

Report

Workshop: Mathematics for Smart Security: Challenges and Opportunities

Date: 19 October 2018

Venue: Instituto Superior de Engenharia de Lisboa, Portugal



The Portuguese Network of Mathematics for Industry and Innovation - PT-MATHS-IN - workshop was held at ISEL - Lisbon on October 19th, under the subject "Mathematics for Smart Security: Challenges and Opportunities". With excel guest speakers, from Academia and Industry, the meeting imprinted in the participants a clear and deep insight into the role of Mathematics in the Societal Security challenges arising nowadays and expected in the near future.

74 participants, representing 37 distinct organizations, including a considerable number of students and people from industry attended the meeting. An intensive but stimulating program included a panel of distinguish plenary speakers:

Pietro Gennari – Chief Statistician, Food and Agriculture Organization of the United Nations (FAO)

The role of mathematics/statistical modelling in monitoring food security.

Rafael Tesoro Carretero – European Commission
Maths for digital privacy

David Rios – AXA-ICMAT Chair, ICMAT, CSIC and Royal Academy of Sciences
Aviation Safety Risk Management

Paul Hjorth – DTU – Technical University of Denmark and ECMI Executive
Safety in numbers: Smart prediction of crowd dynamics



Wil Schilders - President of EU-MATHS-IN

Smart Security – Challenges and Opportunities from EU-MATHS-IN Point of View

The Chief Statistician of Food and Agriculture Organization of the United Nations (FAO), Dr. Pietro Gennari, highlighted the role of mathematical/statistical modelling in monitoring food security. Food security is a complex, multidimensional concept which has to do with food availability, food accessibility, food use and the stability of all these conditions. Many indicators have been proposed to measure these conditions. However, often these indicators are not, or cannot be, directly measured. For this reason, modelling plays a very important role in food security monitoring. He presented the main modelling solutions proposed to address a number of measurement problems of the key indicators of Food availability and Food access.

Regarding security and privacy in cyberspace, as a relevant domain quite intertwined with cyber security, the member of the European Commission, Rafael Carretero, discussed some examples on how mathematics provides tools and methods which are practical cornerstones for digital privacy.

Aviation Safety Risk Management was the theme introduced by David Rios, AXA-ICMAT Chair, ICMAT, CSIC and Royal Academy of Sciences. Despite being a key feature for the global development of aviation, safety management is pervaded by simplistic methods based on risk matrices. An alternative framework to support risk management decisions in aviation safety at state level, taking advantage of big data infrastructures available was presented.

Predicting and managing pedestrian crowds, both for safety and for efficiency of transport, presents a challenge in modern cities. Poul Hjorth, ECMI Executive Director and Professor at DTU - Technical University of Denmark, discussed a new approach, involving a mix of experiments, heuristics, computation, and mathematics to the modelling of such complex systems.

The President of EU-MATHS-IN, Wil Schilders, presented the final talk of the workshop under a very interesting subject about Smart Security and its challenges. He stated that our defense relies on advanced engineering and technology underpinned by sophisticated mathematical modelling, whilst our national security as well as the security of our financial system has long depended on sophisticated mathematics and remains a major employer of very high-caliber mathematicians. Many other challenges in industry and society are also becoming increasingly more complex, and the only way to master this complexity is the use of sound mathematical techniques. Therefore, strong incentives should be put in place for cross-disciplinary work between the mathematical sciences and other disciplines.

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This meeting confirmed the notion that mathematicians have a very important role to play under the "Smart Security" label, which includes various aspects of security such as the Emergency Evacuation, Criminal Behavior, Cyber-security, Food-security, Digital Privacy, Fraud Prevention or Data Protection, among many others. It was also clear that the methodologies must be effective but also very efficient and that being a transversal subject to several areas in mathematics, it will be necessary to create expertise diversified mathematical teams. In this context PT-MATHS-IN, as well as the other National Networks members of EU-MATHS-IN will surely have an important role to play at the service of mathematics, mathematicians, scientific employment and society.

The organizing committee

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