Alfonso Pierantonio

Curriculum Vitae et Studiorum

Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica
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1 Biographical notes

I was born in Atessa (Italy) on June 5th, 1964.

1.1 Education

1992 – 1996 **Technische Universität Berlin**
Graduiertenkolleg in Kommunikationsbasierte Systeme
Institut für Softwaretechnik und Theoretische Informatik
Topic: Dynamic Abstract Data Types
Advisor: Prof. Dr. Hartmut Ehrig

1990 **Università degli Studi dell'Aquila**
Laurea in Scienze dell'Informazione
Topic: Problemi di ereditarietà e sottotipo in metodologie orientate agli oggetti
Advisor: Prof. Dr. Francesco Parisi–Presicce

1.2 Positions

2020 to *present* **Full Professor**
Università degli Studi dell'Aquila

2006 – 2020 **Associate Professor**
Università degli Studi dell'Aquila

2016 **Visiting Professor**
Division of Computer Science and Software Engineering
Mälardalen University, Sweden – on leave from University of L'Aquila

1998 – 1999 **Gastprofessur (Visiting Professor)**
Department Informationstechnologie und Elektrotechnik
ETH Zurich, Switzerland – on leave from University of L'Aquila

1996 – 2006 **Assistant Professor**
Università degli Studi dell'Aquila

2 Research activity

2.1 Publications

To date, I have co-authored more than 130 articles in peer-reviewed journals, conferences and workshops. The complete list of publications is given in Sect. 7. According to Google Scholar[1], my publications have received 2,918 citations so far (h-index: 28). Five of my papers have received more than 150 citations each. A summary of my bibliometric figures according to Google Scholar and Scopus are given in Fig. 1 and Fig 2, respectively. To provide some context, the work of the most cited scholar in my field (Prof. Krzysztof Czarnecki at the University of Waterloo, Canada) has received 22,483 citations to date (h-index: 57)[2]. Prominent professors in other international universities in my research field include:

- Prof. Perdita Stevens, University of Edinburgh (UK), 2,650 citations (h-index: 25)
- Prof. Jeremy Gibbons, University of Oxford (UK), 2,897 citations (h-index: 30)
- Prof. Jürgen Dingel, Queen's University (Canada), 2,725 citations (h-index: 28)

[1] https://scholar.google.it/citations?user=JVTAEMMAAAAJ&hl=en (accessed May 4, 2019)

[2] https://scholar.google.co.uk/citations?view_op=search_authors&hl=en&mauthors=label:model_driven_engineering (accessed May 4, 2019)

[3] https://www.scopus.com/authid/detail.uri?authorId=15064742800 (accessed May 4, 2019)

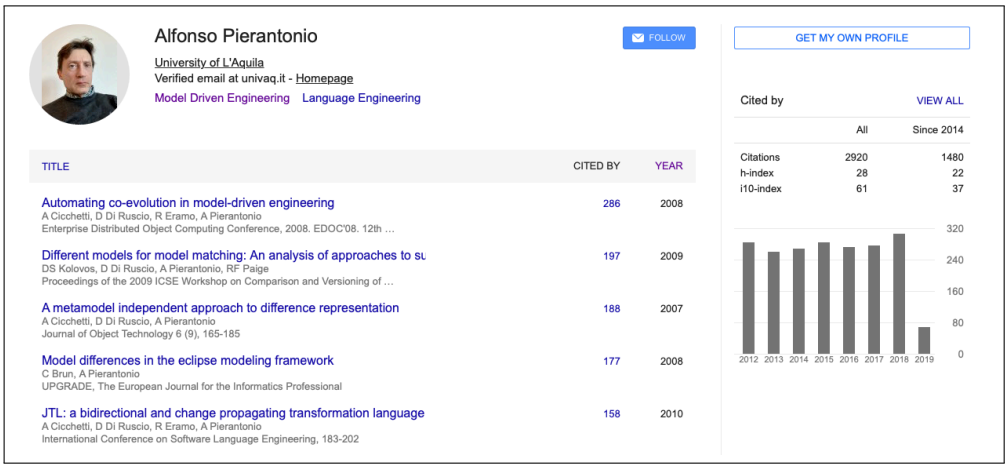

Figure 1: Google Scholar bibliometric profile [1]

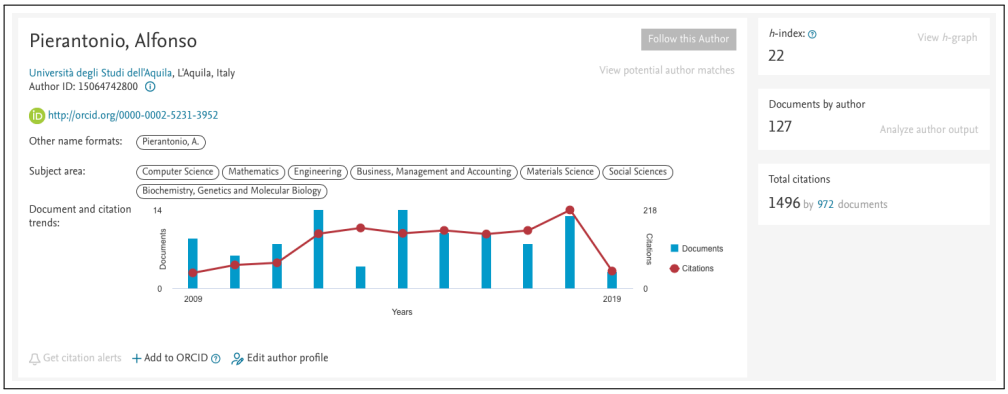

Figure 2: Scopus bibliometric profile [3]

2.2 Research areas

My research activity has focused on many aspects of Language and Software Engineering including in chronological order: (1) the formal characterization of object systems by means of algebraic and categorical methods, (2) the specification of languages and fast prototyping of programming environments, and (3) model-driven engineering.

At the beginning of my career, I was mainly interested in the theoretical aspects of abstract data types because I could use, e.g., algebraic specifications, for the formal characterization of the static aspects of linguistic concepts like classes, inheritance, and subtyping in object-oriented languages that at that time were emerging. However, using classical algebras for also describing the dynamic behavior of objects was a big challenge. It required to relax the notion of algebra homomorphism (that is inherently structure preserving) in order to model the side-effects of object updates, creation, and deletion. My approach to dynamic behavior was "competing" with the work done by Egidio Astesiano[4], Ruth Breu[5], and Marie-Claude Gaudel[6] in the framework of the EU ISCORE project (where I was invited several times to take part in the discussions and present my work) and attracted their interest.

A few years later, it was pretty natural to get interested in the Abstract State Machines[7] (ASMs) since they were useful for representing stateful systems and as such object stores whose behavior could be specified by means of formal and executable semantics. Because of their executabil-

[4] Astesiano, Egidio, and Elena Zucca. "D-oids: a model for dynamic data-types." Mathematical Structures in Computer Science 5, no. 2 (1995): 257-282.

[5] Breu, R. Algebraic Specification Techniques in Object-Oriented Programming Environment. Ph.D. thesis, Universität Passau - TU München, Berlin. 1991.

[6] Dauchy, P., and M. C. Gaudel. "Implicit state in algebraic specifications." In International Workshop on Information Systems-Correctness and Reusability (IS-CORE'93), Informatik-Berichte, no. 01/93. 1993.

[7] Gurevich, Yuri. "Evolving algebras 1993: Lipari guide." In Specification and validation methods, pp. 9-36. Oxford University Press, Inc., 1995.

ity, I used ASMs for giving formal semantics to a diagrammatic meta-notation called Montages that has been used for designing languages and building simulators, debuggers, and much more. Unfortunately, at that time the idea that designing a language required the same pragmatic qualities of designing software (if not more) was not universally accepted. However, well-known researchers like Peter Mosses and Paul Klint had always in high consideration our contributions with Montages probably because they were active also on the practical side of language design. At this point, my interest in languages and modeling notations has induced me to get involved in the model-driven engineering community.

In particular, the research activity in model-driven engineering focused on a wide range of topics, such as: meta-modeling and domain-specific modeling, model-driven techniques in web engineering, model differencing and conflict management, coupled evolution, bidirectionality and uncertainty management, model management, software quality, software architecture, and free and open source software. The quality and visibility of my work are witnessed by invitation to write a foreword to a book on model management and analytics by Mehmet Aksit *et al.*[8].

Below a brief (and partial) description of the research activity and the related publications is reported.

2.2.1 Algebraic methods

Algebraic specification of object systems

A notion of class (or object pattern) as defined in most object-oriented languages has been formalized using known techniques from algebraic specifications. Then, inheritance can be viewed as a relation between classes and hierarchies contain two kinds of information: on the one hand, they indicate how programs are structured; on the other hand, they give information about compatible assignment rules, which are based on subtyping. In order to distinguish between code sharing and functional specialization, the behavior of classes is specified. It is then shown that reusing inheritance can be reduced to specialization inheritance with respect to a virtual class [143, 144, 138]. The class model and the two distinct aspects of inheritance allow the definition of clean interconnection mechanisms between classes leading to new classes which inherit from old classes their correctness and their semantics. A mechanism to derive inherited classes whose behavior can be described cleanly in terms of the behavior of the superclasses is given in [140]. Among these mechanisms, the instantiation of parameters is seen as a particular case of specialization inheritance but not of equal expressive power. A formalization of the notion of subtyping is then related to the stronger inheritance. In [140], a notion of structural inheritance is given in order to reuse entire hierarchies giving place to a form of commutative type embedding. The approach has been extended to synthesis [142], i.e., classes are viewer as production rules to be combined utilizing import and export interface in order to *generate* the desired system. Finally, an extension to dynamic behavior [136, 137] has been proposed by relaxing the algebra homomorphism in order to represent object changes. Algebras are then representing object stores whose values may be updated by means of algebra mappings.

Design and fast prototyping of languages

The idea of relaxing algebra homomorphism to represent object stores given in [136] has also been used by Yuri Gurevich for defining the Abstract State Machines (ASMs). ASMs have the same pragmatic qualities of current programming languages still retaining mathematical formality. They have been applied in several applicative scenarios including the specification of realistic language like the C language. ASMs have been used for providing a semantic anchoring to Montages [134, 131], a meta-notation for defining general-purpose and domain-specific languages. Languages can then be formally defined through extended EBNF packages called Montages that specified the grammar, the dynamic semantics (in terms of pseudo-state machines), and static semantics. Complete integrated programming environments consisting of scanners, parsers, type-checkers, interpreters, and symbolic debuggers, can be then automatically generated by the

[8] Mehmet Aksit, Önder Babur, Mark van den Brand, Loek Cleophas, and Bedir Tekinerdogan. Model Management and Analytics for Large Scale Systems, Academic Press, Elsevier (2020) ISBN: 9780128166499, *in press*

Gem-Mex tool [133, 132]. A diversity of languages have been specified, including Action Notation [129], Oberon [135], and scripting languages [130].

2.2.2 Model-Driven Engineering

Model-Driven Web Engineering

Over the years several models for web applications have been given. In [128], UML-based conceptual descriptions of the data upon which the content is based, the way dynamic contents are composed together to form pages, and how pages are linked together in order to move across the application content is given. Then, partially automated generation of the application is possible employing XSL transformations. Another approach proposed in [120, 126] is based on variability management, a notion of parametric web component is given where the parameters induce forms of variability whose management permits the designer to configure the application. The different dimensions of web applications are investigated in [123] where the data, content, and navigation models are related each other employing weaving models instead of name references in order to leverage decoupling and ease of maintenance. The beContent modeling language has been illustrated in [105] extending the expressiveness of the approach in [128]; complete applications can be automatically generated by means previously investigated transformations [149]. The formalism has also been given support to evolution and coupled evolution as demonstrated in [70].

Model differencing and conflicts

Model differencing is an automated procedure that represents the differences between models in a structural way rather than in lexical terms as done by *gnu diff*, for instance. The difference algorithm of the EMFCompare[9] tool developed by Obeo[10] is described in [146]. In particular, it is illustrated how different model matching techniques [111] can be accommodated in the generic EMFCompare algorithm. The model matching techniques are based on well-known structural and lexical techniques. However, none of them are based on domain knowledge giving place to false negatives or positives: different elements are identified, while others are kept distinguished even though they identify the same element. To this end, we have proposed a semantic differencing algorithm [31] that can be used within EFMCompare that makes use of the WordNet[11] ontology of English language and that associated terms not only by using the usual techniques, e.g., the Levenshtein distance, but their meaning in English. In order to leverage differences to first-class status, model differences must be given a model-based representation [118]. The approach has been generalized by defining a domain-specific modeling language for capturing change patterns within (meta-)models [24] and leveraging them as refactorings. In [91] concurrent versioning of both models and metamodels is outlined. Moreover, different stakeholders working in a distributed environment can concurrently modify the same model. However, merging parallel modification might give place to (textual and semantic) conflicts that must be reconciled [113]. Finally, a categorization for conflicts is given in [90].

Coupled evolution

Model-driven engineering bases a wide range of artifacts on metamodels, including models, transformations, textual and graphical editors, code generators and also other related metamodels, giving place to a modeling ecosystem [86]. When such metamodels evolve, such as a new version of Unified Modeling Language or Business Process Execution Notation or a company-specific metamodel, underlying artifacts often become invalid [81]. As a consequence, whenever a metamodel undergoes modifications, all the related artifacts must be consistently adapted giving place to a coupled evolution scenario [96]. Managing the coupled evolution of modeling artifacts is challenging, and several approaches have been proposed. In [112, 114][12], a declarative approach to metamodel/model co-evolution where co-adaptations are automatically generated from the

[9] https://www.eclipse.org/emf/compare/
[10] https://www.obeo.fr/en/
[11] https://wordnet.princeton.edu
[12] The paper in [112] is one the most cited papers on this topic with 286 citations on google scholar.

metamodel differences. The approach is based on some predefined heuristics to address the difficulties due to dependant changes (i.e., non-parallel independent changes), thus in [107] such changes are serialized in order to resolve the dependencies in an automated manner. Furthermore, different techniques have been devised for managing the coupled evolution of GMF editors [100], textual editors [72], ATL transformations [71], and code generators [60]. In [89], a dedicated language for coupled evolution of any kind of artifact, called EMFMigrate[13], is illustrated. Whereas in [88] an analysis technique for understanding the change impact of metamodel modifications is given (while in [20] the impact on Sirius editors is discussed). The complexity of the ripple effect of the metamodel changes throughout the modeling ecosystem required specific visualization techniques that help grasp the relevant aspects and the rationale behind the changes [75]. Finally, since most of the adaptations are not univocal, i.e., they give place to uncertainty as more than one solution is available (and they are typically sorted out utilizing heuristics) a variability-based approach is presented [47].

An overview of coupled evolution methods and tools to handle such dependencies is given in [112].

Bidirectionality and Uncertainty Modeling

Bidirectional transformations are considered vital for managing both the consistency and synchronization of two or more related models. While the latter is a deterministic process, keeping two models in a consistent state (according to a given relation) implies that the propagation of changes through the models might produce multiple solutions. However, most of the current languages, e.g., OMG QVT-R[14], are deterministic and can generate only one solution giving place to well-known semantic idiosyncracies. The Janus Transformation Language[15] [97] (JTL) is a bidirectional model transformation language based on Answer Set Programming (ASP) and its notion of stable model in order to support non-deterministic transformations and change propagation. The language has been validated in several scenarios, including the backpropagation of analysis feedback to software models [77], to multi-view modeling [116][16], to propagate changes across families of Architecture Description Languages. Tool support for the languages is given on the Eclipse EMF platform [21]. Because it is not easy to inspect a solution space in presence of a multitude of models, the language has been extended to a first-class management of the uncertainty related to the non-deterministic execution of transformations (see [69]): instead of generating a solution space consisting of multiple models, the language engine generates a model with uncertainty that represents all solutions [49, 67, 68, 66, 92]. In order to better deal with the uncertainty in JTL, an improved traceability model has been adopted [22]. The language has been applied to the management of uncertainty in the automated generation of implementation models in the automotive domain [34] as well as interaction modeling with IFML [25], among others.

A mathematical and categorical foundation of JTL with uncertainty is given in [39].

Model management and analytics

To deal with the sheer complexity of nowadays software systems, it is necessary to enforce consistent reuse and leverage the interdependencies of the modeling artifacts that are produced and consumed during the different development phases. This necessity has led to the emergence of model repositories that enable collaborative modeling and let team members check out, commit, and update software models. MDEForge [56] is an extensible cloud-based modeling platform that provides support to a community-based modeling repository [45]. Based on an open and component-based architecture, it enables the definition of model management tools as software-as-a-service (SaaS) that can be remotely used without overwhelming the users with intricate and error-prone installation and configuration procedures.

The platform has facilitated the experimental evaluation of the many model management approaches including the following:

[13] https://github.com/MDEGroup/EMFMigrate

[14] https://www.omg.org/spec/QVT/About-QVT/

[15] http://jtl.univaq.it

[16] For a *Systematic Literature Review* of multi-view modeling please refer to [6].

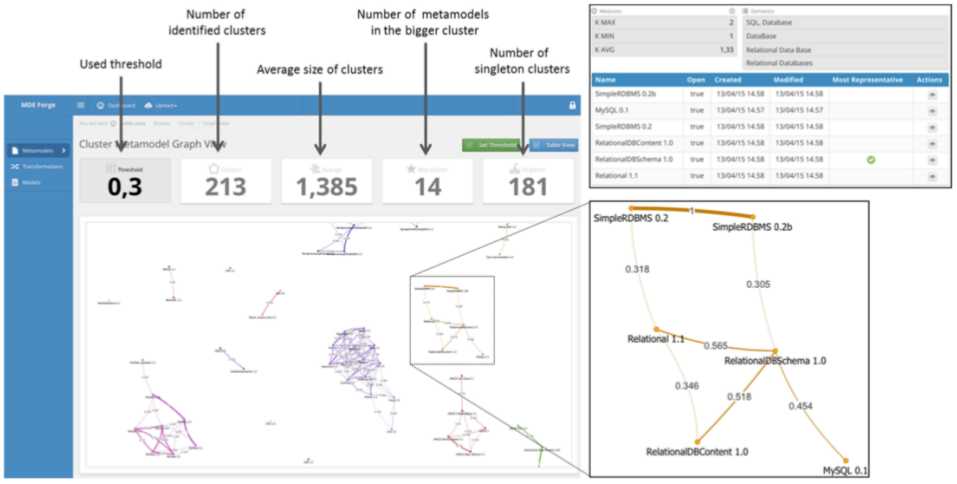

Figure 3: Clustering of a metamodel repository

Automated classification of the repository. Manual classification methods of metamodel repositories require highly trained personnel and the results are usually influenced by subjectivity of human perception. Thus, automated metamodel classification is very desirable and stringent. In [33], clustering techniques for metamodel repositories able to automatically organize metamodels into clusters are proposed. Mutually similar metamodels are grouped together depending on a proximity measure, whose definition can be given according to specific search and browsing requirements. The approach is based on agglomerative hierarchical clustering[17] and explores well-known proximity measures as well as metamodel-specific ones, each providing different browsing characteristics. The method has been already implemented [44] (see Fig. 3) and experimentally evaluated in MDEForge over a large dataset of metamodels.

Model measurements. Almost any artifact in a modeling ecosystem has to be defined following one or more metamodels. Thus, understanding the common characteristics of metamodels, how they evolve, and what is the impact of metamodel changes throughout the modeling ecosystem is of high relevance. In [62], we present an approach to understanding the structural characteristics of metamodels. A number of metrics are used to quantify and measure metamodels and cross-link different aspects in order to provide additional information about how metamodel characteristics are related. The analysis has been extended to transformations as well to identify to what extent their characteristics depend on the corresponding input and target metamodels [61, 46]. The process relies on several transformation and metamodel metrics that are calculated and adequately correlated. The computation of both metrics and correlations is implemented in the MDEForge platform so that any contributed artifact can istantly be analyzed.

Automated chaining of transformations. The development of complex and large transformations can benefit from the reuse of smaller ones that can be composed according to user requirements. However, composing transformations is a complex problem: typically smaller transformations are discovered and selected by developers from different and heterogeneous sources. Then the identified transformations are chained by means of manual composition processes that are typically prone to errors. In [58], an approach to automatically discover and compose transformations is presented: developers provide the system with the source models and specify the target metamodel. By relying on a repository of model transformations, all the possible transformation chains are calculated. Importantly, in case of incompatible intermediate target and source metamodels, proper adapters are automatically generated by exploiting co-evolution migration techniques. Like this, also transformations that otherwise would be discarded are considered increasing reuse possibilities. In order to refine the solution space of all possible chains, in [13] an approach, based on well-established shortest path algorithms, to support modellers when multiple transformation chains are available to bridge a source metamodel with a target one is proposed. Two selection criteria are considered, i.e., transformation coverage, and information

[17] Jain, A.K., Murty, M.N., Flynn, P.J.: Data clustering: a review. ACM Comput. Surv. (CSUR) 31, 264–323 (1999)

loss for assessing the quality of the transformation chains. An implementation in MDEForge is provided and described in [15].

Software Quality

Giving a precise definition of quality models, identifying which quality attributes are of interest for specific stakeholders, can be useful for characterizing artifacts stored in a repository. Thus, custom quality models consisting of hierarchically organized quality attributes whose evaluation depends on the metrics described above (see *Model measurements* paragraph) are defined in [32]. A domain-specific language is proposed to specify how quality attributes and metrics have to be *aligned*. An execution environment is also provided to apply the defined quality models on actual modeling artifacts so to enable their automated quality assessment [2]. Quality approach has been used in [3] to capture smells that can be the result of inappropriate design decisions. To this end, extensible catalogs of metamodel smells can be defined; each of them can be linked to the corresponding quality attributes, e.g., metamodel maintainability, reusability, and understandability. Then, the approach automatically selects only those smells that have to be necessarily resolved for enhancing the quality factors that are of interest for the modeler.

Software Architectures

A universal notation accepted by any software architect cannot exist. This has caused a plethoric spread of architecture description languages (ADLs) each focussing on a specific application domain, analysis type, or modeling environment, and with its specific notations and tools. As a consequence, the production of a software architecture description often requires the use of multiple ADLs, each satisfying some stakeholder's concerns. In order to mitigate the difficulties of handling multiple notations and keeping the models in a consistent state, a convergent change propagation approach between multiple architectural languages has been proposed in [87]. The main advantage of the approach is that it is agnostic of the notations to synchronize and of their corresponding models. Similar objectives have been pursued in [82], where an approach for enabling interoperability consists in bridging each single notation to a pivot language is presented. Then, hierarchies of pivot languages are obtained by systematically extending a root pivot language. Model-driven techniques are employed to support the creation and the management of such hierarchies and to realize the interoperability by means of model transformations. Evolutionary aspects are addressed by byADL [101, 102] (Build Your ADL), a framework which allows software architects to (i) extend existent ADLs with domain specificities, new architectural views, or analysis aspects, (ii) integrate an ADL with development processes and methodologies, and (iii) customize an ADL.

Model-driven techniques have been applied also in the context of performance analysis of software models. In particular, the inability to meet performance requirements is often due to the presence of antipatterns in the software design. In [148], performance antipatterns are defined and detected in UML models by mean of OCL queries. The identification of an antipattern suggests the architectural alternatives that can overcome a specific performance problem. Moreover, the problem of interpreting results of performance analysis and providing feedback on software models to overcome performance flaws has been addressed in [109], where a notation-independent approach is proposed.

Free and Open Source Software (FOSS)

Software systems are more and more based on the abstraction of package, brought to popularity by Free and Open Source Software (FOSS) distributions. These are complex software systems, made of thousands packages that evolve rapidly, independently, and without centralized coordination. During packages upgrades, corner case failures can be encountered and are hard to deal with, especially when they are due to misbehaving maintainer scripts: executable code snippets used to finalize package configuration. In [106, 98], model driven techniques are applies to describe and manage software upgrades of FOSS distributions. Static and dynamic aspects of package upgrades - the latter being the most challenging aspect to deal with - are investigated in order to be able to predict common causes of upgrade failures and undo residual effects of failed

or undesired upgrades. The process of representing existing legacy systems in terms of models, applied to FOSS distributions is reported in [110]. Furthermore, the approach promotes the simulation of upgrades to predict failures before affecting the real system [95]. Both fine-grained static aspects (e.g. configuration incoherences) and dynamic aspects (e.g. the execution of configuration scripts) are taken into account, improving over the state of the art of upgrade planners. Finally, the EVOSS tool [83, 84] has been defined to support the upgrade of free and open source software systems.

2.3 Conference organization

2.3.1 General Chair

2015 **Software Technologies: Applications and Foundations (STAF)**
L'Aquila, Italy - July 20-24, 2015
General Chair

STAF is a federation of leading conferences on software technologies. The edition held in L'Aquila consisted in four main conferences

- 11th European Conference on Modeling Foundations and Applications (ECMFA)
  PC Chairs: Gabriele Taentzer, Francis Bordeleau
- 8th International Conference on Graph Transformation (ICGT)
  PC Chairs: Francesco Parisi-Presicce, Bernhard Westfechtel
- 8th International Conference on Model Transformation (ICMT)
  PC Chairs: Dimitris Kolovos, Manuel Wimmer
- 9th International Conference on Tests and Proofs (TAP)
  PC Chairs: Jasmin C. Blanchette, Nikolai Kosmatov

and 10 satellites workshops. More than 200 registered participants took part at the conference, which has been the first scientific event in L'Aquila after the 2009 earthquake.

2008 **International Conference on Model Transformation (ICMT)**
Zurich, Switzerland - July 1-2, 2008
General Chair

2.3.2 Program (Co-)Chair

2018 **14th European Conference on Modeling Foundations and Applications (ECMFA)**
Toulouse, France - June 26-28, 2018
Chair of the Foundation Track

2017 **13th Educators Symposium**
20th ACM/IEEE Intl. Conf. Model Driven Engineering Languages and Systems (MoDELS)
Austin, Texas - September 17-22, 2017
Co-Chair with Peter Clark

2014 **14th ACM/IEEE Intl. Conf. Model Driven Engineering Languages and Systems (MoDELS)**
Valencia, Spain - Sept 28-Oct 3, 2014
Chair of the Workshop Selection Commitee

2007 **22th Annual ACM Symposium on Applied Computing, Model Transformation Track**
Seoul, South Korea - March 11-15, 2007
Co-Chair with Jean Bezivin and Antonio Vallecillo

2006 **21th Annual ACM Symposium on Applied Computing, Model Transformation Track**
Dijon, France - April 23-27, 2006
Co-Chair with Jean Bezivin and Antonio Vallecillo

2.3.3 Steering Committees

2011 to *present* **Generative and Transformational Techniques in Software Engineering (GTTSE)**
Scientific Committee, Member

2010 to *present* **Intl. Conference on Model Transformation (ICMT)**
Steering Committee, Chair

2010 to *present* **Workshop on Models and Evolution (ME)**
Steering Committee, Member

2.3.4 Organizing Committee Member

2010 – 2019 **Workshop on Models and Evolution (ME)**
Co-located with MoDELS
Co-organizer

2015 – 2018 **Workshop on Flexible MDE (FlexMDE)**
Co-located with MoDELS
Co-organizer

2018 **Winter Modeling Meeting (WMM)**
San Vigilio di Marebbe, Italy - Jan 21-29, 2018
Co-organizer

2017 **Grand Challenges in Modeling (GrandMDE)**
Co-located with STAF 2017, Marburg, Germany, Jul 17-21, 2017
Co-organizer

2013 – 2014 **Workshop on Extreme Modeling (XM)**
Co-located with MoDELS
Co-organizer

2012 **12th International School on Formal Methods for the Design of Computer, Communication and Software Systems: Model-Driven Engineering (SFM 2012)**
Bertinoro, Italy - Jun 18-23, 2012
Co-organizer

2011 **Coupled Software Transformations Workshop (CSXW)**
Co-located with SLE 2011, Braga, Portugal - Jul 6-7, 2011
Co-organizer

2008 **Intl. Workshop on Model Co-Evolution and Consistency Management (MCCM)**
Co-located with MoDELS 2008, Toulouse, France - Sept 30, 2008
Co-organizer

2008 **23rd IEEE/ACM International Conference on Automated Software Engineering (ASE)**
L'Aquila, Italy - Sept 15-19, 2008
Finance Chair

2006 **Intl. Workshop on Models for Enterprise Computing (IWMEC)**
Co-located with EDOC 2006, Hong-Kong - Oct 16-20, 2006
Co-organizer

2.3.5 Selection Committee Member

Workshop Selection Committee at MoDELS
2017, 2016, 2015

2.3.6 Program Board Member

19th ACM/IEEE Intl. Conf. on Model Driven Engineering Languages and Systems (MoDELS)
Saint-Malo, France - October 2-7, 2016

2.3.7 Program Committee Member

I have taken part to more than 150 program, program board, and selection committees of international conferences and workshops, including ASE, ECMFA, FASE, ICMT, ICWE, MoDELS, TOOLS, and WWW. The following is a non-exhaustive list in anti-chronological order[18]:

European Conference on Modeling Foundations and Applications (ECMFA)
2020, 2014, 2013, 2012

Intl. Workshop on Bidirectionality (BX)
2019, 2018, 2017

Doctoral Symposium at MoDELS
2019, 2018

Educators Symposium at MoDELS (EduSymp)
2019, 2016, 2012

Intl. Conference on Model Transformation (ICMT)
2019, 2018, 2017, 2016, 2015, 2014, 2013, 2012, 2011, 2010

Intl. Conference on Web Engineering (ICWE)
2019, 2018, 2017, 2016, 2015, 2014, 2013, 2012, 2011, 2010

Workshop on Modeling in Automotive Software Engineering (MASE)
2019

ACM/IEEE Intl. Conf. Model-Driven Engineering, Languages, and Systems (MoDELS)
2019, 2018, 2017, 2015, 2014, 2013, 2012, 2011, 2010, 2009

Workshop on Model-Driven Requirement Engineering (MoDRE)
2019, 2018, 2017, 2016, 2015, 2014, 2013, 2012, 2011

Intl. Workshop on Petri Nets and Software Engineering (PNSE)
2019, 2018

Euromicro Conf. Series on Software Engineering and Advanced Applications (SEAA)
2019, 2018, 2017, 2016, 2015, 2014, 2013, 2012, 2011, 2010, 2009

Intl. Conference on Software Engineering and Knowledge Engineering (SEKE)
2019, 2018, 2017, 2016, 2015, 2014, 2013, 2012, 2011, 2010

Intl. Conference on Software Language Engineering (SLE)
2019, 2015

Intl. Workshop on Analytics and Mining of Model Repositories (AMMORE)
2018

Workshop on Modeling in Software Engineering (MiSE)
2018, 2017, 2016, 2015, 2014, 2013

Workshop on (Meta)Modeling for Healthcare Systems (MMHS)
2018, 2016

Intl. Workshop on Microservices: Science and Engineering (MSE)
2018

Intl. Conf. Current Trends in Theory and Practice of Computer Science (SOFSEM)
2018

ACM Student Research Competition Grand Final (ACM SRC)
2017, 2016, 2015, 2013

Workshop on Scalability in Model Driven Engineering (BigMDE)
2017, 2016, 2015, 2014, 2013

Intl. Conf. Quality of Information and Communications Technology (QUATIC)
2016

Workshop on the Analysis of Model Transformations (AMT)
2015, 2014, 2013, 2012

Grand Timely Topics in Software Engineering (GTTSE)
2015, 2011

[18] The last edition is emphasised in bold.

Intl. Work. Model-Driven Engineering for Component-Based Software Systems
2015, 2014

Intl. ACM Sigsoft Conf. Quality of Software Architectures (QoSA)
2015, 2014, 2013, 2012

Workshop on Model-Driven Web Engineering (MDWE)
2014, 2013, 2012, 2011, 2010, 2009, 2008, 2007, 2006

Academics Tooling with Eclipse Workshop (ACME)
2013

Intl. Conference on Fundamental Approaches to Software Engineering (FASE)
2013, 2012

Workshop on Academics Modeling with Eclipse (AME)
2012

Workshop on Model Transformations in ATL (MtATL)
2012, 2011, 2010, 2009

Workshop on Conceptualization of Modeling Methods (CMM)
2011

Intl. Workshop on Model Comparison in Practice (IWMCP)
2011, 2010

Int. Workshop on Model-Driven Engineering, Logic and Optimization: friends or foes? (MELO)
2011

Workshop on Aspect-Oriented Modeling (AOP)
2010, 2009, 2008, 2007, 2006

Workshop on Model-Driven Interoperability (MDI)
2010

Intl. Workshop on Validation and Verification of Dynamic Software Systems (ViDAS)
2010

World Wide Web Conference (WWW)
2010

IEEE/ACM International Conference on Automated Software Engineering (ASE)
2009

Intl. Workshop on Model-Driven Software Evolution (MoDSE-MCCM)
2009

Intl. Workshop on Open Component Ecosystems (IWOCE)
2009

Intl. Conference on Objects, Models, Components, Patterns (TOOLS EUROPE)
2009, 2008, 2007

Workshop on Ubiquitous Web Applications (UWA)
2008

Intl. Workshop on Towers of Models (TOWERS)
2007

European Workshop on Composition of Model Transformations (EW-CMT)
2006

Workshop on Global Integrated Model Management (GAMMA)
2006

Workshop in Software Modeling Engineering (WiSME)
2005

2.3.8 Panels

2007 Is language coordination tractable?
Workshop on Towers of Models
co-located with TOOLS EUROPE, Zurich (Switzerland), Jul 27, 2007

Co-panelists: Steve Cook, Robin Milner, Dave Thomas.

2.4 Journal Boards

2.4.1 Direction and Participation in Journal Boards

2018 to *present* **Journal of Object Technology**
Editor-in-Chief

2015 to *present* **Science of Computer Programming**
Advisory Board

2011 to *present* **Journal of Software and Systems Modeling**
Editorial Board

2012 – 2018 **Journal of Object Technology**
Special Section Editor

2.4.2 Edited Journals

2019 **STAF 2015 Special Section**
Jasmin Blanchette, Francis Bordeleau, Alfonso Pierantonio, Nikolai Kosmatov, Gabriele Taentzer & Manuel Wimmer. *Journal on Software and System Modeling* (2019) 18: 191. https://doi.org/10.1007/s10270-018-0686-1

2017 **Special Issue on Flexible Model Driven Engineering**
Davide Di Ruscio, Juan de Lara & Alfonso Pierantonio. *Computer Languages, Systems & Structures* (2017) 49: 174-175. https://doi.org/10.1016/j.cl.2016.12.003

2016 **Special Issue on Models and Evolution**
Alfonso Pierantonio, & Bernhard Schätz. *Journal of Systems and Software* (2016) 111: 270-271. https://doi.org/10.1016/j.jss.2015.05.037

2014 **Success Stories in Model-Driven Engineering**
Davide Di Ruscio, Richard Paige & Alfonso Pierantonio. *Science of Computer Programming* (2014) 89: 69-70. https://doi.org/10.1016/j.scico.2013.12.006

2014 **Special Theme on Models and Evolution**
Dalila Tanzalit, Dirk Deridder, Alfonso Pierantonio & Bernhard Schätz. *Journal on Software and System Modeling* (2014) 13: 621. https://doi.org/10.1007/s10270-013-0338-4

2013 **Special Section on Extreme Modeling**
Davide Di Ruscio, Juan de Lara & Alfonso Pierantonio. *Journal of Object Technology* (2013) 13(3) http://dx.doi.org/10.5381/jot.2014.13.3.e1

2010 **Special Section on Model Transformation**
Jeff Gray, Alfonso Pierantonio & Antonio Vallecillo. *Journal on Software and System Modeling* (2010) 9(3): 281-283. https://doi.org/10.1007/s10270-009-0139-y

2007 **Special Issue on Model Transformation**
Alfonso Pierantonio, Antonio Vallecillo, Bran Selic & Jeff Gray. *Science of Computer Programming* (2007) 68(3): 111-113. https://doi.org/10.1016/j.scico.2007.06.001

2.5 Keynotes and Invited Presentations

2.5.1 Keynotes

2019 **Aut tace, Aut Loquere meliora Silentio (and the Likes)**
Junior Researcher Community Event at STAF 2019
Eindhoven, The Netherlands - July 18, 2019

Starting a career in research is one of the most uncertain professional ambition in modern societies. Besides the technical obstacles of becoming a world-class expert in a specific topic (you have to!), it presents a diversity of daunting psycho-social difficulties that might be conducive to harmful consequences. The talk is informal in nature and tries to reflect the speaker's experience (as a

computer scientist) at the beginning of his career and later as the mentor of students and postdocs. Besides expected definitions about what research is or should be, it tries to discuss how students often tend to adopt the irrational idea of having 'perfect reasoning.' It also will consider empiricism, as a democratic tool for entering research, and the language as a barrier for those who do not speak English as a first language. The final remark will be about 'silence' as a beneficial or pathological aspect of both researchers and mentors.

2018 **Invited Session on Model-Driven Engineering in Education**
Software Technologies: Applications and Foundations (STAF)
Toulouse, France - Jun 26, 2018

The invited session has focused on current practices in teaching MDE at universities across Europe. The session presented an overview of responses to a questionnaire distributed among colleagues, followed by an open discussion.

2016 **Teaching Modeling at the time of disillusionment: from code generation to model management**
Educators Symposium at MoDELS 2016
Saint Malo, France - October 3, 2016

2014 **Non-Determinism and Bidirectional Model Transformations**
Seminar Series on Advanced Techniques & Tools for Software Evolution (SATToSE 2014)
L'Aquila, Italy - July 11, 2014

2012 **Evolution in Metamodeling Ecosystem**
Industrial Track of Software Language Engineering (ITSLE 2012)
Dresden, Germany - September 25, 2012

2012 **Evolutionary Togetherness: How to Manage Coupled Evolution in Metamodeling Ecosystems**
6th International Conference on Graph Transformation (ICGT 2012)
Bremen, Germany - September 24-29, 2012

2012 **Model Transformations**
12th International School on Formal Methods for the Design of Computer, Communication and Software Systems: Model-Driven Engineering, Bertinoro Italy, June 18-23, 2012

2011 **Managing the evolution of F/OSS with Model-Driven Techniques**
4th Summer School on Generative and Transformational Techniques
in Software Engineering, 3–9 Jul, 2011, Braga, Portugal

2009 **Evolution in the Large and in the Small in Model-Driven Web Development**
5th Model Driven Web Engineering Workshop (MDWE 2009)
San Sebastian, Spain - July 2009

2.5.2 Invited Presentations (selection)

2016 **Model Management in Model-Driven Engineering**
University of Alberta, Canada, 2016 (Prof. Eleni Stroulia)

2014 **Uncertainty in Bidirectional Model Transformations**
MacMaster University, Canada, 2014 (Prof. Tom Maibaum, Dr. Zinovy Diskin)

2014 **Co-Evolution in Model-Driven Engineering**
Gran Sasso Science Institute, L'Aquila, 2014 (Prof. Rocco De Nicola)

2014 **Bidirectionality in MDE**
Gran Sasso Science Institute, L'Aquila, 2014 (Prof. Rocco De Nicola)

2011 **Bidirectional and Change Propagating Transformations in MDE**
Dagstuhl Seminar on Bidirectional Transformations (BX), 2011
Organizers: Zhenjiang Hu, Andy Schürr, Perdita Stevens, James F. Terwilliger

2009 **Uncertainty in Bidirectional Model Transformations**
Technische Universität Wien, Austria, 2009 (Prof. Gerti Kappel)

2009 **Managing the evolution of F/OSS with Model-Driven Techniques**
CS Colloquium, Johannes Kepler Universität Linz, Austria, 2009 (Prof. Gabriele Kotsis)

2008 **Model and Metamodel Evolution: problems and issues**
Dagstuhl Seminar on Model Engineering of Complex Systems (MECS), 2008
Organizers: Uwe Aßmann, Jean Bezivin, Richard F. Paige, Bernhard Rumpe, Douglas C. Schmidt

2007 **A Metamodel Independent Approach to Difference Representation**
University of Malaga, Spain, 2007 (Prof. Antonio Vallecillo)

2007 **Lightweight Model-Driven Development of Web Applications**
IMT Lucca, 2007 (Prof. Ugo Montanari)

2006 **UML Modeling vs Domain Specific Modeling**
University of Nantes, France, 2006 (Prof. Jean Bézivin)

2006 **Model Transformation and Weaving with ASMs**
National University of Singapore, 2006 (Prof. Samarjit Chakraborthy)

2006 **Model Transformation and Weaving Formalisms and Applications**
University of Luxembourg, 2006 (Prof. Nicolas Guelfi)

2005 **Algebraic Model Transformation in Model Driven Architectures**
University of Bergen, 2005 (Prof. Uwe Wolter)

2004 **Applying MDA to data-intensive Web Applications**
Politecnico di Milano, 2004 (Prof. Piero Fraternali, Prof. Stefano Ceri)

2004 **Model-Driven Methodology for Web application development**
Università di Camerino, 2004 (Prof. Flavio Corradini)

2004 **Formal Model Transformations in Model Driven Architecture**
CNR ISTI, Pisa, 2004 (Dr. Antonia Bertolino)

2.6 Awards and Grants

2018 **Reviewer Recognition**
Journal of Software and Systems Modeling (SoSyM), Springer
The Editors-in-Chief issued a certificate to express their appreciation for the contributions as a SoSyM Reviewer.

2017 **Beneficiary of "quota di finanziamento premiale"**
Università degli Studi dell'Aquila
The Università degli Studi dell'Aquila awarded me with this grant in relation to the project proposal EU H2020-ICT-2016-1 "Domain-Specific Model- Centric Engineering of Smart Cyber- Physical Systems" positively evaluated (with score above the threshold) but not gone to financing.

2016 **Abilitazione Scientifica Nazionale**
Professore di I Fascia nel Settore Concorsuale 01/B1 – Informatica

2015 **Assessment for a Full Professorship at MDH (Sweden)**
Assessment for a position of full professor at the Mälardalen University in Sweden.
In addition to the most important aspects concerning science (including experience in supervising, publishing in strong venues, leading in academic setting at large), the assessment has screened pedagogical aspects as well.

2015 **Distinguished research paper award**
Eramo, Romina, Alfonso Pierantonio, and Gianni Rosa. "Managing uncertainty in bidirectional

model transformations." In: *Proceedings of the 2015 ACM SIGPLAN International Conference on Software Language Engineering*, pp. 49-58. ACM, 2015.

1993 – 1995 **Grant EC "Human Capital and Mobility" (Marie Curie)**
Technische Universität Berlin (supervisor Prof.Dr. Hartmut Ehrig)
Contract: ERBCHBICT930300

Oct 1992 – Jul 1993 **Grant Deutsche Forschung Gemeinschaft (DFG)**
Graduiertenkolleg Kommunikationsbasierte Systeme
Technische Universität Berlin (supervisor Prof.Dr. Hartmut Ehrig)

2.7 Research Projects

2.7.1 Participation to Research Projects

May 2006 – Apr 2008 **EU FP6-2005-IST POPEYE**
Professional Peer Environment Beyond Edge Computing
Grant agreement ID: 034241
Budget: EUR 3 271 968 (overall)

2001 – 2003 **MIUR National Project SAHARA**
Software Architectures for Heterogeneous Access Network Infrastructures

1999 – 2000 **MURST programma di ricerca di interesse nazionale SALADIN**
Software Architectures and Languages to Coordinate Distributed Mobile Components

1996 – 1999 **EC TMR Network GETGRATS**
General Theory of Graph Transformation Systems

2.7.2 Responsibility of Research Projects

Jan 2019 – Dec 2022 **EU H2020-MSCA-ITN-2018 LOWCOMOTE**
Training the Next Generation of Experts in Scalable Low-Code Engineering Platforms
Role: principal investigator for L'Aquila, ESR supervisor, site coordinator.
Grant agreement ID: 813884
Budget: EUR 4 057 637,76 (overall), EUR 522 999.36 (University of L'Aquila)

Oct 2018 – Sep 2020 **ERMES**
Envisioning Railway systems through Model-driven Engineering approacheS
Role: co-principal investigator of the project, workpackage leader.
Budget: EUR 780 000 (University of L'Aquila)
Note: The project is fully funded by Rete Ferroviaria Italiana SpA

Jan 2018 – Dec 2020 **EU H2020-ICT-2017-1 TYPHON**
Polyglot and Hybrid Persistence Architectures for Big Data Analytics
Role: Co-Principal investigator, site coordinator.
Grant agreement ID: 780251
Budget: EUR 4 499 447,50 (overall), EUR 349 815 (University of L'Aquila)

Jan 2017 – Dec 2019 **EU H2020-ICT-2016-1 CROSSMINER**
Developer-Centric Knowledge Mining from Large Open-Source Software Repositories
Role: site coordinator.
Grant agreement ID: 732223
Budget: EUR 4 519 007,50 (overall), EUR 380 922 (University of L'Aquila)

Feb 2014 – Oct 2016 **EU FP7-ICT-2013-11 LEARNPAD**
Model-Based Social Learning for Public Administrations

Role: principal investigator for L'Aquila, workpackage leader, site coordinator.

Grant agreement ID: 619583
Budget: EUR 3 532 993 (overall), EUR 282 080 (University of L'Aquila)

Oct 2012 – Mar 2015 **EU FP7-ICT-2011-8 OSSMETER**
Automated Measurement and Analysis of Open Source Software

Role: site coordinator.

Grant agreement ID: 318736
Budget: EUR 3 589 297 (overall), EUR 343 000 (University of L'Aquila)

2012 – 2013 **POS/FESR Project FARM**
Free Architecture and Rational Methodology
Role: principal investigator of the project, workpackage leader.

Budget: EUR 800 000 (overall), EUR 80 000 (University of L'Aquila)

Feb 2008 – May 2011 **EU FP7-ICT-2007-1 MANCOOSI**
Managing the complexity of the open source infrastructure

Role: principal investigator for L'Aquila, workpackage leader, site coordinator.

Grant agreement ID: 214898
Budget: EUR 4 427 855 (overall), EUR 361 603 (University of L'Aquila)

Projects currently under revision
Three EU projects proposals I am involved with are currently submitted to the following calls:

- CloudEdgeAI - Model Driven and Privacy by design Framework for building Native-Fog AI Applications
  H2020-ICT-15-2019-2020 RIA
- COPYST - Holistic Engineering of Cyber-Physical Systems based on Systems of Twins
  H2020-ICT-01-2019 RIA
- ELISE - European Languages for Industrial Systems Engineering
  H2020-MSCA-ITN-2019

2.8 Review and evaluation for research organisations

2018 **FNR Award for Outstanding PhD Thesis**
Luxembourg Fonds National de la Recherche (FNR)

2015 **Innovative Projects Research Programme**
Technische Universität Wien

2014 **Research Programme CORE**
Luxembourg Fonds National de la Recherche (FNR)

2012 **Information and Communication Technology Call**
Vienna Science and Technology Fund, Austria

2012 **Research Programme CORE**
Luxembourg Fonds National de la Recherche (FNR)

2011 **Research Foundation Flanders**
Fonds Wetenschappelijk Onderzoek, Belgium

2011 **Luxembourg AFR funding programme**
Luxembourg Fonds National de la Recherche (FNR)

2009 **Research Programme CORE**
Luxembourg Fonds National de la Recherche (FNR)

2.9 Ph.D programs

2.9.1 Member of PhD Boards ("Collegio di Dottorato")

2012 to *present* **Ingegneria e Scienze dell'Informazione**
Dipartimento di Ingegneria Informatica e Scienze dell'Informazione e Matematica, Università degli Studi dell'Aquila

2003 – 2011 **Informatica ed Applicazioni**
Dipartimento di Informatica, Università degli Studi dell'Aquila

2.9.2 Chair of the Reference Group

Since September 2018, I am chair of the "Reference Group 2.2 (Software Engineering and Artificial Intelligence)" of the "Collegio di Dottorato in Ingegneria e Scienze dell'Informazione" at the University of L'Aquila. The group consists of the supervisors of current Ph.D. students working in the areas of Software Engineering and Artificial Intelligence.

2.9.3 Doctoral Advicing

2003 – 2007 **Prof. Davide Di Ruscio**
Current position: Associate Professor, Università degli Studi dell'Aquila
2,321 citations (h-index: 24)

2004 – 2008 **Prof. Antonio Cicchetti**
Current position: Associate Professor, Malardalen University, Sweden
1,667 citations (h-index: 17)

2006 – 2010 **Dr. Romina Eramo**
Current position: Researcher RTD/A, Università degli Studi dell'Aquila
779 citations (h-index: 13)

2009 – 2012 **Dr. Ludovico Iovino**
Current position: Researcher RTD/A, Gran Sasso Science Institute
518 citations (h-index: 13)

2011 – 2015 **Dr. Romeo Marinelli**
Current position: high school teacher

2012 – 2017 **Dr. Gianni Rosa**
Current position: high school teacher

2013 – 2017 **Dr. Juri Di Rocco**
Current position: post-doc (assegnista di ricerca), Univ. degli Studi dell'Aquila
220 citations (h-index: 8)

2013 – 2017 **Dr. Francesco Basciani**
Current position: post-doc (assegnista di ricerca), Univ. degli Studi dell'Aquila
100 citations (h-index: 5)

Currently hiring 2 PhD students in the framework of the EU H2020-MSCA-ITN-2018 LOWCOMOTE project.

All bibliometric data are taken from Google Scholar.

2.9.4 International PhD Committee Member – Final Exam

2017 **Dr. Andrei Varanovich**
University of Koblenz-Landau, Germany
Advisor: Prof. Ralf Lämmel

2016 **Dr. Thanos Zolotas**
University of York, UK
Advisor: Prof. Richard Paige

2016 **Dr. Loli Burgueño**
University of Malaga, Spain
Advisor: Prof. Antonio Vallecillo

2012 **Dr. Petra Brosch**
Technische Universität Wien, Austria
Advisor: Prof. Gerti Kappel

2011 **Dr. Kerstin Altmanninger**
Johannes Kepler University Linz, Austria
Advisor: Prof. Gabriele Kotsis

2011 **Dr. Louis Rose**
University of York, UK
Advisor: Prof. Richard Paige

2010 **Dr. Andres Yie**
Vrije Universiteit Brussel, Belgium
Advisor: Prof. Rubby Casallas

2.9.5 Committee Member for the Admission to National PhD programs

2005 **Informatica ed Applicazioni - XX ciclo**
Università degli Studi dell'Aquila

2017 **Ingegneria e Scienze dell'Informazione - XXXIII ciclo**
Università degli Studi dell'Aquila

2.9.6 National Committee Member for PhD Title Assignment

2017 **Dottorato in Computer Science**
Gran Sasso Science Institute (Thesis defender: Darko Bozhinoski)

2.9.7 Post-Doctoral Advising

2017 – 2018 **Dr. Eric Umuhoza**
Post-doc on the project "Advanced model traceability in MDE". Currently at Carnegie Mellon University Africa, Rwanda

2007 – 2012 **Prof. Davide Di Ruscio**
Post-doc and then fixed-term lecturer in several projects, most of them in connection with EU projects, including EU FP7-ICT-2007-1 MANCOOSI and EU FP7-ICT-2011-8 OSSMETER. Currently at University of L'Aquila

2008 – 2010 **Prof. Antonio Cicchetti**
Post-doc on the project "Model differences and conflict management" in relation to the collaboration with the members of the EU FP7 MANCOOSI project consortium. Currently at Malardalen University, Sweden

2010 to *present* **Dr. Romina Eramo**
Post-doc and then fixed-term lecturer in the project "Definition and implementation of scalable and model-based techniques for the integration of design and execution aspects in the development of complex software systems" characterized by collaborations with members of the project consortium EU H2020-ECSEL-2016-1-RIA-two-stage MegaM @ Rt2. Currently at University of L'Aquila

2012 – 2015 **Dr. Ludovico Iovino**
Post-doc on the project "Coupled evolution in MDE ecosystems". Currently at Gran Sasso Science Institute

2017 to *present* **Dr. Juri Di Rocco**
Post-doc on the project "Traceability for Advanced Management of Models in MDE" in relation to the collaboration with the members of the EU H2020 CROSSMINER project consortium. Currently at University of L'Aquila

2017 to *present* **Dr. Francesco Basciani**
Post-doc on the project "Extra functional quality in model transformation chaining" in relation to the collaboration with the members of the RFI funded project ERMES. Currently at University of L'Aquila

3 Teaching

My teaching philosophy focuses on learning-by-doing. I make extensive use of problem-based learning, focusing on taking students through (quasi or completely) realistic projects where they are exposed to sufficient levels of detail and risk, thus gaining an appreciation for the challenges of solving actual software engineering problems. I also maintain a strong link between teaching and research; one of the postgraduate modules I am currently teaching (details below) builds directly on my main line of research on Model-Driven Engineering. As a matter of facts, a number of student projects resulted in peer-reviewed articles published in international venues as illustrated in Sect. 3.3.

Below a summary of my teaching activities, including *thesis supervision*, *teaching module development*, and *other related activities*, is presented.

3.1 Teaching at undergraduate and postgraduate level

I have developed and delivered modules at both undergraduate and postgraduate levels and I have experience with teaching to both small groups and large cohorts. Modules have been delivered in Computer Science degree programs and in degree programs where Computer Science was not the primary subject. Below is an overview of the modules I have developed and taught so far.

3.1.1 Modules in Computer Science degree programs

2003 to *present* **M1. Tecnologie del Web**
Corso di Laurea di I Livello in Informatica
Università degli Studi dell'Aquila
It is a 6-credit undergraduate module, which is somewhat the natural continuation of the module (M10) in the former degree program (vecchio ordinamento).

2001/02 **M2. Laboratorio di Sistemi Informatici Distribuiti**
Corso di Laurea di I Livello in Informatica
Università degli Studi dell'Aquila
It was a 6-credit undergraduate module, which I took over in 2001 and delivered for just one edition since the degree program at that time was understaffed.

2007 to *present* **M3. Model-Driven Engineering**
Corso di Laurea Magistrale in Informatica
Università degli Studi dell'Aquila
It is a 6-credit graduate module, which I proposed, designed and developed. The course is strongly linked to my research as it makes extensive use of metamodeling, model transformations, and model management in both the conceptual and practical side. As such, it provides me with a first-class opportunity to observe closely how students with different levels of familiarity with software development interact with modeling environments, and I use the observations as feedback for further research and development.

2017 – 2019 **M4. Advanced Modeling Techniques**
Corso di Laurea Magistrale in Informatica
Università degli Studi dell'Aquila

It is a 3-credit graduate module, which has been proposed to enrich the degree program with more advanced concepts and techniques in the range of software modeling and engineering. Often students that are taking this course also take (M3), which allows me to go deeper with certain research topics that otherwise could be explored only in thesis projects.

2006/07 **M5. Sistemi ed Applicazioni su Reti**
Corso di Laurea Magistrale in Informatica
Università degli Studi dell'Aquila
It was a 6-credit graduate module, which I took over in 2006 and delivered for just one edition since the degree program at that time was understaffed.

2006 – 2018 **M6. Applicazioni LAMP**
Master Universitario di I livello in Web Technology
Università degli Studi dell'Aquila
It was a 6-credit graduate module, which I proposed, designed and developed together with (M7, M8, M9) as part of the "Master Universitario di I Livello in Web Technology". All of them are follow-ups from the previous course (M10), although the course material has been deeply revised in order to reflect more advanced and current aspects.

2006 – 2008 **M7. ApplicazioniAJAX/DHTML**
Master Universitario di I livello in Web Technology
Università degli Studi dell'Aquila

2004 – 2006 **M8. Ingegneria del Web I: Web Agents**
Master Universitario di I livello in Web Technology
Università degli Studi dell'Aquila

2004 – 2006 **M9. Ingegneria del Web II: Applicazioni LAMP**
Master Universitario di I livello in Web Technology
Università degli Studi dell'Aquila

1999 – 2001 **M10. Informatica Applicata: Commercio Elettronico**
Corso di Laurea in Corso di Laurea in Informatica (vecchio ordinamento)
Università degli Studi dell'Aquila

1997 – 2001 **M11. Informatica Applicata: Linguaggi Speciali**
Corso di Laurea in Corso di Laurea in Informatica (vecchio ordinamento)
Università degli Studi dell'Aquila
It was a 6-credit graduate module, which I took over in 1997 and delivered for 4 years. I revamped the lecture content and the practical exercises. Especially, the course is strongly linked to my research as it makes extensive use of meta-programming environment for designing and implementing programming languages (see [134, 131]). As such, the students had the opportunity to experiment with new programming concepts that they could design, implement, and inspect in by means of environments generated directly from the language specification.

1995 – 1999 **M12. Laboratorio di Architetture degli Elaboratori**
Corso di Laurea in Informatica (vecchio ordinamento)
Università degli Studi dell'Aquila
It was a 6-credit undergraduate module, which I took over in 1995 and delivered for 4 years. I revamped the lecture content and the practical exercises giving the students the opportunity to have hands-on sessions where they could program and explore the architecture of i8086 based microcomputers. The exercises were delivered in the classroom by means of a MS-DOS simulator implemented by myself and on dedicated hardware.

3.1.2 Modules in other degree programs

2002 – 2004 **M13. Laboratorio di Informatica I**
Corso di Laurea di I Livello in Chimica e Sc. Materiali
Università degli Studi dell'Aquila

2002 – 2003 **M14. Bioinformatica**
Corso di Laurea di I Livello in Biotecnologie
Università degli Studi dell'Aquila

1996 – 2001 **M15. Informatica**
Corso di Laurea in Scienze dell'Educazione (vecchio ordinamento)
Università degli Studi dell'Aquila

1998 – 2000 **M16. Informatica**
Diploma Universitario in Chimica
Università degli Studi dell'Aquila

3.2 Guest lectures

Apr 2016 **Guest Lectures to the Course Model-Drive Engineering (DVA436)**
Mälardalen University, Västerås, Sweden

Feb 2010 **Lecture module at the MDE Diploma**
Model Versioning/Evolution and Conflict Management
Ecole des Mines de Nantes, France

I delivered in the context of the MDE Diploma at École des Mines de Nantes in France a 6-hour course on advanced model-driven topics, including model differencing, model matching, model conflict, and coupled evolution.

3.3 Thesis supervision

Since my first academic appointment, I have supervised 128[19] thesis among Laurea in Informatica (vecchio ordinamento), Laurea di I livello in Informatica, and Laurea Specialistica or Magistrale in Informatica: of these, 18 received 110/110 *summa cum laudae*, 5 received 110/110, and 47 a grade in between 109/110 and 100/110. Some thesis projects resulted in the following peer-reviewed articles, which were accepted for publication in the proceedings of international conferences and workshops:

- **J. Di Rocco**, D. Di Ruscio, L. Iovino, and A. Pierantonio. "Traceability Visualization in Metamodel Change Impact Detection". In: 2nd Workshop on Graphical Model- ing Language Development (GMLD 2013) co-located with European Conference on Modeling Foundations and Applications (ECMFA 2013). ACM, 2013, pp. 51– 62.
- Cicchetti, A., Di Ruscio, D., Eramo, R., **Maccarrone, F.**, Pierantonio, A.: beContent: A Model-Driven Platform for Designing and Maintaining Web Applications. In *Proceedings of the 9th International Conference on Web Engineering*, 2009, LNCS 5648, pp 518-522. Springer.
- Cicchetti, A., Di Ruscio, D. and **Eramo, R.**. Towards propagation of changes by model approximations. In *10th IEEE International Enterprise Distributed Object Computing Conference Workshops*, 2006, pp. 25-33. IEEE.
- **Balzerani, L.**, Di Ruscio, D., Pierantonio, A. and De Angelis, G., 2006. Supporting Web applications development with a product line architecture. *Journal of Web Engineering, 5*(1), pp. 025-042.
- **Balzerani, L.**, Ruscio, D.D., Pierantonio, A. and De Angelis, G.: A product line architecture for web applications. In *Proceedings of the 2005 ACM symposium on Applied computing*, pp. 1689-1693. ACM

In other cases, articles were published as outcome of the work done for exam projects for the course of Model-Driven Engineering (Module M3) (see Sect. 3.1.1).

- Di Rocco, J., Di Ruscio, D., **Narayanankutty, H.** and Pierantonio, A.: Resilience in Sirius Editors: Understanding the Impact of Meta-Model Changes. In *Proceedings 12th Workshop on Models and Evolution*, ME 2018 (Vol. 2192). CEUR-WS.
- **Addazi, L.**, Cicchetti, A., Di Rocco, J., Di Ruscio, D., Iovino, L. and Pierantonio, A.: Semantic-based Model Matching with EMFCompare. In *Proceedings 10th Workshop on Models and Evolution*, ME 2016, (Vol. 1706, pp. 40-49). CEUR-WS.

[19] Two of them still to be defended.

- **Di Rocco, J.**, Iovino, L. and Pierantonio, A., 2012, October. Bridging state-based differencing and co-evolution. In *Proceedings of the 6th International Workshop on Models and Evolution* (pp. 15-20). ACM.

3.4 Research on Education in Modeling

Recently, during the *Winter Modeling Meeting* co-organised with Antonio Bucchiarone (FBK, Italy) and Richard Paige (MacMaster University, Canada), I have been among the initiators of the Body-of-Knowledge on Model-Based Software Engineering (MBSE-BOK). Preliminary results about MBSE-BOK are summarised in the following articles:

- Burgueno, L., Ciccozzi, F., Famelis, M., Kappel, G., Lambers, L., Mosser, S., Paige, R.F., Pierantonio, A., Rensink, A., Salay, R., and Vallecillo, A., 2019. Contents for a Model-Based Software Engineering Body of Knowledge, In *Software & System Modeling*, pp. 1–13, doi:10.1007/s10270-019-00746-9
- Ciccozzi, F., Famelis, M., Kappel, G., Mosser, S., Paige, R.F., Pierantonio, A., Rensink, A., Salay, R., Taentzer, G., Vallecillo, A. and Wimmer, M., 2018. How do we teach modeling and Model-Driven Engineering? A survey. In *Proceedings Educators Symposium 2018* EduSymp18, 16 Oct 2018, Copenhagen, Denmark.
- Ciccozzi, F., Famelis, M., Kappel, G., Lambers, L., Mosser, S., Paige, R.F., Pierantonio, A., Rensink, A., Salay, R., Taentzer, G. and Vallecillo, A., 2018, October. Towards a body of knowledge for model-based software engineering. In Proceedings of the 21st ACM/IEEE International Conference on Model Driven Engineering Languages and Systems: Companion Proceedings (pp. 82-89). ACM.

The results of the MBSE-BOK working group has been presented in the following invited event:

- A. Pierantonio, invited session on «Model-Driven Engineering in Education» during the *Software Technologies: Application and Foundations Conference* held in Toulouse (France) on July 26, 2018.

3.5 Summer Schools

2012 **Summer School Direction**
12th Intl. School on Formal Methods for the Design of Computer, Communication and Software Systems (SFM 2012), Bertinoro, Italy, June 18-23, 2012

Co-directed with Vittorio Cortellessa

The Summer School covered a wide range of concepts, including modeling languages, model transformations, functional and performance modeling and analysis, and model evolution, proper of the software discipline of model-driven engineering. Young researchers had the chance to interact with well-known researchers and experts in the field by spending the whole period in the Bertinoro Conference Centre together with the lecturer.

http://www.sti.uniurb.it/events/sfm12mde/

Lecturers: Steffen Becker, Mark van den Brand, Jordi Cabot, Vittorio Cortellessa, Krzysztof Czarnecki, Holger Giese, Gerti Kappel, Dorina Petriu, Alfonso Pierantonio, Bran Selic, Sebastian Uchitel, and Antonio Vallecillo.

2011 **Summer School Lecture**
Managing the Evolution of F/OSS with Model-Driven Techniques

4th Summer School on Generative and Transformational Techniques in Software Engineering (GTTSE), Braga, Portugal, 3–9 July, 2011

3.6 Other teaching activities

3.6.1 Tutorials in companies and other institutions

2014 **MDE basic concepts: Models, Metamodels, and Model Transformations**

Thales Group (Chieti)

I designed and delivered a 18-hour course together with Prof. Vittorio Cortellessa on Model-Driven Engineering at Thales. The topics included meta-modeling, model transformations, UML, and profiling on different platforms, such as the Eclipse Modeling Framework, Papyrus, and Magic Draw.

2014 The beContent framework: a tutorial
beShape (Frascati)

2011 Metodologie e Tecnologie Innovative per i Servizi Web
Scuola Superiore di Pubblica Amministrazione (SSPA)

I delivered a 36-hour course on the opportunities and privacy issues related to the exploitation of web-based systems and social media in the Italian Public Administration. The audience consisted of high-ranked public officers of the Italian Public Administration ("Dirigenti di I e II livello"). The course has been divided in 6-hour modules held in the SSPA sites of Acireale, Bologna, Caserta, Reggio Calabria e Roma (twice).

2008 Model Driven Architecture
Ericsson (Roma)

Lecturer at the UNI-NORGE Teaching project at Ericsson headquarters in Rome.

2007 A Metamodel Independent Approach to Difference Representation
A4MT & Partners Meeting (Zurich)

2006 Incremental Model Transformations for Code Generation
Soluta (Castelfranco Veneto)

2005 Model-Driven Engineering
Ericsson (Roma)

2004 A component-based framework for Web applications development
Engineering S.p.A. (Porto San Giorgio)

2004 OMG standards for Model Transformations and Model Driven Architecture
Micron Technology (Avezzano)

2003 Workflow e Firma Digitale
Nestor, Università di Roma "Tor Vergata".

3.6.2 Call-for-lectures

After the earthquake in 2009 that affected the city of L'Aquila, I proposed and developed an initiative called "Call for lectures.". The idea was to invite lecturers to help recover the regular teaching activities in our degree programs (severely affected by the earthquake in L'Aquila) with lecture series on the most innovative topics. A large number of applications have been submitted by prominent researchers. Only in the area of Software Engineering the following lecturers delivered modules during two semesters:

> *Bran Selic, Erol Gelenbe, Filippo Lanubile, Giuseppe Calavaro, Giuseppe Valetto, Juan Miguel Gomez, Luciano Baresi, Luiz Fernandez Sanz, Marco Bernardo, Massimiliano Di Penta, Mauro Pezze', Nour Ali, Paolo Tonella, Philippe Krutchen, Ralf Lämmel, and Simona Bernardi.*

4 Spin-offs, technology transfer, software products, and patents

4.1 Participation in spin-off companies

2004 to *present* Beep Innovation S.r.l.
Founder and President

Beep Innovation is a spin-off company of the University of L'Aquila. I have been one of the founders of the company and its president between 2014 and 2016. The company has been created in order to help innovate the productive regional system by proposing innovative added-value services and taking part in the main innovation programs funded by regional and national agencies. The company is still active.

1998 – 2003 **Montages AG, Zurich (Switzerland)**
Founder

Montages AG is a Swiss spin-off company of the ETH Zurich. I have been one of the founders of the company in 1998 and among the main contributors with the Montages notation and the GemMex tool. The initiative originated from the ETH Zurich project «Montages: Design and Fast Prototyping Environment for Domain-Specific Languages and their Interaction», a three-year project focussing on a formal notation and its support tool that I developed together with Philipp Kutter and Matthias Anlauff. The main customers are companies from the Swiss banking system with specific needs and requirements in the domain of data integration and tool interoperability. The company is still active. The company holds a patent (see Sect. 4.4).

4.2 Technology transfer

2018 to *present* **Technology transfer activity for Rete Ferroviaria Italiana**
Rete Ferroviaria Italiana is a state-owned company that manages the national railways network and the related interlocking systems. The cooperation with RFI aims at defining a modeling environment that makes use of the standard interlocking notation and generates a simulation and analysis environment. The notation is build as an Eclipse EMF[20] metamodel, whose semantics (necessary for the simulation) is given by means of Statecharts in Yakindu[21]. One of the most challenging components is the visual editor that is build by means of Sirius[22]. From a scientific and technical perspective, the project is very challenging because of the complexity of the notation and its expressiveness (as a rough comparison measure, the notation has a complexity comparable to UML in terms of number of concepts and relations). See also the ERMES project in Sect. 2.7.2.

2018 to *present* **Technology transfer activity for Braintribe (Vienna, Austria)**
Braintribe[23] is a company that has developed a generic modeling platform implementing their own version of the model-driven paradigm. The platform is used for building data-centric modeling environments to be used by their customers. The cooperation with Braintribe is aiming at introducing the following model management techniques and approaches in their products lifecycle:

- *clustering*: a clustering algorithm (initially proposed in [33, 44]) is being used for an unsupervised classification of customer modeling artifacts. By using different similarity metrics, artifacts are grouped in clusters; for instance, if the similarity is based on model matching [111], the artifact structure is used for the similarity distance. The clustering provides the modeller with interesting insights as each cluster denotes similar artifact and enables a more informed reuse.
- *similarity*: different similarity metrics have been considered to denote how similar two metamodels are. This is key for understanding to which extent a model transformation can be reused.
- *hybrid polystores*: by adopting the TyphonML, a hybrid polystore modeling notation developed in the framework of the Typhon project (see Sect. 2.7.2), Braintribe would like to offer a more expressive data integration approach where non-homogeneous databases, e.g, relational, graph-based, document-based, coexist and are integrated by means of TyphonML. Code generation techniques can then generate containers and dockers with the corresponding restful APIs that integrates the different stores.

The objective of this cooperation is the integration of advanced model management techniques and tools in their commercial platform in order to improve several key aspects: reuse of artifacts by means of clustering similarity techniques, and data integration by means of our TyphonML modeling language.

2015 **EXPO Abruzzo 2015**

[20] https://www.eclipse.org/modeling/emf/
[21] https://www.itemis.com/en/yakindu/state-machine/
[22] https://www.eclipse.org/sirius/
[23] http://www.braintribe.com

I have been the scientific and technical coordinator of the EXPO 2015 Regione Abruzzo project for the University of L'Aquila. Expo 2015 was a universal exposition hosted by Milan, Italy, and the Regione Abruzzo contributed to the event programme with a multitude of activities. The contribution of the University of L'Aquila has been to create a platform for *(i)* collecting heterogeneous data provided by different sources across the region; *(ii)* managing the information according to different profiles usages; and finally *(iii)* distributing the profiled information by means of dedicated web-based systems and mobile apps. The system has been used by a team of different figures, including social media manager, journalists, and several experts in domains such as architecture, tourism, wilderness, organic produce, agriculture, and technology. The system has been completely realized by means of the beContent system (see Sect. 4.3) with the exception of the iOS and Android thin clients.

2014 – 2016 **Technology transfer activity for BOC Information Technologies Consulting GmbH (Vienna, Austria)**
for the design and implementation of a modeling environment for Business Process Modeling in the Public Administration.

2014 – 2016 **Technology transfer activity for Magic Draw (Vilnius, Lituania)**
for the design and implementation of a tooling chain for exporting BPMN2 models from MagicDraw and importing them in the Eclipse Modeling Framework.

2012 – 2015 **Participation in the RIDITT "Ricostruire" project**
funded by the Ministry of Economic Development, it is a programme for the technology transfer and creation of new companies in the field of advanced ICT technologies applied to post-earthquake economic and territorial development.

2011 - 2012 **Technology transfer activity for "Sanità della Regione Abruzzo"**
for the definition of requirements and guidelines for web portals to be used by the Health National System in the Regione Abruzzo.

2011 **Technology transfer activity for Zeroclock (Rome)**
for the design and implementation of a generator of recovery plan for software and hardware architectures employed in an international mobile company. Techniques based on structural similarity and model differencing have been successfully employed by describing the architectures in modeling terms.

2008 – 2011 **Technology transfer activity for Mandriva (France)**
for the design and implementation of a simulator for upgrade scripts of Linux packages.

2008 – 2011 **Technology transfer activity for Caixa Magica (Portugal)**
for the design and implementation of a meta-installer for APT Debian packages and subsequent applicability verification for Android applications have been developed.

2007 **Technology transfer activity for Neta Informatica (Mosciano Sant'Angelo)**
A pilot study has been developed to validate the adoption of code generation techniques for the development of Web-based enterprise systems. The primary objective was to verify the reduction of time and costs for different application patterns (such as CRUD) through the use of Microsoft Software Factory.

2005 – 2007 **Scientific coordinator of the cooperation with Regione Abruzzo**
Responsible of the cooperation contract between the Dipartimento di Informatica dell'Università degli Studi dell'Aquila and Regione Abruzzo.

2003 – 2006 **Scientific coordinator of the cooperation with Engineering S.p.A.**
Responsible of the cooperation contract between the Dipartimento di Informatica dell'Università degli Studi dell'Aquila and Engineering Sanità ed Enti Locali S.p.A.

2004 – 2005 **Technology transfer activity for Parco Scientifico e Tecnologico delle Marche**
During the collaboration, business process modeling systems were identified, selected and customized to be used in the manufacturing sector which TecnoMarche had active technology transfer projects with.

1997 **Technology transfer activity for UBS (Unione delle Banche Svizzere)**
During the Cubix project, whose partners are the University of L'Aquila, ETH Zurich, and UBS, an n-dimensional data model was defined and formalized in a modeling language specified by means of Montages.

Other companies
Since my first academic appointment, I collaborated with the following companies:

AlphaBank (Greece), ATB (Germany), AWS (Germany), CLMS (Greece), BOC (Austria), Cyborg (Pescara), Everett Italia (Pescara), GMV Aerospace and Defence (Spain), IG Technology (Roma), Imola Informatica (Imola), InQueryLabs (Hungary), Intecs (Pisa), Linagora (France), Maggioli Informatica (L'Aquila), Micron Technology (Avezzano), Nea Odos (Greece), Neta (Ancona), NoMagic (Lituania), Nous Informatica (Roma), Oracle Italia (Roma), SED (L'Aquila), Sparx Systems (Austria), Technolabs (L'Aquila), Taiprora (S.Giovanni Teatino), Volkswagen (Germany), and XWiki (France).

4.3 Software Development and Distribution

Software products developed as results of the research activity:

MDEForge
MDEForge [56] is an extensible cloud-based modeling platform that provides support to a community-based modeling repository [45]. The main characteristic is that it enables the adoption of model management tools as software-as-a-service that can be remotely used without overwhelming the users with intricate and error-prone installation and configuration procedures. Several extensions have been implemented and installed, including:

- *automated classification of the repository*: based on our clustering approach in [33, 44] it permits the unsupervised classification of modeling artifacts (models, metamodels, and transformations) according to both predefined (structural, containment-based, cosine, and Dice's coefficient) and user-defined similarity distances;
- *semantic similarity*: since the lexical comparison is typically performed using the Levenshtein distance, we have semantically extended the lexical comparison by using WordNet, a lexical database of the English language, as described in [31]. Like this, terms that would be considered unrelated, e.g., *car* and *vehicle*, are considered similar. Thus, reducing the number of false negatives and making the distance measure more accurate;
- *metrics calculator*: whenever a modeling artifact is uploaded or generated on the platform, all metrics characterizing it are computed and presented [46, 61, 62];
- *model transformation analysis*: any ATL transformation in the repository can be analyzed employing AnATLyzer[24] that can capture a large class or errors in transformation at static time; the integration of ATL language in MDEForge is described in [36];
- *automated chaining of transformations*: the tool permits to bridge two distinguished metamodels in the repository provided that there exist several transformations that can be composed. The approach can return all possible transformation chains, even when metamodels are not fully compatible as shown in [58]. Moreover, in order to refine the space of generated chain additional non-functional requirements can be imposed [57, 15, 13].

MDEForge is currently used in the Model-Driven Engineering module at the Master in Computer Science at the University of L'Aquila for the automated assessment of student homework assignments: model transformations are automatically analyzed and given a score, the procedure has been validated, and the distance between the manual and the automated assessment are extremely close.

My role: I have ideated, designed and supervised the realization of the platform. As part of this work, I have supervised the Ph.D. Thesis of Francesco Basciani that is implemented in MDEForge[25].

https://www.mdeforge.org

[24] Cuadrado, Jesús Sánchez, Esther Guerra, and Juan de Lara. "AnATLyzer: an advanced IDE for ATL model transformations." In Proceedings of the 40th International Conference on Software Engineering: Companion Proceeedings. ACM, 2018.

[25] Basciani, F.: Mining and Enhancing MDE Repositories, 2017, Ph.D. Thesis. Università degli Studi dell'Aquila

beContent

beContent [105] is a lightweight model-driven framework for the fast-prototyping of web applications. Based on the beContent metamodel permits the developer to describe the applications in a declarative way. Models can be authored by means of an Eclipse EMF modeling environment [105] from which code can be directly generated and code can generated [149]. However, the most interesting aspect of beContent is that models can be written directly in PHP by means of a lightweight version of its metamodel (see [93]) and interpreted. Like this, any aspect of an application, including the CRUD operations and the datasources navigating the data model, can be described in a highly declarative way abstracting from asset details that are handled by the system. By means of model differencing techniques, beContent can support forms of co-evolution [70], i.e., whenever an application model undergoes modifications, manual and automated migration procedures are generated and executed, including database migration (when possible) and skin templates. Moreover, manual sanity checks are provided to the developer in order to mitigate the difficulties of restoring the integrity and consistency of the application. The system is being used by the following organizations including the University of L'Aquila and the Dipartimento di Ingegneria e Scienze dell'Informazione. Moreover, developers have used for commercial purposes.

My role: I am the leader and main contributor of the project, i.e., I have designed, developed, and used it in several projects. Tutorials and mentoring activities have been provided to companies using it, e.g., Nous Informatica (Rome), Cyborg (Pescara).

https://github.com/MDEGroup/beContent

Gem-Mex

Gem-Mex is the support tool for the Montages specification language. It permits to generate complete programming environments for domain-specific and general-purpose languages. Moreover, languages can be given dynamic semantics natively in Montages descriptions that can be translated in executable Abstract State Machines specifications. The tool has been used in several commercial projects by the Montages AG company.

My role: I have been one of the leaders and contributors of the project. In particular, I have designed the AST decoration with control-flow information to be used for executing specifications.

http://freshmeat.sourceforge.net/projects/gem-mex

EVOSS - EVolution of free and Open Source Software

This is tool that allows to simulate updates of complex software systems and to predict failures before modifying the actual configuration of the analyzed system. EVOSS was adopted by Caixa Mágica[26] in the CM14 Linux distribution[27].

http://evoss.di.univaq.it

ByADL

A Framework to develop Architecture Description Languages (ADLs) implemented on Eclipse platform.

http://byadl.di.univaq.it

EMFMigrate

Set of tools and techniques to support the co-evolution of metamodels with transformations, models, and graphic editors. Based on the approach presented in [89] and developed in the Ph.D. Thesis of Ludovico Iovino[28].

http://www.emfmigrate.org

GMFEvolution

Tool to support the co-evolution of metamodels and graphic editors developed in GMF (Graphical Modeling Framework). Based on the approach presented in [100, 112].

http://www.emfmigrate.org/gmfevolution/

[26] http://www.caixamagica.pt/

[27] http://linux.caixamagica.pt/pag/documentacao/CM14/ManualCxM14.pdf

[28] Ludovico Iovino. Coupled evolution in metamodeling ecosystems, Ph.D. thesis. Università degli Studi dell'Aquila. 2013

Janus Transformation Language (JTL)
The JTL language is a bidirectional model transformation language described in several papers (e.g., [97, 49]). An Eclipse plug-in has been developed with the language engine implementation [22, 21].

http://jtl.di.univaq.it

4.4 Patents

2008 United States patent No. 7,340,728
Methods and Systems for Direct Execution of XML Documents

https://patents.google.com/patent/US20020111965A1/en

The patent is among the results of the activities developed during my guest professorship at ETH Zurich that led to the creation of the Montages AG spin-off. The formal submitter of the patent is Philipp Kutter who sustained all the financial costs for the patent development and is still the chairman of the company. However, I contributed to its development with the definition of the Montages notation and its support tool (not covered by the patent) by co-authoring the following papers: [129, 130, 131, 132, 133, 134, 135].

5 University and department activities

5.1 International selection committees

2018 to *present* Promotions Selection Committee Member
University of York, UK

5.2 Selection panels

2019 Selection panel member for a fixed-term lecturer position
Selection procedure for a fixed-term lecturer position (in Italian: *ricercatore universitario con contratto di lavoro subordinato a tempo determinato ai sense della legge 240/2010*) in Computer Science at the Gran Sasso Science Institute, L'Aquila.

2017 Selection panel member for a fixed-term lecturer position
Selection procedure for a fixed-term lecturer position (in Italian: *ricercatore universitario con contratto di lavoro subordinato a tempo determinato ai sense della legge 240/2010*) in Computer Science at the Gran Sasso Science Institute, L'Aquila.

2015 Chair of the selection panel for a fixed-term lecturer position
Selection procedure for a fixed-term position of lecturer (in Italian: *ricercatore universitario con contratto di lavoro subordinato a tempo determinato ai sense della legge 240/2010*) in Computer Science at the University of L'Aquila (funded by the EU CHOReVOLUTION project).

2015 Chair of the selection panel for a fixed-term lecturer position
Selection procedure for a fixed-term position of lecturer (in Italian: *ricercatore universitario con contratto di lavoro subordinato a tempo determinato ai sensi della legge 240/2010*) in Computer Science at the University of L'Aquila (funded by the EU LearnPAD project).

2005 Selection panel member for a lecturer position
Selection procedure for a permanent position of lecturer (in Italian: *valutazione comparativa per un posto da ricercatore universitario di ruolo ai sensi della legge 240/1998*) in Computer Science at the University of Rome "La Sapienza".

2004 Selection panel member for a fixed-term lecturer position
Selection procedure for a fixed-term position of lecturer (in Italian: *valutazione comparativa per un posto da ricercatore universitario a tempo determinato*) in Computer Science at the University of Camerino.

2004 Selection panel member for a lecturer position
Selection procedure for a permanent position of lecturer (in Italian: *valutazione comparativa per un posto da ricercatore universitario di ruolo ai sensi della legge 240/1998*) in Computer Science at the University of Chieti-Pescara.

2002 **Selection panel member for a lecturer position**
Selection procedure for a permanent position of lecturer (in Italian: *valutazione comparativa per un posto da ricercatore universitario di ruolo ai sensi della legge 240/1998*) in Computer Science at the University of Firenze.

2001 **Selection panel member for a lecturer position**
Selection procedure for a permanent position of lecturer (in Italian: *valutazione comparativa per un posto da ricercatore universitario di ruolo ai sensi della legge 240/1998*) in Computer Science at the University Ca' Foscari of Venice.

5.3 Other selection panels

I chaired or I have been member of numerous appointment pane-ls for "assegni di ricerca" (post-docs) and "borse di ricerca" (junior researchers) at the University of L'Aquila. Moreover, I have involved in the following selection panels concerning non-academic positions.

2019 **Selection panel member**
Selection procedure for a fixed-term position related to the design, implementation, and management of a web portal for the Human Science Department of the University of L'Aquila.

2015 **Chair of the selection panel**
Selection procedure among employees of the University of L'Aquila for a fixed-term contract (in Italian: *incarico di collaborazione) in the framework of the project "Al.Fo. Aggiuntivo – Abruzzo Musica Formazione-Ricerca-Indotto"*).

2015 **Chair of the selection panel at Regione Abruzzo**
Selection procedure for a permanent position as information system specialist (in Italian: *profilo professionale D1-ST.SI Specialista tecnico in sistemi Informatici*).

2008 **Selection panel member**
Promotion procedure for a position with a technical and scientific profile in teaching and research laboratories (in Italian: *progressione verticale di n. 1 posto di categoria D, area tecnico-scientifica ed elaborazione dati per le esigenze dei laboratori scientifici e didattici per l'Informatica*) at the University of L'Aquila.

2007 **Selection panel member**
Selection procedure for a permanent procedure for a graphic designer to be associated with the "Ufficio Comunicazione ed Immagine" (in Italian: *n. 1 posto, a tempo pieno e indeterminato, di categoria C- posizione economica C1 – Area amministrativa, per le esigenze dell'Ufficio Comunicazione ed Immagine*) of the University of L'Aquila.

5.4 Administration roles and Committees memberships

2018 to *present* **Chair of the Committee for communication and website**[29]
Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica
Università degli Studi dell'Aquila

2015 to *present* **Rector Advisory Committee Member for Informatics**[30]
Università degli Studi dell'Aquila

2012 – 2018 **Committee Member for Space and Resource Management**[31] **Membro della Commissione Spazi e Risorse**
Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica
Università degli Studi dell'Aquila

2013 – 2017 **Councillor of the Head of Department Advisory Committee**[32]
Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica
Università degli Studi dell'Aquila

2010 – 2011 **Chair of the Committee for maintenance and health**[33]
Facoltà di Scienze MM.FF.NN.
Università degli Studi dell'Aquila

2007 **Committee Member for the Procurement of the University Financial Services**[34]
Università degli Studi dell'Aquila

5.5 Scientific Committees

2019 to *present* **Member of the scientific board of the AbSide Consortium**
I represent the University of L'Aquila within the Scientific Board ("Comitato Tecnico Scientifico") of the consortium. The scope of this consortium is to promote technology transfer from the regional academic system to the local industry. Members of the consortium are the Universities within the Regione Abruzzo, ARAP ("Agenzia regionale per le attività produttive"), Confindustria, among other organizations.

2018 to *present* **Chair of the Reference Group 2.2 (Software Engineering and Artificial Intelligence)**
Since September 2018, I am chair of the "Reference Group 2.2 (Software Engineering and Artificial Intelligence)" of the "Collegio di Dottorato in Ingegneria e Scienze dell'Informazione" at the University of L'Aquila. The group consists of the supervisors of current Ph.D. students working in the areas of Software Engineering and Artificial Intelligence.

2012 to *present* **Committee Member for the Ph.D. program in Information and Communication Technology**[35]
Dipartimento di Ingegneria Informatica e Scienze dell'Informazione e Matematica
Università degli Studi dell'Aquila

2003 – 2011 **Committee Member for the Ph.D. program in Computer Science** [36]
Dipartimento di Informatica
Università degli Studi dell'Aquila

5.6 Teaching Committees

2004 – 2018 **Chair of the Master in Web Technology program**
In 2004, I proposed, designed and developed the Master in Web Technology ("Master Universitario di I livello in Web Technology"). The degree program consisted of 60 CFU on topics related to the analysis, design, and implementation of enterprise web applications. Overall, the program delivered 13 editions and graduated more than 260 students.

http://www.disim.univaq.it/mwt/

2003 – 2004 **Committee Member for the Master in Computer Science degree program**[37]
Corso di Laurea in Informatica
Università degli Studi di L'Aquila

5.7 Project Committees

2017 to *present* **Progetto Speciale Multiasse "APP Abruzzo" (PO FSE Regione Abruzzo 2007/2013)**
Member of the application committee
Member of the management and control committee
Budget: EUR 1.498.264,46 (University of L'Aquila: EUR 44.400,00)

https://appabruzzo.eu/

2015 **Progetto di Alta Formazione "Abruzzo Musica", P.O. FSE ABRUZZO 2007-2013**
Scientific and technical coordinator for the University of L'Aquila
Budget: EUR 1.400.000,00 (overall)

2015 **Progetto di Alta Formazione "Research Abruzzo", P.O. FSE ABRUZZO 2007-2013**
Scientific and technical coordinator for the University of L'Aquila
Budget: EUR 2.500.000,00 (overall)

2014 – 2015 **Abruzzo EXPO 2015**
Scientific and technical coordinator for the University of L'Aquila.
Budget: EUR 70.000,00 (University of L'Aquila)

2012 – 2013 **Progetto "Sanitab" Regione Abruzzo**
Scientific and technical coordinator for the University of L'Aquila

2010 **Progetto 10to6 Competition**
Local organizer for the University of L'Aquila
Budget: EUR 10,000,000 (overall) – fully funded by the Fondamenta, M31, and Vertis seed and incubating companies.

5.8 Technical committees

2012 – 2018 **Delegate for business processes, communication, and website**[38]
Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica
Università degli Studi dell'Aquila

2012 – 2018 **Chair of the editorial committee for the department website**[39]
Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica
Università degli Studi dell'Aquila

2013 – 2017 **Chair of the Committee for the Web Portal**[40]
Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica
Università degli Studi dell'Aquila

2009 - 2012 **Chair of the Committee for Information Systems**[41]
Dipartimento di Informatica
Università degli Studi dell'Aquila

2006 **Committee member for University software**[42]
Università degli Studi dell'Aquila

2004 – 2006 **Committee Member for the University network, subcommittee for University portal**[43]
Università degli Studi dell'Aquila

1997 – 1998 **Committee member for University information systems**[44]
Università degli Studi di L'Aquila

1996 – 1997 **Committee member for computing resources**[45]
Dipartimento di Matematica Pura ed Applicata
Università degli Studi di L'Aquila

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[29] In Italian: *Coordinatore della Commissione Comunicazione e Sito Web.*
[30] In Italian: *Membro della Commissione Informatica di Ateneo, Commissione Consultiva della Rettrice*
[31] In Italian: *Membro della Commissione Spazi e Risorse.*
[32] In Italian: *Membro della Giunta di Dipartimento*
[33] In Italian: *Presidente della Commissione Decoro, Ambiente, Salute e Vivibilità*
[34] In Italian: *Membro Commissione di Ateneo per la Gara di Aggiudicazione dei Servizi di Tesoreria*
[35] In Italian: *Membro del Collegio di Dottorato in Ingegneria e Scienze dell'Informazione*
[36] In Italian: *Membro del Collegio di Dottorato in Informatica ed Applicazioni*
[37] In Italian: *Membro della Commissione Laurea Specialistica*
[38] In Italian: *Delegato Informatizzazione Processi, Comunicazione e Sito Web*
[39] In Italian: *Coordinatore Comitato di Redazione sito web*
[40] In Italian: *Presidente Commissione Portale*
[41] In Italian: *Presidente Commissione Mezzi di Calcolo*
[42] In Italian: *Membro della Commissione Software di Ateneo*
[43] In Italian: *Membro della Commissione Reti di Ateneo, Sotto commissione Portale di Ateneo*
[44] In Italian: *Membro del Comitato di Coordinamento Informatico di Ateneo*
[45] In Italian: *Membro della Commissione Mezzi di Calcolo*

6 Key strengths

Strong scientific profile:

- High number of publications (more than 130 papers) in prestigious international journals and conferences, and on a broad spectrum of covered topics, from algebraic specification to code generation
- Considerable involvement in the scientific community, as witnessed by the high number of coauthors (102 according to Scopus[46]), participation to competitive research programs (currently 3 active EU H2020 projects, principal investigator in 2 of them), collaborations with prestigious journals (JOT, SCP, SOSYM), chairing of top-level conferences and the membership of their program committees (26 only in the last 2 years)

Significative experience in PhD programs:

- Chair of the reference group in Software Engineering and Artificial Intelligence for the Ph.D. program in "Ingegneria e Scienze dell'Informazione"
- Supervision of a high number of students who are having successful academic, research and professional careers
- High number of papers co-authored only with students and former students
- Participations in international doctoral schools funded by the EU projects (1 active EU H2020 ITN, 1 submitted EU H2020 ITN under revision)

Significative experience in teaching:

- Delivered modules at undergraduate and postgraduate level to both small and large cohorts (only in the last 2 years I have delivered 7 modules)
- Supervised more than 130 thesis (at all levels)

Established experience in academic roles and duties:

- Director of the Master in Web Technology degree program for 14 years
- Participation to many recruiting committees and duties for institutional academic purposes
- Scientific responsible of several local collaboration agreements and contracts
- Responsible for the portal development of the a) University of L'Aquila, b) Dipartimento di Informatica, and c) Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica

Strong attitude also to technological transfer and applied research:

- Founder of two spin-offs hiring several (former) students and financing research and grants for the University of L'Aquila
- Principal investigator of several projects and non-academic agreements related to innovation and technology transfer
- Principal investigator of an industrial project with Rete Ferroviaria Italiana about model-driven techniques for railways interlocking systems

7 Publications

2020

[1] *Invited foreword*

Alfonso Pierantonio. "Foreword". In: *Model Management and Analytics for Large Scale Systems*. A cura di Mark van den Brand Loek Cleophas Mehmet Aksit Önder Babur e Bedir Tekinerdogan. Academic Press, Elsevier, 2020. URL: https://www.elsevier.com/books/model-management-and-analytics-for-large-scale-systems/tekinerdogan/978-0-12-816649-9.

[46] https://www.scopus.com/authid/detail.uri?authorId=15064742800

2019

[2] *Journal paper*

F. Basciani, J. Di Rocco, D. Di Ruscio, L. Iovino e A. Pierantonio. "A tool-supported approach for assessing the quality of modeling artifacts". In: *Journal of Computer Languages* 51 (2019), pp. 173 –192. DOI: 10.1016/j.cola.2019.02.003.

[3] *Journal paper*

L. Bettini, D. Di Ruscio, L. Iovino e A. Pierantonio. "Quality-Driven Detection and Resolution of Metamodel Smells". In: *IEEE Access* 7 (2019), pp. 16364–16376.

[4] *Editorial*

J. Blanchette, F. Bordeleau, A. Pierantonio, N. Kosmatov, G. Taentzer e M. Wimmer. "Introduction to the STAF 2015 Special Section". In: *Software and Systems Modeling* 18.1 (2019), pp. 191–193.

[5] *Journal paper*

Loli Burgueño, Federico Ciccozzi, Michalis Famelis, Gerti Kappel, Leen Lambers, Sebastien Mosser, Richard F Paige, Alfonso Pierantonio, Arend Rensink, Rick Salay e Antonio Vallecillo. "Contents for a Model-Based Software Engineering Body of Knowledge". In: *Software & Systems Modeling* (2019), pp. 1–13. DOI: 10.1007/s10270-019-00746-9.

[6] *Journal paper*

A. Cicchetti, F. Ciccozzi e A. Pierantonio. "Multi-view approaches for software and system modelling: a systematic literature review". In: *Software and Systems Modeling* (2019), pp. 1–27. DOI: 10.1007/s10270-018-00713-w.

[7] *Journal paper*

Juri Di Rocco, Davide Di Ruscio, Johannes Härtel, Ludovico Iovino, Ralf Lämmel e Alfonso Pierantonio. "Understanding MDE projects: megamodels to the rescue for architecture recovery". In: *Software & Systems Modeling* (2019), pp. 1–23. DOI: 10.1007/s10270-019-00748-7.

[8] *Contribution in conference proceedings*

Juri Di Rocco, Davide Di Ruscio, Ludovico Iovino, Phuong Nguyen e Alfonso Pierantonio. "Automated Classification of Metamodel Repositories: A Machine Learning Approach". In: *IEEE/ACM 22nd International Conference on Model Driven Engineering Languages and Systems (MODELS 2019)*. Accepted for publication. 2019.

[9] *Contribution in conference proceedings*

Ludovico Iovino, Adrian Rutle, Juri Di Rocco e Alfonso Pierantonio. "Query-based Impact Analysis of Metamodel Evolutions". In: *45th Euromicro Conference on Software Engineering and Advanced Applications (SEAA 2019). Accepted for publication*. IEEE, 2019.

[10] *Journal paper*

J. de Lara, E. Guerra, D. Di Ruscio, J. Di Rocco, J.S. Cuadrado, L. Iovino e A. Pierantonio. "Automated Reuse of Model Transformations through Typing Requirements Model". In: *ACM Transactions on Software Engineering and Methodology* (2019). *Accepted for publication.*

[11] *Editorial*

A. Pierantonio, M. van den Brand e B. Combemale. "The JOT Journal: Towards a Rising Generation". In: *Journal of Object Technology* 18.1 (2019), pp. 1–3. DOI: 10.5381/jot.2019.19.1.e1.

[12] *Contribution in conference proceedings*

Massimo Tisi, Jean-Marie Mottu, Dimitrios Kolovos, Juan de Lara, Esther Guerra, Davide Di Ruscio, Alfonso Pierantonio e Manuel Wimmer. "Lowcomote: Training the Next Generation of Experts in Scalable Low-Code Engineering Platforms". In: *Procs. STAF Research Project Showcase Workshop, co-located with STAF*. 2019, pp. 73–78.

2018

[13] *Journal paper*

F. Basciani, M. D'Emidio, D. Di Ruscio, D. Frigioni, L. Iovino e A. Pierantonio. "Automated Selection of Optimal Model Transformation Chains via Shortest-Path Algorithms". In: *IEEE Transactions on Software Engineering* (2018), pp. 1–30. ISSN: 0098-5589. DOI: 10.1109/TSE.2018.2846223.

[14] *Contribution in conference proceedings*

F. Basciani, J. Di Rocco, D. Di Ruscio, Ludovico Iovino e A. Pierantonio. "Exploring model repositories by means of megamodel-aware search operators". In: *1st International Workshop on Analytics and Mining of Model Repositories (AMMORE 2018) co-located with ACM/IEEE 21st International Conference on Model Driven Engineering Languages and Systems*. 2018, pp. 793–798.

[15] *Contribution in conference proceedings*

F. Basciani, D. Di Ruscio, M. D'Emidio, D. Frigioni, A. Pierantonio e L. Iovino. "A tool for automatically selecting optimal model transformation chains". In: *21st ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MoDELS 2018): Companion Proceedings*. ACM, 2018, pp. 2–6.

[16] *Contribution in conference proceedings*

F. Ciccozzi, L. Lambers, A. Pierantonio, G. Taentzer, M. Famelis, S. Mosser, A. Rensink, A. Vallecillo, G. Kappel, R.F. Paige, R. Salay e M. Wimmer. "How do we teach modelling and model-driven engineering? A survey". In: *Educators Symposium 2018 (EduSymp 2018) co-located with 21st ACM/IEEE International Conference on Model Driven Engineering Languages and Systems*. 2018, pp. 122–129.

[17] *Contribution in conference proceedings*

F. Ciccozzi, L. Lambers, A. Pierantonio, G. Taentzer, M. Famelis, S. Mosser, A. Rensink, A. Vallecillo, G. Kappel, R.F. Paige, R. Salay e M. Wimmer. "Towards a body of knowledge for model-based software engineering". In: *Educators Symposium 2018 (EduSymp 2018) co-located with 21st ACM/IEEE International Conference on Model Driven Engineering Languages and Systems*. 2018, pp. 82–89.

[18] *Editorial*

P.J. Clarke e A. Pierantonio. "Teaching Modeling: a Software Perspective". In: *Computer Science Education* 28.1 (2018), pp. 1–4.

[19] *Contribution in conference proceedings*

J. Di Rocco, D. Di Ruscio, J. Härtel, L. Iovino, R. Lämmel e A. Pierantonio. "Systematic recovery of MDE technology usage". In: *International Conference on Theory and Practice of Model Transformations (ICMT 2018)*. Vol. 10888. Springer, 2018, pp. 110–126.

[20] *Contribution in conference proceedings*

J. Di Rocco, D. Di Ruscio, H. Narayanankutty e A. Pierantonio. "Resilience in Sirius Editors: Understanding the Impact of Meta-Model Changes". In: *12th Workshop on Models and Evolution, ME 2018*. Vol. 2192. CEUR Workshop Proceedings. 2018.

[21] *Contribution in conference proceedings*

R. Eramo, A. Pierantonio e M. Tucci. "Enhancing the JTL tool for bidirectional transformations". In: *International Conference on the Art, Science and Engineering of Programming (Programming 2018)*. ACM Special Interest Group on Programming Languages, Association for Computing Machinery, 2018, pp. 36–41.

[22] *Contribution in conference proceedings*

R. Eramo, A. Pierantonio e M. Tucci. "Improved traceability for bidirectional model transformations". In: *2nd International Workshop on Model Driven Engineering Tools (MDETools) co-located with 21st ACM/IEEE International Conference on Model Driven Engineering Languages and Systems*. Vol. 2245. CEUR Workshop Proceedings. 2018, pp. 306–315.

[23] *Edited book*

A. Pierantonio e S. Trujillo, cur. *Proceedings of the 14th European Conference on Modelling Foundations and Applications (ECMFA 2018)*. Vol. 10890. Lecture Notes in Computer Science. Springer, 2018.

2017

[24] *Contribution in conference proceedings*

L. Bettini, D.D. Ruscio, L. Iovino e A. Pierantonio. "Edelta: An Approach for Defining and Applying Reusable Metamodel Refactorings". In: *11th International Workshop on Models and Evolution (ME 2017) co-located with ACM/IEEE 20th International Conference on Model Driven EngineeringLanguages and Systems*. Vol. 2019. CEUR Workshop Proceedings. 2017, pp. 71–80.

[25] *Contribution in conference proceedings*

M. Brambilla, R. Eramo, A. Pierantonio, G. Rosa e E. Umuhoza. "Enhancing flexibility in user interaction modeling by adding design uncertainty to IFML". In: *3rd Flexible MDE Workshop (FlexMDE 2017) co-located with ACM/IEEE 20th International Conference on Model Driven EngineeringLanguages and Systems*. Vol. 2019. CEUR Workshop Proceedings. 2017, pp. 435–440.

[26] *Edited book*

J. De Lara, D.D. Ruscio e A. Pierantonio, cur. *Third Workshop on Flexible Model Driven Engineering (FlexMDE 2017)*. Vol. 2019. CEUR Workshop Proceedings. 2017, pp. 385–386.

[27] *Editorial*

D. Di Ruscio, J. de Lara e A. Pierantonio. "Special Issue on Flexible Model Driven Engineering". In: *Computer Languages, Systems and Structures* 49 (2017), pp. 174–175.

[28] *Contribution in conference proceedings*

Davide Di Ruscio, Juergen Etzlstorfer, Ludovico Iovino, Alfonso Pierantonio e Wieland Schwinger. "A Feature-based Approach for Variability Exploration and Resolution in Model Transformation Migration". In: *European Conference on Modelling Foundations and Applications (ECMFA 2017)*. Vol. 10376. Lecture Notes in Computer Science. Springer, 2017, pp. 71–89.

[29] *Contribution in conference proceedings*

J. de Lara, J. Di Rocco, D. Di Ruscio, E. Guerra, L. Iovino, A. Pierantonio e J.S. Cuadrado. "Reusing Model Transformations through Typing Requirements Models". In: *International Conference on Fundamental Approaches to Software Engineering (FASE 2017)*. Vol. 10202. Lecture Notes in Computer Science. 2017, pp. 264–282.

[30] *Contribution in conference proceedings*

J.D. Rocco, D.D. Ruscio, M. Heinz, L. Iovino, R. Lämmel e A. Pierantonio. "Consistency Recovery in Interactive Modeling". In: *3rd International Workshop on Executable Modeling (EXE 2017) co-located with ACM/IEEE 20th International Conference on Model Driven Engineering Languages and Systems*. Vol. 2019. CEUR Workshop Proceedings. 2017, pp. 116–122.

2016

[31] *Contribution in conference proceedings*

L. Addazi, A. Cicchetti, J. Di Rocco, D. Di Ruscio, L. Iovino e A. Pierantonio. "Semantic-based Model Matching with EMFcompare". In: *10th Workshop on Models and Evolution (ME 2016) co-located with ACM/IEEE 19th International Conference on Model Driven Engineering Languages and Systems (MODELS 2016)*. Vol. 1706. CEUR Workshop Proceedings. 2016, pp. 40–49.

[32] *Contribution in conference proceedings*

F. Basciani, J. Di Rocco, D. Di Ruscio, L. Iovino e A. Pierantonio. "A Customizable Approach for the Automated Quality Assessment of Modelling Artifacts". In: *10th International Conference on the Quality of Information and Communications Technology (QUATIC 2016)*. IEEE, 2016, pp. 88–93.

[33] *Contribution in conference proceedings*

F. Basciani, J.D. Rocco, D.D. Ruscio, L. Iovino e A. Pierantonio. "Automated Clustering of Metamodel Repositories". In: *International Conference on Advanced Information Systems Engineering (CAiSE 2016)*. Vol. 9694. Lecture Notes in Computer Science. 2016, pp. 342–358.

[34] *Contribution in conference proceedings*

A. Bucaioni, A. Cicchetti, F. Ciccozzi, S. Mubeen, A. Pierantonio e M. Sjodin. "Handling Uncertainty in Automatically Generated Implementation Models in the Automotive Domain". In: *42nd Euromicro Conference on Software Engineering and Advanced Applications (SEAA 2016)*. IEEE, 2016, pp. 173–180.

[35] *Book chapter*

G. De Angelis, A. Pierantonio, A. Polini, B. Re, B. Thönssen e R. Woitsch. "Modeling for learning in public administrations-The learn PAd approach". In: *Domain-Specific Conceptual Modeling: Concepts, Methods and Tools*. A cura di Dimitris Karagiannis, Heinrich C. Mayr e John Mylopoulos. Springer, 2016, pp. 575–594.

[36] *Contribution in conference proceedings*

J. Di Rocco, D. Di Ruscio, A. Pierantonio, J.S. Cuadrado, J. De Lara e E. Guerra. "Using ATL Transformation Services in the MDEForge Collaborative Modeling Platform". In: *International Conference on Theory and Practice of Model Transformations (ICMT 2016)*. Vol. 9765. Lecture Notes in Computer Science. 2016, pp. 70–78.

[37] *Edited book*

D. Di Ruscio, J. De Lara e A. Pierantonio, cur. *Proceedings 2nd Workshop on Flexible Model Driven Engineering (FlexMDE 2016) co-located with ACM/IEEE 19th International Conference on Model Driven Engineering Languages & Systems*. Vol. 1694. CEUR Workshop Proceedings. 2016.

[38] *Contribution in conference proceedings*

D. Di Ruscio, J. Etzlstorfer, L. Iovino, A. Pierantonio e W. Schwinger. "Supporting Variability Exploration and Resolution during Model Migration". In: *European Conference on Modelling Foundations and Applications (ECMFA 2016)*. Vol. 9764. Lecture Notes in Computer Science. 2016, pp. 231–246.

[39] *Contribution in conference proceedings*

Z. Diskin, R. Eramo, A. Pierantonio e K. Czarnecki. "Incorporating Uncertainty into Bidirectional Model Transformations and their Delta-lens Formalization". In: *5th International Workshop on Bidirectional Transformations (BX 2016) co-located with The European Joint Conferences on Theory and Practice of Software (ETAPS 2016)*. Vol. 1571. CEUR Workshop Proceedings. 2016, pp. 15–31.

[40] *Contribution in conference proceedings*

R. Eramo, A. Pierantonio e G. Rosa. "Approaching Collaborative Modeling as an Uncertainty Reduction Process". In: *1st International Workshop on Collaborative Modelling in MDE (COMMitMDE 2016), co-located with ACM/IEEE 19th International Conference on Model Driven Engineering Languages and Systems*. Vol. 1717. CEUR Workshop Proceedings. 2016, pp. 27–34.

[41] *Edited book*

T. Mayerhofer, A. Pierantonio, B. Schätz e D. Tamzalit, cur. *Proceedings 10th Workshop on Models and Evolution co-located with ACM/IEEE 19th International Conference on Model Driven Engineering Languages and Systems*. Vol. 1706. CEUR Workshop Proceedings. 2016. URL: http://ceur-ws.org/Vol-1706.

[42] *Editorial*

A. Pierantonio e B. Schätz. "Models and Evolution: an Introduction to the Special Issue". In: *Journal of Systems and Software* 111 (2016), pp. 270–271. DOI: 10.1016/j.jss.2015.05.037 ⧉.

2015

[43] *Contribution in conference proceedings*

F. Basciani, J. Di Rocco, D. Di Ruscio, A. Pierantonio e L. Iovino. "Model repositories: Will they become reality? A position statement". In: *3rd International Workshop on Model-Driven Engineering on and for the Cloud (CloudMDE 2015) co-located with 18th International Conference on Model Driven Engineering Languages and Systems (MoDELS 2015)*. Vol. 1563. CEUR Workshop Proceedings. 2015, pp. 37–42.

[44] *Contribution in conference proceedings*

F. Basciani, D. Di Ruscio, J. Di Rocco, A. Pierantonio e L. Iovino. "A Tool for Clustering Metamodel Repositories". In: *Demo and Poster Session of the ACM/IEEE 18th International Conference on Model Driven Engineering Languages and Systems (MoDELS 2015)*. Vol. 1554. CEUR Workshop Proceedings. 2015, pp. 1–4.

[45] *Journal paper*

J. Di Rocco, D. Di Ruscio, L. Iovino e A. Pierantonio. "Collaborative Repositories in Model-Driven Engineering". In: *IEEE Software* 32.3 (2015), pp. 28–34.

[46] *Contribution in conference proceedings*

J. Di Rocco, D. Di Ruscio, L. Iovino e A. Pierantonio. "Mining Correlations of ATL Model Transformation and Metamodel Metrics". In: *7th International Workshop on Modeling in Software Engineering (MiSE 2015)*. IEEE, 2015, pp. 54–59.

[47] *Contribution in conference proceedings*

J. Di Rocco, D. Di Ruscio, A. Pierantonio e L. Iovino. "Supporting Users to Manage Breaking and Unresolvable Changes in Coupled Evolution". In: *Workshop on Domain-Specific Modeling (DSM 2015)*. ACM, 2015, pp. 47–54.

[48] *Edited book*

D. Di Ruscio, Juan de Lara e A. Pierantonio, cur. *Proceedings of the Workshop on Flexible Model Driven Engineering (FlexMDE 2015) co-located with ACM/IEEE 18th International Conference on Model Driven Engineering Languages & Systems*. Vol. 1470. CEUR Workshop Proceedings. 2015. URL: http://ceur-ws.org/Vol-1470.

[49] *Contribution in conference proceedings*

R. Eramo, A. Pierantonio e G. Rosa. "Managing Uncertainty in Bidirectional Model Transformations". In: *ACM SIGPLAN International Conference on Software Language Engineering (SLE 2015)*. 2015, pp. 49–58.

[50] *Foreword*

A. Pierantonio. "Foreword". In: *Proceedings 11th European Conference on Modelling Foundations and Applications. (ECMFA 2015) held as part of STAF 2015*. A cura di Francis Bordeleau e Gabriele Taentzer. Vol. 9151. Lecture Notes in Computer Science. 2015.

[51] *Foreword*

A. Pierantonio. "Foreword". In: *Proceedings 8th International Conference (ICGT 2015) held as part of STAF 2015*. A cura di Francesco Parisi-Presicce e Bernhard Westfechtel. Vol. 9151. Lecture Notes in Computer Science. 2015.

[52] *Foreword*

A. Pierantonio. "Foreword". In: *Proceedings 8th International Conference on Theory and Practice of Model Transformations (ICMT 2015) held as Part of STAF 2015*. A cura di Dimitris Kolovos e Manuel Wimmer. Vol. 9152. Lecture Notes in Computer Science. 2015.

[53] *Foreword*

A. Pierantonio. “Foreword”. In: *Proceedings 9th International Conference on Tests and Proofs (TAP 2015) held as Part of STAF 2015*. A cura di Jasmin Blanchette e Nikolai Kosmatov. Vol. 9154. Lecture Notes in Computer Science. 2015.

[54] *Contribution in conference proceedings*

A. Pierantonio, G. Rosa, D. Silingas, B. Thönssen e R. Woitsch. “Metamodeling Architectures for Business Processess in Organizations”. In: *Projects Showcase (PS 2015) co-located with the Software Technologies: Applications and Foundations 2015 federation of conferences (STAF 2015)*. Vol. 1400. CEUR Workshop Proceedings. 2015, pp. 27–35.

[55] *Edited book*

A. Pierantonio, B. Schätz e D. Tamzalit, cur. *Proceedings of the Workshop on Models and Evolution (ME 2015) co-located with ACM/IEEE 17th International Conference on Model Driven Engineering Languages and Systems*. Vol. 1331. CEUR Workshop Proceedings. 2015. URL: http://ceur-ws.org/Vol-1331.

2014

[56] *Contribution in conference proceedings*

F. Basciani, J. Di Rocco, D. Di Ruscio, A. Di Salle, L. Iovino e A. Pierantonio. “MDEForge: An Extensible Web-based Modeling Platform”. In: *2nd International Workshop on Model-Driven Engineering on and for the Cloud (CloudMDE 2014) co-located with the 17th International Conference on Model Driven Engineering Languages and Systems*. Vol. 1242. CEUR Workshop Proceedings. 2014, pp. 66–75.

[57] *Contribution in conference proceedings*

F. Basciani, J. Di Rocco, D. Di Ruscio, L. Iovino e A. Pierantonio. “Qualifying Chains of Transformation with Coverage-based Evaluation Criteria”. In: *Seminar on Advanced Techniques and Tools for Software Evolution (SATToSE 2014)*. Vol. 1354. CEUR Workshop Proceedings. 2014, pp. 79–89.

[58] *Contribution in conference proceedings*

F. Basciani, D. di Ruscio, L. Iovino e A. Pierantonio. “Automated Chaining of Model Transformations with Incompatible Metamodels”. In: *International Conference on Model Driven Engineering Languages and Systems (MoDELS 2014)*. Vol. 8767. Lecture Notes in Computer Science. Springer, 2014, pp. 602–618.

[59] *Contribution in conference proceedings*

A. Bennaceur, R. France, G. Tamburrelli, T. Vogel, P.J. Mosterman, W. Cazzola, F.M. Costa, A. Pierantonio, M. Tichy, M. Akşit, P. Emmanuelson, H. Gang, N. Georgantas e D. Redlich. “Mechanisms for Leveraging Models at Runtime in Self-Adaptive Software”. In: *Foundations, Applications, and Roadmaps of Models@ run. time, Dagstuhl Seminar 11481*. Vol. 8378. Lecture Notes in Computer Science. Springer, 2014, pp. 19–46.

[60] *Contribution in conference proceedings*

J. Di Rocco, D. Di Ruscio, L. Iovino e A. Pierantonio. “Dealing with the Coupled Evolution of Metamodels and Model-to-Text Transformations”. In: *Workshop on Models and Evolution (ME 2014) co-located with ACM/IEEE 17th International Conference on Model Driven Engineering Languages and Systems*. Vol. 1331. CEUR Workshop Proceedings. 2014, pp. 22–31.

[61] *Contribution in conference proceedings*

J. Di Rocco, D. Di Ruscio, L. Iovino e A. Pierantonio. “Describing the Correlations between Metamodels and Transformations Aspects”. In: *Seminar Series on Advanced Techniques & Tools For Software Evolution (SATToSE 2014)*. Vol. 1354. CEUR Workshop Proceedings. 2014, pp. 90–101.

[62] *Contribution in conference proceedings*

J. Di Rocco, D. Di Ruscio, L. Iovino e A. Pierantonio. “Mining Metrics for Understanding Metamodel Characteristics”. In: *6th International Workshop on Modeling in Software Engineering (MiSE 2014)*. ACM, 2014, pp. 55–60.

[63] *Edited book*

Proceedings of the 3rd Workshop on Extreme Modeling (XM 2014) co-located with ACM/IEEE 17th International Conference on Model Driven Engineering Languages & Systems (MoDELS 2014). Vol. 1239. CEUR Workshop Proceedings. 2014. URL: http://ceur-ws.org/Vol-1239.

[64] *Editorial*

D. Di Ruscio, R.F. Paige e A. Pierantonio. "Guest Editorial to the Special Issue on Success Stories in Model Driven Engineering". In: *Science of Computer Programming* 89 (2014), pp. 69–70. DOI: 10.1016/j.scico.2013.12.006.

[65] *Editorial*

D. Di Ruscio, A. Pierantonio e Juan de Lara. "Extreme Modelling (XM) 2012 Special Section". In: *Journal of Object Technology* 13.3 (2014). DOI: 10.5381/jot.2014.13.3.e1.

[66] *Contribution in conference proceedings*

R. Eramo, R. Marinelli, A. Pierantonio e G. Rosa. "Towards Analysing non-determinism in Bidirectional Transformations". In: *Workshop on Analysis of Model Transformations (AMT 2014) co-located with ACM/IEEE 17th International Conference on Model Driven Engineering Languages & Systems (MoDELS 2014)*. Vol. 1277. CEUR Workshop Proceedings. 2014, pp. 76–85.

[67] *Contribution in conference proceedings*

R. Eramo, A. Pierantonio e G. Rosa. "Representing uncertainty in bidirectional transformations". In: *Seminar on Advanced Techniques and Tools for Software Evolution (SATToSE 2014)*. Vol. 1354. CEUR Workshop Proceedings. 2014, pp. 112–121.

[68] *Contribution in conference proceedings*

R. Eramo, A. Pierantonio e G. Rosa. "Uncertainty in Bidirectional Transformations". In: 6th International Workshop on Modeling in Software Engineering, MiSE 2014 - Proceedings. 2014, pp. 37–42.

[69] *Editorial*

D. Tamzalit, B. Schätz, A. Pierantonio e D. Deridder. "Introduction to the SoSyM Theme Issue on Models and Evolution". In: *Software and Systems Modeling* 13.2 (2014), pp. 621–623.

2013

[70] *Journal paper*

A. Cicchetti, D. Di Ruscio, L. Iovino e A. Pierantonio. "Managing the Evolution of Data-intensive Web Applications by Model-Driven Techniques". In: *Software and Systems Modeling* 12.1 (2013), pp. 53–83.

[71] *Contribution in conference proceedings*

D. Di Ruscio, L. Iovino e A. Pierantonio. "A Methodological Approach for the Coupled Evolution of Metamodels and ATL Transformations". In: *International Conference on Theory and Practice of Model Transformations (ICMT 2013)*. Vol. 7909. Lecture Notes in Computer Science. Springer, 2013, pp. 60–75.

[72] *Contribution in conference proceedings*

D. Di Ruscio, L. Iovino e A. Pierantonio. "Managing the Coupled Evolution of Metamodels and Textual Concrete Syntax Specifications". In: *39th Euromicro Conference Series on Software Engineering and Advanced Applications (SEAA 2013)*. IEEE, 2013, pp. 114–121.

[73] *Edited book*

Juan de Lara, D. Di Ruscio e A. Pierantonio, cur. *Proceedings of the Workshop on Extreme Modeling (XM 2013) co-located with ACM/IEEE 16th International Conference on Model Driven Engineering Languages & Systems*. Vol. 1089. CEUR Workshop Proceedings. CEUR-WS.org, 2013. URL: http://ceur-ws.org/Vol-1089.

[74] *Edited book*

A. Pierantonio e B. Schätz, cur. *Proceedings of the Workshop on Models and Evolution (ME 2013) co-located with ACM/IEEE 16th International Conference on Model Driven Engineering Languages and Systems*. Vol. 1090. CEUR Workshop Proceedings. CEUR-WS.org, 2013. URL: http://ceur-ws.org/Vol-1090.

[75] *Contribution in conference proceedings*

J.D. Rocco, D.D. Ruscio, L. Iovino e A. Pierantonio. "Traceability Visualization in Metamodel Change Impact Detection". In: *2nd Workshop on Graphical Modeling Language Development (GMLD 2013) co-located with European Conference on Modelling Foundations and Applications (ECMFA 2013)*. ACM, 2013, pp. 51–62.

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