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# HCI Interventions for Science Communication

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**Abstract**

In this paper we describe the practices used by alternate reality game (ARG) designers to engage fans with the issues and effects of global climate change under the scientific guidance of key non-profit organizations. Our multiple case study is based on three projects: Future Coast (2014), the Disaster Resilience Journal (2014) and Techno Medicine Wheel (2007 – ongoing). Our analysis derives from each ARG designer's interview and observations of their game's narrative structure, postmortem. Findings provide HCI practitioners with a list of best practices related to the designer's use of narrative style and physical locations to support fan engagement. These practices emphasize the goals of non-profit organizations (NPO) through science communication utilizing popular media forms.

**Author Keywords**

Community, Politics, Social Change, Design, Intervention, Sustainability, Design Research

**ACM Classification Keywords**

H.5.3 Group and Organization Interfaces, Computer supported, cooperative work.

**Introduction**

Traditional methods of fundraising and mobilizing volunteers are becoming more challenging for non-

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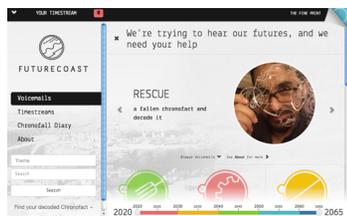
## Future Coast (FC)

*Future Coast (2014)* was an online storytelling project about possible climate-changed futures. Within the game's narrative, a series of "chronofacts" sent back in time from a potential future. Fans were invited to use their imagination and create voicemails "from the future."

Duration: Approx. 60-days, 2014  
Classification: Alternate Reality Game, Climate Fiction, Interactive Narrative, and Location Based Game

URL: [futurecoast.org](http://futurecoast.org)

NPO Affiliation: The PoLAR Partnership at Columbia University and The National Science Foundation, United States



Future Coast Screenshot © FutureCoast.org, 2014

profit organizations (NPO). As a result, some NPOs have employed alternate reality game (ARG) designers to produce, manage and disseminate public awareness campaigns.

ARGs invite fans to collaboratively discover and sometimes solve puzzles to reassemble the fragments of a story that has spilled out into their everyday lives [3]. Generally speaking, ARG design incorporates these primary tropes: Puppet master (orchestrator), Highly crafted narrative hooks (sometimes called plot points) and an Entry point [5]. Often players are engaged in collaboratively solving puzzles that reassemble story-fragments in a real-world context [3]. At times, fans may not know they are participating in a game [5]. Unique to "open-narrative" ARGs is the fan's ability to play a central role in shaping the outcome of a story as they collect, connect, and make sense of the plot [3]. In this case, fans respond to "What if?" scenarios, designed to spark imagination and further dialogue. Therefore, this century has seen a number of socially driven science communication projects move from static (public service announcements on print, TV, radio, etc.), to dynamic (interactive games and transmedia events), to virtuality [7].

For example, *World Without Oil* (2007) was an environmental awareness tool and location-based game experiment which asked people to respond to living in a world without oil. *Superstruct* (2008) was a massively multiplayer forecasting game created by the Institute for the Future. *Conspiracy for Good* (2010) invited fans to join a collective of thinkers, artists and musicians to fight against social and environmental injustice.

The research presented in this paper is part of a larger study, *Transcoding Place through Digital Media* which began in 2014 at Simon Fraser University [11]. This multiple case study investigates the design considerations used in three ARGs: Future Coast (FC), the Disaster Resilience Journal (DRJ) and Techno Medicine Wheel (TMW). Detailed descriptions of each are given in the sidebar margins. Given the limitations of this case study we report only on findings related to the designer's use of narrative style and physical locations that emphasize the goals of NPOs. Understanding the ways designers work with fan contributions and physical locations to shape an ARG may provide some guiding principles for HCI practitioners working on science communication initiatives with NPOs. This research may also assist researchers who intend to archive these new media artworks.

## Methods

The rationale for selecting a multiple case study was to investigate whether there were variations in the ARGs and if there were lessons to be learned from these design practices. Our analytic methods compared two data sets: 1) the designers' interviews and 2) the game's canonical trajectory [2], postmortem.

Case selections were based on the review of articles posted on the Alternate Reality Game Network<sup>1</sup>, Story Code<sup>2</sup> and The Institute for the Future<sup>3</sup>. The three

<sup>1</sup> The Alternate Reality Gaming Network (<http://www.argn.com>) is the largest and most complete news resource for players of online collaborative Alternate Reality Games.

<sup>2</sup> Story Code (<http://storycode.org>) is an open-source, global community for emerging and established cross-platform and immersive storytellers.

## The Disaster Resilience Journal (DRJ)

The Disaster Resilience Journal (2014) examined how individuals, communities, and countries around the world are building resilience to climate change, and social, economic, and cultural shifts. Over a series of forty-two days, the online Journal released a different short story or game activity daily. #myDRJ

Duration: Approx. 42-days, 2014  
Classification: Emergent or Alternate Reality Game, Interactive Documentary

URL: [disaster-resilience.com](http://disaster-resilience.com)

NPO Affiliation: The European Commission's Humanitarian aid and Civil Protection and The International Federation of Red Cross and Red Crescent Societies, Europe



Disaster Resilience Journal  
Screenshot © disaster-resilience.com, 2014

selected ARGs met these criteria: They were developed in partnership with a non-profit organization and designed to engage fans with issues or concerns associated to global climate change.

### Designer Interviews

Methods used to conduct the designer interviews are based on the *Everyday Design Studio's*<sup>4</sup> (EDS) studies exploring the practices of designers [6]. This approach was inspired by a framework developed by Elizabeth Shove, Mika Pantzar and Matt Watson to examine the dynamic aspects of social practice [12]. The EDS applied Shoves' framework to study hobbyist jewelers, and *Steampunk* enthusiasts in their appropriation of everyday things [6]. We leveraged this protocol and used aspects of the research design in this case study.

Designer interviewees are represented by a number (e.g., D#3) to maintain anonymity. D#1 was the lead designer for Future Coast (FC); D#2, D#3 and D#4 contributed to the design of the Disaster Resilience Journal (DRJ); and D#5 and D#6 are the lead designers for Techno Medicine Wheel (TMW).

Semi-structure interview questions were written so that we could first introduce the theme and then follow through with a question that would invite the designers to respond. This process allowed for a natural pause in the discussion so that interviewees could conceptually shift perspective from one topic to the next.

<sup>3</sup> The Institute of the Future (<http://www.iftf.org>) is a non-profit research center that specializes in long-term forecasting.

<sup>4</sup> The Everyday Design Studio (<http://eds.siat.sfu.ca>) is lead by Ron Wakkary at Simon Fraser University, Canada.

### Canonical Trajectory

Steve Benford and Gabriella Giannachi have defined canonical trajectory(s) as the expression of an "designer's intended mapping of story time onto clock time" as part of the plot and schedule of an mixed reality experience [1:p73].

To study how designers built canonical trajectories, we conducted an analysis of each ARG's online content (HTML pages, images, or documents) through a crawl report (Figure 1) and looked for design artefacts that were connected to the game. We discovered elements of the original game by investigating the internal and external hyperlinks, including connections to real-world game artefacts. This required a certain amount of forensic sleuthing resulting in many hours of searching, reviewing and identifying material related to each case. By applying this method, we were able to identify the scale of the website, the artistry built into the core of the design, clusters of content, and links to external social web resources, like YouTube, Tumblr or Twitter.

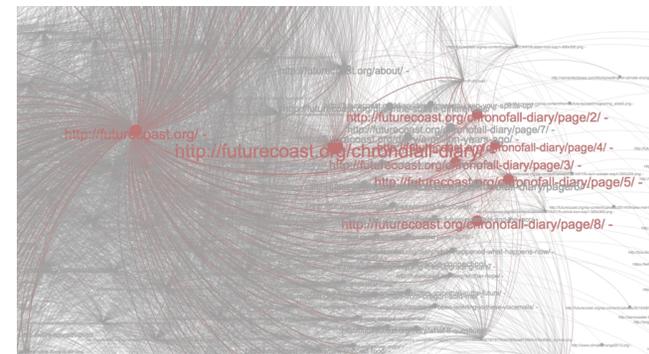


Figure 1. FC Crawl Report Detail, 2016

## Techno Medicine Wheel (TMW)

Techno Medicine Wheel (2007-ongoing) was inspired by the life-long practice of D#6 in British Columbia, Canada. Game teachings are based on the ancestral lands and waterways of the Skwxwu7mesh People, as well as the Tseil-Watuth and Whu-Muthqueam peoples, who have shared these spaces together since immemorial

Duration: 2007-ongoing  
Classification: Alternate Reality Game, Social Impact Game, Location Based Game, Educational and Interactive Story.

URL: [abtec.org/blog/?p=436](http://abtec.org/blog/?p=436)

NPO Affiliation: The Aboriginal Media Lab, The Chief Dan George Centre, Canada



Techno Medicine Wheel  
Screenshot © TMW, 2008

## Findings

Based on the cross case analysis, *realness* was interpreted as a designer strategy to increase knowledge transfer and encourage reciprocity within the context of a physical place. In interviews each ARG designer commented on the complexity of connecting story elements to physical locations, social networks and fan contributions. In fact, FC and DRJ designers suggested that working with fan contributions could be seen as a new and different way of prototyping collective problem solving.

When the game was in play, designers had to balance the narrative elements of the game with fans contributions. For some, the challenge was not in architecting the core narrative structure of the game; it was in maintaining or extending the scope and scalability of the game. Designers were also concerned with the popularity of their game. While the designers hoped to attract additional fans, they were also unsure how to manage the game on a larger scale or over a longer duration.

### Why use *place* to emphasize *realness*?

When talking about emphasizing *realness*, designers referred to the importance of *place* (physical location) as an anchor point to the narrative structure. For TMW, *realness* was expressed through face-to-face communication<sup>5</sup> about indigenous plants (Little People). TWM introduced fans to Coastal Salish traditions in the Vancouver region. As a result, the physical location of

<sup>5</sup> D#6 explained, "teachings are considered inherited or learned and gained only by being in or participating in a Coastal Salish community."

the plants was contextual (added meaning) to the game narrative. D#5 explained,

*"Making a connection to all living things is the objective. We also made offerings to Little People, understanding them not as myth but as real".*

Similarly, FC encouraged fans to seek and find a chornofacts. D#1 explained,

*"A chornofact could land in Eugene, Oregon and then there's a picture of a guy who says 'I found it' and there he is. The person posts it on the Internet and says, 'I found a voicemail from the future'".*

In the context of the DRJ, the designers used *realness* to reference to how communities, volunteers and staff at the International Federation of the Red Cross (IFRC) were enacting resilience in the onset of global climate change. D#2 stated,

*"There was quite a bit of input from the Red Cross in Europe. The EU is divided up into zones. They're called National Partners. Each actually had their own team that worked on the project in terms of supplying sources and material".*

All ARG designers used story elements to direct fans' attention to physical locations outside of the game. FC used *place* to lead fans beyond the online game narrative to find chornofacts (Figure 2). DRJ used *place* to introduce fans to real world problems like how the people living in the Chocó department of Colombia were dealing with flooding (Figure 3). TMW used *place* to encourage fans to 'be apart of' and take responsibility

for communicating indigenous plant knowledge (living physical resource) in Vancouver, BC, Canada.

**Why use narrative style to emphasize *realness*?**

To support the use of *place*, ARG designers used different narrative styles to signify game transversals (narrative hooks) from participating, contributing and finding a physical locations. For example, FC invited fans to: find a chornofact in a physical location; listen to the associated voicemail; and record their own voicemail. D#1 also talked about the archived voicemails influencing the design of an exhibition.

DRJ was produced by a team whose goal was to connect people utilizing multiple platforms (i.e., online, mobile apps, social media, television, film, and print). DRJ designers used a biographical approach to inform fans of the effects of global climate change. As each story was released, the fan's role ramped up from passive engagement (watching a person's testimony); to lightweight contributions (twitter or Facebook comments); to engaged and informed real world encounters. For example, on Day 32, of the DRJ designer's presented a report from Patrick Meier (Figure 4). In the report, Meier shared his thoughts on the value of social media and disaster resilience. From the perspective of D#2, open ARGs are successful when you've increased access and have in some way influenced the fans perspective. In reference to DRJ, D#2 claimed,

*"It is very much about the outside looking in, or western culture looking in on non-western cultures to learn about the effects of climate change".*



Figure 2. Screenshot of found chronofact © FurtureCoast.org, 2014

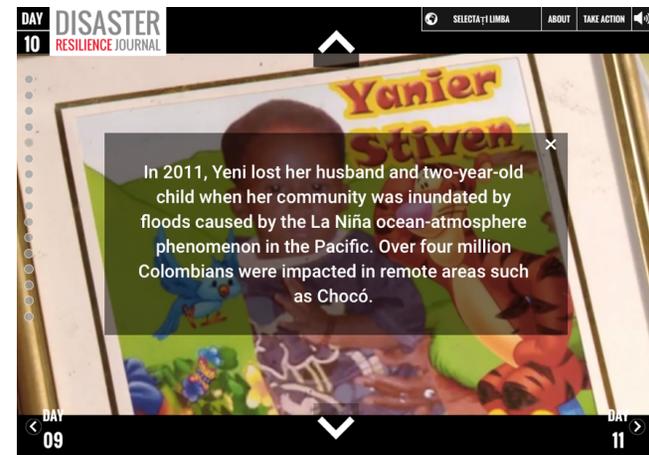


Figure 3. Day 10 Screenshot, Disaster Resilience Journal.com © 2014

In the future, D#2 intends to design a second phase of the journal, where the focus is on the views of the people currently affected by climate change.

Similarly, TMW used face-to-face teachings as a way to present *indigenous plant knowledge* and guide fans towards a healthier future.

In contrast, TMW 's narrative structure was auto-biographical. D#6's book influenced the design of *TMW* (2007) and next generation of the online events that followed. For the TMW designers, the teachings were meant to encourage fans to embrace the interconnectedness of media and plant technology, particularly in relation to traditional values and ethnobotany. D#6 explained,

*"The willow tree as an example of nature transformed through technology to become a natural human pain reliever (i.e., aspirin)."*

TMW designers interpreted *realness* as their fans' willingness to learn about indigenous plants and to reciprocate and share this knowledge with other people. D#5 explained,

*"We wanted to reach people and have the ability to genuinely connect people with knowledge about medicinal plants".*

Unlike the short duration of FC and DRJ, TMW designers continue to use social media sites like Facebook to invite fans to take part in interactive medicine walks. Here, almost 10 years after the launch, TMW D#6 are producing online webinars and games that address indigenous values and ethnobotany.

In summary, all designers demonstrated various strategies for creating transversals in and out of an game narrative, while maintaining a focus on the NPO's



Figure 4. Day 32 Screenshot, Disaster Resilience Journal.com © 2014

awareness campaign. FC invited fans to record fictional stories on climate futures. DRJ designers used games, instructional videos and autobiographical storytelling to report on the effects of global climate change. TMW designers also used autobiographical approach to communicate indigenous plant knowledge specific to a region. Rather than focus specifically on global climate change, TMW designers presented indigenous solutions for living consciously in connection with the environment. Whether regional or global, all ARG designers aim was to facilitate a more direct line of communication between people and the effects of global climate change.

## Discussion

Our cross case analysis provides HCI practitioners with strategies for emphasizing place through narrative style to promote a sense of realness through the game design. All ARG designers interviewed discussed the benefits of working with non-profit organizations and

their public awareness campaigns. FC was produced in collaboration with Columbia University's Polar Learning and Responding (PoLAR) Climate Change Education Program<sup>6</sup>. DRJ was produced in collaboration with the International Federation Red Cross (IFRC) Society<sup>7</sup>. TMW was produced in collaboration with the Aboriginal Media Lab in Cyber Space (AbTeC)<sup>8</sup>. Within the field of HCI, the contributions discussed here advance our understanding of the designer as 'orchestrator' beyond the performance frame presented by [2] in conjunction with mixed reality experiences. Building on the original concept, this study presents evidence that ARG designers are working with NPOs and have become 'orchestrators' of public online awareness campaigns. These orchestrators manage the distribution of the NPO's main message and mechanisms which collect and store fan contributions. Understanding how ARG designers orchestrate the flow of information can help other HCI practitioners deliver emergency preparedness information using multi-modal delivery systems.

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<sup>6</sup> The Columbia Climate Center (CCC) was launched in 2009 by the Earth Institute at Columbia University with the goal of meeting the climate challenge by building upon the many climate-related activities and research efforts conducted throughout the university. <http://climate.columbia.edu/about-us/>

<sup>7</sup> The International Federation of Red Cross and Red Crescent Societies is the world's largest humanitarian organization, providing assistance without discrimination as to nationality, race, religious beliefs, class or political opinions. (<http://www.ifrc.org>).

<sup>8</sup> AbTeC is a network of academics, artists and technologists whose goal is to define and share conceptual and practical tools that will allow us to create new, Aboriginally-determined territories within the web-pages, online games, and virtual environments that we call cyberspace. (<http://www.abtec.org>).

One of the factors that may change the flow of emergency preparedness information is the Federal Communications Commission (FCC) proposal to dismantle the net neutrality rules it adopted in early 2015 [8]. Without these rules, internet service providers could be free to block people from viewing particular sites, throttle the speeds of video streaming services, or charge you extra to view particular content [4]. The end of net neutrality could make it much harder for NPOs to reach people online and prepare them for the effects of global climate change.

Regardless of these concerns, we think it is important for HCI practitioners to understand their roles from new perspectives. Grassroots communities face unique challenges, risks and constraints, which shape designs and the appropriations of interactive systems [10].

As demonstrated in our findings, the ARG designers studied have the ability to hone and orchestrate multi-modal paths for fans to navigate through complex interactions within and outside of the game narrative.

## **Conclusion/Future Implications**

In this multiple case study, we have discussed findings related to Future Coast (FC), Disaster Resilience Journal (DRJ), and Techno Medicine Wheel (TMW). The final analysis presents a set of HCI design considerations that can be used to more effectively build awareness campaigns, they are:

- Emphasize *place* – build short explorations to physical locations and include a mechanism for fans to report on what they find. FC managed their own website that stored and archived voicemails from

## Fukushima Audio Census

This interactive artwork is comprised of two separate subsystems: The Field Encoding System, used to digitize live sounds from within the forests, and the Streaming/Archiving System to conduct live sound delivery via the Internet and to archive sound data in the form of archived files.



Fukushima Audio Census Exhibit, CHI ART Program, 2017, Denver, Colorado, USA

fans. DRJ used social media networks to store and archive fan responses.

- Emphasize the *realness* of a situation or place – work with people to produce autobiographical media or face-to-face experiences that can inform others. Working with the IFRC, DRJ used technology to mediate how people around the world were practicing resilience.
- Support *reciprocity* – create mediated and/or physical face-to-face interactions that provide first-hand accounts of that *place*. TMW encourages fans to ‘be a part of’ and take responsibility for sharing indigenous plant knowledge (a living physical resource). DRJ introduced researchers in the field like Patrick Meier who testified on the benefits of social networks.

As HCI practitioners, we have applied the design considerations presented in this paper to a temporary exhibition called Fukushima Audio Census<sup>9</sup>. In the 2017 CHI Art Program, we orchestrated a multi-modal experience that invited conference attendees to listen to live audio from microphones placed 10 kilometers from the Daiichi Nuclear power plant in Japan [9]. Participants also met with scientist Dr. Hill Kobayashi face-to-face to learn more about the audio system and Fukushima exclusion zone, in general.

In future work we intend to build more visually persuasive displays and multi-modal systems to extend our work to a broader audience base.

<sup>9</sup> Fukushima Audio Census (2017) was a temporary exhibition asking CHI conference attendees to become community researchers in the identification animal sounds from the exclusions zone (Figure 5). Visit [fukushimaaudiocensus.org](http://fukushimaaudiocensus.org)

The potential value and validity of findings derived from this cross-case analysis have been extended through their application in an additional setting. The role of the designer is discussed in the context of an *orchestrator*. A designer’s tools – place, realness and reciprocity – have been incorporated into an ARG narrative style, advancing the goals of partner NPO, introducing a contemporary approach to science communication.

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