

Defining Human Enhancement: Towards a Foundational Conceptual Tool for Enhancement Law

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Abstract

Emerging technologies open the prospect of extraordinary interventions on the human body. These may go beyond what is strictly necessary to sustain health and well-being. While responding to social and ethical challenges of such advances, the law simultaneously faces the challenge of reflecting on the legitimacy to legislate and on whether the existing legal framework is appropriate to address the various concerns. In order to do so, it is crucial to establish clear legal definitions. Precise distinctions between medical treatment, cosmetic interventions, and human enhancement are intrinsically difficult to formulate. However, these are vital legal tools to determine what is regulated in other fields of law and whether there is room for a new legal field – Enhancement Law. This paper provides a reflection on the relevance of establishing a legal definition of human enhancement and to what extent different legal fields and jurisdictions may warrant different understandings of such concept. It reviews a number of different and often divergent concepts and taxonomies of human enhancement and concludes with the proposal of a definition, understood as a conceptual tool for further debate concerning the necessity of specific regulatory activity directed at human enhancement technologies.

1 Introduction: Enhancement and the Law

Emerging technologies open the prospect of extraordinary interventions on the human body. For example, recent advances in gene editing, such as CRISPR-Cas9, demonstrate that precise genetic modification of any living organism is an increasingly viable technological possibility. Regulating technologies and technology-enabled phenomena of such magnitude is complex and often urgent. The law faces two major simultaneous challenges: debating the limits of the legitimacy to legislate and evaluating whether existing legal frameworks are appropriate to address a panoply of social and ethical concerns. It will be argued that, in order to find answers to these questions, it is crucial to start by establishing foundational legal definitions.

This paper presents a scholarly legal reflection, written from a technology foresight perspective, which entails a constructive stance towards the law. It is also grounded in practical experience and adopts a pragmatic approach to law. The objective is to debate and propose a legal definition that may frame and

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transpose part of the social phenomena known as human enhancement into a legal concept. Finding such a definition is arguably an essential legal methodological step. A legal definition of a concept is a work tool for the construction and development of substantive legal norms. Establishing such a conceptual basis is a necessary precondition to subsequent substantive legal analyses in the sense that a definition will guide legal scholarship into subsequent questions. These include foundational issues such as *inter alia* whether certain technologies and uses of technology are already regulated, whether such regulation is sufficient, and whether it is possible to defend the establishment of a new field of law – Enhancement Law.

Therefore, this paper merely proposes a definition of a new legal concept – induced human evolution – which is to be used for legal development purposes. It is not intended to advance a general or cross-disciplinary definition of human enhancement.

Furthermore, a second limitation is that important issues such as whether human enhancement or certain specific examples thereof are morally permissible or even obligatory will not be the object of this paper. The paper is not concerned with evaluating whether human enhancement is likely to produce a net good for individuals or society, and it does not address issues of access and benefit distribution. It will not engage in the debate on whether allowing human enhancement might be just or fair to those who do not wish or cannot afford to be enhanced. Neither will it take on the task of evaluating whether it is wrong or right to try to change human nature.

It merely seeks to frame the social reality or prospect – human enhancement – and create a corresponding legal concept: induced human evolution. This task is a necessary pre-requisite to a systematic and coherent approach to subsequent efforts to determine why, how, and to what extent each category of technology-enabled interventions on the human body should be concretely regulated.

The present paper is organised into five sections. After this brief introduction, Section 2 provides a reflection on the relevance of establishing a legal concept, induced human evolution, as a legal counterpart to the broader term human enhancement. Section 3 debates the extent to which different legal fields and jurisdictions may warrant different understandings of this concept and explains why the present proposal is not intended for cross-disciplinary use. Section 4 proposes and debates a definition of the legal concept induced human evolution. Section 5 offers a prelude for future debate in the form of final remarks.

2 Legal Relevance of Establishing a Legal Conceptual Framework for Human Enhancement

The possibilities offered by every new technology have always implied an ethical debate. Technology may have an impact at the biological level, enable new forms of social interaction, and offer new choices and opportunities for human flourishing. Associated with each technical possibility are personal moral dilemmas and ethical public policy debates. These are not limited to science and technology; similar debates emerge from art, philosophy, and social interaction. Some contemporary critics rush to assert that new ideas, art, or technologies are the source of moral depravity and the decay of civilisation. In time, narratives change, and what was once controversial becomes common knowledge, classical masterpieces, or essential daily tools.

Currently, technology is developing at an unprecedented speed, inducing a sense of urgency and precipitating legislative action. Still, the core of the debate remains constant. Emerging technologies will be embraced by techno-optimists and simultaneously regarded as a threat to human dignity and the foundations of civilisation by techno-pessimists. From a legal perspective, however, not everything experienced as new is, in fact, so different at a conceptual level that analogies cannot be drawn. Still, it is equally true that, upon deeper analysis, apparent similarities are often revealed to be an illusion.

Precise distinctions between different types of interventions are intrinsically difficult to formulate and apply in legal practice. Difficulties do not undermine the necessity and usefulness of establishing theoretical legal concepts. Moreover, a degree of overlap between legal categories is always expected and can be solved by traditional legal mechanisms.

In this section, it will be argued that establishing a new legal concept, induced human evolution, as a complement to the broader term used in other disciplines – human enhancement – is necessary and useful as a legal methodological tool for further research, eventual legislative activity, and legal systematisation.

2.1 Regulating Emerging Technologies

Legislative and jurisprudential developments have a dialectical influence on technological development. They crystallise the result of previous ethical debates, foster broader public debate, and create incentives and/or disincentives for technology development. The prospect of new legislation or controversial court proceedings brings media and public opinion attention to issues rarely debated outside academic circles. Likewise, legislative activity and landmark court rulings are often directly or indirectly influenced by the general ethical debate. In turn, legal declarations of normative choices enforce conformity whilst simultaneously fostering reactive discussions about their adequacy. The regulation of emerging technologies and their uses will generally have measurable effects in promoting or reducing incentives for investment.

Burdensome and expensive compliance procedures may lead research institutions and industry to refrain from these areas of research or technology development. The lack of clear rules and guidelines often leads to unstructured and incoherent case-by-case assessments, generating legal uncertainty that may have a chilling effect on innovation.

A legal concept will provide a more focused starting point in debating possible legislative solutions by distinguishing a new object of legal enquiry and delimiting the need for introducing further legislation. In addition, distinguishing a new legal concept from what already exists will enable the task of extracting guidance from previous solutions. Simultaneously, at the level of legal interpretation and judicial adjudication, it will also facilitate the legal interpretative task of determining the extent to which the existing legal and regulatory framework should apply without distinction to new technology-enabled interventions on the human body.

In today's complex legal systems, true lacunae are increasingly rare. Most interventions on the human body that may be considered enhancement *lato sensu* are already the object of legal norms. If nothing else, legal solutions may be drawn from the application of general legal principles, constitutional or human rights rules, or judicial interpretation by analogy. However, a basic foundational framework is absent. From the practical perspective of legal certainty, conceptualisation and categorisation are required for a simple pragmatic reason: the body of rules is too vast and too complex to navigate efficiently.

Moreover, as it will be elucidated below, at a meta level there is an argument to be made favouring the present approach. Law is a complex normative system of intersecting rules, and conceptualising the social reality (human enhancement) as a narrower legal relevant concept (induced human evolution) will allow us to move beyond piecemeal regulation and general principles to a more coherent approach. This is not to ignore any of the realities left outside the proposed definition. There may be reasons to consider them under a separate legal concept or to defend their complete deregulation.

2.2 Moving on from 'Beyond Health' Formulations

Enhancement is often used in its literal sense as a synonym of improvement of the capabilities of individuals. It is often argued that it is unclear whether there is any moral or legal distinction between conventional forms of enhancement and the kind of interventions enabled by emerging technologies.¹ It is also argued that progress and technological development helps shape human biology and, in this

¹ See, eg, I Glenn Cohen, 'What (If Anything) Is Wrong with Human Enhancement? What (If Anything) Is Right with It?' (2014) 49 *Tulsa Law Review* 645, 646; see generally Michael J Sandel, *The Case against Perfection: Ethics in the Age of Genetic Engineering* (Belknap Press, 2007).

sense, triggers collective human enhancement.² However, a literal understanding is excessively broad for legal use³ since it covers any technological use that improves or restores human function or performance. In its literal sense, enhancement also includes any activity that entails or is motivated by a desire to achieve physical or moral perfection through an improvement in human health, well-being, or even the moral status of a person. In this broad sense, vaccines, medicines, surgery, diets, exercise, study, meditation, prayer, and daily-life use of machines, tools or instruments can be characterised as enhancement.

The classical alternative has been to describe enhancement as a counterpart to medicine as ‘interventions designed to improve human form or functioning beyond what is necessary to sustain or restore good health’.⁴ However, enhancement drivers are often a heterodox mixture of religious, cultural, aesthetic, philosophical, lifestyle, and utilitarian motives, aimed at a variety of intended results (functional, aesthetical, moral, etc). Definitions such as this focus only on interventions motivated by functional improvement and, in this sense, are limited in their inclusiveness.

Another argument against health-dependent definitions is the very fluidity of the concept(s) of health. Emerging technologies affect the organisation of healthcare and create a new dynamic between healthcare provider, recipient, and intervenient beyond traditional doctor-patient roles and relationship. Personalised medicine, big data analysis, and the internet of things are expected to provide greater awareness and a wide array of technical possibilities for self-monitoring, which may drastically change the practice of medicine. The future of healthcare may reside in co-responsibility, self-monitoring, and active health-conscious citizenship. In an age where the concept of therapeutic act is fluid and interventions on the body not always performed by licenced medical professionals, medical deontological norms will lose relevance as public policy safeguards.

² Allen Buchanan, *Beyond Humanity? The Ethics of Biomedical Enhancement* (Oxford University Press 2011) 1-2.

³ Bostrom and Savulesco recognize that ‘[i]f the concept of human enhancement is stretched to this extent, it becomes manifestly unfit for service as an organizing idea for a new and distinctive field of legal inquiry’: Nick Bostrom and Julian Savulesco, ‘Human Enhancement Ethics: The State of the Debate’ in Julian Savulesco and Nick Bostrom (eds), *Human Enhancement* (Oxford University Press, 2009) 3. Foster argues that, while it is true that we are all enhancers, differences of degree should be taken into consideration. The author cautions against allowing false analogies between mundane acts (coffee drinking) and more severe interventions (genetic enhancement) to gain intellectual authority over the basis of non-critical visions of autonomy and argues that dignity should be used as a counterbalance: Charles Foster, *Human Dignity in Bioethics and Law* (Hart, 2011) 148.

⁴ Eric Juengst, ‘What Does Enhancement Mean?’ in Eric Parens (ed), *Enhancing Human Traits: Ethical and Social Implications* (Georgetown University Press, 2008) 29.

Technological advances and improvement in the scientific knowledge of the human body are constant drivers for changes in the concept of health. A deeper knowledge of the social determinants of health and the construction of health as physical and psychological well-being allow expanding the scope of the concept of therapy beyond its traditional confines.⁵ On the other hand, there is a growing debate about the medicalisation of lifestyle choices and personality traits. The mental health field is particularly fertile with respect to scientific controversies, changes in the classification of personality disorders, and claims that specific cultural traits of minorities and gender issues may play a controversial role in diagnosis. Commentators argue that it is difficult to draw objective distinctions among lifestyle choices, genetic characteristics, and personality disorders.⁶ Even the concept of genetic defect or malformation may be questionable since it is based on normative constructions of bio-normality, artificial distinctions between natural and artificial, and assumptions about the value and desirability of traits and characteristics.

Transposing to an eventual legal definition such normative assumptions concerning human traits and characteristics is not helpful in any way. By contrast, an independent solution may improve the debate by erasing strict adherence to normative notions of bio-normality from the equation. As it will be argued, detachment from health will still allow parallels and analogies to be drawn from health law and bio-ethics discussions without making the legal framework a prisoner of health law controversies. At the same time, isolating the definition from the health debate and framing some issues as pertaining to a separate legal concept might introduce diversity and inclusiveness into the debate by reducing common biases. An adaptive legal concept independent of the concept of health will account for the evolution of the concept of medicine and provide sufficient leeway to avoid unintentional regulatory-free zones.

⁵ 'Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity': *Constitution of the World Health Organization*, opened for signature 22 July 1946, 14 UNTS 185 (entered into force 7 April 1948) preamble; see also *Directive 2001/83/EC of the European Parliament and of the Council of 6 November 2001 on the Community Code Relating to Medicinal Products for Human Use* [2001] OJ L 311/67, art 1(2) defining a medical product as 'any substance or combination of substances which may be administered to human beings with a view to modifying physiological functions'. This definition could include pharmacological enhancement. Cf Tamara K Hervey and Jean V McHale, *Health Law and the European Union* (Cambridge University Press, 2004) 7-10; John Tobin, *The Right to Health in International Law* (Oxford University Press, 2011) 125-32; and Charles Foster and Jonathan Herring, 'What is Health?' in Michael Freeman, Sarah Hawkes and Belinda Bennett (eds), *Law and Global Health: Current Legal Issues Volume 16*, (Oxford University Press, 2014) 23.

⁶ See generally Peter Conrad, *The Medicalisation of Society: On the Transformation of Human Conditions into Treatable Disorders* (Johns Hopkins University Press, 2007).

2.3 Enhancement Law and the Law(s) of Enhancement

New technology-enabled interventions on the human body might not find appropriate legal solutions under the logic of existing health law and regulations. Admittedly, it is a matter for debate whether or not the establishment of a new field (or sub-field) of law and legal enquiry is (or will become) necessary in the future. An answer to this question will not be presumed here. Nevertheless, some delimitation is a necessary tool to even begin a debate on determining whether it is necessary and appropriate to establish Enhancement Law as an autonomous field of legal enquiry. This can be achieved *inter alia* by establishing a legal concept delimiting the scope of any such field.

A second argument for the usefulness of the proposed conceptual framework is of a substantive legal nature. Different understandings of the social phenomena and philosophical concept 'human enhancement' already exist. As argued below,⁷ they are not suited to inform a framework envisioned as enabling minimal coherence and interoperability between substantive rules directed at and addressing the social phenomena enhancement – 'the law(s) of enhancement'.⁸

It is acknowledged that current legislation directed at technology-enabled interventions of the type contained under the proposed definition is uncommon. It is precisely because not much specific legislation has been produced that a legal concept corresponding to the broader social phenomenon of 'human enhancement' is timely. From a constructive perspective (*de jure condendo*), a clear conceptual framework promotes coherence in judicial decisions and enhances legal certainty while, from a legislative view point (*de lege ferenda*), a properly delimited sphere of action will facilitate debate and help develop a balanced regulatory framework.

Developing this legal concept of 'induced human evolution' will also be useful to the internal organisation of a legal system. This is because, under the logic of the subsidiarity principle, the proposed concept and definition of 'induced human

⁷ Section 4.

⁸ Despite proposing the concept of 'induced human evolution', the terms 'Enhancement Law' and 'laws of enhancement' are preserved. Legal definitions do not necessarily cover the full extent of a social phenomenon; they only concern a certain dimension of reality, but are applicable in the real world where conceptual boundaries are not always immediately clear. Law is only one type of normative system, intersecting with other normative systems such as religion, morality, and social conventions. Therefore, it has boundaries imposed by different theoretical conceptions of what the law should be and the (internal) substantive limitations to legislative powers – the basic rights of the individual or constitutional and human rights. However, legal definitions will apply to the complete reality – in the case of enhancement – and function in practice as an operative delimitation of the factual reality, identifying what is understood to have legal relevance.

evolution' excludes social phenomena, individual behaviour, and choices that are either clearly outside the scope of legitimacy of legal norms or properly addressed by other specialised fields of law, eg, health law.

Biological integrity is a normative value.⁹ A recent consequence of such biological notions of humanity is the concept of 'human common genetic heritage' found in international conventions.¹⁰ Traditionally, exterior interventions on the human body have been conceptualised as aggressions. However, consensual interventions with socially acceptable goals have been considered legally justified. These justifications are culturally relative and generally divided into two categories: biological and moral. Biological justifications rest on re-establishing a biological function or preventing its decline. Moral arguments are directed at improving social desirability and the moral status of a person, and they are often conceptualised through cultural traditions, philosophy, or religion. However, emerging technology-enabled interventions on the human body elude both these justifications in the sense that they are not driven by biological restoration or necessarily imposed by cultural and social norms. Therefore, both the internal logic of health law and freedom of thought and religion are poorly suited to address them.

Accepting a medical intervention is never a completely free choice because the point of departure is disease or injury. Refusal of treatment entails direct negative consequences (pain, loss of function, or death) and may even endanger others. In theory, 'enhancement' decisions are made from a higher level of freedom of choice, placing the legal debate within the sphere of personal autonomy.¹¹ However, in practice, this is not necessarily true, since refusal or inability to 'enhance' may have negative social repercussions.¹² As long as the current legal framework is in place, inclusiveness, non-discrimination, acceptance of individuality, and human limitations are part of the default approach. The right to personal integrity and human dignity protects the human body from being used as mere object or instrument for the realisation of social goals, precluding a

⁹ For a discussion, see Eric T Juengst 'What's Taxonomy Got to Do with It? "Species Integrity"', Human Rights, and Science Policy' in Julian Savulesco and Nick Bostrom (eds), *Human Enhancement* (Oxford University Press, 2009) 43.

¹⁰ *Universal Declaration on the Human Genome and Human Rights*, GA Res 152, UN GAOR, 3rd Comm, 53rd sess, plen mtg, UN Doc A/RES/53/152 (9 December 1998) art 24; *Universal Declaration on Bioethics and Human Rights*, UN ESCOR, 33rd sess, UN Doc C/RES/33/36 (19 October 2005) arts 1, 16; *Convention for the Protection of Human Rights and Dignity of the Human Being with Regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine*, opened for signature 4 April 1997, CETS 164 (entered into force 1 December 1999) arts 1 and 13 ('Oviedo Convention').

¹¹ Some parallel can be drawn with euthanasia and assisted suicide, see John Griffiths, Helen Weyers and Maurice Adams, *Euthanasia and the Law in Europe* (Hart, 2008).

¹² David DeGrazia, *Human Identity and Bioethics* (Cambridge University Press, 2005) 215.

blank obligation to enhance.¹³ However, once ‘enhancement’ is possible and relatively safe, widespread use is to be expected. Cultural attitudes are likely to change. The validity of a right to human genetic heritage or biological integrity¹⁴ is far from uncontroversial and may lose its appeal altogether. In time, enhancement may become recognised as a right. Conversely, enhancement produces externalities, and the social costs of personal decisions (to enhance or not) may require tailored legal solutions.

Another aspect concerns regulatory approval of procedures and products. In the face of disease or injury, inaction usually decreases survival chances or life quality. Therefore, in health-oriented interventions, a variable degree of uncertainty and risk of side-effects and adverse reactions is acceptable.¹⁵ With respect to interventions in which health maintenance or improvement is not the objective, the direct health risks of inaction are low or non-existent. Therefore, public policy considerations may require novel approaches to safety standards.

Moreover, the legal system has been developed with reference to a theoretical notion of equality: ‘All human beings are born free and equal in dignity and rights.’¹⁶ Equality is a fiction anchored in a shared biology. The possibility of enhancement disturbs this notion and creates specific horizontal challenges with potential implications in every field of law. For this reason, it is suggested that there is a need for a legal definition independent of the concepts of health, disability, and ‘normality’ to ensure that these phenomena and their effects are visible and receive coherent and compatible legal solutions.

3 *The Construction of a Legal Concept: Pluralism or Harmonisation?*

After defending the need for introducing a legal concept, the next question requiring attention is whether to opt for a single legal concept valid for all areas

¹³ Imogen Goold and Hannah Maslen, ‘Must the Surgeon Take the Pill? Negligence Duty in the Context of Cognitive Enhancement’ (2014) 77 *Modern Law Review* 60, 80–5.

¹⁴ *Oviedo Convention* (n 10) arts 1, 2; see also *Explanatory Report to the Convention for the protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine*, ETS 164, [90]. Cf Jos Dute, ‘The Leading Principles of the Convention on Human Rights and Biomedicine’ in Sief JKM Gevers, Ewoud H Hondius and Joep H Hubben (eds), *Health Law, Human Rights and the Biomedicine Convention: Essays in Honour of Henriette Roscam Abbing* (Martinus Nijhoff Publishers, 2005) 3, 7–11 (arguing that self-determination is the core concept of the convention and that dignity is not possible without autonomy).

¹⁵ European Medicines Agency Authority (‘EMA’), *The Rules Governing Medicinal Products in the European Union* (2015) <https://ec.europa.eu/health/documents/eudralex_en>.

¹⁶ *Universal Declaration of Human Rights*, GA Res 217A (III), UN GAOR, 3rd sess, 183rd plen mtg, UN Doc A/810 (10 December 1948) art 1.

of law (possibly extending to other disciplines) or to follow a pluralistic approach. The sections below address this issue from three perspectives: international, interdisciplinary and intra-disciplinary. They will also add specific arguments to sustain the introduction of the proposed legal concept, 'induced human evolution', and its intended scope of action.

3.1 International Legal Harmonisation

The currently-used term, 'human enhancement' is not easy to translate. Corresponding words and expressions may entail different levels of meaning. The proliferation of expressions and conceptual formulations poses an obstacle to international dialogue and the development of international law.

The phenomena concerned are based on global technology-enabled human activities and generate ethical and legal issues likely to transcend political borders. These are connected with fundamental rights enshrined in international law and, as such, already susceptible to, at least, a minimum degree of harmonisation.¹⁷ In today's globalised world, fast communications and fewer trade barriers prompt technology to develop and disseminate across borders. Academic discussions are increasingly global and interdisciplinary, entailing an additional need for establishing a minimum degree of agreement on conceptual common ground.

Arguably, future substantive provisions may need to accommodate each jurisdiction's legal and cultural circumstances. Still, a minimum degree of agreement on a legal definition would facilitate international public policy discussions, granting them a much needed focus and structure, which in turn would also allow minimum an international harmonisation of substantive norms. Moreover, the task of establishing a common definition benefits from the current status quo of relatively low national-specific legislative activity, making this a timely debate.

3.2 Interdisciplinary

Interdisciplinary harmonisation could enable clearer academic debate so as to facilitate interdisciplinary cross-fertilisation of knowledge and research approaches. Interdisciplinary studies produce valuable input, data, and diverse layers of cross-disciplinary inspiration and academic influence. Integrating contributions from other disciplines into academic legal thinking and legal practice is instrumental to obtaining a realistic understanding of the challenges of emerging technologies.

¹⁷ Andrea Bertolini and Erica Palmerini, 'Regulating Robotics: A Challenge for Europe' in Wolfgang Heusel et al (eds), *Upcoming Issues of EU Law: Compilation of In-Depth Analysis* (EU Parliament, 2014) 197.

Conversely, law, ethics, and social norms operate in different spheres. Legitimate legislative intervention is restricted inter alia by the principles of private autonomy, proportionality, and subsidiarity. Certain conduct is by its nature best addressed through other normative systems. The proposed legal concept will be less broad than what might be necessary for philosophy or social sciences. Creating a legal concept corresponding to any social phenomenon is a process of abstraction; it requires the establishment of the legally relevant elements that are capable of framing reality in the legal system.

Definitions established for legal purposes are methodological tools that serve the specificities of law as a field of knowledge. Legal concepts are not descriptive of reality but re-enactments. In this sense, they function as a legal hypothesis that the norm(s) will link to the attribution of a vast and complex network of legal consequences. Applying the law requires a process of characterisation, identifying a 'real' situation and subsuming it to the closest legal norm. Drawing a legal analogy between different situations is an important interpretative tool both in the absence of specific statutory norms and as a matter of ensuring coherence and legal certainty. It requires the previous effort of establishing conceptual delimitations and legal taxonomies. These are necessary to establish a starting point to use as guidance for statutory rules or jurisprudence concerning situations in which similar legal principles and values were previously confronted and reconciled.

Law as a system comprises an interdependent network of legal concepts. These are, to a certain degree, autonomous from corresponding concepts in philosophy or social and natural sciences. For example, the legal concept of 'parent' may or not correspond to the biological notion. Depending on the jurisdiction, legal parenthood may be determined by legal presumption, granted *ope legis* (ie adoption) and may include *in vitro* fertilisation using donated reproductive cells, or even surrogacy. Here, a social-cultural element is taken into consideration, expanding the legal concept of parenthood beyond biology. The contrary may also apply, especially in areas where legal concepts have remained frozen in time and have not followed developments in other areas of knowledge and/or social practice.¹⁸ Because legal reasoning and legal interpretation have specific rules and an internal discourse that differs from other disciplines, finding an interdisciplinary definition is extremely difficult if not impossible. Without prejudice to acknowledging the success of interdisciplinary definitions drafted to meet specific needs of well-defined projects and research questions,¹⁹ this paper takes a cautious and modest approach in proposing a definition for legal

¹⁸ Naturally, such an assessment is also culturally relative. It may be that a law introduced as a consequence of compliance with an international instrument, for example, also imports values and social norms that are not prevalent in a given society.

¹⁹ See, eg, Simone Araldi and Francesca Marin (eds), *Report on Models to Incorporate Ethical Advice in Regulation and to Govern Issues of Enhancement Technologies* (Deliverable D8.2, FP7 project EPOCH, 2012) 1.

purposes susceptible of coexisting with but not replacing conceptual frameworks used in other fields of knowledge.

3.3 Intra-disciplinary

A single legal definition framing enhancement followed by consistent interpretation and application across different fields of law is advisable. At a conceptual level, systemic coherence is an important goal regardless of specific substantive law solutions.²⁰ The present proposal is intended as a general legal conceptual framework. It is useful to delimit the sphere of legal enquiry and establish internal coherence. Admittedly, separate fields of law may understand the same phenomenon differently. This may be the case when the same act is regulated in accordance with different regimes if considered through the lens of diverse public policy concerns. Borrowing an example from health law, an intervention may be subject to safety norms created for medical procedures while, simultaneously, excluded from a list of medical procedures for purposes of access, fees, and reimbursement schemes in public healthcare services. From a public health perspective, it can be argued that the objective/result of the procedure is immaterial for purposes of establishing safety norms. Conversely, the allocation of public resources may prioritise procedures essential to basic health to the detriment of those promoting general well-being.

It should also be clear that the attribution of a specific legal solution for regulatory purposes with respect to induced evolution procedures is not necessarily the same thing as amalgamating different phenomena into the same legal category. Certain interventions may overlap with broader concepts of health and be regulated accordingly. This overlap will not change their conceptual nature because the proposed definition is independent of notions of health and bio-normality. On the other hand, under the proposed framework, it will be possible to regulate separately those types of interventions that warrant special rules, while others may be left under the sphere of private autonomy. The proposed framework, in this sense, is a preliminary step to subsequent characterisation, concrete normative valuation and legal solutions tailored to each intervention or category of interventions.

4 Proposal

The expression 'human enhancement' commonly designates an array of interventions on the human body. There is a vast body of literature on the topic.²¹

²⁰ See generally Amalia Amaya, *Tapestry of Reason: An Inquiry into the Nature of Coherence and Its Role in Legal Argument* (Bloomsbury, 2015).

²¹ See, eg, Eric T Juengst, 'Can Enhancement Be Distinguished from Prevention in Genetic Medicine?' (1997) 22 *Journal of Medicine & Philosophy* 125; Norman Daniels, 'Normal Functioning and the Treatment-Enhancement Distinction' (2000) 9 *Cambridge Quarterly of Healthcare Ethics* 309; Francis Fukuyama, *Our Posthuman Future: Consequences of the*

The expression is used in different contexts, corresponding to diverse concepts, definitions, and characterisations, organised according to several taxonomic criteria or none at all. None of the definitions so far encountered could be used in itself as a conceptual tool for debating the possible establishment of a legal field dedicated to human enhancement-related issues. I propose the use of the expression ‘*induced human evolution*’ as a replacement for human enhancement in legal texts with the following definition:

Use of technological means with the intention to improve, modify or introduce in the human body aesthetic features, physical, emotional or cognitive performance levels and abilities beyond the human species typical standards under the current evolutionary state, and resulting in induced permanent alterations in the human body.²²

4.1 Terminology Issues and Legal Interpretation

Laws and regulations are interpreted in accordance with a set of previously determined rules. These vary from one jurisdiction to another. Rules for interpretation of international treaties and conventions are prescribed by the *Vienna Convention on the Law of Treaties*.²³ Legal interpretation begins with the literal or ordinary meaning of words and expressions examined in light of

Biotechnology Revolution (Farrar, Straus and Giroux, 2002); Jürgen Habermas, *The Future of Human Nature* (Polity Press, 2003); Leon R Kass, *Life, Liberty, and the Defense of Dignity, the Challenge for Bioethics* (Encounter, 2002); Nicholas Agar, *Liberal Eugenics, in Defence of Human Enhancement* (Blackwell, 2004); Julian Savulescu, ‘Justice, Fairness, and Enhancement’ (2006) 1093 *Annals of the New York Academy of Sciences* 321; Henry T Greely et al, ‘Towards Responsible Use of Cognitive-Enhancing Drugs by the Healthy’ (2008) 456 *Nature* 702; Eric Parens, ‘Is Better Always Good? The Enhancement Project’ in Eric Parens (ed), *Enhancing Human Traits: Ethical and Social Implications* (Georgetown University Press, 2008) 1; Ruth Chadwick, ‘Therapy, Enhancement and Improvement’ in Bert Gordijn and Ruth Chadwick (eds), *Medical Enhancement and Posthumanity* (Springer, 2008) 25; George Khushf, ‘Stage Two Enhancements’ in Fabrice Jotterand (ed), *Emerging Conceptual, Ethical and Policy Issues in Bionanotechnology*, (Springer, 2008) 203; Christophe Coenen et al (eds), *Human Enhancement Study* (STOA, European Parliament, 2009); Inmaculada de Melo-Martin, ‘Defending Human Enhancement Technologies: Unveiling Normativity’ (2010) 36 *Journal of Medical Ethics* 483; John Z Sadler, ‘Dignity, Arête, and Hubris in the Transhumanist Debate’ (2010) 10 *American Journal of Bioethics* 67; Ruud ter Meulen, ‘Dignity, Posthumanism, and the Community of Values’ (2010) 10 *American Journal of Bioethics* 69; Buchanan (n 2) 23; Arnaldi and Marin (n 19); Vincent Menuz, Thierry Hurlimann and Béatrice Godard, ‘Is Human Enhancement also a Personal Matter?’ (2013) 19 *Science and Engineering Ethics* 161.

²² Ana Nordberg, ‘Patentability of Methods of Human Enhancement’ (2015) 10(1) *Journal of Intellectual Property Law & Practice* 19; Ana Nordberg, ‘Human Enhancement from Ethical Interrogations to Legal (Un)Certainty’ in Tana Pistorius (ed), *Intellectual Property Perspectives on the Regulation of New Technologies* (Edward Elgar, 2018) 54.

²³ *Vienna Convention on the Law of Treaties*, opened for signature 23 May 1969, 1155 UNTS 332 (entered into force 27 January 1980).

contextual elements.²⁴ The term ‘enhancement’ is a literal synonym of improvement. It points to a positive change, implying a subjectively positive pre-assessment of the use of technology or its intended results.²⁵

In general terms, technology has historically generated both positive and negative outcomes – eg, industrial development and pollution or increased life expectancy and an aging population. Technology assessment is itself a complex field. Qualifying radical interventions on the human body as an improvement is, at best, contentious; but it is also reductive. An enhancement intervention is not necessarily directed towards functional improvement. It may be a form of self-expression, an artistic, political, religious or philosophical statement, or a search for originality. Adding contextual elements does not sufficiently clarify the meaning. Improvement is too subjective and social-culturally relative. The concept of improvement cannot be legally defined in a manner that is sufficiently clear and precise to be compatible with the guarantee afforded by the principle of legal certainty.

The term ‘human enhancement’ also poses translation issues. In Latin-derived languages, enhancement is translated as ‘human improvement’ and the alternatives ‘human optimisation’, ‘human valorisation’, ‘human artificial development’, and ‘human perfecting’. Lüthy and Koop point out that German sources use the expression *die Perfektionierung des Menschen* (*perfecting of man*), which also possesses a positive connotation of improvement but not of discontinuity. They prefer the Dutch expression *de maakbare mens* (makeable man) and propose the use of the Latin expression *homo-manufactus*, arguing it ‘provides a more value-neutral term that can include any of the current techniques applied to changing human nature - not all of which need to aim at enhancement.’²⁶ The expression has the advantage of broadening the debate by including non-functional modifications.²⁷ However, linking enhancement to the issue of human nature does not offer much in terms of legal certainty, as there is not a sufficient consensus, philosophical or legal, on how to define human nature. This makes it extremely difficult to determine what type of interventions will be able to alter

²⁴ Ibid art 31(1).

²⁵ *Merriam-Webster Dictionary* (online) ‘enhance’; see also Nordberg, ‘Patentability of Methods of Human Enhancement’ (n 4); Nordberg, ‘Human Enhancement from Ethical Interrogations to Legal (Un)Certainty’ (n 6).

²⁶ Christoph H Lüthy and Bert-Jaap Koop, ‘Towards Homo Manufactus? An Introduction to this Volume’ in Bert-Jaap Koops et al (eds), *Engineering the Human: Human Enhancement Between Fiction and Fascination* (Springer, 2013) 3.

²⁷ See, eg, Jotterand, who argues that ‘we should not limit our reflections of [brain-computer interfaces] applications in terms of *therapy* and *enhancement* but also include an examination of applications aiming at the *alteration* of human nature’: Fabrice Jotterand, ‘Beyond Therapy and Enhancement: The Alteration of Human Nature’ (2008) 2 *NanoEthics* 15, 17.

human nature and thus qualify as enhancement.²⁸ 'Human re-engineering' has been proposed as an alternative, ethically neutral term.²⁹ Khushf puts forward a distinction between Stage 1 and Stage 2 enhancements.³⁰ Agar writes about 'radical enhancement'³¹ and four types of 'Would-Be Radical Enhancers': The Technologist, the Therapist, the Philosopher, and the Sociologist'.³² Alternative terms also include 'human development'³³ and 'human transgenesis'³⁴ although these appear to relate to specific types of interventions.

Nomen juris are often adapted from or inspired by early adopters and commercial pioneers. Although available technology does not allow a wide range of enhancements, there is an emergent community of diverse proponents and enthusiasts. Interestingly, they do not use the term 'human enhancement'. Transhumanism, human augmentation, and body modification are examples of preferred alternative denominations.³⁵

²⁸ In this sense, Buchanan argues that 'one ought to be very skeptical about the very idea that the concept of human nature that can do any significant work in the enhancement debate or any other serious moral controversy': Buchanan (n 2) 6–7, ch 6.

²⁹ Christopher Hook, 'Nanotechnology and the Future of Medicine' in Nigel Cameron and M Ellen Mitchell (eds), *Nanoscale: Issues and Perspectives for the Nano Century* (John Wiley, 2007) 347.

³⁰ Khushf (n 21) 203.

³¹ 'Radical Enhancement Involves Improving Significant Human Attributes and Abilities to Levels That Greatly Exceed What Is Currently Possible for Human Beings' in Nicholas Agar (ed), *Humanity's End* (MIT Press, 2010) 2.

³² Ibid 6.

³³ Coeckelbergh proposes an analysis of how technology may shape human capabilities (according to the notion proposed by Martha Nussbaum) as opposed to how it impacts the body. Framing the issue in terms of: should we aim at human development (reaching minimum levels of capabilities) and perhaps human excellence (maximising levels of capabilities), or should we aim at human enhancement (changing the capabilities by technological or other means)?': Mark Coeckelbergh, 'Human Development or Human Enhancement? A Methodological Reflection on Capabilities and the Evaluation of Information Technologies' (2011) 13 *Ethics and Information Technology* 81, 86.

³⁴ Fonseca et al define transgenesis as a form of enhancement consisting of the 'biotechnological application of HGT [horizontal gene transfer] with the purpose of the intentional and focused genetic alteration of a given organism': Flávio Guimarães da Fonseca et al, 'Human Transgenesis: Definitions, Technical Possibilities and Moral Challenges' (2012) 25 *Philosophy and Technology* 513, 515. See also Julian Savulesco, 'Human-Animal Transgenesis and Chimeras Might Be an Expression of Our Humanity' (2003) 3 *American Journal of Bioethics* 22.

³⁵ Data based on a literature survey including traditional publications and online materials.

'Transhumanism' is defined by Bostrom, founder of Humanity+,³⁶ as a 'loosely defined movement' that 'promotes an interdisciplinary approach to understanding and evaluating the opportunities for enhancing the human condition and the human organism opened up by the advancement of technology'.³⁷ The term is also claimed by the Transhumanism Party, an 'American political organisation dedicated to putting science, health, and technology at the forefront of United States politics'.³⁸

'Human augmentation' is sometimes used both in an academic and technology development context to refer to technologies that improve human productivity or capability, or that somehow surpass restoration and add features to the human body. The term 'augmented human' has also been found in academic conferences³⁹ and publications,⁴⁰ corresponding to what in this paper is called pre-enhancement, quasi-enhancement, and proto-enhancement. Human augmentation encompasses enhancement as a side-effect to restorative interventions (eg, advanced prosthetics) and non-permanent enhancement (eg, wearable technology).

In addition, there are communities of 'body modification artists'⁴¹ and 'bio hackers'.⁴² Body modification enthusiasts are a heterogenic group having in

³⁶ In 1998, Nick Bostrom and David Pearce founded The World Transhumanist Association, later renamed Humanity+. 'Humanity+ is an international nonprofit membership organization that advocates the ethical use of technology to expand human capacities': 'About', *Humanity+* (Web Page) <<http://humanityplus.org/about/>>.

³⁷ Nick Bostrom, 'Transhumanism Values' in Frederick Adams (ed), *Ethical Issues for the 21st Century* (Philosophical Documentation Center Press, 2003) 3; Nick Bostrom, 'Why I Want to Be a Posthuman When I Grow Up' in Bert Gordijn and Ruth Chadwick (eds), *Medical Enhancement and Posthumanity* (Springer, 2009) 108.

³⁸ 'About', *The Transhumanist Party* (Web Page) <<http://www.transhumanistparty.org/About.html>>.

³⁹ See *Augmented Human International Annual Conferences* (Web Page) <<http://www.augmented-human.com/>>.

⁴⁰ The journal *Augmented Human Research* publishes 'scientific contributions towards augmenting human capabilities through technology for increased well-being and enjoyable human experience': Springer, *Journal No 41133*.

⁴¹ Body modification artists engage in an array of procedures, some of which can be considered surgical. Examples include piercing, tattooing, scarification, implants, tongue splitting, sub-incision, castration, and amputations: *Body Modification Encyclopedia* (Web Page) <http://wiki.bme.com/index.php?title=Surgical_Modification>.

⁴² The community describes itself in this way: 'We're grinders. We hack our bodies with artefacts from the future-present. [...] Grinders practice functional (sometimes extreme) body modification in an effort to improve the human condition. We hack ourselves with electronic hardware to extend and improve human capacities': 'Who are we', *Biohack.me* (Web Page) <<http://wiki.biohack.me>>.

common adherence to non-conformist standards of beauty and body image.⁴³ They claim to be motivated by artistic and/or philosophical expression, individual actualisation, and the materialisation of individual projects of body transformation and self-construction.⁴⁴ Hedonism and experimenting and experiencing sensations (including pain) of the interventions are also referred to.⁴⁵ Bio-hackers (or body hackers) try to merge body and technology. These groups often overlap, and neither sees any significant moral differentiation between modifying the body through make-up, physical exercise or meditation, and extensive permanent interventions.⁴⁶

Although the expression 'human enhancement' has been widely used in academia, it coexists with other nomenclatures, indicating that communities of early adopters may consider 'human enhancement' a misnomer.

4.2 Enhancement as a Legal Concept: Induced Human Evolution

Emerging technologies bring forth the possibility for each individual to personally shape her own evolutionary path: evolution may in the future become active and induced instead of reactive.⁴⁷ In this sense, 'induced human evolution' would be a preferable term for a corresponding legal concept,⁴⁸ encompassing the phenomenon of individual evolution as a result of the active and conscious use of technology.

⁴³ On socially constructed values, non-conformity, deviation, and interpretation, see Joseph Raz, *Engaging Reason, on the Theory of Value and Action* (Oxford University Press, 1999) 215–218.

⁴⁴ For personal accounts and testimonies on motivations and experiences with body modification, see Erik 'The Lizardman' Sprague, 'Once More through the Modified Looking Glass' (2003) <<http://www.thelizardman.com/>>; Shannon Larratt, 'Opening Up: Body Modification Interviews: Body Modifications Interviews 1995–2008' (2008) <<http://www.zentastic.com/pdf/openingup.pdf>>.

⁴⁵ See Sprague (n 44); Larratt (n 44).

⁴⁶ 'Bodyhacking Convention 2016' (Web Page) <<https://bodyhackingcon.com/evolving-you>>; Trevor Goodman, 'What is body hacking', *Body Hacking Con Blog* (Blog Post) <<https://bodyhackingcon.com/blog/what-is-bodyhacking.html>>.

⁴⁷ The term 'induced human evolution' has not been previously used but has been indirectly suggested. Torrance's reasoning points in this direction. See Andrew Torrance, 'Patenting Human Evolution' (2008) 56 *Kansas Law Review* 1075, 1078; Harris argues that enhancement is a new (and faster) process of evolutionary change, one that will replace Darwinian natural selection by 'deliberate selection' and Darwinian evolution with 'enhancement evolution': see John Harris, *Enhancing Evolution, the Ethical Case for Making Better People* (Princeton University Press, 2010) 3–4.

⁴⁸ Legal concepts designating a certain class of objects (phenomena or things) do not necessarily have the same scope of the corresponding concept in other fields of knowledge or sciences.

Observation of major sports events tells us that we are continuously pushing the boundaries of the perceived limits of human physical performance.⁴⁹ Statistical indicators, such as life expectancy and number of healthy life years, demonstrate that our survival chances at birth are increasing, and we are living longer and healthier lives.⁵⁰ Research also points to a continuous increase in the average IQ – the so-called Flynn effect.⁵¹ Not only morphological and physiological characteristics of the human species but also science, technology, culture, and society appear to be evolving. Considering epigenetics, it is difficult to distinguish natural from technological influences in demographic trends. At the individual level, however, it can be said that emerging technologies create the individual possibility to shape our own evolutionary path in an unprecedented way. Current technology promises to bring us closer to an active and induced evolution. It is in this sense, at the individual level, that the term ‘evolution’ is used here.

Commentators have argued that enhancement per se is not new, that ‘humanity has been shaping human biology and altered the genome as long as there have been human beings’.⁵² However, these interventions could only be observed in social and historical contexts. Emerging technological possibilities will enable something new – individual actions directed at immediate results. As it will be elaborated, the term ‘evolution’ should not be interpreted in the biological, Darwinian sense. The term ‘evolution’ is used here in the neutral literal sense of progression or development into something else.⁵³ Proposed definitional terms are meant to be interpreted according to the legal method(s) of interpretation. If the present proposal were to be adopted in international instruments, its legal interpretation would be done in accordance with the rules prescribed by the *Vienna Convention on the Laws of Treaties*. This implies that the starting point is always the ‘ordinary meaning’ of the term. Furthermore, in my opinion, legal terms should also be interpreted by reference to auxiliary contextual elements. These, would benefit from being both internal (eg, legal systematic, legal comparative elements) and interdisciplinary (eg, biological, social or moral).⁵⁴

The choice of the expression ‘induced’ signals that the phenomena here considered is the result of deliberate human action. Induced human evolution is

⁴⁹ *Official Website of the Olympic Movement* (Web Page) <<https://www.olympic.org/>>.

⁵⁰ ‘Demography Yearbooks’, *United Nations Statistics Division* (Web Page) <<http://unstats.un.org/unsd/demographic/products/dyb/dyb2.htm>>.

⁵¹ James Flynn, ‘Searching for Justice: The Discovery of IQ Gains over Time’ (1999) 54 *American Psychologist* 1, 5–20.

⁵² Buchanan (n 2) 2.

⁵³ Synonyms of evolution are elaboration, development, expansion, growth, progress, and progression: *Merriam-Webster Dictionary* (online) ‘evolution’.

⁵⁴ See also Ana Nordberg, ‘Legal Method and Interpretation in International IP Law: Pluralism or Systemic Coherence’ in Suzy Frankel (ed), *Is Intellectual Property Pluralism Functional?* (Edward Elgar, 2019) 96.

distinct from adaptive evolution insofar as it is more than the result of instinctive or conditioned biological or social responses of adaptation to environmental conditions. At an abstract level, most human actions and reactions could be described as governed by an instinct to survive through adaptation to the physical and social environment. However, the law intervenes at the level of individual, concretely-determined actions, even if it does so in order to achieve meta-policy goals. For an act to be considered 'induced evolution', there has to be a clear moment at which such an 'evolutionary' act takes place, a specific human action requiring normative evaluation. This delimitation of scope is not equivalent to disregarding cumulative effects. It is foreseeable that the sum of individual decisions may translate into a social process of collective 'enhancement'. This may require public policy responses, creating incentives and disincentives for specific behaviour.⁵⁵

4.3 Types of Interventions Included under the Concept of Induced Human Evolution

The proposed definition will not include every possible intervention claimed to be human enhancement by other sources or authors. To clarify this proposal, Table 1 exemplifies what may be included under the proposed concept of induced human evolution, classified according to selected taxonomic criteria with potential legal relevance.⁵⁶ The following categories were considered: 1) mechanism of action, 2) abilities, functions or performance levels affected, 3) purpose, 4) result, and 5) scope.

Induced human evolution may occur through different types of mechanism of action, eg, exterior compression, the activation of functionalised nanoparticles, electromagnetic stimulation, traditional or laser surgery, pharmaceuticals, genetic editing, implants, prosthetics, or brain-computer interfaces. Interventions may target functions, skills or performance levels (physical, emotional, or cognitive) and aesthetic features. Further, these interventions may also be classified according to the motives or goals guiding the decision to undergo the procedure. In this respect, the present proposal is intended to be broad and inclusive, encompassing any possible personal projects for achieving functional, aesthetic or moral goals and interventions motivated by recreational purposes.

⁵⁵ Meloni argues that excessive reliance on preliminary or speculative epigenetic claims may result in a return of eugenics. More data and scientific knowledge is necessary in order to extrapolate conclusions and guide public policy: Maurizio Meloni, *Political Biology: Science and Social Values in Human Heredity from Eugenics to Epigenetics* (Palgrave Macmillan, 2016).

⁵⁶ Different taxonomic classifications have been proposed. For the most part, they have the shortcoming of relying on definitions of enhancement that are either overly vague or broad or both. See Khushf (n 21) 203; Cohen (n 1) 646-52.

Table 1: Taxonomies of enhancement considered under the concept 'induced human evolution'

Examples of Criteria	Examples of categories				
Mechanism of action	Electronic	Genetic manipulation	Mechanical	Pharmaceutical	Mixed
Features, abilities, and performance levels intervened	Appearance	Cognition	Emotions	Physiology	Senses
Purpose of intervention	Aesthetic	Functional	Moral	Recreational	Emotional
Result of intervention	Development of existing features, abilities or performance levels	Replacement by analogues	Introduction of new abilities or features		
Scope of intervention	Level 1 (Low) Discrete individual intervention	Level 2 (Medium) Multiple interventions	Level 3 (High) Intervention transmittable to future generations.	Level 4 (Extreme) Multiple interventions transmittable to future generations.	Level 5 (New species) Level of intervention so high that the resulting being can no longer be considered human

It will also be interesting for legal analysis to characterise interventions according to their outcomes. These may develop pre-existent human features, abilities, and performance levels into a species-atypical result, replace human features and abilities by analogues intended to fulfil similar goals or functions, or introduce *ad novum* abilities or features. On the other hand, it is also possible to characterise interventions according to the scope of the achieved result. Acknowledging this, the present proposal entails a 5-level structure that takes into account cumulative effects. Please note that this is a highly subjective criterion only suited for analytic purposes. The possibility of cumulative interventions results in an undeterminable number of variables and, possibly, infinite number of possible permutations.

4.4 Operative Concepts and Elements of the Concept 'Induced Human Evolution'

4.4.1 Use of Technological Means

As explained above, the object of enhancement law should be restricted to human induced evolution – ie human action directed at a specific result. Any activities destined to improve the moral status of a person and/or physical and intellectual capabilities by non-technological means or as a result of accident, forces of nature, random action, or serendipity are, thus, excluded.

With respect to this criterion, it is possible to counter-argue that the use of artefacts and ingenuity is in itself a distinctive species characteristic. In an anthropological sense, most contemporary human activities are driven by technology because, in a strict sense, there is very little that could be considered 'natural' as opposed to 'technological'. For this reason, the use of the qualifying element of 'technicality' here is borrowed from patent law and used in a similar sense as a technological effect. It does not intend to distinguish 'natural' from 'artificial' but rather the results of a deliberate act of human ingenuity from mere reactive or adaptive behaviour. This is not an absolute requirement to be interpreted literally. It should be understood in its legal context. Included are acts in which technology is used to produce an effect and, thus, can be considered inherently technological. The qualifying 'use of technological means' is meant to exclude evolution (biological or social) in the sense of the historical collective development of the species. Here, 'induced' indicates the result of a direct human action. It also excludes individual progress or the development of skills or characteristics as a consequence of lifestyle choices without the direct use of a technological product or process even if a similar result can be achieved with or without a direct use of technological means. It also reinforces the idea that the definition should be constructed in a manner which should not result in the inclusion of actions that are (*best*) regulated in other fields of law or are considered outside the sphere of Law as a normative system.

4.4.2 Improve, Modify or Introduce in the Human Body Aesthetic Features, Physical, Emotional or Cognitive Performance Levels and Abilities

The present definition encompasses any type of outcome, whether functional or not. A functional intervention may target any type of ability (physiological, cognitive, or emotional) and affect performance positively or negatively. The present concept also includes interventions in the mind as long as they fulfil the other cumulative requirements. As explained, 'induced human evolution', unlike the term 'enhancement', does not necessarily signify *improvement* and may even imply loss of function or lower performance. Some interventions may have recreational or other purposes; others will affect appearance.

The substantive legal issues raised by aesthetic and recreational interventions are not fundamentally different from those raised by functional interventions. First,

in a broad sense, all interventions serve a purpose and, therefore, perform a function. Secondly, due to psychosomatic effects it is difficult to discern functional and non-functional interventions in practice. Thirdly, it cannot be pre-determined in theoretical terms whether all functional and non-functional interventions should be regulated autonomously and under what regime. Finally, both functional and non-functional evolutionary interventions have a broader social impact, cannot be perceived under the rubric of, eg, health law, and are too problematic to remain largely unregulated. Therefore, for the purposes of delimiting the sphere of enhancement law, there is no methodological reason to exclude any type of intervention as long as it meets the remaining criteria, and this requirement should be constructed and interpreted broadly.

4.4.3 *Animus to Induce Evolution*

The present concept entails a subjective element. This is a criterion also to be subjectively appreciated and constructed in a broad manner: it should include positive, negative or neutral changes. To fulfil this qualifying element, it should suffice that the intervention is directed at any possible evolutionary result (biological, moral, social). In some situations, it may be clear that a specific intervention is aimed at developing a pre-existing biological function or augmenting performance levels. In other situations, the aim may be to introduce an ability *ad novum*. Non-functional interventions may be directed at achieving aesthetic perfection, self-realisation and expression, recreational purposes or simple curiosity. To qualify as induced evolution, it should not be necessary for the intervention to be an actual objective improvement or development. It would suffice if the technology or technique applied to the body is directed at and results in an evolutionary modification.

In similarity to other definitions of enhancement, the present proposal entails a subjective element of intent directed at specific results⁵⁷ and includes only wilful human acts. The novelty resides in the introduction of a broader element that includes any type of motivation, directed at any act that can produce the qualified result. This may be a quest for moral or physical perfection, self-expression, self-construction or even purely recreational purpose. The question of self-expression may include different variants – whether they are artistic, religious, philosophical or political expressions. To characterise an intervention as intended to evolve or cause progression, a precise motivation is not necessary as long as there is a conscious action directed to *improve, introduce or modify* appearance, function or performance. Moreover, each jurisdiction must determine whether the *animus* to achieve a specific result exists according to its own substantive norms on intent and causation.

⁵⁷ Arnaldi and Marin (n 19) 1; Coenen (n 21) 13.

4.4.4 *Voluntary and Involuntary Interventions*

The proposed definition applies equally to voluntary and involuntary interventions. In order to qualify as induced human evolution, only the intent to produce an effect outside species-typical levels is required. Moreover, it is not required that the act is self-performed or consented. It may be the result of a third-party action or a state-run program (for example, imagine a futurist national preventive gene-editing plan to eradicate a disease). However, if the rules of consent are not fulfilled, the intervention may constitute a violation of the right to personal integrity and should be treated accordingly pursuant to the constitutional guarantees and applicable norms in each jurisdiction. Performing an intervention, evolutionary or otherwise, on a person against their will, where consent is non-existent, or tainted by duress, lack of information or capacity is likely to fall under general criminal and civil liability norms. Perhaps, existing norms concerning informed consent in medical interventions and standards for other areas of consensual bodily harm may not be applicable or suitable. In this case, it may be necessary in due course to develop specific substantive regulations. This is a matter worthy of debate, but outside the scope of the present work. Moreover, because both voluntary and involuntary actions will be considered under the proposed framework, it may include also any type of public or private intervention destined to influence the individual decision to undergo a procedure, eg, nudging or any type of direct or indirect incentive or influence on public behaviour. Whether such actions are valid and acceptable belongs to a general discussion on the (constitutional) limits of public intervention.

4.4.5 *Beyond Species-Typical Standards under the Current Evolutionary State*

The proposed definition contains a qualifier that allows for the exclusion of both prophylactic or restorative interventions and the use of artefacts, meaning that any interaction that is external, non-permanent, or produces only temporary and limited effects is not included in the proposed legal categorisation. In order to reduce subjectivity, interventions on the body are delimited by scope. An intervention on the human body will only be considered an enhancement if it objectively performs an *evolutionary* effect, regardless of how it is described or perceived.

All technology is a human effort to improve survival and longevity and to achieve an ideal of 'the good life'. Without a qualifier to serve as a boundary, any proposed concept framing 'enhancement' would lapse into a synonym for technology. Accordingly, interventions will only be included under the proposed concept if the technological intervention results in permanent and/or non-external alterations that deviate from human species-typical values.⁵⁸

⁵⁸ The proposed understanding of species typical standards is broader than what might be usual in the literature and does not necessarily correspond to notions of normality, health or average performance. Jotterand, for example, uses the expression in the sense

This choice of operative concept is intended to move away from fluctuating notions of health or well-being and social constructions of human perfection or normality. It is designed to be interpreted in an ethnic- and gender-neutral manner, evading debates on human nature. It should be understood as being based on non-static adaptive criteria whose construction can and should include qualitative and quantitative elements. The 'species-typical' standard implies an evaluation of the extent of the intervention, which is done in accordance with the scientifically-available knowledge at the time. Interventions within the boundaries of the typical range of human characteristics will not be considered evolutionary. The criteria inherently exclude health and health-related or aesthetic interventions that have a prophylactic, restorative or corrective effect. It will also exclude by default everyday cultural habits, health-related or purely aesthetic, which result in interventions with a very reduced scope or impact on the person, eg, shaving, brushing one's teeth, bathing, or using make-up and cosmetic products.

Moreover, this definition is intended to be used eventually to establish a new field of law and determine whether there are phenomena that, by their nature, are left outside other legal categories and require specific regulation. Therefore, the concept of species-typical standards for abilities, characteristics, and levels of performance should be constructed in an inclusive and broad manner encompassing both a biological and an anthropological approach. It is recognised that complete objectivity in describing any social phenomena is a known oxymoron. The law has traditionally dealt with ontological debates by measuring standards of human conduct through the lens of a notional reference person (eg, *bonus pater familias* in civil law, the average consumer in EU trade mark, or the person skilled in the art in patent law). In addition, political economy developed the concept of *homo economicus*. The reference person for induced evolution should be constructed in a similar manner, and defined by the widest possible range of characteristics found in human beings including those dictated by gender, ethnicity, geographic origin, and socio-environmental factors.

Recently, at the World Economic Forum, Angela Hobbs stated that 'it is part of the human condition to extend the boundaries of what it is to be human'.⁵⁹ It is likely that the biological or social evolution of the human species, regardless of its causes, will affect the legal concept proposed. The chosen criterion, 'the current evolutionary state', is intended to be an adaptive criterion that can be constructed and developed by adjudication in a flexible manner to take account of biological or social evolution of the human species, regardless of its causes, and ever-developing human knowledge.

of 'transgression of normal boundaries (species typical) to improve biological capacities or functionality': Jotterand (n 27) 17.

⁵⁹ 'Staying Human (debate transcript)', *World Economic Forum* (Web Page, 16 January 2016) <<http://www.weforum.org/events/world-economic-forum-annual-meeting-2016/sessions/staying-human>>.

4.4.6 Human-induced Permanent Alterations

The present definition includes an element of result understood as a causal human action. The evolution beyond species-typical standards has to be *human-induced* because occurrences completely devoid of human intervention, for example the result of acts of nature, are traditionally placed outside the scope of Law. Results that are the product of chance, accident, or serendipity or intrinsically linked to a treatment should not be considered under enhancement rules.

The possibility of shaping evolution and merging body and technology creates specific legal problems; it is at the core of the legal debate over enhancement. Only human-induced interventions resulting in actual permanent effects (improvement, modifications, or the introduction of features, abilities and performance levels) should be considered under enhancement rules.

This notion of 'permanent effect' should include the possibility of cumulative or long-term effects. However, false enhancers and placebo effects should be kept outside the scope. If a product or technology is falsely or wrongly advertised as an 'enhancer', the act should be regulated pursuant to, eg, health law or consumer protection rules. Moreover, specific legal solutions concerning false advertising, labelling or the sale of products with claims for enhancement should be provided. Furthermore, where a specific enhancement act has been deemed illegal the absence of a result will usually disqualify the technology from being subsumed to the illicit type. Naturally, it will be a matter for each national substantive law to determine whether an illicit type might include attempts and negligence.

Interventions with non-permanent effects pose different ethical questions: The fact that they can be reversed or have an effect that is limited in time makes them less likely to be disruptive. Their eventual negative impact may imply similar considerations as illicit drugs, unsafe devices, use of technology for illicit purposes, etc so that they will not require a (new) specific legal solution. Moreover, it is not presumed that interventions with non-permanent effects should never be regulated in similarity to induced evolution interventions. On the contrary, borderline interventions or categories exemplified below may generate social effects and/or ethical concerns more akin to induced evolution interventions than to other legal categories, and thus incorporated into the same legal regimen.

4.5 Pre-, Quasi- and Proto-induced Human Evolution

Technology develops at an increasingly fast pace, sometimes, in unforeseeable directions. No legal definition can be completely objective and solve all uncertainties and factual technological specifications. There will always be a space between categories and fields of law. Some technology uses may have unprecedented effects but still do not fulfil all of the proposed criteria. Closely related interventions and technology uses that cannot be considered acts of

induced human evolution but may be considered as enhancement under a broad definition can also be categorised for analytic purposes as pre-, quasi-, and proto-induced human evolution.

‘Pre-induced human evolution’ designates interventions on the body that have permanent results. However, they are still within the range of the human species-typical standards under the current evolutionary state but only marginally (eg, cochlear implants). Although this category of intervention is outside the scope of the proposed concept, it is likely that at least some of these interventions will entail similar challenges. There is also a possibility that some interventions may be difficult to place clearly.

‘Quasi-induced human evolution’ concerns interventions on the body that produce results outside (above or below) the human species-typical standards. However, they cannot be subsumed under the concept of induced human evolution because they are either dependent on the usage of external artefacts and/or do not cause permanent effects (eg, wearable technology). Typical objections linked to biological integrity will not apply to these interventions due to the lack of a permanent effect. This means that policy decisions will likely have to account for a wider margin of personal autonomy.

‘Proto-induced human evolution’ encompasses interventions on the body with an impact on an individual or class of persons, making them better-than-well, but which do not exceed species-typical standards and do not produce permanent effects (eg, pharmacological cognitive/mood enhancers). This category may also include interventions producing evolutionary results unintentionally or as side-effects of restorative interventions (eg, advanced implanted prosthetics).

Most of the uses of currently available technologies usually perceived as ‘enhancements’ are more likely to fall under one of these categories than to be subsumed to the concept of induced human evolution. However, it is foreseeable that their further development may change this, therefore, from a technology foresight perspective there might be valid arguments for their regulation under the induced evolution framework.

These categories are mere analytical tools; as such, they are highly flexible and permeable. Some interventions are likely to be considered under more than one of these categories. The objective of this legal work tool is to facilitate the consideration of any extensive interpretation or legal analogy. The downstream issue of determining which substantive norms apply to these categories can be solved by category or on a case-by-case basis either through specific statutory law or judicial development. Substantive law could achieve this by extending to or removing from the scope of a particular law any given use of technology either by resorting to legal analogy or introducing legal exceptions. Undoubtedly, rules of legal interpretation should provide ample room to take into consideration which field of law is best equipped to grapple with the different public policy considerations and legal interests of the parties.

This proposal creates an open, positive definition. It establishes a set of criteria capable of development through legal interpretation and creates standards to characterise human uses of technology as acts of enhancement. A different theoretical approach would have been to establish a list of types. Exhaustive closed lists are inflexible and adapt poorly to future developments. Non-exhaustive open lists are flexible but do not provide secure guidance as to what may be subsumed under the legal type or left outside its scope. The option to establish criteria instead of examples is anchored in the need to create a framework that is adaptable to fast-developing technology and social phenomena while simultaneously providing a core of legal criteria capable of discerning common characteristics that may warrant coherent legal solutions.

The proposed concept of ‘induced human evolution’ introduces a requirement of result in order to exclude interventions with marginal and non-permanent effects. In this specific regard, as a rule, the concept of enhancement should be developed in a restrictive manner and having general legal principles (eg, certainty, legality, public health and safety, dignity, autonomy, privacy, expression, etc) in mind. The proposal is intended to set a general standard while it leaves considerable leeway for specific substantive legislative action and judicial adjudication. Exceptions and inceptions may be in order. It may be deemed necessary to declare that certain act(s) should be regulated according to enhancement law(s) or, on the contrary, excluded from such a framework. In borderline cases, an intervention should be qualified and treated according to the legal regimen that affords a higher threshold of protection or that is more likely to achieve a fair balance between the different legal interests and the expectations of the parties.

5 Concluding Remarks

There are drawbacks to using the term ‘enhancement’ in legal texts. These could be ameliorated by the use of the proposed, less-ambiguous term: ‘induced human evolution’.

Overall, this paper attempts to construct a legal concept, ‘induced human evolution’, that is both neutral as possible in terms of religion, values, culture, ethnicity, or gender perspectives and independent of the concepts of medicine, health, well-being, or normative stereotypes of human perfection. It is designed as a multi-element framework, including references to means, intent, scope, and result. The criteria used are also intended to be interpreted and developed in a broad, adaptive, and inclusive manner to include biological and social/cultural elements while following existing legal traditions of interpretation and legal construction as well as fundamental legal principles.

This is a necessary step, a prelude to framing and providing legal answers to important social and ethical issues. Establishing a delimitation of legal categories opens a way forward and will guide forthcoming legal debates to determine,

inter alia, what types of interventions to regulate and what concrete solutions should be enacted.

The present proposal is also a conceptual tool essential as a preliminary step for debating and eventually establishing a new field of legal enquiry – Enhancement Law. It was written also, under the hope that it may also be of use in efforts directed towards the eventual future development and systematic organisation of the rules and regulations governing activities of induced human evolution – the law(s) of enhancement.