SORRENTO
Hotel Imperial Tramontano
November 26 – 29, 2019

SITIS  2019
15th IEEE Conference on Signal Image Technology and Internet based Systems
### ACKNOWLEDGEMENTS

For their invaluable contribution, our gratitude goes to:

<table>
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<tr>
<td><img src="image" alt="UB Logo" /></td>
<td>Université de Bourgogne Dijon, France</td>
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<tr>
<td><img src="image" alt="LiB Logo" /></td>
<td>Laboratoire d’Informatique de Bourgogne France</td>
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<tr>
<td><img src="image" alt="ICAR Logo" /></td>
<td>Institute of High Performance Computing and Networking, National Research Council Italy</td>
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<td><img src="image" alt="Uni Salerno Logo" /></td>
<td>Università di Salerno, Italy</td>
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<td><img src="image" alt="Uni Milano Logo" /></td>
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<td><img src="image" alt="ImViA Logo" /></td>
<td>Image et Vision Artificielle France</td>
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<td><img src="image" alt="IEEE Logo" /></td>
<td>SIGSMM Special Interest Group on Semantic Multimedia Management</td>
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<td>French Chapter of the Special Interest Group on Applied Computing</td>
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FOREWORD

This is the 15th edition of the International Conference On Signal-Image Technology & Internet-Based Systems (SITIS 2019). It comprises two tracks, namely SIVT (Signal & Image and Vision Technology) and I-WeCA (Intelligent Web Computing and Application). The focus of the SIVT track is on recent developments in digital signal processing and pays particular attention to evolutions in signal processing, image analysis, vision, coding & authentication, and retrieval techniques. The I-WeCA track focuses on emerging concepts, architectures, protocols, and methodologies for both information management on the Web and the Internet of Things technologies that connect unlimited numbers of smart objects to make our environment more interactive.

In addition to the main tracks, SITIS2019 include three keynotes, twelve workshops and a poster session. The workshops cover a wide range of related topics, namely, the workshops on:

- Appearance and Imaging (WAI)
- Applied Computational Intelligence (ACI)
- Artificial Intelligent Approaches for Image Processing (IWAIP)
- Computational Intelligence for Multimedia Understanding (IWCM)
- Distributed, Autonomic and Robust Wireless Networks (DARWIN)
- Human Tracking and Behavior Analysis (HTBA)
- Intelligent Multimedia Information Retrieval and Applications (I-MIRA)
- Knowledge Acquisition, Reuse and Evaluation (KARE)
- Numerical Algorithms and Methods for Data Analysis and Classification (NAMDAC)
- Open Business Intelligence Systems (OBIS)
- Quality of Multimedia Services (QUAMUS)
- Ubiquitous implicit BIOmetrics and health signals monitoring for person-centric applications (UBIO)

189 research contributions were received from all around the world and a peer review process was carried out by each track and workshop. Each paper received 3 or more reviews. The acceptance decision, based on the 3 reviewing reports available for each paper, takes into account the relevance paper to track or workshop topics, scientific correctness and clarity of presentation. As a result, 98 papers are included in the Technical Program and in the conference proceedings. In addition to the accepted contributions, the Technical Program includes three keynote lectures by Dr Josiane Zerubia (INRIA, Sophia-Antipolis,
France), Dr Ernesto Damiani (Artificial Intelligence and Intelligent Systems Institute, Khalifa University UAE, professor at University of Milan, Italy) and Dr Mourad Oussalah (University of Oulu, Finland).

If participants will enjoy SITIS 2019, this is definitely due to the dedication of many who have contributed in different ways to select a fine scientific program and exciting social events for the conference program. We acknowledge the commitment and hard work of the track and workshop chairs who have kept the scientific program in focus and made the discussions interesting and invaluable; we recognize the commitment and contributions of the program committee members and the additional reviewers for evaluating the papers on a very tight time schedule; we also gratefully thank all the members of the local organizing committee. We could not have done it without them.

We thank the Honorary Chair, Dr Ernesto Damiani and the General Co-chairs, Dr Gabriella Sanniti di Baja and Dr Giuseppe De Pietro, for their guidance and precious support. Our gratitude also goes to our academic sponsor institutions for their cooperation, support and assistance: University of Bourgogne, University of Milan, the research groups ImVIA and LIB at the University of Bourgogne, ICAR (Institute of High-Performance Computing and Networking) of the National Research Council of Italy.

Last, but not least, we thank the authors for submitting and trusting their work to the conference.

We hope the scientific program of SITIS 2019 will satisfy your expectations. We also hope that you will find time to discover and appreciate the beauty, flavors and wonders of Sorrento.

The Organizing Committee:
Albert Dipanda, Luigi Gallo, Gabriella Sanniti di Baja
Kokou Yetongnon, Richard Chbeir
SITIS 2019
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AI in Cyber Security

Ernesto Damiani
Artificial Intelligence and Intelligent Systems Institute
Khalifa University / University of Milan

Abstract
Recent developments of artificial intelligence (AI) have already had a strong impact on cyber-security technologies. In security products today there is certainly no lack of examples of AI systems capable of extracting key elements from the information flows coming from the network and automatically channeling them to local and remote decision points. These systems are based on the idea of the “telescope”, in which a periphery of passive sensors acquires all the information that it can find, and an intelligent system customizes and packages them for local reactions as well as that of remote decision center. A first generation of AI systems following the telescope approach has already demonstrated its potential in various security applications. However, attackers today have learnt to decouple malware infiltration, operation and exfiltration. “Sleeper modules” randomizing hostile activity along time make telescope-based detection more problematic. The second generation of AI systems for cybersecurity is still in a preliminary stage, but it is already leading to a radical change. AI makes it possible to conceive a “cyber-battlefield” composed of geo-space (the physical world), space (satellite and airborne detectors) and cyberspace where (i) humans may not be involved in tactical decisions, and (ii) the information proactively gathered by actions in a part of the environment is used to make automatic decisions (i.e., without going back up a chain of command) in another area. The talk provides an overview of the two generations of AI techniques for cybersecurity and points to some key aspects of the field’s evolution.

Biography
Ernesto Damiani is the Senior Director of Artificial Intelligence and Intelligent Systems Institute, Khalifa University, leader of the Big Data area at Etisalat British Telecom Innovation Center, and Full Professor at Università degli Studi di Milano, where he leads the SESAR Lab. Ernesto Damiani’s work has more than 15,500 citations on Google Scholar and more than 6,500 citations on Scopus. His areas of interest include Artificial Intelligence, Machine Learning, Big Data Analytics, Edge/Cloud security and performance, and cyber-physical systems. Ernesto has been a recipient of the Stephen Yau Award from the Service Society, of the Outstanding contributions Award from IFIP TC2, of the Chester-Sall Award from IEEE IES, and of a doctorate honoris causa from INSA – Lyon (France) for his contribution to Big Data teaching and research.
Keynote 2

Cascade Model for Hierarchical Joint Classification
Josiane Zerubia
INRIA, Sophia-Antipolis, France

Abstract
Nowadays the capabilities to monitor the Earth's surface, notably agricultural, urban and built-up areas are becoming more and more important for both civilian and military applications. Within this framework, accurate and time-efficient classification methods are crucial tools required to support the rapid and reliable assessment of ground changes and damages induced for example by a natural disaster, in particular when an extensive area has been affected. Given the substantial amount and variety of data currently available from the last generation of very-high resolution (VHR) satellite missions, the main methodological difficulty is to develop classifiers that are powerful and flexible enough to utilize the benefits of multi-band, multi-resolution, multi-date, and possibly multi-sensor imagery. In this talk, first a brief introduction to MRF will be done, and then a family of novel cascade techniques based on the marginal posterior modes (MPM) criterion will be described. The developed cascade methods have been experimentally validated with complex optical multi-spectral (Pleiades), X-band SAR(COSMO-SkyMed), and C-band SAR (RadarSat-2) data after Haiti earthquake. The experimental results show that the cascade methods are able to provide accurate classification maps from heterogeneous remote sensing data.

Biography
Josiane Zerubia has been a permanent research scientist at INRIA since 1989 and director of research since July 1995. She was successively head of 3 laboratories in remote sensing from 1995 to 2016. She has been professor at ISAE-SUPAERO in Toulouse since 1999. Her main research interest is in signal and image processing using probabilistic models. She also works on parameter estimation, statistical learning, optimization techniques and neural networks (in particular cellular NN). In terms of applications, she worked on speech processing (1982-1988), biological image processing (2001-2011), skin imaging (2009-2018) and remote sensing (1988-). She published nearly 100 journal papers and more than 250 papers in international conferences. She published a book on Markov random fields in image segmentation in 2012 (Now pub.), co-authored with Prof. Zoltan Kato. She was co-editor with Prof. Gabriele Moser of a book on mathematical models for remote sensing image processing in 2018 (Springer pub.). Currently her hindex is 53 and i10 is 184 on Google Scholar, her RG score is 40.03. She has been nominated EURASIP Fellow in 2019. She is also a Fellow of the IEEE (2003) and was IEEE SP Society Distinguished Lecturer (2016-2017). She received the excellency award from Université Cote d'Azur (UCA) in 2016, several best paper awards with her students and collaborators, and was made "Chevalier de l'Ordre National du Mérite" by the President of the French Republic in 2002 for an exemplary career in research.
Text Mining and Social Media Analysis. New horizon for fake news identification

Mourad Oussalah
Information Technology and Electrical Engineering
Centre for Machine Vision and Signal Analysis
University of Oulu, Finland

Abstract
In the era of internet computing, social media offers the possibility to create, receive and share public messages at relatively low cost and ubiquitously in various formats (textual, image/video, sound, geolocation) and across various domains (e.g., politics, entertainment, social, business, crisis management and science). This led to an increasing accumulation of data, often termed as social media big data, which opens up new opportunities for exploring both communication and community patterns, including linguistic, social and network related features for the purpose of individual / community behavior analysis for instance. It has been especially found useful in identifying new trends to interact with customers in business sector; in supporting decision-making processes that rely on performance indicators issued from real time social media data; in predicting the spread of diseases through tracking symptoms in social media data; in gathering intelligence that would prevent occurrence of security threats, among others. Social media analytics has helped governments, political and mass organizations to gain new insights from the communication for deriving useful strategies, organize protests, reach new audience, win new support for their cause and design their future plans accordingly. Nevertheless, this should not hide the negative effect of social media in populating rumor and misinformation or fake news in a way to destabilize the whole community or country, which renders social media analytics task rather challenging. This talk aims to shine the light on this phenomenon and review various strategies that are often used to approach the solution with special consideration to Twitter social media platform. Ultimately, the concept of “new information” is somehow related to the notions of novelty detection in computational linguistics, spam and discourse identification together with leveraging evidence gathered from sources conveying this new-information. Therefore, intuitively, techniques issued from information fusion, filtering, argumentation theory are of interest for this purpose. A set of exemplifications will be employed to illustrate the concept and shed light on new development opportunities.

Biography
Dr. Mourad Oussalah is a recently appointed Research Professor in University of Oulu, Faculty of Information Technology and Electrical Engineering, Centre for Machine Vision and Signal Analysis, where he leads the Social Mining Research Group. Prior joining University of Oulu, he was with the University of Birmingham, UK from 2003-2016. He also held research positions at City University of London and KU Leuven in Belgium, and Visiting Professor position in University of Evry Val Essonnes of France (summer 2006), New Mexico of USA (summer 2009) and Xian of China (Fall 2018). Dr. Oussalah research has concentrated mainly on information and data fusion, text mining, information retrieval and uncertainty handling where he published more than 250 international publications and supervised a dozen of PhD students and more than 40 Msc students, provided more than 20 keynote talks at international conferences and served as PC
members of more than 60 international conferences and won best paper awards at IEEE International Conference on Cybernetic Intelligent Systems 2008, WCE, 2015 and best paper nominee at KDIR 2017. He is a Fellow of Royal Statistical Society and Senior member of IEEE and acted as executive of IEEE SMC UK & Ireland Chapter from 2002 till 2016. Dr. Oussalah is also leading and participating into several EU projects including YoungRes (#823701) (2019-2021) on Youth polarization, Prince (#815362) (2019-2022) on CBRNE incidents, Cutler (#770469) on Coastal Urban development, CBC Karelia (Finland-Russia) on IoT Business Creation (2018-2020), Grage –Marie Skłodowska-Curie action (ID:645706) (2016-2018) on active ageing and elderly living in urban settings. He also secured funding from several foundations (e.g., Finnish Cancer Research, Nokia and Nuffield foundations).
Conference events

**Tuesday November 26, 2019**

- **Opening ceremony**
- **Keynote 1 by Dr Ernesto Damiani**
- **Keynote 2 by Dr Josiane Zerubia**
- **Welcome reception**

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<td>15:30–16:30</td>
<td>Keynote 2 by Dr Josiane Zerubia</td>
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<td>19:00–20:00</td>
<td>Welcome reception</td>
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**Wednesday November 27, 2019**

- **Conference Banquet**

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**Thursday November 28, 2019**

- **Keynote 3 by Dr Mourad Oussalah**
- **A taste of Sorrento (Buffet Dinner)**

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<td>Keynote 3 by Dr Mourad Oussalah</td>
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<td>20:30</td>
<td>A taste of Sorrento (Buffet Dinner)</td>
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Tuesday November 26, 2019

13:30 - 19:30
15:00 – 15:30 Coffee Break
19:00 – 20:00 Welcome Reception
(room Lobby Area)

Room Aminta

13:30-14:30
Opening Ceremony

14:00 -15:00 Keynote 1
AI in Cyber Security
Ernesto Damiani (Khalifa University, UAE, University of Milan, Italy)
Chairs: Luigi Gallo and Giuseppe De Pietro

15:30 -16:30 Keynote 2
Cascade Model for Hierarchical Joint Classification
Josiane Zerubia (INRIA, Sophia-Antipolis, France)
Chairs: Albert Dipanda and Gabriella Sanniti di Baja

Room Session | Tuesday November 26, 2019 --- 16:30-18:30
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Room Aminta

SIVT-S1

TRACK SIVT: Signal Image and Vision Technologies
SIVT S1: Object detection & image segmentation
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66 Improved Palmprint Segmentation for Robust Identification and Verification
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Jag Mohan Singh, Sashma Venkatesh, Kiran B. Raja, Raghavendra Ramachandra and Christoph Busch
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106 Unsupervised Novelty Detection in Video with Adversarial Autoencoder based on Non-Euclidean Space
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129 An Efficient Dense Network for Semantic Segmentation of Eyes Images Captured With Virtual Reality Lens
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165 Proposition of convolutional neural network based system for skin cancer detection
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Room Four

Seasons

IWECA-S1

WS DARWIN

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| 119 Analyzing stress situations for blind people | Youssef Keryakos, Youssef Bou Issa, Abdallah Makhoul and Michel Salomon |
| 125 A Novel Approach to Detect Outer Retinal Tubulation using U-Net in SD-OCT images | István Megyeri, Melinda Katona and Laszlo G. Nyul |
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### Wednesday November 27, 2019

**10:00 - 18:30**

10:00 – 10:30 Coffee Break …fast

16:00 – 16:30 Coffee Break

20:30 Conference Banquet

(room: Hotel Restaurant)

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### Room Session

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Seasons WS HTBA: Workshop on Human Tracking and Behaviour Analysis  
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117 Agent-based Approach of Multi-Structures Homecare Planning Problem  
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<tr>
<td>10:00 – 18:30</td>
<td>Coffee Break</td>
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<tr>
<td>16:00 – 16:30</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>20:30 – 20:30</td>
<td>A Taste of Sorrento (Buffet Dinner) (room: Hotel Restaurant)</td>
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**Room Aminta**

**09:00 - 10:00 Keynote 3**

Text Mining and Social Media Analysis. New horizon for fake news identification

Mourad Oussalah (University of Oulu, Finland)

Chairs: Luigi Gallo and Kokou Yetongnon

**Thursday November 28, 2019 --- 10:30-12:30**

**Room Aminta**

**SIVT-S4**

- TRACK SIVT: Signal Image and Vision Technologies
- SIVT S4: Deep learning applications
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- 5 Convolution Neural Networks for Arabic Font Recognition
  George Sakr, Ammar Mhanna and Tony Demerjian
- 8 Manifold extraction in fluorescent stack via deep learning
  Jianfeng Cao and Hong Yan
- 11 Comparing Deep Learning Models for Road Asset Detection and Classification in LiDAR Point Cloud
  George Sakr, Ary Berberian and Patrick Habib
- 38 Machine Learning Based Detection of Hearing Loss Using Auditory Perception Responses
  Muhammad Ilyas and Amine Nait-Ali
- 49 Benchmarking the Imbalanced Behavior of Deep Learning Based Optical Flow Estimators
  Stefano Savian, Mehdi Elahi and Tammam Tillo
- 122 Spotting insects from satellites: modeling the presence of Culicoides Imicola through Deep CNNs
  Angelo Porrello, Stefano Vincenzi, Pietro Buzzega, Annamaria Conte, Carla Ippoliti, Luca Candeloro, Alessio Di Lorenzo, Andrea Capobianco Dondona and Simone Calderara
- 147 Breast Ultrasound Image Classification using a Pre-trained Convolutional Neural Network
  Mohammad I. Daoud, Samir Abdel-Rahman and Rami Alazrai

**Room Four Seasons**

**WS IWAIP S1**

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- IWAIP S1: SESSION 1
- Chair: Thaweesak Yingthawornsuk, KMUTT, Thailand
- 56 Loop Closure Detection for Monocular Visual Odometry : Deep-Learning Approaches Comparison
  Mohamed Ali Sedrine, Wided Souidene Mseddi, Takoua Abdellatif and Rabah Attia
- 128 Using entropy and Marr wavelets to automatic feature detection for image matching
  Beibei Cui and Jean-Charles Créput
- 176 Gender Recognition for juvenile unconstrained faces using Gabor-MeanPool-DCT Feature Model and SVM-Kernel Optimization
  Sandeep Kumar Gupta and Neeta Nain
- 182 Kinematics Solution using Metaheuristic Algorithms
  Ashwani Kumar, Vijay Kumar Banga, Darshan Kumar and Thaweesak Yingthawornsuk
183 Image patch similarity through a meta-learning metric based approach  
Patricia Suarez, Angel Sappa and Boris Vintimilla

187 Inverse Kinematics Solution of Programmable Universal Machine for Assembly (PUMA) Robot  
Garjeet Singh, Vijay Kumar Banga and Thaweesak Yinghawornsuk

189 An interactive table with temperature sensors LED  
Sirimonpak Suwannakhun

Room Session | Thursday November 28, 2019 --- 14:00-16:00
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Room Aminta SIVT-S5 | TRACK SIVT: Signal Image and Vision Technologies  
SIVT S5: Theory and methods  
Chair: Jean-Baptiste Thomas, University of Bourgogne, France

4 Grid Search Optimization (GSO) Based Future Sales Prediction For Big Mart  
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6 Template-Based Surface Estimation Using Statistical Shape Model  
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<td><strong>Chair:</strong> Neeta Nain, MNIT Jaipur, India</td>
<td><strong>Chair:</strong> Neeta Nain, MNIT Jaipur, India</td>
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<th>Joint WS ACI WS OBIS</th>
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<td><strong>A Slalmi, Hatim Kharraz, Rachid Saadane, Chaibi Hasna, Abdellah Chehri and Gwanggil Jeon</strong></td>
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<tr>
<td><strong>WS OBIS:</strong> Workshop on Open Business Intelligence Systems</td>
<td><strong>Chair:</strong> Abdelaziz Elfazziki, Cadi Ayyad university, Morocco</td>
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<td><strong>90</strong> Author Gender Identification from Arabic Youtube Comments</td>
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<td><strong>Jihad Zahir, Youssef Mehdi Oukaja and Haajar Mousannif</strong></td>
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<td><strong>93</strong> Recommending Moodle Resources Using Chatbots</td>
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Livia Marcellino, University of Naples Parthenope, Italy  
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Enjoy!
Wishing you well
Conference Schedule at a Glance

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<th>Thursday November 28, 2019</th>
<th>Friday November 29, 2019</th>
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<td></td>
<td>Registration (14:00 - 18:00)</td>
<td>Registration (08:30 - 18:00)</td>
<td>Registration (08:30 - 18:00)</td>
<td>Registration (9:30 - 10:30)</td>
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<td>Aminta</td>
<td>Four Seasons</td>
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<tr>
<td>09:00 - 09:30</td>
<td>Keynote - Room: Aminta</td>
<td>Mourad Oussalah</td>
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<tr>
<td>09:30 - 10:00</td>
<td>Coffee Break... fast</td>
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<td>10:00 - 10:30</td>
<td>Coffee Break</td>
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<tr>
<td>10:30 - 11:00</td>
<td>SIVT S2</td>
<td>Joint session WS IWCIIM WS UBIO</td>
<td>SIVT S4</td>
<td>WS IWAIP S1</td>
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<td>11:00 - 11:30</td>
<td>Keynote - Room: Aminta</td>
<td>Ernesto Damiani</td>
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<tr>
<td>11:30 - 12:00</td>
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<tr>
<td>12:00 - 12:30</td>
<td>SIVT S3</td>
<td>Joint session WS WAI WS KARE</td>
<td>SIVT S6</td>
<td>Joint session WS ACI WS OBIS</td>
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<td>13:00 - 13:30</td>
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<td>13:30 - 14:00</td>
<td>Opening ceremony</td>
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<tr>
<td>14:00 - 14:30</td>
<td>Keynote - Room: Aminta</td>
<td>Josiane Zerubia</td>
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<td>14:30 - 15:00</td>
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<td>15:00 - 15:30</td>
<td>Joint session i-WEC A S2 WS QUAMUS</td>
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<td>15:30 - 16:00</td>
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<tr>
<td>16:00 - 16:30</td>
<td>Joint session i-WEC A S1 WS DARWIN</td>
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<tr>
<td>16:30 - 17:00</td>
<td>SIVT S1</td>
<td>Joint session WS WAI</td>
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<td>17:00 - 17:30</td>
<td>SIVT S3</td>
<td>Joint session WS KARE</td>
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<td>17:30 - 18:00</td>
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<td>18:00 - 18:30</td>
<td>Joint session</td>
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<td>18:30 - 19:00</td>
<td>Postsers session</td>
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<tr>
<td>19:00 - 19:30</td>
<td>Welcome reception</td>
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<td></td>
<td>Conference Banquet</td>
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<tr>
<td></td>
<td>Dinner (20:30)</td>
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<td>Room: hotel restaurant</td>
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<td></td>
<td>A Taste of Sorrento</td>
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<td></td>
<td>Buffet dinner (20:30)</td>
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**Social Event**

- **Welcome reception**
  - Food & drinks (19:00 - 20:00)
  - Room: Lobby area
- **Conference Banquet**
  - Dinner (20:30)
  - Room: hotel restaurant
- **A Taste of Sorrento**
  - Buffet dinner (20:30)
  - Room: hotel restaurant