More Than a Gimmick – Digital Tools for Boardgame Play

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Despite increasing interest in the use of digital tools in boardgames for both commercial and research purposes, little research has to date explored how and why these tools are used. We interviewed 18 professionals working in the boardgame industry to explore the combination of digital tools and tabletop play, which affords new experiences and opportunities for both players and designers. We generated five key themes from the interview data. Participants engaged with ontological questions about the fundamental nature of games; they showed strong opinions about the use of digital tools; they discussed the impacts of digital tools for game design as well as in their design practice; they raised concerns about the costs to develop and maintain such tools; and they considered how they affect the in-game player experience. From these themes, we generate five design principles for digital tools for boardgame play: traceability, completeness, integration, privacy, and materiality. Grounded in empirical data, these design principles guide game designers and researchers seeking to explore this novel design space. Our research focuses attention on the role of digital components in play and on the need for thoughtful implementation that considers the entire lifecycle of the game, from development through publication and, ultimately, archival access.

CCS Concepts: Human-centered computing~Interaction design~Empirical studies in interaction design •Applied computing~Computers in other domains~Personal computers and PC applications~Computer games

KEYWORDS: boardgames; hybrid play; hybrid digital boardgames; user studies; game design

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1 INTRODUCTION

Digital tools are becoming increasingly common in modern boardgames. Over the past six years in particular, the industry has seen considerable growth in the use of digital tools to support and complement boardgame play. This has led to the development of what we call Hybrid Digital Boardgames (HDBs), which combine both digital tools (e.g. a smartphone app or a skill for Amazon's Alexa digital assistant) and material components such as a board, cards and other

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playing pieces. But – as we show in this paper – there is no common understanding or characterisation of how and why digital tools are used in boardgames, and the boundary between a boardgame and a hybrid game is mutable and negotiated, with many digital tools used informally to supplement or streamline play, rather than as a necessary part of the game.

HCI shares this interest in material-digital play. Researchers have developed novel designs incorporating tangible interactions combining physical pieces with digital playing boards [3, 31, 57], enhancing boardgame components and play with Augmented Reality [2, 4, 5], combining smartphones and tabletop boardgames [1], and developing wearable devices that can be used in tabletop play [14]. Further research has examined the accessibility of hybrid interfaces [24], the adoption of 3D cameras and printers in tabletop gaming [7, 54], the juxtaposition of craft, technologies, and play [47, 56], and the potential for design of play over a distance [27, 42]. Yet to date, this research has focused on the design and development of games for and in research settings, rather than on the rich knowledge and practices of the people who play and design these games.

In this paper, we examine industry professionals' attitudes towards the use of digital technologies in tabletop boardgames. Based on interviews with 18 professionals in the boardgame industry, we describe five key themes which highlight how people think and speak about these games. We show that many beliefs about the use of digital tools in boardgames are linked to underlying beliefs about the nature of boardgames and about people's relationships with technology.

Prior work by Kosa and Spronck [39] coded players' attitudes towards these games as positive, negative or neutral, and identified core concerns in each of these groupings. Our work builds on and extends this analysis by engaging with game industry professionals to identify their key interests and concerns. Rather than coding opinions by valence, we engage with the concerns and opportunities that interviewees identify.

An important early finding in our study was that the use of "hybrid boardgame" was more complex and contested than we had anticipated. Although we asked participants about hybridity, their responses went beyond the narrow range of hybrid digital boardgames which combine physical and digital components. Instead, the rich response data addressed a broad range of situations where digital and electronic tools have been adopted in boardgames.

This paper contributes to understanding the user through empirical, qualitative research, which we analyse using reflexive thematic analysis. It explicitly examines and discusses the ways in which people relate to an under-explored type of game through our five key themes. It highlights fundamental concerns about what a boardgame is, explores underlying attitudes towards technology, and examines the impacts that digital tools have on both the finished design of a game and on the game design process. Finally, it examines concerns about the costs of digital tools and the effect that these tools have on player experience, and highlights the need for a systematic and planned approach to preserving the digital tools, just as players can themselves preserve the physical components of a game. By proposing five guiding principles of traceability, completeness, integration, privacy and materiality, it inspires and encourages thoughtful design of digital tools for tabletop play.

2 RELATED WORK

Although several researchers have examined the combination of digital tools and boardgames, few explicitly engage with hybridity or with players' attitudes towards the use of digital tools in and for boardgame play. The Hybrid Social Play project [46] explicitly engaged with "Hybrid playful

products, combining both the digital and the physical aspects", seeking to develop guidelines and principles for best practice in hybrid social play. For boardgames, these guidelines, which were deliberately generic, comprised Accessibility; Added value; Automation; Aesthetics; Recovery; Availability; Universality; Scalability; Obsolescence; Customizability; Sociability; Shareability; Tutorials; Modifiable Rules; Tangibility; Parallel Play; and Integration [35]. We return to these in section 5, where we discuss our findings in the context of this and other prior work.

Maurer and Fuchsberger [42] have engaged directly with this "technological framing" of hybrid play. They note that current hybrid games limit their scope to simple uses such as "random board setup or as a narrator during story-based gameplay" and "do not fully harvest the potential of their digital component". Like Smit et al. [54], they see potential in exploring tangibility and embodiment in the boardgame context. Further, they note that related uses of technology, for example digitisation of game collections, also combine physical and digital elements and therefore connect to notions of technological hybridity.

There is long-standing interest [6] in the augmentation of boardgames with digital components including smart components [15, 45], smart tabletops, and other devices [31], as well as in the use of digital technologies for mediating and enacting boardgame play [48, 60]. [17] extol the potential for hybrid boardgames while highlighting concerns about cost and mass production of such games. While much of this work focuses on the technology that is used to deliver these play experiences, Bergström and Bjork engage explicitly with the human labour which is required to enact these games [6].

In related work from this project, we [52] explored the uses of digital tools in what we term Hybrid Digital Boardgames (HDBs). This term was developed throughout this project to reflect a specific and narrow focus on games which necessarily combine both digital and material components. We position HDBs as compound mediated artefacts which are neither wholly digital nor wholly material [37]. They are mediated by people [6], by materials [60], and by a digital tool. In doing so, we reject terms like digitally mediated, computer assisted, augmented, and "boardgames with apps" as unnecessarily restrictive, and as focused on only one element rather than on the whole artefact. Such terms suggest that digital tools are added to an existing boardgame, rather than being a fundamental part of a materially hybrid entity. This has been linked to a "digital augmentation fallacy" [16] which presupposes that the addition of digital tools will somehow improve a physical game.

Little work has been done, however, on what players and others think of digital tools in and for boardgame play. Kosa and Spronck [39] studied players' attitudes towards what they term "augmented tabletop games" by examining 928 posts across 15 threads from BoardGameGeek.com and Reddit. The posts were dated between July 2013 and August 2017. They found 15 core negative attitudes towards these games, 15 positive attitudes, and 12 attitudes which they considered "neutral". They use these to build a conceptual "acceptance model" of factors that contribute to a positive attitude towards these games. They distinguish between comments provided without supporting reasons ("I have no interest in board games with apps") and those which identify a specific concern or benefit ("App improves insane setup time").

Although there is considerable interest – in research communities as well as in hobbyist boardgaming communities – in the possibilities for digital tools in boardgame play, the area remains under-explored. Despite examination of what boardgame hobbyists say online about games that incorporate digital tools, no prior work has engaged directly with the expertise and knowledge of boardgame design communities. This paper engages with their opinions and distils them into a set of design principles which can be adopted by practitioners as well as researchers.

3 METHOD

In this paper, we describe a series of semi-structured interviews with people working in the boardgame industry as designers, publishers, game developers and in other roles. We explore participants' attitudes towards and opinions of the use of digital tools in boardgames using a qualitative, constructionist methodology [8, 20]. Through a focus on understanding participants' multiple, subjective perspectives, acknowledgement that understanding is constructed socially and historically, and attention to detail, we generate a broad understanding of attitudes towards these tools and their adoption in boardgames, which in turn leads us to a set of guiding principles of their design. The study was approved by the Human Research Ethics Committee at The University of Melbourne (Project 1955032).

3.1 Interviews

In November 2019, we conducted in-person, semi-structured interviews with 18 professionals working in the boardgame industry. Interviewees included game designers and developers, publishers and others. Many of the people who we interviewed had worked directly with digital and hybrid games as well as with boardgames. Interviewees included newer entrants to the industry as well as people who are well represented in BoardGameGeek's top 20 rated games, and who have won significant awards including the prestigious *Spiel des Jahres*. Importantly, these participants are also players – they spoke not only about their experience as professionals but also about their feelings and observations as players.

The first author conducted all of the interviews during the Tabletop Network Boardgame Designer's Conference and BoardGameGeek convention, a significant co-located event held in November, 2019. They were professionally transcribed by an agency. The transcripts and recordings were reviewed and corrected by the second author, and the third author read over the transcripts. All researchers discussed the interviews and their interpretation of the findings at weekly project meetings.

Table 1 lists the interviewees, who are identified by pseudonyms in this paper.

Table 1 Characteristics of interviewees.

Interview #	Pseudonym	Industry role
1	Gary	Game designer and boardgame media
2	Mark	Game designer and boardgame media
3	Simon	Publisher (mid-size)
4	David	Game designer and large self-publisher
5	Joe	Game designer
6	Ken	Game designer
7	Harry	Game designer and (small to mid-size) publisher
8	Paul	Game designer
9	Craig	Game designer & developer
10	Roger Bob	Game designers
11	Randall	Boardgame media
12	Susan	Game designer
13	Jerry	Game publisher (large mid-size)
14	Perry	Game designer and (small to mid-size) publisher
15	Irving	Game designer and self-publisher; boardgame media
16	Frank	Game designer and small publisher
17	Vaughn	Game publisher (large)

Of the boardgaming professionals we were able to interview, only one was a woman. Recognising that women and non-binary people have historically been under-represented in boardgame design, we reached out to non-male designers through social media groups, personal contacts, and targeted messages, but were unsuccessful in arranging interviews or in identifying the reasons for non-response. This may be due to a higher service obligation being placed on successful women in the industry. It is possible that a more diverse interview sample would have generated additional data that would extend our themes. In our ongoing research, we will continue our efforts to engage with women and non-binary boardgame designers to ensure that their voices are represented.

3.2 Coding and analysis

We followed Braun and Clarke's approach to reflexive thematic analysis [10-12] for open-ended survey responses and interview data. We first used open, inductive coding to identify patterns in participants' responses. We reflected upon these individually and in discussion with our co-authors in weekly Zoom meetings and used this time to refine the codes. We used MindManager software to explore and represent relationships between these codes. The generated themes reflect key ideas and codes in the data.

As well as reflecting on the key themes in the data, we also explored how these ideas could provide guidance to designers of hybrid digital boardgames and of digital tools for boardgame play. Some interviewees explicitly engaged with ideas of best practice, whereas others were less direct but nevertheless revealed ideas about the risks and limitations, or the opportunities, of digital technology adoption. We present these as five guiding principles for the design of such games, which build on the ideas and attitudes that are explored in the thematic analysis.

4 THEMES

We analysed and coded the interview transcripts and generated five broad themes from the codes. Figure 1 shows the groupings of themes and subthemes, which we discuss in this section. Quotes are taken verbatim from interview transcripts, although in some cases we have corrected grammar or removed duplication to assist with readability.

The themes reflect key concerns, opportunities and beliefs which were evident in the interviews. Rather than being structured around 'positive' or 'negative' attitudes, each theme is a framework or idea around which attitudes of different valences are expressed.

4.1 What is a game?

> "As soon as there was plastic and batteries, it got put into a game. The fact that people think that this is some sort of new invention always makes me laugh." (Perry)

This theme encompasses the negotiated boundaries between different types of games – digital, boardgames, and hybrids. It addresses gatekeeping behaviours, or a desire to control what is – or is not – a boardgame.

4.1.1 What is a hybrid?

Interviewees highlighted that there is no common definition of what a "hybrid boardgame" is. This assisted us to develop our definition of Hybrid Digital Boardgames (HDBs) as we considered the various edge cases that were raised.

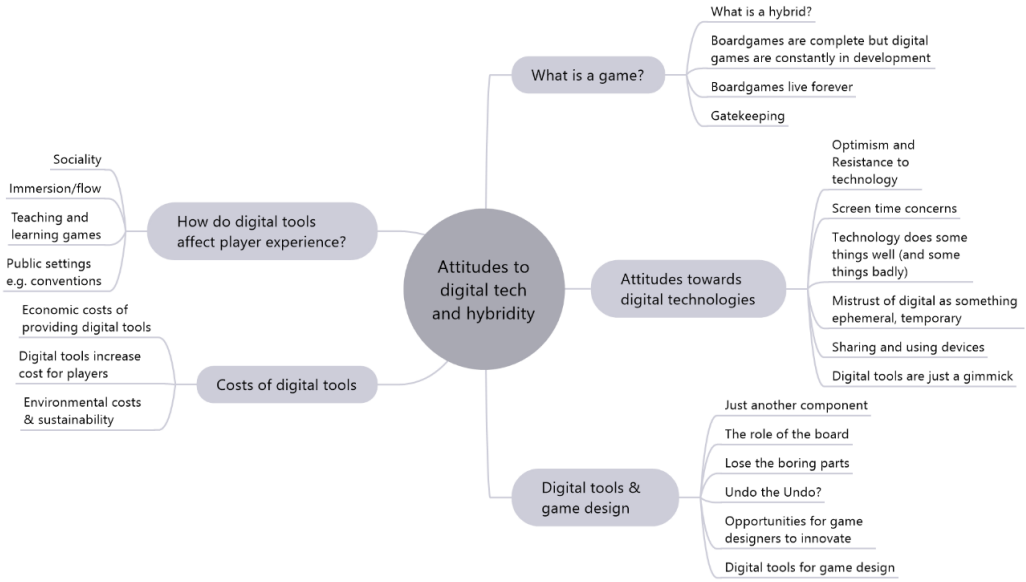

Figure 1 Themes and Subthemes generated through Reflexive Thematic Analysis of interview data

These included unofficial helper apps, both those that are specific to a particular game. For example, an app to calculate a player's score in *Agricola*, or the helper app [26] for *Gloomhaven* [18], which was developed as an unofficial add-on rather than an integral, necessary tool for gameplay.[2] Other tools included apps which support game play more generally, such as the *Chwazi Finger Chooser* [29] and dice simulators, spreadsheets, and even pocket calculators, as well as the *Boardgame Stats* play tracking tool [59], which Randall described as "gaming adjacent".

Participants also mentioned electrical and electronic tools including custom digital game boards. They discussed watching a how-to-play video on YouTube as a form of hybrid experience. The forthcoming *Teburu* "board gaming console" system [62] was a topic of interest for some. Like the forthcoming *Return to Dark Tower* [19], a reimagining of 1981's *Dark Tower* [13] that combines material and electronic components with an app, the *Teburu* will bring together physical components, electronics and smart devices to create a digital playing space.

4.1.2 Boardgames are complete but digital games are constantly in development.

Many interviewees spoke about what Ken called the "malleability" of a digital game. They perceive digital games as being in a constant state of development through tweaks, updates, and patches, and contrast this with expectations that a published boardgame is "finished". Irving saw this completeness as "a big competitive advantage that boardgames have".

Bob, however, saw this malleability as an opportunity for game designers to explore. He suggested, for example, that publishers could consider whether to provide information through fixed components like a rulebook, or thorough digital tools that offer the prospect of "changes

[2] The *Gloomhaven* Helper has been endorsed as an 'official' add-on since mid 2019.

down the road". Similarly, Gary saw opportunities to address issues "that boardgames have traditionally struggled with because you're fixed with this set of components."

4.1.3 Boardgames live forever.

In contrast to digital tools, participants saw boardgames as "timeless" (Vaughn). Where they expected digital content to last for anywhere from a couple of years to 15 years, boardgames could persist for generations, even becoming family heirlooms, passed down from mother to daughter. For Ken, for example, the physical boardgame was paramount and its longevity was deeply connected to his design practice and motivation:

> "For me as a designer, I love the beauty of the single unit game. The game that, in theory, can last for millennia. […] I find it slightly depressing to design a great game and know that in five years' time, people won't be able to play it, that by its very nature, it has to be a flash in the pan."

On the other hand, many interviewees criticised this expectation of eternity. They questioned whether people really play their older games as much as they think that they do, suggesting that most hobbyists' games are only played "once or twice" (David) when they are new.[3] Paul compared buying new games to going to the cinema – "You wouldn't stop making movies because we saw [one film]."

4.1.4 Gatekeeping

As a further definitional concern, Mark and Craig described – and rejected – what they termed a "purity" argument against the use of digital tools in games:

> "I'm aware of hobbyist gamers who are like, 'no, I don't want any digital thing in my game,' and it's less driven by a desire to get away from screens, I think […] and more of like a – I think elitism maybe isn't the right word, but like a purist […] it's like, 'not a real boardgame, because it uses an app.'" (Craig)

Although this gatekeeping is often presented as a rejection of digital technologies, for others it reflects a desire for different forms of interactions at different times.

4.2 Technology and boardgames

The second theme that we generated concerns participants' beliefs about technology: what it does well or not so well, optimism and resistance to its use, concerns about it being transient or simply a gimmick.

[3] We explored these claims by looking at the 100 most frequently played games in January 2021, based on recorded play data logged on BoardGameGeek. Sixty games (representing 66% of plays in our dataset) were published between 2016-2020. A further 21 games (18% of plays) were published between 2011-2015, 10 (9% of plays) were from 2000-2010, and 4 (3% of plays) were from the 1990s. There were five older games, including *Chess* and *Crokinole*, representing 4% of the plays. These data suggest that while it's true that newer games are overrepresented in hobbyist play data, older games are far from unplayed.

4.2.1 Optimism and Resistance to technology

> "There are definitely going to be people that don't want to have to have an app, and will say that. There's not too many people who are going to say, 'Wow, it has an app. That's a good thing.'" (Randall)

Several participants' comments reflected their own optimism about technology. Paul, a veteran designer whose experience dates back to games that used VHS video, was particularly enthusiastic about the opportunities that digital technologies offer. But digital components also attract extremes of hostility, as Perry noted:

> "So you say, 'I don't really like electronics and I'd like to get away'. People feel like they have to say very stridently, like it's a personal attack. … And I'm like, 'well then don't play it.' […] But people are coming from a point... They've never played in them and they don't want them so therefore they don't want to see it. … I don't know, it gets people angrier than usual."

Several participants spoke about age as an important factor for update of new tools, raising concerns about digital exclusion. Frank, for example, saw himself as too old for these digital tools, although he frequently played games online and over Skype. Vaughn agreed: "the more we introduce these kinds of pieces of technology into it, [...] the more ageist it is. […] My mom doesn't have a smartphone. She's never going to get a smartphone for the rest of her life, she won't get it." He saw digital tools as preventing older people – many of whom already play games like *Bunko*, *Mahjongg*, *Bridge*, and *Rummikub* – from accessing these games.

Finally, Irving and Frank shared their deep mistrust of connected devices. Irving connected the use of recording tools to "the modern surveillance state. The idea that there's always a camera on us, monetising our images and our likenesses," while Frank compared Amazon's Alexa smart assistant to an electronic tracking device.

4.2.2 Screen time concerns

Several participants raised concerns about screen time, a very specific form of technology resistance. Joe referenced his experience from "hundreds of hours of playtest video". During playtesting, "when a phone comes out, it's a really bad sign for engagement, […] it goes in the notes." Other participants spoke about their own experience as players: "there's a difference when I'm looking in your eyes and I'm seeing your facial expressions and I'm with you, as opposed to like looking at a screen" (Simon). Randall identified getting away from screens as one of his motivations for playing boardgames. Craig noted the "infinite parenting blogs and books" that urge parents to reduce their children's screen time. These concerns, in particular, highlight that these industry professionals are themselves players confronting the same decisions and innate beliefs and concerns that other players grapple with.

4.2.3 Technology does some things well (and some things badly)

During the interviews, participants frequently referred to different attributes of digital technology and the ways that they could contribute to games. Craig summarised this: "There are things that computers do better than people. And there are things that computers make easier for people." One attribute that was specifically mentioned positively was accuracy. This was particularly important for games featuring logic and deduction, like *Alchemists* or *The Search for Planet X*.

This perfect knowledge can be a hindrance, though, particularly when something goes wrong. Digital tools lack flexibility and can generate new forms of error through misunderstandings. Vaughn pointed out that a single piece may have many names, both official and unofficial. Is a player placing a piece, a pawn, a meeple, a character, a follower, or simply a dude? And will a digital tool recognise all (or even any) of those names? Perry noted that "one thing gets out of sync, now you're having an argument with electronics about what reality is." Susan summarised many of these concerns:

> "Ultimately because the digital components are code and that code functions exactly as it's told to, it can't make mistakes. It can't be changed on the fly. It can't have that same user interface that allows you to customise it or go, well we just want to do it this way. […] that is the downside of a digital component. It can't be as flexible or lenient with the rules as the analogue components can be, despite all of its good benefits."

4.2.4 Digital tools are ephemeral

> "There's always this bogeyman of digital stuff and how it's not permanent. And so even now you can't enjoy it because at some point in the future you might not enjoy it or might not be able to." (David)

Many survey respondents raised concerns about the impermanence of digital tools, particularly apps, which they saw as having a limited lifespan. While these concerns linked to their perceptions of boardgames as eternal (see 4.1.3), they were more strongly connected to participants' concerns and beliefs about technology. They identified forced redundancy associated with operating system upgrades as a particular concern both for HDBs and for fully digital implementations of boardgames. Paul, a veteran designer, described games with digital tools as "transitory"; Randall suggested that such games have a lifetime of less than five years.

Several participants identified the risk of games becoming unplayable. The 2014 miniatures game *Golem Arcana* is frequently named as an example of a game that became unsupported and therefore unplayable. Gary described this as a "big flameout […]" and continued that "I'm sympathetic to players who don't want to expose themselves to that loss." Susan pointed out that while people already know how to preserve and replace physical game pieces, "we just don't have that understanding yet for those digital components".

Even for supported games, technology can create new barriers to play. Bob described a playtest session where "I had an old version of the app and someone was playing and their map was different." This lack of alignment between two versions of the game app made the game unplayable. Moreover, Vaughn raised the question of 'dated' digital components, suggesting that even if the apps continue to be supported, their interfaces may no longer be embraced by players. He connected the ephemerality of digital tools to the planned obsolescence of a legacy game, which is designed to be played a limited number of times by a specific group of players.

Mark suggested that it might not only be digital tools that are dated. He wondered whether "younger generations" who are more accustomed to content licensing models might be more receptive to the notion that digital content would not always be maintained: "I think the issue with like you buying something and feeling like you want to own it, and then it getting taken away from you".

4.2.5 Sharing and Using devices

Several interviewees raised concerns about sharing personal devices, particularly their smartphones. We observed this ourselves, playing an *Unlock!* game [55] with students who were hesitant to touch a staff member's phone, even when required for play.[4] Perry had bought an inexpensive smartphone specifically for use in playtesting, to avoid this problem. Other issues with sharing devices related to slowing down play and the difficulty for multiple players to see a single screen.

Phones do not only become unavailable when they are passed to other players. Several participants named games where the device is physically connected to the game for the duration of play (e.g. *King Arthur* [38], *Das magische Museum* [9] and *Mask of the Pharaoh* [30]). Participants were concerned that the use of a device for play meant that it was unavailable to them "for all the things it's a phone for" (Gary).

Although many participants wanted to keep their phones to themselves, Joe wanted to keep his phone away from play entirely. He saw the phone as a distraction – "when I go to my friend's for game night, first thing I do is I take the phone off and I put it somewhere else. […] And I love that ritual." For other participants, reluctance to share their phone extended beyond the physical device. They were hesitant to install software on their device at all, seeing this as sharing their phone with an unknown company or developer.

4.2.6 Gimmicks

Several participants talked about the "gimmick" of hybrid play – a term that is often used to describe something flashy, lacking intrinsic value. The term was often linked to 'fiddly' and used in relation to functions that did not work (particularly well). It was used to convey a concern that the use of digital tools was not always well thought through or considered: "We're still at like the gimmicky side of things. […] apps are really difficult to write well and function well and have good user interface." (Simon)

At other times, however interviewees were sceptical about this position, linking it to the belief that a boardgame should be eternal (see 4.1.3): "either it's just a gimmick or it doesn't work forever. And I want my games to work forever, seem to be the main arguments on either side" (Mark).

From a more pragmatic perspective, however, interviewees recognise that digital tools and gimmicks may be a selling point for these games. Harry suggested that the novelty factor might be particularly popular for Christmas gift giving, while Roger noted that "glitz and glam" – what Perry called "theatre" and Gary the "whizzbang" – is "a marketing feature". Several interviewees suggested that these games might have particular appeal to non-hobbyist audiences: "For the gimmicky side, I think it's easier sell to mass market. I mean clearly it needs like a super good hook, and the hook has to be extremely superficial." (Simon)

4.3 Game design impacts

Participants reflected on the opportunities that digital tools present for game design – both in the finished game and as a tool for playtesting and development.

[4] This research and the play session were conducted prior to the COVID-19 pandemic and the emergence of new concerns about touch and shared surfaces as potential disease vectors.

4.3.1 Just another component

Many interviewees understand the digital tools in boardgames as just another component that sits beside dice, cards and tokens. Perry spoke about the need to balance the use of digital tools and these other components. If this was done poorly, he suggested, players might as well play the game on their phone and leave the physical pieces in the box. Susan, like others, stressed that digital tools should be inherent and necessary to gameplay:

> "I do like the term digital component myself because it's not just about the app or ... it is like a hybrid like you're saying. It's a piece of the game, it is not the whole game. But it's also not something that can just be removed and have the game still be intact. […] The digital component gives you that avenue to try out something that you wouldn't otherwise be able to accomplish."

Ken suggested that the value of a digital tool might depend on the genre of the game, and that they might be particularly suited to theme-heavy American-style or "Ameritrash" games.

4.3.2 The role of the board

Regardless of the number or scope of digital tools, interviewees were clear that the role of the board, as well as the physical components, must be paramount. Bob spoke about introducing mechanisms in one game "that made the board matter more." Similarly, Perry was awake to the risk that apps may distract designers from the board:

> "We were so fascinated with what the app was going to do with no knowledge that we'd go, 'the app does this,' and we realised we were designing an app game […] I bet, looking back on it now, the app couldn't do half the stuff we said it was going to. So we sort of had to stop after a couple months. Hold on, let's make a good boardgame and then let's make the app, make it better. It enhances the tabletop experience."

4.3.3 Lose the boring parts

Digital tools offer designers the opportunity to eliminate or hide aspects of a game that are less appealing to players. Even Ken, who was generally negative about the use of any form of technology in boardgames, saw potential in the use of optional apps in particular settings: "it's like, you don't need the app to play the game, but if you've got the app, it makes this part of the game quicker. […] an app is an aid to just take some of the pain away."

Susan described looking for opportunities where the design could "obfuscate the complexity of the game so that the players get to focus on the experience instead of worrying about a fiddly mechanic or doing math or trying to determine something or other based on the game state."

To Roger, digital tools offer an opportunity to reduce the players' cognitive load: "you can offload a lot of the compliance into an app, so that people don't have manage that stuff that they're not interested in anyway." The value of this may vary according to the audience for the game. On the one hand, Craig suggested that making players' lives easier is particularly valuable in the mass market. We note, however, that setting up "a technical thing" can also require significant effort.

4.3.4 Undo the Undo?

In many boardgaming groups, it is common for players to take back a move, or to change what they were planning to do. In digital games, this can be represented as an Undo button. Perry was

concerned that Undo features may change the players' focus from selecting their preferred move to focusing on optimisation and on identifying a move that is objectively 'better':

> "they're like, 'hey, I want an undo button.' I said, 'yeah, but if you have an undo button, won't you almost always use it to play around and see what the best results are rather than just go?' And they're like, 'well, probably.'"

4.3.5 Opportunities for game designers to make new things

Several interviewees were excited about the novel affordances and opportunities that hybridity and digital tools could offer, and their potential uses in their boardgame designs. This relates to the subtheme of technological optimism (4.2.1) but was specifically seen in the context of novel designs. Simon volunteered that "I love the opportunity that hybrids bring. So you know, coming from a creative side, that's exciting and interesting".

Ken, however, questioned whether boardgame designers are best placed to leverage the benefits that digital technologies can provide. To him, the role of the game designer is to design a system; creating content is a task for writers.

Several interviewees described specific elements that they were keen to explore. For Harry, a simple timer or background music "can just create some very interesting either tension or encourage people to move faster, especially in a cooperation game." Paul was particularly intrigued by the possibility of distributed remote play, where players in different locations could play a boardgame together.

4.3.6 Digital tools for game design

Several interviewees described their use of digital tools in the game design process. Many are already using statistical models and simulations and are adopting digital tools like Tabletop Simulator[5] for playtesting their designs. Susan valued being able to access a large dataset of play information, even of published games, to inform her understanding of how a game is played. It was unclear whether she wanted to use this data to change the game (see 0) or simply to inform her future designs.

> "It's great market research and it's essentially free market research. … as a designer you can look at it and see the aggregate data and go, 'oh, there's these trends. People tend to play it with this player count or with this particular player count this [task] is significantly easier. What's causing that weird balance oddity?'"

Paul, however, was keen to use the records of what players have already done in the game, "so your past can either come back to haunt you or it can come back to help you."

On the other hand, Harry saw digital tools as a way to get people started in game design: "I think using an app is an easier way to get into this natural cardboard world of game design".

4.4 Costs

Participants were concerned about the economic costs to provide digital tools as well as to buy them. Several participants also spoke about the sustainability of games and their cost to the environment.

[5] Use of these digital tools has increased substantially during the COVID-19 pandemic.

4.4.1 Economic costs of providing digital tools

As well as the cost of producing the physical boardgame, developing digital content and hybrid tools attracts "overhead and maintenance and support costs" (Joe). In particular, producing quality cinematic content and voice acting can be both expensive and unfamiliar for people coming from the boardgame industry. Paul, however, identified a potential saving in reducing the costs of printing components – for example, by replacing decks of cards with digital content.

Simon, a game publisher, described his decision to commission an app as "a pretty dumb business venture" in retrospect. He identified the high costs of development (whether outsourced or in-house) as a significant risk for publishers. Other interviewees, including Frank, supported this, pointing out that small companies do not have the budget to develop digital tools for their games. Perry stressed that these may be subject to economies of scale: "we're a small company. We can't afford [those] prices. I'm not saying they're unreasonable, we just can't pay them." In the future, he suggested, larger publishers might carry the risk of establishing tools or platforms that smaller participants could subsequently leverage.

Bob, who like Roger is skilled in app development from their "day job", found that building their own app removed many of the hurdles that others face:

> "If you decide, 'oh that interaction is too hard,' it could be six months to redo the app before you can try the next change. […] Boardgames benefit from being able to be easily prototyped and rapidly iterated and having a dependency on an app can make that harder. It really can hurt the development process."

Small publishers are not the only ones who must contend with these issues. A designer who has worked with very large publishers concurred: "it adds so much to the cost of the app and development time with that app that it's not feasible to be able to do that." To these costs, Perry added expectations of support and maintenance:

> "I'm not having someone on call at 2:00 AM if the server goes down, I didn't sign up for that. … I need someone 24/7 and I need servers and people answering questions and what if it goes down?"

Aligning with these concerns about high economic costs is a concern that publishers may not understand the opportunities presented by digital and hybrid media. Gary – speaking here about fully digitised boardgames – pointed out that publishers "are not making money off of the apps, they're making money off of people buying the boardgames after the apps."

4.4.2 Digital tools increase cost for players

Craig noted the need to provide components in material form as a "constraint" of the medium. Paul noted that although digital tools could replace certain components, this was not always welcomed by publishers. He connected this to the desire for boardgames to be complete and playable as is (see 4.1.2).

Jerry added that not every game is suited to using digital tools. He sees selecting the right game as essential, particularly given the large numbers of games that are released every year.

> "It's a lot easier and less expensive to just put wooden pieces and cardboard chips and a board and dice whatever you need than to go out and develop an app."

Vaughn and Irving described the costs to maintain custom gaming tools such as the *Teburu* console, even without details about its cost and technical architecture. Irving speculated that it might be more useful in public play settings than for individuals:

> "It's so expensive that I don't know how many people are going to actually use it. How many games are going to support it, whether it's going to have a wide enough acceptance. [...] There are some game cafes that can afford it, but then they'd have to support it, and if it breaks they've got to get it serviced."

4.4.3 Sustainability

As well as economic costs, interviewees discussed the environmental costs of boardgames. Some saw digital tools as offering an opportunity to improve the sustainability of the industry, saving not only on production costs but also on the carbon costs of shipping games (Irving) and allowing for the same components to be reused across different storylines or tasks. On the other hand, however, hobbyists have raised concerns about the cost to the environment of powering players' digital devices.

Paul noted that although digital tools could replace certain components, this was not always welcomed by publishers. In particular, he described a publisher who insisted on packaging a physical timer – which to his mind could have been replaced with a smartphone – with a game, because they wanted the game to be complete – "They want it to be all in the box."

To others, however, there were broader sustainability problems in the boardgame industry. Frank pointed to people buying "fifty or more games" as both "the people I need" and an example of excess. He identified production elements like shrink wrap, expensive plastic components and gold foil printing as far greater sustainability concerns than digital tools.

4.5 Player experience

Our interviewees were particularly interested in how the use of digital tools could affect, achieve or transform a desired experience.

4.5.1 Sociality

> "I'm into boardgames because of the human connection, and I haven't yet seen a digital implementation that has really improved the experience a whole lot." (Joe)

Interviewees are drawn to boardgames as facilitators of social experiences. As we have already noted, they spoke both as enthusiastic players and as designers and publishers of games. Whereas Mark described his own experience of playing *Golem Arcana*, where "you tended to just have your face buried in the app," and Frank was sceptical that digital tools could be anything other than disruptive to social interaction, Bob saw them as a way to deliver "a certain kind of experience" and to make it "the best it can be". Similarly, Simon described his family's "living room social experience" playing the Wii with his mother and children, concluding that "to me that's a little bit of a false dichotomy, of like once it's digital then it's not with people."

Nevertheless, participants raised concerns about the presence of digital tools changing social interactions, providing visual distractions from the game board and other players, usurping the players' attention. Some saw the process of reading and interpreting rules as an essential social activity that was part of the broader experience of play.

4.5.2 Immersion/flow

Interviewees expressed concern that digital tools, rather than streamlining play, could distract players from the game. Whilst Harry saw them as an opportunity to deepen the sense of story or environment, and Roger connected them to opportunities to evoke particular emotions when crafted "in an intelligent way", Vaughn rejected this. He suggested that "the more you define something, the less your own imagination takes hold [...] And at a certain point, [...] I feel like it becomes more of an interactive movie than it does a boardgame."

Several participants, including Perry, raised concerns about digital tools interrupting play, or getting between the players and the game. Gary shared these concerns, suggesting that digital tools "are really bad at [...] getting out of the way." Joe felt that "if it's trying to swallow you into a world, and engage your senses, and at the centre of that is on the device, I don't, I'm not into that at all." He saw images and video material as posing a particular distraction for players, and audio tracks as less disruptive:

> "With the audio track on the phone, I think it works really well, because you can attend to that other channel, and it's not a distraction, it augments it really well. So from a play perspective, I thought that worked fine."

4.5.3 Teaching and learning games

Although not currently a hybrid element, interviewees described the rise of the "YouTube teaching celebrity" and the importance of video rules overviews and playthroughs. Ken saw the delivery of rules and tutorial content as a key opportunity for digital tools, while Gary saw the proliferation of content in this space as "the failure of publishers to extend their brand into YouTube". He felt that more of this content should be provided through official channels. Perry shared these concerns, questioning why he should rely on the rules knowledge of people who are not connected to the publisher. David spoke about his own consumption of these videos:

> "I watched a couple of Jon Gets Games videos before I came [to this convention], of games that I wanted to play here just so I knew how to play them. So yeah, YouTube videos is definitely a thing that I do for tutorial reasons."

Several interviewees spoke about opportunities to "decrease the barrier" (Harry) of learning a new game. Frank noted that "people are not used to reading stuff" and suggested that they find learning from rulebooks difficult. Ken spoke about a colleague's work on an interactive hypertext rulebook "that acts as a crutch, something that enables somebody to more easily get in the game".

Our interviews occurred shortly after the release of an Alexa skill to teach the game *Ticket to Ride* [44]. Several interviewees discussed the potential for other digital tools to contribute to the teaching or "onboarding process" (Simon). Joe saw this as a way to avoid the distractions of visual information content on screens:

> "there's no additional friction there, if it's in your home and right there, it can teach you on a auditory channel, and so you're actually focused on the pieces in front of you, not a separate screen."

Despite the potential for digital tools and videos to support teaching and learning of games, interviewees remained cautious. Perry pointed out that "Tech is not going to replace [...] conversation, facilitating, reading, 'oh, you're struggling.'". Vaughn, meanwhile, described the joy that boardgame hobbyists experience in learning and discussing rules. He pointed to differences in

nomenclature, to negotiated rules, and to errors that become part of the players' own personal experience, as complications that digital tools are unable to accommodate.

4.5.4 Public settings

Our interviews occurred at a major boardgame convention with over 3,000 attendees and hundreds of gaming tables. Irving pointed out that this setting actively disadvantaged games which required digital tools for two reasons. Firstly, many games require internet access, which was patchy in the playing areas and around the convention site. Secondly, the background noise in the playing areas was too loud to allow people to hear any information provided by the tools.

5 GUIDING PRINCIPLES FOR DESIGN OF DIGITAL TOOLS FOR TABLETOP PLAY

There are challenges for researchers in translating empirical findings to concrete implications for design [53]. Our research provides some tentative insights for designers of hybrid digital boardgames and, more generally, for designers of any digital tools for tabletop play. These five principles, shown in Figure 2, reflect the wisdom, experience and understanding of these 18 industry professionals and offer novel perspectives that inspire and open new ways to explore this emerging design space. Further, they are grounded in the empirical data from our interviews, connect to existing literature and theories, are generalisable, and seek to inspire designers to explore this design space [53].

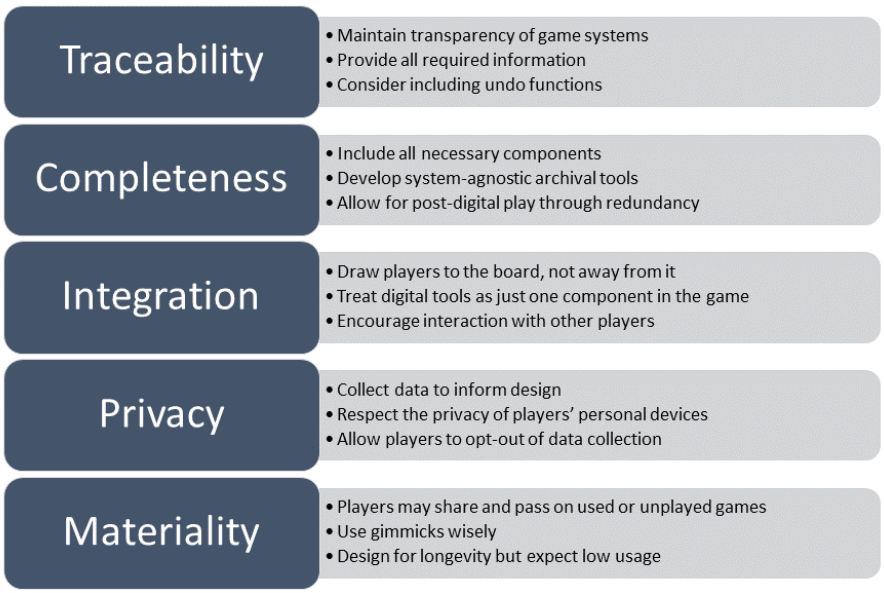

Figure 2 Guiding Principles for Design of Hybrid Digital Boardgames

These principles address the need, firstly, for traceability within a game system. This connects to the theme of "What is a game?" (4.1) as well as to impacts for game design (4.3). Secondly, they explore the requirement for completeness both in the box and throughout the game's life cycle, recognising that games may be played many years after they are bought or first published. This connects to definitional concerns about games (4.1) and also to reflections on how digital tools impact game design (4.3). The third principle addresses integration of digital tools and points to

the need to incorporate them as another game component rather than as a distraction. This acknowledges concerns about unnecessary or gratuitous uses of technology (4.2) while still connecting back to game design (4.3). Fourth, we consider players' privacy and concerns about sharing and using devices (4.2), which must be balanced with the opportunity to use generated data to inform the game (4.3). Finally, we return to the essential materiality of the game which connects to how it is used and experienced by players (4.5) and to its enduring use (4.4) and value over time.

Our findings show that even within this small group there are countless differences in participants' attitudes to the use of digital tools in boardgames and to their readiness and interest to adopt them. But thoughtful reflections on these five principles are seen throughout our findings. We contend that any designer considering using digital tools should engage meaningfully with these principles to understand the context in which these games exist. To explore these insights more fully, in future work we intend to present these insights back to the game developer community to iterate and refine them. Further work in this space could lead to the development of a set of heuristics for digital tools in boardgames (see, for example, [23]).

6 DISCUSSION

This work highlights the broad and varied range of attitudes towards the use of digital tools in boardgame play and design. It shows that many beliefs about the use of such tools are linked to underlying beliefs about the nature of boardgames and to people's personal relationships with technology, and proposes an overarching set of guiding principles for the design of hybrid digital boardgames and, more broadly, for digital tools for boardgame play.

A key finding which has informed our work is the lack of consensus of what constitutes a "hybrid boardgame" amidst the myriad uses and adoptions of digital tools in boardgames. Our respondents described the use of spreadsheets, pocket calculators, and YouTube videos for rules explanation; Kankainen and Tyni [36] use the term "hybrid tabletop game" to include electric and electronic games, as well as games using VCR, CD and DVD technologies. They propose the term "smart device tabletop game" for games where the digital tool is delivered through a smart device. Others have adopted the language of augmentation [6, 39, 42]. As we have discussed elsewhere [52], these interviews led us to understanding these games as a novel compound object which is both digital and material – a medium that is necessarily hybrid, rather than one that first existed in its physical form before the digital tool was added. This hybridity comes from the perspective of player experience and from notions of relational materiality [28], and our understanding of it draws deeply on these interviews.

6.1 Traceability

Beyond this understanding of hybridity, participants also challenged our understanding of what makes a boardgame a boardgame. While [39] point to definitional concerns around the importance of a game's physical pieces and rejection of any computational devices, [34] argues that it is transparency that differentiates tabletop games from digital, a concern that is echoed in a small number of posts in [39]. In a boardgame, resources are visible and available, and outcomes can be traced to the components that determine them. These notions of transparency connect to the idea of being able to undo an action, by rolling back a sequence of choices. Despite this, participants are ambivalent about the value of small housekeeping chores, suggesting that they might be candidates for digitisation. Our guiding principles reflect this as the requirement for Traceability in the game.

6.2 Completeness

Our interviewees also spoke about boardgames as complete in themselves. The game's box contains everything that is required for play, even including timers that are arguably redundant given the prevalence of smartphones in everyday life. This expectation of completeness is arguably what made James Ernest's company Cheapass Games somewhat transgressive – the company printed only components which were unique to each game, relying on game owners to supply common components such as dice, player tokens, and play money. Although such component reuse might be expected to find support for its lower costs and greater sustainability, hobbyist boardgamers continue to embrace high-cost 'deluxe' editions and custom after-market game components [51] over low-cost incomplete options.

Interviewees extend this expectation of completeness to the digital tools provided with the game. These may be subject to necessary operating system updates but must be complete and bug free at the point of release. This extends to fully digital versions of boardgames on sites like *Boardgame Arena*, where games can be released prior to print publication. This acts as a form of advertising for the crowdfunded product,[6] just as digital versions of *Ticket to Ride* have been seen to drive sales of the physical boardgame [43]. Although publishers are not expected to provide a continuous stream of updates, there is potential for these tools to provide new scenarios or tasks within an existing game.

Critical here is a perceived failure by the industry to adequately archive and preserve digital tools. This is linked to the high economic cost of supporting – and of developing – such tools. Kankainen and Paavilainen [35] connect this to the design guidelines of Universality and Obsolescence; concerns about obsolescence form the largest group of negative attitudes towards these games [39]. Our data strongly suggest that considerations around preservation and archiving should be built into the development of these games, for example, by planning for release of source code or by providing non-digital alternatives to the digital tools. Moreover, participants' expectations that even digital tools will be complete and effective explicitly reject the tech sector's approach of "Move fast and break things".

6.3 Integration

Interviewees also described the central role of the board as the place where play is focused. To them, a digital tool is "just another component" to be used in gameplay. It is subject to the same value considerations and balancing as dice or cards – although it can be a costly component to change or update. It is the board, however, that is the gateway through which players experience the game – and it is when players' focus leaves the board that they become lost to the game.

The themes from these interviews connect strongly to prior work on the sociality of tabletop game play [25, 50] as well as to the design guideline that Hybrid Board Games should be sociable [35]. Further, this requirement points to places where – at least in the opinion of these professionals – the experience and demands of hobbyists and mainstream audiences may diverge through differing requirements for sociality in games. A key concern among participants is the potential for digital tools to interfere with the sociality that they value so highly and even see as the core of gameplay. It is essential that such tools integrate seamlessly with play. Many of the concerns that they raise with the adoption of digital tools are concerns about the social experience of play – that a phone will break the interpersonal connections, that people may be excluded if

[6] At the time of writing, Quined Games' unpublished game *Carnegie* was available for pre-order through the Kickstarter crowd-funding site, but had already been played over 10,000 times on the Boardgame Arena site.

they cannot access requisite technology or afford to buy the games [see also 39], that it will become harder to play games in public. Our analysis highlights the duality of our interviewees as both player and professional, and the ways that their own personal concerns inform and influence their attitudes towards adoption of digital tools.

6.4 Privacy

Among these concerns are worries about the role of technology in play. Like [39], we observed deep technology resistance in thoughts about screens and surveillance cultures, alongside more sceptical acknowledgement of societal concerns about screens. Several participants became passionate in their rejection of technology, although rejection of technology does not in itself explain the attraction of boardgames. For some, the adoption and embracing of technology challenged their notions of what a boardgame is and revealed the boundaries that they place on their use of devices.

6.5 Materiality

Boardgaming hobbyists value variety and acts of collecting [50, 61]. This desire to create and curate a personal collection [49] shapes players' attitudes towards ownership of their games. The essential material spectacle of boardgames is found not only in their boards and components but in the game boxes and the "Shelfies" – photos which present the user's collection to others [50]. This desire for display and spectacle goes beyond the considerations of aesthetics and tangibility [35]. The expected obsolescence of digital tools challenges this core tenet of the boardgaming hobby, in which boardgames reflect their owner's identity and values [22] and persist even across generations. Even a completed Legacy game, designed to be played by a specific group a limited number of times, can be revisited in its physical form. Nevertheless, there is tension here between the need to design and build games for longevity (including the requirement for completeness) and the perception that very few games will actually be played for extended periods.

Interviewees engaged strongly with the dismissing of digital tools as trivial gimmicks. They spoke at length about the thoughtful considerations that apply to developing digital tools, including a strong economic disincentive to developing tools which are unnecessary and a desire for the use of digital tools to be meaningful in the context of play. The Hybrid Social Play project identified Added Value as a key design consideration [35]. Even those who agreed that these tools might be gimmicks pointed to their use in marketing, in attracting new players and purchasers, and in creating excitement and suspense for players.

6.6 Further opportunities for research

In further considerations for future work, we return to the ambiguous space of so-called "helper apps" – tools which streamline play but are not essential for it. These include tools like spreadsheets for complex calculations, scoring assistants, tools for selecting the start player, die rollers, and collection management tools. While not explicitly connected to specific games, these tools nevertheless contribute to the assemblage of tools that, together, form the space of boardgaming play. We also note the opportunity to explore attitudes towards boardgames with electrical and electronic components.

We note also the opportunity to explore the effects of digital tools on various gameplay experiences, including on the accessibility of these tools for groups with specific needs [21, 41]. Although this was not something that our participants explicitly discussed, we see it as an important area and one where digital tools can potentially make a meaningful contribution. In

particular, we note the work done by Heron et al [32, 33] on the accessibility of boardgames for different groups.

Several participants discussed the use of digital tools for teaching; here, participants included the use of YouTube videos and rules podcasts. This echoes the Hybrid Social Play project's identification of Tutorials as an important design guideline for Hybrid Board Games, as well as of Accessibility in the context of creating positive first-time experiences [35], and was highlighted in content analysis by [39]. Liberman [40] has shown that many players struggle with rules learning; it would be valuable to re-visit his findings in the context of the use of video tutorials and other digital tools.

Finally, we see potential to use the guiding principles as both a tool for game design and as a tool in teaching about or exploring the use of digital tools in boardgames. Further work could develop specific activities to encourage the use of these principles both as design prompts and as tools or heuristics for validating designs.

7 CONCLUSION

> "I think it's exciting. I think it opens up a lot of design possibilities and I really feel like we're only really scratching the surface of what's going on. … I think you can create experiences with hybrid stuff that you could not create otherwise, or not easily create otherwise. So I think that I wouldn't want every single game I play to have to be a hybrid. But I think if it justifies itself, then I think it can be great." (Mark)

Our analysis highlights the range of opinions that industry professionals have towards the use of digital tools in boardgames, as well as some clear areas of consensus in their attitudes. These include acceptance of the many tools that players adopt as part of play and recognition that a boardgame must necessarily be complete and playable as it is received, as well as concerns about the economic and environmental costs that digital tools attract. While it is clear that boardgames will not now, and likely will never, be replaced by games with digital components, such components can play a part in streamlining and simplifying gameplay. Our interviewees suggest that this may be particularly valuable for players who are not hobbyists, who are also a group identified as likely to appreciate the theatrical gimmickry that a digital tool can offer. Finally, they point to the need for developers and publishers to plan for digital tool adoption throughout the lifecycle of a game, from design, development and playtesting through publication and, ultimately, for preservation efforts to ensure that games with digital tools are not doomed to premature obsolescence.

We propose five tentative guiding principles for design of digital tools in boardgames and, more specifically, for Hybrid Digital Boardgames. These address traceability, completeness, integration, privacy, and materiality. These principles are fundamental for the design of any digital tools for tabletop play, as they orient the designer and the game in this novel design space, and will be explored and refined through engagement with boardgame industry professionals. They recognise and reinforce the importance not only of getting the design right – by iterating and testing – but also of getting the right design – by understanding where to effectively use digital tools and where to avoid them [58].

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