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Legal Personhood and Identity of Human Digital Twins

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Abstract: Although no "absolute" definition exists, a human digital twin (HDT) may be defined as a virtual physiological copy or counterpart in digital world of a real person existing in the physical world having active connection between the human and his corresponding twin in metaverse. The current study aims to explore the legal and societal challenges with human digital twins (HDTs) especially regarding their identity and personhood. The HDT discussions have mostly focused their potential use in health system for predictions of diseases nearly ignoring their legal status, the ethical issues associated with them, and the characteristics that HDT should possess to entail legal personhood. We have discussed these issues thoroughly and based upon our discussion empirical knowledge and anticipated developments, we suggest that HDT can be accorded legal personhood. As parents think that their children will be more brilliant than they are and do way better in life, likewise it can be hoped that HDT will make the world better that we could not.

Keywords: human digital twins; personhood; identity; ethics; legal; transhumanism; personhood

1. Introduction

The emerging technologies are changing our ecosystem rapidly and affecting all spheres of life including legal domain. One such infant technology is that of a human digital twin (HDT). Currently no accepted definition of human digital twins (HDTs) exists and the same is true regarding their identity, personhood, ethical issues, and data related issues. Briefly, a HDT is a virtual reflection of a human, updated from real-time data by simulation and machine learning (Armstrong 2020). The HDTs are true "digital copies", i.e., "duplicates" of real persons, which can interact with reality as well as their counterpart real persons. Being digital constructs, HDTs only require data and a digital world, i.e., metaverse to operate. Sensors, high-speed communication, cloud computing, and artificial intelligence help the HDT continuously adapt to the real person (Raden 2020). This new weightless and soul-minus entity namely, "digital self", "another me", "a better me", "a future me" (Teller 2021), "digital double", "virtual replica", "para-person", "human digital clone", "personal digital twin", "artificial companion", "human shadow", "digital reflection of physical person" and "second me, i.e., me and me" is merely halfway between people and things. Chemically speaking, a person and his HDT are isotopes and isomers of each other. Isotope elements have nearly the same chemical properties but tasking potential (being a computerized construct), requiring only energy and a digital world to operate (Helbing and Sanchez-Vaquerizo 2022). No HDT of a complete human exists currently and only digital twins of some organs of human body, e.g., heart have been built. By evolution, a HDT can become an indistinguishable copy of its counterpart human with all the expertise, memories and personality characteristics transmitted through observation and direct data input. A figurative description of HDT and its evolution process is shown in Figure 1-3.

The desire to create "virtual me, synthetic or artificial humans" being nearly instinctive is not new, dating back to ancient mythology and storytelling. The urge of replicating humans has been same throughout ages and revolves around life, health, and death. Pygmalion, a Greek sculptor who created a statue of a woman and fell in love with it. The goddess Aphrodite bestowed life to this statue turning it into a real woman namely Galatea. This is the earliest synthetic human, the creature identical to a real human. These synthetic humans are described resembling and behaving like real humans equipped with superhuman faculties except for being emotionless or insensitive to pain. Sketches, statues, and other depictions of humans by primitive anatomists keen to know material under human skin existed much before the rise of anatomy in ancient Egypt, followed by recent Rembrandt's infinite illustrations of his favorite model, i.e., himself. The "automata" idea was first described by Descartes philosophically (Descartes 1980) and contemporary philosophy has plethora of literature on organism like HDT namely "zombies" (Kirk 2008), "doppelgangers" (Putnam

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1996), and "swamp-men" (Donald 1987). Such creatures were previously believed to be mere philosophical devices or "intuition pumps" meant to initiate and streamline human intuition (Dennett 2013).

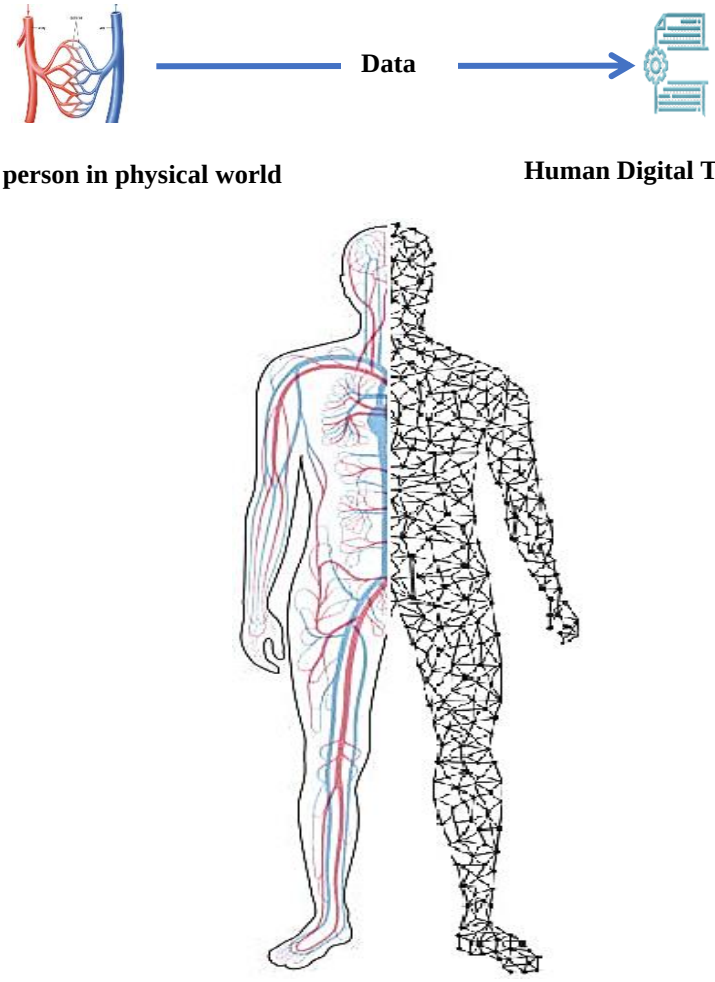

Figure 1. Three parts of a HDT: The physical person, his/her virtual digital copy and a communications channel linking the two.

Figure 2. HDT are combinations of data, visualization and connected sensors, offering unparalleled levels of insight into everything and every moment of its counterpart human.

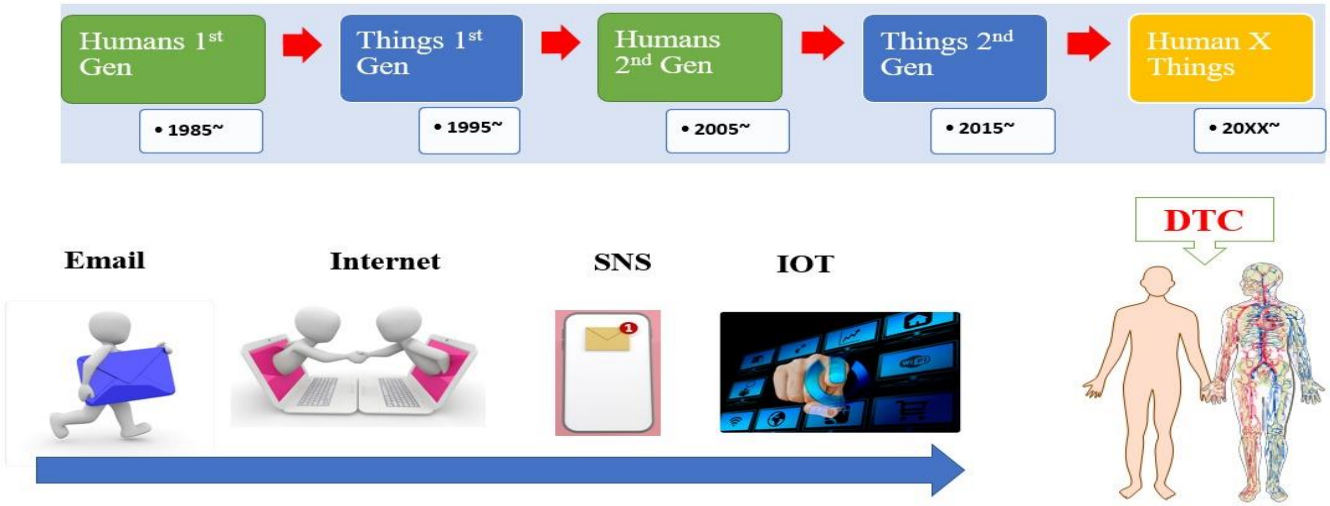

Figure 3. HDT and its evolution process (Anonymousb 2023). SNS=Social Networking Sites, IOT=Internet of Things, DTC=Digital Twin Computing

However recently, the advanced versions of HDT have become a reality (Bagaria et al. 2020; El Saddik 2018). This shift of humanity from face-to-face interface to a digital domain where cyber audience knows one's offline identity (Ellison et al. 2007) has raised many issues. The questions arises whether HDT are a profile in digital world, merely a "kinetic shadow of a human", "dynamic image of a human", an altered form of organic humans as "pixelized and digitalized humans", "hamzad or qareen" (Hindu and Muslim mythology) or may be having small portion of each of these. It can also be taken as shadow self, which is hidden, and private aspect of personality as compared to persona which the public observes about a personality.

A human digital twin is simultaneously a concept, a person, and a property. We don't and can't expect all such features in HDT. Being dependent on counterpart physical humans for their existence just like symbionts, HDTs cannot keep a low entropy by themselves. A HDT is everywhere and nowhere simultaneously thanks to being made up of data. HDTs are invisible body-less unique entity, neither live nor dead just like a virus. But are HDTs mere extensions, false fruits, useless beings, and twigs of a physical human which need pruning? This question and many allied questions have not been addressed substantially and when done, only peripherally. Hence the current study was designed as a preliminary attempt at mapping some issues and perspectives relevant for HDTs in a wider legal and societal context.

2. Methods

The principal question of this research is to analyze challenges associated with HDT, including but not limited to definition, personhood, and identity of HDT, ethical implications and data issues of HDT in the existing legal frameworks. An interdisciplinary approach, utilizing both legal and philosophical methodologies has been used to decipher this complex issue. The subject choice and argumentation are free in legal analytical method, and it does not presume correct answers on legal problems. Moral and societal questions are best addressed by philosophical methodologies, specifically, normative ethics and philosophy of law. Normative ethics, describing the criteria for what is morally right or wrong (Singer 2011), was used to analyze the ethical implications of recognizing HDT as a legal entity. Philosophy of law, on the other hand, was employed to delve into the fundamental questions about the nature of law and legal systems, and how HDT fits into these frameworks. Regarding data collection, we extensively reviewed academic literature, including review articles, books, and academic conference proceedings, to gain an understanding of the current academic discourse on HDT. Due to the nascent nature of this subject and its comparatively novel legal questions and implications, it is currently mainly discussed in scientific articles, news articles, blogposts, and speeches. The data collected from these sources served as the basis for our analysis of the positive and negative aspects of recognizing HDT as a legal entity. The juridical person and legal person have same meanings in this article.

2.1 Person and Personhood

Cyber world is becoming less virtual and more real and soon physical, biological, and cyber worlds may be fused. It is creating new challenges like personality and identity of HDTs. The reactions may be polarized between techno-enthusiasts and techno-apocalyptics favoring and opposing the personhood of HDTs. But first, let's have a view about the basics of person and personhood.

Personhood is related to both metaphysical and biological concepts of humanity and is not a purely legal matter. The "personhood" although an ambiguous notion can be classified into "fundamental personhood" and "legal personhood" whereby the latter is based on former, suggesting only persons can be recognized as legal persons. This narrative, however, is weak as several definitions of "person" exist, based on the criteria one considers important. Since no "true and gold standard" exists, it is unclear which criteria is superior to other (Doomen 2023). For example, Locke definition of a person "as an intelligent being that persists over time, being able to contemplate its own existence all the while" is narrow (Locke 1824), while Giubilini and Minerva definition, "an individual who is capable of attributing to her own existence some (at least) basic value such that being deprived of this existence represents a loss to he" (Giubilini and Minerva 2013) of a person has a broader scope. The most comprehensive definition is "a person is a conscious, reflexive, embodied, self-transcending center of subjective experience, durable identity, moral commitment, and social communication who as the efficient cause of his or her own responsible actions and interactions exercises complex capacities for

agency and inter-subjectivity in order to develop and sustain his or her own incommunicable self in loving relationships with other personal selves and with the nonpersonal world" (Smith 2010). The person enjoys an abstract capacity to practice in law, provided by law because it is suitable for law to have such a creature. Anything can be a person in the law, due to the practical advantages of such an acknowledgement. Historically, Thomas Hobbes in his well-known work, Leviathan, explains that "person" comes from the Latin "persona" and the Greek "prosperon," a mask used in theatres. Romans still use "persona" for living natural humans (Hobbes 1651). A human is known as Homo sapiens biologically. Human persons possess certain natural moral rights, such as the right not to be murdered, and the right of dignity which should be respected.

Currently, the legal systems recognize two major types of persons, i.e., natural, and juridical or legal persons. The human legal person, is labeled as a "natural person" while the nonhuman legal person, is named as "juridical person". Natural persons can behave socially and, if legally competent, able to perform tasks having legal values. The natural person is not superior to an artificially created legal person. The autonomy to make decisions is the ethical and legal foundation of the obligation for natural persons who are then legally responsible for their actions. Infact no exact boundary exists between natural and non-natural persons, i.e., legal persons (Genderen 2018). The increasing extensions of humans with implants and prosthetics is making it challenging to define a natural person. How much percent a natural person should be natural (50% artificial organs and 50% biological), and is this important from a legal aspect? A key element of the natural person can be traced in the spiritual attribute of the natural person. The scriptures often mention the existence of the soul as "the spiritual principle in man". The HDT does not have a soul. Even if it's assumed that the soul can be computerized, digitalizing information in human consciousness is currently impossible. The marriage between human and data mediated by AI can be considered as father of this HDT.

The soul is the subject of sovereignty and consciousness in humans. Sovereignty resides only in one individual (Bodin 1955) but can be transported to other legal bodies, i.e., the state, corporations, or any other unit. It makes the position of HDT, "a semi-natural person", whereby HDT and human complement each other, quite challenging.

Legal person is just a technical concept indicating that an entity has rights and liabilities. In law, a legal person is any person or entity that can do the things an ordinary person normally does in law, e.g., enter contracts, sue, and be sued, own property, and the like. Hence, both a human and nonhuman entity can be a legal person. The legal personality of artificial legal persons is different from non-human actors (Hobbes 1651). The notion of a legal subject as an "artificial person" date back to the idea of "persona ficta et rapraesentata" in Canon Law since the thirteenth century (Pagallo 2013). If the person can't articulate himself, but his act or reflection is recognized, he has an artificial personality as a legal person. This does not necessarily mean that a legal person must be a human. A human person immediately at his birth or even conception becomes a legal person. Usually, physical persons are believed legal persons as such as they are either indirectly supposed by the legislature to be, or the issue is simply not raised. For juridical persons, the personality is created legally, the fundamental personality and fundamental personhood being undeniably fictitious (Doomen 2023). A legal person does not need blood, flesh, and DNA to exist, but is constructed for facilitation in economy and during proceedings in a court of law (Kelsen 1960). The type and quantity of rights and liabilities of an entity having legal personhood fluctuates even for same species. The rights of children and mentally incapacitated people are less than a normally sound adult person. The characteristics of possessing rights and liabilities are the exclusive features for defining legal personality along with enforcing legal claims on breach of those rights. Corporations are artificial legal persons as some persons manage them, and own their action (Solum 1992).

The previous notion that legal scholars deal with persons while philosophers deal with concepts is now transformed and both deal with both. Philosophical functionalism opens the window of granting legal personhood to non-human entities (Bryson et al. 2017). Legal personhood is granted on different grounds and for different purposes, i.e., economic benefits (Smith 1928, Novelli et al. 2022, Zevenbergen et al. 2018; Bertolini and Episcopo 2022). A legal person is not analogous to a human being, having a conscience, free will or necessarily enjoying all the rights granted to humans. Granting legal personality is not based on any value judgment but it's just assumed that it will meet the goals set by the legislator enhancing the common well-being and meet the market demands. Humans are "natural persons" by virtue of birth while inanimate objects like corporations are "legal persons" by decree. Legal personhood is always granted by legislature or court and is not by default.

There is a distinction between "legal personhood" and "moral or metaphysical personhood". Moral personhood denotes individual beings who are moral agents as they are responsible for their purposeful acts. The acts and behaviors of moral agents can be described as morally right or wrong, moral, or immoral, or morally acceptable or unacceptable. Ordinarily, human beings are considered moral agents and moral persons. Nonhuman animals, e.g., dogs, cats, birds, and fish, are usually neither moral agents nor moral persons. The corporations being moral agents are also moral persons and are responsible for their acts. The proponents of physical personhood suppose that a human is fundamentally a physical being, without any metaphysically distinct soul or mind. Hence human beings are equipped with or own an apparently physical body. Under physical personhood, a person continuously exists in this world due to his physical body. Metaphysics denotes a transcendent space beyond the physical suggesting that all existing stuff is not merely physical (material), and there are two ultimate kinds of irreducible stuff, mind, and matter.

Personhood exists in degrees meaning some are more person than another. When an individual in his life cycle (conception, infancy, adult) becomes a person is not agreed upon yet. There are no absolutely defined features of a person and even if they exist, it's unknown whether is it necessary to have all traits for being a person or a minimal set fulfills the criteria. Some rights are natural, i.e., right to life. These rights are also known as moral rights and are universal in nature. The unnatural rights, e.g., legal rights are not universal but rather vary in different societies. If an entity possesses moral personhood, then society has to respect her certain moral rights. The question of granting personhood to HDTs entails two distinct questions: "can HDT be granted personhood?" and "should HDT be granted personhood?". These two questions refer to and effectuate an eminent theoretical division namely the "is/ought" problem. In other words, it depends upon what is possible and what is desirable, an anthropomorphic aspect constructed on free will or metaphysical reflections about the presence of a conscience, which is like the debates on allowing legal personality to corporations in the nineteenth century (Simonart 2022).

The legal person as per Naffine's Cheshire Cat approach has no moral or ethical dimension and it does not differentiate between natural and artificial persons, or other entities. Naffine postulates that a legal person is a rational, sensible, and aware of his situation

excluding children and mentally and consequently legitimately incompetent people from the legal hood sphere. He indicates that humans can delegate legal personhood to anything. Legal personhood is a pleat and unfixed element of the legal system. Inanimate entities, e.g., temples in Rome, church buildings in the Middle Ages, rivers in India and New Zealand and corporations are recognized as persons (Solum 1992). Consequent to legal personhood, a legal person will obey the law, and can enjoy the rights and privileges conferred to a legal person. All human persons are equal legally although they may differ from each other in the physical sense, each biological person has bundle of rights and responsibilities. The subjects of law in any legal system don't possess similar rights or quality and magnitude of rights as it fluctuates according to the needs of the society (Brownlie 1990). For example, a lunatic and a sane person do not have the same rights although both are natural and legal persons.

Table 1 indicates that HDTs lack many elements found in humans and hence can't be granted personhood. Life is necessary and precondition to exercise other rights. The key traits of a living thing are known to all and sundry and HDTs does not fulfill this criterion. A human digital twin is a boundless digital entity floating somewhere between online datasets and the physical world. But the same is true for corporations and other entities which have been accorded legal personhood. The physical human and HDT have relationship of "one is humans, the other represents humans". The HDTs are objects, i.e., managed by an individual.

Table 1. Characteristics of a Human Digital Twin.

Feature	Indication/Description
Interaction with physical world	+/with counterpart human and with its organs until its connected virtually
Intentionality	-/absent
Conscience	-/absent
Freedom	-/absent
Creativity	-/absent
Rationality	-/absent
Foresight	-/absent
Autonomous	-/absent
Liability	-/Never operationalized and hence not decided yet
Human-Like Behavior	-/absent
Sentience	-/absent
Moral Agency	-/absent
Rights & Obligations	-/absent

2.2 Arguments for granting Personhood for HDT

In the light of the above discussion, granting personhood to HDTs has some strong points. A human digital twin is an extension of both physical identity (refereeing and/or demonstrating the postures & movements) of a human and their mind (since humans kinetically understand themselves in a digital ecosystem where their presence and behavior can be experienced by others) (Eriksson 2021). HDTs may be indistinguishable from humans in physical form and live symbiotically with humans soon. The HDTs may be considered omnipotent and omnipresent non-organic humans, "a digital proxy in cyberspace", "a dynamic selfie", "second life (or lives in case of more than one HDT of a person) of a person in borderless parallel world" or an "advanced version of avatars" and may be granted "synthetic or digital personhood". The judicial/legal personality is based on three theories, namely, aggregate theory, fiction and concession theory and realist theory. The HDT can be granted personality under fiction and concession theory. Legal rights and legal personality have been accorded previously to corporations, NGOs, and states as these are individual identities, and can undergo legal actions. If a HDT is considered as a legal personality, it would undergo legal action and even face charges as are faced by corporations if anything goes wrong under the name of the legal entity. Jimenez (2023), based upon Mind Bank AI, the EU Tech Chamber, and the European Senate postulated that "all personal DTs are equivalent in dignity and rights to their human complements and any act upon the personal DTs that opposes the Declaration of Human Rights would be an act upon the human person they represent". The UN Universal Declaration of Human Rights is an inclusive and multidimensional instrument which does not distinguish between physical and digital person and hence the same protection can be offered to HDT. Every human should have the right to claim and control his/her digital twin. A "person right law" like copyright can be designed imitating the two-part structure of copyright whereby the "economic right" describes the user of personal identity, and the "moral right" governs the original individuals right connected to his digital twin. It may be termed as "body right" instead of copyright as it is linked to copyright intuitively and easy to comprehend. A drawback with "body right" term is that it hints mainly the physical appearance, apparently ignoring other aspects of identity such as conduct and recollections. A form based on creative common license can be developed to assign body right with several restrictions and supplement this body right. Copyright management organizations can also be taken into loop. Control over identity can be mediated by an identity donor card, like an organ donor card. This terms like body right will help its adoption quicker and easier. These identity donor cards should be relevant after the death of the person just like donor cards. Through these identity donor cards; individuals can accord various features off their likeness to different users in different circumstances. Lacking an identity donor card can be taken as opting out (Thommy, 2021). New fundamental rights, namely "meta-rights" comprising the rights to forget, be forgotten, disobey, or to be informed can be formulated (Cardon 2015, Murray and Fussey 2019). Similarly, the laws of robotics can be rewritten for big data, mixing public and private law, and creating "algorithmic accountability" obligations (Fabbrini and Celeste, 2020). Some authors suggest the formation of a responsibility-by-design mechanism to initiate responsibility natively, for deep tech systems including HDT (Andrews 2011). Hence, HDTs can be considered as persons if they are able to perform one legal duty or carry solely one right, even if an individual is essential to

administer that right or duty just like for minors and other legally incapacitated persons. In this case, differentiation of the rights of the real person and his/her HDT can be a problem. The personhood scope can be limited just like for natural person who lack rationality or are psychologically unstable. HDTs fit definition of the legal person as it does not need any additional attributes whatsoever and legislature can accord it personhood.

2.3 Arguments against granting personhood to HDTs

The opponents of granting personhood to HDTs have their own strong points. It's too early to grant legal personhood to HDTs, i.e., offering a solution without any problem. Philosophically and morally speaking, a person is an essence of a human or human however in legal context, a person has wide spectrum than merely human beings. By granting legal personhood to various entities, they are personified legally just increasing clarity in theoretical and practical legal matters. Similarly, not all humas have been considered legal persons in history, i.e., slaves, outlaws, and women.

The well-recognized mechanism of "natural persons" and "legal persons" can't meet the challenges posed by the HDT. Naturally, two human bodies are never the same except in this case of HDT, hence it's not feasible to grant a separate personhood status to HDT as its mere a shadow of an already existing human person. HDTs are merely a collection of data traces left in digital world, created, collected, and saved virtually building up a profile of any human. The question boils down to: what more structure (biological, digital, mechanical or bio digital or biomechanical) is required to grant personhood to HDTs? The question currently remains open. If HDTs are considered isomers and isotopes of a person in physical person, the question crystallizes whether it is a person himself restructuring information or is it environment that doing it without asking from human. If both have a role, then their roles should be differentiated individually.

Granting them legal personhood can blur the line between humans and things. The first question is should a "digital person" be introduced which is just an algorithm having a basic algorithmic identity exhibiting some of the key human behaviors e.g., empathy, arrogance, kindness, and sleepiness? Will there be a cognitive difference between biological natural person and HDT? Does a person have the right to know that he is communicating with a natural, legal, or a digital person? Will this open a Pandora box of new professions including digital powers of attorney and digital representatives to match the digital counterparts? Does humanity need "digital law" or "agent law" besides traditional "hard law", and "soft law (e.g., customs, and standards)?" Will the law be outdated and replaced by ethics, which will be managed by the partially virtual Ethical and Legal Advisory Boards (Sjöberg 2020)? HDTs do not meet the definition postulated by Naffine currently as they lack capacity, responsibility, and consciousness. Even if a self-aware HDT is created, it is ontologically impossible, and is useless, to prove whether it is self-aware or not. Even if personhood is granted to HDTs, the rationale to grant personhood should be known otherwise it will just be like finding a solution even when no problem exists.

2.4 Personal Identity

Personal identity is quite a complex and multi-faceted phenomenon which cannot be studied uni-dimensionally such as body, mind, or soul. When we are sure about our identity as well as other people identify us by the same identity, it helps us fit into the community. It is socially structured, and influenced by several elements, processes, and phenomenon during biological life of a person (Berdzenishvili 2022a) and evolves, and changes in different phases of life (Berdzenishvili 2022b). Personal identity includes the characteristics, attitudes, behavior, and appearance that make up a specific person (Covington 2008). Personal identity ties everything together, as every action of a person relates to identity and self. Just like personhood, identity is quite subjective in nature.

Humans require something permanent for their recognition as persons which is "identity". According to article 6 of the Universal Declaration of Human Rights "everyone has the right to recognition everywhere as a person before the law". Identity is necessary to enjoy all other rights assisted with that identity. Arendt describes the right to have rights as a "pre-legal premise, a proto-right for every human individual" (Arendt 1967). García postulates that "the accreditation of personal identity is a necessity of the individual in his public and private relations, which is translated into the exigency of having available a reliable means for its perception, without ambivalences, in the real or physical world and in the virtual" (García 2004). Personal identity is accorded due to psychological (Locke 1689/2004, Parfit 1984, Shoemaker 1984), physical (Thomson 2007, Williams 1973) or narrative (Ricoeur 1995, Schechtman 2011, Schechtman 2005, Taylor 1989) phenomenon. A state constructs identity as a set of objective features used for identification of humans living in that state. On an individual scale, identity encompasses both objective and subjective characteristics that she herself constructs and through which she conveys herself (Michalkiewicz-Kadziela and Milczarek 2022). Identity theorist, Goffman (1959), postulates that humans construct and communicate their identity differently depending on who they are with and situation. According to psychoanalysis, identity is not a substance or a solid core of the personality. Identification is a changeable, disintegrated, and fluid process, and there is no identity construction without identity deconstruction. Personal identity is embedded in the continuity of the physical body over time. This conventional body theory is helpful in situations where memory and consciousness are disturbed, e.g., amnesia or brain damage, as the continuous physical body is the foundation of personal identity.

Scottish philosopher David Hume explained Identity as a bundle of physical and non-material properties, e.g., body, beliefs, morals, and reminiscences. Hume postulates that new stuffs substitute old ones making identity an ever-changing phenomenon (Hume 1739; Berdzenishvili 2022b). In a philosophical scenario, Ricoeur mentioned ipse identity ("who am I) and idem identity (a third-person narrative, suggesting an objective external view on a particular person) (Ricoeur 1994). René Descartes body-mind dualism suggests that the frontier of mankind (Hu et al. 2022) should not be limited to its anatomy. In the Discourse on the Method, he postulated thinking (*I think therefore* I am) as the proof of his existence. Numerous scholars have acknowledged the power of the mind as a clue to existence. However human identity is not assuredly defined by our thinking. This notion, although helpful for discovering self and discovering own existence, does not explain how identity is preserved (Berdzenishvili 2021.). This mind-body dichotomy proposes that persons have a persistent physical presence (Olson 1999). The human body can lose organs (i.e., limbs) or gain organs (i.e., synthetic structures, ranging from clothes to mind-controlling chips), but have a continuous physical presence (Erickson and Clark 2004). Similarly, the mind and cognitive faculties have a continued immaterial existence. The relationship

between the physical body and the immaterial mind has been discussed for a long time in philosophical world (Dreyfus 2000), and HDT has further complicated the situation, adding a virtual, online existence (Hayles 2000; Turkle 1995).

The HDT establishes identity of his counterpart human in the virtual world through tools previously used in in the "real world", e.g., social networking sites, business portals or search engines. Assigning identity to HDT needs understand their current as well future scenario and applications and whether the society and legislature believes in utilitarian notion of 'the good' or in a humanitarian or Kantian narrative indicating that everything that is utility-maximizing is not essentially the best choice. The utilitarian model of 'the good' will accord legal identity to HDT. Psychologically, a HDT may be regarded as merely a split personality or self-representation. Identity singles out a person from the others. Hence to have a personality, a HDT should have a sense of self (Berdzenishvili 2022c) which is not the case right now. Similarly, HDTs do not fit the scale of personal identity proposed by David Hume (1739). A definite answer of assigning identity to HDTs will vary with time depending on answers to questions like what kind of entity is a HDT and what are its characteristics and capabilities. Regarding identity, HDT can be given ISSN/ISBN/DOI like journals/books/papers. HDT can be hyperlinked to original human.

Identity is just a reference to a person and not a person itself. Rights and liabilities are tied to the person and not with identity information. Identity comprises of "a collection of attributes" or "a collection of claims" or "partial identity". Various attributes, traits and behaviors are building blocks of human identity. A person is expected to create, manage, and protect their identity. The core identity can be of a physical person while a peripheral identity can be assigned to HDTs. A digital identity tag comprising of QR code affixed on passports to scan online can be assigned to HDTs. Things happening in one world, i.e., digital world can impact the physical world realm, e.g., online hacking of credit card information can lead to a loss of real money in the physical world.

Many questions are still unanswered. The key issues of HDT include their multiplication enormously at the same time, omnipotence, and immortality among others. HDTs being a constant companion of a human (due to inalienable nature of personal data) can be either a fraction of the human himself or a complementary creature in a parallel dimension. Can a real natural person have so many identities in metaverse, or can multiple entities or persons reside the same body, in parallel, simultaneous, or successive domains? Since a HDT is just a code and exists only due to existence of his real person life, his identity must be dependent on the life of his real person counterpart. When a HDT will stop updating, it will be its death day. Every human has an extended self (his self). It will be an issue where to fit this new entity in hierarchy. If the real natural person is accorded first order, then HDT should be accorded a second order legal identity as the latter exists merely due to former. As cells are building blocks of natural person, data of this natural person is building block of HDT. Birth, marriage, and death certificates can be issue to these HDT.

Is it possible for a relative or heir to take over the digital identity of the deceased? This would be like cats and dogs that inherit rights in several states/countries (honestly, we cannot understand how). Can we inherit from a HDT (if HDT is legally recognized as human) or vice-versa? What rights a DT will have if awarded any status. The questions of identity, the person, and the thin line between what a human possesses, i.e., HDT and what he is, i.e., between being and having need to be answered. If the HDT is the person, then how a person can have a second human, i.e., HDT.

3. Religious and Transhumanism issues

As HDTs fall in the borderland of science, philosophy, religion, ethics, and law, it's better to write a few lines about possible religious concepts that may be affected by HDTs. *Historically, people have sought eternity by religion but now transhumanists believe that it can be sought by technological developments. Death not only ends biological presence, but everything connected with those individual losses meaning for the deceased.* Reincarnation asserts that humans reside in the physical body for a specific time and then moves to next door. Religious narratives although seem myths and lyrics than literal, believe in specialness of humans. HDTs will reject this concept at all or transmute it at least.

Theologians fundamentally believe that human mind and body are God-gifted sanctuaries and should not be altered with unless changed by the Almighty. In the Bible, blasphemy (attempting to become God) is the only unforgivable sin. According to Islamic and Christian eschatology, all humans will face the "four last things" namely death, judgment, and heaven or hell. These *virtual sapines* namely *Homo virtualis, Homo immortalis* or *Homo twinalis* are a human plus entity (due to their enhanced capacities). All religions suggest that death, is not simply a "turn the light off moment" rather we will be transferred into another realm. Humans behave better as they know that they will have to die and be answerable for their deeds. Death marks a journey from known to the unknown. The dream of eternity is as old as humans themselves. Death is a natural part of life, and effects of eliminating death on humans and a human society are unknown.

Mind, soul, and consciousness are closely related notions discussed in previous centuries by philosophers but now by scientists too. "Soul" is a term that most of us instinctively know what we mean when we hear and use it but have trouble talking through exactly what it is. The key question is whether humans are *purely* physical beings or a mix of physical and something more. Socrates argues that the soul is the element that "when present in a body, makes it live." After death, the soul is "released from the chains of the body." The soul is the animating principle of humans, the *fabric* inside humans propelling humans to certain ends. HDTs lack a soul and so it's against human dignity to consider them humans or equivalent to humans. A human body consists of physical structure (blood, flesh, bones), and an ancillary system comprising of mind, intellect and a soul connecting whole body and helping body perform its physiological functions. These engineered humans living in the cloud need electricity power connection as the elixir of life. Power is just like oxygen for their human counterpart. So HDT may prove a false prophecy being non-sustainable. HDTs will be unable to replicate values. Humans are superior because of their capability for moral decisions, understanding, and social correlations. Freedom of choice and action is necessary to uphold moral and religious values. Both freedoms will be compromised when HDT can anticipate human desires. If decisions, desires, and actions are automated and predictable, it will be difficult to hold anyone accountable besides losing the moral supremacy of humans.

There are burning questions like where technology is leading humanity under whose leadership and what are the aims and objectives of this journey. Technology has led to depersonalization and to dissociation making humans just an algorithm and databanks of memories, thoughts, and information. There will be no choice and every human will need to augment his biological body with an artificial companion nested in the cloud to remain relevant and competitive in an economy and society floating on the surface

of a river of data. Instead of achieving transcendence by downloading the data into cyborg flesh, humanity needs to align and harmonize itself with the cosmological order uploading our souls into eternity. An industrial elite comprised of demigods controlling thoughts and actions of other humans through programming can lead to manipulation and distortions in society. The communication and interaction among humans and HDTs of various levels of intellect can create problems as the universe is adapted for humans and not HDTs. Technocrats think that essential in a human can exist outside of body if there is right place. However, theologians suggest that to be human needs to operate within a physical body, and disembodied data can't be a human. A human can't be reduced to mere data, instead a human is a holistic complex biological system-oriented entity.

Death inspires individuals leading an imbued life of significance and meaningful for himself and others. Digital life can decrease affinity for this physical world, starting a race for virtual world. Death has "fascinated, haunted, and ultimately defined" humans. Every human has and will always face the certainty of death. No death will consume earth resources. Earth and human beings are already dying.

Death is returning to mother nature. Just like trees bury their debris to have next year so do humans burying their loved ones to have more loved ones. Immortality (physical, digital, and mystical) literature especially digital immortality grew exponentially in the past decade. The HDTs can blur the line between humanity and divinity. The humanity is leaping towards post-biological world of bodyless immortal entities free from disease, and death. An over-populated world of grandparents living with their grandchildren will make HDTs living a boring unhappy life tempting for suicide.

Transhumanism is believed to lead longer, healthier, and advanced lives. According to transhumanists, humans are not static as the evolutionary process of improvement and transformation is continued. The HDTs raise questions about the potential loss of diversity and the true meaning of humans. The HDTs will lead to a homogenized, personalized, and customized society where differences will not be welcomed. A, HDT is just a sophisticated pattern of data and data processing on a permanent platform which will help resurrect or reincarnate humans saved in it. Transhumanists believe that releasing the human body from its biological limits, humans will transcend into a future unrestrained by death leading to "singularity". Transhumanism promotes the augmentation of human capacity through technology as they believe that humans are incomplete in their current format. It leads to virtual immortality, i.e., transferring human data on a more durable stratum. The vaporization of religious thoughts and their substitution with the belief that only measure able is real. It will not be possible to live in two different dimensions and realms simultaneously. In this world death is just the loss of information and human ability to preserve and retrieve information can help them exist from this tunnel leading to eternity.

3.1 Ethical issues

As technologies progress exponentially at a speed which law can't catch up, ethics leads society. Ethical assessment of technology is always necessary for responsible research and development (Cotton,2014) to identify and avoid the negative effect of technology on society motivating all stakeholders of community to reflect and deliberate on the cost-benefit estimates (Popa et al. 2021). Such assessment is especially important for emerging technologies (Brey 2012; Lin 2010; Lucivero et al. 2011; Marchant et al. 2011; Sandler 2014; Swierstra and Rip 2007) which are softer during the infancy of their development (Collingridge 1982) and the prospect of curbing the technology's trajectory are higher before it effects society. Perhaps humans will have to communicate and address this new creature as "I-you" or "you-I". HDTs are not natural persons, nor an asset. The determination of HDT's assets, and the possible liability of counterpart physical person for HDT will need to be defined besides a new ethics type for cohabitation of the individual and HDT (Kerckhove 2021).

The slow-paced biological evolution of human beings has turned to fast-paced technological evolution. Transhumanism deals with intelligent life beyond its existing human form and overcoming human constraints by science and technology. Such self-emergent artificial systems, i.e., transhumanism can control humans (Bostrom 2009, 2014). Although their potential benefits indicate strong "exo-humanism" potential (limiting destruction capacity) rather than "transhumanism" power, in extreme case of transhumanism, HDT can completely substitute humans (Geraci 2010). It is necessary to balance dilution of humans in the "total capitalism" of the digital economy (Srnicek 2018; Teller 2021). The same questions arise for HDTs which arose for robots. What does it mean to be human? What are the limits of our humanity? Is HDT a person or just simulating a person? The body hackers can hack them online for ransom, or for online assault, and rape or even can kill them. Will the death of HDT will be second death of his counterpart human?

3.2 Identity Theft

Granting a legal status to HDTs may lead to new forms of identity theft, abuse, and fraud. Personal identity can be isolated from the identity holder individual, as the visible features of an individual's identity can be cloned, reiterated, or exercised. This" identity theft" is a condition where someone else is using an individual's distinguishing data, such as name, driver's license, and passport. In the digital world, identity theft can have a much more profound effect. It's impossible to have a HDT as humans are quite unique and complex that simply cannot be copied and cannot be "run" on any other physical strata except another human. It's impossible to determine the point when the identity replication of humans becomes unethical or challenging, and why at that point. Further the central point of the existence of the essence of a person and individual human identity is not agreed upon yet. This HDT relates to past (using parent's data without consent) and future generations (grandchildren without intimation) which can create family problems. If HDT is stuck in repository and can't communicate with anyone or can't be accessed by anyone, it will be just like an orphan.

3.3 Healthcare HDTs

The human body is a distinctive engineering assembly having protection mechanism for key internal organs by resisting external loads. A HDT being highly transparent mirror of an individual's molecular and physiological constitution can help customize the healthcare, by medical decisions, treatments, practices, or products tailored for individual patients. The genetic code and the biographic code possessed by a HDT of its corresponding human can help the healthcare systems (Kamel-Boulos and Zhang 2021). Current healthcare is backwards facing as physicians suggest treatment based on previous history. Hence this one-size-fits-all approach will evolve into one that is truly predictive and personalized. Hence HDT will be just like precision medicine, i.e.,"4P

medicine", being personalized, predictive, preventive, and participatory which are for designed for individuals instead of a one-drug-fits-all model. There is a dire need to develop standards and regulations for healthcare HDT (Braun 2021). Despite the increased computing capacity, cheap intelligent devices, ample data storage, and convenient data acquisition, the inherent complexity of humans makes modeling and massive data fusion analysis difficult besides challenges of the variety of data sources, data variability, and heterogeneousness (Hu et al. 2022). As humans can't go to meta and HDT can't come to physical world due to inability to cross their relevant ecosphere, it's not so easy to have many hopes from HDT. The creation of artificial or digital life for digital humans can be dangerous. The benefits of wasting precious time and resources in this artificial companion should be weighed against their costs. It may not be feasible to live with species which look like us.

3.4 Uniqueness, autonomy, and dignity of humans

HDTs are socio-technical systems or tools. Previously the tools usage was a distinctive characteristic of human intelligence and the key reason of denial of personhood to animals, which were deemed property just like tolls. Although several animal species are very intelligent and have potential to use tools, legal personhood has been granted to only a few of them. With the passage of time tools have become highly sophisticated. The duality of law's objects (property) and subjects (persons) is rampant within legal literature even if it is inaccurate. Property (objects) and persons (subjects) are usually mutually exclusive. One can be either an object or a subject or an object but not both. If HDTs integrate with their counterpart humans, will they become a part of that person and their device's property vaporizes? Is this toll sophisticated enough to accord legal personhood? Since corporations are trading human data available from social networking sites, this potential to control data is property? How can one own data, which is merely information? If HDT are just objects or devices, do they possess any ethical consequences?

From a theoretical point of view, nothing prohibits granting legal personality to HDT. But the question is whether should "HDTs" have the same rights which natural and legal persons have? Humans are believed above "things" in hierarchy from animals, or entities. The HDT lacks the component of soul, will or awareness, and it would be contrary to human dignity to grant legal personality to HDT. Digital humans will populate the metaverse and maybe in future digital family planning will be needed. The use of terminologies we currently use for humans will dilute the meanings of these terms making them vague and hence these may lose importance. The HDTs will vaporize the uniqueness of the persons just like an important piece of art loose due to its replicas.

Humans are self-sustainable as they reproduce but HDT systems are created by humans which makes them solely dependent on men. If DT are humanized it will dehumanize real humans. If HDTs start making decisions besides human himself, it will become a decentralized system just like an octopus which has separate brains in one organism. It may lead to a society which is tilted towards control rather than opportunities creator. Knowledge of the strengths and weaknesses of everyone can lead to easy manipulation of everybody effectively (Bell 2015; Isaak and Hanna 2018). The bad actors can pressurize people without triggering a revolution, figure out how to bypass the will of people and impose policies on them, which do not represent their will by knowledge of HDTs. Hence HDTs can be highly parasitic and undermine human dignity and rights. The HDTs can be commodified in metaverse-like digital ecosystem (Voshmgir 2021] Wired.) empowered by persistent monitoring of individual behavior with details that can't be conceived in the physical world (Virgilio 2022). If the physical twin, i.e., "the person" is responsible for the DT's actions to conform with the law, it will be a different situation than encountered for autonomous cars since programming the HDT will be in the hands of the person (at least partly).

Human acts are allied with a specific time and can't be activated at a different time out of context. The HDT can replicate actions in a different time scale which can create troubles for the next generation or even for human himself.

3.5 Mortality and life after death

These AI copies of humans will eternally disrupt one of the universal features of human beings, i.e., mortality. Since the "life cycles" of both humans and their corresponding HDT are different, the former having a death while the later have perpetual life, it makes them asymmetric and hence not true twin. If by evolution, the HDT develops conscience and becomes sentient, it can view humans as a threat and start conspiracies against humanity.

Prevailing ethics revolves around issues of the traditional human lifecycle while issues of afterlife, i.e., digital afterlife of HDT (after death of his physical person) need to be addressed. There will be challenges due to partitioning of the notion of congruence between the body and the person. How to govern the HDT after death of the physical twin? If the rights of the HDT conflict with the rights of the physical twin, how to weigh them against each other? Humans may permanently lose cognitive functions, sovereignty, secrecy and ultimately identity. Properties and values obtained by studying to regulate language and own oneself may fade away although self will not disappear completely. Usually, rights end when some person dies or after a specific time when someone goes missing. This uploading of humans to the digital strata can remain even after physical death of his counterpart person (Hayles 1993, 2000, Mitchell 1998, Wertheim 1999). For this endless life as for HDT, rights may not end which will create problems for humanity. The HDT may vaporize without leaving traces which is against permanency feature of a human. Can humans grant a right tom an entity in another sphere, i.e., in this case rights to HDTs in cyberworld? Who will be the forefather of these "cyberian" humans just like Adam was for real humans?

3.6 Externalization of cognitive faculties

The increasing abilities of HDT may lead to increased trust of the physical person tempting him allow his DT to take decisions, thus shifting the centre of decision taking from inside to outside of the physical body, i.e., shifting the cognitive features to outer orientation (Kerckhove 2021). Currently, the decision centre remains within the body of natural persons. However, decisions driven by processes external to the person as HDTs can craft a new role for their physical counterpart. The general rule is that increased trust to someone else instead of indigenous faculties leads to decreased practice consequently weaking the potential bestowed by nature. This may be case for real humans trusting HDT for all decisions and their cognitive and decision abilities can weaken making brain a vestigial organ.

3.7 Inequality and injustice

The HDT can broaden the existing socio-economic inequality. The rich people who can afford the service of assessing a medicine on their HDT will acquire understanding and proficiency that others cannot. Should there be any limit to the number of HDTs that each person can have? Will there be any differentiation between public figures and members of the public for their HDTs like the different journalistic code of conduct/ethics? If so, it will worsen the situation. Thel peer ratings of HDT will start soon like ratings of many services on digital platform like restaurants, taxi, and many other services. the aggregation of peer ratings on online platforms. The HDTs of those having marketing skills will manage their profiles better increasing digital disparity. We can't expect a fair society, if wealthy people can 'multiply' themselves, being represented by several HDTs. It will be hard to ensure that the inadequate resources of this planet are exhausted on nonessential technology which entices people to live in an illusionary digital world, evading the genuine issues of the physical world (Kim 2015).

4. The data, cybersecurity & IPR issues

A single technology is mostly safe, the issues start during its implementation and fusion with other technologies. HDT is just data, algorithms, and AI systems. Hence, HDT raises questions regarding data, medical liability, algorithmic integrity, and intellectual property besides others (Teller 2021). Previously the HDTs discussions have been mainly limited to their use in the health care system and few interesting studies have been conducted. The HDT infrastructures will grasp trillion information as data. From a legal perspective, it's helpful to consider the HDT's data as (a) the input or source data and (b) the output data as results of the source data. All major issues surrounding data like quality, ownership, sharing, confidentiality, integrity, and security are involved since the start of a HDT creation, i.e., from prebirth of a real person. Without data sharing, HDTs are useless. Existing rules of data designed for AI can be opted for HDT. Data security and confidentiality are essential in protecting commercially sensitive information. The General Data Protection Regulation (GDPR) provisions regarding personal data will apply to DT especially articles 5 (chapter 2) 6 and 7. The quality of the data guarantees the quality of the digital twin's virtual image, reflecting the real person. The data should be fair, inclusive, i.e., descriptive of various trends, and trustworthy. The notions of "transparency" and "explainability" will need to be redefined to achieve this goal. A key issue will be the territoriality of the regulations for companies offering HDT services. For example, the GDPR is applicable to firms based in Europe, but the HDTs produced by such companies can have worldwide proportions raising problems of extra-EU regulations. Hence adaptation arrangements should be established for companies operating in various parts of globe (Turcht 2023). Every human is biologically and socially connected to those who lived before and will dwell after him, building a world of memories, love, and affection. Hence HDT is a communal issue. The datafication of everyday life has led to a culture of dataism. Data are sticky as they exist forever. If data of 5 years is lost in HDT, will it still be a complete HDT?

Where there is data, there are intellectual property rights (IPRs). It will be necessary to solve the emerging issues of copyright for HDT. If an implant is fixed in a human body and its data is being transferred to HDT, who will own the resulting data? Privacy norms will be disrupted as all the data will be available in metaverse until digital locks, cyber locks, encryption, access control and cybersports are issued. The circumvention of these measures should have penalties to avoid misuse of privacy. Who will be responsible for cybersecurity and keeping data secure? Data handling and sharing policies to trace and audit personal data. Special attention should be paid to medical data to ensure data security, integrity, transparency, and authentication to stop tampering. The data must be real although humans can be artificial, digital, and virtual.

4.1 Counterpart human rights

Many questions arise regarding the physical human counterpart of HDTs. Personhood is based on threshold concept, suggesting that all humans have an equal moral status which is more than entities below that threshold. All human beings are persons is an accepted notion among all debates on personhood. A higher moral status can be accorded to persons who are cognitively enhanced by use of new technologies than other persons. Allen Buchanan (Buchanan 2009), names persons who reached a second higher threshold as "postpersons" while Jeff McMahan recognizes them as "suprapersons" due to their enhanced psychological capacities (Mcmahan 2009). Possession of these entities can ggravte the inequality problems especially for those who will lack a HDT.

HDT is a unique entity. There is no other organism like HDT, it is in a category of its own. On one hand, it's a distinct and independent entity while on the other hand its dependent on its physical counterpart human. Without his physical counterpart no HDT can exist. A physical human having a HDT is more than one (it harbors its HDT), can be accorded higher moral status just like pregnant women having higher status due to hosting fetus. But again, the question arises whether the physical counterpart is nurturing another parasitic person on it, as HDT is just split of his counterpart human bifurcated for data backup. If it's mere bifurcation, even then the physical person is neither two individuals nor one but in between one and two individuals. If there are three HDTs, the physical person can be between one and three. Hence a physical person reaches second threshold, first as being person and second as harboring another person. The physical person is associated with another entity having potential to match the personhood threshold or already reached it (Robinson 2023). So, one can be two legally if not mathematically. However physical persons can be taken as surrogates as they are harboring another person from their biodata.

Human rights are attached to persons and not to HDTs which are just spin-off or spin-out profiles (just data patterns of previous behavior) of that person. If personhood is transferred to profiles instead of persons behind these profiles, the personhood concept is dissolved. Identity information, however, can't be detached from the person's control. Such detachment can lead to a diminishing of a person's participation in society and basic enjoyment of personhood. The ability to control the use of one's identity information is crucial for reminding others that there is a person behind data and enabling that person to have full status when dealing with others. The physical person should have a control panel or central dashboard to link information across various systems by click of a button (e.g., change of home address by single push across all platforms). Human rights are attached to the person, as opposed to the profiles that may be built up from identity information about him.

4.2 Energy costly process and sustainability issues

The HDTs being driven by both data and algorithms require high-end data storage and processing which is an energy-hungry process. The power required by metaverse, and its environmental effects will become clear as the HDTs evolves. However, the

world is already facing shortage of energy and using energy for functional HDTs may lead to an energy crisis in future. The increasing energy usage will lead to greenhouse effects affecting the sustainability of biosphere.

4.3 Self-Surveillance and Controlled society

The quantified self by self-surveillance can misguide people to oversee their wellness, leading to further health problems. HDT decision will be highly optimized as compared to human heuristics decisions (Gigerenzer et al. 2011), based on simple decision rules e.g., the notion of "satisficing", i.e., selecting a "good enough" option (Simon, 1956). The notion of "optimizing the world" is not simple since it's not easy to decide the right goal function to choose. Persons vary in their preferences for various issues GDP per capita or sustainability, life probability, health, or quality of life while optimization maps the intricacy of the ecosphere to a unidimensional direction.

5. Conclusions

A HDT is a child of a meta-Darwinist evolution of his physical counterpart built in the digital universe. HDTs may be termed "quasi persons", "electronic persons", "meta persons", "synthetic humans", "byte human", "cookie human", "para person", or "cyber humans". If thought microscopically, HDTs are just virtual or digital property being product and tools and can be recognized as chattels. Interpretation and extension of existing law seems enough with current version of HDTs. If HDTs technology evolves making them autonomic and consciousness, they may be treated as independent entities. Right now, it can't be predicted when a HDT will become a person. If personhood is granted, several questions crystallize problematizing the situation rather than answering the questions posed in this article. Alternatively, the legal personhood status of the biological person can be extended to a HDT as HDT is a copy and extension of the personality, outlooks, principles, likings, and ethics of his biological people in a digital world. The HDT may be regulated as half human, half robot and their rights and obligations can be expressed very clearly in a special law. The term "represents" in HDT context indicates that it has no independent existence and copies the structure and functions of its real person. Current study explored the multi-layered world of HDTs, investigating their philosophical, and legal and ethical implications. The subject of this research is vast as the field of DT and law spans has numerous issues; it is merely impossible to include all perspectives regarding HDT. Therefore, certain delimitations were made hence this work is not an exhaustive view on the area. It's not the scope of the article to provide any certain or in-depth answers to design future laws, but to identify where HDT poses new regulatory challenges and discuss whether complementary regulation is needed.

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