

Becoming Sandwich Makers: Exploring Provocative Worlds Through an Artist Residency

KIM SNOOKS, Imagination Lancaster, Lancaster University, United Kingdom

DAN RICHARDS, Imagination Lancaster, Lancaster University, United Kingdom

We invite the HCI community to become sandwich makers, advocating for the inclusion of artist residencies as part of speculative design methodologies that build and explore fictional worlds through the creation of provocative prototypes or “provotypes”. In this paper we present our experience of including an artist residency as part of our world-building process. We reflect on how the inclusion of a residency in our sandwich model helped contribute alternative ways to immerse, explore narratives, do world-building and use curation as a form of annotation. We conclude with some key insights for why design researchers in the HCI space might wish to use sandwich models in their own research processes, using artist residencies to pursue multiple explorations of emerging technologies, drawing in different voices to provoke debate about the futures we want to create.

CCS Concepts: • **Human-centered computing** → **HCI theory, concepts and models**; **Interactive systems and tools**.

Additional Key Words and Phrases: world building, design fiction, prototypes, artist residencies, digital identities

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1 Introduction

“There is an art to the business of making sandwiches which it is given to few ever to find the time to explore in depth. It is a simple task, but the opportunities for satisfaction are many and profound: choosing the right bread, for instance. The Sandwich Maker had spent many months in daily consultation and experiment with Grarp the Baker and eventually they had between them created a loaf of exactly the consistency that was dense enough to slice thinly and neatly, while still being light, moist and having that fine nutty flavour which best enhanced the savour of roast Perfectly Normal Beast flesh.”
– Douglas Adams, Mostly Harmless [1].

The challenges associated with creating robust and provocative fictional worlds are similar to those of making exquisite sandwiches. Speculative design [16] and design fiction [14] approaches are common in HCI and allow researchers to explore possible futures of technology with stakeholders by creating fictional worlds and using artefacts and provocative prototypes or *provotypes* as “entry points” for conversations. These approaches often involve three phases that make them comparable to our initial sandwich analogy. Firstly, they typically involve a phase of work which

Authors’ Contact Information: Kim Snooks, Imagination Lancaster, Lancaster University, United Kingdom; Dan Richards, Imagination Lancaster, Lancaster University, United Kingdom.

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helps the researchers familiarise themselves with the technology being explored to form the foundation of the world building activities - much like choosing the right bread for a sandwich. Secondly, they involve worldbuilding activities and the creation of artefacts/entry points to probe different aspects of those worlds and to consider possible futures. We might think of this as selecting and assembling the filling of our delicious sandwich. Finally, a process of reflection and synthesis is often included to engage different stakeholders, provoke discussion and generate insights about possible future implications of specific design decisions. This third element is important in introducing different voices into the worldbuilding process, acknowledging the “*plurality of lived experiences*” [22]. This helps support consideration of multiple futures that represent diverse worldviews, rather than attempting to either reach an artificial consensus for what are often thorny HCI challenges or produce speculations that represent singular perspectives of the design researchers. To complete our sandwich analogy, we can consider this phase the top and most outward-facing bread layer of the sandwich.

As part of the ESRC-funded *Digital Good Network* in the UK [32] we have been contributing to the wider question of what constitutes a “good” digital society [33]. We have been using worldbuilding to create discursive spaces that enable diverse stakeholders to debate the more specific question of what might constitute “good” digital identities. Digital identities represent a particularly thorny space for HCI. Increased digitisation of personal IDs (e.g., digital passports, drivers’ licences) can be used to verify who we are and control access to private and public services. While this might seem relatively innocuous, deployments in a variety of different countries have encountered a plethora of social problems associated with different forms of discrimination and inequities. For example, surveillance, monitoring and profiling of historically marginalised populations [28, 30] and exclusionary measures which result in unequal access to public services [23, 39]. Additionally, whilst guidance on creating “good” digital identities exist [2, 18, 21, 31], it remains a contentious area, in relation to the question for whom these technologies are “good” [12].

To explore this question with a diverse network of academics and industry stakeholders we have explored an alternative *sandwich model* that contains: design sprints as a foundational layer (or base “bread” layer); parallel artist worldbuilding as means to develop and interrogate alternative worlds from different perspectives (or “filling”); and an interactive online exhibition of the worlds explored, using curation as a form of annotation to support engagement and discussion with interdisciplinary audiences (our top outward-facing bread layer).

The aim of this paper is to present our experiences and reflections on the merits and limitations of this alternative model, that most notably embeds an artist residency at the centre of the worldbuilding process and uses curation as a form of annotation to synthesise our findings. We will argue that artist residencies can contribute to world building processes, helping to explore alternative ways to immerse and engage multiple stakeholders in thorny questions about future technologies. Additionally, we argue that curated online exhibitions can enable new forms of interactive annotated portfolios for collating insights and disseminating findings. We conclude the paper by packing our sandwich model into a metaphorical lunchbox that it is ready to be consumed by other design researchers. We explain why this model can support design researchers in the HCI space looking for alternative ways to speculate about technology. In doing so, we invite the HCI community to reflect on their own processes, modifying this sandwich model with different bread properties and fillings to create and represent their own world building or futuring processes.

2 Related Work

2.1 World Building

Worldbuilding and Design Fiction are common approaches used in Design and HCI research. Design Fiction is a term coined by Bruce Sterling [40] as a “more practical, more hands-on” approach than science fiction for future speculation. He then later refined this framing stating that design fiction is the “deliberate use of diegetic prototypes to suspend disbelief about change” [41]. Bleecker extends the idea of Design Fiction as a way of prototyping in a fictional world to explore how people might interact with new technologies that might be integrated in their day to day lives [5]. Coulton et al., further develop Design Fiction through “Design Fiction as World Building”, introducing the idea of designed artefacts as “entry points” [14] to explore multiple potential futures rather than a singular “preferred” future – a critique that has previously been applied to the related area of speculative design [13]. Such *entry points* draw stakeholders into the fictional worlds, facilitating discursive conversations about the implications of design decisions. Mogensen [29] describes how such fictional artefacts, which he refers to as provocative prototypes or “*provotypes*”, when interacted with in collaborative workshops provide “*concrete experience*” to provoke debate and expose problems in current practice.

There are many examples of world building being used to explore emerging technologies, for example artificial intelligence [36], drones [27] and Internet of Things devices [3]. Speculative Worldbuilding and Participatory approaches have also been used to draw in diverse voices to explore emerging technologies. Notably, researchers have used speculation to centre voices in the design process [4, 9], to involve different stakeholders in the making of fictional artefacts [6, 26, 42], as well as immerse participants in fictional worlds to create more focused discussions and debates [24, 25, 34, 37]. However, many of these approaches that actively seek to draw diverse voices into the worldbuilding tend to focus on combining ideas and achieving consensus in relation to thorny subjects. In contrast, our focus has been to create discursive spaces that embody different perspectives and can co-exist in tension to foster rich interdisciplinary debate about futures.

2.2 Artist Residencies & Artist Collaborations with HCI

There is a history of using artist residencies to support innovation and exploration in HCI research. Carrera et al., [11] discuss that artist residencies in HCI have focused on collaboration between creative practitioners and researchers to help produce new knowledge and address “wicked” problems. Similarly, Pender and Jansen [35] support this view discussing how the motivation behind many residencies is to incorporate diverse voices, to provoke new questions and explore possible futures with the aim of sparking creativity and innovation. Elsdon et al., [17] used an artist residency to produce creative interventions to explore living with ubiquitous video-conferencing software whereby the artist interventions acted as starting points to surface dominant normative values in traditional systems. Devendorf et al., [15] describes how residencies can provide a “stepping stone” instead of an end point, collectively envisioning new technologies in the early stages of development. Cai et al., [10] discuss how focus on emerging technologies can help produce “useful creations” within the research and development process, moving beyond technical rationales to explore more immersive and experimental approaches. Notably, Friedman-Gerlicz et al., [19] emphasise that there must be “mutual benefit” for both researchers and artists so that artist’s creative practice can be supported while achieving HCI research objectives.

In this project we sought to build on previous HCI-based artist residencies to collectively explore the concept of “good” digital identity futures in a mutually supporting manner. However, we also were keen to ensure the artist

worldbuilding activities were both connected to important real-world concerns related to digital identities (i.e. based on a foundational layer), and also could both: (a) exist as undiluted provocations that represent a specific worldview, whilst (b) being coherent as part of a wider research project for public dissemination (i.e. our outward facing bread layer).

3 🍞 Making the Sandwich

3.1 🍞 Residency as a Sandwich

In designing our sandwich model for this project, we sought to address several key challenges. Firstly, in acknowledging that digital identities represent a thorny social challenge that is experienced differently by people with various lived experiences, we endeavoured to draw diverse voices into our worldbuilding process. Secondly, we wanted to acknowledge that the challenge of finding “solutions” or reaching meaningful consensus in relation to this complex challenge, and within the scope of this design project, felt overly optimistic and at worst naïve. Our focus was therefore to create a space that could foster and accommodate different perspectives so we could invite a diverse set of academic and non-academic stakeholders from our network to explore and debate. Third, whilst we wanted the individual artist works to represent specific perspectives, we also wanted to ensure that our artists could engage with our network enabling discussion and debate of ideas as they emerged. Finally, a primary concern in this process was in ensuring the worlds produced from this process could be understood and foster discussion with our intended diverse interdisciplinary audience. To address these challenges, our three-phase sandwich model was designed to include the following elements (Figure 1):

- (1) 🍞 *Provotyping as a foundational stage.* To identify areas of interest for worldbuilding we ran two design sprints.
- (2) 🍅🍅 *Worldbuilding with Artists-in-Residence.* Here we designed a “semi-permeable” residency that enabled engagement with the network and researchers, whilst also facilitating parallel worldbuilding and exploration.
- (3) 🧀 *Curation as annotation of provocative worlds.* Here we developed an interactive online exhibition as a form of annotated portfolio to disseminate findings and further engage the community in conversation and debate.

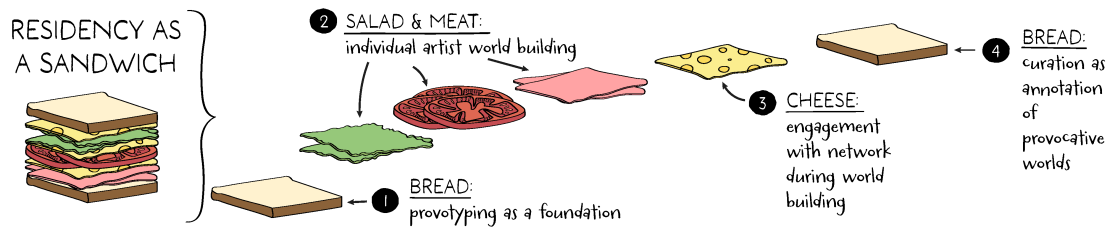


Fig. 1. Layers which constitute our speculative sandwich: (1) 🍞 provotyping as a foundation (2) 🍅🍅 individual artist world building (3) 🧀 engagement with network during world building (4) 🍞 curation as annotation of provocative worlds.

3.2 🍞 Provotyping as a Foundation

To establish a foundation, we ran two 4-week design sprints associated with digital identities. Each sprint comprised of rapid literature reviews and conversations with domain experts. These were followed by the creation of prototypes which intended to probe a specific area or idea and culminated in a 2-hour online workshop with different academic and non-academic stakeholders from our wider network to discuss the themes emerging. The workshops contained a total of 14 participants, with diverse backgrounds ranging from sociology, design, law, computer science and the

non-profit sector. Participants were recruited via the Digital Good Network's social media and newsletter channels. Thematic analysis [8] was used to develop key themes of interest. Our designed artefacts related to the chosen residency theme "*Digital Identities Over Time*", or when might we have digital identities? are presented as an annotated portfolio [20] in Figure 2 and can be explored in more detail in our supporting [virtual gallery space](#).

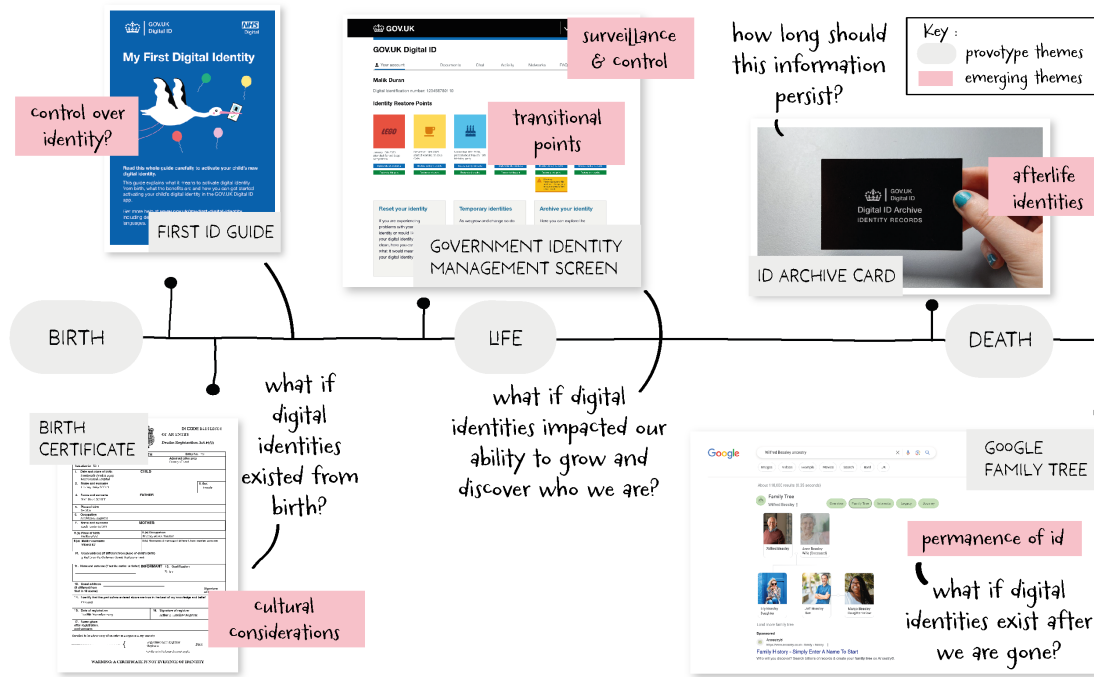


Fig. 2. Examples of digital identity provotypes related to the birth, life and death of a digital identity. This series of provotypes explored different touchpoints of worlds related to mainstream digital identities. The figure highlights provotype themes we explored, and emerging themes from workshop discussions.

In the context of our sandwich model, this foundational work allowed us to generate a series of useful insights that informed our subsequent worldbuilding with artists. Many of our conversations and reflections from these sprints revolved around the unknown temporal aspects of digital identities. For example, questions about the mutability of our data, legal rights associated with posthumous digital identities, the potential future uses of historical data to restrict individual benefits, questions of how people might consent, and the processes by which we enable suitable data literacy around these technologies. This stage also highlighted the importance of developing provocations from different perspectives. For example, through workshop discussions it became clear that cultural contexts like multi-generational households may have different interactions with digital identities potentially resulting in new concerns around control over identity data. We wanted to ensure that our subsequent worldbuilding activities could better represent different lived experiences and raise questions that might not surface from our own explorations.

To move from our foundational provotyping to our parallel worldbuilding with artists that would seek to further develop provocations related to "*Digital Identities Over Time*" as a central theme, we designed a one-month artist residency programme that would be hosted online in a virtual space. This decision to host the residency virtually

provided the ability to work with international artists with different worldviews, and to co-create the online exhibition spaces for the final show. Our recruitment strategy for the artist residency programme involved promotion via the Digital Good Network newsletter and social media as well as promotion on various art community websites. From 114 applications we interviewed 8 people and selected 4 diverse artists based on their ability to work together, individual expertise and the relevance of their residency plans to the residency theme. Unfortunately, one artist was unable to continue with the residency, resulting in 3 artists-in-residence. Artists were compensated for their time with artists interviewed able to invoice us for £50 and artists selected were paid £2,500 to cover their time and required resources. At the start of the residency, we explained how we were working towards an online exhibition on the virtual platform Gather so artists could incorporate platform considerations into their work. We encouraged artists' explorations to reflect their own opinions and critiques of digital identities, rather than trying to collectively reach a shared consensus of what "good" digital identities are or what they could become. The purpose of this was to develop a space that fosters different perspectives, highlighting contentions and challenges to enable more debate around these thorny issues.

3.3 Individual Artist World Building

Each artist was involved in the creation of a provocative world during this residency. Instead of developing one final artefact, much like a commission, artists developed their own digital world in Gather which hosted a range of entry points into their world around their particular digital identity narrative. These entry points also acted as a way to document the process of developing these worlds and allowed viewers to be situated within artists' multiple explorations of digital identities during the online exhibition. Artist's worlds took vastly different directions, surpassing our original expectations of what would be produced. Their explorations were not interested in digital identity systems but in presenting experiences that allowed viewers to question the worlds. This differed from traditional world building processes, instead of creating many fictional artefacts to look inwards towards a particular topic e.g., how we might make "good" digital identity systems, artists created artefacts that shed more light on higher-level themes. For example, questioning notions of consent, identity and trust more fundamentally. The artist's developing these worlds either used connections to literature and existing technologies to generate provocations or relied solely on the art itself to be interpreted with the viewer's own thoughts and feelings. As Carrera et al., [10] indicate, this knowledge is often undervalued in artist residency collaborations, "*favoring work with tightly-scoped and pre-defined problem framings*" even when addressing wicked problems [38]. We now present each of the artist's worlds as different ingredients of our metaphorical sandwich model.


3.3.1  Anshul Roy's World Building. [Anshul Roy](#) is a visual artist currently based in New York, his artistic practice is inspired by Postcolonial discourses, exploring issues like cultural representation, identity, historical memory and visual ethics. Anshul's world was important in helping us challenge ideas around consent in relation to digital identities. Extending from public archival practices, Anshul's world critiqued the application of how our identities are digitally archived and the implicit violence in capturing identity data and displaying it online. This critique shifted our view of consent through the lens of custodianship, given that archives of digital identity data are collected for undefined future utilities. To explore this narrative, Anshul developed a provocative web extension which intervenes with the New York Public Library's website by blocking content that contains data captured without a person's consent. In the final exhibition he used this extension as part of a live lecture performance to build on this argument. Figure 3 shows the world in [Gather](#) Anshul created hosting various entry points such as his lecture performance and reflections e.g., Anshul's perspectives of "good" digital identities.



Fig. 3. Anshul's world and various entry points.

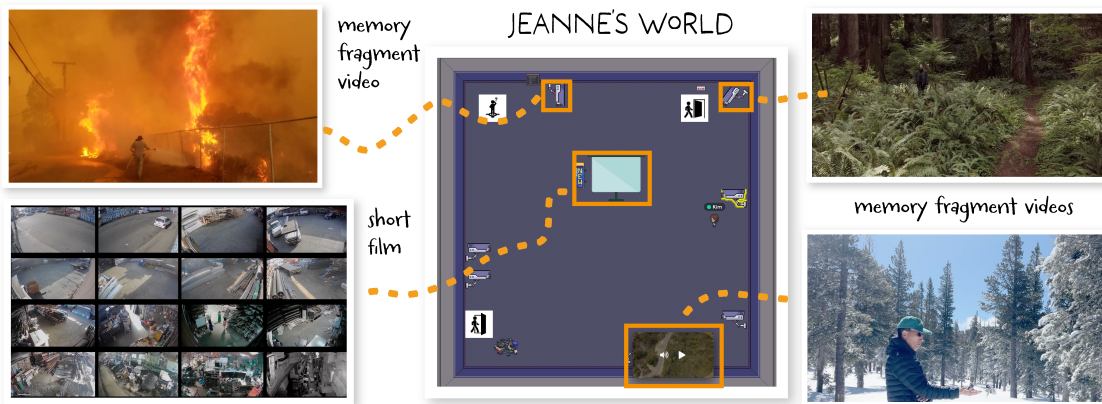


Fig. 4. Jeanne's world and various entry points.

3.3.2 🍅 *Jeanne Jo's World Building.* Jeanne Jo is a visual artist and film maker currently based in Los Angeles, her work uses single-channel and multi-channel narrative film as well as other mediums to explore themes such as power dynamics and interpersonal relations. Jeanne's world was fundamental in changing the ways we considered how we might use digital identities, such as how we might interact with our past, present and future selves. Additionally, we interpreted this world as examining ways our behaviours might be fed into algorithmic models to benefit the individual rather than a commercial entity or other stakeholder. Jeanne explored this using her expertise as a film maker to create a short film through CCTV cameras, capturing surveillance footage to explore how our present identities might connect to our past and future selves as a form of algorithmic intervention. Jeanne's overall world shown in [Gather](#) (Figure 4) situates this film within a world where surveillance cameras are watching and predicting aspects of our identity. Additional entry points are shown in this world by interacting with the surveillance cameras to explore fragments of the world building process, accessible as memories showing the development and influences behind the created film.

This world allows the viewer to project their own thoughts about mediated relationships with digitised memories and possible future projections into the footage shown.

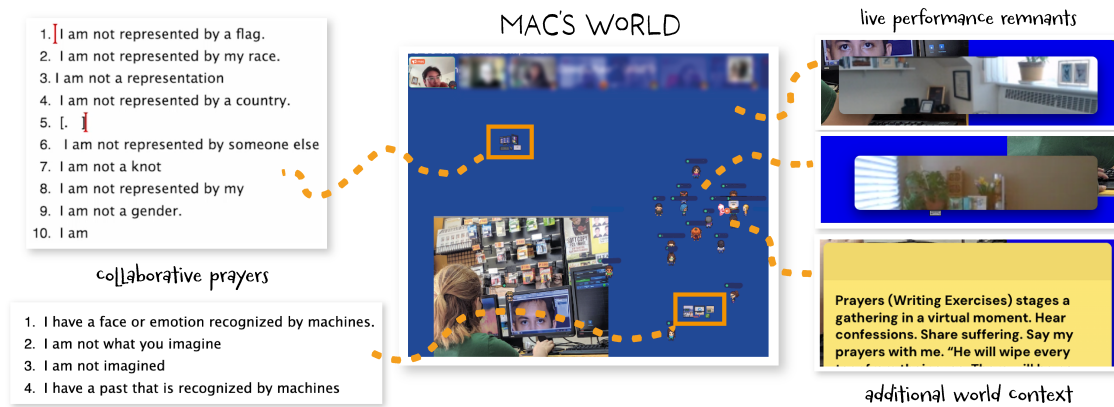


Fig. 5. Mac's world and various entry points.

3.3.3 🧑‍🎨 *Mac Andre Arboleda's World Building*. [Mac Andre Arboleda](#) is an artist, who was based in Paris and London during the residency, interested in exploring the “sickness” of the internet through research and dialogue, art and text and organising and publishing. Mac's world was valuable in challenging terminology used when discussing digital identities, provoking whether the focus should be on faith rather than trust in complex algorithmic systems. This started from his ideas around these systems being God-like, possessing power and control over our identity which can create questions around the way we consider control, agency and representation in systems which may never be made fully transparent to the public. Mac explored this through a performative art piece for the online exhibition where participants collaborated by writing prayers to consider the way we are represented in digital identity systems and how our personal data might be taken in ways we do not expect. For example, Mac placing pictures of our personal spaces within objects in the [Gather](#) world (Figure 5), displayed for anyone to see. Additional provocations are provided within this world, through notes and remnants from this live performance e.g., collaborative prayers people can interact with.

3.4 🏠 Engagement with Network during World Building

During the residency we ran several “studio visits” so artists could engage with our network and discuss ideas as they began developing their worlds. Academic experts from new media art (Nathan Jones and Charlie Gere, Lancaster University) chaired a session around Mac and Jeanne's explorations, with a digital development manager (Linda Spurdle, Birmingham Museums Trust) interested in digital archiving discussing Anshul's exploration. These discussions helped influence artist's digital identity explorations by opening artists' worlds up to suggestions and critique before the exhibition, providing artists with different ideas to consider while developing their worlds. This deviates from traditional world building processes where discussion and critique are had after the worlds are fully developed. Through these events, artists could discuss their work with research-focused audiences early on and know what to expect for the final exhibition where more discussion around their work would take place. These engagements were also important to do during the residency as it generated interest in the final exhibition by familiarising people with artist's work and

providing glimpses into the artist's worlds, acting as teasers for what they might produce from the residency. Alongside these public facing events, the virtual platform in Gather was created to meet and regularly discuss the worlds artists were developing. During scheduled meetings, researchers showed artists' the progression of curating the exhibition and visited individual artist's developing worlds to answer any questions or discuss the emerging worlds. This space acted as a shared repository where things could be seen, deleted, altered right up to the exhibition launch making it clearer what we were working towards, even with artists taking vastly different approaches to the creation of their worlds.

3.5 Curation as Annotation of Provocative Worlds

To create a discursive space capable of engaging a multi-disciplinary audience to discuss futures of "good" digital identities, our residency concluded with a public-facing online exhibition and roundtable event. In creating this exhibition, we wanted to respect the particularity of each of the artist insights, whilst also showcasing some of the connections, shared concerns, and linkages to our earlier foundational work to help situate the different perspectives. In this way, we saw our exhibition as closely aligned with the logic of an annotated portfolio that is commonly used in research-through-design to synthesise insights and draw out family resemblances of different designed artefacts [7]. To this end, we sought to consider curation as a form of annotation for our provocative worlds.

The artist works all shared a common theme of being open to interpretation. That is to say, rather than proposing explicit scenarios or suggestions, they intended to ask questions and required the viewer to consider the performance in relation to the residency theme. For this reason, we wanted our curatorial "annotations" to similarly remain somewhat interpretative and simultaneously provide connective scaffolding to help provoke meaningful discussion with audiences less familiar with creative exploration, whilst also avoiding forcing a singular perspective and reading of the work as a whole. To achieve this, we approached our curation in two ways. Firstly, we designed a landing page for our exhibition that loosely situated the artists worlds in relation to a web of emerging themes and concerns. Secondly, we created a series of what we called "metaphor rooms" that audiences could move through on route to the artist works. These metaphor rooms invited the viewer to temporarily consider digital identity "as something" and each was presented as a rich collage of ideas, insights, and snippets of reflection that we as the design researchers had generated over the course of this project. The intention is that these metaphor rooms would act as "meta-annotations" in the interactive portfolio of our exhibition, whilst also providing memorable and provocative conversation starters to help engage our diverse audience.

Figure 6 outlines one of these rooms as an example (the others can be visited by exploring our [online exhibition](#)). "Digital ID as a Grim Reaper" relates to ideas about "afterlife" IDs, exploring what if our digital identity remained after we died? This figure shows a digital avatar surrounded by a collage of images intended to provoke questions about the transition of our digital identity between life and death, with curated annotations offering our own interpretations on the metaphor. For example, would our legal identity records be open for anyone to view? A grim reaper covers a large part of the metaphor room, symbolising an entity we might interact with to manage someone's legal or online identities such as activating a will, updating a family tree or deleting social media accounts. By approaching a signpost in the room, audiences can learn how to interact with various elements such as offering their reflections on the room through a whiteboard object. To move between worlds, audiences enter through the bottom left-hand corner of the room and leave via an icon in the top right-hand corner of the room.

We propose that a combination of metaphor rooms and artist world explorations could act as an online and interactive repository of current thinking around digital identity futures, archiving the project insights. We have witnessed these spaces remaining active post exhibition launch with artists updating their worlds with new entry points and viewers

adding to interactive elements such as Mac's collaborative prayers. Therefore, we see these types of interactive annotated exhibitions as worlds which continue to grow and shift to reflect current understandings. These spaces could allow researchers to add their own provocations or combine ideas with pre-existing worlds, or alternatively update spaces that may no longer be representative of what digital identities are or what they could become.

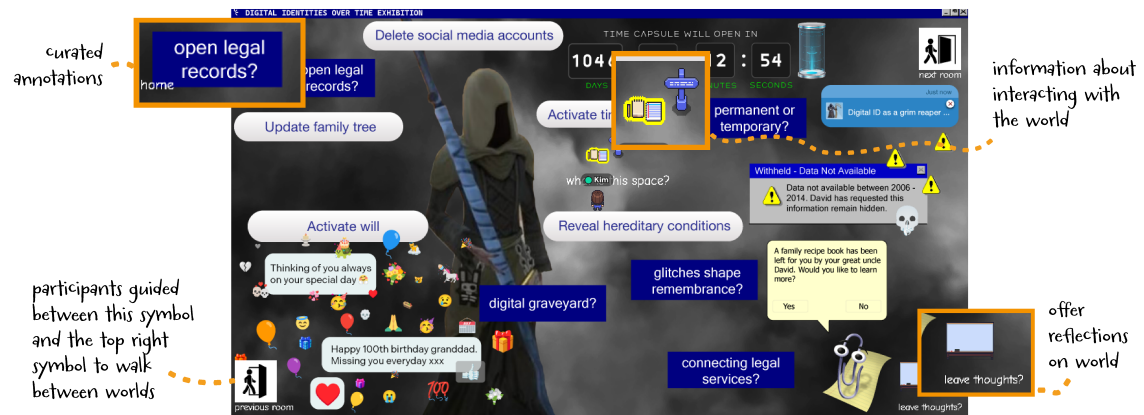


Fig. 6. Metaphor room 'Digital ID as a grim reaper' showing interactive elements of the world and influences from across the foundational stage of the project with screenshots from workshop diagrams of emerging themes. Text not intended to be readable at this scale. Emojis created using Google's emoji kitchen or from material icons. Background and time capsule from Adobe stock. Sims grim reaper can be found at <https://tinyurl.com/2c6d3wx5>. Clippy can be found at <https://tinyurl.com/2v4ry6je>

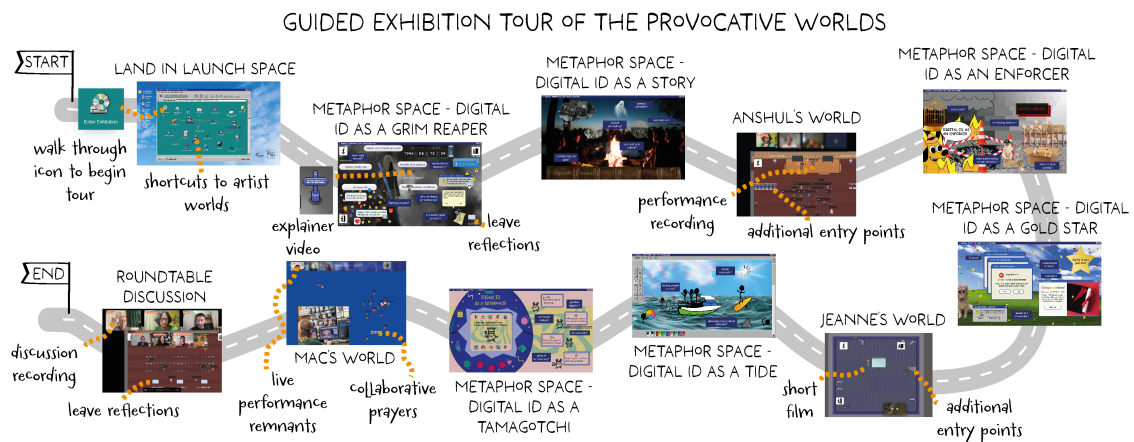


Fig. 7. Roadmap showing the overall journey through provocative worlds in the online exhibition. We invite you to enter our [online exhibition](#) and explore this journey yourselves. Dotted lines indicate interactive elements within the worlds, the objects they are pointing to are to show there are interactive elements, they are not intended to be seen at this scale.

During the exhibition launch, a guided tour was used to walk 29 attendees through the exhibition. Attendees were guided through the different metaphor rooms, pausing at each of the artist worlds for 15-mins to watch the artist

performances and/or films and to reflect on the worlds presented. The metaphor rooms provided space for conversations as attendees moved through the virtual spaces as digital avatars capable of talking to each other via audio and video chat. The guided tour ended in a virtual roundtable space whereby our artists, and three invited panellists with expertise in media art (Jen Southern, Lancaster University), digital identity technology development (Lisa Thomas, Northumbria University), and digital archiving (Linda Spurdle, Birmingham Museums) discussed the different artworks and the residency theme of “*Digital Identities Over Time*”. This exhibition remains open as a reflective space that people can return to and interact with, offering their own reflections on digital identity futures. Figure 7 provides an overview of the guided tour through each of the provocative worlds, showing the various ways these worlds can be interacted with.

4 Packing the Sandwich

This section is about taking the presented sandwich model, wrapping it up and packing it in a metaphorical lunchbox so it's ready to be consumed by design researchers in the HCI space. Throughout the paper we have explained how various aspects of our sandwich model contributed to our world building process. To briefly summarise these layers, we began by using design sprints as a foundation for an artist residency (bread layer), identifying areas of interest for further exploration. This was important for world building to ensure developed worlds linked to real-world concerns around digital identities. Following this, we used an artist residency to develop multiple provocative worlds which explored various digital identity narratives, referred to as the filling of our sandwich (lettuce, tomato, ham and cheese). This was essential to involve diverse voices in the world building process and integrating the residency into the wider network enabled debate and discussion of ideas as these worlds were developed. Entry points artists created showed how the process behind world building could be documented and helped us as design researchers consider new conceptualisations of themes such as consent, identity and trust. In our final outward-facing (bread) layer, curation was used as a form of annotation to create an interactive online exhibition that supported discussion and debate with multiple stakeholders. This showed ways that world building findings could be disseminated for richer debate about emerging technology futures. Using curation allowed our own interpretations to provide connections to earlier foundational work and cohesively explore multiple digital identity provocations, immersing viewers in a range of perspectives around “good” digital identity futures for interdisciplinary discussion.

Ultimately, this model was useful across the world building process for immersing people, exploring alternative narratives, developing individual worlds and using annotations as a form of curation. We conclude with two reflections for how the sandwich model and the use of artist residencies within this is useful for world building. Firstly, for collaboration and engagement with different stakeholders (section 4.1) and secondly for archiving and documenting the world building process (section 4.2). We suggest that there is value in this model for designers in the HCI space looking for alternative ways to bring in additional voices into their world building process.

4.1 Sandwich models for collaboration and engagement with different stakeholders

The inclusion of an artist residency as part of our world building process allowed for the exploration of alternative narratives and development of individual worlds. Various engagement activities across the residency provided insights into the developed worlds, bringing in various expertise to critique or offer suggestions on the individual explorations of digital identity topics. This meant that the artefacts were open to critique throughout the world building process, influencing the directions research took compared with typical world building processes where critique can only come in after the worlds have been fully developed. Once these worlds were developed, the use of an online exhibition meant participants could be guided through the diverging worlds to reflect upon the provocative worlds and form new

discussions. This shows how these worlds offer a way for various stakeholders to be brought into the conversation by moving beyond technical jargon to use interpretative features within the provocations. For example, annotation as a form of curation, summarising our interpretations as entry points for people’s own reflections and provocations. This was helpful for bringing more voices into these thorny spaces, by creating worlds that provide people with the opportunity to come back to and reflect upon.

4.2 Provocative worlds for archiving & documenting the world building process

Artists’ worlds helped to challenge or critique normative ideas about the types of futures we want to create in ways we couldn’t predict. The creation of worlds which exist beyond a particular event helps respond to the challenge of documenting the process involved in world building, showcasing multiple explorations of emerging technologies. Through entry points in each of the provocative worlds, the process involved in creating the final prototypes could be documented. This was useful to provoke debate about specific elements of the prototypes (e.g., representing findings as annotations) or to provide additional entry points to the world (e.g., additional videos and text-based statements created by the artists). We acknowledge that it was not our intention to develop an interactive online exhibition that might be considered active or “living” post exhibition launch. However, we have seen an emergence of “living” aspects with artists returning to these provocative worlds to update the worlds with new entry points and visitors interacting with the spaces, updating various provocations with their own thoughts. This shows how the world building process could be used to create repositories that can actively grow, alter and hold divergent thoughts around emerging technologies that people can come back to and reflect upon. For future work, using a residency as a basis for this process of developing worlds connected by annotations in an online exhibition, shows how these worlds can be adapted or altered, to continue to represent current understandings rather than reflecting outdated or incorrect understandings of a particular topic. These could also be used to continue collaboration and future speculation by adding additional projects, increasing the scale of the worlds. Considering how people can return to created worlds, is a necessary step for exploring how people can reflect upon and critique or challenge the types of futures we wish to create.

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