

INNOVATION

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 is committed to incorporating the benefits of digital technologies into the different businesses to meet current needs, anticipating future ones, and establishing a culture that stimulates creativity and transformation.

At Ferrovial, innovation is organized through the Global Innovation Group, which is chaired by the General Manager for Innovation Systems and Innovation. It includes representatives from all the company's business lines and is responsible for developing the innovation strategy, coordinating global programs, sharing information on special projects and best practices, and contributing to establish the culture of innovation at the company.

The main areas for action of this group are cities, innovative construction, toll roads, airports, reuse of waste and water, and works geared to develop sustainable solutions, energy-efficient systems, contribution to the fight against climate change and new product development. This is done while optimizing processes and ensuring they include the latest digital technology.

All this activity is materialized in more than 100 projects underway, which in 2016 have represented investment of 47.8M€, 8.6% more than the previous year and 12% up on the figure for 2014. The number of projects in development has been increasing since 2009, and in recent years has remained at over 100.

Ferrovial is number 389 in the 2015 EU Industrial R&D Investment Score Scoreboard ranking. It has risen to 9th place in the "Construction and Materials", recognizing its investment efforts in R&D. By geographic zone, Ferrovial is in 4th place in Europe.

In the area of innovation, many awards have recognized the company's work. Among them, the Ecofira international environmental solutions fair granted Ferrovial Services' Environment and Cities Competence Centers recognition for its 2016 Innovation.

THE CULTURE OF INNOVATION

Ferrovial promotes a culture of innovation among its employees to foster the generation of ideas and their transformation into projects. This innovative spirit can overcome resistance to change, foster collaborative thought and adapt the company to an environment of constant change.

Ferrovial has a variety of programs such as Zuritanken, Innovative Construction Awards, DEN and CintraSpirit.

Zuritanken aims to recognize talent and innovative ideas that could be implemented to increase process productivity and efficiency, and generate new business opportunities. The third edition of this program in 2016 received over 1,400 ideas submitted and more than 1,700 participants, which is proof of its elevated level of internal acceptance. This program has earned Ferrovial recognition in the digital talent category at the second Expansión Awards for the 50 best digital initiatives.

In addition, the innovation culture is materialized through training in techniques and processes by various programs organized together with Summa, the Ferrovial Corporate University. This is an open space for the acquisition of knowledge, sharing experiences and construction of rela-

INVESTMENT IN R&D (M€)

47.8⁽¹⁾

+9% COMPARED TO 2015

IMPLEMENTED R&D PROJECTS

+100

5 PROJECTS IN PARTNERSHIP WITH MIT

IDEAS PRESENTED BY EMPLOYEES

+1,400

ZURITANKEN 2016

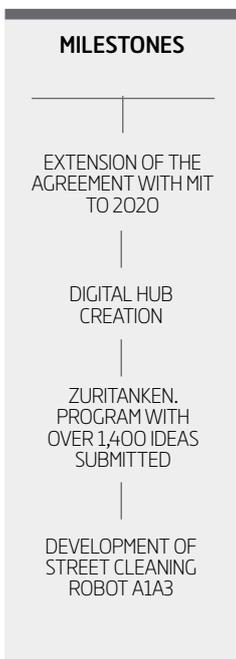
(1) This figure includes € 949,235,95 corresponding to Ferrovial's collaboration with MIT, which has been considered R&D and investment in the community.

DIGITAL HUB CREATION

A *Digital Hub* was created in 2016 as a response to the business opportunities emerging from digital transformation. The hub constitutes an environment for researching the application of emerging technologies such as the Internet of Things, artificial intelligence, drones, 3D printing, customer experience and Big Data.

The working method is based on the combination of processes already existing in the organization, supplemented with Lean Startup and User Experience principles. Over 20 projects are underway.





tions within the company. Since 2010, more than 2,000 employees have received specific training in innovation.

OPEN INNOVATION ECOSYSTEM

Ferrovial develops an open innovation model with partners that best complement the needs and capabilities of the company, such as technology and research centers, universities and engineering schools, businesses, companies, startups and entrepreneurs, Government Administrations, public innovation agencies, financing entities, etc. The aim is to find ideas and solutions to meet the challenges of the businesses so that once they are tested through pilots and/or prototypes, they can be implemented in the contracts under management.

The company views startups as the ideal space for working and developing disruptive ideas, not only due to their setup but also the speed at which they implement their projects. It thus collaborates with the most brilliant entrepreneurs, linking them with the organization to speed up the innovation process. The company also participates in different programs and forums, mentoring and providing advice to startups in events such as *South Summit*, *Startup Olé*, *MIT STEX*, *Pasion>ie*, and *IBM SmartCamp*.

A variety of projects have been developed in 2016 with startups in different fields such as robotics and artificial vision applied to waste collection and treatment, building automations systems for energy efficiency and the development of smart clothing that can monitor physiological parameters.

One notable example of these collaborations is the road cleaning robot A1A3, capable of following the worker around, with an automatic collector that operates via a button on the broom, so that the cleaner does not have to lift weights. Sensors that detect objects and slopes

20.19 STRATEGIC CR PLAN

Drive entrepreneurship and innovative solutions of the company among its employees and stakeholders

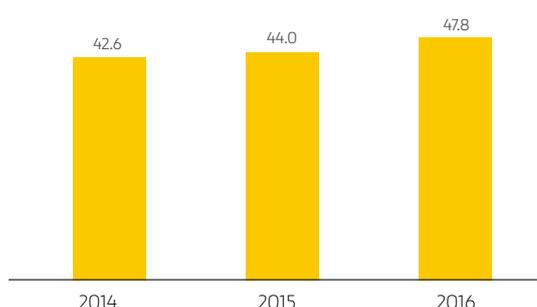
trigger an automatic brake on detecting an obstacle, ensuring that pedestrians, urban furniture or the robot itself is not damaged.

Last year, Ferrovial has continued to identify the main ecosystems of interest, establishing relations that allow the company's innovation process to speed up.

Currently, it is working with a number of innovation systems in Israel, the east coast of the United States and Finland, to identify the capacities and agents with which to establish relations that can speed up the company's innovation.

In addition, Ferrovial and the Massachusetts Institute of Technology (MIT) have extended their partnership agreement to 2020. The company participates as an associate member of the MIT Energy Initiative (MITEI) to support research projects conceived to transform the cities and infrastructures of the future. Both parties actively undertake to ensure that results are aligned with Ferrovial's strategy, knowledge transfer is streamlined, and new opportunities and future fields of research are identified. Eleven projects were carried out in the previous period (2011-2015) in the areas of construction, cities, infrastructures, water treatment, waste management and energy efficiency with satisfactory results for the business. Five new projects were launched in 2016, with investment of almost 1 M\$.

INVESTMENT IN R&D (M€)



INNOVATION PROCESS





GLADYS AIRPORTS

Humanoid robot that will interact with and entertain users at the Glasgow airport for generating a different experience for passengers, and gaining a better understanding of their interaction with a robot of such characteristics



HEFESTO ENERGY EFFICIENCY

IoT platform implementation for capturing and managing data from different sensors, devices and systems with a view to improving the energy efficiency of buildings and public lighting facilities

RAILROAD OF THE FUTURE INNOVATIVE CONSTRUCTION

Incorporation of new technological concepts for increasing railroad infrastructure capacity, reliability and security; while simultaneously optimizing investment and operating costs so that railroad infrastructures can extend their useful service life, generate less maintenance costs and have a better information flow



ROBOT WALL-B WASTE RECYCLING

The Ecoparc 4 Waste Treatment Plant in Barcelona has installed the first robot with artificial intelligence for increasing the recovery of recyclable materials from waste at treatment plants



WATER TREATMENT

URBAN WASTE WATER

Project for studying the possibility of modifying conventional urban wastewater treatment processes by incorporating Upflow Anaerobic Sludge Blanket (UASB) reactors at ambient temperature. The goal is to reduce both generated sludge quantity and energy consumption by optimizing the general layout of a Wastewater Treatment Plant (WWTP)



CINTRA TRAVEL TIMES TOLL ROADS

Project developed by Cintra and Datalab that employ Big Data for route duration studies to extract and organize route durations of previously selected routes made available to individual vehicles by GPS. This enables a refinement on the accuracy of traffic studies while identifying new business opportunities for Cintra



REVIVE CITIES

Digital platform for promoting the reuse of objects in good condition through recycling points

