

Presidency of the Council of Ministers



Abstract

**DEVELOPMENTS IN ROBOTICS AND
ROBOETHICS**

17 July 2017

This opinion on the scientific, technological, ethical and legal implications of robotics and roboethics has been prepared by a mixed group comprising members from the Italian Committee for Bioethics and from the Italian Committee for Biosafety, Biotechnology and Life Sciences.

It begins with a preliminary definition of “robot” and “artificial intelligence” and goes on to outline the possibilities, potential and limitations of the emerging new technologies in relation to robots with and without a mechanical body and with and without intelligence. At the heart of the discussion is the relationship between the “body” (robot) and the “brain” (AI) and their interconnection. The document expounds on the confine between (mechanical) automation and (human) autonomy, outlining possible scenarios arising from recent developments in robotics applied to different contexts, with the aim of avoiding confusion, excessive optimism or catastrophising and providing a balanced analysis of the roboethical and legal issues which will define the future governance of these new technologies.

Particular attention is paid to the replacement of human labour with robots and to new, specifically human jobs which cannot be replaced by technology; to dependence on robots (intended as social or personal dependence, or as “technological vulnerability”); to providing information to the public in order to boost critical awareness and encourage the “metabolisation” of innovation; to the robotic divide and inequality in access to technology, whether due to its cost or to a lack of the skill and motivation necessary to use it; and to the responsibility and liability of scientists and the ethical and professional codes of conduct of the designers, which refer to the principles of human dignity, privacy and safety.

The document also focuses on applications in medicine and healthcare (potential and limitations of robotic surgery, especially in experimentation; robotic assistance or robotics for assistance; biorobotics and neurorobotics); on the use of robots for military and surveillance purposes; and on possible new forms of legal liability.

The Committees conclude by offering various recommendations for society. These pertain to the need for critical awareness, the desirability of an interdisciplinary analysis of the social impact of robotics, the consideration of justice and non-discrimination, the need for ethical codes for robot programmers and for ethics committees for robotic research, and the importance of studying ethics in engineering and IT courses.

In medical contexts, the Committees affirm the need for a weighing-up of the risks, costs and benefits in robot experimentation and application and for equity of access; while in relation to military use, there is a need to incorporate the study of ethical issues in military robotics and an urgent need for the international community to take a position on the development of the infant technology of autonomous weapons.

Finally, from a legal perspective, the need for clarification of the new meaning and limitations of human legal liability in relation to robots, the need to protect public safety and the desire for European legislation are affirmed.

The working group was coordinated for the Biosafety Committee by Professors Andrea Lenzi, Carlo Caltagirone (who is also a member of the Bioethics Committee), Roberto Cingolani and Roberta Siliquini and for the Bioethics Committee by Professors Lorenzo d’Avack, Laura Palazzani, Riccardo Di Segni, Salvatore Amato and Luisella Battaglia.

The opinion benefited from a hearing with Prof. Roberto Cingolani and from the observations and comments of Professors Antonio Amoroso, Carlo Casonato, Bruno Dallapiccola, Pier Angelo Morandini and Pier Franco Pignatti and of Dr Carlo Petrini.

The opinion makes use of figures provided during the hearing by Prof. Roberto Cingolani and made available for publication.