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Imagined Interaction: Visualizing Human-machine Communication

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Abstract

We live in an age where consumer media technologies are hyped way before most people actually have a chance to engage with a physical product. Still, product representations, such as marketing videos, technical specifications and even software development kits provide certain clues to the capacities and limitations of the physical product in question. Prospective consumers are also increasingly invited to interact with technologies more distant in the future – via for example design fiction videos and technology vloggers. The 'virtual products' represented there also entice users to imagine how future interaction would take place (which they vividly do). From this premise, this paper explores what we may call imagined human-machine interaction. Put simply, this entails an interest in the intentions and concerns that come with engaging with media technologies implicitly – i.e. through representations of different kinds (which may have different underpinning agendas). However, as we shall see, retaining a notion of strict implicitness or immateriality is difficult. Theories around imaginary media, performative prototypes and design fiction challenge any firm separation of material and immaterial technologies, pointing us towards developed studies of imagined human-machine interaction.

Keywords: design fiction, diegetic prototypes, imaginary media, human-machine communication

1. Introduction

In his seminal book on social cognition and mental imagery, "Imagined Interactions: Daydreaming about Communication" (2003), communication scholar Honeycutt theorizes how individuals imagine conversations with significant others for a variety of purposes. Put simply, imagined interaction refers to cognitive processes whereby actors imagine themselves in interaction with other actors. These processes can occur before, after or even during actual decision-making. The notion of imagined interactions builds on work in symbolic interactionism[i], where meta-cognition, or internal conversations, is regarded as essential in the construction of (a view of) the self, how others see oneself, and how one would interact in a particular social situation.

This paper will argue that the notion of imagined interaction is useful in HCI (human-computer interaction) and media research, and that it can be elaborated in relation to a modern technology-saturated society. That is, in contemporary culture we are faced with an enormous amount of 'almost available' technologies. They appear in commercials and popular culture. In parallel, the notion of 'design fiction' is generating a significant amount of attention in the HCI community (and elsewhere), indicating an interest in speculative media futures and technologies. As such, various 'virtual products' are presented to us via advertisements, tech specs, commercials (and other product videos), spectacular pre-release events and, occasionally, physical prototypes. The recurring feature of these future-oriented activities, other than enticing users' desires, is that they exist in a 'gestation phase' where very few regular users get a chance to interact with the actual product. Of course, that does not

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stop users from engaging emotionally and cognitively with these technologies, not only in internal dialogues, but also in communication with other users. So, when users cognitively and socially engage with virtual (or even fictitious) media technologies we arrive at a phenomenon we may refer to as *imagined human-machine interaction*. That is, prospective users imagine how future interaction with a speculative media technology could take form, fueled by various representations of it, its functionalities and its sociotechnical context.

This paper will explore the increasingly common phenomenon of imagined human-machine interaction by putting a number of well-known cases of 'speculative technology introductions' into a theoretically grounded discussion. Because imaginary media technologies have interested scholars of many different backgrounds (e.g. HCI, media archaeology, science fiction studies) there is a great potential to, not only identify interesting theoretical synergies, but also, by including a focus on user interaction, and coining the notion of imagined human-machine interaction, add a new facet to the theoretical understanding. The research question can thus be summarized as: how can we understand and theorize imagined human-machine interaction?

The paper starts by presenting the concepts of imaginary media (Kluitenberg, 2011; Parikka, 2012; Zielinski, 2006), diegetic prototypes (Kirby, 2010) and design fiction (Bleecker, 2009), as forms of product representations capable of influencing user expectations and imagined human-machine interaction. These concepts emanate from different academic fields (media archaeology, human-computer interaction, and science and technology studies) but share an interest in the intricate temporalities of media. Next follows a conceptualization of the IT artifact, presenting levels of analysis that are helpful in addressing the details of imagined human-machine interaction. The paper goes on to discuss a number of recent examples where technologies have been available as virtual products well before the availability of the material technology as a (physical consumer) product; particularly focusing on users' imagined interaction with these technologies. The paper concludes by combining insights from the examples, pointing to future questions central to research on imagined human-machine interaction.

2. Imaginary media, design fiction, and diegetic prototypes

Today, media technologies are marketed, conveyed and consumed through a variety of immaterial product representations, often available prior to the physical product: "Media technology companies use these representations, or virtual products, to fertilize a future market, designers use them to communicate design solutions, and consumers use them to make meaning of the product in their (future) everyday context." (Skågeby, 2011, p.144) As such, this section will introduce the notions of imaginary media, design fiction and diegetic prototypes to outline a framework from where we can address the idea of imagined human-machine interaction.

The concept of imaginary media can be expressed as the idea that media technologies can be more than just physical artefacts. For example, according to Zielinski (2006), imaginary

media entails the idea that media technologies can be *untimely* (out-of-sync with current development, and thus obscured as weird prototypes in histories of development), *fictitious* (imagined, but never implemented designs) or *impossible* (not achievable under current technological know-how). Consequently, imaginary media points to dimensions of temporality, im/materiality and human desire (Kluitenberg, 2011). The temporal aspects may take on both futuristic and historical direction, but also twist and fold the teleological linearity into unanticipated turns, continuities and disruptions. In terms of im/materiality, the notion of the imaginary suggests a strong coupling to immateriality. This is however only partly true. Imaginary media oscillates between the material and immaterial in interesting ways. As Parikka observes:

> *"Imaginary media as shorthand for what can be addressed as the non-human side of technical media; the fact that technical media are media of non-solid, non-phenomenological worlds (electro-magnetic fields, high-level mathematics, speeds beyond human comprehension), and because of that ephemeral nature they are often described in the language of the fabulous and the spectacular."* (Parikka, 2012, p. 62)

Imaginary media is a concept connected to the field of media archaeology, a field which seeks to illuminate obscured temporal connections between media technologies. While media archaeology is perhaps mostly historical in its ambitions, the interest in the spectacular and the fabulous connects it to the future, and thereby to fields such as design fiction. Design fiction is a field and method, which has attracted a growing amount of attention over the last years (Lindley & Coulton, 2015). Put simply it entails the use of "fictional depictions of future technology to tell a story about the world in which that technology is situated: it uses narrative structures to explore and communicate the possible futures for technology." (Tanenbaum, 2014). Even though the notion was introduced already in 2009, it is only in the last few years that, mainly the HCI and design research communities have begun to address design fiction issues more systematically. At the same time, design fiction is being accused of being a vague and ambiguous concept, without a coherent approach. While this is to a certain extent true, its malleability is also part of its strength (Blythe & Encinas, 2016). The fact that it can provide convincing representations of imaginary media, narrated under realistic conditions, helps us foresee how not-yet practical, but still situated, interaction can take place.

As such, imagined human-machine interaction is nothing new. Science fiction has always embedded fantastic and speculative technologies in its narratives, envisaging how human-machine interaction could take place in the future. Design fiction has extended this ambition and applied it in a more 'controlled' manner (Wong, Wyk, & Pierce, 2017). The main shift we have been seeing for some time now is that the general public, as consumers of both popular culture and commercial products, is more widely enticed, and eager, to engage with imaginary media as such. Consequently, this paper will argue that imaginary media are not only textual (or visual) figures of imagination with strictly immaterial qualities. As Wythoff claims, writing about 'scientification' pioneer Hugo Gernsback: "Before it was a particular kind of story or plot, science fiction was a way of thinking about and interacting with emerging media." (Gernsback, 2016) In many ways, this is still true – the relation between the amazing technologies in

science fiction and the potential manifestation of, and interactions with, imaginary media is not necessarily that clear-cut. For example, as Russell and Yarosh points out, science fiction can inspire design:

> *"Science fiction can be sources of inspiration, common language, and both aspirational and cautionary tales. Used with appropriate discretion, science fiction can inspire experts in creating design fiction—stories whose primary purpose is to elaborate and explore new technologies in their context. Seen from this point of view, science fiction has the opportunity to be the most vibrant and valuable of all literary genres."* (2018, p.36)

Grounded in yet another research area, science communication scholar David Kirby goes further in examining the relation between technologies as depicted in popular cultural films and real-world design. He coins the term diegetic prototypes to address this relation (Kirby, 2010). The term diegetic (adopted from film studies) refers to a narrative world within a film – a 'realistic' world where an internal logic dictates the agency of human and non-human actants. A diegetic prototype then, is a (technological) object, which is fully functional, or performative, within that diegetic world. In the words of Kirby:

> *"The performative aspects of prototypes are especially evident in diegetic prototypes because a film's narrative structure contextualizes technologies within the social sphere. Technological objects in cinema are at once both completely artificial — all aspects of their depiction are controlled in production — and normalized within the text as practical objects that function properly and which people actually use as everyday objects."* (Kirby, 2010, p. 41)

Kirby goes on to develop the notion of technological sincerity, which includes a conveyed sense of normalcy about the technology in its diegetic setting, a sense of viability regarding how the technology performs, and importantly also the installation of desire for (and thereby necessity of) the technology. Arguably then, wants produces needs (I want it; therefore, I need it). Installing desire is central to all the notions presented in this section. Imaginary media can be seen as expressions of recurring human desires – media archaeology explores such yearnings and aspirations that can, for some reason, not be met just yet, and how they reoccur over time and in different designs. Design fiction is more applied in its approach and opens up to exploration of future consequences of present or near-future technologies, including how things might be, and how we want them to be. Kirby also argues that one of the functions of diegetic prototypes is to create a cultural desire for the technology in question.

By putting these concepts, originating from different scientific perspectives, together, we are adding facets to the notion of imagined human-machine interaction. Imaginary media is more historically oriented, exploring obscured alternatives and unrealized development trajectories from media technological genealogies. Design fiction provides us with a more future-oriented perspective, outlining actual future development of technologies (and their potential consequences). The notion of diegetic prototypes emphasizes the *cultural*, and *public*, corresponding connection (i.e. the co-development of hopes, fears, myths, and technologies) that can be made between popular representations of imaginary media and the actual development of consumer devices. Importantly, these concepts also have many mechanisms in common, for example in that they all seek to explore alternatives, and that they all include

human desire as an important dimension. In all, they each add vital theoretical traction to the notion of imagined human-machine interaction.

Another important dimension is that all these three theoretical notions are not only interested in the cultural and holistic aspects of imagined media technologies, but also in their more detailed technical specificities. That is, an IT artifact is also comprised of different layers of conceptual components, which can, in turn, connect to different aspects of cultural imaginaries. Thus, the connection between the cultural and technical functions of imagined media technologies, and how they can co-influence each other, requires us to also address more detailed theoretical aspects of IT artifacts.

3. The IT artifact

Having outlined a more theoretical side of imagined human-machine interaction – the performative prototypes and their influential capacities – we now turn to the question of how users engage with such representations? Today, we are witnessing a widening of user engagement with imaginary media technologies. Thanks to the Internet, users now vividly engage with immaterial media technologies, most notably on a scale between optimistic and pessimistic scenarios. While technological specifications and details of features can be of quite high fidelity, imagined human-machine interaction, by way of definition, still leaves a lot of room for speculation and supposition. Thus, and to begin with, the examination of imagined human-machine interaction calls for a high-level conceptual framework, which can systematically address the question of defining an IT-artifact. Cheikh-Ammar proposes an aggregated model, built on Heideggerian notions of technology, to deal with this definition:

> *"[…] the IT artifact arises out of the intertwining relationships between IT features and the [symbolic expressions] that they project, the functional affordances that they allow, and the values that emerge from their appropriation in a social context"* (Cheikh-Ammar, 2018, p. 2).

The conceptual components of IT artifacts – features and symbolic expressions, affordances, and spirit – exist on different levels of abstraction, and as such, have systematic differences between them, but they are also deeply interconnected. Cheikh-Ammar admits that there are conceptual difficulties in pinning down an IT feature. They exist on a spectrum between concrete and abstract, detached and bundled. As such, one advantage of studying imagined human-machine interaction, is that features are usually interplay between the purported features emanating from 'tech specs', and the features as expressed by users when describing their imagined human-machine interaction. Symbolic expressions are highly connected to features, and is defined as the ways and potentials of an IT artifact (containing several features) to communicate its functionalities to a prototypical user. As such, symbolic expression is largely a question of representation – visual cues and symbols designed in the interface, which can aid users in understanding what the artifact 'can do' for them in that specific context of use (Skågeby, 2014). Seeing how features can differ in visibility (some are more emphasized, some less), the features that are more evident or discernible are more likely to aid

users in identifying future action potentials. Moreover, symbolic expressions can be interpreted differently during different phases of use, or with different user groups, resulting in a more open range of higher level 'effects'. In terms of imagined human-machine interaction, symbolic expressions are, again, more dictated by representations emanating from the manufacturer.

Moving up in Cheikh-Ammar's conceptual model, we find affordances, or 'action potentials'. Affordances are similar to symbolic expressions, but also envelop more than the perceivable surface or interface. Affordances can be defined as potentialities that may, or may not, be actualized. These potentialities are not embedded as such in the artifact in question, but rather emerge through a joint agency between user and artifact. This joint agency can be presented to users in marketing material, or design fiction videos, potentially shaping how users imagine interaction.

Finally, on the highest level of abstraction, the IT artifact includes the component of 'spirit' or values. Spirit is defined as the underlying 'message' behind a technology. To explicate, IT artifacts are placed within a field of meaning that guides general user perceptions of it. Or, to put it otherwise, the way the IT artifact is presented to users has an impact on the choices users make about how to process lower levels of abstraction in the model (i.e. features, symbolic expressions and affordances). Spirit has the capacity to tell users not only what they should focus on, but also how to think about those focal points in terms of the human values that are supported. Importantly though, spirit is not settled once and for all – it can be renegotiated as an emergent interconnection between the levels of the IT artifact, and vary with users.

In summary, the IT artifact model provides us with distinguishable levels of analysis of a specific media technology. So, while this paper will steer clear of the ambition to definitely define what an IT artifact is, the model nevertheless allows us to delineate, and address, the specific level where imagined human-machine interaction takes place.

4. Imagined human-machine interaction: two examples

Seeing how the purpose of this paper is to explore how imagined human-machine interaction can be understood and conceptualized, the data reported in this paper represents but a fraction of all potential user engagement data on each case and can, as such, only be interpreted as indications. Nevertheless, the elicited data emanates from highly popular technology blogs and comment sections, pointing to a framing that incorporates both spirit and vivid reader reactions. Also, from a methodological point of view, the mass of data available indicates firstly, that users really want to discuss imagined human-machine interaction and secondly, that comments and forum posts provide a rich source of user engagement insights in general (Skågeby, 2015). As such, the analysis focuses on user comments. In the first case, a temporal delimitation was made, identifying technology blog posts concerned with the iPhone before its actual release (i.e. between the 9th of January 2007 and the 29th of June 2007). User comments were elicited

based on their relevance and detail in expressing a distinct opinion connected to a distinct IT component. In the second case (the design fiction videos), all comments on the distribution platforms, connected to each respective video, were included and thematically analyzed. Put simply, a thematic analysis includes a careful reading and re-reading of the material (i.e. user comments), while continuously assigning expressions to emerging thematic headings, and grouping these.

4.1. The pre-release event: The iPhone

On January 9th 2007, Apple announced the iPhone. While it was preceded by much speculation and unconfirmed rumors, it was not until Steve Jobs presented it at the traditional Apple keynote event that the public got definitive confirmation. The iPhone is a particularly interesting everyday example of imagined human-machine interaction since discourse patterns diverted significantly. Many users, and technology experts, were initially extremely skeptical – even though extremely few had been given a chance to interact with the physical device (which was to be released on June 29th). At the same time, Apple fans were thrilled. Journalist David Pogue summarizes the situation concisely:

> *"Talk about hype. In the last six months, Apple's iPhone has been the subject of 11,000 print articles, and it turns up about 69 million hits on Google. Cultists are camping out in front of Apple stores; bloggers call it the "Jesus phone." All of this before a single consumer has even touched the thing."* (2007)

Looking back, we now know that the iPhone was a considerable market success. During its 'gestation phase' however, when users relied on imagined human-machine interaction, previsions were not always very positive. There were a number of issues where prospective users were unconvinced, including for example the virtual keyboard. At the time, Windows mobiles and Blackberries were popular, and they often included a physical (albeit small) keyboard. This caused users to question the virtual keyboard, imagining that it would result in a waste of time and lots of typing errors. The iPhone arrived at a time where the 'spirit of the mobile' did not include touch interfaces and virtual keyboards. As such, said spirit probably impacted on users to think of the forthcoming technical features of the iPhone as substandard. As a consequence, the future affordances became even harder to foresee. This relates to foreseen problems with the touch screen itself. Users imagined that tactile interaction would significantly smudge the screen, something that was foreseen as problematic when relying on a touch interface only. These were not the only features causing concerns for imagined human-machine interaction: low battery life (previous phones could go weeks on a single charge), a lack of custom ringtones (something which was a fad at the time), insufficient wireless network speed (the original iPhone lacked 3G support), price ($499/$599, significantly more than other brand's flagship models) and poor sound quality, are just some of the features that went against the contemporary spirit of the mobile phone.

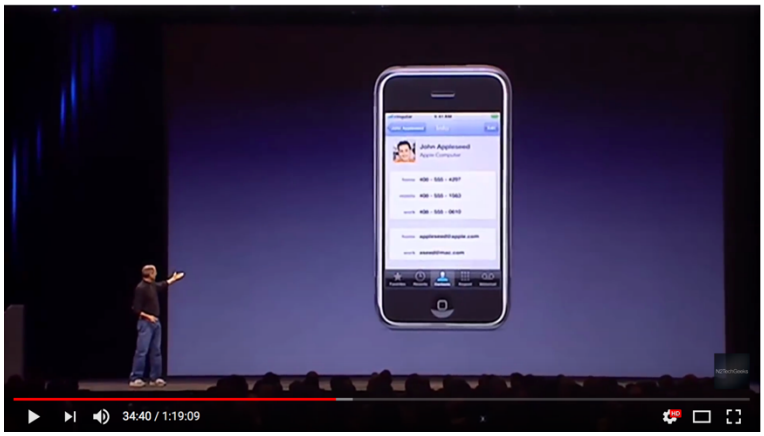

Figure 1. Steve Jobs introducing the first iPhone (2007)

As mentioned the iPhone was nevertheless, a huge success. The technical features and symbolic expressions of the iPhone were more readily available to users, and these were put into a contemporary context of the spirit of mobile phone. For some users, this generated an underestimation of sorts, for others, a more euphoric anticipation. This paper does not seek to emphasize that users necessarily 'got it wrong' (i.e. market logics are not always fair or promoting the best solution). Rather, it wants to stress how imagined human-machine interaction is a distinct phase of usage, worthy if examination in its own right. In the case of the iPhone, hype was built through exclusive pre-release events and more traditional marketing channels, and imagined human-machine interaction took place largely in discussion forums and blog comment sections. Arguably, imagined human-machine interaction has taken a more visual direction, including design fiction videos and technology vloggers, illustrating and discussing potential IT artifact components (ranging from features, to affordances, to human values).

4.2. Design fiction videos: Sight and Slaughterbots

Design fiction, and design fiction videos, are generating an increasing amount of attention. As examples of imagined human-machine interaction, they hold dual potential. Firstly, they can of course generate speculation amongst viewers of the video. Secondly, they can, through narrative embedding, provide a more enticing view of imagined human-machine interaction than is commonly the case with marketing videos.

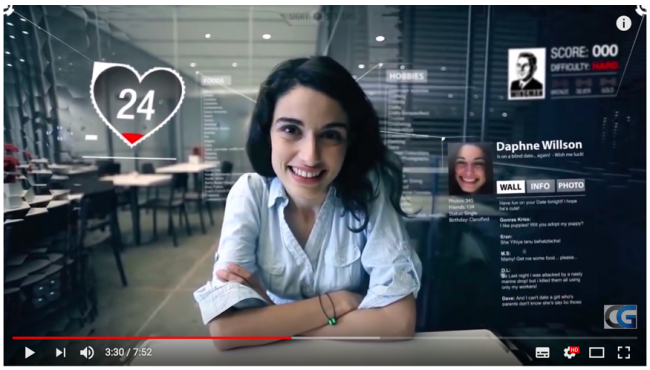

Figure 2. Still from Sight video

The short film 'Sight' (2012), produced by Israeli student filmmakers Eran May-raz and Daniel Lazo, presents an imaginary media technology embedded in a thought-inducing narrative structure. Extrapolating current trends and discussions in augmented reality, gamification, techno-solutionism, and threats to personal integrity, the short film projects the viewer into a real-life episode as it could happen when this imaginary technology becomes ubiquitous. The technology in question is the Sight Systems contact lenses – a biotechnology which displays computer-generated perceptual information, superimposing and interlacing it with physical environments. The video has almost 2 million views on YouTube and 3 million on Vimeo. Viewer comments amount to 900+ on Vimeo and 3000+ on YouTube. The comments express a fairly coherent assortment of feelings between "creepy" and "scary", but also as something that has a potential to "become reality soon". Prospective users relate it to existing technologies such as Google Glass (which is, in several phases throughout its product cycle, itself an example of imaginary media) and HoloLens, but also to fictional technologies, as appearing in for example the TV-series Black Mirror and Star Trek. These diegetic prototypes provide users with a richer view into features, symbolic expressions, affordances, and spirit. As Kirby argues, there is often a purpose to these videos to impact on spirit, or influence values in different directions (most often clearly identifiable as dystopian or utopian). While most users are expressing distress in the face of Sight (partly depending on the spirit emphasized in the video), they also seem poised (and at times almost resigned) in that it would not be that surprising to witness a technology of this kind being adopted en masse by the population. Taking baby-steps, technological development pushes cultural limits, and imagined human-machine interaction is an important part of this process.

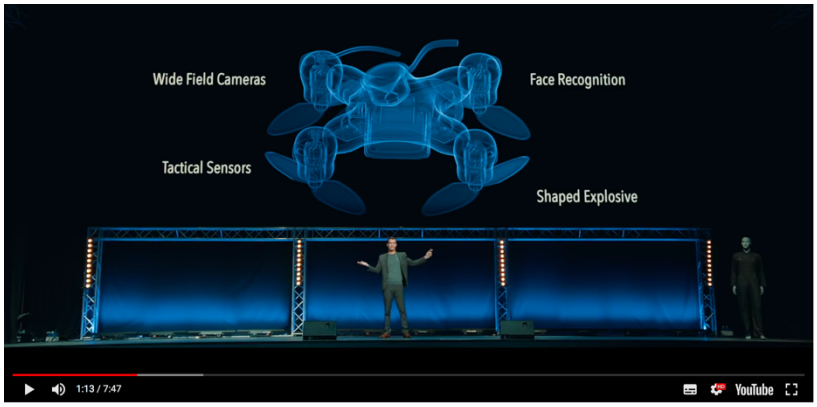

Figure 3. Still from Slaughterbots video

The 'Slaughterbots' video (Sugg, 2018), released on YouTube in 2017, is introduced with the text "If this isn't what you want, please take action at http://autonomousweapons.org/". The video imitates a stereotypical 'big tech event' (e.g. TED talk), where a captivating CEO is presenting a new product, AI-powered killer drones. To be absolutely clear, the organization behind the video has released it with the expressed intent to ban autonomous weapons. Nevertheless, in the Slaughterbot case, there are more clear factions of imagined human-machine interaction. There are groups who find the speculative technology plausible, and those

who find it implausible; and there are those who are optimist about it, and those who are pessimist. These groupings are not very visible in the other cases, illustrating the usefulness of the IT artifact model. The IT artifact model helps us to disentangle these groupings from each other since the user comments address different components of the imagined technology in different ways. From the Slaughterbots video comments, the following 2x2 matrix can be generated:

Table 1. 2x2 matrix of imagined human-machine interaction

	Pessimist	Optimist
Plausible	Dystopians	Utopians
Implausible	Debunkers	Idealists

This matrix serves as an example of how imagined human-machine interaction can take shape in reactions to a specific imagined technology. So, while the matrix is mainly based on user comments to the Slaughterbots video/technology, it also has potential applicability to imagined human-machine interaction in a wider sense. As already mentioned, the four identified types of imagined human-machine interaction relate differently to various conceptual components of the imagined IT artifact. The dystopians hold views similar to the main reactions towards the Sight video. These individuals find the imaginary media presented in this video "scary" and "pure evil". They are more anxious, seemingly based on a certainty that all the technological elements necessary to create this technology already exists, and that it is just a question of (a short amount of) time before it becomes a horrible reality. Essentially, the imagined features and affordances of the technology will produce negative results.

Debunkers are much more suspicious and critical against the underlying purpose of the video, and question the very viability of the presented imaginary media (i.e. autonomous weapons). Their position is ambiguous though – and autonomous weapons are seen as either impossible or, at least, as redundant societal problems. Some users even refer to the video as 'predictive programming', a term charged with conspiratory ideas which, nevertheless, holds similarities to concepts such as premediation and diegetic prototypes[ii]. As such, debunkers also take a slightly fatalist position, proficiently criticizing the practicalities of the imagined technology, but at the same time expressing resignation in the face of (what is perceived as mostly negative) techno-cultural development. As such, debunkers tend to focus of the features of technologies, questioning their viability, leading on to a very abstract (spirit) level of techno-pessimism.

Utopians on the other hand, regard the video as unnecessarily critical against technological development as a whole, and promotes a more techno-optimist view where drones can even be a "personal freedom-enhancing" technology. The imaginary technology, in this case AI-powered drones, can help humanity in the long run. Their focus is mainly on the spirit level, but this view also emerges from specific features and affordances, which are regarded as negatively overemphasized in the representation of the imaginary medium.

Idealists are also techno-optimist but foresee that the represented imagined technology will not be realized in the future. In general, their position is that the potential problem is not technology per se, but instead (bad) people who put them to bad use. As such, they rely more on the view that humanity will prevent and restrict immoral uses of technologies. They are often also more inclined to believe in the ascendancy of the human as part of technological endeavors. As such, human values (i.e. spirit) are the starting point for their imagination, seeping down to lower levels, regarding affordances and features as neutral, and subject to human volition.

This tentative taxonomy illustrates how single cases of human-machine interaction can spur the generation of new analytical dimensions. The plausible-implausible, and optimist-pessimist dimensions, represent a first step, and will likely be accompanied by several others when analyzing a wider range of cases of imagined human-machine interaction.

5. Discussion and future work

This short paper has introduced the concept of imagined human-machine interaction, which has been tentatively defined as the intentions and concerns that come with engaging with media technologies implicitly – i.e. through representations of different kinds (which may have different underpinning agendas). While imagined human-machine interaction can essentially take place in relation to any technology to which the user has no direct access, this paper has focused on futuristic media technologies. The argument goes that future-oriented imagined human-machine interaction is becoming increasingly common, fueled by the market, popular culture and lobbyists. One contemporary indication of this is that, while popular science media have been around since, at least, the early 1900s (e.g. magazines such as Scientific American, Modern Electrics, The Electrical Experimenter, Radio Amateur News, Science and Invention), encouraging both imagination and practical tinkering, popular technology vlogging has exploded. YouTube channels such as c|net TV, Make:, Future Ideas & technology, and many more, are attracting lots of viewers and discussants. Presenting emerging technologies such as neuromorphic computing, social robots, nanotechnology, and interfaces supporting immersive, conversational, or brain-computer interaction, these popular science outlets are engaging a growing part of the public in vivid debates on future human-machine interaction. This paper reads this, along with the significant engagement in pre-release product events and design fiction videos, as a sign that imagined human-machine interaction is becoming more common.

The paper has introduced a number of conceptualizations of imagined media technologies, originating from different theoretical strands, and combined these with a theoretical model of the conceptual components of IT artifacts. The benefit of such a combination is to provide a framework under which imagined human-machine interaction can begin to be explored. The notions of imaginary media, design fiction, and diegetic prototypes, each provide an essential perspective on the temporal and cultural intricacies that characterize imagined human-machine interaction. The conceptual component model of the IT artifact, helps us to address the level at which the imagined interaction is

more specifically directed. In combination, they provide a tentative framework that can address how certain hopes, fears and myths can be connected to certain features, affordances, and values. While this paper has taken a methodological approach based on a small elicitation of user comments, there are numerous other methods that would provide equally viable sources of data for the exploration of imagined human-machine interaction, including ethnography, cultural probe interviews, critical incident analysis, hands-on workshops, design criticism, media genealogy, etc.

The theoretical combinations presented in this paper are intended to serve as a tentative guideline when approaching imagined human-machine interaction. One important point however, is that today imaginary media technologies are also more than ever construed under capitalist power regimes, which puts new analytical demands to the circumstances under which they are represented. The desire for the next big thing has, in many ways, been colonized by the commercial desire for people to consume it. We could even argue that through this form of premediation (Grusin, 2004), where we emotionally prepare for the future, we allow (interpretations of) diegetic prototypes to dictate the present:

> *"[…] rather than preemption being a means by which the present captures the future, the future, that of a splendid product, mobilizes the present for its purposes"* (Fuller & Goffey, 2012, p. 101)

As always when debating the future, there is a tendency for polarized positions. Some prospective users lean more on pessimist notions, where the technological future disrupts many conventional human activities (see for example Keen, 2015; Talbott, 2007; Turkle, 2015). Other users put more trust in the great opportunities perceived in future technologies to augment and empower humanity (see for example Gauntlett, 2011; Hess & Ludwig, 2017; Tapscott & Williams, 2008). While the research community has (rightfully) questioned this strict division (see for example McChesney, 2013; Morozov, 2013), these two polarized perspectives still resonate in debates today, not the least in relation to imagined human-machine interaction. And perhaps they should not be too hastily overlooked – they do contain real concerns and intentions, which may point to important insights into strengths and shortcomings with the technology in question.

While this paper has started from the notions of imaginary media and the IT artifact (here seen as a necessary first step), future research on imagined human-machine interaction could, of course, take much more inspiration from imagined person-to-person interaction research. Most notably, this would include discerning the attributes and functions of imagined human-machine interaction. The eight attributes identified by Honeycutt (Honeycutt, 2003), relating to imagined person-to-person interaction include: frequency (the ir/regularity and occurrence of imagined interaction); proactivity (imagined interaction taking place in advance of actual interaction); retroactivity (imagined interaction taking place after actual interaction); variety (refers to variety in topics and 'interactors'); discrepancy (incongruities between imagined interaction and actual interaction); self-dominance (a variable indicating which interactor is more in control); valence (a variable indicating positive and negative emotions); specificity (a dimension dealing with the level of fidelity in the imagined interaction). While

all of these might not be equally relevant for imagined human-*machine* interaction, they may provide good starting points for initial exploration.

Likewise, the functions of imagined interactions, as proposed by Honeycutt, could be elaborated in relation to human-machine communication. Honeycutt proposes the following six functions when discussing imagine person-to-person interaction: relational maintenance; conflict management; rehearsal; self-understanding; catharsis; and compensation. Seeing how we are also entering an era where relational machines are becoming increasingly common (Skågeby, 2018), this paper foresees that imagined human-machine interaction may take several interesting new directions. For example, relational maintenance, conflict coordination and rehearsal (planning how to interact; and how others will interact) may become an increasingly important part of human-machine communication. In terms of self-understanding, imagined human-machine communication has in science fiction had a long history of asking 'what is human'. Imagined interaction with emerging technologies can raise important questions around how we experience and come to know things about the world (*together* with our technologies); how control is distributed through designed and emergent interaction protocols; and, ultimately, how decisions are made and behaviour is shaped. In terms of self-understanding, imagined human-machine interaction can make people explore and reflect upon the underpinning values, attitudes and opinions they hold.

From the very preliminary results presented in this paper, it is also clear that users engage in catharsis – in fact, one purpose of imaginary media is to reduce uncertainty, and provide users with a way to relieve tension and anxiety in relation to future technologies. In terms of compensation, there is also an interesting area to explore in human-machine communication. Honeycutt refers to compensatory imagined interaction as a form of substitute for 'real' conversations. Here, imagined human-machine interaction takes on a double function, as imagining conversations with a partner that may itself be perceived as a substitute for a 'real' partner to begin with. In any case, the examination of the functions proposed by Honeycutt, when put in a context of imagined human-machine interaction, is an important future research endeavour.

In her groundbreaking work 'Computers as Theatre', Laurel states that engagement "is what happens when we are able to give ourselves over to a representational action, comfortably and unambiguously. It involves a kind of complicity, we agree to think and feel in terms of both the content and conventions of a mimetic context. In return, we gain a plethora of new possibilities and a kind of emotional guarantee" (Laurel, 1993). When users emotionally, socially, technically, and spatio-temporally prepare themselves for a new stage of media actualization, they are coordinating their tensions between hopes, fears and desires for 'the new' to solve, or increase, the problems existing now. One important way to do this, is by relocating the discourse of the fabulous and the spectacular in the well-known, the mundane and the commonplace (i.e. their everyday human-machine interaction patterns). As such, imagined human-machine interaction, as an everyday practice where users relate to im/material media

technologies, calls for further research. In a society preoccupied with both utopian and dystopian future technology scenarios, imagined human-machine interaction might in fact be one of the key modes of user experience.

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[i] A sociological theory focusing on how individuals interact with each other through symbolic worlds (i.e. how such symbolic worlds are jointly created, and how such representations, in turn, come to coordinate behavior)

[ii] According to RationalWiki, the term predictive programming entails the claim that "when conspirators plan a false flag operation, they hide references to it in the popular media before the atrocity takes place; when the event occurs, the public has softened up, and therefore passively accepts it rather than offering resistance or opposition."