SHORT BIOGRAPHY OF ANDREA MARRELLA

Andrea Marrella, born **15 August 1982** in Rome (Italy), is a **research fellow** (scientific disciplinary sector **ING-INF/05**) at Sapienza Università di Roma, Italy, Dipartimento di Ingegneria Informatica, Automatica e Gestionale Antonio Ruberti (DIAG – Dept. of Computer, Control and Management Engineering), since 2013.

He got a **PhD** in **Engineering in Computer Science** (Dottorato di Ricerca in Ingegneria Informatica) from Sapienza Università di Roma in October 2013. He previously studied Engineering in Computer Science (Ingegneria Informatica) at Sapienza Università di Roma, where he obtained a Bachelor Degree in 2005 and a Master Degree in 2009. Since 2011, he is qualified to practice as Computer Science Engineer (abilitato all'esercizio della professione di Ingegnere).

In 2018, he obtained the **National Scientific Habilitation** (Abilitazione Scientifica Nazionale) as **Associate Professor** for sectors **09/H1** (Sistemi di Elaborazione delle Informazioni) and **01/B1** (Informatica).

RESEARCH ACTIVITY, KEYNOTES AND INVITED TALKS

Andrea Marrella is affiliated to **DASILab** (Data and Service Integration Lab) at DIAG. He is a member of the **Data and Service Management research group** and of the **Human-Computer Interaction research group**. His overall research activity has been carried out in Rome (Italy), Tartu (Estonia), and Toronto (Canada).

The **research activity** of Andrea Marrella concerns **theoretical, methodological,** and **practical aspects** in different areas of **Computer Science**, including Business Process Management, Modelling, Adaptation, Mining and Resilience, Cyber-Security and Human-Computer Interaction. Such topics are challenged in the application domains of smart manufacturing, healthcare, emergency management and cultural heritage.

Since 2010, Andrea Marrella has developed a **research program** aimed at investigating how to integrate the solid theoretical foundations provided by **Automated Planning** and **Reasoning about actions** techniques in **Artificial Intelligence** (AI) with the practical needs required by **Business Process Management** (BPM) and **Process Mining** solutions. Thanks to the recognized results of his research, **he is actually considered as one of the pioneers** of the concrete application of AI techniques to untangle complex challenges from the BPM domain, such as the **automated synthesis of process models**, the **automated adaptation of running processes**, the **analysis of process compliance** with defined policies and regulations and the **optimal alignment of execution traces** against their underlying (procedural or declarative) process models.

For this reason, in 2017 he was invited to give the **keynote talk** at the **1st International Workshop on BP Innovation with AI** (**BPAI'17**) organized within the 15th International Conference on Business Process Management (BPM 2017 - GII-GRIN Class A - CORE Class A), where he presented (as a single author) his research on "*Automated Planning for Business Process Management*". The findings of this research have been also published as a journal article at Journal on Data Semantics (Springer).

In addition, he was invited to present the **results of his research at various institutions worldwide**, including University of Toronto (Canada) and York University (Canada) in 2012, Ryerson University (Canada) in 2013, University of Vienna (Austria) and University of Ulm (Germany) in 2014, and University of Tartu (Estonia) in 2016. Finally, he was invited to organize and give a **full-day tutorial on Process Mining** at 18th International Conference on Product-Focused Software Process Improvement (PROFES 2017).

From 2006 to 2010, the research of Andrea Marrella focused on realizing **advanced methodologies and tools** in the field of Human-Computer Interaction (HCI). Specifically, he designed and developed **innovative touch-based graphical user interfaces for pen-based mobile devices** (notice that touch-based interaction for mobile devices started to become popular since late 2008 with the mass production of iPhone 3G) and the realization of **advanced workflow engines** and **location-based services** for supporting collaborative work of human operators on-the-field in emergency/disaster scenarios.

His **current research** on HCI tackles a well-known (unsolved) challenge in this area, namely the **automated quantification of learnability of interactive systems**. In this direction, he is focusing on developing a **theoretical** and **practical framework** that exploits Process Mining algorithms and technologies to

automatically derive the learnability of a system during its daily use. The **impact** of this research, which requires a strong background and expertise in BPM and HCI, is potentially **ground-breaking** in the HCI field, as it aims at superseding the expensive and time-consuming learnability techniques for observing users in highly controlled environments over extended periods of time. The **long-term objective** is to realize **explainable** and **adaptive interactive systems**, which allow one to **automatically extract and understand the behaviours and the characteristics of users** that interact with such systems, thus enabling more precise **user profiling** and **modelling** that will be used as the basis for any **adaptive change to the system's behaviour** towards the user's specific needs.

In 2018, Andrea Marrella contributed to the writing of the second edition of the **white book on the future of cyber-security in Italy**. In this context, his **current research** on cyber-security is focused, on the one hand, on exploiting **Process Mining** techniques to the **detection of anomalous behaviours** and **prediction of security issues** in information systems. On the other hand, he is investigating user-centred solutions for tackling the **human factors in cyber-security**, in order to **increase cyber-awareness** and **reduce human errors**, which are often the cause of security breaches.

SCIENTIFIC PUBLICATIONS

Since 2007, Andrea Marrella regularly **publishes the results of his research** in top-level international journals and conferences. Notably, since 2013, he has increasingly established his **scientific independence** by authoring several papers presented in collaboration with different authors than the supervisor. Overall, he has co-authored **58 peer-reviewed scientific papers** on the above research topics, including:

- **13 journal articles**, including high impact factor journals such as ACM Transactions on Intelligent Systems and Technology, IEEE Transactions on Data and Knowledge Engineering, Expert Systems with Applications (Elsevier), Information Systems (Elsevier), Journal on Data Semantics (Springer), Journal on Software and Systems Modeling (Springer), IEEE Internet Computing;
- **2 authored book chapters** on the topics of Process Adaptation in cyber-physical domains and Process Resilience of data-aware business processes;
- **43 workshop** and **conference papers,** including several class A*/A conferences (according to the well-known GII-GRIN and CORE rankings) such as DIS in 2018, ICSOC in 2018 and 2014, ICAPS in 2018 and 2016, AAAI and CAiSE in 2017, BPM in 2017, 2015 and 2011, IJCAI in 2016, KR in 2014 and CoopIS in 2012.

His Google Scholar profile reports an **h-index** of **18** and an **i10-index** of **22**, with **778 overall citations** (cf. https://scholar.google.com/citations?user=8zZvFawAAAAJ&hl=en).

SCIENTIFIC AWARDS

In 2017, Andrea Marrella received the **Best Paper Award** at the prestigious **CAiSE 2017** conference (29th International Conference on Advanced Information Systems Engineering – GII-GRIN Class A - CORE Class A) for his paper on "Multi-party Business Process Resilience By-Design: A Data-centric Perspective".

RESEARCH STAYS AND VISITS

From **January 2012** to **June 2012**, Andrea Marrella has been a **visiting Researcher** at **York University** in Toronto, Ontario (Canada), Department of Computer Science and Engineering, where he collaborated with Prof. Yves Lespérance to the realization of advanced methodologies and techniques for the automated generation of business process models using partial-order planning algorithms.

From **June 2013** to **August 2013**, he has been a **visiting researcher** at **Ryerson University** in Toronto, Ontario (Canada), Department of Computer Science, where he collaborated with Prof. Mikhail Soutchanski to the formalization of an innovative approach based on action formalisms in Knowledge Representation and Reasoning for the automated synthesis of chemical processes in organic chemistry.

In **October** and **November 2016**, he has been a **visiting researcher** at **University of Tartu** in Estonia. During this period abroad, he collaborated with Prof. Marlon Dumas to the realization of an evaluation framework and of a benchmark to compare process discovery algorithms. Furthermore, he collaborated with Prof.

Fabrizio Maria Maggi on the formalization and implementation of a technique based on finite-state automata manipulation and on Automated Planning for efficiently solving the trace alignment problem of declarative processes in Process Mining.

PROJECTS

Andrea Marrella is the **principal investigator** of the research projects (progetti di Avvio alla Ricerca):

- METRICS (*"Mining ExTended leaRnability of InteraCtive Systems"*), which has been financed by Sapienza Università di Roma in 2018.
- DAKIP ("*Data-aware Adaptation of Knowledge-intensive Processes in Cyber-Physical Domains through Action-based Languages*"), which has been financed by Sapienza Università di Roma in 2016.

Moreover, he is/has been **actively involved** in **several research projects**, including WORKPAD (FP6 European Project) and the Italian projects MAIS, TESTMED, SUPER, FIGO (as Unit Leader), NEPTIS (as OR Leader), IT-SHIRTS (as WP Leader), FILIERASICURA and ACI-I.

TEACHING EXPERIENCE

Andrea Marrella has an **excellent teaching experience**. Within Sapienza, he is the **main lecturer** (docente a contratto) of the graduate course of **Process and Service Modeling and Analysis** (ING/INF 05 – 6 CFU – semester Fall 2018) and of the graduate course of **Enterprise Information Systems** (ING/INF 05 – 6 CFU – semester Spring 2018). Over the years, he has taught as **main lecturer** the graduate course of **Interaction Design** (ING/INF 05 – 6 CFU – semester Spring 2017) and the undergraduate course of **Databases** (ING/INF 05 – 3 CFU – semester Spring 2014). In Fall 2017, he has taught as **main lecturer** the PhD course of **Process Mining** (3 CFU).

Since 2009, he has been teaching assistant for the undergraduate course of **Databases** (Spring 2009, 2010, 2011, 2013, 2015, 2016). Furthermore, he gave several seminars and lectures for the following graduate courses: **Process and Service Modeling and Analysis** (Spring 2016, 2017, 2018), **Great Ideas in ICT** (Spring 2017), **Human-Computer Interaction** (Spring 2010, 2011, 2016, 2017, 2018), **Seminars in Software and Services for the Information Society** (Spring 2012, 2013, 2014, 2015, 2016), **Reasoning about Actions in Cognitive Robotics** (module of Elective in Artificial Intelligence, Spring 2018).

Andrea Marrella has also a **wide experience as a lecturer for industries and companies**. He taught the course of **Process Simulation and Mining** at NESEA in 2015, and the course of **Human-Machine Interaction** at Cineca in 2016 and at SELEX (now incorporated with Leonardo/Finmeccanica) in 2010 and 2012. Finally, he was **lecturer** for the course of **Databases** (Basi di Dati) at Meschini Institute in 2011, in the range of IFTS - Istruzione e Formazione Tecnica Superiore (Higher technical education and training) teaching program financed by Regione Lazio.

SUPERVISION OF STUDENTS

Since 2010, within DIAG, Andrea Marrella **supervised** and **co-supervised**:

- **3 M.sc**. **student** and **27 B.sc. students** in Engineering in Management Science on the topics of process modelling, process automation, process identification, process simulation, process choreography design, data quality and big data management through NoSQL technologies.
- **12 M.sc. students** and **1 B.sc. student** in Engineering in Computer Science on the topics of software learnability, user experience design, conformance checking, process mining on databases, process repair, process adaptation and process resilience in cyber-physical and IoT-based environments.
- **2 M.sc. students** in Design, Multimedia and Visual Communication, on the topics of gamification, adaptive storytelling and word clouds design and generation.

Moreover, he co-supervised **2 M.sc theses** in Computer Science for Software Engineering at the University of Tartu (Estonia) on the topics of process discovery and adaptation.

Notably, the majority of his M.sc. students completed their degree with the highest honours, and **9 of them published the results of their thesis** in international peer-reviewed scientific journals, conferences and workshops.

Since 2017, he is **co-supervising 3 PhD Student** at DIAG on the topics of:

- discovering, formalizing and evaluating user profiling and interactions in videogame contexts and IoT-based smart environments;
- understanding and mastering human factors in cybersecurity;
- synthesizing strategies for Robotic Process Automation via Process Mining and Automated planning techniques.

PROFESSIONAL SERVICE

Andrea Marrella serves/has served regularly as a **reviewer for top class journals**, such as ACM Transactions on Computer-Human Interaction (TOCHI), IEEE Transactions on Knowledge and Data Engineering (TKDE), IEEE Transactions on Human-Machine Systems (SMC), IEEE Transactions on Service Computing (TSC), Information Systems, Data & Knowledge Engineering (DKE), Journal of Artificial Intelligence Research (JAIR), Journal on Data Semantics (JODS), Business & Information Systems Engineering (BISE), ACM Computing Surveys (CSUR).

Moreover, in 2018 he is acting as **expert reviewer** for the **Discovery Grant Program** financed by **Natural Sciences and Engineering Research Council of Canada**.

Since 2017, Andrea Marrella is the **Information Director** of the **ACM Journal on Data Quality** (ISSN 1936-1955) and is **member of the Editorial Board** of the **International Journal of Information Systems for Crisis Response and Management** (ISSN 1937-9390).

He serves/has served in the **Program Committee** of the 31st Int. Conference on Advanced Information Systems Engineering (CAiSE 2019), 34th ACM/SIGAPP Symposium On Applied Computing (SAC 2019), 16th and 17th Int. Conference on Business Process Management (BPM 2018 and 2019), 14th Int. Conference on Advanced Visual Interfaces (AVI 2018), 2017, 2018, 2019 Int. Conference on Software and System Processes (ICSSP 2017, 2018 and 2019), 22nd Int. Conference on Business Information Systems (BIS 2019), 17th Int. Conference of the Italian Association for Artificial Intelligence (AI*IA 2018), 12th, 13th, 14th Int. Conference on Web Information Systems and Technologies (WEBIST 2016, 2017 and 2018), 14th Int. Conference on Intelligent Environments (IE'18), 2014 Symposium on Computational Intelligence and Data Mining (CIDM 2014) and of several international workshops.

As far as **organization** and **chairship** of conferences and **workshops**, Andrea Marrella has acted/is acting as:

- Organization Chair of the 31st Int. Conf. on Advanced Information Systems Engineering (CAiSE 2019)
- Program Chair of the 3rd Int. Workshop on Artificial Intelligence for Business Process Management (AI4BPM 2019)
- Demo & Poster Chair of the 14th ACM Int. Conf. on Advanced Visual Interfaces (AVI 2018)
- Local Chair of the 8th IEEE Int. Conf. on Service Oriented Computing & Applications (SOCA 2015)
- Proceedings Chair of the 23rd Italian Symposium on Advanced Database Systems (SEBD 2015)
- Publicity Chair of the 12th Int. Conf. on Mobile Web and Intelligent Inf. Systems (MobiWis 2015)
- PC Chair of the 2nd Int. W/shop on Knowledge-intensive Business Processes (KiBP 2013)
- Proceedings Chair of the 1st Int. W/shop on Knowledge-intensive Business Processes (KiBP 2012)