WhatFutures: Designing Large-Scale Engagements on WhatsApp

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ABSTRACT

WhatsApp, as the world's most popular messaging application, offers significant opportunities for improving the reach and effectiveness of engagement projects. In collaboration with the International Federation of Red Cross and Red Crescent Societies (IFRC) we designed WhatFutures, a collaborative future forecasting engagement for global youth using WhatsApp. WhatFutures was successfully deployed with 487 players across 5 countries (Kenya, Bulgaria, Finland, Australia and Hong Kong) to inform strategic change within the IFRC. Based on our analysis of the activity - including 16,100 messages, 95 multimedia artifacts, and a post-engagement survey - we present a reflection upon the design decisions underpinning WhatFutures and identify how decisions made around group structures, processes and externalization of outputs influenced engagement and data quality. We conclude with the wider implications of our findings for the design of engagements that best utilize the affordances of existing messaging applications.

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CCS CONCEPTS

• **Human-centered computing → Collaborative content creation**.

KEYWORDS

WhatsApp, collaborative content creation, engagement

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1 INTRODUCTION

WhatsApp [4] is the world's most popular messaging application, used by tens of millions of people daily [52]. Ostensibly a secure multimedia messaging tool, in the last few years we have seen WhatsApp repurposed for the classroom [10], for young people sourcing credit in Durban [28], to connect amateur cooks with professionals [23], to monitor election fairness in South Africa [40] and even for issuing court summons in India [54], to name just a few examples. WhatsApp offers a low-cost and effective way for organisations, institutions and businesses to engage with clients, customers and employees.

Increasingly, as organizations and institutions embark on large scale strategic planning and engagement projects they seek to include the voices of large and diverse groups of

stakeholders. By engagement, we refer to the process of directly involving participants in activities aimed towards generating insight and information. Typically, workshops and focus groups are used to produce the rich data and insight that are vital to these processes, however, these methods are simply unsuitable for projects that seek to work at scale and across geographies [39]. The multimedia affordances of WhatsApp could be repurposed to this end, however it is not designed with productive collaborative activity in mind, has no available API and limited customizability.

We present WhatFutures, a gameful engagement designed in collaboration with the International Federation of Red Cross and Red Crescent Societies (IFRC) in direct response to these challenges. The engagement is designed for collecting large amounts of rich qualitative data from distributed, communities in an entertaining, flexible and participatory way. WhatFutures uses structured groups and applies a process of activities to WhatsApp, in order to engage distributed participants in the collaborative production of information rich multimedia artifacts (video, audio and articles), and to improve the quality and quantity of overall participation by engaging groups who would not normally participate in similar processes and sustaining this participation through gameful activities.

We detail the design goals underpinning WhatFutures along with an accompanying description of its pilot deployment across five countries, which successfully engaged 487 participants in generating 95 individual pieces of crafted multimedia data as well as 16,100 messages in support of the IFRC's strategic planning goals. Our analysis of the results of this pilot deployment show that the structures and processes we employed on WhatsApp have great potential for engaging large distributed populations in the creation of information-rich qualitative data. This is further evidenced by the IFRC's decision to later globally deploy WhatFutures with nearly 4,000 participants from 120 countries.

The main contributions of this paper are: 1) a detailed description of the WhatFutures engagement method; 2) a large-scale deployment and analysis of WhatFutures; 3) a reconceptualising of existing communication platforms as material with which to design new interactions and coordinate action and activity.

2 RELATED WORK

Due to a scarcity of research specifically addressing the use of WhatsApp for engagement, our literature review is on collaborative crowdsourcing, engagement games, and the appropriation of existing platforms for engagement, with a focus on how they have addressed similar design challenges including motivating and organizing large groups of distributed people towards collective action.

Collaborative Crowdsourcing

Crowdsourcing is highly effective at organizing large numbers of people towards completing tasks. Often at a global scale, crowdsourcing, is a growing phenomenon that spans a range of industries and levels of expertise from micro-tasks such as translations and classification of images, to logo and t-shirt design for companies and individuals, up to complex solutions for innovation challenges set by organizations on open innovation platforms [13]. Within research, web-based platforms such as Lab In The Wild [45], Sensr [30] and Pybossa [44] allow researchers to harness the power of the crowd to take part in behavioral surveys, act as sensors for citizen science projects or contribute to simple analysis of large data sets to name a few examples. Typically, these crowdsourcing activities are oriented towards the completion of tasks and performed by individuals in isolation, and so are unsuitable for deep collaborative generation of rich qualitative data. Law et al [34] further argue that crowdsourcing is more suited to mechanical study designs and express uncertainty regarding the utility of using crowdsourcing within more exploratory and open-ended research.

Recent work into crowdsource platforms which incorporate peer production and collaborative mechanisms has yielded interesting results. For example, Retelny et al [46] successfully explored how complex tasks could be divided up and distributed to small collaborative 'flash teams' on an online platform, Cheng and Bernstein [12] investigated the use of 'activation thresholds' in supporting collective action and Kittur et al cite collaboration between crowd workers as being crucial for the future of crowdwork [32] particularly for creative tasks [31]. These approaches, although using custom built platforms, do offer useful insights into how activities can be designed to support productive collaboration between peers and point to the value of this collaboration in improving the quality and creativity of the output.

Engagement Games

One approach to focusing distributed crowds in engaging activities and collective effort can be found in serious Alternate Reality Games (ARGs). ARGs are large scale, trans-media games where players collaboratively unravel and unlock mysteries using clues scattered across physical and digital media and have been designed and enjoyed by thousands since the early 2000s [29]. ARGs take many forms but primarily their design focusses on the creation of engaging, participatory experiences which blur a game's 'magic circle' with real life experience through the use of game mechanics and interactive fiction [9]. Serious ARGs have more serious goals, and it has been argued, can be used in the cultivation of collective intelligence, awareness building and participatory learning [24, 38, 47].

One such serious ARG that can be seen as generating large amounts of qualitative data is World Without Oil (WWO) [5]. WWO sought to engage its players in blogging around imagining the serious repercussions of a future of global oil shortage. This game attempted to leverage collective imagination to chart potential futures, and build community awareness of global issues and solutions [38]. Although WWO succeeded at generating insight on future forecasting activity from their players, JafariNaimi and Meyers' analysis of contribution and participation patterns [24, 25], point out a number of problems with the data resulting from the game design. Firstly, they highlight that the vast majority of data was generated by a small but 'hyper-engaged' group of players, along with the game designers, resulting from a very high level of drop off in the early stages of the game. The authors' attribute this to a lack of formative feedback within the game to inform players how they are doing relative to their own and others' play. Further studies have shown that the absence of formal game structures in ARGs also forces motivated players to create their own structures and co-opt tools in order to play effectively [41, 57].

An example of how game structures can be leveraged to sustain and structure collaborative activity can be found in the concept of engagement games by Gordon et al [22]. Engagement games are games that attempt to use game design techniques to transform civic processes to make them more accessible, transparent, and engaging. Similarly, Devisch et al. [17] identify the role gameful design plays in fostering 'collective reflection'. A prominent example, Community Planit [1], is a workshop and web-based engagement game where citizens are invited to take part in a series of time-limited missions. These missions involve answering simple questions about their experiences of their city. Answering questions and interacting with other player's answers earns in-game currency, which can be pledged to player submitted local projects and causes. Community Planit is an example of how compelling game structures can be used to generate high quality data to support existing civic processes, whilst at the same time creating an engaging and entertaining participatory experience for players [21]. Approaches like Community Planit point again to the effectiveness of game structures in productively focusing participants towards a shared goal, whilst facilitating the deep peer communication that contributes to high quality qualitative data.

Appropriation of Platforms for Engagement

Recent attempts to appropriate popular social media platforms for distributed research participants include MacLeod et al.'s Asynchronous Remote Communities (ARC) [35] which engaged distributed 'hard-to-reach' populations using private Facebook groups. The ARC method relies on a series of designed activities that participants complete to generate data around issues. Taking place entirely by posting comments and uploading media to a Facebook group, the ARC method has been successfully used to engage new mothers [43], people with rare diseases [36] and people living with HIV [37]. Through successive studies MacLeod et al. have refined their method for using existing platforms to design engagements with distributed populations, and also point to limitations specific to Facebook.

3 WHATFUTURES

The design of WhatFutures draws on a legacy of insights and successes from previous approaches to digitally mediated distributed coordinated action. Firstly, work on collaborative crowdsourcing has shown the value of using group structures and roles in supporting distributed group production [18, 32, 46]. Secondly, some of the most successful civic engagement applications have utilized gameful design to motivate participation and structure collaborative data generation [1, 5]. Finally, recent work on the appropriation of existing platforms [35] have demonstrated the enormous opportunities of leveraging their affordances to engage with distributed research participants.

WhatFutures was designed in collaboration with a large IFRC with an estimated 17 million volunteers worldwide, 9 million of whom are under the age of 30. In 2017 the IFRC embarked on a 3-year long series of horizon scanning activities to inform the creation of *Strategy 2030*, the strategic vision of the organization for the next ten years (a report and set of recommendations to be submitted for approval by its General Assembly). As with most humanitarian organizations, a significant concern of the IFRC was the inclusion of the voices of their young volunteers in this process: *'Surveys have been primarily used previously to achieve this input but have been shown to have limited value for this purpose and particularly struggle to engage appropriate representation from the millions of youth volunteers that [IFRC] has in developing and emerging countries.'* (Head of Innovation, IFRC).

The IFRC's concerns that the voice of young people should be central to the consultation process around Strategy 2030 were colored by their past difficulties engaging young people in organization-led initiatives through bespoke digital platforms and echoed Toyama's assertion that *'technology projects should seek to amplify the impact of existing institutions that are already contributing successfully to development goals'* [55]. A consequence of this was that early in the design process the IFRC indicated a preference to incorporate WhatsApp [4] in the engagement activity, given its widespread use throughout the developing world [52] and by young volunteers to talk between themselves and their local volunteer organizations. A second priority for the IFRC was that the complexity of the issues facing humanitarian organizations could be addressed in the engagement activities, and that

it would provide a space for dialogue around authentic and localized accounts of challenges and elicit innovative grassroots responses. Finally, the outcomes of the activity must be rendered in forms that can readily be incorporated into the formal future forecasting process. Given the ultimate target of many thousands of participants (in an anticipated full-scale global deployment) the risk of being overwhelmed by large quantities of unstructured qualitative data was a major concern for the IFRC. These requirements, and closely related issue identified by the IFRC, can be summarized as three design goals (DGs):

DG1 Engagement. Increase the quantity, duration and depth of engagement by lowering barriers to participation and through gameful design. [5, 16, 22, 24].

DG2 Complexity. Support participants in understanding complex global drivers of change, in reflecting on these, and in expressing their local perspectives on this change. [24, 31, 46, 50].

DG3 Data. Generate rich multimedia artifacts that communicate the authentic insights of young volunteers that can be used meaningfully in strategic deliberations within the IFRC.

Designing With WhatsApp

To achieve the IFRC's goals for the activity through WhatsApp required a design that effects an augmentation of the features and functionality of WhatsApp through a set of structures, rules and activities that allow us to create, configure and control an activity in support of these goals. In taking this approach we framed WhatsApp as the *material* with which to design our activity, and we explored the design space for the augmentation of WhatsApp. Our initial exploration indicated four dimensions to the affordances of WhatsApp; group morphology, individual's roles within groups, visibility of group activity and the mechanisms by which individuals and information enter and leave groups. We summarize these dimensions as *morphology, role, externalization and process.*

Morphology. The size, membership criteria, and connectedness of WhatsApp groups characterizes the qualities and dynamics of interactions between participants. For example, the size and membership of a group has a significant impact on factors such as mutual understanding, group cohesion, and a group's capacity for decision making. Likewise, the connections between groups, realized through overlapping membership, is the channel through which information and knowledge diffusion can occur (and can be influenced).

Role. Stemming from the simplicity of its intended use, WhatsApp only enforces two distinct group roles: *group members* (who can contribute to group chats) and *group admins* (who can also control membership). Yet the assignment of roles to group members shapes their behavior in the activity, both at the individual level and group level, For example, roles foster identity and a sense of responsibility, and can be powerful mechanism for scoping anticipated contributions of both participants and groups, and make expectations concerning division of labor explicit.

Externalization. WhatsApp is designed so that only members of a group have access to content produced by other members (i.e. their multimedia messages). Externalization considers how, when and whether such content is made visible more generally (both during and after the engagement); and how this visibility of content drives behavior, knowledge exchange and a sense of collective action or competition.

Process. Membership of a WhatsApp group has no associated expectations of participation other than those that are implied by its membership or informally agreed by its members (e.g. posting family pictures in a family WhatsApp group). *Process* is the series of actions and/or steps that participants are required to take in order to achieve the desired outcome of the engagement. Key process challenges are the communication, execution and regulation of the process with the limited administrative powers that WhatsApp affords.

The Design

WhatFutures is a real-time game event that runs for 10 days (see figures 1 & 2). Participants signed up to play on a small website in advance of the game, either individually as part of a team. When signing up, each participant was asked to choose one of four specialisms. At the start of the game a WhatsApp group was created for each team containing the team members and a game administrator. After a day of icebreaker activities, the teams were assigned the game's first main challenge by the administrators (named Future Guides), with a deadline of 3 days to produce a response. Additionally, each team member was also invited to a larger separate WhatsApp group containing players from other teams who all shared the same specialism, in order to discuss different global drivers of change. After the challenge deadline, a leaderboard of the best responses was presented on a website, a link was broadcast within the groups, and the second challenge was set. This pattern was repeated for the final challenge. Alongside and supporting each challenge, smaller lightweight activities were set within the conferences. The game culminated in a final summary leaderboard.

Teams. For real-time peer production and collaboration to occur, players must be able to communicate with other players with a shared goal, as evidenced by work in peer production in 'flash teams' [46]. To this end, players in WhatFutures were grouped together into small teams. These teams were the basic unit of the morphology of WhatFutures and were the primary place where players worked collaboratively to

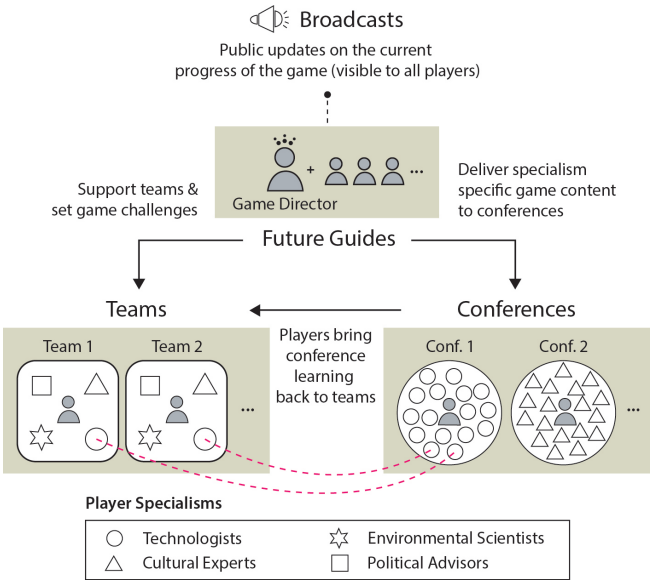

Figure 1: The components of WhatFutures

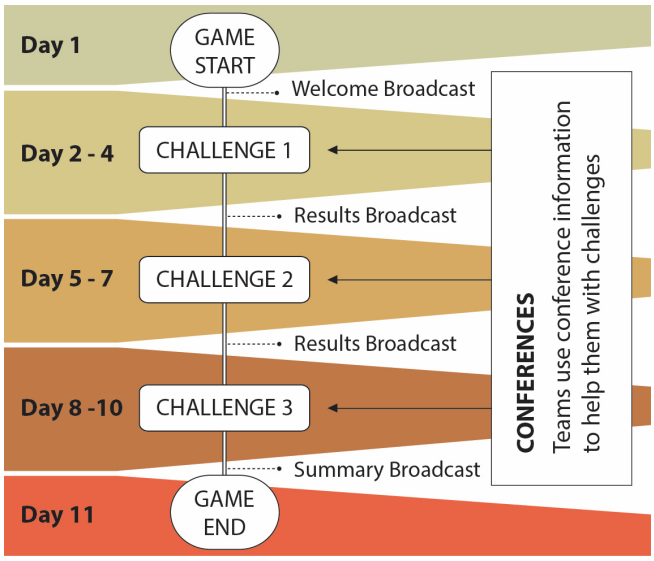

Figure 2: WhatFuture's timeline

generate rich qualitative data. In teams, players took part in the activities set during the game and were the mode in which a player explicitly contributed to the collaborative production of multimedia artifacts in response to the game's challenges (DG3). Morphological considerations led us to restrict team sizes to 4-8 players so as to be small enough for individual players to be comfortable contributing to team activity, but also large enough so that activity and work could be distributed amongst its members (DG2).

Specialisms. The benefits of assigning roles in groupwork activities are well documented [14, 27]. Roles enhance positive interdependence - the sense that individual success depends on group success, and individual responsibility. Both of which Johnson and Johnson [27] argue are crucial for successful group work (DG2). Multiple roles allow for the creation of shared understanding through collaborative grounding [7], allowing the group to respond to complicated scenarios with a sophisticated depth that stems from analysis from multiple perspectives (DG2). Additionally roles can help increase overall engagement by giving players a tool to express their own personal interests and identity and are important elements of gameplay [26, 56] (DG1) and learning [20] (DG2).

The IFRC were particularly interested in how global drivers of change (e.g. climate change, demographic shifts, migration etc.) may impact local communities. To this end, we identified four specialist roles that players could choose in the game that would encompass four large drivers for future change (DG2), as identified by the IFRC. The specialisms were technologist, cultural expert, environmental scientist and political advisor. Much like the roles chosen in traditional pen and paper role-playing games (e.g. warrior, thief, wizard), these roles gave a player a unique perspective, and unique responsibilities within their team (DG1).

Conferences. A conference is a large group of players from different teams, who all share the same specialism. Modelled after the idea of 'guilds' found in massively multiplayer online roleplaying games, where groups of players band together towards a shared goal. Players who join guilds are generally rewarded with tighter social cohesion, loyalty and a sense of group identity [42, 49], all of which are desirable goals for maintaining engagement (DG1). As places of learning, conferences are also loosely based on the Teams-Games-Tournaments method of structuring large scale cooperative learning [15] - a successful teaching method where students work in individual teams and in larger groups based on ability (DG2).

To help players explore their specialisms further we collated existing multimedia content around future foresight, organized into four corresponding themes of technology, culture, environment and politics. This material was presented in the conferences for each specialism, to provide anchor points for discussions. The conferences were designed to be places where players could meet other players outside of their own team and engage in peer learning. The intention here is that due to the morphology of overlapping membership, the peer-to-peer learning and exploration that took place within the conferences, would be brought back by individual players to their respective teams for further discussion and synthesis into the team's responses to the major challenges of the game (DG2).

Challenges. A key aspect of process were decisions around how exactly participants would generate usable insight for the IFRC. To this end the IFRC identified three questions that they particularly wanted to gather data on: *what challenges do young IFRC volunteers think their local communities will face in 2030? What opportunities will arise from these challenges in 2030? And how should the IFRC adapt to meet these challenges and opportunities in 2030?* In collaboration with the IFRC, we used these to design three challenges that would be presented to players of WhatFutures during the game. We configured them as multimedia challenges, so as to give teams the opportunity to enjoy creating videos, audio and images (DG1), and to create immediately accessible insight for the IFRC without the need for further processing (DG3).

- *Challenge 1:* Work with your team to produce a news story from 2030 about the biggest challenge facing your society
- *Challenge 2:* Create an advertisement for an innovation in 2030. It could be a new product, service or initiative.
- *Challenge 3:* Record a message to the Global Secretary General of the IFRC updating her from the front line of an innovative disaster response in 2030.

These challenges were presented as image files to be posted within each team's WhatsApp group (DG1) and contained supporting sub questions to help the player's approach and break down these large and open challenges (DG2).

Future Guides. To support the overall process, we identified the need for an additional administrative role, which we named Future Guides. Their primary function is to help players who have questions or need assistance and are the first port of call for any queries players may have regarding the game. Due to the lack of API for WhatsApp, Future Guides also facilitated the delivering of content within the game by posting challenges, gathering data, and transferring multimedia content into and out of WhatsApp groups (DG1). Morphologically this necessitated a Future Guide within each team and conference group. Supporting the Future Guides was the lead researcher in a game director role, who assisted the Future Guides in their role, and ensured the smooth running of the game overall.

The IFRC identified an existing group of motivated young volunteers to take the role of Future Guides. We designed a training program, delivered by the game director over WhatsApp in 30-minute chunks over 3 days, to train nine of these volunteers to act as Future Guides. This training program involved the volunteers preparing for the game by practicing support activities such as posting challenges, exporting chat transcripts and uploading multimedia files to a Google Drive repository (DG1). Each Future Guide was assigned between 10 and 14 teams. They were responsible for setting up these teams' WhatsApp groups at the start of the game, posting the game information and challenges to them, exporting the teams' responses to the challenges, exporting transcripts (with consent) of the teams' conversations, and generally providing support to their teams by answering questions and offering suggestions if any players were struggling with any aspect of the game (DG1).

Broadcasts. Our consideration of externalization led us to the inclusion of broadcasts, in the form of an online leaderboard, designed to provide an externalized overall summary of the game that is available and visible to all players, and to act as a feedback loop. Feedback loops are an intrinsic component of any game as they allow a player to judge their actions and compare themselves to other players or to the rules of the game system [48] and to receive feedback - an important condition for engagement [19] (DG1). They were also designed to contribute to a sense of epic scale, that imbues players with a sense of being part of something bigger than themselves which McGonigal [38] identifies as a prime factor in fostering engagement and motivation in gameplay (DG1).

After each challenge in WhatFutures, the responses would be assessed by leaders of the IFRC innovation team who would pick the top 10 and present these on the IFRC innovation website publicly for all players to see and comment upon. In this way the leaderboard externalized the current state of the game and brought an element of friendly competition where players would judge the quality of their responses based on their positions on leaderboard, and potentially seek to better this for the following challenge (DG1).

Infrastructure. Players signed up on a small micro site where they could register with their details and WhatsApp number to play the game. They were also asked to choose which specialism to play. Players could start a new team, upon which they would receive a share code delivered via SMS to share with friends who wished to join their team (DG1). Twilio [3] was used to verify phone numbers during player registration and send SMS. Google Drive [2] was used to support the sharing of content and material from the game, as it integrates with the share function on WhatsApp. Players were also invited to join their specialism's conference via a WhatsApp group 'share code' sent by an automatically generated SMS from Twilio once the game had started (DG1). The IFRC Innovation WordPress website was used as the leaderboard.

4 STUDY DESIGN

Recruitment of Participants

WhatFutures was promoted to volunteers from the national societies of Kenya, Finland, Bulgaria, Australia and Hong

Kong through the IFRC's internal channels and marketed as an opportunity to take part in a pilot game in lieu of a larger organization wide game. These countries were selected to offer good geographical coverage and to respond to internal political issues. Due to the deeply hierarchical communication channels of the IFRC (where local branches report to national, who in turn report to regional and then international, each being independently responsible for recruitment methods and relaying of information), it is difficult to ascertain how many volunteers were reached by this internal promotion, or even what methods of promotion were ultimately used. In total, 487 volunteers signed up to play WhatFutures (283 female, 193 male, 11 other) with a mean average age of 24.4 years (SD=7.17), 125 of these accessed the WhatFutures microsite through a friends' share code. Overall, players constituted 100 separate teams, with a modal average of 5 players per team (table 1). As the IFRC were interested in local responses, each team contained players from the same country so as to be playing the game from similar contexts. To ensure informed consent, players acknowledged terms of use upon signing up on the site, and also directly to Future Guides within WhatsApp.

Table 1: Player and team distributions in WhatFutures

	Kenya	Bulgaria	Australia	Hong Kong	Finland	Total
Players	191	118	74	65	39	487
Teams	36	22	17	14	11	100

Data and Analysis

The study gathered three types of data. 1) Multimedia data (videos, articles, audio) created by teams in response to the game's challenges, transferred from the team's WhatsApp group to a shared Google drive by Future Guides. 2) Text data in the form of exported chat transcripts from WhatsApp. Consent was obtained before Future Guides used the export chat function. All exported chats were anonymized. 3) Responses to a post-game survey sent via email to participants shortly after the game ended. To provide additional context, we also present post-deployment data based on interviews and real outcomes with the IFRC.

Analysis of the multimedia data was performed via application of a modified SOLO taxonomy [8]. Text data was analyzed through automated topic modeling using Amazon Comprehend [6]. The results of the post-game survey are presented as is.

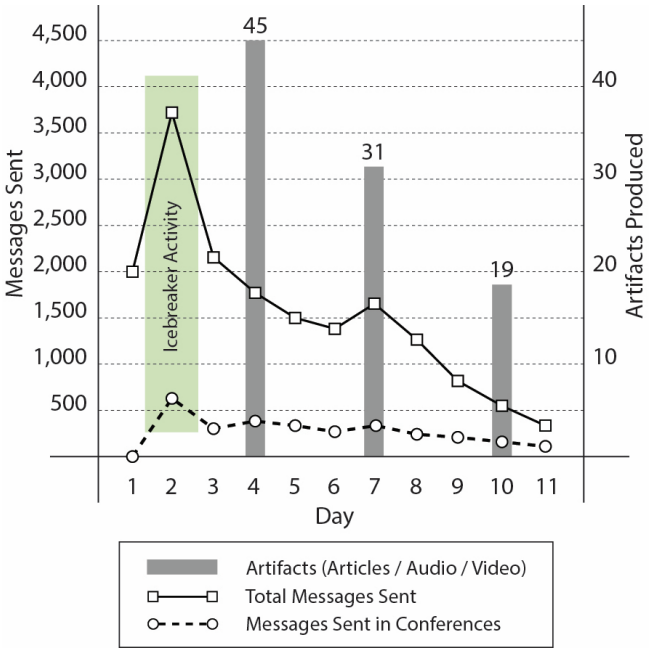

Figure 3: Player engagement as measured through production of messages and multimedia artifacts.

5 FINDINGS

WhatFutures ran from 9th to 19th June 2017, during which time 16,100 messages were sent and 95 digital multimedia artifacts were created. These highly crafted artifacts consisted of videos, audios and magazine articles about the challenges and opportunities for the IFRC in 2030, examples of which can be seen in figures 4 & 5. Figure 3 shows a breakdown of player engagement throughout, as measured by volume of messages sent per day and the production of multimedia artifacts in response to the game's three challenges. Messages sent was chosen as a primary metric of engagement (as opposed to word count) as it takes into consideration emoji, image, video and audio messages.

The chart shows a sharp spike of activity around and after the introductory 'icebreaker' day, and then a general steady depreciation with a small peak of activity around the deadline of second challenges, this is generally consistent with engagement patterns reported in previous large scale engagement projects e.g. [25]. The overall word count of messages sent was 131,109, which also peaked on the icebreaker day at 41,643 words sent, with a similar pattern of depreciation on following days.

Multimedia Data

Overall, 95 individual digital multimedia artifacts were produced in response to the game's challenges. Out of 100 teams

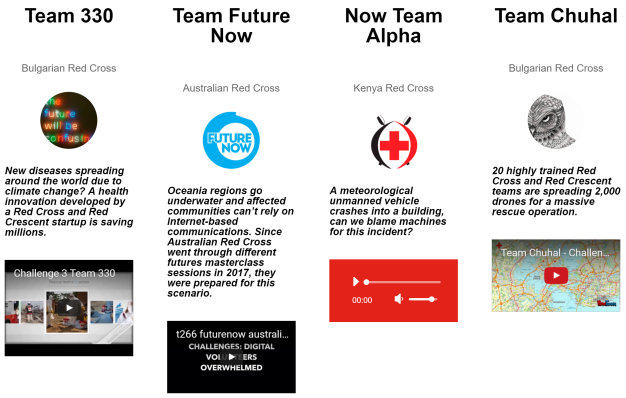

Figure 4: Examples of multimedia artifacts created by teams, taken from the IFRC Website. Including videos detailing innovations in disaster response, community resilience, rising sea levels as well as an audio report on an accident involving an autonomous vehicle.

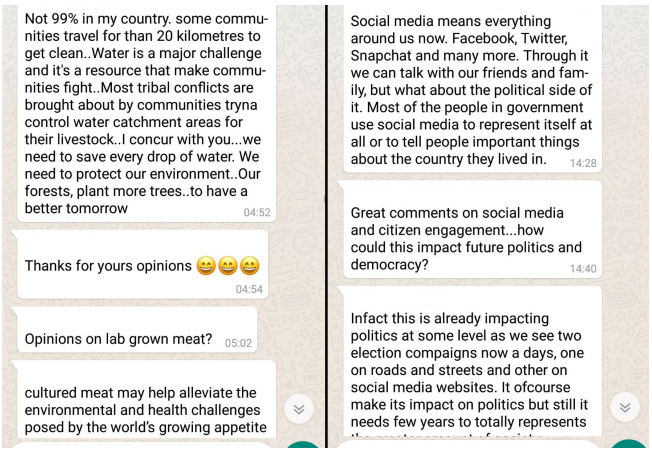

Figure 5: Sample messages from two conferences. On the left, environmental specialists discuss real tensions caused by water shortages and lab grown meat. On the right, political advisor specialists discuss the impact of social media on politics.

who took part in the game, 45 produced multimedia responses to the first challenge, 31 for the second and 19 for the third. We can approximate that this data was created by 45% of the player base for the first challenge, and 31% and 19% for the second and third challenges respectively. 14 of the teams who responded to the third challenge also responded to the first and second, indicating a subset of dedicated teams who produced responses to each challenge. In respect to origins 43 were from Bulgaria, 25 from Kenya, 12 Australia, 11 Finland and 4 from Hong Kong.

In order to assess the quality of this data, and therefore its usefulness to the IFRC, we employed a modified version of Biggs' Structure of Observed Learning Outcomes (SOLO) Taxonomy [8] to classify each artifact according to the sophistication and depth of its content. Although frameworks for data quality exist, these primarily rely on accuracy/truthfulness as a key measure for quality [33, 53], which is not an applicable factor for a data set that is largely concerned with future forecasting and foresight, and is therefore unverifiable at least at the time of publication. Biggs' SOLO taxonomy in contrast provides a rubric for measuring the quality of a piece of information according to the sophistication of its internal structure. We adapted the rubric to focus on evaluating the issue-focused nature of the game's three challenges, and constructed a rubric that consists of 5 levels indicating increasing quality of contained information:

- *Pre-structural.* The artifact does not respond to the challenge; is in the wrong format and/or provides irrelevant information.
- *Uni-structural.* The artifact focuses on an issue and provides some single information about it (e.g. a problem it causes)
- *Multi-structural.* The artifact focuses on a single issue and provides multiple distinct aspects to it, such as multiple associated problems, but these are treated distinctly, OR the artifact lists multiple issues in isolation.
- *Relational.* The artifact details an issue or issues as a coherent whole and placed in context with causes, effects and possible solutions.
- *Extended Abstract.* The artifact, as well as detailing a coherent issue, also places this issue within the context of wider abstract concepts, such as implications on governmental policy or the organisation and work of humanitarian institutions.

This adapted rubric was applied by two researchers to a sample of 10 artifacts to cross-compare classifications and ensure consistency. Once agreement in classification was established, the remaining 85 artifacts were then classified by a single researcher. A classification of multi-structural or above would indicate data with enough informational quality as to be useful for the IFRC's strategic considerations. See figure 6 for a breakdown of data quality by challenge.

Text Data

As well as multimedia artifacts, players of WhatFutures generated a large corpus of text data. 16,100 messages were sent during the game: 2,414 in conferences and 13,686 in teams (figure 3). A message can consist of anything from a single word utterance up to multiple paragraphs. In terms of engagement, each team on average produced 136.86 (SD=242.76)

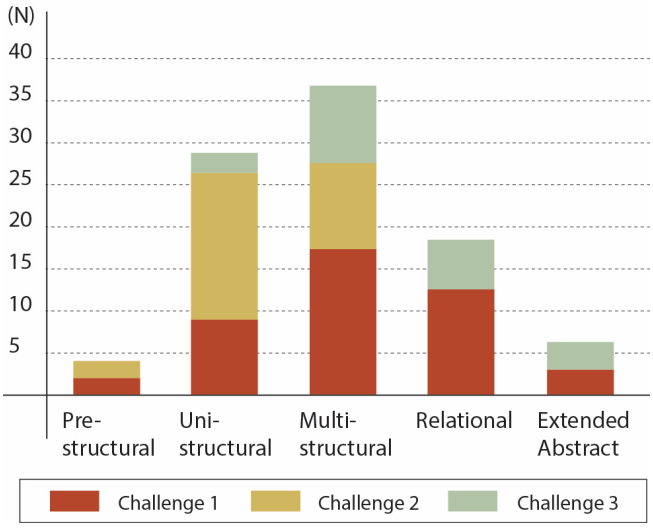

Figure 6: Overall data quality of multimedia artifacts for each challenge.

messages - a significant amount of text data. The 10 most productive teams (in terms of total messages sent) contributed 6606 messages (48.27% of all messages sent by teams) over the duration of the game. Although most teams sent over 75 messages, the 10 least productive sent only 138 (1.00% of total).

This data consisted of multiple text files exported directly from WhatsApp by Future Guides. We performed four stages of data processing. The first stage used Python to parse and combine the text data into standardized formats and annotate each message with the corresponding metadata of the messaging player's country and team affiliation. The second stage used Amazon Comprehend [6] to perform automated topic modelling on the standardized data, to identify the most prominent topics. In the third stage we categorized each of the identified topics. Broadly we found each topic model could be classified into four main categories, interpersonal (22%), consisting of greetings and friendly conversation; administrative (35%), consisting of team coordination and distribution of activity; substantive (39%), consisting of expressions of views and opinions directly related to 2030 and the challenges of the game; and unknown (4%), largely consisting of emoji data. These categories were created as broader conceptions of the classifications of communication employed in Soller's [51] and Celina's [11] investigations of communication patterns in collaborative learning systems. Finally, subsets consisting of all the messages from each country were also put through Amazon Comprehend to identify country specific topics. We then grouped these topics under broad themes and were able to further identify a subset of themes unique to each country. A sample of these substantive themes can be seen in table 2.

Post-Game Survey

A post-game survey was sent via email to all the players a few days after the game had ended, to assess how players had found their experience and to inform further iterations of WhatFutures. The survey also intended to assess the reasons why some players did not engage with the game, either in the teams or within the conferences. The survey had a two-part design, where respondents who self-reported as being engaged for at least half the duration of the game were asked questions around their experiences of the game, and where respondents who self-reported playing for less than half were asked questions about why they had not engaged. The survey was not intended to measure engagement, rather to funnel respondents to different questions depending on their self-reported engagement levels.

The survey had 101 respondents (68 female), which constitutes 20.7% of the total player base. Of these respondents, 72.8% reported playing for at least half of the game or more. When asked how seriously they took their contributions to the game and how accurately these reflected their genuine thoughts and feelings about the future, 87.7% of these respondents reported that their individual predictions about the future were *'serious'* or *'very serious'*, and 82.2% reported that their team's responses to the challenges were *'serious'* or *'very serious'*. *'...It was fun to be creative and forecast trends that would impact the world, and think about how we can respond/prepare...'* This suggests that those players who engaged with the game, did so in the spirit of accurately portraying their thoughts and opinions about the future (DG3).

With respect the individual structures of the game, this group reported positive reactions to the leaderboard broadcasts with 71.3% saying that it increased their motivation to play WhatFutures. Teams were also popular with 38.8% reporting scoring them the highest or second highest on the scale as *'enjoying a lot'*, or *'really enjoying'* being in a team. 58.9% reported somewhat enjoying participating in the discussions in the conference, suggesting that although conference activities in WhatFutures were enjoyed by the majority, 30 survey respondents did not enjoy them *'...It was very hard to keep up with the group chat and the essential details passed me by because there was so much talk in the main conference group'*.

Of the 27.2% of respondents who reported playing for less than half of the game, the main reason cited for their decreased engagement was belonging to an inactive team. *'There were around 3 nonfunctional team members in our team leading to only 2 people working on the tasks. There should be a way to evaluate and address this as it puts undue pressure on the active members. In our case, this spoiled the enjoyment,*

Table 2: Sample themes and country specific issues identified from topic modelling of text data

Country	Australia	Bulgaria	Finland	Hong Kong	Kenya
Key Themes	Climate Change, Waste	Climate Change, Waste	Refugees, Religion & Culture, Waste	Ageing Population, Climate Change	Water, Climate Change, Drones
Local Issues	Cultural Tensions, Bushfires	Religious Decline, Litter & Waste	Social Isolation, GM Foods	Housing Issues, Residential Care	Poor Governance, Direct Aid Education

engagement and motivation level of the active members in our team'. The next most reported reason was a perception of difficulty associated with the challenges. This difficulty was attributed mainly to the short three-day deadlines of the challenges, *'I would give more time for the challenges to be completed'* but also the nature of the activities with some respondents commenting that they felt too much like *'an assignment'*, and that it *'...felt more like a school group project or a competition than a game'*.

Post Deployment

Although the IFRC had attempted to engage digitally with their young volunteer populations before, WhatFutures was a meaningful improvement over previous projects. *"Rural volunteers in Kenya or in urban areas of Hong Kong can be extremely difficult to reach and to engage with from a global perspective, the game was highly successful at attracting a diverse audience directly and maintaining a substantive dialogue, an outcome that most other previous attempts have failed at. The numbers in this rollout are impressive, however the real outcome was the depth of engagement as evidenced through the types of conversations and sharing that went on in the groups and conferences. This ensures that the IFRC can now meaningfully incorporate a youth voice in S2030 deliberations and in particular a voice that is often excluded or marginalized, simply by tyranny of distance and communication options."* (Head of Innovation, IFRC)

The data generated has since been utilized by the IFRC to inform their Strategy 2030 process. Firstly, a selection of audio and video multimedia artifacts have been presented to decisions makers within the global organisation as part of an exhibition during the IFRC's annual general assembly in November 2017. The immediacy of video and audio has been reported as a key factor in its impact in this context, as well as unmistakably linking the artifacts to the young people whose faces and voices can be seen and heard unmediated within the artifacts. A large sample of the magazine article artifacts as well as a re-presentation of the key themes surfaced within the text data were combined into a 'newspaper from the future' and distributed to each delegate in the conference. At the time of writing it is impossible to say what effect these presentations have had in shaping Strategy 2030 as the process is incomplete.

Through the case study we have also identified an interesting side-effect of WhatFutures in an organizational context. The IFRC reported that the game had flattened the organizations communication hierarchies and facilitated networking between volunteers:

"For a volunteer from Kenya to be able to communicate with volunteers and global staff would normally require a multi layered pyramid of communication through the enormous structures of the IFRC. This game connected volunteers directly and facilitated dialogue. Throughout the game many of the players became Facebook friends or connected in other social media channels... it is clear for some at least this initiative has opened up new lines of communication with other volunteers." (Head of Innovation, IFRC)

This improvement of communication channels can be seen as a positive side-effect of WhatFutures and was echoed by player responses in the post-game survey.

6 DISCUSSION

We now discuss our results in respect to the initial design goals of the method and offer suggestions which we believe should bear consideration in the design of similar approaches.

DG1: Engagement

As a solution to the problem of engaging distributed populations, WhatFutures has been shown to be successful within the context of the IFRC, offering an effective method of direct and meaningful engagement with youth volunteers. Although the novelty of the approach may have accounted for some uplift in participation, we attribute this success primarily to the utilization of a popular existing communication service that was familiar to the intended player base. By using WhatsApp, WhatFutures overcame many of the hurdles associated with attempts to migrate users onto new and unfamiliar platforms. Participants were not required to download and install an unknown application, they did not need to be taught how to use new interfaces and they did not need to use or access any special equipment or software

that they did not already possess or were already comfortable with. This approach significantly lowered the barrier of participation by adapting to the existing technological ecosystem of its intended user base.

The steady decline in participation throughout the project is similar to curves reported in other work [25], suggesting that although WhatFutures may have been successful in reaching a wider audience than previous attempts, it did not manage to sustain this engagement throughout.

Belonging to an 'inactive team' was the most cited reason for dropping out of the game. For future deployments we recommend building in more time at the start of a game for players to introduce themselves, build rapport and become familiar with the game and Future Guides, or even to change teams if necessary. One suggestion would be the design of light-weight, team-building activities to further strengthen the social connection between players, thereby increasing overall engagement and reducing dropout rates.

DG2: Complexity

The high amount of complexity and sophistication found within the multimedia artifacts produced during WhatFutures, is a reliable indicator of participant's understanding of complex global issues. Furthermore, we can attribute this understanding of complex issues to the structures employed in WhatFutures, namely the positive influence of specialisms and conferences in directly equipping players with differing perspectives and by providing the mechanisms with which to gather further related and contextual information about issues from peers and experts within conferences. Of course, the pre-existing understanding of global issues by players, as well as their general education levels, will also affect the quality of produced data. However, we can say that the structure of WhatFutures itself communicates an expectation of multi-structural, relational or extended abstract responses, and indeed facilitates the meeting of these expectations.

However, one risk is the potential for dominant narratives to emerge, either through biased curation and creation of expert information that is put into the conferences, or through louder player voices within these conferences. Here the risk is that a dominant narrative may subvert, mask or in other ways damage the authenticity and originality of player generated data. Although analysis of the WhatFutures message data (table 2) shows that different topics and themes do emerge depending on a team's country, and to some extent dominant narratives outside the game (e.g. climate change) are unavoidable, care should be taken with specialisms and conferences to minimize their effect.

One approach could be to incentivize originality through game mechanisms, such as by rewarding teams who discuss an issue or perspective on an issue that few other teams have. Another could be to frame conference activity around sourcing of counter narratives, or through the expression of individual perspectives, rather than reinforcement of widely reported perspectives.

DG3: Data

We can see that the majority of the multimedia artifacts submitted in response to the game's challenges are multi-structural or above (figure 6), and therefore of high enough quality as to be useful to the IFRC. Additionally, the design of challenges within WhatFutures regulated data outputs so that they can be used immediately. For example, the IFRC selected some of the video responses from WhatFutures to be included directly in reports to decision makers within the organisation, without needing any additional processing or analysis. Similarly, news stories generated in the game, were incorporated almost immediately in an IFRC internal newspaper, thanks to their consistent formatting, style and tone.

In terms of the content of text data, our processing has brought to light numerous insights for the IFRC (table 2) to help inform strategic deliberations, and as such we can say that WhatFutures was successful in generating information rich text data. In its raw form however, this data is difficult to navigate and requires multiple stages of processing to allow metadata to be embedded, topics and concerns to be surfaced, and made navigable for stakeholders. This limitation is not unique to WhatFutures however and can be found in any data project that generates large amounts of qualitative text data.

As they directly reported instances of 'good play', the leaderboard broadcasts within WhatFutures can be seen as having set expectations for player productivity. The top 10 responses in each broadcast in WhatFutures were handpicked by the IFRC and tended to favor submissions of higher production quality and presentation standard, likely leading to a perception of a 'standard of quality' of good play. This is the likely cause of in an increase in the fidelity of team's responses after each leaderboard. Conversely, this may have discouraged contributions from teams who were unable or unwilling to create higher-fidelity multimedia responses. A possible way of taking advantage of this effect could be to involve players themselves in the production of broadcast material. In this way, key themes or topics may be further surfaced through an extra stage of participatory analysis of data, as players identify elements that they feel are significant.

7 CONCLUSION: TOWARDS UNPLATFORMED DESIGN

This work contributed a detailed description of a novel large-scale engagement method, WhatFutures, designed and delivered on WhatsApp. It details how WhatsApp can be appropriated and designed with, in order to engage large numbers of

geographically distributed participants in meaningful coordinated action. We have evidenced this through the additional contribution of a real-world deployment and corresponding analysis of WhatFutures, the outputs of which contributed to the strategic deliberations of the International Federation of Red Cross and Red Crescent Societies.

The third, and possibly most significant contribution, is a reconceptualising of existing communication platforms as material with which to design and coordinate collective action. Through designing with WhatsApp, we identified four dimensions *(morphology, role, externalization, process)*. These served as a pragmatic framework with which we structured the design of WhatFutures. However, revisiting these dimensions allows us to map a trajectory from designing with WhatsApp, to the wider design space for distributed engagements based on augmentations of mainstream social media systems. Our choices as to *morphology* (group structure, size, membership) sought to facilitate the rapid formation of small groups, and access to sources of knowledge (both expert and peer) that would support the teams time-bounded responses to challenges. Yet the full scope of morphology is obviously greater. Designers of alternative orchestrations may consider the implications of groups as subsets of other groups; alternative intersections between groups; dynamic group formation (opening and closing); fusing of groups; multiple memberships; sizes of groupings to name just a few alternatives. Each of these has inevitable implications on the quality, aspect and coherence of any designed activity.

WhatFutures used the notion of *role* (the specialisms and Future Guides) to respond to the challenges of understanding complexity and improving engagement. *Role* frames both how players relate to each other and their expectations of participation, and is a powerful tool for configuring the designer's intended qualities of participation. For example, dynamic role shifting; different levels of player agency in choosing roles; power imbalance between roles; roles as expressing different identities; and roles as matched (or not) to lived experience. Clearly, the design space is much larger than explored in WhatFutures. Likewise, alternative designs for *externalization*, might have considered a different curatorial and editorial process to the competitive leaderboards. For example, a collaborative project; a shifting narrative determined by participant choices; or news bulletins highlighting aspects of the engagement written by participants themselves.

Our approach examined the material qualities of WhatsApp - *morphology, role, externalization, process* - and used these qualities to design WhatFutures. Yet this approach of framing existing platforms as material, with material qualities, points to a significant space that HCI has yet to explore. Both in terms of charting and understanding these qualities, but also how they can be used to design new types of interactions and collective action. This approach we refer to as *unplatformed design*.

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