

INNOVATION

FERROVIAL FOCUSES ITS INNOVATIVE ACTIVITY ON STRATEGIC AND TRANSFORMATIONAL PROJECTS THAT GENERATE NEW SOLUTIONS FOR EXISTING PRODUCTS AND SERVICES, AND ACCELERATE THE DESIGN AND COMMERCIALIZATION OF NEW BUSINESS MODELS THAT BRING GREATER VALUE TO THE COMPANY.

New technologies (robotics, artificial intelligence, IoT and Big Data) are having a significant and fast impact on all sectors. The transformative capacity they generate derives in an environment with threats but also great opportunities. To respond to the challenges, Ferrovial is accelerating its process of implementing innovative solutions, within its open innovation strategy.

OPEN INNOVATION ECOSYSTEM

Collaboration with startups

An essential part of this strategy focuses on collaboration with startups, which complement the company's capabilities, providing flexibility, agility and capacity for disruption, facilitating the joint market launch of new products, processes and business models. 30 projects were executed in collaboration with startups in 2017.

Under this scope, **BuildUp!** has been presented (www.ferrovialbuildup.com) a program to seek the collaboration of startups to resolve different business challenges. Given the importance of the safety of its workers, the first challenge was how to guarantee the safety of operators working in road maintenance. The selected startup will carry out a four-month pilot project in one of Ferrovial's infrastructures or contracts, and will have the possibility of becoming a supplier of the company and internationalizing its product or service.

Ferrovial is also participating as a partner in three European acceleration projects for startups approved by the European program H2020, **Impact Growth** in the Internet of the future area, **Impact Connected Car** in the connected vehicles area and **Systems for Robotics** in the robotics area.

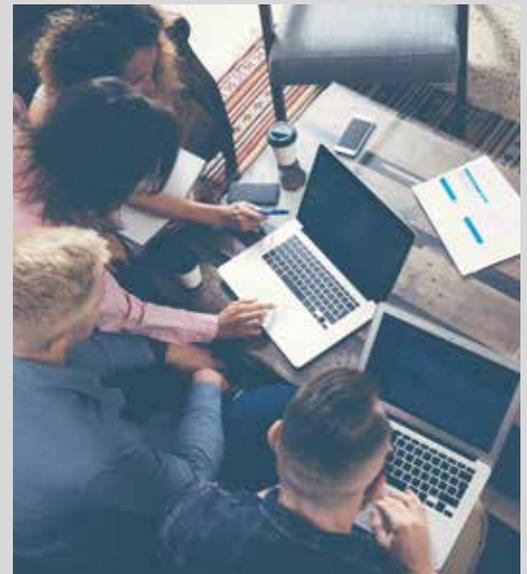
Collaboration with research centers and universities

Within the current Ferrovial open innovation model, relationships with universities and research centers continue to be fostered and maintained with the aim of establishing medium and long-term collaboration agreements. At present, there are 13 medium to long-term collaboration agreements.

Due to its relevance, the **Massachusetts Institute of Technology (MIT)** has a prominent role. The agreement was renewed in 2016 until 2020 to develop research proj-

ects in different innovation areas of Ferrovial: construction, cities, infrastructures, water treatment, waste management and energy efficiency. It also participates as an associate member of the **MIT Energy Initiative (MITEI)**, an initiative to develop projects aimed at transforming the cities and infrastructure of the future. Ferrovial collaborates in the Mobility of the Future proposal to identify trends, new models, consumer preferences and government policies that will shape the future of mobility.

Ferrovial is also a member of **MIT REAP Madrid** (Regional Entrepreneurship Acceleration Program), a training program promoted by **MIT** to accelerate innovation and



ATOMICO

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Ferrovial is one of the participating partners in Atómico, a European venture capital fund that invests in startups, acting as an accelerator. The Atómico team comprises the founders of some of the most important technology companies in the world, helping the startups they invest in to think on a more global scale and multiply their business possibilities.

The investments are focused on European and North American companies, related to different emerging technologies.

entrepreneurship in different regions of the world. It aims to encourage collaboration to identify and implement a set of good driving and accelerating entrepreneurship practices that achieve economic growth and employment. The fourth edition will take place in the 2016–2018 period, with Madrid being one of the eight regions selected in this initiative. Ferrovial is an active member and promoter of the team constituted by the Government of the Community of Madrid, representatives of large companies, universities, venture capital funds and startup accelerator.

In 2017, Ferrovial became a partner of the **European Institute of Innovation and Technology (EIT)**, through two knowledge and innovation communities, the **Digital Community (Digital-KIC)** and the **Community on Climate Change (Climate-KIC)**. The EIT integrates the three areas of the triangle of knowledge, education, entrepreneurship and innovation, to promote the transformation of ideas and knowledge into new business opportunities. Digital-KIC aims to accelerate the absorption of digital technologies in the market, in a way that attracts business talent and leadership in Europe. Meanwhile, Climate-KIC seeks to help build a carbon-free economy to address climate change, working around four thematic areas: promoting sustainability in urban areas, production, land management and financial parameters and decision making.

To continue expanding the partner ecosystem in 2017, Ferrovial has continued carrying out exploration tasks in different Asian countries.

INNOVATION CULTURE

The innovation strategy not only seeks to collaborate with others, but also to develop the entrepreneurial spirit existing in the company. To this end, the second edition of the **ShuttleX** intrapreneurship program seeks to respond to internal challenges of the Services business. Through the creation of multidisciplinary teams, and with the support of experts in the lean startup methodology and different mentors, the entire innovation process has been worked on, from the generation of ideas to the obtaining of validated prototypes for their subsequent activation.

The company has also organized the second edition of the **Innovation Community Summit**, an internal conference that brings together the innovation leaders from all Ferrovial's business units to strengthening innovation and create contact networks to share knowledge and ideas that respond to existing challenges.

To reflect on the state of the latest technologies, generate debate and analyze the possibilities of application in Ferrovial, different **awareness sessions** have been organized, aimed at senior executive representatives, covering blockchain, machine learning, autonomous vehicles and cognitive computing.

INVESTMENT IN R&D (M€) *

46.7

PROJECTS DEVELOPED IN 2017

+100

PILOT PROJECTS DEVELOPED WITH STARTUPS

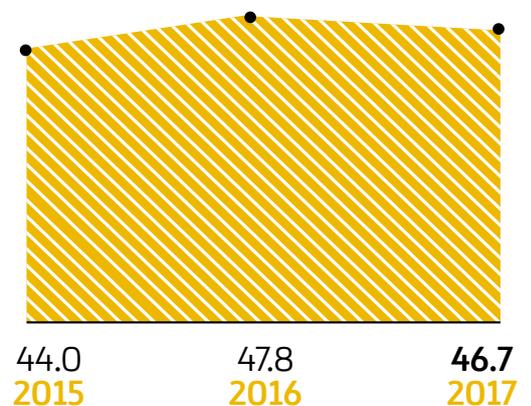
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INNOVATION STRATEGY

Ferrovial's innovation strategy includes the goal of digitally transforming the company, taking advantage of existing opportunities in the use of emerging technologies. **Digital transformation** focuses mainly on four main lines of action: new business models that increase the offers of products and services; the improvement of operational efficiency, the improvement of cross-cutting knowledge management processes, administrative and financial processes and the increase of the digital skills of employees.

It should be noted that investment in R&D in 2017 was 46.7 million euro, having focused the efforts on projects of greater importance, aligned with the strategy and with the vision of transformation. In 2018, the company will continue to work on strengthening the innovation ecosystem, in particular the collaboration with startups, and focus on new topics such as streamlining processes and the rapid scaling of projects. 

INVESTMENT IN R&D (M€)

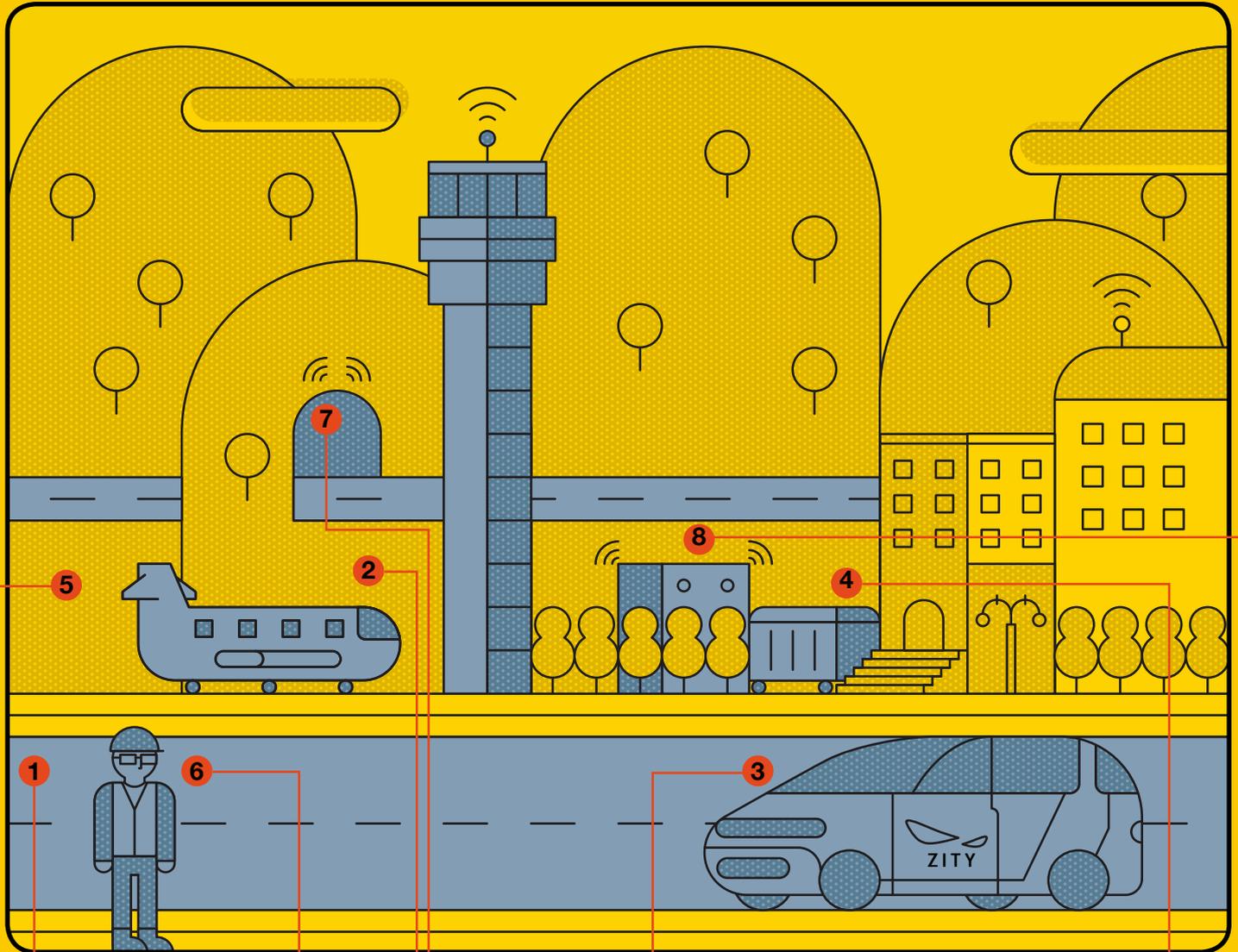


VIDEO: INNOVATION STRATEGY
Click on this link for more information

(*) 12% of innovation on Construction expenditure were made in 2016 but certified in 2017, following the criterion of certifications with Binding Motivated Reports.

INNOVATION PROJECTS

FERROVIAL BELIEVES THAT INNOVATION IS A DIFFERENCE MAKER THAT ENABLES THE COMPANY TO LEAD THE TRANSFORMATION OF INFRASTRUCTURES AND SERVICES, PROVIDING CUSTOMERS AND USERS WITH SOLUTIONS THAT EFFICIENTLY, SUSTAINABLY AND SAFELY CONTRIBUTE TO THE WELL-BEING AND PROGRESS OF SOCIETY AS A WHOLE. THE COMPANY WORKS ON NEW BUSINESS MODELS THAT INCREASE THE OFFERS OF PRODUCTS AND SERVICES; THE IMPROVEMENT OF OPERATIONAL EFFICIENCY, THE IMPROVEMENT OF CROSS-CUTTING MANAGEMENT PROCESSES AND THE INCREASE OF THE DIGITAL SKILLS OF EMPLOYEES.



1 BIG DATA AND MOBILITY TRENDS

The use of Big Data is a competitive advantage when analyzing new projects and optimizing existing ones. On the toll roads of Europe, Dallas and Canada, projects are already underway to analyze the impact that autonomous and connected vehicles will have on future mobility.

5 PREDICTION MODEL

A model is used to predict passenger traffic in Heathrow in the medium term (2-18 months), taking into account certain terms that are generated in the Google search engine (Google Trends).

2 NOISE TO ENERGY

Heathrow Airport and MIT have developed an innovative system to capture the noise emitted by aircraft at the airport and turn it into electricity.

6 SMART GLASSES

Smart glasses to share information and knowledge in works, helping to optimize processes and facilitate communication among all professionals involved in the project, with the ultimate goal of ensuring quality in each of the different phases of the construction process.

3 ZITY CAR

New car sharing mobility service in Madrid that has an electric vehicles with autonomy of 400 km and that allows the citizen to drive further and use the vehicle for longer. It is recharged with 100% renewable energy and meets the highest safety certification.

7 INTERNET OF RADIO LIGHT IN TUNNELS

Use of LIFI (Light Fidelity) technology to improve communications complex and difficult to access works such as a tunnel or confined areas. A communication solution based on wireless technology that makes it possible to transmit ultra-fast data through a beam of light.

4 INTELLIGENT USE OF URBAN INFORMATION

Installation of sensors in the urban waste collection containers (75% coverage of the city of Granada) that collect information on the level of filling, temperature, use and incidents. These data are processed to optimize the truck collection routes, offering a higher quality service and reducing the environmental impact.

8 ASSET MONITORING

This is a tool for monitoring the status of assets in real time, providing predictive analysis, early detection of anomalies and failures and helping to optimize maintenance.