



**24th IEEE International Conference on
Business Informatics (IEEE CBI 2022)
June 15–17, 2022, Amsterdam, The Netherlands**



Foreword from the Organizers

The IEEE International Conference on Business Informatics (CBI) series encourages a broad understanding of Business Informatics research, and intends to promote its many different facets, theoretical foundations and experiential body of knowledge. In doing so, the CBI series has proven to be a fertile ground for research with high impact, and a hub for multidisciplinary research with contributions from Management Science, Organisation Science, Economics, Information Systems, Computer Science, and Informatics.

In this 2022 edition, we have issued a call-for-papers featuring the following tracks:

- Enterprise Modelling, Engineering and Architecture
- Data and AI Applications for Business
- Business Process Management
- Information Systems Engineering, Management and Governance
- Business Innovation and Digital Transformation
- Information Systems Risk, Security, and Resilience
- General topics

We selected 25 papers out of 68 submissions (37%) for presentation at the main conference and publication in this volume of the proceedings.

Each submission was reviewed by three Program Committee members and received a recommendation from the corresponding Track Chairs. In addition, 8 papers were selected for publication in the companion workshop proceedings and were presented at the CBI Forum along with papers accepted for the three workshops. The CBI Forum targets research in progress, novel ideas, discussion papers, etc.

In addition to the technical sessions, we have two excellent keynote speeches planned for the second and third days of the conference: Prof. Roel Wieringa (University of Twente) will talk about "Design Science Methodology for Business Informatics" and Prof. Ricardo Pérez-Castillo (University of Castilla-La Mancha) will talk about "Business Information Systems in the Quantum Era".

CBI 2022 hosts three workshops to be held in conjunction with the main conference. The 11th International Workshop on Vocabularies, Ontologies and Rules for the Enterprise (VORTE 2022) brought together researchers and practitioners to discuss the role that ontologies and business rules play in the conceptual design and implementation of next-generation enterprise solutions. It had Renata Guizzardi as a keynote speaker, who discussed her work on trustworthiness requirements. VORTE was organized by Mattia Fumagalli, Pedro Paulo Favato Barcelos, and Giancarlo Guizzardi, all of them affiliated with the Free University of Bozen-Bolzano, Italy.

The 1st IEEE International Workshop towards Decentralized Governance Design (tDGD 2022) contributed to the establishment of decentralized governance as an emerging research field. It welcomed scholars with different backgrounds to meet and discuss about computation governance, the role of law and trust on decentralized ecosystems, and other related topics. tDGD was organized by Marc Makkes, Tina van der Linden, and Fadime Kaya, all affiliated with the Vrije Universiteit Amsterdam, The Netherlands.

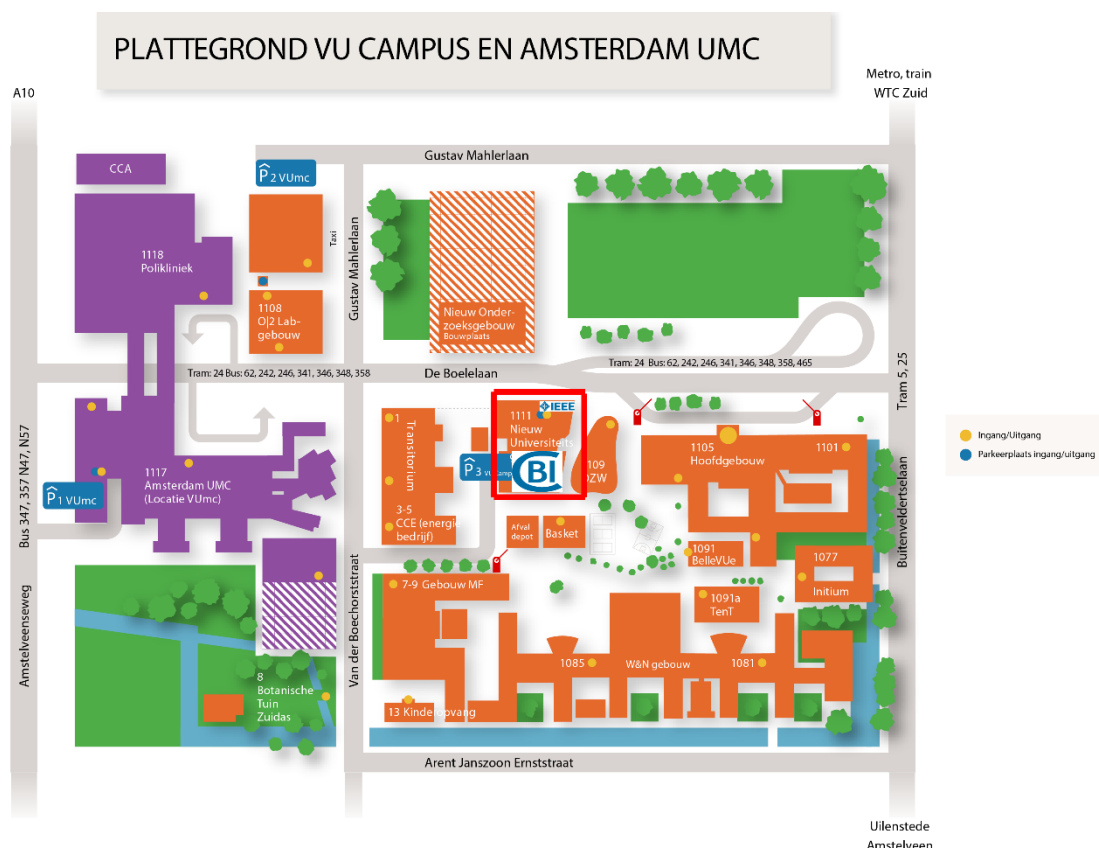
The 10th International Workshop on the Internet of Things and Smart Services (ITSS 2022) focused on advances in the theory, applications, and different approaches to using IoT and Smart Services. It was organized by Svetlana V. Maltseva, National Research University Higher School of Economics, Russia; Mikhail M. Komarov, National Research University Higher School of Economics, Russia; Kevin J Lu, Brunel Business School, UK; Raissa Uskenbayeva, Satbayev University, Kazakhstan; and Dmitry M. Nazarov, Ural State University of Economics, Russia.

The organisation of this conference was only possible through the help and commitment of many people. We would like to thank all contributing authors. We would also like to thank the program committee and track chairs that guided us through the review process. We want to thank the workshop organizers for their trust and for preparing dedicated discussion forums topically relevant to the aims of CBI 2022, thus in extenso providing a foundation for advancing the state of the art in the exiting and interdisciplinary field of business informatics. Lastly, we would like to thank the whole organising team for their excellent work.

Geert Poels, Miguel Mira da Silva (Program chairs), Sybren de Kinderen, Tiaga Prince Sales (Workshop chairs), Jaap Gordijn (General chair)

Location Overview

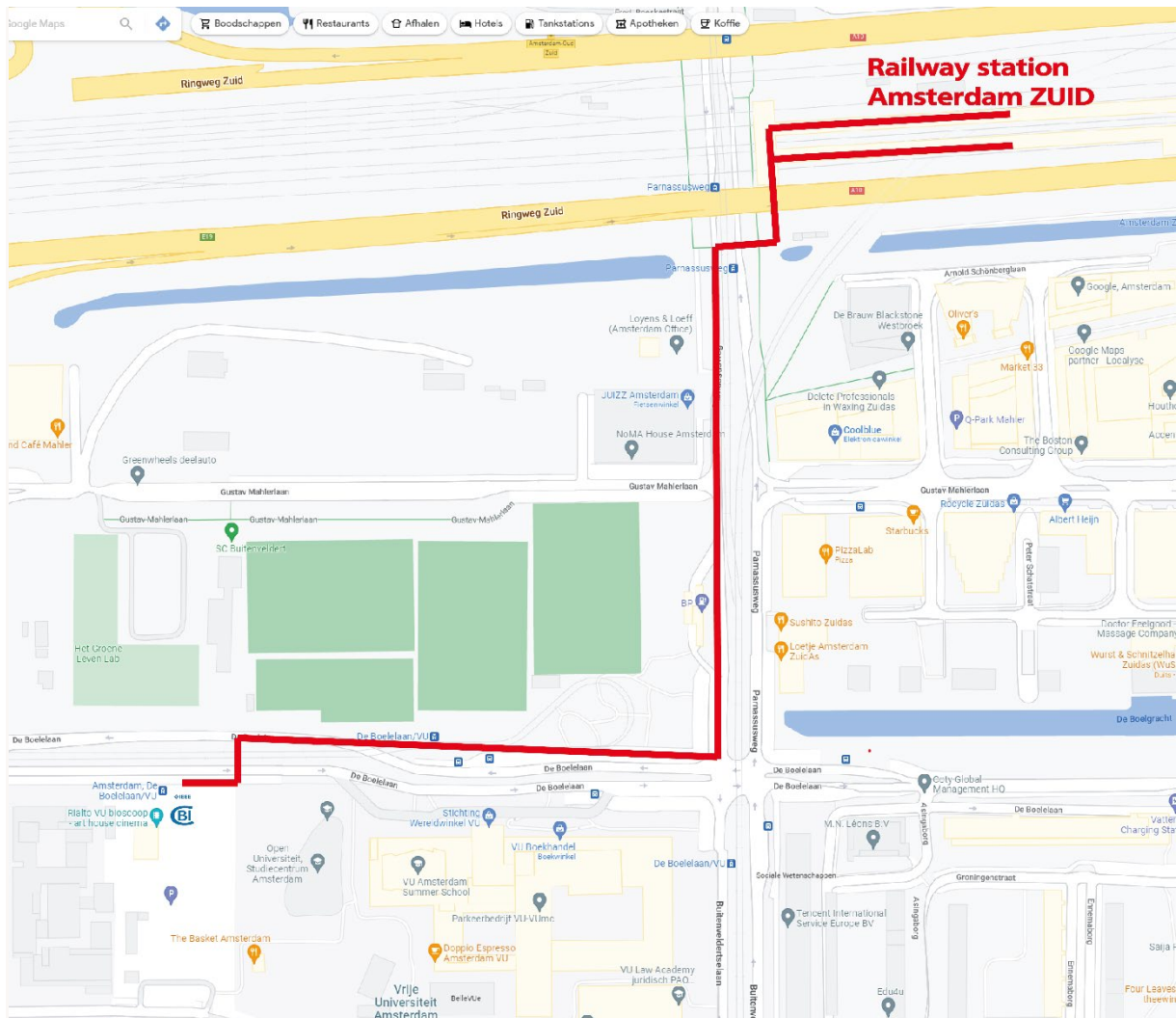
CBI 2022 is located at the Vrije Universiteit campus, NU Building, De Boelelaan 1111, 1081 HV Amsterdam, The Netherlands.



Reaching the location

From Train station Amsterdam Zuid to the VU

It's a 10-minute walk to VU Amsterdam from Station Amsterdam Zuid:



By public transport in approx. 2-4 minutes, get off at De Boelelaan / VU:

- Metro 52, Amsterdam Zuid, and walk 10 minutes
- Tram 25 direction Amstelveen Westwijk
- Bus 62 direction Haarlemmermeerstation
- Bus 242 towards Mijdrecht Centrum (Monday to Friday between 2:30 pm - 6:00 pm)
- Bus 341 towards Hoofddorp Spaarne Gasthuis
- Bus 346 direction Haarlem Station
- Bus 348 direction Uithoorn
- Bus 358 towards Kudelstaart

From Schiphol Airport to the VU

- Train to Amsterdam Zuid Station (6-7 min); see further 'From Amsterdam Zuid station'. Do **not** take the train to Amsterdam Central station, but trains with final station Utrecht, Eindhoven, Enschede, Maastricht. All these trains stop at Amsterdam Zuid (first stop).
- Bus 341 direction Amsterdam Zuid Station (25 min) - exit: De Boelelaan / VU

From the VU Schiphol to Airport

- From station Amsterdam Zuid Station (10 minutes walk), Schiphol Airport is one train stop. Take direction Hoofddorp Den Haag, Leiden or Schiphol Airport ; **Note: Ensure to arrive at least three hours before your flight leaves, because there are long queues for the security check.**

Venue Details



The conference venue is the NU Building, De Boelelaan 1111, 1081 HV Amsterdam, The Netherlands. If you enter the building and take the escalator, you will find the reception desk. Coffee and tea is

also served here. Theatre 5, for the plenary sessions (VORTE and ITSS workshops, and CBI sessions 1 and 2) is just a few steps away. If you take the stairs, you will find room 4A25, where the CBI Forum and DGD workshop will be held.

IEEE CBI 2022 full program

Wednesday June 15th, 2022

Room	Theater 5 / 2 nd floor	4A25 4 th floor
9.00-10.30	VORTE workshop Chair: Pedro Paulo Favato Barcelos <ul style="list-style-type: none"> • Keynote: The Ontology of Trust and the Design of Trustworthy Systems, <i>Renata Guizzardi</i> • Knowledge Graph Semantic Annotation and Population with Real-Time Events Data from GDEL, Marc Gallofré Ocaña, Tareq Al-Mosmi and Andreas L. Opdahl, • Interoperating Vocabularies in Multilingual Domain Data, Simone Bocca, Gabor Bella and Fausto Giunchiglia 	CBI Forum Chairs: Sybren de Kinderen and Jaap Gordijn <ul style="list-style-type: none"> • Trust and its Extensions in Digital Platform Ecosystems: Key Concepts and Issues for Future Research, <i>Sebastian Reiners</i> • KnowGraph-MDM: A Methodology for Knowledge-Graph-based Master Data Management, <i>Nour Ramzy, Sandra Durst and Martin Schreiber</i> • Business Process Redesign Initiatives with the BPR:Assessment Framework, <i>George Tsakalidis, Nikolaos Nousias, Michael Madas and Kostas Vergidis</i> • Towards an event-centric knowledge graph approach for public administration, <i>Dimitris Zeginis and Konstantinos Tarabanis</i>
10.30-11.00	Break	
11.00-12.30	ITSS workshop Chair: Kevin J Lu <ul style="list-style-type: none"> • Towards Uninterruptible Smart Home Processes, Kai Grunert • Community Embeddings with Bayesian Gaussian Mixture Model and Variational Inference, <i>Anton Begehr, Peter Panfilov</i> • Another Approach of DeFi: P2P Smart Contracts, <i>Ansel Shaidullin, Mikhail Komarov</i> 	CBI Forum Chairs: Sybren de Kinderen and Jaap Gordijn <ul style="list-style-type: none"> • Innovating Smart Product-Service Systems in Manufacturing SMEs: Current Practices, Affordances, and Constraints, <i>Daniel Heinz, Hae-Rin Park, Carina Benz and Gerhard Satzger</i> • Resource Requirements in Business Process Modelling from an Operations Management Perspective, <i>Asvin Goel and Min-Bin Lin</i> • Discovering Instance Spanning Exceptions from Process Execution Logs, <i>Florian Stertz, Karolin Winter and Stefanie Rinderle-Ma</i> • Global System for Avalanche Risk Assessment, <i>Fanny Pagnier, Frédéric</i>

*Pourraz, Hervé Verjus, Didier Coquin
and Gilles Mauris*

12.30-13.30	Lunch	
13.30-15.00	CBI session 1: Information Systems Risk, Security and Resilience Track Chair: Jaap Gordijn Resilience Track <ul style="list-style-type: none"> • SecRiskAI: a Machine Learning-based Approach for Cybersecurity Risk Prediction in Businesses, <i>Muriel Franco, Erion Sula, Alberto Huertas, Eder Scheid, Lisandro Granville and Burkhard Stiller</i> • The Sociotechnical Digital Twin: On the Gap Between Social and Technical Feasibility, <i>Balbir Barn</i> • Efficient Verification of Process Models Supporting Modifications of Data Values, <i>Elaheh Ordoni, Jutta Mülle, Kuan Yang and Klemens Böhm</i> 	DGD workshop session 1 Chair: Marc Makkes <ul style="list-style-type: none"> • <i>Keynote: Thibault Schrepel</i> • <i>Decentralized Governance inspired by Corporate Governance, Hans Koning and Tina van der Linden</i> • <i>Smart Legal Contracts & Smarter Dispute Resolution, Ece Su Ustun and Melek Yuce</i>
15.00-15.30	Break	
15.30-17.00	CBI session 2 Data and AI Application for Business Track Chair: Jens Gulden <ul style="list-style-type: none"> • Data analytics and SMEs: how maturity improves performance, <i>Jeroen Baijens, Remko Helms and Laury Bollen</i> • No Time Like the Present: Effects of Language Change on Automated Comment Moderation, <i>Lennart Justen, Kilian Müller, Marco Niemann and Jörg Becker</i> • Developing a Generic Predictive Computational Model using Semantic data Pre-Processing with Machine Learning Techniques and its application for Stock Market 	DGD workshop session 2 Chair: Tina van der Linden <ul style="list-style-type: none"> • Rethinking the Rule and Role of Law in Decentralized Finance, <i>Andre Wang</i> • Easing the use of smart contracts through model-based engineering, <i>Cristian Gómez Macías, Juan Manuel Vara, Francisco Javier Perez Blanco and Esperanza Marcos</i> • Watch the Gap: Making code more intelligible to users without sacrificing decentralization?, <i>Simona Ramos and Mannan Morshed</i>

	Prediction Purposes, <i>Natalia Yerashenia, Alexander Bolotov and David Chan</i>
17.00-19.00	Welcome reception (VU, NU building, 2nd floor)

Thursday June 16th, 2022

Room	Theater 5 / 2 nd floor
9.00-9.15	Opening
9.15-10.30	Keynote 1: Business Information Systems in the Quantum Era – Ricardo Pérez-Castillo Chair: Geert Poels
10.30-11.00	Break
11.00-12.30	CBI session 3: Data and AI Application for Business Track II Chair: Geert Poels <ul style="list-style-type: none"> Retail sales forecasting for a Brazilian supermarket chain: an empirical assessment, <i>Fernanda Monteiro De Almeida, Allan de Medeiros Martins, Marcus Alexandre Nunes and Leonardo Bezerra</i> Supermarket customer segmentation: a case study in a large Brazilian retail chain, <i>Wellerson Viana de Oliveira, Daniel Sabino Amorim de Araújo and Leonardo Bezerra</i> Challenges of pricing data assets: A call to take up!, <i>Wolfgang Badewitz, Christoph Hengesbach and Christof Weinhardt</i> An Adaptable Framework for Entity Matching Model Selection in Business Enterprises, <i>Alex Boyko, Siamak Farshidi and Zhiming Zhao</i>
12.30-13.30	Lunch
13.30-15.00	CBI session 4: Enterprise Modelling, Engineering and Architecture Track Chair: Maria-Eugenia Iacob <ul style="list-style-type: none"> ServML – A Domain-Specific Modeling Language as an Extension of SysML to Model Smart Service Systems, <i>Emanuel Marx</i> Reconsidering the Notion of “Operating Model” in the context of Innovation and Transformation. A Systematic Literature Review, <i>Bart van der Heijden, Stijn Viaene and Amy Van Looy</i> Towards a Reference Enterprise Architecture to enforce Digital Sovereignty in International Data Spaces, <i>Danniar Reza Firdausy, Patrício de Alencar Silva, Marten van Sinderen and Maria-Eugenia Iacob</i> Understanding Interdependencies among Fog System Characteristics, <i>Maximilian Blume, Sebastian Lins and Ali Sunyaev</i>
15.00-15.30	Break
15.30-17.00	CBI session 5: Information Systems Engineering, Management and Governance Track I Chair: Erik Proper <ul style="list-style-type: none"> IT Project Portfolio Assessment criteria: development and validation of a reference model, <i>Ruud Wissenburg, Rob Kusters, Harry Martin and Joyve Evers-Wagemakers</i> IT Business Value Measurement and Communication: A Conceptual Framework, <i>Tobias Held and Markus Westner</i>

	<ul style="list-style-type: none"> Perceived Challenges in Benefits Management – A Study of Public Sector Information Systems Engineering Projects, <i>Sinan Sigurd Tanilkan and Jo Erskine Hannay</i>
19.00-21.30	Conference dinner

Friday June 17th, 2022

Room	Theater 5 / 2 nd floor
9.00-10.30	Keynote 2: Design Science Methodology for Business Informatics – Roel Wieringa Chair: Miguel Mira da Silva
10.30-11.00	Break
11.00-12.30	CBI session 6: Information Systems Engineering, Management and Governance Track II Chair: Kostas Vergidis <ul style="list-style-type: none"> Requirements for DataOps to foster Dynamic Capabilities in Organizations – A mixed methods approach, <i>Inan Gür, Frederik Möller, Marius Hupperz, Dilara Uzun and Boris Otto</i> How EA Information Drives Digital Transformation: A Multiple Case Study and Framework, <i>Frank Grave, Rogier Van de Wetering and Rob Kusters</i> A Unified Process Model of Information Systems Certification Internalization, <i>Philipp Danylak, Sebastian Lins, Malte Greulich and Ali Sunyaev</i> Drivers and inhibitors of low code development platform adoption, <i>Sebastian Kaess, Susanne Strahringer and Markus Westner</i>
12.30-13.30	Lunch
13.30-15.00	CBI session 7: Business Innovation and Digital Transformation Track Chair: Miguel Mira da Silva <ul style="list-style-type: none"> Describing Digital IT Consulting Services: The DITCOS Ontology Proposal and its Evaluation, <i>Meikel Bode, Maya Daneva and Marten van Sinderen</i> Industry 4.0 Maintenance: An Examination Of The Readiness Of Germany's Industrial Sector, <i>Jonas Wanner, Lukas-Valentin Herm, Kevin Fuchs, Christian Janiesch and Axel Winkelmann</i> Design of an Idea Evaluation Method for SMEs Involving External Support Units, <i>Andreas Hermann, Torsten Gollhardt and Jörg Becker</i> Algorithmic Decision Making and Model Explainability Preferences in the Insurance Industry: A Delphi Study, <i>Eric Schotman and Deniz Iren</i>
15.00-15.30	Closing

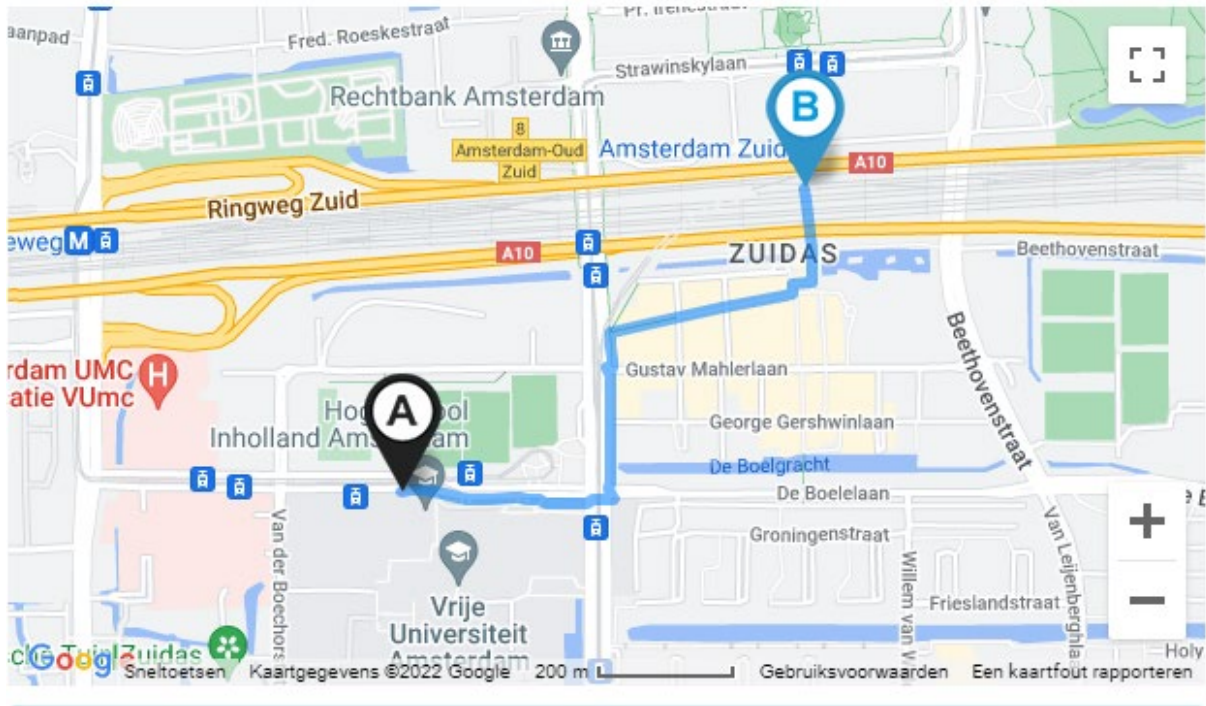
Social Events

Welcome Reception on Wednesday, June 15th, 2022. The welcome reception will be held in the VU NU building, 2nd floor, near to the registration desk.

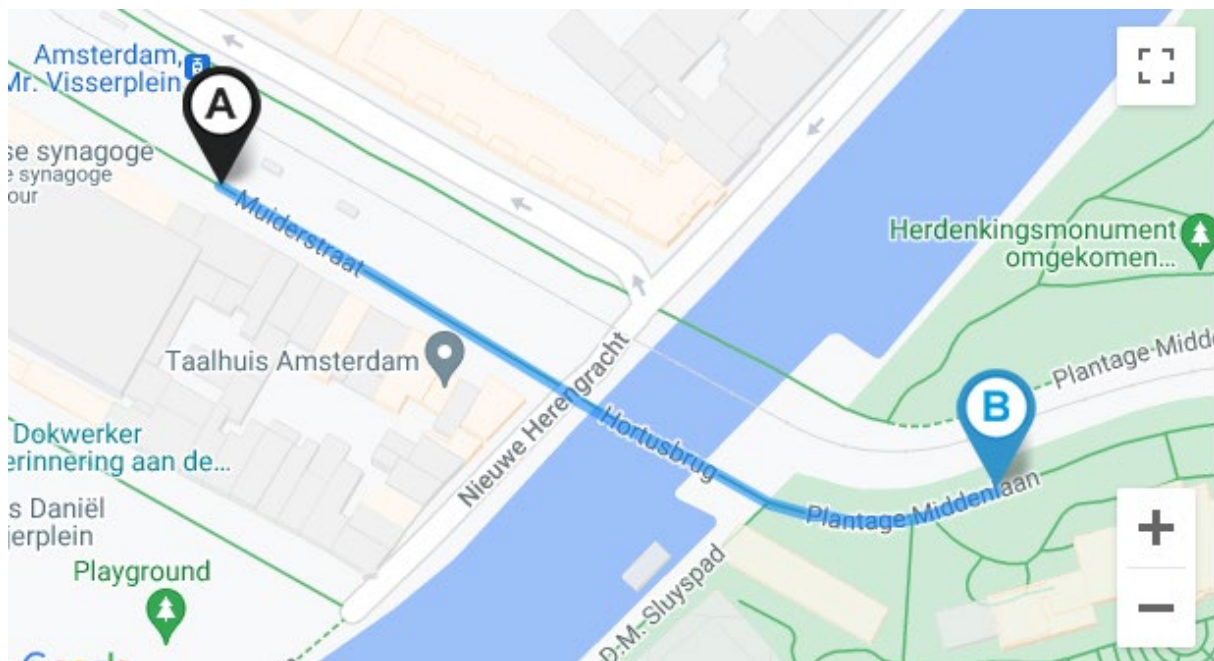
Conference Dinner on Thursday, June 16th, 2022. The dinner is at *the Hortus Botanicus Amsterdam*, Plantage Middenlaan 2a, 1018 DD Amsterdam, +31 20-7025410. The Hortus can be reached by metro/tram. In your conference bag you will find a public transportation ticket valid for 2 x 1 hour.

Instructions to reach the Hortus from the VU

1. Walk to metro station at station Amsterdam Zuid (about 10 minutes)



2. Take metro 52, direction Noord
3. Get out at station Rokin
4. Walk to the tram stop nearby
5. Take tram, direction Flevopark
6. Get out at tram stop Mr. Visserplein
7. Walk to the Hortus



Keynotes

Thursday June 16th, 2022. 9.15

Business Information Systems in the Quantum Era – Ricardo Pérez-Castillo

Quantum computing is destined to revolutionise how society will solve computationally challenging problems, i.e., those problems that cannot be addressed in a reasonable time frame. Quantum computing is, therefore, gaining increasing relevance due to its promising applications in many business domains. To such extent, that many experts consider this as the latest shiny new thing. At this point, most IT managers therefore wonder if quantum computing should be integrated in their information systems and, a more important question, how to do it. To succeed in this integration, quantum software is also required. Accordingly, quantum software engineering has become crucial, in that it attempts to apply or adapt existing methods and techniques (or propose new ones) for the analysis, design, coding, and testing of quantum information systems as well as playing a key role in ensuring quality in large-scale productions. In this talk, Ricardo will introduce landscapes and horizons on quantum computing and guide us through the area of quantum software engineering to design and build classical-quantum information systems.



Ricardo Pérez-Castillo holds the Ph.D. degree in Computer Science from the University of Castilla-La Mancha (UCLM), Spain. He is currently an associate professor at the IT & Social Sciences School of Talavera de la Reina at UCLM, where he is also the Academic Director at Vice-Rectorate of postgraduate programs and lifelong learning. His research and lecture career have been made compatible with professional jobs at some consultancy companies such as Indra, itestra GmbH and Deloitte, where he was able to conduct technological transfer projects. His main research contributions and technology transfer has been made in the field of software modernization and reengineering of legacy information systems. In 2018 he joined as senior research to the aQuantum Joint Research Unit (Alhambra IT-UCLM), and his research focused on modernization from/to hybrid (classical-quantum) information systems. He is the co-author or more than 30 articles and 50 communications in conferences, as well as participated in various books. He is also a promoter and co-author of The Talavera Manifesto for Quantum Software Engineering and Programming.

Friday June 17th, 2022, 9.00

Design Science Methodology for Business Informatics – Roel Wieringa

Business informatics studies and designs information technology in organizations. The mixed sociotechnical nature of its topic imposes constraints on its research methodology. Technical systems cannot be studied and designed in the same way as social systems. And the integration of technical and social systems poses special problems of its own. In this talk I review the generic methodology of design science, illustrate how these are applied in the CBI conference, and discuss how business informatics can develop explanatory and generalizable theories.



Roel Wieringa is emeritus Chair of Information Systems at the University of Twente, The Netherlands. His research topics ranged from formal specification, conceptual modeling, requirements engineering and risk analysis of information systems. In the past 20 years his research also included research methodology for information systems engineering and he published a book about this, Design Science Methodology for Information Systems and Software Engineering (Springer, 2014). Today, Roel helps companies design their digital ecosystem (www.thevalueengineers.nl), and he is very busy writing blogs about business models, business ecosystems, and the networked society.