

Manuele Pasini, Ph.D. Candidate

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CITIZENSHIP Italian

CURRENT PLACEMENT **DISI, Università di Bologna**, Italy
• Ph.D. Candidate

RESEARCH THEMES My research activities focus on data engineering and analytics in both conventional and large-scale data contexts, with particular emphasis on the design of efficient data structures for emerging forms of complex data and their associated analytical processes. Current research topics include:

- (i) the engineering of big data platforms to support the integration of spatiotemporal data from heterogeneous sources and stakeholders in the agriculture domain;
- (ii) the engineering of data structures and architectures enabling modern digital twins' applications.

I am involved in several projects to deploy my efforts in practical applications, specifically in the field of precision agriculture.

EDUCATION **Ph.D. Candidate** in Computer Science and Engineering @ **DISI, Università di Bologna**, Italy

- From Nov 1, 2023, ongoing
- Project title: Architectures and Methods for Digital Twins Platform
- Topic: Following the spread of Internet of Things devices, more and more physical “things” are being mapped into their digital twins. Indeed, an exponential increase in the number of digital twin’s applications can be observed in scientific literature from 2018 onwards. Such applications entail a sensible increase in the volume and variety of the data to be collected, causing well known hip-data issues. Researchers have studied and addressed those issues through data platforms: integrated ecosystems that transparently allow large amounts of data to be collected, processed, and stored in real time while enabling, at the same time, the building and maintenance of a large historical knowledge. While data platforms have become a standard tool in managing big data, no similar concept has yet been introduced in digital twins nor has a form of integration between the two been studied or defined. In the examined digital twin’s applications, data-related issues are usually handled on a use case application, never considering a wider and more general-purpose approach or methodology. This inevitably results in an expensive and inefficient data management process, failing to realize its key value as the primary source of optimization hence not allowing digital twins to express their full capabilities. In this context, this project would like to define a state-of-the-art framework for designing and developing Digital Twin Platforms (DTPs): a wider and more data-centric approach to digital twins, incorporating key principles and techniques widely employed in data platforms in order to enhance management, integration, and analytics of data inside the digital twin ecosystem. Within a DTP, significant emphasis is placed on integration and automation (e.g., automated data integration and governance to ensure the reliability, traceability, and integrity of data).
- Supervisor: Prof. Matteo Golfarelli

Master’s Degree in Computer Science and Engineering @ **DISI, Università di Bologna**, Italy

- 110L/110 - *Graduated cum laude*
- From Oct 2019 to Mar 2023
- Thesis title: Progettazione di un sistema di ottimizzazione per il consiglio irriguo
- www: <https://amslaurea.unibo.it/28103/>
- Supervisor: Prof. Matteo Golfarelli
- Area of Study: Data Mining

Bachelor’s Degree in Computer Science and Engineering @ **DISI, Università di Bologna**, Italy

- 95/110
- From Sep 2015 to July 2019
- Thesis title: Programmazione memory-safe senza garbage collection: il caso del linguaggio Rust
- www: <https://amslaurea.unibo.it/18535/>
- Supervisor: Prof. Mirko Viroli
- Area of Study: Software engineering

High-school diploma in “Informatica” (computer science) @ **I.T.T.S. “Blaise Pascal”**, Cesena (FC), Italy

- 100/100
- From Sep 2011 to July 2016

INTEGRATIVE
TEACHING

Teaching (#1 courses)

A.Y.	Hours	Role	Course name	Type	Affiliation
23/24	30	Teacher	Relational Database Systems	Higher technical institute course	FITSTIC , Cesena (FC), Italy
23/24	40	Course Tutor	Machine Learning and Data Mining	Master Degree	Digital Transformation Management, Università di Bologna
24/25	30	Teacher	NoSQL Database Systems	Higher technical institute course	FITSTIC , Cesena (FC), Italy
24/25	40	Course Tutor	Machine Learning and Data Mining	Master Degree	Digital Transformation Management, Università di Bologna
25/26	30	Teacher	NoSQL Database Systems	Higher technical institute course	FITSTIC , Cesena (FC), Italy
25/26	40	Course Tutor	Machine Learning and Data Mining	Master Degree	Digital Transformation Management, Università di Bologna

Bachelor thesis advisor @ DISI, Università di Bologna, Italy

1. Denis Nikaj (Progettazione e prototipazione di un’applicazione web per l’irrigazione di precisione), March 2024.
2. Davide Speciali (Progettazione e realizzazione di un simulatore per l’irrigazione di precisione), December 2024.
3. Federico Capponi (Progettazione e prototipazione di un sistema di irrigazione di precisione), July 2025.

PARTICIPATION
IN RESEARCH
GROUPS

Business Intelligence Group, University of Bologna, Italy

May 1st, 2023 — today

The research group led by my Ph.D. project supervisor. The Business Intelligence Group studies the architectures, techniques, and methodologies aimed at extracting value from data in the most diverse business contexts. The innovation brought by data ranges from the digital transformation of business operational processes to the adoption of artificial intelligence techniques for the extraction of knowledge and the automation of the most advanced processes, passing through the study of optimized algorithms for data extraction and analysis. We carry out both theoretical research and practical studies, with the awareness that without the former there is no real innovation and that without the latter there is no real technology transfer. We are driven by curiosity and often deviate from our core research area to work on problems that emerge from the projects and business contexts we face.

RESEARCH
CONTRACTS

Contract type	Affiliation	Title	Start	End	Duration
Ph.D. student	DISI, UniBO	Architectures and Methods for Digital Twin Platforms (grant from the Italian Ministry of Research)	2023-11-01	on-going	3 years
Research grant	DISI, UniBO	Precision Agriculture Analytics	2023-05-01	2023-10-31	6 months

- **NOTE:** Research grant = Assegno di ricerca.

PARTICIPATION
IN RESEARCH
PROJECTS

Research projects

- **PNRR Spoke 3**

Mar 1, 2023 — Feb 28, 2026

Title: “Sistemi di intelligenza artificiale e big data per la sostenibilità dei processi produttivi agricoli”. Fondi PNRR, Bando CN - Progetto AGRI, “National Research Centre for Agricultural Technologies”, Codice CN00000022, CUP: J33C22001150008

Commissioned research

- Optimizing kiwi and walnut irrigation **2024 — 2026**

Funded by F.In.A.F. srl (First International Association Fruit). The project involves the study of the irrigation needs of walnut and kiwi plants, the digitalisation of irrigation management, and the modeling of the problem as a multi-objective optimization problem (balancing of irrigation resources and production quality and quantity KPIs).

- Technological Framework for Vineyard Development Analysis **2025 — 2025**

Funded by agrifoodTEF, the project aims to develop a set of technologies designed to support and investigate vineyard development. These technologies will assist researchers in gaining a deeper understanding of the complex dynamics underlying vine growth and associated requirements.

SERVICE IN
INTERNATIONAL
JOURNALS

Reviewing for international journals

- Data & Knowledge Engineering (DKE; 2024)
 - Information Systems (2024)
 - Journal of Big Data (2025)
 - Future Generations Computer Systems (2025)
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TALKS IN
INTERNATIONAL
CONFERENCES

1. “Towards a Process Driven Design of Data Platforms” @ **DOLAP@EDBT/ICDT 2024**
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PUBLICATIONS
IN
INTERNATIONAL
CONFERENCES,
ORDERED BY
TIME
*

- [c1] M. Francia, M. Golfarelli, and M. Pasini, “Towards a process-driven design of data platforms,” in *Proceedings of the 26th International Workshop on Design, Optimization, Languages and Analytical Processing of Big Data (DOLAP 2024) co-located with the 27th International Conference on Extending Database Technology and the 27th International Conference on Database Theory (EDBT/ICDT 2024), Paestum, Italy, March 25, 2024*, ser. CEUR Workshop Proceedings, vol. 3653. CEUR-WS.org, 2024, pp. 28–35. [Online]. Available: <https://ceur-ws.org/Vol-3653/paper3.pdf>
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PUBLICATIONS
IN
INTERNATIONAL
JOURNALS
*

- [j1] M. Francia, M. Golfarelli, and M. Pasini, “Process-driven design of cloud data platforms,” *Information Systems*, vol. 131, p. 102527, 2025. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S0306437925000122>
- [j2] A. Baiardi, M. Francia, M. Golfarelli, A. V. Papadopoulos, and M. Pasini, “Prescriptive watering: Data-driven optimization of water consumption in kiwifruit orchards,” *Comput. Electron. Agric.*, vol. 243, p. 111306, 2026. [Online]. Available: <https://doi.org/10.1016/j.compag.2025.111306>
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SKILLS

Big Data management and analysis:

- Distributed file systems (HDFS)
- Distributed databases (MongoDB, Cassandra, HBase)
- Distributed execution frameworks (Spark)
- Ecosystem management (Cloudera CDH)
- System orchestration and administration (Oozie, Hue, Airflow)

- Cloud platforms (AWS)
- On-premise ad-hoc architectures

Database Management Systems:

- Relational DBMSs (Oracle, MySQL, PostgreSQL, Microsoft Access, Microsoft SQL Server)
- NoSQL DBMSs (MongoDB, Neo4j, Cassandra, Redis, HBase, Apache Age)
- Big Data architectures (both on cloud and on-premise)
- Timeseries DBMSs (InfluxDB, TimescaleDB, AsterixDB)
- GIS systems (PostGIS)

Computer programming:

- Java, Scala, Kotlin, Python, R, JavaScript, HTML, CSS, SQL, SPARQL, Rust
- Object-oriented and functional programming

Software engineering:

- Distributed Version Control Systems (Git)
- Build systems (Gradle, Maven)
- Virtualization software (Docker)

Web development:

- Web servers (NodeJS)
- Content Management Systems (Wordpress)
- Responsive frameworks (Bootstrap)
- Charts and maps (D3, OpenLayers, Chart.js)

Operating Systems:

- Linux (CentOS, Debian, Ubuntu)
- Microsoft Windows family

SPOKEN
LANGUAGES

- **Mother tongue:** Italian

	Understanding		Speaking		Writing
	Listening	Reading	Spoken interaction	Spoken production	
English	C1	C1	C1	C1	C1

Cesena. February 12, 2026

Manuela Pasini