

pHEALTH 2021

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# pHealth 2021

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# Preface

pHealth 2021 is the 18th conference in a series of scientific events that has brought together expertise from medicine, technology, politics, administration, and social domains, and even from philosophy and linguistics. It opens a new chapter in the success story of this series of international conferences on wearable or implantable micro and nano technologies for personalized medicine.

Begun 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 become truly interdisciplinary and global events. As comprehensively represented in the conference series, pHealth also covers technological and biomedical facilities, legal, ethical, social and organizational requirements and impacts, as well as the basic research necessary for the enabling of future-proof care paradigms. It thereby 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. In 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 brings together health-service vendor and provider institutions, funding organizations, government departments, academic institutions, professional bodies, and 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 of healthcare services. Social media and gamification have added even further knowledge to pHealth as an eco-system.

The OECD has defined four basic areas on which to focus in the new care model: addressing the challenges of big data; fostering meaningful innovation; understanding and addressing the potential new risks; and supporting a concerted effort to un-silo communities for a virtual care future. The benefits of pHealth technologies offer enormous potential for all stakeholder communities, including patients, citizens, health professionals, politicians, healthcare establishments, and companies from the biomedical technology, pharmaceutical, and telecommunications domain, not only in terms of improvements in medical quality and industrial competitiveness, but also for the management of healthcare costs.

The pHealth 2021 conference benefits from the experience of and the lessons learned by 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, 2018 in Gjøvik, 2019 in Genoa, and 2020 in Prague. The 2009 conference raised the interesting idea of having special sessions focusing on a particular topic and organized by a mentor/moderator. The Berlin event in 2010 initiated workshops on particular topics taking place before to the official start of the conference. Lyon, in 2011, launched so-called dynamic demonstrations which allowed participants to demonstrate software and hardware

solutions on the fly without the need for a booth. Implementing pre-conference events, pHealth 2012 in Porto gave attendees a platform for presenting and discussing recent developments and provocative ideas that helped to animate the sessions. The highlight of pHealth 2013 in Tallinn was the special session on European project success stories, and also presentations on up and coming paradigm changes and challenges associated with Big Data, Analytics, Translational and Nano Medicine, etc. Vienna, in 2014, focused on lessons learned from national and international R&D activities and practical solutions, particularly from Horizon 2020, the new EU Framework Program for Research and Innovation. Alongside 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, particularly considering security and privacy aspects were presented and deeply discussed. pHealth 2015, held in Västerås, addressed mobile technologies, knowledge-driven applications and computer-assisted decision support, as well as apps designed to support the elderly and chronic patients in daily and possibly independent living. The fundamental scientific and methodological challenges of adaptive, autonomous, and intelligent pHealth approaches, the new role of patients as consumers and active parties with growing autonomy and related responsibilities, as well as the requirements and solutions for mHealth in low- and medium-income countries were also considered. The 2016 pHealth conference was aimed at the integration of biology and medical data, the deployment of 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 focused afresh on the behavioral aspects of designing and using pHealth systems. A specific aspect addressed was the need for flexible, adaptive and knowledge-based systems, as well as decision intelligence. pHealth 2018 established national and European satellite workshops, so complementing the more theoretical consideration of the majority of the papers with organizational and practical experiences. Borrowing good experiences from former events, pHealth 2018 responded to the national and regional need for advancing healthcare systems and their services to citizens and health professionals. pHealth 2019 placed a particular focus on artificial intelligence (AI) and machine learning (ML) and their deployment for decision support, and ethical challenges and related international manifests were discussed in depth in that context. pHealth 2020 – organized as a virtual event – addressed AI and robots, bio-data management and analytics for health and social care, security, privacy and safety challenges, integrated care, and also the intelligent management of specific diseases including the Covid-19 pandemic. The 2021 edition of the pHealth conference series – again a virtual event – focuses on digital health ecosystems in the transformation of healthcare towards personalized, participative, preventive, predictive precision medicine (5P medicine). The deployment of mobile technologies, micro-nano-bio smart systems, bio-data management and analytics, autonomous and intelligent systems, as well as the Health Internet of Things (HIoT) for personalized health, systems medicine, public health and virtual care are thereby especially considered. The conference also addresses new potential risks for security and privacy as well as safety chances and challenges, trustworthiness of partners and processes, and the motivation and empowerment of patients in care processes. The multilateral benefits of pHealth technologies offer enormous potential for all stakeholder communities, not only in terms of improvements in medical quality

and industrial competitiveness, but also for managing health care costs and, last but not least, improving patient experiences.

The conference is organized under the patronage of the City of Genoa and the Liguria Regional Authority, the University of Genoa and the Department of Informatics, Bioengineering, Robotics and System Engineering (DIBRIS) in particular, and Healthtropy srl as a University of Genoa's Spin-Off. Following a long-standing tradition, the Working Groups "Electronic Health Records (EHR)", "Personal Portable Devices (PPD)", "Security, Safety and Ethics (SSE)", and "Translational Health Informatics" of the European Federation for Medical Informatics (EFMI) have also been actively involved in the preparation and realization of the pHealth 2021 event.

Neither the pHealth 2021 Conference nor the publication of the pHealth 2021 Proceedings by IOS Press would have been possible without the aforementioned financial 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, and the European Federation for Medical Informatics (EFMI) and standard-setting 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 for the dedicated efforts of members of the Local Organizing Committee and their supporters for the careful preparation and the smooth operation of the conference.

Bernd Blobel, Mauro Giacomini  
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