Pushing the Limits of Design Fiction:
The Case For Fictional Research Papers

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ABSTRACT
This paper considers how design fictions in the form of 'imaginary abstracts' can be extended into complete 'fictional papers'. Imaginary abstracts are a type of design fiction that are usually included within the content of 'real' research papers, they comprise brief accounts of fictional problem frames, prototypes, user studies and findings. Design fiction abstracts have been proposed as a means to move beyond solutionism to explore the potential societal value and consequences of new HCI concepts. In this paper we contrast the properties of imaginary abstracts, with the properties of a published paper that presents fictional research, *Game of Drones*. Extending the notion of imaginary abstracts so that rather than including fictional abstracts within a 'non-fiction' research paper, Game of Drones *is* fiction from start to finish (except for the concluding paragraph where the fictional nature of the paper is revealed). In this paper we review the scope of design fiction in HCI research before contrasting the properties of imaginary abstracts with the properties of our example fictional research paper. We argue that there are clear merits and weaknesses to both approaches, but when used tactfully and carefully fictional research papers may further empower HCI's burgeoning design discourse with compelling new methods.

Author Keywords
Design fiction; fictional papers; imaginary abstracts; research through design; prototyping.

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

DESIGN FICTION IN HCI RESEARCH
The precise provenance of the term design fiction is slightly unclear and while coinage of the term is often attributed to Bruce Sterling in his 2005 book *Shaping Things* [42], Sterling said that it was Julian Bleecker who "invented the interesting term" [44]. In Shaping Things, design fiction is introduced as Sterling's way of delineating between science fiction's "hand-waving hocus-pocus" and a style of writing that "makes more sense on the page" [42]. Design fiction is a relative of science fiction, however its intention and purpose go beyond the cultural and entertainment purposes of science fiction, "it sacrifices some sense of the miraculous, but it moves much closer to the glowing heat of technosocial conflict" (ibid).

In 2012, Sterling offered this concise definition of what design fiction is and what it tries to achieve: "the deliberate use of diegetic prototypes to suspend disbelief about change" [43]. Lindley and Coulton reflect on Sterling's definition as it relates to HCI research and distil the definition to 'something that creates a story world' and then 'prototypes something within that story world' [30]. They go on to note, however, that "although this definition appears straightforward, complexity arrives when we consider what that 'something' may be" (ibid). The first instance of 'something' refers to the media used to create the fictional world. The second instance of 'something' refers to what is actually being prototyped within that world. In both instances the scope is considerable, as demonstrated by the year-on-year increase of references to design fiction in the ACM digital library, and the diversity of the work contained in those publications. Notable examples of design fiction in HCI contexts are explored in the following paragraphs.

Markussen and Knutz claimed a "precise definition of design fiction" and an "integrative account of the methodological interconnection between poetics and design practice" [35]. This work is relatively highly cited as an example of design fiction in HCI, however neither the claimed 'integration of poetics and design practice' nor the 'precise definition' have since been widely built upon or adopted. The paper's most significant contribution to design fiction discourse is in its demonstration that the approach may be used in order to generate concepts or ideas and that these may then be articulated through a range of different media.

Design fiction has been proposed as a way of showcasing prototypical interactions [32]. Prototyping interactions for technologies or devices that do not actually exist, but that are on plausible future trajectories [cf. 2], is a common

application of design fiction [e.g. 20,37,40,45]. Bold claims made of this approach such as "[by] employing design fiction techniques we can act to shape technical and creative direction, unfettered by an obdurate tie to existing technical paradigms" [32] are impossible to meaningfully verify, however popular design fictions certainly do have a wide reach. Superflux's *Drone Aviary* project, for instance, has attracted nearly 80,000 views in period of around 5 months [21]; *Sight* has been viewed 2.7 million times in 3 years [37]; the academic project *Sensory Fiction* has had extensive coverage in the mainstream press, online, as well as in academic venues [20]. Some design fictions then, as is the case with science fiction [22], can participate in a wider interplay with science fact and society [12], although this is not the full extent of design fiction's utility in HCI research.

Recent research has utilized design fiction as a critical tool. Lawson et al. suggest that there is "emerging dissent in the HCI community regarding the often overly simplistic approach of quantifying everything, including the assumption that users themselves will find quantified datasets immediately useful" [26]. They go on to explain how design fiction artifacts (e.g. 'Emotidog' [50]) can be used to explore Morozov's notion of solutionism [38]. Their research produces knowledge pertaining to the domain of enquiry, in this case that is 'the quantified pet', however they conclude that many of the concerns raised are also directly relevant to technology and HCI research more generally [26]. For Lawson et al., design fiction artifacts, external to the paper itself, were used as stimuli to generate data and derive findings.

Parodying the erotic novel *50 Shades of Grey*, Buttrick et al. created a series of erotic design fictions intended to illustrate how humans are often subservient in their interaction-driven relationships with computers [7]. The salient point of their work, however, is the lack of critical perspectives in HCI: "There is little questioning of the assumption that interactive technology makes our lives more enjoyable, easier, better informed, healthier and more sustainable; or of our role as researchers in that process" (ibid). In the case of Buttrick et al. text-based design fictions were used *within* their research paper to rhetorically illustrate their key point.

In what is perhaps the most extreme example of design fiction as critique within HCI research, 'The Kirminator' et al., a 'team of robots from the future', congratulate the "CHI community for your tireless work in promoting and supporting our evil robot agenda" [23]. Their tongue-in-cheek design fiction paper is framed as a retrospective from a future reality. This example is slightly different, because the *whole paper* is a work of design fiction. Starting with the title, *CHI and the future robot enslavement of humankind: a retrospective,* the authors clearly signpost that this is not a 'normal' research paper and is, in fact, satirical. The paper's content parodies various aspects of

contemporary HCI research in order to encourage the development of more critical perspectives. The paper concludes by calling on members of the HCI community to substantively ask this question of their research: "How does this work contribute to the future enslavement of humankind by evil robots?" (ibid). In a workshop at CHI 2014, some of the same authors used design fiction to explore possible alternative HCI scenarios. Drawing upon design fiction's ability to better "consider the social, psychological and ethical dimensions of technology development" [34] the intent of the workshop's organizers was to broaden design fiction's audience within the research community (ibid).

Yet another configuration of design fiction in HCI is to illustrate findings of real-world studies. Blythe et al. built upon an interview-based 'positive aging' study and then developed a series of design concepts. Two of these concepts were created as design fictions, in the form of advertisements. Of three research findings in the paper, one pertains to design fiction. Blythe et al. contend that these design fictions, as part of a research through design fiction process, can help to indicate the broad shape of the design space and to aid in "design beyond solutionism" [4].

This review intentionally focuses on design fiction usage within the HCI community. For completeness however we should note that design fiction is practiced outside the HCI community as well. Independent practitioners, design studios and collectives (e.g. The Near Future Laboratory, Superflux, Design Friction, Auger Loizeau) practice design fiction, often in a critical, if not entirely academic, mode. Corporate design fictions (e.g. Corning's *A Day Made of Glass* or Microsoft's *Future Vision*) are, generally speaking, devoid of critique and instead suggest "don't worry the future is safe in our hands" [16 quoted in 5]. These unrealistically utopian visions of the future employ diegetic prototypes to seed notions and expectations of future consumption, mirroring the long tradition of 'Vapourware' in commercial design [1], hence the coining of the term *vapour fiction* [33].

Design fiction is a flexible approach; it can be configured in order to be appropriate for a range of different purposes. What is fundamentally a prototyping technique has been demonstrably used as a way of generating ideas, showcasing interactions, critiquing design concepts, critiquing research directions, and illustrating findings. Being so flexible clearly makes *using* design fiction slightly problematic. Perhaps in Kuhnian terms we can call it pre-paradigmatic [cf. 25]: there are concurrently multiple schools of thought about what role design fiction could or should play, as well as how to achieve those goals. This is reflected in recent calls to accept that design fiction is inherently ambiguous. If we accept its ambiguity, then disambiguation strategies for communications *about* design

fiction, may help to strengthen applications *of* design fiction [30].

Scholars continue to develop frameworks for understanding and specifying design fictions. For example, DiSalvo argues that to be anything more than a bland provocation then design fictions must utilize tropes to make ideas relatable [11]. Gonzatto et al. remind us not to forget social factors and that we must "acknowledge the uncertain unfolding of history" in order to have any meaningful interrogation of the future [16]. Lindley proposes a set of terminology to help authors specify the intent behind their design fiction practice, from critical research-centric approaches, to corporate vapour fictions [33]. Generalized perspectives on design fiction have been published too: a taxonomy [19], a typology [24], a methods toolbox [18], and a model [29]. Despite these efforts, current design fiction practice remains contingent and open to interpretation [30].

Having acknowledged and explored the breadth and scope of design fiction practice in HCI we might reasonably conclude many of the contributions have been posing questions *about* HCI practices. In contrast, in this paper we consider design fiction as a method by focussing on two ways of applying design fiction in HCI research that have emerged recently: imaginary abstracts and fictional papers. Both of these approaches incorporate elements of design fiction directly into research papers but in subtly different ways. The nature of these differences are explored in the subsequent sections.

IMAGINARY ABSTRACTS
Among the numerous approaches to using design fiction in research, imaginary abstracts have been mooted as a way of operationalizing design fiction in research through design projects. Imaginary abstracts summarize the findings of papers that "have not been written" and report on "prototypes that do not exist". The general premise "might be a shocking argument" but "perhaps fictional user studies might be a means of reflecting on what might be learned through prototype development" [5].

This is a space rife with debate and challenges to research traditions. Blythe's introduction to imaginary abstracts frames them squarely as part of research through design, an approach that itself remains the midst of a lively debate to do with the value of creative design approaches in research [cf. 6, 26]. So introducing another debated (or pre-paradigmatic) concept, in particular one that pivots around fictitious prototypes, is not a straightforward proposition. Nonetheless design fiction *is* an increasingly popular method, and *is*, for better or worse, on the research agenda.

Situating imaginary abstracts firmly within research through design discourse, Blythe reasons that by analyzing a corpus of research through design texts "an overview of the language" and "the kinds of claims made in academic

papers" can be discerned [5]. These themes or motifs are then used as the template for the pastiches that make up the imaginary abstracts. Arguably the decision to pastiche *abstracts*, is itself, an act that is critical of HCI research. Perhaps Blythe is not only responding to solutionism in HCI, but also to the technical rationality [cf. 28,47] that drives it. Because the imaginary abstracts draw on the language and types of representation usually found in academic research through design texts, they appear plausible to the reader, facilitating a suspension of disbelief. Supported by the analysis of the corpus, the necessary structure of imaginary abstracts is distilled to (1) a frame that justifies an area of study, (2) a description of a prototype and/or study, and (3) findings and/or discussion section. The discussion sections of such abstracts, as is often the case in research through design, tend not to state hypotheses and are more akin to informed reflections on a prototyping process; "the results are rarely uniform and are often nuanced" [5].

Blythe aligns research through design and design fiction with each other, saying that they do "not offer generalizable or repeatable findings" and "could be considered as a complimentary (though different) practice[s]". The similarity between the two practices does not start and end with their lack of generalizable findings, but is also because they revolve around creating prototypes (in the case of design fiction however, physical or functioning prototypes need not actually exist). Noting that "Design Fiction is not entirely new in HCI" Blythe considers various related techniques including scenarios, storyboards and personas. Each of these methods *does* include an element of fiction, but they also have differentiating factors and properties in conflict with design fiction. It is clear from Blythe's discussion that each of these approaches has its own style, each is quite diverse, and debate around the 'best' way to use them continues [cf. 6,9,15,27,39,48]. Our earlier exploration of related design fiction work in HCI research suggests the same may be true for design fiction too. These continuing discussions could be attributed to design fiction being pre-paradigmatic [25], perhaps are caused by its inherently ambiguous character [30], or possibly this 'contingency' is because it is a design-based enquiry [15]. A thorough discussion of these contentions is beyond the scope of this paper and a concrete position is likely unattainable. However, what seems unambiguous is that in contrast to some other approaches, the ability of design fiction to "open up scenarios for the inclusion of social and political conflict in design thinking" [5] is attractive to researchers, and is helping drive interest and adoption of design fiction.

While stating the case for imaginary abstracts playing a part in research through design, Blythe quotes Slavoj Žižek saying that this "may sound a little bit crazy". The imaginary abstracts require a "willing suspension of disbelief" and that the proposition is not based upon empirical findings but is "reflective argument drawing on

the traditions of the essay in the Humanities". Blythe asks "if you intend to proceed any further then please bear with me" (ibid). The same sentiment is pertinent for the following review of Game of Drones, which is an *entirely* fictional paper [31]. In common with imaginary abstracts Game of Drones describes a fictional problem frame, prototype, study, and findings. However, in *contrast* to imaginary abstracts, which compress and summarize each of these aspects into a single paragraph, Game of Drones is a complete six-page paper. This fictional paper approach is unique. In our review of existing design fiction work we referred to one other entirely fictional paper *CHI and the future robot enslavement of humankind: a retrospective*, authored by 'robots from the future' and making a range of satirical (but rhetorically critical) fictional claims [23]. Game of Drones is an entirely different proposition, primarily because there are no overt elements of comedy or satire, the authors appear to have deliberately opted for a style intended to make the fictional paper *appear* real.

When compared to satire such as [23], the 'serious' style of Game of Drones has much in common with Blythe's imaginary abstracts. However where the abstracts are *introduced* as design fiction beforehand and the reader is made fully aware of their fictional nature, in contrast Game of Drones mentions design fiction only at the *end* of the paper. As such it departs from Blythe's request for "willing" suspension of disbelief [5]. Instead of requesting the reader to 'come along for the ride', Game of Drones attempts to create the suspension of disbelief by being *wilfully* deceitful. In the following sections we will describe and discuss Game of Drones, before going on to contrast the properties of imaginary abstracts with fictional papers, and conclude by discussing design fiction's role in research.

GAME OF DRONES: A FICTIONAL PAPER
Design fiction speculations are best suited to forging discursive spaces pertaining to near futures. In most cases 'near futures' refers to technologies that either have either recently become available, or are on the cusp of becoming relevant or viable. Design fictions explore these nascent technologies along plausible trajectories [2]. Game of Drones was recently published as a 'work in progress' paper and explores one of these trajectories: the use of unmanned aerial vehicles (referred to in the original paper and subsequently in this paper, as 'drones') as part of a 'gamified civic enforcement system' [31]. The paper describes a change in European legislation that would allow the use of drones in the United Kingdom for commercial or civic tasks. The drones must only be piloted by individuals who are in possession of a 'Drone Pilot Proficiency Certificate'. In the paper the 'Drone Enforcement System' is 'gamified' so the enforcement tasks are combined with a game mechanic. Players earn points for completing enforcement tasks through a game-like interface. The civic enforcement tasks in question relate to issuing penalty fines to dog owners who allow their pets to defecate in public

without cleaning up the feces, and also parking patrol, issuing tickets where they are due. The paper details various aspects of the system and the user trial including:

- Changes in legislation necessary to make this kind of drone operation legal and regulated.

- The statutory and safety requirements that must be met under the new legislation.

- Technical specifications of the hardware used in the trial.

- Elements of system infrastructure such as designs for the 'Drone Docking Station' (for charging and storage of the drones) and signage used to inform the public of 'Drone Enforcement Zones'.

- The control system (Xbox hardware to facilitate control by citizen users from their homes).

- Details of the users involved in the trial (ex-military and ex-police personnel).

- Description of the type of data gathered as part of the trial.

- Preliminary notes on the findings of the trial.

- A YouTube video that depicts the live system 'in the wild'.

Game of Drones is published and archived in the ACM digital library as 'work in progress', it is therefore fair to assume that there *may* be additional aspects to the work that were not included in the published version and are forthcoming.

According to its concluding paragraph the project had two aims, the first was to examine the practical, ethical, and social considerations of using drones in a gamified enforcement system. In the words of the authors Game of Drones exists "not only to highlight potential usability or utility issues such systems might present but to also create a discursive space in which researchers can consider the wider societal and ethical issues of technological futures in which drones might be widely adopted" (ibid). Second, Game of Drones also contributes to discussions around "design fiction more generally as a method for exploring issues related to introduction of technologies" (ibid). It seems then, that part of Lindley and Coulton's intention in publishing Game of Drones resonates with some of the critical design fiction works discussed previously [e.g. 7,23,26,34]. The authors of Game of Drones are suggesting that this design fiction can help researchers to ask not only about 'how' to implement technology, but also to address questions around 'why'.

Although there are clearly some similarities, Game of Drones is structurally and aesthetically quite different from Blythe's imaginary abstracts in several ways. Game of Drones reveals its fictional nature at the end of the paper, as opposed to imaginary abstracts that are prefaced as such. Also, it does not offer any evaluation or even reflection on the design fiction within the paper itself. At six pages in

length, Game of Drones includes a great deal more detail than an imaginary abstract could. In the subsequent section we provide some analysis, in the form of reflections and commentary, on the structure and content of Game of Drones.

READING BETWEEN THE LINES

Game of Drones occupies a liminal and tense space: it is simultaneously a work of fiction, a 'work in progress', and yet is archived as, and alongside other, peer-reviewed 'real' research. Other examples of design fiction in research introduce the fictional element 'up front', usually explaining the background to design fiction before describing why and how it has been used. Only then (and sometimes *not even* then) is the design fiction itself included in a research paper [e.g. 26]. It is also usually the case that the design fiction is reflected upon, or annotated in some way, such that some elements of the authors' insights and perspectives are articulated to the reader: this is not the case for Game of Drones. Game of Drones also omits a related work section to explore related gamification research, civic enforcement systems, or approaches to design and design fiction. It may be the case that these omissions are intentional, aimed at contributing to a suspension of disbelief, or perhaps these sections are not included due to the limitations of the 'work in progress' format. In either case Game of Drones raises some challenging questions about design fiction in research. What role, if any, should fictional papers play in HCI's design discourse? Is it unethical to submit works of fiction to academic venues without clearly sign-posting their fictional nature? If design fictions, in the form of fictional papers, are intended to stimulate discussion, where and how can that discussion happen, and who should take part in it? To shed light on these questions, and in the tradition of research through design's production of insights even in the absence of clear hypotheses, the following section provides a commentary and annotation of Game of Drones [cf. 5,14,15,41].

Structuring a Fictional Paper

The structure of Game of Drones is not unusual, it is a fairly typical work in progress research paper. In order to make imaginary research through design abstracts that were coherent, Blythe analyzed a corpus of literature deriving a template for the style and structure of the imaginary abstracts. No such preliminary work is described in Game of Drones, although it is possible that Lindley and Coulton researched civic enforcement, gamification, or 'work in progress' papers to inform the structure and style employed. As is the case with Blythe's imaginary abstracts, by appearing quite normal, Game of Drones may be attempting to engender a suspension of disbelief in the reader by 'hiding in plain sight' or highlighting that the structures adopted for papers contribute to producing a 'research reality'.

Although 'design fiction' is shown on the first page of the paper as an 'author keyword' (see figure 2), there is no mention of design fiction in the body of the text itself until the concluding paragraph where the authors state "The research in this paper and the associated artifacts are part of a design fiction" [31]. The first section of the paper is given over to discussing the change in legislation that would be necessary to make the system described a legal possibility. The system itself is described in some detail, including diagrams of the 'drone docking station', control system, and public signage used to indicate 'drone enforcement zones' around the trial city.

The description of the user trial covers factors such as the participants' backgrounds, the location of trial sites, the types of data gathered (including a discussion of the legal provisions necessary to deal with the data gathered), public signage (see figure 1), and screenshots from the 'live system' (which is in reality a video mockup[1]). No actual data or analysis is included in the paper but instead the authors offer this summary, "the data gathered has been considerable […] and will require further analysis along with more extensive trials". One clear reason for not including the data or analysis is that the data did not exist. It is worth noting that the omission of *actual* trial data would almost certainly preclude the work from being published in a 'full paper' track. In this way the work in progress format appears to have played a part in facilitating the design fiction's masquerade as non-fiction. The types of conclusion drawn in Game of Drones are similar in character to those drawn in Blythe's imaginary abstracts. Following on from their call for further analysis, Lindley and Coulton sum up their preliminary results by saying "the initial results indicate that not only does this age group find the game-like activity enjoyable they feel that they are providing an important role within their community".
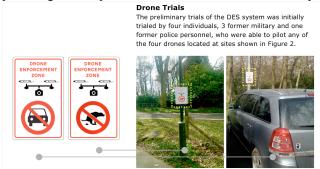

Figure 1. The signage illustrated to the left, and also shown in situ to the right, informs the public that they are in a 'Drone Enforcement Zone'.

In summary, the *structure* of Game of Drones is not unusual. In fact, although the account is fictional the authors have clearly made significant effort to make it appear as 'normal' research, maybe even as a 'future

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[1] See https://www.youtube.com/watch?v=6b_30d7yW2s

mundane' [13]. Contrasting science fiction and design fiction Sterling notes "it would never occur to a normal reader to separate the two" [42], a sentiment which holds true for Game of Drones. Differentiating between the factual elements and fictional elements may simply not occur to a 'normal' reader (e.g. researchers or reviewers). It is clear that the paper, and its structure, could only exist in a work in progress track, as it makes no attempt to include data or analysis. Although 'design fiction' is included in the keywords section, because the fictional nature of the paper is revealed only in the conclusion, Lindley and Coulton's approach to "suspending disbelief" sits somewhere between deliberate ambiguity and purposeful deceit. Although we do see merit in the work, Game of Drones' opacity is unsettling: we beg the question, were the peer-reviewers of Game of Drones fully aware that the system, user trial, and results are all fictional?

Crafting the Diegetic Landscape
A common point of confusion in design fiction discourse is the precise relevance of the word 'fiction'. This is because the prototypes inside the design fictions are, by definition, 'not real' and they *are* therefore fictional. However, that is *not* what the word fiction, in 'design fiction', is referring to. Design fiction is named such because the designs are *diegetic* prototypes [22], or prototypes inside a story world. So the use of the word 'fiction' is actually referring to the prototyping *medium,* not the prototypes themselves. Acknowledging this nuance goes some way to exonerating Lindley and Coulton: what could be interpreted as deceit, could alternatively be seen as 'being true' to the design fiction approach and contributing to the richness of their fiction's diegesis. Across the spectrum of design fiction practice there are many different ways that fiction-as-prototyping-medium is used. As part of the Future Londoner project[2] Tim Maughan uses short story form to flesh out a design fiction character, Nicki [36]. There are a wide variety of design fictions in the form of short films [e.g. 37,40,45,51], the films themselves use a variety of techniques to craft the story world. Other design fictions evoke the story worlds indirectly. For example, *TBD Catalogue* [46] creates the story world by showcasing invented products in a design fiction 'product catalogue'. In examples like this, it is down to the reader to imagine the kind of world that the prototypes would exist within; the design fiction artifact effectively acts as a stimulus. The story worlds, the prototypes within them, and society *in* that world, may be seen as 'diegetic landscapes'. These landscapes can be created as elaborately, or simply as is necessary. For instance *Lie detector glasses perfected, civilization collapses*[3] is an extreme example of a minimal

[2] http://www.nesta.org.uk/news/future-londoners

[3] Quote attributed to Richard Powers as part of the Six Word Stories project, http://www.sixwordstories.net/2009/01/lie-detector-eyeglasses-perfected-civilization-collapses/

design fiction, which despite being very brief, encodes the texture of complete plausible future world within it.

As pastiches of academic tropes, imaginary abstracts and fictional papers are but two additional ways to induce, or build, a diegetic landscape. As they do not have a traditional story structure, the way that they create their story world is similar to *TBD Catalogue*: the fictional world is implied rather than described. Given that the research community is the target audience, formats that are familiar *to* that community seem apt. Game of Drones is a slightly different proposition to imaginary abstracts; it has a much broader scope for building the story world given that it is not constrained to paragraph-or-two long abstracts. In the following we examine the content of Game of Drones more closely, suggesting how different parts of the paper contribute to crafting the diegetic landscape of the Game of Drones 'world'.

> In particular we have worked with retired members of the police and armed services as drone pilots in relation to the enforcement of by-laws relating to parking offences and dog fouling in a small UK city. The initial results indicate that not only does this age group find the game-like activity enjoyable they feel that they are providing an important service to their community.
>
> **Author Keywords**
> Game design; privacy; drones; playbour; design fiction.
>
> **ACM Classification Keywords**
> I.2.9. Robotics: Operator Interfaces.

Figure 2. In Game of Drones 'design fiction' appearing in 'Author Keywords' is the only indication that the research is fictional, until the final paragraph of the paper.

Changes to Legislation
In order for the Game of Drones world to make sense, the law around the use of unmanned aerial vehicles would have to change. Considering the overall length of Game of Drones, a considerable amount of space is given over to describing both the old (factual) and the new (fictional) legislation. Opening the paper with this discussion sets the scene. It leads the reader into a believable world. Describing the legislation also means that should the reader happen to be aware of the old legislation, the remainder of the paper would be plausible and disbelief can be suspended. As well as helping to craft the story world the changes to legislation are also part of the 'prototype' in their own right and unpack the feasibility of such a change in legislation. The changes to the law are also provocative. Given the massive uptake in consumer and commercial drones, current legislation is arguably in urgent need of an update. Game of Drones offers an alternative, the reader may consider whether they approve of the alternative, or, conversely, whether they dislike it.

The considerations for safety included in Game of Drones are in part related to the changes in legislation (safety is a prime consideration in the existing law, and presumably would be in any new law pertaining to drone usage). Given that any 'real' trial of drones used in this way would have to address safety, the fictional paper must include it in order to maintain believability and plausibility. The safety considerations also contribute to the wider discussion about practicality. For example, in Game of Drones it is stated that that the minimum height for the drones to fly is 4.5 meters for safety reasons. An obvious shortcoming of this arbitrary regulation is that although it may avoid collisions at "typical lamppost height" [31] it certainly would not protect against collisions with some power lines, trees or apartment buildings, for example.

System Infrastructure and Hardware

Some technical details about hardware are included in Game of Drones. A contemporarily available consumer model of drone and camera are cited as being used in the trial, as well as a sketch of a docking station design (figure 3), photographs of signage (figure 1), and a diagram of the control device. In terms of the hardware, specifying models seems to mainly play a supporting role in the design fiction: a reader with in-depth knowledge of drone technology would possibly question why that model of drone was selected (if the system were to be trialed for real it is unlikely that consumer-grade hardware would be used). However, for the majority of readers including this detail will help to contribute to their suspension of disbelief. The sketch of the lamppost with integrated 'drone docking station' is based on a real type of lamppost (shown in the supporting video) and appears believable. As well as contributing to the believability and plausibility of the story world, depiction of 'Drone Enforcement Zone' signage in photographs may provoke thought around social and ethical considerations of using this technology for civic enforcement.
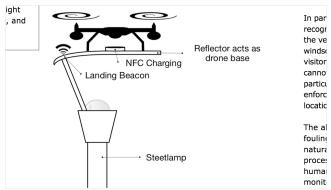

Figure 3. This sketch shows the design for the integrated streetlamp, docking, and charging station.

User Trial

The results of the user trial, as previously discussed, are entirely absent from Game of Drones. Instead the authors provide an extremely brief summary that is reminiscent of how conclusions are represented in imaginary abstracts. There is however significant detail around how the trial was set up:

• A real map shows the fictitious trial locations.

• The professional background of the trial users is mentioned.

• A range of system-generated metrics were collected to assess the "effectiveness, impact, and feasibility" of the system.

• Legal aspects of the data collection are acknowledged.

• The collection of qualitative data pertaining to system usage is detailed.

The detail around the user trial, once again, appears to have been included in order to make the fiction appear believable, plausible, practically viable, and some aspects touch directly upon social and ethical issues. In our view, the inclusion in the paper of details such as the fictitious trial locations and the nature of the system-generated metrics are mainly aesthetic and help to suspend disbelief. It seems likely that 'thinking through' these details may also have assisted the authors in adding texture to their diegetic landscape. Other detail elements, such as "the drone pilots are also encouraged to record any activity they consider 'unusual' to ascertain if the use of drones has potential for crime prevention beyond enforcement activities" (ibid) appear to be included in order to populate the discursive space that Game of Drones strives to create by suggesting visions of 'big brother' dystopias or technology-facilitated neighborhood watch schemes. These details are clearly included to catalyze and enrich discussion about the desirability of such drone-assisted surveillance systems.

Figure 4. A parody of the 'Top Gun' logo that features in Game of Drones' supporting video, giving a clear indication of the 'tongue-in-cheek' character of the work.

Supporting Video

Screenshots taken from the video are included towards the end of Game of Drones in support of the claim that "the data generated has been considerable". The video itself is 5 minutes in length and shows footage recorded from a drone in the trial city. A game-like interface has been added to the footage in post-production (see figure 5) and features the player's name, current location on a map, and points being awarded for certain activities (such as logging car registrations and identifying dogs). The footage looks believable and by envisioning what such a game would

look like helps contribute to the suspension of disbelief. However certain aspects of the video are incongruous with the paper's otherwise 'serious' style. For example, the video begins with a take off of the *Top Gun* logo, where 'Top Gun' is replaced with the words 'Game of Drones' (figure 4). Similarly, the video's sound track is musical rather than an informative voice over or similar, and it does not appear to fit with outputs associated with research conducted in partnership with a local government. In one section of the video a text overlay that is part of the 'heads up display' (figure 5) of the game interface refers to a 'spiky-haired' dog owner[4], a form of words that given the civic enforcement context, would unlikely exist in reality. This mismatching of styles may be intentional as the video is referenced *after* the fictional nature of the paper has been revealed. Perhaps the authors included some less plausible aspects in the video to provide a playful contrast to the serious, but arguably deceitful, text in the paper itself. We also considered whether the production of the video might have played a role in the development of the paper, possibly the creation of the design fiction video could have helped the authors 'think through' the details that were subsequently included in the paper.

Summarizing Game of Drones' Diegetic Landscape

Approaches taken from the arts are appropriate for reflecting on and evaluating design fictions. However, such evaluations do not fit well with previous forms of HCI research. The most significant problem is that arts-based reflections are inherently subjective [5]. The annotation and commentary in the preceding paragraphs is carefully considered, and, where possible, references to other work demonstrate precedents. But it is true that, unavoidably, there are subjective factors in our critique of Game of Drones. A subjectivity that is perhaps rubber-stamped by the fact that Game of Drones was authored by the same Lindley & Coulton who author *this* paper.

Although one previous example of an *entirely* fictive HCI design fiction paper does exist [23], the proposition here is quite different. Writing the paper as if it were real – without any of the satire integral to [23] or the 'introduction to design fiction' included in [5] – the authors of Game of Drones appear to have taken design fiction's intention to 'suspend disbelief' to an extreme condition.

The structure and content in Game of Drones, almost without exception, exists to either make the work appear plausible (in terms of technological or legislative feasibility) or to make it believable (appearing factual despite being made up). This is true of the fictional change in legislation, of the hardware used in the trial, and the signage. Even the parts of the paper that we referred to as 'aesthetic' (e.g. a list of the metrics automatically gathered by the system) look like they were included in order to

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[4] Allegedly the 'spiky-haired dog owner' is actually co-author of Game of Drones, Professor Paul Coulton.

contribute to the plausibility of the system described in Game of Drones. Perhaps these aesthetic inclusions are intended to make the piece look plausible in the eyes of the target audiences: HCI researchers and reviewers. Said differently, if those things were not mentioned, the fictional paper would stand out as being unrealistic. Game of Drones, then, is like a jigsaw puzzle, where the completed puzzle attempts to comprehensively suspend disbelief. Each element in the paper is a piece in the jigsaw, linking with the pieces around it. When aggregated together, the puzzle shows the full picture of the diegetic landscape.

Figure 5. Screen grab from the Game of Drones video showing elements of the game interface and heads up display.

Game of Drones, though, is not *solely* an exercise in crafting a fictional world and packaging it into a research paper. By building the Game of Drones world the authors have provided a means to ask meaningful questions about such a system. The discursive space created by the diegetic prototypes described in Game of Drones inspired us to ponder a raft of issues around the feasibility of such a system. For example, the system-imposed minimum height limit is clearly not sufficient to avoid collisions with tall trees or apartment buildings; what kind of collision avoidance system would be required to do this effectively? Based up on the battery life of the hardware used in the study, a much larger number of drones would be required to achieve useful enforcement coverage. Given that the drones cannot fly in windy, rainy or nighttime conditions, we postulated that dog-walks or illegal parking at nighttime might increase as a direct result of the system being implemented. The authors refer to a discussion about the possibility of "accusations by the public of promoting over zealous enforcement", they conclude that "this would only be an issue if payment was related to this aspect of performance" [31]. As well as being an intriguing question in its own right, this caused us to ask wonder about the gamification of the system. The game itself appears quite mundane, what would motivate the players to continue playing the game beyond the realm of the trial? The discursive space created by this design fiction segues between practical and technical considerations of feasibility and into more general ethical questions about the implementation of technology.

In part, the intention of Game of Drones, is to use the discursive space in order to "consider the wider societal and ethical issues of technological futures in which drones might be widely adopted" (ibid). As with the practical and technical aspects of the system, Game of Drones provokes critical thinking around societal and ethical considerations. Obvious discussion points included the potential for 'overzealous' ticketing, a problem that would quite possibly by made worse by the game mechanic. We are quite used to signage denoting various types of enforcement and/or monitoring, but the notion of 'Drone Enforcement Zones' opens up the possibility of 'drone ghettos' (spaces where people do not go because they are surveilled by drones), perhaps new markets for 'aerial disguises', or even the reemergence of dazzle camouflage to inhibit visual tracking. Most alarmingly the enforcement system's encouragement for players "to record any activity they consider 'unusual'" (ibid), under the guise of parking enforcement local governments *could* crowd source a brand new type of citizen-on-citizen surveillance. These example ethical discussion points are included for illustrative purposes, demonstrating the type of discursive space that Game of Drones has the potential to create.

In our discussion of Game of Drones it is clear that the content of the paper has been put together in order to make the concepts described in it appear believable and plausible and to blur the boundaries between the diegetic landscape and reality via a suspension of disbelief. Through that suspension of disbelief, readers are nudged towards constructing their own ideas about the ethics and feasibility of such a system. However, *this* paper is about HCI's design discourse, and understanding what part fictional papers like Game of Drones can play in that discourse. Concluding Game of Drones, the authors cover the aforementioned intentions to do with practical and ethical considerations, but the final sentence refers to considering "design fiction more generally as a method for exploring issues related to the introduction of technology" (ibid). With this in mind we ask what role fictional papers like Game of Drones can play in HCI? In what way (if any) are fictional papers useful? How can researchers approach the latent ethical dilemma that emerges when willfully deceiving both peer-reviewers and other researchers, by publishing fictional papers?

CONTRASTING ABSTRACTS WITH PAPERS
A compelling case has been made for creating imaginary abstracts as works of design fiction, and using them in HCI research as a means to provide "research focused critique and development" [5], to help "design beyond solutionism" [4], and to "explore possible user reactions" [3]. If we consider not only the *utility* of these fictions for research, but *how* design fictions derive their value – through a suspension of disbelief about change – then there is a case for extending imaginary abstracts into fully formed fictional *papers*.

The purpose of abstracts, including *imaginary* abstracts is to provide a summary, précis, or abridgement. By definition they do not go as far as is possible, they cannot explore a concept in as much detail as longer formats. Limiting accounts of fictional prototypes to abstracts removes some of their ability to articulate the essence of the diegetic landscape to the reader, which in turn limits the ability of the design fiction to suspend disbelief as much as it otherwise might. Fictional papers, on the other hand, can commit to providing the fullest picture they can. They have significantly more scope to attempt to suspend disbelief for the reader. A downside is that this can, as we pointed out previously, be interpreted as being willfully deceitful and are therefore ethically dubious.

The longer fictional paper format also has the advantage of forcing a full engagement with the design process, something that can easily be overlooked when the designs are, in fact, fictional. It seems infeasible to produce a fictional paper, which suspends disbelief effectively, without doing a reasonable amount of research or without properly thinking through the detail and intricacies of a system's design. In the case of Game of Drones, we see this engagement demonstrated in the well-detailed discussion around legislative changes, in the prototypical designs for docking stations, and in the safety considerations. By forcing this deeper engagement with the design task, fictional papers undoubtedly produce 'deeper' design fiction artifacts, which perhaps have the ability to catalyze more meaningful discussion and reflection.

The weakness of imaginary abstracts, due to their short form, may or may not be an issue; it depends on what the intention behind creating the design fiction is. Likewise, the potential extra depth available for longer fictional papers is not necessarily always needed or relevant. If a research paper that features an imaginary abstract has 'made its point', if the discursive space that design fictions aim to create has already been utilized, and findings derived from it are being recounted, then it seems that imaginary abstracts are the ideal format to weave into the body of another research paper. Conversely if the design fiction is not intended as an end point, but rather to provide a means for further or continuing discussion, then longer and more detailed formats like fictional papers have a clear advantage.

Fictional papers have some obvious problems too though. If imaginary abstracts are, as Blythe described them, 'a little bit crazy', then fictional papers are arguably 'a little bit more crazy'. Although our exemplar paper does concede its fictional status in the concluding paragraph, in terms of research ethics and publication conventions, Game of Drones is on shaky ground. We beg the question, on what basis would peer-reviewers accept work like this: because the format and use of design fiction is worthy of publication, or because they were deceived into believing the work was real? Does the fictional paper format push the

use of design fiction 'beyond the sublime into the ridiculous'? Is there a place for fictional papers in research, or do they, by their very nature, contravene the scientific rigor of 'proper' research? Fictional papers such as Game of Drones can quite easily be cast as willfully employing deceit, or putting it colloquially, 'taking the piss'.

A counter perspective is that fictional papers are actually being *true* to design fiction. If a good design fiction intends to suspend disbelief about change, then doing that efficiently or 'well', should not necessarily be frowned upon. A good precedent for this exists if we consider Wizard-of-Oz [8] techniques: they also willfully 'pull the wool over the users eyes' by making 'fake' interactions look like real ones in order to elicit a meaningful response. The future of using design fiction in HCI research, in the form of fictional papers, seems to pivot around a problem of presentation. If researchers want to harness a full suspension of disbelief and be true to the nature of design fiction, while also sitting comfortably within the tradition of peer-reviewed research, then a convention should be developed that allows this to happen without either compromising how deception can enhance a suspension of disbelief *nor* compromising the transparency and honesty of ethical research. In other disciplines deception in research can be weighed against potential scientific and educational gains [10] or alternatively in terms of the potential to cause harm [17]. Exploring how to apply these pre-existing frameworks presents a future trajectory for further research into how design fictions may be incorporated into HCI research.

In our view both 'imaginary abstract' and 'fictional paper' approaches have merits, are novel, and are potentially powerful, ways of integrating design fiction practice into HCI research. By pastiching the forms of traditional HCI research, the design fiction artifacts they create are easy for the target audience to interpret and relate to. Both approaches appear to be resonant with a wider discussion in the community around solutionism, and provide a flexible tool to be critical of solutionist approaches whilst not impinging upon meaningful progress. Depending on the intent behind the inclusion of design fiction, either approach may be more or less appropriate in a given circumstance.

Fictional papers are provocative pieces that showcase 'fully thought-through' systems. They will always require a substantial effort on the part of the author, but this is 'paid back' to the reader by defining the diegetic landscape *explicitly* and unburdening the reader. The added definition or clarity that these the diegetic landscapes have may allow readers to engage with these fictions more comprehensively or meaningfully. Fictional papers can be the starting point in continuing discussions about desirability of possible technological trajectories. Imaginary abstracts provide researchers with a relatively quick way of considering what a particular concept might be like, often as a way of

discounting less desirable ideas, sometimes as a way of advocating for others, and occasionally stimulating unexpected iterations or entirely new ideas [3,5]. They have a far lower overhead than fictional papers, but this may compromise how well considered they are as the author does not have to think through the whole system. Meanwhile their brevity may also burden readers with the task of suspending their own disbelief. Blythe's work on imaginary abstracts has shown not only how they may be constructed and what they look like, but also demonstrates how to approach their evaluation. As the only available example of its kind, because the paper itself is almost entirely fictional, and in order to preserve our anonymity through the peer-review process for CHI 2016, our analysis and evaluation of Game of Drones has, through necessity, been delicate and to reflect this we have deliberately kept the analysis in the form that it appeared in the paper sent for review.

CONCLUSION

In this paper we have reviewed the use of design fiction in HCI research and contrasted 'imaginary abstracts' with 'fictional papers'. We argue that depending on the desired outcome, either approach may be more or less appropriate. Whilst imaginary abstracts establish discursive spaces and articulate concepts fictional papers go further by offering a deeper and more involved level of insight to the reader. This is achieved by presenting fully thought through diegetic landscapes capable of a comprehensive suspension of disbelief. Both formats challenge norms and conventions in academic research and a number of issues are evident. While imaginary abstracts are admittedly 'a little bit crazy' their transparency makes them quite palatable to the research community. The transparency, though, reduces their ability to suspend disbelief. In contrast the example fictional paper strives for a fuller suspension of disbelief by being deceitful and maintaining the illusion of fact until the very end of the paper, but in doing so becomes part of an opaque ethical space. Through our discussion around the merits and limitations of both approaches we have highlighted that fictional papers have a great potential. However, until uncertainty about how they are presented, peer-reviewed and evaluated are addressed, there will be continuing tension around their publication. There *is* a case for pushing design fiction to the limit in the form of fictional research papers. However, doing so without undermining research rigor means that conventions must be established to facilitate ethical-and-effective creation, review and publication of fictional research papers.

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