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# Exploring Human Nature in a Technology-Driven Society

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**Abstract.** Major philosophical works have presented discussions of human nature and interdisciplinary programs have set out to address the interrelation of technology and social factors. Still, only few works have tried to present a bird's-eye perspective on current debates, combining original philosophical positions with relevant technological developments and scientific paradigms. Based on an interdisciplinary definition of human nature, this paper explores three dimensions to better understand and categorize views of human nature and technology: first, the natural constitution of human beings; second, the position of human beings within their environment; and third, human values. It discusses how different accounts of human nature result in different views of the role of technology by reviewing perspectives of the human body and technological enhancement as well as accounts of the human as an isolated individual or social being. Human values are presented along five dimensions, covering individual, social, environmental, technical, and economic aspects, which play unique roles in the human-technology relation. While this paper can only offer a preliminary analysis of positions and arguments, it concludes with challenges of a dualist view of the human and technology and motivates further investigations of the human-technology. A better understanding of implicit beliefs regarding humans and technology can inform research and practice in the fields of technology ethics, design, and engineering and can open up space for a positive reconceptualization both of what it means to be human and the role of technology.

**Keywords:** Human Nature, Technology, Human-technology Relation, Design.

## 1 Introduction

The ability to build technological artefacts that help and support us has characterized human beings throughout our evolutionary history. Today, technological innovations are still being perceived as a symbol for human intellectual capacities as they increase control over the world as well as over human capabilities and deficiencies. However, scholars have emphasized that technology is much more than a means to an end as it shapes human experiences, actions, and vulnerabilities [1, 2]. In light of the significant role that technology plays in our lives, it is vital to better understand different accounts of the human and technology and investigate their influence on prevailing as well as

emerging technologies. This paper takes a first step in providing a selective overview on important views and arguments that can potentially influence the future relation of humans and technology.

Many approaches in IT ethics, design, engineering, and development stress that relevant stakeholders should be included in the design and development process of new technologies (e.g. [3]). This is based on the assumption that individuals differ in their needs, goals and general views regarding technology. However, the relation of human beings and technology is always bidirectional. Implicit in our expectations of technology is also an understanding of human beings and their general abilities, needs, and goals. In turn, “our notion of what we consider as being human is being increasingly shaped by the technologies that we use”, as stated in the HCC14 Call for Papers. This interrelation has long been studied by interdisciplinary programs such as science and technology studies (STS) or philosophy of technology. A single publication cannot live up to the critical appraisal that contributions from these and related fields deserve. Still, only few works have tried to present a bird’s-eye perspective on current debates, combining original philosophical positions with relevant technological developments and paradigms in the cognitive sciences (but see [4]). Also, most of the discourse has taken place in form of theoretical discussions with scarce empirical research investigating implicit theories and beliefs about humans and technology.

Informative findings come from a research group that empirically investigated the role of privacy in information system engineering. Carew and colleagues [5] found that important beliefs and attitudes in system development can be represented along two dimensions. The first dimension (labeled "humanist-existentialist") combines the belief in a free will and the responsibility for one’s choices (existentialist aspects) with a concern for society and a broad humanitarian perspective that places the human at the center and shows concern for a person’s values, rights, and dignity (humanist aspects). The second dimension ("technocentrist-industriofatalist") puts the focus on economic pursuits as well as on technical aspects such as functionality. Although this two-dimensional perspective has emerged in the information privacy context, it fits well with the wider diverging paradigms in current technology design approaches, which attribute different levels of appreciation to humans and technology.

On the one hand, we find approaches that focus on human needs, goals, and values. Don Norman, probably the best-known advocate of Human-Centered Design, proposes that any design should ensure “that people’s needs are met, that the resulting product is understandable and usable, that it accomplishes the desired tasks, and that the experience of use is positive and enjoyable” [3, p. 44]. A human-centered approach takes into account human capabilities and limitations and designs enjoyable experiences instead of mere functionality. Related approaches strive to consider human goals (e.g. goal-directed design [6]) or values (e.g. value sensitive design [7]) in the design of technological systems or focus on including the stakeholders in the design process (e.g. through participatory design [8]). All these approaches share an empathic attitude towards human needs and capabilities that they seek to include in the design process.

On the other hand, the far-reaching possibilities of technological development have nurtured a technological optimism that focuses on capabilities and potentials on the side

of technology. Silicon Valley is one of the places of origin of this techno-centered perspective, which often sees information as the driving resource [9]. With it comes an image of the human as a creature that can be fully understood and assessed through information technologies. On the consumer side, data-driven activities such as self-tracking and life-logging have inspired the “quantified self” movement that seeks to support individuals in gaining “self knowledge through numbers” [10]. Extreme techno-centered movements such as “transhumanism” [11] surpass IT applications and devices as they are currently in use – they seek to move beyond human limitations by interfering with the physiological and cognitive setup of human beings by technological means. To make this possible, many transhumanists support investments in technological innovations such as biotechnology, nanotechnology, and artificial intelligence – areas often subject to complex ethical and legal discussions.

These different approaches to technology show the important influence that assumptions about human nature and the role of technology can have on the design of technological artefacts. This paper sets out to explore a few selected dimensions to delineate views of human nature that potentially influence how we perceive, use, and design technology. Any concept of human nature typically captures basic assumptions about humans in one image, either to determine what is right (normative function) or to show what is characteristic of humans (descriptive function) [12]. Whether human nature itself is fixed or variable is itself under debate, which is why a concept of human nature typically reflects the assumptions, reflections and concerns of a certain era, discipline, or cultural group. In the following, the paper outlines views of humans and technology that are relevant in our era along three dimensions.

## 2 Core Questions on Human Nature Along Three Dimensions

The German psychologist Jochen Fahrenberg provides one of few interdisciplinary theoretical works on different views of human nature. Based on psychological, biological, intercultural, and religious perspectives, he defines a concept of the human as “the aggregate of assumptions and beliefs regarding *what the nature of human beings is*, how they should *live in their social and material environment* and which *values and goals* their lives should have” [11, p. 9, translated and highlighted by the author]. This definition suggests three core dimensions that can be explored with regard to how they play out in technology design and use: first, the natural constitution of human beings; second, the position of human beings within their environment; and third, human values. While major philosophical works have presented elaborate ideas on these topics, this paper wants to bring perspectives from different times, disciplines and discourses together in a critical but necessarily limited overview.

### 2.1 Where to Draw the Line? Body, Mind, and Technological Enhancements

One of the characteristics that traditionally differentiates human beings from other living creatures is their self-awareness and rich mental life. Rooted within this emphasis of the human mind is the question on what gives rise to mental experiences and the role

of the body. Depending on how and where the line between the subjective mental life and the physical world is drawn, different concepts of human beings, their worth and their position in their environment can be derived. This can influence to what degree the use of technology is desirable, acceptable, morally acceptable or to be condemned, a question that forms the core of current debates on human enhancement. Especially the line between mind and body influences how emerging technologies such as biotechnologies and information technologies are regarded. Different positions in this debate regard technology and its potential effects on the human constitution either with optimism or pessimism: while some welcome and celebrate human enhancement by means of emerging technologies, others condemn it. A third position suggests an alternative view to human nature overall, and questions the strict separation of the human and technology. These views are briefly discussed in the following.

Proponents of the view that the body is a mere biological substrate of the mind often recognize the physical vulnerability of humans as a weakness that technology could help to overcome. For example, transhumanists (e.g. Nick Bostrom [11]) welcome emerging technologies and their application not only for treatment but also for enhancement purposes. They emphasize the potential of technology and see the ultimate goal of human development in the transcendence of human boundaries and limitations. On the other end, we find “bioconservatives” [4] and “infoconservatives” [1], who want to protect what naturally constitutes and characterizes humans and thus support “natural” strategies for human development and personal growth, such as education. Proponents (e.g. Francis Fukuyama [14]) criticize technological developments and innovations that alter human capabilities and characteristics and argue for the protection of the boundaries between humans and technology.

These two opposing positions on biotechnologies make apparent how different views of the human constitution influence the perception of technology, its design and use. But they both share the view that there is something fixed that constitutes human nature. Outside of this view is the existential-phenomenological account of Mark Coecklebergh, who argues that there is no clear boundary between the natural and technology and that the impact of technological enhancement on what some describe as “human nature” is more complex than assumed in the debate of transhumanists vs. bio/infoconservatives [1]. In his view, any enhancement will produce new vulnerability, which is why we need to discuss *how* human beings are influenced rather than debating whether this influence changes human *nature*. Tamar Sharon makes a similar conclusion, designating both positions as “humanism” as they emphasize the uniqueness of the human and thus separate the human from “the rest”, be it animals, nature, or technology [4]. Similarly, other approaches (e.g. in the philosophy of technology [15]) emphasize that human nature is never purely “natural” but always includes “technological” aspects, which is why they argue for opening up the dichotomy of the human and technology and rethinking these categories and their relation.

## 2.2 Autonomy Reconsidered: Humans and Their Environment

In the history of philosophy, discussing the “state of nature” of humans became prominent during European colonialism when groups of people that had lived unreachable by

European civilization were discovered. Out of this experience arose the idea that humans generally have a natural state outside the influence of society. This helped to inspire liberal thinkers such as Thomas Hobbes and John Locke, according to whom humans are isolated individuals who exist completely independent from one another and from nature, i.e. in radical autonomy. This liberal view still influences much of our Western thinking and with it our views of technology. In light of liberalism, technology increases human freedom by extending human capabilities and compensating inequalities and supports humans in manipulating and controlling their natural environment. This idea is largely owed to Francis Bacon and has taken on new dimensions with the technologies available today [16].

Liberalism is often criticized for forgetting that humans have developed and evolved with their natural environment and are embedded in social groups (e.g. family, friends, colleagues, society, community, state). From an alternative perspective, humans have become deeply social beings who have learned to appreciate support and show solidarity because of their dependence on members of the community [17]; they are *situated* and *embedded* and thus perceive and act *in the world* [18]. Thus, social and cultural aspects do not only form the human understanding of morals, norms, habits, and goals, but also human cognitive abilities.

Phenomenological accounts that stress the relation between human beings and their environment have seen an increase in popularity and have influenced current thinking (e.g. [4, 18]). However, the concept of human autonomy and with it the assumed independence from the social and natural environment still exists in many disciplines. Especially economics at large is still stuck with the image of the human as an autonomous, calculating individual, the “homo oeconomicus” [19]. Thus, the assumptions of basic economic models stand in contrast with the concepts that stress the importance of the social and natural environment for human beings. This, in turn, influences how we design and envision future technologies, seeking to further extend our control over ourselves and our environment, both social and natural. If we take our situatedness and embeddedness seriously, we need to consider the wider effects that such technologies could cause with regard to our cognitive and social capabilities.

### 2.3 Discovering Human Values in Technology

Values represent things that are important to people in their lives and thus represent an important dimension of human beings. As described above, several design approaches try to consider values, goals, or needs for the design of new technologies. While some research has suggested that values are distinct from goals [20], the widely used conceptualization of values as “desirable transsituational goals, varying in importance, that serve as guiding principles in the life of a person or other social entity” [20, p. 21] stresses their commonalities.

Still, values differ from needs and goals: Values go beyond human *needs* because they represent what matters to humans, what they value, strive for and seek to protect, and can include moral considerations. Furthermore, they go beyond human *goals* because they stress the relationship and interaction between the human as valuing organism and the world as value-bearing environment [22]. Recent research has shown that

laws, principles, declared goals and obligations that have been put forward in various fields (including design, engineering, law, psychology, philosophy, and ethics) can be brought together in terms of values [23]. The resulting taxonomy presents values along five dimensions of sustainability (individual, social, technical, economic, and environmental), which provide a good starting point for discussing views of the human and technology. In the following, individual values, social values, environmental values, technical values, and economic values are briefly discussed with regard to their relevance for technology design and use.

Individual values cover basic and higher-order preconditions for a good life. They thus comprise health, safety, freedom, and property as well as education, knowledge, and pleasure [23]. In psychology, these values are usually framed as needs and several theories have addressed how they drive human behavior. One of the best-known models is Maslow's theory of needs [24], which proposes a hierarchical structure that covers physiological needs, safety needs, love needs, esteem needs, and the need for self-actualization at the very top. While user-centered design approaches typically seek to account for individual needs, they often focus on mere ease of use and ergonomic factors. These developments have led to the human-centered design approaches addressed in the beginning, which seek to exchange this reductionist view of "the user" with a more holistic view of human needs, values, and goals. Furthermore, a focus on individual values and virtues brings in an additional moral dimension in the consideration of the human-technology relation [25].

Different views of the social human condition result in a different appreciation of social values. For example, the values of freedom, safety, and justice can stand in contrast with the values of equality, dignity, trust, and community. While human rights aim to protect every human's dignity independently of the individual's capacities, abilities, etc., liberal thinkers typically stress human freedom. Digital products and services cater to social values in complex ways, e.g. by making digital communication easier and faster while at the same time reducing personal interactions and meetings. In contrast, a stronger community is being called for as a powerful way towards a more democratic and socially just political [26] and economic life [19]. Thus, an adequate understanding of humans as social beings is needed to translate between what is needed for a functioning society and the products and services that are being advertised and put on the market.

Related to this is the perception of environmental values such as biological diversity and a respect for nature [23]. For most of our evolutionary history, the natural environment determined the conditions of human life, influencing the genetic constitution of human beings and thus human capacities and limitations. In modernity, a view of human superiority over nature emerged. Influenced by scholars from the liberal tradition such as Francis Bacon and Thomas Hobbes, humans were described as being in strong control over nature, including their own nature. Today, humans are met with the challenge to maintain an environment that allows natural life, including humans, animals, and plants. We have entered "the Anthropocene", the age where humans determine the fate of earth. Thus, any human-centered approach is being challenged by the need to take the natural environment into account [27]. In line with this is a view that attributes a unique stewardship role to humans, a position of responsibility in the world. No matter

whether humans are seen in a superior position to their surrounding or not, the question is whether this superiority is accompanied by an attitude of power or an attitude of care, which results in a different appreciation of environmental values – and thus a different starting position for the design and development of future technologies. The current climate crisis and the multitude of technological devices being produced force us to consider any technology as an ecology that includes design, materials, humans and non-humans as much as politics and motivate environmentally friendly and sustainable technological innovations [27].

Values have long made their way into technology design and development (e.g. [3]). While usability, maintainability, and efficiency are usually being accounted for, values with social import such as information privacy have attracted wider attention only more recently. In Europe, this was accompanied by the application of the new General Data Protection Regulation in 2018. The example of information privacy also serves as an example that can very well illustrate how individuals' views and beliefs impact their behavior. Research has shown that engineers' pessimist beliefs about the feasibility of information privacy come with a decreased motivation to implement privacy mechanisms [28, 29]. Carew and colleagues express even wider concerns by showing that in system development, interests in human, social, and moral issues are diametral to interests in technical issues and functionality [30]. Thus, a sustainable model of technology production, use, and interaction needs to conciliate technical values with individual, social, and environmental values.

Economics is one of few disciplines that has designed its own view of human nature. The image of “homo oeconomicus” that pictures the human as “standing alone, money in hand, calculator in head, and ego in heart” [25, p. 96] still prevails in many economic textbooks, theories and policy making – and has resulted in specific economic values. The strive to maximize utility, perfect knowledge, and foresight were added to the idea of human beings as rational, autonomous individuals, to create an image of the ideal consumer – an initially descriptive model that soon became prescriptive. While this image was later criticized by important figures in economics, it has contributed to the development of current economic values that focus on profit maximization through efficiency, productivity, and innovation. In her book “Doughnut Economics” [19], Kate Raworth emphasizes the need for a new image that is fit for the twenty-first century as well as new economic values that seek to re-situate human well-being within the social and ecological boundaries determined by human needs and the natural environment's capacities.

### **3 Discussion and Conclusions**

The natural and technological environment offers a variety of ways for human beings to live, grow and develop. This paper has delineated discourses on human nature and technology that seem relevant for further developments in technology-driven societies. Based on an interdisciplinary definition of human nature, it discusses selected positions with regard to the natural constitution of human beings, the position of human beings within their environment, and human values. Interestingly, many debates start from the



assumption that the nature of human beings can be captured in specific images that delimitate human nature from the natural and material environment.

These positions are challenged by accounts that emphasize the interrelatedness of mind and body, humans and the natural environment, and humans and technology. For example, a recent paradigm in cognitive science stresses that cognition is embodied, embedded, extended, and enactive [31], or in other terms, “ecological” [18]. Furthermore, both transhumanists as well as bio- and infoconservatives are being challenged by accounts that do not see a clear boundary between the human and technology. Tamar Sharon [4] proposes her account of “mediated posthumanism” that stresses the interrelatedness of humans and technology. Mark Coeckelbergh [1] makes a similar argument by pointing out that there is no fixed notion of “human nature” but that technology as much as the social and historical context has always shaped human beings. Both argue that an ideological view of the human in terms of “human nature” or “humanism” needs to be overcome in order to make room for a view of humans and technology as inherently interrelated categories.

The argument that opening up the dichotomy of human and technology allows radical rethinking and restructuring of categories is not new, though. It is what Donna Haraway [32] tried to illustrate with her idea of the “cyborg”, which challenges traditional categories such as the human-technology dichotomy. Similarly, philosophers of technology such as Don Ihde or Peter-Paul Verbeek have emphasized the mediating role of technology for how humans relate to the world and to each other: Verbeek argues that technologies shape the world we live in and mediate our practices and experiences [15]. Similarly, accounts that see the human as an isolated, autonomous individual are being challenged by phenomenological accounts that stress the embeddedness of human beings within their environment. Putting the split between mind and body, human and technology, and human and world into perspective can thus be critical in reconsidering the role of technology for human beings.

The discussion of human values shows that several concepts (needs, goals, and values) seek to capture what is important to human beings in order to include it in the design of technology. The concrete design and use of new technologies depend on the relevance attributed to specific individual, social, environmental, technical, and economic factors. Any technology is shaped by human goals and values, but also shape them in turn. More research that helps to structure human needs, goals, and values by addressing their commonalities and conceptual differences could offer helpful contributions in this respect. Technology design that acknowledges the human side needs to be flexible to take into account the many regards in which humans and technology influence each other. Human-centered design approaches have proposed ways to do this, but might be able to profit from considerations on how to place their approach “within the doughnut” [19, 27], that is, to consider both human and environmental restrictions.

The debates on what constitutes the human naturally, how human beings are related to their environment, and what implications this has for their actions and responsibility as well as for the role of technology, clearly show that implicit theories and assumptions can influence how technology is being designed and used. An understanding of implicit beliefs regarding humans and technology can inform research and practice in the fields

of technology ethics, design, and engineering and can open up space for a positive reconceptualization of both what it means to be human and the role of technology. While this paper can only offer a preliminary analysis of positions and arguments, further research – both theoretical and empirical – could help to further delineate different accounts and discuss their influence on current and future technological developments and the human-technology relation.

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