Roberto BARBUTI, Stefano CHESSA, Roberto FRESCO, Paolo MILAZZO

PREFACE

The technological innovation in biology and agriculture often leveraging on innovation in computer science and engineering, pushed forward the process of integration among these disciplines. In particular, information technology (IT) provides common methodologies and tools for the automatic acquisition and analysis of the data that concern the management and optimization of the natural and territorial resources.

In agriculture, applications of IT enable the integration of interventions concerning its sustainability and productivity, by offering methods and tools to monitor, control, analyse and optimize the production while keeping it respectful of the environment. Similarly, the best practices for bio sustainability, for the management of bio-diversity and for the bioremediation of the environment (including soil, water etc…) are also progressively adopting IT, which enable more focused (and thus more effective) applications.

In this context, the conference "Technologies and innovation for sustainable management of Agriculture, Environment and Biodiversity" (TI4AAB), was held in July 2016 at the Natural History Museum of the University of Pisa located in the Calci Charterhouse (Calci, province of Pisa) in order to encourage the sharing of emerging knowledge about the above topics.

In fact, the conference was dedicated to fostering innovative cross-disciplinary research and applications and to stimulating the exchange of strategies and experiences, among academic and company experts from different disciplines (agriculture, biology, computer science and engineering and environmental decision making), in order to encourage a common, interdisciplinary discussion about the adoption and perspectives of IT in modern agriculture, environmental management, biodiversity and bio-sustainability in general.

The conference was held under the auspices of the municipality of Calci, the University of Pisa and of the "Ordine dei Dottori Agronomi e Dottori Forestali". It was also attended and supported by some leading national and worlwide industries, like CAEN RFID, OSRAM, STMicroelectronics, EBV Elektronik, Qprel Srl, AEDIT Srl, EMipiace Srl, and Zefiro Ricerca & Innovazione Srl, and by the Italian National Forestry Authority.

This volume constitutes a selection of the contributions presented at the conference and cover the aspects of innovation in agriculture, biology, and applied information technology. In particular, concerning innovation in agriculture, the paper by Nin et al. studies new soilless cultivation systems for wild strawberry growing in the Tuscan Appennine mountains. The paper by Prisa describes experimental research concerning the use of zeolites in combination with effective microorganisms, in order to improve the quality of olive trees. Finally, the paper by Lombardo et al. describes collaborative approaches to innovation in agriculture (co-generation of technology).

Concerning innovation in biology, the paper by Baldacci et al. describes the results of the preliminary phases of the AIS-LIFE project, which aims at developing aerobiological information systems in order to improve pollen-related allergic respiratory disease management. Still concerning the AIS-LIFE project, the paper by Natali et al. aims to describe the strategy used in AIS-LIFE project, to evaluate daily pollen concentration in the atmosphere produced by many allergic plant species. The use of data and GIS system are shown as an approach to assess allergy risk maps.

Concerning innovation in computer science applied to agriculture and biology, two contributions focus on modeling approaches, and two contributions provide a survey of information technology applied to agriculture and biology. Specifically, the paper by Bodei et al. describes the application of the IOT-LYSA formal modelling framework to a possible scenario of grape cultivation, in order to assess water consumption, and the paper by Barbuti et al. proposes a mathematical model of artificial reefs, in order to study the dynamics of algal coverage and of populations of fish in some Italian

artificial reefs. Finally, the paper by Fresco et. al. explores the current challenges and IT solutions in order to realize a digital agriculture framework, intended as an evolution from Precision Farming to connected knowledge-based farm production systems, and the paper by Pucci et al. provides a survey on biologging methodologies for the collection of knowledge about animals' behaviour, making a review of some related common data analysis techniques.

All papers have been carefully reviewed by experts in the specific fields. Here is the list of the reviewers, that we thank for the collaboration.

ROBERTO BARBUTI
Dipartimento di Informatica, Università di Pisa, *roberto.barbuti@unipi.it*

PAOLO BARSOCCHI
Istituto di Scienza e Tecnologie dell'Informazione del CNR (ISTI), *paolo.barsocchi@isti.cnr.it*

GIULIO CARAVAGNA
School of Informatics, University of Edinburgh, *giulio.caravagna@ed.ac.uk*

STEFANO CHESSA
Dipartimento di Informatica, Università di Pisa, *stefano.chessa@unipi.it*

BARBARA FACCINI
Dipartimento di Fisica e Scienze della Terra, Università di Ferrara, *fccbbr@unife.it*

GIANLUGI FERRARI
Dipartimento di Ingegneria e Architettura, Università di Parma, *gianluigi.ferrari@unipr.it*

PAOLO FONTANELLI
Meccanica Agraria DiSAAA, Università di Pisa, *marco.fontanelli@unipi.it*

ROBERTO FRESCO
Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria (CREA), *roberto.fresco@crea.gov.it*

PAOLO LUSCHI
Dipartimento di Biologia, Università di Pisa, *paolo.luschi@unipi.it*

PAOLO MILAZZO
Dipartimento di Informatica, Università di Pisa, *paolo.milazzo@unipi.it*

STEFANIA NIN
Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria (CREA), *stefania.nin@crea.gov.it*

ELIO PASSAGLIA
Dipartimento di Scienze Chimiche e Geologiche, Università degli Studi di Modena e Reggio Emilia, *elio.passaglia@unimore.it*

DOMENICO PRISA
Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria (CREA), *domenico.prisa@crea.gov.it*

DANIELE SARRI
GESAAF Dip. Gestione dei sistemi Alimentari Agrari e Forestali, *daniele.sarri@unifi.it*

ROBERTO TRASARTI
Istituto di Scienza e Tecnologie dell'Informazione del CNR (ISTI), *roberto.trasarti@isti.cnr.it*