The most in-demand jobs in the Smart Cities Sector

REPORT

November 2015

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1.   Introduction to the sector

The increase in population is a challenge worldwide. This leads to an increase in the promotion of projects that develop the Smart Cities, sustainable spaces in an environment and economic standards. The final purpose is to make efficient use of resources and improve the quality of life. Despite the cross-cutting nature of the Smart Cities, which hinders the existence of specific data, the different activities carried out can be classified in the following areas:

- **Urban Mobility:** includes all those initiatives aimed at improving the sustainability, accessibility and efficiency of urban transport systems.

- **Environmental sustainability and infrastructure management:** include projects for saving energy resources based on innovative designs, efficient management of energy systems in buildings, improving distribution networks and the development of smart applications (automation and inmotic).

- **Citizenship, governance and economy:** integrate all initiatives that seek to increase the transparency of government, a greater citizen participation in decision-making and innovation in teaching, among others.

- **Health and social services:** include all initiatives aimed at promoting the application of technology to health services and care for people, helping to improve the delivery of services.

The technology is a key element for these projects, enabling greater innovation in materials and resources used, as well as greater integration and connection between infrastructure and city services.

02. Current environment

Global Trends:

According to data from the European Commission in 2015 the 85% of the European GDP is generated in cities and is expected that 78% of European citizens live in urban populations. Likewise, the European Commission is aware of the importance of promoting the implementation of smart technology in cities. Therefore, EU finances an initiative to development Smart Cities across Europe through the association of Smart Cities and Communities. Thus, 370 actions related to the Smart Cities have been established both public and private until 2015. There have also been established clusters in different areas (environment, urban transport, infrastructure and integrated processes, business models, citizen action, policy and regulation) focused on the creation of synergies and the effective implementation of solutions, activities and new business models.

Additionally, during the year 2015 the European GrowSmart program (2015-2019) has been launched. It has a budget of 25 million euros to develop 12 Smart Cities solutions related to energy, infrastructure and transport.

Trends in Spain:

The Spanish Smart Cities Networking (*Red Española de Ciudades Inteligentes, RECI)* is a national reference organization in the sector in Spain, which is integrated in 60 cities across the country. This network ensures the exchange of experiences and teamwork to promote efficient management of infrastructure and urban services while reduces spending and stimulates economic activity. The city councils of this network work together in diverse fields such as energy, environment, ICT, culture, tourism, government and open data.

On the other hand, as a sign of increased commitment by the Administration, the Ministry of Industry, Energy and Tourism has launched during the 2015 the National Plan for Smart Cities and Islands with a total budget of 188 million euros (funded by the European Regional Development Fund (ERDF)). It is a specific plan for the development of so-called Smart Regions, through which several towns come together in common projects related to the digitization of certain key activities.

Trends in Catalonia:

The application of positive experiences in Barcelona as a Smart City has been attempted, both locally and internationally throughout 2015. Furthermore, the United Nations (UN) has set in Barcelona a specialized center in Public-Private Partnerships in Smart and Sustainable Cities (PPP for Cities). This organization, though the collaboration between the private and public sectors, aims to become a research and innovation center to advice governments around the world in the best practices of urban planning and management and the development of these projects. Still, Barcelona has also been chosen to participate in the European project called GrowSmarter, becoming the exhibitor of the actions that the European cities can adopt in terms of Smart Cities.

Moreover, it is noteworthy that Barcelona leads initiatives globally like the City Protocol Society or the City Expo World Congress, and thanks to the projects promoted by Barcelona, the city has improved its position in the global rankings of Smart Cities set by Juniper Research. In 2015 Barcelona has achieved the top position, ahead of cities like New York or London .

Smart Cities Indicators	Position of Barcelona in Smart Cities ranking worldwide [1]	Number of Smart Cities projects in Barcelona[2]	Urban population in Catalonia[3]
	1a *(2015)*	More than 20 *(May 2014)*	95% *(2014)*

(1)   *Study elaborated by Juniper Research, industry experts. Information available in the Smart City Barcelona website.*
(2)   *ITC Director Plan 2014: Infrastructure Deployment "Smart" in Public Space (PDTIC)*
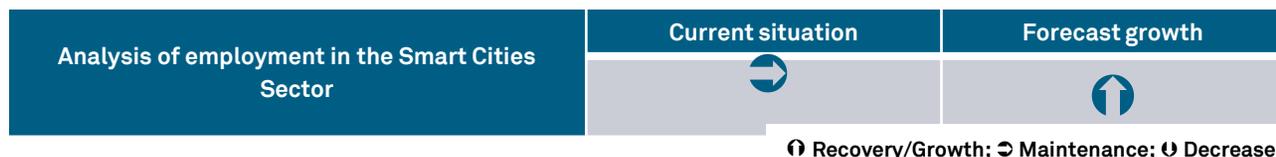(3)   *Generalitat de Catalunya based on data form IDESCAT.*

03. Key sectorial trends

	Open Data & Big Data	Increasingly, initiatives are underway to support the development of Open Data portals or platforms, and Linked Data (data attached or linked). These provide citizens, businesses and other administrations, access to a large volume of information to be used for commercial purposes or search, etc.

Furthermore, the generation of large volumes of data from multiple sources (Big Data) is leading to the development of tools designed to facilitate the analysis. The purpose is to draw conclusions from this information, in order to improve the management of public services. This can facilitate decision making, increase the capacity and speed of reaction and promote collaboration between the different agents in the city. |
| | **Energy Efficiency and Sustainability** | To address the problem of pollution in cities, there are several initiatives addressed at implementing Smart Grids. These are networks where the distribution of electricity is done by digital technology, in order to make energy consumption efficiently. In these areas, we proceed to the installation of smart devices that not only have visibility on consumption made, but also receive information on the price of energy at any time, tailoring consumption according to price changes.

On the other hand, there is also a tendency to promote the sustainable development in cities through Smart Cities. In this regard, the European Commission has established the European Strategic Energy Technology Plan to transform research and innovation of energy technologies. Similarly, the European Innovation Partnerships (EIP) aims to develop intelligent solutions that contribute in reducing energy consumption and the emission of gases causing greenhouse effect while also intends to promote the use of renewable energy. |
| | **e-Health** | To maintain the standard of living of citizens and to respond to the increasing aging of the developed societies, new technologies in the field of health (e-health) are being implemented. Hence, by establishing information-sharing networks, electronic health records, and using biosensors and telemedicine systems, facilitate the development of new systems for the prevention, diagnosis and treatment, and also enable the adaptation to the requirements and patient needs. This results in the development of a more personalized medicine. |

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	Transformation of Public Administrations (e-Administration)	Increasingly, projects aimed at transforming public administration become more important. They seek to increase efficiency and transparency in administrative management removing all documents and requirements that are unnecessary. Furthermore, they also try to facilitate the relationship between citizens and businesses with government. For this purpose, platforms that allow all kinds of procedures at any time and place have been developed. In addition, new technologies increase the range of channels through which people can contact the Administration and also enable them to gain a better understanding of its activity.
	Congresses	There is a clear commitment to the organization of events and conferences on Smart Cities and specific technologies applied in the city. Evidence of this commitment are the congresses organized during the first quarter of 2015 in Zaragoza, Sevilla, Alicante, Madrid and also the Smart City Expo World Congress that took place last November in Barcelona. The increasing frequency of these events is a clear indicator of the sector strengthening. Furthermore, congresses are a good way to promote new business opportunities, strengthen ties among professionals and find quality standards and prestige in their performance.

04. Employment in the smart cities sector

Because Smart Cities are still a booming phenomenon, there is a especially growth in demand for professionals with knowledge in new technologies (apps, big data and open data). It also abounds the demand for professionals in the field of energy and environmental sustainability, able to develop and implement innovative projects. Consequently, in the medium and large term it is forecasted that the demand for professionals in this sector will continue to grow. Furthermore, other jobs as the expert architect in Smart Cities or the engineer in Smart Factory will become more popular in the near future.

Analysis of employment in the Smart Cities Sector	Current situation	Forecast growth
	⊃	◖

◖ Recovery/Growth; ⊃ Maintenance; ◗ Decrease

4.1. THE MOST REQUIRED HIGHLY-QUALIFIED JOBS

	Job Position	Description	Requirements valued (Education, experience and skills)	Additional considerations
1	Mobile Application Developer	The mobile applications developer is the professional expert in programming and integration of web applications for mobile devices aimed at improving urban mobility.	• Education: either a professional training course in IT or a degree in telecommunication or IT field is required. It is also advisable to have knowledge in programming languages such as Java, PHP or J2EE. • Experience: it is advisable to have experience in web application development or integration of these mobile devices.	Given the importance of new technologies in initiatives related to Smart Cities, the most needed profiles correspond to computer engineering or telecommunications. Knowledge about project management and team leadership are a must.

	Job Position	Description	Requirements valued (Education, experience and skills)	Additional considerations
2	**Solutions Engineer for Smart Cities Projects**	The solution engineer for smart cities projects is the professional responsible for the design and implementation of the technology related to the Smart Cities. Likewise, also leads functional work teams to develop and design detailed plans and implements projects in this area.	• Education: it is required to have a professional technical training related to engineering, technology, ICT or technical marketing. Moreover, it is desirable to have knowledge in cloud computing and analytical platforms. • Experience: it is advisable to have previous experience in implementing Smart Cities technologies (fleet management, access control, security systems, traffic, parking management systems, smart water management, public safety and intelligent infrastructure).	Several projects are international, so it is necessary to have a good level of English. In addition, knowledge of other languages are positively valued. Although a little training linked to the Smart Cities is offered, it is highly appreciated to have training in technology, energy and environmental sustainability.
3	[Tele-care Expert](#)	The tele-care expert is the professional responsible for developing home care systems that are provided through an electronic device or a transmitter connected to the network, and allow for immediate notification of any emergency 24 hours a day, every day a year.	• Education: it is necessary to have a degree in telecommunication field and also knowledge in tele-care health science. • Experience: minimum 3 years managing projects or developing tele-care products is required.	Skills as [analytical thought](#), [creativity](#), [planning and organization](#) and [teamwork and cooperation](#) are highly valued.

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	Job Position	Description	Requirements valued (Education, experience and skills)	Additional considerations
4	Telemedicine Expert	A telemedicine expert is the professional who designs and develops specific systems and solutions for the practice of remote medicine.	• Education: it is necessary to complement engineering education with knowledge of medicine and / or clinical and health management. • Experience: it is appropriate to have previous experience in the health sector.	Although a little training linked to the Smart Cities is offered, it is highly appreciated to have training in technology, energy and environmental sustainability.
5	Big Data Expert	Big Data expert is the professional who designs the application process of Big Data systems in companies, including: to analyse the needs of data exploitation (quantification of data volume to be processed, type of data analysis, and storage capacity); to dimension the system based on these needs; to design and plan a security system; to track, and support its implementation; to train company staff in Big Data system operation; or to participate in the strategic development of the company, providing information about Big Data system possibilities.	• Education: it is required to have a degree in either engineering, mathematics or statistics. It is also desirable to be familiar with the business which it operates in. Furthermore, knowledge of web environments, pattern recognition, platforms to generate big data solutions and distributed data management is highly advisable. • Experience: previous experience managing business intelligence projects or database programming is required.	Skills as analytical thought, creativity, planning and organization and teamwork and cooperation are highly valued. It is convenient to have interest in other projects of the sector and look for potential good practices that can be incorporated into the project being developed.
6	Expert in Development and Marketing of Domotic and Inmotic Products	The expert in development and marketing of domotic and inmotic products is the professional who promotes, negotiates and fixes the operations and product sales..	• Education: a degree in electrical or electronic field is required. Furthermore, it is convenient to have a complementary training in sales and marketing techniques. • Experience: it is valued to have experience in commercial activities.	

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4.2. THE MOST REQUIRED LESS-QUALIFIED JOBS

	Job Position	Description	Requirements valued (Education, experience and skills)	Additional considerations
1	**Building Home Automation Installation Technician**	The building home automation installation technician is the professional responsible for installing the application of technologies such as electronics and telecommunications in homes with the aim of automating and controlling the systems, installations and equipment related to comfort, security, communications and energy efficiency.	• Education: it is essential to have a professional training course in the field of electricity and electronics. Furthermore, specific training in building office-automation facilities is highly valuated. • Experience: it is possible to access this position after previous experience as an assistant at facilities.	Usually, less-qualified profiles develop tasks related to the installation and maintenance of the systems and applications. Given the innovative nature of many of the technologies used, it is appropriate to be highly adaptive.
2	**Environmental technician for service buildings**	The environmental technician service buildings is the professional in charge of environmental management system. This technician should be able to sustain an Environmental Management System and, where applicable, apply good environmental practices aimed at streamlining and improving the management of natural and energy resources, as well as implementing technical and functional changes, including raising awareness about good environmental practices amongst clients and users.	• Education: it is highly recommended to have a professional training course in environmental management and legislation, specially for SGMAs. • Experience: experience gained in practical training or specialized courses in the subject may be sufficient.	The main skills required are: concern for order and quality, planning and organization as well as learning and use of knowledge.

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5. Conclusions and future prospects

New opportunities

- The importance of the development of Smart Cities in key urban sectors (transport, construction, energy and ICT) provides a global market that, according to forecasts of growth by the European Commission, will have an estimated value of more than one trillion euros in 2020. This may imply a market with great opportunities for diverse businesses and, consequently, also for the creation of new jobs.

- The field of Smart Cities will offer wide career opportunities given its transverse nature, generating synergies and actions with other sectors. Furthermore, the development of such projects will encourage an increase in demand for professionals in other fields, such as telecommunications and energy.

- Skills such as planning and time management, risk, flexibility and change management are the most valued for high-qualified professional by employers. However, the most valued skills for less-qualified professionals are learning and use of knowledge, manual dexterity, attention to detail, etc.

Funding Needs

- The transformation projects of the Smart Cities will require in a medium and long term a significant investments from public-private partnerships. In this context, private companies will be willing to invest in projects in which the financing, risk and benefits are shared with the public sector.

- In the current context, finance for these initiatives is facing significant challenges in accessing to credit due to the perceived risks: the volatility of prices in the energy sector, the high volume of required investments and the limited financial capacity of public administrations.

Alerts

- The decrease in the number of students in careers of ICT and telecommunications field can lead, in the future, in a lack of trained professionals to develop different initiatives.

- According to European experts of Smart Cities, there are many innovative solutions that require new business models and financial solutions to reduce the risks. However, despite the demand for better infrastructure and services is growing, the public sector budget is still low.

- Since the phenomenon of Smart Cities is relatively recent, there is still no specific regulations or standards and/or international certifications that approve and ensure the quality of all the actions undertaken.

Strengths

- The excellent position of the city of Barcelona as a reference city worldwide in Smart Cities projects and technologies, allows leading several global initiatives and being an exporter of knowledge and good practices in this field.

- The existence of a wide range of training options in various industry areas (from vocational training courses to master's degrees) and also the wide range of undergraduate degrees, provide access to professions linked to Smart Cities.

- There is a high level of commitment of public administrations in order to develop Smart Cities projects in the future as they contribute to the efficiency and the improvement of the quality of life of citizens. Also, they are considered as a tourism attraction.

The excellent position of Barcelona as a worldwide reference in Smart Cities, as well as the transverse nature of their projects, offer a wide range of opportunities to professionals.

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06. Articles and consulted reports

Sources: Latest available data from IDESCAT *(Statistical Institute of Catalonia);* Ministry of Industry, Energy and Tourism Spain; European Comission ; Smart Cities Institute.

Press: *La Vanguardia, Cinco Días, Europa Press, Diario Expansión*.

Articles:

Cohen, B. (2014)."The 10 Smartest Cities in Europe. Co.Exist".

Peiró, K. (2014)."No solo "*Smart*", También talento creativo*". Barcelona Metropolis.*

Barcelona newspaper article (2015). "La ONU i el IESE creen un centre per impulsar les ciutats intel·ligents".

Borrell, I (2014)."El Agua en las Smart Cities, una apuesta de futuro".*Tecnoaqua*.

Institut Tecnològic (2015) AIDIMA. Smart *City Trends.*

Ortiz, I. (2015)."Smart Cities, la tecnologia al servicio de las ciudades". *El Mundo.*

Tintoré,E. (2015)."El Mirador: Barcelona, líder de las Smart Cities". *La Vanguardia.*

07. Sectorial complementary webography

✓ Smart City Expo World Congress

http://www.smartcityexpo.com/en/

✓Hàbitat Urbà Blog – Smart Cities

http://habitaturba.bcn.cat/blog/tema/temes/smart-cities

✓ Smart City Institutes

www.smartscities.com

✓ Red Española de Ciudades Inteligentes (RECI)

http://www.redciudadesinteligentes.es

✓ Europe 2020 is the EU's growth strategy for the coming decade

http://ec.europa.eu/europe2020/index_en.htm

✓Smart Cities and Communities

http://ec.europa.eu/eip/smartcities/

! The job seeking website of Barcelona

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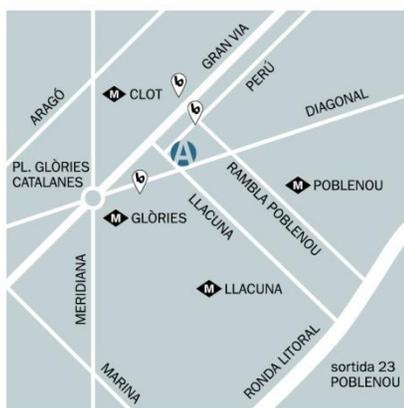Free technology training for job seekers, entrepreneurs and companies...
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