efficient.

It still remains open a very hot topic for all cities that are equipping the territory with “smart devices”:it would be auspicial, considered that

more and more vehicle floats are going to be replaced by electric ones, once investing in charging stations, try to procure since the very beginning multifunctional and hybrid charging stations, for example adaptable to more than one mean of transport: bus, scooters, bikes, boats.



2.3 Integrated cross-departmental working

Aveiro is a medium-sized city and the local government has a relatively short hierarchical chain. Relationships are very fluid and immediate. Nevertheless, some strategic functions within the municipality could be reinforced in terms of competencies and human capital.

Managing Aveiro STEAM city, considering that the local authority didn't want to externalize many actions and didn't procure for any advisory service, requires very strong competencies to the people staffed and within the municipality itself. In particular, the local authority is in charge of almost all the procurement procedures for investments and also needs some specific competencies in order to coordinate, address and monitor partners, especially from the digital and tech point of view.

So, the lack of competencies assessed by the PM was referable in particular to some crucial internal staff functions: the procurement sector and the ICT sector.

So, even if in presence of good inter-functional internal mechanisms, some specific external experts were hired by the municipality, using (virtuously), the project's budget.

2.4 Partners' commitment

The good level of commitment coming from the partners already produced the first tangible results. The development of a 5G ecosystem within the city is a vital achievement for the project, so last September Altice Labs, the telco partner of Aveiro STEAM city, has conducted an

emergency drill using 5G communications to support the SOS teams and emergency units at the scene. This initiative has been successful thanks to the effective teamwork among the Aveiro Municipality, the Police and Fire Brigades, the Hospital of Aveiro, Altice Labs and Ericsson, with the propose to demonstrate the improvement of the emergency unites response with 5G communications, by using live images of the scenes and the assistance of a drone.

During the Aveiro Techdays held last October the municipality also officially launched several initiatives in the area of innovation, digital skills and in the development of disruptive ideas in education, technology and arts. One of those initiatives was the "**Aveiro 5G Challenges**" that aims to support startups, scaleups and R&D Institutes to develop new products and services in the 5G network testbed, that is about to become a reality in Aveiro also thanks to the UIA project. This was also a good result of the teamwork among partners involved in WP 6: Municipality of Aveiro, Telecommunications Institute, University of Aveiro, Altice Labs and INOVARIA.

2.5 Monitor and Measure expected results

Aveiro STEAM City integrates many small novel and innovative actions, which are also part of a new urban concept. While, in general, it's not easy to monitor innovation, it is important to stress that a dynamic monitoring plan can be a good solution as a great part of the activities is characterized by some level of uncertainty. The first draft of the monitoring plan has been designed, mainly by the partner CEDES. Its composed by:

a. a set of statistical, technological and socioeconomic indicators for the assessment of the status and potential of the local context in terms of jobs, qualifications and added-value produced per employee that will be necessary in terms of ecosystem improvement;

b. a section dedicated to guidelines for self-evaluation from the users and companies;

c. a set of recommendations on data treatment;

d. a focus on the results of WP4 (Aveiro Labour market observatory) and WP6 (Aveiro Challenges) in terms of possible implications on the Business Model;

e. a final section to help monitoring the overall compliance of the project objectives, outputs and deliverables (extra AF).

It's interesting to note that point c) is strictly connected not only to GDPR prescriptions but also – in practice - to the business model development, as data treatment protocols strongly impact – through permissions or limitations - on the potential use and monetization of data that companies may consider to do. This first draft of the monitoring plan maybe redundant at the moment in term of numerosity of the dimensions investigated, but it is flexible in order to become more focused, as soon as the core project's trends will emerge at a later stage.

2.6 Citizen engagement and communication

Aveiro Steam City kicked off in presence of the European Commissioner for Research, Science and Innovation, Carlos Moedas. He stated: "Aveiro, once again, is leading the way. When we see so many cities and universities that competed for this project, Aveiro was the only Portuguese city and with this project Aveiro positions itself for the future of what will be the capacity, or not, to

win". This participation and commitment from the European Commission has been obviously very significant in terms of "blessing" the project on its very beginning and also in terms of impacts on media coverage. The event counted with over 250 participants, including project partners, other different stakeholders and the local community.

Aveiro STEAM City project also attended the Portugal Smart Cities Summit, in May 2019 in Lisbon. The event is the biggest conference and exhibition dedicated to Smart Cities in Portugal, with more than 100 speakers, 21 municipalities, 40 startups, 60 companies from different countries, 7000 visitors and guests. The topics under discussion cover a wide catalogue of areas, from smart mobility to digital transformation, water sustainability and happy cities.

The fifth edition of the Techdays, last October, was also an occasion for the mayor to "account" for the first year of activity of Aveiro STEAM City. During Techdays were also launched:

1. The TECHCityBootcamp - aiming at promoting STEAM and Coding Competences in citizens that wish to work in the Aveiro ICT ecosystem.
2. CRIATECH Residences - aiming at promoting and develop STEAM subjects in a Collaborative Ideation, with the participation of professionals and students from several areas, in order to exchange experiences, knowledge and to bring together interdisciplinary activities and Improvement in Science, Technology, Engineering, Art and Math. Residences also intend to give kids, teachers, educators and the general public the opportunity to experiment Digital Creations.

All communication activities were dedicated to a (more or less) digitally literate target audience. Some of them were dedicated to larger group of citizens. Still some activities of citizen engagement should be planned in order to amplify the value generated by use cases. Probably, if the digital urban platform – or part of it – will be accessible to citizens, it will be valuable to develop some codesign sessions, together with target groups, in order to make the platform a real instrument for participation, accountability and interaction among citizens and civil servants/political majority.

It must be reported that in the last months the city procured a communications agency in order to take care of communication' digital and non-digital campaigns and also hired a communication officer to join the local authority team, in order to take care of the relationship with the agency but also in order to start up some new citizen engagement activities.

2.7 Upscaling and Legacy

The legacy of the project is going to represents a huge opportunity for the local authority but at the same time presents some points of attention that should be addressed as soon as possible.

The “technological heritage” in terms of tangible and not tangible goods (sensors, charging stations, fibre, 5G infrastructure, the digital platform) is very rich and has – at the moment – an ideal ownership linked to the single partners responsible, in accordance to the AF, for their purchase, installation and management. A possibility to be explored for the future is to attribute this heritage to a municipal or public owned/controlled company. This option should still be discussed and verified and should find the acceptance of all interested partners. The possibility to value economically and financially the current investments is of course connected to the idea of being able to make all maintenance and management costs, that will arise at the end of the project, sustainable.

The preliminary business model lists some main players/stakeholders:

a. Raw/primary Data providers

b. Infrastructure providers

c. Government Authority

d. Solution providers

e. End users

As an annex of the business model, a preliminary version of “Data Sharing Agreements, Procedures and Guidelines to Privacy and data policy” has been drafted by the partner CEDES.

3 CONCLUSIONS

The future of cities, as regards innovation, is strongly linked to both enhancing human capital and highlighting territorial identities (The future of cities Report, EC 2016).

This journal conveys the message that the Aveiro STEAM city project is a huge chance to be taken by this Portuguese city, where the dimension of the funding, together with the strategic vision of the local authority and the limited (in numbers) partnership create an "*unicum*"; this project is potentially fully capable of making tangible impacts on its inhabitants, and it will hardly be drowned or confused among many other still visible and important initiatives run in Aveiro.

As Dani Rodrik, in "Tackling Inequality from the Middle", correctly states "Economists are coming to recognize that combating the resulting polarization depends in large part on reinvigorating the economy's capacity to generate good jobs. (…) Government support of innovation must be directed toward explicitly employment-friendly technologies. We can envisage an entirely new regime of public-private collaboration in the service of building a good-jobs economy. Many of these ideas are untested. But new challenges require new remedies. If we are not ready to be bold and imaginative in the service of creating inclusive economies, we will cede the ground to hawkers of old, tested, and disastrous ideas."

Aveiro's project tackles exactly this rising crucial situation with an approach that, making an improper similitude, could be defined "from the cradle to the grave", in the sense that an integrated approach is addressed to citizens in different stages of their lives: from 7 years old kids to workers that need to be reskilled.

Although progress is very good overall, special attention is needed in the fields of participation and citizen engagement through the design of some particular processes (e.g. city platform, Aveiro tech hub), because – as it was expressed – this is a distinctive approach of the second wave of smart cities. Also, for starting up of the Labour Observatory, it may be interesting to engage students, interns or other groups of stakeholders in the design of the solution, considering that they will represent a significant group of beneficiaries.

It's very remarkable the effort put by the local authority in learning from other European cities that develop similar initiatives, so the idea to look for benchmarks, periodically, such as "Smart Docklands" in Dublin, it's very inspiring and useful at the same time. Other good examples in Europe to explore would be the "Copenhagen solution Lab", the "Sharing cities – Porta Romana/ Vettabbia" testbed in Milan, the "smart" case of Canary Wharf in London.

Finally, there is some work to be done with all stakeholders to ensure that the project can be sustainable, maintained and scaled up after the formal end of the project period. Although the municipality is strongly committed, to explore the idea that a "third party", as a legal entity publicly controlled, might inherit the smart city infrastructure and overall investments made during the project is promising and deserves a deep dive.

Urban Innovative Actions (UIA) is an Initiative of the European Union that provides urban areas throughout Europe with resources to test new and unproven solutions to address urban challenges. Based on article 8 of ERDF, the Initiative has a total ERDF budget of EUR 372 million for 2014-2020.

UIA projects will produce a wealth of knowledge stemming from the implementation of the innovative solutions for sustainable urban development that are of interest for city practitioners and stakeholders across the EU. This journal is a paper written by a UIA Expert that captures and disseminates the lessons learnt from the project implementation and the good practices identified. The journals will be structured around the main challenges of implementation identified and faced at local level by UIA projects. They will be published on a regular basis on the UIA website.

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