

Preface

It is real pleasure to declare that the research activities around holonic and multi-agent systems for industrial applications have continued and even increased their importance during the past 15 years. The number of both the scientific topics and the achievements in the subject field is growing steadily, especially because of their direct relevance to the German Industry 4.0 initiative and similar initiatives worldwide. The influence of the multi-agent and holonic system philosophy on the Industry 4.0 visions is more than clear.

HoloMAS has been the pioneering event in this field, but we can see that there are multiple conferences like the IEEE SMC annual conference, ETFA, INDIN, or INCOM that aim their attention at advanced industrial solutions based on intelligent agents. However, the HoloMAS conference keeps its orientation, character, and flavor. It remains strongly industry oriented.

This year's conference was the 11th in the sequence of HoloMAS events. The first three (HoloMAS 2000 in Greenwich, HoloMAS 2001 in Munich, and HoloMAS 2002 in Aix-en-Provence) were organized as workshops under the umbrella of DEXA. Starting in 2003, HoloMAS achieved the status of an independent conference organized bi-yearly on even years, still under the DEXA patronage (HoloMAS 2003 in Prague, HoloMAS 2005 in Copenhagen, HoloMAS 2007 in Regensburg, HoloMAS 2009 in Linz, HoloMAS 2011 in Toulouse, HoloMAS 2013 in Prague, HoloMAS 2015 in Valencia). The HoloMAS line of scientific events created a community of researchers who are active in the subject field. They have started to cooperate on large EU projects, e.g., on the IP project ARUM in 2012 or DIGICOR in 2016, and they have jointly submitted several new project proposals since the last HoloMAS event.

The research of holonic and agent-based systems attracts the very strong interest of industry and receives increasing support from both the public sector and private institutions. We can see increased interest from the IEEE System, Man, and Cybernetics Society, namely, from its Technical Committees on Distributed Intelligent Systems and on Cybernetics for Intelligent Industrial Systems. Another IEEE body – Industrial Electronics Society – supports the related R&D field through its Technical Committee on Industrial Agents (<http://tcia.ieee-ies.org/>). Its mission is to provide a base for researchers and application practitioners for sharing their experiences with application of holonic and agent technologies in the industrial sector, especially in assembly and process control, planning and scheduling, and supply chain management. There are a number of impacted journals that provide space for articles dealing with industrial agents like *IEEE Transactions on SMC: Systems*, *IEEE Transactions on Industrial Informatics*, *Journal of Production Research*, *Journal of Intelligent Manufacturing* or *JAAMAS*.

It is our pleasure to inform you that for HoloMAS 2017 there were 27 papers submitted, from which the Program Committee selected 19 papers to be included in this volume. The papers are organized into five sections. Issues of scheduling are the focus

of the first section (three papers). The next one is aimed at knowledge engineering approaches exploring holonic and multi-agent principles (four papers). There is also one specific section aimed at results from simulation, modeling, and reconfiguration (four papers). The fourth section is dedicated to the very hot field of energy systems and smart grids leveraging the MAS approach (four papers). This application area seems to be growing in importance in the past few years, because some of the results could be easily applied to industrial practice. The last section is dedicated to applications in various fields, e.g., smart cities, sensor networks, environmental protection, and gas turbines.

In general, we are very pleased that the papers accepted for publication follow the main innovation trends in the field of holonic and multi-agent systems and display the current state of the art keeping the industrial orientation of the research in mind. Thus, HoloMAS 2017 reflected the progress in the field, but retained its original character and focus.

The MAS technology represents an excellent and promising theoretical background for developing an Industry 4.0 solution. The MAS theory can be used with advantage to support research activities and to bring new features to these solution explorations, e.g., AI principles, machine learning, data mining, and data analytics in general. But the implementations explore – as a rule – the SOA (service-oriented architecture) approaches on an ever broader scale. These are critically simplifying real-life solutions.

This volume of the HoloMAS 2017 proceedings presents the current trends in intelligent manufacturing. It confirms that additional techniques, like ontology knowledge structures, machine learning, etc. represent very important and promising topics for further research. These are expected to enrich the current solutions and to help bring the Industry 4.0 visions to industrial practice.

The HoloMAS 2017 conference represented another successful scientific event in the HoloMAS history and created a highly motivating environment, challenging future research and fostering the integration of efforts in the subject field. This conference offered – as usual - information about the state of the art in the MAS industrial application field with a focus on Industry 4.0 needs to specialists in neighboring research fields covered by the DEXA multi-conference event.

We are very grateful to the DEXA Association for providing us with this excellent opportunity to organize the HoloMAS 2017 conference as part of the DEXA event. We would like to express many thanks to Gabriela Wagner and Lucie Budinová for all their organizational efforts, which were of key importance for the success of our conference.

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