



Industry Day at the ICIAM2019 in Valencia

Mathematics achieves innovation in industry and business

- The participants explained how businesses can be transformed thanks to technologies such as digital twins, machine learning and blockchain.
- Peregrina Quintela, president of the Spanish Network Mathematics-Industry (math-in) and director of the Technological Institute of Industrial Mathematics: "Mathematics has always gone hand in hand with scientific and technological advances".
- Reyes Maroto, Minister of Industry, Trade and Tourism: "A country that wants to progress needs a commitment to mathematics".
- Javier Ponce, general director of the Center for Industrial Technological Development (CDTI): "Mathematics is the core of the Industry 4.0 revolution".

Valencia, July 18th of 2019. The revolution of mathematics has reached the business world: It is directly responsible for 10% of the Spanish gross domestic product and more than one million jobs, which implies 6% of total employment in Spain, according to a recent study of the Strategic Network in Mathematics (REM). In addition, the double degree studies in Mathematics and Physics have been the most popular option in our country over the last five years.

The importance of mathematics in the industrial field has not stopped growing, and that is why it is of utmost importance to understand how this transfer of knowledge from the Maths sciences to the companies takes place. Today, the 9th International Congress of Industrial and

Applied Mathematics (ICIAM), celebrates a special day, Industry Day, with the aim that "the company itself shows the great innovative potential of mathematical tools, such as statistics, big data and the techniques of modeling, simulation and optimization"; as explained by the organizers of the congress, the most important in applied mathematics across the globe and which is being celebrated over the coming days in Valencia.

Mathematical developments for the progress of society

"Mathematics has always gone hand in hand with scientific and technological advances." When analyzing which decisions have allowed for these advances, we see that mathematical tools are behind almost all: from optimizing a device and shortening developing times to reducing the energy costs and in general; the generation of a cleaner processes", explains Peregrina Quintela, president of the Spanish Network Mathematics-Industry (math-in) and director of the Technological Institute of Industrial Mathematics.

For that reason, Maria J. Esteban, president of the International Council of Industrial and Applied Mathematics (ICIAM), insisted that "the collaboration between companies and mathematics adds value to the companies". In addition, "if you do not invest in mathematics, you will be left behind". Spanish mathematicians have understood this very well and although starting later than other countries, they are taking great steps towards the future.

In the same line, Reyes Maroto, Minister of Industry, Trade and Tourism, who has supported Industry Day by sending a welcome video, stressed that "a country that wants to progress needs a commitment to science, technology and education, and, in particular, to mathematics". Within the fourth industrial revolution in which we find ourselves immersed, "mathematics is the basis of the technologies which are emerging, such as 3D printing, the internet of things and big data," Maroto added. Virtual and augmented reality, digital twins, artificial intelligence and machine learning, blockchain, automation and robotics, are other technological developments that are increasingly used by companies and have their foundation in mathematics.

Companies want mathematical tools and mathematicians

For this reason, companies have perceived that "mathematicians are interesting and enriching profiles within multidisciplinary groups," says Quintela. Mathematicians' career opportunities have dramatically expanded in recent years to various sectors, such as banking, telecommunications, energy and aerospace amongst others. Javier Ponce, director of the Center for Industrial Technological Development, has also pointed out new technological areas which have incorporated mathematics in recent years, such as the agri-food industry, and has placed mathematics "as the central core of the Industry 4.0 revolution".

They have also explained how international participants use mathematics, such as Siemens, which has delved into the applications of digital twins - mathematical-computational models of mechanisms and devices - which, for example, can "democratize" product design, and help the milling robots fine-tune their tasks. Other participating companies have been Fujitsu; Bosch; the National Bank of Canada; EDF; Gore; Microflown Technologies; EDF; Nors and NEC. There are also research centers which collaborate very closely with the industry, such as The

National Laboratory of Los Alamos (USA) and the NIST (National Institute of Standards and Technology), also from the United States.

The celebration of the **International Congress of Industrial and Applied Mathematics 2019** is the biggest conference on this topic in the world, it takes place every four years and this is the first time the event is being held in Spain. Over the coming days, more than 4,000 mathematicians from all over the world are discussing mathematics of the future. This celebration is possible thanks to the sponsorship of many institutions, among them **The Ministry of Science, Innovation and Universities**; the **Foundation of the Valencian Community for the Promotion of Higher Studies (FFES)**; the **Diputació de València**; the **City Council of Valencia**; the **University of Valencia**; and **Banco Santander**.

Further information:

<https://iciam2019.org/>

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