

Preface

This book contains the contributions selected for publication at the sixth edition of the Distributed Ledger Technology Workshop (DLT 2024), which was held in Turin (Italy), on May 14 and 15, 2024. This event follows the previous editions of the workshop held in Perugia (2018), Pisa (2019), Ancona (2020), Roma (2022) and Bologna (2023), which represent one of the two annual meetings of the Italian DLT group.

The DLT workshops are meant as a forum for researchers, developers, and users to discuss issues related to Distributed Ledger Technology and its adoption in research and business scenarios. The primary goal is to foster discussion and cross-fertilisation of ideas among experts in different fields related to DLT, and thus advance the national and international state of the art. Research, applications, case studies, and experiences concerning DLT are all encouraged.

The DLT 2024 workshop solicited two kinds of contributions: research papers and oral communications, both entailing an oral presentation at the workshop. Overall, we received 68 submissions. Research papers were peer reviewed by at least three experts in the field, and 32 of them were accepted for publication in this volume.

We would like to sincerely thank all the authors who submitted their papers to our workshop, and to the members of the Technical Program Committee and their subreviewers for their valuable work in evaluating the submitted papers.

September 24th, 2024

Massimo Bartoletti
Claudio Schifanella
Andrea Vitaletti

Organization

Program co-chairs

- Massimo Bartoletti – Università degli Studi di Cagliari
- Claudio Schifanella – Università degli Studi di Torino
- Andrea Vitaletti – Università degli Studi di Roma “La Sapienza”

Workshop chair

- Claudio Schifanella – Università degli Studi di Torino

Program committee

- Leonardo Aniello – University of Southampton
- Marco Baldi – Università Politecnica delle Marche
- Fadi Barbara – Università degli Studi di Torino
- Marco Benedetti – Banca d'Italia
- Stefano Bistarelli – Università degli Studi Perugia
- Andrea Bracciali – Università degli Studi di Torino
- Chiara Braghin – Università degli Studi di Milano
- Alessandro Brighente – Università degli Studi di Padova
- Francesco Bruschi – Politecnico di Milano
- Michele Ciampi – University of Edinburgh
- Agostino Cortesi – Università Ca' Foscari Venezia
- Silvia Crafa – Università degli Studi di Padova
- Angelo De Caro – IBM Zurich
- Alfredo Favenza – Links Foundation, Torino
- Stefano Ferretti – Università degli Studi di Urbino
- Danilo Francati – Aarhus University / Concordium
- Letterio Galletta – IMT Lucca
- Valentina Gatteschi – Politecnico di Torino
- Cosimo Laneve – Università degli Studi di Bologna
- Alberto Leporati – Università degli Studi di Milano-Bicocca
- Bernardo Magri – Manchester University
- Marino Miculan – Università degli Studi di Udine
- Paolo Mori – Istituto di Informatica e Telematica del CNR

- Leonardo Mostarda – Università degli Studi di Camerino
- Maurizio Pizzonia – Università degli Studi Roma Tre
- Laura Ricci – Università degli studi di Pisa
- Sabina Rossi – Università Ca' Foscari Venezia
- Domenico Saccà – Università degli Studi della Calabria
- Luisa Siniscalchi – Technical University of Denmark
- Francesco Tiezzi – Università degli Studi di Firenze
- Adele Veschetti – Technische Universität Darmstadt
- Andrea Visconti – Università degli Studi di Milano
- Ivan Visconti – Università degli Studi di Salerno
- Marco Zecchini – Università degli Studi di Salerno
- Roberto Zunino – Università degli Studi di Trento

Program

Day 1 – Tuesday 14 May

08:15 **Registration**

08:45 **Welcome**

09:00 **Session 1 – Blockchain for good**

Alberto Butera, Noemi Romani and Valentina Gatteschi

Improving driving behavior: a blockchain-based gamification system

Gavina Baralla, Luisanna Cocco, Roberto Tonelli and Marco Di Francesco

A Blockchain-Based System Proposal for management and monitoring Historical Heritage (Oral communication)

Giovanni Miri

Blockchain Enabling Project-Focused Public Debt: A DApp to Help Public Entities Raise Funds (Oral communication)

Ivan Homoliak

Towards Secure, Scalable, and Flexible E-Voting in Blockchains (Oral communication)

09:42 **Session 2 – DAOs**

Irene Domenicale, Flavia Fredda and Claudio Schifanella

Tokenomics in Civic Blockchain: Implementing Community and SoulBound Tokens in a Game-Theoretical Framework for Collaborative Economies

Sowelu Avanzo, Alex Norta, Julio Linares, Claudio Schifanella and Marie Hattingh

DAO-ML: A Modelling Language for the specification of Decentralized Autonomous Organization governance

Stefan Kitzler, Stefano Balietti, Pietro Saggese, Bernhard Haslhofer and Markus Strohmaier

The Involvement of Contributors in Decentralized Autonomous Organizations' (DAOs) Governance (Oral communication)

Alberto Leporati

Certification of Business Processes and Workflows via Blockchain

Stefano Ferretti, Gabriele D'Angelo, Angelo Furfaro and Paolo Giaccone

How Blockchain Technologies can Promote the Creation of Smart Services in Smart Shires (Oral communication)

10:45 **Coffee break**

11:15 **Invited speaker**

Stefan Schulte

Blockchain Interoperability: Current State and Future Trends

12:15 **Sponsor**

Afredo Favenza – Links Foundation

12:30 **Session 3 – AI**

Fadi Barbara, Emanuele Antonio Napoli, Valentina Gatteschi and Claudio Schifanella

Automatic Smart Contract Generation Through LLMs: When The Stochastic Parrot Fails

Jahan Zeb Shahid and Stelvio Cimato

Sharded Blockchain for the Scalability and Privacy of Healthcare Data in Federated Learning (Oral communication)

Giovanni De Gasperis and Sante Dino Facchini

MAS, DAO and DLT: a 3 Legs Architecture for Intelligent Services (Oral communication)

13:05 **Lunch**

14:18 **Session 4 – Applied Crypto**

Diego Pennino and Maurizio Pizzonia

Virtual Private Blockchains for GDPR: Cheap Private Blockchains out of Public Ones

Domenico Tortola, Andrea Pelosi, Giuseppe Gabriele Russo, Paolo Mori and Laura Ricci
zkSNARKs Libraries for Blockchains: a Comparative Study

Abhimanyu Rawat, Tarun Kumar Vangani, Hanno Cornelius and Vanesa Daza
Accelerating Proly Trees: Simplified Chunking for Rapid Updates

Gennaro Avitabile, Vincenzo Botta, Daniele Friolo and Ivan Visconti
Data Redaction in Smart-Contract-Enabled Permissioned Blockchains

Pierpaolo Della Monica, Ivan Visconti, Andrea Vitaletti and Marco Zecchini
Non-Fungible Tokens for Confidential Assets (Oral communication)

15:27 **Session 5 – Supply Chain**

Carmelo Felicetti, Domenico Saccà, Antonella Guzzo and Francesco Pasqua
Innovative Distributed Ledger Technologies for Local Product Traceability in Agro-Touristic Economies

Giulia Rifaiani, Giacomo Zonneveld, Paolo Santini, Massimo Battaglioni, Franco Chiaraluce and Marco Baldi

A Blockchain-based Architecture for Data Certification and Notarization (Oral communication)

Alberto Amico, Vincenzo Apicella, Alberto Bufera, Devis Bianchini, Matteo Cesana, Gabriele Digregorio, Massimiliano Garda, Valentina Gatteschi, Corrado Innamorati, Francesco Leotta, Stefano Longari, Pierluigi Plebani, Mariarosa Pizzo, Giovanni Quattrocchi, Noemi Romano, Letizia Tanca, Andrea Vitaletti and Stefano Zanero

Blockchain-based solutions for trusted and quality-aware data sharing (Oral communication)

16:00 **Session 6 – Software Engineering**

Andrea Pinna, Ilaria Lunesu and Roberto Tonelli

Blockchain Technologies for Managing Ephemeral Teams for Agile Software Development (Oral communication)

Francesco Salzano, Lodovica Marchesi, Remo Pareschi, Roberto Tonelli, Simone Scalabrino and Rocco Oliveto

How are Smart Contracts Vulnerabilities Fixed? Bridging the Gap between Theory and Practice (Oral communication)

16:18 **Coffee Break**

16:48 **Session 7 – Formal Methods**

Adele Veschetti, Richard Bubel and Reiner Hähnle

SmartML: Enhancing Security and Reliability in Smart Contract Development

Silvia Crafa, Giacomo Dal Sasso, Alvisè Spanò, Sabina Rossi and Michele Bugliesi

Linear typing for asset-aware programming: the case of Sui Move (Oral communication)

Joao Afonso, Elvis Gerardin Konjoh Selabi, Maurizio Murgia, Emilio Tuosto and António Ravara

TRAC: a tool for data-aware coordination (with an application to smart contracts) (Oral communication)

Samia Guesmi, Carla Piazza and Sabina Rossi

Noninterference Analysis for Smart Contracts: Would you Bet on it?

Chiara Braghin, Elvinia Riccobene and Simone Valentini

A Formal Framework for security assessment of Ethereum Smart Contracts (Oral communication)

Massimo Bartoletti, Fabio Fioravanti, Giulia Matricardi, Roberto Pettinau and Franco Sainas

Towards benchmarking of Solidity verification tools (Oral communication)

António Ravara

Towards a Solider Solidity: Taming Type Casts (Oral communication)

Dario Maddaloni, Riccardo Marchesin and Roberto Zunino
How To Save Fees in Bitcoin Smart Contracts: a Simple Optimistic Off-chain Protocol

Giulia Matricardi, Fabio Fioravanti and Marco Di Ianni
Visualizing CHC Verification Conditions for Smart Contracts Auditing (Oral communication)

Massimo Bartoletti, Angelo Ferrando, Enrico Lipparini and Vadim Malvone
Solvent: liveness verification of smart contracts (Oral communication)

18:40 **Meeting DLT Group**

20:30 **Social Dinner**

During the event, prizes were awarded to the authors of the best paper and the best reviews.

Best paper award:

A Netting Protocol for Liquidity-saving Automated Market Makers
Margherita Renieri, Letterio Galletta, Alberto Lluch Lafuente and James Chiang

Best reviewer awards:

Fadi Barbara
Pierpaolo Della Monica
Riccardo Marchesin

Day 2 – Wednesday 15 May

08:30 **Session 8 – Integrating Tech**

Stefano Bistarelli, Chiara Luchini and Francesco Santini
Policy-based Credential Disclosure in SSI by Using ORCON-based Access Control

Ivan Homoliak
Secure Logging with Blockchains and its Utilization for Central Bank Digital Currency (Oral communication)

Mohammad Rowhani Sistani, Pierluigi Gallo and Maria Timoshina
Integrating Computer Vision & Blockchain for Enhanced Saffron Evaluation: A Focus on Filament Curvature Assessment

Hasret Ozan Sevim

A Survey on Cross-chain Interoperability Solutions within the On-chain Finance Ecosystem (Oral communication)

George Giamouridis, Boojoong Kang and Leonardo Aniello

Blockchain-based DNS: Current Solutions and Challenges to Adoption

Luigi Bellomarini, Marco Favorito, Eleonora Laurenza, Markus Nissl and Emanuel Sallinger

Towards FATEful Smart Contracts

09:48 **Session 9 – DeFi**

Margherita Renieri, Letterio Galletta, Alberto Lluch Lafuente and James Chiang

A Netting Protocol for Liquidity-saving Automated Market Makers

Federico Calandra, Francesco Pio Rossi, Francesco Fabris and Marco Bernardo

Making Algorithmic Stablecoins More Stable: The Terra-Luna Case Study

Margherita Renieri and Letterio Galletta

Detection of De-Fi Profitable Scenarios through History-Based Policies (Oral communication)

10:36 **Coffee break**

11:06 **Session 10 – Consensus**

Angelo Murano, Bruna Bruno and Vincenzo Vespri

Incentives compatibility constraints for vote-based consensus protocols

Stefano Bistarelli, Cosimo Laneve, Ivan Mercanti and Adele Veschetti

Analyzing the Fairness of Proof of Stake Ethereum

Alked Ejupi, Stefano De Angelis and Vladimiro Sassone

Performance and scalability testing for blockchain consensus protocols: a systematic framework

Ivan Malakhov, Andrea Marin, Sabina Rossi, Carla Piazza and Daria Smuseva

Under the space threat: Verifier's Dilemma in Cosmos blockchain (Oral communication)

António Ravara

Modular Blockchain Simulator (Oral communication)

Ivan Visconti, Andrea Vitaletti and Marco Zecchini

Do your readers need a blockchain? (Oral communication)

12:09 **Session 11 – Layer 2**

Marco Benedetti, Francesco De Sclavis, Giuseppe Galano, Sara Giammusso, Antonio Muci and Matteo Nardelli

Impact of Layer-1 Characteristics on Scalability of Layer-2 Semi-Hierarchical Payment Channel Networks

Ivan Gallo, Marina Ribauda and Matteo Dell'Amico

Network Analysis of the Lightning Network (Oral communication)

12:42 **Lunch**

13:57 **Session 12 – Analytics and Measurements**

Antonio Pierro, Luisanna Cocco and Roberto Tonelli

Besu vs. Quorum: Comparative Analysis in the Context of Energy Communities

Alvaro Revuelta, Sergei Tikhomirov, Aaryamann Challani, Hanno Cornelius and Simon Pierre Vivier

Message Latency in Waku Relay with Rate Limiting Nullifiers

Flavio Corradini, Alessandro Marcelletti, Andrea Morichetta and Barbara Re

A Data Extraction Methodology for Ethereum Smart Contracts (Oral Communication)

Stefano Bistarelli, Francesco Santini and Luca Maria Tutino

A Short Survey on Bitcoin Price Prediction

Stefano Bistarelli, Gianlorenzo Giuliani, Ivan Mercanti and Francesco Santini

An In-depth Analysis of Mining Pools Revenue

Nicola Elia, Francesco Barchi, Alessia Pisu, Livio Pompianu and Andrea Acquaviva

Estimating Smart Contracts Performance (Oral communication)

Nawaz Abdullah Malla, Alessandro Marcelletti, Andrea Morichetta and Francesco Tiezzi

Unveiling Algorand Storage Peculiarities

Stefano Bistarelli, Marco Fiore, Antonio Ignazio Lazzizzera, Ivan Mercanti and Marina Mongiello

Analysis of Blockchain Sustainability through the Comparison of Different Smart Contracts Programming Languages

15:45 **Session 13 – Law**

Luca Olivieri, Luca Pasetto, Luca Negrini and Pietro Ferrara

European Union Data Act and Blockchain Technology: Challenges and New Directions

Ludovico Papalia and Chantal Bompreszi

The Use of Blockchain for Legislative Simplification Tracking(Oral communication)

16:18 **Session 14 – Energy and IoT**

Matteo Vaccargiu, Giacomo Ibba and Roberto Tonelli

Is it possible to create a decentralized free energy market? An automatic literature review approach

Alessia Pisu, Livio Pompianu, Salvatore Castello, Daniele Riboni and Salvatore Carta
Personalized Smart Contracts for IoT Data Certification (Oral communication)

Silvio Meneguzzo, Alessandro Mozzato, Alfredo Favenza, Valentina Gatteschi and Lucio Rocco Inglese

Distributed ledger technologies for electric vehicles charging and payment operations (Oral communication)

Daniele Orrù, Andrea Pinna and Roberto Tonelli

Low-Cost Tamper-Proof IoT Devices to Improve Data Origin Verification and Privacy in Blockchain-Based Energy Consumption Records

Giuseppe Spadavecchia, Marco Fiore, Daniela De Venuto and Marina Mongiello

Using Blockchain and Smart Contracts as a Centralized Cloud Alternative for IoT (Oral communication)

Lodovica Marchesi, Maria Ilaria Lunesu and Roberto Tonelli

Integrating Blockchain, IoT and Robotics into a Reliable Production System (Oral communication)

17:25 **Closing**

17:40 **Coffee break and greetings**