



EVERYONE'S PLAYING: CITIZEN SCIENCE & VIDEO GAMES

Susan Gold

Professor of the Practice, Northeastern University

Founder, Global Game Jam®

2001

2006

2009

2013

15 YEARS IN GAME DEVELOPMENT

Susan Gold





GLOBAL
GAME JAM

2016 BY THE NUMBERS



- 632 locations (22% increase over 2015)
- 93 countries (20% increase over 2015) – bigger than Winter Olympics
- 6869 games (20% increase over 2015)
- 1.8M page views on Global Game Jam website from (January 25-February 1)
 - 4.6M page views over the course of the year
- 2.1M minutes watched on Global Game Jam related Twitch channel(s)

VIDEO GAMES



TRANSFORMATIVE

- Narrative
- Visual
- Interactive
- Collaborative
- Experimental
- Explorative

“Snow World”









Reduces pain in burn victims during the cleaning of wounds by 30-50%...

... which is more effective than
MORPHINE.

UNIQUE



- Cross age, gender, ethnicity, educational status
- Measure performance on a very wide variety of tasks, and can be easily changed, standardized and understood
- Stimulating for participants
- Experience novelty, curiosity and challenge
- Develop transferable IT skills

VIDEO GAME INSIGHTS

- 150 Million Americans play video games *
 - 42% regularly play 3 hours per week *
 - Average kid plays 13 hours per week **
- Average Gamer is 35 years old *
 - 44% of which are female *
 - 74% are 18 or older *
- Video Games are a source of Economic Growth
 - \$91.5B in 2015 with expected growth to \$107B in 2017***

* *ESA*, ** *GlassLab*, *** *Newzoo*



**MPAA SAYS
THE FILM
INDUSTRY
\$36.4B
GLOBALLY**

2014



ENGAGEMENT

(AKA FUN)



FOUR KINDS OF FUN



FOUR KINDS OF FUN

- Hard Fun: Fiero – in the moment personal triumph over adversity
- Easy Fun: Curiosity
- Serious Fun: Relaxation and excitement
- People Fun: Amusement

Nicole Lazzaro

<http://www.nicolelazzaro.com/the4-keys-to-fun/>

4 KEYS
2 FUN

MASTERY "THE BRASS RING"

HARD FUN

The 4Keys 2Fun:
Player Experience (PX) is how player interaction creates emotion. Best selling games use emotion from four types of interactions to capture attention and motivate play. Use the 4Keys 2Fun to paint attention onto any UI like Velcro and color it with emotions to match a brand or the look at hand.

It's 2FUN

HARD FUN PERF

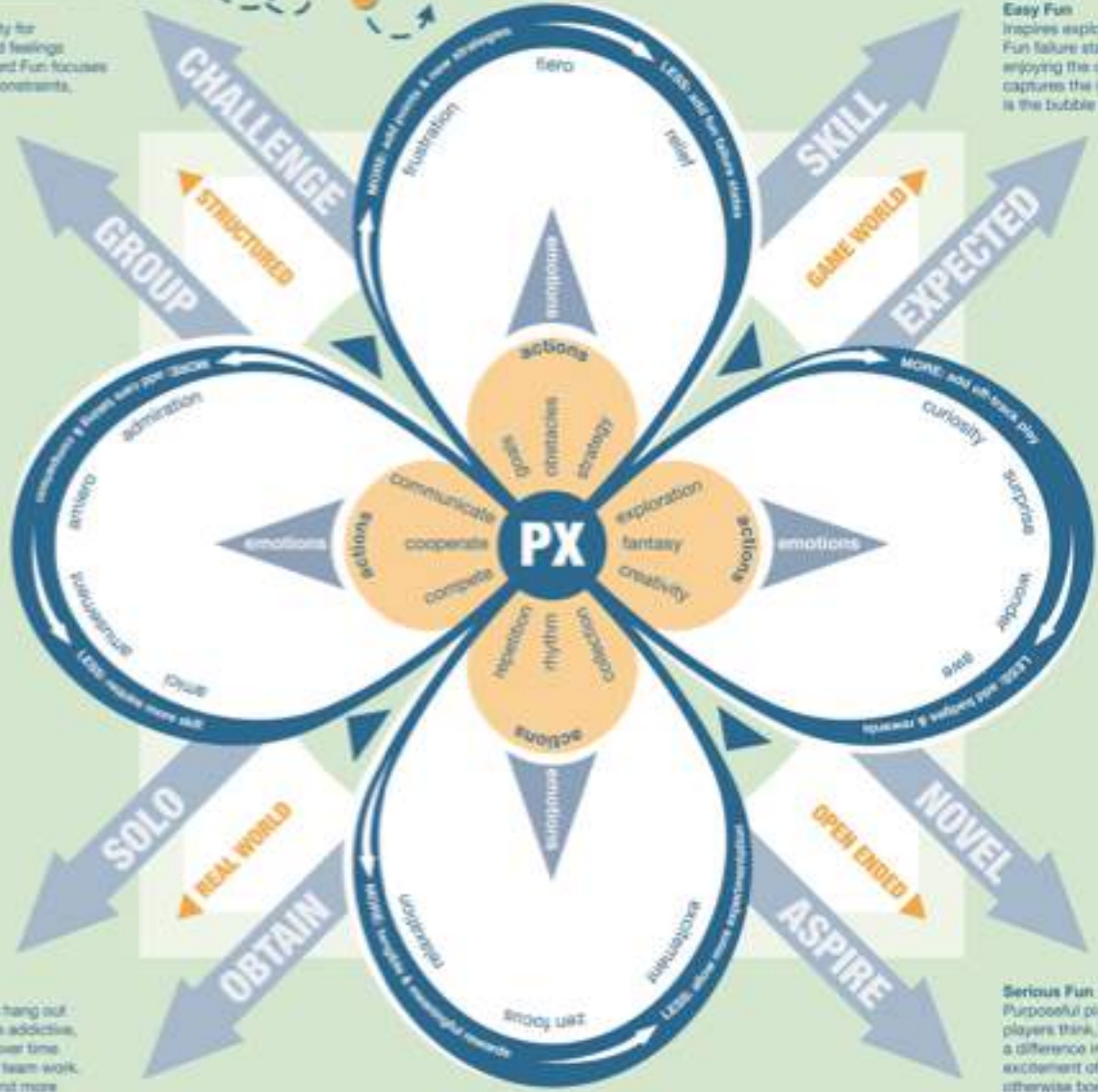
Hard Fun
Provides the opportunity for challenge, mastery, and feelings of accomplishment. Hard Fun focuses attention with a goal, constraints, and strategy.

like video and color it with emotions to match a brand or the task at hand.

Easy Fun
Inspires exploration and role play. Fun failure states, fantasies, or simply enjoying the controls enchants and captures the imagination. Easy Fun is the bubble wrap of game design.

SOCIAL BONDING
PEOPLE FUN
AMUSEMENT

VEHICLE FOR IMAGINATION
EASY FUN
CONTENT



People Fun
Provides the excuse to hang out with friends. People are addictive, and these mechanics over time build social bonds and team work. Everyone wants to spend more time with their friends.

Serious Fun
Purposeful play changes how players think, feel, behave, or make a difference in the real world. The excitement of games drives otherwise boring tasks. Serious Fun is play as therapy.

The 4Keys 2Fun is based on XEODesign's independent contextual interviews of 60 players playing their favorite games in SF and STL, 2003-2004. Free white papers: www.xeodesign.com/whyweplaygames.html.

PROVIDE MEANING & VALUE

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“Human beings have an innate need to belong, to feel an integral part of something greater than themselves, a cause, project, or living entity that outlives and transcends their own brief life-line. ”

- Professor Richard Griffin, *Longing to Belong: Cultivating Transcultural Humanism in Modern Society as a Source of Identity*



CITIZEN SCIENCE

Experience Science: Count Birds From Your Backyard



Citizen Science

THE COLLECTION AND ANALYSIS OF DATA RELATING TO THE NATURAL WORLD BY MEMBERS OF THE GENERAL PUBLIC, TYPICALLY AS PART OF A COLLABORATIVE PROJECT WITH

Data Analysis

Searching for Pulses / Triplets 21% 
Doppler drift rate: 0.0000 Hz/sec Resolution: 76.294 Hz
Pulse: power 1.22, period 0.7274, score 0.54



Overall: 0.198% done

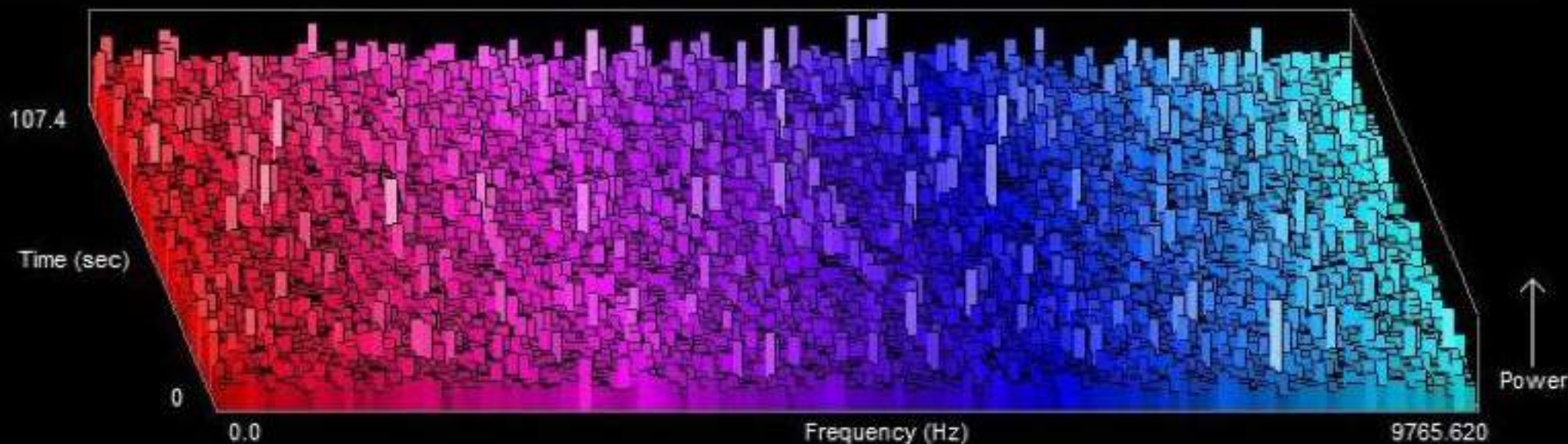
CPU time: 0 hr 01 min 33.2 sec

Data Info

From: 12 hr 1' 1" RA, + 25 deg 51' 36" Dec
Recorded on: Fri Oct 03 16:10:19 2003 GMT
Source: Arecibo Radio Observatory
Base Frequency: 1.420019531 GHz

User Info

Name: nnn
Data units completed: 2216
Total computer time: 20330 hr 06 min 07.0 sec



<http://setiathome.ssl.berkeley.edu/>

GOOD CITIZEN SCIENCE IS MADE TO BE

-
- Accessible / Interface
 - Entertain & Actionable
 - Visual Design & Appeal
 - Usability & Interactivity
 - Content
 - Encourages Learning
 - Clear & Compelling - Flow



LESSON PLANS + MATERIALS ▼

TRAINING ▼

TOOLS ON BRAINPOP ▼

GAMES + TEACHING ▼

HELP + FAQ ▼

Academic Standards

Select Standard ▼

Select Subject ▼

LESSON IDEAS



EDUCATOR RESOURCES FOR CITIZEN SCIENCE



More Citizen Science Lesson Ideas ▶



Game Learning Society (GLS) has provided 5 additional lesson plans for the Citizen Science game. Visit their site to view and download the f...

Citizen Science Game: Additional My BrainPOP Features ▶





“The key is to translate the complicated science into something that’s easily done by people who don’t need to understand the scientific details,” the researchers explain. “The broad idea is to get people involved who have an interest in science, even if it is a fairly shallow interest. Anybody can participate as long as they have a computer and can do the basic tasks required.”

Research Scientist Stuart Robbins of CU-Boulder’s Laboratory for Atmospheric and Space Physics



WHAT HAPPENS WHEN YOU

WHAT HAPPENS WHEN YOU COMBINE CITIZEN SCIENCE & VIDEO GAMES



U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

GAMES

planet arcade

AGENCIES UTILIZING GAMES

Federal Games Guild

<http://games.noaa.gov/>





YOUNG METEOROLOGIST PROGRAM "SEVERE WEATHER PREPAREDNESS ADVENTURE!"

PLANIT NOW's Young Meteorologist Program takes you on a severe weather preparedness adventure!

[Play!](#)

○ ● ○



Reverse The Odds

GOAL To help complete a muscle-invasive bladder cancer study
TASK You'll classify bladder tumour samples on behalf of researchers

[GET STARTED NOW!](#)

what interests you?

- All Activities
- All Topics
- Agriculture



GET STARTED NOW!

Photo: Channel Four

Rating 

Presented by **Cancer Research UK**

Participation fee \$0

Expenses \$0

Spend the time outdoors

Location anywhere

Appropriate for kids yes

Teaching materials no

In Reverse The Odds, you help the Odds – colorful creatures whose world is falling into decline. By completing mini puzzle games and upgrading their land, you can restore the Odds back to their lively selves.

But it's not just the Odds you're helping. We've incorporated the analysis tumour image analysis into the game. So as you play, you're helping to analyse important data for a huge bladder cancer study.

You're analysing in the same way researchers do, but because there are a lot more of you, we can get through data much more quickly, freeing up more of our researchers valuable time and unveiling clues about cancer sooner.

Required Gear:

All you need is a smartphone or tablet. You can play for a couple of minutes, or hours at a time - it's entirely up to you!

advanced search

[View all projects](#)

what interests you?

- All Activities
- At a science center, zoo or aquarium
- At home
- At night
- At school
- At sports stadiums
- At the beach
- Emergency Response
- Exclusively online
- In oceans, streams, rivers, lakes
- In snow or rain
- In the car
- On a hike
- On a walk, run
- While fishing

students (Our Pick)

search for

- projects suitable for children
- do-it-yourself projects

location (Philadelphia, U.K., ...)

- featured projects
- projects I can do outdoors
- teaching materials available

search

- Agriculture
- Animals
- Archeology & Cultural
- Astronomy & Space
- Awards
- Biology
- Birds
- Chemistry
- Climate & Weather
- Computers & Technology
- Crowd Funding
- Ecology & Environment
- Education
- Events
- Food
- Geography
- Geology & Earth Science
- Health & Medicine
- Insects & Pollinators
- Nature & Outdoors
- Ocean, Water, Marine & Terrestrial
- Physics
- Psychology
- Science Policy
- Social Science
- Sound
- Transportation

<http://scistarter.com/>

App Store > Games > Channel 4



Reverse The Odds 



Channel 4 >

[Details](#) [Ratings and Reviews](#) [Related](#)

Game Center

Screenshots

iPhone

iPad

+ Get -

This app is designed for both iPhone and iPad

★★★★★ (10)

Rating: 4+

LINKS

[Privacy Policy](#)

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2014





Reverse The Odds: Your impact

<https://www.youtube.com/watch?v=cjgYoostpXo>

Citizen Science

HOME

PLAY GAME

RESOURCES

Play Citizen Science!

Globe Inputs

Less More

Wetlands Restoration

Fishing Regulation

Construction Regulation

Fish Stocking

Rain Garden Planting

Buffer Strip Planting

Manure Treatment

Exotic Mussel Introduction

Littering

Results

Phosphate Levels

Flooding

Runoff

Piscivore Population

Planktivore Population

Algae Population

Pollution Levels

Odor

Zooplankton

Clarity

START

<https://www.youtube.com/watch?v=c81HJ8xactw>

Educational Curriculum

Content Area	Length	Grade	Resource Type	Domain
Civic Action	1 Week	All Ages	Activity	Government Policy
Ecology	2 Weeks	Other	Teacher Support	Invasive Species
Math	Other	Kindergarten	Test	Local History
Other	1 Day	1st Grade	Event	Other
Reading	2 Days	2nd Grade	News	Pollution
Science	3 Days	3rd Grade	Reading	Tradeoffs
	4 Days	4th Grade	Video	
		5th Grade	Web	
		6th Grade	Worksheet	

Apply

Citizen Science Content Maps

Tue, 02/26/2013 - 17:40 — Amanda B

The contents of this framework are intended to help educators use Citizen Science as a tool for engaging learners in scientific discovery. It is not designed to support scripted teaching approaches, rather to leverage the elements of the video game to support educators in linking game content to local contexts. Have fun playing and learning!

[Civic Action](#) [Other](#) [Other](#) [Teacher Support](#) [1 attachment](#)

Save Lake Wingra - Introduction

Fri, 03/15/2013 - 00:37 — Amanda B

This activity introduces EcoDesign, a company based in Madison that asks students to research on proposed plans for Lake Wingra and decide on the best outcome for the the community. Students will work in groups of three, and each student will take on t of a professional with a unique agenda. The following documents provide:

- An introduction to the activity
- A brief description of the Lake Wingra challenge
- In-depth descriptions for each participant

Research

Local Girl Scouts Play Citizen Science

Thu, 06/06/2013 - 17:55 — Amanda B

A group of Madison Girl Scouts from the Bayview Community Center toured Games + Learning + Society (GLS) and played Citizen Science on May 13. GLS Research Assistant and Troop Leader Amanda Barany organized the event as a way to bring Girl Scouts into the center and provide them with an opportunity to experience Citizen Science. "My goal was to give them a rich GLS experience, where they could first understand how games are made and the creativity and ingenuity that goes into designing a game, and then allow them to explore Citizen Science in an unstructured environment," Barany said.

[News](#) [Research](#) [Read more](#)

Citizen Science Presented at Early Education and Technology for Children

Wed, 05/22/2013 - 11:44 — Amanda B

Citizen Science and its use in classrooms earned a spotlight last month at the Early Education and Technology for Children (EETC) conference, held in Salt Lake City in early April of this year. Children and media researcher and PhD candidate Meagan Rothschild, alongside undergraduate researcher Amanda Barany, presented on the outcome of an in-class observational analysis of the use of Citizen Science in a Madison-area charter school in 2012.

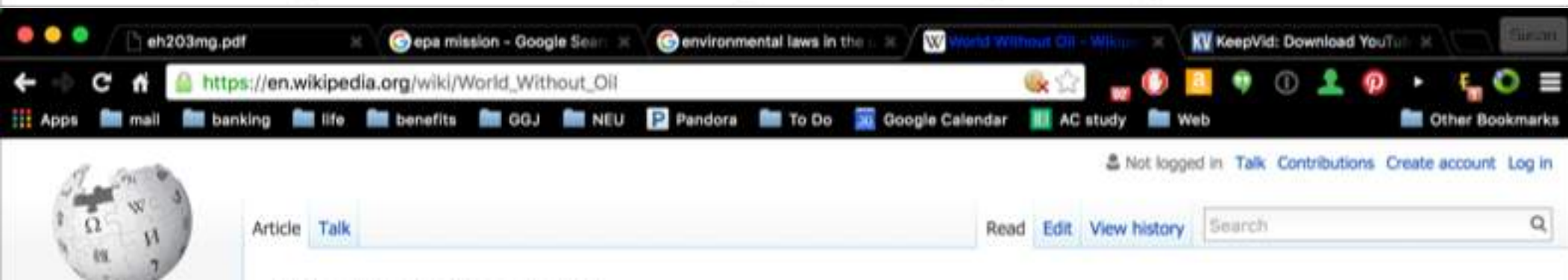
[News](#) [Research](#) [Read more](#) [1 attachment](#)



Superstruct was a massively multiplayer forecasting game, created by the Institute for the Future, and played by more than 8000 citizen future-forecasters from September - November 2008

Superstruct

<http://archive.superstructgame.net/>



The screenshot shows a web browser window with several tabs open: 'eh203mg.pdf', 'epa mission - Google Search', 'environmental laws in the...', 'World Without Oil - Wik...', and 'KeepVid: Download YouTub...'. The address bar displays the URL 'https://en.wikipedia.org/wiki/World_Without_Oil'. The browser's bookmark bar contains various folders and links, including 'Apps', 'mail', 'banking', 'life', 'benefits', 'GOJ', 'NEU', 'Pandora', 'To Do', 'Google Calendar', 'AC study', 'Web', and 'Other Bookmarks'. The Wikipedia page header shows the user is 'Not logged in' and provides links for 'Talk', 'Contributions', 'Create account', and 'Log in'. The article title 'World Without Oil' is visible, with tabs for 'Article' and 'Talk'. Navigation options 'Read', 'Edit', and 'View history' are present, along with a search box.

World Without Oil

From Wikipedia, the free encyclopedia

World Without Oil (WWO) is an [alternate reality game](#) (ARG) created to call attention to, spark dialogue about, plan for and engineer solutions to a possible near-future global oil shortage, post [peak oil](#). It was the creation of [San Jose](#) game writer and designer [Ken Eklund](#), and ARG veterans [Jane McGonigal](#), [Dee Cook](#), [Marie Lamb](#), [Michelle Senderhauf](#), and [Krystyn Wells](#) were on the [puppetmaster](#) team.^[1] *World Without Oil* was presented by [Independent Television Service](#) (ITVS) with funding by the [Corporation for Public Broadcasting](#).

The game's tagline is "Play it – before you live it."^[2]

The game concluded on June 1, 2007.

Contents [hide]

- [The game](#)
- [Goals](#)
- [Acclaim](#)
- [Criticism](#)
- [References](#)
- [External links](#)

The game [[edit](#)]

World Without Oil combined elements of an [alternate reality game](#) with those of a [serious game](#). The game sketched out the overarching conditions of a realistic oil shock, then called upon players to imagine and document their lives under those conditions. Compelling player stories and ideas were incorporated into the official narrative, posted daily. Players could choose to post their stories as videos, images or blog entries, or to phone or email them to the WWO gamemasters. The game's central site linked to all the player material, and the game's characters documented their own



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World Without Oil <https://www.youtube.com/watch?v=M-hzUGFD-Gc>



fold it
Solve Puzzles
for Science

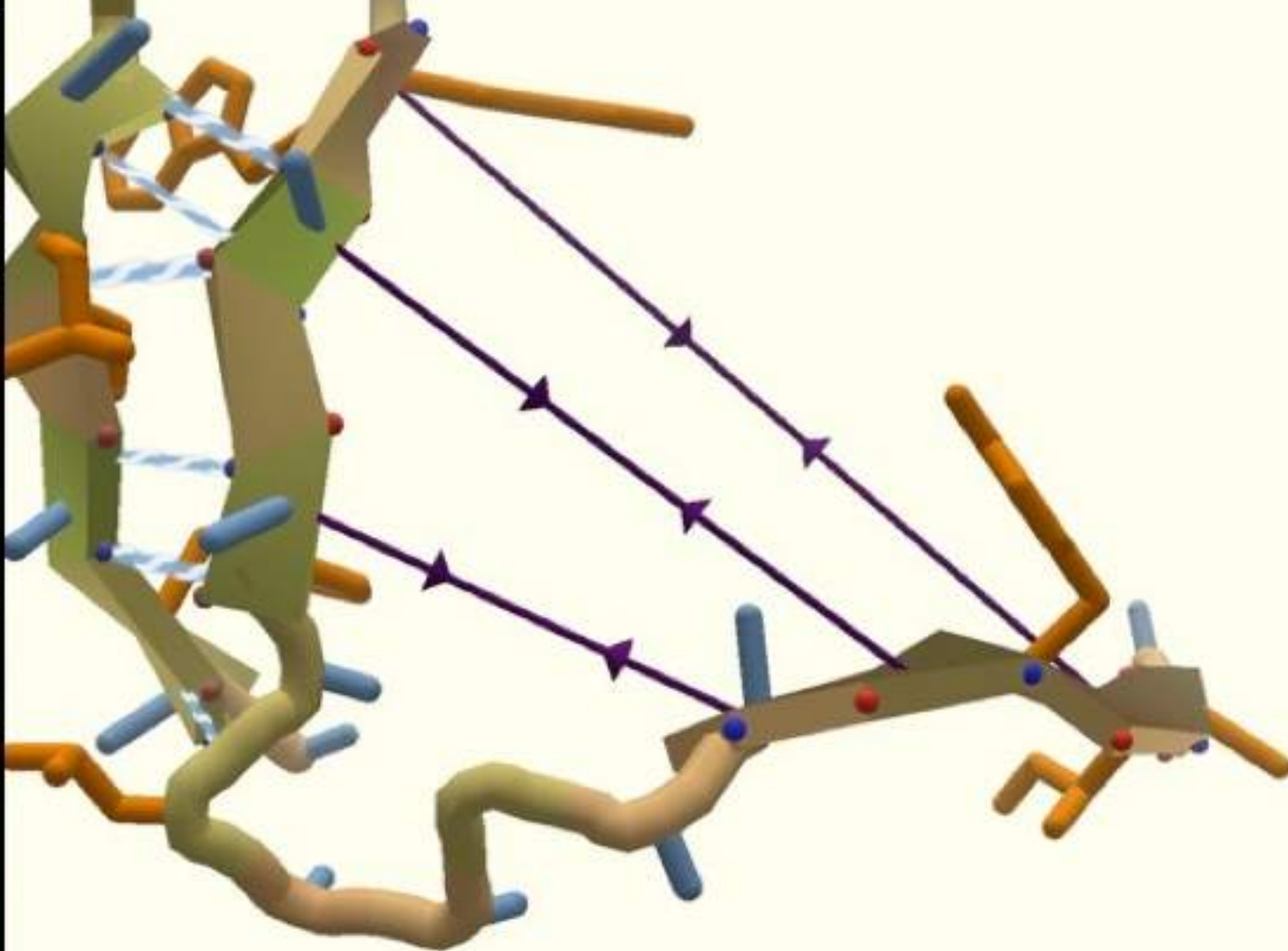
Score: of 8420



Sheets and Ladders

Repeat guide?

OK



Reset
Puzzle

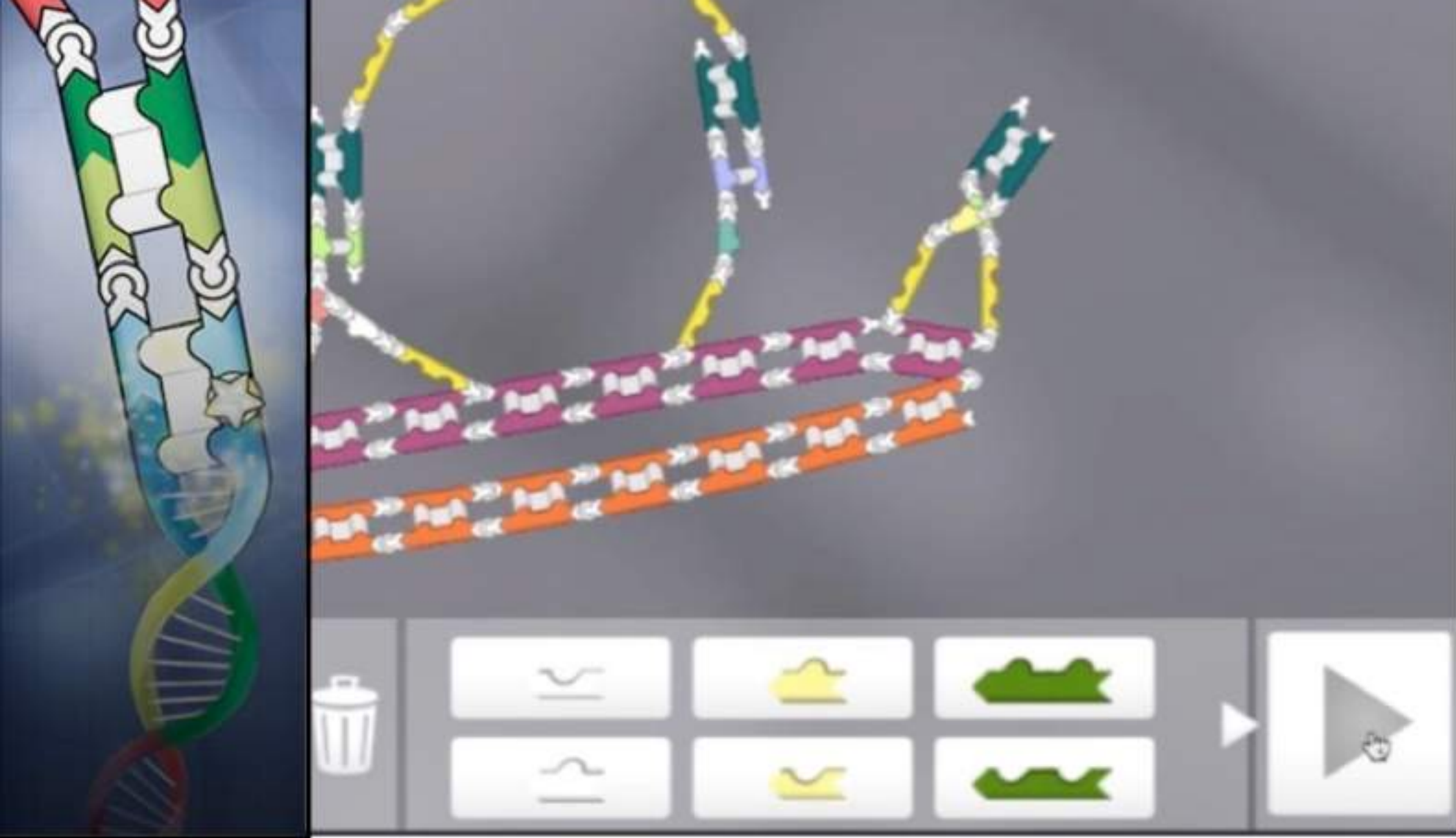
Chat - Group X auto show
Chat - Puzzle Levels X auto show
Chat - Global X auto show

FOLD IT

Foldit allows players compete and collaborate to predict natural protein structures and design novel synthetic ones—

Foldit allows players compete and collaborate to predict natural protein structures and design novel synthetic ones activities that can contribute to the advancement of biomedicine. Promising protein structures designed in the game have been tested in the wetlab. Foldit is an online multiplayer game that allows players to compete and collaborate to computationally fold and design proteins. Since its launch in 2008, it has had over 400,000 players, and demonstrated that by leveraging human problem solving and creativity, humans and computers can work together to solve previously unsolvable problems in computational structural biology. Foldit players have contributed toward solutions for two of the "holy grail" problems in computational structural biology: the protein folding problem and the protein design problem (also known as the inverse folding problem). More specifically, Foldit players have: outperformed state of the art protein structure prediction methods; created models of sufficient quality for successful molecular replacement and subsequent structure determination of a monomeric retroviral protease; participated in extensive backbone remodeling of a computationally designed bimolecular Diels-Alderase, increasing the activity of the enzyme; and discovered structure prediction algorithms that outperformed previously published methods. Several manuscripts describing these exciting results have been published in Nature and other journals Player discoveries have resulted in a number of scientific publications, including in Nature, Proceedings of the National Academy of Sciences, and ACM CHI. Current projects include designing binders to inhibit Ebola, and we are working on features for designing drugs for rare diseases. The game can currently be downloaded from its website at <http://fold.it/>.





NANO CRAFTER

Nanocrafter is a game about crowdsourcing DNA nanotechnology. Synthetic biologists are exploring new ways to fight disease, construct nanomaterials, and even compute, using self-assembling systems of short strands of DNA. The game

disease, construct nanomaterials, and even compute, using self-assembling systems of short strands of DNA. The game simulates DNA dynamics so that interesting player discoveries could be synthesized in the wetlab. Thousands of players have already played and submitted hundreds of devices, and the game recently won the Best Social Media Crowdsourcing Game in the Serious Games Showcase & Challenge. From the challenges posted thus far we have seen early evidence of players building self-assembling structures, polymers, and logical circuits with minimal guidance, which we have recently published in Foundations of Digital Games. Thus far, the game has accumulated over 10,000 players. The game has also been used to illustrate the mechanics of DNA strand displacement reactions in a professional master's course on synthetic biology at the University of Washington. Nanocrafter can be played in-browser at its website <http://nanocrafter.org/>.

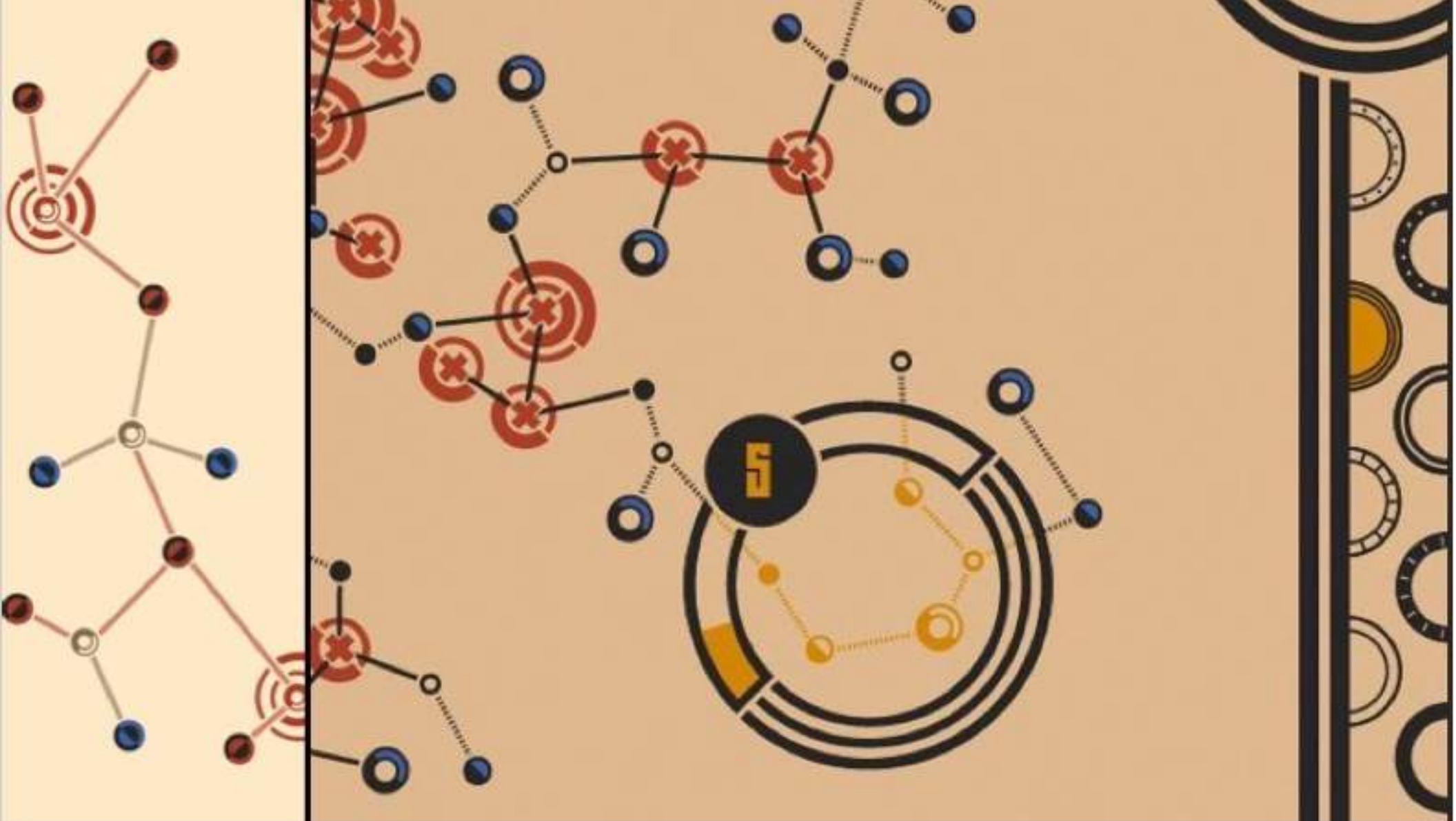
The logo for Paradox Interactive, featuring the word "paradox" in a white, lowercase, sans-serif font. The letter "o" is stylized as a red circle with a white dot in the center, resembling a target or a molecular structure.

options

menu

score

20789



PARADOX

Paradox, launched recently, aims to crowdsource the formal verification of software. Players solve puzzles based on constraints derived from code, with the goal of assisting programmers in proving their code is free from certain classes of common security vulnerabilities. We are working towards improving the application of human problem solving in this

common security vulnerabilities. We are working towards improving the application of human problem solving in this domain. Paradox can be played in-browser at <http://paradox.verigames.com/>.

MapMill



DONE



some

heavy

MAP MILL

MapMill is a platform (part of Public Lab) for crowdsourcing image sorting for responses to disasters. During Hurricane Sandy, Open Street Maps Humanitarian Team temporarily adapted the MapMill software and collaborated with FEMA to organize 6,000 online volunteers to sort images of the damage. We are looking at MapMill as a tool to empower civic engagement through environmental monitoring as well as study methods to

collaborated with FEMA to organize 6,000 online volunteers to sort images of the damage. We are looking at MapMill as a tool to empower civic engagement through environmental monitoring as well as study methods to improve crowd engagement. This work is with Sara Wylie at Northeastern.



A GAME TO MAP THE BRAIN

PLAY NOW



<http://eyewire.org/explore>

2016 TED Prize winner

The wish

globalXplorer

The winner

Sarah Parcak

The year



The year

TED2016



What would Indiana Jones do with access to satellite data? Not as much as our 2016 TED Prize winner. Sarah Parcak uses 21st century technology to discover ancient sites, buried in time.

"I wish for us to discover the millions of unknown archaeological sites across the globe. By building an online citizen science platform and training a 21st century army of global explorers, we'll find and protect the world's hidden heritage, which contains clues to humankind's collective resilience and creativity."



https://www.ted.com/talks/sarah_parcak_archeology_from_space?language=en

2012 talk of the 2016 TED Prize Winner

TED PRIZE 2016

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A TIPPING POINT

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ABOUT SARAH PARCAK

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THANK YOU

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