Preface

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Biographical notes: Qingliang Chen is a Professor of Computer Science at the Jinan University. His research interests are knowledge representation and reasoning, logical modelling and verification of multi-agent systems and computational logics. He has published more than 30 papers in peer-reviewed international journals and conferences on artificial intelligence.

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Agent-based computing technology is an exciting emerging paradigm expected to play a key role in many important practices, particularly in e-commerce, and also in planning, logistics, manufacturing, robotics, decision support, transportation, entertainment, emergency relief and disaster management, and data mining and analytics. Agent and multi-agent researchers are focusing on building working systems that bring together a broad range of technical areas from market theory to software engineering to user interfaces. As a result, intelligent agents and multi-agent systems have demonstrated the

capability to use intelligence, knowledge representation and reasoning, and other social metaphors like 'trust', 'game' and 'institution', not only to address real-world problems in a human-like way but also to transcend human performance. As one of the largest and still growing research fields of computer science, agent-based computing today remains a unique enabler of inter-multi-and trans-disciplinary research.

The international conference on conference on principles and practice of multi-agent systems (PRIMA) originally started in 1998 as a regional (Asia-Pacific) workshop and in the last decade it grew to become one of the leading and influential scientific conferences for research on multi-agent systems. Each year, PRIMA brings together active researchers, developers and practitioners from both academia and industry to showcase, share and promote research in several domains, ranging from foundations of agent theory and engineering aspects of agent systems, to emerging interdisciplinary areas of agent-based research. Previous successful editions were held in Nagoya, Japan (2009), Kolkata, India (2010), Wollongong, Australia (2011), Kuching, Malaysia (2012), Dunedin, New Zealand (2014) and Gold Coast Australia (2014). The last two editions were held in Phuket, Thailand (2016) and in Nice, France (2017).

This issue contains selected practically-oriented papers from the eighteenth edition of PRIMA, which took place from 26 to 30 October 2015 in Bertinoro, FC, Italy and attracted 94 submissions from 30 countries. The contributions underwent a strict two-or three-stage double-blind reviewing procedure, resulting in the final four papers in the present collection. They constitute the most recent advances in the practice and engineering of multi-agent systems, addressing the challenges posed by real-world application domains.

In a realistic environment, intentions of belief-desire-intention (BDI) agents may be threatened by exogenous change. Subsequent activity failure may incur debilitative consequences that hinder both recovery and subsequent goal achievement. In 'Improving plan execution robustness through capability aware maintenance of plans by BDI agents', White et al. propose a CAMP-BDI (capability aware, maintaining plans) approach, equipping BDI agents with capability knowledge, allowing anticipation of threats to activity success and stimulating the proactive, preventative modification of intended plans. Their experimental results show superior goal achievement to a reactive equivalent in a stochastic environment, increasing with the likelihood of debilitative failure effects, which suggests that CAMP-BDI offers a valuable approach towards robustness, particularly in tandem with reactive recovery methods.

In 'Aggregate plans for multi-agent systems', Viroli et al. introduce the notion of 'aggregate plan', as a specification of the collective behaviour of a team of agents embedded in space. Aggregate plans are managed by self-organisation: they can be spread from a source agent, get iteratively diffused to the whole MAS, and be dynamically selected and carried on by each agent based on its local deliberation process. This approach is rooted on the aggregate computing paradigm, recently introduced to address open, dynamic, and large-scale scenarios of pervasive computing and internet of things (IoT). They define the approach, describe the underlying computational mechanisms, discuss its expressiveness, and present an example of people rescuing in disaster scenarios.

Manned space missions are typically performed by teams composed of humans as well as technical systems, and are situated in complex, dynamic, and safety-critical domains. Intelligent electronic partners (*ePartners*) can play an important role here to support human-robot teams in their collaborative problem solving process when things do

not go as planned. In 'Developing ePartners for human-robot teams in space based on ontologies and formal abstraction hierarchies', Bosse et al. put forward an approach to represent the functionality of human-robot teams in a formal manner using abstraction hierarchies. As a consequence, ePartners are equipped with the ability to reason about the status of a mission, propose solutions in non-nominal situations, and provide explanations for the proposed solutions. The approach has been implemented within a mobile application on a tablet that can be used to support astronaut-robot teams during space missions. The application has been evaluated during an experiment at the European Space Research and Technology Centre (ESTEC) in the context of a Mars mission.

Another domain that is receiving greater attention by the day is that of electric energy micro-grids, whereby communities share their locally-generated power. Sometimes there are energy surpluses (supply is more than demand) and sometimes deficits (supply is less than demand) among those micro-grids. The ill effects of this variation in energy supply can be reduced by trading energy by means of a connected electricity grid. In 'Agent-based modelling of coalition formation in energy micro-grids', Yasir et al. introduce the idea of forming coalitions of communities, and present a model for the dynamic formation of micro-grid coalitions. This model is scalable and affords autonomy among the micro-grids participating in the coalition. Thus individual micro-grids, which are modelled as autonomous agents, can join and depart from coalitions at any time. This model proposes such methods in order to reduce overall 'discomfort', a notion of situation where a community will suffer hardship caused by insufficient energy supply. Finally they present empirical studies with real energy production and consumption data to validate the applicability of their model.

We thank the authors for putting effort into submitting and revising their papers in order to achieve their current quality, the reviewers for their care and constructive criticism, and the Editor-in-Chief of the *International Journal of Agent-Oriented Software Engineering*, Michael Winikoff, for allowing us to publish the resulting collection of papers as a special issue of this journal.