Project Number: 813884

Project Acronym: Lowcomote

Project title: Training the Next Generation of Experts in Scalable Low-Code Engineering Platforms

FIRST TRAINING PROGRESS REPORT

Project GA: 813884

Project Acronym: Lowcomote

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Authors: Dimitris Kolovos, Marie Chastanet, Massimo Tisi

Contributors: Dimitris Kolovos, Juan De Lara, Hélène Coullon, Pedro Molina, Paul Taylor, Ivan Cantador, all ESRs (Lissette Almonte Garcia, Fatima Rani, Panagiotis Kourouklidis, Félicien Ihirwe, Léa Brunschwig, Arsene Indamutsa, Ilirian Ibrahimi, Alessandro Colantoni, Faezeh Khorram, Sorour Jahanbin, Qurat ul ain Ali, Benedek Horváth, Jolan Philippe, Apurvanand Sahay)

HISTORY OF CHANGES		
Version	**Publication date**	**Change**
1.0	18/11/2020	▪ Initial version
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Project Abstract

Low-code development platforms (LCPD) are software development platforms on the Cloud, provided through a Platform-as a-Service model, which allow users to build completely operational applications by interacting through dynamic graphical user interfaces, visual diagrams and declarative languages. They address the need of non-programmers to develop personalised software, and focus on their domain expertise instead of implementation requirements.

Lowcomote will train a generation of experts that will upgrade the current trend of LCPDs to a new paradigm, Low-code Engineering Platforms (LCEPs). LCEPs will be open, allowing to integrate heterogeneous engineering tools, interoperable, allowing for cross-platform engineering, scalable, supporting very large engineering models and social networks of developers, smart, simplifying the development for citizen developers by machine learning and recommendation techniques. This will be achieved by injecting in LCDPs the theoretical and technical framework defined by recent research in Model Driven Engineering (MDE), augmented with Cloud Computing and Machine Learning techniques. This is possible today thanks to recent breakthroughs in scalability of MDE performed in the EC FP7 research project MONDO, led by Lowcomote partners.

The 48-month Lowcomote project will train the first European generation of skilled professionals in LCEPs. The 15 future scientists will benefit from an original training and research programme merging competencies and knowledge from 5 highly recognised academic institutions and 9 large and small industries of several domains. Co-supervision from both sectors is a promising process to facilitate agility of our future professionals between the academic and industrial world.

Table of contents

Introduction

The present document is a deliverable of the Lowcomote project (Grant Agreement n°813884), funded by the European Commission Research Executive Agency (REA), under the Innovative Training Networks Programme of the Marie Sklodowska Curie Actions (H2020-MSCA-ITN-2018). The purpose of this document is to describe the trainings performed during the first thesis year of Early-Stage Researchers recruited.

Executive Summary

All-in-all, the training programme has progressed well and in compliance with the work plan mentioned in the Grant Agreement.

All network events planned took place despite Covid-19 pandemic, which has not had a severe impact on the progress of the work of ESRs or on the organization of the network events.

Only secondments have been postponed to 2021 due to the pandemic.

Finally, the attendance to ACM/IEEE MoDELS Lowcode workshop was an opportunity for Early-Stage Researchers (ESRs) to participate in their first dissemination activity to promote their work.

1. Forewords

1.1. Quality and Innovative Aspects of the Training Programme

Lowcomote is offering a rich set of innovative multi- and interdisciplinary training activities, both at the local and at the network-wide level, that are accurately tailored to each ESR's development stage. The training has been designed to efficiently provide ESRs with high-level scientific knowledge combined with development of professional skills, to enable these 15 future scientists to successfully compete at the internationally competitive level. The training programme must be seen as a whole and covers the actions led at the local and the network level. The international research meetings offer possibilities to share common knowledge between ESR's, and bring opportunities to ESRs to train and to be trained by and with peers. The whole includes the local thesis works, secondments and exposure to different and complementary environments, and finally networks activities offering the possibilities to exchange competences, capabilities, knowledge and career perspectives. The relevance of the network level depends on the efficiency and quality of the local level training. ESRs will bring competencies to the group. To ensure a strong interweaving between local and network level, it has been decided to maximise exposure between ESRs and stakeholders of the training with internal research meetings every 4-5 months, divided between research training activities, soft and transferable skills training, entrepreneurship or dissemination training.

The project identified key scientific and transferable skills required to evolve ESRs into tomorrow's successful professionals' pathways (in the industrial sector, in the academic sector, in the academic sector at the service of the industrial sector or as company founders), and designed a comprehensive training program to ensure this transition. The network, spanning multiple research areas and disciplines (MDE, Cloud Computing and Machine Learning), will allow ESRs to gain an interdisciplinary and inter-sectoral view of the relevant research and development fields, through cooperation with supervision by world-class academics and domain experts.

1.2. Overview and Content Structure of the Training Programme

The training programme of Lowcomote has the following training objectives:

- **TO1:** Provide ESRs with scientific knowledge beyond the state of the art to strengthen career perspectives.
- **TO2:** Maximise exposure to different environments, in order to give ESRs the possibility to understand the whole chain of value in their domain. Multiple exposures will enhance creativity, agility and value generation.
- **TO3:** Provide ESRs with communication, management and career development skills, enabling them to succeed in any sector.

The training programme is underpinned by the following principles:
(1) training is led by world experts in the field to ensure that European R&D capability is enhanced,

(2) training is developed by well-rounded researchers with regard to the programme objectives;
(3) timely and high quality feedback is provided;
(4) and training will maximise the value of contact time between ESRs, advisors and co-advisors, via regular feedback, focus on impact and dissemination, and substantial networking.

The design of the training programme of Lowcomote is in line with the principles for Innovative Doctoral Training[1], and its aim is to enable the 15 recruited ESRs to develop a broad range of scientific, technical and transferable skills that will prepare them for fruitful careers in academia and industry. To this end, Lowcomote will organise the research, technical and transferable skills workshops. All ESRs are required to attend all workshops. Training and networking activities occurring within the same month are co-located in a single network event.

Recurring events are:

- **Regular internal research meetings** (approximately every 4 months) that comprise presentations from ESRs, senior members of the network and invited speakers from academia and industry on challenges and advances in the state-of-the-art in the field of LCE and related research areas (e.g data engineering, Cloud computing, software engineering). Each internal research meeting is led by a different beneficiary (from academia and industry). Each internal research meeting is associated with a social activity, in order to increase the social cohesion of the network.

- **Two Hackathons** (co-located with internal research M22 and M38) where ESRs are encouraged to work in small teams with the aim of integrating the products of their individual research projects in the Lowcomotive platform and identifying opportunities for further collaboration and prepare sustainability of results, inputs, methods of our project after its lifetime.

- **Research workshops** co-located with the leading conference in the field (ACM/IEEE International Conference on MDE Languages and Systems (MoDELS)). Partners of the network have a long track record of organising successful workshops in the context of MoDELS.

1.3. Detailed Training Programme Activities

Individual technical training and transferable skills workshops are grouped in 7 global actions, namely training program activities (TPA).

TPA 1: Local and secondment research training The main local training is based on the local research and PhD programs of the hosting institutions. During 36 months, ESRs will work on a specific research works under the supervision of several high level experts belonging to the academic and the industrial field, through a co-supervision process.

When hosted by academic partners, the ESR will be fully integrated to the hosting ecosystem working with ESRs and staff. If the hosting institution is an industrial partner, the ESRs will

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[1] ec.europa.eu/euraxess/pdf/research_policies/Principles_for_Innovative_Doctoral_Training.pdf

work in close collaboration with the different units and with the R&D staff to offer an industry-oriented ground. Two intersectoral secondments will be planned for each ESR.

Lowcomote builds on a network of 5 academics and 9 industrial beneficiaries and partner organisations. Each ESR will spend in total 6 months outside of the hosting institution. With secondments, we will promote interdisciplinarity and we will contribute to reduce the "European Paradox", i.e. that Europe is unable to sufficiently turn research results into competitive products.

TPA 2: Research training network sessions We will organise 3 research training sessions on specific topics on the first part of the thesis works at the network level. These sessions will serve as a base to progress collectively towards the same goals with the same level of knowledge.

- **TPA 2A: MDE Foundations and Tools Training** (4 days). This training aims at presenting core modelling theory (e.g., linguistic architecture, metamodelling, transformation). It will introduce technologies such as the Eclipse Modelling Framework, Xtext and GMF/Sirius. It will also provide an overview of state-of-the-art model management technologies such as ATL, VIATRA and Epsilon. The training event will be delivered by Prof. Dimitris Kolovos, who is an expert in such state-of-the-art frameworks and technologies.

- **TPA 2B: Cloud Computing and Virtualisation Training** (4 days). The training introduces students to both the theoretical background of Cloud Computing and Virtualisation as well as the practical applications, including the processing of large datasets using Big Data techniques. The set of notions will include: Virtualisation technique basics and specifics, Infrastructure resource management, Virtual machine management API, Virtual machine deployment mechanisms, Automatisation scripting; CAP Theorem, Eventual Consistency, Shared Nothing architectures, Dynamo algorithm; Amdahl's law, Gustafson's Law, Karp-Flatt Metric; Lambda Architecture, Multi-tenancy, IaaS, PaaS and SaaS models; Map Reduce, real time stream analytics, generalised functional decomposition, Futures.

- **TPA 2C: Data Science and Machine Learning Training** (4 days). This training event introduces the state-of-the-art in data science and machine learning. It will introduce the core concepts of data analysis and the creation of knowledge models from such data. Tools for both data analysis and development will be introduced, such as Jupyter and R. Machine learning techniques, will range from unsupervised (clustering) to supervised methods, e.g. similarity, deep neural network, and decision tree learning. Participants will be receiving both theoretical foundations and hands-on experience through lectures and guided exercises.

TPA 3: Internal research workshops If universities, research centres or engineering schools remain the main producers of scientific knowledge, there is a disconnection with the industry that focuses on market applications and commercial benefits. To reduce this gap, we want to promote sessions where research ideas could be seen with an industrial or technological transfer aspect through workshops. We will invite external participants belonging to the private sector, to give a good visibility of the excellence of our network and the ESRs. These workshops offer an even more concrete basis to discuss these topics.

- **TPA 3A: Scalable Development of Low-Code artefacts Workshop** (1 day). This workshop introduces techniques for developing modelling artefacts (models, metamodels, transformations) at industrial scale. Topics include different approaches to modularisation, componentisation and reutilisation of modelling artefacts and model transformations. The workshop also covers techniques to reduce the accidental complexity in domain models, like those based on multi-level modelling.

- **TPA 3B: Scalable Management of Low-Code artefactsWorkshop** (1 day). This workshop introduces technologies and tools such as Eclipse CDO, EMFStore, MDEForge for storing and managing modelling artefacts including models, metamodels, transformations, code generators etc. The workshop also provides an overview of state-of-the-art techniques and tools managing the evolution of modelling artefacts.

- **TPA 3C: Heterogenous Low-Code Engineering in Industry Workshop** (1 day). This workshop will synthesise and present the scalability issues faced by the industrial partners of the project, as well as any technical solutions/workarounds that are in place to address them.

TPA 4: Communication skills training sessions Future scientists need a array of communication skills ranging from the ability to explain to other researchers (and non-researchers) about their work or to prepare a coherent proposal for funding. Being able to communicate their research effectively can help our future ESRs write better scientific research papers or reports, secure research funding, and/or even find a job. To do so, we have designed 5 activities to provide our ESR with these skills.

- **TPA 4A: Oral Presentations** (0.5 day). The ESRs will attend a half day training based on techniques and methodologies to communicate with efficiency and relevance. This training will be carried out by IMT-Atlantique at the beginning of the project to offer possibilities to implement these methods in a concrete way during the lifelong time thesis. We will maximise progress thesis work presentation by ESRs during congress meetings to improve their oral skills and self-confidence as speakers. Furthermore, these presentations will serve to spread the knowledge and research works among the network. ESRs will benefit from works done by peers.

- **TPA 4B: Scientific paper writing** (0.5 day). This session focusses on every aspects of writing scientific papers to enable our ESRs to efficiently present their research works and results. Good dissemination of research results through publications led to a better visibility and maximise employability and career perspectives.

- **TPA 4C: Report writing** (0.5 day). This school deals with the planning, design, and writing of industry, technical, project, and other reports, allowing the ESRs to seamlessly communicate with their colleagues of the private sector.

- **TPA 4D: Grant proposal writing** (0.5 day). Writing proposals is a significant activity in researchers working life. This session takes as an example the H2020 program and beyond. It will be complemented by training from host supervisors who will give information about local/national funding opportunities.

- **TPA 4E: Job interview and application** (0.5 day). Our future scientists will receive a training and guidance to be well prepared to job applications, underlying interpersonal,

scientific and social skills needed to convince employers. This session is planned at the end of the project, close to the end of the thesis.

TPA 5: Career Development skills training sessions Nowadays, research is also a matter of management: project management, team management, activities management, ability to assess works performed. Management training in a general way can be addressed through two aspects: methods and tools to manage project and/ or team and/or activities; self-management and interpersonal skills.

- **TPA 5A: Project management** (0.5 day). This session provides ESRs with understanding, tools, and methods to manage projects. The objective of this session is not to make ESRs project manager at the end of the 0.5 day but to give them tips to understand the different aspects of the project management.

- **TPA 5B: Project self assessment** (0.5 day). This session provides ESR with methods to analyse and evaluate the job performed, and to plan the actions to be taken to bring their projects to success.

- **TPA 5C: IPR management** (0.5 day). Results of research and development activities can lead to technological transfer. Through our network, we promote ESRs able to convert ideas into technological transfer. Training ESRs to IPR management will help them avoiding future conflicts with potential technology users. Researchers must know how to protect their works without jeopardise technological transfer.

- **TPA 5D: Team management** (0.5 day). This session deals with management of small or large groups. We will provide a basic training to manage team, to design and plan a group project with members and to manage meetings.

TPA 6: Career development plan skills training sessions These sessions intend to provide ESRs with methodologies, tools and knowledge to maximise their career perspectives and employability. The Personal Career development plan (PCDP) is the common thread of this TP.

- **TPA 6A: Career planning** (0.5 day). This session deals with the creation of career plans. ESRs will receives guidance from field experts in career plan development, learn basics of assessment and self-evaluation.

- **TPA 6B: Industrial sector career** (0.5 day). This session gives an overview of career development in the industrial sector. In addition to the presentation by the industrial partners of the consortium, we will invite external partners from industries to provide additional testimonies.

- **TPA 6C: Academic sector career** (0.5 day). This session gives an overview of career development in the academic sector. In addition to the presentation by the academic partners of the consortium, we will invite external partners from others universities or research centres to provide additional testimonies.

- **TPA 6D: Future steps** (0.5 day). Planned at the end of the project, this session intends to give time to ESR for self evaluation, guided by expert in development career. We expect that each ESR develops an action plan to continue their career towards industry, academic, business foundation, etc.

TPA 7: Entrepreneurship training sessions As one of the objectives of ITN is to bring students and future scientists to turn ideas into products, we want to reinforce the entrepreneurship mindset. We have identified 3 steps that will be the base of our 3 sub-sessions:

- **TPA 7A: Start-up testimonies** (1 day). The entrepreneurship mindset will be stimulated by testimonials from entrepreneurs on their business creation experience and with lectures from experts on creativity process, innovation management, project management (agile) and business modelling methodology. The ESRs have the opportunity to listen about start-up creation and stories.

- **TPA 7B: Opportunity recognition** (1 day). The OR module is an intensive module that focus on the ideation process for a new product or service opportunity to a business model. Groups of ESRs will work on a specific idea for product or service case inspired by a real entrepreneur or derived from their own scientific work.

- **TPA 7C: Business Modelling and Development** (1 day). The last sub-session brings the students to the process of turning an innovative product or service idea with a structured business model into a real business. At the end of this session, future scientists of the Lowcomote ITN will be able to create a consistent Business Plan for a new venture in their respective disciplines.

TPA 8: Industrial workshop Our main dissemination event.

TPA 8A: Industrial workshop (1 day). Core event of our dissemination strategy, INT will hold a one-day industrial workshop gathering non-academics including PaaS, LCDP or LCEP vendors, and potential LCEP users. ESRs will have the opportunity to present their results to potential recruiters.

1.4. Draft calendar of all training activities as in Grant Agreement

	Main Training Events & Conferences	Lead Institution	Month
1	1st Internal Research Meeting (1 day)	IMT	9
2	MDE Foundations and Tools Training (4 days)	UY	9
3	Oral Presentations (0.5 day)	IMT	9
4	2nd Internal Research Meeting (1 day)	UAM	14
5	Cloud Computing and Virtualisation Training (4 days)	AWS	14
6	Scientific paper writing (0.5 day)	UAM	14
7	3rd Internal Research Meeting (1 day)	INCQ	18
8	Data Science and Machine Learning Training (4 days)	BT	18
9	Report writing (0.5 day)	INCQ	18
10	4th Internal Research Meeting (1 day)	UGD	22
11	ACM/IEEE MoDELS 2020 Research Workshop (1 day)	UAM	22
12	Scalable Development of Low-Code artefacts Workshop (1 day)	UAM	22
13	1st Lowcomote Hackathon (1 day)	CLMS	22
14	5th Internal Research Meeting (1 day)	CLMS	26
15	Scalable Management of Low-Code artefacts Workshop (1 day)	UDA	26
16	Grant proposal writing (0.5 day)	UY	26
17	Job interview and application (0.5 day)	BT	26
18	6th Internal Research Meeting (1 day)	BT	30
19	Heterogeneous Low-Code Engineering in Industry Workshop (1 day)	JKUL	30
20	Project self assessment (0.5 day)	UGD	30
21	Industrial sector career (0.5 day)	SPX	30
22	7th Internal Research Meeting (1 day)	UY	34
23	ACM/IEEE MoDELS 2021 Research Workshop (1 day)	UDA	34
24	Project management (0.5 day)	UGD	34
25	Start-up testimonies (1 day)	INCQ	34
26	8th Internal Research Meeting (1 day)	JKUL	38
27	2nd Lowcomote Hackathon (1 day)	JKUL	38
28	Team management (0.5 day)	CLMS	38
29	Career planning (0.5 day)	IMT	38
30	9th Internal Research Meeting (1 day)	INT	42
31	Industrial Workshop	INT	42
32	IPR management (0.5 day)	TOG	42
33	Academic sector career (0.5 day)	JKUL	42
34	Opportunity recognition (1 day)	SPX	42
35	10th Internal Research Meeting (1 day)	UDA	45
36	ACM/IEEE MoDELS 2022 Research Workshop (1 day)	UY	45
37	Future steps (0.5 day)	INT	45
38	Business Modelling and Development (1 day)	INT	45
39	Closing workshop	IMT	48

2. Network Events

The first year of the network involved the organisation of 4 network events in accordance with the WorkPlan. Some adjustments have been done to adapt to the Covid-19 pandemic.

2. 1.   1st Network Event

Training programme activities (TPA) planned in September 2019 have been postponed to December 2019 due to delays in recruitment and so as to optimize the number of participating ESRs. The original Work Plan foresaw a first network event in September 2019 at IMT Atlantique, Nantes, which eventually took place from 2nd to 7th December 2019 with the following contents:

- 1st Internal Research Meeting (1 day, including social activity for ESRs), organized by IMT Atlantique
- TPA 2A: MDE Foundations and Tools Training (4 days), provided by the University of York and some contributions from CLMS and partner organization Metadev
- TPA 4A: Oral Presentations (0.5 day), provided by IMT Atlantique

1st Internal Research Meeting	
Type of training	Complementary skills
Duration	1 day
Content and contributing partners	**Monday 2nd December,** **8:30 – 9:00: Introduction** – Massimo Tisi, Scientific coordinator **9:00 – 10:30: ESR Presentations** – Each ESR presents himself / herself, their contribution to the project & their Personal Career Development Plan (5 minutes each). **10:30 – 10:45: Coffee Break** **10:45 – 11:30: ESR-related Information** – Marie Chastanet, Project Assistant Manager • Training calendar • Responsibilities of ESRs • Communication rules • Obligation of each beneficiary towards ESRs • Governance bodies • Mid-term Check **Saturday 7th December,**

	Social activity, It's a Trap Studio (for ESRs only)
Skills acquired	Career planning
	Oral presentation
Attendees	**Coordination Team:** TISI Massimo (Scientific Coordinator), CHASTANET Marie (Project Assistant Manager), **ESRs:** ALMONTE GARCIA Lissette (ESR1), RANI Fatima (ESR2), KOUROUKLIDIS Panagiotis (ESR3), IHIRWE Felicien (ESR4), BRUNSCHWIG Léa (ESR5), INDAMUTSA Arsene (ESR6), KALWAR Safia (ESR7), COLANTONI Alessandro (ESR9), KHORRAM Faezeh (ESR10), JAHANBIN Sorour (ESR11), ALI Qurat Ul Ain (ESR12), PHILIPPE Jolan (ESR14), SAHAY Apurvanand (ESR15) **Supervisors:** MOTTU Jean-Marie, IMT Atlantique SUNYE Gerson, IMT Atlantique KOLOVOS Dimitris, University of York DE LARA Juan, Universidad Autónoma de Madrid GUERRA Esther, Universidad Autónoma de Madrid PIERANTONIO Alfonso, University of L'Aquila WIMMER Manuel, Johannes Kepler University of Linz NOPPEN Joost, British Telecommunications MAZZINI Silvia, INTECS DIEZ Pablo, Uground MOLINA MORENO Pedro Juan, Metadev

TPA 2A: MDE Foundations and Tools Training	
Type of training	Scientific skills training
Duration	4 days
Planned content of the Grant Agreement	This training event will present core modelling theory (e.g., linguistic architecture, metamodelling, transformation). It will introduce technologies such as the Eclipse Modelling Framework, Xtext and GMF/Sirius. It will also provide an overview of state-of-the-art model management technologies such as ATL, VIATRA and Epsilon. The training event will be delivered by Prof. Dimitris Kolovos, who is an expert in such state-of-the-art frameworks and technologies.
Revised Actual Content and contributing partners	**Monday 2nd December** **14:00 - 17:00** TPA 2A: MDE Foundations and Tools -

	Introduction to the course structure - Dimitris Kolovos (University of York) Demonstration of the Quid low-code platform – Pedro Molina (MetaDev) Demonstration of the zAppDev low-code platform – Katia Sarsempagieva (CLMS) **Tuesday 3rd December** **9:30 – 12:00** TPA 2A: Lecture: Introduction to MDE and the Eclipse Modelling Framework (EMF) - Dimitris Kolovos **13:00 – 16:00** TPA 2A: Practical: Modelling with EMF (in groups of 2-3) **Wednesday 4th December** **9:30 – 12:00** TPA 2A: Lecture: Graphical Modelling using GMF and Eugenia - Dimitris Kolovos **13:00 – 16:00** TPA 2A: Practical: GMF and Eugenia (in groups of 2-3) **Thursday 5th December** **9:30 -12:00** TPA 2A: Lecture: Model validation and transformation - Dimitris Kolovos **13:00 – 16:00** TPA 2A: Group project (in groups of 2-3) **Friday 6th December** **9:30 – 12:00** TPA 2A: Group project (in groups of 2-3)
Skills acquired	At the end of the training course, students are expected to: - Understand the principles and practices of modelling and metamodelling; - Know how to construct models and metamodels that are fit for engineering purposes; - Understand the techniques and practices of model management; - Be able to construct and evaluate model management programs;

	• Be able to implement models, metamodels and model management operations using Eclipse-based tools; • Understand the principles of orchestrating model management workflows. • Appreciate how Model-Driven Engineering integrates with wider system engineering processes and policies.
Attendees	**ESRs:** ALMONTE GARCIA Lissette (ESR1), RANI Fatima (ESR2), KOUROUKLIDIS Panagiotis (ESR3), IHIRWE Felicien (ESR4), BRUNSCHWIG Léa (ESR5), INDAMUTSA Arsene (ESR6), KALWAR Safia (ESR7), COLANTONI Alessandro (ESR9), KHORRAM Faezeh (ESR10), JAHANBIN Sorour (ESR11), ALI Qurat Ul Ain (ESR12), SAHAY Apurvanand (ESR15)

TPA 4A: Oral Presentations	
Type of training	Complementary skills training
Duration	0.5 day
Planned content of the Grant Agreement	The ESRs will attend a half day training based on techniques and methodologies to communicate with efficiency and relevance. This training will be carried out by IMT-Atlantique at the beginning of the project to offer possibilities to implement these methods in a concrete way during the lifelong time thesis. We will maximise progress thesis work presentation by ESRs during congress meetings to improve their oral skills and self-confidence as speakers. Furthermore, these presentations will serve to spread the knowledge and research works among the network. ESRs will benefit from works done by peers.
Revised Actual Content and contributing partners	**Friday 6th December** **13:00 – 17:00** TPA 4A: Oral Presentations, Mrs Morgane Heligon
Skills acquired	- Tips for making good presentations - Classic research presentation mistakes to avoid - The structure and language of a presentation - 3-minute thesis challenge
Attendees	**ESRs:** ALMONTE GARCIA Lissette (ESR1), RANI Fatima (ESR2), KOUROUKLIDIS Panagiotis (ESR3), IHIRWE Felicien (ESR4), BRUNSCHWIG Léa (ESR5), INDAMUTSA Arsene (ESR6), KALWAR Safia (ESR7), COLANTONI Alessandro (ESR9), KHORRAM Faezeh (ESR10), JAHANBIN Sorour (ESR11), ALI Qurat Ul Ain (ESR12), SAHAY Apurvanand (ESR15)

1st network event - 2nd - 7th December 2019
IMT Atlantique, 4, rue Alfred Kastler, 44307 Nantes cedex 3 (France)

Monday 2nd	Tuesday 3rd	Wednesday 4th	Thursday 5th	Friday 6th	Saturday 7th
8:30 – 12:00 1st Internal research meeting (project launching meeting - see separate agenda)	9:30 – 12:00 TPA 2A: Lecture: Introduction to MDE and the Eclipse Modelling Framework (EMF) - Dimitris Kolovos	9:30 – 12:00 TPA 2A: Lecture: Graphical Modelling using GMF and Eugenia - Dimitris Kolovos	9:30 -12:00 TPA 2A: Lecture: Model validation and transformation - Dimitris Kolovos	9:30 – 12:00 TPA 2A: Group project (in groups of 2-3)	9:30 – 12:00 Social activity: It's a Trap Studio (Escape Game)
13:00 – 14:00 EB & SB meeting / ESRs meeting 14:00 - 17:00 TPA[1] 2A: MDE Foundations and Tools - Introduction to the course structure - Dimitris Kolovos Demonstration of the Quid low-code platform - MetaDev Demonstration of the zAppDev low-code platform - CLMS **20:00 : Dinner at O'Deck restaurant**	13:00 – 16:00 TPA 2A: Practical: Modelling with EMF (in groups of 2-3) 18:30 - 19:45 Dinner at self-service restaurant next to IMT	13:00 – 16:00 TPA 2A: Practical: GMF and Eugenia (in groups of 2-3) 18:30 - 19:45 Dinner at self-service restaurant next to IMT	13:00 – 16:00 TPA 2A: Group project (in groups of 2-3) 18:30 - 19:45 Dinner at self-service restaurant next to IMT	13:00 – 17:00 TPA 4A: Oral Presentations, Mrs Heligon 20:00 Dinner at Baron Lefevre restaurant	

[1] TPA: training program activity

1

2.2. 2nd Network Event

Training programme activities (TPA) planned for the 2nd network event were organized in accordance with the Work Plan from 17th to 21st February 2020 as follows:

- 2nd Internal Research Meeting (0.5 day, including social activity for ESRs), organized by the Universidad Autónoma de Madrid in co-operation with IMT Atlantique
- TPA 2B: Cloud computing and virtualization (3.5 days), provided by Amazon Web Services (AWS) and some contributions from IMT Atlantique and partner organization Metadev

2nd Internal Research Meeting	
Type of training	Complementary skills
Duration	0.5 day
Content and contributing partners	**Monday 17th February** **9:30:** Introduction - Juan de Lara **9:40:** WP1 - Management & WP2 - Trainings - Marie Chastanet **10:00:** WP3 - Presentation overview of goals and objectives - Low-Code Engineering of Large-Scale Heterogeneous Systems - Juan de Lara Presentation of achievements and short term goals (incl. questions) by following ESRs: ALMONTE GARCIA Lissette (ESR1), RANI Fatima (ESR2), KOUROUKLIDIS Panagiotis (ESR3), IHIRWE Felicien (ESR4), BRUNSCHWIG Léa (ESR5) **10:30:** WP4 - Presentation overview of goals and objectives - Large-scale Repository and Services for Low-code Engineering - Alfonso Pierantonio Presentation of achievements and short term goals (incl. questions) by following ESRs: INDAMUTSA Arsene (ESR6), KALWAR Safia (ESR7), COLANTONI Alessandro (ESR9), KHORRAM Faezeh (ESR10)

	11:00: Break
	11:30: WP5 - Presentation overview of goals and objectives - Scalable Low-Code Artefact Management - Manuel Wimmer
	Presentation of achievements and short term goals (incl. questions) by following ESRs:
	JAHANBIN Sorour (ESR11), ALI Qurat Ul Ain (ESR12), HORVÁTH Benedek (ESR13), PHILIPPE Jolan (ESR14), SAHAY Apurvanand (ESR15)
	12:00: WP6 - Communication, Dissemination & Exploitation - Jean-Marie Mottu
	12:30: Reminders and Discussions for Mid-Term Check meeting - Marie Chastanet
Skills acquired	Oral presentation / Project Management
Attendees	**Coordination team:** TISI Massimo (Scientific Coordinator), CHASTANET Marie (Project Assistant Manager), **ESRs:** ALMONTE GARCIA Lissette (ESR1), RANI Fatima (ESR2), KOUROUKLIDIS Panagiotis (ESR3), IHIRWE Felicien (ESR4), BRUNSCHWIG Léa (ESR5), INDAMUTSA Arsene (ESR6), KALWAR Safia (ESR7), COLANTONI Alessandro (ESR9), KHORRAM Faezeh (ESR10), JAHANBIN Sorour (ESR11), ALI Qurat Ul Ain (ESR12), HORVÁTH Benedek (ESR13), PHILIPPE Jolan (ESR14), SAHAY Apurvanand (ESR15) **Supervisors:** MOTTU Jean-Marie, IMT Atlantique SUNYE Gerson, IMT Atlantique MATRAGKAS Nicholas, University of York DE LARA Juan, Universidad Autónoma de Madrid GUERRA Esther, Universidad Autónoma de Madrid PIERANTONIO Alfonso, University of L'Aquila WIMMER Manuel, Johannes Kepler University of Linz NOPPEN Joost, British Telecommunications MAZZINI Silvia, INTECS DIEZ Pablo, Uground MOLINA MORENO Pedro Juan, Metadev

TPA 2B: Cloud computing and virtualization	
Type of training	Scientific skills training
Duration	3.5 days
Planned content of the Grant Agreement	The training introduces students to both the theoretical background of Cloud Computing and Virtualisation as well as the practical applications, including the processing of large datasets using Big Data techniques. The set of notions will include: Virtualisation technique basics and specifics, Infrastructure resource management, Virtual machine management API, Virtual machine deployment mechanisms, Automatisation scripting; CAP Theorem, Eventual Consistency, Shared Nothing architectures, Dynamo algorithm; Amdahl's law, Gustafson's Law, Karp-Flatt Metric; Lambda Architecture, Multi-tenancy, IaaS, PaaS and SaaS models; Map Reduce, real time stream analytics, generalised functional decomposition, Futures.
Revised Actual Content and contributing partners	**Tuesday 18th February** **14:30 – 18:00** TPA 2B: Cloud Computing and Virtualisation Training, Hélène Coullon (IMT): - Shared resources management; - Virtualization techniques (VM and containers); - IaaS level of the Cloud; - Introduction to other levels PaaS and SaaS **Wednesday 19th February** **9:00 – 13:00** TPA 2B: Cloud Computing and Virtualisation Training: Technical essentials on AWS, by Wilson de Santana (AWS) (11:00 - 11:30: break) **14:30 – 17:30** TPA 2B: Cloud Computing and Virtualisation Training: Technical essentials on AWS, by Wilson de Santana (AWS) (16:00 to 16:30: break) **Thursday 20th February** **9:00 -15:00** TPA 2B: Cloud Computing and Virtualisation Training: Running Container-enabled Microservices on AWS, by Wilson de Santana (AWS) (11:00 - 11:30: break)

	Friday 21st February **9:30 – 13:00** TPA 2B: Cloud Computing and Virtualisation Training: Practical sessions, Jonathan Pastor (IMT) **15:00 – 19:00** TPA 2B: Cloud Computing and Virtualisation Training: Terraform / Infrastructure as Code, Pedro Molina (Metadev)
Skills acquired	- Virtualization - Containers - Docker - Cloud Computing - Amazon Cloud Platform - Infrastructure as Code - Terraform
Attendees	**ESRs:** ALMONTE GARCIA Lissette (ESR1), RANI Fatima (ESR2), KOUROUKLIDIS Panagiotis (ESR3), IHIRWE Felicien (ESR4), BRUNSCHWIG Léa (ESR5), INDAMUTSA Arsene (ESR6), KALWAR Safia (ESR7), COLANTONI Alessandro (ESR9), KHORRAM Faezeh (ESR10), JAHANBIN Sorour (ESR11), ALI Qurat Ul Ain (ESR12), HORVÁTH Benedek (ESR13), PHILIPPE Jolan (ESR14), SAHAY Apurvanand (ESR15)

2nd network event - 17th to 21st February 2020
Universidad Autónoma de Madrid, Escuela Politécnica Superior, C/Francisco Tomás y Valiente, 11, 28049 Madrid Spain
Room: Sala de Juntas "C" (Telecommunication Engineering building, ground floor)

Monday 17th	Tuesday 18th	Wednesday 19th	Thursday 20th	Friday 21st
9:30 - 13:00 Internal research meeting (11:00 - 11:30: break)	9:00 -12:30 MS7: Mid-Term Check (11:30 - 11:45: break) 10:00 - 11:30: EB Meeting (room B-405, building "B")	9:00 – 13:00 TPA 2B: Cloud Computing and Virtualisation Training (AWS): Technical essentials on AWS (11:00 - 11:30: break)	9:00 -15:00 TPA 2B: Cloud Computing and Virtualisation Training (AWS): Running Container-enabled Microservices on AWS (11:00 - 11:30: break)	9:30 – 13:00 TPA 2B: Cloud Computing and Virtualisation Training (IMT): Practical sessions
13:00 - 14:30: Lunch [Plaza Mayor Restaurant (1st floor)]			15:00 - 16:00: Lunch [Plaza Mayor Restaurant (1st floor)]	13:00 - 14:30: Lunch [Plaza Mayor Restaurant (1st floor)]
14:30 – 17:00 MS7[1]: Mid-Term Check (15:20 to 15:30: break) 20:00 Dinner ["*El Olvido*" Restaurant, Street Juan Hurtado de Mendoza 13 (Metro Cuzco) http://www.lamision.es/el-olvido-conocenos/]	14:30 – 18:00 TPA[2] 2B: Cloud Computing and Virtualisation Training (IMT): - Shared resources management; - Virtualization techniques (VM and containers); - IaaS level of the Cloud; - Introduction to other levels PaaS and SaaS **from 18:00** Dinner [Comp. Sci. Cafeteria]	14:30 – 17:30 TPA 2B: Cloud Computing and Virtualisation Training (AWS): Technical essentials on AWS (16:00 to 16:30: break) **19:00 (for ESRs)** Bowling & dinner at: https://www.bowlingchamartin.com/bolera/ **from 18:00** Dinner [Comp. Sci. Cafeteria]	Free **from 18:00:** Dinner [Comp. Sci. Cafeteria]	15:00 – 19:00 TPA 2B: Cloud Computing and Virtualisation Training: Terraform / Infrastructure as Code (Metadev) **from 19:00** Dinner [Comp. Sci. Cafeteria]

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[1] MS: milestone
[2] TPA: training program activity

2.3. 3rd Network Event

Due to the Codiv-19 pandemic crisis, consortium members decided to organize training programme activities remotely. So as to leave enough time for preparation to the beneficiaries involved, the 3rd network event was organized from 8th June to 27th July 2020 with the following elements:

- TPA 4B: Scientific paper writing (0.5 day), provided by the Universidad Autónoma de Madrid
- TPA 2C: Data Science and Machine Learning Training (4 days, 4 Mondays in July), provided by British Telecommunications and some contributions from Universidad Autónoma de Madrid.

TPA 4B: Scientific paper writing	
Type of training	Complementary skills training
Duration	0.5 day
Planned content of the Grant Agreement	This session will focus on different aspects of writing scientific papers to enable our ESRs to efficiently present their research works and results. Good dissemination of research results through publications led to a better visibility and maximise employability and career perspectives.
Revised Actual Content and contributing partners	**Monday 8th June** **09:00 – 10:30** TPA 4B: Scientific paper writing (UAM) - Juan de Lara: Part I: Scientific publication Part II: Scientific writing: the literature part **10:30 -- 11:00: break** **11:00 – 12:30** Part III: Scientific writing: the technical part Part IV: Scientific writing & reviewing: the practical part **Tuesday 23rd June** **23:59 CEST** TPA 4B: Scientific paper writing: Deadline for submission of draft papers by ESRs **Monday 29th June**

	23:59 CEST TPA 4B: Scientific paper writing: End of paper reviews by ESRs **Monday 15th July** **23:59 AoE** MoDELS Lowcode Workshop: Deadline for submission of papers
Skills acquired	• Understanding of scientific publication process • Scientific paper writing in practice • Scientific paper reviewing in practice
Attendees	**ESRs:** ALMONTE GARCIA Lissette (ESR1), RANI Fatima (ESR2), KOUROUKLIDIS Panagiotis (ESR3), IHIRWE Felicien (ESR4), BRUNSCHWIG Léa (ESR5), INDAMUTSA Arsene (ESR6), KALWAR Safia (ESR7), IBRAHIMI Ilirian (ESR8), COLANTONI Alessandro (ESR9), KHORRAM Faezeh (ESR10), JAHANBIN Sorour (ESR11), ALI Qurat Ul Ain (ESR12), HORVÁTH Benedek (ESR13), PHILIPPE Jolan (ESR14), SAHAY Apurvanand (ESR15)

TPA 2C: Data Science and Machine Learning Training	
Type of training	Scientific skills training
Duration	4 days
Planned content of the Grant Agreement	This training event will introduce the state-of-the-art in data science and machine learning. It will introduce the core concepts of data analysis and the creation of knowledge models from such data. Tools for both data analysis and and development will be introduced, such as Jupyter and R. Machine learning techniques, will range from unsupervised (clustering) to supervised methods, e.g. similarity, deep neural network, and decision tree learning. Participants will be receiving both theoretical foundations and hands-on experience through lectures and guided exercises.
Revised Actual Content and contributing partners	**Monday 6th July** **9:00 – 12:30 (UK Time):** TPA 2C: Data Science and Machine Learning Training, Paul Taylor & Blaise Egan (BT) • Introduction to Data Science, Machine Learning and AI • SQL Refresh and Introduction to R and RStudio • **(11:00 - 11:30: break)** • Exploratory Data Analysis and Statistics in R - part 1

14:00 – 17:00 (UK Time):

TPA 2C: Data Science and Machine Learning Training, Paul Taylor & Blaise Egan (BT)

- Exploratory Data Analysis and Statistics in R - part 2
- Q&A, help with software setup for practical assignments

Monday 13th July

9:30 – 12:00 (UK Time):

TPA 2C: Data Science and Machine Learning Training, Paul Taylor (BT)

- Machine Learning (illustrated with R) - part 1
- Machine Learning (illustrated with R) - part 2
- Machine Learning - Model Building and Validation

(10:30 - 11:00: break)

13:00 – 17:00 (UK Time):

TPA 2C: Data Science and Machine Learning Training, Paul Taylor (BT)

- Practical Training in SQL and R using RStudio and SQL Developer
- Practical Training: Using Jupyter Notebooks and/or RStudio to practice data preparation and statistics

Monday 20th July

9:00 -12:00 (UK Time):

TPA 2C: Data Science and Machine Learning Training, Paul Taylor (BT)

- Machine Learning and Big Data
- Best Practice Data Science & Machine Learning Standards

(11:00 - 11:30: break)

14:00 – 17:00 (UK Time):

TPA 2C: Data Science and Machine Learning Training, Paul Taylor (BT)

- Practical Training: Using Jupyter Notebooks to practice data preparation and machine learning in R

Monday 27th July

9:00 – 12:30 (UK Time):

	TPA 2C: Data Science and Machine Learning Training, Iván Cantador (UAM) • Information retrieval and Machine Learning - Part 1 • Information retrieval and Machine Learning - Part 2 (10:30 - 11:00: break) **13:00 – 17:00 (UK Time):** TPA 2C: Data Science and Machine Learning Training, Paul Taylor (BT), Detlef Nauck (BT) • The future of AI • Advanced SQL • Machine Learning in Python with Scikit Learn • Tips, tricks and Tools • Wash-up and Q&A
Skills acquired	• Introductory knowledge of SQL and R and their use in DS projects • Exploratory Data Analysis • Machine Learning • Awareness of Big Data technologies, uses and their appropriate applications • Best practices for the running of Data Science projects, and how machine learning experiments should be managed/evaluated both in development, and in production • Learning of fundamental concepts of Information Retrieval: the information retrieval process, definition and representation of information needs and relevance • Learning of principal information indexing and retrieval models, with special emphasis on learning to rank (i.e., machine learning) and web search approaches • Learning of standard information retrieval evaluation protocols, including both methodologies and metrics, some of them shared with the machine learning community. • Awareness of popular information retrieval tasks, applications, and resources.
Attendees	**ESRs:** ALMONTE GARCIA Lissette (ESR1), RANI Fatima (ESR2), KOUROUKLIDIS Panagiotis (ESR3), IHIRWE Felicien (ESR4), BRUNSCHWIG Léa (ESR5), INDAMUTSA Arsene (ESR6), KALWAR Safia (ESR7), IBRAHIMI Ilirian (ESR8), COLANTONI Alessandro (ESR9), KHORRAM Faezeh (ESR10), JAHANBIN Sorour (ESR11), ALI Qurat Ul Ain (ESR12), HORVÁTH Benedek (ESR13), PHILIPPE Jolan (ESR14), SAHAY Apurvanand (ESR15)

3rd network event, From 8th June to 27th July 2020
Organized remotely (due to Covid-19 pandemic)

Monday 8th June	Tuesday 23rd June	Monday 29th June	Monday 15th July
09:00 – 10:30 TPA[1] 4B: Scientific paper writing (UAM) - Juan de Lara: Part I: Scientific publication Part II: Scientific writing: the literature part **10:30 -- 11:00: break** **11:00 – 12:30** Part III: Scientific writing: the technical part Part IV: Scientific writing & reviewing: the practical part **Please use Microsoft Teams. downloadable from the following link:** https://www.microsoft.com/en/microsoft-365/microsoft-teams/download-app **Link for training:** https://teams.microsoft.com/l/team/19%3a2fb4969e30d142d59b0eb46c77591ed3%40thread.tacv2/conversations?groupId=7af6899e-3dca-411c-aafb-5d7248ee277e&tenantId=fc6602ef-8e88-4f1d-a206-e14a3bc19af2	**23:59 CEST** TPA 4B: Scientific paper writing: Deadline for submission of draft papers by ESRs Submit to: https://easychair.org/conferences/?conf=lowcomote2020	**23:59 CEST** TPA 4B: Scientific paper writing: End of paper reviews by ESRs	**23:59 AoE** MoDELS Lowcode Workshop: Deadline for submission of abstracts

Monday 6th July	Monday 13th July	Monday 20th July	Monday 27th July
9:00 – 12:30 (UK Time): TPA[2] 2C: Data Science and Machine Learning Training, Paul Taylor & Blaise Egan (BT) - Introduction to Data Science, Machine Learning and AI - SQL Refresh and Introduction to R and RStudio - **(11:00 - 11:30: break)** - Exploratory Data Analysis and Statistics in R - part 1	**9:30 – 12:00 (UK Time):** TPA 2C: Data Science and Machine Learning Training, Paul Taylor (BT) - Machine Learning (illustrated with R) - part 1 - Machine Learning (illustrated with R) - part 2 - Machine Learning - Model Building and Validation (10:30 - 11:00: break)	**9:00 -12:00 (UK Time):** TPA 2C: Data Science and Machine Learning Training, Paul Taylor (BT) - Machine Learning and Big Data - Best Practice Data Science & Machine Learning Standards (11:00 - 11:30: break)	**9:00 – 12:30 (UK Time):** TPA 2C: Data Science and Machine Learning Training, Iván Cantador (UAM) - Information retrieval and Machine Learning - Part 1 - Information retrieval and Machine Learning - Part 2 (10:30 - 11:00: break)
14:00 – 17:00 (UK Time): TPA 2C: Data Science and Machine Learning Training, Paul Taylor & Blaise Egan (BT) - Exploratory Data Analysis and Statistics in R - part 2 - Q&A, help with software setup for practical assignments	**13:00 – 17:00 (UK Time):** TPA 2C: Data Science and Machine Learning Training, Paul Taylor (BT) - Practical Training in SQL and R using RStudio and SQL Developer - Practical Training: Using Jupyter Notebooks and/or RStudio to practice data preparation and statistics	**14:00 – 17:00 (UK Time):** TPA 2C: Data Science and Machine Learning Training, Paul Taylor (BT) - Practical Training: Using Jupyter Notebooks to practice data preparation and machine learning in R	**13:00 – 17:00 (UK Time):** TPA 2C: Data Science and Machine Learning Training, Paul Taylor (BT), Detlef Nauck (BT) - The future of AI - Advanced SQL - Machine Learning in Python with Scikit Learn - Tips, tricks and Tools - Wash-up and Q&A

2.4.   4th Network Event

Due to the Codiv-19 pandemic, consortium members decided to organize training programme activities remotely. So as to leave enough time for preparation to the beneficiaries involved, the 4th network event will be organized on 9th and 10th December 2020 with the following elements:

- 3rd Internal Research Meeting (1 day), organized by IMT
- TPA 3A: Scalable Development of Low-Code artefacts Workshop (1 day), provided by Universidad Autónoma de Madrid.

The organization of the 1st Lowcomote Hackathon, (provided by CLMS) has been postponed to a future network event.

At the time of writing of this report, the programme of the event is still under development. Updated detailed information, will be provided in the Second Training Progress Report due in 2021.

3. Individual ESR trainings and secondments

The training programme for ESRs foresees also local training either provided by academic or industrial partners, including sessions when in secondment. This section provides an overview per ESR.

ESR 1: Lissette Almonte Garcia

TPA 1: Local and secondment research training	
Model-driven Software Development	
Type of training	Scientific skills
Duration	50 hours
Content and contributing partners	Course from the Master I2-ICT of UAM about MDE
Skills acquired	MDE
Contributors	Esther Guerra (UAM), Juan de Lara (UAM)
IP Management in H2020 - with a special focus on MSCA	
Type of training	Complementary skills
Duration	1.5 hours
Content and contributing partners	European IP helpdesk
Skills acquired	Intellectual Property
Contributors	Léa Montesse

ESR 2: Fatima Rani

TPA 1: Local and secondment research training	
Model-driven Software Development	
Type of training	Scientific skills
Duration	50 hours
Content and contributing partners	Course from the Master I2-ICT of UAM about MDE
Skills acquired	Modelling and Meta-modelling, Design of domain-specific (visual, textual) languages, Model transformation, Code generation and Model-based analysis and verification
Contributors	Esther Guerra & Juan de Lara (Universidad Autónoma de Madrid)
Server-side Development with NodeJS, Express and MongoDB	
Type of training	Scientific skills
Duration	18 hours
Content and contributing partners	Course from the platform coursera about NodeJS development
Skills acquired	This course deals with all things server-side. The entire course is around the NodeJS platform, with a brief overview of the Web protocols: HTTP and HTTPS. I've learned about the NodeJS and NodeJS modules: Express for building web servers.
Contributors	Jogesh K. Muppala (The Hong Kong University of Science and Technology)
Web Applications for Everybody Specialization	
Type of training	Scientific skills
Duration	25 hours
Content and contributing partners	Specialization course from the platform coursera about web development
Skills acquired	This Specialization is an introduction to building web applications for anybody who already has a basic understanding of responsive web design with JavaScript, HTML, and CSS. I have learned about the development of web and database applications in PHP, using SQL for database creation, as well as functionality in JavaScript, jQuery, and JSON.
Contributors	Charles Russell Severance (University of Michigan)
Eclipse Essential Training	
Type of training	Scientific skills

Duration	3 hours
Content and contributing partners	Course from the platform LinkedIn Learning about Eclipse IDE
Skills acquired	Eclipse is an industry-standard IDE and a critical tool for developers who want to build projects in multiple languages. In this course, I've learned how to effectively use Eclipse's built-in tools and extensions to create, code, test, and debug projects in Java and how to adapt the Eclipse workflow to the nuances of each language, and integrate with Git for version control.
Contributors	Todd Perkins

Theia Kick Starter Training

Type of training	Scientific skills
Duration	5 hours
Content and contributing partners	Training from Eclipse Source Munich about Theia IDE
Skills acquired	This training is about Theia. Its architecture overview, how to launch/debug Theia and extend Eclipse Theia via extensions. Also about the overview of LSP and TextMate, GLSP, JSON Forms, EMF.cloud and Eclipse Che.
Contributors	Jonas Helming

Spanish Language Course - Level A1

Type of training	Complementary skills
Duration	35 hours
Content and contributing partners	Basic Reading, Writing, Speaking, Listening skills in spanish
Skills acquired	Basic level in Spanish language
Contributors	Sol Chaves (Universidad Autónoma de Madrid)

How to make great CVs for industry and academia

Type of training	Complementary skills
Duration	1.5 hours
Content and contributing partners	The webcast by Nature Reseach
Skills acquired	The webcast aimed to help PhD students and other early career researchers to improve their CVs for their future careers in academic and industry.
Contributors	Sarah Blackford, MA (Warwick University, UK)

IP Management in H2020 - with a special focus on MSCA

Type of training	Complementary skills
Duration	1.5 hours
Content and contributing partners	European IP helpdesk
Skills acquired	Information on the state of intellectual property protection and enforcement.
Contributors	Léa Montesse

Virtual Conferences

Type of training	Scientific skills
Duration	10 days
Content and contributing partners	MODELS' 2020, ER 2020, EclipseCon 2020
Skills acquired	I have attended different talks about MDE, Conceptual Modelling, Acceleo4ever etc.
Contributors	MODELS' 2020, ER2020, EclipseCon2020

Effective IP and Outreach Strategies Help Increase the Impact of Research and Innovation

Type of training	Complementary skills
Duration	1.5 hours
Content and contributing partners	European IP helpdesk
Skills acquired	This webinar showed a particular spotlight on the role of communication, dissemination and exploitation in maximising the impact of Horizon 2020 projects.
Contributors	Joerg Scherer, Stephanie Weber

EMF Modelling Training

Type of training	Scientific skills
Duration	2.5 hours
Content and contributing partners	EMF training by Macromedling
Skills acquired	Understanding how to compute/access the IDs that are managed by a resource for any EObject. How to manage libraries and classpath dependencies using plugins, including wrapping a jar as a plugin. Understanding how to load resources with absolute URI such that relative references resolve correctly.
Contributors	Ed Merks

ESR 3: Panagiotis Kourouklidis

TPA 1: Local and secondment research training	
BT internal Data science week	
Type of training	Complementary skills
Duration	05 days
Content and contributing partners	BT
Skills acquired	Statistics, data science, machine learning
Contributors	Paul Taylor, Detlef Nauck, Blaise Egan
Networking course	
Type of training	Complementary skills
Duration	30 day(s)
Content and contributing partners	Online course on Udemy
Skills acquired	networks
Contributors	N/A
IP Management in H2020 - with a special focus on MSCA	
Type of training	Complementary skills
Duration	01 day(s)
Content and contributing partners	European IP helpdesk
Skills acquired	IP knowledge
Contributors	N/A

ESR 4: Felicien Ihirwe

TPA 1: Local and secondment research training	
Electronic System-Level HW/SW Co-Design for Heterogeneous Parallel Embedded Systems by Vittoriano Muttillo (PhD)	
Type of training	Scientific skills
Duration	6 day(s)
Content and contributing partners	PhD course part of Doctoral Program in Information and Communication Technology.
Skills acquired	We learnt the introduction to HW/SW co-design dedicated to embedded and real-time systems. Following heterogeneous parallel architectures, we learned how to perform HW/SW multi-processor partitioning architecture in HEPSYCODE tool.
Contributors	University of L'Aquila, Vittoriano Muttillo
Recommendation systems in Software Engineering by Prof. Davide Di Ruscio	
Type of training	Scientific skills
Duration	2 day(s)
Content and contributing partners	PhD course part of Doctoral Program in Information and Communication Technology.
Skills acquired	We learned the basics and the applicability of recommender systems in industry.
Contributors	University of L'Aquila, Prof. Davide Di Ruscio
UML and Model Based Principles by Pierluigi Pierini	
Type of training	Scientific skills
Duration	6 day(s)
Content and contributing partners	Part of Intecs internal training on Model based software engineering.
Skills acquired	I've learned the basics of model-based design in UML, we introduced SysML language and we have also introduced CHESSML language provided by CHESS tool.
Contributors	Intecs Solutions S.p.a, Pierluigi Pierini
Few things you should consider while embarking in research (and also later) by Prof. Alfonso Pierantonio	
Type of training	Complementary skills
Duration	1 day

Content and contributing partners	This seminar was part of bi-weekly seminars under Doctoral Program in Information and Communication Technology
Skills acquired	In this seminar we learned different tips to avoid various mistakes in research which can lead to problems such as frustration, feelings of low self-worth. It was a good opportunity to learn how to overcome such issues and keep up with the research.
Contributors	University of L'Aquila, Prof. Alfonso Pierantonio

AI Webinar Series on Deep Learning by the Italian NVIDIA AI Technology Centre (NVAITC)

Type of training	Scientific skills
Duration	2 day(s)
Content and contributing partners	PhD course part of Doctoral Program in Information and Communication Technology.
Skills acquired	In this seminar we learned how to design, train, optimize, profile and deploy a deep neural network using NVIDIA technologies. We explored the fundamentals of deep learning from building and training neural networks, optimizing data loading and performance through mixed-precision and parallelization, to deploying trained models in production for inference.
Contributors	Italian NVIDIA AI Technology Centre (NVAITC), University of L'Aquila

Professional seminars on open source IoT from Oracle Italia by Gabriele Provinciali

Type of training	Scientific skills
Duration	2 days
Content and contributing partners	This seminar was part of bi-weekly seminars under Doctoral Program in Information and Communication Technology
Skills acquired	In this 2 days seminar, we learned the fundamentals of serverless platforms, the architecture of Fn platform, development and deployment methods. We also learnt the Oracle Functions platform, logging & monitoring with cloud native tools
Contributors	Oracle Italia, University of L'Aquila (Gabriele Provinciali)

Computer Science vs Data Science by Andrea Clementi

Type of training	Complementary skills
Duration	1 day
Content and contributing partners	This seminar was part of bi-weekly seminars under Doctoral Program in Information and Communication Technology
Skills acquired	In this seminar we reviewed some important results computer science has proposed for a fundamental class of tasks in the data science sector.

Contributors	University of L'Aquila, Andrea Clementi

IP Management in H2020

Type of training	Complementary skills
Duration	01 day(s)
Content and contributing partners	European IP helpdesk
Skills acquired	IP knowledge
Contributors	Léa Montesse

Introduction to CHESS platform by Stefano Puri (Intecs)

Type of training	Scientific skills
Duration	3 day(s)
Content and contributing partners	Part of Intecs internal training on CHESS platform.
Skills acquired	This course was to introduce the development side of the CHESS platform. In this course we learned the basic CHESS tool extension mechanism through eclipse plugins and eclipse features. For instance we learned how to develop and configure eclipse plugins by adding eclipse commands, handlers, toolbars and menus. Finally, we learned how to deploy changes on the update site.
Contributors	Intecs Solutions Spa, Stefano Puri

ESR 5: Léa Brunschwig

TPA 1: Local and secondment research training	
Model-driven Software Development	
Type of training	Scientific skills
Duration	50 hours
Content and contributing partners	Course from the Master I2-ICT of UAM about MDE
Skills acquired	MDE
Contributors	Esther Guerra (UAM), Juan de Lara (UAM)
The Complete ARKit Course - Build 11 Augmented Reality Apps	
Type of training	Scientific skills
Duration	9,5 hours
Content and contributing partners	Course from the platform Udemy about the Apple's technology ARKit for Augmented Reality
Skills acquired	ARKit, Augmented Reality programming, Swift
IP Management in H2020 - with a special focus on MSCA	
Type of training	Complementary skills
Duration	1 day
Content and contributing partners	European IP helpdesk
Skills acquired	Intellectual Property
Contributors	Léa Montesse

ESR 6: Arsene Indamutsa

TPA 1: Local and secondment research training	
Software engineering for robotics 2019/2020	
Type of training	Scientific skills
Duration	48 hour (s)
Content and contributing partners	The course comprised three modules each with 16 hours. The first module was Engineering and architecting the software of cars and robotic systems , the second module was From mission specification to movements of robots and the third was Runtime collective adaptation of multi-robot systems. It designed to introduce engineers to software development of robots from architecture specification, path planning, adaptation and execution and challenges that the robots and both the users face all along this journey
Skills acquired	Architecture specification using 4 + 1 view model, optimization techniques of robot programming, and current challenges in this domain.
Contributors	University of L'Aquila / Patrizio Pelliccione
IP Management in H2020 - with a special focus on MSCA	
Type of training	Complementary skills
Duration	1 day
Content and contributing partners	European IP helpdesk
Skills acquired	Intellectual Property
Contributors	Léa Montesse
IPR and software	
Type of training	Complementary skills
Duration	1 day
Content and contributing partners	European IP helpdesk
Skills acquired	Intellectual Property
Contributors	Dr Eugene Sweeney

ESR 8: Ilirian Ibrahimi

TPA 1: Local and secondment research training	
Communicating with Confidence	
Type of training	Complementary skills
Duration	1h16m
Content and contributing partners	Organizing your thoughts • Speaking slowly, naturally, and confidently • Breathing properly • Using your body to reinforce speech • Managing facial expressions • Handling nervousness • Voice modulation, eye contact, and gestures
Skills acquired	Communicate with confidence
Contributors	Jeff Ansell
IP Management in H2020 - with a special focus on MSCA	
Type of training	Complementary skills
Duration	1 day
Content and contributing partners	European IP helpdesk
Skills acquired	Intellectual Property
Contributors	Léa Montesse
Dissertation Colloquium - Business Informatics	
Type of training	Complementary skills **And** Scientific skills
Duration	4 day(s)
Content and contributing partners	Course (256.020) from Business Informatics Software Engineering of JKU about Phd Thesis presentation
Skills acquired	Thesis roadmap
Contributors	Manuel Wimmer, Stefan Koch, Michael Schrefl, Christian Stary
Dissertation Seminar- Business Informatics	
Type of training	Complementary skills **And** Scientific skills
Duration	2 day(s)
Content and contributing partners	Course (256.013) from Business Informatics Software Engineering of JKU about Phd Thesis presentation
Skills acquired	Thesis roadmap
Contributors	Manuel Wimmer, Stefan Koch, Barbara Krumay

ESR 9: Alessandro Colantoni

TPA 1: Local and secondment research training	
Design Science: Development of Design Artifacts	
Type of training	Scientific skills
Duration	4 day(s) (6 hours)
Content and contributing partners	Course (259.002) from Business Informatics Software Engineering of JKU about Systematic Literature Review, and design research artifacts
Skills acquired	Performing SLR, design and perform a research project
Contributors	Prof. Manuel Wimmer (JKU)
Design Science: Evaluation of Design Artifacts	
Type of training	Scientific skills
Duration	1 day(s), 4 hours
Content and contributing partners	Course (256.008) from Business Informatics Software Engineering of JKU about design science evaluation
Skills acquired	Evaluate papers, and science artifacts
Contributors	Prof. René Riedl
Dissertation Colloquium - Business Informatics	
Type of training	Complementary skills **And** Scientific skills
Duration	4 day(s)
Content and contributing partners	Course (256.020) from Business Informatics Software Engineering of JKU about Phd Thesis presentation
Skills acquired	Thesis roadmap
Contributors	Manuel Wimmer, Stefan Koch, Michael Schrefl, Christian Stary
Dissertation Seminar- Business Informatics	
Type of training	Complementary skills **And** Scientific skills
Duration	2 day(s)
Content and contributing partners	Course (256.013) from Business Informatics Software Engineering of JKU about Phd Thesis presentation
Skills acquired	Thesis roadmap
Contributors	Manuel Wimmer, Stefan Koch, Barbara Krumay
IP Management in H2020 - with a special focus on MSCA	
Type of training	Complementary skills

Duration	2 hours
Content and contributing partners	Relevant IP issues for MSCA proposals, Particularities of MSCA grant agreements, Ownership of background and results.
Skills acquired	IP Management
Contributors	Léa Montesse

German Course (A1)

Type of training	Complementary skills
Duration	30 day(s)
Content and contributing partners	German course
Skills acquired	Basic German language
Contributors	Angelika Freudenthaler

ESR10: Faezeh Khorram

TPA 1: Local and secondment research training	
Research integrity in scientific professions	
Type of training	Complementary skills
Duration	15 hours
Content and contributing partners	Research integrity issues, Scientific misconducts definition, Preventing scientific misconduct, Research Integrity Regulation
Skills acquired	Management of the rights, IP when making a PhD
Contributors	S. Le Goff, E. Moreau
French Language Course	
Type of training	Complementary skills
Duration	52 hours
Content and contributing partners	reading, writing, speaking, listening
Skills acquired	Basic level in French language commands
Collect data ethically, Protect your scientific work and publish	
Type of training	Complementary skills
Duration	3 hours
Content and contributing partners	IMT Atlantique
Skills acquired	Collect data ethically, Protect your scientific work
The resources of IMT Atlantique to make its state of the art. First approach on scientific publication	
Type of training	Complementary skills
Duration	3 hours
Content and contributing partners	IMT Atlantique
Skills acquired	Scientific publication
Presentation of the integration program and the professionalizing offer IMT Atlantique	
Type of training	Complementary skills
Duration	3 hours
Content and contributing partners	IMT Atlantique

ESR 11: Sorour Jahanbin

TPA 1: Local and secondment research training	
Research Integrity	
Type of training	Scientific skills
Duration	1 day(s), 03 hours
Content and contributing partners	University of York
Skills acquired	Introduction to the principles and practice of research integrity
Become an effective researcher	
Type of training	Scientific skills
Duration	1 day(s), 03 hours
Content and contributing partners	University of York
Skills acquired	Key elements of a research degree, Responsibilities as a researcher, Responsibilities with regards to personal and professional development
Model Driven Engineering (MODE)	
Type of training	Scientific skills
Duration	08 weeks
Content and contributing partners	University of York
Skills acquired	Fundamental concepts of Model Driven Engineering, Practical skills for Epsilon Framework
Contributors	Prof. Dimitris Kolovos

ESR 12: Qurat ul ain Ali

TPA 1: Local and secondment research training		
Research Integrity		
Type of training	Scientific skills	
Duration	03 hours	
Content and contributing partners	University of York	
Skills acquired	Introduction to the principles and practice of research integrity.	
Become an effective researcher		
Type of training	Scientific skills	
Duration	03 hours	
Content and contributing partners	University of York	
Skills acquired	Key elements of a research degree, Responsibilities as a researcher, Responsibilities with regards to personal and professional development	
Model Driven Engineering (MODE)		
Type of training	Scientific skills	
Duration	08 weeks	
Content and contributing partners	University of York	
Skills acquired	Fundamental concepts of Model Driven Engineering, Practical skills for Epsilon Framework	
Contributors	Dimitris Kolovos	

ESR 13: Benedek Horváth

TPA 1: Local and secondment research training	
Design Science: Development of Design Artifacts	
Type of training	Scientific skills
Duration	4 day(s) (6 hours)
Content and contributing partners	Course (259.002) from Business Informatics Software Engineering of JKU about Systematic Literature Review, and design research artifacts
Skills acquired	Performing SLR, design and perform a research project
Contributors	Prof. Manuel Wimmer (JKU)
Design Science: Evaluation of Design Artifacts	
Type of training	Scientific skills
Duration	1 day(s), 4 hours
Content and contributing partners	Course (256.008) from Business Informatics Software Engineering of JKU about design science evaluation
Skills acquired	Evaluate papers, and science artifacts
Contributors	Prof. René Riedl
Dissertation Colloquium - Business Informatics	
Type of training	Scientific and complementary skills
Duration	4 day(s)
Content and contributing partners	Course (256.020) from Business Informatics Software Engineering of JKU about Phd Thesis presentation
Skills acquired	Thesis roadmap
Contributors	Manuel Wimmer, Stefan Koch, Michael Schrefl, Christian Stary
Dissertation Seminar- Business Informatics	
Type of training	Scientific and complementary skills
Duration	2 day(s)
Content and contributing partners	Course (256.013) from Business Informatics Software Engineering of JKU about Phd Thesis presentation
Skills acquired	Thesis roadmap
Contributors	Manuel Wimmer, Stefan Koch, Barbara Krumay
IP Management in H2020 - with a special focus on MSCA	
Type of training	Complementary skills

Duration	90 minutes
Content and contributing partners	European IP helpdesk
Skills acquired	Intellectual Property
Contributors	Léa Montesse
German C1 exam preparation course	
Type of training	Complementary skills
Duration	31.5 hours
Content and contributing partners	Improve communication (oral, written) skills, listening skills, text comprehension and writing skills.
Skills acquired	Intellectual Property
Contributors	Ildikó Zsemlye (private tutor)

ESR 14: Jolan Philippe

TPA 1: Local and secondment research training	
Model Driven Engineering (MDE) course	
Type of training	Scientific skills
Duration	30h (Fall 2019)
Content and contributing partners	The cornerstones and standards of MDE and how to use them
Skills acquired	Knowledge in model driven engineering
Contributors	University of Nantes (Gerson Sunye)
The resources of IMT Atlantique to make its state of the art. First approach on scientific publication	
Type of training	Complementary skills
Duration	3 hours
Content and contributing partners	IMT Atlantique
Contributors	IMT Atlantique
The resources of IMT Atlantique to make its state of the art. Second Session	
Type of training	Complementary skills
Duration	2 hours
Content and contributing partners	IMT Atlantique
Contributors	IMT Atlantique
Collect data ethically, Protect your scientific work and publish	
Type of training	Complementary skills
Duration	3 hours
Content and contributing partners	IMT Atlantique
Contributors	IMT Atlantique
Presentation of the integration program and the professionalizing offer IMT Atlantique	
Type of training	Complementary skills
Duration	3 hours
Content and contributing partners	IMT Atlantique

Contributors	IMT Atlantique
Research integrity in scientific professions	
Type of training	Complementary skills
Duration	15 hours
Content and contributing partners	Research integrity issues, Scientific misconducts definition, Preventing scientific misconduct, Research Integrity Regulation
Contributors	University of Bordeaux (on funMooc)

ESR 15: Apurvanand Sahay

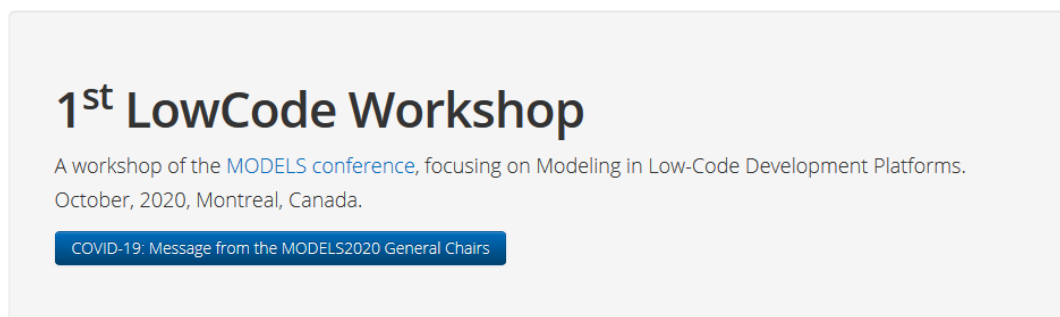| TPA 1: Local and secondment research training	
Generative Objects Functional and Technical presentation	
Type of training	Scientific skills
Duration	1 day (1 hour 50 minutes)
Content and contributing partners	Generative Objects
Skills acquired	How to use the generative object low-code platform, about technical know-how of the open source platform that includes model transformation, code generation, code reusability etc.
Contributors	Walter Almeida
Introduction to ROSE (Recursive Ontology Semantic Engineering) platform	
Type of training	Scientific skills
Duration	2 days (3 hours)
Content and contributing partners	All technical and functional basics of ROSE platform, Uground Global
Skills acquired	Basic know-how and functionalities of ROSE platform
Contributors	Pablo Diez Burillo
Few things you should consider while embarking in research (and also later)	
Type of training	Complementary skills
Duration	01 day (1 hour)
Content and contributing partners	This seminar was part of bi-weekly seminars under Doctoral Program in Information and Communication Technology
Skills acquired	In this seminar we learned different tips to avoid various mistakes in research which can lead to problems such as frustration, feelings of low self-worth. It was a good opportunity to learn how to overcome such issues and keep up with the research.
Contributors	Professor Alfonso Pierantonio, University of L'Aquila
IP Management in H2020 - with a special focus on MSCA	
Type of training	Complementary skills
Duration	01 day (2 hours)
Content and contributing partners	European IP helpdesk
Skills acquired	IP knowledge about intellectual property protection and enforcement

Contributors	Léa Montesse
Italian Language Course - Level A1	
Type of training	Complementary skills
Duration	9 hours (3 hours a week - ongoing class)
Content and contributing partners	Basic Reading, Writing, Speaking, Listening skills in Italian
Skills acquired	Basic level in Italian language and still learning
Contributors	Antonetti Roberta, University of L'Aquila

4. ACM / IEEE MoDELS 2020 Research Workshop

The very first Workshop on Low-Code Development Platforms has been organised at the leading international ACM/IEEE MoDELS conference. Due to the Covid-19 pandemic, the event has been organized remotely.

Open to researchers across the world, 12 ESRs of Lowcomote project have seen their articles selected for publication and presentation in the workshop. Below is the URL of the workshop website as well as screenshots of the website, its topics of interest, its publication and submission guidelines, the members of the Program Committee and a copy of the programme of the workshop.

https://lowcode-workshop.github.io/

Home

The growing need for secure, trustworthy, and cost-efficient software as well as recent developments in cloud computing technologies, and the shortage of highly skilled professional software developers, have given rise to a new generation of low-code software development platforms, such as Google AppMaker (soon AppSheet) and Microsoft PowerApps. Low-code platforms enable the development and deployment of fully functional applications using mainly visual abstractions and interfaces and requiring little or no procedural code. This makes them accessible to an increasingly digital-native and tech-savvy workforce who can directly and effectively contribute to the software development process, even if they lack a programming background.

At the heart of low-code applications are typically models of the structure, the behaviour and the presentation of the application. Low-code application models need to be edited (using graphical and textual interfaces), validated, version-controlled and eventually transformed or interpreted to deliver user-facing applications. As all of these activities have been of core interest to the MoDELS community over the last two decades, we feel that a workshop on low-code software development at MoDELS is a very natural fit, and an opportunity to attract low-code platform vendors and users to our community, with substantial benefits to be reaped from both sides.

The objectives of the workshop are to:

- bring together developers and users of low-code platforms with model-driven engineering researchers and practitioners;
- explore the technologies that power contemporary low-code platforms;
- identify the open challenges that vendors and users of low-code platforms face
- identify solutions from the model-driven engineering community that could be ported/adapted in the context of low-code development

Topics of interest

Topics of interest to the workshop include:

- Technologies underpinning low-code platforms
- Comparisons of classical MDE tools and low-code platforms
- Low-code development platforms as a service
- Citizen/end-user software development
- Recommender systems for low-code platforms
- Graphical and textual cloud-based editors
- Repositories of low-code development artefacs
- Low-code platforms for data-driven applications
- Low-code development for and from mobile devices
- Interoperability issues between low-code platforms
- Automation support in low-code platforms
- Scalability in low-code development
- Collaborative low-code development
- Empirical studies on using low-code platforms

Publication and submission guidelines

The papers will be included in the MODELS joint workshop proceedings in the ACM Digital Library. The joint proceedings will include an opening message from the organizers and the workshop program committee. We aim to arrange for extended versions of the best papers to be published in a journal (e.g. JOT).

Two kinds of papers are solicited: regular papers (10 pages, double column), and short papers (5 pages, double column), adhering to the ACM format (available at https://www.acm.org /publications/proceedings-template). LaTeX users must use the provided acmart.cls and ACM-Reference-Format.bst without modification, enable the conference format in the preamble of the document (i.e., \documentclass[sigconf,review]{acmart}), and use the ACM reference format for the bibliography (i.e., \bibliographystyle{ACM-Reference-Format}).

Contributions should present novel research ideas (even if at a preliminary development stage), challenging problems, and practical contributions to the domain. Industrial experience reports or case studies related to the development or use of low-code development platforms in industrial settings are also solicited. All papers must be written in English.

Paper can be submitted via Easy Chair using the following link:
https://easychair.org/conferences/?conf=lowcode2020

Important Dates

- Deadline for abstracts: July 15, 2020
- Deadline for submissions: ~~July 22, 2020~~
  July 26, 2020 (**extended**)
- Notification of authors: Aug 21, 2020
- Camera-ready deadline: Aug 28, 2020
- Workshop date: Oct 19, 2020

Organisers

- Juan de Lara
  (Universidad Autonoma de Madrid)
- Davide Di Ruscio
  (University of L'Aquila)
- Dimitris Kolovos
  (University of York)
- Massimo Tisi
  (IMT Atlantique, Nantes)
- Manuel Wimmer
  (Johannes Kepler University, Linz)

Programme Committee

- Antonio Cicchetti
  (Maalardalen University, Sweden)
- Federico Ciccozzi
  (Maalardalen University, Sweden)
- Vittorio Cortellessa
  (University of L'Aquila, Italy)
- Gregor Engels
  (Gregor Engels, Germany)
- Antonio Garcia-Dominguez
  (Aston University, UK)
- Esther Guerra
  (Universidad Autonoma de Madrid, Spain)
- Akos Horvath
  (IncQuery Labs Ltd, Hungary)
- Nicholas Matragkas
  (University of York, UK)
- Pedro Molina
  (MetaDev, Spain)
- Jean-Marie Mottu
  (University of Nantes, France)
- Joost Noppen
  (BT Research and Innovation, UK)
- Richard Paige
  (McMaster University, Canada | University
  of York, UK)
- Alfonso Pierantonio
  (University of L'Aquila, Italy)
- Adrian Rutle
  (Western Norway University of Applied
  Sciences, Norway)
- Matthias Tichy
  (University of Ulm, Germany)
- Andreas Wortmann
  (RWTH Aachen University, Germany)
- Yannis Zorgios
  (CLMS, UK)

LowCode Workshop at MODELS 2020
Monday 19th, 2020

Times are in the Montreal timezone: UTC/GMT -4 hours

7:00 - 8:30	**KEYNOTE** • Johan den Haan. **The Future of Low-Code** **MODEL-DRIVEN ENGINEERING AND LOW-CODE PLATFORMS** • Jordi Cabot. **Positioning of the low-code movement within the field of model-driven engineering** • Mariana Bexiga, Stoyan Garbatov and João Costa Seco. **Closing the Gap Between Designers and Developers in a Low Code Ecosystem**
	8:30 - 9:00
9:00 - 10:30	• Léa Brunschwig, Esther Guerra and Juan de Lara. **Towards access control for collaborative modelling apps** • Jean Felicien Ihirwe, Davide Di Ruscio, Silvia Mazzini, Pierluigi Pierlini and Alfonso Pierantonio. **Lowcode Engineering for Internet of things: A state of research** • Fatima Rani, Pablo Diez, Enrique Chavarriaga, Esther Guerra and Juan de Lara. **Automated Migration of EuGENia Graphical Editors to the Web** **TESTING OF LOW-CODE APPLICATIONS** • Alexandre Jacinto, Miguel Lourenço and Carla Ferreira. **Test Mocks for Low-Code Applications built with OutSystems** • Faezeh Khorram, Jean-Marie Mottu and Gerson Sunyé. **Challenges & Opportunities in Low-Code Testing**

10:30 - 11:00

11:00 - 12:30	**MODEL MANAGEMENT IN LOW-CODE PLATFORMS** • Benedek Horváth, Ákos Horváth and Manuel Wimmer. **Towards the Next Generation of Reactive Model Transformations on Low-Code Platforms: Three Research Lines** • Jolan Philippe, Massimo Tisi, Héléne Coullon and Gerson Sunyé. **Towards Transparent Combination of Model Management Execution Strategies for Low-Code Development Platforms** • Apurvanand Sahay, Davide Di Ruscio and Alfonso Pierantonio. **Understanding the role of Model Transformation Compositions in Low-Code Development Platforms** • Qurat Ul Ain Ali, Dimitris Kolovos and Konstantinos Barmpis. **Efficiently Querying Large-Scale Heterogeneous Models** • Sorour Jahanbin, Dimitris Kolovos and Simos Gerasimou. **Intelligent Run-Time Partitioning of Low-Code System Models**

12:30 - 13:30

13:30 - 15:00	**DEVOPS AND LOW-CODE DEVELOPMENT** • Bruno Piedade, João Pedro Dias and Filipe Correia. **An Empirical Study on Visual Programming Docker Compose Configurations** • Alessandro Colantoni, Luca Berardinelli and Manuel Wimmer. **DevOpsML: Towards Modeling DevOps Processes and Platforms** **RECOMMENDER SYSTEMS AND MACHINE LEARNING** • Lissette Almonte, Iván Cantador, Esther Guerra and Juan de Lara. **Towards automating the construction of recommender systems for low-code development platforms** • Claudio Di Sipio, Davide Di Ruscio and Phuong T. Nguyen. **Democratizing the development of modeling assistants by means of low-code platforms** • Panagiotis Kurouklidis, Dimitris Kolovos, Nicholas Matragkas and Joost Noppen. **Towards a low-code solution for monitoring machine learning model performance**

15:00 - 15:30

15:30 - 17:00	**Discussion and closing**