

Walter Cazzola

Curriculum Vitae

PERSONAL DATA

Biographical Data

Walter Cazzola was born in Sestri Ponente (Genova) on July 25th, 1969. He lives in Via Carlo Rolando 23–67, Sampierdarena (Genova) CAP 16151.

ACADEMIC RECORD

Educational History

1994–95. Master in Computer Science, (with full marks), at the Università degli Studi di Genova. He has defended a thesis entitled:

Channel Reification: a New Reflective Model. Analysis and Comparison with Other Models and Application to Fault Tolerant Systems.

Thesis Advisors: Prof. M. Ancona, Prof. G. Dodero and Prof. V. Gianuzzi.

1999-2000 PhD in Computer Science, at the Università degli Studi di Milano. He has defended a thesis entitled:

“Communication-Oriented Reflection: a Way to Open Up the RMI Mechanism.”

Advisor: Prof. **Shigeru Chiba**, University of Tsukuba, Japan (Now at University of Tokyo, Japan).

Supervisor: Prof. Francesco Tisato, University of Milano Bicocca.

ACADEMIC CAREER

2000-11→2002-11. Researcher Assistant. Department of Informatics and Computer Science (DISI) of the **Università degli Studi di Genova**.

2002-12-30→2010-10-31. Assistant Professor. Department of Informatics and Communication (DICO) of the **Università degli Studi di Milano**.

2010-11-01→2012-01-01. Associate Professor. Department of Informatics and Communication (DICO) of the **Università degli Studi di Milano**.

2012-01-01→2023-10-31 Associate Professor, Computer Science Department of the **Università degli Studi di Milano**.

2023-11-01→ Full Professor, Computer Science Department of the **Università degli Studi di Milano**.

2015-07-01→ Faculty Affiliate, Computer Science Department, **Colorado State University**, Fort Collins, USA.

FOREIGN LANGUAGES

Good English both spoken and written. Scholastic French both spoken and written. Italian as mother tongue.

SCIENTIFIC RESEARCH ACTIVITIES

Leadership and Participation in Research Group Activities

From **2005** to **2011**, I served as the principal investigator for two research projects:

- **RAMSES**: Reflective and Adaptive Middleware for Software Evolution of Non-Stopping Information Systems, and
- **RAMSES II**: Reflective and Adaptive Middleware for Software Evolution of Non-Stopping Information Systems, funded by **DFG (The German Research Foundation)**. The projects and associated research activities were hosted at **Otto-von-Guericke-Universität Magdeburg** and conducted in collaboration with Prof. Gunter Saake.

For these projects, the following initiatives were undertaken:

- Two **Ph.D. scholarships** were awarded to Ahmed Ghonaim and Mario Pukall, and
- Four **research support scholarships** were awarded to Jörg Liebig, Christian Hübner, Alexander Grebhanhn, and Reimar Schöter.

The entire **research activity** funded through these scholarships was **coordinated** and **supervised** by myself.

The collaboration with Otto-von-Guericke-Universität Magdeburg and the funding from DFG enabled:

- Several **visits** by myself to the University of Magdeburg;
- The development of **JavaAdapter**, a framework for dynamic software evolution that cannot be stopped, (topic that I'm still exploring); and
- Approximately **ten publications** in international journals and conferences.

Since **December 1, 2007**, I have been the **principal investigator and director of the ADAPT lab** at the Department of Computer Science, University of Milan.

- The ADAPT lab is an officially recognized and accredited laboratory of the University of Milan.
- Currently, the ADAPT-Lab includes **4 faculty members** (Lorenzo Capra, Camillo Fiorentini, Alberto Momigliano, and myself), **2 postdoctoral researchers** (Francesco Bertolotti and Luca Favalli, both on the **PRIN** project T-LADIES for which I am the **principal investigator**), **1 Ph.D. student** (Gabriele Maurina co-supervised by myself and Sudipto Ghosh), and several master students.

Previously, among the lab activities, I **supervised** the doctoral work of **Edoardo Vacchi**, **Albert Shaqiri**, **Mehdi Jalili**, and in co-tutorship, **Mohammed Al-Refai**, **Ahmed Ghoneim**, and **Mario Pukall**.

The lab has several **international collaborations** with:

- **Technische Universität Dresden**: Dr. **Thomas Kühn** was a guest at the lab for 3 months in 2015.
- **Northeastern University in Shengyan, China**: Dr. **Ying Liu** and Dr. **Janze Zhao** were guests at the lab for 15 days in 2016.
- **Université de Rennes**: Prof. **Benôit Combemale** and Dr. **Suresh Pillay** visited the lab for 7 days in January 2013.
- **University of Tokyo**: Prof. **Shigeru Chiba** was a guest at the lab for 15 days in 2009 and, in 2014 and 2015, Prof. **Chiba** and his Ph.D. students **Kazuhiro Ichikawa** and **Yungyu Zhuang** visited the lab multiple times.
- **Otto von Guericke University Magdeburg**: Dr. **Ahmed Ghoneim** and Dr. **Mario Pukall** visited the lab several times between 2007 and 2012 during their Ph.D. research.
- **Colorado State University**: Prof. **Sudipto Ghosh** was a guest at the lab for 2 weeks in January 2020 and conducted a Ph.D. course during his stay.

I am the **ideator**, in 2014/15, and the **main advocate** of the research area called «**Language Product Lines**».

- The idea is to simplify the development of tooling for programming languages using concepts and technologies related to software product lines.

Currently, three other international groups are active in this area, in addition to my research group:

- Aachen University in Germany, led by Prof. Bernhard Rumpe.
- Technische Universität Dresden in Germany, led by Prof. Uwe Assmann.
- INRIA (Rennes and Toulouse), led by Prof. Benôit Combemale.

With **INRIA** and **Technische Universität Dresden**, there have been (or are) several **collaborations** on this topic, including:

- **Student exchanges**: Edoardo Vacchi spent time at INRIA, Suresh Pillay from INRIA, and Thomas Kühn from Technische Universität Dresden visited my lab for a period.
- **Visits**: In January 2019, I visited Technische Universität Dresden, and in 2013, Prof. Combemale visited my lab.
- Writing articles (currently, collaborations have **yielded 9 articles**) and
- Organizing events to promote the topic (with Dresden and Aachen, we are organizing a Dagstuhl seminar on language product lines).

Since 2009, the lab's research activities have focused on the development of **Neverlang**, of which I am the **designer** and the **principal investigator**. Neverlang is a **language workbench** based on the concept of language features that enables effective componentization and reuse of the implementation of programming languages and their ecosystems.

Neverlang has (or is) the subject of various research activities conducted in the ADAPT lab:

- The modular nature of Neverlang is **fundamental to the development of the language product line concept**.
- Neverlang has been successfully used in several projects for **technology transfer**
 - In the MATRICE project to develop a DSL for the organization, integration, and querying of data from heterogeneous streams.
 - In the TylFramework project, funded by Tyl, for the development of a DSL for Enterprise Resource Planning.
 - In the EMIF project, funded by the European Union, for the development of a DSL similar to natural language for querying medical databases.
- Neverlang has been the subject of **two Ph.D. courses** (in 2014 in Milan and in 2023 in Bertinoro) and an **international summer school** (in 2013 held in Montpellier).
- More than **30 articles** have been published on Neverlang or its applications, **three Ph.D. theses** have been centered around it (E. Vacchi, A. Shaqiri, and L. Favalli), and **about twenty** master's theses have been produced.

Research Topics

My research activity lies at the intersection of **programming languages** and **software engineering**, with a current focus on: **domain-specific languages**, **(modular) implementation of programming languages**, **programming and software development techniques**, and their applications, particularly in the areas of software evolution, testing, and maintenance.

My research work has always been conducted **independently** and has been characterized by **various collaborations** at the national and international levels, enriching and specializing my expertise.

Below are the overarching research topics that define my research, along with key outcomes.

1998. Reflection. My early research focused on **computational reflection**, where I studied models and applications. Specifically, I defined:

- a communication-oriented reflection model and implemented a reflective framework (**mChARM**) to support it [3];
- a reflective model in-the-large, called **architectural reflection** [48], which forms the basis of the MAPE-K model for self-adaptive systems;
- a **reflective model for authorization schemes** [33].

This research involved collaborations with: **Massimo Ancona** (University of Genoa), **Francesco Tisato** (University of Milan Bicocca), and **Eduardo Fernandez** (Florida Atlantic University).

2002. Reflective Middleware for Software Adaptation. I explored the application of computational reflection to model, formalize, and develop a reflective architecture for dynamically adapting critical and non-stopping software systems. Specifically, I:

- modeled and implemented a framework (**JavaDaptor**) for the evolution of Java applications during runtime without stopping them [10];
- modeled and implemented a framework (**FiGA**) that uses design information to guide the evolution of a running system [89]; and
- extended the Petri net model (**reflective Petri nets**) to support reflective systems that can update without stopping [8].

This research involved collaborations with: **Gunter Saake** (Otto-von-Guericke-Universität Magdeburg), **Robert France** (Colorado State University), and **Lorenzo Capra** (University of Milan).

2008. Software Quality, Comprehension, and Testing. I addressed the importance of quality and stability in the software lifecycle beyond code writing. In this context, I:

- developed an **empirical framework** to measure the quality of feature-based and aspect-based programs [73, 13] and one for language implementation [25];
- am developing various **code representation models** [28, 30] for use in conjunction with **deep learning** techniques for automatic code comprehension;
- tackled software stability by developing approaches for **reducing tests** to be executed when software is updated [23, 24] and for **load monitoring** during the execution of Erlang applications [26].

This research involved collaborations with: **Alessandro Garcia** (Lancaster University), **Alessandro Marchetto** (Fondazione Bruno Kessler), **Sudipto Ghosh** (Colorado State University), and **Francesco Cesarini** (Erlang Solutions).

2009. Modular Implementation of Programming Languages. In the contemporary era, the use of domain-specific languages is common, but their development remains complex and requires diverse technical knowledge. In this context, I:

- developed a framework (**Neverlang**) [14, 29, 31] that allows the decomposition of the implementation of a programming language into autonomous components that implement each linguistic construct, enabling easy composition and removal by the final compiler/interpreter, fostering language reuse and evolution;

- developed a framework (**μ -DSU**) that supports the evolution of a running application through dynamic evolution of the language interpreter used to implement the application [20];
- developed a methodology for the **gradual teaching** of programming [15] and to support the **agile development** of programming languages [31].

This research involved collaboration with **Awais Rashid** and **Ruzanna Chitceyan** (University of Bristol).

2013. Language Product Line. Combining concepts from software product lines with those of modular programming languages to support modular design and evolution of a programming language. Specifically, I:

- developed a tool (**AiDE**) [90, 96] that allows the graphical selection of which components should be part of the final language; and
- integrated AiDE with the *de facto* standard for software product lines (**FeatureIDE**) [106].

This research involved collaborations with: **Benoît Combemale** (Université de Rennes 1), **Thomas Kühn** and **Uwe Aßmann** (Technische Universität Dresden).

Note that the timeline provided is intended as a starting point for each particular research direction, and the various directions are not mutually exclusive.

Participation in Funded Research Projects

Principal Investigator of Funded Projects based on Competitive Calls

2005-10-15→2008-03-31. Principal Investigator of the project “RAMSES: Reflective and Adaptive Middleware for Software Evolution of Non-Stopping Information Systems,” funded by **DFG (The German Research Foundation)** for **219,500€**. The funding supported **Ahmed Ghoneim’s Ph.D.** and two semestral grants for research support (utilized by **Jörg Liebig** and **Christian Hübner**).

2007-02-09→2009-02-08. Principal Investigator of the University of Milan’s Unit for the **PRIN** project “Object-Oriented and Aspect-Oriented Programming, Computational Reflection, Meta-Data for the Unpredictable Evolution of Software (EOS-DUE),” co-funded by **MIUR**.

2008-04-01→2011-08-31. Principal Investigator of the project “RAMSES II: Reflective and Adaptive Middleware for Software Evolution of Non-Stopping Information Systems,” funded by **DFG (The German Research Foundation)** for **284,000€**. The funding supported **Mario Pukall’s Ph.D.** and two semestral grants for research support (utilized by **Alexander Grebhahn** and **Reimar Schöter**). This project is a continuation of the RAMSES project.

2010-03-22→2012-09-22. Principal Investigator of the University of Milan’s Unit for the **PRIN** project “Composition and Evolution of Advanced Object Systems (DISCO),” co-funded by the Ministry of Education, University and Research (MIUR).

2012-09-01→2013-08-31. Responsible for the University of Milan’s Unit for the project “IP-ViOpe: Learning Computer Programming in Virtual Environment.” Project co-funded by the **European Community** under the chapter **Lifelong Learning: Erasmus Intensive Programme**.

2013-09-01→2014-08-31. Responsible for the University of Milan’s Unit for the project “IP-ViOpe: Learning Computer Programming in Virtual Environment.” Project co-funded by the **European Community** under the chapter **Lifelong Learning: Erasmus Intensive Programme. Renewal**.

2016-01-01→2019-12-31. Principal Investigator of the project titled “Modern Methods for Complex Systems.” Funded under the Support Plan for Research (PSR) of the University of Milan, Line 2. The project involved **6 researchers** (Walter Cazzola, Paolo Boldi, Lorenzo Capra, Alberto Momigliano, Massimo Santini, and Sebastiano Vigna) and some Ph.D. students. The project received **three renewals** (total duration of 4 years) for a total funding of **24,123€**.

2021-01-01→2023-06-30. Principal Investigator of the Transition Grant funded under Line 5 (Transition Grant PRIN 2017) of the Support Plan for Research (PSR) of the University of Milan. Access to funding was conditional on having a PRIN 2017 proposal judged **eligible but not funded** due to lack of funds. The funding amount is **15,000€**.

2020-01-01→ Responsible for the project titled “Theory and Practice for Software Monitoring and Maintenance (ToPa-SoMMA).” Funded under Line 2 of the Support Plan for Research (PSR) of the University of Milan. The project involved **7 researchers** (Walter Cazzola, Paolo Boldi, Lorenzo Capra, Alberto Momigliano, Massimo Santini, Sebastiano Vigna, and Andrea Visconti) and some Ph.D. students. The project is at the **second renewal** for a current funding of **31,500€**.

2022-06-01→2025-05-31. Principal Investigator of the **PRIN 2020** project titled «Typeful Language Adaptation for Dynamic, Interacting and Evolving Systems (T-LADIES).» The project involves **5 units** (MI, GE, CT, MORE, and CNR-PI) and is **financed** for approximately **950,000€** (approximately 855,000€ MUR financing). The project includes funding for a **30-month research grant** for Dr. Favalli starting from February 2023 and a **second grant** for Dr. Bertolotti for 18 months starting from November 2023.

Responsibilities for Studies and Scientific Research Entrusted by Qualified Public and Private Institutions

2003-04→2003-04. **Holder of a grant** from **Microsoft** for the research titled “SNA servants.” The aim of the research was the discovery of services and their integration into the application independently of the technologies used for service and application development.

- 2012-10→2012-12.** Responsible for the University of Milan's Unit (part of the MPXlab consortium) for the project "ENEL care" commissioned by **ENEL**. The research aimed at profiling ENEL customers and integrating data from other sources (e.g., ENEL's mobile app, Facebook, ...) to tailor website/app advertising to customers' interests. Funding amount: **70,000€ + VAT**.
- 2012-10→2013-12.** The National Agency for Regional Health Services (**AGENAS**) within the MATRICE project funded by the **Ministry of Health** entrusted me with the development of part of the IT infrastructure, including the creation of a domain-specific language using **Neverlang** (a product of the ADAPT-lab I direct). The MATRICE project uses administrative flows from various information systems with different formats to understand how people with certain chronic and complex pathologies (diabetes, ischemic heart disease, heart failure, hypertension, dementia) are cared for. Currently, the MATRICE project is being tested in half of the Italian Local Health Authorities (ASL). The funding consisted of a **grant for Ph.D. student E. Vacchi (supervised by me) of 10,000€** and coverage of expenses for system deployment (**5,000€**).
- 2013-01→2015-01.** Scientific leader of the project "TylFramework" funded by Tyl Consulting. The research required the definition of a programming language (called TylLanguage) whose specific domain was the construction of business applications. TylLanguage was implemented using **Neverlang**, a framework developed in the ADAPT-lab I direct. Funding of **24,000€ + VAT**.
- 2013-11→2014-04.** The **Tuscany Regional Health Agency** entrusted me with the design of a domain-specific language oriented towards natural language use and intended for querying medical-pharmaceutical databases related to diabetic patients. The research is part of the European project "**European Medical Information Framework (EMIF)**" (WP12). The **Neverlang** framework developed by the ADAPT-lab, which I direct, was used for the research. Funding of **5,000€ + VAT**.
- 2017-01→2021-01.** Principal Investigator of the feasibility study for a domain-specific language for interaction with the APIs of various blockchains such as HyperLedger. Study commissioned by DATABIZ s.r.l. for an amount of **24,000€ + VAT**.
- 2020-03→2021-08.** Principal Investigator of the feasibility study for the use of tensor-processor units (Huawei's ATLAS and NVIDIA's Jetson) in real-time recognition and tracking of people using machine learning techniques. Study commissioned by MOBIMESH s.r.l. for an amount of **27,000€ + VAT**.
- 2021-01→2023-01.** Principal Investigator of the industrial project titled "ROSiE: ROS in Erlang." Funded by the **Erlang Ecosystem Foundation**. The project aims to integrate ROS (Robot Operating System) with Erlang to leverage the features of this language, such as dynamic code updates and increased reliability in communications. **Funding 9,700€ + VAT**.
- 2022-06→2025-07.** Principal Investigator of the industrial project titled "COBOL on the Java Virtual Machine." The project, lasting 36 months, is funded by RES IT. The project aims to implement a COBOL interpreter for the JVM, allowing interoperability with Java code and facilitating the migration of obsolete and difficult-to-maintain COBOL software to Java. **Funding of 49,500€ + VAT**.
- 2023-04→2024-09.** Principal Investigator of the industrial project: "Distributed neural networks using functional languages." Funded by VoiSmart s.r.l. and MOBIMESH inPiazza s.r.l. **Funding of 45,000€ + VAT**.

Participation in Research Projects

- 2000-10-01→2003-03-31.** Participation in the **European Project** (IST 1999-20805) titled "PAST: exPeriencing Archaeology across Space and Time" as a member of the University of Genoa's unit. The project was co-funded under the 5FP by the European Community.
- 2003-01-01→2006-01-01.** Participation in the **FIRB project** titled "WebMinds" as a member of the University of Milan's unit coordinated by Prof. Claudio Bettini. Project No. RBNE01WEJT 005 funded by MIUR.
- 2004-01-01→2006-06-30.** Participation in the **European Project** (IST 508013-STP) titled "Agamemnon: Pictures from the Past: a Wireless Network of Magical Digital Cameras and Palmtops for Archaeological Travels Through Time" as a member of the University of Genoa's unit. The project was an STREP project co-funded under the 6FP by the European Community.
- 2004-01-01→2006-12-31.** Participation in the **European Project** (IST-1-508015) titled "DOC@HAND: Knowledge sharing and decision support for healthcare professionals" as a member of the University of Genoa's unit. The project was an STREP project co-funded under the 6FP by the European Community.
- 2004-11-30→2006-12-29.** Participation in the project titled "Extensible Object Systems (EOS)" as a member of the University of Genoa's unit. **PRIN Project** co-funded by the Ministry of Education, University and Research (MIUR). Project coordinated by Prof. Elena Zucca.
- 2012-09-01→2014-09-01.** Participation in the project titled "Consistency Checking for Adaptive Service-Based System Based on Reflective Petri Nets" as an expert in "Reflective Petri Nets." Project coordinated by Dr. Ying Liu of Northeastern University (China) and **funded by the Chinese National Science Foundation** for 2012-2014 (2 years starting from September 2012).
- 2013-02-01→2016-02-01.** Participation in the project titled "CINA: Compositionality, Interaction, Negotiation, Autonomy for the future ICT society" as a member of the University of Genoa's unit; **PRIN Project** co-funded by MIUR. Project coordinated by Prof. Rocco De Nicola.

Reviewing Activities for International and National Projects

- 2010.** I served as a reviewer for a grant application for the ETH Individual Investigator's Research Award (**ETHIRA**) from the **ETH Zürich Research Commission**.
- 2013.** I served as a reviewer for several projects submitted to the **PRIN 2012** program published by MIUR.
- 2018.** I served as a reviewer for a grant application to the Strategic Research Programme (**SRP**) for the Research Council of Vrije Universiteit Brussel.
- 2021.** I served as a reviewer for a grant application to the **NWO Talent Programme** (Veni Scheme) for the Dutch Research Council.
- 2023-24.** I was a member of the Advisory Committee for the XL cluster evaluating projects submitted to the **NWO Open Competition Domain Science** for the Dutch Research Council. I reviewed 13 project proposals.

Fellowships, Visiting, and Scientific Recognitions

Formal Assignment of Research Positions at Foreign Universities

- 2004-07-01→2007-02-16. Advisor and Co-Supervisor** (formally only from June 2005, informally since the summer of 2004) for the **Ph.D. in Computer Science of Dr. Ahmed Ghonaim**. Degree awarded on February 16, 2007, defending the thesis titled "RAMSES: a Reflective and Adaptive Middleware for Software Evolution of Nonstopping Systems" at Otto-von-Guericke-Universität Magdeburg.
- 2008-01-01→2012-03-22. Advisor and Co-Supervisor** (formally only from June 2005, informally since the summer of 2004) for the **Ph.D. in Computer Science of Dr. Mario Pukall**. Degree awarded on March 22, 2012, defending the thesis titled "Dynamic Evolution in Java" at Otto-von-Guericke-Universität Magdeburg.
- 2012-05-12→2012-05-27. 2-week Fellowship** at the Computer Science Department of Colorado State University (Fort Collins, CO, USA), research assignment, and student supervision (during this period, I began supervising the thesis work of now Dr. Mohammed Al-Refai).
- 2012-07-01→2019-04-26. Advisor and Co-Supervisor** (formally only from October 30, 2015, informally since the summer of 2012) for the **Ph.D. in Computer Science of Dr. Mohammed Al-Refai**. Degree awarded on April 29, 2019, defending the thesis titled "Towards Model-Based Regression Test Selection" at Colorado State University.
- 2015-07-01→ Affiliation to the faculty** of the Computer Science Department at **Colorado State University**. Affiliation for free for research activities, project participation, and supervision of theses and doctoral students. As of the application date, it has been **8 years**.
- 2022-01-01→ Advisor and Co-Supervisor** for the **Ph.D. in Computer Science of Dr. Gabriele Maurina**. Degree to be completed in 2026.

Visiting Periods at International Research Centers

- **September and October 2001.** Visiting period as a young researcher at the Tokyo Institute of Technology (Titech), Japan.
- **July 2005.** Visiting period as a researcher at Otto-von-Guericke-Universität Magdeburg, Germany.
- **December 2005.** Visiting period as a researcher at Otto-von-Guericke-Universität Magdeburg, Germany.
- **February 2007.** Visiting period as a researcher at Otto-von-Guericke-Universität Magdeburg, Germany.
- **May 2012.** Visiting period as a researcher at Colorado State University, USA.
- **September 2013.** Visiting period as a researcher at Colorado State University, USA.
- **January 2019.** Visiting period as a researcher at Technische Universität Dresden, Germany.

Scientific Recognitions

- 2005-07-24. Invited Keynote** titled "On the Join Point Model Problems: Design Information Based Approaches" invited to a meeting of the AOSD-Europe Excellence Network (Financed by the European Community) held in Glasgow, Scotland.
- 2006-10-01.** The article: "Walter Cazzola and Sonia Pini. Join Point Patterns: a High-Level Join Point Selection Mechanism." was awarded as the **best paper** presented at the 9th International Workshop on Aspect-Oriented Modeling.
- 2009-09-14. Invited speech** titled "Cogito, Ergo Muto!" at the first International Workshop on Self-Organizing Architectures (SOAR'09). Co-located with the third edition of the European Conference on Software Architecture (ECSA 2009) in Cambridge, United Kingdom.
- 2013-01-01→2018-12-31.** Elected Vice President (for 3 terms of 2 years each) of the Association Internationale pour les Technologies Objets (AITO). <http://aito.org/> AITO is the association behind the organization of ECOOP (The European Conference on Object-Oriented Programming) and consists of a steering committee of 6 people elected by the association members.

- 2013-07-01**→ Member of the GEMOC initiative. The GEMOC initiative is an international initiative aimed at coordinating and disseminating research results related to supporting the coordinated use of different languages (both modeling and programming). This initiative introduces the concept of language globalization, i.e., the use of multiple languages for socio-technological coordination required by the engineering of modern software systems. <http://gemoc.org/>.
- 2016-12-13. Invited Keynote Speaker** at the 15th Workshop on Adaptive and Reflective Middleware (ARM'16), Trento, Italy. The keynote provided an overview of my research on reflective frameworks, particularly their use in seamless adaptation of running systems.
- 2021-12-31.** The article “Walter Cazzola, Sudipto Ghosh, Mohammed Al-Refai, and Gabriele Maurina. Bridging the Model-to-Code Abstraction Gap with Fuzzy Logic in Model-Based Regression Test Selection.” has been awarded the **2021 SoSyM Best Paper Award**. SoSyM is the journal published by Springer on Software Systems and Modeling.
- 2023-10-23.** The article “Walter Cazzola and Luca Favalli. Exceptions all Over the Shop: Modular, Customizable, Language-independent Exception Handling Layer.” has been awarded the **Best Paper Award** at the International Conference on Software Language Engineering (SLE'23) in Cascais, Portugal.

Scientific Activities Organization

Participation in Steering Committees

- 2010-06**→ Member of AITO: Association Internationale pour les Technologies Objects (<http://www.aito.org>) (**steering committee** of ECOOP).
- 2013-01**→**2018-12** **Elected Member of the Executive Board and Vice President** of AITO (Association Internationale pour les Technologies Objects (<http://www.aito.org>)), the steering committee of the European Conference on Object-Oriented Programming (ECOOP). The **6 members of the executive board** of ECOOP are elected by the respective community. After 3 terms (each term lasting 2 years), I did not make myself available for another term.
- 2023-06**→ Member of the **steering committee** of the International Conference on Software Language Engineering (SLE).

Service for International Journals

- 2014-06-23**→**2018-12-31.** Member of the editorial board of the **Journal of Computer Languages, Systems and Structures** published by Elsevier.
- 2019-01-01**→ **Member** of the editorial board of the **Journal of Computer Languages** published by Elsevier.
- 2019-01-01**→ **Associate editor** of the **Journal of Computer Languages** published by Elsevier.
- 2023-05-25**→ **Executive Associate editor** of the **Journal of Systems and Software** published by Elsevier.

Conference Chairships

- 2006-10. Tool Exhibition Chair** for the ninth edition of the ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MoDELS'06). Held in Genoa, Italy.
- 2009-07. Organizing Co-Chair** for the 23rd European Conference on Object-Oriented Programming (ECOOP 2009). ECOOP is the premier conference in Europe for object-oriented languages and systems. The 2009 edition hosted approximately **350 participants**, mostly international. It **lasted 5 days** and featured various co-located events, including **12 workshops**, **1 summer school** (with 7 seminars by renowned international speakers), **1 doctoral symposium** (providing doctoral students the opportunity to present their ideas and receive feedback from experts), and 2 keynotes (1 industrial and 1 academic).
- 2013-06. Workshop Co-Chair** (with Professor Michel Wermelinger) for the seventeenth European Conference on Software Maintenance and Reengineering (CSMR 2013). Held in Genoa, Italy.
- 2014-04. Demos Chair** for the thirteenth edition of the International Conference on “Modularity (Modularity 2014)” (formerly known as the International Conference on “Aspect-Oriented Software Development”). Held in Lugano, Switzerland.
- 2015-03. Workshop Chair** for the fourteenth edition of the International Conference on Modularity (Modularity'15), formerly the International Conference on Aspect-Oriented Software Development (AOSD). Held in Fort Collins, CO, USA.
- 2017-09. Data, Demonstrations and Tools Track Co-Chair** (with Dr. Maurice ter Beek) for the twenty-first International Systems and Software Product Line Conference (SPLC'17) in Seville, Spain.
- 2019-03. Workshop Co-Chair** (with Professor Stefan Marr) for the third edition of the International Conference on the Art, Science, and Engineering of Programming (<Programming>'19) in Genoa, Italy.
- 2022-12. Program Co-Chair**, with Dr. Lola Burgueño, for the fifteenth edition of the ACM SIGPLAN International Conference on Software Language Engineering (SLE'22). Co-located with SPLASH 2022 in Auckland, New Zealand.

Editor

- 2000-07. Guest co-editor** (with Francesco Tisato and Robert J. Stroud) of volume 1826 titled “Reflection and Software Engineering” in the series **Lecture Notes in Computer Science** published by Springer.
- 2007-01. Guest co-editor** (with Shigeru Chiba and Gunter Saake) of the special issue on “Aspect-Oriented Programming and Development for Software Evolution” in the journal **Transaction on Aspect-Oriented Software Development** published by Springer.

2007-08. Guest co-editor (with Jeff Gray, Dominik Stein, Jörg Kienzle, Tzilla Elrad, and Omar Aldawud) of the special issue on “Aspect-Oriented Modeling” in the journal **Journal of Object Technology** published by ETH Zürich and now by AOSA.

2023-12. Guest co-editor, with Lola Burgueño and Dimitris Kolovos, of the special issue titled “Software Language Engineering” to be published at the end of 2023 in the **Journal of Systems and Software** published by Elsevier. For this activity, I also hold the role of **Executive Associate Editor**.

Reviewer

As an expert in the Java core reflection library, I reviewed the book:

- Ira R. Forman and Nate B. Forman. *Java Reflection in Action*. Manning Publications, November 2004.

As an expert in aspect-oriented programming, Cambridge University Press asked me to review the proposal for the book

- Awais Rashid, Jean-Claude Royer, and Andreas Rummeler. *Building Ample Software Product Lines*.

which was published in 2010.

I have served as a **reviewer**, with regularity, for the following **journals** (grouped by publisher):

IEEE.

- IEEE Computer,
- IEEE Software,
- IEEE Transaction on Software Engineering, and
- IEEE Transactions on Emerging Topics.

Springer.

- Empirical Software Engineering,
- Software and Systems Modeling, and
- Transaction on Aspect Oriented Software Development.

Elsevier.

- Journal of Computer Languages, Systems and Structures,
- Journal of Information and Software Technology,
- Journal of Logical and Algebraic Methods in Programming,
- Journal of Systems and Software, and
- Science of Computer Programming.

ACM.

- Communications of the ACM.

John Wiley and Sons.

- Software: Practice and Experience and
- Theory and Practice of Object Systems.

AOSA.

- Journal of Object Technology.

Organization of International Workshops

1998-09. Co-organizer (with Flavio De Paoli, Carlo Bellettini, Sandro Morasca, Andrea Sosio, and Francesco Tisato) of the 15th edition of the IFAC Workshop on Distributed Computer Control Systems (DCCS’98). Como, Italy.

1999-11. Co-organizer (with Franceso Tisato and Robert J. Stroud) of the 1st “Workshop on Object-Oriented Reflection and Software Engineering (OORaSE’99)”. Co-located with the International Conference on Object-oriented Programming, Systems, Languages, and Applications (OOPSLA’99) in Denver, CO, USA.

2000-06. Co-organizer (with Shigeru Chiba and Thomas Ledoux) of the 1st “Workshop on Reflection and Meta-Level Architectures (EWRMA’00)”. Co-located with the European Conference on Object-Oriented Programming (ECOOP 2000) in Cannes, France.

2001-09. Co-organizer (with Gordon Blair, Roy Campbell, Jean-Charles Fabre, Robert J. Stroud, and Ian Welch) of the 1st “Workshop on Experience with Reflective Systems”. Co-located with Reflection 2001 in Kyoto, Japan.

2004-06. Co-organizer (with Shigeru Chiba and Gunter Saake) of the 1st “Workshop on Reflection, AOP and Meta-Data for Software Evolution (RAM-SE’04)”. Co-located with the European Conference on Object-Oriented Programming (ECOOP 2004) in Oslo, Norway.

2005-07. Co-organizer (with Shigeru Chiba, Gunter Saake, and Tom Tourwé) of the 2nd “Workshop on Reflection, AOP and Meta-Data for Software Evolution (RAM-SE’05)”. Co-located with the European Conference on Object-Oriented Programming (ECOOP 2005) in Glasgow, Scotland.

2006-07. Co-organizer (with Shigeru Chiba, Yvonne Coady, and Gunter Saake) of the 3rd “Workshop on Reflection, AOP and Meta-Data for Software Evolution (RAM-SE’06)”. Co-located with the European Conference on Object-Oriented Programming (ECOOP 2006) in Nantes, France.

- 2006-10.** Co-organizer (with Omar Aldawud, Tzilla Elrad, Jeff Gray, Jörg Kienzle, and Dominik Stein) of the 9th edition of the “Workshop on Aspect-Oriented Modeling (AOM@MoDELS’06)”. Co-located with the International Conference on Model Driven Engineering Languages and Systems (MoDELS 2006) in Genoa, Italy.
- 2007-03.** Co-organizer (with Omar Aldawud, Tzilla Elrad, Jeff Gray, Jörg Kienzle, and Dominik Stein) of the 10th edition of the “Workshop on Aspect-Oriented Modeling (AOM@AOSD’07)”. Co-located with the International Conference on Aspect-Oriented Software Development (AOSD 2007) in Vancouver, Canada.
- 2007-07.** Co-organizer (with Shigeru Chiba, Yvonne Coady, Stephane Ducasse, Günter Kniesel, Manuel Oriol, and Gunter Saake) of the 4th “Workshop on Reflection, AOP and Meta-Data for Software Evolution (RAM-SE’07)”. Co-located with the European Conference on Object-Oriented Programming (ECOOP 2007) in Berlin, Germany.
- 2007-10.** Co-organizer (with Omar Aldawud, Tzilla Elrad, Jeff Gray, Jörg Kienzle, and Dominik Stein) of the 11th edition of the “Workshop on Aspect-Oriented Modeling (AOM@MoDELS’07)”. Co-located with the International Conference on Model Driven Engineering Languages and Systems (MoDELS 2007) in Nashville, Tennessee.
- 2008-04.** Co-organizer (with Omar Aldawud, Tzilla Elrad, Jeff Gray, Jörg Kienzle, and Dominik Stein) of the 12th edition of the “Workshop on Aspect-Oriented Modeling (AOM@AOSD’08)”. Co-located with the International Conference on Aspect-Oriented Software Development (AOSD 2008) in Brussels, Belgium.
- 2008-07.** Co-organizer (with Shigeru Chiba, Manuel Oriol, and Gunter Saake) of the 5th “Workshop on Reflection, AOP and Meta-Data for Software Evolution (RAM-SE’08)”. Co-located with the European Conference on Object-Oriented Programming (ECOOP 2008) in Paphos, Cyprus.
- 2009-03.** Co-organizer (with Omar Aldawud, Thomas Cottenier, Jeff Gray, Jörg Kienzle, and Dominik Stein) of the 13th edition of the “Workshop on Aspect-Oriented Modeling (AOM@AOSD’09)”. Co-located with the International Conference on Aspect-Oriented Software Development (AOSD 2009) in Charlottesville, Virginia.
- 2009-07.** Co-organizer (with Shigeru Chiba, Manuel Oriol, and Gunter Saake) of the 6th “Workshop on Reflection, AOP and Meta-Data for Software Evolution (RAM-SE’09)”. Co-located with the European Conference on Object-Oriented Programming (ECOOP 2009) in Genoa, Italy.
- 2009-10.** Co-organizer (with Omar Aldawud, Thomas Cottenier, Jeff Gray, Jörg Kienzle, and Dominik Stein) of the 14th edition of the “Workshop on Aspect-Oriented Modeling (AOM@MoDELS’09)”. Co-located with the International Conference on Model Driven Engineering Languages and Systems (MoDELS 2009) in Denver, Colorado.
- 2010-06.** Co-organizer (with Shigeru Chiba, Manuel Oriol, and Gunter Saake) of the 7th “Workshop on Reflection, AOP and Meta-Data for Software Evolution (RAM-SE’10)”. Co-located with the European Conference on Object-Oriented Programming (ECOOP 2010) in Maribor, Slovenia.
- 2010-10.** Co-organizer (with Omar Aldawud, Thomas Cottenier, Jeff Gray, Jörg Kienzle, and Dominik Stein) of the 15th edition of the “Workshop on Aspect-Oriented Modeling (AOM@MoDELS’10)”. Co-located with the International Conference on Model Driven Engineering Languages and Systems (MoDELS 2010) in Oslo, Norway.
- 2011-03.** Co-organizer (with Sebastian Gonzalez, Michael Haupt, Philippe Lahire, and Stefan van Baelen) of the 2nd edition of the “Workshop on Variability and Composition (VariCOMP’11)”. Co-located with the International Conference on Aspect-Oriented Software Development (AOSD 2011) in Porto de Galinhas, Brazil.
- 2011-06.** Co-organizer (with Shigeru Chiba, Manuel Oriol, and Gunter Saake) of the 8th “Workshop on Reflection, AOP and Meta-Data for Software Evolution (RAM-SE’11)”. Co-located with the International Conference on the Technology of Object-Oriented Languages and Systems (TOOLS 2011) in Zurich, Switzerland.
- 2012-03.** Co-organizer (with Sebastian Gonzalez, Michael Haupt, Philippe Lahire, and Stefan van Baelen) of the third edition of the “Workshop on Variability and Composition (VariCOMP’12)”. Co-located with the International Conference on Aspect-Oriented Software Development (Modularity-AOSD 2012) in Potsdam, Germany.
- 2012-06.** Co-organizer (with Shigeru Chiba, Manuel Oriol, and Gunter Saake) of the 9th “Workshop on Reflection, AOP and Meta-Data for Software Evolution (RAM-SE’12)”. Co-located with the European Conference on Object-Oriented Programming (ECOOP 2012) in Beijing, China.
- 2013-03.** Co-organizer (with Sebastian Gonzalez, Dimitri Van Landuyt, and Philippe Lahire) of the 4th edition of the “Workshop on Variability and Composition (VariCOMP’13)”. Co-located with the twelfth edition of the International Conference on Aspect-Oriented Software Development (Modularity: AOSD’13) in Fukuoka, Japan.
- 2013-07.** Co-organizer (with Benoît Combemale and Robert France) of the first “International Workshop on the Globalization of Domain Specific Languages (GlobalDSL’13)”. Co-located with ECMFA, ECOOP, and ECSA 2013 in Montpellier, France.
- 2015-09.** Co-organizer (with Ruzanna Chitchyan and Awais Rashid) of the first “International Workshop on Software Engineering for Social Sustainability (SE4SS’15)”. Co-located with the third edition of the International Conference on ICT for Sustainability (ICT4S’15) in Copenhagen, Denmark.

Participation in International Program Committees

- 2001-09.** Member of the program committee of the third edition of the International Conference on Metalevel Architectures and Separation of Crosscutting Concerns (Reflection’01) in Kyoto, Japan.
- 2003-02.** Member of the program committee of the eleventh edition of the Euromicro International Conference on Parallel, Distributed and Network-based Processing (PDP 2003) in Genoa, Italy.
- 2004-02.** Member of the program committee of the twelfth edition of the Euromicro International Conference on Parallel,

- Distributed and Network-based Processing (PDP 2004) in La Coruña, Spain.
- 2005-02.** Member of the program committee of the thirteenth edition of the Euromicro International Conference on Parallel, Distributed and Network-based Processing (PDP 2005) in Lugano, Switzerland.
- 2005-03.** Member of the program committee of the first edition of the track on Programming for Separation of Concerns of the 20th edition of the ACM Symposium on Applied Computing (SAC-PSC'05) in Santa Fe, NM, USA.
- 2006-04.** Member of the program committee of the second edition of the track on Programming for Separation of Concerns of the twenty-first edition of the ACM Symposium on Applied Computing (SAC-PSC'06) in Dijon, France.
- 2007-03.** Member of the program committee of the third edition of the track on Programming for Separation of Concerns of the twenty-second edition of the ACM Symposium on Applied Computing (SAC-PSC'07) in Seoul, South Korea.
- 2008-03.** Member of the program committee of the fourth edition of the track on Programming for Separation of Concerns of the twenty-third edition of the ACM Symposium on Applied Computing (SAC-PSC'08) in Fortaleza, Ceará, Brazil.
- 2009-03.** Member of the program committee of the fifth edition of the track on Programming for Separation of Concerns of the twenty-fourth edition of the ACM Symposium on Applied Computing (SAC-PSC'09) in Honolulu, Hawaii, USA.
- 2010-03.** Member of the program committee of the sixth edition of the track on Programming for Separation of Concerns of the twenty-fifth edition of the ACM Symposium on Applied Computing (SAC-PSC'10) in Sierre, Switzerland.
- 2011-03.** Member of the program committee of the seventh edition of the track on Programming for Separation of Concerns of the twenty-sixth edition of the ACM Symposium on Applied Computing (SAC-PSC'11) in Tai-Chung, Taiwan.
- 2012-03.** Member of the program committee of the eighth edition of the track on Programming for Separation of Concerns of the twenty-seventh edition of the ACM Symposium on Applied Computing (SAC-PSC'12) in Riva del Garda, Italy.
- 2012-06.** Member of the program committee for the fourth edition of the Workshop on Hot Topics in Software Upgrades (HotSWUp 2012). Co-located with the International Conference on Software Engineering (ICSE 2012) in Zürich, Switzerland.
- 2013-03.** Member of the program committee for the seventeenth edition of the European Conference on Software Maintenance and Reengineering (CSMR 2013). Genoa, Italy.
- 2013-03.** Member of the program committee for the twelfth edition of the International Conference on Aspect-Oriented Software Development (Modularity: AOSD 2013). Fukuoka, Japan.
- 2013-03.** Member of the program committee for the 10th edition of the track on Object-Oriented Programming Languages and Systems at the 28th edition of the ACM Symposium on Applied Computing (SAC-OOPS'13), Coimbra, Portugal.
- 2013-03.** Member of the program committee for the ninth edition of the track on Programming for Separation of Concerns at the 28th edition of the ACM Symposium on Applied Computing (SAC-PSC'13), Coimbra, Portugal.
- 2014-03.** Member of the program committee for the tenth edition of the track on Programming for Separation of Concerns at the 29th edition of the ACM Symposium on Applied Computing (SAC-PSC'14), Gyeongju, South Korea.
- 2014-04.** Member of the external review committee (dedicated to managing articles submitted by program committee members) for the 13th edition of the International Conference on Modularity (Modularity'14), Lugano, Switzerland.
- 2015-03.** Member of the program committee for the 14th edition of the International Conference on Modularity (Modularity'15), formerly the International Conference on Aspect-Oriented Software Development (AOSD), Fort Collins, CO, USA.
- 2015-04.** Member of the program committee for the eleventh edition of the track on Programming for Separation of Concerns at the 30th edition of the ACM Symposium on Applied Computing (SAC-PSC'15), Salamanca, Spain.
- 2016-03.** Member of the program committee for the fifteenth edition of the International Conference on Modularity (Modularity 2016) (previously known as the International Conference on Aspect-Oriented Software Development). Málaga, Spain.
- 2016-04.** Member of the program committee for the 30th edition of the track on Programming Languages at the 31st edition of the ACM Symposium on Applied Computing (SAC-PL'16), Pisa, Italy.
- 2016-06.** Member of the program committee for the Software Engineering Technology and Applications (SETA) Symposium of the 40th edition of the IEEE International Conference on Computers, Software and Applications (COMPSAC'16), Atlanta, Georgia, USA.
- 2016-10.** Member of the program committee for the nineteenth edition of the International Conference on Model Driven Engineering Languages and Systems (MoDELS 2016). Saint-Malo, France.
- 2017-04.** Member of the program committee for the 31st edition of the track on Programming Languages at the 32nd edition of the ACM Symposium on Applied Computing (SAC-PL'17), Marrakech, Morocco.
- 2017-04.** Member of the program committee for the 2nd edition of the International Workshop on Modularity in Modelling (MoMo'17). Co-located with the first International Conference on Art, Science, and Engineering of Programming (<Programming>'17) in Brussels, Belgium.
- 2017-04.** Member of the program committee for the second edition of the International Workshop on Live Adaptation of Software System (LASSY'17). Co-located with the first International Conference on Art, Science, and Engineering of Programming (<Programming>'17) in Brussels, Belgium.
- 2017-06.** Member of the program committee for the ninth edition of the International Workshop on Context-Oriented Programming (COP'17). Co-located with the European Conference on Object-Oriented Programming (ECOOP'17) in Barcelona, Spain.
- 2017-07.** Member of the program committee for the Software Engineering Technology and Applications (SETA) Symposium of the 41st edition of the IEEE International Conference on Computers, Software and Applications (COMPSAC'17),

Turin, Italy.

- 2017-09.** Member of the program committee for the fourteenth edition of the International Conference on Managed Languages and Runtimes (ManLang 2017) (previously known as the International Conference on Principles and Practices of Programming on the Java Platform (PPPJ)). Prague, Czech Republic.
- 2017-10.** Member of the program committee for the 10th edition of the International Conference on Software Language Engineering (SLE 2017). Co-located with the International Conference on Systems, Programming, Languages and Applications: Software for Humanity (SPLASH'17) in Vancouver, Canada.
- 2018-04.** Member of the program committee for the 32nd edition of the track on Programming Languages at the 33rd edition of the ACM Symposium on Applied Computing (SAC-PL'18), Pau, France.
- 2018-08.** Member of the program committee for the 44th edition of the International Conference organized by Euromicro on Software Engineering and Advanced Applications (SEAA'18). Prague, Czech Republic.
- 2018-11.** Member of the program committee for the 1st edition of the International Workshop on Software Language Engineering Body of Knowledge (SLEBoK'18). Co-located with the conference on Systems, Programming, Languages and Applications: Software for Humanity (SPLASH'18) in Boston, USA.
- 2018-11.** Member of the program committee for the 3rd edition of the International Workshop on Meta-Programming Techniques and Reflection (Meta'18). Co-located with the conference on Systems, Programming, Languages and Applications: Software for Humanity (SPLASH'18) in Boston, USA.
- 2018-11.** Member of the program committee for the eleventh edition of the ACM SIGPLAN International Conference on Software Language Engineering (SLE 2018). Event co-located with SPLASH 2018 in Boston, Massachusetts, USA.
- 2019-04.** Member of the program committee for the third edition of the International Conference on the Art, Science, and Engineering of Programming (<Programming> 2019). Genoa, Italy.
- 2019-04.** Member of the program committee for the 33rd edition of the track on Programming Languages at the 34th edition of the ACM Symposium on Applied Computing (SAC-PL'19), Limassol, Cyprus.
- 2019-08.** Member of the program committee for the 45th edition of the International Conference organized by Euromicro on Software Engineering and Advanced Applications (SEAA'19). Kallithea-Chalkidiki, Greece.
- 2019-09.** Member of the program committee for the twenty-third edition of the International Conference on Systems and Software Product Line Conference (SPLC 2019). Paris, France.
- 2020-04.** Member of the program committee for the 34th edition of the track on Programming Languages at the 35th edition of the ACM Symposium on Applied Computing (SAC-PL'20), Brno, Czech Republic.
- 2020-10.** Member of the program committee for the twenty-fourth edition of the International Systems and Software Product Line Conference (SPLC'20), Montreal, Canada (held online due to the pandemic).
- 2020-11.** Member of the program committee for the thirteenth edition of the ACM SIGPLAN International Conference on Software Language Engineering (SLE'20), Co-located with SPLASH 2020, Chicago, Illinois, USA (held online).
- 2021-09.** Member of the program committee for the twenty-fifth edition of the International Systems and Software Product Line Conference (SPLC'21), Leicester, United Kingdom (held online due to the pandemic).
- 2022-12.** Co-chair (with Lola Burgueño) of the program committee for the fifteenth edition of the ACM SIGPLAN International Conference on Software Language Engineering (SLE'22), Co-located with SPLASH 2022, Auckland, New Zealand.

Scientific Dissemination Activities

Seminars

Below is a list of seminars I have given to disseminate my research activities independently of paper presentations. For brevity, only the most important seminars held after obtaining the Ph.D. degree are reported.

- 2001-02-12.** “Communication-Oriented Reflection: a Way to Open Up the RMI Mechanism.” Ph.D. Dissertation, University of Milan, Milan, Italy.
- 2001-10-01.** Seminar titled “Communication-Oriented Reflection: a Way to Open Up the RMI Mechanism.” Organized by Prof. Satoshi Matsuoka and held at the Tokyo Institute of Technology (TITech), Tokyo, Japan.
- 2003-03-28.** Seminar titled “Smart Data Caching in Archaeological Wireless Applications: the PAST Solution.” Seminar held for the Final Review of the European Project PAST (IST 20805). Luxembourg City, Luxembourg.
- 2003-06-18.** Seminar titled “Computational Reflection: Definitions, Properties, and Applications” held for the Annual Plenary Meeting of the FIRB Project (Web-Minds). University of Naples, Naples, Italy.
- 2003-11-11.** Seminar titled “Implementing the Essence of Reflection: a Reflective Run-Time Environment” held for the Final Review of the Co-Financed Project NAPOLI. University of Pisa, Pisa, Italy.
- 2004-02-12.** Seminar titled “Seamless Nomadic System-Aware Servants.” Organized by Dr. Antonio Cisterino and held at the University of Pisa, Pisa, Italy, on February 12, 2004.
- 2005-05-07.** Seminar titled “RAMSES: Reflective and Aspect-oriented Middleware for Software Evolution.” Organized by Prof. Elena Zucca as part of the kick-off of the PRIN project: EOS and held at the University of Florence, Italy.

- 2005-06-22.** Seminar titled “Seamless Nomadic System-Aware Servants.” Organized by Prof. Vittorio Scarano within the FIRB WebMinds Project and held at the University of Salerno. The seminar is part of the GL4 contribution on “Wireless Systems and Location/Context-Aware Services” coordinated by Prof. Antonio Corradi.
- 2005-07-14.** Seminar titled “Client Adaptation to Face the Servers Heterogeneity Problem.” Organized by Prof. Gunter Saake at the Fakultät für Informatik, Otto-von-Guericke-Universität Magdeburg, Germany.
- 2005-12-09.** Seminar titled: “A Petri-Net Based Reflective Framework for the Evolution of Dynamic Systems” held at the Fakultät für Informatik, Otto-von-Guericke-Universität Magdeburg, Germany.
- 2006-01-09.** Seminar titled: “@Java: Annotations in Freedom.” Organized by Prof. Elena Zucca for the final review of the co-financed PRIN project Extended Object Systems (EOS) at the University of Genoa, Genoa, Italy.
- 2006-04-21.** Seminar titled: “RAMSES: A Reflective Middleware for Design-Oriented Software Evolution.” Organized by Dr. Antonio Cisternino and held at the University of Pisa, Pisa, Italy.
- 2007-12-03.** Seminar titled: “Aspect-Oriented Programming.” Organized by Prof. Francesco Tisato and held at the Department of Computer Science, Systems and Communication of the University of Milan Bicocca, Milan, Italy.
- 2008-09-11.** Seminar titled “ReverseЯ: a Quasi-Automatic Approach to Software Documentation.” Organized by Prof. Thomas Gross and Dr. Susanne Cech-Previtali and held at ETH Zurich, Switzerland.
- 2009-01-09.** Seminar titled: “ReverseЯ: a Quasi-Automatic Approach to Software Documentation” held within a meeting of the co-financed EOS-II project at the University of Turin, Turin, Italy.
- 2009-10-12.** Seminar titled: “Cogito, Ergo Muto!” Organized by Prof. Gunter Saake and held at the Fakultät für Informatik, Otto-von-Guericke-Universität Magdeburg, Germany, on October 12, 2009.
- 2010-04-21.** Seminar titled “Aspect-Oriented Programming & AspectJ” held as part of the seminar series on programming languages organized by the University of Genoa, Genoa, Italy.
- 2011-11-28.** Seminar titled “Self-Evolution under the Hood.” Organized by Professors Uwe Assmann, Nelly Bencomo, Betti Chang, and Robert France within their Dagstuhl Seminar on MoDELS@Run-Time, Dagstuhl, Warden, Germany.
- 2012-03-23.** Seminar titled: “Neverlang: A Compiler for a Non-Existent Language.” Organized by Prof. Gunter Saake and held at the Fakultät für Informatik, Otto-von-Guericke-Universität Magdeburg, Germany.
- 2012-05-22.** Seminar titled: “Neverlang: A Compiler for a Non-Existent Language.” Organized by Prof. Robert France and held at the Computer Science Department of Colorado State University, USA.
- 2013-02-04.** Seminar titled “Dynamic Adaptation under the Hood: JavAdaptor.” Organized by Prof. Rocco De Nicola at the kick-off of the PRIN project: CINA and held at the University of Pisa, Pisa, Italy.
- 2013-02-09.** Seminar titled “Fine-Grained Adaptation: Model-Driven Dynamic Software Adaptation.” Organized by Prof. Jörg Kienzle and held at the Bellairs Research Institute of McGill University, Barbados/Canada.
- 2013-07-04.** Seminar titled: “Evolvable and Reusable Domain Specific Languages in Neverlang” held at the European Conference on Object-Oriented Programming (ECOOP 2013) Summer School in Montpellier, France.
- 2013-09-27.** Seminar titled: “Dynamic Adaptation under the Hood: JavAdaptor.” Organized by Prof. Robert France at the Computer Science Department of Colorado State University, Fort Collins, CO, USA.
- 2015-07-07.** Seminar titled “Neverlang a Compiler for a Non-Existing Language.” Organized by Prof. Weng-Fai Wong and held at the Computer Science Department, National University of Singapore, Singapore.
- 2019-01-21.** Seminar titled: “Neverlang an Interpreter for a Non-Existent Language.” Organized by Prof. Uwe Assmann and Dr. Thomas Kühn and held at Technische Universität Dresden, Germany.

Invited Keynote at International Events

Below is a list of invited talks (e.g., keynotes) at international events given to disseminate my research activities.

- 2005-07-24.** Keynote titled “On the Join Point Model Problems: Design Information Based Approaches” invited to a meeting of the AOSD-Europe Excellence Network (Funded by the European Community) held in Glasgow, Scotland.
- 2006-04-06.** Talk titled “Ethical & Security Issues” invited to the International Conference Med-e-Tel organized by the European Community in Luxembourg City, Luxembourg. The talk presents part of my contribution to the European Project 6FP Doc@Hand: Knowledge Sharing and Decision Support for Healthcare Professionals (IST-1-508015).
- 2009-09-14.** Invited speech titled “Cogito, Ergo Muto!” at the first International Workshop on Self-Organizing Architectures (SOAR’09). Co-Located with the third edition of the European Conference on Software Architecture (ECSA 2009) in Cambridge, United Kingdom.
- 2015-07-03.** Invited Talk titled: “Gradually Learning Programming Supported by a Growable Programming Language” for the thirty-ninth Annual Computer Software and Applications Conference (COMPSAC’15) in Taichung, Taiwan.

- 2016-12-13.** Invited Keynote titled: “Dynamic Fine-Grained Adaptation at Hands: The JavAdaptor and FiGA cases” for the fifteenth Workshop on Adaptive and Reflective Middleware (ARM’16). Co-located with Middleware 2016 in Trento, Italy.
- 2018-03-09.** Invited presentation titled “Language Evolution to Support Dynamic Software Updating” at the first edition of the Language Development Meet-Up (LangDev’18). Organized by Prof. Tijs van der Storm at CWI, Amsterdam, Netherlands.
- 2021-10-14.** Invited presentation titled “Bridging the Model-to-Code Abstraction Gap with Fuzzy Logic in Model-Based Regression Test Selection” at the twenty-fourth edition of the International Conference on Model Driven Engineering Languages and Systems (MoDELS’21). Held online.
- 2023-10-24.** Invited presentation titled “Is Polyglot Programming Really a Thing?” at the nineteenth edition of the International Dynamic Language Symposium (DLS’23). Cascais, Portugal.

TEACHING ACTIVITIES

Teaching Activities in Undergraduate and Graduate Curricula

From a.y. 1996-97 to a.y. 2004-05

- Lecturer in the distributed systems course in the computer science undergraduate curriculum of the University of Genova.

From a.y. 2004-05 to a.y. 2006-07

- Lecturer in the special programming languages and techniques course in the computer science graduate curriculum of the University of Genova.

From a.y. 2003-04 to a.y. 2008-09

- Lecturer in the programming laboratory in the digital communication undergraduate curriculum of the University of Milano.

a.y. 2010-11

- Lecturer in the operating system course in the digital communication undergraduate curriculum of the University of Milano.

From a.y. 2005-06 to 2023-24 then every two a.y.

- Lecturer in the special programming techniques course in the computer science graduate curriculum of the University of Milano.

From a.y. 2009-10 to 2024-25 then every two a.y.

- Lecturer in the advanced programming course in the computer science graduate curriculum of the University of Milano.

From a.y. 2011-12 to now

- Lecturer in the programming languages course in the computer science undergraduate curriculum of the University of Milano.

From a.y. 2024-25 to now

- Lecturer in the programming course in the computer science undergraduate curriculum of the University of Milano.

Teaching Activities in PhD Curricula

Instructor for the Ph.D. in Computer Science at the University of Milan.

2004-06. 24-hour course titled “Reflection: State of the Art and Future Developments.”

2005-09. 24-hour course titled “From Reflection to Aspect-Oriented Programming: Advanced Techniques for Software Development.”

2009-09. 26-hour course titled “Evolved Development Paradigms.”

2014-04. 12-hour course titled “Modular Language Implementation.”

2023-03. 12-hour course (with Luca Favalli) for the **28th Bertinoro International Spring School 2023** titled “Shape Your Own Language.”

Organizer for the Ph.D. in Computer Science at the University of Milan.

2009-06 Title: “Search Engines Design and Development.” Instructor: Sebastiano Vigna.

2009-10 Title: “Implementation Techniques of AOP and Reflection.” Instructor: Shigeru Chiba.

2011-01 Title: “Systematic Debugging Techniques.” Instructor: Massimo Santini.

2011-02 Title: “Functional Programming in a Nutshell with Haskell and F#.” Instructors: Tamburelli, Giordano, Matteo Pradella, Matteo Rossi, and Giuseppe Maggiore.

2012-07 Title: “An Introduction to Reflection and Context-Oriented Programming.” Instructors: Mens, K., S. Gonzalez.

2012-09 Title: “Computational Types, Collection Types and Monads.” Instructor: Eugenio Moggi.

2013-03 Title: “Development by Contract.” Instructor: Mattia Monga.

2013-05 Title: “Systematic Debugging Techniques.” Instructor: Massimo Santini.

2014-09 Title: “Search Engines Design and Development.” Instructor: Sebastiano Vigna.

2014-11 Title: “From Lightweight Validation to Formal Certification.” Instructor: Alberto Momigliano.

2015-04 Title: “Special Topics in Domain Specific Languages.” Instructor: Marjan Mernik.

2015-06 Title: “Parallel Haskell on MultiCores and Clusters.” Instructor: Hans Wolfgang Loidl.

2015-11 Title: “Approximation Algorithms.” Instructor: Sebastiano Vigna.

2016-09 Title: “Structural Analysis of Petri Nets.” Instructor: Lorenzo Capra.

2020-01 Title: “Regression Test Selection and Prioritization.” Instructor: Sudipto Ghosh.

Since June 2006, **member of the committee** for the Ph.D. in Computer Science at the University of Milan.

Since **June 2008**, I have been **co-coordinator** (with Sebastiano Vigna) and **responsible** for the **curriculum** titled “Advanced Techniques in Software Design and Development” within the Ph.D. in Computer Science at the University of Milan. To date, under the auspices of the curriculum, **more than 15 Ph.D. courses** have been organized with national and international speakers.

I was the **Organizing Chair** of the second edition of the “**AOSD-Europe Summer School**”. The school was held in Genoa from 16-07-2007 to 20-07-2007, with the participation of thirty-five Ph.D. students and young researchers from major international research institutes. The school was part of the AOSD-Europe Excellence Network **funded by the European Community**. The school was intended for European Ph.D. students working in the field of Aspect-Oriented Software Development, organized annually in a different European city, and lasted one week. I have been a **member of the scientific board** from the third edition until the last one held in 2010.

Teaching Activities as Thesis Advisor

Ph.D. Program (10 Ph.D. candidates)

Ahmed Ghoneim obtained his Ph.D. on February 16, 2007, at Otto-von-Guericke-Universität Magdeburg, defending the thesis titled: “RAMSES: a Reflective and Adaptive Middleware for Software Evolution of Nonstopping Systems.” Thesis supervision and joint research work with Professor Gunter Saake of Otto-von-Guericke-Universität Magdeburg. The **Ph.D. was funded by the DFG project** titled “RAMSES: Reflective and Adaptive Middleware for Software Evolution of Non-Stopping Information Systems,” for which I was the **scientific coordinator**.

Sonia Pini earned her Ph.D. in computer science on June 29, 2007, at the University of Genoa, defending the thesis titled “Blueprint: A High-Level Pattern Based AOP Language.” Thesis supervision and joint research work with Professor Massimo Ancona of the University of Genoa.

Mario Pukall obtained his Ph.D. on March 22, 2012, at Otto-von-Guericke-Universität Magdeburg, defending the thesis titled “Dynamic Evolution in Java.” Thesis supervision and joint research work with Professor Gunter Saake of Otto-von-Guericke-Universität Magdeburg. The **Ph.D. was funded by the DFG project** titled “RAMSES-II: Reflective and Adaptive Middleware for Software Evolution of Non-Stopping Information Systems,” for which I was the **scientific coordinator**.

Edoardo Vacchi obtained his Ph.D. on March 13, 2015, at the University of Milan, defending the thesis titled “Programming Languages à la Carte.”

Albert Shaqiri obtained his Ph.D. on February 27, 2018, at the University of Milan, defending the thesis titled “Dynamic Language Updating.” The thesis received honors, the first honors in the Ph.D. in computer science at the University of Milan.

Mehdi Jalili obtained his Ph.D. on February 27, 2018, at the University of Milan, defending the thesis titled “Towards Change Validation in Dynamic System Updating Frameworks.”

Mohammed Al-Refai obtained his Ph.D. on April 26, 2019, at the Computer Science Department of Colorado State University, defending the thesis titled “Towards Model-Based Regression Test Selection.”

Luca Favalli obtained his Ph.D. on April 27, 2023, at the University of Milan, defending the thesis titled “The Dimensions of Variability Modeling.”

Francesco Bertolotti will obtain his Ph.D. on January 26, 2024, at the University of Milan, defending the thesis “★piler: Not a VM to rule no one.”

Gabriele Maurina will obtain his Ph.D. in 2026, at the Computer Science Department of Colorado State University, with a thesis on “Regression Test Selection.”

Graduate Degrees

I have supervised the thesis work of **over a hundred students** both at the University of Milan and the University of Genoa.

Undergraduate Degrees

I have supervised the thesis work of **over a sixty students** both at the University of Milan and the University of Genoa.

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