Report of the Informatics Europe Working Group on:

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

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with contribution from the Working Group Members
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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.
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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.