ISD 2023

08/30–09/01, 2023
Lisbon, Portugal

31st International Conference on Information Systems Development (ISD 2023)

Lisboa, Portugal, 30 August to 1 September 2023

Conference Booklet

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Welcome Message

Welcome to ISD 2023!

The International Conference on Information Systems Development is an academic conference hosted annually in different locations worldwide, where scientists and practitioners are welcomed to participate and share their knowledge and expertise in information systems development. The conference has focused on different aspects, ranging from methodological, infrastructural or educational challenges in the ISD field to bridging the gaps between industry, academia and society. However, the conference's mission has remained: to research, share, and discuss developments and trends in Information Systems and Information Systems Development.

The 31st International Conference on Information Systems Development (ISD 2023) conference provides a forum for research and developments in information systems. The theme of ISD 2023 is "Information systems development, organizational aspects and societal trends". New trends in developing information systems emphasize the continuous collaboration between developers and operators to optimize the software delivery time. The conference promotes research on methodological and technological issues and how IS developers and operators are transforming organizations and society through information systems.

The ISD 2023 conference this year also provides an opportunity for researchers and practitioners to promote their research and practical experience and discuss issues related to Information Systems through papers, posters, and journal-first paper presentations.

ISD 2023 will be hosted by Instituto Superior Técnico, in Lisbon, Portugal, from August 30 till September 1, 2023.

Reviewing Process and Selected Papers

ISD2023 attracted many submissions from different areas spanning several thematic tracks, proposed in the call for papers, in various cutting-edge technologies of specialized focus, organized and chaired by eminent experts of each field.

The Program Committee of ISD2023 comprised 136 international academic and industrial domain experts, apart from the 18 track chairs. The best quality papers were first identified based on a rigorous peer-review process performed using a double-blind process, with three reviews per submission. After that, the track chairs proposed the papers to be accepted based on the results from the reviews. The final decision was taken by the Program and Organizing Chairs taking into account the different perspectives from the session chairs.

Out of the submission pool of 102 papers, 37 were accepted as full papers, 12 as short papers, and 12 as posters. Furthermore, from the 37 full papers, a short list of only 16 papers were selected to be published in a Springer book.

Keynotes

ISD2023 is fortunate to have three invited keynotes presented by outstanding speakers.

Wilfrid Utz (OMiLAB), Challenging Innovation in IS Development through Digital Design Thinking. This keynote will highlight the value of transforming design artefacts into digital models and their role in driving innovation in information systems development. These models play an essential role in connecting the innovation to its enterprise context and work environment as they capture relationships between different facets of the targeted problem. The interplay of Conceptual Modelling and Design Thinking fosters this relation and establishes a connection between unrestrained design artefacts and more formal abstractions (e.g., business process models). Conceptual models can be co-created, assessed, and shared with stakeholders and IS developers to embed the collective intelligence of the community in iterative cycles and to improve the design artefacts. Machine-readable semantics are needed to enable model-value functionalities such as queries, while at the same time supporting understanding and interpretation through visual means. Two layers of interpretability are enabled – one for users, and the other for machines, as automated mechanisms are enabled in support of design assessments and decision-making.

Geert Poels (Ghent University), Domain ontologies, business models, enterprise models, requirements models, and software models, What is the difference? It is all about Conceptual Modelling. The creation of models for facilitating and supporting understanding, communication, analysis, and design, is a common research theme in many academic disciplines that contribute to the practice of information systems development. Based on the speaker's own experiences of being involved in different disciplines, this keynote sheds some light on the purpose and nature of the models that are intended to be used by ontology engineers, entrepreneurs and business designers, enterprise architects, requirements engineers, and software engineers, focusing on their commonalities rather than their differences. The keynote will highlight common concerns that provide opportunities for research across disciplines and will end with an outlook on how conceptual modelling and model-driven development can remain relevant in the rapidly evolving information systems development reality that is characterised by agile work approaches, no/low-code development, data mining pipelines, and artificial intelligence applications.

Arlindo Oliveira (Instituto Superior Técnico, Universidade de Lisboa), Bridging the Gap: Large Language Models and Symbolic Information Processing. Large language models have the potential to revolutionize the way humans interact with symbolic information systems by serving as human-friendly interfaces. This approach can significantly enhance user experience, accessibility, and efficiency across various domains. By leveraging natural language processing capabilities, large language models can understand and interpret complex human language inputs, translating them into queries or commands that symbolic information systems can process. This enables users to interact with systems like relational databases, search engines, or domain-specific software, such as accounting, payroll, and reservation information systems, using everyday language, rather than specialized syntax or programming languages.

The integration of large language models as human-friendly interfaces for symbolic information systems holds immense potential for transforming the way we interact with technology. This approach can democratize access to advanced systems, improve user experience, and foster more effective collaboration between humans and AI.

We hope you have the opportunity of exchanging ideas and experiences with your peers!

We sincerely hope you enjoy your participation in ISD2023!

Alberto Rodrigues da Silva, Organizing Chair

Miguel Mira da Silva, Program Chair

Thanks

We thank all the people and organizations that directly or indirectly supported this event. Thanks to the track chairs and all other members of the scientific committee for their many contributions and reviews that guarantee the overall quality of the conference.

Thanks to our colleagues from INESC-ID and Instituto Superior Técnico, Universidade de Lisboa, for all the organizational details required for hosting a conference. Thanks to our colleagues and students that participate at different levels in the organization of the conference. Thanks to the ISD's Steering Committee members for their guidance and support throughout this process.

Also, thanks to all the organizations involved in this conference, including promoters and supporters, AIS, IST-UL, and INESC-ID, and sponsor Quidgest.

Finally but not least, special thanks to all the authors and participants at the conference. Without their efforts, there would be no conference or proceedings! Thank you for contributing to the critical mass of researchers that keep this conference alive for what we expect to be many years to come.

Proceedings

M. Mira da Silva, A. Rodrigues da Silva, J. Estima (Eds.), Information Systems Development: Information systems development, organizational aspects and societal trends (ISD2023 Proceedings). Lisbon, Portugal.

Supporters and Sponsors

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Program

Note that hours are presented in the Lisbon time zone (or UTC+1). To convert into your local time zone, please use e.g., The Time Zone Converter, https://www.thetimezoneconverter.com.

Day 1 -Wednesday, August 30

8:30	**Registration** @ Registration Desk
9:30	**Opening Session** @ Room 02.1
10:00	**Keynote: Wilfrid Utz (OMiLAB)** @ Room 02.1 Challenging Innovation in IS Development through Digital Design Thinking
11:00	**Break** @ Hall 02
11:30	**Managing IS Development and Operations** @ Room 02.1 * Rahmat Mulyana, Lazar Rusu and Erik Perjons - How Hybrid IT Governance Mechanisms Influence Digital Transformation and Organizational Performance in the Banking and Insurance Industry of Indonesia * Daniel Remta, Marie Kovarova and Vlasta Svata - Is SAFe Agile Portfolio Management Compatible with COBIT? * Francisco Cesario - Blockchain Technology Adoption: Factors Influencing Intention and Usage	**Information Systems Modelling** @ Room 01.1 * Pascal André, Dalila Tamzalit, Ali Benjilany and Hugo Bruneliere - A Review of Core Operational Business-IT Alignment * Leonardo Abreu, David Aveiro, Duarte Pinto, Vitor Freitas and João Oliveira - DEMO Models Based Automatic Smart Contract Generation: a case in Logistics using Hyperledger * Patrícia Borges Vilão and Alberto Rodrigues da Silva - Rapid Production of Enterprise Applications in a Low-Code Environment: Comparing the ITLingo-ASL and Microsoft PowerApps Metamodels
13:00	**Lunch** @ Hall 02

14:30	**Managing IS Development and Operations** @ Room 02.1 * Timo Tokkonen, Atte Kinnula, Kari Kuutti and Marianne Kinnula - How Digitalization Affects Trucking: A Decision Makers' View * Daniel Staegemann, Natalie Schröder, Christian Daase, Christian Haertel, Matthias Pohl, Robert Häusler, Johannes Hintsch and Klaus Turowski - Contrasting the Necessary Skills of Leaders in Classical and Agile Software Development * Damian Dziembek and Paula Bajdor - Impact of the COVID-19 Pandemic on the Adaptation and Development of Cloud Computing Solutions in Enterprises in Poland	**Information Systems Modelling** @ Room 01.1 * Qishan Yang, Mouzhi Ge and Markus Helfert - Classification Model for Architectures in Information Systems: A Statistical Converging Technique * Carolina Bandeira, João Barata and Nuno Roque - Introducing the Sectoral Enterprise Architecture Framework (SEAF) * Grażyna Paliwoda-Pękosz, Piotr Soja, Marius Rohde Johannessen, Dariusz Dymek, Lasse Berntzen, Kim Normann Andersen and Tove Bøe - Reconciling Multiple Stakeholders in University ICT Curricula Development: Preliminary Lessons Learned from Poland and Norway
16:00	**Break** @ Hall 02	
16:30	**User Interface and Customer Experience** @ Room 02.1 * Adrianna Mateja and Anna Borawska - Incorporating Cognitive Neuroscience Techniques to Enhance User Experience Research Practices * Aleksandra Schick and Jakub Swacha - Factors Affecting the Perceived Usefulness of Enterprise Content Management Systems * Artur Strzelecki and Mariia Rizun - Exploring the Impact of Google Discover on Users and Publishers: A Data-driven Study	**Data Science and Machine Learning** @ Room 01.1 * Jarosław Wątróbski, Aleksandra Bączkiewicz, Robert Król and Iga Rudawska - Neural Network Based Multi-Criteria Ranking Prediction - Sustainability Assessment Case Study * David Calhas and Rui Henriques - EEG to fMRI Synthesis: Is Deep Learning a candidate? * Caroline Relva De Moraes, Paulo Rupino Da Cunha and Isabel Ramos - Barriers in Digital Workplaces During Covid-19 Lockdowns: a Phenomenological Longitudinal Study Using Actor-Network Theory
18:30	**Welcome Reception** @ IST's North Garden (Portuguese Music and Wine Tasting)	

Day 2 - Thursday, August 31

9:00	**Registration** @ Registration Desk		
9:30	**Keynote: Geert Poels (Ghent University, Belgium)** @ Room 02.1 Domain ontologies, business models, enterprise models, requirements models, and software models, What is the difference? It is all about Conceptual Modelling.		
10:30	**Rodrigo Serafim, Chief Innovation Officer** @ Room 02.1 GenOps: Decoding Generative AI Sponsor Quidgest	**Journal First** @ Room 01.1 * Tomás Lopes and Sérgio Guerreiro - Assessing business process models: a literature review on techniques for BPMN testing and formal verification	
11:00	**Break** @ Hall 02		
11:30	**Data Science and Machine Learning** @ Room 02.1 * Alan Caetano, Edirlei Lima and Jacinto Estima - Cyclist Route Assessment Using Machine Learning * Celina Olszak and Marcin Pałys - Data Exploration a Trigger for Customer Relationship Management * Antonio Martins, Alberto Silva and Jacinto Estima - Streamlining Literature Reviews Using an Automatic and Flexible Data Gathering and Classification Platform	**Ontologies and Knowledge Management** @ Room 01.1 * Snehal Walunj, Michael Sintek, Parsha Pahlevannejad, Christiane Plociennik and Martin Ruskowski - Ontology-based Digital Twin for Smart Factories * Bogumiła Hnatkowska and Mateusz Kimmel - Data Generation Based on a Domain Ontology * Vasile Ionut Iga and Gheorghe Cosmin Silaghi - Ontology-based dialogue system for domain-specific knowledge acquisition	**Learning, Education, and Training** @ Room 02.2 * Joni Rajala, Marianne Kinnula, Netta Iivari and Tonja Molin-Juustila - Exploring Upper Secondary School Students' Value Expectations, Perceptions and Propositions Around IS Outreach Programs * Kinga Krupcała - Development of digital competences of business students through e-business learning based on CMS WordPress * Paulina Rutecka and Karina Cicha - Digital tools for innovative higher education teaching
13:00	**Lunch** @ Hall 02		

Time			
14:30	**Data Science and Machine Learning** @ Room 02.1 * Teresa Zawadzka and Tomasz Wierciński - Late Fusion Approach for Multimodal Emotion Recognition Based on Convolutional and Graph Neural Networks * Milosz Wrzesien, Mariusz Wrzesien and Wladyslaw Homenda - Time Series Classification Using Images: the Case of SAX-like Transformation * Urszula Kużelewska - Scheme Selection based on Clusters' Quality in Multi-Clustering M-CCF Recommender System	**Ontologies and Knowledge Management** @ Room 01.1 * Suryamukhi K and Manish Singh - Linking Rare and Popular Tags in CQA sites * Anna Sumereder, Patrik Burzynski, Dimitris Karagiannis and Robert Woitsch - Conceptualization of Digital Twins: The EU-Project COGITO * Marco Ruiz and Juan Sánchez - Framework Architecture Design for ERS	**Learning, Education, and Training** @ Room 02.2 * Odd Steen and Paul Pierce - Do IS Curricular Guidelines Match Employer Expectations in Swedish IS Job Ads? * Maria Dias, João Barata and Licínio Roque - A Digital Twin for Training Marine Pollution Control * Catarina Vieira, Pedro Alves, Jorge Alves and André Perrotta - "Small Data" as a tool to predict player game design preferences: a qualitative pilot study
16:00	**Break** @ Hall 02		
16:30	**Risk, Security, and Resilience** @ Room 02.1 * André Fernandes, Miguel Mira da Silva and Ruben Pereira - Digital Resilience in Critical Infrastructures: A Systematic Literature Review * Priscila Cedillo Orellana, Andrea Rodriguez, Alberto Soriano, Elizabeth Viviana Cabrera Avila and Paul Esteban Cardenas Delgado - Decentralized ID and Self-sovereign Identity Solutions Using Blockchain: A Systematic Literature Review * Marek Pawlicki and Aleksandra Pawlicka - Strengths and weaknesses of deep, convolutional and recurrent neural networks in network intrusion detection deployments	**New Topics in IS Development** @ Room 01.1 * Urszula Stanczyk, Beata Zielosko and Grzegorz Baron - Going Deeper than Supervised Discretisation in Processing of Stylometric Features * Sinuo Wu, Karen Stendal and Devinder Thapa - Forming Digital Workspace: Current State and Applications of Extended Reality in Virtual Teams Normative Requirements	**New Topics in IS Development** @ Room 02.2 * João Cruz, André Fernandes, Miguel Mira da Silva and Rúben Pereira - A Mapping Tool for Normative Requirements * Jacek Winiarski, Pawel Robert Smolinski and Joseph Januszewicz - Towards Completely Automated Advertisement Personalization: An Integration of Generative AI and Information Systems
20:00	**Conference Banquet** @ Casa do Alentejo		

Day 3 - Friday, September 1

9:00	**Registration** @ Registration Desk
9:30	**Keynote: Arlindo Oliveira (Instituto Superior Técnico, Portugal)** @ Room 02.1 Bridging the Gap: Large Language Models and Symbolic Information Processing.
10:30	**Break + POSTERS**[*1] @ Hall 02

11:30	**New Topics in IS Development** @ Room 02.1 * Kurt Sandkuhl, Balbir Barn and Souvik Barat - Neural Text Generators in Enterprise Modeling: Can ChatGPT be used as Proxy Domain Expert? * Andre Perrotta, Jorge Cardoso, Pedro Gaspar, Leonor Palminha, Carla Pais-Vieira, Demétrio Matos and Miguel Pais-Vieira - Thertact-system: a virtual reality exoskeleton gait training simulator controlled by brain-computer interface * Arkadiusz Januszewski and Dariusz Zoltowski - Artificial Intelligence, Big Data, Cloud Computing, and Internet of Things as Emerging ICT for Sustainability	**New Topics in IS Development** @ Room 01.1 * João Mendes, David Aveiro, Duarte Pinto and Vitor Freitas - A comparative analysis of open-source Business Intelligence platforms for integration with a low-code platform. * Mariusz Żytniewski and Małgorzata Pańkowska - Digital Twin Framework Survey and Proposal of Implementation * Miguel Baptista, Miguel Mira da Silva, Paulo Rupino da Cunha and Cláudia Antunes - Data Analysis on Blockchain Distributed File Systems: A Systematic Literature Review

13:00	**Closing Session** @ Room 02.1
13:30	**Lunch** @ @ Hall 02
16:00	**Optional Social Event: TukTuk Tour** @ Rua Alves Redol roundabout (near the IST)

Posters[*1]

Marta Kadłubek, Dimitrios Chatzoudes and Dimitrios Maditinos - IT Adoption and Wireless Network Use for Logistics and Customer Service Performance in the Management of Freight Transport Enterprises

Bartosz Marcinkowski and Bartlomiej Gawin - To Integrate, or Not to Integrate: A General Framework for Developing System Integration

Agnieszka Bitkowska, Damian Dziembek and Tomasz Gzik - Business Process Management Systems and Cloud Computing: The Perspective of Polish Banks and Insurance Companies

Prithvi Bhattacharya - Towards A Prescriptive Framework for Selecting Suitable Artificial Intelligence Algorithms for Enterprise-Level Problems

Gerald Kremer, Ina Peters and Rainer Stark - Digital Capture of Design Heuristics to Represent Sustainability Knowledge in Product Design

Teresa Zawadzka, Wojciech Waloszek and Zawadzki Michał - Ontology-based method for analysis of inconsistency factors in emotion recognition

Elham Rostami - Empowering Information Security Managers: tailored information security policy design with POLCO software

Pawel Pisarski, Marek Bednarczyk, Tadeusz Puzniakowski, Adam Aszyk and Bartosz Marcinkowski - Innovative Data Visualization Tools: Facilitating Logistics Management in Times of Crisis

Jakub Więckowski, Bartłomiej Kizielewicz, Andrii Shekhovtsov and Wojciech Sałabun - Towards sustainable cloud services: MCDA approach

Grażyna Rosa - Digital Traveler - the use of modern information technologies in passenger transport

Anna Borawska, Małgorzata Łatuszyńska and Mariusz Borawski - Virtual Reality Games in Promoting Waste-Sorting Behaviour

Damian Dziembek and Leszek Ziora - New trends in cloud based business intelligence development in the management of business organizations

Social Events and Practical Hints

Conference Venue – IST Map

The ISD2023 conference runs in the Congress Center of Instituto Superior Técnico on floors 01 and 02 of the Civil Engineering building. The map below shows the location of the building inside the campus circled in red. The red star marks the location of the Holiday Inn Hotel, nearby.

Instituto Superior Técnico

Av. Rovisco Pais, 1049-001 Lisboa

Congress Center of Instituto Superior Técnico,

Civil Engineering Building

1 Pavilhão Central
2 Pavilhão de Civil
3 Pavilhão do Jardim Norte
4 Pavilhão de Mecânica I
5 Torre Norte
6 Pavilhão de Electricidade
7 Pavilhão de Informática II
8 Pavilhão de Mecânica IV
9 Pavilhão de Informática I
10 Pavilhão de Informática II
11 Pavilhão de Mecânica II
12 Pavilhão de Mecânica III
13 Cantina
14 Pavilhão da Associação de Estudantes
15 Campo de Jogos
16 Piscina
17 Pavilhão de Acção Social
18 Secção de Folhas
19 Pavilhão de Minas
20 Torre Sul
21 Pavilhão de Química
22 Pavilhão do Jardim Sul
23 Infantário
24 Pavilhão de Matemática
25 Pavilhão de Física
26 Complexo Interdisciplinar

Floor 01 (-1)

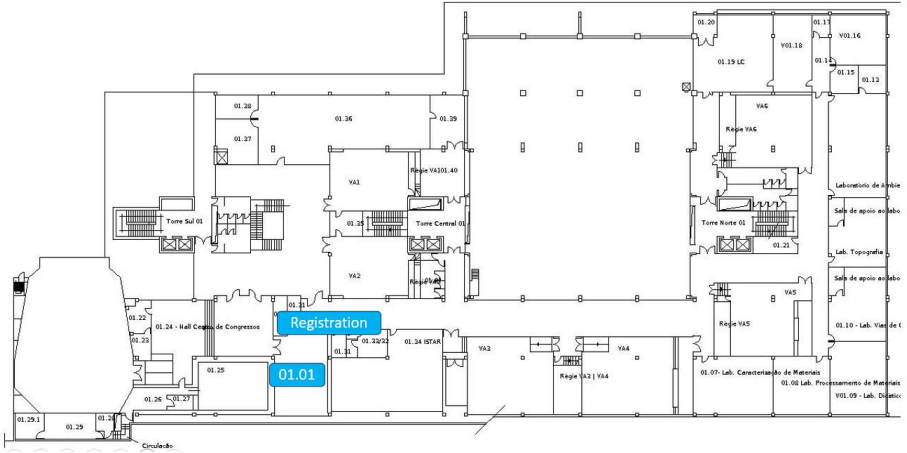Registration Desk (01)

Room 01.1
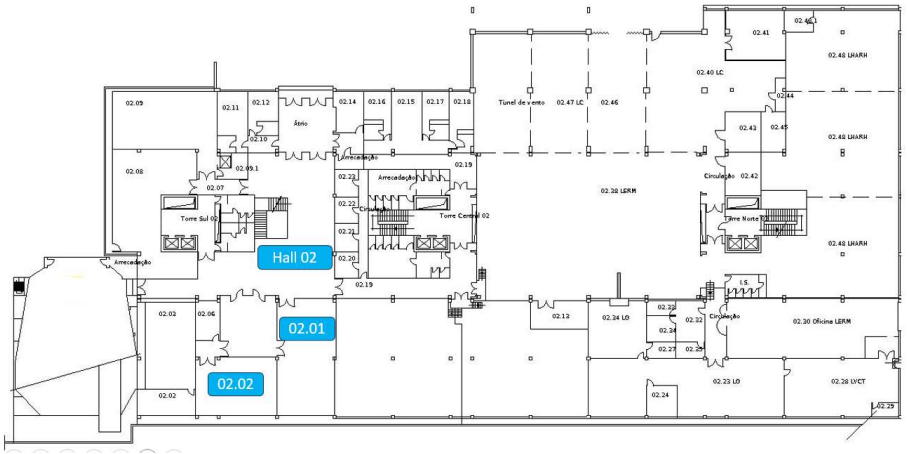
Floor 02 (-2)

Hall 02

Room 02.1 (Main Room)

Room 02.2 (Open Room)

Local – Floor 01 (-1)

Local – Floor 02 (-2)

Welcome Reception (30 August)

The Welcome Reception will take place on the 30th of September at the IST's North Garden (Jardim Norte), which is in front at the Civil Engineering Building, very close the conference location.

The Welcome Reception will start around 6:30 PM in an informal and relaxing environment, with Portuguese music and an informal cocktail! Don't forget it!

See below the map to go to this venue:

1 Pavilhão Central
2 Pavilhão de Civil
3 Pavilhão do Jardim Norte
4 Pavilhão de Mecânica I
5 Torre Norte
6 Pavilhão de Electricidade
7 Pavilhão de Informática II
8 Pavilhão de Mecânica IV
9 Pavilhão de Informática I
10 Pavilhão de Informática II
11 Pavilhão de Mecânica II
12 Pavilhão de Mecânica III
13 Cantina
14 Pavilhão da Associação de Estudanti
15 Campo de Jogos
16 Piscina
17 Pavilhão de Acção Social
18 Secção de Folhas
19 Pavilhão de Minas
20 Torre Sul
21 Pavilhão de Química
22 Pavilhão do Jardim Sul
23 Infantário
24 Pavilhão de Matemática
25 Pavilhão de Física
26 Complexo Interdisciplinar

Conference Banquet (31 August)

The Conference Banquet will take place on the 31st of August at the **Casa do Alentejo** (Rua Portas de Santo Antão, 58, 1150-268 Lisboa) at 8:00 PM.

See https://casadoalentejo.pt/ for further information.

To go from the IST (the conference location) to **Casa do Alentejo** you may have several options, see for example: https://bit.ly/3OkUYxi.
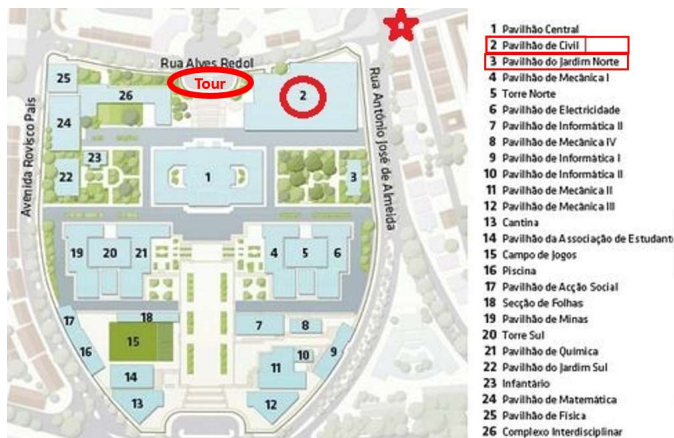
Social program TukTuk Tour (September 1)

We are pleased to announce that an optional visit by Tuktuk is available for the ISD 2023.

The visit will take place on 1 September, leaving IST at 16h00.

Tour description:

We start leaving the Rua Alves Redol roundabout (just near the IST) towards Graça, with a stop at the Senhora do Monte viewpoint and then we go down to take a walk in the Pantheon, and we continue towards Portas do Sol, Sé, Rua da Madalena, Martim Moniz, Campo Mártires da Pátria, Estefânia and we finish again at the Rua Alves Redol roundabout.

See below the map to meet at the "Tour" point to join to this event:

Wireless Internet Access

During the conference you may access the Internet via the provided wireless network using a simplified web-based authentication through network name eduroam-guest:

URL: http://wifi.ist.utl.pt/index_webauth.php
Account name: ISD2023
Password: bgLp9P

Please note that, when using this type of authentication, your application data might be transmitted in the clear unless the applications use a security layer such as TLS/SSL.

You can also opt to directly connect to eduroam (if you have access to).

Contacts

31st International Conference on Information Systems Development (ISD 2023), Lisboa, Portugal, 30/August to 1/September 2023, Lisbon, Portugal https://isd2023.inesc-id.pt/

For issues related to the registration and social events: Ask at the conference registration desk, or Madalena Almeida madalena.almeida@abreu.pt.

For further information feel free to ask any of our staff, or send an email to Manuela Sado manuela.sado@inesc-id.pt.