

Direzione Generale per il coordinamento e la valorizzazione della ricerca e dei suoi risultati

PRIN: PROGETTI DI RICERCA DI RILEVANTE INTERESSE NAZIONALE – Bando 2020

Prot. 2020W3A5FY

PART A

1. Research project title

Engineered MachinE Learning-intensive IoT systems

2. Duration (months)

36 months

3. Main ERC field

PE - Physical Sciences and Engineering

4. Possible other ERC field

5. ERC subfields

1. PE6_3 Software engineering, operating systems, computer languages

2.

3.

6. Keywords

n°	Testo inglese
1.	software engineering
2.	quality control
3.	reliability
4.	internet of things
5.	machine learning
6.	ML-Intensive IoT systems

7. Principal Investigator

MARIANI (Surname)	LEONARDO (Name)
Professore Ordinario (L. 240/10) (Qualification)	
01/03/1977 (Date of birth)	MRNLRD77C01B474C (Personal identification code)
Università degli Studi di MILANO-BICOCCA (Organization)	
0264487870 (Phone number)	mariani@disco.unimib.it (E-mail address)

8. List of the Research Units

n°	Associated Investigator	Qualification	University/ Research Institution	e-mail address
1.	MARIANI Leonardo	Professore Ordinario (L. 240/10)	Università degli Studi di MILANO-BICOCCA	mariani@disco.unimib.it (manca l'adesione)
2.	BARESI Luciano	Professore Ordinario (L. 240/10)	Politecnico di MILANO	luciano.baresi@polimi.it (adesione completata il 13/01/2021)
3.	DI RUSCIO Davide	Professore Associato (L. 240/10)	Università degli Studi dell'AQUILA	davide.diruscio@univaq.it

				(manca l'adesione)
4.	DI PENTA Massimiliano	Professore Ordinario (L. 240/10)	Università degli Studi del SANNIO di BENEVENTO	dipenta@unisannio.it (manca l'adesione)
5.	DE LUCIA Andrea	Professore Ordinario	Università degli Studi di SALERNO	adelucia@unisa.it (adesione completata il 12/01/2021)

9 - Substitute Principal Investigator (To be identified among one of the research units participating in the project).

(Surname)	(Name)
(Qualification)	
(Date of birth)	(Personal identification code)
(Organization)	
(Phone number)	(E-mail address)

10. Brief description of the proposal

11. Total cost of the research project identified by items

Associated Investigator	item A.1	item A.2.1	item B	item C	item D	item E	sub-total	Total
MARIANI Leonardo	59.635	90.000	89.781	0	0	10.000	249.416	249.416
BARESI Luciano	51.348	90.000	84.809	0	0	10.000	236.157	236.157
DI RUSCIO Davide	53.539	90.000	86.123	0	0	10.000	239.662	239.662
DI PENTA Massimiliano	50.126	90.000	84.076	0	0	10.000	234.202	234.202
DE LUCIA Andrea	51.621	90.000	84.973	0	0	10.000	236.594	236.594

Total	266.269	450.000	429.762	0	0	50.000	1.196.031	1.196.031
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N.B. The Item B and TOTAL columns will be filled in automatically

- item A.1: enhancement of months/person of permanent employees
- item A.2.1: cost of contracts of non-employees, specifically to recruit
- item B: overhead (flat rate equal to 60% of the total personnel cost, A.1+A.2.1, for each research unit)
- item C: cost of equipment, tools and software products
- item D: cost of consulting and similar services
- item E: other operating costs

PART B

B.1

1. State of the art

2. Detailed description of the project: methodologies, objectives and results that the project aims to achieve and its interest for the advancement of knowledge, as well as methods of dissemination of the results achieved

3. Project development, with identification of the role of each research unit, with regards to related modalities of integration and collaboration

4. Possible application potentialities and scientific and/or technological and/or social and/or economic impact, with indications of the possible use of research infrastructures

5. Financial aspects: costs and funding for each research unit

n°		Total cost (euro)	Co-funding (item A.1) (euro)	MUR funding (other items) (euro)
1.	MARIANI Leonardo	249.416	59.635	189.781
2.	BARESI Luciano	236.157	51.348	184.809
3.	DI RUSCIO Davide	239.662	53.539	186.123
4.	DI PENTA Massimiliano	234.202	50.126	184.076

5.	DE LUCIA Andrea	236.594	51.621	184.973
	Total	1.196.031	266.269	929.762

N.B. The fields will be filled in automatically

6. Bibliography

B.2

1. Scientific Curriculum of the Principal Investigator

2. Scientific Curriculum of the associated investigators

1. BARESÌ Luciano

Luciano Baresi is full professor at the Politecnico di Milano, where he spent most of his professional life. He received both his Master degree in Electronic Engineering and PhD in computer science from Politecnico di Milano. He was also visiting professor at University of Oregon (USA) and visiting researcher at University of Paderborn (Germany).

Luciano is a regular member of the program committee of important conferences related to service-oriented computing, web-based systems, and software engineering. He was program co-chair of ICECCS'02 (International Conference on Engineering Complex Computer Systems), FASE'06 (ETAPS Conference on Fundamental Approaches on Software Engineering), ICWE'07 (International Conference on Web Engineering), ICSOC'09 (International Conference on Service-Oriented Computing), SEAMS'12 (Symposium on Software Engineering for Adaptive and Self-Managing Systems) ESEC/FSE'13 (Joint European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering) and SCC'19 and '20 (IEEE International Conference on Services Computing). He also served as general chair for WICSA'16 (Working IEEE/IFIP Conference on Software Architecture).

Luciano is currently a member of the editorial board of Transactions on Autonomous and Adaptive Systems (ACM), Transactions on Services Computing (IEEE), Requirements Engineering (Springer), IEEE Software, Science of Computer Programming (Elsevier), and International Journal of Cooperative Information Systems (World Scientific). He also served on the editorial board of IEEE Transactions on Software Engineering and was chair of the IFIP working group (2.14/6.12/8.10) on Services-oriented Computing. Since 2015 he has been chairing the steering committee of ESEC/FSE (Joint European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering).

Luciano co-authored some 200 papers. Some of his papers appeared on prestigious journals, conferences, and magazines like ACM TOSEM, IEEE TSE, IEEE/ACM ICSE, ACM ESEC/FSE, IEEE RE conference, ICSOC, IEEE Computer, IEEE Software, and IEEE Internet Computing. He is also the co-author of a book in Italian. Currently, his work has been cited more than 10,000 times and Luciano's h-index is 49.

Luciano was the co-recipient of the ICSC 2020 Best Paper Award and of RE 2020 Most Influential Paper. Luciano was also awarded two CNR short-term mobility grants (1998 and 1999), one IBM Shared University Research award (2006), and one IBM Faculty award (2007).

Luciano's research interests touch different aspects of software engineering. While he started with formal approaches for modeling and specification languages, he then moved to UML and the design of web-based applications. He is now interested in distributed systems, service-based applications, and in the different aspects of mobile and ubiquitous software systems. This research has been funded by participating to diverse national and international projects.

Research/teaching periods abroad:

- Visiting researcher at University of Oregon – Eugene, USA (jul-sep 1998 and jul-sep 1999)
- Visiting professor at University of Oregon – Eugene, USA (jan-mar 2001)

- Visiting research at University of Paderborn, Germany (jan-feb and oct-nov 2003)
- Visiting professor at Tongji University, Shanghai, China (sep-oct 2008), in the context of PoliTong and of the Sino-Italian campus.

Research projects:

Principal investigator at PoliMi:

- MOMOCS (MOdel driven MOdernisation of Complex Systems): EU FP6 (Specific Targeted Research Project) (2006-2008)
- SLA@SOI (Empowering the Service Economy with SLA-aware Infrastructures), EU FP7 (Collaborative project) (2008-2011)
- MADES (Model-based methods and tools for Avionics and surveillance embeddeD SystEmS), EU FP7 (Collaborative project) (2010-2012)
- INDENICA (Engineering Virtual Domain-Specific Service Platforms). EU FP7 (Collaborative project) (2010-2013)
- SITAD (Sistema Integrato di Telemedicina e Assistenza Domiciliare) - Regione Lombardia e Ministero dell'Istruzione, Università e Ricerca (2012-2014)
- EEB – Edifici A Zero Consumo Energetico In Distretti Urbani Intelligenti (Italian Technology Cluster for Smart Communities) - PON Ricerca e Competitività, Ministero dell'Istruzione, Università e Ricerca (2014-2017)
- ITS Italy 2020 - Soluzioni ICT a supporto della logistica e dei processi di trasporto (Italian Technology Cluster on Transportation). – PON Ricerca e Competitività, Ministero dell'Istruzione, Università e Ricerca (2014-2021)
- Sistema innovativo di Big Data Analytics. Accordi di Competitività della Regione Lombardia (2016-2018)
- Dossier-cloud (DevOps-based Software Engineering for the Cloud. EU H2020 (Coordination and support action) (2016-2018)
- MeMoSa (in-car Media Entertainment Mobility and Safety). EIT (European Institute of Innovation and Technology) Digital (2017)
- Gauss (Governing Adaptive and Unplanned Systems of Systems), Italian Ministry of Education, University and Research, PRIN program (2017-2020) (together with Gianpaolo Cugola)
- Sisma (Solutions for Engineering Microservices Architectures), Italian Ministry of Education, University and Research, PRIN program (2019-2022)

Technical coordinator:

- Giocosco (Giochi pediatrici per la comunicazione e la socializzazione). Smart Cities and Communities - Regione Lombardia (2014-2015)
- PSC (Piattaforma dei servizi nel settore della giustizia civile). Smart Cities and Communities, Ministero dell'Istruzione, Università e Ricerca (2014-2018)
- ICT4D: Innovation Space as an Interface between Eduardo Mondlane University and Mozambican Society by promoting Science, Technology and Innovation. Supported by the Italian Agency for Cooperation and Development (2021-2024)

Workshop organizer:

- Luciano Baresi, S. Dustdar, H. Gall, and M. Matera. International Workshop on Ubiquitous Mobile Information and Communication Systems, satellite event of CAiSE (UMICS) 2003 and 2004
- Luciano Baresi and N. Maiden. International Workshop on Service-Oriented Computing: Consequences for Engineering Requirements, satellite event of RE (SOCCER) 2005, 2006, 2007, 2008, and 2011.
- Luciano Baresi and J. Bezivin. International Workshop on Model-based Modernization of Complex Software Systems, satellite event of ECDMA (MMSS) 2008.
- Karina Villela, Sholom Cohen, Luciano Baresi, Jaejoon Lee, and Klaus Schmid. Workshop on Services, Clouds, and Alternative Design Strategies for Variant-Rich Software Systems, satellite event of SPLC 2011 and 2012.
- Matteo Baldoni, Luciano Baresi, and Mehdi Dastani, Third International Workshop on Engineering Multi-Agent Systems, satellite event of AAMAS 2015.
- Luciano Baresi, Tim Menzies, Andreas Metzger, and Thomas Zimmermann. International Workshop on BIG Data Software Engineering, satellite event of ICSE 2015 and 2016.
- Jesper Anderson, Rafael Capilla, Luciano Baresi and Holger Eichelberger. Tenth International Workshop on Dynamic Software Product Lines - Adaptive Systems through Runtime Variability, satellite event of SPLC 2017.

Professional activities (at Politecnico):

- Chair of the bachelor degree program in Engineering Computing Systems - Cremona campus (2009-2011)
- Deputy chair of the bachelor degree program in Engineering Computing Systems for the Cremona campus (2011-)
- Member of the board of professors of the doctoral program in information technology at Politecnico (2011-2016)
- Co-coordinator of S-Cube, research lab on Social Smart Spaces in cooperation with Telecom Italia (2013-2017)

Project evaluator and reviewer:

European Union, Netherlands Organisation for Scientific Research (Netherlands), Mitacs (Canada), Vienna Science and Technology Fund (Austria), National Council for Scientific Research (Romania), Fundação para a Ciência e a Tecnologia (Portugal), TrentoRISE (Italy), INRIA (France), Israel Science Foundation (Israel), Provincia Autonoma di Trento (Italy), Regione Puglia (Italy), Swiss Science Foundation (Switzerland), and Icelandic Research Fund (Iceland)

PhD students:

Naser Derakhshan (2016), Sam Guinea (2007, co-advised with Carlo Ghezzi), Anita Imani (2016), Danilo Mendonça (2019), Matteo Miraz (2010), Alfredo Motta (2012), Liliana Pasquale (2010),

Mohammad Pourhashem (2015), Giovanni Quattrocchi (2016), Mersedeh Sadeghi (2018), Adnan Shahzada (2015).

External reviewer:

Anna Rita Laurenzi, Univeristà dell'Aquila (Italy), 2004, Fabio De Rosa, Università di Roma la Sapienza (Italy), 2006, Khaled Mahbub, City University London (UK), 2006, Cristina Marin, Universite Grenoble 1 (France), 2008, Dhaminda Buddhika Abeywickrama, Monash University (Australia), 2010, Jocelyn Simmonds, University of Toronto (Canada), 2010, Fabiano Dalpiaz, Università di Trento (Italy), 2011, Vikas Agarwal, Indian Institute of Technology, Kanpur (India), 2011, Garth Heward, Swinburne University of Technology (Australia), 2012, Asli Zengin, Università di Trento (Italy), 2012, Heorhi Raik, Università di Trento (Italy), 2012, Walter Rudametkin Ivey, Universite Grenoble 1 (France), 2013, Adina Sirbu, Università di Trento (Italy), 2013, Basil Becker, University of Potsdam (Germany), 2014, Gil Didac, Linnaeus University (Sweden), 2014, Christian Inzinger, Technical University Vienna (Austria), 2014, Abel Silva Lizzano, Politecnico di Milano, PhD program in Spatial Planning and Urban Development, 2014, Felipe Pontes Guimarães, Universidade de Sao Paulo (Brasil), 2017, Luigi Manco, Università del Salento (Italy), 2017, Martina De Sanctis, Università di Trento/FBK (Italy), 2018, Edith Zavala, Universitat, Politecnica de Catalunya (Spain), 2019, Antonio Teofilo, Universidade Nova de Lisboa (Portugal), 2020, Alessandro Aliberti Politecnico di Torino (Italy), 2020.

Post-doc researchers:

Martin Garriga (past), Valerio Panzica La Manna (past), Giovanni Quattrocchi (2017-now), Clement Quinton (past), Nicholas Rasi (2019-now), Konstantin Rubinov (past), Yu Zhu (past).

2. DI RUSCIO Davide

3. DI PENTA Massimiliano

4. DE LUCIA Andrea

Andrea De Lucia received the Laurea degree in Computer Science from the University of Salerno (Italy) in 1991, the MSc degree in Computer Science from the University of Durham (UK) in 1996, and the PhD degree in Electronic Engineering and Computer Science from the University of Naples "Federico II", in 1996. Since 2006 he is full professor of Software Engineering and head of the Software Engineering Lab at the Department of Computer Science of the University of Salerno, Italy. Previously, he was with the Department of Engineering of the University of Sannio, Italy.

His research interests are in the area of software engineering and include software maintenance, software testing, software quality, reverse engineering, source code analysis, refactoring, impact analysis, traceability management, empirical software engineering, search based software engineering, predictive models in software engineering, collaborative software development, and visual languages. In these fields he has published more than 250 papers in international journals, books, and conference proceedings, and edited journal special issues, books, and conference proceedings. His h-index is 49 in SCOPUS with more than 8000 citations (<http://www.scopus.com/authid/detail.url?authorId=7003641564>) and 66 in Google scholar with more than 14500 citations (<http://scholar.google.com.au/citations?user=iyx0u6kAAAAJ&hl=en>).

MAIN ACADEMIC SERVICES

- 1998-2001: member of the Administrative Council of the University of Sannio;
- 2001-2003: member of the executive committee of the Research Centre on Software Technology, University of Sannio;
- 2013-2018: Coordinator of the PhD program in Management & Information Technology, University of Salerno (XIX and XXX cycle);
- since 2015: member of the executive committee of CINI (Italian inter-University Consortium on Informatics) and Director of the Research Unit of the University of Salerno;
- since 2018: Coordinator of the PhD program in Computer Science, University of Salerno (since XXXIV cycle);
- since 2018: member of the evaluation committee for the national scientific qualification (ASN) for associate and full professors in Computer Engineering and Information Processing Systems (SC 09/H1).

MAIN PROJECT COORDINATION ACTIVITIES

- 1998-2001: coordinator of a technology transfer project on workflow and document management for small to medium enterprises and local Public Administration within the project plan LINK, funded by Ministry of University and Research, in collaboration with Scuola Superiore Sant'Anna of Pisa;
- 2000-2002: coordinator of the project "Legacy Systems Reengineering" within the project plan "Virtual Software Factory", funded by Ministry of University and Research, in collaboration with EDS Italia Software;
- 2001-2003: coordinator of the research activities of the University of Sannio and technical manager of the project GENESIS (GEneralised eNvironment for procEsS management in cooperative Software engineering), funded by EU within the V program framework;
- 2004-2006: principal investigator of project "Migration of legacy systems towards web based infrastructures", funded by Campania Region;

- 2007-2009: principal investigator and coordinator of the unit of the University of Salerno of the project PRIN "Methods and Tools for the Migration of software systems towards web and service oriented architectures: experimental evaluation, usability, and technology transfer";
- 2008-2009: principal investigator of project: "MADE in Med (Metodo e Applicazione delle Evidenze in Medicina)", funded by Campania Region;
- 2008-2010: coordinator for CeRICT of the project TA-CAMP (ICT support for Textile and Clothing of Campania Region), funded by Ministry of University and Research and Campania Region;
- 2014-2015: coordinator for the University of Salerno of the activities for the development of the test platform within the project WISCH (Advanced Technologies for the security of the territory and airspace), funded by Campania Region.

ROLES IN INTERNATIONAL SCIENTIFIC SOCIETIES

- since 2010: Senior Member of the IEEE;
- 2009-2011: Member of the executive committee of the IEEE Computer Society Technical Council on Software Engineering (TCSE);
- 2010-2011: Member of the Advisory Committee of the IEEE program on Real World Engineering Projects.

ROLES IN EDITORIAL BOARDS OF INTERNATIONAL JOURNALS

- since 2019: co-Editor in Chief of Science of Computer Programming (published by Elsevier, ISSN: 0167-6423);
- 2018-2019: Associate Editor of Science of Computer Programming (published by Elsevier, ISSN: 0167-6423)
- since 2013: Associate Editor of Empirical Software Engineering (published by Springer ISSN: 1382-3256);
- since 2011: Associate Editor of the Journal of Software: Evolution and Process (published by Wiley, ISSN: 2047-7481).

ROLES IN ORGANIZING AND PROGRAM COMMITTEES

- Director since 2005 of the International Summer School on Software Engineering (<http://www.sesa.unisa.it/seschool/>);
- General chair: 23rd IEEE International Conference on Program Comprehension (ICPC 2015); 6th IEEE International Workshop on Source Code Analysis and Manipulation (SCAM 2006);
- Program co-chair: IEEE Working Conference on Reverse Engineering (WCRE 2014 and 2005); 2nd IEEE International Workshop on Source Code Analysis and Manipulation (SCAM 2002); 9th IEEE International Workshop on Program Comprehension (IWPC 2001);
- European Projects track chair: 15th European Conference on Software Maintenance and Reengineering (CSMR 2011);
- Workshop co-chair: 30th IEEE International Conference on Software Maintenance and Evolution (ICSME 2014);
- Proceedings chair: IEEE International Conference on Software Maintenance (ICSM 2007 and 2008); 3rd IEEE International Workshop on Source Code Analysis and Manipulation (SCAM 2003);
- Tool exhibition chair: 20th IEEE International Conference on Software Maintenance (ICSM 2004).

Prof. De Lucia has also been member of program committees of many international conferences, including ICSE, ICSME, SANER, WCRE, CSMR, ICPC, and SCAM. Finally, he has been steering committee member of IWPC (2001-2004) and co-founder and steering committee member of SCAM (2001-2003).

PAPER AWARDS

- Most Influential Paper (MIP) Award received at 28th IEEE/ACM International Conference on Program Comprehension 2020, for paper: R. Oliveto, M. Gethers, D. Poshyvanyk, A. De Lucia, "On the Equivalence of Information Retrieval Methods for Automated Traceability Link Recovery", Proceedings of 18th IEEE International Conference on Program Comprehension, Braga, Portugal, 2010, ISBN: 978-0-7695-4113-6, pp. 68-71;
- ACM SIGSOFT Distinguished Paper Award for paper: M. Tufano, F. Palomba, G. Bavota, R. Oliveto, M. Di Penta, A. De Lucia, D. Poshyvanyk, "When and Why Your Code Starts to Smell Bad", Proceedings of 37th IEEE/ACM International Conference on Software Engineering, 2015, ISBN: 978-1-4799-1934-5, pp. 403-414;
- ACM SIGSOFT Distinguished Paper Award for paper: F. Palomba, G. Bavota, M. Di Penta, R. Oliveto, A. De Lucia, D. Poshyvanyk, "Detecting Bad Smells in Source Code using Change History, Information", Proceedings of 28th IEEE/ACM International Conference on Automated Software Engineering, 2013;
- Best paper award for paper: G. Bavota, B. De Carluccio, A. De Lucia, M. Di Penta, R. Oliveto, O. Strollo, "When does a Refactoring Induce Bugs? An Empirical Study", Proceedings of 12th IEEE International Working Conference on Source Code Analysis and Manipulation, 2012;
- Best paper award for paper: A. De Lucia, M. Di Penta, R. Oliveto, A. Panichella, S. Panichella, "Improving IR-based Traceability Recovery Using Smoothing Filters", Proceedings of 19th IEEE International Conference on Program Comprehension, 2011.

INVITED TALKS AND TUTORIALS

- 1995: invited talk on "Symbolic Execution in Reuse Reengineering Processes", University of Durham, UK;

- 1998: invited talk on "Incremental Migration of Legacy Systems, De Monfort University, UK;
- 2001: keynote speech on "Program Slicing: Methods and Applications", 1st IEEE Workshop on Source Code Analysis and Manipulation, Florence, Italy;
- 2006: invited talks on "Fine-grained Artefact Management" and "Using Information Retrieval Methods for Traceability Recovery", Free University of Bozen, Italy;
- 2008: invited talk on "Migrating Legacy Systems to the Web: Challenges for Migration to SOA", 2nd International Workshop on a Research Agenda for Maintenance and Evolution of Service-Oriented Systems, Beijing, China;
- 2008: invited talk on "Traceability Management for Impact Analysis", Frontiers of Software Maintenance, Beijing, China;
- 2009: invited talks on "Using Structural and Semantic Metrics to Improve Class Cohesion", Technical University of Delft, The Netherlands;
- 2012: tutorial on "Software Artefact Traceability Management and Recovery", International Summer School on Software Engineering, University of Salerno, Italy;
- 2013: tutorial on "Refactoring Software Systems: Challenges, Solutions, and Open Issues", International Summer School on Software Engineering, University of Salerno, Italy;
- 2015: invited talk on "Teaching Software Project Management and Software Engineering: An Integrated and Practical Approach", workshop on "Decision Making and Responsibility, Creativity and Enterprising skills in the Learning Process", Fondazione Politecnico of Milan, Italy;
- 2015: tutorial on "Bad Smell Detection e Refactoring Automation Challenges, Solutions, and Open Issues", International Summer School on Software Engineering, Free University of Bozen, Italy.
- 2016: tutorial on "Code Smell Identification and Refactoring Automation: Challenges, Solutions, and Open Issues", International Summer School on Software Engineering, University of Salerno, Italy.

3. Main Principal Investigator's scientific publications (Max. 20)

4. Main scientific publications of the associated investigators (Max. 20, for each research unit)

1. BARESI Luciano

1. Baresi L., Griswold W., Lewis G. A., Autili M., Malavolta I., Julien C. (2020). Trends and Challenges for Software Engineering in the Mobile Domain. IEEE SOFTWARE, vol. Early Access, ISSN: 0740-7459, doi: 10.1109/MS.2020.2994306 - **Articolo in rivista**
2. Pourhashem Kallehbasti, Mohammad Mehdi, Rossi, Matteo Giovanni, Baresi, Luciano (2020). On How Bit-Vector Logic Can Help Verify LTL-based Specifications. IEEE TRANSACTIONS ON SOFTWARE ENGINEERING, vol. online, p. 1, ISSN: 0098-5589, doi: 10.1109/TSE.2020.3014394 - **Articolo in rivista**
3. Quinton C., Vierhauser M., Rabiser R., Baresi L., Grunbacher P., Schuhmayer C. (2020). Evolution in dynamic software product lines. JOURNAL OF SOFTWARE, vol. n/a, p. 1-28, ISSN: 2047-7481, doi: 10.1002/smr.2293 - **Articolo in rivista**
4. Tsigkanos C., Garriga M., Baresi L., Ghezzi C. (2020). Cloud Deployment Tradeoffs for the Analysis of Spatially Distributed Internet of Things Systems. ACM TRANSACTIONS ON INTERNET TECHNOLOGY, vol. 20, p. 1-23, ISSN: 1533-5399, doi: 10.1145/3381452 - **Articolo in rivista**
5. Baresi L., Mendonca D. F., Garriga M., Guinea S., Quattrocchi G. (2019). A unified model for the mobile-edge-cloud continuum. ACM TRANSACTIONS ON INTERNET TECHNOLOGY, vol. 19, p. 1-21, ISSN: 1533-5399, doi: 10.1145/3226644 - **Articolo in rivista**
6. Baresi, Luciano, Leva, Alberto, Quattrocchi, Giovanni (2019). Fine-grained Dynamic Resource Allocation for Big-Data Applications. IEEE TRANSACTIONS ON SOFTWARE ENGINEERING, vol. Early Access, p. 1-17, ISSN: 0098-5589, doi: 10.1109/TSE.2019.2931537 - **Articolo in rivista**
7. RUBINOV, KONSTANTIN, Baresi L. (2018). What Are We Missing When Testing Our Android Apps?. COMPUTER, vol. 51, p. 60-68, ISSN: 0018-9162, doi: 10.1109/MC.2018.2141024 - **Articolo in rivista**
8. BARESI, LUCIANO, Delamaro, Marcio, Nardi, Paulo (2017). Test oracles for simulink-like models. AUTOMATED SOFTWARE ENGINEERING, vol. 24, p. 369-391, ISSN: 0928-8910, doi: 10.1007/s10515-016-0207-9 - **Articolo in rivista**
9. BARESI, LUCIANO, GHEZZI, CARLO, Ma, Xiaoxing, Manna, Valerio Panzica La (2017). Efficient Dynamic Updates of Distributed Components Through Version Consistency. IEEE TRANSACTIONS ON SOFTWARE ENGINEERING, vol. 43, p. 340-358, ISSN: 0098-5589, doi: 10.1109/TSE.2016.2592913 - **Articolo in rivista**
10. Baresi, Luciano, Morzenti, Angelo, Motta, Alfredo, Pourhashem, Mohammad Mehdi, Rossi, Matteo (2017). A logic-based approach for the verification of UML timed models. ACM TRANSACTIONS ON SOFTWARE ENGINEERING AND METHODOLOGY, vol. 26, p. 1-47, ISSN: 1049-331X, doi: 10.1145/3106411 - **Articolo in rivista**
11. Rabiser Rick, Guinea Montalvo Sam Jesus, Vierhauser Michael, Baresi Luciano, Grünbacher Paul (2017). A comparison framework for runtime monitoring approaches. THE JOURNAL OF SYSTEMS AND SOFTWARE, vol. 125, p. 309-321, ISSN: 0164-1212, doi: 10.1016/j.jss.2016.12.034 - **Articolo in rivista**
12. Mendonça, Danilo Filgueira, Nunes Rodrigues, Genáina, Ali, Raian, Alves, Vander, BARESI, LUCIANO, FILGUEIRA MENDONÇA, DANILO (2016). GODA: A goal-oriented requirements engineering

- framework for runtime dependability analysis. INFORMATION AND SOFTWARE TECHNOLOGY, vol. 80, p. 246-264, ISSN: 0950-5849, doi: 10.1016/j.infsof.2016.09.005 - **Articolo in rivista**
13. Luciano Baresi, Sam Guinea Montalvo, Liliana Pasquale (2012). Service-Oriented Dynamic Software Product Lines. COMPUTER, vol. 45, p. 42-48, ISSN: 0018-9162, doi: 10.1109/MC.2012.289 - **Articolo in rivista**
 14. Luciano Baresi, Carlo Ghezzi, Luca Mottola (2011). Loupe: Verifying Publish-Subscribe Architectures with a Magnifying Lens. IEEE TRANSACTIONS ON SOFTWARE ENGINEERING, vol. 37, p. 228-246, ISSN: 0098-5589, doi: 10.1109/TSE.2010.39 - **Articolo in rivista**
 15. Luciano Baresi, Sam Guinea Montalvo (2011). Self-supervising BPEL Processes. IEEE TRANSACTIONS ON SOFTWARE ENGINEERING, vol. 37, p. 247-263, ISSN: 0098-5589, doi: 10.1109/TSE.2010.37 - **Articolo in rivista**
 16. Baresi L., Denaro G., Quattrocchi G. (2019). Symbolic execution-driven extraction of the parallel execution plans of Spark applications. In: ESEC/FSE 2019 - Proceedings of the 2019 27th ACM Joint Meeting European Software Engineering Conference and Symposium on the Foundations of Software Engineering. p. 246-256, Association for Computing Machinery, Inc, ISBN: 9781450355728, est, 2019, doi: 10.1145/3338906.3338973 - **Contributo in Atti di convegno**
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3. DI PENTA Massimiliano

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5. Main staff involved (max 10 professors/researchers for each research unit, in addition to the PI or associated investigator), highlighting the time commitment expected

List of the Research Units

Unit 1 - MARIANI Leonardo

Personnel of the research unit

n°	Surname Name	Qualification	University/ Research Institution	e-mail address	Months/person expected
1.	MARIANI Leonardo	Professore Ordinario (L. 240/10)	Università degli Studi di MILANO-BICOCCA	mariani@disco.unimib.it (manca l'adesione)	5,0
2.	PASI Gabriella	Professore Ordinario (L. 240/10)	Università degli Studi di MILANO-BICOCCA	pasi@disco.unimib.it (adesione completata il 12/01/2021)	2,0

Total cost of the research unit, per single item

	Cost
item A.1	59.635 €
item A.2.1	90.000 €
item B	89.781 €
item C	

	0 €
item D	0 €
item E	10.000 €
Total	249.416 €

N.B. The Item B and TOTAL columns will be filled in automatically

- item A.1: enhancement of months/person of permanent employees
- item A.2.1: cost of contracts of non-employees, specifically to recruit
- item B: overhead (flat rate equal to 60% of the total personnel cost, A.1+A.2.1, for each research unit)
- item C: cost of equipment, tools and software products
- item D: cost of consulting and similar services
- item E: other operating costs

Major new contracts for staff specifically to recruit

Number of expected RTD contracts	Number of research grants expected	Number of PhD scholarships expected	Overall expected time commitment (months)
	2		36

Unit 2 - BARESI Luciano

Personnel of the research unit

n°	Surname Name	Qualification	University/ Research Institution	e-mail address	Months/person expected
1.	BARESI Luciano	Professore Ordinario (L. 240/10)	Politecnico di MILANO	luciano.baresi@polimi.it (adesione completata il 13/01/2021)	3,0
2.	CUGOLA Gianpaolo Saverio	Professore Ordinario (L. 240/10)	Politecnico di MILANO	cugola@elet.polimi.it (manca l'adesione)	2,5

Total cost of the research unit, per single item

	Cost
item A.1	51.348 €
item A.2.1	90.000 €
item B	84.809 €
item C	
item D	
item E	10.000 €
Total	236.157 €

N.B. The Item B and TOTAL columns will be filled in automatically

- item A.1: enhancement of months/person of permanent employees
- item A.2.1: cost of contracts of non-employees, specifically to recruit
- item B: overhead (flat rate equal to 60% of the total personnel cost, A.1+A.2.1, for each research unit)
- item C: cost of equipment, tools and software products
- item D: cost of consulting and similar services
- item E: other operating costs

Major new contracts for staff specifically to recruit

Number of expected RTD contracts	Number of research grants expected	Number of PhD scholarships expected	Overall expected time commitment (months)
	2		

Unit 3 - DI RUSCIO Davide

Personnel of the research unit

n°	Surname Name	Qualification	University/ Research Institution	e-mail address	Months/person expected
1.	DI RUSCIO Davide	Professore Associato (L. 240/10)	Università degli Studi dell'AQUILA	davide.diruscio@univaq.it (manca l'adesione)	5,0
2.	DI MARCO Antinisca	Professore Associato (L. 240/10)	Università degli Studi dell'AQUILA	antinisca.dimarco@univaq.it (manca l'adesione)	4,0

Total cost of the research unit, per single item

	Cost
item A.1	53.539 €
item A.2.1	90.000 €
item B	86.123 €
item C	
item D	
item E	10.000 €
Total	239.662 €

N.B. The Item B and TOTAL columns will be filled in automatically

- item A.1: enhancement of months/person of permanent employees
- item A.2.1: cost of contracts of non-employees, specifically to recruit
- item B: overhead (flat rate equal to 60% of the total personnel cost, A.1+A.2.1, for each research unit)
- item C: cost of equipment, tools and software products
- item D: cost of consulting and similar services
- item E: other operating costs

Major new contracts for staff specifically to recruit

Number of expected RTD contracts	Number of research grants expected	Number of PhD scholarships expected	Overall expected time commitment (months)
	2		

*Unit 4 - DI PENTA Massimiliano**Personnel of the research unit*

n°	Surname Name	Qualification	University/ Research Institution	e-mail address	Months/person expected
1.	DI PENTA Massimiliano	Professore Ordinario (L. 240/10)	Università degli Studi del SANNIO di BENEVENTO	dipenta@unisannio.it	4,0

				(manca l'adesione)	
2.	DI LUCCA Giuseppe Antonio	Professore Associato confermato	Università degli Studi del SANNIO di BENEVENTO	dilucca@unisannio.it (manca l'adesione)	2,5

Total cost of the research unit, per single item

	Cost
item A.1	50.126 €
item A.2.1	90.000 €
item B	84.076 €
item C	
item D	
item E	10.000 €
Total	234.202 €

N.B. The Item B and TOTAL columns will be filled in automatically

- item A.1: enhancement of months/person of permanent employees
- item A.2.1: cost of contracts of non-employees, specifically to recruit
- item B: overhead (flat rate equal to 60% of the total personnel cost, A.1+A.2.1, for each research unit)
- item C: cost of equipment, tools and software products
- item D: cost of consulting and similar services
- item E: other operating costs

Major new contracts for staff specifically to recruit

Number of expected RTD contracts	Number of research grants expected	Number of PhD scholarships expected	Overall expected time commitment (months)
	2		

Unit 5 - DE LUCIA Andrea

Personnel of the research unit

n°	Surname Name	Qualification	University/ Research Institution	e-mail address	Months/person expected
1.	DE LUCIA Andrea	Professore Ordinario	Università degli Studi di SALERNO	adelucia@unisa.it (adesione completata il 12/01/2021)	5,5
2.	PECORELLI Fabiano	Dottorando (data fine contratto: 31/10/2021)	Università degli Studi di SALERNO	F.PECORELLI3@STUDENTI.UNISA.IT (manca l'adesione)	1,0
3.	DE STEFANO Manuel	Dottorando (data fine contratto: 31/10/2023)	Università degli Studi di SALERNO	M.DESTEFANO36@STUDENTI.UNISA.IT (manca l'adesione)	2,0
4.	IANNONE Emanuele	Dottorando (data fine contratto: 31/10/2023)	Università degli Studi di SALERNO	E.IANNONE16@STUDENTI.UNISA.IT (manca l'adesione)	2,0

Total cost of the research unit, per single item

	Cost
item A.1	51.621 €
item A.2.1	90.000 €
item B	84.973 €
item C	
item D	
item E	10.000 €
Total	236.594 €

N.B. The Item B and TOTAL columns will be filled in automatically

- item A.1: enhancement of months/person of permanent employees
- item A.2.1: cost of contracts of non-employees, specifically to recruit
- item B: overhead (flat rate equal to 60% of the total personnel cost, A.1+A.2.1, for each research unit)
- item C: cost of equipment, tools and software products
- item D: cost of consulting and similar services
- item E: other operating costs

Major new contracts for staff specifically to recruit

Number of expected RTD contracts	Number of research grants expected	Number of PhD scholarships expected	Overall expected time commitment (months)
	2		

6. Information on the new contracts for personnel to be specifically recruited

n°	Associated or principal investigator	Number of expected RTD contracts	Number of research grants expected	Number of PhD scholarships expected	Overall expected time commitment (months)
1.	MARIANI Leonardo	0	2	0	36
2.	BARESI Luciano	0	2	0	0
3.	DI RUSCIO Davide	0	2	0	0
4.	DI PENTA Massimiliano	0	2	0	0
5.	DE LUCIA Andrea	0	2	0	0
	Total	0	10	0	36

"The data contained in the application for funding are processed exclusively for carrying out the institutional functions of MUR. The CINECA, Department of Services for MUR, is in charge of the maintenance of these data. The consultation is also reserved to universities and research institutions (each for its respective competence), MUR - Directorate General for coordination and development of research and its results - Office III, CNGR, CdS, and the reviewers in charge of the peer review. MUR also has the right to the dissemination of the main economic and scientific data related to the funded projects".

Date *(inserted by system at the closing of the application)*