Complex Systems: Understanding Complexity to Address Global Challenges

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Complex Systems Society promotes an interdisciplinary approach to addressing societal challenges: new members include 3 FBK researchers.

Complex systems are deeply linked to many of the most relevant challenges facing our society today. Transportation networks, energy infrastructure, climate change, global economic and social dynamics are systems that have a collective behavior, which cannot be fully understood by analyzing only their individual parts. In fact, **complex systems** are sets of interconnected elements that, as they interact, generate novel behaviors and properties. The whole is "more than the sum of the parts" since the interactions between the components create new dynamics, which is why the study of complex systems should aim for innovative approaches and cannot be done through traditional approaches.

This is addressed by the **Complex Systems Society ([CSS](#))**, an international organization established to promote the development of complex systems science in all its forms, both theoretical and applied, within the global scientific community and is governed by a Council (CSS Council) and an Executive Committee (CSS Executive Committee).

This year, Center for Augmented Intelligence's Mobs Unit researcher **Massimiliano Luca was appointed to the board**, together with **Riccardo Gallotti** and **Kaveh Kadkhoda** – head and researcher of the Complex Human Behaviour Lab **CHuB**unit respectively. Former council members **Lucila Alvarez-Zuzek** and **Thomas Louf**, the latter being the outgoing president of the society's "young" section, i.e. the Young Researchers of the Complex Systems Society (**[yrCSS](#)**) are affiliated with the same unit at the Center for Digital Society.

"In the past, there was a tendency to treat problems in isolation, without considering the many connections that exist between different parts. Today, the complex systems approach allows us to overcome this fragmented view, using advanced analysis tools and algorithms from different domains to address problems from a global perspective," **Riccardo Gallotti** explained. *"Within the Complex Systems Society we*

bring together researchers from very different fields, from experts in artificial intelligence and psychology to sociology and computational science. The combination of varied expertise and different points of view is what makes the study of complex systems possible: it is this richness of approaches that is a significant added value of the Society," **Massimiliano Luca** added.

One of CSS's main goals is to apply complex systems science to crucial and widely diverse social problems, such as reducing inequality in cities, urban mobility, human behavior, misinformation, the use of social media, and even the analysis of epidemics. The development and funding of research in this field generates a direct impact on people's daily lives in many areas such as health and medicine, environment and transportation, but also information and outreach. Being interdisciplinary par excellence, complex systems analysis narrows the gap between pure and applied science and provides the tools to address problems of increasing complexity in our modern society.

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