

# BARBARA MARTINI

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## PROFILE OVERVIEW

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- Barbara Martini is Associate Professor at Universitas Mercatorum in Software Engineering (ING-INF/05), Italy since January 2022 and Affiliate Researcher with Scuola Superiore Sant'Anna, Italy, since 2003. After her Master Degree at University of Florence in Electronic Engineer, she worked as software designer, developer and product integrator for two large telco companies, Italtel and Marconi Communications (currently, Ericsson), from 1999 to 2003. She was the Italian University Consortium for Telecommunication (CNIT) from 2003 to 2022 with leading roles from 2009, coordinating research activities in the field of **network virtualization and orchestration in 5G, network control/management architectures and programmability, service platforms for networking, and security solutions for multi-domain networks and NFV deployments**. The research is carried out in several application scenarios, from Logistics, Genomics to E-health, to name a few. I co-authored over **100 papers** in top-notch scientific journals and international conference proceedings.
  - Her experience spent in both academic institutions and large industrial companies gave me the opportunity to acquire a deep technical knowledge and at the same time a broad view over the subject and to foster an effective synergies between the major ICT companies and the most representative Research Centers in telecommunications that was essential to pursue innovative research results as well as to maximize the impact of my research in terms of technology developments and applications.
  - She has been involved in several national/EU research projects, the recent ones 5GPPP 5GEx, 5GTRANSFORMER, 5GROWTH in 5G/SDN/NFV, ICONET in Physical Internet for Logistics, and in several FIRE projects (OFELIA, Fed4FIRE+, TRIANGLE, 5GINFIRE) with leading roles. Overall, I have been involved in **10 commissioned jobs** funded by ICT industries, the two recent ones as **scientific person in charge** of coordinating research activities, and in **14 research projects** funded by both the European Union and National Institutions, the most recent ones as **Principal Investigator**. I am also active in standardization activities in IEEE, ETSI and most recently in IETF/IRTF.
  - She is an Adjunct Professor with the **Sant'Anna School of Advanced Studies** and formerly with **University of Pisa**, Pisa, Italy, teaching courses to PhD and Graduate programs. I am also very active in the scientific community as Organizing Committee member and Technical Program Committee member of several IEEE/OSA conferences, Editor for IEEE/OSA/MDPI scientific journals, and Reviewer for IEEE/Elsevier/OSA journals in my research area. Finally, I has been appointed by the European Union and European Institute of Technology as evaluator of competitive proposals submitted to ICT calls and as reviewer of running research projects under the European Union FP7 and H2020 programs.
  - Research interests and fields:
    - » Service-oriented networking
    - » Network virtualization and abstraction
    - » Security in next-generation networks
    - » Service platforms and network management for next-generation networks
    - » Intent-based networking
    - » Software-Defined Networks (SDN) and Network Function Virtualization (NFV)
    - » Network slicing in SDN/NFV infrastructures and virtualized 5G networks
    - » Edge/Fog and Cloud Computing and Networking
    - » Orchestration in SDN data center networks
    - » SDN/NFV orchestration for E-health, Genomics and Logistics applications
    - » Modeling, simulation and experimentations for performance evaluation of communication networks and services
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## WORKING EXPERIENCES

2022-current	
<b>Position</b>	<b>Associate Professor</b>
<b>Univerisity</b>	Universitas Mercatorum
<b>Sector</b>	<b>Academy</b>
<b>Overview</b>	<p>Associate Professor in Software Engineering (ING-INF/05)</p> <p>Research interests: Network Softwarization, 5G Resource and Service Orchestration and Management, Slicing for vertical applications (industry 4.0, automotive), Network slicing Security, Satellite and 5G integration, IRTF/IEEE standards.</p> <p>Coordinator of PhD Program “Big Data and Artificial Intelligence” funded by a plethora of industries and the the Italian Minister of University.</p> <p>Course holder of Software Engineering (L8) and Security and Disaster Recovery (LM31).</p>
2018-2022	
<b>Position</b>	<b>Head of Research</b>
<b>Company</b>	Consorzio Nazionale Inter-universitario per le Telecomunicazioni (CNIT) ( <a href="http://www.cnit.it">www.cnit.it</a> )
<b>Sector</b>	<b>Telecommunications/Computer Engineering – Research</b>
<b>Overview</b>	<p>As head of the “<i>Network Softwarization</i>” group, I <b>(i)</b> define the research strategy of the group in the area of <b>5G/6G</b> and novel service infrastructures leveraging network virtualization and softwarization - <b>(ii)</b> ensure the sustainability of the research group by managing <b>fundraising</b> activities (IT-EU) targeting both public and private funding instruments - <b>(iii)</b> plan the research and technology transfer activities of the research group in collaboration with major ICT companies - <b>(iv)</b> coordinate joint research activities and software developments with universities and corporate research centers worldwide - <b>(v)</b> contribute to standardization activities IETF/IRTF su multi-level intent-based network managemet (NMRG group) e ETSI su NFV management. - <b>(vi)</b> increase the visibility of the research outcome by submitting and publishing high-quality scientific papers to top-notch conferences and journals, by participating in the organisation and in editorial boards of IEEE/IFIP/OSA conference and IEEE/Elsevier/OSA journal, by having oral presentations of research achievements and outcomes</p> <p>As for technology transfer, I am promoting advanced management software tools for softwarized 5G networks and corporates opearating platforms for cloud/edge computing services. Many of the projects have been carried out in collaboration with leading ICT manufacturing companies and service providers in Europe, and hence I have been able to gain familiarity with the industrial world as well.</p> <p>As adjunct professor and course holder appointed by the Sant'Anna School of Advanced Studies and University of Pisa, I carry out teaching classes of "Network Management and Services". I am also very active in the scientific community, supporting dissemination activities with conference, journal special issues, workshop and conference organization, and contributing to expert panel discussions in international conferences.</p>
<b>Target Research areas and strategic /core skills</b>	<p><b>1)</b> Flexible and programmable networks through the paradigms of Software Defined Networking (SDN) and Network Functions Virtualization (NFV) – <b>2)</b> Dynamic allocation of network and cloud/edge resources in 5G infrastructures – <b>3)</b> Network service composition and orchestration for industries (e.g., Logistics, E-health, Genomics) – <b>4)</b> Management and orchestration in SDN data center networks – <b>5)</b> Industrial IoT and cloud-based services for advanced ICT in Logistics and Physical Internet paradigm – <b>6)</b> Security in multi-domain networks and NFV - <b>7)</b> Prototyping of control systems for self-configuration, adaptation and automation of the network infrastructure for network operators to provide reliable and on-demand connectivity to the 5G applications</p>
<b>Fundraising</b>	I obtained <b>4 research grants</b> as job orders or in response to open calls launched by the European Community (330k EUR) playing the role of principal investigator and coordinating project management and technical leading activities.
<b>Main achievements</b>	<p><b>1) Best Demo Award</b> at 3<sup>rd</sup> Fed4Fire Engineering Conference (FEC3) for demonstration of an orchestrator prototype for dynamic network slicing and service composition in 5G scenarios – <b>2) Best Demo Award</b> at the IEEE Conference of Network Function Virtualization and Software-Defined Networking 2018 for demonstration of an integrated management systems for both SDN networks and clouds aiming at dynamic service chaining for 5G platforms. – <b>3)</b> demonstration "A Multi-Level Approach to Intent-based Networking” admitted with prototype to IETF Network Management Research Group (NMRG) at the NMRG 58 @ IETF Hackathon 108</p>

<b>2009-2018</b>	
<b>Position</b>	<b><u>Lead Researcher</u></b>
<b>Company</b>	Consorzio Nazionale Inter-universitario per le Telecomunicazioni (CNIT) ( <a href="http://www.cnit.it">www.cnit.it</a> )
<b>Sector</b>	<b>Telecommunications/Computer Engineering – Research</b>
<b>Overview</b>	My core activity is to <b>coordinate research</b> and development of solutions for Softwarized Infrastructure and Next Generation network services for 5G and to <b>run projects</b> with Companies or Institutions (either public or private) in order to improve the performance of networks and 5G application platforms. My background and the crucial encounter between Research and Application has led me to manage <b>industrial contracts</b> , Italian and European Research Projects and personally follow <b>fundraising</b> activities (IT-EU), which I do all along the line from writing the proposal to selecting the partnership. In order to give more resonance to my profile, I round out these technical-managerial activities with University teaching, writing scientific articles, reviewing works, and attending international conferences and industrial meet-up that are necessary to evaluate and share the impact that Technological Innovation produces in the scientific community and in the market.
<b>Research Areas</b>	<b>1)</b> Operating Systems for software-based network infrastructures (i.e., softwarized networks) developed in SDN/NFV technology for 5G Service Scenarios (e.g., Genomics, Cloud Robotics, Smart Cities) - <b>2)</b> Orchestration of connectivity services in IP/(G)MPLS transport networks and/or local datacenter networks in distributed clouds - <b>3)</b> Advanced security solutions for access control and confidential data protection in transport networks managed by different operators - <b>4)</b> Advanced solutions for electric vehicles recharge in high mobility and Smart Cities scenarios.
<b>Scientific research and international experience</b>	<b>1)</b> Developed and/or coordinated research activities in 6 industrial contracts funded by ICT companies (TIM, NATO, Ericsson), in technology transfer initiatives and 8 research projects funded by the Italian Region of Tuscany and the European Community - <b>2)</b> Participated in IEEE and OSA international conferences for the developed research areas, including speaking on invitation - <b>3)</b> Involvement and active contribution to technical committees in international IEEE, OSA and ITU conferences <b>4)</b> Active participation in international standardization groups (IETF, IEEE) - <b>5)</b> Review of research works for peer-reviewed conferences and International journals for IEEE, OSA, ITU and review of research projects on behalf of the European Community - <b>6)</b> Organized scientific dissemination events (workshops) in the context of international conferences and in synergy with European project initiatives ( <a href="http://o4sdi.unibo.it/o4sdi3">http://o4sdi.unibo.it/o4sdi3</a> )
<b>Strategic development and organization</b>	<b>1)</b> Achieved objectives and implemented strategies provided by the Steering and Evaluation Committees in order to raise qualitative research standards and stimulate the achievement of funding sources in Europe and Italy. <b>2)</b> Presented research results to international committees to discuss the results produced in relation to the set objectives (European Commission auditing commissions, CNIT board or Sant'Anna School board, University system evaluation bodies) - <b>3)</b> Technical and administrative reporting in European projects: finalization of agreements; periodic reports on the carried out activities, achieved objectives and publications; drafting of deliverables on project output, data management for expenses (months/person) and spending resources (travel, equipment) and reporting critical issues encountered during the reference period and expected in the following quarter <b>4)</b> Coordinated groups of junior researchers, PhD students and trainees consistently composed of 3-4 people with planning research activities for a period of a semester/year and up to three years in the field of PhDs.
<b>Fundraising</b>	<b>1)</b> Contributed to the drafting of over 20 research proposals also with formation of partnerships in response to invitations to tender by the Region of Tuscany and Casse di Risparmio banks, the Ministry of Research and Economic Development, the European Community and private ICT companies (TIM) - <b>2)</b> Contributed to 14 research activities funded by individuals and Institutions with coordination of activities in the 4 lines of research being developed. - <b>3)</b> Obtained 4 research grants in response to open calls launched by the European Community with negotiation activities for the allocation of the budget among the partners (budget: € 250k) - <b>4)</b> Obtained a 20 kEUR research contract financed by TIM and funds for 2 Ph.D.s in the area “Softwarized networks for 5G applications and security” financed by TIM.
<b>Teaching</b>	<b>1)</b> Taught in courses for “Laurea Magistrale” (Master's Degree), PhD degrees and International Master's degrees at Sant'Anna School of Advanced Studies with frontal lessons and exercises in classroom workshops consisting of 15-20 mostly foreign students (Pakistan, Germany, Sri Lanka, India) - <b>2)</b> Member of the Degree Committee for Graduation, PhD and Master's Degree at the Sant'Anna School of Advanced Studies, University of Pisa, Polytechnic University of Turin, University of Florence - <b>3)</b> Supervision of students in PhDs, thesis works, and internships
<b>Main achievements</b>	<b>1)</b> Developed prototypes for the self-configuration, adaptation and automation of the softwarized network infrastructure across and within cloud computing datacenters. These systems are designed for network operators and service providers to optimize resource usage (e.g., energy saving) and provide reliable connectivity to the dynamic 5G services. A prototype of orchestrator for datacenter was demonstrated at international conferences - <b>2)</b> Developed a network simulator for distributed clouds with generalized characterization of network (connectivity) and computing

	(processing) resources. This simulator is designed for network and/or cloud operators to dimension the infrastructure control and management systems according to specific targets (e.g., optimization of energy consumption) - <b>3)</b> Contributed to a new version of the IEEE NGSON 1903 standard with also SDN and NFV.
<b>2003- 2009</b>	
<b>Role</b>	<b>Senior Researcher</b>
<b>Company</b>	Consorzio Nazionale Inter-universitario per le Telecomunicazioni (CNIT) ( <a href="http://www.cnit.it">www.cnit.it</a> )
<b>Sector</b>	<b>Telecommunications/Computer Engineering – Research</b>
<b>Overview</b>	I have mainly been active in the ambit of advanced control of optical transport networks by developing service-oriented solutions and prototypes that are more efficient for novel high-demanding application scenarios and, in particular, for creating on-demand network services for applications (e.g., multimedia, scientific grids). I have worked closely with the industrial world in Italian, European and private research projects, and I have been able to work concretely on really innovative projects for next-generation optical networks. In my activity as a teacher and disseminator and through taking part in international conferences.
<b>Technical skills</b>	<b>1)</b> Network protocols for the generalized control of optical and IP/MPLS transport networks - <b>2)</b> High-performance reconfigurable telecommunication network management systems - <b>3)</b> Service platforms for application-oriented telecommunication networks
<b>Scientific research and international experience</b>	<b>1)</b> Development of research activities in the field of 5 industrial contracts funded by ICT companies (Ericsson, Marconi Communications) and 7 research projects funded by the Ministry of Research and the European Community - <b>2)</b> Participation in IEEE and OSA International conferences of reference for the developed research areas - <b>3)</b> Review of peer-review research work by IEEE, OSA, ITU
<b>Reporting</b>	Presentation of research results at a Steering Commette of the Sant'Anna School of Advanced Studies and CNIT board composed of international experts in order to evaluate the scientific objectives and the results produced
<b>Teaching</b>	<b>1)</b> Taught in Master Degree's courses at Scuola superiore di Sant'Anna with frontal lessons in classrooms consisting of 15-20 mostly foreign students (Tunisia, Cina) – <b>2)</b> Supervision of students in Phd and thesis work
<b>Main achievements</b>	<b>1)</b> Development of a prototype platform for automatic configuration of connectivity services in optical and IP/MPLS networks and on-demand delivery of application connectivity services - <b>2)</b> Development of a prototype for a dynamic protocol control configuration platform for Optical Transport Networks and IP/MPLS - <b>3)</b> Contributed to 10 research activities funded by private individuals and institutions with the 3 developed research lines).
<b>2001- 2003</b>	
<b>Role</b>	<b>Software Architect and Product Integrator</b>
<b>Company</b>	<b>Marconi Communications</b> ( <a href="http://www.marconi.com/">http://www.marconi.com/</a> )
<b>Department</b>	Optical Product Development Laboratory – Pisa
<b>Sector</b>	<b>TLC – Research and Development</b>
<b>Overview</b>	Selected as a member of a pool of engineers to start up a Laboratory of Excellence designed to collaborate with innovation-oriented Research Institutes in high-capacity optical networks (Sant'Anna School of Advanced Studies, CNIT, Consorzio Pisa Ricerche), I have been involved in the development of new product features and of testing tools and contributed to the installation of an optical network testbed infrastructure for the development and validation of network equipment before their deployment and operation in the production networks.
<b>Technical skills</b>	<b>1)</b> Designed and developed software for the remote management of the SmartPhotonix family of photonic network equipment used in the high-capacity transport networks (DWDMs) of the main Telco operators (TIM, British Telecom) - <b>2)</b> Study and application of ITU-T and USBellCore standards for integrated transport management - <b>3)</b> Specification of requirements and definition of an information model for the remote monitoring of traffic data in accordance with ITU-T standards <b>4)</b> Installation, configuration and maintenance of an optical network testbed with composed of SmartPhotonix equipment: set-up of a cluster of photonic devices, configuration of equipment traffic cards, consistent setting of traffic parameters (e.g., wavelengths) - <b>5)</b> Testing of the photonic equipment and traffic cards (analysis of the criticality and correlation of alarms).
<b>Main results</b>	<b>1)</b> Designed and developed (according to the ITU-T G.709 standards) a software tool for the generation and the configuration of traffic stream for photonic networks in support of software integration and device testing activities. -

	2) Designed and developed a software agent for remote monitoring of traffic performance according to the ITU-T M.3100 standards for Line Terminal and Multiplexer DWDM devices - 3) Design and development of a software agent for remote management of DWDM photonic network equipment according to the US BellCore standard.
<b>2000- 2001</b>	
<b>Role</b>	<b>Software Design and Development Engineer</b>
<b>Company</b>	<b>Marconi Communications</b> ( <a href="http://www.marconi.com/">http://www.marconi.com/</a> )
<b>Department</b>	Photonics Software Development Division– <b>Genova</b>
<b>Sector</b>	<b>TLC – Research and Development</b>
<b>Overview</b>	I have been mainly involved in the design and development of software for telecommunication equipment used in the high-capacity transport networks of main telecom operators (IIM, British Telecom). In this experience I mainly managed the high complexity of telecommunication systems, software modules, and standards that support countless equipment features, including remote management of the same systems.
<b>Technical skills/ acquired knowledge</b>	1) High-capacity transport networks and operation of photonic equipment ("SmartPhotonix" family) - 2) Multiplexing traffic data structures in the electronic domain (SDH) and the photonic domain (DWDM) used to aggregate the data transmitted in the high-capacity transport networks - 3) Set-up and operation of photonic equipment: configuration of DWDM / SDH traffic cards, transmission and monitoring of traffic, alarm management 4) Design and development of software modules for remote performance management of photonic equipment and networks according to the ITU-T and USBellCore standard (layered network model, functional description of resources and interconnection capabilities).
<b>Main results</b>	1) Designed and developed software for TCP/IP protocol suite integration into photonic equipment designed to support interfaces for remote management in accordance with the US BellCore standards - 2) Designed and developed a performance monitoring system of a Line Terminal used at the entrance of a DWDM photonic network to route client SDH traffic (ITU-T standard)
<b>1999- 2000</b>	
<b>Role</b>	<b>Firmware Engineer</b>
<b>Company</b>	<b>Italtel</b> ( <a href="http://www.italtel.com/">http://www.italtel.com/</a> )
<b>Department</b>	Fixed Networking – <b>Milano</b>
<b>Sector</b>	<b>TLC – Research and Development</b>
<b>Technical skills/ Acquired Knowledge</b>	1) Telephone networks and structure of UT family equipment used in telephone switching networks (telephone switching principles, network architectures and protocols, Intelligent Network principles, structure of a telephone exchange) - 2) Embedded system and software design for Ethernet cards (programming of registers, interfacing between peripheral devices and processors, timing, real-time operating systems for embedded systems) - 3) Designing and developing of firmware for an Ethernet switch used in telephone switching nodes from the "UT" Family
<b>Main results</b>	1) Firmware design and development of switching and interfacing features of Ethernet switch cards (CPUs, NICs, I/Os) via PCI bus - 2) Firmware design and firmware development for the integration of the TCI/IP protocol suite in an Ethernet switch to support network applications (monitoring, card configurations) - 3) Acquired familiarity with the high complexity of a software project for a newly developed card and field deployed telecommunication systems - 4) Acquired familiarity with the multitude of functions and business processes in Italtel.

## EDUCATION

- a.y. **Degree in Electronic Engineering** at the University of Florence (final mark: 107/110)
- 1998-1999** Thesis: "TMS320C6x digital processing at 250MHz: application of the 'software pipelining' technique". The thesis work has been developed under the Texas Instruments DSP "Elite" Program and elaborated firmware code optimizations for ultra-fast FFT algorithms running in Digital Signal Processors (DSPs) for both biomedical and radar applications. Results produced in the thesis work has been published in a conference paper.

## SCIENTIFIC PUBLICATIONS

I have published **110+ "peer-reviewed" scientific articles** on journals, book chapters, and international conference papers. Publications cover all the research areas I have been investigating. I have also written numerous technical and deliverable reports as outputs of the activities carried out under the funded projects, not listed in the list below. For more details about citations and other indicators, refer to my Google Scholar (<https://scholar.google.it/citations?user=84hv6OMAAA&hl=it&oi=ao>). **For the complete list of publications see Annex A.**



## CERTIFICATION AND FELLOWSHIP

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- 2021 **National habilitation as Full Professor** – Academic Recruitment Field and Discipline: **Informatics** (INF/01) – Competition Sector: **Informatics** (01/B1)
- 2021 **National habilitation as Associate Professor** – Academic Recruitment Field and Discipline: **Software Engineering** (ING-INF/05 – Competition Sector: **Software Engineering** (09/H1)
- 2018 **National habilitation as Associate Professor** – Academic Recruitment Field and Discipline: **Informatics** (INF/01) – Competition Sector: **Informatics** (01/B1)
- 2018 **National habilitation as Associate Professor** – Academic Recruitment Field and Discipline: **Telecommunication Engineering** (ING-INF/03) – Competition Sector: **Telecommunication** (09/F2)
- 2003-  
current **Affiliate Researcher** at Sant'Anna School of Advanced Studies in Pisa, Italy  
Contribution to funded projects, delivery of courses to Masters, Graduate and Ph.D. Programs, supervision of students, PhDs, thesis works, and internships.
- 2004 **Research fellowship** at the Royal Institute of Technology (KTH) in Stockholm, Sweden.  
As visiting researcher I was in charge of extending KTH experimental facilities with the Service-Oriented Optical Network testbed capabilities I formerly set-up at CNIT for validating the novel service-oriented concept I elaborated for optical networks on the basis of the Intelligent Network Conceptual Model.
- 1999 **Licence** for the profession of Engineer, final mark 105/120

## HONORS AND AWARDS

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- 2018 **Best Demo Award** at 3<sup>rd</sup> Fed4Fire Engineering Conference (FEC3) held in Paris for demonstration of an orchestrator prototype for dynamic network slicing and service composition in 5G scenarios. The competition took place between more than 30 demonstrations developed as part of the work of 2 EU Future Internet Research & Experimentation (FIRE) projects (Fed4Fire+ and SoftFire projects)
- 2018 **Best Demo Award** at the IEEE Conference of Network Function Virtualization and Software-Defined Networking 2018 for demonstration of an integrated management systems for both SDN networks and clouds aiming at dynamic service chaining for 5G platforms. The competition took place between 15 demos presented by scientists from worldwide universities and industries working on 5G softwarized networks

## TEACHING ASSIGNMENTS

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- 2022-  
2025 Coordinator of PhD Program “Big Data and Artificial Intelligence” funded by a plethora of industries and the the Italian Minister of University.
- 2022-  
current Course holder of *Software Engineering* (L8) and *Security and Disaster Recovery* (LM31) delivered at Universitas Mercatorum.
- 2012-  
2020 **Course holder** of the "*Telecommunication Networks and Technologies*" (80 hours) course as adjunct professor appointed by **Sant'Anna School of Advanced Studies** and **University of Pisa** for the Graduate Program in Computer Science and Networking.
- 2012-  
2018 **Adjunct professor** appointed by the Sant'Anna School of Advanced Studies, Italy for the "*Network Management Systems*" course (30 hours/year) of the following Ph.D. Programmes:
- a.y. 2012-2013 Ph.D. in Innovative Technologies
  - a.y. 2013-2014 Ph.D. in Emerging Digital Technologies
  - a.y. 2014-2015 Ph.D. in Emerging Digital Technologies
  - a.y. 2015-2016 Ph.D. in Emerging Digital Technologies
  - a.y. 2017-2018 Ph.D. in Emerging Digital Technologies
- 2012-  
2016 **Adjunct professor** appointed by the Sant'Anna School of Advanced Studies, Italy for the "*Resource Virtualization for Data Centers and Cloud Computing*" course (4 hours/year) of the following Masters:
- a.y. 2012-2013: Master di Secondo Livello "Smart Solutions - Smart Communities"
  - a.y. 2014 -2015: Master di Secondo Livello "Smart Solutions - Smart Communities"
  - a.y. 2015-2016: Master di Secondo Livello "Digital Life – Smart Living"
- 2005-  
2020 **Adjunct professor** appointed by the Sant'Anna School of Advanced Studies, Italy for the "*Network Management Systems*" course module (30 hours/year) within the following courses/programs/masters:

- a.y. 2019-2020: “*Telecommunication Networks and Technologies*” in the Graduate Program in Computer Science and Networking (jointly with University of Pisa)
- a.y. 2018-2019: “*Telecommunication Networks and Technologies*” in the Graduate Program in Computer Science and Networking (jointly with University of Pisa)
- a.y. 2017-2018: “*Telecommunication Networks and Technologies*” in the Graduate Program in Computer Science and Networking (jointly with University of Pisa)
- a.y. 2015-2016: “*Telecommunication Networks and Technologies*” in the Graduate Program in Computer Science and Networking (jointly with University of Pisa)
- a.y. 2014-2015: “*Telecommunication Networks and Technologies*” in the Graduate Program in Computer Science and Networking (jointly with University of Pisa) and International Master on Communication Networks Engineering
- a.y. 2013-2014: “*Telecommunication Networks and Technologies*” in the Graduate Program in Computer Science and Networking (jointly with University of Pisa), “*Network Management and Simulations*” in the Graduate Program in Computer Science and Networking (jointly with University of Trento) e International Master on Photonic NETWORKS Engineering
- a.y. 2012-2013: “*Telecommunication Networks and Technologies*” in the Graduate Program in Computer Science and Networking (jointly with University of Pisa), “*Network Management and Simulations*” in the Graduate Program in Computer Science and Networking (jointly with University of Trento) e International Master on Photonic NETWORKS Engineering
- a.y. 2011-2012: “*Telecommunication Networks and Technologies*” in the Graduate Program in Computer Science and Networking (jointly with University of Pisa), “*Network Management and Simulations*” in the Graduate Program in Computer Science and Networking (jointly with University of Trento) e International Master on Photonic NETWORKS Engineering, International Master on Photonic NETWORKS Engineering e International Master on Communication Networks Engineering
- a.y. 2009-2010: International Master on Communication Networks Engineering
- a.y. 2007-2008: International Master on Communication Networks Engineering, International Master in Information Technology
- a.y. 2006-2007: International Master on Communication Networks Engineering, International Master in Robotics and Mechatronics
- a.y. 2005-2006: International Master on Communication Networks Engineering

## PROFESSIONAL ASSIGNMENTS

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- 2018**      **Evaluator** appointed by the **European Institute of Technology (EIT)** of research proposals submitted to the EIT as part of Business Plan 2019 portfolio of research, innovation management and education activity portfolio.
- 2016**      **Evaluator** appointed by the **European Community** for evaluation of research proposals submitted to the call ICT-13-2016 under the FIRE + initiative aimed at building a European infrastructure for Future Internet Experimentation on 5G services (Contract Number: CT-EX2006C159994-103).
- Reviewer** appointed by the **European Community** for the final review of the SMARTFIRE research project funded under FIRE+ initiative, Final Revision (Contract Number: CT-EX2006C159994-101).
- 2015**      **Reviewer** appointed by the European Community for the mid-term revision of the SMARTFIRE research project funded under the FIRE + initiative. (Contract Number: CT-EX2006C159994-102).

## RESEARCH PROJECTS

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Taken active part in research projects funded by the European Union and National Institutions by bringing my technical knowledge, acquiring expertise in technical and financial management issues and contributing favorably to technical reviews. Coordinated working groups from the point of view of technical/scientific management. Many of the projects have been carried out in collaboration with leading TLC ICT manufacturing companies and service providers in Europe, and hence I have been able to gain familiarity with the industrial world as well.

- 2019-current**      **5GROWTH** funded under the 5G PPP initiative of the European Union's H2020 Framework Program as follow-up of 5G-TRANSFORMER to extend the orchestration platform across multiple federated domains and leveraging advanced techniques (e.g., machine learning) to increase efficiency, robustness and reliability demonstrated in field-trials of vertical industries. The contribution to demos is in terms of advanced network manager able to support orchestration of network resources. Position: **Principal Investigator** as third party partner (budget 25k)

- 2018-2021** **ICONET** funded under “Mobility for Growth” initiative of the European Union's H2020 Framework Program on integrated ICT infrastructures for advanced Logistics & Transport services under the novel paradigm of "Physical Internet". The experimentations are carried out on field trials named Living Labs. Position: **Principal Investigator and task leader** (budget 140k)
- 2018-2019** **SLICENET-5G** funded under the Future Internet Research & Experimentation (FIRE) initiative of the European Union's H2020 Framework Program. I was responsible to carry out experimentations on network slicing orchestration on top of virtualized network and cloud infrastructures to enable 5G service scenarios for vertical industries. The experimentation were carried out using the 5GinFIRE European testing platform. The activities also led to the integration of tested orchestration functionalities into the 5GinFIRE platform. Position: **Principal Investigator and Coordinator** (budget 60k)
- 2017-2020** **5G-TRANSFORMER** funded under the 5G PPP initiative of the European Union's H2020 Framework Program to design future next generation mobile networks for 5G scenarios and generalized orchestration techniques for various application domains (e.g., smart cities, multimedia content distribution, e-health). Position: **Task Leader** responsible for network or cloud service orchestration activities.
- 2017-2018** **LASH-5G** funded under the Future Internet Research & Experimentation (FIRE) initiative of the European Union's H2020 Framework Program to carry out experimentations on resource orchestration techniques with the provision of services with minimization of latency for 5G applications. The experimentation will be carried out using the Fed4Fire European testing platform. Position: **Principal Investigator and Coordinator** (budget 100keuro)
- 2017-2018** **DiMoVis** funded under the Future Internet Research & Experimentation (FIRE) initiative of the European Union's H2020 Framework Program to coordinate experimentations on Mobile Video Surveillance in software-defined and virtualized network infrastructure (according to SDN and NFV paradigms) to enable 5G service scenarios like Pervasive Video applications for Smart Cities. Experiments were carried out in the TRIANGLE experimental platform. Position: **Co-Principal Investigator** (managed budget: 20k euro)
- 2014-2015** **EVIDENCE** funded under the Future Internet Research & Experimentation (FIRE) initiative of the 7th European Union Framework Program to carry out experimentations on coordinated deployments of both cloud computing resources (i.e., Virtual Machines in datacenter servers) and network resources (i.e., virtual links) in order to optimize resource usage (e.g., minimize energy consumption) and provide reliable services to users. The experimentation have been carried out using the European Fed4Fire testing platform. Position: **Principal investigator and Coordinator** (Budget 50Keuro)
- 2012-2013** **EMOTICON** funded under the Future Internet Research & Experimentation (FIRE) initiative of the 7th European Union Framework Program to carry out experimentations on datacenter traffic engineering techniques using Software-Defined Networking (SDN) approach and to contribute to the set-up of a federated European SDN-based experimental facility OFELIA. Position: **Co-Principal Investigator and Work Package Leader** (80k euro budget).
- 2012-2014** **GEMMA** on intelligent management of electric vehicles and microgrids for sustainable mobility related to the "Formation for applied and technological research (FORTEC)" co-financed by the Region of Tuscany under the "POR CRO FSE 2007-2013" program. Managed the study activities using a simulator concerning optimized power supply techniques for charging electric cars. Position: Network scientist expert in service management
- 2008-2010** **BONE** within the framework of the research programs for scientific cooperation (networks of excellence) funded by the 7th Framework Program of the European Community. Managed research activities on multi-service transport networks jointly carried out in collaboration with european universities and research centers. Position: **Task leader**.
- 2004-2008** **E-photon/ONE** (2004-2006), **E-photon/ONE+** (2006-2008) within the framework of the research programs for scientific cooperation (networks of excellence) funded by the European Community of the 6th Framework Program. Carried out research activity in collaboration with the Royal Institute of Technology (KTH) in Stockholm and the University of Bologna on multi-service transport networks. Position: Network scientist and software developer
- 2004-2008** **NOBEL** (2004-2006), **NOBEL-phase 2** (2006-2008) funded by the European Community under the 6th Framework Program with the aim of designing new technologies and architectural solutions for high performance networks. I have taken care of the aspects of multi-service networks and general management of transport networks in close collaboration with the leading TLC industries and manufacturing companies in Europe. Position: Network scientist and software developer
- 2005** **"Software and Communication Platforms for High Performance Collaborative Grids"** funded by the Ministry of University and Research through the FIRB investment board in the Italy-Tunisia category. Looked after the aspects of application connectivity for computational grids. Position: Network specialist and software developer
- 2003-2006** **ICT Action COST270** "Reliability of Optical Components and Devices in Communications Systems and Networks"



funded by the European Community under the programs in support of scientific and technological cooperation. Analyzed connectivity solutions and dealt with the reliability issues of intelligent network-oriented service networks. Position: Network specialist and software developer

**2002-2005 GRID.IT** funded by the Ministry of University and Research through the FIRB research and investment board for the study of distributed computing architectures and services (computational grids) on high capacity networks. Taken care of the architectural aspects of on-demand connectivity services for computational grids. Position: Network specialist and software developer.

## JOB ORDERS

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Carried out research and/or coordination activities taking active part in technical meetings and reporting in the following jobs funded by ICT industries (whenever referred to, the budget is to be understood as personally managed).

**2021-2023 European Spatial Agency (ESA):** commissioned job “5GSENSOR@SEA” funded under the ARTES 4.0 Technology & Product Developments program to develop a service platform for innovative services in the context of the maritime transport and logistics leveraging 5G technologies and Industrial IoT (NB-IoT, software network and programmability) and OneM2M IoT platform. The platform also leverages satellite networks for services to be delivered also with cargos travelling in open sea and not only at the port terminals. Position: **Co-Principal investigator and Work Package Leader** responsible for network softwarization (budget 100kEUR)

**2014-2018 Telecom Italia (TIM):** collaborative activities with TIM within the Joint Open Lab initiative for the creation of a network of University labs (*JOLnet*)<sup>1</sup> aimed at experimenting innovative network technologies (SDN/NFV). Collaboration begins in 2014 with the support to the requirement specifications and continues with research and experimental activities funded through two PhDs at Sant’Anna School of Advanced Studies on “5G scenarios and security software networks” ending September 2018. Position: **Task Leader** and **Supervisor** of two PhDs (150K EUR).

**2015-2016 Telecom Italia (TIM):** commissioned job “*Dynamic Composition of Multi-Level Network Services*” to carry out studies on novel solutions to address service requirements of future 5G networks through network orchestration functionalities working with appropriate abstractions (and related interfaces) and dealing with different levels of service dynamicity. The job has been commissioned after a selection process among proposals submitted by the main Italian universities. Coordinated a group of young researchers at the Sant’Anna School of Advanced Studies and at the University of Bologna. Position: **Principal investigator** (20K EUR).

**2014 Ericsson (TEI):** commissioned job “*SDN-based Transport Network Controller for multi-layer networks*” on the design of a network controller according to the Software-Defined Networking (SDN) approach for IP/optical transport networks. I have taken care of the aspects of the assessment of different available software platform of SDN network controllers (OpenDayLight, ONOS) benchmarking definition and functional comparison of SDN control platforms. Position: **Task leader**.

**2011 NATO Agency NC3A:** commissioned job “*Investigation on grid technology suitable to enhance the NATO Network Enabled Capabilities (NNEC): Market survey and validation of Grid Technologies*” on the analysis and reporting of emerging distributed computing technologies designed to expand and develop the ICT infrastructure. Been concerned with the aspects of Cloud Computing and Security technology. Position: **Task leader**.

**2008-2009 Ericsson (TEI):** commissioned job “*Definition of a software architecture and traffic engineering algorithms for optical networks planning*” for the design of an optical transport network planner with data processing logic oriented towards greater extensibility, portability and general validity. Mainly carried out definition of the generalized data model and design of a configuration rule conversion tool for optical equipment. Position: **Task leader**

**2007-2008 Ericsson (TEI):** commissioned job “*Service Layer Automation and Extension of GMPLS Concepts to Service Layer*” on the design of a distributed signaling platform for multi-service optical networks. Taken care of the definition of requirements, the architecture specification, the signaling structure between the platform nodes for providing reliable and QoS-enabled network services. Position: **Task leader**.

**2006-2007 Ericsson (TEI):** commissioned job “*Convergent management information model for generalized transport applications*” on the definition of an extended information model for the generalized and integrated management of multi-layer transport networks. Taken care of the definition of the generalized model of data and analyzed solutions to improve communication reliability for the management of Ericsson equipment. Position: **Task leader**.

**2005-2006 Marconi Communications:** commissioned job “*ASTN enhancement: Information modeling to support GMPLS management*” on the management of Marconi’s network equipment featured with a generalized control plane. Taken care of the

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<sup>1</sup> <http://www.telecomitalia.com/tit/it/notiziariotecnico/numeri/2014-2/capitolo-05/approfondimenti-02.html>

architectural aspects and the definition of a roadmap for generalized management of optical transport networks.

**Position:** Technical Consultant.

**2003-2004 Marconi Communications:** commissioned job "*A Generalized Multi-Protocol Label Switching (GMPLS) Framework*" on the generalized control plane for multi-layer optical transport networks. Developed a software platform for general development of XML-based control and signalling protocols. **Position:** Technical Consultant.

## INVITED TALKS AND DEMONSTRATIONS

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**2022** **Invited panelists** at the IEEE Conference on Network Softwarization (NetSoft) 2022 (Milan, Italy) discussing on "Network Softwarization Coming of Age: New Challenges and Opportunities"

**2021** **Invited panelists** at the IEEE International Mediterranean Conference on Communications and Networking 2021 (Athens, Greece) discussing on "Computing at the edge: opportunities, challenges, and evolution"

**2020** **Demonstration** at the meeting NMRG 58 @ IETF 108 Hackathon titled "*A Multi-Level Approach to Intent-based Networking*" on orchestration of network and cloud resources of 5G infrastructures for vertical applications.

**Talk on invitation** titled "5G: the revolution in progress in the network of future" at Smart City Now ([www.smartcitynow.it](http://www.smartcitynow.it)) organized within the Technology Cluster for Smart Cities & Communities in Lombardia - Italy

**2019** **Invited technical presentation** titled "*Intent-based Networking in the NFV ecosystem*" (B. Martini) to the IRTF Network Management Research Group meeting at the 10th International Conference on Network of the Future (NoF'19) Conference (Roma, Italy). The Internet Research Task Force (IRTF) promotes research of importance to the evolution of the Internet protocols, applications, architecture and technology.

**Demonstration** of a prototype of an orchestration system for network slicing of optical network and cloud domains at the OSA/IEEE 2019 Optical Fiber Communications Conference and Exhibition (OFC), USA. The prototype has been developed within the EU-funded 5G-TRANSFORMER project. The demo has been admitted after a review process on peer-reviewing basis.

**Demonstration** of a prototype of an orchestration system able to perform advanced control access at the time of slice creation as well as during the lifecycle to avoid misuse of virtual resources in NFV deployments at the IEEE 2019 International Conference on Network Softwarization (NetSoft 2019). The demo has been admitted after a review process on peer-reviewing basis.

**2018** **Invited panelists** at the IEEE International Conference on Network Function Virtualization and Software Defined Networks 2018 (Verona, Italy) discussing on "*Accelerating Computation for Network Function Virtualization*".

**Keynote presentation** entitled "*Latency-aware and self-adaptive service chaining in reliable 5G/SDN/NFV infrastructures*" at the Workshop "SR+SFC" co-located with IEEE International Conference of Network and Service Management 2018 (Rome, Italy).

**Final demonstration** of an orchestrator for dynamic service composition developed under the LASH-5G research project given during the 3rd Fed4FIRE+ Engineering Conference held in Paris – France. Demonstration has been awarded as "Best Demo" in the competition of more than 30 competitor demos.

**Paper on invitation** entitled "*Latency-aware Network Service Orchestration over an SDN-controlled Multi-Layer Transport Infrastructure*" (B. Martini, S. Fichera, M. Gharbaoui, P.Castoldi) at the International Conference on Transparent Optical Networks 2018 (Bucarest, Romania).

**Final demonstration** of an orchestrator for dynamic service composition developed under the LASH-5G research project given during the 3rd Fed4FIRE+ Engineering Conference held in Paris – France. The demonstration has been awarded as "**Best Demo**" in the competition of more than 30 competitor demos.

**2017** **Demonstration** of a distributed multi-data center set-up with orchestration of network capabilities developed under the LASH-5G research project given during the 2nd Fed4FIRE+ Engineering Conference held in Volos – Greece. Demonstrations are admitted on the basis of peer review.

**Paper on invitation** entitled "*Network Orchestration in Reliable 5G/NFV/SDN infrastructures*" (B. Martini, S. Fichera, M.Gharbaoui, P.Castoldi) at the International Conference on Transparent Optical Networks 2017 (Girona, Spain).

**2016** **Paper on invitation** entitled "*Network and datacenter resource orchestration strategies for mobile virtual networks over telco clouds*" (B. Martini, M.Gharboui, I. Cerutti, P. Castoldi) at the International Conference on Transparent Optical Networks 2016 (Trento, Italy).

**2015** **Paper on invitation** entitled "*Cross-Functional Resource Orchestration in Optical Telco Clouds*" (B. Martini, S.Fichera, M.Gharboui, P. Castoldi) at the International Conference on Transparent Optical Networks 2015 (Budapest, Hungary)..

**Invited speaker** at the IEEE SDN Initiative Standards Committee at IEEE Head Quarters (Piscataway, New Jersey, USA) delivering a presentation entitled "Context-aware Service Composition and Delivery in Next Generation Service Overlay Networks "

**2014** **Demonstration** of a data center orchestrator prototype developed under the OFELIA research project given during the NOMS2014 conference held in Krakow – Poland. Demonstration are admitted on the basis of peer review.

**2009** **Presentation on invitation** “Challenges for enabling Cloud Computing Computing over optical networks over optical networks” (P. Castoldi, B. Martini, F. Baroncelli) at the International Workshop on the Cloud/Grid/Utility Computing over Optical Networks durante la conferenza OFC/NFOEC, San Diego, USA

**2008** **Presentation on invitation** “Service Plane Capabilities and Challenges” (P. Castoldi, F. Baroncelli, B. Martini, V. Martini, L. Valcarengi) al “FEDERICA-Phosphorus tutorial and workshop” at the TERENA Networking Conference 2008, Bruges, Belgium

**2004** **Seminar on invitation** entitled "Optical Networking: Advanced Architectures and Protocols" (B.Martini) at Marconi Communications, Future trends in Network Restoration and Resilience in All-Optical Networks, Coventry (UK).

**Presentation on invitation** entitled "New concepts, research tools and protocol extensions for optical switching" (N. Andriolli, F. Baroncelli, B. Martini, P. Castoldi, F. Cugini, M.Ghizzi, A. Giorgetti, Ramesh Kumar Manickam, P. T. Kulkarni, L. Valcarengi) at the Indo-Italian One-day Workshop on Photonic Technologies, Networking and Applications, Indian Institute of Technology (IIT), Kharagpur, India

**1999** **Seminar on invitation** titled "TMS320C6x-family devices for digital signal processing at 250MHz" (B. Martini) at the course "Applied Electronics 3" at the Faculty of Engineering of the University of Florence

## SERVICES TO UNIVERSITY AND SCIENTIFIC COMMUNITY

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**2018-current** Member of the **Organizing Committee** of the following conferences:

- 2023 IEEE Conference on Network Softwarization (NetSoft) – **General Chair**
- 2023 (IEEE-sponsored) Conference on Innovation in Clouds, Internet and Networks (ICIN) – **Demo Chair**
- 2022 IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN)– **Doctoral Symposium Chair**
- 2022 IEEE Conference on Network Softwarization (NetSoft) – **Publicity Chair**
- 2022 (IEEE-sponsored) Conference on Innovation in Clouds, Internet and Networks (ICIN) – **Workshop Chair**
- 2021 IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN)– **Keynote Chair**
- 2021 IEEE Conference on Network Softwarization (NetSoft) - **TPC Chair**
- 2021 (IEEE-sponsored) Conference on Innovation in Clouds, Internet and Networks (ICIN) - **TPC Chair**
- 2021 IFIP/IEEE International Conference on Network and Service Management (CNSM 2021) - **Workshop Chair**
- 2020 IEEE Conference on Network Softwarization (NetSoft) - **Tutorial Chair**
- 2020 (IEEE-sponsored) Conference on Innovation in Clouds, Internet and Networks (ICIN) - **Tutorial Chair**
- 2020 IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN)– **Doctoral Symposium Chair**
- 2020 IFIP International Conference on Network and Service Management (CNSM) - **Student Travel Grants Chair**
- 2019 IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN)– **Workshop Chair**
- 2019 IEEE/IFIP International Symposium of Internet Management (IM)– **Demonstration Chair**
- 2018 IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN) - **Secretary**

**2020-current** **Associate Editor** of, IEEE Transaction of Network and Service Management (**TNSM**) since 2020, Frontiers in Communications and Networks since 2020 and Wiley International Journal of Network Management (**IJNM**) since 2021.

**2018-2021** **Associate Editor** of OSA/IEEE Journal of Optical Communications and Networking (**JOCN**)

**2021** **Guest Editor** of Special Issue “Smart Management of Future Softwarized Networks“ for IEEE Transactions on Network and Service Management (TNSM) (<https://www.comsoc.org/publications/journals/ieee-tnsm/cfp/smart-management-future-softwarized-networks>)

**Guest Editor** for the Special Issue "Advances in Pervasive and Ubiquitous Computing" of Wiley Internet Technology

Letters ([https://onlinelibrary.wiley.com/page/journal/24761508/homepage/special\\_issues.htm](https://onlinelibrary.wiley.com/page/journal/24761508/homepage/special_issues.htm) )

- 2020** **Guest Editor** of Special Issue “Advanced Management of Softwarized Networks” for IEEE Transactions on Network and Service Management (TNSM) (<https://www.comsoc.org/publications/journals/ieeetnsmp/cfp/advanced-management-softwarized-networks>)
- 2019** **Guest Editor** of Special Issue “Latest Developments for the Management of Softwarized Networks” for IEEE Transactions on Network and Service Management (TNSM) (<https://www.comsoc.org/publications/journals/ieeetnsmp/cfp/latest-developments-management-softwarized-networks>)
- Guest Editor** of Special Issue “Adaptive and Secure Network Slicing for 5G Applications and Services” for MDPI Future Internet
- 2016-current** **Chairwoman and Steering Committee member** of the "Orchestration in Software-Defined Infrastructures" Workshop (<http://www.o4sdi.unibo.it/>) on issues, challenges and practical experiences in network and service infrastructures in 5G technology. The workshop is endorsed by main EU projects on SDN/NFV and orchestration topics (SONATA, 5GEx, 5G-TRANSFORMER). Workshop came to the third edition and was held in conjunction with the following International conferences:
- IEEE/IFIP Conference on Network Operations and Management Symposium (NOMS) 2020
  - IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN) 2018
  - IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN) 2017
  - IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN) 2016
  - IEEE International Conference on Communications (ICC) 2016
- 2009-current** **Member of technical committees** at the following conferences, workshops and international journals for which I carry out article reviews and contribute to the selection of research works:
- IEEE Optical Networks Design and Modelling (ONDM) 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021
  - IEEE 5G World Forum 2018, 2019, 2020, 2021
  - IEEE/IFIP Conference on Network Operations and Management Symposium (NOMS) 2020
  - (IEEE-sponsored) Conference on Innovation in Clouds, Internet and Networks (ICIN) 2020, 2021, 2022
  - IEEE International Conference on Network Softwarization (NetSoft) 2017, 2018, 2019, 2020, 2021, 2022
  - IEEE International Conference on Communications (ICC)-Next Generation Networking and Internet Symposium 2020
  - IEEE Conf. on Network Function Virtualization and Software Defined Networks (NFV-SDN) 2016, 2017, 2018, 2019, 2020, 2021
  - IEEE/IFIP Asia-Pacific Network Operations and Management Symposium (APNOMS) 2015, 2016, 2017, 2019, 2020
  - IEEE Globecom - Next Generation Networking and Internet (NGNI) Symposium 2017, 2018, 2019
  - IEEE International Conference on Network and Service Management (CNSM) 2017, 2018, 2019, 2020
  - Global Information Infrastructure and Networking Symposium (GIIS) 2019
  - IEEE International Conference on Communications (ICC) - Optical Networks Symposium 2016, 2017
  - IEEE International Conference on Communications (ICC)-SAC on NFV-SDN 2017
  - IEEE International Conference on Connected Vehicles & Expo (ICCVE) 2013, 2014, 2015, 2016, 2019
  - ITU Kaleidoscope Conference 2011
  - International Workshop on Network Intelligence @ IEEE International Conference on Computer Communications (INFOCOM) 2019, 2020
  - International Workshop on Security for Emerging Distributed Network Technologies (DISSECT) @IEEE/IFIP IM/NOMS 2015, 2016, 2017
  - Workshop on Slicing in end-to-end Networks including Wireless: Orchestration & Management (SLICEWOMAN) @ IEEE/IFIP IM 2019
  - Workshop on Performance Issues in Virtualized Environments and Software Defined Networking (PVE-SDN) @ IEEE NetSoft 2018, 2019
- 2009-current** **Reviewer** for the following journals and magazines relevant in the field: Wiley International Journal on Network Management, Wiley International Journal of Communication Systems, AIRCC Journals of Computer Networks and Communications, IEEE/OSA Journal of Lightwave Technology, IEEE/OSA Journal of Optical Communications and Networking, IEEE Transaction on Network and Service Management, IEEE Communication Magazine, MDPI Future Internet
- 2007-current** **Committee Member** in the following evaluation/selection procedures:
- **Member of the Committee** appointed by the **Fondazione Bruno Kessler (FBK)** for a selection procedure to



cover a Tenure Track position for a senior researcher in the field of Edge-Cloud Computing at FBK Center for Digital Society - 2021

- **Member of the Committee** for the final exam (thesis defense) of the First Level Master on Photonic Integrated Circuits, Sensors and Networks (PIXNET) of the Sant'Anna School of Advanced Studies, a.y. 2020-2021
- **Member of the Graduation (Ph.D.) Committee** of Dr. Danny Lachos Perez at the **Unicamp University** (Brazil) - 2021
- **Member of the Committee** for a public selection at Sant'Anna School of Advanced Studies for one technology expert required to design, organization and coordination of the activities of a software laboratory for telecommunications networks - 2020
- **Member of the Committee** for the selection for awarding Research Scholarship (Assegno di Ricerca) on "Wireless networks for control system in railway systems" at Sant'Anna School of Advanced Studies - 2020
- **Member of the Graduation (Ph.D.) Committee** of Dr. Shanay BEHRAD at the **Telecom SudParis** (Francia) - 2020
- **Member of the Committee** appointed by the **Fondazione Bruno Kessler (FBK)** to assess the tenured senior researcher along the track in the field of multi-layer networks and infrastructures - 2019-2022.
- **Member of the Graduation (Ph.D.) Committee** of Dr. Silvia Fichera at Sant'Anna School of Advanced Studies, Pisa - 2019
- **Member of the Graduation (Ph.D.) Committee** of Dr. Francesco Marino at Sant'Anna School of Advanced Studies, Pisa - 2018
- **Member of the Committee** for the final exam (thesis defense) of the Master Program "Computer Science and Networking" at the University of Pisa and Sant'Anna School of Advanced Studies, Pisa, Italy - 2018
- **Member of the Graduation (Ph.D.) Committee** of Dr. Francesco Lucrezia at **Polytechnic University of Turin**, Turin, Italy - 2018
- **Member of the Committee** appointed by the **Fondazione Bruno Kessler (FBK)** for the selection of a senior researcher to cover a Tenure Track position in the area of Multi-layer Networks and Infrastructures at the CREATE-NET Research Center - 2018
- **Member of the Graduation (Ph.D.) Committee** of Dr. Molka Gharbaoui and Gianluca Raponi at Sant'Anna School of Advanced Studies, Pisa - 2012
- **Member of the Graduation (Ph.D.) Committee** of Dr. Karim Torkman at Sant'Anna School of Advanced Studies, Pisa
- **Member of the Committee** for the assignment of a Research Scholarship (Assegno di Ricerca) on "Study and design of optical interconnection networks with high energy efficiency" at Sant'Anna School of Advanced Studies
- **Member of the Committee** for the final exam (thesis defense) of the International Master on Communication Networks Engineering (IMCNE) of the Sant'Anna School of Advanced Studies, a.y. 2007-2008

## TECHNOLOGY TRANSFER AND STANDARDIZATION

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- 2022** **Member of panel experts** at IoThingsAwards appointed by **Innovability** to select the most innovative IoT solutions and products from Small-Medium Enterprises in different application domains, such as e-health, smart cities (<https://www.iothingsawards.com/giuria-2022/>)
- 2021** **Member of panel experts** at IoThingsAwards appointed by **Innovability** to select the most innovative IoT solutions and products from Small-Medium Enterprises in different application domains, such as e-health, smart cities (<https://www.iothingsawards.com/giuria-2021/>)
- 2021-current** **Member of the User Committee** of SLICES Research Infrastructure (RI) projects: "Scientific Large-scale Infrastructure for Computing/Communication Experimental Studies - Design Study" (SLICES-DS) and "Scientific Large-scale Infrastructure for Computing/Communication Experimental Studies - Starting Community" (SLICES-SC), to promote the SLICES RI and provide input on how to enlarge the plathora of potential users and best deliver research infrastructural services to them (<http://slices-ri.eu/>).
- 2018-2021** **Coordination of transferability and capacity building actions** during EU-funded project ICONET. Managed activities to foster knowledge consolidation and impact generation from ICONET outcomes toward enabling the "Physical Internet" paradigm in Transport & Logistics (T&L). I set-up a structured set of initiatives to transfer project results in the T&L ecosystem and let them to reach out stakeholders and institutions (e.g., European Shippers' Council, Chartered Institute of Logistics and Transport (CILT)). I arranged dissemination and training initiatives (e.g., workshops, design of CILT qualifications on the topic Physical Internet, training programs) and formulate best practices from project experimentations to foster advanced IoT- and cloud-based solutions in future Supply Chain services.
- 2018** **Evaluator and independent expert** appointed by the European Institute of Technology (EIT) for the **Business Plan 2019** of the Knowledge and Innovation Communities (KICs), a portfolio of research, innovation management and

education activities submitted for evaluation to the EIT. I focused on research and innovation activity proposals in the area of Digital Infrastructure to evaluate their potential impact on the business generation. (see also Professional Assignments section).

2014-  
current

I was/am part of the following **standardization** initiatives:

- Contributing to the Internet Research Task Force (IRTF) Network Management Research Group (NMRG) on intent-based management and intent classification – 2020
- Contributed to the NMRG 58 @ IETF Hackathon 108 with a demonstration of a prototype for "A Multi-Level Approach to Intent-based Networking" (<https://trac.ietf.org/trac/ietf/meeting/wiki/108hackathon>) - 2020
- Member of the Research Group "Future Networks in 2030 and beyond" at the IEEE Computer Society – 2019
- Contributed as reviewers to the Internet Research Task Force (IRTF) Request for Comment (RFC) on network virtualization research challenges (<https://tools.ietf.org/html/rfc8568>) - 2019
- Member of the IEEE ComSoc Research Group on Future Networks in 2030 and Beyond (2019)
- Contributed to the Internet-draft IETF "draft-bernardos-nmrg-multidomain-01" on multi-domain network virtualization titled "Multi-domain Network Virtualization" (<https://tools.ietf.org/html/draft-bernardos-nmrg-multidomain-01>) - 2016
- Contributed to the finalization of **IEEE 1903 standard** on Next Generation Service Overlay Network (NGSON) with SDN and NFV insights.- 2016
- Contributed to the IETF "draft-deng-nfvcon-nb-use-cases" Internet-draft on open issues and case studies on NFV configurations titled "NFV configuration north bound use cases" (<https://tools.ietf.org/html/draft-deng-nfvcon-nb-use-cases-00>) - 2014

2009-  
2018

Aiming at advanced training as a mean of capacity building on future network technologies, I contributed to advanced education programs at the Scuola Superiore Sant'Anna designed with close interactions with ICT industry. I contributed with courses on cutting-edge technological contents in the field of softwarized 5G network and with tutoring of students attending both frontal lectures as well as internships in partner ICT companies. More specifically, I

- taught to the Second Level Master "Smart Solutions - Smart Communities" e "Digital Life – Smart Living" and supervised students in their internship in TIM while carrying out joint research activities as result of long-established collaborations between Scuola Superiore Sant'Anna and TIM –
- supervised 2 Ph.D. students within a PhD program set-up with fundings from TIM to carry out studies on 5G networking and beyond
- tutored students of the Second Level Master "Master of Service Management, Innovation and Engineering" (MAINS) during the Technology Innovation Laboratory named "Marketing & Strategy: Economic Impact of Developing an NGN on the Country System. Convergence scenarios between Telco and Broadcast TV" with activities carried out in collaboration with Telecom Italia, Ericsson, Vodafone (see also Teaching Assignments and Job Orders sections).

2003-  
current

In the light of applied research development as a mean of technology transfer in ICT industry, I had continuous contacts and **collaborations with ICT companies** (Marconi Communications, Ericsson, TIM, NATO Agency NC3A, European Spatial agency) to study and develop advanced solutions to deploy in the field. Such collaborations have been carried out in the form of commissioned job orders or joint activities in EU-funded research (see also Job Orders section).

## SUPERVISION ACTIVITY

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2005-  
current

**Supervision of students** in Ph.D., Graduate and Master Programs:

- Eddi Lorenzi, master student at the Graduate Program in Computer Science and Networking at the Sant'Anna School of Advanced Studies and University of Pisa – Thesis in progress on use of Blockchain technology for cargo tracing in Transport and Logistics.
- Silvia Fichera, Ph.D student in Emerging Digital Technologies at the Sant'Anna School of Advanced Studies funded by Telecom Italia (TIM) – Thesis title: "Resource Orchestration in Softwarized Networks" - (Main Supervisor) - 2019
- Francesco Marino, Ph.D student in Emerging Digital Technologies at the Sant'Anna School of Advanced Studies funded by Telecom Italia (TIM) - Thesis title: "Towards a Softwarized and Secure Internet of Things" - 2019
- Serkalem Abebe, master student at the Graduate Program in Computer Science and Networking at the Sant'Anna School of Advanced Studies and University of Pisa – Thesis title: "Topology discovery in distributed SDN network domains" - (Main Supervisor) - 2018
- Hagos Lemlem, master student at the Graduate Program in Computer Science and Networking at the Sant'Anna



School of Advanced Studies and University of Pisa – Thesis title: “Graphical interface for an SDN monitoring platform” - (Main Supervisor) - 2018

- Daniele Calchi, student of Master “Smart Digital Life & Smart Living” at the Sant’Anna School of Advanced Studies during the internship at the Telecom Italia (TIM) Marketing Business Unit in Milan – Thesis title: “Platform as a Service solutions for Cloud Computing” (Accademic Supervisor) - 2016
- Maurizio Rametta, student of Master “Smart Digital Life & Smart Living” at the Sant’Anna School of Advanced Studies during the internship at the Telecom Italia (TIM) Marketing Business Unit in Milan – Thesis title: “Support the development of solutions Cloud Computing Open Source” (Accademic Supervisor) – 2016
- Silvia Fichera, student of Master “Smart Solutions – Smart Communities” at the Sant’Anna School of Advanced Studies during the internship at the Telecom Italia (TIM) JolNet Lab di Pisa – Thesis title: “Software Defined 5G Controlling Autonomous Machine” (Accademic Supervisor) – 2015
- Ahmed Ali Mohammed, during an internship at CNIT for the development of an orchestration appliance for network and cloud resources in data centers (Main Supervisor) – 2015
- Ahmed Ali Mohammed, master student at the Graduate Program in Computer Science and Networking at the Sant’Anna School of Advanced Studies and University of Pisa – Thesis title: “Application-driven Network Service Composition and Delivery Using SDN” (Main Supervisor) – 2014
- Shamim Ahmed, master student at the Graduate Program in Information and Communication Technologies at the Sant’Anna School of Advanced Studies and University of Trento – Thesis title: “Network-Assisted Virtual Machine Migrations” (Main Supervisor) - 2014
- Molka Gharbaoui, Ph.D student in Innovative Technologies at the Sant’Anna School of Advanced Studies – Thesis title: “Dynamic Resource Provisioning and Security solutions in Service-Oriented Networks” (Main Supervisor) - 2012
- Karim Torkman, Ph.D student in Innovative Technologies at the Sant’Anna School of Advanced Studies – Thesis title: “On-demand service provisioning in GMPLS networks” (Co-Supervisor) - 2011
- Valerio Martini, Ph.D student at the Sant’Anna School of Advanced Studies – Thesis title: “Service Oriented Optical Network (SOON) Architecture” (Co-Supervisor) – 2009
- Molka Gharbaoui, master student at International Master on Communication Networks Engineering (IMCNE) at the Sant’Anna School of Advanced Studies – Thesis title: “Study and Implementation of QoS techniques in IP/MPLS networks” (Main Supervisor) – 2008
- Karim Torkman, master student at International Master on Communication Networks Engineering (IMCNE) at the Sant’Anna School of Advanced Studies – Thesis title: “Evaluation of the on-request approach for the service provisioning in IP/MPLS networks” (Co-Supervisor) - 2007
- Sammi Ajina, master student University of Tunis – Thesis title: “Service Plane-aided Visualization of Virtual Topology in transport networks” - 2007
- Angelica Aprigliano, master student University of Florence – Thesis title: “Analysis, design and implementation of a software module for network and grid applications interworking” - 2005

## FOREIGN LANGUAGES

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<b>English</b>	B2/C1 level in both written and spoken language, acquired through teaching foreign students, writing scientific articles and research reports and presentations in English, frequent attendance at international meetings and numerous stays abroad (the most extended stay in the US for around 2 months, host of a family, in 1999)
<b>French</b>	Basic
<b>Italian</b>	Mother tongue

## COMPUTER AND TECHNICAL SKILLS

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**Operating systems:** Windows, Unix, Linux (base level), real-time operating systems for embedded systems (VxWorks, PSOS), router operating systems (Junos, Cisco IOS)

**Programming languages:** Java, Python (base level), C ++, C, Assembler (DSP Texas Instruments), Matlab

**Mark-up languages and validation formalisms:** HTML, XML and DTD, XML Schemes used in Internet application development, LaTeX used to prepare text based on the TeX composition program

**Software Design Languages and Methodologies:** Object Oriented, UML, Design Pattern, Finite State Machine

**Micro-processor Architectures:** Motorola PowerPC, Texas Instruments DSP, Intel x486

**Application Packages:** MS Word, OpenOffice, MikTeX for text editing, MS Power Point for presentations; MS Excel for data management in spreadsheets; MS Visio for diagramming and vector graphics; MS Outlook, Mozilla Thunderbird, Lotus Notes for Email Management; Google Drive, Google Docs, Dropbox for file storage and sharing on cloud.

**Internet Browser:** Microsoft Internet Explorer, Mozilla Firefox, Google Chrome.

**Version control Systems:** Concurrent Version System (CVS), SubVersioN (SVN), TortoiseSVN

**Computer Science Fundamentals:** Algorithms, Data Structures, Resource Optimization, Operating Systems, Distributed and parallel programming (basic level). Database

**Cloud Computing and Application Platforms:** Cloud platform virtualization software and services (SaaS, PaaS, IaaS, VMWare, Virtual Box, Openstack (basic level)), Service Overlay Networks

**Internet technology and protocols:** HTTP, HTML, Web Services, Service Oriented Architecture (SOA), REST

**Telecommunication:** Data plane technologies (transmission in electronic and optical domains); Network control and management planes; Network and Resource Optimization and Planning; Resource allocation algorithm design, implementation and testing; Next Generation Internet (4G/5G); Software Defined Networking (SDN); Network Function Virtualization (NFV)

**Networking protocols and technologies:** TCP/IP and ISO/OSI protocol suites; LAN/MAN/WAN network architectures; fixed and mobile access networks; IP/MPLS and Photonic (DWDM) transport networks; Interior and Exterior routing protocols (Link State OSPF, IS-IS; Distance Vector IGP; BGP); signaling protocols (RSVP); session management protocols (SIP); network management protocols (SNMP, CMiP, TL1, NETCONF);

**Modeling languages, data coding/decoding in telecommunication:** YANG, SMI, GDMO, JSON, ASN.1

## MATERNITY LEAVE AND PART-TIME WORK PERIOD

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In compliance with the Italian legislative decree no. 1204 dated 30/12/1971 I used two compulsory full-pay maternity leaves from CNIT (about 6 months each) and in compliance with the Italian legislative decree no. 199/2011 I took two parental leaves from CNIT for overall 360 days (in fractional way). Overall, I stopped working due to **maternity leaves** for two main periods: **June 2006-April 2007 and February 2010-October 2010**.

I have been working at **part-time** (66%) at CNIT from **November 1<sup>st</sup> 2019 to April 30<sup>th</sup> 2021**.

## HOBBIES

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- Executive Member of the School Council of Istituto Comprensivo (IC) in my hometown
- Play-to-learn activities on Internet and Coding for children from primary school
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