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Tales from the Materialverse: Comic-Based Narratives and Character Cut-outs for Co-Design Fiction

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Abstract. Sequential art in the form of comics is a powerful and effective vehicle for graphic storytelling and communication, rendering it a suitable means for design fiction. Few, dispersed examples introduce comic-based design fictions in HCI research, yet little is reported on the design and implementation process or the use of paper cut-outs. In this paper, we present our process of crafting and implementing comics and character cut-outs for facilitating co-designing fictions. Our utopian visions, “Tales from the Materialverse”, informed by our interest in future smart materials and their applications, were used as a provocative communication tool to mediate discussions and encourage critical thinking. Based on learnings derived from our process and an expert workshop, we propose suggestions for designing design fiction comics and cut-outs as an alternative co-design fiction approach.

Keywords: Comics · Design Fiction · Co-Design · Design Tools

1 Introduction

Comics are an appealing and widespread entertainment medium of sequential art. Their visual language functions as a portal transporting the audience into a story [23], allowing for mental time travel to fictional worlds. Inherently, the comic format embraces the exaggeration element and facilitates identification with the main characters. When it comes to design fiction in HCI research - a technique where researchers employ imaginary narratives to explore fictional worlds, products, and concepts [23] - comics are under-explored. The limited examples (e.g., [22, 21]) present the final polished result, overlooking the process of conceptualising, designing, and implementing comics.

To fill this gap, we developed a co-design fiction approach based on comics. Our approach involves a design fiction comic booklet and character cut-outs designed in the context of a multidisciplinary research project on smart materials. As HCI researchers, our role in the project involves envisioning future smart material applications. Our design fictions act as a provocative means of future inquiry for evoking critical thinking and initiating discussions with our

collaborators on the subject matter, with the ultimate aim to reach a common understanding and alignment. The booklet illustrates a fictional utopian narrative with an open ending. During a workshop, experts co-designed their ending to the story facilitated by the use of character cut-outs.

With this work, we contribute our comic-based design fictions and the process of designing and implementing them to the growing body of research on co-design fiction approaches. Through our suggestions, we envision broadening this design space and propagating the use of comic-based narratives and character cut-outs for facilitating co-creation in the context of design fiction.

In the subsequent section, we explicate the apt pairing of comics and design fiction by providing background into both areas. Next, we present our design fictions and the process of creating them. Further, we detail the expert workshop setup, procedure, and results. We conclude by formulating our lessons learnt from both the process and workshop insights as a series of suggestions for designing and implementing design fiction comics.

2 Background

Examples of traditional entertainment comics and visuals that depict visions of the future are recurrent and non-exhaustive. As early as the beginning of the 19th century Jean-Marc Côté and others depicted extravagant technology visions of the year 2000 [1], whereas more recently, examples such as the Ghost in the Shell manga series [20], depict technology-augmented humans with stories set in the near future. Over a decade ago, Marcus indicated that traditional entertainment comics started incorporating HCI-related concerns in their content, demonstrating awareness of HCI achievements and pitfalls [13]. Such works pinpoint the relevance of comic-based design fictions as a future inquiry for HCI.

2.1 Design Fiction Comics

In design fiction, comics are considered a suitable [23], yet under-represented medium. A prominent example we take inspiration from is work by Sturdee et al. [22], who made use of comics to explore their scenario of a digital empathy detector in a dating scenario. In their words, “*design fiction can be almost anything that creates a story world*” [22, p. 378], and indeed, other forms include diegetic prototypes [11], imaginary abstracts [3], and video sketches [18]. Other examples of participatory or co-design fictions approaches (e.g., [2]) do not involve comic-based scenarios.

In comparison to other visual narrative design fictions, such as live-action films [24] or short video clips [18], comics hold an advantage when it comes to creation time and hyperbole. Comics’ visual language encourages the element of exaggeration [15], constructs an immersive environment, and allows the reader to identify with the fictional characters. Unlike films, comics are “permanent”; it is up to the reader to decide the pace at which information is consumed. In print form, comics afford a sense of ownership that digital means do not; Haughney

noted that in studies participants tended to keep their comics' physical copy instead of dispersing it [9].

2.2 Comics in HCI research

Design fiction aside, comics have been embraced in other areas of HCI research. Dykes et al. make use of them as a medium for illustrating their Research-through-Design (RtD) process [7], whereas Sturdee et al. present their alt-CHI provocation arguments in comic form [21]. Albeit the numerous examples, little reference exists on the comic's design process or the use of cut-outs.

When it comes to implementation, comics might not look dissimilar to storyboards [23], but they differ intent-wise; comics narrate a story and are a finished product, whereas storyboards are simply tools that guide product development. Instead of illustrations photostories utilise photographs to capture reality into stories. Rowland et al. make use of comics to showcase the potential of photostories implemented by both children and adults [19]. Comicboarding is a participatory design (PD) technique for co-creating or brainstorming [10, 16], where comics are used as persona proxies so that children can share their ideas. Both photostories [19] and comicboarding [16] require an (experienced) artist to facilitate the process and convert participants' ideas into sequential art.

We situate our work in these design fiction examples and expand on the work by Sturdee and Lindley [23] on comics as a tool for inquiring the future. We do so by presenting and detailing our comic design process and showcasing how to implement comic-based co-design fiction sessions via paper cut-outs to elicit context-specific reactions and initiate discussions.

3 Our Design Process for Comic-Based Design Fictions

For our design fiction comics, we drew inspiration from McCloud's and Cohn's textbooks on comic creation [15, 14, 4] which divide the comic design process into narrative and illustration. Larson further splits the narrative part into three segments: ideation, plot development, and script [12], whereas the illustration part is divided into: art production (pencilling, inking, and colouring the illustrations), lettering (dialogue placed into speech balloons), and editorial (final checks). We opted for an episodic structure to explore diverse facets of the story world and to achieve flexibility in engaging with different stakeholders [8].

Narrative Design Our narrative is shaped around the Materialverse; a future world presented through the eyes of a grandmother and her grandson. In contrast with traditional comic design practices where the starting point is the main storyline concept, our starting point (See Figure 1) was an idea exploration based on preliminary non-fictional materials provided by our collaborators (i.e., wood-based 3D printing filament and translucent wood veneer). During the ideation, we defined sustainability-related values, such as circularity, which were translated into the first scenario ideas where we envisioned technology that has the

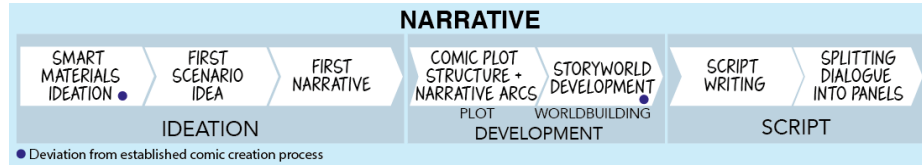


Fig. 1. Our process of designing comic-based design fictions based on McCloud’s textbooks [15, 14] and Larson’s guide [12].

ability to fulfil our visions. The narrative presented in this paper was based on this technology-based scenario and further outlined by crafting the characters. In hope for reader identification, we depicted an elderly person, 50 years in the future, conversing with a child. We added flashback elements from the past (the 2020s) into the story to underline the utopic facets of the story and add tension in the narrative, magnified by the two character’s diverse perspectives. Once we defined the narrative, we created the plot structure and outlined the two characters’ story-lines through narrative arcs (where peaks are followed by releases [4]). Deviating from established comic creation methods, we developed the story world as a worldbuilding practice [17], detailing its socio-technical assets (e.g., relations between citizens, objects, and technology, values, laws). We wrote the narrative’s script collectively and divided the dialogue into pages with (a storyboard per page) based on the narrative arcs.

Comic Illustration For the illustration part (Figure 2), one of the authors translated the written script into digital illustrations, initially by outlining the main characters and their facial expressions and body language. We arranged the panels on each storyboard and placed characters in the panels accordingly. Afterwards, we cautiously drew future technology artefacts, elaborating on system functions and interaction possibilities. We proceeded with colouring, emphasising key elements of our story world. The dialogue was then positioned in each panel and, subsequently, speech and thought balloons were drawn around it. Finally, we reviewed the end result for spelling and other errors and combined all the comic pages, resulting in a six-page printed booklet.

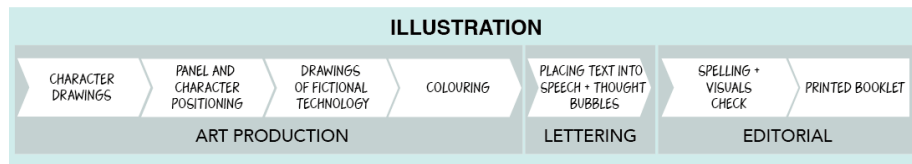


Fig. 2. Our process of illustrating our comic-based design fictions based on McCloud’s textbooks [15, 14] and Larson’s guide [12].

4 Tales from the Materialverse

Our fictional world is based on utopian circular economy visions situated in 2070, where all solid matter (i.e., metals, composites) could be 3D-printed and endure infinite life cycles. Contrasting the majority of design fictions, we opted for a utopian narrative; a hopeful scenario where people perform their best against all odds [5]. Albeit the utopian tone, we kept tension and conflict in the narrative to facilitate story climax and ensure engagement [8].

In the first episode of the Materialverse, the grandmother requests help in repairing her kettle with the MatterMix; a futuristic technological device that can manufacture or repair any device, or dismantle it into raw solid matter. We utilise the characters' dialogue to construe what changed from nowadays to 2070 and the eradicated concept of waste (See Figure 3, left).



Fig. 3. Left: The comic's main characters, discussing the anachronistic notion of waste. **Right:** The last two panels of the comic booklet with a narrative peak ending.

In the second episode, the grandchild explains how to use the MatterMix, providing added clues on this new world, while the kettle gets repaired. For example, solid matter is viewed as a currency, used to construct technological devices and other material objects. Additionally, the knowledge around material science is open-sourced in a way that communities can collectively allocate materials where needed. The episode ends with a cliffhanger, a peak in the plot (i.e., the apex of narrative tension [4]) where the grandmother offers a 2€ coin as a gratitude token and the grandson thanks her, while an empty thought balloon hovers above his head (Figure 3, right).

5 Expert Workshop

To obtain qualitative feedback on the implemented comics, we recruited five HCI experts for a workshop of ninety minutes. Three days before the workshop, we distributed our design fiction booklet to the participants (Figure 3). A short description of the context and the aim was written on the cover, followed by six pages with comic panels and the request on the last page of contemplating an ending, to provide them time to reflect on the story.

The workshop, led by two members of our team, was split into four parts: a short briefing of 5 minutes (introduction and consent), a 40-minutes feedback

round on the design fiction booklet, a short (20 minutes) story-ending co-creation session, and a 25-minutes reflection part (discussing benefits and drawbacks of the approach and the use of paper cut-outs).

5.1 Feedback Round

The participants provided feedback, in a conversational manner, on the design fictions they had received. They addressed the comic’s stylistic (e.g., wording, colouring, and depiction of future technology) and narrative elements (e.g., ending at a peak). Both the design and narrative were received positively, although the experts mentioned that some wording could be simplified or explained (e.g., protagonists, MatterMix), whereas selective colourisation confused one participant. In terms of narrative, the experts expressed that the booklet placed them into context and that the peak ending was intriguing.

5.2 Co-design Session

Right after the feedback round, we split the group into two teams to co-create an ending to the story as they saw fit, in a 20-minute interval (Figure 4, right). In anticipation of the participants facing difficulties in drawing the comic’s characters, we prepared two sets of paper cut-outs (12 per set) of the main characters with different facial expressions and body language, beforehand (Figure 4, left) to provide the same language form and facilitate the session. We suggested the use of the cut-outs and the whiteboard table surface installed at our research centre to draw speech or thought balloons or other objects. In each group, there was a member of our team observing and taking notes.

Two alternative endings were created; both teams made use of 5 or 6 of the provided cut-outs and 5 or 4 panels respectively. The experts drew speech balloons above the cut-outs to express the narrative of the ending verbally. Both teams drew the fictional technology presented in the booklets. Both endings depicted a similar narrative where the grandson reduces the coin into solid matter, yet one of them used humour for the release (the narrative’s resolution) panels.

5.3 Reflection

In the final 25 minutes, we requested the two teams to read each other’s story ending and discuss it as a reflection activity. We concluded the reflection with short feedback on the use of paper cut-outs. All the participants reported that they found the cut-outs helpful in completing the story; one of the experts specifically mentioned that the cut-outs *“takes(sic) away the fear of drawing, if you don’t have confidence in your drawing skills”*. They suggested that different cut-outs could serve as inspiration. As Haughney noted [9], three experts requested to keep the comic booklets at the end of the workshop.

We compiled and classified our notes from the workshop and audio recording transcriptions into feedback on the comic design, the design fiction narrative, and reflections on the co-creation approach and the cut-outs. We formulated these findings into actionable elements, presented in the following suggestions.



Fig. 4. **Left:** Paper cut-outs assortment of the two main comic characters, used to support a co-speculation activity during the expert workshop. **Right:** Expert workshop, participants co-creating an alternative ending using comic character cut-outs.

6 Suggestions on Designing Design Fiction Comics

Based on insights from the experts' feedback, we propose a preliminary set of suggestions partitioned into stylistic, and design fiction elements of comic-based story worlds, and the implementation of character cut-outs.

Suggestions on Stylistic Elements of a Design Fiction Comic

- **Form matters:** Design a comic booklet or other tangible medium to facilitate the thought process of ending an episode. A tangible item may also trigger feelings of ownership and active engagement [6].
- **Style change assumes meaning:** Make use of the absence or presence of certain visual elements (e.g. colourisation and drawing style shifts) to indicate change in the plot and to highlight or draw attention to certain parts of the story.
- **Words and visuals are equal:** Visualise and name fictional technology cautiously as word choice affects interpretation and opens up discussions (e.g., on functionality), hindering dialogue on the rest of the content.
- **Visual simplicity:** Depict the characters or other entities simple enough so that they can be used as entities of a self-contained comic booklet or as character cut-outs, without compromising on the quality of the fiction.

Suggestions on Design Fiction Elements of a Comic Storyworld

- **Constructing believable characters:** Craft your design fiction characters as real people with believable backstories and convincing dialogue so that readers can empathise and identify with them. Keep tension between the characters for reader engagement [8]. Developing the story world extensively could further support this step.
- **Ambiguity before peaks as a stylistic element:** Use ambiguity elements in your design fiction narrative to allow for different interpretations [22]. In combination, introduce ambiguous objects right after a peak to offer a chance for questioning.
- **Capturing method:** Document the co-creation outcomes by using comparable means and have an observer in each team to take notes and photographs. The set of cut-outs for completing the story facilitates comparison

among the developed stories. Using a piece of paper as a working area instead of a whiteboard could be an alternative as Desjardins' et al. [6] showcase.

- **Boundaries for imagination:** Provide a fictional world in advance, to set the context and the right set of boundaries in which participants' imagination is free to develop their own story ending, instead of having a broad and open starting point. Another such boundary is the use of the character cut-outs.

Suggestions on the Use of Character Cut-outs Include enough depth and variation in the paper cut-outs to articulate how they would behave in a specific scene (e.g., via a range of different facial expressions and characters), as people inherently continue a story from a personal perspective. Through the paper cut-outs (Figure 4, left) researchers and participants share the same language form and means to articulate ideas; a rather simple and low-technology technique for co-creation as it does not require an experienced artist to translate the participants' thoughts into visuals as in comicboarding [16]. Additional, object-based cut-outs could inspire and affect the completion of the story, providing guidance on other aspects of it (i.e., cut-outs depicting a technology artefact could guide or influence the participants in placing it in their story and exploring its functionality and interaction possibilities). However, the main character cut-outs were seen as more valuable for facilitating the completion of the story.

7 Conclusion and Future Work

In hope to open up the design space of comic-based co-design fiction, we presented our comics design process and suggestions for designing comic-based narratives and paper cut-outs as a tool for co-creating design fictions in a group setting. We found that the comics' narrative facilitated the co-design process in terms of communicating a fictional world, demonstrating how design fiction in a comic format can serve as a means of inquiry. In addition, the comic cut-outs provided support in co-designing an ending to the fictional story. In future work, we will make use of the design fiction outcomes for inspiration when designing future interactive systems. We see opportunities of implementing this approach as a co-design exercise in lieu of storyboarding, for establishing a common ground in multi-stakeholder workshops and initiating dialogue among participants.

The use of paper cut-outs provided support in co-designing an ending to the fictional story and seems promising as an idea-articulation means for co-designing fictions. Digitisation of this approach could be yet another step towards non-collocated co-design fiction activities. Further implementation will be carried on in this direction and reported in future work.

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