Abstract: "The need for achieving more flexibility, higher capacity, programmability and embedded cognition at reasonable extra cost in future optical communication networks, is one of the immediate consequences of the overwhelming developments of real-time person-to-person and machine-to-machine interactions and online services. These features are expected to be introduced in the coming years with the emergence of: I)Tactile Internet as a set-horizon to be met in the 5th generation of mobile networks, II)Internet of Things based applications to build smart cities and brand-new style of living, and III) Giant data farms to store and process the ever-increasing generated data. Since this progress impacts different tiers of the Internet backbone—and by now optical-based solutions have penetrated all of them— new optical networking solutions must be introduced in every tier/network segment to keep with the pace of these new developments. The talk will cover recent EU-funded research activities that assisted in the realization of new solutions that can demonstrated significant progress beyond the state of the art, like for example: a) the concept of "Elastic Optical Networking (EON)", b) the development of "bandwidth-variable super-channel transceivers", c) the realization of "Flex-grid Reconfigurable Optical Add/Drop multiplexers (ROADMs)", and d) the implementation of novel concepts that support the smooth migration towards future "Space Division Multiplexed (SDM)" based optical networks.".