Executive Summary

The umbrella term "human enhancement" refers to a wide range of existing, emerging and visionary technologies, including pharmaceutical products: neuroimplants that provide replacement sight or other artificial senses, drugs that boost brain power, human germline engineering and existing reproductive technologies, nutritional supplements, new brain stimulation technologies to alleviate suffering and control mood, gene doping in sports, cosmetic surgery, growth hormones for children of short stature, anti-ageing medication, and highly sophisticated prosthetic applications that may provide specialised sensory input or mechanical output. All these technologies signal the blurring of boundaries between restorative therapy and interventions that aim to bring about improvements extending beyond such therapy. As most of them stem from the medical realm, they can boost societal tendencies of medicalisation when increasingly used to treat non-pathological conditions.

In the present study, we do not rely on the still widespread conceptual distinction between "therapy" and "enhancement", but instead, in line with recent political statements on the issue, adopt a notion of human enhancement that includes non-therapeutic as well as some therapeutic measures. Defining human enhancement, for heuristic and politically pragmatic reasons, as any "modification aimed at improving individual human performance and brought about by science-based or technology-based interventions in the human body", we distinguish between restorative or preventive, non-enhancing interventions, therapeutic enhancements, and non-therapeutic enhancements. We therefore view human enhancement primarily as offering a specific perspective on developments in science, technology, medicine and society. The effects of human enhancement technologies (HET) can be either long term or even permanent (as in the case of genetic enhancements), or temporary (such as improved concentration levels brought about by drugs). The aim may be to improve our natural abilities (for example by making us stronger or happier) or to give us characteristics or abilities that no human being has ever possessed before, such as full night vision, or even extra senses.

The phenomenon of human enhancement shows a Janus face: on the one hand, there are a range of technoscientific developments, and of social and individual demands and desires that often appear in themselves to be highly relevant from an ethical or political point of view, yet also interact in a way that can be said to amount to a tendency towards an "enhancement society". On the other hand, the convergence of technologies and of the related visions of human enhancement is actively driven forward by a number of social groups and networks in science, technology and research policy, among them a couple of key players in these fields.

Faced with the often highly visionary and strongly ideological character of the debate on human enhancement, one must strive for a balance between advancing a rational discussion through critical analysis of the relevant visions and normative stances, and taking a close look at the diversity of HET and their actual social, technological and political significance. The present study is a systematic attempt to bridge the gap between, on the one hand, the visions and their cultural and ideological aspects, and, on the other hand, the technoscientific developments in question and their social aspects and implications.

The tension between these two faces of the human enhancement topic is maintained throughout the study. It neither relies on views that discard the issue (and with it many of the technologies in question) on account of its speculative features, nor does it intermingle fantasies

and vision with real or emerging developments in a way that hinders rational discussion and misleads policy-makers and the public.

Accordingly, instances of the use of existing or emerging technologies for non-therapeutic human enhancement are presented and discussed in some detail, with the goal of separating the hype and far-flung visions from the actual state of the art and realistic expectations. In general, one can say that the great majority of HET discussed in the debate on human enhancement are still therapeutic, and do not offer their users significant advantages over "non-enhanced" humans; indeed, the level of improvement is often well below the level of normal function. However, there are also strong indications that more and more effective means of non-therapeutic enhancement will be developed in the near future, and that some existing lines of research and development already have the potential to significantly alter human corporeality and cognition. Visions of human enhancement that are, for example, based on neurotechnologies which might allow for super-human performance or species-untypical abilities still have no real basis in research development, but the technologies in question show the potential to fundamentally change man-machine interrelations in the foreseeable future. Furthermore, there is still scarce evidence to prove the existence of effective, non-therapeutic cognitive pharmaceutical enhancers, especially if one compares them with traditional and modern non-technological and non-pharmaceutical means of improving or maintaining cognitive functioning; what is more, the results of the scant pertinent research are to some extent inconsistent. Only if we look at drugs that were developed to treat diseases and are now also used under conditions of sleep deprivation or stress do we find some evidence of performance enhancement in healthy individuals. However, these decreased conditions are more similar to a disease than to a state of well-being, and pharmaceutical cognitive enhancers in these cases are mainly used to counter the effects of the unhealthy behaviour that caused the deficits. Moreover, evidence of these drug uses does not exclusively show improvements, and some of the improvements are very short-lived and minor. On the other hand, many experts and studies agree that it is highly probable that more effective and safer pharmaceutical cognitive enhancers will be developed in the near future. If the development of medication for healthy people to improve cognitive performance were allowed, more targeted research would most probably boost this trend. In any case, it is safe to say that a side effect of the fast-growing research and development into pharmaceuticals for age-related neurodegenerative diseases will be a number of new drugs which can be used for the enhancement of performance of young, healthy people.

If one takes a closer look at certain segments of the discourse on human enhancement (e.g. gene doping, designer babies, use of drugs for cognitive enhancement, and mood enhancement by means of brain implants) and the involved technologies, it becomes obvious that these diverse cases all share certain characteristics. They all relate, for example, to ideas that push back the boundaries of medical and scientific research. All the research on which these technologies are based stretches the known limitations of the scientific disciplines. Furthermore, novel applications for new technologies can be developed for derivative purposes other than those for which the technology was originally designed. Moreover, many HET have the potential to increase the incidence of currently illegal practices, and all raise questions of distributive justice now or in the future. They often throw up questions about fundamental cultural values and tend to challenge our view of what it means to be human. More pressing are concerns regarding the costs of the technologies in question, the unintended (side-)effects, the

desirability of the social changes they will precede, and the acceptability of medical tourism benefitting from highly specialised medical or enhancement tourism.

The study outlines and discusses possible general strategies of how to deal with the topic of human enhancement and HET in a European context, rejecting a total ban and a *laissez-faire* approach as inappropriate, and identifying a reasoned pro-enhancement approach, a reasoned restrictive approach, and a systematic case-by-case approach as viable options for the EU. However, like all the experts we consulted, we hold that a strategic positioning of EU with regard to the topic of human enhancement needs in any case to be based on a normative framework which does not yet exist. The development of such a framework should take into account those dimensions – not of "human nature" (a contested subject) but of the human condition – that we tend to consider fundamental to our self-respect and mutual cooperation.

As demonstrated in this study, human enhancement issues are not just academic: the technologies and trends involved can have both beneficial and adverse effects on several kinds of political domain, provide opportunities for individuals and for society, present new risks, create new needs and social demands, and challenge crucial cultural notions, social concepts and views of the human condition.

Currently however, the EU has no platform for monitoring and discussing human enhancement issues. Arenas are lacking where the normative issues can be politically deliberated and the gap between the needs and the concerns of the broader public and the practitioners and experts bridged. We believe that such a platform should be created on the basis of a critical vision of the phenomenon of human enhancement.

How could the EU initiate and politically organise a broader deliberation on human enhancement issues? What form could EU involvement in human enhancement issues take?

The essence of our proposal is to set up a European body for the development of a normative framework for human enhancement that guides the formulation of EU policies in this field. For the establishment of such a body, we see two institutional options, both of which have been chosen in the past for human genetics and genetic testing. The European Parliament could decide to set up a temporary committee. Alternatively the European Commission could decide to install a working group in which members of the European Parliament participate. In any case, the involvement of the European Parliament in such a body would be highly desirable in order to strengthen the body's intermediate and public role.

It would be the task of such a body to further explore the topic and lay the ground for possible further regulation of human enhancement issues that affect such political domains as health, research and economy in the EU. As pointed out in the present study, a wealth of resources would be available for the work of such a body, some of them generated in EU-funded projects. The primary task of the body would be to develop a normative framework for human enhancement that should be based on evaluation criteria regarding the above-mentioned dimensions of the human condition. The normative framework would help to:

- Evaluate the effectiveness and risks of the technologies in question;
- Organise a comprehensive impact assessment of human enhancement technologies (taking into account political, ethical, legal, societal, cultural, political, safety, security, and health aspects);

- Assess whether the EU should fund technologies that are potentially disruptive to the social fabric, or European cultural value systems;
- Identify further research needs on the topic of human enhamcement and single human enhancement technologies;
- Define the limits within which each country can regulate human enhancement within its own boundaries;
- Prevent undesirable (side) effects of human enhancement technologies within member states and the EU as a whole;
- Prevent inequalities arising in healthcare between member states;
- Prepare the ground for a policy on the funding of human enhancement research;
- Prepare and stimulate a social dialogue on the topic of human enhancement at large.

In order to achieve these objectives, the body would have to properly monitor the current and emerging developments in HET. By doing this, it would have to establish a solid ground for discussions on normative and regulatory aspects by carefully defining the subject of its activities. It must be ensured that the work of the body is not overloaded by highly visionary or ideological thoughts and aspirations currently triggered by the term "enhancement". It should, however, monitor relevant activities, in Europe or elsewhere, in which more radical visions of human enhancement are promoted. Without neglecting possible future societal changes, one of the most prominent tasks of the body would be to focus the debate on human enhancement on emerging technologies and observable societal trends that might lead to an increased use of enhancement technologies in everyday life.