

pHEALTH 2019

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# pHealth 2019

Proceedings of the 16th International Conference on Wearable  
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# Preface

pHealth 2019 is the 16th Conference in a series of scientific events bringing together expertise from medical, technological, political, administrative, and social domains, and even from philosophy or linguistics. It opens a new chapter in the success story of the series of international conferences on wearable or implantable micro and nano technologies for personalized medicine.

Starting in 2003 as a Dissemination Activity in the framework of a European Project on Wearable Micro and Nano Technologies for Personalized Health with personal health management systems, pHealth conferences have evolved to truly interdisciplinary and global events. Meanwhile, pHealth comprehensively represented in the conference series also covers technological and biomedical facilities, legal, ethical, social, and organizational requirements and impacts as well as necessary basic research for enabling the future proof care paradigms. Thereby, it combines medical services with public health, prevention, social and elderly care, wellness and personal fitness to establish participatory, predictive, personalized, preventive, and effective care settings. By this way, it has attracted scientists, developers, and practitioners from various technologies, medical and health disciplines, legal affairs, politics, and administration from all over the world. The conference brought together health services vendor and provider institutions, payer organizations, governmental departments, academic institutions, professional bodies, but also patients and citizens representatives.

Smart mobile systems such as microsystems, smart textiles, smart implants, sensor-controlled medical devices, and innovative sensor and actuator principles and techniques as well as related body, local and wide area networks up to cloud services have become important enablers for telemedicine and ubiquitous pervasive health as the next generation health services. Social media and gamification have added even further knowledge to pHealth as an eco-system.

OECD has defined four basic areas to be managed in the new care model: address the big data challenges; foster meaningful innovation; understand and address the potential new risks; and support concerted effort to un-silo communities for a virtual care future. The multilateral benefits of pHealth technologies for all stakeholder communities including patients, citizens, health professionals, politicians, healthcare establishments, and companies from the biomedical technology, pharmaceutical, and telecommunications domain gives enormous potential, not only for medical quality improvement and industrial competitiveness, but also for managing health care cost.

The pHealth 2019 conference thankfully benefits from the experience and the lessons learned from the organizing committees of previous pHealth events, particularly 2009 in Oslo, 2010 in Berlin, 2011 in Lyon, 2012 in Porto, 2013 in Tallinn, 2014 in Vienna, 2015 in Västerås, 2016 in Heraklion, 2017 in Eindhoven, and 2018 in Gjøvik. The 2009 conference brought up the interesting idea of having special sessions, focusing on a particular topic, and being organized by a mentor/moderator. The Berlin event in 2010 initiated workshops on particular topics prior to the official kick-off of the conference. Lyon in 2011 initiated the launch of so-called dynamic demonstrations allowing the participants to dynamically show software and hardware solutions on the

fly without needing a booth. Implementing pre-conference events, the pHealth 2012 in Porto gave attendees a platform for presenting and discussing recent developments and provocative ideas that helped to animate the sessions. Highlight of pHealth 2013 in Tallinn was the special session on European projects' success stories, but also presentations on the newest paradigm changes and challenges coming up with Big Data, Analytics, Translational and Nano Medicine, etc. Vienna in 2014 focused on lessons learned from international and national R&D activities and practical solutions, and especially from the new EU Framework Program for Research and Innovation, Horizon 2020. Beside reports about technology transfer support and building ecosystems and value chains to ensure better time to market and higher impact of knowledge-based technologies, the acceptability of solutions, especially considering security and privacy aspects have been presented and deeply discussed. pHealth 2015 in Västerås addressed mobile technologies, knowledge-driven applications and computer-assisted decision support, but also apps designed to support elderly as well as chronic patients in their daily and possibly independent living. Furthermore, fundamental scientific and methodological challenges of adaptive, autonomous, and intelligent pHealth approaches, the new role of patients as consumers and active party with growing autonomy and related responsibilities, but also requirements and solutions for mHealth in low- and medium income countries have been considered. The pHealth2016 conference aimed at the integration of biology and medical data, the deployment mobile technologies through the development of micro-nano-bio smart systems, the emphasis on personalized health, virtual care, precision medicine, big bio-data management and analytics. The pHealth 2017 event in Eindhoven provided an inventory of the former conferences by summarizing requirements and solutions for pHealth systems, highlighting the importance of trust, and newly focuses on behavioral aspects in designing and using pHealth systems. A specific aspect addressed is the need for flexible, adaptive and knowledge-based systems as well as decision intelligence. pHealth 2018 established national and European satellite workshops, so completing the more theoretical consideration of the majority of the papers by organizational and practical experiences. Borrowing from good experiences of former events, pHealth 2018 responds to the national and regional needs for advancing the healthcare systems and its services to citizens and health professionals as well. In that context, communication and cooperation with national and regional health authorities, but also with the Gruppo Nazionale di Bioingegneria play a special role in the 2019 conference. Furthermore, and following an international trend, a special focus was dedicated to artificial intelligence (AI) and machine learning (ML) and their deployment for decision support.

Being organized under the patronage of the City of Genoa and the Liguria Regional Authority, the University of Genoa and especially the Department of Informatics, Bioengineering, Robotics and System Engineering (DIBRIS), Healthtropy srl as a University of Genoa's Spin-Off, but – following a long-term tradition – also the Working Groups “Electronic Health Records (EHR)”, “Personal Portable Devices (PPD)” and “Security, Safety and Ethics (SSE)” of the European Federation for Medical Informatics (EFMI) have been actively involved in the preparation and realization of the pHealth 2019 Conference.

This proceedings volume covers 1 keynote, 2 of 4 invited talks presented to the conference, 36 oral presentations, and 7 short poster presentations from 141 authors, coming from 15 countries from all around the world. All submissions have been carefully and critically reviewed by at least two independent experts from other than

the authors' home countries, and additionally by at least one member of the Scientific Program Committee. The performed highly selective review process resulted in a full papers rejection rate of more than 30% despite of the specific dedication of the addressed community in comparison with multi-topic conferences. This process guarantees a high scientific level of the accepted and finally published papers. The editors are indebted to the internationally acknowledged and highly experienced reviewers for having essentially contributed to the quality of the conference and the book at hand.

Both the pHealth 2019 Conference and the publication of the pHealth 2019 Proceedings at IOS Press would not have been possible without the aforementioned pecuniary and spiritual supporters and sponsors. This also includes the Italian Scientific Society of Biomedical Informatics, the IEEE Engineering in Medicine and Biology Society (EMBS), the Camber of Engineers Genoa, or the European Federation for Medical Informatics (EFMI) and standards developing organizations such as HL7 International, ISO/TC215 or CEN/TC251.

The editors are also grateful to the Members of the international Scientific Program Committee, but especially the dedicated efforts of the Local Organizing Committee members and their supporters for carefully and smoothly preparing and operating of the conference.

Bernd Blobel, Mauro Giacomini  
(Editors)

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