



Ajuntament de
Barcelona



Barcelona
Activa

The most in-demand jobs in Telecommunications and ITC Sector

REPORT

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Index

01.	INTRODUCTION TO THE SECTOR	3
02.	CURRENT ENVIRONMENT	3
03.	KEY SECTORIAL TRENDS	5
04.	EMPLOYMENT IN THE TELECOMMUNICATION AND ITC SECTOR	7
	04.1. THE MOST REQUIRED HIGHLY-QUALIFIED JOBS	7
	04.2. THE MOST REQUIRED LESS-QUALIFIED JOBS	12
05.	CONCLUSIONS AND FUTURE PROSPECTS	14
06.	ARTICLES AND CONSULTED REPORTS	16
07.	SECTORIAL COMPLEMENTARY WEBOGRAPHY	16

01. Introduction to the sector

The telecommunications and ICT industry includes all activities addressed to managing, processing and transmitting information through a communication channel. In this sense, these activities can be classified into two subsectors:

- **Telecommunications:** include all activities related to the field of telephone (landline or mobile), network access and communication via electromagnetic waves.
- **ICT:** integrated activities related to digital and data processing (digital production and digital media), management, consulting and systems integration (design solutions for companies or integrated systems), safety, design and development of software and hardware and commercial services, technical support and maintenance associated with new technology and electronics.

It is also important to refer to the mainstreaming of the sector, happening, increasingly, a lever for improving the efficiency and competitiveness of companies in multiple fields of industry and services.

It is also important to refer to mainstreaming, diversity and dynamism of this sector resulting in the digitization of business processes both in the generation of products and supply of services. It is a key element for the employment and for the impact it has in the improvement of efficiency and competitiveness of all companies whatever the industry or sector.

02. Current environment

Global Trends:

The ICT and telecommunications is a strategic sector for the development of the European economy in the coming years. There will be an over demand for professionals that is expected to be between 730,000 and 1,300,000 by 2020, according to European Commission estimations. However, the European labor market is facing a shortage of professionals in this sector. Therefore, the European Union has launched two programs to encourage research, innovation and increasing employment in this sector. The first one is the Horizon 2020 program (run from 2014 to 2020); with a budget of 7.711 million euros it is aimed at financing projects and ideas to accelerate the technological development of this sector.

The second program, launched in 2013 and called Grand Coalition for Digital Jobs, the Commission wants to achieve industry careers attractiveness, designing training programs that meet the current companies needs and promoting greater transnational competencies recognition. There are also several initiatives such as Tech All Stars and Europioneers, implemented in order to help young entrepreneurs to create startups and new projects related to telecommunications and ICT.

Trends in Spain:

During 2015 the sector of Telecommunications and ICT had a slight growth in sales and some evidence of improvement compared to 2014. According to official data from the Spanish Statistical Office, in 2013 was recorded a total of 390.638 employed in this sector.

Moreover, 47% of companies have hired more professional in 2015 than in the previous year, according to survey results from Ticjob portal. In this regard, to continue promoting their recovery and future growth, the Government of Spain launched in July 2015 an aid program with a budget of 80 million euros to implement ICT solutions in SMEs.

The aim is to contribute to the development of economy, society and the digital work. This program complements the Digital Agenda (2013-2015) started in 2013 to boost new jobs opportunities in this sector.

In regards with the number of labour contracts in this sector, it is important to highlight that they increased during 2014. The ITC labour contracts rate were around 28,3% of the total number of labour contracts, according to available data in “*Los más buscados*” report of Adecco.

Trends in Catalonia:

Telecommunications and ICT sector experienced an employment growth until reach 84.600 employed people in the third quarter of 2015, what represents the 2.7% of the total employed population in Catalonia. These data indicate a slight recovery of the sector after the slight contraction in early 2015. Likewise, the number of companies increased until reach 13.056 in 2014, reflecting, again, the trend of positive dynamics in this sector.

Reflecting the importance of the sector, from the *Generalitat de Catalunya* cloud technology initiatives for SMEs are promoted in order to improve their efficiency, situating Catalonia as the world reference in the use of Cloud Computing solutions. Barcelona is still positioned as the worldwide leader in this sector as it focuses on initiatives such as the cluster Tech and e-Commerce or the 22@ as well as the Mobile World Congress, the largest global event on mobile and technology expected to remain in the city until 2023. Furthermore, during 2015 there have been driven new events in technology and entrepreneurship as the Challengers or E-show.




Telecommunications and ITC indicators	Sector contribution to GDP in Spain ⁽¹⁾	Employed population in Catalonia ⁽²⁾	Number of companies in Catalonia ⁽³⁾
	8,4% (2013)	84.600 (3rd quarter 2015)	13.056 (1 January 2015)



(1) ITC Sector Report Edition 2014 ONTSI .Ministerio de Industria, Energía y Turismo.

(2) Data from Observatori d'Empresa i Ocupació Generalitat de Catalunya, Noviembre 2015.

(3) Data from Corporate Structure Report November 2015. Observatori d'Empresa i Ocupació. Generalitat de Catalunya.

03. Key sectorial trends

	<p>Cloud Computing</p>	<p>Cloud computing is an increasingly important trend lately. Cloud services, internet service package addressed to storage, consultation and access to information from any location, are the premier choice of consumers and businesses for most ICT services. In addition, there are several initiatives aimed at the implementation of cloud systems in SMEs funded by public institutions.</p> <p>On the other hand, as the professional tasks are carried out from a mobile device (laptop, Smartphone, Tablet, ...), it become a work daily routine. This is because corporations highly value the access of different resources from anywhere to get greater labor flexibility and improve their competitiveness.</p>
	<p>Mobilitat: <i>Everthing Everywhere</i></p>	<p>As use of mobile devices has increased significantly in recent years, the main objective is to focus on mobile user needs. Mobile devices will be connected in different environments and have different shapes, sizes and types of interaction. The convergence of mobile technology and the cloud will continue to revolutionize the way business interact with consumers as well as promote the growth of applications that can be used from any device. Thus, apps will evolve to support simultaneous use of multiple devices in the near future. In this context, technical developers companies seek technological professionals in mobile applications or apps in order to respond to consumers demands.</p> <p>Moreover, the industry has been working to achieve greater diffusion of 4G coverage across the country and to initiate the development of 5G technology during the year 2015.</p>
	<p>Big Data</p>	<p>Big Data is about information that can not be processed or analyzed using traditional tools or processes. It is one of the most outstanding trends of 2015 because companies need to manage and filter an enormous amount of data information from social networks, mobile devices and the internet of things.</p> <p>There is still scope for further increase in the number of open databases and thus encourage the creation of an economic ecosystem that leverages this information to generate value-added services.</p>

	<p>3D printing</p>	<p>It is expected that 3D printers will become a revolution in the coming years due to their applications in all sectors. Although this technology is focused on industrial use, it is expanding in the biomedical and domestic field. Also, 3D printing can enable enterprises to reduce costs through improved designs and less time manufacturing.</p> <p>Furthermore, it is estimated that 3D printing will transform industry flexibility simplifying the production process. This involves the creation of new jobs in this area as a 3D printing specialist, an expert in robotic or an expert in 3D programming.</p>
	<p>Internet of Things (IoT)</p>	<p>The Internet of things is one of the latest trends in this sector. This technology allows physical and virtual objects to be connected anytime and anywhere enabling people to use any service. Increasingly, companies from various sectors (transport, energy, health care, etc.) are interested in the development of new devices, applications and projects that facilitate the automation of decision making and optimization services, adding value to services for citizens (emergency response, traffic safety, remote home control, energy saving devices, etc.).</p>

04. Employment in Telecommunication and ITC Sector

The sector of Telecommunications and ICT has an important role in the digital transformation of all sectors as a key factor for competitiveness and growth. The employment rate has had a steady growth favored by the increase in ICT investment by businesses and public institutions in the 2nd quarter of 2015. Different economic sectors are acting to improve its use of mobile application technologies, Cloud Computing and Big Data. Therefore, the demand for professionals is growing and, given the dynamic, flexible and innovative approach of the sector is expected to continue growing in the coming years.

Analysis of the employment in the Telecommunication and ITC Sector	Current situation	Forecast Growth
	↑	↑

↑ Recovery / Growth; ⇌ Maintenance; ↓ Decrease

4.1. THE MOST REQUIRED HIGHLY-QUALIFIED JOBS

	Job Position	Description	Requirements valued (Education, experiences and skills)	Additional considerations
1	R&D Director	Director R & D is the professional with extensive experience in managing R & D projects, carrying out research studies with the collaboration of marketing and production.	<ul style="list-style-type: none"> Education: it is required to have a degree in either telecommunications or engineering field. Experience: it is valued to have previous experience in a position of responsibility, as well as at least five years of experience as a R&D engineer. 	For those positions that need to promote projects is desirable to have knowledge related to project management: planning, customer relationship management, team management, etc.
2	Multimedia Applications Engineer	The multimedia application engineer is the professional with experience in interactive applications which enable dialogue between users and a broadcasting device such as a television set, computer or mobile phone. Also in charge of creating prototypes, simulations or visual settings with the assistance of different multimedia technologies.	<ul style="list-style-type: none"> Education: it is required to have a degree in either telecommunications, multimedia engineering or computer science. Experience: previous experience in the construction and design of software applications in graphic environments is highly recommended. 	Degree in either telecommunications, multimedia engineering or computer science is required.

	Job Position	Description	Requirements valued (Education, experiences and skills)	Additional considerations
3	ICT Consultant	ICT consultant is the professional with a hybrid profile that needs extensive economic and sales experience, as well as knowledge related to information and communications technology (ICT). These professionals use their experience in both sectors to help their clients develop technology solutions to help them reach their business goals.	<ul style="list-style-type: none"> • Education: it is required to have a degree in an engineering field. Moreover, a master's or postgraduate degree in management and business administration may be necessary. • Experience: at least three to four years' experience is required. 	Analytical thought is the most convenient skill.
4	Data Analyst	The data analyst is the professional who takes care of the design process of applying big data systems companies, including analysis of needs related to the exploitation of the data, sizing system based on these needs; and the design and planning of its safety.	<ul style="list-style-type: none"> • Education: is appropriate to have a technical degree or knowledge of statistics and mathematics. It is advisable to have knowledge of systems management databases (MySQL, Access, SAP Hana) as well as SQL, ODBC and JDBC. • Experience: previous experience analysing data from any field. 	It is advisable to have a continuous training because this is a constantly changing sector. Most professionals are required to have knowledge of operating systems, databases, programming languages, etc.
5	IT Project Manager	IT project manager is the professional responsible for managing software development projects for their own company or for other companies.	<ul style="list-style-type: none"> • Education: it is required to have a degree in an engineering field. Moreover, holding a MBA is a plus. Employers also seek professionals who have completed certification courses in technologies like Java • Experience: it is required to have experience in negotiation with clients and suppliers as well as in team and project management. 	

	Job Position	Description	Requirements valued (Education, experiences and skills)	Additional considerations
6	Programmer	Programmer is the professional responsible for creating, testing and maintaining software programs. He/she implement algorithms using a programming language understood by a computer.	<ul style="list-style-type: none"> • Education: courses on programming languages are valued. • Experience: it is required to have previous experience in programming, although it is possible to star working as junior. 	<p>It is highly valued to have knowledge in adapting new technologies for use by people with disabilities.</p> <p>Skills such as the following are required: planning and organization, customer orientation, team work and cooperation and concern for order and quality.</p>
7	Cloud Computing Specialist	Cloud Computing specialist is the professional expert in development of cloud technology in the design of the technology architecture and in the implementation of ICT projects related to this field.	<ul style="list-style-type: none"> • Education: it is desirable to have knowledge in programming languages such as Java y JavaScript; DevOps, Perl, Ruby, etc.; and in infrastructure and software such as <i>PaaS, IaaS and SaaS</i>. • Experience: it is appropriate to have previous experience in the development and implementation of ICT projects. 	
8	ICT Product Manager	The ICT product manager is the professional responsible for the sales of the applications, programs and software, analysing potential business opportunities and defining possible commercial actions.	<ul style="list-style-type: none"> • Education: It is necessary to have a technical degree to understand the characteristics of the product. Moreover, additional training in business field, especially related to marketing, sales and customer management is recommended. • Experience: it is necessary to have previous experience in the product. 	

	Job Position	Description	Requirements valued (Education, experiences and skills)	Additional considerations
9	Digital Manager	The Digital Manager is the professional responsible for the digital strategy of the company. Its main task is to plan, coordinate and oversee the design, implementation and evolution of the digital strategy. It is also responsible for the generation of proposals and innovative solutions for the organization.	<ul style="list-style-type: none"> • Education: it is required a university degree in the field of ICT. It is also desirable to have a degree in digital marketing. It is advisable to have practical knowledge of CRM and digital marketing automation tools. • Experience: previous experience in similar positions of responsibility is required. 	For all positions, English is essential because it is the language used in many programming languages and operating systems.
10	Business Intelligence Consultant	Business Intelligence consultant is the professional expert in implementing business intelligence solutions and manage client projects from all sectors. It is also the responsible for analyzing and understanding the business context and processes of organizations, design and implement improvements in business processes and applications as well as operations support department.	<ul style="list-style-type: none"> • Education: is appropriate to have an engineering degree in the field of ICT, mathematics, statistics or in the business field. Moreover, it is advisable to have knowledge of analytical platforms, database management and ICT solutions. • Experience: It is recommended prior experience in the field of ICT and telecommunications and business Intelligence projects. In addition, previous experience in data analysis is valued. 	It is advisable to have a practical disposition, oriented to technology solutions application to improve operational and business competitiveness.

	Job Position	Description	Requirements valued (Education, experiences and skills)	Additional considerations
11	Mobile Game Developer	The developer of mobile games is the professional who is responsible for the development of 2D / 3D video games for mobile devices, whether indie games (independent games) as mass games (games aimed at the general public).	<ul style="list-style-type: none"> • Education: it is necessary to have a degree in either telecommunications or computer science. • Experience: between one and two years of experience for junior positions and between three and six years for senior positions. 	<p>Knowledge in programming language such as Java, C/C++ or ActionScript is highly valued.</p> <p>It is required to have knowledge of algorithms and techniques used in games.</p>
12	Mobile Product Manager	The mobile product manager is the professional who manages the life cycle of the mobile applications, from their concept to their launch in the market, according to the specifications defined initially.	<ul style="list-style-type: none"> • Education: it is required to have a degree in either telecommunications, computer science or business field. • Experience: normally a minimum of 3 to 5 years experience in mobile product management (or, as an alternative, in web product management) is required. 	<p>It is valued to have a high knowledge of Agile software development methods (especially SCRUM) adapted to the mobile environment.</p>

4.1. THE MOST REQUIRED LESS-QUALIFIED JOBS

	Job Position	Description	Requirements valued (Education, experiences and skills)	Additional considerations
1	Technical Telecommunication Equipment Installer	The technical telecommunication equipment installer is the professional who is in charge of installing telecommunication systems (telephone, radio and TV) and of their maintenance.	<ul style="list-style-type: none"> • Education: it is necessary to have a professional training course in electricity and electronics. • Experience: previous experience in the implementation of telecommunications infrastructures is an advantage. 	Knowledge of quality control can increase the value of those candidates who wish to work in the maintenance of networks and systems.
2	Fibre Optics Installer	The fibre optics installer is the professional responsible for installing, configuring, fine tuning and maintaining fibre optic systems and networks, which allow the transmission of audiovisual material and data processing, following the appropriate plans and diagrams.	<ul style="list-style-type: none"> • Education: although it is not essential, it is advisable to have completed a professional training course in electrical installations and civil infrastructures.. • Experience: previous experience is not required because they will receive basic training at the company in order to carry out the installations. 	<p>It is important to be able to report possible incidents in a language understandable to customers.</p> <p>It is desirable to have knowledge of English because it is the language used in most systems and programming languages.</p>

	Job Position	Description	Requirements valued (Education, experiences and skills)	Additional considerations
3	Fibre Optics Commercial	The fibre optic commercial is the professional directly responsible for maintaining the customer base, as well as performing market research to attract new accounts, advise clients products and services and request the necessary authorizations to deploy fibre optic network in buildings.	<ul style="list-style-type: none"> • Education: it is highly valued to have a professional training course in either telecommunications or trade management. • Experience: previous experience in the telecommunications industry, as the type of products and services that are traded often involve some technical complexity. It is advisable to have commercial skills, negotiation and vocation to sell. 	<p>The following skills are highly valued: analytical thought, planning and organization and team work and cooperation.</p> <p>Sometimes if the professional have the enough work experience in proper field, can access these type of jobs positions profession without formal training.</p>
4	ICT Maintenance Technician	The ICT maintenance technician is the professional responsible for solving network-related incidents within a company. Maintenance technicians know the operation of the software, communications, optimum fibre, broadband, etc.	<ul style="list-style-type: none"> • Education: it is necessary to have a professional training course in software, platforms, servers, systems and technologies. 	

5. Conclusions and future prospects

New opportunities



- The current digital transformation implies new job opportunities in the field of telecommunications and ICT. Technologies related to mobility, cloud, big data and digital transformation offer new possibilities to grow in the coming years in terms of business. Therefore, new job positions are expected to be created in the different fields of the sector.
- Mobile devices with access to broadband Internet have become part of daily routine. As companies want portals and websites adapted to these devices in order to close to the clients, it has generated many new job opportunities for the professionals of this sector. Also, many companies require professionals with specific expertise in developing and creating apps in order to offer new services to their customers.

The professionals in Telecommunication and ITC industry



- Companies and the public sector have warned of the progressive loss of vocations in this field which means that, despite the good prospects of employment, the sector is not attractive enough to many students. This, together with low labor mobility and insufficient adaptation of vocational training to current labor market needs, causes that many companies problems to fill vacancies.
- Catalonia offers a high level of education, including from technical universities to high schools located in Barcelona. Likewise, Catalonia has a good infrastructure to train qualified professionals in order to work in the Telecommunications and ICT sector.
- Promoting the attractiveness of technology to different profiles, has become a priority for the institutions and companies that are working and contributing to the sector.
- Companies require highly-qualified professionals to have skills such as analytical thought, orientation toward achievement and business vision as well as a high level of adaptation to market changes. Moreover, they require less-qualified professionals to have a high degree of innovation and creativity, teamwork and willingness to continuous learning.

Alerts



- It has detected a lack of professional specialized in the Telecommunications and ICT in recent years. In fact, companies are struggling to find talent to fill vacancies with certain professional profiles such as programmers, developers and other more specialized in areas such as mobility, Big data and Cloud Computing.
- Public investment in R&D is still insufficient, which may cause a progressive loss of international competitiveness of companies.
- Despite good technical training of professionals in this sector, there is a lack of readiness in areas such as business management as well as other cross-cutting issues such as teamwork or languages.

Strengths



- The Telecommunications and ICT sector promote initiatives to boost competitiveness and innovation among companies, like the events organized around the Mobile World Capital. Barcelona is a place of innovation and entrepreneurship where there are opportunities in order to create new businesses and to develop careers in this sector.
- The sector is committed to internationalization. For this reason, many companies in this sector tend to internationalize its business and undertake more sustainable initiatives.
- As ICT is a reference for other sectors in terms of interaction and contribution, it can become a facilitator to develop projects in the field of health, biotechnology, automotive, intelligent transport solutions, etc.

The Telecommunications and ICT activities interaction with other sector can contribute to the job creation, not only within the sector but also in other industries.

06. Articles and reports consulted

Sources: Latest data available. IDESCAT; Baròmetre del sector tecnològic a Catalunya; Employment and career: Ametic; “*Los más buscados*” report Adecco. Employment industry portals: ICT portal *Ticjob*. Prensa: El Periódico; Cinco Días; La Vanguardia; Expansión; EuropaPress.

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07. Sectorial complementary Webography

✓ Barcelona Digital Centre Tecnològic

<http://www.bdigital.org/en/>

✓ Cercle Tecnològic de Catalunya (Ctecno)

<http://www.ctecno.cat/en/>

✓ Observatorio de empleo TIC. Portal Ticjob.

<http://www.ticjob.es/>

✓ Economía Digital

<https://ec.europa.eu/digital-agenda/en/digital-economy>

✓ Research & Innovation (European Commission)

http://ec.europa.eu/research/industrial_technologies/

✓ Asociación de Empresas de Electrónica, Tecnologías de la Información, Telecomunicaciones y Contenidos Digitales

<http://ametic.es/en/association>

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