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On the Move to Meaningful Internet Systems

OTM 2019 Workshops

Confederated International Workshops:
EI2N, FBM, ICSP, Meta4eS and SIAnA 2019
Rhodes, Greece, October 21–25, 2019
Revised Selected Papers

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General Co-chairs and Editors' Message for OnTheMove 2019

The OnTheMove 2019 event held October 21–25 in Rhodes, Greece, further consolidated the importance of the series of annual conferences that was started in 2002 in Irvine, California. It was then moved to Catania (Sicily) in 2003, to Cyprus in 2004 and 2005, Montpellier in 2006, Vilamoura in 2007 and 2009, Monterrey (Mexico) in 2008, Heraklion (Crete) in 2010 and 2011, Rome in 2012, Graz in 2013, Amantea (Italy) in 2014, Rhodes in 2015, 2016, and 2017, and lastly to Valletta in 2018.

This prime event continues to attract a diverse and relevant selection of today's research worldwide on the scientific concepts underlying new computing paradigms, which of necessity must be distributed, heterogeneous, and supporting an environment of resources that are autonomous yet must meaningfully cooperate. Indeed, as such large, complex, and networked intelligent information systems become the focus and norm for computing, there continues to be an acute and even increasing need to address the software, system, and enterprise issues involved and discuss them face to face in an integrated forum that covers methodological, semantic, theoretical, and application issues. As we all realize, e-mail, the Internet, and even video conferences are not by themselves optimal or even sufficient for effective and efficient scientific exchange.

The OnTheMove (OTM) International Federated Conference series has been created precisely to cover the scientific exchange needs of the communities that work in the broad yet closely connected fundamental technological spectrum of Web-based distributed computing. The OTM program every year covers data and Web semantics, distributed objects, Web services, databases, information systems, enterprise workflow and collaboration, ubiquity, interoperability, mobility, as well as grid and high-performance computing.

OnTheMove is proud to give meaning to the “federated” aspect in its full title: it aspires to be a primary scientific meeting place where all aspects of research and development of internet- and intranet-based systems in organizations and for e-business are discussed in a scientifically motivated way, in a forum of interconnected workshops and conferences. This year's 18th edition of the OTM Federated Conferences event therefore once more provided an opportunity for researchers and practitioners to understand, discuss, and publish these developments within the broader context of distributed, ubiquitous computing. To further promote synergy and coherence, the main conferences of OTM 2019 were conceived against a background of their three interlocking global themes:

- Trusted Cloud Computing Infrastructures Emphasizing Security and Privacy
- Technology and Methodology for Data and Knowledge Resources on the (Semantic) Web
- Deployment of Collaborative and Social Computing for and in an Enterprise Context

Originally the federative structure of OTM was formed by the co-location of three related, complementary, and successful main conference series: DOA (Distributed Objects and Applications, held since 1999), covering the relevant infrastructure-enabling technologies, ODBASE (Ontologies, DataBases and Applications of SEmantics, since 2002) covering Web semantics, XML databases, and ontologies, and of course CoopIS (Cooperative Information Systems, held since 1993) which studies the application of these technologies in an enterprise context through, e.g., workflow systems and knowledge management. In the 2011 edition security issues, originally started as topics of the IS workshop in OTM 2006, became the focus of DOA as secure virtual infrastructures, further broadened to cover aspects of trust and privacy in so-called cloud-based systems. As this latter aspect came to dominate agendas in this and overlapping research communities, we decided in 2014 to rename the event as the Cloud and Trusted Computing (C&TC) Conference, and it was originally launched in a workshop format.

These three main conferences specifically seek high-quality contributions of a more mature nature and encourage researchers to treat their respective topics within a framework that simultaneously incorporates (a) theory, (b) conceptual design and development, (c) methodology and pragmatics, and (d) application in particular case studies and industrial solutions.

As in previous years, we again solicited and selected additional quality workshop proposals to complement the more mature and “archival” nature of the main conferences. Our workshops are intended to serve as “incubators” for emergent research results in selected areas related, or becoming related, to the general domain of Web-based distributed computing. We were very glad to see that our earlier successful workshops (EI2N, META4eS, FBM, and SiANA) reappeared in 2019. The Fact Based Modeling (FBM) workshop in 2015 succeeded and expanded the scope of the successful earlier ORM workshop. The Industry Case Studies Program, started in 2011, under the leadership of Hervé Panetto, Wided Gueédria, and Gash Bhullar, further gained momentum and visibility in its ninth edition this year.

The OTM registration format (“one workshop and/or conference buys all workshops and/or conferences”) actively intends to promote synergy between related areas in the field of distributed computing and to stimulate workshop audiences to productively mingle with each other and, optionally, with those of the main conferences. In particular, EI2N continues to create and exploit a visible cross-pollination with CoopIS.

As the three main conferences and the associated workshops all share the distributed aspects of modern computing systems, they experience the application pull created by the Internet and by the so-called Semantic Web, in particular developments of big data, increased importance of security issues, and the globalization of mobile-based technologies.

The three conferences seek exclusively original submissions that cover scientific aspects of fundamental theories, methodologies, architectures, and emergent technologies, as well as their adoption and application in enterprises and their impact on societally relevant IT issues.

- CoopIS 2019 (Cooperative Information Systems), our flagship event in its 27th edition since its inception in 1993, invites fundamental contributions on principles and applications of distributed and collaborative computing in the broadest scientific sense in workflows of networked organizations, enterprises, governments, or just communities.
- C&TC 2019 (Cloud and Trusted Computing), is the successor of DOA (Distributed Object Applications) and focuses on critical aspects of virtual infrastructure for cloud computing, specifically spanning issues of trust, reputation, and security.
- ODBASE 2019 (Ontologies, Databases, and Applications of SEmantics) covers the fundamental study of structured and semi-structured data, including linked (open) data and big data, and the meaning of such data as is needed for today's databases, as well as the role of data and semantics in design methodologies and new applications of databases.

As with the earlier OnTheMove editions, the organizers wanted to stimulate this cross-pollination by a program of engaging keynote speakers from academia and industry and shared by all OTM component events. We are quite proud to list for this year:

- Elena Simperl, University of Southampton, UK
- Stefan Thalmann, Karl-Franzens University of Graz, Austria
- Silvie Spreeuwenberg, Lab for Intelligent Business Rules Technology, The Netherlands

The general downturn in submissions observed in recent years for almost all conferences in computer science and IT has also affected OnTheMove, but this year the harvest again stabilized at a total of 156 submissions for the three main conferences and over 45 submissions in total for the workshops. Not only may we indeed again claim success in attracting a representative volume of scientific papers, many from the USA and Asia, but these numbers of course allowed the respective Program Committees to again compose a high-quality cross-section of current research in the areas covered by OTM. Acceptance rates vary but the aim was to stay consistently at about one accepted full paper for three submitted, yet as always these rates are subordinated to professional peer assessment of proper scientific quality.

As usual, we separated the proceedings into two volumes with their own titles, one for the main conferences and one for the workshops and posters. But in a different approach to previous years, we decided the latter should appear after the event and so allow workshop authors to eventually improve their peer-reviewed papers based on critiques by the Program Committees and on live interaction at OTM. The resulting additional complexity and effort of editing the proceedings was professionally shouldered by our leading editor, Christophe Debruyne, with the general chairs for the conference volume, and with Hervé Panetto for the workshop volume. We are again most grateful to the Springer LNCS team in Heidelberg for their professional support, suggestions, and meticulous collaboration in producing the files and indexes ready for downloading on the USB sticks. It is a pleasure to work with staff that so deeply understands the scientific context at large and the specific logistics of conference proceedings publication.

The reviewing process by the respective OTM Program Committees was performed to professional quality standards: each paper review in the main conferences was assigned to at least three referees, with arbitrated e-mail discussions in the case of strongly diverging evaluations. It may be worthwhile to emphasize once more that it is an explicit OnTheMove policy that all conference Program Committees and chairs make their selections in a completely sovereign manner, autonomous and independent from any OTM organizational considerations. As in recent years, proceedings in paper form are now only available to be ordered separately.

The general chairs are once more especially grateful to the many people directly or indirectly involved in the setup of these federated conferences. Not everyone realizes the large number of qualified persons that need to be involved, and the huge amount of work, commitment, and financial risk in the uncertain economic and funding climate of 2019, that is entailed by the organization of an event like OTM. Apart from the persons in their aforementioned roles, we wish to thank in particular and explicitly our main conference Program Committee chairs:

- CoopIS 2019: Martin Hepp and Maria Maleshkova
- ODBASE 2019: Dave Lewis and Rob Brennan
- C&TC 2019: Claudio A. Ardagna, Ernesto Damiani, and Athanasios Vasilakos

And similarly we thank the Program Committee (co-)chairs of the 2019 ICSP and Workshops (in their order of appearance on the website): Hervé Panetto, Wided Guédria, Gash Bhullar, Georg Weichhart, Milan Zdravkovic, Peter Bollen, Stijn Hoppenbrouwers, Robert Meersman, Maurice Nijssen, Ioana Ciuciu, Anna Fensel, George Karabatis, and Aryya Gangopadhyay. Together with their many Program Committee members, they performed a superb and professional job in managing the difficult yet vital process of peer review and selection of the best papers from the harvest of submissions. We all also owe a serious debt of gratitude to our supremely competent and experienced conference secretariat and technical admin staff in Guadalajara and Dublin, respectively, Daniel Meersman and Christophe Debruyne. The general conference and workshop co-chairs also thankfully acknowledge the academic freedom, logistic support, and facilities they enjoy from their respective institutions – Technical University of Graz, Austria; University of Lorraine, Nancy, France; Latrobe University, Melbourne, Australia – without which such a project quite simply would not be feasible. Reader, we do hope that the results of this federated scientific enterprise contribute to your research and your place in the scientific network, and we hope to welcome you at next year's event!

September 2019

Hervé Panetto
Robert Meersman

Organization

OTM (On The Move) is a federated event involving a series of major international conferences and workshops. These proceedings contain the papers presented at the OTM 2019 Federated Workshops, consisting of the 14th International Workshop on Enterprise Integration, Interoperability and Networking (EI2N 2019), the 5th International Workshop on Fact Based Modeling (FBM 2019), the Industry Case Studies Program 2019 – Industry Day (ICSP 2019), the 8th International Workshop on Methods, Evaluation, Tools and Applications towards a Data-driven e-Society (Meta4eS 2019), and the First International Workshop on Security via Information Analytics and Applications (SIAnA 2019).

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Hervé Panetto	University of Lorraine, France
Robert Meersman	TU Graz, Austria

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Georg Weichhart	Profactor GmbH and Johannes Kepler University Linz, Austria
Hervé Panetto	University of Lorraine, France
Milan Zdravkovic	University of Nis, Serbia

FBM 2019 PC Co-chairs

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Stijn Hoppenbrouwers	HAN UAS and Radboud University, The Netherlands
Robert Meersman	TU Graz, Austria
Maurice Nijssen	PNA Group, The Netherlands

ICSP 2019 PC Co-chairs

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Wided Guédria	Luxembourg Institute of Science and Technology, Luxembourg
Gash Bhullar	Control 2K Limited, UK

Meta4eS 2019 PC Co-chairs

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Anna Fensel	STI Innsbruck, University of Innsbruck, Austria

SIAnA 2019 PC Co-chairs

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Aryya Gangopadhyay	University of Maryland, Baltimore County, USA

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Christophe Debruyne	Trinity College Dublin, Ireland
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ICSP 2019 Additional Reviewer

Sabine Klein	German Research Center for Artificial Intelligence, Germany
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OTM 2019 Keynotes

Qrowd and the City: Designing People-Centric Smart Cities

Elena Simperl

University of Southampton, UK

Short Bio

Elena Simperl is professor of computer science at the University of Southampton and director of the Southampton Data Science Academy. She is also one of the directors of the Web Science Institute and a Turing Fellow. Before joining Southampton in 2012, she was assistant professor at the Karlsruhe Institute of Technology (KIT), Germany and vice-director of the Semantic Technologies Institute (STI) Innsbruck, Austria. She has contributed to more than twenty research projects, often as principal investigator or project lead. Currently she is the PI on four grants: the EU-funded Data Pitch, which supports SMEs to innovate with data, the EU-funded QROWD, which uses crowd and artificial intelligence to improve smart transportation systems, the EPSRC-funded Data Stories, which works on methods and tools to make data more engaging, and the EU funded ACTION, which develops social computing methods for citizen science. She authored more than 100 papers in sociotechnical systems, knowledge engineering and AI and was programme/general chair of the European and International Semantic Web Conference and of the European Data Forum.

Talk

Smart cities are as much about the needs, expectations and values of the people they serve as they are about the underlying technology. In this talk, I am going to present several areas of system design where human and social factors play a critical role, from fostering participation to augmented intelligence and responsible innovation. I will present ongoing challenges, solutions and opportunities, drawing from recent studies in Qrowd, a Horizon 2020 programme proposing a humane AI approach for transport and mobility.

Managing Knowledge Risks in Data-Centric Collaborations

Stefan Thalmann

Karl-Franzens University of Graz, Austria

Short Bio

Stefan Thalmann is Professor and the Director of the Center for Business Analytics and Data Science of the Karl-Franzens University of Graz, Austria. Prior to that he was with the Graz University of Technology and lead the cognitive decision support group in the application-oriented research center Pro2Future. He managed several industry funded research projects as well as EU funded research projects and worked for universities in Austria, Germany, Italy, Finland and the UK. He holds a diploma in Information Systems from the University of Halle-Wittenberg, a PhD and a habilitation degree in Information Systems from the University of Innsbruck. His research interest includes industrial data analytics, data-driven decision support and the management of knowledge risks in digitized supply chains. Stefan authored more than 50 academic publications and a member of 40 conference and workshop program committees.

Talk

Due to digitization the exchange of data along the supply chain intensified over time and data-centric collaborations emerge. These data sets become more and more comprehensive as cheap sensors, affordable infrastructure and storage capacity intensified the data collection. Based on advanced data analytics it is now more likely that supply-chain partners or even competitors discover valuable knowledge out of these data sets. Not sharing is however not an option in most cases and thus a suitable trade-off between sharing and protection needs to be found. Thus data-centric collaborations might be also the source of knowledge risks and need to be considered in an organisational knowledge protection strategy.

In this talk, I will analyze the challenges of data-centric collaborations from a perspective of knowledge risks. I will present examples and insights from current research projects and studies. Further, I will present solutions enabling companies to managing data-centric collaborations by finding a suitable tradeoff between the benefits arising from sharing data in such a collaboration on the one hand and the knowledge risks associated with the sharing of data.

Choose for AI and for Explainability

Silvie Spreeuwenberg

Lab for Intelligent Business Rules Technology – LIBRT,
Amsterdam, The Netherlands

Abstract. As an expert in decision support systems development, I have been promoting transparency and self-explanatory systems to close the plan-do-check-act cycle. AI adoption has tripled in 2018, moving AI towards the Gartner-hype-cycle peak. As AI is getting more mainstream, more conservative companies have good reasons to enter this arena. My impression is that the journey is starting all over again as organizations start using AI technology as black box systems. I think that eventually these companies will also start asking for methods that result in more reliable project outcomes and integrated business systems. The idea that explainable AI is at the expense of accuracy is deeply rooted in the AI community. Unfortunately, this has hampered research into good explainable models and indicates that the human factor in AI is underestimated. Driven by governments asking for transparency, a public asking for unbiased decision making and compliance requirements on business and industry, a new trend and research area is emerging. This talk will explain why explainable artificial intelligence is needed, what makes an explanation good and how ontologies, rule-based systems and knowledge representation may contribute to the research area named XAI.

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