Thanatechnology and the Living Dead: New Concepts in Digital Transformation and Human-Computer Interaction

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Abstract

In a digital society, shall we be the authors of our own experience, not only during our lifetime but also after we die? We ask this question because dying and bereavement have become even harder, and much less private, in the digital age. New big data-driven digital industries and technologies are on the rise, with promises of interactive 3D avatars and storage of digital memories of the deceased, so they can continue to exist online as the “living dead” in a digital afterlife. Famous rock and roll icons like Roy Orbison, Frank Zappa, Ronnie James Dio, and Amy Winehouse have famously been turned into holograms that can once again give “live” performances on the touring circuit, often pulling in large audiences. Death studies, dying, and grief have become virtual in the 21st century. We live in truly unprecedented times for human-computer interactions. Thanatology is the scientific study of death, dying, loss, and grief. In contrast to the biological study of biological aging (cellular senescence) and programmed cell death (apoptosis), thanatology employs multiple professional lenses,
medical, psychological, physical, spiritual, ethical, descriptive, and normative. In 1997, Carla Sofka introduced the term thanatechnology as “technological mechanisms such as interactive videodiscs and computer programs that are used to access information or aid in learning about thanatology topics.” Onward to 2021, the advent of social media, the Internet of Things, and sensors that digitize and archive nearly every human movement and experience are taking thanatechnology, and by extension, digital transformation, to new heights. For example, what happens to digital remains of persons once they cease to exist physically? This article offers a critical study and snapshot of this nascent field, and the “un-disciplinary” sociotechnical issues digital thanatechnologies raise in relation to big data. We also discuss how best to critically govern this new frontier in systems science and the digital society. We suggest that new policy narratives such as (1) the right to nonparticipation in relation to information and communication technologies and (2) the planetary public goods deserve further attention to democratize thanatechnology and big data. To the extent that systems science often depends on data from online platforms, for example, in times of pandemics and ecological crises, “critical thanatechnology studies,” introduced in this article, is a timely and essential field of scholarship with broad importance for systems science and planetary health.

**Keywords:** human-computer interaction, innovation policy, critical thanatechnology studies, e-death, the right to nonparticipation, industry 5.0

"There is no single time: all of our times are alive, all of our pasts are present"

Carlos Fuentes (1928–2012)
Novelist and essayist

**Humans Are Mortal, But Their Digital Footprints Are Not**

Social media are full of dead people whose digital remains in the form of past tweets, videos, and photographs, among other artifacts, continue to circulate in the virtual space. Leonard Nimoy (1931–2015), known for his role as Mr. Spock in the popular science fiction series *Star Trek*, used Twitter to say goodbye to friends, family, and fans with poetry and reflections on life. His final tweet on February 23, 2015, ended with “LLAP,” Spock’s signature greeting “live long and prosper,” and was re-tweeted more than 239,000 times (https://twitter.com/therealnimoy).

As we begin a new decade in the current historical moment of the coronavirus disease 2019 (COVID-19) pandemic in early 21st century, new digital media, the Internet of Things (IoT), and sensors that can digitize and archive nearly every human movement and experience are taking digital transformation in medicine, public health, and quotidian life to new heights. With the COVID-19 pandemic, digital health has also been on the rise to achieve the twin objectives of remote health care and social distancing. Digital health refers to electronic health, computing science, big data, artificial intelligence, machine learning, and the IoT, to name but a few of its technical pillars (Food and Drug Administration, 2020; World Health Organization, 2019).

**A New Industry for e-death/Digital Preservation**

We live in truly unprecedented times for human-computer interactions. The funeral industry, new digital media, and technology firms have been launching services over the past decade that may allow people to memorialize their digital footprints and how they are remembered after they die. A new unprecedented digital death/immortality (e-death) industry and related technologies are on the rise with promises of storage of digital memories (digital personalities?) of the deceased so they can continue to exist online as the “living dead” in a digital afterlife (Bassett, 2015).

Imagine this: what if some scientists are interested in having their scientific output in their lifetime to be associated with them after their death so they have a QR code placed on their gravestone?

Digital interactive avatars designed to appear, act, and sound like the deceased person may be “trained” and thus evolve over time by daily interactions with friends, former and new (Bassett, 2015; Parker, 2014). Famous rock and roll icons like Roy Orbison, Frank Zappa, Ronnie James Dio, and Amy Winehouse have famously been turned into holograms that can once again give “live” performances on the touring circuit, often pulling in large audiences (Grow, 2019). Death studies, dying, and grief have become virtual in the 21st century. The rituals of grieving are no longer restricted to a fixed place or time (Cann, 2014), representing a new “death-scape” that is not immediately connected to the material world (Maddrell and Sidaway, 2016).

Digital death and grieving are not always private, nor single point events in time in our digital societies. The current digitalization of grief and dying has broad implications. For example, the availability of online platforms and continued presence of the digital selves of the deceased present new, longer, temporaliy for the grieving process, not to mention the possibilities of building new meanings and social relationships between those who are left behind and the living dead in the borderless virtual space.

There are pressing questions we need to face and attempt to candidly answer in the digital era. Chief among these questions is the following:

*Shall we be the authors of our own experience, both in our lifetime, and after we die, in representations of our digital selves?*
This is an important question for which each of us may have different answers. Immortal data and digital preservation are not just data collected when we were alive. The issue at hand, and what is also at stake in this context, is that other people can add to, subtract from, or alter our digital data without our knowledge after we are dead. In the current post-truth age, and publics anxious with pandemics and ecological threats, and decade-long precarity from neoliberal governance around the world, which has eroded the safety nets that have been built since the World War II (Brabazon, 2021; Springer, 2016, 2020), a worrisome reality is that if false information is repeated multiple times, people may believe in that, even though the information provided is demonstrably false or unjust. With the enormous speed and scale offered by information and communication technologies (ICTs), social media can become weaponized to spread false information and post-truth (Özdemir et al., 2017).

Given the accuracy with which holograms have already been produced for some music celebrities, the rapidly advancing technology also leaves the possibility of deepfakes on the table, where reputations of the deceased could potentially be altered even further. This could be used to discredit certain individuals, or it could be used to repair the legacies of certain politicians where there are implications for contemporary politics among the living. In this context, the regulators, critical social sciences, and humanities could play important roles to protect the rights. European Commission’s “Proposal for a Regulation laying down harmonized rules on artificial intelligence” (European Commission, 2021a) aims to address the topic of deepfake and artificial intelligence.

Of course, we know that people can unjustly write about us without our knowledge when we are alive, but at least we might have a chance to see, respond, and correct such injustice. But who defends the dead? And who decides who should or may not be protected after death? We live in an age of post-truth, digital stigmatization, and socially and politically guided manipulation. The justification for our actions and statements are becoming increasingly reductionist and lacking in justifiability and proportionality (Geiselberger, 2017; Özdemir et al., 2017).

The deceased are often alone, and defenseless, especially if their digital data are transformed and new narratives and artifacts about them are socially and politically constructed after their death. Of course, this is a double-edged sword. Even beyond the question of deepfakes, digital preservation and the artifacts produced in the online universe may also be used to create benevolent narratives about people who were not so benevolent after all in their lifetime.

Thanatechnology

Thanatology is the scientific study of death, dying, loss, and grief as seen through an interdisciplinary perspective. In contrast to the biological study of biological aging (cellular senescence) and programmed cell death (apoptosis), thanatology employs multiple professional lenses, medical, psychological, physical, spiritual, ethical, descriptive, and normative (Sofka, 2018; Yu and Wang, 2021). In terms of the actors, thanatology concerns the person dying, as well as those grieving, from immediate family and friends to strangers who may care about the deceased.

Over two decades ago, Carla Sofka presciently introduced the term thanatechnology as “technological mechanisms such as interactive videodiscs and computer programs that are used to access information or aid in learning about thanatology topics,” (e.g., the Internet and World Wide Web) (Sofka, 1997).

Sofka has offered a historical context for the convergence of thanatology and technology in a recent interview:

Thanatechnology is a word that I invented back in 1996, because there was no way to describe how, at that point in time, it was just websites and maybe chat groups online, it was kind of the dinosaur version of what we have now, there was no way to describe how these new technologies were being used in death education and grief counselling. So that is a word I came up with to capture those mechanisms. And now of course, we have so much more with social media and social networking sites and apps on phones, and social robots that can capture maybe files that preserve our consciousness and our ability to communicate with people we love forever—I mean who would have imagined back then that those things would be available now. So I can’t even begin to guess what kinds of technology will be available 20 years from now, because it’s changed so much. So it’s any kind of technology that can be used to deal with death, dying, grief, loss, and illness.” (Sofka, 2018)

Biçer and Yıldırım (2021) have recently analyzed some of the salient implications of data (im)mortality emergent from thanatechnologies such as IoT:

“Yet another scenario that is different than memorialized social media digital footprints of the dead, is the case of digital zombies. This term refers to the dead that remain alive and socially active in the virtual domain. Digital zombies occur, for example, when the digital media and social networks of the deceased are actively managed by their family, friends and others who continue to evolve and reshape their digital footprints, for example, by continuing to upload pictures, and other material in socially interactive ways. Digital zombies refer to ‘the resurrected, re-animated, socially-active ‘dead’ (Bassett, 2015) where the deceased persons remain both dead and virtually alive, blurring the boundaries of the physical and digital worlds […]’ (Biçer and Yıldırım, 2021; see also Bassett, 2015).

Thanatechnology is an important conceptual frame for digital health, and bears technical, societal, and political theory corollaries. For example, what happens to digital remains of persons once they cease to exist physically? How shall we govern this new frontier in digital societies in ways that are critically informed (Özdemir, 2021)?

While digitalization of grief cannot be overlooked, especially in resource-rich regions of the planet, such virtual transformation of the experience of death and grieving is yet not available to all, by virtue of the current digital divides and differences in inclusion and equity in the emerging virtual worlds (Biçer and Yıldırım, 2021; Sofka et al., 2012; Yıldırım, 2012).

While the technologies were available before COVID-19, the pandemic also opened up the deathscapes of individuals to new and unanticipated geographies for the dead. Online funerals suddenly became commonplace within the infrastructure of thanatechnology, which enabled a certain sense of morbid curiosity cum digital voyeurism that would not exist otherwise. While few would crash a funeral in person,
when presented in the virtual realm, suddenly the privacy of funerals became much more fraught, in ways that were potentially not considered by the deceased (Muturi et al., 2020).

**What Is the Anticipated Scale?**

In a recent analysis, Öhman and Watson, (2019) forecasted “a minimum of 1.4 billion users will pass away before 2100 if Facebook ceases to attract new users as of 2018. If the network continues expanding at current rates, however, this number will exceed 4.9 billion.” This is only the tip of the iceberg, however. For the big data tsunami approaching from the digital remnants of the living dead on social media, just imagine the various types of new media in existence or being invented each year and will be added to the panoply of online platforms in this century (Bassett, 2015; Bıcıer and Yıldırım, 2021). In addition, the COVID-19 pandemic has brought to the fore digital health, and by extension, new frontiers in human-computer interaction and thanatechnologies such as IoT.

**Why Should Systems Scientists Take Notice of Thanatechnology?**

Thanatechnology offers several prospects to inform systems science and planetary health (Fig. 1).

Researchers might want to consider during their lifetime how to preserve data and with an eye to harnessing of the data they have generated. Such an approach is both responsible and pays dividends from the standpoint of intergenerational justice, and usefully informs the careers of the next generation of scientists in the 21st century. There are already new mechanisms in place, for example, to offer credit to scientists in hitherto underappreciated fields of scientific service such as refereeing articles and grant applications as a peer reviewer. Publons is an invaluable development to recognize the scientists who volunteer their time as an expert reviewer for science and public service (https://publons.com/about/home/) in this context. Publons integrates data regarding publications, citations, research interests, and peer review activity of the researcher.

**Thanatechnology Meets Systems Science and Planetary Health**

Data Source for Outcomes in Planetary Health, Ecosystems, Climate Change, Human Migration, etc.

→

Phenomics Data Source for Genomic Association Analyses

Digital Data (Im)mortality through Thanatechnology

Eventually, metadata (data about data) from digital media for signal detection and monitoring, and contextual sense making on the data-to-innovation trajectories. These can include patient-related outcomes and phenomics data, common or rare drug and vaccine side effects, among other health signals that can be informed by digital and social media and other forms of thanatechnology. Refugee health and migration studies, a topic of significance in an age of climate crises and the anticipated climate refugees, require contextual and real-life data on health outcomes (Kılıç, 2019), and thus may be informed by digital thanatechnologies such as social media accounts of people and communities in constant move. Large-scale epidemiological, pharmacy, and ecological surveillance research (Şaradaş and Kendirci, 2019; Sardas et al., 2020), too, can be informed by thanatechnology and digital recordings of the real-life experiences and accounts of patients during end of life.

As society shifts toward a digital one, although not in equal scales and speed across the nation states and communities, pervasive digital connectivity is creating a state of affairs that was hitherto named as the Quantified Planet (Özdemir, 2018), wherein animate and inanimate objects increasingly have their digital twins and digital footprints (NSF, 2019). In this context, the Destination Earth is a large-scale initiative at the European Commission that has the objective to “develop a very high precision digital model of the Earth (a ‘digital twin’) to monitor and predict environmental change and human impact to support sustainable development” (European Commission, 2021b). Seen in this light, the rise of thanatechnology can be further shaped by these and other planetary scale digital big data initiatives.

Omics and systems science are data intensive fields of scholarship. Data (im)mortality and stretching of big data across the time dimension in the digital universe create unprecedented prospects and challenges. Digital immortality, or conversely, digital death in the case of deceased individuals who do not want digital preservation of their footprints, can facilitate or hinder access to population scale phenomics and patient outcome data. This is relevant especially in times of public health emergencies and ecological threats such as the COVID-19 pandemic and others possibly lurking on the horizon in this century. Digital data on public health outcomes are invaluable for genotype-phenotype association analyses or to monitor the virulence of emerging new variants of environmental pathogens. Digital footprints can also serve as metadata so as to establish robust linkages between the context and content of emerging omics data in clinical and ecological research (Fig. 1).

Thanatechnology in the digital age, digital preservation, or the lack thereof add yet another and highly fluid dimension to big data. Insofar as biobanks that inform machine learning and population-based research are concerned, new decision support systems, informatics, and statistical tools will need to be developed in parallel to an ever-changing big data landscape with the rise of thanatechnologies.

**The Future of Death and Big Data in Digital Society**

Dying and bereavement have always been difficult. However, they have become even harder, and much less
private, in the digital age. The performativity of social media among the living becomes a distraction from the intimacy of the final acts of life for the dying. We no longer die alone or within the comforting embrace of our loved ones, but on a very public stage. Digital footprints of a lifetime, and the digital noise and false information they are occasionally embedded in, do not disappear nor can be entangled easily in the digital afterlife. Digital footprints are mutable, not invariably accurate, and thus, may compromise the wishes of dying persons and risk the dignity of the dead.

Thanatechnologies are further raising the stakes of dying in the digital age. On the one hand, the prospect of digital preservation of the experiences, personal narratives, and meanings we co-create during our lives may offer the prospect of digital immortality for some people, and thus defy death in a virtual realm. For those left behind, digital thanatechnology can be a mixed blessing, both aiding and prolonging grieving. Yet, others may have little or no interest in digital immortality, and instead prefer to vanish and disappear into the ether quietly with as little digital trace as possible, and making peace with “been there, done that, and now is the time to leave.”

Thanatechnologies have enormous consequences for data (im)mortality, and by extension, digital transformation in health and society. Since the rise of Enlightenment and the scientific method in the 16th and 17th centuries, we have tended to treat data as immutable objects that are present here and now, neglecting the temporal dimension of data, and the ways in which data can evolve and change over time, context, and application, especially in the current digital age. Big data associated with the new media and social networks are highly volatile, contested in regard to their veracity, and mutable over time, place, and context, as discussed in this article.

Regardless of our individual preferences for a digital afterlife or the lack thereof, the convergence of digital technologies with thanatology is too significant to ignore.

Systems science relies on big data with veracity. Thanatechnologies of the digital era are already generating enormous volumes of big data; this is only expected to increase as digital media continue to proliferate. The scale and speed of the IoT, sensors, digital media, and social network accounts that remain active and interactive after death will be contributing to the “biggest data yet” in this century (Öhman and Watson, 2019; Özdemir, 2018). Consistent with this, the number of wirelessly connected smart objects, excluding smartphones and computers, has already reached 8.4 billion worldwide by the end of 2017, averaging about one connected “thing” per person (Gartner, 2017). From data access to veracity, thanatechnology raises numerous challenges for which we do not yet have answers, and thus calls for research in technical, social, and political science spheres.

**Thanatechnology Policy and Critical Governance**

Amid debates for data (im)mortality, the conceptual frames for critical governance of thanatechnologies have lagged behind. Bayram et al. (2020) have underscored, in the current context of the pandemic, the importance of astute innovation policies to steer emerging technologies and fields of science in ways closely attuned to societal values, are broadly relevant and experiential, thus, democratic and socially just. Moreover, a prominent lesson that has emerged from the COVID-19 pandemic is that the triple capacity of “scale-speed-surge” is crucial for resilient and coordinated responses to ecological crises. The IoT, sensors, and broadband wireless connectivity can offer, in theory, the prospect of helping realize such collective action capacity against existential threats in the 21st century.

Seen in this light, digital technologies that contribute to collective action capacities can be approached as planetary public goods (PPGs), rather than commodities (Von Schomberg and Özdemir, 2020). PPGs would as a technology policy narrative because we will likely be facing other pandemics, climate crises, and other ecological threats in this century. Along these lines, in a discussion of the challenges of preservation of the digital footprints of the deceased, Öhman and Watson (2019) underscore that “an exclusively commercial approach to data preservation poses important ethical and political risks that demand urgent consideration. We call for a scalable, sustainable, and dignified curation model that incorporates the interests of multiple stakeholders.”

A second and understudied technology policy narrative is the “right to nonparticipation” in the context of ICTs. Iliadis (2015) notes that users are no longer comfortable in providing their data in exchange for services, and underlines the important difference between citizens’ participation in democracy in a nation-state versus participation in the virtual world, while being treated as reserves of data capital:

“The difference lies in this. Instead of participating in the democracy of the Nation State, new types of citizens are forced to participate in the digitality (Baudrillard, 2006) of non-Statal organizations each time they are online by offering up their data. Further, it remains increasingly difficult for citizens to ‘opt out’ (Vleugels et al., 2011) of digitality given the importance of digital ICTs for work and other essential, everyday activities (Purcell and Rainie, 2014).” (Iliadis, 2015).

**New Ways of Thinking and Critical Governance of Human–Computer Interaction**

**FIG. 2.** Top half of the panel: Thanatechnologies influence data (im)mortality, for example, through the social media accounts of the living dead or the digital zombies whose accounts remain active, interactive and continue to produce sociotechnical artifacts that may be different than the original narrative, personality, and experiences of the deceased. Bottom half of the panel: Critical governance of data (im)mortality calls for new technology governance narratives such as the PPGs and the Right to Nonparticipation in relation to ICTs. ICTs, information and communication technologies; PPGs, planetary public goods.
Historically, concepts such as privacy and intellectual property rights have been intensively studied in the case of ICTs. In contrast, the right to nonparticipation has received much less attention as concept and technology policy frame. The right to nonparticipation and PPGs deserve further study and consideration with an eye to democratize thanatechnology and the ICTs in digital societies (Fig. 2), lest death itself becomes neoliberalized.

We are currently living in a social and technical experiment as the physical and digital worlds are colliding and coalescing; and the boundaries of the living and the living dead, and the present and the digital afterlives, are blurring. What better time is there to think about data (im)mortality, digital transformation, and critical thanatechnology studies?

Disclaimer

Views expressed are the personal opinions of the authors only.

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Abbreviations Used
COVID-19 = coronavirus disease 2019
ICTs = information and communication technologies
IoT = Internet of Things
PPG = planetary public good