Disclaimer:

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I. ICT Sector in Spain

II. Competitive Advantages in ICT sector

III. Business Opportunities
I. ICT Sector in Spain
Spain is one of the most important ICT markets by volume in Europe: €105,868 Million.

There are more than 33,000 ICT companies, including digital content, operating in Spain. The sector employs more than 471,000 workers.

The gross added value at market prices represented the 4.2% of GDP in 2016.

The flow of foreign investment in the ICT sector in Spain was €750 Million in 2016.

Exports of ICT products grew again for the fourth consecutive year to stand at €13,961 Million in 2016.

The World ICT market by region, 2016

- USA: 31.3%
- Europe*: 21.8%
- Middle East & Africa: 18.2%
- Japan: 16.5%
- BRIC: 12%
- Asia Pacific**: 6.9%
- LATAM***: 6.5%
- Canada: 1.6%

€ 3,063 Billion

Source: ONTSI, 2017. Data 2016 (Last data available)

Spain ICT Sector Turnover, 2016

- Telecommunications: 33.2%
- Information Technologies: 28.5%
- Digital Content: 16.5%
- Commerce: 18.5%
- Production: 3.3%

€105.86 Billion

*except Russia  **except China, South Korea and Japan  ***except Brazil
Digital Content: There are included publication of books, magazines and other publication activities. Cinematographic, video and television programs. Sound recording and music edition activities. Other information services, programming and broadcasting activities, Video Games and Online Advertising.

Telecommunication: Telecommunication services operators and companies dedicated to the provision of specialized telecommunication services and applications.

Commerce: Companies engaged in the wholesale of computers, peripheral equipment, software, electronic and telecommunications equipment.

Information Technologies: There are included software companies, programming, IT resources management, consulting, data processing, hosting and repair and maintenance services.

Production: Companies that manufacture electronic components, printed circuits, as well as computers, telecommunications equipment, consumer electronics and magnetic and optical media.

<table>
<thead>
<tr>
<th></th>
<th>Number of companies</th>
<th>Workers</th>
<th>Turnover (€ Million)</th>
<th>Investment (€ Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Content</td>
<td>9,749</td>
<td>103,954</td>
<td>17,534</td>
<td>2,776</td>
</tr>
<tr>
<td>Telecommunication</td>
<td>3,656</td>
<td>71,868</td>
<td>30,141</td>
<td>5,947</td>
</tr>
<tr>
<td>Commerce</td>
<td>2,940</td>
<td>26,557</td>
<td>19,556</td>
<td>1,354</td>
</tr>
<tr>
<td>Production</td>
<td>932</td>
<td>14,478</td>
<td>3,459</td>
<td>566</td>
</tr>
<tr>
<td>Information Technologies</td>
<td>15,899</td>
<td>255,003</td>
<td>35,178</td>
<td>8,363</td>
</tr>
</tbody>
</table>

Source: ONTSI, 2017. Data 2016 (Last data available)
### Data from Digital Content in 2016

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number of companies</th>
<th>Workers (€ Million)</th>
<th>Turnover (€ Million)</th>
<th>Investment (€ Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Publication of books, magazines and other publication activities</td>
<td>3,245</td>
<td>34,759</td>
<td>5,676</td>
<td>1,454</td>
</tr>
<tr>
<td>Cinematographic, video and television programs</td>
<td>2,702</td>
<td>27,673</td>
<td>4,646</td>
<td>866</td>
</tr>
<tr>
<td>Sound recording and music edition activities</td>
<td>147</td>
<td>719</td>
<td>341</td>
<td>69</td>
</tr>
<tr>
<td>Other information services</td>
<td>2,453</td>
<td>17,834</td>
<td>577</td>
<td>123</td>
</tr>
<tr>
<td>Programming and broadcasting activities</td>
<td>1,202</td>
<td>22,969</td>
<td>4,111</td>
<td>265</td>
</tr>
<tr>
<td>Video Games</td>
<td>ND</td>
<td>ND</td>
<td>617</td>
<td>ND</td>
</tr>
<tr>
<td>Online Advertising</td>
<td>ND</td>
<td>ND</td>
<td>1,566</td>
<td>ND</td>
</tr>
</tbody>
</table>

### Spain Digital Content Turnover, 2016

- **Cinematographic, video and television programs**: 26.5%
- **Programming and broadcasting activities**: 23.5%
- **Publication of books, magazines and other publication activities**: 32.4%
- **Other information services**: 8.9%
- **Sound recording and music edition activities**: 3.5%
- **Video Games**: 3.3%
- **Online Advertising**: 1.9%

**Total Digital Content Turnover**: €17.53 Billion

Source: ONTSI, 2017. Data 2016 (Last data available)
The Spanish Videogame development industry had a turnover of 617 million euros in 2016.

There are 450 Videogame companies in Spain and more than 5400 workers in the industry.

### Turnover by Operator (€ Million)

<table>
<thead>
<tr>
<th>Company</th>
<th>Turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movistar</td>
<td>14,720.92</td>
</tr>
<tr>
<td>Vodafone</td>
<td>5,801.68</td>
</tr>
<tr>
<td>Orange</td>
<td>5,039.22</td>
</tr>
<tr>
<td>Masmovil</td>
<td>890.21</td>
</tr>
<tr>
<td>Atresmedia</td>
<td>852.30</td>
</tr>
<tr>
<td>Mediaset España</td>
<td>803.59</td>
</tr>
<tr>
<td>Euskaltel</td>
<td>562.98</td>
</tr>
<tr>
<td>Rest</td>
<td>4,347.78</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33,018.68</strong></td>
</tr>
</tbody>
</table>

### Main mobile operators

<table>
<thead>
<tr>
<th>Company</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movistar</td>
<td><a href="http://www.movistar.es">www.movistar.es</a></td>
</tr>
<tr>
<td>Vodafone</td>
<td><a href="http://www.vodafone.es">www.vodafone.es</a></td>
</tr>
<tr>
<td>Orange</td>
<td><a href="http://www.orange.es">www.orange.es</a></td>
</tr>
<tr>
<td>Masmovil</td>
<td><a href="http://www.masmovil.es">www.masmovil.es</a></td>
</tr>
</tbody>
</table>

### Mobile Virtual Network Enablers (Complete)

<table>
<thead>
<tr>
<th>Brand</th>
<th>Main Host Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIGI Mobil</td>
<td>Movistar</td>
</tr>
<tr>
<td>Lycamobile</td>
<td></td>
</tr>
<tr>
<td>TeleCable</td>
<td></td>
</tr>
<tr>
<td>Lowi</td>
<td>Vodafone</td>
</tr>
<tr>
<td>Euskaltel</td>
<td></td>
</tr>
<tr>
<td>Ibercom</td>
<td>Orange</td>
</tr>
<tr>
<td>IOS</td>
<td></td>
</tr>
<tr>
<td>Simyoo</td>
<td></td>
</tr>
<tr>
<td>Truphones</td>
<td></td>
</tr>
</tbody>
</table>

### Mobile Virtual Network Enablers (Redistributors)

<table>
<thead>
<tr>
<th>Brand</th>
<th>Main Host Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuenti, PepePhone</td>
<td>Movistar</td>
</tr>
<tr>
<td>Lebara, Hits Mobile, BT, Eroski Móvil</td>
<td>Vodafone</td>
</tr>
<tr>
<td>Aire Networks, Carrefouronline, Día Móvil, LCR Telecom, MÁSmovil, Moreminutes, Ocean’s, OpenCable, Procono, República Móvil, Sarenet, Voz Telecom, You Mobile</td>
<td>Orange</td>
</tr>
</tbody>
</table>
Source: ONTSI, 2017. Data 2016 (Last data available)
Production in 2016

<table>
<thead>
<tr>
<th>Number of companies</th>
<th>Workers</th>
<th>Turnover (€ Million)</th>
<th>Investment (€ Million)</th>
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<td>3,459</td>
<td>566</td>
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</tbody>
</table>

Source: ONTSI, 2017. Data 2016 (Last data available)
### Information Technologies in 2016

<table>
<thead>
<tr>
<th>Number of companies</th>
<th>Workers</th>
<th>Turnover (€ Million)</th>
<th>Investment (€ Million)</th>
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</thead>
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<td>15,899</td>
<td>255,003</td>
<td>35,178</td>
<td>8,363</td>
</tr>
</tbody>
</table>

*Source: ONTSI, 2017. Data 2016 (Last data available)*

### Evolution 2011 - 2016

- **Number of companies**
  - 2011: 12,617
  - 2012: 12,409
  - 2013: 13,035
  - 2014: 13,975
  - 2015: 15,032
  - 2016: 15,899

- **Workers**
  - 2011: 199,770
  - 2012: 197,926
  - 2013: 198,232
  - 2014: 215,393
  - 2015: 237,266
  - 2016: 255,003

- **Turnover (€ Million)**
  - 2011: 27,657
  - 2012: 26,825
  - 2013: 26,896
  - 2014: 28,383
  - 2015: 32,505
  - 2016: 35,178

- **Investment (€ Million)**
  - 2011: 7,201
  - 2012: 7,624
  - 2013: 6,810
  - 2014: 6,264
  - 2015: 7,782
  - 2016: 8,363

*Source: ONTSI, 2017. Data 2016 (Last data available)*
Spanish companies are present and recognized in major international markets...

Spain is a leader in advanced technologies:

- Spanish software for air-traffic control is worldwide renowned and used
- High-Tech and Defense Industry
- Telecommunications, Utilities, Energy, Banking...
Main Players. Other Spanish Companies
Leading **ICT multinationals** are already successfully located in Spain, taking advantage of Spain’s benefits:

**Software Vendors**
- HITACHI
- SAP
- ORACLE
- SAS
- Microsoft
- software AG
- CITRIX
- Novell
- EMC²
- UNISYS
- bmcsolutions
- Ubisoft

**Hardware Vendors**
- IBM
- HP
- RICOH
- NEC
- SONY
- lenovo
- Fujitsu
- apple
- intel
- EPSON
- TOSHIBA
- LG
- xerox

**Telecom equipment vendors**
- SIEMENS
- NORTEL NETWORKS
- CISCO
- Samsung
- Ericsson
- Alcatel-Lucent
- ZTE
- Huawei

**Service Providers**
- vodafone
- TeliaSonera
- Google
- BT
- Colt
- Orange

**ICT Services and Consulting Companies**
- THALES
- NTT DATA
- UST Global
- NEORIS
- ALTRAN
- accenture
- Ernst & Young
- Deloitte
- PwC
- Atos
- Softtek
- Capgemini
The German company has been operating in Spain since 1895. The company currently has a workforce of over 3,400 in Spain, with three factories (in Cornellá, Getafe and Rubí) whose products are exported to all corners of the world, its HQ in Tres Cantos, and sales offices in the major cities.

Siemens is currently making a decisive contribution to the modernization of the high-speed rail network by installing cutting-edge safety and signaling systems. They have also helped make sustainable mobility a reality in cities like Madrid, with the first electric car charging station that uses the braking power of trains, and Barcelona, where modern signaling systems have increased the efficiency of the metro lines.

Also, there has been a production and R&D center in Getafe since 1957 for portable radiology equipment and imaging systems that form part of other diagnostic equipment.

HP has a strong commitment with Spain since 1971, with presence in cities such as Madrid, Sant Cugat (Barcelona), Leon, Sevilla or Bilbao.

HP’s facilities in Sant Cugat (Barcelona), hosts one of the corporation’s most emblematic R&D Business Centers outside the US. Sant Cugat employs over 1,700 highly qualified professionals, with around 500 engineers working on R&D and innovation. Recently, these facilities have also become the worldwide headquarters of HP’s 3D printing business.

HP’s commitment with Spain and the R&D is also shown in other centers as Leon Competence Center, established in 2005 and focused on the creation of advance software solutions for the printing and the computing organizations.
Huawei launched its operations in Spain in 2001. Since then, they have been developing its lines of business and establishing itself as a key organization in the Spanish ICT sector.

The company also has various joint innovation centers in Spain with Telefónica and Vodafone. Huawei Spain is focused on providing customers with cutting-edge ICT solutions and services. Their product portfolio includes wireless, fixed-line network and network core solutions, data network technology, apps, software and terminals.

Huawei have created a workforce of over 1,000 employees, of which 85% are local. They have a head office in Madrid, along with five further offices in Barcelona, Valencia, Seville, A Coruña and Bilbao.

IBM was set up in Spain in 1926. Today the company coordinates the activities in Portugal, Greece and Israel. The Spanish subsidiaries have over 7,200 employees.

The IBM environment includes very relevant projects developed in Spain:

Centre of excellence in Barcelona to develop solutions for financial entities and the health sector; INSA, an IBM branch, has set up two centres (Caceres and Salamanca) for software developments to be applied worldwide; MareNostrum, supercomputer installed in the Barcelona Supercomputing Centre in collaboration with the University of Catalonia; Technology Expert Council (TEC), which integrates IBM’s best talents in Spain to enhance the leadership of the company and develop its technical knowledge.
AMETIC

AMETIC, the Association of Electronics, Information and Communications Technologies, Telecommunications and Digital Content Companies, is a point of reference in a sector which is one of the most dynamic in the Spanish economy and of unique importance for the development of the country. AMETIC is one of the largest and most representative business organizations in Spain, with over 3,000 members, comprising individual members and business groups, whose activities are related to the electronics, information technologies and telecommunications sector.

C/ Príncipe de Vergara 74, 4ª planta - 28006 MADRID
Tel: +34 91 590 23 00
http://www.ametic.es

aDigital

The Spanish Association of Digital Economy, Adigital, integrates businesses and organizations interested in the development of the digital economy for promoting and defending their interests.

C/ Entença 218, Entlo - 08029 BARCELONA
Tel: +34 93 240 40 70
http://www.adigital.org

CONETIC

The Spanish Confederation of Information Technology, Communications and Electronics Companies is a collaborative project consisting of 14 Associations united in that same interest and actively working for the competitive improvement of the more than 1,200 companies represented, promoting the development of the individual competences of the more than 55,000 professionals active in those companies, disseminate and facilitate the knowledge and application of technologies in all sectors of the economy and society and thereby contribute to generate interest in ICT vocations and new talent for the sector.

C/ Orense, 85 Edificio Lexington – 28020 MADRID
Tel: +34 91 567 84 54
http://www.conetic.info
Red.es

Red.es is the public corporate entity attached to the State Secretariat for the Information Society and Digital Agenda (SESIAD) from the Ministry of Economy and Business. Their mission is developing programs to boost the digital economy, innovation, entrepreneurship, training for young people and professionals and support to SMEs by promoting the efficient and intensive use of Information and Communication Technologies (ICT). They also deploy technology implementation programs in the public services of the Administration and work for the development of Intelligent Cities and Islands.

ONTSI

The National Observatory for Telecommunications and the Information Society is a body attached to the public corporate entity Red.es, the main objective of which is the monitoring and analysis of the Telecommunications and Information Society sector.

ONTSI prepares, gathers, synthesizes and systematizes indicators, prepares studies and offers informative and updated services relating to the Information Society and is currently the leading public Observatory of the Information Society in Spain. ONTSI is also a meeting and dialogue point between the Information and Communications Technology sector and the different public administration bodies, for the definition of policies and the subsequent evaluation thereof.

Reports

- **CNMC**: [Annual Report 2017](#)
- **ONTSI**: [Annual Report 2017](#)
- **Telefónica**: [Digital Society in Spain 2017](#)
US video game developer Take-Two buys Spanish company Social Point for €235 million.

Take-Two Interactive Software, owner of Rockstar Games or 2K, has announced the acquisition of Spanish social Point, dedicated to the development of video games for mobile devices, for an aggregate amount of $250 million (€232.5 million), it said in a statement.

El Economista, February 2017

Telefónica sells up to 40% of Telxius to KKR for €1,275 million.

Expansión, February 2017

The technology firm Epson has inaugurated the new headquarters of the subsidiary in Sant Cugat del Vallès. The Japanese multinational has ended 30 years of history in Cerdanyola to move to a facility that welcomes a vision of the future that the firm has to transfer its technological know how to everyday life. It is a space of 3,000 sqm which has meant an investment of two million euros and where the hundred employees who up to date worked in Cerdanyola have been moved.

El periódico, February 2017
Hewlett Packard Enterprise has inaugurated in Las Rozas (Madrid) a new installation of 1,200 sqm. This center will accommodate all HPE technology solutions for the educational community, its network of partners and startups.

El Economista, May 2017

RICOH

The Japanese company Ricoh, specialized in printing and digital services to companies, has acquired Techno Trends, a Spanish company specialized in solutions of telepresence and visual communication by distance. The operation will serve the Japanese to expand digital transformation services to companies.

La Vanguardia, July 2017

Chinese telecommunications giant Huawei has opened its new Center for Experiences and Technological Demonstrations (CSIC) in Madrid, in which it aims to teach its customers the added value of the technology it develops for telecom operators.

Cinco Días, May 2017
<table>
<thead>
<tr>
<th>Company</th>
<th>Private Capital Entity</th>
<th>Sector</th>
<th>Type of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxi Mobility Spain (Cabify)</td>
<td>Rakuten</td>
<td>Internet</td>
<td>Late Stage Venture Capital</td>
</tr>
<tr>
<td>Job&amp;Talent</td>
<td>Atomico, Kibo Ventures</td>
<td>Internet</td>
<td>Late Stage Venture</td>
</tr>
<tr>
<td>Xperience Consulting (Userzoom)</td>
<td>Stepstone Group, TC Growth, Trident Capital</td>
<td>IT Services</td>
<td>Late Stage Venture</td>
</tr>
<tr>
<td>Hundredrooms</td>
<td>Seaya Ventures, Bankinter Capital Riesgo, Inveready Technology</td>
<td>Internet</td>
<td>Other early stage</td>
</tr>
<tr>
<td>4IQ (former Survela)</td>
<td>Trident Cibersecurity, Adara Ventures, Telefónica Ventures</td>
<td>Internet</td>
<td>Start up</td>
</tr>
<tr>
<td>Salupro</td>
<td>Bonsai VC, Vitamina K</td>
<td>Internet</td>
<td>Start up</td>
</tr>
<tr>
<td>ABA English</td>
<td>Kennet Partners, Nauta Capital VC Partners</td>
<td>Internet</td>
<td>Other early stage</td>
</tr>
<tr>
<td>iContainers Solutions</td>
<td>Serena Capital, Kibo Ventures, Vitamina K</td>
<td>Internet</td>
<td>Other early stage</td>
</tr>
<tr>
<td>Sherpa Europe</td>
<td>Alma Mundi</td>
<td>Software</td>
<td>Start up</td>
</tr>
<tr>
<td>Olapic</td>
<td>Felix Capital, Unilever Ventures, Fung Capital, Longworth Venture Partners</td>
<td>IT / Internet</td>
<td>Other early stage</td>
</tr>
</tbody>
</table>

II. Competitive Advantages in ICT sector
In 2016, mobile lines reached the 51.5 million mark (110.9% penetration rate)

There are over 120,000 stations all over the country for mobile telecommunications

There are over 30 million internet users in Spain

78.4% of households are equipped with computers (desktop, laptop, netbook or tablet) and 83.4% of households are connected to Internet

60.8% of people over 15 years old have a smartphone

Spain has 14.7M gamers that play 5.8 hours/week in average

98.3% of the companies in Spain are connected to internet and 86% of companies use some Open Source Software

Spanish is the second most natively spoken language in the world with 400 million native speakers, after Chinese Mandarin

In January 2018 the registered .es domains reached 1,900,887

E-commerce turnover in Spain in 2016 was €25,354 million

Spain was the 3rd country in the OECD with greater growth in implantation of fiber optic in 2016 (101.9%).
Infrastructure for Business Development

84 Science and Technology Parks throughout Spain

Highways: Logistics Hubs and Road Infrastructures

Railway: High Speed Networks

Airports: Business Infrastructure & Tourist Main Entrance

ICT and Telecommunication Networks

Urban Transport: Smart Cities

Ports: World Logistics Platforms

Source: APTE 2016
Network Infrastructure Plan – RedIRIS Network (Network for the Scientific Community)
Spain is the 3rd country in the OECD with greater growth in implantation of fiber optic (101.9%).

Broadband penetration in Spanish households keeps growing. In 2015 it was 77.8% and in 2016 it reached 81.2%.

In 2016, fiber optic covers a total of 10,039,416 households, 23.1% more than in 2015. Coverage reaches 55.6% of Spanish households, 10.8 points higher than 2015.

Spain is the European country with the largest fiber optic network.

78.4% of households are equipped with computers (desktop, laptop, netbook or tablet):

Source: INE and ONTSI, 2017
Internet use in Spain by age range
Percentage of Internet users

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Percentage of Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 to 24</td>
<td>98</td>
</tr>
<tr>
<td>25 to 34</td>
<td>96.3</td>
</tr>
<tr>
<td>35 to 44</td>
<td>95.8</td>
</tr>
<tr>
<td>45 to 54</td>
<td>90.3</td>
</tr>
<tr>
<td>55 to 64</td>
<td>73.9</td>
</tr>
<tr>
<td>65 to 74</td>
<td>43.7</td>
</tr>
<tr>
<td>Total population</td>
<td>84.6</td>
</tr>
</tbody>
</table>

Source: INE and ONTSI, 2017

Internet use in Spain by level of education
Percentage of Internet users

<table>
<thead>
<tr>
<th>Education Level</th>
<th>Percentage of Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Education</td>
<td>44.2</td>
</tr>
<tr>
<td>Secondary Education, First Level</td>
<td>84.4</td>
</tr>
<tr>
<td>Secondary Education, Second Level</td>
<td>94.2</td>
</tr>
<tr>
<td>Vocational Training, Higher Level</td>
<td>97.6</td>
</tr>
<tr>
<td>Tertiary Studies</td>
<td>98.8</td>
</tr>
<tr>
<td>Total</td>
<td>82.7</td>
</tr>
</tbody>
</table>

Source: INE and ONTSI, 2017
The spending in **e-commerce in Spain in 2016 was €25,534 million.** It means an increase of **22.2%** with respect to 2015.

The number of new **online shoppers** have increased **13.1% in 2016**, totaling **21.2 million people**.

**Booking accommodations, tourist packages** and **transport tickets** are the goods and services most demanded with **46.6%**.

*Source: INE and ONTSI, 2017*
In January 2018 the registered .es domains reached 1,900,887

Source: Red.es, 2018
More than 2.4 Billion Euros allocated by the government to fulfil the Digital Agenda, assuming the Digital Agenda for Europe in 2020.

It contains 106 lines of action structured around 6 main objectives:

**Encourage the deployment of ultra-fast networks**
- At least 50% households 100 Mbps in 2020
- Promote an improved user experience and promote appropriate service conditions
- Encourage the deployment of ultra-fast broadband networks, optimizing the use of radio spectrum and improve the experience for broadband users

**Develop the digital economy**
- 33% of SMEs make online purchases or sales
- Promoting the development of e-commerce
- Promoting an innovative industry of digital content
- Increasing public-private partnerships and identify and maximize the opportunities that are presented in this new scenario

**Improve e-government and digital public services**
- Increasing effectiveness and efficiency in public Administrations
- Bringing the Administration to citizens and businesses
- Increasing the levels of use of eGovernment
- Rationalize and optimize the use of ICT in public administration

**Building confidence in the digital**
- Establishment of capabilities for monitoring and diagnosis of digital trust permanent
- Boost market confidence services
- Strengthen existing capacities to promote digital trust
- Promote excellence in the organizations on digital trust

**Encourage R & D + i in the industries of the future**
- Double the total annual public spending on research and ICT development, in 2020
- Leverage an equivalent increase in private spending
- Increase the efficiency of public investment in R & D in ICT
- Encouraging private investment in R & D in ICT
- Promote R & D in ICT in SMEs
- Expand the Spanish participation in R & D in ICT in the international arena

**Supporting digital inclusion and ICT training new professionals**
- Reduce to below 15% the percentage of population that has never used internet
- Promote inclusion and digital literacy
- Adapt training systems for digital training and ICT training new professionals
Spain has got many Institutions that promote incentives in different calls along the year

R&D:

The Centre for Industrial Technological Development (CDTI) has got a wide range of grants and loans at competitive low interest rate for technological projects.

The State Secretariat for Innovation in the Ministry of Science, Innovation and Universities also offers support with grants and loans for technological projects developed by companies and public bodies.

INVEST IN SPAIN/ICEX has developed a program for supporting foreign companies up to €200,000 for investments with a high degree of R&D in competitive tenders.

The National Innovation Company (ENISA) finances SMEs up to €1.5 million with participative loans at a very competitive interest rate and where no-guarantee is required.

The Public organization RED.ES promotes the IT activities of technological companies and start-ups financing investments in infrastructures, equipments and so on.
- Labour costs in Spain are below the EU-28 average (Spain is **19.7€/hour** and EU-28 is **25.7€/hour**)
- Favourable fiscal system for foreign investors and R&D activities
- 41.5% of the population aged 25-34 have a tertiary education

**Salaries on the Technology Industry (USD)**

<table>
<thead>
<tr>
<th>Location</th>
<th>Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>PALO ALTO</td>
<td>111000</td>
</tr>
<tr>
<td>SWITZERLAND</td>
<td>80000</td>
</tr>
<tr>
<td>LONDON</td>
<td>73000</td>
</tr>
<tr>
<td>EUROPE</td>
<td>64000</td>
</tr>
<tr>
<td>IRLANDA</td>
<td>58000</td>
</tr>
<tr>
<td>FRANCE</td>
<td>57000</td>
</tr>
<tr>
<td>BERLIN</td>
<td>57000</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>54000</td>
</tr>
<tr>
<td>SPAIN</td>
<td>49000</td>
</tr>
</tbody>
</table>

Source: Angel List, 2016

**Global MBA ranking 2017**

<table>
<thead>
<tr>
<th>Ranking</th>
<th>School name</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Insead</td>
<td>France/Singapore</td>
</tr>
<tr>
<td>2</td>
<td>Stanford Graduate School of Business</td>
<td>USA</td>
</tr>
<tr>
<td>3</td>
<td>University of Pennsylvania: Wharton</td>
<td>USA</td>
</tr>
<tr>
<td>4</td>
<td>Harvard Business School</td>
<td>USA</td>
</tr>
<tr>
<td>5</td>
<td>University of Cambridge: Judge</td>
<td>UK</td>
</tr>
<tr>
<td>6</td>
<td>London Business School</td>
<td>UK</td>
</tr>
<tr>
<td>7</td>
<td>Columbia Business School</td>
<td>USA</td>
</tr>
<tr>
<td>8</td>
<td>IE Business School</td>
<td>Spain</td>
</tr>
<tr>
<td>9</td>
<td>University of Chicago: Booth</td>
<td>USA</td>
</tr>
<tr>
<td>10</td>
<td>IESE Business School</td>
<td>Spain</td>
</tr>
<tr>
<td>11</td>
<td>Ceibs</td>
<td>China</td>
</tr>
<tr>
<td>12</td>
<td>Northwestern University: Kellogg</td>
<td>USA</td>
</tr>
<tr>
<td>13</td>
<td>MIT:Sloan</td>
<td>USA</td>
</tr>
<tr>
<td>14</td>
<td>University of California at Berkeley: Haas</td>
<td>USA</td>
</tr>
<tr>
<td>15</td>
<td>Hong Kong UST Business School</td>
<td>China</td>
</tr>
<tr>
<td>16</td>
<td>Yale School of Management</td>
<td>USA</td>
</tr>
<tr>
<td>17</td>
<td>ESADE Business School</td>
<td>Spain</td>
</tr>
<tr>
<td>18</td>
<td>Dartmouth College: Tuck</td>
<td>USA</td>
</tr>
<tr>
<td>19</td>
<td>New York University: Stern</td>
<td>USA</td>
</tr>
<tr>
<td>20</td>
<td>HEC Paris</td>
<td>France</td>
</tr>
</tbody>
</table>

Source: Financial Times 2017
## IT Labor costs in Spain

<table>
<thead>
<tr>
<th>Job Category</th>
<th>Experience (0-2 years)</th>
<th>Experience (2-5 years)</th>
<th>Experience (5-10 years)</th>
<th>Experience (&gt;10 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country Manager</td>
<td>80 (20%) – 107.5 (40%)</td>
<td>100 (20%) – 142.5 (40%)</td>
<td>125 (20%) – 175 (40%)</td>
<td>140 (20%) – 195 (40%)</td>
</tr>
<tr>
<td>Chief Information Officer</td>
<td>80 (10%) – 102.5 (20%)</td>
<td>90 (10%) – 110 (20%)</td>
<td>125 (10%) – 152.5 (20%)</td>
<td>137.5 (10%) – 175 (20%)</td>
</tr>
<tr>
<td>IT Director</td>
<td>50 (10%) – 65 (20%)</td>
<td>55 (10%) – 75 (20%)</td>
<td>67.5 (10%) – 85 (20%)</td>
<td>75 (10%) – 95 (20%)</td>
</tr>
<tr>
<td>Chief Technology Officer</td>
<td>40 – 52.5 (10%)</td>
<td>52.5 – 65 (20%)</td>
<td>70 – 87.5 (20%)</td>
<td>90 – 125 (20%)</td>
</tr>
<tr>
<td>Chief Security Officer</td>
<td>50 – 51 (10%)</td>
<td>65 – 67 (10%)</td>
<td>85 (20%)</td>
<td>-</td>
</tr>
<tr>
<td>Development Manager</td>
<td>38.5 – 54 (10%)</td>
<td>45 – 63.5 (10%)</td>
<td>55 – 70 (10%)</td>
<td>64 – 77.5 (10%)</td>
</tr>
<tr>
<td>SW Architect (Java, .NET, etc.)</td>
<td>36 – 43.5 (5%)</td>
<td>41.5 – 46.5 (5%)</td>
<td>46.5 – 53.5 (10%)</td>
<td>48.5 – 56.5 (10%)</td>
</tr>
<tr>
<td>Team Lead (SW Development)</td>
<td>32.5 – 42.5 (10%)</td>
<td>40 – 45.5 (10%)</td>
<td>45.5 – 50 (10%)</td>
<td>50 – 55.5 (10%)</td>
</tr>
<tr>
<td>IT Business Analyst</td>
<td>27.5 (5%) – 33.5 (10%)</td>
<td>30 (5%) – 41.5 (10%)</td>
<td>36.5 (5%) – 49.5 (10%)</td>
<td>42.5 (5%) – 57.5 (10%)</td>
</tr>
<tr>
<td>Business Intelligence Consultant</td>
<td>25 – 32.5 (10%)</td>
<td>30 – 38.5 (10%)</td>
<td>35.5 – 48.5 (10%)</td>
<td>40 – 51.5 (10%)</td>
</tr>
<tr>
<td>IT Security Consultant</td>
<td>24 – 31.5</td>
<td>29.5 – 37</td>
<td>34 – 44.5</td>
<td>41.5 – 51.5</td>
</tr>
<tr>
<td>Java/J2EE Developer</td>
<td>21.5 – 25 (5%)</td>
<td>27.5 – 35 (5%)</td>
<td>34 – 40 (10%)</td>
<td>40 – 45 (10%)</td>
</tr>
<tr>
<td>.NET Developer</td>
<td>22.5 – 26.5 (5%)</td>
<td>29 – 33 (5%)</td>
<td>33.5 – 40 (10%)</td>
<td>38.5 – 43 (10%)</td>
</tr>
<tr>
<td>PHP Developer</td>
<td>21.5 – 24 (5%)</td>
<td>25 – 33.5 (5%)</td>
<td>30 – 39 (10%)</td>
<td>38 – 43.5 (10%)</td>
</tr>
<tr>
<td>ERP Consultant (SAP mainly)</td>
<td>24 – 31.5 (10%)</td>
<td>32.5 – 41.5 (10%)</td>
<td>37.5 – 47.5 (10%)</td>
<td>42.5 – 57.5 (10%)</td>
</tr>
<tr>
<td>Mobile Apps Developer</td>
<td>25.5 – 32.5 (5%)</td>
<td>30 – 37.5 (5%)</td>
<td>41.5 – 47.5 (5%)</td>
<td>-</td>
</tr>
<tr>
<td>CRM Consultant</td>
<td>26 (5%) – 34 (10%)</td>
<td>30 (5%) – 40 (10%)</td>
<td>34 (5%) – 43.5 (10%)</td>
<td>39.5 (5%) – 51.5 (10%)</td>
</tr>
<tr>
<td>Network Engineer</td>
<td>24 – 27.5</td>
<td>25 – 30</td>
<td>27.5 – 35</td>
<td>29.5 – 39.5</td>
</tr>
<tr>
<td>System Administrator</td>
<td>20 – 27.5</td>
<td>24 – 32.5</td>
<td>30 – 41.5</td>
<td>34 – 47.5</td>
</tr>
</tbody>
</table>

*Data: Thousand € (In brackets, variable salary)*

*Study for the cities of Barcelona, Bilbao, Madrid, Seville and Valencia*

*Source: Guide of the labor market in Spain. Hays, 2017*
Spanish is the **second most natively spoken language** in the world with around **400 million native speakers**, only after Chinese Mandarin.

### Internet Users by language

<table>
<thead>
<tr>
<th>Percentage of Users</th>
<th>Number of Users (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25,30%</td>
<td>984,7</td>
</tr>
<tr>
<td>19,80%</td>
<td>770,8</td>
</tr>
<tr>
<td>8,00%</td>
<td>312</td>
</tr>
<tr>
<td>4,80%</td>
<td>184,6</td>
</tr>
<tr>
<td>4,10%</td>
<td>158,4</td>
</tr>
<tr>
<td>4,10%</td>
<td>157,6</td>
</tr>
<tr>
<td>3,00%</td>
<td>118,4</td>
</tr>
<tr>
<td>2,80%</td>
<td>109,5</td>
</tr>
<tr>
<td>2,80%</td>
<td>108</td>
</tr>
<tr>
<td>2,20%</td>
<td>84,7</td>
</tr>
<tr>
<td>Other</td>
<td>896,7</td>
</tr>
</tbody>
</table>

Spain is the 1st country in Europe in terms of quality of life for ex-pats and 2nd-ranked worldwide.

With large communities of many different nationalities, Spain is known for its highly cosmopolitan character. On average, 12.2% of the Spanish residents are foreign-born, a figure that rises to 16-17% in regions like Catalonia or Madrid.

One of the largest number of International Schools in Europe.

Outstanding & modern health system with very high standards.

Favourable fiscal regime for expatriates.


Excellent climate, first-class gastronomy, wide range of cultural and leisure activities.

Source: The Expat Explorer Survey 2016 (HSBC)
III. Business Opportunities in the Spanish ICT sector
Printing in three dimensions (3D printing) is the process of joining materials to make objects from a digital model, usually putting one layer on top of another, as opposed to subtractive methodologies such as traditional manufacturing machining. It is about making solid three-dimensional structures in volume. A 3D printer is a machine capable of "printing" of 3D designs, creating pieces or volumetric models from a design made by computer.

ORIGIN AND BENEFITS OF THE INVESTMENT OPPORTUNITY

DEMAND

- This methodology arises primarily from the needs of adaptability to changes in the design of parts that manufacturing companies face. By drastically reducing costs and accelerating time to market for both prototypes and tools, 3D printing solves specific unmet needs in some production lines.

TECHNOLOGY

- All this is possible thanks to technology that has led to the evolution of the printer that applies ink to paper, to another that creates layers of resin or other materials to form a volume.

CONSUMER/USER

- In manufacturing companies this technology represents a reduction of costs and a significant improvement in functionality as certain types of complex tools cannot be manufactured using traditional methods. It enables rapid prototyping of an industrial idea, the efficient use of resources, production in small batches and streamlined production.

COMPANY

- The low barriers to entry to this production system created the conditions for anyone to design and print what they wanted, which offers great opportunities for entrepreneurs and businesses.

SOCIETY

- It means advances in key sectors for the welfare of citizens, such is the nature of medicine, including the possibility of printing organs.
ASSOCIATIONS DRIVING 3D PRINTING

❖ Addimat, the Spanish Association of Additive and 3D Manufacturing Technologies, brings together companies related to the manufacture and marketing of equipment and materials for additive manufacturing and 3D printing and responds to the specific demands of additive and 3D aspects in the world of manufacturing. Addimat aims to bring together all stakeholders with interests in the development and promotion of additive manufacturing and 3D and improve their situation in Spain.

COMMITMENT BY THE SPANISH GOVERNMENT ON 3D PRINTING

❖ The government is launching PPP projects to promote R&D in new technologies and materials to create a new faster, cheaper and higher quality 3D printers. One example is the aid package of 21.25 million euros to Hewlett-Packard Spain. Moreover, in this case the Ministry of Industry grants aid to HP of 5.31 million as a grant and 15.94 million as a loan.

AUTOMOTIVE SECTOR - STRATEGIC SECTOR

❖ The automotive sector is a strategic sector in Spain and has 17 production plants among the most automated in Europe. In addition, recent data places Spain as the 2nd largest producer of vehicles in Europe and the 9th in the world, while wanting production to reach 3 million cars in 2017.

SOCIAL FACTORS AND HABITS

❖ Spain is a leader in the development and use of innovative technology in different innovation sectors. Spain and its companies today are prominent in the application of new information and communications technology (ICT), ranking 5th in Europe in terms of turnover. It has first class infrastructure, research centers and leading companies in the implementation of ICT tools in sectors as diverse as environmental technologies, health, marine, space and automotive.
SUCCESS STORIES

HP SET UP THEIR 3D GLOBAL BUSINESS center IN SANT CUGAT

- HP set up their 3D global business center in Sant Cugat. Trusting the firm at its center in Catalonia earned it the Award for Best Business Initiative 2014.
- The company has been in Catalonia for 30 years and the Sant Cugat facilities, inaugurated in 1990, have become a world leader in research and development in areas such as large-format printing. It is HP’s biggest R+D center outside of the US.
- After detecting the potential of 3D printing, the American company decided to focus its innovation efforts in this sector in Sant Cugat, where a specific team works to find future technology and materials which reduce by up to 10 times the time of printing 3D. Its first product could reach the market in 2016, and as well as investing 50 million in the new center of 3D printing, it will consolidate and create new jobs.

CLEARCORRECT EXPANDED THE PRODUCTION CAPACITY

- The company ClearCorrect expanded the production capacity for orthodontic aligners by 30% thanks to 3D printers by Stratasys. These aligners result in a significant improvement over metallic devices traditionally used for orthodontic treatment. They are completely transparent and allow the patient to remove the aligners and eat foods that are a problem with traditional braces.
- ClearCorrect began using Stratasys 3D printing technology with some printers. Upon observing the excellent results, it decided that the entire production of their dental models would be done by 3D printing.

FORD IS A PIONEER IN THE USE OF 3D PRINTERS FOR THE PRODUCTION

- Ford is a pioneer in the use of 3D printers for the production of prototype parts. By using this technique, it is able to reduce development time of components used in all vehicles, such as heads rests, intake manifolds and air intakes. Thus, Ford managed to print 500,000 pieces that it uses to create new prototypes. Thus, Ford optimizes investment during new product development. 3D printing avoids the use of special tools or moduls for specific parts prone to change.
Combination of processes, technologies and business models that are based on data and capturing the value of the data itself. This can be achieved both through improved efficiency through the analysis of data or via the emergence of new business models involving an engine of growth. The main objective of big data is to provide a technological infrastructure for companies and organisations with the aim of storing, processing and analysing the large amount of data generated daily in a cheap and fast way.

ORIGIN AND BENEFITS OF THE INVESTMENT OPPORTUNITY

ECONOMIC/BUSINESS

❖ For some time, public administrations and businesses have stored information about citizens but did not have the capacity to process such large volumes of it. Big Data comes about thanks to the fall in storage costs, the increase in processing speed and the appearance earlier this century of the massively parallel computing and software.

DEMAND

❖ Companies need to analyse data, since this analysis to find relationships between data that at a glance seem to have nothing in common but that may be of benefit to businesses, organisations and the general public because It allows them to detect patterns, trends and correlations to make informed decisions. It is very useful to detect subtle correlations that may be lost when analysing smaller data sets for carrying reliable diagnostic and prognostic tests in many areas.

CONSUMER/USER

❖ For companies implementing such solutions, Big Data means understanding the profile, needs of and feelings of its customers about products and/or services. This is particularly relevant as it allows for adapting the way the company interacts with its customers and how it serves them.

COMPANY

❖ Today's businesses are changing and seeking new ways to get value through the use of information. This places new demands on the IT infrastructure of their companies. It is when the opportunity arises for technology companies that develop new products that meet these business needs.

SOCIETY

❖ In the US it has been used to predict earthquakes, unemployment rates, lower crime rates and track epidemics. It also has environmental related applications.
FAVOURABLE FACTORS IN SPAIN

PUBLIC ADMINISTRATIONS COMMITMENT TO BIG DATA

- Big Data has various applications in Smart Cities for managing the amounts of data generated mainly from the interactions of people on social networks, and from sensors and connected devices. In addition to the large volume of data to be managed in the cities of today, there are a variety (over 80 percent are unstructured) and decisions must be made quickly. In Spain, the development of Smart Cities is very advanced and therefore there is a large market for the application of Big Data solutions.

INTEREST IN BIG DATA ABOVE THE EUROPEAN AVERAGE

- Significantly, a high number of Spanish companies (96%) have already analysed or are considering how Big Data could benefit their business. This is 15 percent above the average of other countries analysed (81%) according to the study "Big Data: Beyond the noise.

SPECIFIC QUALIFICATIONS IN SPAIN

- Spanish universities, aware of the importance of Big Data, are developing specific courses, namely the University of Valladolid offers the Degree in Computer Engineering with a specialisation in computation, in addition to the two 'traditional' Software and Information Technology degrees.

SOCIAL FACTORS AND HABITS

- Social networks such as Facebook, Twitter and LinkedIn, Foursquare and Google+, are widespread and adoption by users has accelerated producing a large amount of data. Spain has an economically active population of 28.9 million people. 73% of this population actively uses social networks monthly.
SUCCESS STORIES

FUJITSU HAS BUILT AN INNOVATION CENTER FOR DATA ANALYTICS

❖ Fujitsu has built an innovation center for data analytics in Madrid. The company has opened an innovation center in Madrid specializing in data analytics and in which it has initially invested five million euros.
❖ The opening of this center in Madrid is a demonstration of the importance of innovation in Spain for Fujitsu. The center already has several innovative projects in Spain with major Spanish institutions and organisations, including the University of Seville and the Foundation for Biomedical Research San Carlos Clinical Hospital. In the first case, the project is focused on heritage data integration, and in the second, a support system for clinical decisions based on data fusion.

EY HAVE A BIG DATA AND ANALYTICS LABORATORY LOCATED IN SPAIN

❖ EY have a Big Data and Analytics laboratory located in Spain for the financial sector. EY Global has chosen Spain to host the first Global center of Excellence in Big Data and Analytics, specialising in Financial Services. Conceived as a ‘laboratory’ for ideas and business strategy design for the sector, the center intends to respond to the challenge and strategic importance that the data revolution implies for the management of customers in banking, insurance and Wealth Management.

IBERDROLA USES BIG DATA TECHNOLOGY TO GUIDE THE EXPANSION OF SMART GRIDS

❖ Iberdrola and Ibermática have collaborated in developing a software solution based on Big Data, which aims to efficiently manage its database, which contains information transmitted every hour from smart meters that Iberdrola is incorporating in its electricity distribution network as part of their innovation and infrastructure improvement projects.
❖ This analysis allows to plan, evaluate and monitor electricity consumption and therefore reduce energy costs and reduce emissions. This advanced technology, which allows the processing of data from 240 million daily records from 11 million meters, has seen Iberdrola take the lead in the expansion of the smart grid.
implementation of a process of analysis and management of risks related to the use, processing, storage and transmission of information or data and the systems and processes used based on internationally accepted standards. Cybersecurity is the collection of tools, policies, security concepts, security safeguards, guidelines, actions, training, best practices, insurance and technologies that can be used to protect the assets of an organisation and users.

ORIGIN AND BENEFITS OF THE INVESTMENT OPPORTUNITY

DEMAND AND TECHNOLOGY

❖ The dependence of society on ICT and cyberspace grows every day. Knowing threats, managing risks and having the adequate capacity for prevention, defence, detection, analysis and research is a priority for all actors in society: businesses, citizens and public administrations. In recent times, the growing importance of the digital economy on the economy as a whole and its vulnerability to global cyberattacks has highlighted the need for the cybersecurity sector to provide solutions to the challenges of network security.

LEGISLATION

❖ Following the latest cyber threats, the USA put into force a cybersecurity legislation package. This commitment to cybersecurity in the US acts as a catalyst for the development of the sector in other countries. In Spain, looking at the guidelines for the safe use of cyberspace is a national priority.

CONSUMER/USER

❖ There are four types of consumers of cybersecurity solutions: Central government (defence and interior), Critical Infrastructure (Spain’s strategic sectors such as banking, telecommunications, energy, etc.), SMEs and citizens.
❖ Thanks to these solutions, defence mechanisms against online risks can be developed in three areas: prevention, detection and reaction.

COMPANY

❖ This opportunity could mean the emergence of new companies.
❖ Also cybersecurity is an opportunity to work on a new business line.

SOCIETY

❖ The use of ICT is essential in the economy. In other words, the safe use of technology to provide all users will the feeling of being protected against possible attacks or threats.
FAVOURABLE FACTORS IN SPAIN

INCIBE WORLD LEADER IN CYBERSECURITY

- Located in Spain, **INCIBE is the benchmark organisation for the development of cybersecurity and digital trust of citizens**, the Spanish academic and research network (RedIRIS) and companies, especially in strategic sectors. It is an effective means of strengthening digital trust, increasing cybersecurity and resilience, and promoting the safe use of cyberspace.

HIGH DEMAND FOR PROFESSIONALS

- Spain is the **second most targeted country in the world** after the United States and accounts for 20% of international cyberattacks. Despite the proliferation of network crimes, **there are not enough cybersecurity experts**. Globally, the deficit of these experts exceeds one million and most organisations do not have personnel to monitor networks and detect infiltration.

IMPORTANCE OF STRATEGIC SECTORS IN SPAIN

- In Spain, the **strategic sectors** (energy, telecommunications, banking, etc.) for cybersecurity are the most important sector and **generate the largest volume of business**. These companies demand better cybersecurity services.

SOCIAL FACTORS AND HABITS

- Broadband access of Spanish companies is above the European average at **98%, putting Spain 4 percent above the EU28**. By company size, those with more than 250 employees use broadband with greater intensity, 99.7% of these companies have this kind of access.
- In addition, **74.4% of Spanish households have access to the Internet**. Nearly 11.9 million households.
SUCCESS STORIES

THALES & SCHNEIDER ELECTRIC

- Thales, a company with technologies for use in defence, aerospace, security, transport and space, has signed a commercial cooperation agreement with Schneider Electric, for the development of cybersecurity solutions and services for command and control systems against potential cyberattacks. With this agreement, Thales and Schneider Electric make available the most up-to-date security and defence technologies against the current cybersecurity threats to both industrial operators and defence agencies.
- The catalogue of solutions that both companies offer includes risk management, vulnerability analysis, definition of security architectures, implementing and monitoring of security measures as well as the maintenance of security and incident response management, among others.

TELEFONICA DIGITAL LAUNCHED ELEVEN PATHS

- Telefonica Digital, a division of the group focused on digital content and services, and the popular hacker Chema Alonso launched Eleven Paths, a cybersecurity subsidiary of the Spanish multinational. The company has a prototype that allows 2,000 checks per minute for possible threats from the Telefonica Security Operations center (SOC).

THE SPANISH CYBERSECURITY FIRM S2 GRUPO SELECTED FOR INNOVATION IN THE EU

- S2 Grupo, a Spanish company specialising in cybersecurity, has been chosen by the EU to develop Captor, the first system to combat persistent cyberthreats created with Spanish technology. S2 Grupo was selected from a total of 2,666 companies.
- Initial funding will total of 50,000 euros, which could later be increased to 2 million euros to help cope with advance persistent threats (APT).
- The Spanish firm has over 10 years of experience working in the field of cybersecurity and leads the European MUSES consortium, which is developing a multidevice corporate security system and has also been partly financed with European funds.
Development of financial services based on technological innovation. Foremost among them is the new payment services like PayPal’s online payment system, which offers the possibility of doing business on the Internet and NFC (Near Field Communications) technology which allows purchases to be made by placing a mobile telephone near a payment terminal, without making contact.

ORIGIN AND BENEFITS OF THE INVESTMENT OPPORTUNITY

TECHNOLOGY

❖ The digital revolution, the growing proliferation of payments via the Internet and especially mobile telephone is changing the face of industry payment methods worldwide.
❖ The current prevalence of the use of cards and cash is decreasing and virtual cards, contactless technology, mobile apps or mobile payment are beginning to gain momentum.

CONSUMER/USER

❖ The benefits to consumers of using new payment methods are:
  • Speed and simplification of the payment process.
  • No need to carry a wallet.
  • Innovative way to pay.
  • Immediate confirmation of payment.
  • Easier than payment by card or cash.

DEMAND

❖ Companies that sell their products via the Internet see that many users abandon the shopping process at the time of payment. One of the main reasons is because of the complex sequence of steps that they face. For this reason, these companies have the challenge of offering their customers a simple payment process and one which users can trust.

COMPANY

❖ FinTech provides businesses with the possibility to open new business lines to adapt to users' needs.

SOCIETY

❖ Laws to combat financial fraud and the underground economy favour the control and recording of operations when analysing payment methods linked to technology.
FAVOURABLE FACTORS IN SPAIN

HIGH PENETRATION RATE OF SMARTPHONES

- Spain is consolidating its leadership among the most important countries in the European Union in terms of penetration of smartphones, with 81% of the total number of mobiles being smartphones, which is ten percent above the average, after growing five percent in the last year. The increase of people who use the Internet from their smartphone stands out.

PUBLIC ADMINISTRATION SUPPORT

- The General Telecommunications Act seeks to develop the digital economy and employment, and promote new digital services. In addition, the SME ICT and e-commerce Plan aims to get companies to make more efficient and intensive use of digital technologies.

INCREASED NUMBER OF INTERNET BUYERS

- B2C e-commerce in Spain has seen continuous growth. Thus, the estimated total volume of B2C increased by 27.5% in 2015 compared to the previous year.

SOCIAL FACTORS AND HABITS

- The average expenditure on online purchases stood at €848, 3.9% more than in the previous year.
- More than four million people used a mobile device or tablet to make purchases, representing an increase of 13.8% over the previous year.
SUCCESS STORIES

**YAAP**

- Yaap is the first company in the world which brings together banks and operators (CaixaBank, Santander and Telefonica) for the development of businesses that are digital, global and open to all. Yaap offers services that are accessible to all people regardless of their bank or mobile operator.

- Yaap Money allows money to be sent from mobile to mobile easily, quickly, safely and without providing bank details to third parties. Yaap already has over 130,000 registered users and 350,000 downloads have been made for different operating platforms (iOS, Android and Windows Phone).

**BBVA WALLET**

- BBVA Wallet allows users (currently restricted to Android smartphone users version 4.4 or higher installed and NFC system) to make contactless payments by placing their device close to Near Field Communication (NFC) contactless readers, like those used for contactless credit cards. These applications can be used to pay in shops or on public transport. Money is preloaded on the account using a credit card or debit card.

- In addition, with this application, card can be configured from the phone and notifications regarding purchases received.

**KANTOX, PIONEERING PLATFORM IN CURRENCY EXCHANGE**

- Kantox is dedicated to currency exchange between companies, that is, without bank intermediation (peer to peer), through its online platform.

- Kantox offers SMEs a solution that, until now, was only available to large companies. Through its platform, it gives customers access to the mid-market exchange rate, updated in real time, allowing for operations without hidden spreads to be performed, thus ensuring complete transparency.
Internet of Things (IoT for short) is the name given to the growing range of Internet-connected objects with integrated sensors that can process and share complex information without human intervention. Currently, IoT is composed of a collection of different networks and different purposes but is not connected. As IoT evolves, these and many other networks will be connected with the incorporation of security capabilities, analysis and management.

### ORIGIN AND BENEFITS OF THE INVESTMENT OPPORTUNITY

#### DEMAND

- IoT represents evolution of the Internet, and arises from the need for companies and final consumers to gather, analyse and distribute data that can be converted into information, that is, into knowledge.

#### TECHNOLOGY

- IoT is the first real evolution of the Internet, an evolution towards revolutionary applications with the potential to improve the way people live, learn, work and play. IoT has already ensured that Internet has become sensory, ie, sensitive to temperature, pressure, vibration, light, humidity, stress, etc. All this is possible thanks to the technological evolution and transformation.

#### ECONOMIC/BUSINESS

- IoT arises from the need to have all possible information to make the products and services they offer their customers higher quality and meet their needs.

#### CONSUMER/USER

- They may be companies or end users. There are the following benefits:
  - Cost savings, comfort, ability to manage household objects from outside, data personalisation and analysis, real-time information.
  - Businesses, thanks to IoT, will discover new business opportunities.

#### COMPANY

- The opportunity arises for companies to launch products that achieve the conversion of data into information and knowledge.

#### SOCIETY

- The use of IoT in lighting, irrigation systems or separate waste collection can produce cost savings and therefore directly benefit citizens by reducing the tax burden, as well as there being a greater efficiency in cities.
FAVOURABLE FACTORS IN SPAIN

HIGH PENETRATION OF SMARTPHONES

- Spain is consolidating its leadership among the most important countries in the European Union in terms of penetration of smartphones, with 81% of the total number of mobiles being smartphones, which is ten percent above the average, after growing five percent in the last year. The increase of people who use the Internet from their smartphone stands out. It has increased from 58.1% of Internet users in 2013 to 70.8% in 2014.

ACCESS TO THE FI-WARE PLATFORM FOR ENTREPRENEURS

- FI-WARE is the central project of the program of Public-Private Partnership developed around the Internet of the Future signed between the European Commission and a number of ICT companies. This program has two main objectives: to create an open platform (FI-WARE) that integrates the key technologies for the development of applications in the Internet of the Future, and on the other hand, to create sustainable open ecosystem of innovation around FI-WARE technology.

AGREEMENTS FOR THE IMPLEMENTATION OF IOT

- Large companies sign agreements to boost the implementation of IoT in specific areas, one example is that of Telefonica and the Foundation for Research in Ethology and Biodiversity (FIEB) to develop the capabilities of the IoT in the field of wildlife protection in Spain.

SOCIAL FACTORS AND HABITS

- In Spain, Internet penetration continues to rise steadily and there is an online population of 28.9 million people. 70% of regular Internet users use mobile devices to access it.
- Broadband access of Spanish companies is above the European average at 98%, putting Spain 4 percent above the EU28.
SUCCESS STORIES

THINKING THINGS, THE FIRST COMMERCIAL PRODUCT OF IoT

- Modular set of low-cost devices that integrate various sensors and, through a connection to the cloud, allow the full potential of the Internet of things to be exploited. It is a plug and play solution so that users can employ Thinking Things without any knowledge of programming or how to enable additional infrastructure. The temperature, light and humidity conditions of the home or office can be remotely controlled and managed.

- All this is much easier thanks to FIWARE, open initiative to create a sustainable ecosystem seizing the opportunities of the new digital era thanks to internet technology, in which Telefónica is one of the greatest drivers and provides a powerful set of APIs.

CLICK & PIZZA

- Telefónica and Telepizza have created a small device, called Click & Pizza, which stick to the fridge and allows for a pizza to be ordered with one click. The goal is that any home can place an order immediately. Telepizza has experienced significant growth in online sales penetration at home, and representing 25.2% of the total in 2013. Sales through mobile devices accounted for 27% of total e-commerce sales.

- The development of these applications is easier with FIWARE, an initiative promoted by Telefónica and developed around the Internet of the future.

NEC ARE CARRYING OUT A PIONEERING PROJECT IN THE FIELD OF WASTE COLLECTION

- NEC are carrying out a pioneering project in the field of waste collection for Ascan-Geaser in Santander, which provides the service needed to analyse data in real time as a tool for decision making in managing intelligence. The project involves the deployment of a complete technology solution, including sensor technology in recycling containers to read the fill level in real time, the infrastructure necessary to collect data from sensors such communications devices shipped in pickup trucks for the management of vehicles and routes, and mobile applications to aid in the work of collecting, cleaning and maintenance of the workers in street.
A Smart City is a city that applies ICT to improve the quality of life and accessibility of its inhabitants and ensures sustainable economic, social and environmental development in continuous improvement. ICT is the enabler, the fact that it allows information regarding the provision of public services and the management of urban infrastructure to be measured, monitored and predicted, results in a better overall functioning of cities.

ORIGIN AND BENEFITS OF THE INVESTMENT OPPORTUNITY

<table>
<thead>
<tr>
<th>ECONOMIC/BUSINESS</th>
<th>CONSUMER/USER</th>
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<tbody>
<tr>
<td>- This opportunity arises from the problem to manage increasingly complex urban environments, which have become the real centers of economic and social development.</td>
<td>- Users of Smart solutions would be the public administrations that will be able to provide more efficient services of higher quality by using these solutions. With the development of the Smart Cities, efficiency and quality of services increases by properly managing resources.</td>
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<tr>
<td>DEMAND</td>
<td>COMPANY</td>
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<tr>
<td>- There has been a public demand for higher quality public services.</td>
<td>- For businesses the rise of Smart Cities is a way to innovate, create new businesses and ideas and adapt their products to the needs of cities.</td>
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<tr>
<td>TECHNOLOGY</td>
<td>SOCIETY</td>
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<tr>
<td>- There are technological solutions in response to the challenges of the city that aim to provide infrastructure, services and features to make cities sustainable, improving the quality of life and participation of citizens.</td>
<td>- New products range from sensing different aspects of the city for the collection and transmission of data to the platforms for storage, analysis and reuse of this data.</td>
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<tr>
<td>LEGISLATION</td>
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<tr>
<td>- The Spanish and European strategic framework outline the development of society, also allocating specific funds to boost the technology industry for Smart Cities in Spain.</td>
<td>- Smart Cities use the concept of energy efficiency and sustainability, pursuing a balance between environment and consumption of natural resources.</td>
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FAVOURABLE FACTORS IN SPAIN

PUBLIC SUPPORT FOR THE DEVELOPMENT OF SMART CITIES

❖ The Ministry of Industry, Energy and Tourism supports the development of Smart Cities by the National Plan for Smart Cities. With a budget of 188.350 M€ is intended to help local authorities in the process of transformation towards Smart Cities and Destinations. Furthermore, it has been the Smart Cities Sector Forum whose aim is to Spain to play a pioneering role in the development of Smart Cities.

TECHNOLOGICAL MODERNISATION PROCESS UNDERWAY

❖ Spain is committed to the technological advancement of the cities in providing their services. Law 11/2007 on electronic access of citizens to Public Services forces cities to acquire technology infrastructure, which means that the starting point in the development of smart cities is already underway.

GOOD POSITION OF THE SPANISH CITIES

❖ Seven Spanish cities among the top fifty European, according to the index IESE Cities in Motion (ICIM). Moreover, Barcelona was recently named Global Smart City 2015 by Juniper Research, after a solid score in intelligent networks, traffic management, public lighting, technological, social cohesion, etc.

SOCIAL FACTORS AND HABITS

❖ The high level of development of E-government in Spain and online public services is highlighted. 99% of the administrative procedures of the Central Government are available electronically. This facilitates relations with the public administrations ranging from payment of taxes to the Social Security contributions through the application of permits and licenses for different activities.
SUCCESS STORIES

BARCELONA, NO. 1 SMART CITY IN THE WORLD

❖ Barcelona, No. 1 Smart City in the world in 2015, as ranked by Juniper Research. Some successful actions that define the Barcelona Smart City are, among others, the cycling network, management of public transport, the automatic lighting plan, containers with capacity sensors, telematic control deposits rainwater, public network digital manufacturing, energy self-sufficiency plan and the programme to promote electric car.

❖ Barcelona has also gained widespread international recognition by organizing the annual Smart City Expo World Congress.

PLATFORM VALENCIA CITY

❖ Valencia is the first completely connected city via the Intelligent Platform Valencia City, with efficient infrastructure for telecommunications, gas, transport, emergency services and security, public facilities, environment, cleaning, waste collection, street lighting, towing, gardening and meteorology.

❖ It also developed an augmented reality app that provides real-time information on facilities and municipal services (libraries, police stations, health centers, sports facilities, tourist attractions, transport, faults, etc.) for the location in which the citizen is. Thanks to augmented reality technology, the user can see elements (drawings, icons, 3D buildings) on device that does not exist in reality but add virtual information to the existing physical information.

THE ZEM2ALL MOVEMENT

❖ The ZEM2ALL movement is an initiative to know how will mobility in the city of the future, today. Zero Emissions Mobility To All, or what is the same Zero Emission Mobility for All is a pioneering initiative to give all citizens the opportunity to have an emissions-free mobility. ZEM2ALL serves as a real litmus test of the functioning of the free electric mobility emissions. With this initiative we know the impact and management of resources of electric mobility in the city of the future. The use of cars, recharging, which services may be offered, the impact on the energy management of the cities... all starts in the city of Malaga.
A Smart Grid is a system that enables two-way communication between the end user (private or industrial users) and utilities so that the information provided by consumers is used by companies to allow more efficient operation of the grid. In addition, all this information will offer new services to customers as a complement to the electricity itself.

**ORIGIN AND BENEFITS OF THE INVESTMENT OPPORTUNITY**

**LEGISLATION**
- In response to the challenge of the more efficient use of energy in modern economies, it has emerged the concept of "Smart Grids". In line with this challenge, the Europe 2020 strategy proposes, as one of the five major objectives for the European Union, known as 20-20-20 that has three goals: reducing emissions of greenhouse gases, reaching 20% of renewable sources and increase energy efficiency in to save 20% of energy consumption in the EU regarding projections for 2020.

**CONSUMER/USER**
- Provide insight into consumption in real time to enable know habits and improve network efficiency.
- Improve efficiency in the distribution of energy flows and flexibility in managing peak demand, thereby decreasing the need for new generation facilities.

**DEMAND**
- The role played by the user in the Smart Grids, is taking a radical change. Surge in demand for new and improved services, in order to adjust pricing in real time and the freedom to choose the energy suppliers.

**COMPANY**
- This opportunity involves the design of new products that allow providing intelligence to traditional power grids, such as telematic counters readings. With these new products, which are in line with the current trends in society can target new markets.

**SOCIETY**
- They contribute to maintaining environmental sustainability, integrating distributed generation from renewable sources, and deploying charging infrastructure for electric mobility, thus contributing to reducing CO2 emissions.
FAVOURABLE FACTORS IN SPAIN

COUNTERS REPLACEMENT PLAN

❖ The Royal Decree 1110/2007, dated 24 August, approving the unified measurement points of the electrical system Council Regulation, requires that new domestic meters (type 5, \( P \leq 15 \text{kW} \)) have timers and capacity for remote management, which entails undertaking a plan to replace all equipment already installed.

COMMITMENT TO NEW ENERGY MODELS

❖ The commitment of large companies for energy models respectful of the environment is increasingly important, investing over the last 10 years in clean technologies, which has led companies like Iberdrola to be the only Spanish electricity company and the second European utility included within the 100 Most Sustainable Corporations in the World Global index.

FUTURERED PLATFORM SPAIN

❖ Created with the mission of promoting the technological development of Spanish electric transmission and distribution networks, propelling technological leadership, sustainable development and enhancing competitiveness of the company. It attempts to give a better response to the needs that electricity networks have within the country.

SOCIAL FACTORS AND HABITS

❖ Spain is in a good position for the development of Smart Grids due to its high use of renewable energy and distributed generation.
❖ Renewable energy (wind, hydro, solar) has an important role in the global energy production in the electricity system of Spain, covering approximately 43% of total production.
SUCCESS STORIES

SMART GRIDS PROJECT MALAGA

✓ A sustainable energy management model for cities of the future, led by Endesa. This project responds to the European guidelines for the energy sector to drive efficiency, use of renewable energy and advanced network storage capacity. The main objectives of the project are: automated meter reading, changing consumer habits, providing online data consumption, rates and effects on the environment, technology research V2G (vehicle to grid) for energy efficiency in public and private buildings, efficient management of public lighting, battery management and storage facility in generators and installation, management and control of producers of alternative energy (photovoltaic, small wind, biogas, hydrogen cell, CHP...) among others.

INTELLIGENT NETWORK PROJECT IN THE HENARES CORRIDOR (PRICE)

✓ The largest joint demonstration project of smart grids in Spain and one of the most ambitious in the European Union. It allows the distribution networks Gas Natural Fenosa and Iberdrola to be turned into smart ones, in the Henares Corridor (Madrid and eastern part of the province of Guadalajara). It involves the installation of 200,000 smart meters and other smart devices oriented towards power management, and modification of 1,600 transformation centers to adapt to this new model of distribution.

PRIME PROJECT

✓ Iberdrola has driven the PRIME project, with the intention of developing an infrastructure of remote meter management that is public, open and standard in nature. This project was started by the most prominent industry leaders in the areas of measurement, telecommunications and silicon manufacturers such as Advanced Digital Design, CURRENT Group, Landis + Gyr, STMicroelectronics, Usyscom and VIZ. A number of electricity companies have already joined and others continue to join the project.

✓ All these companies have teamed up to launch a new model of public architecture, open and non-proprietary communications that supports the new features of remote meter, and to progress in the construction of electricity networks of the future SmartGrids.
Ultra-fast Broadband is a connection speed equal to or greater than 100 Megabits per second. Via optical fibre connections or via 4.5 G (LTE-Advance) radio connections. The opportunity is identified in the implementation or deployment of Ultra-fast Broadband. To deploy new telecommunications networks, operators can reuse the pipes, ducts and publicly owned sites or other networks of private operators.

**ORIGIN AND BENEFITS OF THE INVESTMENT OPPORTUNITY**

**DEMAND & ECONOMIC/BUSINESS**

- The development of a dynamic and innovative digital economy that fosters growth and productivity, allows for the development of new services, generation of social improvements and enhancement of job creation require wide access to ultra-fast broadband.

**CONSUMER/USER**

- IT processes and general navigation are made easier. Access to information sooner and greater opportunities to share work with other online users.
- Seen as the best services to access the potential of the digital world.
- It allows companies to move towards the digital economy.

**LEGISLATION**

- Spain faces the challenge of establishing an environment that favours private investment to modernise existing networks to provide ultra-fast services and that continue to expand the ultra-fast broadband coverage to reach 2020 targets (universal broadband coverage in 2013, 100% coverage of the population of at least 30Mbps by 2020 and at least 50% of households subscribing to speeds above services of 100 Mbps in the same year.

**COMPANY**

- The new services offered by operators allow for attracting new customers. They also improve the satisfaction of current customers, since higher quality services will be offered, mainly evident in the increased speed of data exchange.

**SOCIETY**

- Ultra-fast lines drive economic growth and job creation.
FAVOURABLE FACTORS IN SPAIN

BOOST FROM THE GOVERNMENT

❖ The Telecommunications and Ultra-fast Networks Plan and the National Strategy for Ultra-fast Networks, set out specific measures to promote deployment and promote the adoption of ultra-fast networks, focusing on reducing deployment costs, and measures to promote the use of new products and services. According to this plan, by 2020, 50% of households will be connected at more than 100 Mbps.

IMPLEMENTATION OF ULTRA-FAST NETWORKS IN SCHOOLS

❖ In Spain, a framework agreement for the extension of access to ultra-fast broadband for Spanish schools has been signed. The project has a budget of 330 million euros through the European Regional Development Fund (ERDF) under the Multi-Regional Operational Program of Smart Growth and jobs will run through Red.es through public tenders for operators.

ELIMINATION OF ADMINISTRATIVE BARRIERS

❖ The General Telecommunications Act, which has the aim of facilitating network deployment and the provision of electronic communications services will lead to administrative simplification by eliminating licenses and authorisation by the telecommunications administrators.

SOCIAL FACTORS AND HABITS

❖ Broadband coverage of over 30 Mbps rose from 53% to 65% of the population and ultra-fast broadband over 100 Mbps has already reached 61% of the population, exceeding the 50% target set for the 2015 in the Digital Agenda for Spain.
SUCCESS STORIES

HUawei- LEADING THE LTE ERA

- Huawei- Leading the LTE era: Huawei’s social contribution to Spanish society has been a constant since the introduction of the company in the country. In recent years, the Corporate Social Responsibility strategy of the company has focused its efforts on ensuring a more dynamic educational environment and to **democratise the deployment of next-generation networks throughout the country**. The firm commitment of the company to innovation, its expertise in the development and deployment of next-generation LTE networks and its **pioneering work with 5G technology** are already underway and entrench the company’s commitment to Spain and economic, social and technological improvement in the country.

- Through the framework agreement "Leading the LTE era", Huawei and the Polytechnic University of Madrid teach a **graduate course in mobile communications that, in addition to theoretical training, includes internships in the virtual LTEStar 6.0 laboratory**, run by Huawei.

Vodafone Buys Ono to Offer Its Customers Better Landline and Mobile Services

- Vodafone and Ono have **complementary characteristics** because of their expertise in landline and mobile broadband.

- Thus, the new company will be a **leader in ultra-fast broadband**, offering 100 Mbps Internet and 4G. That is to say, a powerful landline broadband network. Moreover, through this strategy Vodafone-ONO offers a pay-TV platform, which means it can compete with other operators.

GOOGLE FIBER

- Google as a provider of lines, supplies the people of Kansas City: a speed of 1Gb per second. Attracted by this capacity, web **entrepreneurs and professionals** have come to **exploit the advantages** of a connection that is 100 times faster than the average in the United States. The city of Chattanooga in Tennessee, is also acting as a **magnet for innovation**. Since it built a 1Gb optical fibre network, companies like **Amazon** and **Volkswagen** have established themselves there. More than 3,700 jobs have been created related to the new infrastructure.
Spain offers interesting opportunities in other segments of the market

- Digital Entertainment – Video Games
- e-Government
- e-Health
- e-Justice
- Nearshore Platforms
- Open Source Activities
- Social Media – Social Business