

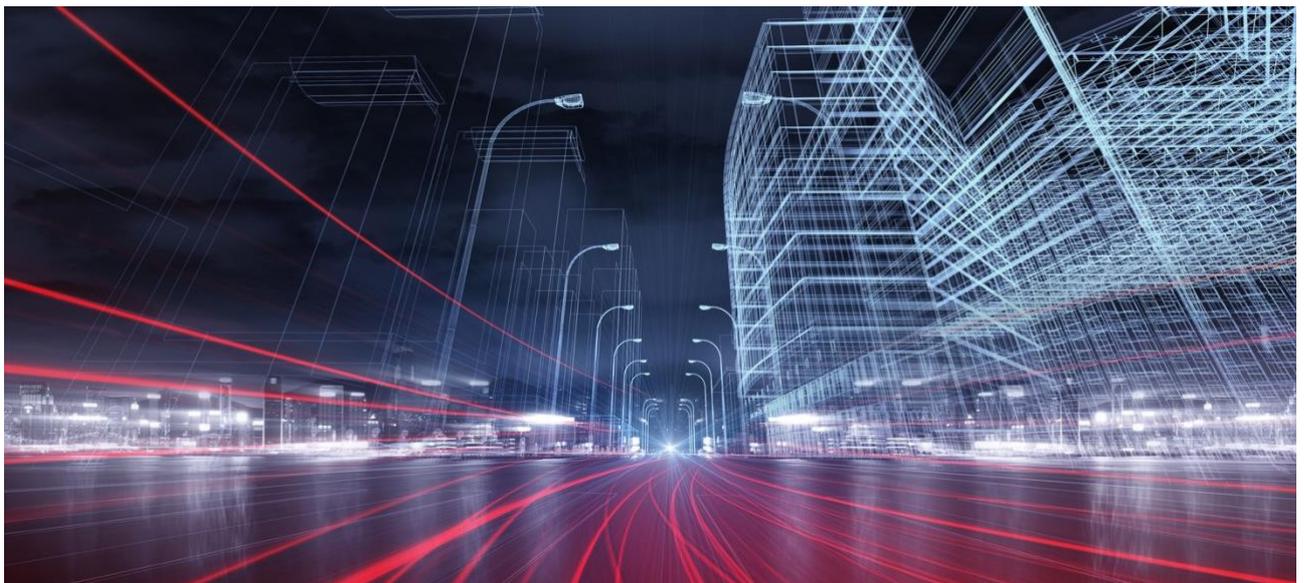


DIGITAL CITIES CHALLENGE

Assessment report for the city of Patras

PATREUS: PATRas E-city Urban Strategy

July 2019



Digital Cities Challenge

Assessment report for the city of Patras
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Table of contents

1. Introduction to the Digital Cities Challenge	4
2. Key sectors of the local economy and DCC focus.....	6
3. Digital maturity level of the city: outcomes of the Self-Assessment Tool and Key Performance Indicators.....	8
3.1. Outcomes of the Self Assessment Tool	8
3.2. Key Performance Indicators	11
4. The local digital ecosystem: leadership and governance.....	12
5. The use of digital solutions by local companies.....	14
6. Community engaged in digital transformation.....	15
7. The state of local digital and physical infrastructure	17
8. Digital solutions enabling the modernisation of business environment	18
9. Data-driven innovation.....	20
10. Skills and entrepreneurial culture	21
11. Digital transformation SWOT analysis	22
Appendix I: Table of abbreviations and definitions.....	24
Appendix II: Bibliography	25

1. Introduction to the Digital Cities Challenge

According to the recent data, 72% of the EU's population lives in cities, towns and suburbs, making them the engines of the continent's economy. Cities generate 85% of Europe's GDP, they also face multiple, interconnected challenges, including energy and climate change, employment, migration, social inequality, and water, air and soil pollution.

However, through advanced digital technologies, Europe has the opportunity to re-invent the way we manage our cities' development and respond to the big societal challenges, such as efficient health management, cleaner environment, green mobility, and offering great-value jobs. Due to their high density, cities are put in a very good position to create innovative ecosystems made up of a wide array of different stakeholders from government, industry, finance, academia, communitarian organisations, social partners, etc. Cities have the capacity to make policies become reality.

In this context arises the **Digital Cities Challenge**, an initiative of the European Commission with the main purpose to support the cities in their path to digital transformation. DCC offers policy advice and support to 15 cities in Europe, namely **Alcoy**, **Algeciras** and **Granada** in Spain, **Arad** and **Iasi** in Romania, **L'Aquila** in Italy, **Kavala**, **Patras** and **Thessaloniki** in Greece, **Sofia** in Bulgaria, **Ventspils** in Latvia, **Grand-Orly Seine Bièvre** in France, **Pori** in Finland, **Rijeka** in Croatia, and **Guimarães** in Portugal. The support to be offered will speed up the digital transformation and the industrial modernisation of cities in order for them to take full advantage of the 4th industrial revolution.



This initiative draws inspiration on the recommendations set out in the "Blueprint for cities as launch pads for digital transformation". In addition, it will reinforce the networking among model

cities, facilitate their participation in on-going European initiatives in similar policy fields, strengthen stakeholder collaboration, cross-regional partnerships and stimulate investments.

The selected Digital Cities receive support in the form of field advisory services to be provided by a group of high level experts and peer reviewers, and offer the possibility for city representatives to participate in a series of capacity building and networking seminars. These activities take place in four Academy seminars during which cities share practices, take advantage of peer to peer learning and work together and in thematic groups on the steps of their transformation trajectory.

This document has been developed in the framework of the field advisory services delivered in Patras. It represents the main output of the first step of the digital transformation strategy: setting the digital vision and ambition for digital transformation. The assessment report has been developed by the Digital City team on the basis of:

- The results of the Self-Assessment Tool and collection of Key Performance Indicators at the city level which took place between February and May 2018. A total of 29 valid replies were collected through the SAT.
- A literature review of key documents provided by the local leadership team (In Appendix 1 the full list of documents consulted).
- An assessment visit which took place from 14-17 March and 21-24 March.
- A vision and ambition workshop which took place on the 4th of May.

This document represents the key input to the work performed during the subsequent phases of the digital transformation trajectory (i.e. definition of the city strategy and roadmap).

2. Key sectors of the local economy and DCC focus

For the purposes of the DCC, Patras is defined as the municipality of Patras, strictly speaking, plus the industrial zone, located outside the city itself but strongly connected to its economic activities as a major source of employment and value added. In a nutshell the economy of the city is in decline, it is composed of some well-embedded subsidiaries of national and foreign companies, very few medium-sized manufacturing companies, few competitive service companies mainly in tourism and transport and many microenterprises in retail. There is a vibrant ecosystem of start-ups, most but not all of them in ICT, yet with only few visible success stories as yet.

According to the 2011 census, the new (as emerged from the national reorganisation of municipalities) Municipality of Patras, has 213,984 permanent residents and is the third largest city in the country. It is the gateway of Greece to the West due to its harbour, an international shopping centre and a focal point for trade and communication with Italy and Europe. The harbour has played a significant role in the local economy leading to tourism and logistics but is endangered because of competition from the port of Igoumenitsa after the completion of a new highway in 2017 as well as a problem with legal and illegal migrants trying to cross the Adriatic sea to Italy and from there to Western Europe. The Port Authority has adopted plans to reinvigorate its activity and, during the DCC strategy discussions, has suggested specific measures necessary for its digital transformation.

Patras has been a prosperous city in the past thanks to its central role for exports and manufacturing (food, beverages and textiles mainly) was the key activity, but faced massive deindustrialisation since the 1980s. The crisis affected the few construction companies. According to the Chamber's data, about 800 medium and small businesses were closed during 2011-2016. Unemployment today in Patras is over 30%, while youth unemployment is over 60%. Few large factories, such as "Athenian Brewery" and "Titan", are left in the industrial zone. About 50 smaller companies without a clear sectoral pattern are also located in the industrial zone. Most of the activities are now in tourism, transport and the service sector with very small units and non-tradable services. For the future, the Smart Specialisation Strategy (SSS) of the region of Western Greece foresees support for the agro-food sector, aquaculture,

the tourism-culture complex as well as materials and microelectronics. Only the last three would be relevant for the city of Patras: the tourism-culture complex can scale up through facilitating access, increasing the quantity and quality of services and enhancing of e-commerce. Materials and microelectronics are relevant for some manufacturing companies and start-ups. One important activity supporting some seasonal businesses is the Patras Carnival, which is famous and attracting tourism for a few days each year.

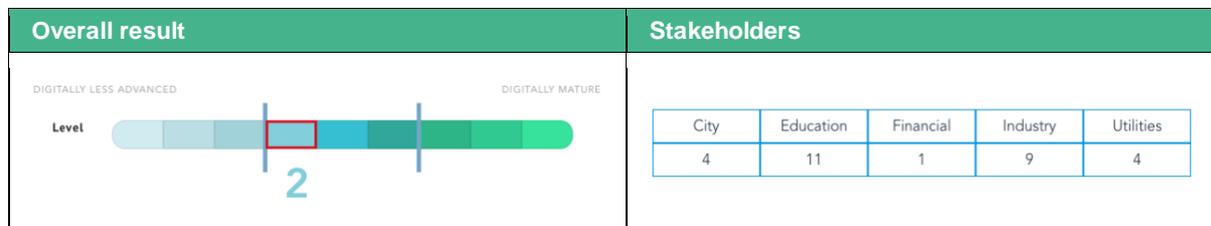
The main challenges, common to all sectors, include the small size of the local market, the barriers created by the crisis and lack of efforts to modernise. The digital transformation is crucial for enhancing networking and partnerships out side the region/country, diminishing costs and improving skills.

3. Digital maturity level of the city: outcomes of the Self-Assessment Tool and Key Performance Indicators

3.1. Outcomes of the Self Assessment Tool

The City of Patras has been found to be in the early steps of digital transformation based on the aggregate perception of stakeholders who completed the SAT.

Figure 1 Self Assessment Tool overall result



The relative strengths of the City, according to the SAT are the Digital skillset; Support Services; Community; Governance and Leadership while the weaknesses are Open data; Infrastructures; Companies’ Digital competencies and Finance.

The results are to a large extent compatible with the overall reporting in the few documents available for the situation in the City and the interviews conducted.

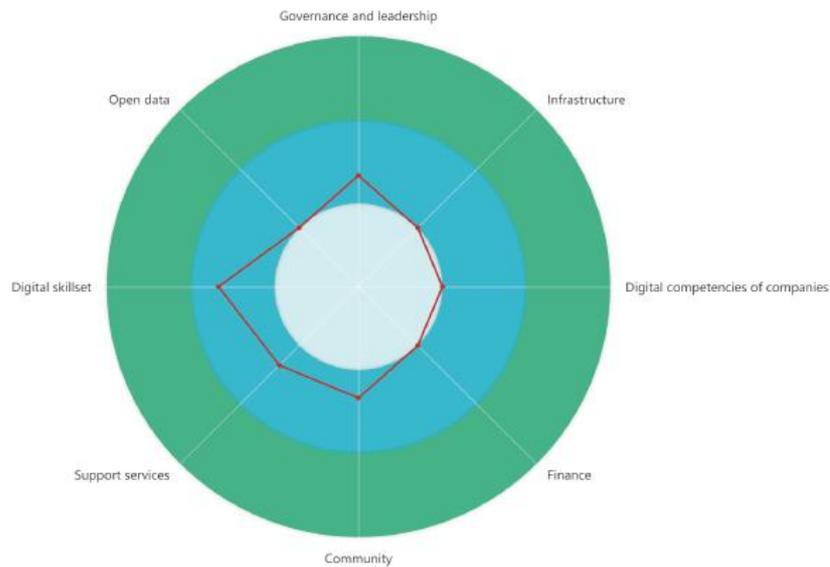
There is no doubt that education and attraction of talent¹ constitute the strongest points thanks to the three HEIs, which are all active in their respective fields, while the University of Patras (UoP) is among the largest and best in the country.

Innovation labs and accelerators should be considered as a relative strength thanks to the Corallia² cluster development tradition and recent efforts of the UoP.

¹ Given the way HEI entry is organised in Greece a lot of talented students study in Patras

² Corallia is one of the first cluster development organisations established in Greece and is active in Patras in cooperation with the local (adjacent to the University) Science Park and the Patras Innovation Hub designed to accelerate the successful development of innovative companies in Western Greece.

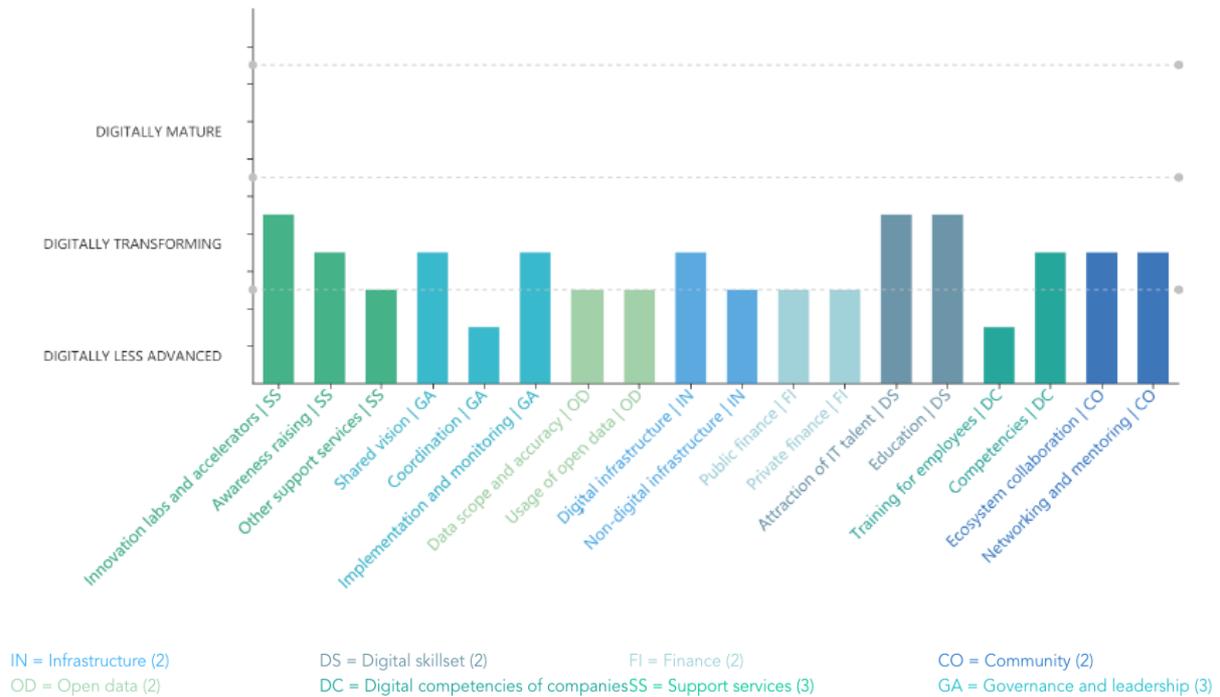
Figure 2 City stakeholder average assessment by dimension



The digital infrastructure is fairly satisfactory thanks to the creation of the Metropolitan Area Network (MAN, with some reservations on its maintenance and use) and at the time of the responses the announcement that Patras would be one of the two Greek cities to pilot a G5. Meanwhile it seems that this will not materialise.

These findings were to a large extent confirmed in the local Vision Workshop. Lively discussions indicating to some disagreement took place in the case of openness of the municipal data and the role of leadership with shared opinions on the extent to which data are open.

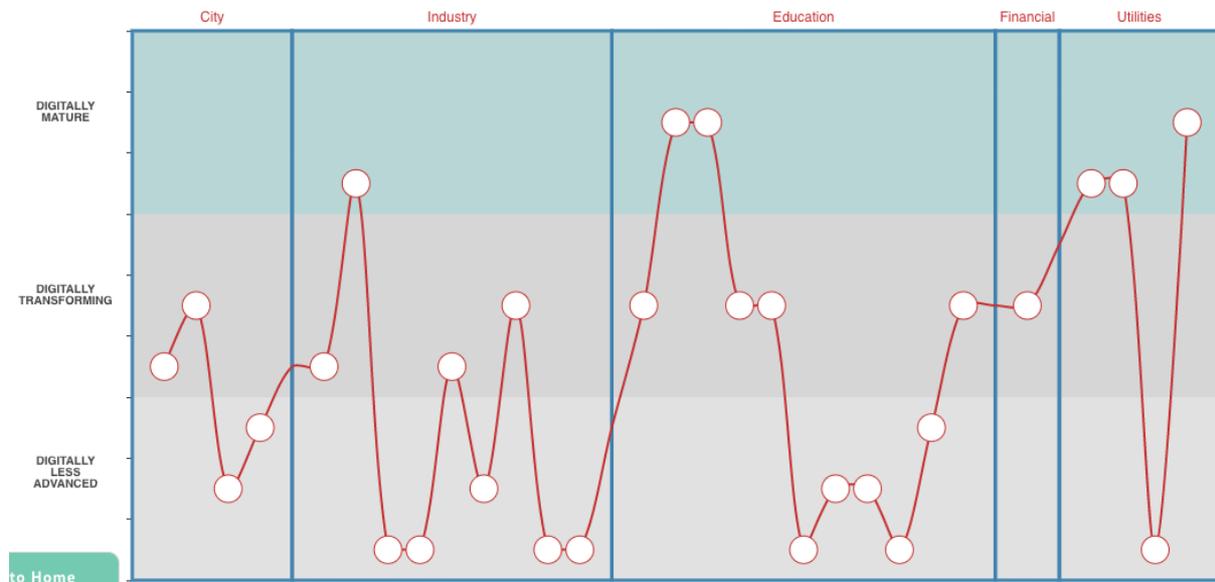
Figure 3 City stakeholder average assessment by sub-dimension



While there is a fairly normal distribution in the perception that the city belongs to this category there were differences in the way the different dimensions were rated. The relative frequency of the respondents reflects well the relative size and position of the actors:

- There is a vibrant and comparatively large education community,
- A highly underrepresented financial sector (which not only suffers from the liquidity constraints of the Greek crisis but is also practically managed in Athens with limited degrees of freedom in Patras) and
- A dual business sector with few ambitious and optimistic, modern companies and a large majority of traditional SMEs.

Figure 4 Individual city stakeholder replies by stakeholder type (City, Industry, Education, Financial, Utilities)



3.2. Key Performance Indicators

There is no systematic data collection at the city level in Greece. The team invested the necessary efforts for collecting data related to SAT KPIs for the city of Patras and could only compile few of them:

Due to the fact that education represents a strong point for the City it has been possible to gather data related to some of the KPIs in the Digital skillset and education category. More specifically value for KPI #24 (percentage of students in digital subjects over the last 5 years) is 10.97%; value for KPI #26 (percentage of non ICT/digital diplomas including digital courses) is 54.05%; value for KPI #29 (percentage of foreign students in digital subjects) is 16,20%; all above indicators utilising data of all three Universities of the city.

With reference to the Digital Infrastructure category there has been difficulty in discerning households and enterprises with broadband internet at home as available data does not allow to discern between households and enterprises with broadband internet; 80% of landlines and 100% of mobile phone broadband connections data does not provide this information. With reference to KPI #4 (average speed of internet) maximum mean measured downstream for mobile phone connections ranges between 31.9 and 47.7 Mbps depending on the measurement area. Relevant measurements for landlines are too few to permit safe results. The value for KPI #7 (percentage of city covered by 4G) is 100%.

With reference to Non-digital infrastructure category KPIs #11, #12, #13, #14, #16 have values of No or zero, while KPI #15 (availability of coax or fibre network at main business parks) has a value of No as this condition is partly met for the city business parks.

With reference to Community category KPI #37 (number of ICT clusters and number of ICT companies joined as cluster member in any cluster organised/formed in the city) there are three ICT clusters present in the city, 1 local and the other 2 of national distribution with local presence. With reference to Support Services category KPI #47 (number of innovation labs / accelerators) has a value of 2. Finally, with reference to Governance and leadership category KPIs #51 and #52 have a value of Yes, although not formal yet, while KPI #45 has a value of No.

4. The local digital ecosystem: leadership and governance

One of the main strengths of the digital transformation of the City is the adoption of a Strategic Plan Patras Smart City endorsed by local stakeholders (not yet by the Municipal Council) in November 2017. This started with the initiative of a university professor and his team and was then elaborated, discussed and adopted by all major stakeholders, who formed working groups for the Environment and Security; Energy; ICT and Electronic Governance, Mobility, Water and Waste Treatment, Health, Education and Sports, Entrepreneurship, Tourism and Culture. The endorsement of the Plan by the stakeholders constitutes a reference document and there are individual efforts to pursue the targets it has set. However, it is not a formal City document yet. In the local Vision Workshop there was agreement that the existing Smart City Initiative and the future Digital City Strategy may partly overlap but they also differ, and they are both needed and welcome. They are expected to co-exist and reinforce each other addressing both the public service and the stimulation of the economy. The Vision was to create a smart city with sustainable neighbourhoods, eco-efficient, self-sustainable in terms of energy, with zero emissions, fully connected and with active citizen involvement, using innovative initiatives and new technologies to improve everyday life of the citizens. This is shared by all stakeholders but, from the discussions in the Vision Workshop and the interviews it was evident that the public and higher education sectors are a lot more actively involved in this exercise than the business sector.

The Regional Operational Programme and the Regional Smart Specialisation Strategy include a number of ideas and initiatives in ICT, yet they refer to the entire region and not explicitly the

City of Patras. Smart cities is explicitly mentioned in the SSS; Patras, being the capital and major economic pole of the region expects to be benefit significantly from the regional funding.

There is no explicit digital development plan but the foundations of a digital development plan can be extracted from the Smart City Strategy, which includes detailed and specific descriptions of the current situation by individual actors in education, the establishment of an open network (LoRa protocol), the sense-city platform, improvement of infrastructure management by the national Telecom, a city dashboard, a citizen multipurpose (ID-type) card and a pilot Narrow Band IoT technology. There are also ICT applications suggested for all sectors included in the Strategy. At the same time the National Digital Strategy 2016-2021 foresees important improvements in infrastructure, e-government in all public sector activities and support for business development in the whole country. Because of the centralised administration in Greece cities are not expected (allowed) to take any individual initiative in the case of systems, which are a national responsibility in order to ensure interoperability.

At this stage neither the City nor the national strategy have made any systematic and coordinated progress. The Smart City Strategy suggests a comprehensive set of indicators for monitoring progress but there are no baseline nor target values. The national strategy includes national targets not broken down by city.

Given this situation the key strengths of governance and leadership are the commitment and skills of relevant stakeholders, more at the level of individuals, which carry the burden to mobilise their respective organisations and the emergence of initiatives like the Innovation Hub, Corallia, and Patras IQ described below. The major weakness is a lack of institutional commitment (including coordination efforts) for concrete actions and monitoring and the lack of administrative and financial resources to implement the strategy.

5. The use of digital solutions by local companies

Local companies are in their majority not investing in digital solutions. The main companies active in digital technologies are the very few larger ICT companies and the start-ups, few of them already independent but most still hosted in the Innovation Hub /Science Park, which are developing digital applications. Firms in the tourism sector have websites most of which are locally developed. SMEs, mainly in the Industrial Zone, complain about the lack of access to low cost digital infrastructure and have a variety of more urgent, everyday problems hence digital technologies are not their priority.

The main barriers are partly inherent to the structure of the local economy (small size businesses in traditional non-tradable activities) and partly triggered by the crisis, which has diminished market opportunities and drained the financial system. While skills are sometimes mentioned as an inhibiting factor, they are not the critical barrier. Some specific skills may be missing but generic skills are available and with some in-house training graduates from all three HEIs would be able to comply with company needs.

It is unlikely that local SMEs will overcome their current reluctance for investments soon unless there will be first and foremost an increasing confidence in the prospects of the Greek economy, well-organised awareness raising campaigns and last but not least generous financial incentives and easier access to the banking and capital markets system.

At this moment the financial opportunities are considered as the major barrier both by incumbents and start-ups: the local banks, deprived by liquidity after the crisis, are only funding low risk activities (short term operational capital) for their regular clients. Venture capital has never been offered locally. There are some small encouraging signs for the future in that respect with the creation of new national VC funds. Opportunities for start-ups improve thanks to active intermediaries (mostly non-profit organisations) trying to help young entrepreneurs to access skills and markets beyond the local opportunities. Most young entrepreneurs are directly or indirectly using ICT.

The lack of access to finance in the market is expected to be covered through national and regional grants. The National Operational Programme for Competitiveness provides for a variety of competitive grants for digital technologies, for start-ups, for digitisation projects, for

export promotion etc. These opportunities are nationwide and have no city quotas. Benefitting companies and applicants complain regarding bureaucracy and delays in payments. The Regional Operational Programme offers also a few grants for entrepreneurship. They are smaller amounts, than those foreseen in the National Programme, but they are earmarked for the whole Region of Western Greece only. Patras is the major pole and hence expected to attract a significant share of the regional funding. The calls for these funds are expected and may be an opportunity for local businesses, if adequately prepared.

6. Community engaged in digital transformation

Although compared to major hubs and the other major cities in Greece Patras is lagging behind, there are important nodes for a digital community in place and several initiatives trying to create the necessary links to produce a vibrant local ecosystem in the future.

The main drivers are the three HEIs: (a) The UoP with two ICT Departments, the active involvement of practically all departments in ICT applications and utilisation, the support of the Science Park and the recent development of the Innovation Hub (b) The Open University offering degrees in ICT and conversion to ICT skills at undergraduate and post-graduate level; it is a public university supported partly by private foundations. The Open University offers also short courses trying to anticipate company needs (c) The Technical Educational University, which offers courses in ICT and has a lab for students to test entrepreneurial ideas.

The Computer Technology Institute and Press is an active research centre which is also responsible for the publishing of printed and electronic material and for the administration of the Greek School network. It conducts basic and applied research in ICT and is very successful in competitive bids. The Industrial Systems Institute (ISI) is a research institute active in information and communication systems for the industry, industrial software, embedded systems, and robotics, control and mechatronics applications.

Corallia is one of the first cluster development organisations established in Greece and is active in Patras in cooperation with the local (adjacent to the University) Science Park and the Patras Innovation Hub designed to accelerate the successful development of innovative

companies in Western Greece. It provides incubation facilities and services to start-ups and SMEs. There is a co-working space supported by the university in the city centre.

Patras IQ is an annual exhibition of local companies and projects, including a variety of events that bring all actors together and attract speakers and visitors from all over the country. It has been operating for five years and has become a reference event for the local ICT Community.

The business sector is composed in its overwhelming majority of traditional SMEs and microenterprises operating in non-tradables with very limited exposure to digital applications. The tourism and logistics industries are more open than others at least in rudimentary use of platforms. The exception are the few companies that embraced the Innovation Hub (which offers incubation facilities and mentoring), described above, and some subsidiaries of larger companies. Few of the latter, namely those active in ICT are directly involved in the Innovation Hub. There is at the same time a small number of small software development companies and young entrepreneurs in the incubators, some of which demonstrate a growth potential. Realistically, Patras is unlikely to grow into one of the major attraction poles for companies from all over Greece. Start-ups are more likely to be created or move to Athens and Thessaloniki.

The financial sector, the government and utilities are the weak links of the Digital Community:

- The banking system is composed of local branches of the national systemic banks with limited liquidity and unused to fund risky businesses. Only the subsidiary of the National Bank of Greece has a mind-set towards supporting start-ups, applying a nationwide programme developed in its headquarters. There is no local venture capital but the VC funds supported by the European Investment Fund are active in the whole country. There is one fund specialising in university spin offs, which has demonstrated an active interest in the activities of the local HEIs.
- The Municipality has limited resources and acts only in calls for proposals or tenders by the Regional OP or the national OP for Competitiveness or for Administrative Reform. It has data for the utility functions in the city (transport and energy) using GIS but has limited authority being bound to follow the national schemes and guidelines. This is one of the major problems of Greek cities, which have very limited degrees of freedom, when it comes to the organisation of public services; the National Ministry imposes standards and processes across the country in an effort to ensure compatibility. Although the electronic signature is used to a good extent by the City Services, however, electronic document handling among government agencies is a

public horizontal process that is planned to be implemented by the Ministry of Digital Policy in the context of National Strategy.

- The Regional Authority has a regional Operational Programme funding some development projects in the region. In this context it funds ICT applications (the municipality of Patras has already earmarked mobility projects. More calls for proposals are expected in the future. University teams active in EU calls (mainly H2020 and Interreg) complain of difficulties to join forces with the Regional Authority. This has created some disappointment leading them to cooperate with other regions rather than Western Greece.

Unless there will be a coordinated network with some sort of central or distributed governance to act as a forum for collaboration it is unlikely that synergies will be produced and bridges will be built.

7. The state of local digital and physical infrastructure

Local digital infrastructure depends almost exclusively on the national authorities for funding and to a very large extent for operations and management. There are limited degrees of freedom at the city level, which refer to applications and the potential of a local coordination mechanism for these applications.

Patras has a Metropolitan Area Network (MAN) of optical fibres, which connects the centre of the city with the UoP. Most public organisations have access to the MAN but there are several complaints about the potential of access by other interested actors. There has been a governance issue in the past about the responsibility of the maintenance, which has been resolved. There are particular complaints about the inability of the Industrial Zone to use it. The Smart City Strategy has adopted specific proposals for its exploitation and upgrade in particular for using it for IoT sensors allowing to start pilot applications.

There are three mobile telecommunications operators in Greece, all three of them active in Patras. Mobile access is available, but the prices are high compared to other EU cities (data to be confirmed). WiFi free to the public is very limited but expected to improve as Patras hopes to get funding from a national call launched in the spring 2018.

A major leap forward was expected as Patras was announced to be one of the two 5G pilots in Greece. This project is currently in an ambiguous phase as the (national) General Secretariat for Digital Policy announced a new group of pilot cities, which does not include Patras.

Improvements are suggested in the context of the Smart City Strategy including the creation of a small Data Centre to support the city's digital environment, the linking and networking of all digital infrastructure of the city on the MAN, the development of access points all over the city, the creation of an (open software) City Operating System and last but not least the adoption of a governance system including the adoption of common standards and hiring the personnel with the necessary skills to operate and maintain the whole system.

8. Digital solutions enabling the modernisation of business environment

At the moment there are no active policies by the City Council towards entrepreneurship and new business development. Support services from the HEIs and non-profit cluster development efforts have timidly developed to make up for the gap. The City has no financial means to support companies and its procurement budget is too low to enable significant initiatives in innovative procurement.

The City has ensured funding for three projects, included in the Patras Smart City Strategy, hoping to kick-start a sensitisation of the local community. The funding has been ensured and the City is in the process of preparing the documents for a competitive bid:

Smart ICT applications to promote thematic tourism: The project concerns the promotion of thematic tourism through ICT applications (web, mobile) in the Municipality of Patras, with emphasis on the Historic Center of Patras. It aims to develop digital interactive and multi-channel services to visitors, promoting the city tourism and culture (focusing on thematic tourism) as well as the local enterprises and products. The ultimate goal is the exploitation of ICT services for the expansion of the tourist season and the enhancement of the cultural heritage and local economy. The project includes in particular:

- The development of a promotion platform for the city of Patras as a tourist destination and interaction of visitors. Visitors will have access to the platform services via multiple channels - interface points. At the most important points of interest, Quick Response (QR) codes (two-dimensional barcodes) will be placed, typically used for storing URLs or other information (text, images) that can be read by an imaging device such as the camera of a smartphone.
- The development of a dynamic loyalty platform that will enable the promotion of local products and the participation and volunteering of visitors and citizens.

Developing a network of smart sensors to improve the quality of the urban environment:

The main objective of this project is to create an infrastructure with public open environmental data and to support its interoperability with other "smart" systems that will be deployed in the city of Patras through open standards. It exploits smart solutions and applications developed with the evolution of the Internet of Things in the field of the environment aiming to improve the microclimate of urban areas and protect the environment. The smart sensor network is designed to:

- Measure gas emissions and calculate the carbon footprint in the city of Patras in order to identify the areas in need of protection and to make the necessary interventions.
- Record the environmental pollution, air quality, noise pollution and light pollution by means of the Internet of the Objects (IoT).
- Measure the electromagnetic radiation in urban fabric.
- Measure the audience assembly in open spaces.

Smart Sustainable Urban Mobility: The objective of the project is the development of smart city solutions to inform residents and visitors of the city of Patras about parking spaces, traffic and smart bus stops. In addition to interventions that require equipment procurement and installation, the project includes the development and customisation of specialised software modules and the integration of them into a single platform. The aim of the project is to promote sustainable urban mobility by implementing smart solutions for the collection, processing and distribution of traffic through multiple channels of communication in real time. The project includes the following subsystems:

- Vehicle time transit logging system via a network of sensors.
- Network of ground sensors to control the availability of the parking space.
- Expansion of the existing network of smart bus stops.

- Free parking availability control system in open municipal parking spaces.
- Variable Message Signs placed in strategically selected locations of the road network.
- Central Transport Platform for the integration of subsystems as an administration and monitoring tool.

Open data and Open access are not at a mature stage yet.

9. Data-driven innovation

Graduates and young entrepreneurs have explicitly expressed an interest for open data, which would allow them to create commercial applications and be an stimulus for innovative services. However, data accessibility is limited.

The Directorate of Urban and Traffic Planning & Structure of the Municipality of Patras has developed a Geographical Information System Database with open data available to the public. Digital data include sectors of urban planning, water supply, waste bins, municipal electric power supply network, pavements and the hydrographic network (<http://gissrvweb.geopatras.gr/gispol/>).

Patras' cartographic pedestals include online services that provide comprehensive cartography. They come from mosaics of scanned maps or charts and maps of the Municipality, from available online maps and from orthophotos.

Functional levels include: City Plan, Settlements, Maps & Chart Directory, Seaside areas, Cadastre, Municipal Property, and Property Values.

In the context of the web map composition, the attributes of each map layer that will be displayed to the user, how they are displayed, selection queries, list queries, geocoding functions, etc. are selected.

Overall, however, there are no local data-driven innovation reported.

10. Skills and entrepreneurial culture

While the results of the SAT indicate that Patras is at a rather low level in terms of digital skills, this is based mostly on the labour market perception. The three local HEIs educate many students in hardware, software development and applications but their graduates partly migrate after completing their studies. There are no data available on the number of graduates remaining in the city compared to those leaving. As Patras is an educational hub there are many students coming from outside the city and returning to their home towns after graduation.

There are several small companies offering basic digital services to SMEs in the form of website creation and back office automation. According to the interviews conducted non-ICT companies do not demand digital skills. The few large companies in the city have no real problems to find the necessary skills; in case they are not available the companies retrain people in-house.

The limited demand in the labour market has created a trend for students to become more entrepreneurial and try to identify ideas and establish their own companies. There are a few undergraduates and alumni located in the Science Park with ideas at different stages of development mostly ICT related. Most of them have not established a company yet.

Because of this encouraging trend of entrepreneurship there are initiatives from the Corallia Cluster, Orange Grove (with a local presence of one full-time employee linking Patras to the Athens hub of Orange Grove), the Innovation Hub and all three HEIs. The universities encourage students and offer entrepreneurship courses.

The young entrepreneurs and potential entrepreneurs interviewed expressed the view that they would need more mentoring, a forum to get ideas on the needs of the city and the region that would help them develop applications of interest for public procurement and a wish to get access to open data from the city in order to develop applications that might end up in commercial products. In general, the perception is that an ecosystem is in the process of being born but it needs more support and coordination to allow for companies to develop into profitable firms and scale up.

11. Digital transformation SWOT analysis

	Strengths	Weaknesses
 Infrastructure	<ul style="list-style-type: none"> > Existence of a metropolitan fiber optic network (MAN) > Pilot 5G > 4G Mobile phone providers practically cover the city > Support for core research networks, schools and public administration 	<ul style="list-style-type: none"> > MAN has not been effectively used in the past; efforts to improve > Lingering 5G introduction > Incomplete and expensive telecommunication infrastructure in the industrial zone
 Access to data	<ul style="list-style-type: none"> > Public Network Diavgeia > National efforts to promote open data 	<ul style="list-style-type: none"> > Very little and simple data specifically about the Municipality > No special provision for open systems
 Digital skillset	<ul style="list-style-type: none"> > 3 Universities with training programs in hardware or software > Highly competent Public Research Centres > A large number of students in the city > IT training for non-ICT students 	<ul style="list-style-type: none"> > Lack of generalized professional skills > Lack of adult education > Schools lag in digital equipment
 Companies' digital competencies	<ul style="list-style-type: none"> > Few but successful large (for Greek circumstances and especially for the region) companies 	<ul style="list-style-type: none"> > Limited digital capabilities of the vast majority of non-ICT SMEs > Proportionally enough start ups

	Strengths	Weaknesses
 Community	<ul style="list-style-type: none"> > Establishing Patras IQ (annual event promoting startups and technology transfer) > Citizen participation through Sense City 	<ul style="list-style-type: none"> > Digital gap to elderly citizens aged over 40
 Finance	<ul style="list-style-type: none"> > National Bank Program for start-up companies 	<ul style="list-style-type: none"> > Very high liquidity problems in the banking system across the country > Lack of local involvement of the banks' subsidiaries > Lack of VC
 Support services	<ul style="list-style-type: none"> > Smart Park, Smart City Innovation Hub, Orange Grove > Incubators (Patras Smart Park, Corallia) > University co-working space 	<ul style="list-style-type: none"> > Limited size and funding for support services > Highly voluntary support > Lack of skills / collaborations acceleration
 Governance & leadership	<ul style="list-style-type: none"> > National Digital Strategy Plan > In implementation the Patras Smart City plan > Sustainable Urban Development Plan 	<ul style="list-style-type: none"> > Insufficient resources in the municipality in relation to its planning and needs > Delays in the implementation of the Operational Programs > No tradition of active stakeholder involvement in governance > Lack of continuity: projects that start well stop functioning when project funding ends

	Opportunities	Threats
 Infrastructure	<ul style="list-style-type: none"> > 5G Pilot > MAN Activation > Fibre to home by providers > Improving physical infrastructure 	<ul style="list-style-type: none"> > Slow development > Implementation problems due to bureaucracy and other delays > Lack of general strategy adoption
 Access to data	<ul style="list-style-type: none"> > National level efforts > Reduce standard packet costs 	<ul style="list-style-type: none"> > Administrative reluctance and lack of skills
 Digital skillset	<ul style="list-style-type: none"> > Community Programs H2020 > NSRF > Universities –companies cooperation > Exploit digital skills of school pupils 	<ul style="list-style-type: none"> > Brain Drain > Reforms in the education system at national level
 Companies' digital competencies	<ul style="list-style-type: none"> > Community Programs H2020 > NSRF > Universities –companies cooperation 	<ul style="list-style-type: none"> > De-industrialise > Technology change speed
 Community	<ul style="list-style-type: none"> > New tools from the national administration > Mature open mind mentality worldwide > New Generation Skills > Successful tourist brand name 	<ul style="list-style-type: none"> > Wider administrative mentality
 Finance	<ul style="list-style-type: none"> > New financial tools EIF > Gradual exit of the country and the banking system from the crisis > New tools (crowdfunding, social entrepreneurship) 	<ul style="list-style-type: none"> > New economic crisis in the country > Comparative disadvantages to attract EIF
 Support services	<ul style="list-style-type: none"> > Smart Specialisation Strategy Promotion > New possible national proclamations 	<ul style="list-style-type: none"> > Funding inability
 Governance & leadership	<ul style="list-style-type: none"> > Local community activation > Implementation of Approved Projects (Sustainable Energy, Parking) 	<ul style="list-style-type: none"> > Low Priority by Region / Municipality > Average level of civil servants skills > Insufficient funding for new ideas > Insufficient local coordination

Appendix I: Table of abbreviations and definitions

Digital Cities Challenge (DCC)

The Digital Cities Challenge initiative, was launched by the European Commission in November 2017 and scheduled to run until August 2018. It helps cities (The Digital Cities, referred as DC) develop and implement digital policies that can transform day to day life for residents, businesses, workers, and entrepreneurs.

Digital City Teams (DCT)

Each participating Digital City has a Digital City Team which will be in charge of managing and coordinating the involvement of the city in the Challenge. Digital City teams will include a) the core team which consists of one Lead Expert, one Local Expert, one Support Consultant as well as Thematic Experts; and the b) the Digital City leadership team which is made up of representatives of the city (i.e. local elected officials, local public servants, and the designated project management team).

Digital Transformation Trajectory (DTT)

The Digital Transformation Trajectory refers to the evolutionary path a city follows while taking part in the initiative, from the preliminary assessment of the digital potential of the City, to the definition of the City's digital transformation strategy and roadmap.

Field Advisory Services (FAS)

Field Advisory Services are services provided by the Digital Cities Challenge to Cities throughout the duration of the initiative. The Field Advisory Services include the organisation of one assessment visit and a number of local workshops, which will gather local stakeholders involved in defining the digital transformation strategy of the City.

Key Performance Indicators (KPIs)

The objective of the KPIs is to collect data that can diagnose the current status in terms of digital maturity and measure the progress made by cities during and at the end of the Digital Cities Challenge initiative. The KPIs will facilitate the activities of the policy makers and stakeholders of cities when identifying and addressing the bottlenecks and obstacles of the

processes of digital transformation and industrial modernisation. They will also enable the right identification of the key success factors of the different initiatives and actions undertaken.

Self-Assessment Tool (SAT)

The objective of the SAT is to identify the starting points for discussion on how to (further) develop, reshape and improve the digital transformation strategies of European cities. It is an online-tool developed by the project with a set of questions and corresponding response options to be filled in collectively by a set of stakeholders such as industry representation, utility companies, education and research and financial institutions. The SAT covers eight key dimensions: Infrastructure, Open data, Digital skillset, Digital competencies of companies, Community, Finance, Support services, Governance and leadership.

Appendix II: Bibliography

1. Ministry of Digital Policy, Telecommunications and Information - General Secretariat for Digital Policy (2016), National Digital Strategy 2016-2021
2. Region of Western Greece (2014), Regional Operational Programme 2013-2020
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4. Smart City Group (2017), Business plan Patras – Smart City

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