“It’s All Connected” - A Boardgame to Communicate Climate Impacts of IoT

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ABSTRACT

Fueled by the rapidly increasing Internet of Things industry, the volume of global e-waste escalates annually posing significant health and environmental risks. Our research around repairability of IoT devices to elongate their lifespan has uncovered common faults, challenges and barriers to repair. To communicate this work in an engaging and impactful way, we created a boardgame raising awareness of challenges and highlighting connections between design, production, ownership and repair. This paper describes our design process demonstrating how research findings were translated into game mechanics through design iteration and testing workshops. We discuss findings from workshops to demonstrate how the game influenced thinking about links between smart device production, maintenance, policy and the climate. Through this we demonstrate how complex IoT repair challenges can be disseminated through game design. Thus contributing to both research around device repair and the growing movement of research communication through serious games.

CCS CONCEPTS

• **Human-centered computing → HCI theory, concepts and models**; **Collaborative interaction**.

KEYWORDS

boardgame, serious games, IoT, repair, production, policy, e-waste, climate impacts

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1 INTRODUCTION

The volume of global e-waste is escalating at an alarming rate [36], projections anticipate approximately 74 million metric tons by 2030 [15]. E-waste poses significant health and environmental risks globally, particularly when it is not handled and recycled correctly [18, 28]. Extending the lifespan of existing products can reduce demand for new resources and levels of e-waste, both of which contribute to the climate crisis [25]. As the Internet of Things (IoT) continues its rapid expansion, integrating intelligence and connectivity into commonplace items [33], an increasing number of everyday and affordable devices approach a state where repair or disposal is necessary. Increased awareness and a sustainable behaviour approach is required from research, policy, industry and citizens to address this crisis. Community-based repair is an area of increasing interest to the research community [24] due to the expanding efforts of repair cafés in providing affordable repair to elongate the lifespan of products. Recent research into the repairability of technology in these contexts has uncovered common faults, challenges and barriers to repair [1, 8, 19, 22, 30, 32]. IoT is of specific interest here due to the complex but low-cost nature of devices and ecosystems making disposal and replacement appear an easy option. Raising awareness to change attitudes and increase knowledge can help to promote sustainable behaviours [11]. In particular, gamification, including boardgame use has been demonstrated as a promising method for communicating complex sustainability problems [14] and promoting sustainable behaviour [2, 12]. In an area of research focusing on e-waste, where technology is at the heart of the problem the research team came to the conclusion that a physical boardgame methodology was both fitting and preferable to a digital game in this case. This paper describes the design process of a boardgame designed to translate IoT repair research into game mechanics that raise awareness of these challenges and the connection between device design, production, ownership and repair. We describe our design approach, including details of game mechanics crafted to communicate project-based research findings. Workshop feedback from participants is also discussed to demonstrate the user-centered iterative design process and preliminary data indicating an increased awareness of some of the climate impacts surrounding the IoT.

2 DEVELOPING THE INITIAL CONCEPT

Our initial design brief was to communicate current research findings around IoT device repair in the form of a boardgame that will engage people in the relevant themes surrounding it. We aimed to raise awareness of repair issues, promote individual repair behaviour, increase understanding around the impact of policy, and support a move towards sustainable IoT design.

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2.1 The Merging of Two Games

Initial research into game options that would meet this design brief were explored with two very different concepts:

2.1.1 Inventors. Involved competing players as industry professionals auctioning and drafting new technologies to meet specified demands, among changing conditions. Independently developing technologies while managing reputation and pollution/production.

2.1.2 Realistic Forces. Involved Citizens competing against one industry player who produced non-specific devices with hardware, battery and software statistics that aged over time. Renewable and non-renewable resources were used for production, and there was a separate company repair shop, in addition to player-individual repair statistics and a repair café to fund to open. Policy funding was incorporated, as was a climate marker and maintenance/repair rolls for devices.

A review meeting with four researchers, involving discussions about current research findings and a play session to test the corporation game mechanics, resulted in a merging of the two separate games. This pulled in the Corporation on one side and the Citizens on the other with the climate in the middle impacting both. In addition to the merging of the two concepts this initial review meeting became the foundation for feeding in the different research streams that were being explored within the research group.

2.2 Incorporating the Research

Current research was discussed which drew on, literature reviews, ethnography of repair cafés, scenario-based design probes and semi-structured interviews with different communities (including users, repair café volunteers and visitors, industry-based IoT designers and related professionals). The researchers directly involved in these ongoing studies contributed through feedback sessions, written versions of study findings and samples of current literature around IoT design and community repair (for example, [7, 8, 19, 21, 22, 29, 30, 32, 34]), to feed into the next game iteration. The focus of these inputs included:

- Common faults (both IoT-specific and more general electro-mechanical)
- Repair café challenges and processes
- IoT Design challenges
- Business models and product-service considerations
- Smart product repair motivation and expectations

2.3 Developing It's All Connected

Once the initial concept had been decided upon the iterations began to ensure research findings were being successfully communicated through game mechanics and that the game was balanced and engaging for players. Key game mechanics were developed, and paper prototype games were produced. Two additional rounds of testing were held within the project team, resulting in further iterations to improve playability before external testing commenced. Some key design decisions resulted from these internal testing sessions. For example:

- A turn order was added
- Adapted to be two v's two to foster communication and collaboration and increase transparency between community and corporate players
- Device goals were refined as relating to the functions they serve in the household
- Faults were aligned to the research findings, pulled through from ongoing ethnographic and interview studies.
- A map was added to allow community players to meet up and trade
- A circumstance deck was added to represent the impact of an increasing climate tracker
- An End-of-Round card discard/draw was introduced, to expose players to more ideas within the game
- Card wording was amended to add clarity where actions were not obvious

Ongoing ethnographic fieldwork by the first author of this paper focused on understanding challenges and barriers to repair of connected devices within repair cafés. Due to the focus of this work as part of a wider EPSRC funded project on IoT and the right to repair, it was essential that the game reflected these findings within the wider contexts. In particular, the wide ranging faults that impact connected devices including, connection issues, software faults, data security and hardware issues needed to be accurately reflected through the fault cards. The unique business models that surround IoT devices can also impact the repair options available to users. For example, service model approaches offer longer term value generation to the producer through data-driven services [26]. Depending on the type of device and service these may be sold with maintenance contracts in place. It was therefore important that this was reflected in the game through some of the device cards adopting a service model. A final factor that the research team deemed as important was communicating the embedded nature of connected devices within the socio-technical infrastructure of household goals and routines. This was communicated through a focus on consumer device and service categories, goal cards relating to everyday routines and house shaped Citizen boards.

3 AN OVERVIEW OF IT'S ALL CONNECTED

It's All Connected displays the wider tensions within the systems of repair through abstracted mechanics in a four-player match. Played by two different teams, a pair of Citizens and the Corporation (consisting of the Director and Producer roles) have two asymmetrical goals: owning working devices with desired functions and amassing a certain number of coins, respectively. It is possible to play collaboratively – if both goals are completed in the same round, both teams have won. On the other hand, if the climate marker (in the middle of the board) reaches its final position, both teams lose. Throughout play, participants encounter mechanics surrounding the production and purchase of common products, including their maintenance and potential disrepair (with disposal consequences!) within a context of daily life, climate-dependent global events and changing legal policy which both sides can influence. Figure 1 shows a basic overview of the game setup before play commences.

Figure 1: Game Set up

3.1 Playing the game

At the beginning of the game, the Citizens place their pawn at the community centre and draw 4 Goal cards from their colour's decks, before setting the rest aside. These should be concealed from the Corporate team. The cards represent the goal objectives of the Citizens in the form of technical functionality (for example, Cleaning, Reading, Music, Gaming, Scheduling). From here Citizens must obtain and maintain devices with these functions to meet their goals. When both Citizens have working devices that meet all of their goals the Citizens have met their win condition. For the Corporate team to meet their win condition, they must accrue £30. This is primarily achieved through the production and sale of devices.

3.1.1 Round Order. Each round is split into three phases which mean different things for each role. In the physical game, there are double-sided reminders with the turn proceedings outlined with highlights of each teams' roles within it. This compliments each players playboard, which contains details of what they can do each turn. For Citizens who share the same powers, this is another reference sheet between their houses.

The Renew Phase - The Director player in the Corporate team begins the round by reading a circumstance card (see figure 2) corresponding to the current climate zone that will affect both teams this round. Circumstance cards can be positive or negative to either or both team(s), keeping game-play engaging each round corresponding to the current stage of climate destruction. Next, all players start the round by taking any coins or cards as written on their playboards, keeping in mind any potential effects of the circumstance card that round. The Corporate players are limited to a starting income of £1 a round to ensure they rely on the Citizens' custom instead of passively reaching their profit goal. Following the Producer's playboard, the climate marker advances equal to the number of cubes produced through non-renewables' methods, explained as polluting in the reference.

Figure 2: Climate Marker and Circumstance Cards

The Main Phase - During this phase all players carry out two actions from their player boards. The order of play is: Director → Citizen one → Producer → Citizen two. Each player has a reference to the actions their role can do as part of a main turn, as explored later. Citizens decide on Citizen one at the end of each round, so the exact player order is not fixed – if a Citizen is ready to buy a device, for example, it might be worth going second to see if the Producer brings out any new products, however, some strategic plays could aid both Citizens in the round if played earlier on.

The Review Phase - In this phase, the Director checks for any wins/losses (if the Citizens have won, they must announce it now as their goals are a secret from the Corporation). Following this, all players discard any unwanted cards knowing they'll draw up to their role's limit in the next phase. Any Citizens with broken devices at the end of the round roll for each and subsequently incur penalties (such as discarding a card, or paying £1 to the bank symbolising time wasted on workarounds or hiring out the faulty functions) before moving age markers down (or attaching ones to newly purchased devices) and rolling maintenance checks. Maintenance checks involve a roll of the dice for each device owned (see figure 3). The roll must equal or beat the current value of the age marker on the right of the device cards. If the maintenance roll fails, a fault card is drawn and added to the device. Broken devices require fixing or will incur a penalty roll next round. Once maintenance is complete Citizens decide on next first player and a new round begins.

3.2 The Citizen Roles

As opposed to the Corporate team, Citizens have the same powers and the ability to share devices or trade cards, though their finances are separate. In addition to cards and actions outlined below, only the Citizen team has access to the map, up to two moves per turn in either direction (one move for two spaces, or up to two actions one space away).

During the renew phase Citizens look toward the centre of their playboard for the amount of cards to draw and coins to collect. The blue Citizen draws one more card and one fewer coin per round compared to green, so that Citizens have their own specialised contribution and may employ different strategies.

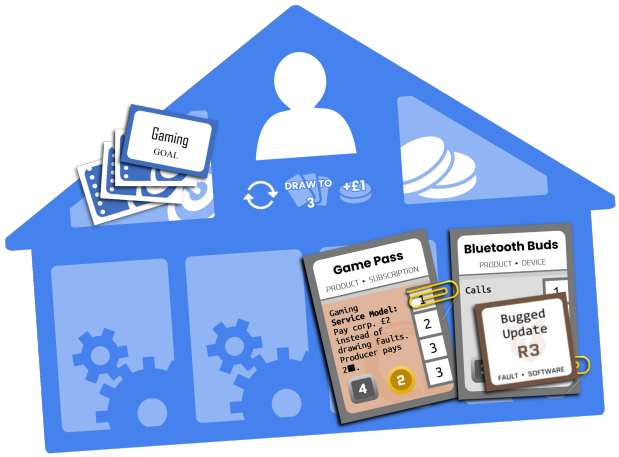

Figure 3: Maintaining Devices

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During the main phase, both Citizens can choose from the following actions (although contextual restrictions may apply, such as location of pawn):

- **Play a Card** - All players' cards have a cost at the bottom and an action cost under the title (some are full-turn cards like Guerilla Gardening taking up both actions, while some like Cycling are 'free', played to complement the two main actions. - see figure 3)

Figure 4: Player Card Examples

- **Move** - This covers moving one's pawn and carrying out the action of the new location.
- **Map Actions**- When a Citizen's pawn lands on a map location there are actions associated. These include: Paying coins to lobby for policy (at the Courthouse), collecting a card (from the Library), purchasing a device (from the Shop), collecting coins (from Work), Paying for climate initiatives to lower the climate marker (at the Community Centre), repairing broken devices (at the Repair Café).
- **Clean** - Lowering the age marker of a device one owns by two spaces makes maintenance rolls easier.
- **Bin** This discarding action is a Citizen-based pollutant, involving placing a product card in the pink bin and moving up the climate marker equal to half of its resource value rounded up.
- **Trade** - This is a bonus action available when both players are on the same spot on the map – they can trade any number of cards or devices, using only an action of the player initiating the trade. Coins cannot be traded.

3.3 The Director Role

During the renew phase the Director draws a circumstance card according to the climate's colour (see figure 2), before drawing up to five cards (the most out of any player to symbolise the importance of planning and directing) and taking £1 from the bank, the only regular income for the corporation's shared money pool – this is to ensure both teams are reliant on each other for goals (products/income).

During the main phase the Director has unique actions to slow the progress of legislation, remove products from the shop or spy and rearrange key non-player decks to symbolise the executive powers of corporate stakeholders in repair systems. The Director's deck includes cards that manipulate prices of items, force extra maintenance checks, change Citizen's goals through marketing initiatives, assist the Producer and climate meter management.

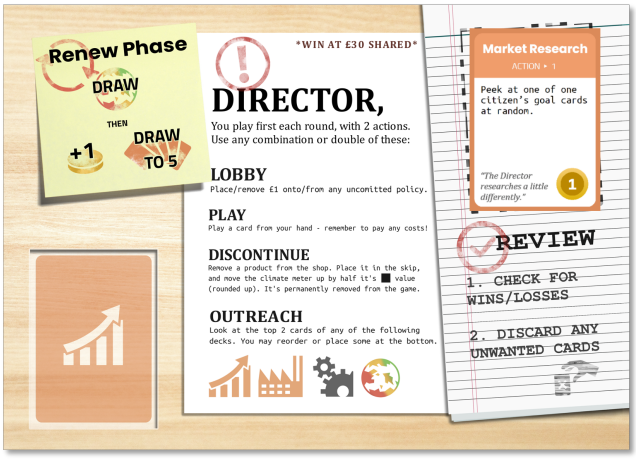

Figure 5: Director Game Board

3.4 The Producer Role

During the renew phase the Producer draws both cards and resource cubes. They have two card decks: Innovations and Products, and can choose any combination to draw. They are the main polluter of the game, with the climate marker moving up equal to the red resource marker on the Producer's board. Resource cubes are collected equal to the sum of the red and green markers and can be used to produce products during the main phase according to their cards' resource cost.

During the main phase the Producer can undertake standard play card action and ship devices. The Producer can also research

Citizens' opinions in order to infer their goals through preferences or service devices once players have less need for the shop. The Producer's card deck is focused around cards that manage [non-] renewable production and extra cubes, along with some interactions with the product deck and repair offers for existing devices.

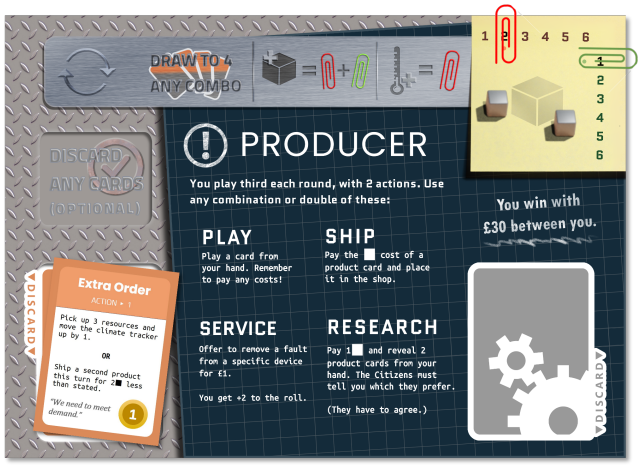

Figure 6: Producer Game Board

4 DESIGN ITERATION AND TESTING WORKSHOPS

The initial concept stage of the design process involved play testing and discussions within the research team incorporating their knowledge of literature and early findings from ethnographic, interview and workshop studies [8, 19]. Following the concept stage, we conducted a series of five play testing design workshops [16] as part of the pre-production phase. This testing was approved by the university's ethics committee and involved an audio recording during game-play, alongside questionnaires to test the alignment to the design brief. During the sessions, researchers took on the role of game moderators providing the opportunity for observations to be made about the dynamics of the game and player reactions to various elements and mechanics. The purpose of the workshops was to collect data on both the success of the game mechanics to engage players in an enjoyable experience and the effectiveness of the game in communicating key messages from the research. An important element of which had now become linking the policies, production, ownership, management and repair of smart devices to climate change to help promote sustainable behaviour. At the end of each workshop session the research team reviewed, discussed and analysed the observation and questionnaire data. Amendments based on any observed tensions between elements and suggested improvements from players were made to the game before the next testing session. From here design decisions were made and recorded on a detailed changelog.

The game mechanics were assessed through the researcher observations and reviews of audio data in areas where play had been disrupted or confusion had occurred. Players were also asked as part of a post-game questionnaire whether they had suggestions for improvements. The success of the game in meeting the brief of communicating key messages from the research was assessed using 'before' and 'after' questionnaires. Prior to the testing, participants were asked about their current attitude to repair and about the last thing they had repaired (either personally or via other means). Following the game session, participants were asked whether the experience had been enjoyable and whether they had changed their opinions or learned anything new.

In total 18 participants (aged between 18 and 50) tested the game across four workshops. An additional workshop was held with people who had already played the game once to review the changes and gain an understanding of the dynamics when the players already know how the game works and therefore do not face the initial learning curve. We also held three informal play sessions with friends, family and colleagues where data was not collected.

4.1 Turning Research into Game Mechanics

There were several key game mechanics developed from the initial iterations that drew on our research to shape the core messages of the game. These were refined through the workshop testing process. The following sections discuss some examples of these.

4.1.1 The Corporate and Citizen roles. An important dynamic of this game in representing our research and disseminating key messaging is providing visibility to players over the different actors and stakeholders that make up the socio-technical infrastructure around the production, ownership, repair and disposal of IoT. This visibility was praised by workshop participants as creating an enjoyable dynamic and prompting reflection.

4.1.2 Device ownership and repair. Citizens have goals to fulfil through the collection of devices into their houses. These devices are purchased from the shop or traded and must be maintained on a round by round basis, as they age maintenance increases in difficulty. When a product breaks a fault is assigned and Citizens must decide whether to visit the repair shop or dispose of the device. These mechanics were drawn directly from our research and the community repair literature as these had been highlighted as challenges and barriers to IoT repair [8, 19, 22, 30]. When devices are disposed of e-waste is generated which has a negative impact on the environment [18, 25], thus when players enact this behaviour in the game, the climate marker increases. Through this depiction of reality we attempted to represent the key interaction points in the IoT life-cycle and prompt reflection from players on their own behaviour.

4.1.3 Device faults. From interviews with community and DIY repairers we identified common faults both general and specific to IoT devices [8, 19]. These were translated directly into the game through fault cards applied to devices after a failed maintenance roll. Fault cards represent the variety of faults that can affect IoT devices due to their multilayered nature, including software, hardware and data connections. For example: Blown Fuse, Drive Failure, Worn Cable, Unreliable Sensor, Connection Failure.

4.1.4 The climate marker and circumstance cards. The impact of device production and disposal on the climate is ultimately felt

by both industry and the community[18, 25, 27]. It was essential this was reflected in the game to increase players' awareness of climate impacts surrounding the IoT. The climate is represented by a dial that moves from green to red which increases due to resource use and device disposal. Circumstance cards, drawn at the start of each round, increase in impact as the climate marker moves towards maximum. Feedback from workshops led to increasing the severity of the circumstance decks based on the state of the climate marker, prompting a move from one deck to three (see figure 2). For example, green circumstances include policies and tech advancements, whereas red circumstances include impacts from storms and flooding.

4.1.5 Incorporating Policy. Policy and legislation is currently an active research area that surrounds IoT design, production and repair [5, 9, 23]. It was therefore important for it to feature within the game. The policy board allows Citizens to lobby for policy to be implemented, so as to maintain a level of reality and promote discussion and reflection among players. The four policies impact different elements of game-play. These include, improving the outcomes of device repair at repair cafés, transferring some of the repair cost from the citizen to the corporation (when network or software related), encouraging climate action and taxing polluting behaviours.

4.1.6 Product-service models and competitors. In reality, IoT solutions are offered under different business models with some sold as products and others on a service or subscription basis [3, 7, 26]. It was important for us to represent these differences in the game to mimic realistic consumer conditions. Due to the repair focus of the game, this was challenging. A round by round subscription would benefit the corporation hugely and would disadvantage the Citizen. Therefore, we abstracted this to a pay-on-breakdown model - Citizens pay coins and the Corporation pay resource cubes immediately upon a failed maintenance check to 'repair'/upkeep the service. This represented the service model but maintained balance between the teams. Competitor devices were also added through the Citizen card deck. This incurred higher costs but ensured not all purchases went through the corporation players to smooth device card withholding issues.

4.1.7 Motivating repair. After commencing game test sessions, it became clear that in some cases there was little motivation for Citizens to repair devices as there was no consequence of them breaking until the final stages of the game. On observing this, we revisited research considering motivation and barriers to repair [19, 22, 30] to understand how these may be used to to leverage these behaviours during game-play. This posed a design challenge, as in reality, the benefit of having household goals met is ongoing and naturally provides motivation, whereas in the game it is about a win condition. The result of this was to add in a penalty roll for Citizens with broken devices to encourage repair. While this approach did not represent the research as closely as we had hoped it would, it did work well to encourage participants to consider the repair or disposal decision around the point of breakdown. Thus, keeping it relevant to realistic contexts.

5 WORKSHOP CHALLENGES

The complexity of the game was necessary to convey the level of insights to players that were indicative of the realities surrounding IoT production, policy, ownership and maintenance. Over-simplification of concepts has been noted as a limitation in sustainable education boardgames [10]. While abstraction of concepts was required to represent socio-technical elements as game mechanics, we were mindful not to over-simplify. However, this presented us some design challenges. The game lasts around two hours to play in full and includes a learning curve for players engaging with it for the first time. A key consideration then was our delivery of instructions at the start of the game sessions and our role as game moderators. We worked on a basis of trial and error, walking players through rounds, presenting information on a projector screen and refining individual instructions. Instructions were included on game boards as reminders for each player as prompts. This approach worked very well and was mentioned as *'particularly useful'* by participants. All the participants reported the workshops as enjoyable and said they would like to play it again. Many appreciated the investment required in learning the game and praised the complex dynamics at play.

An additional design challenge relating to the complexity of the game arose due to the many different ways to play. From observing the workshops, we found that game strategy and tactics differed for each game. For example, Citizens can decide how much they will cooperate, when and if they will focus on policy, the climate and repair. The corporate players can decide whether to ship products or hold back, whether to focus on the climate or lobby policy. This variety in player strategy was in part what engaged participants into the different roles and scenarios at play supporting exploration of the IoT industry and its related climate impact. However, from a design perspective, this meant we could not go into the workshops aiming to test a particular game mechanic (such as, one that had incurred a recent change). This caused us to increase the number of workshops that we had planned for and to re-invite some participants to play a second time. This approach ensured that the testing had been thorough and design iterations had been checked.

6 DELIVERING A FUN EXPERIENCE

One of the core elements of our original design brief was to engage people in the relevant themes surrounding IoT production and repair. Particularly in the social and wider societal aspects, something which has been noted as an important consideration when using games to promote and educate sustainability concepts [31]. The questionnaire completed by participants at the end of workshop sessions demonstrated that our participants were very much engaged in these themes through an enjoyable game-play experience:

> *"I liked how we got to work as teams each having our own rules"*
>
> *"I would play it in a real-world setting"*
>
> *"I love that it encourages some cooperation even across teams"*
>
> *"I got very angry which means I was very engaged. I think the most fun thing in the world is being engaged"*

"It helped that the end was so close between the two teams which added some adrenaline"

"The game was fun once I got the hang of it"

7 RAISING AWARENESS THROUGH PLAY

Another core goal of this project was to raise awareness of the impact of the IoT on e-waste and climate change. To test whether we were achieving this we asked participants whether their attitudes towards repair had changed and whether they had learnt anything from playing the game. Through a bottom-up thematic analysis [6] of the open questions assessing these elements, four themes were identified. These included, the impact that policy can have on production and repairability:

"I truly hadn't considered the seller side of the coin before regarding how repair affects them and what might need to happen (socially/politically) to encourage manufacturers or sellers to invest in repair"

"My attitudes to repair remain the same but I was able to better understand how companies can incur significant losses if government enacts policies"

The impact of corporate approaches on repair and sustainability:

"I learned corporates can have major impacts on repairing and it does need thinking about"

"It entrenched views about corporate sustainability being mostly lip service"

"I maintain my views on repair , but I can see how as a corporation, killing the climate a little bit to achieve an objective can be seen as not so bad by those up top"

Visibility over resource use to produce devices and the related impact on the environment:

"I liked how the game gave a visual representation of what went on in the corporate side (i.e. the resource blocks)"

"Although I did know that repairs were a better option, I never understood how much it reduces our own carbon footprint or how many resources go into manufacturing goods and devices"

"I think the game does well to highlight the link between producing devices and damaging the environment"

Links between individual human behaviour, IoT production, ownership, maintenance and the climate crisis:

"Thought provoking that the climate was steamrolling out of control until both teams worked together"

"The cost is large to the environment every time I buy something"

"It reminded me how expendable smart devices are – repair costs a lot of money but throwing them away affected the environment"

8 CONCLUSION

This paper details our design journey to produce a boardgame that reflects research around the repairability of IoT technologies. We respond to calls around more effective communication of climate and sustainability related science [17] and draw on research demonstrating boardgames as a learning tool [4] and an effective method of communication for complex sustainability problems, particularly those with multiple stakeholders at play [14] and multidisciplinary elements [13]. IoT devices offer both physical and digital experiences for users across multiple interfaces. This fundamentally changes the requirements of the design work to include holistic design, as well as innovation at each individual architectural layer [35]. This digital layering, embedded nature and multi-interface design also increases the number and type of potential faults a device may incur [8, 19]. Further research has also indicated that sustainable consumer behaviour around connected devices often differs from that of non-connected products [20]. Here we build on this research by creating an experience that has the potential to promote sustainable behaviour reflection of IoT purchase and repair through offering visualisation of impacts of the socio-technical systems surrounding IoT life-cycles from multiple stakeholder perspectives.

It's All Connected presents a strategic boardgame experience where players can take on different roles to envision scenarios and partake in decision making that directly impacts the climate. The game mechanics developed during this process use abstraction to transform digital technologies into a physical game elements. This approach offers players an alternative way to engage with the IoT, emphasising the physical resource use, waste and climate impacts. Our initial findings from running a series of pre-production play testing workshops [16] demonstrate that It's All Connected is engaging and fun. While these findings are preliminary, we have shown promising signs of successfully communicating complex climate related science and promoting reflection about sustainable behaviours from different social perspectives. A key strength being that it offers Citizen, Corporate and Policy perspectives. Through this we support the findings of other research that using boardgames to convey complex climate related issues can be an effective method [13]. Based on the feedback from our participants, the two vs two competitive elements of the game provided a level of fun and engagement. Players also appreciated the visualisation of stakeholder actions that are not usually available to them, either by playing the role of the Corporation or through observations as a Citizen, supported by the physical nature of the representations of resource use and climate change.

In conclusion then, drawing on current research and knowledge around the rising e-waste crisis [15, 18, 28], natural resource use [25] and repairability challenges of the IoT [8, 19], we have undertaken a detailed design process to develop a boardgame that communicates sustainability related research to wider audiences. Despite the complexity of the game and the learning curve required at the start to understand various concepts, our initial investigations suggest players found it, enjoyable, engaging and insightful. Our intention now is to move beyond prototype versions and concept testing, to further explore the potential impact It's All Connected can have in communicating complex sustainability by supporting player reflections from their own and other stakeholder perspectives.

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