



The 43rd International Conference on Conceptual Modeling 2024

Conceptual Modeling, AI, and Beyond

OCTOBER 28–31, 2024 | PITTSBURGH, PENNSYLVANIA, USA

Conference Program



The 43rd International Conference on Conceptual Modeling

The 43rd International Conference on Conceptual Modeling (ER 2024) is the main international forum for discussing the state of the art, emerging issues, and future challenges in research and practice on conceptual modeling.

Topics of interest span the entire spectrum of conceptual modeling, including research and practice in areas such as theories of concepts and ontologies, techniques

for transforming conceptual models into effective implementations, and methods and tools for developing and communicating conceptual models.

ER 2024 will be held in Pittsburgh, Pennsylvania, United States, hosted by Carnegie Mellon University's Software Engineering Institute on October 28–31, 2024.

Sponsors

Carnegie Mellon University
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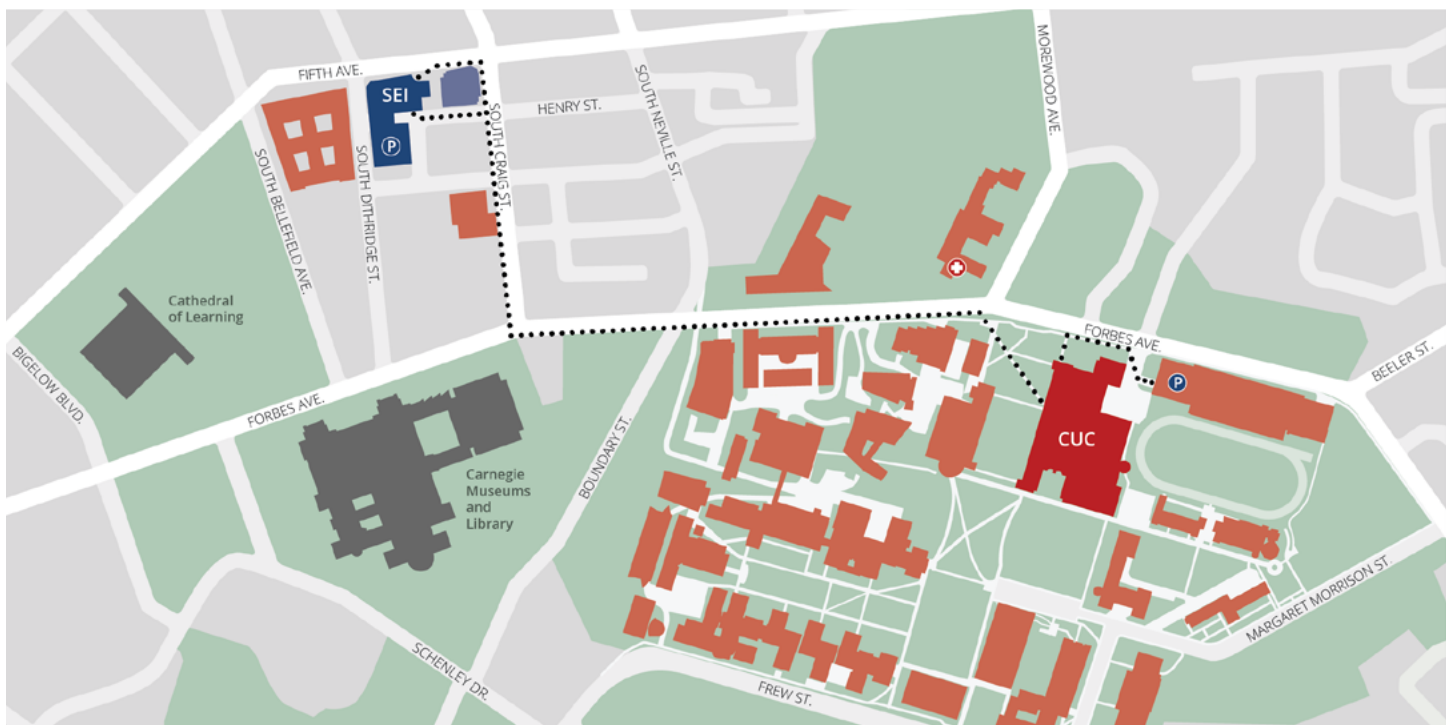


Walking Map between SEI and Carnegie Mellon University Campus

ER 2024 conference co-located workshops will be held on the Carnegie Mellon University campus at the Jared L. Cohon University Center in the Rangos Ballrooms and McKenna and Wright rooms, which are located on the second floor.

ER 2024 conference tutorials and the 17th iStar Workshop will be held at the Software Engineering Institute, 4500 Fifth Avenue, Pittsburgh, PA 15213.

Registration check-in will begin at 8:00 a.m. in each location, with the workshops and tutorials beginning at 9:00 a.m. There will be breakfast, lunch, and breaks served at both locations. You are free to walk between each location to attend the workshop or tutorial of your choice.



Program Outline

Monday, October 28

Carnegie Mellon University Campus—Jared L. Cohon University Center, 2nd Floor

	Rangos Ballroom 2	Rangos Ballroom 3	McKenna Room	Wright Room
8:00 a.m.	Breakfast Available—Rangos Ballroom 1			
9:00 a.m.	Workshop AISA + AIMM	Workshop CMLS	Workshop LLM4Modeling	Workshop JUSMOD
11:00 a.m.	Morning Break—Rangos Ballroom 1			
11:30 a.m.	Workshop AISA + AIMM	Workshop CMLS	Workshop LLM4Modeling	Workshop JUSMOD
1:00 p.m.	Lunch—Rangos Ballroom 1			
2:00 p.m.	Workshop AISA + AIMM	Workshop EmpER+QUAMES		
3:30 p.m.	Afternoon Break—Rangos Ballroom 1			
4:00 p.m.	Workshop AISA + AIMM	Workshop EmpER+QUAMES		
5:30 p.m.	Adjourn			

Monday, October 28

Software Engineering Institute—4500 Fifth Avenue

	Training Room 1201	Training Room 1202
8:00 a.m.	Breakfast Available—SEIber Café	
9:00 a.m.	Tutorial Data Fabric: Technologies, Modeling and Applications	The 17th International i* Workshop (iStar'24)
11:00 a.m.	Morning Break—Lounge area outside training rooms	
11:30 a.m.		iStar'24 Workshop
1:00 p.m.	Lunch—SEIber Café	
2:00 p.m.	Tutorial Spatial Conceptual Modeling: MM-AR Metamodeling Platform and Augmented Reality Workflow Modeling Language	iStar'24 Workshop
3:30 p.m.	Afternoon Break—Lounge area outside training rooms	
4:00 p.m.	Tutorial A Deep Dive Into Benchmarking Ontology Reasoners	
5:30 p.m.	Adjourn	

Tuesday, October 29

Software Engineering Institute—4500 Fifth Avenue

	Jordan Auditorium	Training Room 1201	Training Room 1202
8:00 a.m.	Breakfast—SEIber Café		
9:00 a.m.	Opening General Chair: Hasan Yasar, CMU SEI		
9:30 a.m.	Keynote: Nicola Guarino Chair: Hyoil Han		
11:00 a.m.	Morning Break		
11:30 a.m.	ER 2024 Papers Advanced Modeling Languages Chair: Hyoil Han, Illinois State University		
1:00 p.m.	Lunch—SEIber Café and Training Room Area		
2:30 p.m.	ER 2024 Papers Ontological Modeling Chair: Roman Lukyanenko, University of Virginia	Panel Will LLMs Transform Conceptual Modeling as We Know It?	
4:00 p.m.	Afternoon Break		
4:30 p.m.	ER 2024 Papers Domain and Goal Modeling Chair: Elda Paja, IT University of Copenhagen		Special Topic AI Engineering for Context-Driven AI System Design Robert Beveridge, CMU SEI
6:00 p.m.	ER 2024 Welcome Reception, SEI Building (6:00–7:30 p.m.)		

Wednesday, October 30

Software Engineering Institute—4500 Fifth Avenue

	Jordan Auditorium	SEI Training Room 1201	SEI Training Room 1202
8:00 a.m.	Breakfast—SEIber Café		
9:00 a.m.	Keynote: Pradeep Ravikumar Chair: Wolfgang Maass		
10:30 a.m.	Morning Break		
11:00 a.m.	ER 2024 Papers Language Models and Conceptual Modeling Chair: Veda Storey, Georgia State University	ER Forum IoT and Genomics Chair: David Shepard, CMU SEI	Product Demo
12:30 p.m.	Lunch—SEIber Café and Training Room Area		
2:00 p.m.	Keynote Panel Theme: Conceptual Modeling, AI & Beyond Moderators: Wolfgang Maass and Hyoil Han		
3:30 p.m.	Afternoon Break		
4:00 p.m.	ER 2024 Papers Applications of Conceptual Modeling Chair: Oscar Pastor, Universidad Politécnica de Valencia	Posters & Demo Chair: Sergio de Cesare, University of Westminster	Special Topic Analysis Contracts for AADL Models Aaron Greenhouse, CMU SEI
5:30 p.m.	Board buses to Conference Dinner Cruise at SEI entrance on Fifth Avenue		
5:45 p.m.	Buses depart for Conference Dinner Cruise at approximately 5:45 p.m.		
7:00 p.m.	Conference Dinner Cruise—ship departs at 7:00 p.m. and arrives back at dock at approximately 9:30 p.m. Buses depart dock at 9:45 p.m. and arrive back at the SEI at approximately 10:15 p.m.		

Thursday, October 31

Software Engineering Institute—4500 Fifth Avenue

	Jordan Auditorium	SEI Training Room 1201	SEI Training Room 1202
8:00 a.m.	Breakfast—SEIber Café		
9:00 a.m.	Keynote: Paul Nielsen Chair: Hasan Yasar		
10:30 a.m.	Morning Break		
11:00 a.m.	ER 2024 Papers Process Modeling Chair: Dominik Bork, Vienna University of Technology	ER Forum Ontologies and Analytics Chair: Doug Reynolds, CMU SEI	Special Topic Bootstrapping Secure Pipelines with Development Containers! David Shepard and Jeffrey Hamed, CMU SEI
1:00 p.m.	Lunch—SEIber Café and Training Room Area		
2:00 p.m.	ER2024 Papers Applications of Conceptual Modeling Chair: Carlos Ordonez, University of Houston	ER Forum AI and Robots Chair: Luiz Antunes, CMU SEI	
3:30 p.m.	Short Break—everyone please return to the Jordan Auditorium		
3:45 p.m.	Closing and Adjourn		

Keynotes



Nicola Guarino

*Research Associate (Retired)
at the Institute of Cognitive
Sciences and Technologies
of the Italian National
Research Council (ISTC-CNR)*

be shared and integrated, conceptual models need to be explained in terms of their ontological commitments to the world. I will distinguish therefore between ordinary conceptual models, which typically describe a domain in terms of its relevant entities and relationships, and have therefore a merely descriptive role, and explanatory conceptual models, which aim at explaining why those relationships hold. I will propose then a systematic approach to expand an ordinary model at two different levels of explanatory detail, based on the ontological notion of truth-making.

OCTOBER 29, 9:30 A.M.

Towards Explanatory
Conceptual Models:
A Systematic Approach
Based on Ontological
Analysis

**Chair: Hyoil Han,
Illinois State University**

A widespread requirement for conceptual models is that they need to have some kind of formal semantics in order to be used, and especially in order to be shared. In this talk I will defend that just having a formal semantics is not enough: in order to

Nicola Guarino is a retired research associate at the Institute of Cognitive Sciences and Technologies of the Italian National Research Council (ISTC-CNR), and former director of the ISTC-CNR Laboratory for Applied Ontology (LOA) based in Trento.

He has been playing a leading role in the ontology field, developing a strongly interdisciplinary approach that combines together Computer Science, Philosophy, and Linguistics. Among the most well-known results of his lab, the OntoClean methodology and the DOLCE foundational ontology. He has been founder and co-editor-in-chief of the Applied Ontology journal, founder and former president of the International Association for Ontology and its Applications (IAOA), and editorial board member of International Journal of Semantic Web and Information Systems and Journal of Data Semantics. He is also ER fellow and fellow of the European Association for Artificial Intelligence (EurAI). Recently he received the Peter P. Chen award for outstanding contributions to the field of conceptual modeling.

On the theoretical side, his current research interests are focusing on the ontological foundations of knowledge representation and conceptual modeling and specifically the ontology of events, processes, and relationships, while on the application side he has been focusing on enterprise modeling, ontology of economics, and manufacturing. He is also interested in leveraging on ontological analysis and semantic technologies to improve the cognitive transparency, the social accountability and the participatory governance of artificial intelligence artifacts.

His publications have 30,000+ citations, with H-index=54 according to Google Scholar.



Pradeep Ravikumar

*Carnegie Mellon University,
Professor in the Machine
Learning Department,
School of Computer Science*

datasets is not meaningful. For instance, why should numeric times series of stock prices have anything to do with time series comprising the vital signs of an ICU patient? For such settings, we propose the class of wood wide models.

The wood wide web is often used to describe an underground network of fungal threads that connect many trees and plants together, which stands in contrast to a large concrete foundation on top of which we might build specialized buildings. Analogously, in contrast to a single foundation model upon which one might build specialized models, we have many smaller wood wide models that all borrow subtler ingredients from each other. But to be able to share nutrients from the wood wide web, trees need a special

OCTOBER 30, 9:00 A.M.

Wood Wide Models

**Chair: Wolfgang Maass,
Saarland University**

Foundation models are monolithic models that are trained on a broad set of data, and which are then in principle fine-tuned to various specific tasks. But they are ill-suited to many heterogeneous settings, for instance numeric tabular data, or numeric time-series data, where training a single monolithic model over a large collection of such

root based architecture that can connect to these fungal threads. Accordingly, to operationalize wood wide models, we develop a novel neuro-symbolic architecture, that we term “neuro-causal”, that uses a synthesis of deep neural models and causal graphical models to automatically infer higher level symbolic information from lower level “raw features”, while also allowing for rich relationships among the symbolic variables. Neuro-causal models retain the flexibility of modern deep neural network architectures while simultaneously capturing statistical semantics such as identifiability and causality, which are important to discuss ideal, target representations and their tradeoffs. But most interestingly, these can further form a web of wood wide models when they borrow in part from a shared conceptual ontology, as well as causal mechanisms. We provide conditions under which this entire architecture can be recovered uniquely. We also discuss efficient algorithms and provide experiments illustrating the algorithms in practice.

Dr. Pradeep Ravikumar is a Professor in the Machine Learning Department, School of Computer Science at Carnegie Mellon University.

He is a Sloan Fellow, a Siebel Scholar, a recipient of the NSF CAREER Award, and a co-editor-chief of the Journal of Machine Learning Research.

Ravikumar was previously the Associate Editor-in-Chief for IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI).

His recent research interests are in neuro-symbolic AI, combining statistical machine learning, and symbolic and causal learning.

OCTOBER 30, 2:00 P.M.

Keynote Panel: Conceptual Modeling,
AI & Beyond

Nicola Guarini, *Institute of Cognitive Sciences and Technologies
of the Italian National Research Council (retired)*

Pradeep Ravikumar, *Carnegie Mellon University*

Paul Nielsen, *Software Engineering Institute*

Moderators

Wolfgang Maass, *Saarland University*

Hyoil Han, *Illinois State University*



Paul Nielsen

*Carnegie Mellon University
Software Engineering
Institute (CMU SEI),
Director and CEO*

OCTOBER 31, 9:00 A.M.

New Technology,
Same Basics

Chair: Hasan Yasar, CMU SEI

Who hasn't dabbled with popular Artificial Intelligence (AI) Large Language Models such as Gemini or ChatGPT, either as part of a project or just to see what it might produce? The popularity and idea that AI can transform human effort is everywhere in our scientific and industrial communities. AI clearly is a growing business driver.

And AI has value for

conceptual modelling. For instance, natural language processing can help in identifying the relational data of entities and generative AI and inverse relationship approaches can help create deeply insightful entity relationship (ER) diagrams and models for the systems. To get the usable, reliable AI systems people want, designers and developers need to learn how to repeatably build sound AI systems. With those systems, we will see improvements in areas such as modeling (e.g., digital twins for smart cyber-physical systems), security engineering to defend large-scale systems, and the use of modern software practices (e.g., in developing threat models for DevSecOps).

Building sound AI systems repeatably, we need to pursue these system qualities: robust, secure, scalable, and human centered. Those quality attributes form the basis for forming an AI Engineering discipline. There is much work to do to create and implement the AI Engineering discipline in areas such as making a commitment to moving R&D in practice to get ahead of the galloping use of AI tools, recognition that we cannot abandon good practices such as practicing

cyber hygiene and the use of modern software engineering practices, and the creation of a new concept of the digital-engineering-aware workforce able to interact effectively with AI models.

Dr. Paul D. Nielsen is the Director and Chief Executive Officer of the Carnegie Mellon University Software Engineering Institute (CMU SEI), a U.S. Department of Defense federally funded research and development center (FFRDC). The SEI is a global leader in advancing software engineering, cybersecurity, and the engineering of artificial intelligence systems. Since joining the SEI in 2004, Nielsen has overseen the growth of SEI to an organization with more than 600 men and women and operating revenues of \$150 million annually. Nielsen has encouraged expansions of the SEI's cyber portfolio, an emphasis on model-based software engineering and DevSecOps, a better alignment of software engineering and systems engineering and new initiatives in the engineering of AI systems.

Prior to joining the SEI in 2004, Nielsen served in the U.S. Air Force, retiring as a major general and commander of the Air Force Research Laboratory. Nielsen is a member of the U.S. National Academy of Engineering (NAE) and a fellow of the American Institute of Aeronautics and Astronautics (AIAA), the Institute of Electrical and Electronic Engineers (IEEE), and the International Council on Systems Engineering (INCOSE).

Nielsen earned a BS in Physics from the US Air Force Academy, an MBA from the University of New Mexico, and an MS and PhD in Applied Science for the University of California, Davis. He is a 1989 graduate of the National War College. He has served on several boards and advisory groups including the Hertz Foundation, AIAA, AFCEA. PAR Technology Corporation, the AF Scientific Advisory Board, and the Defense Science Board. Nielsen has been a strong proponent of science and technology throughout his career, inside and outside of government, but most importantly, he is a strong proponent of the dedicated women and men involved in the global science and engineering communities.

ER Papers

TUESDAY, OCTOBER 29

11:30 a.m.—Advanced Modeling Languages

Chair: Hyoil Han, Illinois State University

Multi-Faceted Evaluation of Modeling Languages for Augmented Reality Applications—The Case of ARWFML

Fabian Muff and Hans-Georg Fill

Application of the Tree-of-Thoughts Framework to LLM-Based Domain Modeling

Jonathan Silva, Qin Ma, Jordi Cabot, Pierre Kelsen, and Henderik Proper

ECQL: Towards Succinct and Extensible Modeling of Multi-Model Query Results

Gengyuan Shi, Chaokun Wang, and Yabin Liu

2:30 p.m.—Ontological Modeling

Chair: Roman Lukyanenko, University of Virginia

An Analysis of the Semantic Foundation of KerML and SysML

João Paulo Almeida, Luis Ferreira Pires, Giancarlo Guizzardi, and Gerd Wagner

Portions of Matter and their Existential Events: An Ontology-Based Conceptual Model

Lucas Vieira, Fabricio H. Rodrigues, and Mara Abel

Model-Driven Design and Generation of Training Simulators for Reinforcement Learning

Sotirios Liaskos, Shakil Khan, John Mylopoulos, and Reza Golipour

2:30 p.m.—Panel: Will LLMs Transform Conceptual Modeling as We Know It?

Chairs: Oscar Pastor, Universidad Politecnica di Valencia
Veda Storey, Georgia State University

Panelists: Giancarlo Guizzardi, Steve Liddle, Wolfgang Maass, Jeff Parsons, Jolita Ralyté, and Maribel Santos

Growth of LLMs affects software and information systems engineering practice in a way that many researchers consider disruptive. Is it just “yet another hype”? Or is it really a disruptive technology that will affect how modeling is used in those disciplines? Under this “LLM wave”, there are many relevant ongoing discussions on how LLMs can influence systems engineering in general. But in the ER context, we want to emphasize in this discussion the conceptual modeling (CM) dimension, taking CM as the main application domain for LLMs, and the value that LLMs can bring to it.

This panel will discuss how LLMs can influence CM practice. In particular, we want to know CM experts’ opinions on concrete CM questions such as (1) how using LLMs can affect the human cognition process, not acting anymore as the mediator between the conceptual model-based documentation and the engineering system, or (2) how a CM-based prompt engineering process can provide a new opportunity to make “conceptual model programming” feasible, or (3) how LLMs can shift the role of conceptual modeling practice in software engineering and the way CMs are involved in engineering processes, or (4) wondering if the CM community can already delegate abstraction and design tasks to LLM-based products.

5:00 p.m.—Domain and Goal Modeling

Chair: Elda Paja, IT University of Copenhagen

Generating Secure Workflow Designs from Requirements Goal Models Using Patterns

Sotirios Liaskos, Ibrahim Jaouhar, Syed Muhammad Danish, and Shakil Khan

Modeling and Reasoning About Explanation Requirements using Goal Models

Sotirios Liaskos, John Mylopoulos, Alex Borgida, and Shakil Khan

Enhancing Domain Modeling with Pre-trained Large Language Models: An Automated Assistant for Domain Modelers

Dominik Prokop, Stepan Stenchlak, Petr Skoda, Jakub Klimek, and Martin Necasky

WEDNESDAY, OCTOBER 30

11:00 a.m.—Language Models and Conceptual Modeling

Chair: Veda Storey, Georgia State University

How Are LLMs Used for Conceptual Modeling?
An Exploratory Study on Interaction Behavior and
User Perception

Syed Juned Ali, Iris Reinhartz-Berger, and Dominik Bork

Small, Medium, and Large Language Models for
Text-to-SQL

Aiko Oliveira, Eduardo Nascimento, Gustavo Coelho,
Caio Viktor Avila, Lucas Feijó, Yenier Izquierdo, Grettel Garcia,
João Pinheiro, Luiz Andre P. Paes Leme, Melissa Lemos, and
Marco A. Casanova

Establishing Traceability between Natural
Language Requirements and Software Artifacts by
Combining RAG and LLMs

Syed Juned Ali, Varun Naganathan, and Dominik Bork

4:00 p.m.—Applications of Conceptual Modeling

Chair: Carlos Ordonez, University of Houston

Conceptual Framework for Designing
Hippocratic APIs

Sarmad Rezayat, Gerrit Burmester, Hui Ma, and
Sven Hartmann

SAQI: An Ontology-Based Knowledge Graph
Platform for Social Air Quality Index

Saad Ahmad, Sudhir Attri, Ruchi Dwivedi, Muzamil Yaqoob,
Aasim Khan, Praveen Priyadarshi, and Raghava Mutharaju

GenACT: An Ontology based Temporal Web
Data Generator

Gunjan Singh, Udit Arora, Shashikant Kumar,
Riccardo Tommasini, Pieter Bonte, Sumit Bhatia, and
Raghava Mutharaju

THURSDAY, OCTOBER 31

11:00 a.m.—Process Modeling

Chair: Dominik Bork, Vienna University of Technology

Enhancing BERT Performance: Multi-Teacher
Adversarial Distillation with Clean and Robust
Guidance

Xunjin Wu, Jingfei Chang, Wen Cheng, Yunxiang Wu, Yong Li,
and Lingfang Zeng

On the Task-specific Effects of Fragmentation in
Modular Process Models

Amine Abbad Andaloussi, Clemens Schreiber, and
Barbara Weber

A Universal Prompting Strategy for Extracting
Process Model Information from Natural Language
Text using Large Language Models

Julian Neuberger, Lars Ackermann, Han van der Aa, and
Stefan Jablonski

Agent System Event Data: Concepts, Dimensions,
Applications

Qingtian Shen, Artem Polyvyanny, Nir Lipovetzky, and
Timotheus Kampik

2:00 p.m.—Applications of Conceptual Modeling

Chair: Jose Morales, CMU SEI

The Role-Artifact-Function Framework for
Understanding Digital Identity Models

Frederico Schardong and Ricardo Custodio

Ontological Foundations of Resilience

Pedro Paulo Favato Barcelos, Rodrigo F. Calhau, Italo Oliveira,
Tiago Prince Sales, Frederik Gailly, Geert Poels, and
Giancarlo Guizzardi

Conceptual Modelling Method for Digital Twins

Emilio Carrion, Oscar Pastor, and Pedro Valderas

WEDNESDAY, OCTOBER 30

11:00 a.m.—IoT and Genomics

Chair: David Shepard, CMU SEI

Extending the SensorThings API Data Model—
Improving Interoperability and Use Case Flexibility
in IoT

Arnold F. Arz von Straussenburg, Timon T. Aldenhoff, and
Dennis M. Riehle

A Conceptual Approach to Using Relevant Patterns
in Genomic Data Analysis

Mireia Costa, Alberto García S., Anna Bernasconi, Stefano Ceri,
and Oscar Pastor

SISO: A Conceptual Model-Based Method for
Variant Interpretation Systematization

Mireia Costa, Alberto García, Ana León, and Oscar Pastor

THURSDAY, OCTOBER 31

11:00 a.m.—Ontologies and Analytics

Chair: Doug Reynolds, CMU SEI

Towards a Conceptual Model for FAIR
Metadata Schemas

Filipi Miranda Soares, Luís Ferreira Pires, Luiz Olavo Bonino
da Silva Santos, Rodrigo Fernandes Calhau, Benildes Coura
Moreira dos Santos Maculan, Karen Coyle, Shenghui Wang,
Erwin Folmer, Debora Drucker, Maria Luiza de Almeida
Campos, Carlos Henrique Marcondes, Maurício Barcellos
Almeida, Kelly Rosa Braghetto, Guilherme Ataíde Dias, José
Augusto Salim, Fernando Elias Correa, Dilvan de Abreu
Moreira, Alexandre Cláudio Botazzo Delbem, and
Antonio Mauro Saraiva

A Model-driven Approach to Enhance Data
Visualization through Domain Knowledge Integration
Andreia Almeida, Alberto Alves, Maribel Yasmina Santos,
Ana León, and João Moura-Pires

Integrating Business and Process Analytics for
Enhanced Data-Driven Decision-Making
Vânia Sousa, Cristiana Vieira, Ana Lavalle, António Vieira, and
Maribel Yasmina Santos

The Ontology of Fields as a Foundation for
Conceptual Modeling

Arturo Castellanos, John W. Beard, Binny Samuel, Keng Siau,
Carson Woo, Veda C. Storey, Roman Lukyanenko, Roger H.L.
Chiang, and Debra Vandermeer

2:00 p.m.—AI and Robots

Chair: Luiz Antunes, CMU SEI

Managing Trade-offs in the Nested Iterative Cycles
of Responsible AI

Rohith Sothilingam, Eric Yu, and Vik Pant

A Framework for Conceptual Model Augmented
Generative Artificial Intelligence

Hans-Georg Fill, Felix Härer, Iva Vasic, Daniel Borcard, Benedikt
Reitemeyer, Fabian Muff, Simon Curty, and Marcel Bühlmann

Comparison of Dependencies for Human-Robot
Interaction Types

Jeshwitha Jesus Raja, Philipp Kranz, and Marian Daun

ER 2024 Posters

WEDNESDAY, OCTOBER 30

4:00 p.m.

Chair: Sergio de Cesare, University of Westminster

An Architecture for Integrating Large Language Models into Metamodeling Platforms: The Example of MM-AR

Gunakar Challa, Aya Gartini, Fabian Muff, and Hans-Georg Fill

Smart Model-Driven Engineering to Improve the Music Valuation

Giovanni Giachetti, Daniel Catalá-Pérez, Blanca De-Miguel-Molina, Conrado Carrascosa, María de Miguel, Jesús Carreño, and Oscar Pastor

Supporting Safety Assessment in Human-Robot Collaboration using Process Models

Philipp Kranz, Shaza Elbishbishy, Jeshwitha Jesus Raja, and Marian Daun

An Ontological Approach to Breast Cancer Screening: Risk Assessment and Personalized Testing Recommendations

Bruno Szilagyi, Edelweis Rohrer, Yasmine Anchén, and Regina Motz

Utilize the PROVE Tool to Evaluate Ontological Modeling

Asiyah Lin and Avi Shaked

OWL2Gen: Towards a Configurable Ontology Generator for Benchmarking

Gunjan Singh, Ashwat Kumar, Sumit Bhatia, and Raghava Mutharaju

Tutorials

MONDAY, OCTOBER 28

9:00–11:00 a.m.

Data Fabric: Technologies, Modeling and Applications

Kamalakar Karlapalem, Radha Krishna Pisipati, and Satyanarayana R Valluri

2:00–3:30 p.m.

Spatial Conceptual Modeling: Introduction to the MM-AR Metamodeling Platform and the Augmented Reality Workflow Modeling Language

Fabian Muff, Hans-Georg Fill, and Daniel Borcard

4:00–5:30 p.m.

A Deep Dive Into Benchmarking Ontology Reasoners: Techniques, Tools, and Insights

Gunjan Singh and Raghava Mutharaju

Special Topics

TUESDAY, OCTOBER 29

4:30 p.m.

AI Engineering for Context-Driven AI System Design

This 90-minute workshop, adapted from the Software Engineering Institute's AI Division's Introduction to AI Engineering course, explores the critical role of context in AI system design. Led by Cole Frank and Nick Winski, the workshop emphasizes how problem-specific contexts, operational settings, and end-user considerations shape effective AI solutions, with a focus on conceptual modeling in AI engineering.

The workshop is structured around three main sections: an introduction to AI Engineering, context-driven planning for AI solutions, and architecting context-aware AI systems. Participants will gain insights into key AI Engineering concepts, learn methods for developing context for AI use cases, and understand how to compose AI system architectures with context in mind. The session includes coverage of common AI components, their implementation, and typical functional and non-functional requirements of AI systems.

Designed for researchers and practitioners in conceptual modeling and AI engineering, this workshop aligns closely with the themes of the International Conference on Conceptual Modeling. It explores how contextual factors influence the conceptual models underlying AI systems, bridging the gap between raw data and contextualized AI solutions. By the end of the workshop, participants will have a deeper understanding of how context shapes AI system design and practical insights for incorporating contextual factors in their AI projects.

WEDNESDAY, OCTOBER 30

4:00 p.m.

Analysis Contracts for AADL Models

This tutorial introduces a new technique for assuring AADL models called "Analysis Contracts." Analysis contracts are supported by the OSATE AADL tool and are backed by a novel analysis process called "symbolic assurance refinement." Symbolic assurance refinement is described with an emphasis on how it addresses current difficulties with assuring models of cyber-physical systems. OSATE tool support for assurance contracts is demonstrated using a case study drawn from a real-world avionics scenario.

THURSDAY, OCTOBER 31

11:00 a.m.

Bootstrapping Secure Pipelines with Development Containers!

In today's world of fast-paced software development, security is critical, but the tools and resources needed to build a robust DevSecOps pipeline often seem out of reach for smaller teams and open source projects. However, building a secure, scalable, and repeatable pipeline doesn't have to be expensive or complicated. This talk will show you how.

We'll start by exploring the challenges faced by many teams when trying to integrate security into their development and deployment processes. From there, we'll demonstrate how to bootstrap a full DevSecOps pipeline using containers and free, open-source tools—enabling you to secure your project from day one without breaking the bank.

As your project grows, so does the complexity. You'll need to maintain consistent environments, manage dependencies, and ensure that builds and deployments are reproducible across systems. Here's where we take it a step further: using the Nix package manager, we'll show how to create development and production containers that solve these problems at scale. Nix provides a declarative, reproducible approach that locks down dependencies, integrates static analysis, and builds hardened, production-ready containers with ease.

By the end of the talk, you'll see how these two approaches—bootstrapping a DevSecOps pipeline with free tools and scaling it using Nix—come together to create a secure, reliable, and cost-effective development lifecycle that grows with your project. Whether you're just starting out or managing a complex system, you'll walk away with practical steps to implement a DevSecOps pipeline that works for your team.

Workshops

MONDAY, OCTOBER 28

9:00 a.m. – 5:30 p.m.

The First International Workshop on AI Services and Applications (AISA'2024) + The First International Workshop on AI-Driven Modeling and Management of Data (AIMM 2024) (AIMM 2024 is integrated in AISA'2024)

Big Data and Artificial Intelligence: Innovation-Oriented Research to Improve Decision Making
Distinguished Speaker: Juan Trujillo

Empirical case study of AI Service and Application for people with disabilities
Jaehwan Lee and Jintaek Jung

A Methodological Framework for Designing Human-Centered Artificial Intelligence Services
Thang Le Dinh, Tran Duc Le, and Jolita Ralyté

Beyond One-Fits-All: A Case Study Approach to AI System Design Methods
Sabine Janzen and Hannah Stein

GRASPER: Leveraging Knowledge Graphs for Predictive Supply Chain Analytics
Sabine Janzen, Hannah Stein, and Sebastian Baer

An MLOps Framework to Data-Driven Modelling of Digital Twins with an Application to Virtual Test Rigs
Denis Kruschinski, Dylan Tchawou Ngassam, Umut Durak, and Sven Hartmann

Empirical Study on the Use of Artificial General Intelligence Healthcare in the Elderly
Seungho Seo and Jintaek Jung

Effects of Perceived Ease of Use and Perceived Usefulness of Technology Acceptance Model on Intention to Continue Using Generative AI: Focusing on the Mediating Effect of Satisfaction and Moderating Effect of Innovation Resistance
Sa-Rang Jeong, Si-Hoo Kim, and Seung-Hee Lee

Conceptual Modeling for Public AI Systems
Seonghwan Ju, Seoltae Ko, and Andrew Lim

Self-Explanatory Retrieval-Augmented Generation for SDG Evidence Identification
Dario Garigliotti

9:00 a.m. – 12:30 p.m.

The 5th International Workshop on Conceptual Modeling for Life Sciences (CMLS)

On the Expressiveness of Petri Nets for Modeling Biological Processes the Case for mRNA Translation and Protein Synthesis
Luis Henrique Costa Neto, Sérgio Lifschitz, Fernanda Baiao, Marcos Catanho, Antonio Basílio de Miranda, and Edward Hermann Haeusler

Enhancing Vaxign-DL for Vaccine Candidate Prediction with added ESM-Generated Features
Yichao Chen, Yongqun He, and Yuhan Zhang

Conceptual Modeling for Polygenic Risk Score Research: Improving Domain Understanding and Clinical Utility
Diana Martínez-Minguet and Óscar Pastor

Integrative Ontology of Bipolar Disorder (OBD): Advancing Bipolar Disorder Research through an Interoperable Ontological Framework
Yujia Tian, Yongqun He, Rachel Richesson, and Melvin McInnis

2nd Workshop on Modeling in the Age of Large Language Models (LLM4Modeling)

An LLM Assistant for Characterizing Conceptual Modeling Research Contributions
Steve Liddle, Heinrich C. Mayr, Oscar Pastor, Veda Storey, and Bernhard Thalheim

AI-Assisted Analytics—An Automated Approach to Data Visualization
Alberto Alves, João Moura Pires, Maribel Yasmina Santos, Ana Léon, and Andreia Almeida

Combining Natural Language Generation and Graph Algorithms to Explain Causal Maps through Meaningful Paragraphs
Tyler Gandee and Philippe Giabbanelli

**3rd International Workshop on Digital JUSTice, Digital Law
and Conceptual MODELing (JUSMOD24)**

Resignifying Compliance. Between Ontologies and
Epistemologies of Law

Matteo Buffa

Modelling Legal Enforcement with UFO-L: A Case
from Swedish Healthcare

Jöran Lindeberg, Paul Johannesson, Martin Henkel,
Erik Perjons, and Katarina Fast Lappalainen

The eu-FAIRnews: A Preliminary Exploration of
Bridging Disinformation and Digital Justice through
FAIR Data Practices in Online News Sources

Antonella Calo, Marco Zappatore, Antonella Longo, Davide
Damiano Colella, Marco Longo, and Priamo Tarantino

Safety Assurances in Autonomous Vessels

Sreekant Sreedharan, Muthu Ramachandran, Erik Røsæg, and
Børge Rokseth

2:00–5:30 p.m.

**7th International Workshop on Empirical Methods in
Conceptual Modeling (EmpER'24) + 5th International
Workshop on Quality and Measurement of Model-Driven
Software Development (QUAMES 2024) (EmpER'24 and
QUAMES 2024 are merged to EmpER'24 + QUAMES 2024)**

How Does UML Look and Sound? Using
Multimodal AI to Interpret UML Diagrams through
Empirical Evidence

Aleksandar Gavric, Dominik Bork, and Henderik A. Proper

Can Large Language Models Learn Conceptual
Modeling by Looking at Slide Decks and Pass
Graduate Examinations? An Empirical Study

Philippe Giabbanelli and Noé Flandre

Evaluating a Framework of Conceptual Modelling
Research

Jose Ignacio Panach Navarrete, Oscar Pastor,
Stephen W. Liddle, Veda C. Storey, Heinrich C. Mayr, and
Bernhard Thalheim

Extending Goal Models with Execution Orders: An
Investigation of the Impact on Comprehensibility

Jeshwitha Jesus Raja, Akhila Vissom Raju, Jennifer Brings, and
Marian Daun

Towards leveraging gamified code-testing for
effective model validation

Felix Cammaerts and Monique Snoeck

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