7. Systems and the Integrity of Science (Sisteme şi integritatea ştiinţei)

English version

Over the past decade, we have learned that, in many disciplines, the concept of systems is central toward an integrated understanding of function, processes and structures. Systems are often visualized as component blocks with connections drawn between them. Yet, because the interactions between the different parts, the whole (system) becomes more than the sum of the parts (this is the so-called synergic effect), whether these parts are chemical molecules, cellular organs, individuals, populations, or ecosystems. A system has emergent properties from the interactions among the parts. The laws of thermodynamics apply to nearly all systems. Although the temporal and spatial scales might differ dramatically, the concept of systems can help us to better understand the various challenges that many systems on our planet encounter, and the necessary adaptation or mitigation.

These include global changes, extreme events, sustainable development and production, as well as applications of modern biology, bioengineering and innovative molecular biology toward an improvement of the quality of life on Earth. In Ecology, for example, the ecosystem is the basic functional unit, since it includes both organisms (biotic communities) and the abiotic environment, each influencing the properties of the other and both necessary for maintenance of life as we know it.

Another example is the field of Systems Biology that seeks to bring together understanding of structure in terms of gene and biochemical networks. Within the realms of size there are parts that interact to form other (sub) systems.

The topography of the continent Europe is at the interface of processes taking place deep in the Earth, at the Earth surface and in the atmosphere. Over the last 20 millions of years, plate tectonics and other geodynamic processes in the Earth's interior have caused many changes in the surface topography of Europe. Topography affects society not only via landscape changes but also through its impact on geo-hazards and the environment. When sea-, lake-, or ground water levels rise, or land subsides, the risk of flooding increases, directly affecting the sustainability of local ecosystems and human habitats. On the other hand, declining water levels and uplifting land may lead to higher risk of erosion and desertification.

Now it is a great opportunity to strength the Europe's forces directed to integrated solid Earth sciences.

In September 2007 took place the First World Conference on Research Integrity. The event was initiated and organized by the European Science Foundation (ESF) and US Office for Research Integrity (ORI) together with the Portuguese EU Presidency. The conference itself marks a milestone for the science community as it linked, for the first time, all the concerned parties in a global effort to tackle fraud, falsification and plagiarism in science and share their growing concerns over misconduct in science.

In Europe alone, the public funding organizations and the public performing research organizations are responsible for 25 billions Euros in public money. "To have public money of that dimension is built on trust from politicians and general public. So, even if may not concern large numbers, even single case of misconduct is a serious threat

to the foundation of our research founding" – said Pär Omling, Director General of the Swedish Research Council and President of the European Heads of Research Councils (EUROHORCs). The European Comission plans initiatives following the publication of the report of its Expert Group on Research Integrity, including research integrity in nanosciences.