

**VIII EPS Forum Physics and Society**  
**Geneve, September 29, 2018**  
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**EPS STATEMENT ON PHYSICS AND ETHICS IN THE 2050 HORIZON**

Scientific knowledge is not only an understanding of the world, but an understanding that enables people to imagine and shape the future. Science is a unique human activity used by different stakeholders in activities ranging from basic research to technological development. Stakeholders include not only professional organizations, universities, industry and government agencies but also citizens and civil society organisations.

Today the pace of scientific discoveries and innovation is accelerating drastically and science and technology are likely to increase their already important influence on society and human affairs in the Horizon 2050. Reflection on the ethical dimension of science - and physics is an important part of it - and its application is needed if we are to optimise the beneficial use of science in society.

SCIENCE AS A NON-ETHICALLY NEUTRAL ACTOR

Per se the quest for scientific knowledge may seem ethically neutral. Nevertheless, as soon as we consider it in the setting of society, it drops its neutrality. The very choice to fund science rather than other human activities can be itself subject to ethical scrutiny. The way scientific knowledge is generated is also subject to ethical rules, depending on and evolving with society. The impact of technological developments undertaken to tackle major issues directly affects the lives of citizens and the environment and are not without ethical consequences. Examples include health research and life sciences, where the interests of science, society and corporations can compete with individual liberties and wellbeing, or in the research for sustainable development, where the desires of individuals can compete with the common good of society and humanity.

EPS observation: Fundamental science and its derived technologies have been tremendously successful in improving the quality of life of citizens. EPS is committed to lead an ethical reflection on these developments, considering opportunities and threats for science, citizens and society.

EPS observation: As the potential of science and technology grows, fostering their benefits - while mitigating their challenges - is a key issue for sustainable development, requiring a global ethical governance of science and technology.

TECHNOLOGY DEVELOPMENT: POWER GAINS AND VULNERABILITIES

We live in an increasingly technical era where many believe that technology has the answers to key open questions while others experience fear regarding its developments. Artificial intelligence (AI) will soon lead us through a fascinating landscape of development as well as deep ethical considerations. This is particularly the case when

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<sup>[1]</sup> Prepared by Angeles Faus-Golfe, John Finney, Philippe Galiay and Carlos Hidalgo based on comments raised by participants in round table and group discussions at the VIII EPS Forum Physics and Society meeting as well as remarks received by December 15th.

AI algorithms take on cognitive work, for example in the job market, security and life sciences (e.g. physics for health, genetic engineering), where there are huge social dimensions to be considered. Other technological fields will experience this ambivalence in one way or another. The Internet can boost our communication capacities but at the same time make our privacy rights more vulnerable. Furthermore, we are facing a transition in the way we generate and use energy, with new drivers like climate change and globalization highlighting the importance of a culture and ethic for sustainable development.

**EPS recommendation:** EPS is committed to confront ambivalences linked to technology developments. Consequent power gains and vulnerabilities should be considered along with the technological developments, with the aim of preventing inequalities in that respect <sup>[2]</sup>.

**EPS recommendation:** The EPS encourages the European as well as the international community to foster further convergence on risk and safety culture and ethical issues.

### OPEN COMMUNICATION AND CRITICAL CITIZENS

Science has given us the ability to cope with problems of the world, allowing us the option of not just believing things but instead the powerful ability to critically analyse them. New technologies allow large-scale information sharing, thus accelerating the spreading of information but also misinformation (fake news). In this context, science and citizens have an important role to play. Solutions to the difficult questions and threatening perspectives that lie ahead of us (e.g. climate change and the future of energy sources in a multidisciplinary scientific environment) will be found through well-founded views and thanks to well-informed and engaged citizens.

**EPS recommendation:** The EPS encourages the European as well as International Scientific Societies to engage in an open dialogue with citizens and civil society organisations in order to raise the critical spirit of citizens and the awareness of researchers regarding the use of science for the benefit of mankind and its environment and their adhesion to the highest standards of quality and responsibility <sup>[3]</sup>.

### RESEARCH, EDUCATION AND SUSTAINABLE DEVELOPMENT

Science needs more than just research to contribute to social progress. The latter depends on the mutual interaction between science, politics, economics, citizens and society at large. Values, political and economic considerations influence what is done

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<sup>[2]</sup> This is particularly important in physics for health, where some technologies are unevenly implemented in European states. In particular, the recent report on accelerators research and development in Europe shows a strongly uneven distribution of operating proton therapy centres [<http://apae.ific.uv.es/apae>].

<sup>[3]</sup> European Academies (ALLEA) and the European Science Foundation (ESF) have developed the European Code of Conduct for Research Integrity [<http://www.allea.org/>]. The European Group on Ethics (EGE) advises the European Commission in science and new technologies [<https://ec.europa.eu/research/ege/index.cfm?pg=home>]. Responsible Research and Innovation is cutting across the whole Community Framework Programme for Research and Innovation Horizon 2020 [<https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation>].

with discoveries and how different fundamental science and technological developments are prioritised. Science should aim to contribute to raise sustainable standards of living globally, which will require long-term perspectives on international cooperation and more substantial investments in research, education and development.

EPS recommendation: Ethical governance should be further promoted across the globe with scientists seeking ways to foster the basic fundamental human rights of dignity, freedom, equality and solidarity. To that end, the EPS encourages Academia, educational institutions and science teachers to include and implement elements of ethics education in school and university physics curricula. Strategies to improve the attractiveness and effectiveness of science education (especially for young people) should be further explored and their implementation encouraged <sup>[4]</sup>.

<sup>[4]</sup> This would be consistent with UNESCO's Recommendation on Science and Scientific Research

[[http://portal.unesco.org/en/ev.phpURL\\_ID=49455&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.phpURL_ID=49455&URL_DO=DO_TOPIC&URL_SECTION=201.html)]