



INFORMATICS
EUROPE

Report of the Informatics Europe Working Group on:

Ethical/Social Impact of Informatics as a Study Subject in Informatics University Degree Programs

Paola Mello

Enrico Nardelli

with contribution from the
Working Group Members

Report of the Informatics Europe Working Group on:

**Ethical/Social Impact of Informatics as a Study
Subject in Informatics University Degree Programs**

Prepared by:

- **Paola Mello**, Università di Bologna, Italy (Working Group Coordinator)
- **Enrico Nardelli**, Università di Roma "Tor Vergata", Italy

with contribution from the Working Group members

Report of the Informatics Europe Working Group of on:

Ethical/Social Impact of Informatics as a Study Subject in Informatics University Degree Programs

October 2019

Published by:

Informatics Europe
Binzmühlestrasse 14/54
8050 Zurich, Switzerland
www.informatics-europe.org
administration@informatics-europe.org

© Informatics Europe, 2019

Other Informatics Europe Reports

- *Industry Funding for Academic Research in Informatics in Europe. Pilot Study.* (2018, Data Collection and Reporting Working Group of Informatics Europe).
- *Informatics Education in Europe: Institutions, Degrees, Students, Positions, Salaries. Key Data 2012-2017* (2018, Svetlana Tikhonenko, Cristina Pereira).
- *Informatics Research Evaluation* (2018, Research Evaluation Working Group of Informatics Europe).
- *Informatics for All: The strategy* (2018, Informatics Europe & ACM Europe)
- *When Computers Decide: Recommendations on Machine-Learned Automated Decision Making* (2018, Informatics Europe & EUACM, joint report with ACM Europe)
- *Informatics Education in Europe: Institutions, Degrees, Students, Positions, Salaries. Key Data 2011-2016* (2017, Cristina Pereira, Svetlana Tikhonenko).
- *Informatics Education in Europe: Are We All In The Same Boat?* (2017, The Committee on European Computing Education. Joint report with ACM Europe).
- *Informatics in the Future: Proceedings of the 11th European Computer Science Summit (ECSS 2015), Vienna, October 2015* (2017, eds. Hannes Werthner and Frank van Harmelen, Springer Open).
- *Informatics Education in Europe: Institutions, Degrees, Students, Positions, Salaries. Key Data 2010-2015* (2016, Cristina Pereira).
- *Informatics Education in Europe: Institutions, Degrees, Students, Positions, Salaries. Key Data 2009-2014* (2015, Cristina Pereira).
- *Informatics Education in Europe: Institutions, Degrees, Students, Positions, Salaries. Key Data 2008-2013* (2014, Cristina Pereira, Bertrand Meyer, Enrico Nardelli, Hannes Werthner).
- *Informatics Education in Europe: Institutions, Degrees, Students, Positions, Salaries. Key Data 2008-2012* (2013, Cristina Pereira and Bertrand Meyer).
- *Informatics Doctorates in Europe - Some Facts and Figures* (2013, ed. Manfred Nagl).
- *Informatics Education in Europe: Europe Cannot Afford to Miss the Boat* (2013, ed. Walter Gander, Joint report with ACM Europe)

All these reports and others can be downloaded at:

www.informatics-europe.org

ABOUT THIS REPORT

Information technology (IT) is constantly developing, influencing our everyday life, and impacting choices and decisions at individual as well as at collective level. Thus, IT is invading the social, political and economic spheres. Systems and tools that use modern computer science technologies have clear ethical and social impacts. Even if such impacts have already been subject of discussion in the Artificial Intelligence field, their scope is definitely much broader, and they potentially affect all the fields of Informatics. What happens when they control autonomous systems or make important decisions? How should they be developed and deployed? Can they be made predictable and reliable? Which ethical and legal implications should be observed? The social and ethical impact of new technologies is a key issue of our increasingly connected society that affects users, developers, researchers and governments.

During their training in university degree programs in Informatics, students are provided with the basis for designing and developing modern computer systems. A question arises, then, if they should be trained also on ethical and societal topics, thus enabling them to conceive “good” and beneficial Informatics systems for the society. In 2019 a group of experts, following an open call for interest disseminated in Europe, was convened with the goal of analyze this issue. The working group on **“Ethical/social impact of Informatics as a study subject in Informatics university degree programs”** has tried to understand the current state of affairs and to solicit a discussion on these topics, by answering questions such as, for example: Should ethical/social impact of Informatics be a study subject in Informatics university degree programs? Why? What are the main ethical issues arising from the application of Informatics in society? In which areas ethical/social impacts of Informatics are more evident? Which topics of study at university programs should be taught to make students skilled in ethics-aware design?

This report is the first product of the activity of this working group, outlining the possible approaches, the state of the art, and suggestions and guidelines for inclusion of topics related to ethics, responsibility and social impacts in Informatics university degree programs.

Given the broadness of the topic, in this first exploratory phase, we surveyed the position of the WG members. We have had an enthusiastic participation: 30 out of 32 WG members replied to the questionnaire. In this report, we collect and summarize the results of this consultation together with feedbacks and comments from WG members, to provide a first starting point for further discussions and to establish how to focus and organize further work of the WG.

Working Group Members:

Paola Mello, Università di Bologna, Italy (Working Group coordinator)
Vaishak Belle, University of Edinburgh, UK
James Davenport, University of Bath, UK
Gonzalo Génova, Universidad Carlos III de Madrid, Spain
Jeroen van der Ham, Universiteit Twente, Netherlands
Reinhard Kahle, Universität Tübingen, Germany
Kaido Kikkas, Tallinna Tehnikaülikool, Estonia
Krisztina Balázs, Eötvös Loránd University, Hungary
James Larus, EPFL, Switzerland
Gabriele Lenzini, Université du Luxembourg, Luxembourg
Kevin Macnish, Universiteit Twente, Netherlands
Donato Malerba, Università degli Studi di Bari Aldo Moro, Italy
Andrew McGettrick, University of Strathclyde, UK
Antoanela Luciana Naaji, Universitatea de Vest "Vasile Goldiș" din Arad, Romania
Michael Nagenborg, Universiteit Twente, Netherlands
Enrico Nardelli, Università di Roma "Tor Vergata", Italy (Informatics Europe President)
Viorel Negru, Universitatea de Vest din Timișoara, Romania
José Angel Olivas, Universidad de Castilla-La Mancha, Spain
Barry O'Sullivan, University College Cork, Ireland
Juan Pavón Mestras, Universidad Complutense de Madrid, Spain
Christian Reuter, TU Darmstadt, Germany
Sara Román Navarro, Universidad Complutense de Madrid, Spain
David Rozas Domingo, Universidad Complutense de Madrid, Spain
Olivier Pereira, Université catholique de Louvain, Belgium
Idoia Ana Salazar García¹, Fundación Universitaria San Pablo CEU, Spain
Kristina Sargsyan, Université Française en Arménie, Armenia
Fermín Sánchez, Universitat Politècnica de Catalunya, Spain
Marcos Sánchez-Elez Martín, Universidad Complutense de Madrid, Spain
Giovanni Sartor, European University Institute
Viola Schiaffonati, Politecnico di Milano, Italy
Florence Sèdes, IRIT, France
Henry S. Thompson, University of Edinburgh, UK
Martina Zitterbart, Karlsruher Institut für Technologie, Germany

Thanks to Svetlana Tikhonenko and Cristina Pereira from Informatics Europe for the active contribution to the questionnaire organization and processing and for feedbacks and comments.

¹ Idoia Ana Salazar Garcia joined the WG after the survey.

1. Executive Summary

In this report, we collect and summarize in data and figures the results of this consultation together with feedbacks and comments from WG.

This collected material is a first step towards a more deep and informed discussion about the topic of **if and how ethical/social impact of Informatics should be a study subject in Informatics university degree programs**. Notice that this does not necessarily imply that ethics or social impact should be a study subject, but asks whether the study of ethics or social impact should be present in some way in the degree programs.

Some points (possibly subjects of further investigations) emerged from this consultation and can be summarized as follows:

- **Several members of the WG have proven experiences** in the development, implementation, and monitoring of courses about ethics and social impact in the different level degree programs of the ICT area. Most of them have a specific background in Computer Science and Engineering, Mathematics, Logic, Ethics and Philosophy (of Science and Technology), Education, Sociology and Law. Some of them have a highly interdisciplinary profile covering both Computer Science & Engineering, and Philosophy.
- WG members have great interest in these subjects, as foreseeable. Almost all respondents pointed out the risks and perspectives of the implementation of the newest applications of Informatics. The areas of Informatics considered to have the **greatest impact** from this point of view are Artificial Intelligence and Autonomous Intelligent Systems (e.g. Autonomous Vehicles), Machine Learning, Cryptology, Security, Privacy, Human Computer Interaction and Bioinformatics.
- For the most part, the answers are **positive** to the question: “Should the ethical/social impact of Informatics be a study subject in Informatics university degree programs?” The result seems obvious, possibly due both to the specific skills of the respondents and their interest in participating in the WG on these issues. In general, **the motivations are well articulated and consistent**.
The importance of teaching ethics and social impact is recognized as important also in the case of negative responses. However, such answers concern the fact that ethical/social impact of Informatics is not yet considered a clear intellectual discipline, and therefore it should be incorporated into several technical subjects, so that students perceive them as a part of their discipline.
- With respect to the topics that should be taught, some suggestions are more methodological, others are more specific about courses contents.
The report also classifies the topics to be emphasized in relation to the social and ethical impact with respect to the different areas of Informatics. The classification can be a useful guide to better link the teaching of ethical/social aspects with the appropriate technological subjects.

- The majority of the answers suggest that **social and ethical aspects of Informatics could be taught in the context of Bachelor programs** and that these courses should be mandatory. With respect to who should teach these courses/modules, the majority of the respondents wish a close collaboration between different teachers, with different backgrounds.
- A (preliminary) list of some existing courses within Informatics university degree programs which address ethical/social impacts of Informatics, has been collected through the feedback of the respondents. The list testifies that this topic is already a well-developed academic field, with accredited institutions training huge numbers of students for Bachelor, Master and PhD degrees. However, this list is to be intended just as an example of what is currently happening and a starting point for further investigation.

The report is organized in three distinct but related sections:

- Section 2 focuses on the participants and their professional profile.
- Section 3 is the core of the survey, and deals with the ethical/social impact of Informatics as a study subject in Informatics university degree programs.
- Section 4 collects suggested documentation.



INFORMATICS
EUROPE

www.informatics-europe.org
© Informatics Europe, 2019

