DUST
An NSF-Funded Alternate Reality Game

Advancing scientific inquiry & the deep-time sciences

Creative Brief
A joint production between Brigham Young University, the University of Maryland, and Tinder Transmedia

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ALTERNATE REALITY GAMES

Alternate Reality Games are an established genre of interactive storytelling in which players work collaboratively to piece together and advance an adaptive narrative that is integrated into real world media and spaces, including museums, social media sites, print novels, text messages, and the Web.

LAUNCH DATE

The anticipated launch date for Dust is 6 October 2014. While we expect the initial game to run 4-6 weeks, we are developing curricular materials, exhibitions, and learning modules for classrooms, museums, libraries, and after-school programs with the overall objective of sustaining and increasing the longevity of the game and its associated storyworld.

DUST

In a Nutshell

When a meteor shower disperses mysterious clouds of dust into earth’s atmosphere, adults worldwide fall unconscious, leaving teenagers to search for the answers that will save their parents’ lives.

The Plot

In “Dust,” players are invited to attend a special NASA webcast of an upcoming meteor shower, where they are joined by a group of teenagers visiting with their parents, who are astronauts on board the International Space Station. When the meteors enter the atmosphere, they burn up, dispersing dust into the air that causes exposed adults across the world to collapse into a cryptobiotic state. Later the teens and players discover that the meteor dust is full of microscopic extremophiles whose DNA contains the records of a lost alien civilization, a voice from the DUST, whose world was destroyed. It is these alien microbes which have inadvertently (or perhaps purposely) “infected” the adults, knocking them out, and leaving traces of these records in their brains. With the adult population incapacitated, an errant meteor on a collision course with earth, and the kids’ loved ones in peril, it’s up to the players to help the teenagers at the Kennedy Space Center figure out what has caused these events and how to avert catastrophe.

Gameplay

The prelude to Dust will be an invitation to the public to help christen IRIS, a fictitious NASA AI that will later serve as an in-world character, assuming many of the functions of a traditional gamemaster, such as announcing new story revelations, adjudicating among competing player hypotheses to advance the game, releasing new game apps, unlocking new features, motivating and interacting with players, fortifying the connections between the different game tracks, and rehearsing the story “so far” at key junctures throughout.
Once the game launches, players will choose among four distinct but complementary tracks to participate in, each with its own set of research questions and associated artifacts, documents, and citizen science apps to support it:

- **Human Biology track**: Why have the adults collapsed? Are they dead or alive? Do they need food and water? How long can they survive in this state? Will kids be affected too?

- **Astronomy and Exobiology track**: Where did the meteorite come from? What is it made of? How did it get here? What are the properties of an exoplanet? What is needed to support life on an exoplanet? What separates living things from non-living things? What kinds of technologies—such as satellite telescopes, space probes, and planetary rovers—might be used to collect data and evidence from these exoplanets? How are these technologies engineered and repaired?

- **Microscopic World track**: Are there organisms in the dust and the meteorite? What kind of organisms? How did they survive in space? Are they alien predators? Is there a connection between them and the fractal patterns? Why are they eating tardigrades? Can these organisms be stopped? Should they be?

- **Ethics track**: Is the AI human? What makes us human? How do we act and live in a world without adults? How do we assume the responsibility of adults? What did adults do to keep our world running? Should we kill the alien microbes? Can these organisms be stopped? Should they be? Who controls information? Should it be controlled? What are the consequences of sending probes to another planet? Should organisms be genetically modified? Should we play with the balance of life in an ecosystem? What are the ramifications of experimenting on animals or other life forms? How do we foster the kind of long-term thinking needed to address these questions?

*Dust* is an open-ended ARG, meaning that not every detail about the plot or storyline has been scripted in advance. The designers deliberately cede some control and authority to players, whose contributions help determine the shape and character of the game, as well as final outcomes. Some of the best-known education, public media, and museum-focused ARGs have been open-ended, including World Without Oil, Urgent Evoke, PHEON, and Superstruct. By contrast, a closed-ended ARG is a narrative-rich experience in which players are guided along a pre-determined path of action. These games follow a more tightly scripted plot structure that resolves into a single fixed ending. Well-known closed-ended ARGs include The Lost Experience and Dark Knight.

**TARGET AUDIENCE**

**Demographic**: teenagers between 13-17 years old, with an emphasis on females and other populations traditionally under-represented in STEM fields, such as blacks and Hispanics.

**Psychographic**: These students deal with strong social pressures from their peers, society, and the media. They care about their image and are very connected to the world and their friends via mobile and social media platforms. They are developing emotionally, intellectually, and physically. Decisions they make now will drastically affect their long-term abilities, talents, and sense of identity.
At a glance: Teens are in turmoil figuring out who they are, where they belong, and what they do; they are desperate to avoid unpopular labels from their peers. As many STEM fields, including biology and astronomy, are traditionally associated with white, “nerdy” males, our task is to rebrand and reposition them as compelling, relevant, and attractive, so that teens will be open to the ways their talents can be utilized in the service of advancing scientific knowledge, and open to STEM interests being part of their personal, public identity.

WHAT WE WANT THE TARGET AUDIENCE TO BELIEVE

- You are capable and willing to redefine negative social and gender stereotypes around STEM.
- You are an investigator and innovator. Your unique perspective and ideas are crucial to the future of STEM.
- There is a HUGE spectrum of careers included within STEM, including careers at NASA, and in fields such as astronomy and astrobiology.
- Big ideas that change the world often come from collaboration and teamwork.
- Innovation is exciting; problem-solving (scientific inquiry) can be fun and rewarding.

LEARNING OBJECTIVES

ARGs present exciting opportunities to encourage informal learning and critical engagement through narrative. In the course of the game, players will acquire content knowledge about the deep-time sciences, including astronomy and biology, as well as develop skills crucial to scientific inquiry, such as forming and testing hypotheses, and collecting and analyzing data. The deep-time sciences are those sciences that deal with processes that occur over thousands or millions of years, like the formation of galaxies or the evolution of species. Because game play takes place across familiar social media platforms, players are empowered to recognize that many of the skills they already possess--discovering content; annotating and interpreting media; collaborating and sharing with their peers; and communicating and explaining key concepts--also constitute valuable learning practices in their own right, applicable to STEM and other disciplines, and that core scientific concepts are within their grasp. Institutional partnerships with NASA, the Computer History Museum, and the Smithsonian Institution--in conjunction with a distinguished advisory board of astronomers, astrobiologists, and learning scientists--enable the researchers and game designers to draw on significant disciplinary expertise relevant to the educational objectives of the project.

Each scenario in the game will include one or more player activities that have been mapped to the relevant Next Generation Science Standards (NGSS) based on the K–12 Science Education Framework created by the National Research Council. As players explore the origins and phylogeny of the microscopic extremophiles that have been carried to earth aboard the meteor, for example, their investigations will be tied to NGSS MS-LS4 and HS-LS4, Biological Evolution: Unity and Diversity; and MS-ESS1 and HS-ESS1, Earth's Place in the Universe. Similarly, when players confront the final challenge--how to deflect an errant meteor--their activities will be designed in accordance with NGSS standards for MS-ESS1 and HS-ESS1, Earth's Place in the Universe and MS-ETS1 and HS-ETS1, Engineering Design. A suite of augmented reality apps developed by the production team will support players' research endeavors. These include microbiology tools
for studying extremophiles (a genetic tool and a phylogenetic tree generator); a telescope/star map explorer; and a stationary space probe. A collaborative scientific inquiry platform will serve as a virtual gathering place and central repository for sharing, aggregating, analyzing, and reporting on data.

Some of the anticipated learning outcomes include the following:

- Players practice and/or improve their application of scientific inquiry skills;
- Players demonstrate increased awareness of their scientific inquiry skills through game play (i.e. they recognize they are using them when playing the games);
- Players demonstrate increased engagement with STEM concepts across different media channels (e.g., websites, print, video, museum artifacts, social media);
- Players develop technological literacy and demonstrate increased knowledge of the deep-time sciences, especially astronomy and biology.

**LEARNING ASSESSMENT AND ANALYTICS**

As stated above, carefully crafted narrative-driven activities that map to NGSS standards will be authentically woven into Dust. Designed to measure proficiency across the three areas of science inquiry, science content, and science awareness, these embedded forms of assessment with concrete indicators of performance will allow the research team to collect and analyze data about player knowledge and skills without having to administer a formal test. Additionally, visual learning analytics will be applied to log data of player interactions to identify optimal design patterns for promoting learning and engagement. These patterns can then be adapted for future use in ARGs and other storytelling environments to advance STEM education.

**OUTREACH AND PROMOTION**

In addition to our marketing team, we have assembled an educational outreach team charged with promoting and communicating information about the game to key stakeholders, such as teachers, students, principals, parents, and school librarians. A Dust brochure and press release will provide teachers with a website address where they can sign up for game updates and receive their own class registry page. On Tuesday, 10 June 2014, Steven Shumway (Professor, College of Technology and Engineering, BYU) will hold a press conference with ~40 teachers at Davis High School in Kayesville, UT—the first of several such events in the months leading up to the game. In October of this year, June Ahn (Professor, iSchool and College of Education, UMD) will use the occasion of his keynote at the annual National Science Teacher’s Association in Richmond, VA to publicize the game. We have also budgeted generous stipends for teachers, librarians, staff at local hackerspaces (such as HacDC), and other educators to attend workshops on using our reusable ARG components in formal and informal learning settings. Participants will be expected to help us collect data from the youth they work with for evaluations.
**DUST: LOOK & FEEL**

*Dust* will be presented in an online graphic novel-style format, with stylized illustrations (*Figure 1*). In keeping with ARG conventions, players will interact with these characters via real world media—such as Twitter, Facebook, and Instagram—as well as through the chat and blog features incorporated into players’ individual profile pages, the *Dust* community website, and the scientific inquiry platform we are designing for the game.

![Character mockups for Dust](image)

*Figure 1: character mockups for Dust*

**NASA’S INVOLVEMENT**

We believe NASA will accrue several benefits through its involvement with the game:

- NASA’s participation demonstrates the agency’s commitment to encouraging young women and minorities to see their potential in pursuing STEM-related fields.
- It rejuvenates interest in NASA’s core values and programs by speaking to a demographic that is primarily influenced by games, entertainment and social media.
- It bolsters NASA’s value as a key national institution that engages and inspires America’s youth to pursue STEM-related fields and strive for excellence in education.
- Data gathered through the game experience will be invaluable in refining the methods for utilizing gaming principles to engage and educate a new generation of learners.