Systems Science and Architecture

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Classical Science, with very high specilization has demonstrated its inability to handle problems of big complexity as biological, communications, environmental, and other systems. The high level of interaction of system variables makes too difficult to manage the interrelated functionalities, so that the cause and effect seems to be a kind of circular logic. On the other hand, to reduce complexities to their components, intending a knowledge of the wholeness through the knowledge of the parts is no longer valid: the wholes are more than the sum of the parts!

The basic concepts of the System Theory and Systems Science (systems complexity, systems dynamics, feedback connections, ..) will be updated, in particular for theirs application to the biology and communication worlds. Also the Systems architecture aspects, physical and functional, subsystems concept, communication levels, planes and scenarios, will be treated in a context of analogy and convergence.
The various system performances present some specific aspects that will be revised, mainly related to the systems development, evolution, selforganization, as well as systems analysis and requirements for new tools.

There is a similarity, from the functional point of view, between the biological architectures and the communications architectures, mainly from the holistic view and the system concept, both approaches have already allowed big advances in Telecommunications, and they are allowing the quick development of the Systems Biology.

There are various communication levels, within a technological telecommunication system current approach, as physical, link, network and applications levels, but also within the biological system, as intracellular, intercellular, intracortical, between organs, and, in general, among living beings, all of them can be included within the *Biocommunication System concept*, where the systems science and the network architectures play a fundamental role.

A big variety of sensor elements, embedded in all type of environments, specially included the biological media, with computing facilities, high person to person and person to technology interactivity, are creating a new line of convergence between the Biology and Communications systems. In addition, the continuous evolution of Internet System architectures is providing new facilities and applications to the users, creating the future Web with new semantic intelligence and fully oriented to the Internet of Things, where the biology elements and system architectures will be integrated.

The Nanotechnology advances will allow to create intelligent devices at the nanoscale level, for the development of new integrated subsystems and systems, in full interaction with the biological architectures, and connected to external communication networks. It is a multidisciplinary line, as it is the Systems Science, integrating many different sciences,

systems and technologies, creating new components, modules, subsystems and systems, for a new generation of biological Microsystems and Nanosystems.

The first part of the Symposium is dedicated to the System Architectures area, as a common frame for the biological and communications technologies, including Systems and Network Sciences, Functionality Emergence, Systems Biology and Information Architectures.