Designing Reusable Alternate Reality Games

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ABSTRACT

Successful Alternate Reality Games (ARGs), such as *The Lost Experience*, *I Love Bees* and *Urgent EVOKE* have solicited thousands of active participants and, often, millions of spectators from around the world. ARGs require significant resources not only in terms of initial design, but also in implementation, since live, dynamic interplay between players and designers is an inherent aspect of their interactive storylines. This paper outlines a novel design framework for creating reusable ARGs, that will help extend the lifespan of ARGs and allow them to permeate new domains such as education. The framework includes three key reusable design objectives (replayability, adaptability, extensibility), each of which can be enacted at different levels of depth. The paper also identifies barriers to reusable ARGs and design patterns for overcoming those barriers, drawing upon ARG designer interviews and games.

Author Keywords

Alternate Reality Games, serious games, design, replayable, extensible, adaptable, reusable.

ACM Classification Keywords

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General Terms

Design; Human Factors.

INTRODUCTION

Alternate Reality Games (ARGs) are an emerging genre of large-scale, transmedia storytelling experiences [15, 18]. ARGs are "immersive, interactive experiences where players collaboratively hunt for clues, make sense of disparate information, contribute content, and solve puzzles to advance a narrative that is woven into the fabric of the real world" [9]. Successful Alternate Reality Games (ARGs), such as *The Lost Experience*, *I Love Bees* and *Urgent EVOKE* have solicited thousands of active participants and, often, millions of spectators from around the world. They have created highly engaging and interactive experiences in a range of domains including entertainment [15], marketing [18], education [4, 8, 16, 21], and societal problem solving [20]. As new technologies for supporting mixed reality experiences, such as augmented reality and location-aware devices, begin to proliferate, the future of ARGs looks promising.

Most ARGs are designed as one-time experiences. While this lends an authenticity and novelty to the hunting and problem-solving elements of an ARG, it limits the number of potential players and reduces the return on investment of time and resources. This is particularly true of educational ARGs, which could ideally be tailored by educators to meet the unique needs of their students and classroom setting (e.g., length of class). If ARGs are to reach their potential, novel design approaches must be developed that support the unique properties of ARGs, while also recognizing the need to make their content reusable.

To some extent, reusable ARGs seem like an oxymoron. How can a genre that prides itself on the improvisational interplay between game designers and players be replayed? How can those replaying ARGs, which require online research and participation in online communities, shield themselves from the puzzle solutions and story spoilers that are scattered across the web? How can ARGs that rely upon geography be authentically ported to other locations? Is it possible to individually experience ARGs when their very nature requires collective problem solving and experiences? Can an ARG be "repackaged" or even archived in the first place, given that it plays out in such a multitude of media platforms? These and related questions highlight the challenge of designing authentic, reusable ARGs. Though a handful of ARGs have identified these challenges (see Background section), no one has yet provided generalizable principles or concepts to aid ARG designers attempting to create sustainable ARGs.

The purpose of this paper is to provide a framework for designing reusable ARGs: ones that can be replayed, adapted to new environments, and/or extended for new audiences. After introducing the framework, we identify barriers to creating reusable ARGs and then provide specific design patterns for overcoming the barriers using our framework as a backdrop. These design patterns draw upon expert interviews and a review of existing ARGs that have some reusable component.

BACKGROUND

As noted earlier, ARGs are a genre of transmedia storytelling [15] or transmedia fiction [12], because their core mechanic is to engage players in scavenger-hunt-like missions to uncover, collectively interpret, and reassemble

HCIL TECH REPORT (2012)
http://www.cs.umd.edu/hcil/pubs/tech-reports.shtml

the fragments of a story that is distributed across multiple media, platforms, and locations. ARGs are also characterized as "games of progression," because they feature a series of interactive challenges (e.g., puzzles) that players must overcome, like decoding a cryptogram, as they work through the storyline [17, 22]. In contrast, "games of emergence," such as Chess and Pong, feature a relatively small set of rules that can result in a high variety of play possibilities. Although games of progression, including ARGs, can engage players for countless hours over days or weeks, once the story is completed, there is little motivation to repeat it [22]. Game designer Jordan Weisman has compared ARG game-play to a "rock concert… a temporal event, a gathering of energies all in one place for a short period of time. And afterwards, it's a bit like hearing the album from the concert. It doesn't ever have the vitality and the life of one that unfolds in real time" [10].

However, finding ways to craft interactive story worlds that can be experienced in multiple ways, over multiple play sessions, is not new. Videogames like *Civilization (I-V)* provide players with rich virtual worlds to explore and enlist them in numerous empire-building strategies [26, 27]. Similarly, multiplayer games, such as the Massively Multiplayer Online Role-Playing game (MMORPG), *World of Warcraft®* (*WoW*), offer rich story worlds with multiple levels of play and diverse character roles to broaden replay possibilities [28]. In addition to *WoW*, digital games like Disney's *Epic Mickey*, Nintendo's *Legend of Zelda*, and Bioware/LucasArts' Star Wars-based *Knights of the Old Republic*, represent "replayable progression" hybrids [22] that combine compelling stories with elements of emergence, such as different story paths that arise from multiple player choices, or different character roles that open up new player perspectives on the story. Text-based antecedents to these interactive story worlds are the *Choose Your Own Adventure Series*, which are both read and played at the same time [19].

Literary examples for reusability include book series such as the *Sherlock Holmes, Hardy Boys*, or *Nancy Drew* mysteries or *James Bond* and *Alex Rider* spy novels. These series feature multiple episodic extensions, with the same cast of protagonists encountering a diverse array of adversaries and adventures. In many cases, multiple authors, different from the initial creator and often, fans of the original tales, assume the responsibility for expanding the series' canon. Consider fan productions such as *Harry Potter-Fan-Fiction* (harrypotterfanfiction.com), a popular archive featuring over 74,000 original story extensions of the Harry Potter universe; or the burgeoning genre of Star Wars fan-film spin-offs that prompted *Lucasfilm* to establish an annual competition, the *Official Star Wars Fan Film Awards* [15]. Just as fan-fiction extends the story worlds of popular literary works, devoted player communities develop game guides and walkthroughs that can expose the narrative play experience to more casual audiences. For example, the players of *Metacortechs/Project MU*, an ARG based in the Matrix universe, created both a printed book and an online narrative, complete with hyperlinks to all the ARG resources such as in-game sites, emails, puzzles, and hacker chats [30]. While these player productions are indirect imitations of live game play, they represent another avenue for larger audiences to enjoy the experience, even long after the original game is no longer available [11].

To date, very little research in ARG design has addressed issues of reusability [9, 21]. Most work on ARGs and ARG design—whether in academia or industry—has focused on the development and distribution of story elements and interactive challenges [4, 16, 19, 23, 24, 29]; player participation [11, 14, 20]; or the challenges inherent in the preservation of distributed narratives [25]. Indeed, the most prominent ARGs are not designed to be repeatable because their primary goal is to generate heightened interest in a one-time event, such as the release of a new album (*Year Zero*), game (*I Love Bees*), or movie (*The Beast*), or the start of a new season of a television show (*The Lost Experience*).

A handful of ARGs have dealt with repeatability either explicitly, during initial design (*ARGOSI*, *AGOG*, *Urgent EVOKE*), or implicitly, based on player feedback (*World Without Oil/WWO*). *ARGOSI* was developed for a university system with the goal of launching the game anew each year for incoming freshmen [31]. Consequently, the *ARGOSI* design team openly published all their design documents online for use by other university systems with similar goals. *ARGOSI's* design documents included specific guides for narrative design, information-literacy-based challenge design, and marketing design, and a collection post-game lessons learned write-ups [3]. Similarly, as one of the sponsors for *EVOKE*, the World Bank was interested in developing a game frame that would motivate participation over multiple "seasons" of play, with each season recruiting new participants focusing on emerging opportunities for global social innovation [20]. The final mission for *EVOKE Season 1* was for players to crowd-source options for follow-on seasons [1]. The *Arcane Gallery of Gadgetry (AGOG)* was designed so that it could be replayable by different middle-school classes, as well as extensible into future seasons [8]. In contrast to these explicit plans for repeatability, WWO developed a replayable version that was driven by player feedback after the game had ended. In general, player feedback for WWO was very positive, and included several educators who requested that complementary teacher resources be developed so that the game could be replayed in classrooms [K. Eklund, personal communication, Oct 12, 2010].

Although the developers of ARGs like *ARGOSI, AGOG, EVOKE,* and *WWO* addressed a few isolated reusability issues, no comprehensive framework currently exists to design or analyze ARGs for reusability. Furthermore, specific strategies for creating reusable ARGs have not

been documented. The aim of this paper is to lay a theoretical framework for reusable ARGs, as well as identify *design patterns* for creating reusable ARGs. Design patterns, as originally described by [2], and as used in software engineering [13], are descriptions of a common problem and an abstract solution to that problem. As applied to game design, design patterns need not solve a problem, though they do describe "commonly reoccurring parts of the design of a game that concern gameplay" [6]. In addition, design patterns often describe the implications of applying the specified solution or reoccurring parts of a game design. In this article, we focus on design patterns that relate to the reusability of ARGs.

METHODS

To develop the reusability framework and design patterns we conducted interviews with expert ARG designers and a systematic review of ARGs that had some reusability component to them. We also drew upon our own experience in designing _____, which included numerous group sessions focused on reusability that occurred before, during, and after the ARG was run.

Expert Interviews

We conducted a total of 15 interviews with expert ARG designers and researchers. Topics included: definitions of ARGs and related concepts (e.g., transmedia fiction), the ARG design process, the educational potential of ARGs, design challenges of ARGs, unique opportunities of ARGs. Many of these interviews touched upon the issue of ARG reusability, either as something that needs to be considered, or as something the interviewee had thought about and worked towards. For this paper, we analyzed transcripts from the interviews to identify quotes, examples, and insights related to ARG reusability. While these interviews helped shape our theoretical framework, they did not lead directly to it, as they were not sufficiently comprehensive. However, quotes and examples from the interviews were mapped to the theoretical framework categories and used to derive design patterns. When needed, the framework and design patterns were modified to assure that they accurately represented the experience of the expert designers. Thus, the interviews helped motivate, inform, update, and validate the ARG reusability framework and design patterns.

Review of ARGs

We conducted a systematic review of prior ARGs to identify ones that were designed to be reusable (e.g., *ARGOSI, AGOG, EVOKE*), became reusable after-the-fact (e.g., *WWO*), or had some core game element or content that was reused (e.g., *Ghosts of a Chance/GoAC*). We identified ARGs from several sources including:

- ARGs mentioned by our expert interviews
- Keyword searches on Google Scholar and Google using the search phrases ["alternate reality game"], ["alternate reality game" "case study"], [best OR top "alternate reality games"]
- Those mentioned in sources that list ARGs including the International Game Development Association ARG SIG White Paper [19], an ARG literature review [9], Wikipedia's "List of alternate reality games" page, and the ARGnet, and Unfiction forums dedicated to ARG news.

ARGs that were written about more extensively and were more widely played took precedence, since more details about their gameplay and content were available. Once reusable ARGs were identified, they were reviewed to identify design patterns that related to the theoretical framework outlined in the following section.

DESIGN FRAMEWORK FOR REUSABLE ARGS

There are many ways that content or game play from an ARG may be reused. A single player may replay a game. Two independent groups may play an ARG without ever knowing about the other group. Content from an ARG may be organized into a stand-alone narrative that can be enjoyed without the live gameplay elements. The nuanced differences between these examples suggest that a common language is needed to understand the various ways of reusing ARGs, as well as the factors that make reusability complicated. In the following sub-sections we define design objectives of reusable ARGs, characterize the level of reusability, and identify factors that influence the reusability of ARGs.

The proposed design framework for reusable ARGs identifies 3 core design objectives related to reusability, as shown in Figure 1. Each is defined and discussed below.

A game is **replayable** if the game can be played multiple times. A game may be replayable from the perspective of the player or the producer.

Games that are replayable from a player perspective are designed so that a single person or group could replay the game many times and still enjoy it. Examples of replayable games of this type include Chess, MarioKart, Mafia, the *Elder Scrolls* series, and most sports. Narrative examples include *Choose Your Own Adventure* books and favorite stories. The core design challenge for creating this type of replayable ARG is making the experience meaningful and enjoyable for those playing the game multiple times.

In contrast, games that are replayable from a producer perspective are designed so they can be launched many times without one group of players infringing on another player group's experience. A single person (or group) may or may not enjoy playing these games multiple times. Examples of this type of game include *Legend of Zelda* and *How to Host a Murder*. Narrative examples include most any book or movie, since people can enjoy the same book or movie independent of one another – assuming nobody gives away too much (e.g., posts "Dumbledore is Dead" on a billboard). The key design challenge of these types of replayable games is minimizing spoiler alerts, keep

gameplay "local," or create an experience that renders spoilers inconsequential.

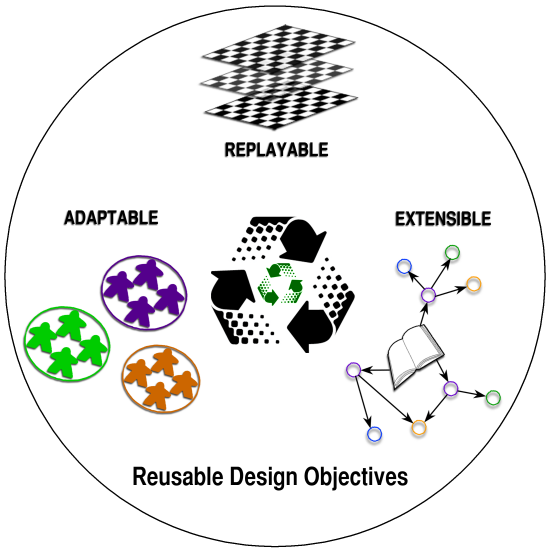

Figure 1: Design objectives for Reusable ARG

A game is **adaptable** if the game can be reasonably modified to better meet the specific needs of a particular player, group of players, or context (e.g., location, time). Adaptable games include *Uno* with various "house rules" and *Tag* with its many versions tailored for youth versus toddlers. Narrative examples include classic, cross-cultural stories whose narrative arcs remain constant, while the specific narratives are adapted to different cultures and audiences (e.g., *Red Riding Hood*). The key design challenge of creating adaptable ARGs is making them so they can be easily customizable to the needs of various potential players and contexts.

A game is **extensible** if it can be legitimately added to in a way that retains the authenticity of the original game, while extending it to do something else. Such games are not entirely reusable, but some aspects of them (e.g., characters, mythology, content, gameplay elements) are reusable. Game examples include many MMORPGs such as *WoW*; *Minecraft*, which allows player-developers to add their own modules to the existing game engine; and other games that allow players to add content to the game world. Narrative examples include fan fiction, comic books, and series like *Star Wars*. The core design challenge for creating extensible ARGs is updating and staying true to the canon and assuring that extensions are authentic and high quality.

These three design objectives for creating reusable ARGs are not mutually exclusive. A single ARG may theoretically be replayable, adaptable, and extensible, though these interrelated design objectives interact in complex ways. For example, an ARG designed to be adaptable will also be replayable, at least from a producer perspective. The converse is not necessarily true, as replayable ARGs may be too tightly scripted to allow for adaptation. Meanwhile, ARGs designed for adaptability and replayability may have players starting the game at different times, making potential conflicts related to extensibility more likely. Despite the inter-related nature of the three design objectives, we discuss design patterns for each of them separately in the following section for parsimony.

Depth of Reusability

ARGs can be replayable to different extents. An ARG that is reusable at a superficial level may simply allow a passive reader to consume an already completed ARG in the form of a book or video walk-through, perhaps solving a few optional puzzles along the way. In contrast, an ARG that is reusable at a deep level may allow an entirely new player community to replay the ARG from start to finish without any help from previous player communities. Other ARGs may allow some aspects to be reused at a superficial level, while other aspects are reused at a deep level. Table 1 describes what shallow and deep reusability means for the three different design objectives. Though extreme examples are shown, it is important to remember that different aspects of an ARG may be replayed at different levels of depth.

Design Objective	Reusability Depth Examples
Replayable	**Shallow:** re-users passively consume content created during the original ARG
	Deep: re-users completely replay ARG without any input from the original ARG
Adaptable	**Shallow:** re-users passively consume content from original ARG that has been hand-picked and adapted for them
	Deep: re-users completely replay adapted version of an ARG without any input from the original ARG
Extensible	**Shallow:** re-users passively consume a narrative that is loosely connected to a summary of the original ARG
	Deep: re-users play an extension of an ARG that reinterprets and reengages with the original narrative and gameplay

Table 1: Depth of Reusability

BARRIERS TO CREATING REUSABLE ARGS

Creating reusable ARGs requires tradeoffs that may or may not be worth making, depending upon the goals of the ARG. In many cases, these tradeoffs go against some of the most established tropes of ARG design such as their fleeting feeling of liveness or the sense of initial discovery. Understanding the barriers to creating reusable ARGs helps designers know when they can be avoided and suggests alternate designs that can be employed to work around them (such as the reusable ARG design patterns discussed in the following section). Table 2 outlines some of the key factors that should be considered when designing reusable ARGs along with example barriers to reusability for each one.

Factor	Example Barrier to Reusability
Size of player community	Large player communities tend to leave public conversations and spoilers scattered across the web, which discourages replayability and adaptability by removing the excitement associated with initial discoveries
Player characteristics	Having significantly different target audiences (e.g., elementary schoolers and undergraduates) discourages adaptability.
Narrative structure	Highly time-contingent and/or one-time events (e.g., live events with actors or story elements that must occur on a given day) discourage replayability and adaptability
Game mechanics	Resources (e.g., in-game websites and puzzles) that change throughout the course of the game discourage replayability and adaptability by failing to support players who are not synched with each other.
Location	Highly location-dependent events discourage replayability in other locations by different audiences
Run-time	Extremely long ARGs discourage replayability and adaptability
Media types used	Platform-specific development (e.g., an iPad-only application) discourages replayability and adaptability by people without the technology, as well as extensibility because the platform-specific scope might inhibit future development.
Intellectual property	Rigid intellectual property restrictions discourage extensibility and adaptability due to legal concerns

Table 2. Factors Influencing ARG Reusability

REUSABLE ARG DESIGN PATTERNS

With an understanding of the barriers to designing replayable, adaptable, and extensible ARGs as a backdrop, we now identify design patterns that help make ARGs reusable while remaining true to ARG design priniciples. Each design pattern is given a name, description, and examples from specific ARGs in Table 3. This is not meant to be a comprehensive list. Instead, those listed are meant to provide design inspiration, as well as promote the additional creation of reusable ARG design patterns. Note that just because a design pattern is tied to a particular design objective, doesn't mean it can't also apply to a different design objective. For example, the *Secret player community* pattern is listed under adaptability, but would also work well under replayability. However, we discuss those listed in each category separately below.

Replayability

Challenges of Making Games Replayable

- Many people lose interest in a narrative once they know the ending (i.e., some people don't like watching movies or reading books multiple times or if the ending has been spoiled).
- An ARG may require a critical mass of players to collaboratively work through the ARG together. Synchronizing new players into sufficiently sized cohorts that begin together is challenging.
- The narrative cannot rely on time-based elements or references (e.g., June 6, 2012) since those replaying later could not access those elements. Similarly, location-based elements (e.g., Washington monument) may be inaccessible to re-players in different locations.

Design Patterns for Replayability

The *Cyclical, event-driven play* design pattern ties the game to a recurring event. This pattern works well for making games replayable from the producer's perspective, but not from the player's perspective. An example of this approach was *ARGOSI*, which was created to help new university students who were attending an orientation learn about the University library/information resources [31]. This pattern assumes that those who have played before don't spoil any discoveries inadvertently (by posting the answers to puzzles on a public site) or purposefully. It solves the problem of having a critical mass of players by synchronizing them around an event. Nicola Whitton, a designer of ARGOSI referred to their approach as a "pedagogic model" that was designed to make the game sustainable by relying on "reuse, sharing, [and] open resources" which were "absolutely key to the model when we started developing it" (N. Whitton, personal interview, Jan 18, 2011).

Though not all agree that the Fourth Wall Studio '*RIDES'* should be classified as ARGs, their use of transmedia, puzzle-solving elements, and This is Not a Game mentality are consistent with ARGs. These use the *pre-scripted, transmedia touches* pattern, which allows individuals to experience the same interactive story as others are experiencing. Sean Stewart (*The Beast*, *I Love Bees*, *Year Zero*) compared RIDES to an "album" as opposed to more elaborate, live ARGs, which were compared to a "concert" that people may miss. The goal of RIDES was to create a "product that is not ephemereal in time" and could be a "replayable, single player cross-platform" experience (S. Steward, personal interview, Dec 17, 2010). If built with enough depth, they may be more enjoyable the 2nd or 3rd time, as is true of some books and movies. They are also excellent experiences to share with a friend or family member compared to high involvement ARGs.

Design Pattern	Description	Example Implementation
Replayable		
Cyclical, event-driven play	Game is tied to a recurring event attended by a new batch of players.	*ARGOSI* – Created to help new university students attending orientation learn about University resources.
Ongoing exhibit	A short, ongoing exhibit (e.g., museum exhibit) is created for visitors who have a chance to interact with the ARG narrative and gameplay elements.	*Ghosts of a Chance* exhibit in American Art Museum that uses text messaging and puzzles tied to the overall GoAC narrative.
Pre-scripted, transmedia touches	Brief, pre-scripted narratives that use several media channels (phone, email, text messaging) to draw individual player into the experience.	Fourth Wall Studio 'RIDES' projects that function as short transmedia trailors including *UNNexclusive.com*, *Eagle Eye: Freefall*, and *HOME: A Ghost Story*.
Multiple story paths	Allow for different story paths that players or player communities can choose (like a choose your own adventure book).	• *39 Clues* online interactive experiences let players choose which pre-scripted response to provide. • Disney's *Kingdom Keepers* lets players' vote determine what the main character does next.
Adaptable		
Secret player community	Player groups must solve puzzles and receive narrative updates via a secret community portal, thus keeping all content "local" to that group of players and potentially adaptable to their unique needs.	*AGOG* – Players become part of the Junto secret society chapter, which gives them access to a private online community portal. Other players could replay the game via a different Junto chapter that was adapted to the players unique needs.
Open-ended, participatory "pre-enactment"	Players collectively contribute their own content to an open-ended narrative focused on the pre-enactment of a future scenario related to a core question or theme. Later players (e.g., educators and students) can use existing user-generated content and adapt the narrative details to their needs.	• *WWO* – Driving question/theme: "What would you do in a global oil crisis?" with changing scenario updates presented to players each day • *SUPERSTRUCT* – Players are asked to develop solutions for avoiding various "end-of-world" scenarios • *Urgent EVOKE* – Players collaboratively solve societal problems
Location-based game with common set of rules or structure	Gameplay is dictated by a common set of rules or structure, but is carried out and adapted to the needs of a specific player community and location	• *Humans Versus Zombies* (*HvZ*) – a "hybrid" ARG, initially created as a traditional pervasive "tag" game that is adapted to each location (e.g., University) • *WeQuest* – an ARG authoring platform that supports creation of location-specific, user-generated content
Extensible		
Multiple seasons or episodes	A game is organized so that new episodes or seasons build off of prior ones.	• The *HEROES 360° Experience*, included multiple seasons tied to the HEROES television show. • *Urgent EVOKE* had a short second season.
Frame narrative	A frame narrative, which supports "stories within stories," offers potential spinoffs related to the overarching alternate reality	*AGOG's* frame narrative enables new episodes or extensions based on rediscovered, anachronistic artifacts from the Cabinet of Curiosities.
In-game mission	Puppetmasters provide new in-game missions to players who participate in the context of an overall ARG narrative.	*PHEON* – Players joined a Facebook group where missions were posted periodically. The final mission included an in-museum game tied to a work of art.
Player or producer generated products [Dena, 2008]	Players or producers create synopses of ARGs or in-game content for later more passive consumption. These include walkthroughs, meta-discussions of player experiences, documentaries, and books.	• *Lostpedia*, which documented The Lost Experience narrative content and player solutions and experiences. • The Cloudmakers' clue and puzzle-solving forums • *Perplex City's* player generated book "Tales from the Third Planet"

Table 3: Design Patterns for Reusable ARGs

Similar short, pre-scripted experiences tied to ARG content have also been created as *ongoing exhibits*, allowing museum visitors to experience the same ARG elements. These individual and small-group approaches don't require the synchronizing of player communities.

The *multiple story paths* pattern is perhaps the best example of a replayable ARG from a player's perspective, since the experience can differ each time due to changes in the story. Few ARGs have fully capitalized on this approach, perhaps due to the extra work needed to design multiple endings. Still, some have started to explore the possibilities. *39 Clues* includes online interactive experiences where youth can choose how to respond to the characters they are interacting with, prompting differently worded responses but the same overall story path. Disney's *Kingdom Keepers* lets players collectively determine what the main character does next, but this is not done in a way that supports replayability. This design pattern does not explicitly address the problem of synchronizing player communities.

Though not characterized as a design pattern, it is important to recognize the potential for unique social roles, such as mentor, to help motivate people to replay a game. For example, initial *Urgent EVOKE* players were encouraged to replay the game and serve as mentors to a new batch of players. Similarly, the "hard-core" players who are the first to solve the game puzzles and plot often help create materials to help later players get up-to-speed, which are consumed by newer players, albeit more passively [11].

Adaptabilty

It is important to recognize that adaptable ARGs are also replayable by nature, though not all replayable ARGs are adaptable (e.g., *pre-scripted transmedia touches*). As such, adaptable design patterns also work to make games replayable. Likewise, there are some challenges to replayable and adaptable games that overlap. Below we list only challenges unique to adaptable ARGs and design patterns that are particularly amenable to adaptability.

Challenges of Making Games Adaptable

- Designing location-based ARGs that can be transferrable to different locations.
- Keeping different player communities distinct from one another so that each can play an adapted version of the ARG without infringing upon the others' experiences.
- Designing narrative and content in a way that it can be easily modified and adapted to different audiences.

Design Patterns for Adaptability

One strategy for supporting adaptability is to enable the game to be played by isolated groups of players, for which the game can be customized. Ideally, there will be a narrative reason to remain isolated such as being part of a secret player community, which must keep their discussions and discoveries secret from the outside world. *AGOG* implemented this approach, wherein student players joined a chapter of a secret organization and communicated via a "secret" multimedia collaboration platform. This kept them from posting spoilers etc. in public places. Different chapters could easily be created and customized for different groups, such as older students. Alternative approaches to keeping groups separate would be to use competition, as is done between the clans in *39 clues*, or by simple obscurity for lesser-played games.

One particularly popular approach has been the open-ended participatory "pre-enactment" pattern used in ARGs such as *WWO*, *SUPERSTRUCT*, and *Urgent EVOKE*. The open-ended nature of the narratives allow the games to essentially go on indefinitely, so long as there is a player group that continues contributing content, as these games rely primarily on user content. After the official end of *WWO*, educators worked with the game designers to create lesson plans that adapted the narrative and hand-picked age-appropriate, user-generated content to meet their unique needs. The wealth of user-generated content to draw from makes these games relatively easy to adapt, while the open-ended nature of play makes it so that player communities can't really "spoil" the ending.

The location-based game with a common set of rules and structure pattern helps deal with the challenge of adapting location-based ARGs to specific places. The *HvZ* game provides an excellent example of this pattern. They provide a set of rules (e.g., how Humans become Zombies, how to stun Zombies, which areas are off limits) for how the game should be played, but local groups organizing the game can adapt those rules to their own needs as necessary. The local nature of the game helps keep player communities distinct from each other, and the lack of a narrative conclusion makes spoilers irrelevant. A different implementation of this pattern is the creation of *WeQuest*, an ARG authoring platform that allows users to create their own narratives that can be played out in various locations due to a sophisticated location-translation feature [21].

Extensibility

Challenges of Making Games Extensible

- Maintaining the canon; assuring that extensions are consistent with the existing canon, are integrated into the canon, and don't limit future extensions too much.
- Assuring that extensions meet a minimum quality.
- Knowing how to legitimately extend an ARG.

Design Patterns for Extensibility

Perhaps the most common way to extend a game is to *create multiple seasons or episodes*. The serial release of new content removes complex dependencies with canon material, suggests a familiar strategy for extending a narrative, and helps assure the extension will meet the minimum quality since the original game designers will likely have control over future seasons or episodes. Despite this fact, few ARGs have had multiple seasons. One successful example was The *HEROES 360°* Experience,

which included multiple seasons tied to the release of new seasons of the *HEROES* television show. *The Lost Experience* also had a short follow-up ARG tied to *Lost*, the television show, though it was not regarded as favorably. *Urgent EVOKE* had a small-scale second season, but like *Perplex City* which promised a second season, suffered from a lack of sufficient resources to fund further seasons.

Similarly, ARG designer, Ken Eklund (e.g., *WWO*, *Urgent Evoke*) related the ARG reuse challenges to both the *cyclical, event-driven play* pattern and the *multiple seasons or episodes* pattern: "If you were to do something which was just very clearly for a set class, for freshman in college or freshman in high school, you can use a basic structure, and run it every year. Make the old game essentially the platform that people use to catch up to speed on. You can improve it every year with new players because you raise your game. I look at it as more of a story-telling challenge, it's like you put on your hat like you're making a TV series and just think of it that way. TV series writers have dealing with that sort of seemingly contradictory thing for quite a long time. I think there are lessons to be learned there" (K. Eklund, personal interview, Oct 12, 2011).

The *frame narrative* pattern requires the original designer to create a narrative framework that suggests potential hooks for future extensions. For example, *AGOG's* initial season was based around a single item, the Kairograph, that was originally part of the Cabinet of Curiosities, a collection of anachronistic artifacts that went missing but could presumably start turning up to inspire future seasons. This allows many extensions can be created simultaneously. As described in [7], counterfactual designs, such as creating stubs for little known historical figures or unexplained historical events, can be used for game development (or expansion). While this pattern helps people know how to extend an ARG, it does not necessarily identify a mechanism for maintaining the canon or assuring quality control. As is done with complex alternate reality worlds such as *Star Wars*, the trusted designers may need to have access to a secret collection of materials that explain the canon and specify what can and cannot be done (e.g., can't kill off character X). They may also have an editorial process to assure that extensions are approved before creation to help assure quality control.

Another approach is to extend the activities that are performed without significantly extending the narrative itself. The in-game mission pattern, piloted by *PHEON*, used this approach. While there was an overarching narrative driving play, specific challenges posted via a Facebook app could be added at any time and made available to players who earned points for their team by completing them. Not only can puppetmasters create in-game missions, but players can as well. For example, the in-museum portion of *PHEON* ended with players designing a question or puzzle around a museum artifact of their choice, which other players could complete later. Extending ARGs by in-game missions has the potential to have players perform meaningful activities outside of the game, such as adding accurate historical information to the national register of historical places or scientific data to the *Encyclopedia of Life*. It also avoids the challenges associated with maintaining the canon because the missions need not be narrative heavy.

Finally, ARGs may be extended via player or producer generated products. Often, such products, in the form of wikis, discussion forums, walk-throughs, and even documentaries, are produced by "hard core" players during gameplay. These can be repackaged or formalized into extensions of the game, allowing many more players to experience the ARG later, albeit at a shallower depth than the original players. In other cases, players are asked to create artifacts that are extensions of the game as part of play. For example, *Perplex City* players created a collection of short stories in a book titled "Tales from the Third Planet." As ARGs become more prevalent, we can expect to see more ARG-inspired artwork, books, films, and other extensions that can be digested independent of the ARG but that have connections to it that add meaning to players familiar with them.

DISCUSSION

Despite the seeming contradiction between core ARG principles and reusable designs, we found a number of already tested design patterns for creating authentic, reusable ARGs. Some were explicitly designed for, while others were byproducts of designs that were chosen for other reasons. The range of different design patterns we identified suggests that many more potential patterns could be created with sufficient effort and thought. We hope our framework outlining the three types of reusability (replayability, adaptability, and extensibility) will inspire and focus such efforts.

Our framework and design patterns for creating reusable ARGs is related to, and potentially extends, [5]'s concept of "Temporal Trajectories." Temporal trajectories represent complex mappings between "story time" and "clock time" that are found in shared interactive experiences such as ARGs, and highlight design implications associated with resolving differences between the two. For example, in video games, players can pause a game, or save-and-exit in mid-story, then come back to the same story-spot many "real" clock cycles later. This results in synchronization challenges for multi-player games, such as when a player has to drop out in mid-story while other players continue. The three types of temporal trajectories detailed in [5] parallel our discussion of replayability from producer versus player perspectives:

- *canonical trajectories*, i.e., the narrative sequence planned by game designer/producers;
- *participant trajectories*, i.e., how players actually experience the game, because some players are more

dedicated to experiencing the whole canonical progression than others, who might dip in and out of story time based on demands of "real" world time; and

- *historical trajectories*, i.e., selections from recorded post-game participant trajectories that can be used to create histories and reminiscences of specific interactive or story-based events.

The *cyclical, event-driven play* design pattern, along with the replayability challenge of synchronizing new players to story time, is also related to [5]'s notion of schedule time (the sequencing and distribution of narrative to players). Furthermore, historical trajectories are analogous to the player-produced tiers' and participatory pre-enactment patterns: each supports extensibility, and may serve to address preservation design challenges. Player-produced "anachrony audits" [11], that players develop in game-guides as they work to reconcile the presentation order of the story with the actual canonical trajectory, are specific instances of historical trajectories.

The primary difference between our framework and Temporal Trajectories is that [5] did not address reuse, except implicitly in their discussion of historical trajectories. Our framework both supports and extends the Temporal Trajectories concept with an emphasis on reusability and overall sustainability of the artifacts from interactive narrative experiences like ARGs. Like Temporal Trajectories, our reuse design patterns aim to be expressive enough to account for a wide range of reuse concerns and also motivate new techniques. Our theoretical framework may also serve ARG designers and tool developers in targeting and situating practical design solutions. For example, [21]'s *WeQuest* aimed to solve an adaptability hurdle by embedding an automated location translation service, and effectively applied the player generated products' design pattern to support an extensibility hurdle by enabling player-authored content and story distribution.

As discussed throughout, our theoretical framework and the design patterns we identified were based upon expert interviews and examples from existing ARGs. In some cases ARGs we point to use patterns that could have led to reuse, although the ARGs were never actually reused. Thus, some of our design claims and arguments are based on logical reasoning about the potential effects of designs rather than empirical studies of reuse. Such empirical studies can validate the theoretical framework and design claims put forward in this work. Additionally, future work should focus on developing new design patterns for reusable ARGs, not simply focusing on design patterns that have already been tested.

Before concluding, it is important to note that the framework for creating reusable ARGs presented in this paper is ultimately predicated on adequate documentation and long-term curation of game content that is by design distributed across multiple servers, media, and physical locations. Indeed, many of the very things that serve as barriers to creating reusable ARGs make their preservation problematic. Location, and time dependent elements, live events and actors, platform-specific development, and the dynamic nature of web-based content all profoundly discourage ARG preservation. Even identifying the boundaries of a given work is problematic. These challenges explain why foundational ARGs such as The Beast and The LOST Experience have almost entirely vanished from public access. Websites return '404 Page Not Found' errors and phone lines are disconnected.

The differential survival rate of paper-based and electronic records means that ARG components will require preservation actions carefully tailored to individual file format or media type, as opposed to adopting a single, uniform approach. Although the Electronic Literature Organization and the Stanford Humanities Lab have each partnered with the Internet Archive to harvest and capture online literature and games that fall within their respective purviews – including a number of ARGs – the archiving service encourages focused collections whose seed sites predetermine the scope of a crawl, limiting it to other pages, documents, or media files that share a common domain name. Given the radically decentralized nature of ARG assets (including many that exist only in the physical world), this approach, while promising, nonetheless remains inadequate. One partial solution involves recognizing the strong correlation between reusability and longevity. As Bethany Nowviskie has noted, "the more a digital object is handled and manipulated and shared and even kicked around, the longer it will endure." If we design ARGs to be replayable and modifiable from the outset, then we have by extension already taken a crucial first step toward ensuring their long-term survival.

CONCLUSION

This paper outlines a novel design framework for creating reusable ARGs. The framework includes three key reusable design objectives (replayability, adaptability, extensibility), each of which can be enacted at different levels of depth. It also identifies barriers to reusable ARGs and design patterns for overcoming some of those barriers. We are anxious to see the many ways in which ARGs develop in the coming years and hope this contribution will help focus attention on the creation of authentic, engaging, and reusable alternate reality experiences.

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