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# Enterprise Design, Operations, and Computing

26th International Conference, EDOC 2022  
Bozen-Bolzano, Italy, October 3–7, 2022  
Proceedings


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# Preface

EDOC 2022 is the 26th conference in the EDOC series which provides a key forum for researchers and practitioners in the field of Enterprise Computing. EDOC addresses the full range of models, methodologies, and engineering technologies contributing to building and evolving intra- and inter-enterprise software systems. This year's conference has a special emphasis on the theme of designing and operating "Flexible Enterprises". The theme reflects an ever-changing world under the influence of disruptive events, trends and technologies, as well as the increasing role of artificial intelligence.

We are happy to announce a number of developments for EDOC. First, the EDOC acronym is now spelled-out "Enterprise Design, Operations and Computing" to reflect the broad range of aspects of interest to the conference. Second, proceedings are now published by Springer in the Lecture Notes in Computer Science (LNCS) series. Finally, EDOC is collocated for the first time with the International Conference on Cooperative Information Systems (CoopIS) now in its 28th edition. This collaboration led to a program with several joint events, including shared keynote speeches, panels, technical sessions and social functions. We look forward to a most fruitful interaction between the communities involved in the two conferences, and an exciting overall program.

These proceedings include 15 full papers selected out of 48 full papers sent for peer review (31.25% acceptance rate). All submissions were thoroughly reviewed in a single-blind process by at least three program committee members and, in the vast majority of cases, by four program committee members. The review process was led by the program committee chairs João Paulo A. Almeida and Dimka Karastoyanova and overseen by the general chairs Giancarlo Guizzardi, Marco Montali and Fabrizio Maria Maggi. The selected papers cover topical areas such as Enterprise Architecture, Enterprise Security, Business Process Mining and Discovery, Business Process Modeling and Monitoring and Development of Process-Driven Applications. We would like to show our greatest appreciation to the submitting authors and to the members of the program committee as well as additional reviewers for their hard work.

These proceedings further include abstracts which pair with the invited talks of our three renowned keynote speakers: Carliss Y. Baldwin (Harvard Business School, USA, *emerita*), Jordi Cabot (Universitat Oberta de Catalunya, Spain) and Giovanni Sartor (University of Bologna & European University Institute of Florence, Italy); and with the tutorial offered by Gerd Wagner (Brandenburg University of Technology, Cottbus, Germany.) We would like to thank them all for their generosity in joining us in Bolzano.

Companion post-conference proceedings will be published separately and will include papers selected for the EDOC forum alongside workshop papers, doctoral consortium papers and demonstration-track papers.

We would also like to thank the EDOC steering committee for entrusting us with the responsibility of organizing this year's conference. We would like to express our gratitude to all members of the organizing committee, and in particular our local organization committee. The local organization chairs Tiago P. Sales, Mattia Fumagalli, Pedro Paulo F. Barcelos and Claudenir M. Fonseca put in a lot of energy for a successful event.

Claudenir M. Fonseca should be acknowledged for his key role in our web presence, registration, and for supporting us in putting the program and these proceedings together.

We would like to thank the Free University of Bozen-Bolzano and the NOI Techpark for generously sponsoring and hosting the conference.

Finally, there can be no conference without engaged participation: we would like to express our deep gratitude to all who contributed with their insights to make our conference program interesting and all those who came to Bolzano to make EDOC lively. We were thrilled to organize the first in-person edition of EDOC after two years of online editions.

October 2022

João Paulo A. Almeida  
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# **Keynote Speeches**

# **“We Are All Digital Now”: Platform Systems and Flow Processes in Modern Enterprises**

Carliss Y. Baldwin

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In the last 25 years, modern enterprises have become centered on digital systems. IT applications, knit together by enterprise architectures, now pervade all business functions. But there is still doubt and confusion as to how a firm’s digital infrastructure should be managed and maintained. On the one hand, modern enterprises must be flexible, capable of generating a stream of new products and providing customers with numerous options. On the other hand, they must be efficient providing timely solutions at low cost.

These contrasting requirements are exemplified by two opposing technical paradigms: flow processes and platform systems. In the talk, I will characterize flow processes and platform systems in terms of their innate properties and organizational implications. I will also indicate when and why each patterns is more valuable. In modern establishments, the two patterns are not mutually exclusive: technologically sophisticated organizations must use both. At the end of the talk, I will speculate on where each pattern is likely to be needed and invite comments on the tensions they are likely to cause within organizations.

# Smart Modeling of Smart Software

Jordi Cabot

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There is an increasing demand for embedding intelligence in software systems as part of its core set of features both in the front-end (e.g. conversational user interfaces) and back-end (e.g. prediction services). This combination is usually referred to as AI-enhanced software or, simply, smart software.

The development of smart software poses new engineering challenges, as now we need to deal with the engineering of the “traditional” components, the engineering of the “AI” ones but also of the interaction between both types that need to co-exist and collaborate.

In this talk we’ll see how modeling can help tame the complexity of engineering smart software by enabling software engineers specify and generate smart software systems starting from higher-level and platform-independent modeling primitives.

But, unavoidably, these models will be more diverse and complex than our usual ones. Don’t despair, we’ll also see how some of these same AI techniques that are making our modeling life challenging can be turned into allies and be transformed into modeling assistants to tackle the engineering of smart software with a new breed of smart modeling tools.

# **Modelling Ethical and Legal Norms/Explaining Compliance and Violation**

Giovanni Sartor

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Automation-supported compliance checking has become necessary in increasingly automated socio-technical contexts. AI & law research, since the 70's has addressed ways to model ethical and legal knowledge, and has developed approaches that are relevant to compliance-checking.

I will shortly review approaches to the modeling of legal content: Rules- and logic-based models; Argumentation-based models; Case-based reasoning models.

I will then address some recent approaches aimed at providing logical models in a way which is understandable to non-technical people, and consider whether this idea may support developments in automated compliance checking. I will also consider the significance of argumentation-based models and ontologies to provide rationales for compliance assessments.

I will argue for the construction of human-understandable models of law and ethics, to be used for the purpose of compliance checking, also over the functioning of machine-learning based systems. How to integrate logical modeling and machine learning, in eliciting and applying normative knowledge is a challenging task for the future.

# **Tutorial**



# **Business Process Modeling and Simulation with DPMN**

Gerd Wagner

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The Business Process Modeling Notation (BPMN) has been successfully established as the defacto standard in Business Process (BP) Management. However, BPMN does not have a convincing formal semantics and lacks several important elements needed for BP simulation. BPMN is also not well-aligned with the Processing/Queuing Network paradigm of Operations Research (OR) and the related business process simulation paradigm pioneered by the Discrete Event Simulation (DES) languages/tools GPSS and SIMAN/Arena. The Discrete Event Process Modeling Notation (DPMN) is based on the Object Event Modeling and Simulation (OEM&S) paradigm and on Event Graphs (Schruben 1983), which capture the event scheduling paradigm of DES. DPMN supports modeling resource-constrained activities (with resource roles and resource pools) in Activity Networks and Processing Networks, as well as basic agent concepts (perception, action, communication) and agent-based BP modeling.

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