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## **PROCEEDINGS**

### **Volume II**

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**Special Track on Risk Management and Cyber-Informatics: RMCI 2016**  
**In the Context of**  
**The 20th Multi-Conference on Systemics, Cybernetics and Informatics: WMSCI 2016**



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**Number of Papers Included in these Proceedings per Country**  
(The country of the first author was the one taken into account for these statistics)

Country	# Papers	%
<b>TOTAL</b>	<b>96</b>	<b>100.00</b>
United States	19	19.79
Japan	15	15.63
Czech Republic	7	7.29
Germany	5	5.21
Russian Federation	5	5.21
Slovakia	5	5.21
Taiwan	5	5.21
South Korea	4	4.17
China	3	3.13
Italy	3	3.13
Latvia	3	3.13
South Africa	3	3.13
Brazil	2	2.08
Paraguay	2	2.08
Spain	2	2.08
Argentina	1	1.04
Austria	1	1.04
Ecuador	1	1.04
India	1	1.04
Iraq	1	1.04
Kuwait	1	1.04
Mexico	1	1.04
Nicaragua	1	1.04
Pakistan	1	1.04
Poland	1	1.04
Saudi Arabia	1	1.04
Switzerland	1	1.04
Turkey	1	1.04



## Foreword

Our purpose in the 20<sup>th</sup> World Multi-Conference on Systemics, Cybernetics and Informatics (WMSCI 2016) is to provide, in these increasingly related areas, a ***multi-disciplinary forum, to foster interdisciplinary communication*** among the participants, and to support the sharing process of diverse perspectives of the same transdisciplinary concepts and principles.

Systemics, Cybernetics and Informatics (SCI) are being increasingly related to each other in almost every scientific discipline and human activity. Their common transdisciplinarity characterizes and communicates them, generating strong relations among them and with other disciplines. They work together to create a whole new way of thinking and practice. This phenomenon persuaded the Organizing Committee to structure WMSCI 2016 as a multi-conference where participants may focus on one area, or on one discipline, while allowing them the possibility of attending conferences from other areas or disciplines. This systemic approach stimulates cross-fertilization among different disciplines, inspiring scholars, originating new hypothesis, supporting production of innovations and generating analogies; which is, after all, one of the very basic principles of the systems' movement and a fundamental aim in cybernetics.

WMSCI 2016 was organized and sponsored by the International Institute of Informatics and Systemics (IIIS, [www.iiis.org](http://www.iiis.org)), member of the International Federation of Systems Research (IFSR). The IIIS is a ***multi-disciplinary organization for inter-disciplinary communication and integration***, which includes about 4500 members. Consequently, a main purpose of the IIIS is to foster knowledge integration processes, interdisciplinary communication, and integration of academic activities. Based on 1) the transdisciplinarity of the systemic approach, along with its essential characteristic of emphasizing *relationships* and *integrating* processes, and 2) the multi-disciplinary support of cybernetics' and informatics' concepts, notions, theories, technologies, and tools, the IIIS has been organizing multi-disciplinary conferences as a platform for fostering inter-disciplinary communication and knowledge integration processes.

Multi-disciplinary conferences are organized by the IIIS as support for ***both intra- and inter-disciplinary*** communication. Processes of intra-disciplinary communication are mainly achieved via traditional paper presentations in corresponding disciplines, while conversational sessions, regarding trans- and inter-disciplinary topics, are among the means used for inter-disciplinary communication. Intra- and inter-disciplinary communications might generate *co-regulative cybernetic loops*, via negative feedback, and *synergic* relationships, via positive feedback loops, in which both kinds of communications could increase their respective effectiveness. Figure 1 shows at least two cybernetic loops if intra- and inter-disciplinary are adequately related. A necessary condition for the effectiveness of Inter-disciplinary communication is an adequate level of **variety** regarding the participating disciplines. *Analogical thinking and learning processes* of disciplinarians depend on it; which in turn are potential sources of the creative tension required for cross-fertilization among disciplines and the generations of new hypothesis. An extended presentation regarding this issue can be found at [www.iiis.org/MainPupose](http://www.iiis.org/MainPupose).

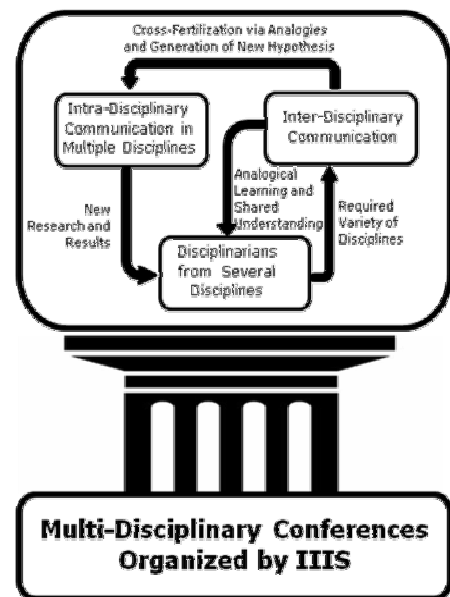


Figure 1

In the specific case of Systemics, Cybernetics and Informatics (SCI), the IIIS is an organization dedicated to contribute to the development of the Systems Approach, Cybernetics, and Informatics potential, using both: knowledge and experience, thinking and action, theory and practice, for:

- a) the identification of synergetic relationships among Systemics, Cybernetics and Informatics, and between them and society;
- b) the promotion of contacts among the different academic areas, through the transdisciplinarity of the systems approach;
- c) the identification and implementation of communication channels among the different professions;
- d) the supply of communication links between the academic and professional worlds, as well as between them and the business world, both public and private, political and cultural;
- e) the stimulus for the creation of integrative arrangements at different levels of society, as well as at the family and personal levels,
- f) the promotion of transdisciplinary research, both on theoretical issues and on applications to concrete problems.

These IIIS objectives have oriented the organizational efforts of yearly WMSCI/ISAS conferences since 1995.

On behalf of the Organizing Committee, I extend our heartfelt thanks to:

1. The 688 members of the Program Committee from 61 countries (including the PC members of the events organized in its context and jointly with it). Almost all the members of the Program Committee are *authors or co-authors sessions' best papers*, i.e. papers selected by the respective audience as the best paper of the session in which they were presented;
2. The 519 additional reviewers, from 74 countries, for their *double-blind peer reviews*; and
3. The 221 reviewers, from 54 countries, for their efforts in making the *non-blind peer reviews*. (Some reviewers supported both: non-blind and double-blind reviewing for different submissions).

A total of 1171 reviews made by 740 reviewers (who made at least one review) contributed to the quality achieved in WMSCI 2016. This means an average of 5.47 reviews per submission (214 submissions were received). *Each registered author had access, via the conference web site, to the reviews that recommended the acceptance of their respective submissions*. Each registered author could also get information about: 1) the average of the reviewers' evaluations according to 8 criteria, and the average of a global evaluation of his/her submission; and 2) the comments and the constructive feedback made by the reviewers, who recommended the acceptance of his/her submission, so the author would be able to improve the final version of the paper.

In the organizational process of WMSCI 2016, about 214 articles were submitted. These pre-conference proceedings include about 96 papers that were accepted for presentation from 28 countries (43 countries taking into account the presentations in collocated events). I extend our thanks to the invited sessions' organizers for collecting, reviewing, and selecting the papers that will be presented in their respective sessions. The submissions were reviewed as carefully as time permitted; it is expected that most of them will appear in a more polished and complete form in scientific journals.

This information about WMSCI 2016 is summarized in the following table, along with the other collocated conferences:

Conference	# of submissions received	# of reviewers that made at least one review	# of reviews made	Average of reviews per reviewer	Average of reviews per submission	# of papers included in the proceedings	% of submissions included in the proceedings
WMSCI 2016	214	740	1171	1.58	5.47	96	44.86%
IMSCI 2016	147	357	691	1.94	4.70	60	40.82%
CISCI 2016	133	509	1111	2.18	8.35	52	39.10%
<b>TOTAL</b>	<b>494</b>	<b>1606</b>	<b>2973</b>	<b>1.85</b>	<b>6.02</b>	<b>208</b>	<b>42.11 %</b>

We also extend our gratitude to the invited sessions' organizers: Dr. Shigehiro Hashimoto, and Dr. Natalja Lace, as well as the special track co-chairs and the co-editors of these proceedings, for the hard work, energy and eagerness they displayed preparing their respective sessions. We express our intense gratitude to Professor William Lesso (1931-2015) for his wise and opportune tutoring, for his eternal energy, integrity, and continuous support and advice, as the Program Committee Chair of past conferences, as well as for being a very caring old friend and intellectual father to many of us. We also extend our gratitude to Professor Belkis Sánchez, who brilliantly managed the organizing process.

Our gratitude to Professors Bela H. Banathy, Stafford Beer, George Klir, Karl Pribram, Paul A. Jensen, and Gheorghe Benga who dignified our past WMSCI conferences by being their Honorary Presidents. Special thanks to Dr. C. Dale Zinn and Professor Jorge Baralt for co-chairing WMSCI 2016 Program Committee and to professors Andrés Tremante and Belkis Sánchez for co-chairing the Organizing Committee. We also extend our gratitude to the following scholars, researchers, and professionals who accepted to deliver plenary workshops and/or to address the audience of the General Joint Plenary Sessions with keynote addresses.

**Plenary Workshops**, more details (abstracts and short bios) were included in the Conference Program booklet and at <http://www.iiis.org/summer2016plenaryevents/>

**Professor Emeritus Stuart Umpleby**, The George Washington University, USA, Former President of The American Society of Cybernetics.

**Tom Hull**, MS. CIO Florida Polytechnic University, USA, Vice President and Chief Information Officer, CTO of Moffitt Cancer Center, Former VP and CIO - Pace University; VP and CIO - Siena College, IBM Director and Executive Consultant.

**Plenary Keynote Speakers**, more details more details (abstracts and short bios) were included in the Conference Program booklet and at <http://www.iiis.org/summer2016plenaryevents/>

**Professor J. Hanns Pichler**, University of Economics & Business Administration, Vienna, Austria, Senior Schumpeter Fellow, Center for European Studies/Harvard University.

**Professor Shigehiro Hashimoto**, Kogakuin University, Japan, Associate to the President and Dean of Admissions Center, Doctor of Engineering and Doctor of Medicine, Professor and Researcher on Biomedical Engineering.

**Professor Stuart A. Umpleby**, The George Washington University, USA, Director of the Research Program in Social and Organizational Learning, Former President of The American Society of Cybernetics.

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We also extend our gratitude to the following scholars, researchers, and professionals who accepted to deliver keynote addresses at the sub-plenary session of the The 15<sup>th</sup> Ibero-American Conference on Systems, Cybernetics and Informatics: CISCi 2016 (*Décima Quinta Conferencia Iberoamericana en Sistemas, Cibernética e Informática: CISCi 2016*) collocated with WMSCI 2016 and IMSCI 2016

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Our gratefulness is also extended to the organizations that provided scientific, academic, professional, or corporative co-sponsorships. The following are among these organizations:



Special Thanks to Dr. Jeremy Horne, Dr. Harvey Hyman, and Ms. Molly Youngblood Geiger (Google Partners Community Ambassador) for their efforts in helping us with the identification of above shown co-sponsors.

We extend our gratitude as well to María Sánchez, Juan Manuel Pineda, Marcela Briceño, and Freddy Callaos for their knowledgeable effort in supporting the organizational process producing the hard copy and CD versions of the proceedings, developing and maintaining the software supporting the interactions of the authors with the reviewing process and the Organizing Committee, as well as for their support in the help desk and in the promotional process.

Professor Nagib C. Callaos, Ph. D.  
WMSCI 2016 General Chair  
[www.iiis.org/Nagib-Callaos](http://www.iiis.org/Nagib-Callaos)



**WMSCI 2016**  
**The 20<sup>th</sup> World Multi-Conference on Systemics, Cybernetics and Informatics**  
**Special Track on Management, Engineering and Informatics: MEI 2016**  
**Special Track on Bio- and Medical Informatics and Cybernetics: BMIC 2016**  
**Special Track on Academic Globalization and Inter-Cultural Communication: AGIC 2016**  
**Special Track on Knowledge and Cognitive Science and Technologies: KCST 2016**  
**Special Track on Risk Management and Cyber-Informatics: RMCI 2016**

## VOLUME II

## CONTENTS

<b>Contents</b>	i
 <b>Applications in Electrical Engineering</b>	
Gregor, Raúl *; Renault, Alfredo *; Comparatore, Leonardo *; Pacher, Julio *; Rodas, Jorge *; Gregor, Derlis *; Muñoz, Javier **; Rivera, Marco ** (* Paraguay, ** Chile): "Finite-States Model Predictive Control with Increased Prediction Horizon for a 7-Level Cascade H-Bridge Multilevel STATCOM"	1
Qabazard, Adel (Kuwait): "Methodological Application to Integrate Renewable Energy Resource into Kuwait's Electrical Grid"	7
 <b>Applications in Environmental Engineering</b>	
Akarapu, Vikranth; Gunkala, Sairam; Pattigadapa, Sahitya; Pattigadappa, Bharani Krishna; Ponnappall, Srikar; Segall, Richard S. (USA): "Statistical Quality Control and Improvement of Waste Water Treatment Plant"	12
Ismail, Zainab Z.; Mohammed, Ali J. (Iraq): "Biotreatment of Slaughterhouse Wastewater Accompanied with Sustainable Electricity Generation in Microbial Fuel Cell"	18
 <b>Applications in Power and Energy Engineering</b>	
Caballero, David *; Gavilán, Federico *; Maqueda, Edgar *; Gregor, Raúl *; Toledo, Sergio *; Rodas, Jorge *; Gregor, Derlis *; Rivera, Marco ** (* Paraguay, ** Chile): "Active and Reactive Power Control Strategy for Grid-Connected Six-Phase Generator by Using Multi-Modular Matrix Converters"	24
Velázquez-Araque, Luis; Cárdenas, José (Ecuador): "A Preliminary Study of Pelletized Ecuadorian Cocoa Pod Husk for its. Use as a Source of Renewable Energy"	29
 <b>Special Track on Interdisciplinary Research, Education, and Communication: Summer IDREC 2016</b>	
Dimauro, Giovanni; Scalera, Michele; Visaggio, Giuseppe (Italy): "The Educational Cloud, Problems and Perspectives"	34

Kvasnicova, Terezia; Kremenova, Iveta; Fabus, Juraj; Babusiak, Branko (Slovakia): "e-Commerce User Experience: Do We Feel under Pressure During Online Shopping?"	41
Loffredo, Donald; Tavakkoli, Alireza (USA): "Analyzing Motives, Preferences, and Experiences in Video Game Play"	45
Lom, Michal; Pribyl, Ondrej; Zelinka, Tomas (Czech Republic): "System Engineering for Smart Cities - Hybrid-Agile Approach in Smart Cities Procurement"	50
Senan, Divya C. *; Edwards, Matthew E. **; Khan, Salam **; Vilasini, Asha J. * (* India, ** USA): "Effectiveness of a Constructivistic Multimedia-Learning Package on Shaping and Guiding Students' Attitudes Toward Physics"	56

## **Engineering and Management**

Almalki, Hamed M.; Rabelo, Luis; Davis, Charles; Usmani, Hammad; Hollister, Debra (USA): "Analyzing the Existing Undergraduate Engineering Leadership Skills"	63
Goker, Nazli; Karsak, E. Ertugrul (Turkey): "An Improved Common Weight DEA-Based Decision Approach for Problems with Multiple Inputs and Multiple Outputs"	68
Wang, Junliang; Zhang, Jie (China): "A Hybrid Data Driven Approach for Cycle-Time Forecasting in Semiconductor Wafer Fabrication System"	74

## **Management Science**

Chiu, Singa Wang; Chen, Yu-Ru; Li, Yi-Ying; Ting, Su Yu; Chiu, Yuan-Shyi P. (Taiwan): "An Alternative Approach for Solving FPR Model with Quality Assurance, Multi-Customer, and Discontinuous Deliveries"	79
Chiu, Yuan-Shyi Peter; Chiang, Kuo-Wei; Chiu, Singa Wang; Chen, Han-Ying (Taiwan): "On Finite Production Rate Model with Quality Assurance, Multi-Customer, and Discontinuous Deliveries"	85
Lara Gracia, Marco A. (USA): "Queuing Theory – Based Modeling and Analysis of an Airport's Customs Facility"	91
Yoon, Ki-Kwan (South Korea): "Who Drives Market Access for Genetically Modified Organisms and Products in Korea? A Political Economy Approach to Sustainable Development"	96

## **Biomedical Engineering - Invited Session**

### **Organizer: Shigehiro Hashimoto and Yusuke Takahashi (Japan)**

Hashimoto, Shigehiro; Hino, Haruka; Takahashi, Yusuke; Hiraoka, Akira (Japan): "Design of Comb-Shaped Surface Electrode to Measure Signal from Tissue Cultured with Electric Stimulation"	99
Hino, Haruka; Hashimoto, Shigehiro; Takahashi, Yusuke; Ochiai, Masashi (Japan): "Effect of Shear Stress in Flow on Cultured Cell: Using Rotating Disk at Microscope"	105

Hino, Haruka; Hashimoto, Shigehiro; Takahashi, Yusuke; Nakajima, Hiroaki (Japan): "Effect of Ultrasonic Vibration on Proliferation and Differentiation of Cells"	111
Hino, Haruka; Hashimoto, Shigehiro; Takahashi, Yusuke; Nakano, Shusuke (Japan): "Design of Cross Type of Flow Channel to Control Orientation of Cell"	117
Hino, Haruka; Sugimoto, Hiromi; Takahashi, Yusuke; Hashimoto, Shigehiro; Miura, Shoki (Japan): "Behavior of Cells in Excess Gravitational Field: Using Centrifuge"	123
Mizoi, Atsushi; Takahashi, Yusuke; Hino, Haruka; Hashimoto, Shigehiro; Yasuda, Toshitaka (Japan): "Deformation of Cell Passing through Micro Slit between Micro Ridges"	129
Sugimoto, Kenta; Takahashi, Yusuke; Hino, Haruka; Hashimoto, Shigehiro (Japan): "Effect of Aspect Ratio of Checkered (Ichimatsu) Convexo-Concave Micro-Pattern on Orientation of Cultured Cells"	135
Sugimoto, Hiromi; Hino, Haruka; Takahashi, Yusuke; Hashimoto, Shigehiro (Japan): "Effect of Surface Morphology of Scaffold with Lines of Micro Ridges on Deformation of Cells"	141
Takahashi, Yusuke; Mizoi, Atsushi; Hashimoto, Shigehiro; Hino, Haruka; Noda, Kenta (Japan): "Cell Behavior around Surface-Electrode with Electric Pulses"	147
Takahashi, Yusuke; Hashimoto, Shigehiro; Hino, Haruka; Takeda, Tomokazu (Japan): "Electric Stimulation for Acceleration of Cultivation of Myoblast on Micro Titanium Coil Spring"	153
Takahashi, Yusuke; Sugimoto, Kenta; Hino, Haruka; Katano, Tomoaki; Hashimoto, Shigehiro (Japan): "Design of Scaffold with Array of Micro Projections to Trace Intra- and Inter-Cellular Behavior"	159
Takahashi, Yusuke; Hashimoto, Shigehiro; Hino, Haruka; Azuma, Tatsuki (Japan): "Design of Slit between Micro Cylindrical Pillars for Cell Sorting"	165

## **Bio-Complexity**

Errigo, Demetrio P. (Italy): "An Analog Simulation of the Human Neural System. The Model Realization. The Main Theoric Bases of the Model Realization"	171
--	-----

## **Medical Informatics: Applications and the Use of Information and Communication Technologies (ICT) by Medical and Health-Care Practitioners**

Liu, Ying Chieh; Hung, Yun Ying; Lee, Yu Hung (Taiwan): "Flipped Learning to Quality: An Acute and Critical Care Simulation Experience for University Nursing Students"	178
---	-----

## **Academic Globalization**

Kim, Yong-Jae (South Korea): "A Study on the Development Strategy for Expanding TBT"	181
Lo, Yen-Fen *; Lo, Yen-Hsi *; Hsiao, Jung ** (* Taiwan, ** USA): "A Case Study of Synchronous Distance Learning Between Shih Chien University and Beijing Foreign Studies University"	185

## **Inter-Cultural Communication**

Orazbayeva, Balzhan *; Baaken, Thomas *; Meerman, Arno ** (* Germany, ** Netherlands): "Intercultural Knowledge Transfer in Teams – Findings Based on a Case Study"	190
Redkin, Oleg; Bernikova, Olga (Russian Federation): "Globalization and the Arabic Language Acquisition"	196
Stingl de Vasconcelos Guedes, Tilia *; Costa dos Santos Wüthrich, Fernanda **; Shahini-Hoxhaj, Remzie *** (* Austria, ** Switzerland, *** Kosovo): "The Role of Media Pedagogy in Post-Crisis Societies within a Globalized World"	200
White, Marta Szabo (USA): "Culture Propels the Intersection of Ethos, Pathos, and Logos with Innovation and Entrepreneurship"	206

## **Knowledge and Cognitive Science and Technologies**

Nam, Deok; Singh, Harpreet (USA): "Comparative Studies of Dimensionality Reduction Techniques for Preprocessed Correlation Based Dimensionality Reduction"	212
Power, Faith B.; Croswell, Clyde V. (USA): "The Enaction of Embodied Wisdom: The Unifying, Dynamic Nature of Cognition, Behavior, and Affect"	218

## **Effective Risk Identification, Analysis and Evaluation**

Lusková, Mária; Titko, Michal; Leitner, Bohuš (Slovakia): "Multilevel Approach to Measuring Societal Vulnerability due to Failure of Critical Land Transport Infrastructure"	224
Müller, Jürgen; Moritz, Werner; Nörthemann, Kai; Biengen, Jan-Eric (Germany): "Early Forest Fire Detection Using Low Energy Hydrogen Sensors"	229
Plos, Vladimir; Soušek, Radovan; Szabo, Stanislav (Czech Republic): "Risk-Based Indicators Implementation and Usage"	235
Plos, Vladimir; Nemec, Vladimir; Szabo, Stanislav (Czech Republic): "The Role of Taxonomies for the Safety Indicators Definition"	238
Šustr, Martin *; Pluhař, Matěj *; Soušek, Radovan *; Fuchs, Pavel *; Nedeliaková, Eva ** (* Czech Republic, ** Slovakia): "Methodologies for the Crisis States in the Czech Republic"	242
Sventekova, Eva; Luskova, Maria; Dvorak, Zdenek (Slovakia): "Use of Network Analysis in Conditions of Critical Infrastructure Risk Management"	247

<b>Authors Index</b>	251
----------------------	-----



Pages 1-250 are not included in this book preview.

To view the papers, please, click the “Home” button at the top of this page, and then, click the “Papers” link for this volume.



## AUTHORS INDEX

### Volume II

Akarapu, Vikranth	12	Hino, Haruka	99; 105; 111; 117;
Almalki, Hamed M.	63		123; 129; 135;
Azuma, Tatsuki	165		141; 147; 153;
Baaken, Thomas	190		159; 165
Babusiak, Branko	41	Hiraoka, Akira	99
Bernikova, Olga	196	Hollister, Debra	63
Biengen, Jan-Eric	229	Hsiao, Jung	185
Caballero, David	24	Hung, Yun Ying	178
Cárdenas, José	29	Ismail, Zainab Z.	18
Chen, Han-Ying	79	Karsak, E. Ertugrul	68
Chen, Yu-Ru	85	Katano, Tomoaki	159
Chiang, Kuo-Wei	79	Khan, Salam	56
Chiu, Singa Wang	79; 85	Kim, Yong-Jae	181
Chiu, Yuan-Shyi P.	85	Kremenova, Iveta	41
Chiu, Yuan-Shyi Peter	79	Kvasnicova, Terezia	41
Comparatore, Leonardo	1	Lara Gracia, Marco A.	91
Costa dos Santos Wüthrich,	200	Lee, Yu Hung	178
Fernanda		Leitner, Bohuš	224
Croswell, Clyde V.	218	Li, Yi-Ying	85
Davis, Charles	63	Liu, Ying Chieh	178
Dimauro, Giovanni	34	Lo, Yen-Fen	185
Dvorak, Zdenek	247	Lo, Yen-Hsi	185
Edwards, Matthew E.	56	Loffredo, Donald	45
Errigo, Demetrio P.	171	Lom, Michal	50
Fabus, Juraj	41	Luskova, Maria	247
Fuchs, Pavel	242	Lusková, Mária	224
Gavilán, Federico	24	Maqueda, Edgar	24
Goker, Nazli	68	Meerman, Arno	190
Gregor, Derlis	1; 24	Miura, Shoki	123
Gregor, Raúl	1; 24	Mizoi, Atsushi	129; 147
Gunkala, Sairam	12	Mohammed, Ali J.	18
Hashimoto, Shigehiro	99; 105; 111; 117;	Moritz, Werner	229
	123; 129; 135;	Müller, Jürgen	229
	141; 147; 153;	Muñoz, Javier	1
	159; 165	Nakajima, Hiroaki	111
		Nakano, Shusuke	117

Nam, Deok	212	Velázquez-Araque, Luis	29
Nedeliaková, Eva	242	Vilasini, Asha J.	56
Nemec, Vladimír	238	Visaggio, Giuseppe	34
Noda, Kenta	147	Wang, Junliang	74
Nörthemann, Kai	229	White, Marta Szabo	206
Ochiai, Masashi	105	Yasuda, Toshitaka	129
Orazbayeva, Balzhan	190	Yoon, Ki-Kwan	96
Pacher, Julio	1	Zelinka, Tomas	50
Pattigadapa, Sahitya	12	Zhang, Jie	74
Pattigadappa, Bharani Krishna	12		
Plos, Vladimir	235; 238		
Pluhař, Matěj	242		
Ponnapall, Srikar	12		
Power, Faith B.	218		
Pribyl, Ondrej	50		
Qabazard, Adel	7		
Rabelo, Luis	63		
Redkin, Oleg	196		
Renault, Alfredo	1		
Rivera, Marco	1; 24		
Rodas, Jorge	1; 24		
Scalera, Michele	34		
Segall, Richard S.	12		
Senan, Divya C.	56		
Shahini-Hoxhaj, Remzie	200		
Singh, Harpreet	212		
Sousek, Radovan	235		
Soušek, Radovan	242		
Stingl de Vasconcelos	200		
Guedes, Tilia			
Sugimoto, Hiromi	123; 141		
Sugimoto, Kenta	135; 159		
Šustr, Martin	242		
Sventekova, Eva	247		
Szabo, Stanislav	235; 238		
Takahashi, Yusuke	99; 105; 111; 117; 123; 129; 135; 141; 147; 153; 159; 165		
Takeda, Tomokazu	153		
Tavakkoli, Alireza	45		
Ting, Su Yu	85		
Titko, Michal	224		
Toledo, Sergio	24		
Usmani, Hammad	63		