Philosophy of Technology 'Un-Disciplined'

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Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
In
Science and Technology Studies

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25 March 2016
Blacksburg, Virginia

Keywords: Philosophy of Technology, Postphenomenology, Posthumanism, Science and Technology Studies

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Abstract

Philosophy of technology (PoT) analyzes the nature of technology, its significance and consequences, and its mediation of human experiences of the world. Classical philosophers of technology describe mechanization as alienating: Technology causes humans to lose their connection with the natural world. Tehno-rationality replaces critical engagement and creativity. Failing to comprehend the essence/nature of Technology, and its consequences, portends disastrous social, political, and economic consequences. Such perspectives, however, neglect individual experiences of technologies. Filling that lacuna, contemporary philosophers of technology challenge the sweeping determinism of their intellectual forerunners and investigate how specific technologies mediate particular human experiences. Their descriptive prowess, however, lacks the normative engagement of classical PoT, and they emphasize micro effects of technologies to the detriment of macro implications. This dissertation describes an "un-disciplined" philosophy of technology (UPoT) that unites the macro and micro perspectives by providing narratives of human-technology symbiosis and co-development. Un-disciplined philosophers of technology present posthuman and transhuman perspectives that emphasize the symbiotic relationships between humans and technology. Thus, they deny disciplined philosophy's first critical maneuver: define and demarcate.

UPoT enables conversations and debate regarding the ontological and moral consequences of imagining humans and technologies as hybrid, co-dependent things. UPoT builds upon environmental and animal rights movements, and postphenomenology, to emphasize pluralist accounts that emphasize the dynamism of human-technology relations. UPoT argues we should imagine technologies as extensions/parts of living things: they do the shaping and are shaped in turn. I argue that such thinking reinforces the habit, already proposed by contemporary PoT, that emerging human-technology relations demand active interpretation and engagement because the relationships constantly change. Thus, we need to imagine a moral theory that best matches the hybrid/connected condition of the present century. Increasing automation in agriculture and surgery, for instance, exemplify technologies mediating human experiences of food and health, thus affecting how we understand and define these categories.

Acknowledgements:

The following work owes much to many. Through the many years I have worked on this project, I have relied on a collection of individuals, things, and places to ground me and also to inspire me. I thank: Professor Joseph Pitt for testing my many notions and theories about technology; Professor Richard Hirsh for making history of technology a subject I will never stop exploring; and Professor Skip Fuhrman for being candid and open to my ideas. My advisor, Professor Jim Collier, has been my greatest influence over these last years: his critical engagement with my ideas empowered me to create this work; his friendship and patience encouraged me to finish.

My students, friends, and colleagues in Flagstaff, Arizona; Ciudad Ixtepec, Oaxaca; and el Distrito Federal de Mexico first inspired me to pursue this interdisciplinary path. You made me see the world, and my place in it, differently. Thank you for that perspective. To my past and present friends and colleagues in Blacksburg, Joel, Adam, Monique, Gail, and Erik, thank you for listening to me ramble and keeping me as sane as possible.

Thank you Amy, Caroline, and Grandmother for teaching me strength and perseverance through your unconditional support. To Jamie, I appreciate all that you have brought to my life. We did it; now we press on. Although not here to celebrate this accomplishment, my mother is never far from my mind. I miss you still. Finally, I want to acknowledge the debt I owe my father. You have enabled me to become who I am. Thank you. This completed project is for you.

And to the machines/artificial agents, I look forward to our continued collaboration.

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Chapter 1: Introduction

Our Technological Selves

> The posthuman subject is an amalgam, a collection of heterogeneous components, a material-information entity whose boundaries undergo continuous construction and reconstruction. . . . the presumption that there is an agency, desire, or will belonging to the self and clearly distinguished from the "wills of others" is undercut in the posthuman, for the posthuman's collective heterogeneous quality implies distributed cognition located in disparate parts that may be in only tenuous communication with one another. . . . my dream is a vision of the posthuman that embraces the possibilities of information technologies without being seduced by fantasies of unlimited power and disembodied immortality . . . that understands human life as embedded in a material world of great complexity, one on which we depend for our continued survival. (Halyes, 1999, pp. 3-5)

Despite the spate of technological transformations and permutations that we in the West encounter each passing year; despite hyperbolic exclamations about technologies to revolutionize our lives, our relationships, and our world, even the state-of-the-art soon becomes quotidian. Perhaps humans adapt too well to change, to original and remarkable situations and devices. Because people adapt[1] so quickly, and with seeming ease and aplomb—we might even perceive societal pressure to do so as new technologies become imbedded in, for example, our professions, like electronic mail[2]--emerging technologies do not appear to herald much more than a need to purchase them, or incorporate them into daily life. The most recent handheld computers (nee cellular/mobile phones), packed with innovative features, become obsolete within a matter of years—if not months.

Our technologies teach us to expect such novelty from them, and they do not often disappoint in that regard. We learn from them to embrace modifications. More, we learn to seek out change lest we succumb to the boredom and monotony that results from engagement with the same old technologies, the same relationships we have already experienced. Somewhat counterintuitively, however, we often think that the technologies themselves will transform us and that we need only participate by, for instance, buying the product. The epigraph from Katherine Hayles (1999) reminds us that conceptions of

[1] Paul Ceruzzi (2005) makes an analogous point regarding technologies in our lives: *we* adapt to *them*. Humans do not simply control and manipulate technologies according to our needs. We begin to conceptualize our problems based on the technologies at our disposal, and this affects what we see as solutions.

[2] Even writing that phrase out, as opposed to 'email,' is jarring.

the human should evoke ideas of heterogeneous entities, hybrid entities that depend on each other. To understand the human is to understand technologies: changes to the latter often require alterations to our own bodies, perceptions, and perspectives. The posthuman is embedded in a world of technologies, among other *things*. Discussions of agency or cognition, for instance, must account for these other things as co-constituting each other.

Philosophers of technology, then, have a particular responsibility. Just as "there *is* a place for specialization in philosophy"—like philosophy *of technology*—there is a need for persistent reflection on technological artifacts and processes themselves with an "'eye on the whole'" (Sellars, 1963, p. 3). One purpose of philosophy of technology is to connect the specifics (the micro)[3] with the broader social, economic, political and cultural tendencies and habits of our time (the macro).[4] Thus, in this dissertation, I explore what a philosophy of technology can, and should, account for in the creation, mediation and transfer of values to an epistemic community. In particular, I argue that our technologies, and the relationships we have with them, *should* compel us to reject essentialist visions of humans. We are hybrids, mixtures of many things. We should not axiomatically privilege humans over any "other," whether nonhuman animals/life, the environment, or

[3] Peter-Paul Verbeek (2005), for example, performs empirical research into particular technologies while attempting to maintain focus on macro conditions and situations. He examines the role technology plays in human existence and in the relation between humans and reality. He does so by analysing particular technologies. Classical philosophers of technology (see Chapter 2) overgeneralized technology and based their theories of human-technology relations upon a false determinism where technologies drove societies and humans. Contemporary philosophers of technology (see Chapter 3), on the other hand, do not imagine technology as a single "thing" because that makes invisible the different pieces that make up the whole—like the rubber, metal and wood of the early bicycles (Bijker, 1993, p. 118). Bijker (1993) argues for a blurring of social and technical divisions in part because it allows him to show the related aspects of each, as well as the inherently contingent character of technological development.

> Through demonstrating the interpretative flexibility of a technical artifact, it is shown that an artifact can be understood as being constituted by social processes, rather than by purely technical ones. This seems to leave more latitude for alternatives in technical change. (p. 121).

[4] Nicholas Rescher (2006) offers further explication regarding metaphilosophy, including first principles—akin to maxims in moral philosophy of the type "always keep your promises" (p. 2). For Rescher, these principles have functional efficacy for philosophy. Philosophy's mission is "to enable us to orient ourselves in thought and action, enabling us to get a clearer understanding of the big issues of our place and our prospects in a complex world that is not of our own making" (p. 2). Philosophers of technology, as specialist philosophers, have a part to play in such engagement, and it extends beyond analysing and describing the particulars of technologies. After separating out the particulars of the technologies themselves, we must re-form and re-mould the specifics to show how they connect back to larger phenomena and practices.

technology. That perspective of dominance masks our responsibility and co-dependence, and promotes an instrumental view of technologies that leads us away from discussing the technologies as producers, conveyors, and sites of value-formation.

How do, and should, we engage with our technologies, and how do technologies affect our relationships with other humans, animals, environments, and societies? Such broad and far-reaching questions occupied philosophers of technology like Jacques Ellul (1964), Martin Heidegger (1979), and Herbert Marcuse (1994); further, they remain as relevant today as they were in the last century. Our technologies have altered/enabled humans, relationships, environments, and just about every aspect/product of our existence; that seems a likely constant for the near future. Just as our devices need updates, so do our perspectives.

Philosophers of technology have an opportunity to help guide conversations and worldviews, and to do so will require engagement with the broad publics, engineers, and scientists regarding the values we wish to promote for the future.[5] In this dissertation, I review works from a variety of philosophers of technology and investigate how they propose we act with, and in relation to, our technologies. Further, I also engage thinkers/philosophers that imagine the prospect of humans merging with technologies, like Ray Kurzweil (2005), to form some new creature/being. For my part, I will side with those for whom the future entails an acknowledgment of the mergers/amalgamations that have already taken place, particularly over the past century (Hayles, 1999, 2011). The latter two positions represent a variety of speculative philosophy of technology, what I will term 'un-disciplined' philosophy of technology (UPoT), and both offer—at times conflicting—paths and standpoints for how we should approach human-technology relations.

Interlude: Self-Driving Systems

Recent explanations and understandings of Self-Driving Vehicles (SDVs), instances of Self-Driving Systems (SDS), provide an example of one site for intervention by 'un-disciplined' philosophers of technology. In February 2016, the National Highway Traffic and Safety Administration (NHTSA) issued a statement that will help shape debate over the development, introduction, and use of autonomous agents (machines, systems of technology) in the U.S. The letter written to Google's Self-Driving Car Project Director, Chris Urmson, outlines a preliminary definition of a vehicle's *driver* (NHTSA, 2016). Google argues its SDVs have no need for a human to drive the vehicle. According to the NHTSA letter, Google argues

[5] No stranger to such public engagement, Martin Heidegger sought it out explicitly. His essay, "The Question Concerning Technology" (1979), developed out of a series of lectures he gave to wealthy Bremen businessmen in 1949 (Heidegger, 2012; Merwin, 2014). Although I do not advocate philosophers of technology exclusively targeting businesspeople, or even technologists, as the essential audiences for their work, philosophers of technology must account for them and their products as they both represent important actors effecting change for our present and future.

> that the SDS consistently will make the optimal decisions for the SDV occupants' safety (as well as for pedestrians and other road users), [and] the company expresses concern that providing human occupants of the vehicle with mechanisms to control things like steering, acceleration, braking, or turn signals, or providing human occupants with information about vehicle operation controlled entirely by the SDS, could be detrimental to safety because the human occupants could attempt to override the SDS's decisions. (NHTSA, 2016)

Google claims, and the NHTSA largely accepts, that the SDS can make *better* driving decisions than a person. Thus, allowing a person to control these vehicles, in ways more significant than raising and lowering a window, perhaps, poses a high risk. Taking the human out of such positions of control *reduces* risk.

For 'un-disciplined' philosophers of technology, the NHTSA's decision heralds a shift in narrative, a removal of the independent human agent as explicitly in control in driving situations. It represents an opportunity for posthumanists to engage the practical implications of what the epigraph from Hayles (1999) notes as "the posthuman's collective heterogeneous quality" (p. 3). The SDS amounts to "distributed cognition located in disparate parts that may be in only tenuous communication with one another" (Hayles, pp. 3-4). Such an interpretation by the NHTSA is an acknowledgement, not a rupture, of the momentum introduced by previous technologies like antilock brakes, power steering, cruise control, air bags, and electronic stability control, and augmented by features like emergency braking, forward crash warning, and lane departure warnings (NHTSA, 2016). The significance of the NHTSA's acknowledgement of SDS as drivers should not be underestimated. Although it may seem like a minor pronoun exchange, the move from "*who* drives" to "*what* drives" the vehicle has the potential to influence realms like healthcare, childcare, governance, and ethical/moral decision-making.

If an SDS can operate more safely and reliably than a human driver, car companies, and the U.S. Department of Transportation, should consider moving away from human-controlled vehicles. We should consider a shift toward vehicles that move people without requiring individual human operators to manipulate the vehicles' controls. I see 'un-disciplined' philosophy of technology (UPoT) as intervening in such discussions. UPoT recognizes this move to autonomous vehicles as a harbinger of increasing automation, but also as derivative of past decisions regarding the governance of technologies. Incremental changes often go unnoticed until they pass a point where their impacts can no longer be ignored. As I will discuss in Chapter 2, classical philosophers of technology like Heidegger, Ellul, and Marcuse note such a shift in the twentieth century. They attempt to extract from specific instances of technology development and use (the micro) an understanding of broader patterns and implications for societies, economies, cultures and polities (the macro).

Examples like SDS should remind us that decisions about autonomy, independence, and agency belong to more than industry (Google in this example) and governments (here, the NHTSA). This is a debate about self-driving vehicles, but I think it also represents more

than a particular instance of (systems of) technologies acting of their own accord. This particular case should demand public input because everyone in this country will be impacted by whatever decisions are made. Rather than simply reporting *on* what Google and the NHTSA negotiate, UPoT practitioners must find a way to enter discussions with the engineers and legislators to help shape the technologies and the policies that will accompany them. I am not convinced traditional philosophy programs train students to intervene in such ways, although Adam Briggle and Bob Frodeman at the University of North Texas do take steps in this direction with their Field Philosophy (Frodeman and Briggle, 2014). The "un-disciplined" philosophers of technology I want to promote engage in what Frodeman and Briggle (2016) would describe as "a motley collection of different tasks for different audiences, rather than the current two main tasks, writing for other philosophers and teaching." They create, promote, and engage narratives (the macro). They critically engage with the lived experience of our world. Theirs is the philosophy of our century.

What 'Un-Disciplined' Philosophy of Technology Gains from Its Antecedents

Un-disciplined philosophy of technology relies on ideas from practitioners of numerous disciplines. It attempts to stitch together the social, political, ethical, and economic aspects of our world. It takes a collective approach to these issues and does not rely on the explications of one or two past geniuses—this is the terrain of traditional philosophy. Traditional philosophy fails to apprehend our current world made up of hybrid objects. Classical philosophers of technology notice the presence of Technology, as techno-rationality and the technical milieu, yet they seek an understanding of humans and technologies that reinforces dualisms and essentialisms rather than accepting hybridity. As contemporary philosophers of technology like Peter-Paul Verbeek (2011) note, *classical philosophy of technology* faces the past and does not look forward to a future of increasing connectivity. I will argue, in Chapters 3 and 4, that *contemporary philosophy of technology* also mistakes the interconnectivity, the co-dependence of humans and technologies, humans and other *things*.

Contemporary philosophy of technology, with its focus on specific cases of human-technology mediations, does not go past the micro, the particular cases of human-technology relations. To understand broader impacts, we need more sources, more voices—these will not necessarily belong to philosophers. The impacts of human-technology hybridity touch all people. To understand the experiences of the many, we must engage them directly. Traditional philosophy lacks the diversity and the tools to directly engage these audiences and interlocutors. As Katherine Hayles (1999) reminds us, we are already posthuman.

Un-disciplined philosophers of technology take that posthuman perspective as the starting point, not the end, and ask what kind of world we want to create, to live in. When we acknowledge our mutual dependence, we approach the seamless web advocated for by social constructivists of technology (Bijker, Hughes, and Pinch, 1987). We see the shared responsibility we have with our technologies. We see their agency, and can theorize with that interconnectedness as our starting point. Let us not imagine ourselves as independent

things. Let us start with the supposition, and related values, that technologies are extensions of ourselves—technologies as moral patients, perhaps even moral agents in some cases—as co-constituting the world. This kind of thinking exemplifies "un-disciplined" philosophy of technology.

Being in the world with technologies makes us, and the world, significantly different. Traditional philosophy, like postphenomenology, starts with the human and imagines a separation. The world today is one of hybrids, connected objects (humans and nonhumans). The social theory I explore in this philosophical project does not privilege the human only. It does not start with the supposition that people are a-contextual, independent, rational reasoners. I want to understand how humans and technologies co-constitute each other. Our existence is co-dependent on other things, objects. In that sense, I see "un-disciplined" philosophy of technology as an extension of environmental and animal rights movements. Acknowledging the agency of technologies, especially as many become more autonomous, asks us to re-imagine the interconnectivity of all things. Traditional philosophy of technology lacks the conceptual apparatus to explore these connections.

Before going further, in the next section I will situate myself for the reader. This dissertation, of course, is not *about* me. Nevertheless, I regard it as an admirable quality of the work of "un-disciplined" philosophers of technology that they provide their interlocutors with a sense of authorial perspective. They do not purport to hold an objective view, or one that somehow transcends the limits of their own experiences. Though they, like traditional philosophers, utilize citations and references to other thinkers, when done well, their works function as invitations not discouragements, to debate and discussion. An essential aspect of their work involves telling narratives, so they give their readers a sense of who they are and why the readers should listen to them. Their introductions, for instance, do not invoke what Graham Harman (2005) likens to

> some Praetorian guard, a long list of names [that] serves to intimidate readers, to make them feel outclassed by a competent network of college professors, research institutes, and fellowship foundations. Whether consciously or not, a subtle message is transmitted: 'To disagree with me, you must contend with all of these others as well. Do you dare?'. . . . In this way, the possible objections of a talented but uncredentialed reader are silenced in advance. (p. vii)

Instead, "un-disciplined" philosophers of technology cultivate the "talented but uncredentialed reader" and viewer as their target audiences. Because their works transcend single disciplines, their ideas and their personas recommend them as much as their accomplishments. Axiomatically, writers of dissertations seek credentials greater than those they already possess. What I think most valuable to aid the reader in assessing my own contributions to the field of philosophy of technology will come from the analyses and arguments of later chapters. First, though, I offer an anecdote that situates the writer.

Future Farmer

From a climate controlled tractor cab, eye level nearly nine feet above the field, the disconnect between the soil—the object to be worked, tilled, planted, sprayed, and harvested—and I stands out as starkly as the hills and edge of the horizon. I have come to sit in the tractor because my father was a farmer. He still is, of course, but the past tense serves the purpose of delimiting work he did fifteen years ago and work he does now—a topic particularly relevant to my last chapter. He raised me with machines and equipment—farm implements—that kept me warm in winter cold and cool in summer heat as we—the machines and I—performed the tasks set before us.

I learned to drive a tractor before I could ride a bicycle without training wheels. I came to trust the "me + tractor" hybrid (though I certainly did not understand the relationship in that way then) more than I trusted other "me + machine" combinations. On a bicycle or skateboard, for instance, I was conscious of falling in part because I knew I was, largely, in control. With the tractor, I understood it did not need me to balance it, nor did it need my energy to make it move. Indeed, I quickly apprehended that I did not even need to be at the controls for it to move through a field. Learning to drive the tractor well, of course, required much practice, and learning to use it for farming practices like planting and harvesting necessitated even more time. From an early age, though, I learned the perspectives a large tractor affords: elevation, supervision, domination. Climbing into a tractor cab, each step up takes you away from the thing—the soil—that is meant to be manipulated.

Surveying the field from the tractor, the operator can simultaneously feel in control while also experiencing a kind of surrogacy: the tractor and implements will do the 'work' of tilling, planting, harvesting, etc., and the operator will guide and manage the equipment. Rather than a neat separation of duties, as clean as the purported separation of the human and the equipment, the operator and the machines work in tandem, although it is not hard to imagine how the person, as farmer, serves as a proxy for the things that perform the labor.

My father, certainly, does not imagine himself as a resource for the objects doing the farming. He does not consider his *feeding* the tractor—filling it with diesel fuel—on the same level as his *feeding* the cows that roam the farm's pastures. When I use such language with him, he laughs and reminds me machines and animals are not the same things. I should not confuse diesel fuel and hay bales; cows do not, so why would I?

Making the familiar less familiar, of taking things/processes out of their quotidian contexts and making them strange—what Viktor Shklovsky (1917/1965) termed "defamiliarization"—allows us to experience those things and processes in greater detail, perhaps revealing a complexity, meaning, and perspective lost through habitualization. Well-trodden ground in Science and Technology Studies,[6] the act of making the familiar

[6] C.f., Latour and Woolgar (1979/1986), Latour (1987/2003), and Collins (1985/1992) for studies that ask readers to set aside our preconceptions of, for instance, science "as the

somewhat unfamiliar invites us to reimagine how we envision the shared, even co-dependent and symbiotic, relationships between humans and technologies. For Shklovsky (1917/1965),

> The purpose of art is to impart the sensation of things as they are perceived and not as they are known. The technique of art is to make objects "unfamiliar," to make forms difficult, to increase the difficulty and length of perception because the process of perception is an aesthetic end in itself and must be prolonged. (p. 5)

I understand *classical philosophy of technology*[7] as, at least in part, an exercise in making the supposedly familiar less familiar. *Classical philosophy of technology* challenges readers to question their relationships with the artifacts and techniques that permeate their lives. Its practitioners explore the kinds of experiences we have with, through, and because of technologies—a practice taken up by postphenomenologists and which I examine in Chapter 3. Though I will argue that technologies facilitate and mediate the human experience, and in important ways are extensions of ourselves, I do not make the ontological claim that humans are technologies (or *vice versa*), that the two are actually one.

The project of *classical philosophy of technology*—macro analysis and criticism of human-technology relationships—deserves renewed attention, and this dissertation participates in that intellectual project. The normative and speculative qualities of *classical philosophy of technology*—attempting to understand and explain the "right relations" humans should have with technologies—provide the interlocutor with a substantial position to critique, debate, espouse, decry, etc. Much *contemporary philosophy of technology*, conversely, offers little more than description. Postphenomenology, for instance, often avoids normative judgments and pronouncements.[8] Postphenomenology accounts for the relations between humans and

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locus of certain knowledge" and to imagine it instead "as a cultural activity" (Collins, 1985/1992, p. 1).

[7] Throughout this work, I follow Hans Achterhuis's (2001) demarcation of philosophy of technology. He distinguishes between *classical philosophy of technology*, as practiced by Martin Heidegger (1979), Jacque Ellul (1964, 1990), Herbert Marcuse (1964/1991) and Lewis Mumford (1964), from *contemporary philosophy of technology*, as practiced by Peter-Paul Verbeek (2005, 2011), Don Ihde (1979, 1993), Andrew Feenberg (1995), Philip Brey (2010) and Bruno Latour (1992, 1993a). Carl Mitcham's *Thinking through technology* (1994) distinguishes engineering philosophy of technology and humanities philosophy of technology. Though useful distinctions, his "Notes toward a philosophy of meta-technology" (1995) begins to demarcate philosophy of technology in ways that closely resemble how Achterhuis (2001), Brey (2010) and Verbeek (2011) distinguish *classical* and *modern* philosophy of technology, now a commonly accepted distinction.

[8] Robert Rosenberger (2015) makes explicit the need to include phenomenological accounts of human-technology relations in our explanation of "phantom vibration

artifacts. It does so by combining philosophical analysis with empirical investigation (Rosenberger and Verbeek, 2015, p. 9). On a methodological level, postphenomenology is normative: descriptions of human-technology relations require the use of certain concepts, and the investigator should try to imagine numerous perspectives regarding human-technology relations.[9] It tells us how to investigate human-technology relations, but it offers no guidance on *what to do with that description*. It does not advise us on how we *should* act, think, work, play, etc., in relation to technologies. Although I do not agree with the pessimism often found in *classical philosophy of technology* (see Chapter 2 for more on this topic), I do appreciate its explicit normativity.

In Chapter 4, I identify writers that speculate about our potential futures and offer normative judgments about how humans should live and act in a world mediated by technologies. Though these writers—whom I will label "un-disciplined" philosophers of technology—do not reside in traditional academic departments, their perspectives, their narratives, deserve attention from the community of philosophers that seek to make philosophy of technology relevant to more than just academics (Wittkower, Selinger, and Rush, 2014).

These "un-disciplined" philosophers of technology make familiar techniques and technologies unfamiliar by offering narratives that challenge, for instance, the notion of clean divides between humans and technologies. They propose that we have always been intimately linked with technologies and could not have reached our present states without them (Hayles, 1999; Kelly, 2010), or that we will soon reach a point where biology no longer limits (trans)human development (Kurzweil, 2005). Posthumanism and Transhumanism share the idea "of the human as a non-fixed and mutable condition"—and this perspective thus denies essentialist perspectives (Ferrando, 2013, p 27). "Un-disciplined" philosophers of technology motivate their audiences to change how they see themselves and their world in the present, but they also urge their audiences to imagine potentials beyond the current horizon. A tractor cab might seem a strange place to reflect on such topics, but it was the feeling of connection with the machines, and the lack thereof at times, that motivated me to seek out thinkers that explored how I should

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syndrome." He offers a detailed description of how study participants use cell phones, how human brains interpret the stimuli associated with the phone's notifications, and even how social and cultural norms and motivations impact the person in terms of pressure, stress, and anxiety. He argues that any attempt to understand "phantom vibration syndrome" requires all of these accounts because "what is at issue here . . . is whether pointing to the brain itself as the noun committing the behavior in question is the most helpful way to frame our explanation" (p. 130). At the cusp of shifting from description to prescription, however, he stops. He may not have intended to provide normative analysis; he may have only intended to explicate specific aspects of the issue that have gone unobserved. His account is detailed, insightful, and compelling, but he refrains from making a broader connection to how people in general *should* use cell phones.

[9] In Chapter 3, I examine this methodological principle further.

imagine my relationship with the machines. Once I found them, I realized I held a perspective that needed updating, that required adjustment to fit the pieces—me, the tractor, the field, the equipment—together into a coherent whole. This project attempts to explain how I assemble the disjointed chunks of metal, plastic, dirt, and flesh—matter all—into a narrative that helps situate me with the objects that surround, support, and guide me.

Why Un-discipline Philosophy of Technology

In this dissertation, I argue that in order to understand, and act in relation to, technology, we cannot rely on a sub-discipline of philosophy, pursued by a narrow set of practitioners, to provide audiences with adequate epistemic resources for considering our technologically-mediated futures.[10] Philosophy of technology must move beyond disciplinary boundaries and be, at its core, synthetic — speaking to multiple audiences and drawing from various disciplines, sources, and perspectives. The scientific project of the past few hundred years has followed its own reductive logic, splintering itself into pieces like phyla and kingdoms: physics, particle physics, theoretical physics; biology, microbiology, biochemistry, etc. Contemporary philosophy need not follow a similar reductive trajectory; indeed, it need not emulate the sciences (or, we might argue that the sciences have followed philosophy's own original foray into reductionism: moral philosophy and natural philosophy) in any way save one: speculation about possible presents and futures, and the relationships between the objects that inhabit them.

In what follows, I describe individuals that I label "un-disciplined" philosophers of technology. Though these thinkers already exist, they might reject such a label—whether it be to the word "un-disciplined" or even "philosopher." An "un-disciplined" philosopher of technology (UPoT) speculates on and evaluates trends, developments, and concrete cases as they occur, and often with a transhumanist or posthumanist leaning. "Un-disciplined" philosophy of technology moves from the 'ideal situations' of traditional philosophy into messy, tangled, and often unclear, real scenarios. Un-disciplined philosophy of technology (from here on, I drop scare quotes around the word *un-disciplined*) calls for changes regarding the practices of contemporary philosophy, a move away from its small cadre of practitioners writing in an esoteric style for a specialized and limited audience (Davis, 2013; Carbera, Davis and Orozco, 2015). Un-

[10] In this dissertation, I define the traditional academic model of philosophical writing and outline problems with using that model for philosophy of technology. Academic philosophy, with its cadre of practitioners that write in a very particular style for a specialized, limited audience, is not organized in such a way that promotes mainstream consumption of its theories and analysis. I argue that academic philosophy, though certainly providing both useful and necessary commentary, is not sufficient to develop the critical engagement required to analyze human-technology relations. More radical styles of philosophical thinking are required, such as those found in works of un-disciplined philosophers of technology, but also object-oriented ontology (Harman, 2005, 2007) or its broader category, speculative realism (Bogost, 2012).

disciplined philosophers of technology emphasize the ethical, social, and political co-constructions of technologies, challenging both deterministic and constructivist views of technological development (a topic discussed in Chapter 2), in order to propose visions of future engagements between humans and non-humans, or between humans and technologies.[11]

Though not meant as an exhaustive list, work from un-disciplined philosophers of technology tends to exhibit the following characteristics.[12] 1. They reflect on current and emerging technologies and/or trends, providing speculative normative claims (in forms like fictional scenarios[13] and thought experiments[14]) about the moral decisions that should be made and followed. 2. They write/perform for more than just academics (philosophers of technology); their audiences are often lay publics, so their products are commercial (someone has to fund them, and if not academia or public sources, then private companies—Kurzweil's hiring by Google, for instance). Advantages to writing for broad publics, as opposed to specialists and experts, includes the accessibility of the ideas to non-philosophers, like, among others, students taking STS-style classes. Un-disciplined philosophy of technology serves as a starting point, not a final destination, for

[11] Other main themes in PoT over the last century and a half include technological utopianism, dystopian futures, and a mix of wary enthusiasm and criticism.

[12] An expanded, more clearly explained list appears at the start of Chapter 5.

[13] Eric Drexler's (1986/1990) *Engines of Creation* speculates on the possible uses of nanobots on grand and microscopic scales—these remain potentials, not fully-developed technologies. Nanobots could facilitate the human colonization of asteroids and work within the human body to aid in healing. He imagines self-replicating nanoscale machines capable of assembling materials and devices as needed (for asteroid colonization), or that could replace molecules and cells in the human body. Like Drexler, Ray Kurzweil envisions the technologies, as well as the applications they promote, as paths to transforming individuals and, thus, society. They promote radical uses of emergent technologies that aim to enable humans to master their bodies and environments in unprecedented ways, ultimately overcoming current biological limits.

[14] Thought experiments often employ, at minimum, five qualities that serve to push us outside of the known and comfortable world we live in, and into one where the possible becomes potential. It is fictional in the sense that the world does not appear this way currently. It is broad with clear enough descriptors to delimit the subject matter while remaining vague enough to allow the audience to imagine the world for themselves. It is abrasive/jarring in that it imagines a world/time with substantive changes that cause upheaval in how humans view themselves, the world, and their relationships to that world and everything else in it. It is compelling because there are aspects of it that both appeal to us now and challenge us to imagine how everything would come to be this way. Finally, it permits the audience to engage in speculation about how that world/time should be organized—philosophically, politically, socially, economically, bodily—and constituted.

topics related to human-technology relations. Done well, UPoT exhorts interlocutors to explore the topics and questions further, to continue investigating. Un-disciplined philosophers of technology relate compelling narratives, and that partly stems from their (seeming) transparency: unlike most[15] traditional academic philosophers of technology, un-disciplined philosophers of technology tell stories about themselves. They make themselves relatable, approachable, in ways that traditional philosophers of technology cannot due, in part, to the standards of academic writing that they must adhere to when they publish (Wittkower, et al., 2014). 3. They consistently and provocatively promote a normative agenda regarding the right relations between humans and technology, usually as a form of co-dependence—between humans and technologies/machines (the nonhuman). 4. They seek to instill habits, ways to think and act, that take into account human-technology relationships, or ways of being with technologies. Examples of such habits include speculating about fictional scenarios and thought experiments that incorporate extreme/potential situations. Further, they consider long-term consequences of developing and emerging technologies, for instance how responsibility accrues to humans and nonhumans

Un-disciplined philosophy of technology assesses trends and developments that result from the adoption of particular technologies and makes normative claims regarding how future development, organization, and implementation should occur. Un-disciplined philosophy of technology is democratic in two senses. First, it aims to *un-discipline* philosophy of technology, making a space beyond analytic and continental, dualist and/or humanist positions. Though some un-disciplined philosophers of technology, like N. Katherine Hayles (1999) and Ray Kurzweil (2005), would accept labels of posthumanist and transhumanist, respectively, these specific labels are not required so much as a willingness to write/ perform for audiences outside of single disciplines/specialties. Second, UPoT makes its sites of study, technologies and human-technology relations, parts of a larger whole: technologies, humans and nonhumans, organic and inorganic objects. UPoT acknowledges distinctions between humans and nonhumans, but not in morally significant ways. To paraphrase Latour (1993, 1994), Harman (2007) and Bogost (2012),[16] actants/actors are everywhere: computers, concepts, chicken casseroles and

[15] Don Ihde (1993, 2004) serves as a clear exception to this trend in philosophy of technology. He inserts himself directly into his works, providing readers with often detailed explanations of his own life experiences and how his perceptions and ideas have changed over time. Peter-Paul Verbeek (2005) makes a similar move, but it is not nearly as thoroughgoing as Ihde's.

[16] Ian Bogost's (2012) *Alien Phenomenology* posits general positions, though still contentious, for speculative realists and object-oriented ontologists: "*all things equally exist, yet they do not exist equally*" (p. 11, emphasis in original). He writes, "the philosophical subject must cease to be limited to humans and things that influence humans. Instead it must become *everything*, full stop (p. 10, emphasis in original). Such a crowding together of things means, "everything whatsoever is like people on a subway, crunched together into uncomfortably intimate contact with strangers" (p. 31). The last chapter of this dissertation explores just a few of these fellow travellers, and theorizes how,

quarks. How we choose to incorporate them into our worldview, however, still requires effort.

Philosophy of Technology Becomes Un-Disciplined

The last chapters of this dissertation aim at an analysis of the values people attribute to, and expect from, hybrids: systems of things that work individually and collectively. In chapter 5, I juxtapose work in machine ethics and postphenomenology, and argue that their cross-fertilization permits critical analysis of the acknowledgment of the agency of objects, both born and made. Posthumanism (Ferrando, 2014) and transhumanism (Kurzweil, 2005) propose a present, for the former, and a future, for the latter, where the human and the non-human combine to form amalgams, entities of mixed parts and pieces drawn from organic and inorganic matter. Transhumanists have an easier task, relatively speaking, because they look to a time yet to occur.

Posthumanists, on the other hand, posit such hybridity already exists, and attempt to create a narrative that presents audiences with an understanding of how such hybridity surrounds them already. Philosophers of technology—collectively, at least—cannot wait to make 'end of the day' assessments after some consensus has been reached about the details of, for instance, posthumanity. Doing so leaves a void into which other narratives will flow, and these narratives, like emerging technologies, can solidify over time (Collingridge, 1980) to create pernicious perspectives that require much more effort to sculpt/edit/shape.[17] Some academic philosophers of technology wish to influence public opinion on human-technology relationships by making their ideas accessible to broad segments of the population (Wittkower, *et al.*, 2014). They believe philosophers of technology amply equipped to promote varieties of what Heidegger (1977) would describe as "right relations" with technologies. In Chapter 5, by describing precision agriculture and robot-assisted surgery as posthuman enterprises, I provide my own vision of the "right relations" between humans and particular technologies. In doing so, I attempt to bridge the "disciplined" and "un-disciplined" philosophies of technology.

When taken seriously, declaring we (humans) are posthuman (Hayles, 1999) or cyborgs (Harraway, 1991) or hybrid (Latour, 1993) compels not only a reimagining of humans and non-humans, but also an examination of how to commence shifting the perceptions of broad publics regarding the implications of these claims. Un-disciplined philosophy of

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on the human side at least, people should approach/co-exist with these often-overlooked "strangers."

[17] For instance, recent offshoots of philosophy of technology, speculative ethics of emerging technologies and nanoethics, have encountered fierce criticism just as they have begun to develop. Although unsuccessful in halting the growth of the field, attacks on the legitimacy of and need for speculative ethics of emerging technologies (Nordmann, 2007; 2010; Nordmann and Rip, 2009; Keiper, 2007)—exercises in boundary maintenance—serve as reminders of the difficulties of creating and shaping narratives of emerging fields and practices.

technology (UPoT), based in part on the pragmatism of postphenomenology, aims to inspire habits. Ihde's postphenomenology, in particular his variational method (1993), is a means of promoting (prompting) habits, styles of thinking and being, in relation to technologies. The variational method requires us to recognize that the way we see the world, technologies and nonhumans included, must include more perspectives than those that we first imagine.

Such an attitude supposes that each perspective has its own merits, and limits, and that accounting for 'other' perspectives improves—at least by making more robust—the original understanding of the phenomenon/phenomena. The *gestalt* shift metaphor serves to remind us of the layers hidden, yet painted so clearly that they should be obvious; the aspects we have not yet imagined, internalized, or even barely realized. The method of postphenomenology asks us to live and to experience our relationships with the world and our technologies in ways that require us to examine critically how we may have initially interpreted them. As we translate/transform the world for ourselves, we change ourselves, our habits, and our ways of being in the world.

A philosophy of technology represents a challenge, even to the initiated, to imagine the world, ourselves, etc., in manners previously unvoiced—to speak and think in ways that seem foreign until they no longer seem so distant. Heidegger (1977) rightly viewed technology as a challenging-forth, as instantiations of such methods later found in postphenomenology. Building off of the challenging-forth of postphenomenology, UPoT pushes the challenge beyond academic philosophers and calls upon STS practitioners and lay publics to take up postphenomenology's variational method, to see in our technologies more than the instantiations of specific artifacts. We should see ourselves transformed by, through, and into our technologies. By acknowledging the values in our technologies, like efficiency, discipline, and profitability, we can see beyond those values and imagine our technologies as more than a sum of these parts. Further, once we make these values 'strange' by way of 'de-familiarization' (Shklovsky, 1965), we may notice other values, like cooperation and community, should be equally important. The social construction of technology (SCOT), for instance, promotes a narrative of cooperation among entities—human, nonhuman, institutional, etc.—and forces—economic, social, political, etc.—that help shape technologies, communities, knowledge, people, and environments (Bijker, Hughes, Pinch, 1987).

Technologies take on different meanings in specific contexts—the thrust of social constructivist positions regarding technology—and are both influencing and influenced. Technological determinism (discussed further in Chapters 2 and 3) remains a viable and influential position in part because we permit ourselves to imagine societies, and the world, as products of the technologies we have created and implemented. Philosophy of technology sets the human free from such schemes, but it can also set free the nonhuman. The hybrids we see, including the human itself, have more than metaphorical impact: they are real and challenging. They challenge us to question human-technology distinctions and the resulting hybridity/unification that results from such separations in our understanding of ethics. This dissertation aims to provoke as much as it aims to quell

fears of classical philosophers of technology like Langdon Winner's (1978) "technics-out-of-control."

In addition to an overview of each chapter of this dissertation, I provide below a brief section on the history of philosophy of technology that serves to show how the roots of un-disciplined philosophy of technology can be traced to *classical* and *contemporary philosophy of technology*. Additionally, though no reader of this dissertation might have a problem identifying particular technological artefacts, a general definition of technology itself likely remains elusive. I begin, then, with an explanation of why such a definition might elude even those whose object of study is technology itself.

A History of Philosophy of Technology

As a concept, technology resists easy definition and demarcation. Even in the philosophy of technology, no consensus exists on a single definition of technology or its relationship to humans and nonhumans.[18] David Kaplan (2009) suggests it might be easier to accept technology as an inexact concept and simply "look at the ways that artifacts and technical concepts relate to the world" (p. xvi). The works of contemporary philosophers of technology seem to follow Kaplan's prescription and focus on certain technologies and their impact upon the human condition.

Prior to the 1980's, however, philosophy of technology (PoT) examined, broadly, relationships between Technology and the human condition. Its practitioners were critical of the notion that technologies were simply positive and frequently showed the harmful impacts of technologies on the human condition (Verbeek, 2011, pp. 3, 7). Classical philosophers of technology saw, and wrote about, capital 'T' Technology as deterministic and described Technology as if it were generalizable in all its forms (Ellul, 1964; Heidegger, 1979; Marcuse, 1991). In Chapter 2, I examine the work of three *classical philosophers of technology*: Martin Heidegger, Jacques Ellul, and Herbert Marcuse.

Classical philosophers of technology envisioned Technology and Technique as fundamentally nonhuman, yet they also imagined this "other" as having significant (negative) impacts on how humans interact with each other and the world around them. For Heidegger (1979), technologies turn humans and environments into standing reserves, thus altering our experiences of the world and ourselves. Ellul (1964) argues that techno-rationality, with its focus on efficiency and profitability, fundamentally alters

[18] See, for example, Carl Mitcham and Joseph Mackey's (1983) overview "Introduction: Technology as a philosophical problem" in *Philosophy and Technology: Readings in the Philosophical Problems of Technology* which gives an explication of twentieth century philosophers, from Martin Heidegger to Jacques Ellul to Lewis Mumford, grappling with how to define to technology. Joseph Pitt's (1999) *Thinking about Technology* offers yet another definition: "humanity at work." Whether deemed a kind of 'applied science,' technique(s), artifact, or something broader, technology seems easier to write about than define, a testament to its deep connections in so many aspects of human life.

how people see their work, interests, and communications, and this has profound effects on what people consider "the good life." For both Heidegger and Ellul, technology/technique causes people to think of other people, political and economic systems, and the environment, as raw materials to be shaped and molded to fit our wants and desires, evocative of how sciences and technologies attempt to pry apart reality into malleable pieces to be studied, worked and made into something new.

Heidegger and Ellul present a vast inter-connectedness of the human and nonhuman. Though they lament such changes in perception, pining for a past when humans were the measure of all things and distinct from technology/technique, they observe that there may not exist a way out of such inter-connectedness. Whether or not we, today, share their pessimism and bleak outlook for the future, we cannot shake off the core of their philosophical reflections: humans and technology/technique develop alongside each other to create something new, what Latour (1993) and Haraway (1991) might label hybridity. Instead of rearguard actions and policies meant to make ever finer distinctions between humans and technologies, we might be bettered served to embrace what we humans have become in order to help shape what we will become.

Contemporary philosophers of technology tend to regard technologies as more ambivalent than deterministic and autonomous (Brey, 2010; Feenberg, 1995, 1999; Ihde, 1990, 1993; Latour, 1993, 1994; Verbeek, 2005, 2012), and in Chapter 3, I juxtapose four proponents of theories of technology that diverge from their classical predecessors. Technologies, through human use, can have positive and harmful impacts on individuals, societies and environments, and they should be examined empirically and individually—"technologies" as opposed to "Technology" (Brey, 2010, pp. 38-41).[19] Don Ihde, Andrew Feenberg, Peter-Paul Verbeek, and Philip Brey contend that technologies come between the human and our experiences of the world, a view not entirely divergent from *classical philosophy of technology*. For *contemporary philosophy of technology*, however, such mediation differs depending on the technology, and, importantly, the cultures, values, and various exigencies specific to the sites of the technologies' deployment. Contemporary philosophers of technology replace their predecessors' technological determinism, with its sweeping claims gleaned from general examples about the effects of media, science, and artistic expression on society as a whole, with a more nuanced approach that focuses on specific instances and artifacts rather than those broad extrapolations. When Technology recedes; technologies emerge.

For Heidegger, Technology comes between humans and some sort of right relation with the world because people fail to see the essence of Technology. Ellul's technical rationality, and Marcuse's one-dimensionality, point to similar failures of human creativity, individuality, artistic expression. *Contemporary* philosophers of technology,

[19] Put generally, *classical* PoT focused on "Technology . . . not in terms of specific artifacts that help to shape our everyday lives but as a monolithic phenomenon that is hostile to the human world" (Verbeek, p.3). *Contemporary* PoT, though also encompassing a variety of positions, focuses on specific technologies and human-technology relations (mediations).

on the other hand, back away from such broad claims. They emphasize the subjective and individual experience of technologies. Technologies evoke various reactions, ways of being, states of engagement, political positions, etc., but these are not uniform across cultures or societies. The *contemporary* philosophers of technology I describe in Chapter 3 do not seem to want something similar to Heidegger's "right relation" to technology. Pluralism appears to mean too much to *contemporary* PoT to imagine such a relation that applies to all users of technology, to all people.

Classical and *contemporary* PoT hold a very similar position in one area (at least): the human (read as *humanity* for the *classical* philosophers of technology, or *individual humans* for the *contemporary* philosophers of technology) matters most in any examination of human-technology relations. This position has strong consequences for their investigations of human-technology relations. It denies any appeal to hybrid entities, to the symbiosis (Margulis, 2007) that results from the co-dependence of humans and things/objects (or, the co-dependence of humans-nonhumans). *Classical* philosophers of technology attempt to identify conditions that give rise to human alienation and loss. Their works challenge social, economic, and political strategies and norms. They seem to wish for a return to some idyllic past where humans were more in touch with their individuality, creativity, and feelings. Technology comes between the human and what makes her human. Thus, their normative claims attempt to show humans how to get back to the 'right relation' with technology.

Contemporary philosophers of technology, true to their 'plurality of perspectives' focus, resist identifying broad outcomes/effects of technological development, change, and emergence. They seem to identify macro inquiry--delving into broad outcomes/effects of Technology--as something that would first require a repository of particular case studies that, so far, remains incomplete. Expecting a normative position to emerge from particular empirical case studies, without somehow unifying/synthesizing them to identify larger trends, mistakes the efforts of much *contemporary* PoT to catalog the multiplicity of human-technology relations. This tendency in *contemporary* PoT, then, appears broadly endemic to Science and Technology Studies as identified by Fuller (2006):

> the various schools of empirical STS . . . . share a suspicion of distinctly "philosophical" explanations that override accounts explicitly grounded in native practices. The goal, then, is to deligitimate these explanations and in some sense let the phenomena speak for themselves. Here, "philosophical" is synonymous with "metaphysical" in the objectionable sense . . . . a source of misunderstandings, false expectations, and potentially disastrous interactions that result from letting what we say get in the way of what we see. (p. 30).

Contemporary philosophers of technology, in their laudable zeal for attending to a plurality of perspectives, render themselves ineffective in, if not incapable of, making macro normative claims.

Classical PoT's notions of Technology's widespread, wholesale effects on all of humanity are deemed exaggerated and inexact, promoting pessimistic and dystopian visions of societies of people cut off from our own humanity. By focusing on specific instances, artifacts and systems of technology, contemporary philosophers of technology embrace the diversity of their objects of study, and attend to the nuances of particulars. Technologies, the things themselves, become sites of study, a cornucopia of interactions waiting to be catalogued, expanded, and examined. Their overriding interests in description—and there is much to catalogue—and parity make normative judgments more difficult. If technologies have mainly have particular, specific impacts, and are co-determined by the cultures from which they emerge, general pronouncements seem to have no place.

Toward More Inclusive Narratives: Re-imagining Humans and Nonhumans as Symbionts

Chapter 4 presents various writers, performers, and thinkers whose works do not fit neatly into single academic disciplines (un-disciplined philosophers of technology), though labels like *posthumanist* and *transhumanist* do serve to describe their general perspective on human-technology relations. Accepting our shared experiences—human to human, human to nonhuman, and nonhuman to nonhuman—as central to understanding individuals requires us to reconsider our human-technology relations. That understanding is the express goal of philosophy of technology, specifically, and STS more generally—and the values we wish for those relations to promote. We can, then, do as Selinger and Engstrom (2007) propose: evaluate how our cyborg (mixture of biology and technology) experiences make us better, or worse, off, and how we can improve.

As both Francesca Ferrando (2014) and Thomas Philbeck (2014) emphasize, though it may seem natural, even intuitive, for humans to think of ourselves as separate from each other and from everything nonhuman, humans have always already been linked to technologies, to nonhumans. If we accept such cross-fertilization, then one contentious or problematic aspect of transhumanism no longer seems radical: human augmentation (physical, cognitive, etc.) through technologies has always occurred, so attempting to delineate, for instance, between *augmentation* and *therapy* makes little sense. In *contemporary philosophy of technology*, the strengths of postphenomenological perspectives (*cf.* Ihde, 1993; Verbeek, 2005) lie in their explorations of how technologies mediate human experience: we experience the world through our technologies and this has normative implications for ontology, morality and epistemology. We should have an even thicker understanding of the social to include things other than humans and animals: a society of objects (humans included), equally real, impacting, influencing and interacting with each other (Bogost, 2012).

Un-disciplined philosophers of technology take important steps in providing narratives that elaborate on what such hybrid societies might look like, what values they promote, and why they should be preferred. Ideally, UPoT prompts audiences to think critically about these preferred futures. In Chapter 5, I analyze two developing technologies,

precision agriculture (PA)[20] and robot-assisted surgery (RaS), to understand the values they overtly promote and how they should guide our thoughts about ourselves (hybrids) and our place in this world (symbionts). The resulting theory, itself an amalgamation of animal rights and environmental movements, involves a decentering of the human with the aim of understanding of the human/hybrid as part of a larger community. Humans/hybrids cannot exist in isolation—we rely on humans and nonhumans to survive, grow, etc.—and our reliance on technologies for work, play, communication, health, food, and general well-being should point us to an understanding of ourselves as community dependent. This move pushes us away from the egocentric "I" and into the communal "we," a recognition of our interdependence. If we see technologies as extensions of ourselves, as part of us, then our treatment of them should change, but so should our treatment of other people, animals, the environment, and all things that make up our shared ecosystem.

If we accept technologies as extensions of ourselves, as essential aspects of our experiences, as vital to our social, economic, and ethical wellbeing, then we could begin to alter how we value technologies. Such a shift in attitude, for instance, could alter our current resource consumption habits. Rather than treating a phone, computer, car, etc. as disposable items, products of planned obsolescence, we might envision these nonhumans as necessary for sustaining human life. They then become vital partners instead of objects merely to consume and throw away. On this view, precision agriculture and robot-assisted surgery enable our Western lifestyles by feeding and healing us. They matter.

Planned obsolescence encourages the attitude that the latest iterations of technologies should supplant their predecessors. Older models become, at best, antiques and/or history museum pieces. At worst, the once novel and indispensable artefacts transform into junk suitable for landfills: buried and forgotten to make way for the newest version. Such logic advocates only for increased consumption. There could never be a model so complete that adding or removing features, or altering its appearance would not "improve" it. Heidegger's view that technologies make everything into "raw materials" (1979, 2012) assumes that ever-increasing consumption of resources becomes its own end/goal. Similarly, amassing more and more friends and acquaintances through social media make our relationships more superficial (Turkle, 2011) rather than encourage us to cultivate lasting bonds that reflect our interdependence on other people. Relationships become items to collect and discard depending on convenience. Technological instrumentalism, the view that "artefacts are independent of value. . . . Things are mere instruments for human activity" (Kaplan, 2009, p. xvi), perniciously reinforces planned obsolescence regarding technologies, and it hardly seems farfetched to imagine these attitudes could

[20] Precision agriculture (PA)—exerting ever-greater control over "the spatial and temporal variability of soil and crop factors within a field"—is a modern phrase describing processes that have developed over centuries (Zhang, Wang, M., & Wang, N., 2002, p. 113). In recent decades these practices have sought to automate—through farm implements linked to/guided by global positioning systems (GPS)—much of the physical labor involved in tilling, planting, fertilizing, and harvesting crops.

affect human relationships as well.[21] To see technologies as extensions of ourselves, however, might cause us to shift our attitudes toward them. No longer would we imagine technologies as objects/things merely useful for a time until the next and newest version arrives.

Caring for the things that sustain us should be a shared value, and how we care for them will certainly need further elaboration in a future project. For now, it suffices to claim that people should maintain the relationships that sustain them, and our technologies unquestionably sustain much human life and work. Following object-oriented ontologists (Bogost, 2012) that believe all *things* equally exist even if they do not exist equally, it seems appropriate to conclude that all things matter ethically even if they do not matter equally ethically. Ethical theory should account for more than humans and animals. It should consider our symbiotic relationships with all other *things*. Morozov (2015) makes a compelling point about technology criticism: without a social and/or economic theory to accompany it, the criticism remains superficial and unlikely to effect any change on its audiences.

By expanding definitions of the social to include technologies, ethical, environmental, economic, and other values can be discussed on scales larger than single technologies, an aspiration of *classical philosophy of technology* and one that writers like Evgeny Morozov (2015) seek to revitalize.[22] Precision agriculture, for instance, assumes farming as an equation in need of refined solutions, what Morozov (2013) would describe as "solutionism." Seeds + soil + fertilizer + machines = food. Farming as cultural practice, family tradition, way of life, or any other formulation that somehow exceeds

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[21] Sherry Turkle (2011) has analogous concerns regarding human-technology relations: "when technology engineers intimacy, relationships can be reduced to mere connections. And then, easy connection becomes redefined as intimacy" (p. 16). Although I do not follow Turkle's concern that human-technology relationships will supplant human-human relationships, I support her view that the relationships we are currently developing with, through, and because of our technologies have significant impacts on human and social identities.

[22] Morozov worries about the futility of his own recent work as technology critic:

> contemporary technology criticism in America is an empty, vain, and inevitably conservative undertaking. . . .Since truly radical technology criticism is a no-go for anyone seeking a popular audience, all we are left with is debilitating faux radicalism. (2015)

To transcend the kind of criticism that might get us, say, a smartphone that better adapts to its user, Morozov, like his *classical philosophy of technology* forerunners, aims to connect broader economic, political, and social critique to technological criticism. Science and Technology Studies scholars might aspire to such critique, but lacking a popular audience, their voices go unheard.

quantification, becomes an anachronism, a nostalgic fancy.[23] In less than two decades, precision agriculture has become the dominant model for modern farming practices, in no small part because as machines become swifter and more massive (and as field sizes have expanded), the ability of the operator to control and maneuver them decreases (Reid, Zhang, Noguchi, & Dickson, 2000). In contrast, Robot-assisted Surgery (RaS) has arisen to combat a converse problem: the need to operate in spaces so small that a surgeon's hands become an extra obstacle. For instance, pediatric surgeries that well into the 2000s were deemed far too difficult for humans to perform accurately and safely, like those occurring *in utero*, are now possible because "a robot's computer can scale down a surgeon's hand movements into micromotions inside the fetal patient" (Berlinger, 2006, p. 2099). Even highly skilled surgeons cannot compete with the precision and accuracy of the machine; farmers fare no better in their fields. Through our technologies, we experience the world in ways that permit us to manipulate it, but these technologies also seem to distance us from the actions themselves. Precision Agriculture and Robot-assisted Surgery allow humans to influence other objects in this world in unprecedented ways, but they also allow people to feel disconnected from what they have done (in no small part because people did not act alone—people needed the technologies for those tasks).

Chapter 5 of this dissertation argues that people need a different conception of the human in relation to technologies (indeed, to all other *things* in this world, including other humans). Embracing co-dependence /symbiosis as a more accurate representation of the relationship between human-technology relations, further, *thing-thing* relations, enables us to re-examine human-human relationships alongside human-other relationships. For instance, rather than lament particular technologies, like computers, tablets, televisions, and other media, as having a powerful impact on children in their formative years ("Technologies are raising our children!"), we should examine the economic, political, and cultural factors that have made it the case that parents have such little time, outside of work, to spend with their children.[24] Moreover, we might accept such technologies as, if

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[23] One need only skim the pages (online and physical) of magazines like *Modern Farmer* (http://modernfarmer.com/) or *Farm Journal* (http://www.agweb.com/farmjournal/) to find articles and advertisements touting the digital connectedness of the twenty-first century farming *industry*. Chapter 5 offers a more thorough analysis of the content from academic journals related to agriculture, but both sorts of publications rather unabashedly promote the benefits of computational approaches to the business of farming.

[24] Do people control the development of technologies (social constructivism), or do technologies (as autonomous or self-fulfilling) determine their own development? Technologies do partly determine how humans live in the world, but this does not imply people have no freedom to choose the types of relationships we wish to have with our technologies and with other people, as well as political and social institutions. Understanding how technological systems develop permits human intervention, reminding us of the choices we, as users and makers of technologies, do have. Andrew Feenberg (1995, 1999) takes seriously the idea that technical decisions shape our world and how we live within it. For Feenberg, rejecting technological determinism signifies a

not necessary, beneficial to child development. In that case, and as children (and the elderly)[25] become more accepting of technologies as playmates, interlocutors, caregivers, etc., I argue that we should consider technologies as morally important to such children, and to the rest of us. In doing so, our attitude toward the design of technologies, for instance the planned obsolescence associated with technologies like computers and smartphones, should change. That we interact with technologies so frequently should invoke our curiosity over why objects/things of such great importance—for work, play, communication, etc.—should have such limited 'lifespans' rather ignoring this aspect of their design as unalterable. This curiosity could lead to technology design that incorporates interchangeable parts—as specific components wear out, they can be swapped/replaced without discarding the entire device. Although computers and smartphones seem the most obvious examples, one wonders why such planning cannot go into the design of more mundane, though no less useful, artefacts like washing machines and coffeemakers.

Fostering an attitude of co-existence, not consumption, would promote a change in how we make and use our technologies, including our attitudes toward technologies as objects merely to be controlled as opposed to things to engage with that also engage with and alter us. Why must we assume that a child/person can only have a meaningful relationship with an organic thing? Humans needing technologies should no more alarm

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shift in how we view not only technology, but also the place of the human in the world. Feenberg's constructivist accounts of technology, rationality and science emphasize the importance of the decisions we make regarding technologies. Choices do exist; we must learn to see them if we wish to intervene.

[25] Two recent examples of technologies as caregivers include the robots Nao (Deng, 2015) and Paro (Bendel, 2015, p. 26). Nao, used with autistic children, among others, becomes the friend/teacher that no human—parent, friend, caregiver, or otherwise—can be: incredibly patient, responsive, and upbeat, even in the face of the kind of repetitive conversations and interactions that many autistic children exhibit. In the case of Paro, elderly people suffering from dementia, and even just loneliness, find comfort in the cooing and constancy of the furry machine made to look like a baby seal. While it may be said that family, therapists, and other humans, *ought* to interact more with these individuals, they simply do not, and rather than castigate the people for callousness, or impatience, or disinterest, perhaps we simply ought to celebrate the machines that do perform these tasks. It seems incorrect to think that families do not care about, say the autistic child or grandparent. It seems more likely that these family members cannot attend to those with special needs and maintain their jobs, communities, etc. Thus, Nao and Paro gain important status as caregivers. The human-technology relationships formed by human interactions with Paro and Nao are not traditional, but in no way makes them less vital. That is my understanding of Latour's (1994) actor network: each actor has significance; each has importance in our world. To criticize one piece of the network, we should recognize the place of the human as simply another node that interacts with many others. Some nodes may matter more than others, but that does not diminish the importance of each link.

us than humans needing air, shelter, and sustenance. The biota encompasses all on this planet, and beyond (Margulis and Sagan, 2007), and that narrative needs more voices, including how such a conception of the human in relation to others will affect our social, economic, and political institutions and practices.

I argue that axiomatically privileging humans over any "other," whether nonhuman animals/life, the environment, or technology, masks our responsibility and co-dependence, and promotes an instrumental view of technologies that leads us away from discussing the technologies as producers, conveyors and sites of value-formation.[26] Although I do not contend all *things* deserve equal moral treatment, they do equally matter (Bogost, 2012) if we accept that humans need the other *things* in the biota, from bacteria to basalt, for our continued survival. Our co-dependence on the things in the world, and in particular, for this dissertation, our technologies that mediate our experiences of the world, should remind us that we cannot 'offload' our problems onto our technologies as if they will resolve them for us.

Because technologies mediate so much of our experiences, even permitting us to intervene in the world and seemingly exert control over it—the thrust of postphenomenological work (Ihde, 1993; Verbeek, 2005; Rosenberger, 2015)—we might simply imagine the world as just another complex instrument/device. With some tinkering and experimenting, humans can master it. Imagining the human as master of all things on this planet, human and nonhuman alike, however, only serves to insulate us from responsibility rather than require us to acknowledge our complicity. Technologies like PA and RaS embody values like increased control and accuracy in domains where the amount of information that human operators would need to process can quickly become unwieldy and onerous. Whether all of that information actually needs accounting for, of course, remains outside the scope of the technologies themselves: their designs conceal some of their implicit assumptions while revealing the impressive computational power they employ.

Increasing the automation of food production through PA, and health through RaS, can certainly lead to greater efficiency, profit, and accuracy. Rather than directly question each of these values, a challenge ardently accepted by un-disciplined philosophers of technology like Evgeny Morozov (2013, 2015), in this dissertation, I instead aim to present an alternative narrative that draws on *classical* and *contemporary philosophy of technology* to promote a posthumanist understanding of human-technology (and, further,

[26] Peter Singer's *Animal Liberation Liberation* (1975/2001) explores this topic in much richer detail using a utilitarian moral argument to call for a change to our understanding of the moral status of animals. Yet, Singer's progressive expansion of moral outlook only appears applicable to things that could possibly be sentient—if not sentient, then nothing that could be done to them would make a difference (Singer, 2001, p. 123). This perspective is both too narrow/limiting, and too anthropocentric. Humans will judge whether or not other beings/things have sentience, consciousness, etc., based on criteria that apply to us in regards to ethics, and in doing so people assume much about the 'other' that only humans can confirm with our current systems of experiential and experimental analysis.

thing-to-thing) relations. It is easy to imagine myself as different from everything else around me; I see where my body stops and the rest of the world begins. It is harder to imagine myself as connected to everything else; this is not the Enlightenment independent, self-sufficient, and rational position that has long served to undergird Western societies.

Conclusion

When taken seriously, declaring we (humans) are posthuman (Hayles, 1999) or cyborgs (Harraway, 1991) or hybrid (Latour, 1993a) compels a reimagining of humans and non-humans, and in particular their relationships with one another. As values are created, mediated and transferred, human actions change accordingly. Humans should act as explicit drivers of the changes we wish to impose, and this involves more than approving or disapproving of specific technologies. To be drivers of change, people should think critically and deeply about the kinds of lives we wish to foster, and this type of inquiry goes beyond reflecting on particular technologies and approaches reflecting on the social, cultural, economic, and political factors that enable the kind of "solutionism" that Morozov (2013, 2015) argues against so fervently. Importantly, this is not a task for academics alone. The ways of being in the worlds we create do not have to mimic the kinds of worlds we lived in fifty years ago, an idea writers like Kevin Kelly and Stewart Brand (Turner, 2006) emphasized when they developed and promoted the communities spawned by their own digital utopianism.

The philosophy of technology I envision builds on the tradition of *classical PoT* and proposes actions and ways of being in the world[27] that will move individuals, singly and collectively, toward improved lives and relations with the other objects inhabiting our universe.[28] Philosophers of technology cannot wait to make 'end of the day' pronouncements as more traditional philosophers may. Instead, they must evaluate trends, developments, and concrete cases as they occur, and this work entails moving from the 'ideal situations' of traditional philosophy into the messy, and often unclear, scenarios whose best outcomes are equally murky. *Contemporary philosophy of*

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[27] Edmund Husserl's *Logical investigations* volumes 1 and 2 (1900, 1901) and Maurice Merleau-Ponty's *Phenomenology of perception* (1962) use similar phrases, but my own usage departs from theirs. In my work, this phrase describes an integrative approach, mindful of historical and social factors, that asks audiences to think deeply about human-technology relations as they are and could be in the future.

[28] "Improved lives" is a phrase frequently offered by both academics and marketers of particular technologies. Throughout this project I will attempt to elucidate just what an 'improved life' entails, although I will be critical of descriptions like making our lives: easier, more democratic or more financially robust. These characteristics of the 'Good Life' seem full of promise but empty of specific content. I wish to investigate what thinking deeply about technology in a *classical* way, and in a contemporary setting, will get us and how it might inform the 'Good Life.'

technology follows too closely to the style of traditional philosophy: it is too rule-bound (e.g. Ihde's *Technics and Praxis*), too impenetrable (e.g. Latour's *We Have Never Been Modern*) and too closed-off to ideas and styles of performance that will engage non-academic philosophers (e.g. Peter-Paul Verbeek's *What Things Do*). Nevertheless, though the styles of expression differ, PoT is linked to and informed by traditional moral philosophy.[29] The un-disciplined PoT I describe breaks from traditional academic philosophy in its style of presentation and, in some ways, its content.[30] The un-disciplined PoT practitioner I envision investigates and takes normative positions on certain issues, like automation in agricultural and medical fields, but she will connect those particular cases to broader themes and issues that transcend individual cases and technologies.[31] To influence broad audiences, PoT practitioners need not only transcend the narrow confines of academic practices like academic papers and presentations, but also re-assess the values they wish to promote.

Confronted with a topic so far-reaching, it is tempting for PoT practitioners to specialize, examining single instances rather than general trends. *Contemporary philosophy of technology's* empirical turn (a focus on empirical analysis of particular technologies) illustrates this approach.[32] Although the empirical turn has spawned myriad monographs and articles, the turn to the micro has not illuminated the macro; namely, the vast and expanding human-technology relationships, and how people should see themselves in a world in which so many more objects/things matter (environment, other animals, bacteria, machines, etc.).[33] Asking questions about what values should shape technologies

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[29] By 'moral philosophy' I mean thinking about the human values that we impose on our technologies and which are reflected back to us in our artifacts and systems of artifacts, as characterized in works like Feenberg's (1995) *Alternative Modernity*.

[30] It will integrate ways of performance made possible by recent technologies, like the ability to mix audio, images and video with prose, in order to show more robustly how these ideas play out in our experiences and the worlds we build through our technologies. Moral philosophical ideas will, however, still inform the PoT I describe, buttressing its normative positions.

[31] The PoT I describe is informed by STS work. It can be local and practical or global and theoretical, but I see it as meta-STS in important respects. PoT provides a backbone to STS work by giving STS practitioners the means to offer normative claims despite the seemingly tentative nature of the findings that result from individual cases.

[32] A good example of this trend occurs in *Techné: Research in Philosophy and Technology* volume 15, number 3 through the analysis of dissection and computer-assisted (simulated) dissection by numerous authors including Borgmann, Ihde, Friesen and Rosenberger.

[33] Human-technology relations impact all individuals and societies, not just those creating and governing the implementation of technologies, but also the people that use the technologies.

to reflect the values humans wish to promote rather than passively taking on the values embedded in the technologies themselves becomes a necessary process.[34] PoT, then, transcends disciplined confines, and that means *how* philosophers of technology engage their subject matter and communicate it to their audiences takes on greater importance.

Robert Frodeman *et al.* (2012) have asked how the nature of philosophical arguments changes when philosophers are not the only audience for their work (p. 8). Philosophy of technology offers fertile ground for such a metaphilosophical question because arguments and theories proposed by academic philosophers of technology are taken up by non-academic philosophical writing on technology (Kelly, 2010; Kurzweil, 2005; Lanier, 2011; Morozov, 2013). These non-academic writers on technology are *un-disciplined:* their writing and presentations do not fit neatly into academic disciplines like philosophy, sociology, computer science, or economics, yet their work touches on the themes in, and beyond, these disciplines. Indeed, these works might not even be *interdisciplinary*: they do not attempt to unify multiple disciplines into one project (Klein, 1990; Frodeman, 2010; Davis, 2011). Instead, their authors write with the authority and expertise garnered from working in a variety of arenas and their reflections transcend single, or even multiple, fields of study. Kevin Kelly, Jaron Lanier and Ray Kurzweil ruminate on how things (technologies, processes, ways of being and thinking) hang together[35] and whether or not they are leading humans to the good life. Further, they articulate visions of the future worlds we are making along with the technologies and people that populate those worlds, necessary narratives if people are to shift how we view human-technology relations. Because they are "un-disciplined," these writers have the freedom to draw from whatever discipline they like, helping them reach broad audiences.[36]

Like classical philosophers of technology, I witness an increasing dependence on technologies to navigate and negotiate our existences, experiences, and relationships without significant questioning of how such dependencies alter the same categories. It is at this point, however, that I diverge from their humanistic leanings and embark on a different, posthuman, path. Despite our reliance on increasingly complex technologies

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[34] Philosophy of technology should help audiences to confront and evaluate their own tendencies and leanings on topics like the increasing use of digital technologies in agriculture and health management, not with the goal of convincing people to think a certain way about an issue, but to give them the toolset they need to evaluate topics and come to their own conclusions with as rich an understanding of what is at stake, now and for the future, in mind.

[35] I intentionally borrow this phrasing from Wilfrid Sellars's (1962) "Philosophy and the scientific image of man."

[36] Works by Kelly, Kurzweil and Lanier frequently appear on best-seller lists, and these authors also perform publicly, like at TED talks. Their words and ideas reach broad audiences, a target that philosophers of technology have begun to covet as they wish their works to transcend their own subfield (Ihde, 2004; Brey, 2010; Wittkower, *et al*. 2013).

that perform more and more cognitive, ethical, and physical labor for us, most of us hesitate to take our phenomenological relationships with the technologies seriously enough to accept our own hybridity. If humans and technologies blend together, in the form of cyborgs or some other label, then how should we view ideas like technological determinism and momentum? It might make sense to scrap them in favor of the point of espoused in Katherine Hayles's (1999) *How We Became Posthuman*: "in the posthuman, there are no essential differences or absolute demarcations between bodily existence and computer simulation, robot teleology and human goals" (p. 3).

I argue that separating humans and technology, in terms of moral responsibility, masks responsibility and promotes an instrumental view of technologies that leads us away from discussing the technologies as producers, conveyors and sites of value-formation. We then begin to imagine that we can 'offload' our problems—from how we define these problems to the kinds of solutions we find acceptable—onto our technologies. That kind of narrative imagines that the responsibility does not lie with humans or hybrids, but with the instruments/technologies as if they are necessarily separate from humans. This kind of thinking only serves to insulate people from responsibility rather than require us to acknowledge our complicity.

In conjunction with postphenomenology and un-disciplined philosophy of technology, and opposed to *classical philosophy of technology's* search for essences, I wish to shift focus from essences to collaborations and the relationships that come out of the unifications. Let us engage and make new posthuman narratives centering on the 'things' or 'objects' that come out of the mixing and mingling, what object oriented ontologists like Ian Bogost (2012) are after when things are blended, formed, and created, and the impact they have on us. This is a shift from individual things to mixtures, like science and technology studies (STS) generally. Latour's (1993) *We Have Never Been Modern* attempts to shift our perspectives, to remind us that we have never been alone, a-contextual, disembodied, or independent. We are made up of other things and we make up other things.

Like science, much traditional philosophy attempts to reduce complexity. Yet, these very distinctions may serve to complicate more than simplify (Rescher, pp. 23-4). Un-disciplined philosophers of technology, by blurring distinctions between humans and technologies, reveal, discuss and speculate on the forms of hybridity that result. From their work, we learn that humans do not lose importance by acknowledging our connectedness with other objects. Instead, by viewing our world as inhabited by objects—us included—that depend on other objects, we make good on goals set out by environmental ethics and animal rights movements: ethical engagement with anything requires seeing beyond the individual's wants and wishes. By decentering the human, our actions and ideas serve to benefit the whole rather than its myriad individual pieces.

Chapter 2: What Is Gained from What Was Lost: Lessons of Classical Philosophy of Technology

Anxious Anticipation

Pessimistic, dystopian apparitions haunt the writing of classical philosophers of technology like Martin Heidegger, Jacques Ellul and Herbert Marcuse. For these writers, the specter, Technology,[37] with its attendant instrumentalist and rationalist approaches, would transform humans and the world into raw materials. Heidegger's "standing-reserve," Ellul's "technical order," and Marcuse's "one-dimensional thought"[38] heralded a future, quickly approaching, void of human creativity and freedom. Each confronted the effects of twentieth-century Technology on European and North American societies by examining, broadly, the impacts Technology has on human thought, work, environments and values. Though their writings began with analyses of specific technologies, they quickly moved to general pronouncements of how capital "T" Technology had and would impact humans and human value systems. Their often overtly deterministic descriptions of Technology evoked images of humans as servants to far-reaching technological systems that, once established, would be nigh impossible to subvert. Classical philosophy of technology, prevalent into the 1980's, was critical of the notion that technologies were simply positive; classical philosophy of technology frequently showed the harmful impacts of technologies on the human condition (Verbeek, 2011, pp. 3, 7).

In this chapter, I review and analyze the trepidations shared by these classical philosophers of technology as they confronted a world in transition. They voice a view rather uncommon amid the buzz and whirl of our contemporary cultures. Today, we are at once dependent, optimistic, and enthralled regarding the impact and place of technologies in and on the world and its inhabitants. We may wish to dismiss the pessimism of classical philosophers of technology as the fears of Luddites, but doing so blinds us to the shadow of a world of control cast by our technologies, even as we stand in its shade. As I develop my notion of an un-disciplined philosophy of technology in later chapters, the reader will quickly comprehend my own debt to these classical philosophers of technology. However, it also becomes clear that I do not share their anxiety toward present and future human-technology relations. From a post or transhumanist perspective, for instance, human and technology identifying distinctions

[37] Classical philosophers of technology and wrote about capital 'T' Technology as deterministic and described Technology (capital "T") as if it were generalizable in all its forms (c.f. Heidegger, 1977; Marcuse, 1964/1991; Mumford, 1964).

[38] C.f. Heidegger, 1977, p. 17; Ellul, 1990, p. 27; Marcuse, 1964/1991, p. 128. I will address and offer explanations for each of these ideas and themes throughout this chapter.

blur.[39] Techno-human relationships challenge how philosophy is done—an idea I take up in Chapters 4 and 5—as the works of Ellul, Heidegger, and Marcuse attest. *Classical PoT* contests the dominant perspectives on technology of the twentieth century. Un-disciplined philosophy of technology, in a similar move, confronts the dominant philosophical perspective underpinning *classical PoT*, the hard distinction between humans and technologies.

Philosophy of technology is not simply a philosophy *about* technology. Technologies, and their attendant values of efficiency and profitability, transcend cultures, languages, ideologies, and national borders with seeming ease and fluidity, instantiating themselves in political, social, academic, corporate and manufacturing systems. Heidegger, Marcuse and Ellul might describe such transfer of values as techno-rationality, a style of thought and action. Ellul (1964) and Marcuse (1991), in particular, bemoan the future of a humanity wedded to such values as efficiency, profitability, and rationality, identifying these values with the increasing ubiquity of technology. Transcendence beyond a "one-dimensional human," however, cannot occur until we humans begin to take more seriously the reality and significance of the nonhuman, including technologies, to all other objects/things. Techno-rationality is a style of thought, planning, and execution, but it need not tyrannically dictate all other styles of thought, planning, and execution. Technology, and its concomitant techno-rationality, need not delegate and arbitrate all relations between objects and things.

Philosophy of technology, as the philosophy dealing with techniques and artifacts, humans and nonhumans, has the burden of explicating the ontology, epistemology, and moral theory of our modern world (Kaplan, 2009) and providing normative directives for how people should approach, use, develop, and govern technologies. It is the philosophy of our time and should engage our lives as they are lived today. To accomplish such goals, however, requires a shift in our thinking about techno-human relationships. Classical philosophers of technology consider technology as fundamentally distinct from the human, even searching for the *essence* of technology (Heidegger, 1977). By accentuating distinctions between humans and technology, however, *classical PoT* reinforces divisions that might not need such emphasis—a point I return to in Chapters 4 and 5. That humans classify, order, and reduce all aspects of the world according to how we can test and utilize them (Heidegger, 1977, pp. 22-5) does not mean that tendency needs reinforcing.

[39] Rescher (2006) notes the fundamental need for distinctions in philosophy: "Ideally, a distinction would reflect a significant contrast in the operational or functional nature of the items at issue. . . . Whatever it be, an item is either an X or a non-X" (pp. 27-8). Post and transhumanist perspectives, which un-disciplined philosophers like Kelly (2010) and Kurzweil (2005) incorporate, appear to err in their *identifying* distinctions (Rescher, 2006, p. 27) between humans and technology. If identifying distinctions "dichotomously distinguish the Xs from the non-Xs" (p. 27), then definitions of human (X) and technology (non-X) cannot overlap.

Absence and Mystery: Heideggerian Philosophy of Technology

Martin Heidegger's philosophy of technology involves the cultivation and practice of habits, quite similar in its intent to the type of habits I recommend for un-disciplined philosophers of technology in Chapter 1.[40] In this section, I outline Heidegger's perspective on technology found in *The Question Concerning Philosophy of Technology and Other Essays* (1977) before moving on to the philosophies of Marcuse and Ellul. Heidegger (1977) promotes a kind of *right relation* to technology that should still serve philosophers of technology today. His view counters the instrumentalist understandings of technology that make all of nature, humans included, into "standing-reserve" (Heidegger, p. 17).[41]

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[40] Work from un-disciplined philosophers of technology tends to exhibit the following characteristics. 1. They reflect on current and emerging technologies and/or trends, providing speculative normative claims (in forms like fictional scenarios and thought experiments) about the moral decisions that should be made and followed. 2. They write/perform for more than just academics (philosophers of technology); their audiences are often lay publics, so their products are commercial (someone has to fund them, and if not academia or public sources, then private companies—Kurzweil's hiring by Google, for instance). Advantages to writing for broad publics, as opposed to specialists and experts, includes the accessibility of the ideas to non-philosophers, like, among others, students taking STS-style classes. Un-disciplined philosophy of technology serves as a starting point, not a final destination, for topics related to human-technology relations. Done well, UPoT exhorts interlocutors to explore the topics and questions further, to continue investigating. Un-disciplined philosophers of technology relate compelling narratives, and that partly stems from their (seeming) transparency: unlike most traditional academic philosophers of technology, un-disciplined philosophers of technology tell stories about themselves. They make themselves relatable, approachable, in ways that traditional philosophers of technology cannot due, in part, to the standards of academic writing that they must adhere to when they publish (Wittkower, *et al*., 2014). 3. They consistently and provocatively promote a normative agenda regarding the right relations between humans and technology, usually as a form of co-dependence—between humans and technologies/machines (the nonhuman). 4. They seek to instill habits, ways to think and act, that take into account human-technology relationships, or ways of being with technologies. Examples of such habits include speculating about fictional scenarios and thought experiments that incorporate extreme/potential situations. Further, they consider long-term consequences of developing and emerging technologies, for instance how responsibility accrues to humans and nonhumans

[41] Though the un-disciplined philosophy of technology I promote throughout this dissertation shifts emphasis away from discussions of *essences*, un-disciplined philosophers of technology grapple with the increasing hybridity of human-technology, and, more generally, human-nonhuman, relations to return once more to the kinds of *right relation* with which Heidegger asks us to contend.

In "The Question Concerning Technology," Heidegger (1977) argues that the two common twentieth-century definitions of technology, "a means to an end" and "a human activity," serve to blind us to the essence of technology (1977, pp. 4-5). The essence of technology is not equivalent to those two definitions, yet we have come to accept the instrumental definition in part because this instrumentalist explanation seems sufficient (p. 5). Unfortunately, seeing technology as human means to specific ends "conditions every attempt to bring man into the right relation to technology" (p. 5). From the outset of the essay, Heidegger begins to outline his normative vision of how humans should see or understand technology, and our relationship to it. He does this first by showing that though our instrumental understanding of technology is "correct," it misses the point, i.e., the search for the "essence" of technology (p. 4-6). The supposed "right relation to technology," emphasizes the role of humans as masters, a role that Heidegger argues ignores the essence of technology. He explains that "Everything depends on our manipulating technology in the proper manner as a means. We will, as we say, 'get' technology 'spiritually in hand.' We will master it. The will to mastery becomes all the more urgent the more technology threatens to slip from human control" (p. 5). An instrumental understanding of technology, though "correct," still forces humans into a master-subject relation with technology, so it is not "true" (p. 6).

Heidegger clearly wishes for a different dynamic, one *revealed* (an "uncovering" in Heideggerian terms) by an examination of technology's essence. He claims that "Only at the point where such an uncovering happens does the true come to pass. For that reason the merely correct is not yet true. Only the true brings us into a free relationship with that which concerns us from out of its essence" (p. 6). Part of Heidegger's normative claim regarding how people should view technology, and our relationship with it, entails shrugging off the uncomplicated and uncritical view that ignores technology's essence and instead focuses on its instrumental definition. Although somewhat difficult to pin down, the "free relationship with [technology]" that Heidegger strives to achieve will depend on humans thinking about technology in certain ways (p. 6), and, in later chapters, I supplement this view by claiming that in addition to *thinking* about technology in specific ways, we must also speak, write and act in relation to technologies in particular manners as well.

As Heidegger translator and commentator William Lovitt explains, part of the difficulty in reading and understanding Heidegger's ideas stems from his insistence on using common words (in both the original German and in translation) in manners altogether uncommon. Lovitt (1977) argues that reading Heidegger should be a transformative experience in no small part because "in reading Heidegger [the reader] is encountering words that he must learn to let come to him with fresh meaning" (p. xxi). Heidegger asks his readers to join him in looking at the things in the world that we seem to know well, the technologies that surround us, in unaccustomed ways.[42] Lovitt (1977) remarks that

> If we can learn, with whatever difficulty, to think truth as unconcealment or essence as the manner in which something endures in coming to presence; if we

[42] Shklovsky's (1965) *defamiliarization* makes a similar plea.

> can let words like 'technology' or 'destining' or 'danger' sound with the meaning Heidegger intends, then something of that power will be present for us. (p. xxi)

We, the readers, must accept Heidegger's new usage of everyday and philosophical language in order to understand his approach and his claims. In order to do that, I will outline below some of the influences on Heidegger's language in many of his essays on technology. As Andrew Feenberg (2005) has claimed, "Exaggerating only slightly, one could say that Heidegger presents Aristotle as a phenomenological philosopher of technology," so before explicating Heidegger further, it will prove useful to explore the Greek philosophy, themes and terms that Heidegger has appropriated from them (p. xvi).

To the ancient Greeks, *poisésis* involved "coming into the 'present' out of the 'not-present'" (Heidegger, 1979, p. xxiv). Already we begin to glimpse the basis for Heidegger's usage of "presence." Lovitt explains that the "bringing forth" of *poisésis*

> was manifest first of all in *phsysis*, that presencing wherein the bursting-forth arose from within the thing itself. *Techné* was also a form of this bringing forth, but one in which the bursting-forth lay not in the thing itself, but in another. In *techné,* through art and handcraft, man participated in conjunction with other contributing elements—with 'matter,' 'aspect,' and 'circumscribing bounds"—in the bringing forth of a thing into being. (Heidegger, 1977, p. xxiv)

Thus, "*techné* is the mode of 'revealing' for the Greeks," or the way in which they experienced the world (Feenberg, 2005, p. 4). If *poisésis* signifies the "practical activity of making," which humans engage in when they produce something, then *techné* "is the knowledge or discipline associated with *poisésis*" (p. 6). For Heidegger, and for Marcuse later, technology represents more than humans making things, or the things humans make. Technology, and technological thinking, represents more than a political or economic view. The "bringing-forth" makes what is concealed unconcealed (Heidegger, 1977, pp. 9-11). For Heidegger, the "bringing-forth is grounded in revealing," and thus "technology is no mere means. It is a way of revealing" (p. 12). Through attention to this revealing, people may come to understand the essence of technology more completely. We will understand revealing as truth (p. 12).

Turning again to the Greeks, Heidegger remarks that up until Plato, *techné* and *episteme* were linked as different "names for knowing in the widest sense. . . . to be entirely at home in something, to understand and be an expert in it. Such knowing provides and opening up . . . . a revealing" (p. 13). By appealing to ancient Greek understandings of "knowing" and their relationship with the produced, Heidegger connects technology and truth: "Technology comes to presence [*West*] in the realm where revealing and unconcealment take place, where *alétheia*, truth, happens" (p. 13).

Heidegger attempts to recover the Greek understanding of *techné*, perhaps the "essence" of technology, in a broad sense: *techné* represents the way humans are in the world and how they come to view the world. A Greek philosopher "attempted to master that which

'in the onrush of the revealing of Being' came at him, the experiences of everyday life (Heidegger, 1979, p. xxiv). The attempt to understand becomes an attempt to 'master:'

> The philosopher wondered at the presencing of things and, wondering, fixed upon them. . . . The philosopher sought to grasp and consider reality, to discover what might be permanent within it, so as to know what it truly was. But precisely in doing so he distanced himself from Being, which was manifesting itself in the presencing of all particular beings. For in his seeking, he reached out not simply to receive with openness, but also to control. . . . *Techné* was a skilled and thorough knowing that disclosed, that was, as such, a mode of bringing forth into presencing, a mode of revealing. (Heidegger, 1977, p. xxv)

The "free relation" (1977, p. 6) to technology that Heidegger wishes humanity to attain eludes us because humanity has sought to control "the presencing of things" rather than "receive [them] with openness." Humans use technologies to gain control over ourselves and everything we encounter in the world. Even "the modern scientist does not let things presence as they are in themselves. He arrests them, objectifies them, sets them over against himself, precisely by representing them to himself in a particular way" (Lovitt, 1977, p. xxvi). Scientists, and others investigating the world, seek to understand the world by making it something that fits into patterns, languages, and symbols that humans understand, which Heidegger describes as an "entrapping and securing refining of the real" (p. 167). William Lovitt (1977) argues that Heidegger encounters

> Reality as 'nature' [sic] represented as a manifold of cause and effect coherences. So represented, nature becomes amenable to experiment. But this does not happen simply because nature intrinsically *is* of this character; rather it happens . . . specifically because man himself *represents* nature as of this character and then grasps and investigates it according to methods that, not surprisingly, fit perfectly the reality so conceived." (emphasis in original, pp. xxvii)

Although the above discussion of how humans order the world is explicitly expressed in reference to modern scientists, "Heidegger makes a clear comparison between the type of scientific thinking and orienting just described with modern systems of technique and apparatus now called technologies" (p. xxvii). Humans seek to master whatever confronts us, and in doing so we create tools and techniques to aid in the attainment of this goal. Lovitt claims that for Heidegger,

> Technology treats everything with 'objectivity.' The modern technologist is regularly expected, and expects himself, to be able to impose order on all data, to 'process' every sort of entity, nonhuman and human alike, and to devise solutions for every kind of problem. (p. xxvii)

Humans seek to master all, from ourselves to all that we encounter, and the current move in that direction comes from quantitative methods. The instrumentalist understanding of human-technology relationships licenses the mining of enormous data sets as substitutes for research with qualitative dimensions. It seems far easier to analyze the results of

scientific experiments and social scientific investigations than it is to ask normative questions about whether or not we should perform such tests and what values we impose through such testing. When humans bracket off value-based questions of whether our current practices bring us closer to the types of relationships we want with each other, with technologies, with nature, and with nonhumans in general, then we do not think critically about how we are making the world and ourselves.

One reason to connect modern science and technology to ancient Greek understandings of *techné* lies in Heidegger's aim to exemplify the similarities and differences between modern and ancient technologies. In terms of showing their similarities, Lovitt's reading of Heidegger emphasizes that "modern technology, like ancient *techné*, from which it springs—and like science and metaphysics, which are essentially one with it—is a mode of revealing. Being, in its manner of ruling in all that is, is manifesting itself within it" (p. xxviii). Nevertheless, modern technology does differ from what came before, from *poiésis,* in that the "revealing that rules in modern technology is a challenging [*Herausfordern*], which puts to nature the unreasonable demand that it supply energy that be extracted and stored as such (p. 14).

Modern technology does not merely make use of nature; it transforms nature into a "standing-reserve" to be called upon when needed (p. 17). Heidegger characterizes modern technology as a "challenging-forth:"

> That challenging happens in that the energy concealed in nature is unlocked, what is unlocked is transformed, what is transformed is stored up, what is stored up is, in turn, distributed, and what is distributed is switched about ever anew. Unlocking, transforming, storing, distributing, and switching about are ways of revealing. But the revealing never simply comes to an end. . . . Seen in terms of the standing-reserve, the [technology] is completely unautonomous, for it has its standing only from the ordering of the orderable. (pp. 16-7)

The "challenging-forth" of modern technology fixes humanity, as another kind of standing reserve, in an instrumental relationship with technology. Because humans view technology, and even nature, as standing-reserves, things to be consumed/used, there is no possibility of imagining the essence of technology. A normative view of how humans should see/imagine technology emerges from Heidegger's discussion of technology, but the normative position appears mainly in what is currently lacking in the instrumental view of technology. Lovitt (Heidegger, 1977) reads Heidegger as arguing that:

> man does not merely impose his own construction upon reality. He does indeed represent reality to himself, refusing to let things emerge as they are. He does forever catch reality up in a conceptual system and find that he must fix it thus before he can see it at all. But man does this *both* as his own work *and* because the revealing now holding sway at once in all that is and in himself brings it about that he should do so. This simultaneous juxtaposing of the destining of Being and the doing of man is absolutely fundamental for Heidegger's thinking. (p. xxviii)

Heidegger does want people to seek out the essence of technology, but it is unclear just how people might accomplish this task. Scientific inquiry requires us to describe things as we perceive them, forgetting that there may be alternative ways of imagining our objects of inquiry.[43] Heidegger claims that people do not see the world as it is, its essence (Enframing), because our conceptions of ourselves and the world around us fit a pattern of dominance and mastery. Humans classify, order, and reduce the things in the world according to how they might be best tested and utilized (Heidegger, pp. 22-5). If we cannot fit the pieces of the world into a language, theory, and scheme, then those pieces are ignored. Ontologically, all that exists is simply all that humans can describe and master (even the "not yet mastered" is delineated as something that will one day be brought under control). Rather than observing technology as instruments, we must "[catch] sight of what comes to presence in technology," yet even this macro perspective is "in a lofty sense ambiguous" (pp. 32-3).

Heidegger's normative vision for how people should view technology, his "saving power," is thus marked largely by absence and mystery (p. 33). Somehow, "when we look into the ambiguous essence of technology, we behold the constellation, the stellar course of the mystery" (p. 33). Heidegger seems to be arguing that we should look at technology without actually focusing on technologies themselves. Once we train our gaze on one aspect, one coming to be, we lose sight of the broader Enframing/revealing/bringing-forth of truth (p. 33). The "saving power" is that which preserves Being. Again, Heidegger invokes the Greek conception of *techné*.

In a romantic imagining of a distant past when humans encountered essences, Heidegger claims that in ancient Greece "there was a time when the bringing-forth of the true into the beautiful was called *techné*. And the *poiésis* of the fine arts also was called *techné*" (p. 34). The "saving power" that arises when we come to know that "the essence of technology is nothing technological" will become manifest when we better consider/reflect upon the potential of the fine arts, from poetry to sculpture, prose to painting (p. 35). Art permits "the bringing-forth of the true into the beautiful," and this relationship to truth and beautify exemplifies what technology currently lacks (p. 34). Though an attempt at prescription, the declaration that only when we see a connection between technology and fine arts will we come to the essence of technology remains haltingly vague.

In his brief essay "The Turning," Heidegger elaborates further upon the essence of technology, but again he leaves much to interpretation. He argues that we must "[renounce] human self-will" and, thus, project ourselves away from ourselves in order to come to "insight" (p. 47). To claim that we will accomplish this task through art is only slightly less puzzling. Nevertheless, the divine appears as something humans can only catch sight of when we look beyond ourselves, when we pay attention to the revealing of essences: "Insight into that which is—thus do we name the sudden flash of the truth of Being into truthless Being" (p. 47). The essence of the divine, for Heidegger, has little to

[43] In later chapters, I overview two related alternative ways of imagining our objects of inquiry: object-oriented ontology/speculative realism and posthumanism.

do with specific religious deities. Unsurprisingly, the divine may be caught sight of not when we focus on a particular religion or religious ceremony. Much like the essence of technology, humans can behold the divine only by rejecting such an ordering as found in specific religions. Just as "all that is technological never arrives at the essence of technology," the divine will not disclose itself through our technologies (p. 48). Humans may seek the "constellation of Being" by browsing the internet or watching film, but these technologies do not reveal Being as the thing that saves (pp. 48-9). The divine is of religion but not religion:

> Whether the god lives or remains dead is not decided by the religiosity of men and even less by the theological aspirations of philosophy and natural science. Whether or not God is God comes disclosingly to pass from out of and within the constellation of Being. (1977, p. 49).

Heidegger asks humans to slow down and reflect upon the world around us. We should seek essences not by examining instances, but by somehow widening our vision beyond a specific focal point.

In an attempt to demonstrate the un-disciplined philosophy of technology I propose—the habit of making traditional philosophy speak to lay audiences—, a metaphor might help explain what Heidegger asks of us. Instead of attending to a particular object in front of us, we should allow our field of vision, our focus on the object of inquiry, to blur. The object remains, but only a hazy image of it. By losing focus on the object, its surroundings come into view. We become aware of the location of the object, its dynamic with the surrounding environment, and even our own perspective as observer of the object itself. The object does not disappear, but we see more than the object. The ordering and organizing, the reductive thinking that has helped us perceive the object as an instance, a piece of something, loses its hold on our imagination and understanding.

Our perceiving the object as an example of something directs us to use the object in certain ways—thus making the object a standing-reserve (and the "object" may well be other people). Heidegger's "constellation of Being" metaphor thus appears as a way of seeing the world, a way of looking at, say, the bright spots in a dark night sky, without concentrating on any single stars. Our language, ontology, taxonomy, and methods of observation and inquiry all train us to see the world in certain ways. We pick out specific aspects of the world in our field of view by naming them and categorizing them, by reducing them to pieces of some other thing. This process allows us to perform myriad tasks, but it also blinds us to other ways of seeing these things.

In a similar manner, the "seamless web" metaphor of the social constructivists serves as a reminder of the interlocking aspects of humans and technologies (as well as all other nonhumans). In place of the term *Technology*, Bijker, Hughes, and Pinch (1987) propose a "seamless web" or "technological system" that softens boundaries between the economic, technical and scientific (p. 9). Technologies certainly impact societies, economies, political environments and more, but trying to demarcate between technology and any of these other categories ignores the connections for the sake of clean divisions

and distinct definitions. The "seamless web" concept directly relates to the metaphor of allowing our field vision to blur. In both cases, by *not* picking out a specific aspect or artifact, our minds must attempt to make sense of the broader connections and relationships that transcend the single object/example/technology. Thus we train our minds to imagine an interconnected world with humans as one piece of many, and with as many perspectives as there are people/objects/relationships.

In artistic renderings of the world, we often find the things depicted not as they readily appear to our vision. Pablo Picasso's *Girl before Mirror* presents just such a rendering: the woman in front of the mirror and the image in the mirror differ in important ways, highlighting that there exist more than one interpretation of even our own body and shape.

The artist sees something within the object that a superficial inspection would not reveal—namely, how the person actually sees herself and how that differs from the way others might see her. Heidegger invokes essences, at least in part, so that we may understand that how we view things does not determine what they are or how they should be utilized. That, of course, is one way of seeing them (an instrumental way), but to close ourselves off to other possibilities because of such a habit seems foolish. The words on the page tell a story, but the story involves more than the collection of words. Stories shape who we are and how we see the world in ways that mere words cannot. We often say that we "get lost" in stories. Heidegger wishes us to "get lost" in the world without seeking a way that already makes sense to us, a way we have learned from past experiences. It may be that a way will present itself to us out of the world itself. "The way" is ambiguous precisely because we have not yet perceived it. Perhaps "the way" involves being open to the possibilities that will present themselves to us, that direct us rather than what we direct. Significantly, we must first see the organizing and patterning aspect of our own thinking and visualizing that arises through interactions with modern science and technology before we can move beyond it and open ourselves to that other way.

Inescapable Pattern: Jacques Ellul's Analysis of Technology

Heidegger's (1977) claim that people do not see the world's essence (Enframing) because our conceptions and perceptions of ourselves, and the world around us, fit a pattern of dominance and mastery matches well with Jacques Ellul's (1990) diagnoses concerning the relationships between humans and "technique."[44] Where Heidegger observes humans

[44] When writing *The Technological Bluff* (1990), Ellul summarizes his earlier efforts (1964, though the text was originally published in French in 1950) at defining "technique:" "technique is our environment, the new 'nature' in which we live, the dominant factor, the system. . . . its features: autonomy, unity, universality, totality, automatic growth, automation, causal progression, the absence of finality" (1990, p. 15). The breadth of such descriptions, and their lack of precision, at once exasperates readers—such vague notions about systems and features of the system lead only to more questions as opposed to clear

incessantly classifying, ordering, and reducing the things in the world according to how they might best be tested and utilized (Heidegger, 1977, pp. 22-5), Jacques Ellul sees a loss of human creativity and freedom. Heidegger pines for a return to times that appreciated and celebrated *techné*; Ellul, however, might likely point out the futility of such romantic imaginings in societies where rationality and efficiency serve as the societies' primary values. Ruthless in its efficiency, unyielding in its rationality, technique organizes; technique classifies; technique commands. Technology/Technique transforms and dehumanizes the imaginative mind until only a technical rationality—a style of thinking that focuses on efficiency and rationality over other values—remains (Ellul, 1990, p. 27).

In *The Technological Society* (1964), Ellul provides explicit evidence that 'technique' has come to dominate human lives. Rationality and efficiency, both overarching concepts and goals of a "Technological Society," serve to eliminate human freedoms and creativity, unless they contribute to furthering rational and efficient processes. Technique-governed societies even reject critical positions that question the necessity of rationality and efficiency in our lives, leading to a kind of 'one-dimensional' person and society that Marcuse will later condemn. "Improvements" would only be deemed so if they led to more efficient and rational thought and action.

In his 1962 "The Technological Order," Jacques Ellul expands the ideas he outlines in *La Technique* (1954) and recounts the problems affecting the West that arise from a switch from a "natural" order to a "technical order." The "*milieu*"[45] in which Western societies exist is fully saturated by Technique (p. 394); there is no escape from technique as it dominates every aspect of Western life. Ellul (1962) describes this non-natural *milieu* as both deterministic and autonomous:

> a. It is artificial;
> b. It is autonomous with respect to values, ideas, and the state;
> c. It is self-determining in a closed circle. Like nature, it is a closed organization which permits it to be self-determinative independently of all human intervention;
> d. It grows according to a process which is causal but not directed to ends;
> e. It is formed by an accumulation of means which have established primacy over ends;
> f. All its parts are mutually implicated to such a degree that it is impossible to separate them or to settle any technical problem in isolation.
> (pp. 394-5)

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ideas of a specific definition—and inspires awe at the myriad explanations, uses, perspectives and perceptions of 'technique.'

[45] In "Technology and Democracy" (1992), Ellul defines "*milieu*" as "the predominant human environment that furnishes mankind with all this is needed in order to live but that, at the same time, is the cause, source, and origin of the greatest dangers" (p. 35).

Ellul's sociological critique contends that Technique has come to dominate every aspect of human life in the West.[46] Economics and politics are not influenced by Technique. They, like any other social situation, are "*in*" Technique, which Ellul argues is "a novel situation modifying all traditional social concepts" (p. 395). As noted above in points b., c., e., and f., Technique is the background, the *status quo*, that enables Western life to continue as it does. All social aspects, and thus all social problems, are defined by their relationship to Technique and can only be solved through the application of some other Technique. Even values are interpreted through their interaction with the "*technical milieu*:" "Modern man's state of mind is completely dominated by technical values, and his goals are represented only by such progress and happiness as is to be achieved through techniques" (p. 395). The transformation that has taken place, for Ellul, is total: "people have stopped looking for direct means to resolve conflicts" (1990, p. 18). For any crisis, whether economic, environmental, political, etc., "extreme technical development is the only solution" (p. 19).

Technique dominates humans, acting as both the source of problems and their solutions, to the point that imagining a way out of the "*technical milieu*" is nearly impossible. To move beyond the "*technical milieu,*" humans would first need to recognize that we have ceded vast control of our lives to technical values, a tremendous acknowledgment that would require us to see from both micro and macro perspectives—evocative, once again, of Heidegger's emphasis on essences.[47] Just as the majority of the population in E.M. Forester's (1909) "The Machine Stops" does not realize there is another way to live without the aid and shelter of The Machine, Western peoples, on Ellul's reading, do not even understand how fully their lives are directed and ordered by the "*technical milieu.*" Because we in the West lack an understanding of what "good-in-itself" might be, traditional moral and value systems are simply replaced by a system based on Technique (1962, p. 396). There is comfort in such a view, but for Ellul it is an unimaginative and uncritical acceptance of the status quo that he seeks to shatter.

Ellul does not argue that he has found a motivating factor for change in our societies; he has identified *the* factor for change in societies, technical rationality. It dominates all other kinds of deliberating problems and solutions. Indeed, problems are only identified as problems when the "*technical milieu,*" has a way to express them and provide a

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[46] When writing in the 1950s and 1960s, Ellul did not ignore the non-West, like Africa and Asia, but he did see these populations as distinct from the West because they did not rely on Technique as overtly as Western peoples. They were "as yet, scarcely confronted by technical problems" (1962). Although Ellul's conclusions about the non-Western world are dubious at best, I do not have space here to delve into such issues.

[47] One understanding of Heidegger's "essences" involves the notion that how we view things does not determine what they are or how they should be utilized. This instrumental vision, critiqued by Heidegger and Ellul, closes us off to other possible interpretations and narratives. These other narratives would invite us to make sense of experiences without recourse to technical interpretations and rational explanations.

solution for them. Ellul claims that technicians, those with expertise in specific techniques, have gained authority in many current societies by invading the political realm, thus becoming technocrats. "Technicians are no longer talking as technicians who in the presence of given technical problems provide technical solutions, but as technocrats who say: 'Here is *the* solution. There is no other. You will have to adopt it'" (1990, p. 24). No issue seems to escape the purview of the technocrats, thus all aspects of human life can be ordered by technical rationality, a rationality which technocrats dominate: all that is power depends upon [technocrats]" (p. 27).

Traditionally, philosophers address questions regarding the Good Life, but Ellul doubts they are up to the task for two reasons. First, philosophers have little influence over societies: "technicians of every order distrust them and rightly refuse to take their reveries seriously" (p. 399). In the face of technical rationality, any attempt to steer thought toward creativity, if it questions efficiency or profitability, becomes a radical challenge to what 'works,' and may thus be set aside as fanciful wishing that may make sense for academics but holds little usefulness—utility—for everyday life. Second, even if philosophers could make themselves heard, they would have to invent a means of mass education in order to deliver their messages to the publics (p. 399). These philosophers would have to challenge, and provide a means for normalizing such a challenge, an instrumental system of thought that authenticates its own rationality by pointing to what Albert Borgmann (1984) describes as the device paradigm—that effective technologies are ubiquitous, safe, instantaneous and easy. The device paradigm illustrates this tendency of technologies to instantiate the values that humans prize.

For instance, as humans instrumentally value *autonomy*, our technologies permit us to perform more functions without the aid of others. I can communicate my individual ideas on a blog, with the potential to be read by anyone with an internet connection, instead of sending my writing/video/sound recording to some publishing house, tv/video broadcaster or radio station. Policy develops to facilitate such forms of communication, and our ethical theories are interpreted to explain how these technologies augment the values we prize. This pernicious closed loop authenticates only what it engenders. Deviation and imagination, the hallmarks of Heidegger's *techné* and Ellul's creativity and human freedom, become inefficient and unproductive musings of luddites.

If philosophers sound anything like Ellul, extolling the deterministic, pessimistic and totalitarian dimensions of societies driven by Technique, then Ellul may rightly argue that their views would be suppressed, even feared, by those representatives of the "*technical milieu.*" Philosophers (of technology) would need to move beyond pessimistic and Luddite attitudes toward Technique and Technology in order to influence values, a situation that remains elusive half a century later. Recently, Evgeny Morozov (2015) has upbraided critics of technology for similar omissions. By focusing their critical gaze on instantiations of technological innovation, critics of technology take for granted the economic, political, and social systems that enable the continued, unreflective innovation and development of more profitable and more efficient technologies. By remaining silent about what Ellul would describe as the "*technical milieu*," technology critics serve to propagate entrenched positions rather than make radical interpretations and proposals for change.

Ellul's later work (1992) on technology and political/social systems makes it clear that our current age, or *milieu*, presents us with questions we have not had to ask previously. Because of our dependence on technologies, we must investigate whether humans or 'things' will determine the course of human development (p. 37).[48] Ellul is concerned that technique will drive all human decision-making. Technique, for Ellul, serves as a 'closing' of possibilities (p.38). Democracy, Ellul's preferred driver of human development, allows for endless 'openings' or possibilities. In democracy, there are possibilities for revisions and changes. In a democratic system, humans may develop along a certain trajectory, but we can go back and evaluate that development and decide if another path might bring us closer to a Good Life. The system of technique, on the other hand, drives humans closer to a technocracy. In this system, "the technological solution becomes irreversible" (p. 38). The instrumental viewpoint becomes a paradigm[49] that defines the problems/puzzles to be solved without questioning the problems/puzzles themselves.

Ellul sets up a neat binary for humans to choose: we must pick either technique or democracy. The two systems are mutually exclusive—we cannot have both as technique relies on quantitative evaluations and democracy on qualitative judgments (p. 38). The logic of technique is efficiency (efficiency of process, not of results) (p.38). Democracy, however, does not have a logic of efficiency—it is incredibly inefficient because it takes into account so many different variables such as human wants and proclivities. Technique eradicates diversity because numerous minority opinions would cause too much delay in decision-making processes (p. 39). Technique emboldens the instrumental paradigm by making critiques of it appear unproductive, inefficient, and unprofitable.

Ellul draws from the work of French political scientist and sociologist Maurice Duverger by setting up a political binary that we must choose from: majority rule or proportional rule (Ellul, 1992, p. 39). The former, and dominant system in the U.S., provides citizens with only two parties, two choices.

> Under majority rule one ends up with two parties and the one which obtains majority can govern in peace and carry out its projects…. Politics of this kind also excludes diverse minorities…. Any system that reduces choice to two candidates also limits the possibility of debate. What happens when an election gives one the choice between a dishonest candidate and a stupid one? In the last analysis, everything that makes democracy a human system is eliminated if one applies the criterion of efficiency. (Ellul, 1992, p. 39).

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[48] Interestingly, Ellul discusses the effects of technologies on human 'evolution' (p. 37). I will return to this description of human development when discussing critiques of Kevin Kelly as Kelly has been criticized for using 'evolution' in a sense that seems outside of the scope of biological understanding of the term.

[49] C.f. Thomas Kuhn's (1962/1996) *The Structure of Scientific Revolutions.*

Forcing human choice into a binary system, either technique or democracy, majority rule or proportional rule—Ellul ignores the possibility of democratic technique, and, perhaps, pragmatic philosophy of technology, to which I will turn in the next chapter. For Ellul, efficiency dominates technique to the exclusion of any other possible influence, a claim Herbert Marcuse's philosophy also engages.

The Dominance of Efficiency and Rationality: Marcuse's Philosophy of Technology

Herbert Marcuse shares Ellul's pessimistic view of a society dominated by technological rationality. *One-Dimensional Man* (1991) describes people as indoctrinated, manipulated, and far from autonomous. Marcuse portrays a world where social needs become individual needs, and he imagines the media as playing a large role in the process: at once entertainer, educator and manipulator. Nevertheless, he does suggest that humans have the potential to escape this way of life. Freedom, according to Marcuse, will not come from more education, science, or technology but from critique. Like Ellul, Marcuse laments the one-dimensional thinking that accompanies the erasure of dialectic debate.[50] People must realize that their supposed choices between types of government, cars, television shows, computers, etc. do not actually represent a choice between alternatives but between 'more of the same.' Any contradiction to or protest of the status quo does not serve as critique because the protest is consumed by the status quo as just another aspect of it. Thus, Marcuse argues that freedom in relation to politics would mean freedom *from* politics, at least in its current manifestations.

Technology, for Marcuse, can be appropriated by different political schemes (totalitarianism to democracy), but efficiency always remains the underlying driver. He describes a "new rationality and new standards of individuality" ushered in by the technological process (p. 139).

> Technology, as a mode of production, as the totality of instruments, devices and contrivances which characterize the machine age is at the same time a mode of organizing and perpetuating (or changing) social relationships, a manifestation of prevalent thought and behavior patterns, an instrument for control and domination. (1982, pp. 138-9)

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[50] Marcuse (1964/1991) describes such thought as "one-dimensional":

> The technological and the pre-technological stages share certain basic concepts of man and nature which express the continuity of the Western tradition. Within this continuum, different modes of thought clash with each other; they belong to different ways of apprehending, organizing, changing society and nature. The stabilizing tendencies conflict with the subversive elements of Reason, the power of positive with that of negative thinking, until the achievements of advanced industrial civilization lead to the triumph of the one-dimensional reality over all contradiction. (p. 128)

In some (supposed?) past prior to our contemporary machine age, and reminiscent of such a romantic past as the one described by Heidegger when *techné* once dominated, humans lived free to pursue their own rational and creative courses in determining their faculties and abilities. Society—its economics and politics—served to permit each person to pursue this course for herself. Individuality and self-interest were deemed rational as they were presumed to stem from, and be constantly guided by, autonomous thinking (p. 140). "Liberalist society was held to be the adequate setting for individualistic rationality" (p. 140). It was the "process of commodity production [that] undermined the economic basis on which individualistic rationality was built" (p. 141). "The principle of competitive efficiency" favors large industry over individual, small production, and this has infected how people think and act in areas having nothing to do with industry or production. Marcuse claims "individualistic rationality has been transformed into technological rationality," and this shift has pervasive and detrimental effects on human actions and values (p. 141).

Technological rationality controls protest and dissent, what can and should be protested or critiqued. It also "establishes standards of judgment and fosters attitudes" that cause people to accept the rule of technics and its standards of efficiency (pp. 141-2). Individualism has not been abolished, only mutated. Standards,[51] once set by the individual, become defined by technics:

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[51] The following example may serve to explain more clearly the deleterious effects of 'external standards.' We scholars can—and are compelled to—compare our output with our peers: where we publish; how often we publish; how many citations our work receives. Importantly, however, the individual scholar does not necessarily perform the comparison; the scholar's employer does. Such comparison will provide much of the basis for continued or future employment. Where one did their graduate work takes on massive importance because, apparently, it is not the individual product that matters as much as the environment where that product blossomed. An academic department's standing or ranking, as if such comparisons offer easy, like-for-like comparisons assume critical importance not just for employment, but for the acceptance and weight of the findings of the scholars. As Neil Postman (1992) points out,

> Whether it is a culture of technological simplicity or sophistication, there always exists a more or less comprehensive world-view, resting on a set of metaphysical or theological assumptions. Ordinary men and women might not clearly grasp how the harsh realities of their lives fit into the grand and benevolent design of the universe, but they have no doubt that there *is* such a design. (p. 59, emphasis in original)

The "design" that Postman describes match up well with the "external standards" that Marcuse locates as part and parcel of the technological rationality. Why should academic departments at various universities, wittingly or no, be in competition with each other? It seems that their 'products' (graduates and faculty) require some sort of comparison to determine their worth. Their worth, far from intrinsic, depends upon some system that

> The efficient individual is the one whose performance is an action only insofar as it is the proper reaction to the objective requirements of the apparatus, and his liberty is confined to the selection of the most adequate means for reaching a goal which he did not set. (p. 142)

The loss of individualism caused few objections in part because new standards, apparently universal (as long as one accepts technological rationality), immediately usurped the place of what was lost. There is something seductive about universal standards, at least for those in position to adapt quickly, because they allow for broad comparison between seemingly unlike constituents. Meeting one's own standards for achievement, whether in business, ethics or even education, seems trivial when that same achievement can be compared to larger groups in various parts of the world. There is no external recognition of individualized achievements beyond self-satisfaction—and that, apparently, provides sparse utility on a worldwide scale (p. 142). When individual achievements meet or exceed external standards, however, the achievements take on (seemingly) greater import. One can say she forms 'part of something greater than herself' and her achievements impact societies generally.

Technological rationality, based on standardized efficiency, gives people a sense of connectedness. They all work toward some 'greater good,' even if that greater good remains based on a material production that has little to no impact on them individually (and which might even adversely affect them on an individual level). Further, and perhaps this plays on human desires to compare ourselves with others, we can strip away subjective experiences, or at least use them to describe minimums and maximums, or that which fails to meet or exceed external standards. All achievement is open to comparison and, it seems to follow, should be so.

In "On Concrete Philosophy" (2005) Marcuse defines philosophy and outlines its role in helping to create an existential understanding of *Dasein* (being) in contemporary society:

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requires competition. The value—or worth—can ostensibly be measured by research grants, funding, publications and even, perhaps, notoriety. But does that accurately, or sufficiently, describe their value to their constituents and communities? Marcuse and Postman would likely not consent to such valuation because they refuse to equate worth with externally standardized efficiency and technological rationality. Ranking an academic department, or individual academic achievement, should not be a simple equation because achievement appears subjective and, perhaps, temporal. I do not claim all academics, or even all academic departments, are equal, but I do wonder how and why we need such comparisons. Standards of excellence, and mediocrity, seem oxymoronic if we assume that individual achievements must not necessarily conform to external standards.

> Human existence, the subject of philosophy,[52] always stands in a particular historical situation. The subjects and objects addressed by philosophy are not abstract, "interchangeable" ones; each individual exists in a particular framework of activity (in which he shapes himself), in a particular social situation (through which his everyday environment is defined), in a particular state of the community of people, which has in its turn evolved on the basis of particular natural and historical conditions. (p. 37)

Though his pronouncements seem universal regarding how philosophy should be used and in what contexts, Marcuse manages to base these macro pronouncements on specific instances. Marcuse attempts to recover the role of the philosopher that Ellul (1992) worries has become lost. Marcuse attempts to work out the move from micro to macro claims and argues that philosophy can make general normative pronouncements based on particular instances and situations.[53]

The tools and systems of technology that people employ in capitalistic societies have become so large and burdensome that "the *personal* power of humans over nature and 'things'" has decreased (2005, pp. 43-4, emphasis mine). Marcuse's phenomenological perspective, his philosophizing of *Dasein* (being), seeks to recover the power of individuals over nature and technologies. On Andrew Feenberg's (2005) reading, Marcuse rejects the move learned from his teacher, Martin Heidegger, toward nationalism and racism (Feenberg, 2005, p. 5). Marcuse instead chooses the opposite (and Marxist) approach, that the individual in a capitalistic society is inauthentic because of the alienation of production. Individual freedom and authenticity can be achieved through the radical rejection of the self that is created by capitalistic society (Feenberg, 2005, p. 5). When workers[54] reflect on the relationship between self, community and world, they

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[52] Marcuse defines "philosophy" as the human activity of philosophizing: "*the making visible of truth*" (2005, p. 34, emphasis in original). "Truth" for Marcuse is subjective: "The conditions expressed by the laws of nature are not true for nature—for nature they simply *are*—but only for man. A valid set of conditions can be independent of all human existence as far as its *being* is concerned, but validity, as truth, "is" only for man (p. 35, emphasis in original). Marcuse links "truth" to the human phenomenon of "appropriation:"

> Truth demands by its very nature—however independent from all human existence the being of its conditions may be—an appropriation through human existence. Truths are not sought out and secured, not grasped through the labor of knowing then to be tucked away somewhere and observed *in abstracto*; rather, in the knowledge of truth lies the demand for its appropriation. (p. 35)

[53] In Chapter 4 of this dissertation, I will further elaborate the role of the un-disciplined philosopher of technology and her ability to shift/translate between micro and macro perspectives.

[54] For Marcuse, and Marxism more generally, the individual is a "worker."

approach human "essence," and that they realize this "essence" by overcoming the alienation of the self brought about by capitalism (p. 6). Such reflection, the result of practice and habit, leads to realization and results in an overcoming of the instrumentalist view that enlists the human into service of technologies.

Since our technologies, from machines to electricity to transportation, have become seemingly necessary for our existence, individuals "must enter into their service" (Marcuse, 2005, p. 44). In the service of these technologies, and capitalist society broadly, humans are trained (through practice and habit) to act and think in ways that conform to the ideological views inherent in capitalism. Heidegger and Marcuse both viewed technology

> as more than technical, as more even than political; it is the form of modern experience itself, the principal way in which the world is revealed. For both philosophers "technology" thus extends its reach far beyond actual devices. It signifies a way of thinking and a style of practice, indeed, a quasi-transcendental structuring of reality as an object of technical control. Release from this form of experience can only come through another form of experience, an aesthetic form. (Feenberg, 2005, p. 6)

Freeing oneself from this technological rationality poses significant challenges. Even if one comes to understand the reality in which they live, people continue to operate under the same technological conditions. Nevertheless, individual conversion appears antecedent to communal and eventual worldwide conversion. Hope for Marcuse, then, lies with individuals struggling to change how they see the world around them—emblematic of a 'bottom-up' view of change as opposed to a 'top-down' vision.

Contemporaries of Marcuse, Norwood R. Hanson (1958) and Thomas Kuhn (1962) describe similar shifts in perception, although focusing on scientific ideas. Hanson's philosophy of science, drawing heavily from Wittgenstein, is noted for its insistence on the theory-ladeness of observation. Thomas Kuhn's *The Structure of Scientific Revolutions* (1962/1996) owes much to Hanson's (1958) own reflections and investigations into explanations of observation, particularly distinctions between "seeing as" and "seeing that." Whenever a person observes something, the way that she sees that something is dependent upon many ideas, theories and perceptions that she already understands—and it is here that I think the relationship between theory-ladeness and Marcuse arises.

A thought experiment helps Hanson clarify his point: imagine Johannes Kepler and Tycho Brahe sitting on a hill observing dawn. Will both men see the same thing occurring in the east at dawn? (Hanson, 1958, p. 5). For Kepler, the Sun was fixed; for Brahe, the Earth was fixed. One saw the Earth moving while the other viewed the same event as an example of the Sun rising. Of the many inferences that Hanson draws, one of the more important is that there is a difference between a physical state and a visual experience (p. 8). That Kepler takes dawn as evidence that the Earth moves contrasts sharply with Brahe's explanation, yet they both rely on the same evidence/experience. Hanson claims that the possibility for

the same evidence leading to different conclusions is an example of how observation is affected by the theories one holds.

Hanson's interpretation of observation and Marcuse's own views regarding the potential to escape the alienating process of technological rationality have important similarities. Whereas a capitalist may *see* technological rationality *as* the fulfillment, perhaps pinnacle, of human reasoning, Marcuse *sees* technological rationality *as* the implement for repressing individuality and alienating the self. The capitalist and Marcuse rely on the same experience and evidence, but they draw radically opposed conclusions. The theories, ways of being-in-the-world, that each subscribe to account for the divergent ways of 'seeing' the world. Marcuse argues that we have been conditioned to see the world through a technological rationality, and only when we break free from the hold of technological rationality will we see opportunities for reclaiming the self and individuality. The process of breaking away from technological rationality, unfortunately, remains either haphazard or at least unclear, similar to the other "way" of imagining the world that Heidegger (1977) proposes.

Hanson (1958) explains that "In the history of physics few could sense the importance of things not yet expressible in the current idiom . . . The task of the few has been to find means of saying what is for others unsayable" (p. 46). Similarly, Marcuse proposes a new 'idiom,' a new language/way of seeing the world that shrugs off technological rationality as the basis for such qualifiers as productive and unproductive, profitable and unprofitable, in actions and achievements. Feenberg (2005) explains that the later work of Marcuse seeks to find an "authentic existence" and that this authenticity

> is to be achieved at the level of society as a whole through the transformation of technology into an instrument for realizing the highest possibilities of human beings and things. . . . this cannot be achieved on the basis of the existing capitalist technology regardless of the prevailing property and political relations. (p. 6)

Capitalist technology, promoting technological rationality, will not provide the means for the authentic individual experience. Interestingly, however, technology appears as the means for people to reach such an experience.

Feenberg's philosophy of technology,[55] examined in chapter 3, provides an avenue through which to use technologies to achieve an improved life—an emancipatory

[55] Though Feenberg (2005) sets out to explicate the influence of Heidegger on Marcuse, as Marcuse was Heidegger's student, and their phenomenological philosophies of technology, I think Feenberg (2005) is also tracing lines in his own thinking about philosophy of technology, particularly in relation to *techné*:

> Greek *techné* appears here implicitly as a model of an emancipatory technology, contrasted favorably with modern technology insofar as it is respectful of human

technology that respects humans and nature.[56] Feenberg's account begins with historical, sociological and philosophical analyses of specific technological developments. In that sense, he follows the path laid out by Marcuse in his call for "concrete philosophy."

Marcuse wishes for philosophy to become concrete and so it "must *become historical* . . . [and] insert itself into the concrete historical situation" (p. 44). For concrete philosophy to become historical, its practitioners must utilize the sciences of history, sociology and economics rather than continue to regard them as separate or tangential to the task (p. 45). Further, philosophers cannot merely *describe* contemporary *Dasein*,[57] as history, sociology and economics might. Instead, Marcuse urges that the phenomenological investigation into *Dasein*, for it to be brought to truth, must set forth normative guidelines for action (p. 46). These guidelines, however, will not be abstract or universal. The objects of study proposed by Marcuse are fluid and dynamic: "The existing of *Dasein* in its concrete form as 'happening' is always a changing, a transforming of conditions, an affecting . . . an acting" (p. 46). Thus, the normative directives will depend on the particular situation of *Dasein*: "Human *Dasein* does not exist on the basis of knowing, but rather on the basis of fateful happening in a particular situation in the shared and surrounding world" (p. 46). Human *Dasein*, our "being-in-the-world," depends on human interpretation and appropriation of the objects around us. The objects, in themselves, have no meaning before use; they exist in the world but are not meaningful yet. It is human interaction with, and interpretation of, the objects that gives them meaning (Feenberg, 2005, p. 2). The things/objects in the world exist as available to us, and through our use and experience of them, we give the objects meaning (p. 2).

A simple interpretation of Heidegger and Marcuse's utilizations of *Dasein* would be that the objects, the technologies, in the world do not have values or can be considered 'neutral.' Because technical objects rely on human usage for meaning, it might be supposed that the objects themselves are neither harmful nor beneficial—this, again, represents the instrumentalist view. They may appear as raw materials, nothing more. Unfortunately, this type of thinking has led to the understanding of technologies with magnificent destructive capabilities, like chemical and nuclear weapons, as neither good nor bad. Instead, according to both Heidegger and Marcuse, "A world 'enframed' by

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> beings and nature. *Techné* realizes the inherent potentialities of things rather than violating them as does modern technology. (p. 7)

Feenberg's critical philosophy of technology seeks not to condemn modern technologies as inherently pernicious or deterministic. Instead, through our uses of technologies, humans may improve our overall circumstances and lives—a vision for betterment through technologies. This theme seems central to positive readings of Marcuse on human-technology relationships.

[56] C.f. Feenberg, 2005, p. 7, where he discusses Heidegger and Aristotle's use of the term *techné*.

[57] *Dasein*, for Heidegger and Marcuse, means "being-in-the-world" (Feenberg, 2005, p. 2).

technology is radically alien and hostile" (Feenberg, 2005, p. 2). It is, therefore, dangerous because such a view allows for "the obliteration of humanity's special status and dignity as the being through which the world takes on intelligibility and meaning; for human beings have become mere raw materials like the nature they pretend to dominate" (Feenberg, 2005, p.2). Heidegger's understanding of Greek *techné* saw the craftsman as making a world through the crafting of products, but "modern technology destroys the world to the extent of its technological success (Feenberg, 2005, p. 3).

Marcuse's reading of Heidegger concentrated on the positives to be drawn from Heidegger's conception of how humans should use technologies. Values like a respect for nature and all life should be built into our machines and technological systems for humans to escape from the domination of technique (Feenberg, 2005, p. 4). How humans envision technologies will determine their design and usage, a view more in line with technological constructivism than determinism. In other words, there is a way out of the destructiveness of technologies, and that involves learning to see the production of technologies, by humans, as essential to their later use. Technologies are not value-free because they are products of humans with specific intentions. We build our values into the technologies we produce whether we acknowledge it or not. Thomas Hughes goes so far as to describe the things themselves as "congealed culture" (1982, p. 204). For both Heidegger and Marcuse, attention must be paid to the process of production, to embedding the positive and life-respecting values into our technologies. In this line of thinking, a deterministic view of technological development is unnecessary and, further, precipitates the decline of human freedom and individuality—we would be giving over control of our designs to a technical rationality concerned solely with practical and profitable achievement.

To ignore technology would be to ignore a (perhaps "the") constitutive element of human (if not *all*) life. Philosophy of technology, in this line of thinking, might simply be labeled *philosophy* by Marcuse, because philosophical thought that ignores technological aspects of human being-in-the-world dismisses the ways that humans interact with each other and the world around them. From a phenomenological perspective, much of our lives are seen through our technologies—from the implements used for producing and harvesting food and water, to transportation, to work and to play. The view of humans unfettered by technologies appears as romantic a notion as the idea of humans as independent and individualized for both Heidegger and Marcuse.

Conclusion: Toward Multi-Dimensionality

At the root of the classical philosophers of technology's arguments has always been an appeal to the individual as the ultimate epistemic adjudicator. For Heidegger, each of us must seek the essences of *Dasein* and *Techné* in the hopes of eluding instrumental reasoning while finding meaning for ourselves of being-in-the-world. Marcuse, too, stresses the importance of critical thought and modes of investigation that escape the one-dimensional thinking that embraces a very limited set of viewpoints. When Ellul (1964) calls for the dreamer to awaken, he reminds the reader that what follows applies to her and her life; he speaks to her directly.

It may be the scope and tone of these classical philosophers of technology that permits the reader to imagine the text in front of her as, somehow, for her and not about her. Their easy abstraction, moving directly to societies at large instead of concentrating on individuals (though each of these classical philosophy of technology authors directly appeals to the loss of individuality which has accompanied modern technological societies) bears the mark of thinkers trying to find shared foundations/bases that all human-technology relationships share. Those positions, perhaps, needed fleshing out first because without them, the distinctiveness of our technological age remained concealed, simply part of the teleological "progress" of technologies and societies. Classical philosophers of technology like Heidegger, Ellul and Marcuse expose the importance of how humans interact with and in relation to technologies. If we are not careful, we will fall victim to a technical rationality that only champions values like practicality, profitability and efficiency.

Although classical philosophers of technology wish to retain individuality and creativity in the face of technical rationality, they too often fail to engage the individual as interlocutor. The macro systems and processes that serve as their exemplars miss the situatedness and complexity that arise through the individual experience of particular technologies. Contemporary philosophers of technology, to which I turn in Chapter 3, seek to reverse such a course. In doing so, however, they risk ignoring the macro connections and normative directives that classical philosophers of technology went to such lengths to explore.

In Chapters 4 and 5 I return to these macro connections. *Classical philosophy of technology* identifies Technology with social, economic, environmental, and political ills throughout the world. For Heidegger (1977), humans lack the "right relation" to technology, and that may be because the techno-rationality that Ellul (1964) identifies forces us to become Marcuse's (1964/1991) one-dimensional people. *Classical PoT* leaves me wondering, however, if the "right relation" to technology involves a perspective that transcends technology. The "free relation" to technology that Heidegger wants humanity to attain continues to eludes us because people seek to control "the presencing of things" rather than "receive [them] with openness" (1997, p. 6). *Classical PoT* encourages people to interpret the world through creative, imaginative lenses, not through the strictures of techno-rational one-dimensionality.

Un-disciplined philosophy of technology takes up this challenge. It decenters the human, making the human one object/thing among many. In an act of defamiliarization (Shklovsky 1917/1965), I use "decentering the human" to mean conceiving of people as symbionts depending on, and dependent upon a nearly immeasurable array of other objects and relationships. The "seamless web" of social construction of technology (Bijker, *et al.*, 1987) includes things and systems of technology, but it also includes humans and other life. Acknowledging the importance of the nonhuman privileges ideas long pushed for by environmental (Carson, 1962/2002) and animal rights (Singer, 1975/2002) activists: a shift in our thinking, from one sanctioning human domination of the planet and its life and resources, to one proposing cooperation and connectedness.

Chapter 3: From Technology to Technologies: Alienation, Determinism and Mirco-Analyses

Introduction: From Classical to Contemporary Philosophy of Technology

Contemporary philosophers of technology[58] tend to regard technologies as more ambivalent than deterministic and autonomous (Brey, 2010; Feenberg, 1995, 1999; Ihde, 1979, 2004; Verbeek, 2005, 2008, 2011). According to contemporary philosophers of technology,[59] technologies, through human use, may have positive and harmful impacts on individuals, societies and environments, and they should be examined empirically and individually—"technologies" as opposed to "Technology" (Brey, 2010, pp. 38-41). Heidegger, Ellul, and Marcuse view Technology as an insulating and enclosing force, sealing the human off from its natural surroundings. For them, modern Technology represents a revolutionary phenomenon, a driver of human thought and action in directions previously unseen in the history of human existence. Their normative positions decrying the continuing spread and ubiquity of Technology and Technique partly stem from their regard of the rapid changes to communication, economies, transportation, and even artistic expression that they witnessed in the twentieth century. Technology directs human cultures, economies, political systems and values, but not in the service of creativity, or free expression—aspects of humanity that, they emphasize, have dominated our time on this planet. Instead, Technology makes human existence alien to the natural world, walling us off from 'right relations' with each other and our environments, making everything, from nature to life itself, a commodity and resource to be evaluated, measured, bartered, and sold.

The pessimism of classical philosophers of technology, though hardly unfounded after two world wars that culminated in the detonation of two atomic bombs over a Pacific island, evokes a hard separation between the natural and the technological. They perceive a distance between the human and the world, from their perspective a novelty of the twentieth century, and they label Technology the actions, processes, and artifacts that reinforce the distancing. In their writing (Heidegger, 1977; Marcuse 1964/1991), modern

[58] Put generally, *classical* philosophy of technology focused on "Technology . . . not in terms of specific artifacts that help to shape our everyday lives but as a monolithic phenomenon that is hostile to the human world" (Verbeek, p.3). *Contemporary* philosophy of technology, though also encompassing a variety of positions, focuses on specific technologies and human-technology relations (mediations).

[59] Carl Mitcham's *Thinking through Technology* (1994) distinguishes engineering philosophy of technology and humanities philosophy of technology. Though useful distinctions, his "Notes toward a philosophy of meta-technology" (1995) begins to demarcate philosophy of technology in ways that closely resemble how Achterhuis (2001), Brey (2010) and Verbeek (2011) distinguish *classical* and *modern* philosophy of technology, now a commonly accepted distinction.

Technology stimulates this process of alienation and emerges as *the* determining characteristic of an increasingly developing world. Against such a deterministic view, *The Social Construction of Technological Systems* (Bijker, Hughes and Pinch, 1987)—a hybrid/interdisciplinary volume that unites historians and sociologists (and, along with Bruno Latour and Michel Callon, philosophers as well)—stands out for its rejection of neat divisions between technology and economics, society, and politics (p. 4). In place of Technology, Bijker *et al*. propose a "seamless web" or "technological system" that softens boundaries between the economic, technical and scientific (p. 9). Technologies certainly impact societies, economies, political environments and more, but trying to demarcate between technology and any of these other categories ignores the connections for the sake of clean divisions and distinct definitions.[60]

Contemporary philosophers of technology like Don Ihde, Andrew Feenberg, Peter-Paul Verbeek and Philip Brey, do not entirely reject this view, for they acknowledge that technologies do come between the human and our experiences of the world. For contemporary philosophy of technology, however, such mediation differs depending on the technology, and, importantly, the cultures, values and various exigencies specific to the sites of the technologies' deployment. Contemporary philosophers of technology replace their predecessors' technological determinism, with its sweeping claims gleaned from general examples about the effects of media, science, and artistic expression on society as a whole, with a more nuanced approach that focuses on specific instances and

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[60] In Chapters 4 and 5, I push this theme of a "seamless web" even further. I argue that strictly separating the human from the nonhuman masks the extent to which these categories blend together. The ontological and moral implications defy philosophy For instance, my father and his pacemaker are certainly separate things, but their combination allows my father to remain who and what he is: alive. Contemporary philosophers of technology like Don Ihde (2011), frequently make use of such personal examples—hearing aids, prosthetic limbs—to aid their arguments for human-technology mediation. I will claim, in Chapters 4 and 5, that applying the "seamless web" metaphor to human and nonhuman relationships enables an escape from what Rescher (2006) describes as the third "principle of informative adequacy:"

> No entity without identity: This is a modern version of the medieval principle *ens et unum coincidunt*(or: *convertuntur*): (Entity and unity are the same [or: are interchangeable): anything properly characterizable as a thing must be a unit—that is, be specifiable (or identifiable) as a single item.
>
> This is not merely a principle of ontology and should not be so understood. . . . it does not concern the question: What is a thing like? Rather, it is a principle of communicative coherence: Whatever is to be meaningfully discussed needs to be identified—that is, specified in such a way as to distinguish it from the rest. Without specifying something as the particular item it is, you cannot put it on the agenda of consideration. The ruling precept is: "You cannot communicate successfully about something that you have not yet identified." (p. 4)

artifacts rather than those broad extrapolations. Technology recedes; technologies emerge. Notions of Technology's widespread, wholesale effects on all of humanity are deemed exaggerated and inexact, promoting pessimistic and dystopian visions of humans cut off from our own humanity. By focusing on specific instances, artifacts and systems of technology, contemporary philosophers of technology embrace the diversity of their objects of study, and attend to the nuances of particulars. Technologies, the things themselves, become sites of study, a cornucopia of interactions waiting to be catalogued, expanded, and examined. Their zeal for description—and there is much to catalogue—and parity make normative judgments more difficult: if technologies have specific impacts, and are co-determined by the cultures from which they emerge, general pronouncements seem to have no place. Classical philosophers of technology, critical of the most significant phenomenon—Technology—of their century because of its profound impacts on societies, economies, politics and individuals, would likely impugn their successors for settling for an account of particular transistors at the expense of the entire circuit.

In this chapter, I emphasize the areas of analysis that contemporary philosophers of technology feel classical philosophers of technology overlooked and failed to take into account. The shift from macro analyses of Technology—classical philosophy of technology—to micro analyses of particular technologies, enables a wealth of opportunities for case studies, yet it has also largely failed to connect these micro analyses back to broader claims about the effects of technologies on broad populations.[61, 62] Juxtaposing the insights of classical and contemporary philosophy of technology points

[61] Philip Brey (2010) notes this deficiency and calls for philosophers of technology to perform macro studies that account for the findings of philosophers of technology at the micro level. We should start with broad theories proposed by philosophers of technology and use specific cases to check these theories.

[62] The tension here relates to what James Collier describes as the *transportation problem*: how does one move from micro studies to macro claims, and *vice versa*? Findings of how specific technologies affect certain people and groups at given times do not allow investigators to make general or universal proclamations. Philosophically, the problem of induction remains stubborn, yet the motivation to make broad philosophical theories of technology remains because of the impacts these technologies currently have on our lives and values. A similar debate occurs in the philosophy of science, although certainly applicable in philosophy of technology as well, between Richard Burian (2001) and Joseph Pitt (2001) regarding the use of case studies. Pitt argues that generalizing from specific cases or examples, no matter how many, does not get around David Hume's problem of induction, i.e., that past instances tell us anything about future occurrences. Burian counters that case studies, particularly interdisciplinary case studies, allow for independent means of confirmation of broader theories. Though I am not convinced Burian fully resolves the problem Pitt poses, his recommendation of seeking methods of analysis that transcend single disciplines points to the specific problem that Brey (2010) contends must be addressed by philosophers of technology.

the way forward for future philosophers of technology, and, importantly for this work, for un-disciplined philosophers of technology as well.

Central to the rift between classical and contemporary philosophy of technology is the divide between two competing theories of technological development, change, and emergence: technological determinism and social constructivism. Elaborating the differences between these theories permits a clearer comprehension of what contemporary philosophers claim is central to current and future understanding of human-technology relations.

I begin with an overview of technological determinism and social constructivism, as well as Thomas Hughes's attempt at a middle ground between them, technological momentum, before shifting focus to the work of contemporary philosopher of technology Don Ihde. Ihde's postphenomenology focuses on the multiple interpretations of technologies and how technologies mediate our experiences of the world around us (humans, nonhumans, social systems, etc.). Next, I articulate Peter-Paul Verbeek's philosophy of technological mediation as an extension of Ihde's postphenomenology before examining Philip Brey, and Andrew Feenberg's contributions to contemporary philosophy of technology, which also draw directly from their classical philosophy of technology predecessors but which point back to the importance of macro pronouncements and prognostications.

Perspectives in Philosophy of Technology (PoT): The Continuing Allure of Technological Determinism

The main themes in philosophy of technology over the last century and a half have shifted from technological utopianism (Thorstein Veblen (1921)) to dystopian nightmares (Martin Heidegger (1979), Jacques Ellul (1962, 1964), Herbert Marcuse (1991, 1992)) to a mix of wary enthusiasm and criticism (Albert Borgmann (1984), Andrew Feenberg (1995), Philip Brey (2012), Peter-Paul Verbeek (2005, 2011)). I begin with an examination of soft and hard technological determinism, and its advocates, before relating soft determinism to trends prevalent in the works of contemporary philosophers of technology: varieties of social constructivism.[63]

Two Varieties of Technological Determinism

Hard and soft versions of technological determinism mark both dystopian and utopian views—each taking, in part at least, a macro view of technology. For hard technological determinists,

> agency (the power to effect change) is imputed to technology itself, or to some of its intrinsic attributes; thus the advance of technology leads to a situation of

[63] Cf. Biker (1983), "Do not despair: There is life after constructivism," and Pinch and Bijker (1984) "The social construction of facts and artifacts: Or how the sociology of science and the sociology of technology might benefit each other."

> inescapable necessity. . . . To optimists, such a future is the outcome of many free choices and the realization of the dream of progress; to pessimists, it is a product of necessity's iron hand, and it points to a totalitarian nightmare. (Smith & Marx, 1994, p. xii)

Dystopian determinists, like Heidegger (1979), Ellul (1962, 1964) and Marcuse (1991, 1992), offer overtly deterministic descriptions of Technology that evoke images of humans as servants of far-reaching technological systems that, once established, become nigh impossible to subvert.[64] Technology, for these philosophers, exerts enormous control over human thought and action. Their pessimistic views of societies dominated by technological rationality[65] leave humans with a sense of alienation as problems and decisions are fully defined, and determined, by the technologies available at a given time. In the parlance of Science and Technology Studies, technological rationality represents the paradigm through which scientists, technologists, and lay publics imagine problems and solutions to every issue of the day.

At the other end of this deterministic spectrum, "soft" determinism reveals technology to be located "in a far more various and complex social, economic, political, and cultural matrix" (Smith & Marx, 1994, p. xiii). Rather than ineluctable outcomes necessitated by the technologies humans use, soft determinists claim that cultures, economics, politics and societies all impact technological design and use. For instance, Paul Ceruzzi's (2005) brand of soft determinism seeks to evade the conclusion that technologies dictate the kinds of societies we live in and the people we become. On his view, people simply adapt to the technologies present in their lives (pp. 587-590). Individuals, cultures, politics, etc., do not overtly control and manipulate technologies to suit human needs (this would exemplify a "hard" social constructivist view). People, institutions, governments, etc., do, however, adapt to the available technologies. Although hard determinism is often associated with dystopian views and soft determinism with, if not utopian, certainly optimistic views, both versions of determinism do overlap. They claim that people

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[64] Marcuse (1982) argues that "Technology, as a mode of production, as the totality of instruments, devices and contrivances which characterize the machine age is at the same time a mode of organizing and perpetuating (or changing) social relationships, a manifestation of prevalent thought and behavior patterns, an instrument for control and domination" (pp. 138-9). Heidegger (1979) claims that people do not see the world as it is, its essence (Enframing), because our conceptions of ourselves and the world around us fit a pattern of dominance and mastery. Humans classify and order the things in the world according to how they might be best tested and utilized (Heidegger, pp. 22-5).

[65] Ellul (1962) argues that "Modern man's state of mind is completely dominated by technical values, and his goals are represented only by such progress and happiness as is to be achieved through techniques" (p. 395). The transformation that has taken place, for Ellul, and is echoed by Heidegger and Marcuse, is total: "people have stopped looking for direct means to resolve conflicts" (1990, p. 18). For any crisis, whether economic, environmental, political, etc., "extreme technical development is the only solution" (p. 19).

conceptualize problems based on the technologies at their disposal, and this significantly impacts what they see as solutions.

Social Constructivism

Contemporary philosophers of technology, like Feenberg (1995, 2002), Brey (2010) and Verbeek (2012), employ constructivist views of human-technology relations. Envisioning technologies as socially constructed places an emphasis on relevant social groups and interpretive flexibility, two key components of Wiebe Bijker's constructivist view. Bijker (1993) argues for a blurring of social and technical divisions in part because it emphasizes the related aspects of each, as well as the inherently contingent character of technological development. "Through demonstrating the interpretative flexibility of a technical artifact, it is shown that an artifact can be understood as being constituted by social processes, rather than by purely technical ones. This seems to leave more latitude for alternatives in technical change" (p. 121). Opposing hard technological determinist views like those of Heidegger (1979) and Ellul (1962, 1964), constructivists do not see technology as a single "thing" because that makes invisible the different pieces that make up the whole—like the rubber, metal and wood of early bicycles (Bijker, 1993, p. 118). Constructivists would have us trace the development and deployment of the numerous technologies that make up a particular artifact because as relevant social groups[66] contest the meaning and function of technologies, they show the multiple interpretations of these technologies.

Ignoring the multiple interpretations and decisions that constitute the closure of debate—seeing artifacts in only their final, or current, forms—allows technological determinism to gain traction. To escape the determinist view, Pinch and Bijker (1984) explore the histories of technologies like Bakelite and bicycles to show how relevant social groups shape (determine?) technologies. They illustrate how, over time, human interpretations of function and utility serve to stabilize and close debate. Constructivists look back at the processes of stabilization to extrapolate the means by which to exert greater control over technological design and implementation in the future. Constructivism seeks to provide more than an alternative to deterministic views of technology; it also points the way for people to become more actively involved in shaping the design and reception of technologies.[67] A constructivist view promotes a kind of activism that empowers those in

[66] I find the phrase "relevant social groups" almost cripplingly vague, but I see why Bijker settles on it. Determining which groups are "relevant" falls to the person doing the history. Someone else could come along and provide a slightly different history of the same artifacts because they focused on other "relevant" groups. Anyone attempting to adjudicate which study reveals the "true" history could be accused of ignoring the importance of various perspectives or providing teleological history that assumed the results from the start of the investigation (after all, how does one go about choosing which actors, human and non-human, to follow?).

[67] C.f. *The Social Construction of Technological Systems (*1987). The editors note that:

the relevant social groups to advocate for change. Emphasizing the significance of the choices these groups make highlights the economic, political and social pressures that influence those decisions and reveals that technologies do not develop autonomously, and a different set of terms should be developed for the interactions between humans and technologies.[68] People and institutions play important roles in determining which technologies we develop and why, and leveraging these roles enables various actors to participate in anticipatory governance of emerging technologies.

Resolving Tensions? Technological Momentum

Thomas Hughes's concept of technological momentum attempts to resolve the tensions between determinism and constructivism. Technological momentum blends a form of soft determinism with social construction, emphasizing the temporal aspects of technological development. Hughes describes technological systems as both deterministic

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> with their emphasis on social shaping, Pinch and Bijker deny technological determinism. Borrowing and adapting from the sociology of knowledge, they argue that the social groups that constitute the social environment play a critical role in defining and solving the problems that arise during the development of an artifact. Their emphasis on problem solving during the development of technology is like Hughes's reverse salient and critical problems. Pinch and Bijker point out that social groups give meaning to technology and that problems—Hughes's reverse salient—are defined within the context of the meaning assigned by a social group or a combination of social groups. Because social groups define the problems of technological development, there is flexibility in the way things are designed, not one best way. This is approach is like that in 'the Empirical Programme of Relativism,' a sociology of knowledge program stressing that scientific findings are open to more than one interpretation" (p. 12).

[68] Bijker, Hughes and Pinch (1987) seek a new language and different set of concepts

> to express their new understanding of technological change. In addition to the seamless web, systems, actors, networks, closure, stabilization, and social construction, they explore conservative and radical change, balances and imbalances in evolving technological systems, translation, heterogeneity, and research sites. . . . Pinch, Bijker, and Hughes note that inclusion in a group, organization, or bureaucracy dampens the originality of inventors and innovators. High inclusion brings mission orientation and commitment to incremental improvements in the evolving technological systems with which the group, organization or bureaucracy has identified. The outsiders, Hughes believes, create the radical inventions that must stand initially without substantial organizational support. Radical inventions are often stifled by organizations that consider them a threat to the technology that they nurture. But radical inventions are often the geneses of new systems. (p. 13.)

and socio-culturally contingent (1987, p. 51). He discusses technological systems (rather than technologies), a descriptor so broad that one finds it difficult to find something not part of the systems: they include physical artifacts, organizations (as well as entire research programs), legislative artifacts, and even natural resources (p. 51). Hughes's inclusiveness regarding technological systems appears a byproduct of a hidden imperative in social constructivism: seek as many influences/actors as possible when writing histories of technology because such complications provide a more robust understanding of how technologies come to exhibit their present forms. By claiming that technologies influence society and that societies may influence technological development at certain times, Hughes draws upon the strengths of determinism and constructivism and comes to a conclusion reminiscent of the Collingridge dilemma.[69] He claims that a "technological system can be both a cause and an effect; it can shape or be shaped by society. As they grow larger and more complex, systems tend to be more shaping of society and less shaped by it" (1994, p. 112).

On a methodological level, Hughes suggests that social constructivist accounts prove useful for understanding the emergence and development of technological systems, but momentum provides for a more robust understanding of their subsequent growth and the acquisition of at least the appearance of autonomy. In early stages of the development of technological systems, system builders have great influence. As these systems grow larger, however, they develop a kind of momentum, exerting a form of "soft determinism on other systems, groups, and individuals in society" (1987, p. 54).[70] Hughes argues that system momentum does not equate to autonomous technology. Nevertheless, momentum displays deterministic characteristics by placing so much emphasis on technological systems[71] in driving social change. Although it is not impossible for such momentum to be reversed (*c.f.* Hirsh, 1999), it does require tremendous effort.

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[69] David Collingridge's eponymous dilemma, elucidated in his *The Social Control of Technology* (1980), explains that technologies appear easier to govern in the early phases of development and implementation. However, the social, economic and political impacts of such technologies resist early identification and tend to be realized once technologies have permeated societies and cultures. Unfortunately, attempting to control and regulate technologies after they enter the marketplace becomes so labor and economically arduous that efforts to do so strain resources (Johnston, 1984). Collingridge (1980) notes that

> The social consequences of a technology cannot be predicted early in the life of the technology. By the time undesirable consequences are discovered, however, the technology is often so much part of the whole economics and social fabric that its control is extremely difficult. This is the dilemma of control. When change is easy, the need for it cannot be foreseen; when the need for change is apparent, change has become expensive, difficult and time consuming. (p. 11)

[70] The influence of the Collingridge dilemma on Hughes's concept of technological momentum seems most clear in statements like this, though it is uncertain whether he explicates a way out of the dilemma or simply restates it.

The decoupling of technology from social, environmental and political accountability, an offshoot of hard and soft technologically determinist views, removes the human from descriptions of technological development and precipitates pessimistic prognostications about autonomous technologies. Contemporary philosophy of technology (PoT) resists such descriptions because they encourage a lapse into a malaise where humans can do little to affect the kinds of values we wish to incorporate into technologies and which values we wish those technologies to promote. As values are created, mediated and transferred, human actions and perspectives change. Un-disciplined philosophers of technology like Kevin Kelly (2010) and Ray Kurzweil—discussed in Chapter 4—emphasize the symbiotic relationships humans have with technologies. They do not view technologies solely as external entities/things and begin to view them as extensions of ourselves and our capabilities. They are un-disciplined, in part, because they reject hard distinctions between humans and nonhumans, instead focusing on commonalities shared by all things.

For humans to act as explicit drivers of the changes we wish to impose, we must think critically and deeply about the kinds of lives we wish to foster. It reminds us that how we imagine, perceive, and use technologies partly determine how those technologies affect us, and how future iterations of technology will develop. Such deliberations about how technologies come between humans and the world drive contemporary philosophers like Don Ihde and his postphenomenological philosophy of technology.

Multiple Perspectives; Manifold Mediations: Don Ihde's Postphenomenology[72]

Don Ihde's postphenomenology emphasizes the need to examine how technologies mediate our interactions with the world (Rosenberger, 2009, p. 173). Building on the

[71] These systems, however, depend upon people and institutions: technologies do not construct or determine their own technological systems, though large systems may appear to do so if we do not examine their contingent characters.

[72] Postphenomenology represents a school of thought in the philosophy of technology that diverges from classical philosophy of technology as it emphasizes how technologies mediate our experiences of the world (e.g., Ihde 1993, 2003, 2009; Verbeek 2005, 2006; Hasse 2006; Selinger 2006, Rosenberger, 2009). As Robert Rosenberger (2009) explains,

> postphenomenology builds on the philosophical tradition of phenomenology, but also diverges from it in a few significant ways. For example, postphenomenologists focus on issues of technological mediation, and often conduct concrete empirical case studies. Also, postphenomenology is strongly influenced by the American pragmatic tradition, especially in terms of its basic ontological commitments. With Ihde as postphenomenology's central proponent, many postphenomenological investigations use his works as a starting point. (p. 174)

phenomenological tradition of Husserl, Heidegger and Merleau-Ponty, Ihde seeks to explain how technologies alter our experiences as well as how we perceive and interact with the world. For instance, when we pluck an apple from a tree to eat it, our hands touch the apple, feeling it for ripeness, and bring it to our mouths. If the apple is out of reach, we might use a stick to knock the apple from the limb. The stick has come between us and the apple, and this is important because, for example, we do not know until we touch the apple whether it is ripe or not. We have no tactile sense of the apple on the tree; our experiences of the apple only occur after we have harvested it. In Ihde's language, the stick mediates our experience of obtaining the apple. The stick comes between us and the world.

Postphenomenology permits us to examine how technologies come between a person and the world, and thereby alter her experiences of the world. It focuses on particular human-technology relations and uses empirical analyses to investigate these relations (Ihde, 1990). Glasses, a common example used in phenomenological analysis, mediate our experiences: we see the world *through* the lenses of the eyewear. Over time, however, the glasses become part of the background, and the wearer no longer consciously considers or acknowledges that she views the world through the technology.

Ihde's postphenomenology seeks to remind us of the technologies/frameworks that mediate our experiences of the world around us. Further, his postphenomenology has twin normative goals that lead to the promotion of what he terms "phenomenological parity." First, Ihde incorporates reflexive accounts into his writing: he tells the reader who he is and how he has come to view things as he does. The postphenomenologist must insert herself into the analysis she performs, acknowledging her own position and perspectives as inseparable from her experience and pronouncements. This rhetorical move not only suggests to the reader the postphenomenologist's candor—perhaps lending her credibility for being open enough to speak in the first-person and accepting that the view is specific to her—but also the notion that her interpretation is one of many. Ihde does not present an objective view from without/nowhere; he makes his explanations personal, explicitly stating his own thoughts and ideas in first-person narration. Like un-disciplined philosophy of technology, Ihde's texts should remind readers that they have a part to play in interpreting technologies. These subjective interpretations mediate the relationships they, specifically, have with technologies, but they also reflect the kinds of relationships others have with technologies as well.

However, lest the postphenomenologist's audience dismiss her claims as overly subjective, Ihde employs a second normative element to his writing:

> being sensitive to postmodern criticisms of the 'metaphysics of presence,' Ihde does not rely upon biographical commentary to achieve self-reflective understanding. Recognizing that subjectivity is shaped significantly through specific environmental interactions, Ihde attends to the constitution of his own subjectivity through the use of the 'variational method.' (Selinger, 2006, p. 92)

The variational method (Ihde, 1993) supports the normative position that multiple perspectives, the ability to imagine/interpret an object, situation, or experience from more than one vantage point, are required to understand phenomena. The "variational method is a rigorous style of analysis that permits the phenomenologist to experience *Gestalt* shifts" (Selinger, 2006, p. 92). Ihde rejects the idea that there is only one way to observe, understand and explain phenomena. His variational method, coupled with his own tendency to situate himself in his analysis (thereby rejecting any objectivist view of the phenomena) allow him to achieve "phenomenological parity."

Vivian Sobchack (2006) emphasizes the pedagogical benefits of Don Ihde's writing, particularly his use of autobiographical references, everyday language, and seemingly simple examples. Whereas Heidegger, Marcuse and Ellul utilize generalizations regarding the effects of technologies on societies, clear aspects of their soft determinism, Ihde frequently begins his works with self-reflection and invites his readers to do the same. Such emphasis on individual experiences, a celebration of plural perspectives, however, comes at a cost. A wealth of experts expounding upon their topics of authority has so saturated our societies that any move emphasizing the importance of individuals' thoughts and experiences initially appears deflating: I thought this author would tell me something important, not ask me to come up with my own understanding of the situation! At the root of the classical philosophers of technology's arguments, however, lies an appeal to the individual as the ultimate epistemic adjudicator—an idea far from lost on contemporary philosophers of technology. For Heidegger (1979), each of us must seek the essences of *Dasein* and *Techné* in the hopes of escaping purely instrumental reasoning while finding meaning for ourselves of our own being-in-the-world. Marcuse (1991), too, stresses the importance of critical thought and modes of investigation that escape the one-dimensional thinking that embraces a very limited set of viewpoints. When Ellul (1964) calls for the dreamer to awaken, he reminds the reader that what follows applies to her and her life; he speaks to her directly.

It may be the scope and tone of these classical philosophers of technology that permits the reader to imagine the text in front of her as, somehow, for her and not about her. Their easy abstraction, moving directly to societies at large instead of concentrating on individuals (though each of these classical philosophers of technology directly appeals to the loss of individuality which has accompanied modern technological societies) bears the mark of storytellers trying to find common cores that all human-technology relationships share. Those positions, perhaps, needed fleshing out first because without them, the distinctiveness of our technological age remained concealed, simply part of the teleological "progress" of technologies and societies. Classical philosophers of technology like Heidegger, Marcuse and Ellul expose the importance of how humans interact with technologies, and that if we are not careful, we will fall victims to a technical rationality that only champions values like practicality, profitability and efficiency.

Although classical philosophers of technology wished to retain individuality and creativity in the face of technical rationality, they too often failed to engage the individual as interlocutor. Ihde's work builds off classical philosophy of technology (PoT), but as

Sobchack (2006) notes, he enters the discussion by placing his own life, perceptions and experiences as objects of investigation while simultaneously prompting his readers to do the same. His is a philosophy of technology for individuals, and non-experts, because he places the individual, whether the author or the reader, at the center of study by asking us to engage directly with the questions he poses—and he offers his own tentative answers to accompany our own without didactically prescribing us to see the world just as he does (Riis, 2008, p. 451). Ihde accomplishes this task by describing the relation between the technology and the person as an *embodiment relation* (Ihde, 1990, p. 72), and he uses the notion of *multi-stability*, similar to Husserl's *variation analysis*, to explain how each experience is situated and limited by the person doing the experiencing.

Looking 'Forward': Peter-Paul Verbeek's Philosophy of Technological Mediation

Peter-Paul Verbeek, in ways similar to Ihde, performs empirical research into particular technologies while mindful of the hermeneutical approaches of Martin Heidegger. He examines the role technology plays in human existence and in the relation between humans and reality. Like Ihde, Verbeek draws from personal experience—his family's encounter with ultrasound technologies—to elucidate his position that technologies play active roles in moral mediation, with humans as technologically mediated moral agents (Verbeek, 2011). Verbeek (2005, 2011), breaks from classical philosophy of technology and its 'backward-facing' view: it overgeneralizes and bases itself upon a false determinism where technologies drive societies and humans. Verbeek's philosophy of technological mediation proposes a 'forward-facing' view that better permits us to examine the active roles technologies play in mediating our experiences of ourselves and the world around us.

The notion of classical PoT as an enterprise looking "backward" has significant resonance when reading the likes of Heidegger, Ellul and Marcuse (and Jaspers, though this work will not focus on him specifically) as specific technologies, concrete examples, are referenced without much explicit examination of each kind of technology. Verbeek notes that

> [Jaspers and Heidegger] reduced technology to its conditions of possibility and then proceeded as if what they said about these conditions applied to technology itself. . . . In the style of transcendental philosophy, they tried to apprehend technology one-sidedly from its conditions of possibility. They thought 'backward,' reducing concrete technologies to nontechnological things such as 'technological things' or 'the system of mass production,' with technology itself, in the end, falling out of the picture. (Verbeek, 2005, p. 100)

On Verbeek's reading, classical philosophers of technology focused too much on the 'conditions of possibility' of the technologies rather than on the technologies, the things, themselves. His shift in emphasis to the artifacts themselves, performed through empirical research, as opposed to the conditions under which those artifacts were made possible, purportedly makes way for a kind of 'forward' thinking about technology (Verbeek, 2005). This 'forward' approach breaks from views of technology as

autonomous and deterministic, the overarching themes in classical philosophy of technology. Ultrasound, for instance, does not *merely* present us with a view of the womb and fetus. It transforms the fetus into a potential patient, makes the womb a site for intervention, and forces parents to become moral adjudicators of life yet unborn (2011).[73]

The 'forward' approach Verbeek favors also avoids some of the pitfalls of a view of technological development popularized toward the end of the twentieth century in Science and Technology Studies as social constructivism, in the social construction of technology (SCOT).[74] SCOT tends to take determinism in another direction, this time a variance of social determinism. The complexities of "relevant social groups," influenced by social factors, economics, political forces, etc., shape technologies in real and important ways that determine the future of the technologies (Verbeek, 2005, p. 102). As a foray into empirical studies of technological development, SCOT turns out to be another 'backward' looking program that seeks to reduce technologies to their social conditions.

Verbeek's technical mediation[75] eschews dystopian prognostication. As Steven Dorrestijn (2012) explains, "Verbeek's forward looking philosophy of technical mediation is not hostile to technology, but interested in the effects of technology that have shaped and keep transforming human existence, for better or worse" (p. 221). For Verbeek, humans and technologies are intertwined: it is not a matter of whether technologies are good or bad for humans because part of what it means to be human cannot be separated from technology use (2005, 2012). Whereas classical philosophers of technology like Heidegger (1979) search for the essence of Technology and look to the past to find societies that had 'better' interactions with technology in the hope of making current and future societies have more control over themselves and their world, Verbeek would argue that technology use is simply part of being human.

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[73] As Verbeek (2011) persuasively argues, the ultrasound requires parents to view the developing fetus as an object with enormous potential for change: indicators of 'defects' in the fetus require the parents to question whether they should considering aborting the fetus lest they bring into the world a "disabled" individual. It might even appear irresponsible for these future parents *not* to have such procedures performed, *not* to have the experience of pregnancy mediated in a manner previously unimaginable.

[74] For more on the SCOT program, see Wiebe Bijker's (1995) *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change*. Cambridge, MA: MIT Press. Also see the edited collection from Bijker and Law (1992): *Shaping Technology/Building Society*. Cambridge, MA: MIT Press.

[75] "Technical mediation denotes for Verbeek that human existence is always intertwined with technology. 'How the world appears to humans' and 'how humans act in the world' (perception of the world and action in the world) is always to a smaller or larger degree being constituted and transformed by technologies" (Dorrestijn, 2012, p. 220).

Verbeek's "forward looking" approach rejects what he labels "transcendentalist" classical views, and he instead sees mediation as "not simply something that happens to occur when technologies are used; it can have important social impacts, and therefore it deserves careful attention in practices of use and design" (Verbeek, 2012, p. 392). Although careful to avoid utopian perspectives on technology which held sway well into the twentieth century and have resurfaced in transhumanist movements (Dorrestijn, 2012), practitioners of philosophy of technical mediation presume that focusing on instances of particular technologies permits them to influence their use and design. In a sense, philosophy of technical mediation brackets off broader discussions of Technology as non-starters because such discussions rely on past evidence and examples that may or may not shed any light on current contexts.

Philosophy of technical mediation focuses on particular technologies, and the cultures and environments in which they develop, rather than viewing Technology as a fairly uniform phenomenon that has maintained a particular essence over the millennia. The point is to make us see technology as something that shifts and changes along with people, as opposed to technology and humans being determined entities separate from each other, one acting on the other in reciprocation but not symbiosis:[76]

> In the postphenomenological account of mediation (Ihde, 1993; Verbeek, 2005), the central idea is that [*sic*] entities are [*sic*] *constituted* in their mediated relation. Mediation then becomes the *origin* of entities, rather than a 'middle position' between them. In such a postphenomenological reading of the concept of mediation, the 'subjectivity' of human beings and the 'objectivity' of their world are the result of mediations. Mediating technologies are no 'intermediaries' that 'convey' specific aspects of the objective world to the minds of subjects; they are mediators that help to constitute what is real for us, and what we are in relation to that reality … Human beings and their world are the products of mediation, not its starting point. (Verbeek, 2012, pp. 392-3)

Humans become what we are, experience what we experience, only in relation to our environments and our technologies. Joseph Pitt's (1999) broad definition of technology as "humanity at work" is relevant here because he deems human endeavors, any of them, as instances of technology. A pertinent question for the philosophers of technological

[76] Ernst Mayr (2002) describes symbiosis as the

> mutual interaction involving physical association between 'differently named organisms.' The classical examples of symbiosis are the lichens, in which a fungus is associated with an alga or a cyanobacterium. At first considered quite exceptional, symbiosis was eventually discovered to be almost universal. The microbes that live in a special stomach of the cow, for instance, and provide the enzymes for its digestions of cellulose are symbionts of the cow. (xi-xii)

mediation, and one similar to those Pitt confronts,[77] is what separates humans from technology. If humans experience the world through our technologies, then is there a human experience without technical mediation? Such a question further highlights the need for un-disciplined philosophy of technology, one where questions of essences regarding humans and technology have no useful answers because they deny the co-contributing relationships, indeed, even the co-evolution, of humans and technologies.[78] The 'forward looking' perspective championed by Verbeek and followers of philosophy of technical mediation proposes an ontology that, seemingly, presumes human as a kind of cyborg. Heidegger, Ellul and Marcuse sought to describe, and perhaps even convey us back to, a world that is no longer possible (if it ever were), a world of clean divisions, where human and technological essences were more easily identified.

The tendency in phenomenology, and postphenomenology, is to provide ontological accounts based on our perceptions and experiences. We perceive and experience the world, nearly all of it, through technologies like eyeglasses, computer screens, car seats, desk chairs, clocks, GPS devices, televisions, etc. These technologies become part of the background of our experiences; we see/perceive the world through them. There is no world, for humans, without them. This perspective is unsettling for any who prefer neat divisions, clear essences, separating humans and technologies. Nevertheless, it does provide grounds for normative philosophical work regarding technological ethics. As Verbeek (2012) explains,

> For a technology to be 'usable'—in the Heideggerian sense of the word: ready-to-hand, perspicuous, embodied—it needs to allow for actions and experiences *through* itself. . . . Developing an explicit relation to the very ways in which our existence is mediated by technologies could even be an integral part of an ethics of technology, as I elaborated earlier [Verbeek, 2008] by discussing various ways to incorporate obstetric ultrasound in one's decision about antenatal diagnostics and abortion. (p. 394)

Verbeek (2008) rightly points out that when humans begin to think of health and well being in medical terms and through the lens of medical equipment, human perceptions of health, as well the possible actions/interventions related to health, change significantly.

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[77] See *Techné: Research in Philosophy and Technology* volume 5, number 1 for a variety of replies to Pitt's (1999) *Thinking about Technology.*

[78] In Chapter 4, I examine Lynn Margulis and Dorian Sagan's (2007) claim that

> Technology is a part of the human survival strategy, a prerequisite for human production and population expansion; it has extended our ability to sense and manipulate the environment that supports us. It has been with us from the time long before we were human beings—that is, from before there even were any *Homo sapiens* . . . . Any separation of humanness from technology is delusional; from before the beginning they were coupled. (pp. 77-8)

The terms we use, and the technologies that create, confirm and define such terms, shape how we see ourselves and our places in the world.[79] Rather than question whether we want such a perspective, or if we can change it, postphenomenological technical mediation merely presupposes it as part of the world humans inhabit. Once one supposes such a view of the world and humanity's place in it, then micro-analyses of technologies and practice-oriented philosophy of technology in general make sense as starting points for ethics and even epistemology. As Heidegger might point out, once a system and language to describe the system have been devised, there is nothing left but to use the language to describe the system. A lingering question remains, however, as to whether this postphenomenological technical mediation view, with its attendant ontology, should be preferred over, say, posthumanism or object-oriented ontology, a question I take up in Chapter 5.

Philosophy of technical mediation aims to influence both the use and design of future technologies by focusing on specific technologies and their emergence and effects rather than seeking to show how new technologies confirm or deny macro theories of Technology. As Dorrestijn (2012) explains,

> a forward-looking approach aims to describe phenomena at face value, without in first instance, looking for a confirmation of existing theory. It is attentive to effects that add new themes to the known repertoire. The approach is meant as a revitalization of the phenomenological dictum of *back to the things themselves*. After Don Ihde (1990) Verbeek calls the approach *postphenomenology*. Such an approach makes possible to see how technologies and humans exist together and acquire their characteristics from their mutual dependencies. Verbeek's forward looking philosophy of technical mediation is not hostile to technology, but interested in the effects of technology that have shaped and keep transforming human existence, for better or worse. (p. 221, emphasis in original)

As a set of guiding principles for technology designers and policy writers, technical mediation emphasizes the role that individuals can play in the creation and implementation of technologies. In some ways, it lets designers begin from the object itself—unfettered by macro theories that might bias them one way or another. The normative project associated with technical mediation, albeit on a piecemeal basis, has much to recommend it. Descriptions of human-technology interactions should be supplemented with directives for use and design. We shape our technologies, and our technologies shape us. Such co-determination may initially appear limiting, but accepting technology as part, and necessary to, human experience, also allows opportunities for the direct manipulation of the natural and social world.

Verbeek and Ihde both contend that postphenomenology, as a descriptive enterprise, acts as an antidote to technocracy, because technocracy, like hard determinism, can only occur when human behavior is shaped by technologies while people remain unaware that

[79] Once again, we should find echoes of Norwood R. Hanson's *patterns* and Thomas Kuhn's (1962/1996) *paradigms* in such claims.

technologies shape their lives (Riis, 2008, p. 452). From classical to contemporary philosophies of technology, the directive that individuals must perform more explicit considerations/deliberations and take more direct actions regarding technologies processes developments endures.

An Explicit Push for Connecting the Micro and Macro

Philip Brey (2006, 2010) identifies a limitation to contemporary philosophy of technology: the evaluation of the social consequences of technologies at a level that extends beyond micro studies has largely remained absent. Brey worries that too "many evaluations that take place in the field are *ad hoc*, with little theory behind it and much appeal to intuition. Claims are made, for example, that new technologies rationalize, enframe or commodify our existence and thereby harm the quality of life, with little substantiation of these viewpoints" (2010, p. 44). Postphenomenological works by Don Ihde and Robert Rosenberger (2008), as just two examples, provide analysis of human-technology relations, but these generally descriptive works often lack explicit normative claims. Brey's push for value-oriented theories of technology ask us to think broadly about general impacts that technologies have on societies, and move beyond micro analyses. In short, he echoes the impetus behind classical philosophers of technology like Ellul, Heidegger, and Marcuse. For Brey, Ihde's 'human-technology relations' are important, but we must also look at 'society-technology relations,' and this requires developing broader theories that encompass more than local instantiations of particular technologies. Brey explains that we need "methods for developing ethico-technical scenarios, which allow us to make reasoned predictions about which normative and ethical issues will or could arise with regard to new technologies" (2010, p. 47). Although I will take up such predictions specifically in Chapter 5 when discussing speculative ethics and anticipatory governance of emerging technologies, Brey's push for general value-oriented theories of technology serves as a bridge between contemporary philosophy of technology and Chapter 4, what I describe as "un-disciplined" philosophy of technology.

Brey (2010) contends that the scope philosophy of technology encompasses three general questions: "(1) What is technology? (2) How can the consequences of technology for society and the human condition be understood and evaluated? (3) How ought we to act in relation to technology?" (p. 43). Setting aside the first question, Brey regards contemporary philosophy of technology as ill equipped to answer the last two questions.[80] He (2010) argues that

> the task of philosophy of technology is to evaluate the consequences of technology relative to different types of values and standards of goodness and

[80] Brey (2010) distinguishes three distinct forms of philosophy of technology: engineering-oriented, society-oriented, and ethically-oriented (pp. 41-2). Though these three types certainly overlap, he makes clear that none, in their current manifestations, can capably deal with macro questions that help guide humans in our interactions with technologies and the non-ethical values that arise from our relationships with our technologies (p. 43).

> badness, rather than merely concentrating on *moral* goodness or badness. Social consequences are not just good or bad for moral reasons, but may be so for other reasons as well. (p. 43).

Brey uses an example of recent consumer trends to show that contemporary PoT lacks a normative framework for evaluating non-ethical values: buying more products online causes fewer people to travel into city centers to make purchases and thus, potentially, "[lessens] social cohesion in cities" (p.43). Social cohesion, for Brey, is an important value that our technologies should promote, and he wants a philosophy of technology with a sufficiently broad theory—encompassing cultural, social, political, environmental, and economic aspects—that can make normative pronouncements on the kinds of trends that result, in this instance, from commerce moving online.

In a move classical philosophers of technology would applaud, Brey makes clear that the shift to micro studies has left general trends enabled by recent technologies unaccounted for in the philosophy of technology literature. The contemporary philosopher of technology's zeal to provide nuanced analyses of particular artifacts and systems, and their relationships with humans and environments, leaves too many important questions unvoiced, unacknowledged, and therefore unappreciated.

> We need a philosophy of technology that heeds everything of value, and that is able to distinguish between different positive and negative consequences of technology and provide reasons why they are good and bad. Such a philosophy of technology would be able to distinguish between the different values that play a role in social issues and problems that involve technology and weigh them up against one another. (Brey, 2010, p. 43)

Brey's push for value-oriented theories of technology asks philosophers of technology to think broadly about the potentials and realities our use of technological systems. Although Ihde's 'human-technology relations' remain important, PoT must also look at 'society-technology relations,' and this will require developing broader theories. Brey explains that we need "methods for developing ethico-technical scenarios, which allow us to make reasoned predictions about which normative and ethical issues will or could arise with regard to new technologies" (2010, p. 47), and that will require a new/reimagined approach to philosophy of technology. The un-disciplined philosophy of technology I propose in the next chapter seeks to directly address the types of questions and normative agendas that Brey convincingly argues we desperately require.

Conclusion: After Contemporary Philosophy of Technology

In more recent work, Brey (2012) develops his own anticipatory ethics for emerging technologies, and I will return to this idea in Chapters 4 and 5.
Philosophy of technology needs speakers espousing a variety of normative positions regarding technological developments (both specific cases and general trends that have widespread impact), and these normative agendas should be fully elucidated in a manner that is comprehensible to more than academic audiences. For philosophical discussions of

technology to become more open and democratic (as opposed to top-down dictates from policy writers and other technology elites), then these discussions must be more than academic affairs. As Albert Borgmann (2005) remarks, "that humanity and reality interact and shape one another is a truism," so philosophers must move beyond this truism and get down to the investigation of just how humanity and reality interact and shape each other. To do so, more voices than those of academics, technologists, and policy writers need to be engaged, a notion that has driven Science and Technology Studies (STS) since its inception in the 1970s.

A pluralistic view of the world encourages individuals to explore other cultures and their concomitant values, but that same pluralistic perspective offers little to aid us in normatively evaluating these often conflicting practices and values. Which values should we prize? One scheme to answer such a question stems from examining and assessing the technologies that have been constructed by these societies. Un-disciplined philosophy of technology, what I will argue in Chapter 4 is one normative arm of STS, involves just such investigations. It incorporates the broad topics that Brey suggests must be addressed, but it also embraces the call from Wittkower, Selinger, and Rush (2014) to make philosophy of technology a more accessible, flexible, and timely activity. Popular press writers like Ray Kurzweil, Kevin Kelly, Jaron Lanier, and Evgeny Morazov make inroads into making philosophical discussions of topics raised by current and emerging technologies part of everyday, non-academic discussions. To move philosophical reflection, particular normative agendas, forward, philosophy of technology must become, at least in part, un-disciplined.

Chapter 4: Un-Disciplined Philosophy of Technology

Philosophy of Technology Un-Disciplined

Un-disciplined philosophy of technology (UPoT) builds on the critical tradition of *classical philosophy of technology* and proposes actions and ways of being in the world[81] that will move individuals, singly and collectively, toward improved lives. "Improved lives" is a phrase frequently employed by academics, marketers of particular technologies, and a host of others trying to curry their audience's favor. In this chapter, I attempt to elucidate just what an 'improved life' entails, although I am critical of simple descriptions like making our lives: easier, more democratic, or more financially robust. These characteristics of the 'Good Life' seem full of promise but empty of specific content.

I will investigate what thinking deeply about technology in a *classical* way, and in a contemporary setting, will get us and how it might inform the 'Good Life' now and moving forward. In doing so, I argue that we must critically engage that common phrase, 'the good life,' and ask, particularly, how narrowly or broadly we wish to define the word 'life.' If we do, our investigations may propel us toward a posthumanist idea of 'life,' one biologist Lynn Margulis (2007) and her usage of symbiosis might condone, that acknowledges the co-dependence of humans on the vast array of things/objects. Object-oriented ontology (Harman, 2005), for instance, flattens ontology—all things equally exist (Bogost, 2012)—and though such a narrative still implies that humans have importance, its social implications push further: objects (people included) can be differentiated, but they exist in networks populated by (far outnumbered by) many other objects. What is the 'Good Life' for humans in relation to these other objects?

A first step to understanding the question requires an acknowledgment of the importance of the nonhuman. It requires seeing the cohesion of the biota (Margulis and Sagan, 2007) and decentering the human. Such an attitude removes the person—or even *people* generally—as the lone focal point of our questioning about the 'Good Life,' and places a collective—dependent on all other *things*—in its stead. Individuals and groups/cultures still matter, but acknowledging our shared experiences can have profound political and economic consequences. Considering technologies from a collective/communal perspective means philosophers of technology must grapple with questions about politics, economies, and social groups (Morozov, 2015). Technologies do not arise from or exist in isolation, and the techno-human relationships that they enable have remarkable depth and breadth. Un-disciplined philosophy of technology (UPoT), then, should speculate on

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[81] Edmund Husserl's *Logical Investigations,* Volumes 1 and 2 (1900, 1901/2001) and Maurice Merleau-Ponty's *Phenomenology of perception* (1962/2012) use similar phrases, but my own usage departs from theirs. In my work, this phrase describes an integrative approach, mindful of historical and social factors, that asks audiences to think deeply about human-technology relations as they are now and could be in the future.

the future—what directions we, humans and nonhumans should take—as much as it critically examines the present.

Philosophers of technology cannot wait to make 'end of the day' pronouncements as more traditional philosophers may. To evaluate trends, developments, and concrete cases as they occur entails moving from the 'ideal situations' of traditional philosophy into the messy, and often unclear, scenarios whose best outcomes are murky. *Contemporary philosophy of technology*, I argue, follows too closely to the style of traditional philosophy: it is too rule-bound (e.g., Ihde's (1979) *Technics and praxis*), too impenetrable (e.g., Latour's (1993) *We have never been modern*) and too closed-off to ideas and styles of performance that will engage non-academics or non-engineers (e.g., Peter-Paul Verbeek's (2005) *What things do*). Though the styles of expression differ, philosophy of technology (PoT) frequently draws from and is informed by traditional moral philosophy, and the UPoT I promote incorporates value judgments into its analyses.[82] Un-disciplined philosophy of technology breaks from traditional academic philosophy in its style of presentation and, in some ways, its content.[83] Un-disciplined philosophy of technology investigates and takes normative positions on particular technologies and their concomitant values, like automated farming through GPS-enabled machines, and robot-assisted surgery, but it connects those particular cases to broader themes and issues that transcend individual circumstances and technologies.

UPoT draws directly and indirectly from Science and Technology Studies (STS) work and ideas. It can be local and practical or global and theoretical, but I see it as meta-STS in important respects. Philosophy of technology provides a backbone to STS work by giving STS practitioners the means to offer normative claims despite the seemingly tentative nature of the findings that result from individual cases. The un-disciplined philosophy of technology I envision acknowledges Hume's problem of induction, and the difficulty of moving from an *is* to an *ought*, but it is not defeated by these problems. Rather than retreat to the investigation of non-replicable individual cases as further, yet

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[82] By 'moral philosophy' I mean thinking about the human values that we impose on our technologies and which are reflected back to us in our artifacts and systems of artifacts, as characterized in works like Feenberg's (1995) *Alternative Modernity*. Philip Brey (2010) employs the phrase "ethically-oriented" philosophy of technology to describe work specifically emphasizing ethical values, but acknowledges that far more values deserve attention than simply ethical, goodness vs. badness, values (pp. 41-2). He articulates the need for more general value-oriented theories of technology, and the un-disciplined philosophy of technology I promote here seeks to address this value-oriented category of philosophy of technology that I argue already has its roots in *classical philosophy of technology*.

[83] For instance, it integrates ways of performance made possible by recent technologies, like the ability to mix audio, images, and video with prose, in order to show more robustly how these ideas play out in our experiences and the worlds we build through our technologies. Moral philosophical ideas will, however, still inform the PoT I describe, buttressing its normative positions.

insufficient, evidence of certain theories or existing situations, or ways to be in the world, un-disciplined philosophers of technology remind their audiences that any decision, like no decision, has repercussions. The *ought* is derived from investigation of cases and applications of theories, but the *ought* is tenable. Debate and adjudication, at the heart of the UPoT I promote, helps individuals and collectives (cultures, societies, political regimes) evaluate the *ought* particularly for discussions of present and emerging technologies.

For instance, un-disciplined philosophers of technology like Kelly (2010) and Kurzweil (2005) promote varieties of post and transhumanism that inextricably link technology and humans. Traditional philosophy (Rescher, 2006) requires explicit distinction and demarcation such that, at the very least, an identity distinction (pp. 27-9) between humans and technology can be made. Post and transhumanists, however, draw no sharp divisions of this sort. Even *contemporary* philosopher of technology Peter-Paul Verbeek argues that part of what it means to be human cannot be separated from technology use (2005, 2012). Whereas classical philosophers of technology like Heidegger (1979) search for the essence of Technology and look to the past to find societies that had 'better' interactions with technology in the hope of making current and future societies have more control over themselves and their world, Verbeek would argue that technology use is simply part of being human. Un-disciplined philosophers of technology would certainly concur.

UPoT tells stories, constructs narratives and, in so doing, directly challenges our current conceptions and proclivities, habits and practices. Un-disciplined philosophers of technology present their claims to the vast collection of interested interlocutors—and endeavor to bring more into the fold. Making philosophy of technology more accessible to non-academics (Wittkower *et al.*, 2014; Frodeman and Briggle, 2014, 2015), entails inviting the uninitiated to delve into subjects of which, by academic standards, they lack formal training, and to engage non-philosophers, including sociologists, economists, and political scientists—the realm of Science and Technology Studies. In an age that offers much of the world's inhabitants unprecedented, and nearly instantaneous, access to ideas, arguments, and evidence to lay publics, un-disciplined philosophers of technology must engage with the various audiences that, increasingly, have much to say about scientific and technological changes, in no small part because these changes lead to broader economic, social, and political consequences. Undaunted, as Robert Frost's (1979)[84]

[84] I employ Robert Frost's "The Road not Taken" here for two reasons. First, the idea of philosophy of technology at a crossroads conveys a notion that Wittkower *et al.* (2014) have recently sought to make more visible, and represents one aspect of the impetus for my own work. Second, Frost's direct diction, unencumbered by highfalutin flourishes, invites the reader to enter a metaphorical space, as grandiose or quotidian as she likes, both evocative and transparent: we humans have all had to make decisions that leave one path in favor of another, and how we choose that path necessarily impacts how we traverse it. Un-disciplined philosophers of technology confront a decision not nearly as stark as Frost's narrator's, for perhaps UPoT can course through multiple 'ways' of communication. Yet the decision to write and perform for broader audiences than academic ones reveals a conscious and bold decision to eschew the academy as sole

narrator in "The Road not Taken," un-disciplined philosophers of technology must alight down the path wanting wear, though certainly others have already traversed it. UPoT practitioners must trust the imagination and daring of lay publics to connect with their speculations about the 'good life.'[85]

To reach and influence broad audiences, philosophers of technology must not only transcend the narrow confines of academic practices like academic papers and presentations, but also re-assess the values they wish to promote. Such a journey requires a reassessment of the modes of transport, the manners of communicating ideas, and forces its travelers to inquire just what, exactly, they want their work to accomplish. For un-disciplined philosophers like Kevin Kelly, Ray Kurzweil, Jaron Lanier, and Evgeny Morozov, the answer is clear: they ask their audiences to shift their perspectives, to see the world and their places in it in ways they had not previously imagined. In that sense, un-disciplined philosophy of technology owes much to its *classical philosophy of technology* roots.

A subset of philosophers of technology will need to change their current professional practices— styles of writing/presenting, as well as interactions with audiences outside of single disciplines, perhaps even those not affiliated with any particular discipline—if their ideas are to transcend a sub-discipline of philosophy (Wittkower, *et al*. 2014, Frodeman and Briggle, 2014). PoT should provide its audiences with the means to examine human-technology relations as these associations influence nearly every aspect of our lives in the West. Human values are affected by these technologies, and philosophers of technology are well positioned to offer their insights on, and evaluations of, these changes.
Un-disciplined philosophers of technology have already begun making this possible, and in this chapter, I will highlight some of the strategies and ideas that philosophy of technology should incorporate.

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arbiter of her ideas and arguments. There will be career consequences; they need embracing.

[85] "And both that morning equally lay / In leaves no step had trodden black" (Frost, 1979, 11-12). However trite, the metaphor of philosophy of technology in the early twenty-first century as temporally located, positioned at the start of something new, inspires my thinking. *One* branch of philosophy of technology, UPoT—itself a normative limb of Science and Technology Studies—has the potential to make the kind of public philosophy that Frodeman and Briggle (2014) clamor for a part of the reflective habit and practice of anyone interested, no formal expertise required. It evokes Langston Hughes's dream *not* deferred: it neither festers nor stinks; it is realized. If we do not find inspiration in such metaphors, we should try again. Looking to an economic, political, or social system to produce and curate our values for us cedes individual creativity and influence to E. M. Forster's (1909) machine, an idea so abhorrent to *classical philosophers of technology* like Ellul (1964), Heidegger (1978), and Marcuse (1991) that much of their work aimed to dissuade everyone from taking such a path.

Confronted with a topic—technology—so far-reaching, it is tempting for philosophers of technology to specialize, examining single instances of particular technologies rather than the general trends and values that those technologies enable. The empirical turn in philosophy of technology clearly illustrates this approach.[86] Although the empirical turn has spawned myriad monographs and articles, the turn to the micro has not illuminated the macro; namely, the vast and expanding human-technology relationships and their attendant values.[87] We should examine the values and ethics that the use of technologies promote rather than passively taking on the values and ethics embedded in the technologies themselves. Philosophy of technology should help audiences to confront and evaluate their own tendencies and leanings on topics like the increasing automation of agriculture and medicine (topics I take up in Chapter 5). The goal should not only be to convince people to think a certain way about an issue, but to give them the toolset they need to evaluate topics and come to their own conclusions with a robust understanding of what is at stake, now and for the future, in mind. Reflecting on technologies, then, entails reflecting on the kinds of social, economic, and political structures that will best provide for humans and nonhumans.

Robert Frodeman *et al.* (2012) ask how the nature of philosophical arguments changes when philosophers are not the only audience for their work (p. 8). Un-disciplined philosophy of technology offers fertile ground for such a metaphilosophical question because arguments and theories proposed by academic philosophers of technology are taken up by non-academic philosophical writing on technology (Kelly, 2010; Lanier, 2011). These non-academic writers on technology are *un-disciplined:* their writing and presentations do not fit neatly into academic disciplines like philosophy, sociology, computer science, or economics, yet their work touches on the themes in these disciplines and beyond. Indeed, these works might not even be *interdisciplinary*: they do not attempt to unify multiple disciplines into one project (Klein, 1990; Frodeman, 2010; Davis, 2011). Instead, these authors write with the authority and expertise garnered from working in a variety of arenas, and their reflections transcend single, or even multiple, fields of study. Katherine Hayles, Kevin Kelly, Jaron Lanier, Evgeny Morozov, and Ray Kurzweil ruminate on how things (technologies, processes, ways of being and thinking) hang together[88] and whether or not they lead humans to the 'good life.' Further, they

[86] A good example of this trend occurs in *Techné: Research in Philosophy and Technology* volume 15, number 3 through the analysis of dissection and computer-assisted (simulated) dissection by numerous authors including Borgmann, Ihde, Friesen and Rosenberger.

[87] Human-technology relations impact all individuals and societies, not just those creating and governing the implementation of technologies, but also the people that use the technologies.

[88] I intentionally borrow this phrasing from Wilfrid Sellars's (1962) "Philosophy and the scientific image of man."

articulate visions of the future worlds we are making along with the technologies and people that populate those worlds. Because they are *un-disciplined*, these writers do not limit their analyses to specific technologies; they envision the economic, social, and/or political implications that emerging technologies could bring.

Outside Academic Authority

In this section, I present ideas from unlikely sources. The preceding chapters have led me to contend that *contemporary philosophy of technology's* empirical turn has, for all its insights and utility, left underdeveloped the broader relationships and values that provide the background from which to view our current state. In Chapter 5, I will delve into specific technologies—automated farming and genomic engineering—and offer an image of them as instances of ethical and value offload—giving decision-making duties to our machines/technologies. These instances will further exemplify the need for more direct engagement with speculative ethics and anticipatory governance of emerging technologies. Before I get there, however, I need to show how the un-disciplined philosophers of technology I so revere have led us to the point where such conversations, debates, and conciliations are necessary.

The unlikely sources that flesh out this chapter exist at the peripheries of philosophy of technology (if edited volumes like David Kaplan's (2009) *Readings in the Philosophy of Technology* offer markers from which to judge). Nevertheless, akin to *classical philosophers of technology*, the un-disciplined philosophers of technology I describe here gather their objects of study from experiences within academia and without, from within fields like engineering and literature, and from business. UPoT's subjects transcend single disciplines; so do its practitioners. Like poets and fiction writers, perhaps even like the public philosophers to which Robert Frodeman and Adam Briggle (2014) aspire, the narratives of un-disciplined philosophers of technology critique, commend, and even promote certain social, economic, and political ends.

Visioneering[89] the Singularity

[89] Cabrera, Davis and Orozco (2015) explain that

> The neologism "visioneering" encompasses two main concepts: that of the "visionary" on the one hand, and that of the "engineer" on the other. When these two concepts are combined, they embody the hybrid nature of visioneers, i.e., individuals or groups of individuals that actively engineer a clear vision they have about the future (Kim and Oki, 2011; McCray, 2012). This active engineering involves the skillful direction and creative application of scientific and technological principles to the development of novel processes, structures, and equipment, as well as social institutions, movements, and frameworks.

Ray Kurzweil[90] serves as Google's Director of Engineering (Dillow, 2012), a post that enables him to directly influence one of the world's leading companies in technological development. His most prominent proclamation may be the coming *singularity*. For Kurzweil, the singularity represents "a future period during which the pace of technological change will be so rapid, its impact so deep, that human life will be irreversibly transformed" (2005, p. 7). Whether or not one wishes to believe in his proclaimed singularity, or that it even approaches, his current position at Google, a company with worldwide impact, enables his ideas to penetrate societies through the designs and devices he oversees.[91] Through impressive book sales, television appearances, and the advent of his Singularity University,[92] Kurzweil represents the most (in)famous un-disciplined philosopher of technology. Although his work has found its way into academic philosophy of technology texts,[93] his ideas stretch the boundaries of academic philosophy of technology. Philosophers of technology need not agree with Kurzweil, but his agenda, and his funding, require attention for the specific values that

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[90] Kurzweil combines a rare blend of technical ability and public performance. In addition to his five national best-selling books and numerous public appearances, he is

> the principal inventor of the first CCD flat-bed scanner, the first omni-font optical character recognition, the first print-to-speech reading machine for the blind, the first text-to-speech synthesizer, the first music synthesizer capable of recreating the grand piano and other orchestral instruments, and the first commercially marketed large-vocabulary speech recognition. (http://www.kurzweiltech.com/aboutray.html)

[91] Indeed, Kurzweil's claims about the ability of humans to 'download' our minds or consciousness into some mixture of computer hardware and software programs are challenged from a variety of angles. Katherine Hayles (2011), another un-disciplined philosopher of technology, disputes his claims explicitly, and I review her refutations later in this chapter.

[92] Cabrera, Davis and Orozco (2015) note that

> Singularity University (SU) is not a traditional University where students matriculate and graduate; rather the model is one in which for a period of two months a graduate program is run in which students attend talks by appropriate experts about different converging technologies, do site-visits to core places in the region of Silicon Valley, and engage in a project that aims to bring together their learning outcomes with visions of how to positively change the world. http://singularityu.org/

[93] His essay "21st Century Bodies" appears in *Readings in the Philosophy of Technology*, vol. 2, edited by David Kaplan (2009).

his work promotes as well as his rhetorical maneuverings that place him as a key contributor to the burgeoning Transhumanist movement.[94]

Kurzweil, and transhumanists in general, envision a future where commonly held notions of the *human being* require adjustment, ushering in the era of the *posthuman*. The recent "Technoprogressive Declaration" in 2014 makes clear that a variety of stakeholders, from academics,[95] to engineers, to political advocates, have serious intentions of making "augmented" humans a reality in the coming years (Hughes, 2014):

> It is time for technoprogressives, transhumanists and futurists to step up our political engagement and attempt to influence the course of events.
>
> Our core commitment is that both technological progress and democracy are required for the ongoing emancipation of humanity from its constraints.

Given the subtitle of Kurzweil's (2005) *The Singularity Is Near: When Humans Transcend Biology*, and the sentences quoted above, a shift in understanding of the *human being* is well under way in some circles. The implications of this shift are immense, and they raise of number of ethical and value-oriented dilemmas regarding how we wish to plan/augment/implement the future of life and intelligence on this planet. Kurzweil's wish for humans to transcend biology, and the technoprogressives' desire to "emancipate humanity from its constraints," reflect a faith in technological progress, and its potential, that rivals many religions. Publishing best-selling books, one of Kurzweil's strengths, places him on the radar of audiences all over the world, and his post at Google sets him up to influence the experience of technology for hundreds of millions, if not billions, of people.

Academic philosophers of technology may not want to have such broad influence, but in their absence, Kurzweil, and other un-disciplined philosophers of technology, come to

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[94] A fine introduction to the transhumanist and posthumanist movements can be found in *Post- and Transhumanism: An Introduction* (2014), edited by Robert Ranisch and Stefan Sorgner. Further, Davis (2015a), MacFarlane (2014), and Riggio (2015), all offer critical examinations of the above text, as well as posthumanism and transhumanism more generally.

[95] Carl Elliot's (2014) review of Steve Fuller and Veronika Lipinksa's (2014) *The Proactionary Imperative: A Foundation for Transhumanism* offers a conservative check to the optimism of transhumanists in general. Elliot argues that transhumanist notions of human augmentation fail to acknowledge adequately the very real experimenting that must be done on human subjects as well who the potential beneficiaries of such technologies will be—read: the poor will submit to testing for monetary concessions but the wealthy will be the first who actually receive such augmentations as the price will, initially at least, exceed the incomes of all but a minority. For a lengthier and more scathing review of Fuller's own transhumanist leanings, see Robert Frodeman's (2015) "Anti-Fuller: Transhumanism and the Proactionary Imperative."

dominate current lay discussions. As Wittkower, *et al.* (2014) conclude, academic philosophers of technology must seek to engage broader audiences, and that involves, among other options, publishing in outlets beyond traditional peer-reviewed journals, for practitioners to connect with lay audiences and influence conversations, ideas, and policy.

For instance, emerging technologies related to genomic engineering demand immediate engagement for the development of these technologies continues whether academic philosophers of technology participate or no. Recent reports that Chinese scientists have managed to use genomic engineering to "edit" human embryos makes such a case one that demands critical attention (Cyranozski and Reardon, 2015). *Classical* philosophers of technology, like Jacques Ellul (1962) and Herbert Marcuse (1991), sought to influence societies, raising awareness of the values that developing technologies promoted and embodied. Un-disciplined philosophers of technology have different agendas than their *classical* forerunners, but the need to address the values and shifts in paradigm that emerging technologies promote remains a common core. *Classical PoT* and UPoT share a variety of technological determinism, but that does not diminish the critical reflection they promote regarding the kinds of relationships—individual, social, economic, even political—that we should have with technologies. In Chapter 5, I will discuss the need for more voices in the speculative ethics and anticipatory governance of emerging technologies, but the point here is that un-disciplined philosophers of technology already engage lay audiences precisely because they court them without recourse to academic journals and monographs that reach rather limited numbers of readers.

The nearly impenetrable prose of Martin Heidegger (1979, but really any work of his would do as a citation here) certainly requires readers to grapple with important ideas, but it hardly makes itself approachable to those unfamiliar with/uninterested in dense academic writing. Kurzweil (2005), on the other hand, offers a narrative that is comparatively easy to follow, allowing his readers to come away with the gist of his proposals and programs: ever-advancing technologies—and his notion of technological development as exponential buttresses his argument—will be able to address any problem our planet (humans included) faces in the future. If we should learn anything from current debates over anthropomorphic climate change, it is that lay publics—in the U.S.A., at least—do not wish to change their habits as much as they wish for developing technologies to fix current problems without requiring us to do anything more than buy a different kind of device (e.g., a more fuel-efficient car, a more energy-efficient appliance, etc.). Kurzweil does not ask his audiences to delve into deep philosophical tomes to wrestle with the issues of developing technologies that have the potential to transform their understanding of what it means to be human in the twenty-first century. Despite the length of his books (his 2005 work exceeds 600 pages), his sound-bite sized proclamations travel well. His narratives offer compelling and provocative story-telling, helping him to reach broad audiences.[96]

[96] Wittkower, *et al.*, (2014) as well as N. Katherine Hayles (1999, 2012) seek to push the boundaries of philosophical thought and discussion over emerging technologies. Their work attempts to make topics from philosophy of technology accessible to audiences like those that read *Wired* magazine and watch TED Talks—affluent though they may be (in

Kurzweil wants to live to see his so-called *singularity* come to fruition, and by aligning with Google, he has expanded his sphere of influence to help him reach his goals.[97] Making a case for public infatuation with transcending human biological limits through technologies needs no footnotes, but it does require assessment by those trained to make and/or adjudicate normative evaluations, like philosophers of technology specifically, and Science and Technology Studies practitioners more broadly. In short, by considering the work of Ray Kurzweil in an academic dissertation, I argue that such projects, speculative though they may be, deserve serious attention by philosophers. Speculative ethics of emerging technologies, for instance, allows for the possibility of anticipatory governance (Davis, 2015b) related to projects like those proposed by Kurzweil at Google (Cadwalladr, 2015). In an age that places so much emphasis on transparency, we need intellects that unveil the normative, political, and social agendas of these visioneering projects. Otherwise, the marketing campaigns tied to emerging technologies will exert greater and greater influence over lay publics: more proprietary cheerleading, less public engagement and oversight.

The Technium: Kevin Kelly, Coevolution, and Human-Technology Symbiosis

> We are not the same folks who marched out of Africa. Our genes have coevolved with our inventions. . . . Technology has domesticated *us* [emphasis added]. As fast as we remake our tools, we remake ourselves. We are coevolving with our technology, and so we have become deeply dependent on it. . . . We are now symbiotic with technology. (Kelly, 2010, p. 37)

Kevin Kelly[98] and Ray Kurzweil, technological innovators both, aim to influence public opinions regarding the potentials of emerging technologies and how we humans should

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other words, if not the broad masses—with varying levels of education—then certainly those interested enough in the topics to seek out writing/performance of the ideas and criticism emerging technologies lead us to). These un-disciplined philosophers of technology seem to realize that consumers of academic texts must not be the sole target audience for philosophical reflection on human-technology relations.

[97] I want to emphasize that whether or not my readers—academics all—see Kurzweil's vision as feasible, possible, or even enticing entirely misses the point. Like work in genomic engineering, the mere potential of a *singularity* should spur philosophers of technology to consider and critically examine the implications such a breakthrough would have on humanity, life, and our planet as a whole. Failing to do so relegates philosophical engagement to issues and agendas that have already come to pass. Once again, the Collingridge dilemma (1980) reminds us that the time for inspection of and action on emerging technologies demands vigilant oversight.

[98] I make no comparisons between Ray Kurzweil and Kevin Kelly, cofounder of *Wired* magazine, regarding who is more influential, widely read, etc. Instead, it suffices to note

view and engage them. Similar to *classical philosophers of technology*, they examine broad classes of technologies, largely unconcerned with demarcating and differentiating what counts as technology, or on what level it mediates our relations with our environments. Instead, they propose a long view—as the epigraph from Kelly, above, evinces—that attempts to describe how cultures, and humans generally, have and will change as we embrace ways of living that increasingly rely on technologies for their procurement. In particular, Kelly (2010) asks his readers to imagine technologies as necessary for humanity's continued survival—the last line of the above epigraph removing any doubt about Kelly's view of the significance of technology for humans.

Kelly and Kurzweil have no illusions about humanity making a break with our fascination and reliance on technologies to return to some utopian (mythical) Greek life (Heidegger, 1979). Nevertheless, Ellul (1964), Heidegger (1979), and Marcuse (1991) share a technologically deterministic view with Kelly (2010) and Kurzweil (2005), opposing sides of the same coin. Where the first group finds evidence of dystopian nightmares—humans as rationally calculating, insipid, and unimaginative creatures—the second perceives immense potential for transforming the human into something far greater than we are now. Kelly and Kurzweil do not fear that human dependence on technologies implies decadence, a further fostering of Marcuse's *one-dimensionality*. Instead, they take our reliance on technologies as somewhat banal, like me explaining to my readers that I type this work on a computer/keyboard: how else would the words appear on the page/paper in front of them?

Rather than technologies separating humans from our essences, those attributes and characteristics that make us human and everything else nonhuman, they fully embrace the symbiosis of humans and technologies, neither able to exist without the other. There is no mythical past to return to or pine for because humans do not, and would not have, flourished without technologies. Theirs is an optimistic determinism, and though I argue here that it should be tempered and augmented with a strong dose of social constructivism, their enthusiasm and methods of engagement with broad publics, particularly their abilities to produce compelling narratives, make them valuable interlocutors.

Like *classical philosophy of technology*, Kelly's (2010) work utilizes contemporary technologies for his examples, and draws from those examples broad pronouncements about the direction humans should travel to make our lives and our world better. Kelly's techno-optimism stands in stark relief against the dystopian futures imagined by *classical* philosophers of technology, but they all share the idea that technologies have, and will continue to have, increasing influence over all life on this planet. Like *classical* philosophers of technology, Kelly imagines the reach of technology to have few, if any, limits. Unlike *classical* philosophers of technology, however, Kelly does not see the spread of technology as a yoke that harnesses humanity to a one-dimensional, techno-

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that Kelly is also a best-selling author, digital pioneer, and self-proclaimed "radical techno-optimist" (Kelly, 2015).

rational, uninspired, and mundane life. Rather than make technology some 'other' against which humans must carefully distinguish ourselves, Kelly—like Katherine Hayles (1999, 2012), Lynn Margulis and Dorian Sagan (2007), and Francesca Ferrando (2014)—incorporates a posthumanist[99] view that humans and technologies evolve together, neither without the other. Although Kelly might not accept the label 'posthumanist,' his work echoes Katherine Hayles's (1999) pronouncement that by embracing various technologies to communicate, work, play, and, broadly, live our lives, we have already become posthuman.[100]

Classical philosophers of technology would have viewed such an idea as evidence of humanity's failure, a form of submission to techno-rationality, but perhaps that highlights the failure of their own essentialism, their desire to maintain clean divisions between humans and everything else. By embracing the communal symbiosis of all life, posthumanists, and I include Kelly in this category, can direct their attention to promoting different forms of engagement between humans and technologies, between living and non-living things. Just as Peter Singer's *Animal Liberation* (1975/2001) propelled animal rights movements that called into question human attitudes toward and uses of animals, from scientific testing to food consumption, Kelly's championing of the posthumanist posiiton that technologies have evolved with humans, indeed even made possible the beings that we are today, permits us to shift how we think of human-technology relations. Like Singer, Kelly's work attempts to give voice to those that we humans do not consistently think of as having a voice, and speaks to social and political positions that embrace difference. Kelly, like Kurzweil (2005), asks his readers to contend with ideas like coevolution and symbiosis, and he challenges his audiences to imagine themselves, and the world of living and non-living objects all around us, in ways we had not previously. In that sense, these authors bring some of the social and political implications of Harman (2005) and Bogost's (2012) object-oriented ontology to more diverse audiences.

In an important respect, Kelly's notion of coevolution echoes Don Ihde's (1993, 2009) idea of "multistability" that arises from his "variational method" discussed in Chapter 3. The 'multistable variation' (Ihde, 2009) incorporates multiple perspectives to

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[99] Although I do not have space to enter the lengthy debates regarding the differences and similarities between posthumanism and transhumanism, see Ranisch and Sorgner (2014) for more specific overviews and analyses, MacFarlane (2014) provides a helpful sketch:

> While transhumanism is generally considered an intensification of Enlightenment humanist thought, guided by a belief in reason, individualism, science, progress, as well as self-perfection or cultivation, posthumanism has emerged as a popular umbrella term typically used in reference to an eclectic variety of perspectives that together reject humanisms basic concepts and values. (p. 52)

[100] The narrative of the posthuman, itself a story *classical* philosophers of technology likely would have abhorred, well serves Kelly's argument about coevolution, and it enables him to write a book that investigates what *technology* wants.

imagine/interpret an object, situation, or experience from more than one vantage point, which could be extended to perspectives beyond the human. Kelly's insistence that technologies have some sort of agency (even the title of his 2010 book, *What Technology Wants*, clearly gives intentionality to technologies) allows us to imagine what that agency entails and how far it might extend. Popularizing complicated theories, like multistable variation, requires a thinning out of the language, making it both accessible to broader publics, but also making it applicable to their daily lives. For Kelly's ideas to take hold in those not accustomed to reading academic philosophy, the ideas require a kind of translation. In a strict sense, accepting multistable variation does not lead directly to ideas about coevolution, but if one first acknowledges coevolution between humans and technologies, then enquiring into the perspectives of those other objects/things/technologies seems only to improve our understanding of the vast connectedness of all things. Transhumanist Melanie Swan's (2015) "We Should Consider the Future World As One of Multi-Species Intelligence" argues that a future where machines record everything, granting them "perfect memories," offers us "fourth-person perspectives" that extend beyond what we humans can perceive and recall. Such technologies might serve as extensions of human memory, but they also represent a nonhuman that mediates human interactions with other humans, nonhumans, and the world in general.

I take Swan's idea of a "fourth-person perspective" as an extension of multistable variation because it permits humans a vantage point that we would not have without these technologies. In a similar way, the view of evolution as competition becomes one perspective among many; evolution can also be seen as a kind of cooperation amongst a variety of organisms and environments (Margulis and Sagan, 2007). Viewed from such a perspective, Kelly's (2010) human-technology coevolution no longer seems so radical or farfetched: all organisms depend on other organisms and their environments for their continued existence (Margulis and Sagan, 2007). The posthumanist move of decentering the human—reminiscent, again, of Singer's (1975/2001) *Animal Liberation*—permits exactly the kind of multistable variation that Ihde and other postphenomenologists crave: it allows us to imagine/interpret ourselves and our world in ways that we previously did not acknowledge or even consider possible. Following Kuhn (1962/1996), STS scholars describe such breaks with conventional thinking as *paradigm shifts*, and my link between Ihde's (2009) "multistable variation" and Kelly's granting technologies agency seems another relevant example of how *contemporary philosophy of technology* and un-disciplined philosophy of technology can build off of each other: it is not just the rhetorical maneuverings of un-disciplined philosophers of technology that academic philosophers of technology can learn from. To strain the metaphor, they can perhaps realize their own symbiosis.

It should be apparent from the above discussion of Kelly and Kurzweil that I do not mean to supplant academic philosophy of technology with un-disciplined philosophy of technology, trading one for the other. Instead, I take the work of postphenomenologists like Don Ihde (1993, 2009) and Peter-Paul Verbeek (2005, 2011) to pave the way for perspectives on human-technology relations that come from outside the academy. My point, then, is that philosophical thinking about technology needs the plurality of

perspectives that the writings of Ihde and Verbeek promote. Kevin Kelly and Ray Kurzweil began their careers inventing and developing technologies, but their current publications regarding the future of human-technology relations do not receive much serious attention by academic philosophers of technology other than to claim that the work of these "un-disciplined" philosophers of technology lacks attention to the detail of the work done by academic PoT.[101] Kelly and Kurzweil might be insiders when it comes to digital communities and computer engineering, but as philosophers they are often regarded as amateurs. When it comes to understanding the hybridity of humans and technologies, however, we might all—academic philosophers included—rank as amateurs. Exploring the possibilities of a posthumanist worldview demands perspectives that escape our traditional categories lest we assume that hybridity is simply derivative of some other philosophical stance, like humanism. I do not claim that, say, Enlightenment philosophy, has no place in our attempts to orient ourselves to posthumanist perspectives, but to imagine the unknown requires a critical approach to all that we think we know.

Jaron Lanier the Apostate?

Jaron Lanier's (2011) *You Are Not a Gadget* offers a counterbalance to the techno-optimism found in the works of Kevin Kelly and Ray Kurzweil—he specifically argues against their brand of optimism throughout the book. Like Kelly and Kurzweil, Lanier, the principle architect of founding forays into virtual reality (Lanier, 2011), has credibility in technology communities for his designs and ideas. Unlike Kelly and Kurzweil, however, Lanier worries that the metaphors and styles of thought and production that accompany comparisons of human thinking to computer processing and software has a negative impact on human creativity and our ideas of personhood in general (2011, pp. 3-14).

[101] A review of Kelly's *What Technology Wants* by Jerry Coyne (2010), professor of ecology and evolution at the University of Chicago, argues that Kelly has a fundamental misunderstanding of evolution. Because Kelly does not follow the version of the theory of evolution adhered to by Coyne, Kelly's work is deemed fundamentally flawed and provides little usefulness to anyone wishing to apply Kelly's "Theory of Everything." Though not a philosopher of technology, academic or otherwise, Coyne's criticism is both apt and unfair: it is precisely because Kelly wishes to grant technologies agency, some sort of "will," that he wants to expand evolutionary theory to things made by humans. Lynn Margulis and Dorian Sagan's work (1995/2001), *What Is Life?*, was also criticized by biologist Ernst Mayer (who wrote the forward) for its 'incorrect' view of evolution, but was lauded for its attempt to pull together so many different examples, forms of life, and metaphors. In short, it is the way of thinking and telling stories about the world, not simply the particular ideas, perhaps, that matter so much. In that sense, Kelly's Theory of Everything echoes Margulis and Sagan's ideas regarding symbiosis.

You Are Not a Gadget proposes ideas typically found in STS literature, especially contemporary philosophy of technology.[102] Lanier describes the tension between social constructivism and technological determinism as "lock-in"—the deterministic side of Thomas Hughes's (1987, 1994) "technological momentum" simply takes on a different moniker, but the central ideas remain the same. For example, the musical synthesizer MIDI, originally designed in the 1980s, quickly "became entrenched, despite Herculean efforts to reform it on many occasions by a multi-decade-long parade of powerful international commercial, academic, and professional organizations" and it has remained so ever since (Lanier, 2011, pp. 7-8). Couched in a somewhat unassuming and self-effacing style of writing, Lanier ties together themes from STS—history of science and technology, philosophy of science and technology—and repackages them in language, like his term "lock-in" that manages to convey the ideas of the academic writers in general terms that broad audiences can understand.

In a sense, his idea regarding "lock-in" (pp. 7-9) represents a new metaphor to describe ideas like technological determinism and social constructivism in ways that resonate with

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[102] Lanier (2011) begins his work by reminding his readers of his computer programming experience, including his now-famous colleagues and friends, including Kevin Kelly, but his dissatisfaction with what he helped create quickly becomes clear. The ways they imagined human-technology relationships mirrors a kind of technological determinism found in *classical philosophy of technology* and in much current writing about computer technologies. Lanier is highly critical of the deterministic thinking that spawned the technologies he, and his cohort, helped design and create, and much of his book resembles a plea for the kind of social constructivist thinking found in *contemporary philosophy of technology*. His informal style of writing—from his quotidian diction to his penchant for addressing the reader directly in the second person—makes his work accessible, but I find most laudable his challenge to technology consumers to begin to imagine other ways of interacting with and using technologies before the designs become entrenched:

> We [engineers, computer programmers and designers] make up extensions to your being, like remote eyes and ears (webcams and mobile phones) and expanded memory (the world of details you can search for online). These become the structures by which you connect to the world and other people connect to the world and other people. These structures in turn can change how you conceive of yourself and the world. We tinker with your philosophy by direct manipulation of your cognitive experience, not indirectly, through argument. It takes only a tiny group of engineers to create technology that can shape the entire future of human experience with incredible speed. Therefore, crucial arguments about the human relationship with technology should take place between developers and users before such direct manipulations are designed. (pp. 5-6)

Un-disciplined philosophers of technology, like Lanier and Wittkower *et al.* (2014), have clear designs on making the "crucial arguments about the human relationship with technology" part of broader, public discussions (Lanier, 2011, p. 6).

audiences outside of peer-reviewed journals. "Lock-in" might lack the rigor and specificity of "technological determinism" or even "technological momentum" (Hughes, 1987, 1994), but that does not diminish the significance of the claims themselves. Indeed, by bringing philosophical discussions about human-technology relationships to non-academic audiences, he invites critical reflection on his own claims by the same broad publics that he appeals to when decrying the single-mindedness, perhaps even one-dimensionality, of the engineers and designers of emerging technologies (2011, pp. 56-8). Un-disciplined philosophers of technology like Lanier do not merely indoctrinate; they invite critical reflection on ways of being—human and otherwise—with technologies. Technological mediation may not be new, but the virtual reality developed by Lanier, as well as its current and future iterations, allows for human-technology experiences that can transform how humans experience the world around them, other humans and nonhumans alike. Such mediation requires critical reflection on the ethical treatment of digital landscapes and occupants (nonhumans), and that could impact the moral status of the nonhuman. Critical engagement with such ideas and thought experiments require practice and habit. Like learning a new language, more than mere memorization is required: it must be practiced with other speakers; mistakes must be made and corrected/learned from; it must become habit.

Lanier has his Heideggerian moments, for instance when he harkens back to times when 'sound' was conceived not as a MIDI program but in more robust and creative ways (2011). He pines for a time when designs were not as 'locked-in' as they once were, even as he was one of those who helped lock-in some of those designs. Like Heidegger (1979) and Marcuse (1991), Lanier (2011) worries that engineers and other creators of technologies too easily accept the designs and constraints of present artifacts and systems, and that limits creative thought. He questions (2010, 2012) why we want to train our children, through education, to think like a search engine algorithm might: scanning for key words and phrases in a piece of text without understanding the context in which the ideas are presented. Such a scheme for textual analysis may be efficient, but it reinforces habits of superficial thought that can be accomplished quickly but with little comprehension of the text as a whole.

A search engine, or even a source like Wikipedia, simplifies and flattens: parts stand in for wholes because parsing the whole requires greater time and effort. The values that such technologies promote become clear on this reading: efficiency trumps vigorous analysis, and it promotes the one-dimensionality (Marcuse, 1991) of a single paradigm. Lanier (2011) marvels that a single method of transmitting information, like Wikipedia, can so closely emulate its analog predecessor, the encyclopedia, without any significant upgrades. He concludes that because Wikipedia has made vast amounts of information so accessible, none have devoted enough effort to imagine and create its successor. Lanier, like other un-disciplined philosophers of technology, does not simply comment upon particular technologies or technological developments. Like *classical philosophy of technology*, he connects social, economic, and political trends with human-technology relations, arguing for a shift in how we produce, consume, and design the technologies that impact humans now and into the future.

One thing to consider with Lanier, as with all UPoT, is the 'teachability' of the texts themselves, the ease through which the uninitiated can access the themes of the texts. I do not claim that UPoT writing lacks complicated, even convoluted, passages or ideas. However, the writers present their positions to readers from far wider backgrounds than an academic philosophy paper/text might. In doing so, un-disciplined philosophers of technology open their claims to challenge, and defense, from more than a limited cadre of academics. Lynn Margulis and Dorian Sagan (2002, 2007) offer the kinds of engagement with science, technology, and philosophy that presents arguments for seeing the world as vastly more interconnected and co-dependent (symbiotic) than theories linked to Darwinian evolution would argue.

Ross Anderson (2015) presents history of science and history of philosophy of science in a similarly holistic manner. He connects ancient Greek philosophers with Enlightenment philosophers with medieval religious scholars to show the impact particular worldviews have on how we imagine the world and the place of the human in it. Lanier's (2011) critique of the technological and computational metaphors that have come to dominate our understanding of the mind performs a move similar to George Lakoff and Mark Johnson's (1980/2008) *The Metaphors We Live by*: Lanier seeks to show that how we think about human interaction, thinking, and being, depends in part on the language and metaphors we use to describe them. How we think, morally or otherwise, about the nonhuman also depends on the narratives we use to describe them. These writers make connections that extend beyond disciplines, even interdisciplinary work, and the result is a larger picture, or understanding, of the human and this world's environments. By presenting their positions in formats that invite general audiences to engage them, their works transcend local particularities and examples, and attain a global scope. In doing so, they all present worldviews that deserve attention from more than localized experts, and just like the positions they challenge, their own claims require critiques and analyses, competitors and challengers.

I am reminded of T. S. Elliot's (1943/2014) "Little Gidding," and the search for something more than just the material, perhaps something spiritual, that accompanies such criticism and competition: "We shall not cease from exploration / And the end of all our exploring / Will be to arrive where we started / And know the place for the first time" (866-869). As Anderson (2015) and the history and philosophy of science remind, through the millennia humans have sought, and continue to seek, understanding of our world and ourselves. No matter how popular or apparently reliable current conceptions/theories are, they may (and likely will) be replaced one day. What we must foster among academics and non-academics alike is the daring to challenge the accepted.

If *contemporary philosophy of technology* is often esoteric, late, and inaccessible, then UPoT represents its converse: it is straightforward, timely, and broadly comprehensible. PoT, classical included, might have been 'meant' for general consumption in some ways—its authors may have wished everyone would read it and reflect on its ideas—but its authors failed to make their work consumable by mass publics unaccustomed to reading philosophical, or even just academic, work. The theories are often complex, tangled up in historical case studies, contrarian themes, and disconnected philosophy.

Although it might be meant as a series of asides, Lanier (2011) often laments the lack of a unified philosophy regarding how to live with increasing human dependence on technologies. Lanier appears to wish for a single philosophy that can engage with emerging and developing technologies. I share his concerns, and though I think posthumanism could serve as that unifying philosophy, I am not convinced we truly need a single philosophy of technology that denies all opposition. [103]

Conclusion: Un-disciplined Philosophy of Technology and the Path to Speculative Ethics and Anticipatory Governance of Emerging Technologies

Kevin Kelly, Ray Kurzweil, and Jaron Lanier represent just a few of the most popular un-disciplined philosophers of technology. Others, including Nicholas Carr (2011, 2014), N. Katheryn Hayles (1999, 2012), and Evgeny Morozov (2012, 2014, 2015), deserve attention—the latter two, in particular, because they make direct connections from emerging technologies to economic, social, and political systems and structures. Though none of the above writers would likely agree on shared topics raised in their work, a common thread running through them, and with *contemporary philosophy of technology*, is the push for a 'plurality of perspectives' and the potential that cross-pollinating their ideas would entail.

Bringing the disciplined and un-disciplined philosophers of technology into conversation opens a space to bring together posthumanist and transhumanist perspectives, including such notions as: machines should be considered moral patients, if not agents, or at the very least more than just 'things' that require no more reflection than a rock (I will

[103] The latter would resemble current directions in philosophy, and as Robert Frodeman and Adam Briggle (2014) contend, such philosophy needs an overhaul for it to become relevant and useful to more than just philosophers:

> The early 20th century research university disciplined philosophers, placing them in departments, where they wrote for and were judged by their disciplinary peers. Oddly, this change was unremarked upon, or was treated as simply the professionalization of another academic field of research. It continues to be passed over in silence today. Like Moliere's Gentleman, to whom no one had explained that he had been speaking prose, philosophers seem innocent of the fact that they have been disciplined, or that one might have reasons to object to this fact. And so even when their subject matter consists of something of real significance to the wider world, philosophers typically discuss the topic in a way that precludes the active interest of and involvement by non-philosophers. Philosophers may have had much to say to their fellow citizens, but unlike Nietzsche's Zarathustra they no longer come down from the mountaintop to say it.

Un-disciplined philosophers of technology, perhaps never at the 'mountaintop,' readily package their ideas for discussion by non-philosophers and philosophers alike.

develop this notion further in Chapter 5). At present, such a perspective might hold the attention of fringe groups, but to be part of broader conversations, it needs speakers and critics that cut across disciplines and can engage non-academic audiences. Held up against claims from some of the above characters like Ray Kurzweil (2005), the idea that nonhumans, like machines, should be, in certain cases, considered ethical agents no longer appears so absurd. Indeed, an article from the *Institute for Ethics and Emerging Technologies* (itself a largely transhumanist collection of thinkers and writers), by Melanie Swan (2015), delves into the notion of human-machine collaboration, with both humans and machines serving as adjudicators of, for instance, moral issues. Swan discusses the idea of machines with 'perfect' memories as offering us 'fourth-person perspectives,' and expanding our memories. If we wish to use machines to help us make moral judgments (Bendel, 2015), and those machines, through interaction with humans, do guide our judgments, then considering them ethical agents might be appropriate.

Automation, from automated farm equipment and vehicles to automated surgery, all point to a significant decentering—the machines must interact with other machines without direct human control and intervention. This is a significant effect of automation that humans need to understand and accept if we wish such emerging technologies to move forward and proliferate in the directions they are moving now. As Lanier (2011) reminds us, and *classical philosophers of technology* would concur, such directions require human input and creativity lest we simply accept the present designs and capacities as limits, paradigms that would proceed unchallenged. The machines are a part of us, and they are not. They rely on us, and they do not. These are the new relationships—though not new in the sense of just forming, just new in the sense that we are only now beginning to really recognize them for what they are.
Nicholas Carr (2015) seems to pick up on this idea when he claims that the machines we are developing will still need us—perhaps in ways similar to Margulis and Sagan's (2007) idea of symbiosis and bacteria, and Kevin Kelly's (2010) 'technium.' We, humans and our technologies, feed off each other, use each other, rely on each other, but what the end results of the relationships remain opaque. The point is to recognize the plurality that our machines are forcing us to acknowledge, and imagine the ethics, and other values, that such systems should have incorporated within them.

Philosopher of technology and STS practitioner Bruno Latour (1994) points to this kind of shared condition when he appeals to his audience to

> learn to ignore the definitive shapes of humans, and of the nonhumans with which we share more and more of our existence. The blur that we would then perceive, the swapping of properties, is a characteristic of our premodern past, in the good old days of *poesis*, and a characteristic of our modern and nonmodern present as well. (p. 42)

Latour, and the object-oriented ontologists[104] who follow in his wake, seek to prepare us for the symbiosis that Hayles (1999, 2012), Margulis and Sagan (2002, 2007), Kelly (2010) and Kurzweil (2005) describe by flattening ontology. The metaphysics of such a condition will, however, still need fleshing out. For now, I turn my attention in Chapter 5 to the role of un-disciplined philosophy of technology in facing the challenges of speculative ethics and anticipatory governance related to two particular technologies: precision agriculture using GPS guidance in tractors and implements, and robot-assisted surgery.

[104] Speculative realist (SR) and object-oriented ontologist Ian Bogost (2012) contends that his philosophy deals with how things appear to beings/things, but that "it's a phenomenology that explodes like shrapnel, leaving behind the human as the solitary consciousness like the Voyager spacecraft leaves behind the heliosphere on its way beyond the boundaries of the solar system" (p. 32). The "flat ontology" proposed by SR and object-oriented ontology (OOO) advocates like Bogost and Graham Harman (2005), nourished by evocative metaphors such as a spacecraft leaving behind the known solar system, demands that humans accept *a* place among objects, things, automata. SR and OOO do not advocate a view from nowhere so much as a view that does not place us—the human—at the center. What this looks like, and what the ethical and other value impacts this shift would have need fleshing out, and that is work I will continue in future. I will need to consider what this shift entails and why I think it is necessary for us all. This, perhaps, is the real revolution at the root of the Copernican, Kantian, Human, Animal and even Genomic/Bacterial ones: the moving/shifting/decentering of the human as the subject, the leveling/flattening of ontology.

Chapter 5: Un-disciplined Philosophy of Technology and Human-Technology Co-Dependence

Introduction: Amalgams

Un-disciplined philosophy of technology (UPoT), like its academic cousin, draws on elements of historical, social, economic and political analysis. Unlike academic philosophy of technology, it embraces speculative and normative views of how we *should* consider human-technology relations. Its practitioners often explicitly posit direct connections between developing technological systems and their economic, ideological, political, and social impacts (Lanier, 2010; 2014; Morozov, 2012; 2014). Un-disciplined philosophy of technology attempts to make more connections than it does distinctions, and in doing so orients its audience to more than particular instances of human-technology relations. UPoT seeks to bridge the chasm between ever more refined studies of particular cases and macro analysis and in doing so provides a normative vision of human-technology interactions. It takes into account the hybrid techno-human rather than endeavoring to make essentialist distinctions between the two.

Although I have focused heavily on differences between UPoT and *contemporary philosophy of technology*, the two approaches share a number of positions. For instance, Evan Selinger (2006, pp. 90-2) notes Don Ihde's phenomenological parity and variational method[105] as central aspects of postphenomenological normativity. The variational method and phenomenological parity also have strong influence in un-disciplined philosophy of technology for similar reasons: they provide breadth of analysis—attempting to see the object of study from multiple perspectives and understandings—while emphasizing that the author is providing her own interpretation as opposed to a presumed objective view.

Philosophy of technology is not best investigated by specialists alone. Instead, an integrative, synthetic approach is preferred because the motivations, methods, and outcomes of the issues philosophers investigate defy analysis by any one group and necessarily involve a host of actors from a broad spectrum.[106] Nevertheless, producers of philosophy of technology—people—often reside in disciplinary homes: from where they studied (analytic/continental, etc.) to where they publish to the conferences they attend to the kinds of ideas they consider valid (philosophical paradigms and obligatory passage

[105] For further elucidation on this topic, see Chapter 3 under the heading "Multiple Persepctives; Manifold Mediations: Don Ihde's Postphenomenology."

[106] I discuss this idea at the start of Chapter 1 in reference to Sellars (1963). In brief, though specialist philosophy of technology—a form of *contemporary philosophy of technology*—has merit, connecting the specific (micro view) to the larger whole (macro view) has an equally important place. Un-disciplined philosophers of technology seek to make just such connections.

points[107]). When philosophy of technology (*classical*, *contemporary*, or un-disciplined) resonates most strongly, the author has infused it with her candor, voice, and fallibility. She relates the details of the technology with an historian's attention to detail and scope, a sociologist's focus on and analysis of underlying processes (the political, economic, social, and cultural import), and the feminist ethicist and postphenomenologist's acknowledgement of and engagement with her own position, her own situation.

In an important sense, the divide between academic and "un-disciplined" philosophers of technology echo the internal/external divide that has long been part of Philosophy of Science, specifically, and Science and Technology Studies more broadly.[108] Put another way, to be a *philosopher* of technology usually requires affiliation with a school of thought (postphenomenology, for instance) and willingness to perform critical studies of technology/technologies that make copious references to intellectual forerunners while producing texts/work of, perhaps, passing relevance to the uninitiated. To be a philosopher of *technology* often requires some sort of tech background (engineering, for instance), a cavalier attitude toward citations and references to intellectual predecessors, and, somewhat importantly, a tendency to make broad, generalizing claims backed more by intuition than objective/quantitative evidence.[109] The latter often appeal directly to the uninitiated. Their works often become best-sellers not because of their academic rigor but because the authors have working knowledge of their subjects and, most importantly, an ability to tell a compelling story.[110]

UPoT texts like Eric Drexler's *Engines of Creation* (1990), Kevin Kelly's *What Technology Wants* (2010), Ray Kurzweil's *The Singularity Is* Near (2005), and Jaron Lanier's *You Are Not a Gadget* (2011) and *Who Owns the Future* (2014) all display such characteristics. Their ground-breaking work in engineering and computer science—from developing theories about (and coining the term) nanotechnology, to pioneering the adoption and promotion of digital technologies for exchanging information and communicating, to inventing computer readers that render text to speech, to developing virtual reality—enable these authors in two significant ways. First, their engineering and

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[107] Rescher (2006) begins his analysis of metaphilosophical reasoning by looking at just these sorts of philosophical principles and methodologies (pp. 1-26). Shared by many philosophers, these principles serve as metrics from which to judge philosophical work. However, they are also open for challenge amongst philosophers. They might better serve as *guides* rather than *strict rules*.

[108] The debates between Larry Laudan and David Bloor of the early 1980's come particularly to mind here; cf., Bloor, D. (1981). "The strengths of the strong programme." *Philosophy of the Social Sciences*, 11, 199-213. Laudan, L. (1981). "The pseudo-science of science?" *Philosophy of the Social Sciences*, 11, 173-98. Laudan, L. (1982). "More on Bloor."*Philosophy of the Social Sciences*, 12, 71-74.

[110] Or, at the very least, their editor(s) can. As my advisor and academic journal editor, James Collier, often remarks, behind compelling texts are gifted editors. Whether or not Jaron Lanier, Ray Kurzweil, or Kevin Kelly possess remarkable narrative skills, their works display such skill.

computer science backgrounds give them particular insight into how innovative technologies develop and grow, and this expertise grants them the confidence to write, speak, and perform about topics related to technology with authority. Their audiences have the sense that these writers "know their way around" the concepts, artefacts, and processes that they consider in their works.

Second, and stemming from the first point, when they confidently speculate about current and future trends and issues in human-technology relations, the audience understands that their pronouncements grow out of their direct engagements with the technologies. Because they "know their way around" the technologies, and because they make such familiarity clear through their discourse, they convey a sense of trustworthiness that non-experts can appreciate. That trustworthiness they cultivate enables them to make confident claims about the future, and the reader/viewer can be forgiven if she is captivated by such an interlocutor. The ability to speak and write with authority serves as a rhetorical expedient that lends credibility to their ideas and helps transmit them to a variety of audiences.

Un-disciplined philosophers of technology do not adhere to the strictures of dominant philosophical paradigms like phenomenology or postphenomenology. They acknowledge underlying philosophical and ideological foundations of technologies, however, as expressed through their transhumanist or posthumanist positions. In the case of Kurzweil (2005), for instance, readers get the sense that his transhumanism serves as a sort of political expedient. It grounds his claims for pushing research in cognitive augmentation: humans have always relied on technologies for improving our lives, so "humans transcending biology" (2005) is a natural step in our species' evolution. We find similar appeals to the *naturalness* of human-technology co-development in posthumanist writing as well (Hayles, 1999; Ferrando, 2015). By describing the escalating enmeshing of humans and technologies as natural (Sharon, 2014, pp. 3-4), posthumanism and transhumanism endorse narratives that imagine humans as bio-technical hybrids. Thus, they begin the process of creating a new paradigm and obligatory passage points (Callon, 1986, p. 200).

Kuhn's (1962/1996) descriptions of paradigms, and Callon's (1986) notion of obligatory passage points reinforce each other. Paradigms and obligatory passage points specify which questions are legitimate to ask, how they may be asked (what types of investigations/tests would be considered valid), what kinds of data would count/suffice as an answer/response, and who may be permitted to perform such investigations. They set boundaries on investigation, and though such boundaries can prove helpful, adhering to them come what may serves to limit potentially revolutionary ideas and perspectives (Feyerabend (1993) would most certainly agree). In that sense, un-disciplined philosophers of technology are attempting to enact a new paradigm, a new narrative and perspective that imagines humans and technologies as co-developing, co-dependent things. Academic philosophers of technology also struggle for legitimacy (Wittkower, *et al.*, 2014), and it seems reasonable to imagine, say, postphenomenology and posthumanism as complementary. Investigators in an open society (Popper, 1971) draw on the same elements that the revolutionaries, or challengers to paradigms (Kuhn,

1962/1996), must: they see the world differently than their predecessors, and thus the onus falls on them to illustrate their ideas so that they gain followers.

The following list of characteristics delineates general tendencies of un-disciplined philosophers of technology. It serves to distinguish academic and un-disciplined philosophy of technology, but it also points to areas where the un-disciplined and academic philosophers of technology should coincide.

1. They reflect on current and emerging technologies and/or trends, providing speculative normative claims (in forms like fictional scenarios[111] and thought experiments[112]) about the moral decisions that should be made and followed.
2. They write/perform for more than just academics[113] (philosophers of technology). Their audiences are often lay publics, so their products are commercial (someone has to fund them, and if not academia or public sources, then private companies—Kurzweil's hiring by Google, for instance). Advantages to writing for broad publics, as opposed to

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[111] Eric Drexler's (1986/1990) *Engines of Creation* speculates on the possible uses of nanobots on grand and microscopic scales—these remain potentials, not fully developed technologies. Nanobots could facilitate the human colonization of asteroids and work within the human body to aid in healing. He imagines self-replicating nanoscale machines capable of assembling materials and devices as needed (for asteroid colonization), or that could replace molecules and cells in the human body. Like Drexler, Ray Kurzweil envisions the technologies, as well as the applications they promote, as paths to transforming individuals and, thus, society. They promote radical uses of emergent technologies that aim to enable humans to master their bodies and environments in unprecedented ways, ultimately overcoming current biological limits.

[112] Thought experiments often employ, at minimum, five qualities that serve to push us outside of the known and comfortable world we live in, and into one where the possible becomes potential. It is fictional in the sense that the world does not appear this way currently. It is broad with clear enough descriptors to delimit the subject matter while remaining vague enough to allow the audience to imagine the world for themselves. It is abrasive/jarring in that it imagines a world/time with substantive changes that cause upheaval in how humans view themselves, the world, and their relationships to that world and everything else in it. It is compelling because there are aspects of it that both appeal to us now and challenge us to imagine how everything would come to be this way. Finally, it permits the audience to engage in speculation about how that world/time should be organized—philosophically, politically, socially, economically, bodily—and constituted.

[113] Kevin Kelly's *What Technology Wants* (2010) exemplifies this characteristic. He appends a reading list at the end of his text, including references to a number of works in philosophy of technology, but the reader need not consult these texts to understand Kelly's work.

specialists and experts, includes the pliability and adaptability of such works to non-philosophers, particularly undergraduate students taking STS-style classes, among others. Un-disciplined philosophy of technology serves as a starting point, not a final destination, for topics related to human-technology relations.

Done well, UPoT exhorts interlocutors to explore the topics and questions further, to continue investigating, not simply to accept the conclusions reached by the authors. Un-disciplined philosophers of technology relate compelling narratives, and that partly stems from their (seeming) transparency: unlike most[114] traditional academic philosophers of technology, un-disciplined philosophers of technology tell stories about themselves. They make themselves relatable, approachable, in ways that traditional philosophers of technology cannot due, in part, to the standards of academic writing that they must adhere to when they publish (Wittkower, et al., 2014).

3. They consistently and provocatively promote a normative agenda regarding the right relations between humans and technology, usually as a form of co-dependence—between humans and technologies/machines (the nonhuman). For example, Ray Kurzweil's *The Singularity Is Near* (2005) offers a rather provocative look at a near future where machine computing power greatly outstrips human intellect (individually and combined). Technologies will serve to extend human life and consciousness. To take advantage of this future, however, the organic human will be (partially, at least) replaced by synthetic parts

4. They seek to instill habits, ways to think and act, often by offering fictional scenarios and thought experiments that incorporate extreme/potential situations. They conjecture regarding long-term consequences of developing and emerging technologies. They speculate, for instance, on how responsibility accrues to humans and nonhumans and take seriously the complicated human-technology relationships that continue to proliferate. Jaron Lanier's *You Are not a Gadget* and *Who Owns the Future* (2014) provide clear examples of this type of writing on and engagement with emerging technologies.

Though not an exhaustive list of the characteristics of un-disciplined philosophers of technology, the above strike me as essential. None of the above characteristics, moreover, precludes academic philosophers of technology from taking on some of these behaviors and tendencies in their own work. Ideally, I would like to see more academic philosophers exploring the possibilities that un-disciplined philosophy of technology provides for practitioners.[115]

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[114] Don Ihde (1993, 2004) serves as a clear exception to this trend in philosophy of technology. He inserts himself directly into his works. He often provides readers with detailed explanations of his own life experiences, including how his perceptions and ideas change over time.

[115] Wittkower, *et al.*, (2014), Frodeman (2015) and Frodeman and Briggle (2014), make similar overtures to making philosophy of technology, and just philosophy in general, more

Un-disciplined Philosophy of Technology and Morality: Toward Posthumanism

Moral philosophy deals with intersubjectivity. In other words, it concerns the "actions between and involving at least two entities" (Gunkel and Bryson, 2014, p. 5). Luciano Floridi explains that "when reduced to its minimal logical structure, any action, whether morally loaded or not, is a binary relation between an agent and a patient" (2013, p. 61). In this binary relationship, the agent originates the action; the patient receives the action. Who or what is permitted to occupy the positions of agent and patient requires further elaboration, and for that we need to delineate exactly which kinds of entities receive agent and/or patient status. Objects, whether public or private property, have varying levels of status. Similarly, non-human animals, often property themselves, acquire different statuses.

Peter Singer's *Animal Liberation* (1975/2001) explores this topic in much richer detail using a utilitarian moral argument to call for a change to our understanding of the moral status of animals. Yet, Singer's progressive expansion of moral outlook only appears applicable to things that could possibly be sentient—if not sentient, then nothing that could be done to them would make a difference (Singer, 2001, p. 123). This perspective is both too narrow/limiting, and too anthropocentric. Humans will judge whether or not other beings/things have sentience, consciousness, etc., based on criteria that apply to us in regards to ethics, and in doing so people assume much about the 'other' that only humans can confirm with current systems of experiential and experimental analysis. Would ethics only make sense to humans?[116] If so, perhaps other codes of behavior and

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public. See Chapter 4 for further elaboration on the similarities between UPoT and public philosophy of technology as well as public philosophy. Katherine Hayles (1999, 2012)

[116] Such a question, of course, has far deeper roots than this dissertation. David Hume (1779/2007), for instance, provides a compelling warning against such narcissism:

> What peculiar privilege has this little agitation of the brain which we call thought, that we must make it the model of the whole universe? Our partiality in our own favour does indeed present it on all occasions: But sound philosophy ought carefully to guard against so natural an illusion. (p. 121)

being exist for other creatures/things.[117] It appears rather vain, and arrogant, to assume that our way of seeing and experiencing the world, and only our way, exists.[118]

Over the last three decades, philosophers of technology have inquired into the ways humans interact with technologies, like computers (Turkle, 1984/2005, 1995) and other technologies that mediate our experience of the world (Brey, 2010, 2012; Coeckelbergh, 2010, 2011; Verbeek, 2005, 2008, 2011, 2012), and how those interactions affect, and in some ways *should* affect, our moral reasoning. As Tamar Sharon (2014) thoroughly documents,

> New perspectives in science and technology studies, media studies, anthropology, feminist studies and the philosophy of technology, have argued for richer conceptualizations of technology and technologies: as a political and cultural phenomenon (Feenberg 1991; Haraway 1991; Winner 1980), as a social activity (Bijker et al. 1987; Callon and Latour 1992; MacKenzie and Wajcman 1985) and as mediating entities (Ihde 1993; Latour 1992, 1994), rather than as the human's "other." In the views of these theorists, the humanist dualist paradigm cannot account for the deep intimacy, the intricate enmeshing between humans and technology that has always been an integral part of human experience and that has become increasingly evident with the advent of many new technologies.[119] (pp.3-4)

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[117] David Toomey's (2013) text *Weird Life: The Search for Life that Is Very, Very Different from Our Own* rather neatly illustrates the point regarding the bias of our (human) classification system. Explaining one kind of *extremophile* (species that live/thrive in environments we humans consider extreme, like very salty, or very cold, or very alkaline), species *Acidianus*, as thriving in extremely hot (for humans, at least) and acidic environments, only shows one side of the equation (pp. 15-6). If *Acidianius* were to categorize humans, they would likely label us "'psychrophile' and [sic] 'alkaliphile'—cold lover[s] and [sic] alkaline lover[s]" (p. 16).

[118] Terry Bisson's (1991) short story reverses the situation by having aliens discussing the possibility of thinking 'meat' (humans).The aliens cannot comprehend how meat can think, speak, and, generally, be intelligent. The juxtaposition of Bisson's short story with the topic of other beings having sentience, consciousness, etc., serves as a reminder of human limitations. Our own capacities of cognition and perception, though perhaps formidable, might not cover the realm of possibilities regarding what other species, forms of life, beings/things, etc., could be capable of in terms of what Torrance (2014) describes as consciousness/satisfaction/suffering states (CSS states) (p. 16).

[119] Sharon (2014) continues:

> In this sense the very proliferation of human-technology hybrid entities that biotechnologies are giving rise to, from . . . 'designer babies,' genetically modified corn and transgenic mice, to . . . cosmetically and cognitively enhanced humans, surrogate mothers and recipients of brain implants, are all evidence that this dualist paradigm can no longer be upheld. Indeed, the ontological divide that

Sharon's account of "the intricate enmeshing between humans and technology that has always been part of human experience" resonates particularly strongly in this chapter. The examples found in sections below, on precision agriculture and robot-assisted surgery, exemplify technological mediation that highlights the hybridity of human-technology relationships. They raise important questions regarding the moral implications this may have for humanity's increasing reliance on technological 'others,' similar to how animal rights and environmentalist movements in the latter half of the twentieth century asked people to broaden their understanding and conception of morality in relation to nonhumans.

Environmental and animal rights movements have already begun to make an impact on how we envision the human and our relationships with our environment and other living creatures. Thimbleby (2008) explicitly emphasizes the connections regarding the rights of inanimate objects (machine/robot ethics) to the animal rights and environmentalist movements of the mid to late twentieth century:

> Environmental ethics and animal ethics are both recent developments in ethics that emphasise there is a sense of right and wrong action with respect to inanimate objects as well as to living but non-human objects, and moreover that this sense resonates with all thoughtful and informed people. In other words, these ethical positions are stimulating and indeed valid in some way. (In contrast there are plenty of trivial ethics, which are of negligible interest to anybody else, such as my selfishness determining what I think is right for me – a view since Kant is that ethics that are not universalisable are inconsequential.) (p. 339)

Younger generations likely experience technologies in ways that older generations do not. Pointing out that many people experience computers as, in some ways, both inanimate and animate, Turkle (1984/2005, 1995) offers evidence of the increasingly blurred divisions between humans and technologies, between ourselves and our tools.

A brief overview of ontology and metaphysics in terms of *classical* and *contemporary philosophy of technology* helps provide perspective on the post- and transhumanist leanings of un-disciplined philosophers of technology like Drexler, Hayles, Kelly, and Kurzweil. From contemporary work in philosophy of technology, we can deduce a non-dualist and non-essentialist ontology and metaphysics (Sharon, 2014, pp. 122-3). An analysis of *classical philosophy of technology* (Heidegger, 1978; Ellul, 1964; and Marcuse 1991) reveals that though they posit a dualist and essentialist ontology (technology/technique are separate from the human and the former exhibit deterministic influences on the latter), *classical* philosophers of technology lend important insights into

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> is drawn between human beings and technology becomes an obstacle to understanding the many ways in which humans and technology, but also subjects and objects, nature and culture, are interwoven today, and obscures the ways our interactions with technologies shape "what it means to be human" on a number of levels." (p. 4)

current postphenomenological and posthumanist understandings of human-technology relations.

Postphenomenologists like Peter-Paul Verbeek (2008) and posthumanists like Francesca Ferrando (2014) and Katherine Hayles (1999, 2012) come to conclusions inspired by Donna Haraway (1991) and Bruno Latour (1993, 1994): the human/technology dichotomy ignores our shared heritage, our "co-evolution" (Kelly, 2010), but it also ignores hybrids and all the other things/objects that make up everything around the human. The determinism of Ellul, Heidegger, and Marcuse describes technology/technique as directing human activity, perception, and social, political and economic systems, so at first these classical philosophers of technology appear at odds with recent trends in philosophy of technology that present human-technology relations as co-constructed.

Classical philosophers of technology present sweeping visions that do not account for the minutiae of the empirical work done by *contemporary philosophers of technology*. That, however, freed them to observe broad shifts in human thought and tendencies brought on by ubiquitous technologies, akin to the visions of un-disciplined philosophers like Kevin Kelly and Ray Kurzweil who see the world, humans included, as fundamentally altered by our relationship with technologies. Thus, they seek to create new perspectives for pursuing "the good life" in our current times. Instead of viewing technology/technique as separate from the human, perpetuating the bifurcation of human and non-human technologies, an undisciplined philosophy of technology perspective—perhaps founded on posthumanist principles that blur such distinctions and proposes hybrids in their stead—would allow us to make important changes to philosophy generally: to ontology, epistemology, metaphysics, and moral theory. Philosophy of technology can serve as a successor to philosophical traditions stemming from the Enlightenment: a robust philosophy of technology can provide a moral theory that best matches the hybrid/connected condition of the twenty-first century.[120]

One goal of this project is to try to think of the right questions. I am interested in the right answers, if they exist, but also concerned about asking the right questions in the right ways. Part of my goal involves having a discussion with broader segments of the population, particularly interested parties that may or may not have a previous understanding of the topics. In part, this amounts to an education, for them and me. Un-disciplined philosophy of technology, in a sense an amalgam of *classical* and *contemporary philosophy of technology*, attempts to perform these same tasks, with the goal of imagining the right relationships between humans and nonhumans—in this case, technologies. Regarding "right relationships," I follow W. D. Ross (1930/2002):

> We have no more direct way of access to the facts about rightness and goodness and about what things are right or good, than by thinking about them; the moral

[120] Although I believe that philosophy of technology can also provide insight into epistemology, metaphysics and ontology, further exploration of those topics will have to wait for now as I do not have space to discuss them further here.

> convictions of thoughtful and well-educated people are the data of ethics just as sense perceptions are the data of a natural science" (pp. 40-41).

The only sound method of discovering the kinds of acts which are right is "that of direct reflection on what we really think" (p. 23). Reflecting on the right and the good provide the opportunity to work out our preferences, to formulate ideas that provide fodder for us to debate our positions.

Composite Relations

Verbeek (2008) argues for two additions to Don Ihde's postphenomenological relations: hyrbid relations and composite relations. In the hybrid relation, and related to Don Ihde's hermeneutic relation (human→(technology—world)), the human and the technology are no longer separate entities. Verbeek (2008) describes the relation, utilizing Ihde's terms, as (human→technology)→world. Unlike glasses, through which a human sees the world (human→ (technology—world)), a microchip in the human brain could allow the human to experience the world in a new way. As one recent example, the U.S. government's defense research agency, Defense Advanced Research Projects Agency (DARPA), has created a prosthetic arm that connects directly to the human brain (Collins, 2015). With this technology, a paralyzed volunteer can now "feel" physical sensations that were lost to him a decade ago (Collins, 2015). Reality, for the volunteer, is still mediated by technologies, but that mediation is no longer external to him in the way eyeglasses are. The goal of such projects, these hybrid relations, involves directly connecting the human to a technology in a manner that appears to the user as natural, as seamless. Robot-assisted surgery, discussed below, does not achieve this level of connectedness, but a future iteration of the technology could well permit the surgeon and the robot to share a connection that allows a kind of virtual reality for the surgeon but an actual reality for the robot performing procedures on the patient. If we accept such seamless as a potential, if not already actual, people might not balk at seeing the surgeon as simply a human-machine hybrid.

Verbeek's (2008) second proposal, for composite relations, considers how technologies perceive the world in ways that human do/cannot. Unlike a thermometer which measures temperature and displays a number that humans can read off and understand, composite relations involve technologies that perceive information the human does not. X-ray telescopes, for example, "see" the universe in ways the human eye cannot. The images it displays translate the information it gathers in colors that humans can see, but that are not "really there" in terms of things we could actually view with our un-aided eyes. Precision agriculture involves just such a composite relation. The views of the field, from chemical analyses of soil to Radar and Lidar (Light detecting and ranging)[121] scanning, allow the

[121] Lidar allows for remote sensing of an environment using light in the form of a pulsed laser. It measures distances by bouncing the pulsed light off objects in the environment and calculating the distance from the object to the source of the pulse (http://oceanservice.noaa.gov/facts/lidar.html).

machines to perform operations humans cannot and in conditions that would be extremely difficult for humans, such as dense fog, nighttime, etc.

Hybrid and composite relations offer two more tools for the philosopher of technology to utilize in comprehending and explaining human-technology relations. They both offer further evidence of the blending of human and technological capabilities. Human dependence and reliance on ever-advancing technologies reaffirms the posthuman perspective that humans and our technologies are (and continue to become) so interwoven that they create a kind of experience that defies philosophical account of humans as individual, separate, and independent creatures (Sharon, 2014). The evidence for human-technology hybridity is there; we must adjust our perspectives and viewpoints, however, in order to see it. Such a shift in paradigms (Kuhn 1962/1996) would allow us acknowledge our shared existence, and that would lead to the kind of extended agency and joint responsibility (Hanson, 2008) I describe toward the end of this chapter. The narratives of un-disciplined philosophers of technology, whether posthumanist or transhumanist, are developing in parallel to these hybrid and composite relations posited by postphenomenologists. Taken together, they offer compelling stories backed by empirical evidence of the increasing co-dependence of humans and technologies.

Precision Agriculture

Farming practices over the past century have trended towards larger and faster machines (Stombaugh, Benson, & Hummel, 1998; Reid, Zhang, Noguchi, & Dickson, 2000). As the machines became more massive and swifter, however, human ability to control them with precision declined (Reid, *et al.*, 2000). Automated machine guidance, the ability to guide farm vehicles in a field without direct human manipulation of the equipment, has captured the attention of U.S. agricultural researchers since the 1920s and 30s (Reid, *et al.*, 2000).[122] When the last satellite required to complete the Global Positioning System (GPS) achieved proper orbit in October 1993, 'precision agriculture'—also known as 'precision farming,' which utilizes GPS signals to locate (and, eventually, monitor and navigate) equipment in a field with accuracies between +/- 4 centimeters in a field—moved from theoretical concepts to actual practice (Larsen, Nielsen, & Tyler, 1994).

Precision agriculture (PA)—exerting ever-greater control over "the spatial and temporal variability of soil and crop factors within a field"—is a modern phrase describing processes that have developed over centuries (Zhang, Wang, M., & Wang, N., 2002, p. 113). Before mechanized agriculture, small field sizes permitted farmers to treat crops, even specific plants, with variability—for instance, varying amounts of fertilizer and water (pp. 113-4). Field conditions vary greatly—the chemical composition of a field, even a small one, can vary every foot (Biba, 2014). Some fields produce higher yields than fields right next to them, so understanding the chemical makeup of fields is just one important factor for increasing an entire farm's yield. As specialized knowledge of this kind increases, farmers' technical understanding has had to keep up with the amount of

[122] F. L. Willrodt (1924) obtained a patent for diagrams of steering attachments that could follow furrows across a field. Sissons (1939) describes a system

information at their disposal if they wish to continue to produce. Thus, in the twentieth century, and developing even further in this century, precision agriculture has become "conceptualized by a system approach to re-organize the total system of agriculture towards a low-input, high efficiency, sustainable agriculture" (p. 114). Environmental concerns and economic efficiencies have propelled precision agriculture to broad markets over the past twenty years, from Europe to the U.S. to Asia (Zhang, *et al.*, 2002). In the U.S., precision agriculture has fomented the spread of agricultural vehicle automation and guidance (Reid, *et al.*, 2000, pp. 155-6), the latter my focus in this chapter.

As GPS units, for example, become more prominent in tractors, and as farmers rely more on computers and electronics that fill up the cab, a shift in focus occurs. Rather than watching the field and the equipment, the operator is pressured to pay more attention to screens that, in ways that resemble video games, provide virtual representations of the field and information about the implements pulled and powered by the tractor. Rather than seeing the field, the farmer sees an image that depicts the field. Instead of constantly shifting focus from field to implement and back again, the tractor operator relies on monitors that present information about field position and implement status—how it is functioning, actions required by the operator, etc. The person operating the tractor and equipment plays the role of overseer or foreman. One could argue that tractors and farm implements—even animals pulling plows—have already separated the human from direct connections to the field and crops. The farmer as machine operator (as well as mechanic and troubleshooter)—the language I use to describe the human farmer—might more accurately describe the person that now acts as manager of farming equipment systems. Indeed, to describe much modern farming, I actually need to explain the equipment used and how it governs farming practices and the increasing prominence of precision agriculture.

Global Positioning Systems (GPS) have been indispensable to precision agriculture since the mid-1990s. These systems permit tractors, combines, sprayers, and spreaders to operate at higher speeds while allowing the farmer to focus on the implements and gauges themselves without having to concentrate, for instance, on finding the edge of a row—this is central to prevent over or under-planting, both of which affect profit (Stombaugh *et al.*, 1998). GPS is a highly variable technology—and thus extremely valuable because of its uses across multiple platforms—that requires a significant cost outlay at the start, and, potentially, over the lifespan of the device(s). Prices can range from $3000 to $14,000 for GPS systems and from $6,000 to $50,000 for a fully automatic navigation system that will require frequent updates over the lifetime of the device (Grisso, *et al.* 2009). Less expensive technologies that aid farm equipment operators in navigation are foam markers ($500-$3000), [123] one of the most common forms of navigation aid in no small part due to the low price and ease of use (pp. 2, 6).

[123] Because I assume my readers have passing familiarity with GPS, I will only offer the following explanation of how foam markers—with which I am most familiar as they were used exclusively on my family's farm until 2 years ago—function. A long, retractable arm is attached to the implement that the tractor pulls, so the arm extends out at a fixed distance. Then, foam

The advantages of GPS over foam marker systems are numerous, from yield tracking and recording to functioning in low/no light conditions and any type of weather. Further, GPS allows accuracy at higher speeds, is more reliable and accurate overall compared to foam markers, and provides effective guidance over growing crops (foam can fall through the canopy of growing crops, effectively making it invisible from inside the tractor cab) (p. 3). Farmers can also read an LCD screen, follow overhead light bars that provide real-time feedback on field position, and receive audio feedback to help them guide the equipment through the fields in precise and tight lines (Grisso, Wysor, & Groover, 2009).[124] Advances in technological complexity, from tractors and combines to equipment like sprayers, planters, harvesters, etc., place ever-greater demands on farm-equipment operators to be technically savvy. What might once have been a distraction—a computer in a tractor cab—has become a necessity. The automation of farming necessitates further technological developments, and "skill," from a farmer's perspective, becomes defined as proficiency in operating, maintaining, and overseeing equipment that steadily gains in complexity.

As humans increasingly turn to automated farming—varieties of precision agriculture—to feed ourselves, and automated surgery—varieties of robotic surgery, or robot-assisted surgery—to heal ourselves, we ought to examine the values promoted by these technologies. Current discussions regarding the need for these technologies revolve around sustainability, efficiency, and accuracy. While these topics certainly deserve attention—they emphasize the positive effects of these technologies—we also need to consider how these technologies alter our experiences of the world and environment, our relationships with caregivers and the environment, and our interactions with other humans and other technologies.

When consistency, efficiency, precision, and speed become the guiding factors in the evaluation of tasks, from mathematics to manufacturing to stock trading, the machines

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> is dropped [from the arm] and used to align the applicator during the return pass. Foam markers utilize an air pump to pressurize a tank containing the foaming agent. The pressurized fluid causes the foaming agent to flow into an accumulating chamber [where it] collects until the accumulated mass overcomes surface tension, causing a blob to fall to the ground. Most often the foam accumulators are placed at the ends of the applicator boom. (Grisso, *et al.*, 2009, p. 6)

[124] The potentials for GPS in farming and agriculture continue to grow, including: mapping yields, variable rate planting, variable rate lime and fertilizer application, field mapping for records and insurance purposes, and parallel swathing (Grisso *et. al.*, 2009, p. 1). These applications do not include newer developments like auto-steer navigation for tractors and, impressively, master-slave robot systems where one or more tractors/combines operate without a person in the cab(s) (Noguchi, Reid, & Zhang, 2004) to perform a variety of tasks, for instance, harvesting.

excel as they have been designed to exceed the capabilities of the human in these areas. As the discussion moves to surgery and agriculture, below, this observation becomes even more evident. People make tools that improve on and, often, exceed human abilities. Should we, then, limit what we ask our technologies to do for/to us?

Returning to themes from classical philosophy of technology, what kind of world do we wish to live in? What are we willing to give up to realize such a place? Consistency, efficiency, and precision come at a price. In the case of agriculture, it means fewer human jobs and a decline in the number of skilled machine operators (Noguchi, *et al.* 2004). That, in turn, has important secondary effects as well: farms and fields need to be larger for the machines to be most efficient in their tasks, which makes equipment larger and more complex, which raises the costs of such equipment to levels that might exceed the budget of small farms (Grisso, *et al.*, 2009). When small farm owners cannot compete with larger, industrial farming—when they cannot earn enough profit to sustain themselves and their farms—they might see benefit in selling their land or leasing it to larger operations. As opposed to seeing farming as a way of life, or as a kind of art and communal relationship with the land, farming becomes quantified in such a way that any value not associated with efficiency, profit, or precision becomes superfluous. Behind such far-reaching automation of food production lies the idea that freed from the drudgery of working a farm, people with have time to be creative, thoughtful: "better" people. Automation becomes a cure in need of a problem: with fewer humans becoming farmers, the supposed drudgery of being a farmer affects an ever-shrinking population of people (Noguchi, *et al.* 2004).

In a similar vein, small hospitals, unable to compete in terms of finances with larger, more technologically equipped hospitals, could turn to a machine like the *da Vinci* Surgical System that can be remotely operated from other locations throughout the world. The cost outlay for such a machine, in the low millions of U.S. dollars in 2010 (Barbash and Glied, 2010), certainly impedes the widespread proliferation of such machines, but it could easily turn out that the savings in other areas makes the machine seem worthwhile for many institutions. It is not economically beneficial to hire a team of surgeons with different specialties when one machine can perform the same operations while being run by skilled surgeon(s) located in another part of the state/country/world. Consistency, efficiency, precision, and speed as guiding values in agriculture and healthcare point to one overarching value that binds them all: profit. As Herbert Marcuse (1991) would remind us, one-dimensionality threatens societies and cultures by making homogenous the once heterogeneous. Shifting focus away from discussions of the effectiveness of the tractor or computer-enhanced surgical system allows conversations about the kind of well-being and relationships with others (human, non-human animal, artificial, etc.) we wish to have, and the social and political institutions that might best foster such relationships.

Ethical Offloading and the Path to Posthumanism

Unreflectively and automatically assigning tasks of greater and greater importance to our machines amounts to what I call "ethical offloading." Rather than "machines," it might

be better to adopt Torrance's (2014) label 'artificial agents' as the category is more dynamic and encompassing than the term "machines." Humans unload ethical dilemmas onto machines/artificial agents without considering the long-term impacts of such offloading on ourselves, our values, and on the machines/artificial agents. Further, such offloading implies a perceived separation, between human and machine, that does not exist—at least from the perspective of un-disciplined philosophers of technology. The technology, if imagined as necessarily separate from the human, becomes a brace/prop that the human requires to negotiate ethically complex scenarios.

In postphenomenological parlance, ethical offloading leads to further delegation and reinforcement of that habit through "sedimentation." Phenomenologists like Rosenberger (2012, 2015) describe "sedimentation" as "the way that our past experiences build up (like sediment solidifying into rock) to provide a pre-set context of significance through which our experiences occur" (Rosenberger, 2015, pp.127-8). Instead of reinforcing ideas of the split between human and technology, narratives that promote seeing human-technology relations as a "seamless web" (Bijker, Hughes and Pinch, 1987, p. 9) avoid such offloading altogether. The issue I identify here deals with how people imagine their engagement with machines. Rather than "delegating" a task to a machine, we might simply imagine the machine as an extension of ourselves, as part of how we (human and nonhuman) perform tasks. Such a notion removes the possibility of blaming or commending a particular technology. Only together (human plus nonhuman) was the task accomplished. In short, I am arguing against the uncritical and unreflective separation of humans from technologies when it suits human interests. We should not blame the technology for a failure/error when the "seamless web" of human-technology committed the act.

Ethicist Susan Anderson (2011) has high hopes for robots to learn to act ethically through experiences with humans and other robots. Along with her computer scientist collaborator/husband, they (Anderson and Anderson, 2010, 2011) have practical experience trying to design *ethical* robots to work in healthcare—as ethical advisors to nurses and healthcare practitioners and as robots programmed to interact with adults and children. Rosenberger's emphasis, and the postphenomenological project generally, interprets sedimentation as it relates to *human* experience. However, the Andersons' work operates under the principle that *machines* can also learn through similar reinforcement based on context and experience. Postphenomenology investigates human experiences of the world through/with technologies. What the Andersons propose, however, offers a symmetrical reversal: machine experience of the world through human interaction. Humans could then attempt to understand the phenomenology of the machine experiences, thus expanding Ihde's variational method (Ihde, 1993; Selinger, 2006) to apply to the experiences of the robots. Although we currently lack a vocabulary or methodology to investigate the experience of robots,[125] humans can learn from how the

[125] Thomas Nagel (1974) might doubt a human could ever describe the experience of the robot. Indeed, he seems uncertain that a robot can even have experiences (p. 436). Nevertheless, the act of attempting such a description brings people closer to the

machines act and interact in ethical scenarios, and this could improve ethical theories (Anderson and Anderson, 2010, 2011).

Projects such as those developed by the Andersons' intend to teach robots to act ethically, and as people interact with these robots, people become accustomed to such robot actors and their ability to make ethical decisions. We can imagine a scenario in which people come to depend on the machines to act ethically, leading to a form of indifference: "I (person) need not consider the ethical implications of my actions/words because the robot will do so for me and guide me." The Andersons see the creation of ethical machines as a step in improving human understanding of ethics: designing these robots affords the opportunity to learn with and from these robots about the kinds of ethical rules and standards we wish to universalize. The robot becomes a site for ethical consistency (Anderson, 2011); humans will come to expect robots to act in particular ways, and this could also reinforce and sediment desired human behavior. I see such a project as an important step toward posthumanism: the understanding that the complexity of human-technology symbiosis now approaches levels of cooperation that render certain distinctions and divisions nostalgic anachronisms of an era we can no longer logically claim to inhabit. Under these circumstances, the techno-optimism of un-disciplined philosophers of technology like Kelly (2010) and Kurzweil (2005) shifts from radical to reasonable. Posthumanism reorients ourselves toward a future with increased human-technology interaction/hybridity.

'Ethical offloading'—the idea that rather than address ethical and value concerns directly, humans seek to create a machine or program, some sort of 'other,' to answer/resolve the issue—links well to Morozov's (2013, 2015) notion of "solutionism." Some 'other,' be it algorithmic, mechanical, etc., becomes responsible for resolving social, economic, and political issues rather than communities of stakeholders thinking through problems and solutions, both the current and the potential ones, that arise. If the technological solution fails, it does not imply that the issue needs reevaluation as much as it shows that the particular technological fix needs adjusting to foster more buy-in from the consumer (Morozov, 2013).

When the technological solution creates further problems/difficulties, we double down and increase our reliance on the program or machine to do even more without inquiring to the effects on people, cultures, societies, and economies that the technologies themselves impose. Like classical philosophers of technology, I witness an increasing dependence on technologies to navigate and negotiate our existences, experiences, and relationships without significant questioning of how such dependencies alter the same categories. However, I diverge from their humanistic leanings and embrace the posthuman and transhuman path of the un-disciplined philosophers of technology. Despite our reliance on increasingly complex technologies that steadily perform more cognitive, ethical, and physical labor for us, most of people hesitate to take our phenomenological relationships with the technologies seriously enough to accept our own

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phenomenological parity heralded by postphenomenologists (Selinger, 2006) as necessary for an understanding of phenomena.

hybridity. If humans and technologies merge further, in the form of cyborgs or some other label, then how should we view ideas like technological determinism and momentum? It might make sense to scrap them in favor of the point of espoused in Katherine Hayles's (1999) *How We Became Posthuman*:[126] "in the posthuman, there are no essential differences or absolute demarcations between bodily existence and computer simulation, robot teleology and human goals" (p. 3).

Automating certain tasks, as the case of autonomous mobile robots performing farm operations makes clear (Noguchi, *et al.*, 2004), presents us with difficult decisions. For the automata to operate most effectively and efficiently, they should operate independently (without direct human input). Operating independently, however, requires the robots/machines/artificial agents to make rapid decisions that have potentially severe and destructive consequences—to other equipment, operators, animals, buildings, etc. Of course, a human could easily make the same decisions and operate equipment in a manner that causes damage and destruction, whether because of inadequate information, poor training, or carelessness. In such instances, however, the human operator or equipment owner takes responsibility and answers for the repercussions.

With no human involved in direct operation of the equipment, for instance, who receives the blame for failures? The owners of the equipment might be liable, but the designers and programmers ought to share the blame, too. Further, policy makers that allow such autonomous vehicles to operate could come under scrutiny.[127] Writers describing precision agriculture and the need for ever-increasing automation point to economic and yield efficiencies, increased productivity, sustainability, and ease-of-use as the primary reasons why precision agriculture has been and will continue to be successful (Larsen, *et. al.*, 1994; Stombaugh *et al.*, 1998; Reid, *et al.*, 2000; Zhang, *et al.* 2002; Grisso, *et al.*,

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[126] Hayles provides four general explanatory ideas for the term posthumanism:

> First, the posthuman view privileges informational pattern over material instantiation, so that embodiment in a biological substrate is seen as an accident of history rather than an inevitability of life. Second, the posthuman view considers consciousness, regarded as the seat of human identity in the Western tradition long before Descartes thought he was a mind thinking, as an epiphenomenon, as an evolutionary upstart trying to claim that it is the whole show when in actuality it is only a minor sideshow. Third, the posthuman view thinks of the body as the original prosthesis we all learn to manipulate, so that extending or replacing the body with other prostheses becomes a continuation of a process that began before we were born. Fourth, and most importantly, by these and other means, the posthuman view configures human being so that it can be seamlessly articulated with intelligent machines. (pp. 2-3)

[127] As a recent example, unmanned aircraft systems (UAS), or drone, operation in the U.S.A. faces intense scrutiny for some of the same reasons just listed (Whitlock, 2015).

2009). Autonomous machines performing nearly any agricultural task have been reality for a number of years.

In 2001, Zhang, *et al.* published their research on a robot that successfully carried out an impressive amount of tasks. It performed the "tillage, planting, cultivating, and spraying of a soybean field. The root mean square (RMS) lateral error of the robot's operation was less than 5 cm, which is an improvement over skilled-human operation" (Noguchi, *et al.*, 2004, p. 2). Although the robot stopped short of harvesting the soybeans, a task that various harvesters and combines can now accomplish, the machines set a precedent by actually performing these complex tasks.[128]

In the case of automated farming and precision agriculture, the decline in numbers of farmers over the past decades in conjunction with the increase in age of farmers across the globe (Noguchi, *et al.*, 2004) seems to necessitate the rising incidences of automated machines used in agriculture. People do not want to farm as much as they once did, it seems, (or, at the very least, people do not see the need to farm in the same, life-necessitating, ways as they once did). Given that our global population does not decline at the same rate, one solution is to automate the jobs no person wants to do. Humans do not, presumably, value food any less than we once did. It seems, however that we value the use of direct human touch and input in agricultural production much less than we once did. Or, perhaps, humans never really wanted to farm but have needed to in order to sustain their societies and growing populations.

Farming, like surgery, appears more accurately, efficiently, and consistently done by artificial agents/machines than by humans without such technologies. The separation of the human from directly working the land—from cultivating and planting by human hand—is certainly not a product of the twentieth, or even the eighteenth or nineteenth, centuries. Humans have used animals to produce agriculture for centuries if not millennia. Regardless of the motive, the trends point to an increasing reliance on artificial agents to feed and heal us, effectively placing the onus on the artificial agents to keep humans alive and prospering. Further, while the machines have such exceptional responsibility, we seek to offload more of the tasks, cognitive, ethical, and physical, onto our technologies without granting them the status of either moral patient or agent. It may be that their cost—including repair—is the main factor in determining how well we care for our machines, but that only belies their critical importance to our daily lives.

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[128] Harvesting poses a number of problems for autonomous machines, but these are certainly not insurmountable as the following video exemplifies, https://www.youtube.com/watch?v=b01L4XQSMVc. Noguchi *et al.*'s (2001) RTK system provides the autosteer capabilities for the machine in the video, which was shot nearly five years ago in 2010. The 'master-slave robot system' presented by Noguchi *et al.* (2004) enables one operator (in the master tractor) to control the movements of an operator-less tractor (slave tractor) or tractors. Such automation cuts down on the number of human operators needed at harvest time, just to name one season, and provides another step toward the total automation of agriculture.

Un-disciplined philosophers of technology, particularly transhumanists and posthumanists, avoid ethical offloading by emphasizing the greater connectedness of humans and technologies—or simply nonhumans in general. They embrace the attitude that while technologies may help us lead improved lives, technologies also carry with them values like the goals of ever-increasing efficiency and precision. As Lanier (2005; 2014) attempts to show, in every technological choice, there is an underlying ideology or philosophy. Rather than question precision agriculture's specific *ends*, we might better ask if *efficiency* has an ultimate end. Alternatively, we might simply consider efficiency an ever-shifting target that recedes further away from us each step we take toward it. Though I do not have space here to investigate such concerns, they deserve exploration in conjunction with any pursuit of the Good Life.

For robot-assisted surgery, the robot, in a real sense, performs the procedure. The human controls the arms of the robot—very much in a manner resembling a video game—but the robot does the cutting, cauterizing, and any other task taking place inside the body (Berlinger, 2006; Cleveland Clinic, 2013). No human hands or fingers enter the patient; the robot performs the actual surgery while the surgeon sits at a console and remotes operates the robotic instruments.[129] In the case of precision agriculture, even with only GPS guidance, the screen tells the driver what to do and where to steer. Rather than looking at the field, the driver reads the screen to know where to go. More advanced systems, like those developed by John Deere, can steer the tractor, as well as raise and lower, engage and disengage implements (Kise, Bonefas, Moorehead, and Reid, 2010, pp. 265-6). At that point, the human remains in the tractor only to supervise the operations done by the machines. As the technologies develop further, however, the clear goal involves removing the need for humans in the cab of a tractor at all. At that point, we enter the realm of tractors without cabs or manual controls at all, like those designed by Autonomous Tractor Company (Hirsh, 2013).[130]

With precision agriculture and robot-assisted surgery, however, the automation requires a system of technologies networked together. None of the machines/programs operate independently; they work with other machines and programs, and, at present, humans to accomplish tasks. Precision agriculture arose in part because of the immense amounts of information and data that farmers have access to and need to understand in order to increase yield, cause the least of amount of environmental degradation possible, etc. (Zhang, *et al.* 2002; Grisso, et al., 2009; Biba, 2014). Even when aided by experts in

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[129] To see images and video of one such system, Da Vinci by Intuitive Surgical Inc., go to http://www.intuitivesurgical.com/company/media/images/xi/.

[130] Because of the lack of consistent reliability associated with GPS sensors—particularly their vulnerability to external factors like solar flares and signal disruptions—Autonomous Tractor Company's founder chose to use ground-based transponders located on the perimeters of farmland (Hirsh, 2013). Guidance systems aside, the availability of autonomous farm tractors—tractors able to maneuver without human input—serves as a significant step toward ever-increasing automation of farming practices overall.

offices like Virginia Cooperative Extension, the amount of information farmers can access and, increasingly, apparently need to know to be competitive can easily become overwhelming.

Precision agriculture does not necessarily simplify processes and information as much as it removes them from the conscious concern of the farmer. The farmer can offload tasks that require precise repetition, like planting, to devices that guide the tractor—autonomously or through screens and prompts that alert the operator to the machine and implement's position in the field. Perhaps because precision agriculture is marketed as an aid to farmers and not as a replacement of them (Grisso, *et al.*, 2009; Hirsh, 2013; Biba, 2014), ethical and social concerns regarding the changing status of our food providers as, effectively, hybrids, escapes our notice.

Once such technologies have been deployed and their use becomes pervasive, however, they become far more difficult to change, remove, and/or control (Collingridge, 1980). This is due, in part, to the words/metaphors/narratives we implement to describe them serve to discipline our attitudes.[131] Rather than solve such a dilemma, shifting our attitudes toward technological 'others'—viewing *them* as part of a vastly connected *us*—encourages inquiry into the kinds of social, economic, and political systems that we wish to foster, and the results could have greater impact than any single technology imagined as a solution to anything on its own.

For some of these technologies to work most efficiently and accurately, they need less human input, not more. The more humans are involved in 'the loop,' the more inaccuracy occurs. In the case of agriculture, the human operator cannot compete with the robot operator in terms of precise movement over distance and time. With robot-assisted surgery, the instruments have the capability of very small and precise movements, so the machine has to smooth out the movements of the human operating the controls—the skilled surgeon simply does not have the delicate motor control that the robot has. In both cases, the control and precision of the machine trumps the humans' skills in the same categories; furthermore, the machine can perform repetitive tasks without tiring or losing attention (Grisso, *et al.* 2009). They offer a consistency that would be exceedingly difficult for a human to match.

As we adopt increasingly complex and integrated technological systems, where we increasingly rely on various biological and synthetic agents to feed and repair us, we find ourselves inquiring into questions classical philosophers of technology found so compelling: what is the essence of the human? What kinds of relationships should we have with our technologies? Where does the human end and the machine begin in the

[131] Technologies are far simpler to govern in the early phases of development and implementation. However, their social, economic, and political impacts resist early identification and tend to be realized only after technologies have permeated societies and cultures. Unfortunately, attempting to control and regulate technologies after they enter the marketplace becomes so labor and economically arduous that efforts to do so strain resources (Johnston, 1984).

kinds of thought, work and play we now engage in each day? *Classical philosophy of technology* attempted to respond to such questions by continuing the Enlightenment project. *Classical PoT* encouraged essentialist understandings of the human and pined for a return to human relationships with technology where human creativity could flourish and technical rationality would not permeate all aspects of our lives.

Un-disciplined philosophers of technology take an alternative approach in their promotion of transhumanist (Ray Kurzweil, 2005; Kevin Kelly, 2010) and posthumanist (Katherine Hayles, 1999, 2011; Francesca Ferrando, 2014; Tamar Sharon, 2014) values: the stark split between human and technology, each with essential characteristics differentiating them, vanishes. Humans and technologies evolve together; our interweaving—connecting prosthetics to the motor cortex of the brain (Collins, 2015) serving as just one example—with each other blunts discussions about the distinctly human and distinctly technological and renders them intractable. Philosophy of technology, then, needs to lose some of its disciplinary strictures (Frodeman and Briggle, 2014; Wittkower, et al. 2014), and become more speculative about the future we create with our increasing dependence on technological systems. If "all practical moral judgements involve prediction" (Whitby, 2008, p. 328), then it would behoove us to have discussion and debate regarding the ethics of our technologies, especially emerging technologies, before they become so widespread that they become too difficult to control (Collingridge, 1980).

Robot-Assisted Surgery

Artefacts have moral consequences (Verbeek, 2005), and those actors that create, design, and manufacture the artefacts have some moral ideal in mind when they try to improve the world through their creations (Coeckelbergh, 2010, pp. 371-2). Users often incorporate those artefacts into their lives in ways unanticipated by the designers (Feenberg, 1995), however, so we must perform multiple evaluations of the artefacts and their impacts longitudinally. Because a technology promises to _____ (fill in your goal of choice), that does not imply it will fulfill that goal. Even if it does, the indirect consequences may prove unpalatable or explicitly harmful—depending on our perspective. Topics of discussion regarding precision agriculture and robot-assisted surgery frequently highlight many of the direct benefits of these technologies. For instance, both offer increased control and accuracy in domains where the amount of information that human operators would need to process can quickly become unwieldy and onerous. Whether all of that information actually needs accounting for, of course, remains outside the scope of the technologies themselves: their designs conceal some of their implicit assumptions while revealing the impressive computational power they employ.

As surgeons have increasing interaction with robots like Intuitive Surgical, Incorporated's da Vinci system,[132] they have tempered the expectation that such machines

[132] Intuitive Surgical's da Vinci robot, approved by the Food and Drug Administration in 2000, is the most popular of these machines, though in the last 15 years various other

have application in all areas of the surgical theatre (Barbash and Glied, 2010; Scott, 2015). Nevertheless, in the areas in which the robots perform well[133] (including abdominal intervention—for instance, gastric bypass, gastrectomy, cholecystectomy, among others), they tend to outperform human surgeons using laparoscopic and open surgery methods (Berlinger, 2006; Maeso, Reza, Mayol, Blasco, Guerra, Andradas, and Plena, 2010). Experts recommend increased trials to determine the long-term efficacy of robot-assisted surgery (Maeso, *et al.* 2010) in no small part because proper training—surgeons must perform somewhere between 150 and 250 surgeries with the robot to become adept at them (Barbash and Glied, 2010, p. 702)—requires prolonged exposure to the technology. As with precision agriculture, the costs associated with robot-assisted surgery are striking: in 2010, the cost of robot surgical systems ranged between $1 million to $2.5 million U.S. dollars (Barbash and Glied, 2010). With such high costs, and the extensive training involved for surgeons, many doctors wonder if robot surgical devices offer improvement over other surgical methods, in particular laparoscopic surgery and all surgeries requiring extremely precise movements in very small spaces (Delaney, Lynch, Senagore, and Fazio, 2003; Berlinger, 2006; Barbash and Glied, 2010; Fineberg, 2012).

Laparoscopic surgery, first pioneered in the early twentieth century (Vecchio, MacFayden, and Palazzo, 2000, p. 87), offers an alternative to 'open' surgeries where incisions are made, often between six and twelve inches in length, in the patient's body that allow surgeons access—and visibility—to the patient's internal organs (Peters, n.d.). Laparoscopic surgery involves relatively small incisions in the body through which instruments like small video cameras, lights, and surgical tools are inserted. It offers improvements over open surgeries for a variety of reasons. Most importantly, the incisions are smaller—thus reducing the potential for infections and reducing healing time—while allowing the surgeons to perform a variety of procedures (Peters, n.d.). Since the late 1980s, laparoscopic procedures, also known as minimally invasive surgery, have greatly expanded (Vecchio, *et al.*, 2000), thus changing how surgeons operate and receive their training.

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companies, large and small, have produced competitive versions (Greenemeier, 2014). Da Vinci's four arms can manipulate a variety of instruments, from scalpels, forceps, graspers and scissors, to 3 dimensional video cameras able to transmit depth to the surgeon operating the machine (Greenemeier, 2014).

[133] Much like precision agriculture, where tasks like steering a tractor are given over to machine control because of their improved accuracy over human operators, robot surgery also involves an offloading of tasks from the human surgeon to the machine. For instance, pediatric surgeries that well into the 2000s were deemed far too difficult for humans to perform accurately and safely, like those occurring *in utero*, are now possible because "a robot's computer can scale down a surgeon's hand movements into micromotions inside the fetal patient" (Berlinger, 2006, p. 2099). Even highly skilled surgeons cannot compete with the precision and accuracy of the machine.

In the 1980s and 90s, trends in laparoscopic surgery began shifting from 2-dimensional representations on a screen to 3-dimensional representations, and as more instruments are needed, there need to be more surgeons or technicians (Sackier and Wang, 1994, p. 63) present to assist the primary surgeon. Beginning in the 1990s, the use of mechanical holders to steady certain instruments have become more and more common (Sackier and Wang, 1994). In that sense, robot-assisted surgery has existed since the 1990s; however, modern versions of surgical systems, like da Vinci,[134] perform far more tasks than holding instruments steady—they operate as extensions of the surgeon (Mayo Clinic, 2015). For robot-assisted heart surgery, as just one instance, the patient receives three small (one to three inches) incisions going between ribs as opposed to one much larger incision (at least five inches, likely even longer) through the breast plate (Cleveland Clinic, 2013). Due to the size and placement of the incisions with robot-assisted surgeries, the patient has much shorter hospital stays, reduced pain and discomfort, and no explicit restrictions on normal activities (as soon as the patient feels up to it, she can resume any activity) (Cleveland Clinics, 2013).

Significant, and lauded by many medical practitioners as positive, attributes of robot-assisted surgery include: "increased precision, miniaturization, articulation beyond normal manipulation, and three-dimensional magnification" (Shukla, Scherr, and Milsom, 2010, p. 2174). Surgery with robots like da Vinci, then, offer more control to the human by providing more detailed information (three-dimensional magnification) than the human eye could discern (Mayo Clinic, 2015) and more precise movements (Camarillo, Krummel, & Salisburg, 2004). The benefits for patients include reduced scarring (small incision points), shorter hospital stays, decreased use of pain medication, decrease of bleeding and risk of infection and faster recovery times (Cleveland Clinic, 2013).

From pediatrics to otolaryngology to orthopedic surgeries, a substantial obstacle for surgeons involves the small spaces in which they must operate and maneuver, and "the human surgeon is not optimized for tiny spaces" (Berlinger, 2006, p. 2099). The robot, however, excels in such tight spaces, offering significant improvements over procedures performed directly by human hands with, additionally, "software [that] filters out even

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[134] Norman Berlinger (2006) argues that calling da Vinci and similar technologies "machines" or "robots" is inaccurate. His apprehension might come from his association of those words with industrial robots, from which da Vinci, in Berlinger's eyes, could not be further:

> A surgical robot is actually a collection of wristed "servant" tools called manipulators, which receive digital instructions from an interfaced computer. The "master" surgeon, seated at an ergonomically designed video game console with an "immersive" three-dimensional display, initiates the digital instructions by controlling sophisticated hand-grips—essentially, joysticks with seven degrees of freedom (adding the pitch, the yaw, and the "pincer-like" movement to those that were already available [the movement of the machine are meant to mimic the degrees of movement of the human hand and wrist]. (p. 2099)

physiologic hand tremors" (p. 2099). Another notable improvement offered by robot-assisted surgery involves the reproducibility of and reliability of the outcomes, for instance the improved precision of component placement for surgeries like hip and knee replacements (Mihalko, W., 2013; Ponnusamy, K., and Golish, S., 2013).

What I label *ethical offloading* directly relates to robot-assisted surgery and precision agriculture. Depending on the outcome of the human and world interface with the technology (whatever occurs after we interact with the technologies), we confer praise and blame on the technologies (though perhaps more of the former and less of the latter for those of us that prefer crediting ourselves rather than the support network that helped us achieve the ends). F. Allan Hanson (2009) describes this process, from the 'blame' and 'reward' sides, as "extended agency[135]" or "joint responsibility theory," and extending agency to technologies would serve to reduce our penchant for ethical offloading.

When a problem occurs, for example with a computer program or piece of hardware—the planting was not optimal in the case of precision agriculture, or the robotic arms did not operate as expected in the case of robot-assisted surgery—we blame the technology (Hanson, 2009, p. 91). Considering responsibility in terms of more than just separated individuals, however, Hanson's joint responsibility, "encourages constructive, moral behavior in all contexts" (p. 98). His

> extended agency theory emphasizes the multiple connections between humans and nonhumans of all descriptions in systems of action ranging in scope from the immediate all the way to the global. . . . When human individuals realize that they do not act alone but together with other people and things in extended agencies, they are more likely to appreciate the mutual dependency of all the participants for their common well-being. (p. 98)

Extended agency, quite clearly then, directly relates to environmentalist and animal rights movements because it provides a framework for assessing how humans and nonhumans mutually depend on each other. If one accepts that mutual dependence, it requires no great leap to see how humans and technologies share responsibility in many scenarios. The success/rewards of the technologies involved in precision agriculture and robotic surgery accrue to the companies and individuals that make them, to the users of the

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[135] According to Hanson (2008),

> if something is incapable of doing something alone, it cannot be exclusively responsible for it. Certainly it shares in the responsibility if it participates in undertaking the action. . . . To say this is to use 'responsibility' in the causal sense: whatever did something is responsible for its consequences. Causal responsibility has never been restricted to human beings. It need not involve humans at all, as when we say that the sun's gravitational pull is responsible for the orbits of the planets. Causal responsibility is readily applicable to extended agency. (pp. 417-8)

technologies—the hospitals and doctors; the farms, farmers and food consumers; all these are extended agencies, and not all of them are humans or individuals.

With robotic surgery, the issue of who to blame for mishaps and deaths depends on whom one asks—the maker of the technology, the hospital, or the doctor (Kaiser Health News and Evans, 2013). Who to credit, on the other hand, should be equally fraught: the robot, the doctor, and the hospital each play significant roles, and current trends show patients opting more often for robot-assisted procedures than traditional methods (Scott, 2015).

At present, the Food and Drug Administration, which approves such robotic devices, as well as James Blumstein, director of Vanderbilt Health Policy Center, advise doctors and hospitals simply to inform patients of their options, including "known injuries and routine problems" that stem from traditional surgery and robotic surgery. As long as the doctor discloses such information ahead of the procedure, the doctor would not be negligent (Kaiser Health News and Evans, 2013). From the perspective of extended agency and joint responsibility theory, it would be sufficient for the patient to understand that the doctors, surgeons, equipment (from robots to the myriad other devices used in hospitals), and health plan (the system that allows or disallows specific procedures, practitioners, hospitals, etc.) all have responsibility for the outcome of the procedure. People should not expect technologies, by themselves, to save them come what may, nor should people expect technologies, by themselves, to have sole responsibility for any mishaps.[136]

Conclusion: Positive Co-Dependence as Symbiotic Relations between Humans and Nonhumans

Co-dependence—between humans and technologies/machines (the nonhuman)—serves as a tacit or overt metaphor for human-technology relations for un-disciplined philosophers of technology. Rather than imagining technologies as 'others'—what postphenomenologists' would label as hermeneutic relations with technologies (Coeckelbergh, 2011, p. 198)—we should consider hybrid and composite relations (Verbeek, 2008) with technologies as the paradigm for much technological development moving forward. Moreover, Hanson's (2008, 2009) extended agency and joint responsibility theories promote a shift in perspective/paradigm that resonates with the posthumanist movement: rather than posit the individual, rationalistic, autonomous human as the center of moral thought, we should rather see the human as necessarily engaged with, dependent upon, and responsible to/for a variety of other humans and nonhumans. Of particular interest to philosophers of technology that look at autonomous

[136] Selinger and Engstrom (2007), Ihde (1990, 2002) and Latour (1994) note that humans are changed when using certain technologies. The person-with-a-gun, for instance, is a rather different being than the same person without the gun, and the gun undergoes a similar transformation when put to use (Latour, 1994). For Hanson (2008), "the possibilities for action depend not just on human beings, but on the available means of action as determined by the relationship of humans with technology and/or other things in extended agencies" (p. 419).

agents like machines and software would be just how far agency should be extended to the autonomous technologies. Johnson and Powers's (2008) notion of surrogate agency meshes well with Hanson's extended agency. Johnson and Powers call for extending agency to the information technology (program) itself. A short example of an autonomous technology, as opposed to current iterations of precision agriculture and robot-assisted surgery (although they may both achieve further levels of autonomy in the future) helps elucidate this point although the implications of such a shift in perspective necessarily brings us back to the extended agency of precision agriculture technologies and robotic surgical tools.

Just as we would pass moral judgment on human surrogates that perform similar duties to humans, a tax accountant and a tax software perform similar duties and demand similarly accountable. The implicit moral theory utilized here is consequentialist—though Hanson (2008) acknowledges that the discussion of intentions quickly leads back to deontological accounts of morality—and argues that the intentions or aims of the software surrogate and human surrogate are the same, i.e., to aid the person asking for tax advice and help. These particular human and nonhuman surrogates aim to achieve the same ends—saving money on tax returns; not paying more taxes than necessary; staying within the confines of tax law—and Latour (1994) would argue that both deserve symmetrical treatment.

There are far-reaching implications of such a move, and I argue that separating the human and the technology, in terms of moral responsibility, masks responsibility and promotes an instrumental view of technologies that leads us away from discussing the technologies as producers, conveyors and sites of value-formation. We then begin to imagine that we can 'offload' our problems onto our technologies; the responsibility does not lie with *us*, but with some *other* the instruments/technologies. This kind of thinking only serves to insulate us from responsibility rather than require us to acknowledge our complicity. In terms of surrogate or extended agency, technologies are not neutral because the consequences demand an account of responsibility. Hanson's (2008) explication of some technologies possessing extended agency as well as Johnson and Powers's (2008) work in surrogate agency of certain programs demand that we break from instrumentalist conceptions of technologies as value-neutral.
In conjunction with postphenomenology and un-disciplined philosophers of technology, and opposed in a sense to *classical philosophy of technology's* search for essences, I wish to shift focus from essences to collaborations, combinations, and systems, and the relationships that come out of the unifications. Let us engage and make new narratives centered on the 'things' or 'objects' that come out of such mixing and mingling. Object-oriented ontologists like Ian Bogost (2012) seek to engage—even if only to glimpse, as the relations often last brief periods—when things are blended and mixed, forming new things that impact us. This is a shift from individual things to mixtures, like science and technology studies generally. Latour's (1993) *We Have Never Been Modern* attempts to shift our perspectives, to remind us that we have never been alone, a-contextual, disembodied, or independent. We are made up of other things and we make up other things.

If science attempts to break things down into parts, then STS, and philosophy of technology in particular, should help put them back together again, to reveal, discuss and better understand the new forms we take when we combine with other technologies, other 'objects.' Un-disciplined philosophy of technology—with its posthuman and transhuman accounts of human-technology interactions—serves as an initial effort at creating the narratives that orient us in the web of human-technology relations. Humans do not lose importance by acknowledging our connectedness with other objects. Instead, by viewing our world as inhabited by objects—us included—that depend on other objects, we make good on goals set out by environmental ethics and animal rights movements: ethical engagement with anything requires seeing beyond the individual's wants and wishes. By decentering the human, our actions and ideas serve to benefit the whole rather than its myriad individual pieces.

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