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# The Semantic Web – ISWC 2016

15th International Semantic Web Conference  
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Proceedings, Part I

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# Preface

The International Semantic Web Conference (ISWC) continues to be the premier forum for Semantic Web researchers and practitioners to gather and share exciting new findings and experiences. The community has steadily grown in size and scope over the years, covering many aspects of Semantic Web technologies that lie at the intersection of semantic technologies, data, and the Web. Basic research has renewed importance as an engine of scientific understanding and of new ideas. The broad range of applications of Semantic Web technologies in real settings help us appreciate the accomplishments of the field as well as the limitations and challenges ahead. In addition to building on well-established standards, the community is always generating shared resources and infrastructure. There is a palpable excitement as we witness the Web becoming more machine readable every day.

This volume contains the proceedings of ISWC 2016 with all the papers accepted to the main conference tracks. This year, in addition to the traditional ISWC Research Track we solicited submissions to an Applications Track and a new Resources Track. A new Journal Track was introduced to expand the scope of the conference. The main conference call for papers received 326 responses, over 60 more than the total for the 2015 conference.

The Research Track continues to be the most popular category for submissions. This year, the track solicited novel and significant research contributions addressing theoretical, analytical, empirical, and practical aspects of the Semantic Web. In addition to work building on W3C Semantic Web recommendations (e.g., RDF, OWL, SPARQL, etc.), investigations on other approaches to the intersection of semantics and the Web were encouraged. The track received 212 submissions. After a bidding process, each was reviewed by at least four anonymous members of the Program Committee of the track including one senior Program Committee member. Authors were given a chance to respond to the reviews during an author rebuttal period. The senior Program Committee member was responsible for promoting discussion among the reviewers and making a final recommendation to the program chairs. Papers were discussed in a Program Committee meeting, and the chairs made final determinations about acceptance. These proceedings include the 39 papers that were accepted for presentation at the conference.

The Applications Track solicited submissions exploring the benefits and challenges of applying semantic technologies in concrete, practical applications, in contexts ranging from industry to government and science. The track accepted submissions in three categories: (1) in-use applications providing evidence that there is actual, significant use of the proposed application or tool by the target user group, preferably outside the group that conducted the development; (2) industry applications describing a business case or motivation and demonstrating their impact in the respective industry while ideally positioning the value of the tool or system for the Semantic Web community; (3) emerging applications describing early reports on real-world projects,

exposing substantial research contributions and lessons learned in terms of semantics requirements, testing of approaches or infrastructure, and evaluations of early prototypes. The track received a total of 43 submissions and accepted 12. Each submission was reviewed by at least three Program Committee members of the track. Authors had the opportunity to submit a rebuttal to the reviews to clarify questions posed by Program Committee members. The program chairs made final decisions about acceptance: 23 submissions were emerging applications and seven of them were accepted, 15 were in-use applications and four were accepted, and five were industry applications and one was accepted.

The newly introduced Resources Track sought submissions providing a concise and clear description of a resource and its (expected) usage. Traditional resources are considered to be ontologies, vocabularies, datasets, benchmarks and replication studies, services, and software. These resources are important outputs of any scientific work. Sharing these resources with the research community does not only ensure the reproducibility of results, but also has the benefit of supporting other researchers in their own work. Although high-quality shared resources have a key role and an essential impact on the advancement of a research community, the academic acknowledgement for sharing such resources is low. Therefore, many researchers primarily focus on publishing scientific papers and lack the motivation to share their resources. An additional challenge is that resources are often shared without following best practices, for example, at non-permanent URLs that become unavailable within a few months. The Resources Track aimed to encourage resource sharing following best practices within the Semantic Web community. Besides more established types of resources, the track solicited submissions of new types of resources such as ontology design patterns, crowdsourcing task designs, workflows, methodologies, and protocols and measures. The track received 71 submissions. At least three Program Committee members for the track reviewed each paper using a structured review form that focused on best practices for publishing a resource. After an author rebuttal period and subsequent discussion among the reviewers, the program chairs decided on the final acceptance of 24 resource papers that are included in these proceedings and were invited to be presented at the conference.

A new Journal Track was introduced this year to invite presentations at the conference about recent papers in the main journals where the community publishes. This inaugural track targeted the *Journal of Web Semantics* and the *Semantic Web Journal*. Authors of papers accepted during the past year that were not previously presented at a main Semantic Web conference could self-nominate their paper. From the 49 self-nominations, the editorial boards of the respective journals chose 12. These papers are not included in these proceedings, but we list full citations of the papers that can be found in the journals.

There are 75 papers included in these proceedings for the Research, Applications, and Resources tracks. The substantial amount of papers in the Resources Track attest to the strong culture in the Semantic Web community of disseminating research products and continuing to extend the pool of shared resources, and doing so beyond ontologies and software.

The conference proceedings were meticulously assembled by Fabian Flöck as proceedings chair, who worked with the chairs to compile all the papers from the

authors, produce the table of contents and the front matter, and submit everything to the publishers. Silvio Peroni and Christoph Lange served as metadata chairs, organizing structured descriptions of the contents of the proceedings so they can be made available as semantic content in linked open data format. This year we accepted paper submissions in HTML format, but only received one submission in this format.

The conference included a variety of events that are traditional at ISWC and enrich the opportunities for interaction, learning, and mentoring.

The ISWC 2016 program included invited talks from prominent researchers within and outside the field. Christian Bizer from the University of Mannheim talked about “Is the Semantic Web What We Expected? Adoption Patterns and Content-Driven Challenges.” Hiroaki Kitano of Sony Computer Science Labs, the Okinawa Institute of Science and Technology, and the Systems Biology Institute discussed “Artificial Intelligence to Win the Nobel Prize and Beyond: Creating the Engine for Scientific Discovery.” Kathleen McKeown of Columbia University, gave a talk titled “At the Intersection of Data Science and Language.”

The Posters and Demos session, chaired by Takahiro Kawamura and Heiko Paulheim, included 55 posters and 47 demos selected among 115 total submissions. A Lightning Talks session offered time to those who wanted to take to the stage briefly to offer late-breaking results, discussion topics, and perspectives.

Thanks to our workshop and tutorial chairs, Chiara Guidini and Heiner Stuckenschmidt, the conference started off with very successful focused and highly interactive events. Five tutorials were held on ontology design patterns, RDF-stream processing, link discovery, Semantic Web for Internet/Web of Things, and SPARQL querying benchmarks. Moreover, 15 workshops were also held to foster discussions on specific topics of interest and to catalyze emerging communities. Also prior to the conference there was a discussion to envision the future of the Semantic Web Challenge.

The doctoral consortium chairs, Philippe Cudre-Mauroux, Riichiro Mizoguchi, and Natasha Noy, reviewed submissions from students still working on their PhD, and organized an event that gave them an opportunity to share their research ideas in a critical but supportive environment, to get feedback from mentors who are senior members of the community, to explore issues related to academic and research careers, and to build relationships with other PhD students from around the world. This program was complemented by activities put together by Abraham Bernstein, Daniel Garijo, and Matthew Horridge as student coordinators, who arranged travel awards, a mentoring lunch, and other informal opportunities for students to meet other members of the Semantic Web community.

The organization of a conference goes well beyond putting together a scientific program. There were many volunteers who worked hard to support the large event that ISWC has become, with hundreds of attendees from all over the world. We are very grateful to Hideaki Takeda, who as local arrangements chair led a skilled team to support the hotel accommodations, arrange conference facilities, develop the conference website, and take care of the myriad of details involved in supporting a scientific conference. We thank all of them for making the conference a fun event and for hosting us in the beautiful city of Kobe. The city’s diverse surroundings (from the modern Kobe port to the mountainous Arima hot spring) and cultural heritage (from the Ikuta shrine to Nada Sake breweries) inspired all participants to think more broadly and

about the longer-term legacy of their work. We are especially thankful to Ikki Ohmukai and Kouji Kozaki as vice chairs of the local committee and Rathachai Chawuthai as the Web master.

Sponsorship is crucial to support the conference. We would like to thank our sponsorship chairs, Makoto Iwayama and Carlos Pedrinaci, for their thorough and tireless work at arranging sponsorship, and to all of our sponsors for their generous contributions. We would also like to thank Amit Sheth for submitting a proposal to the National Science Foundation that helped secure support for student travel to the conference. The continued support from the National Science Foundation is greatly appreciated.

We are also grateful to the Semantic Web Science Association (SWSA), and in particular to its chair, Natasha Noy, and its treasurer, Guus Schreiber, for their sponsorship and for maintaining all the historical records of previous conferences containing precious data and advice. We are also grateful to Steffen Staab, Ulrich Wechselberger, Jeff Heflin, and the rest of the Organizing Committee of ISWC 2015, who were always at hand to answer our questions and provide thoughtful advice.

Last but not least, we would like to thank Miel Vander Sande, our publicity chair, who took all the announcements to mailing lists, social media, and other outlets to ensure dissemination and awareness of all the conference events.

We hope that these proceedings and the events at ISWC 2016 will contribute to a lasting legacy of this conference for many years to come.

October 2016

Paul Groth & Elena Simperl  
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Program Committee Co-chairs, Resources Track  
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