

Interdisciplinary seeding in complex systems

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The multi-disciplinary approach to research is gaining momentum nowadays. One of the Europe's objectives should be the creation of new types of multi-skilled researchers able to work and understand with a new approach amongst different disciplines. This calls for new skills that are not available nowadays. More and more current and future activities devoted to achieve research goals will bring together specialists in different scientific disciplines to find creative solutions to challenges.

Design and control of the modern communication networks (CN) are important research topics in computer sciences. In their design and organization, different types of users, media, processes, channels, and formats are present; moreover different types of agents receive information and transform it into actions in an isolated or cooperative way.

A communication network is often an open system in permanent relation with its environment, each one modifying the other and being modified in return. The described complexity tends to grow both in designed and "natural" way: CNs often do not have a fixed dimension, i.e. CNs are evolvable systems. The risks of evolutionary processes may be for example saturation, imbalance, and at least partially ungovernable processes. Automation of these system development processes requires self-organization properties. Consequently, appealing or necessary features of CNs are efficiency, robustness and adaptation.

In biology these properties of self-organization, evolution, robustness, etc. account for the functioning and the maintaining of systems at the molecule, cell, and tissue, etc. level. Therefore, learning how the biological entities solve the current problems they are facing can help in developing theoretical and applied solutions in the field of information technologies (IT) research on networks.

Conversely, we expect to derive from this inter-disciplinary interaction new insights that could help modeling mechanisms that govern biological system behaviors as a key challenge to understand the topology and dynamics of the complex networks that underlie their functioning.

Hence it is mandatory and highly strategic for making Europe competitive in these emerging areas to form scientists that can interface both computer scientists and biologist. This requires also a special training in facilitating knowledge transfer. CREATE-NET is proposing a Research Training Network with the objective to train researchers in aspects of Biology and Computer Science in order to create new types of multi-skilled researchers able to work and understand with a new approach amongst different disciplines.