

**IN CASE OF  
EMERGENCY**

**13.10.2017**

**11.02.2018**

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INTRO-  
DUCTION  
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INTRO-

**IAN BRUNSWICK  
& LYNN SCARFF**

**HEAD OF  
PROGRAMMING &  
DIRECTOR**

**SCIENCE GALLERY  
AT TRINITY  
COLLEGE DUBLIN**

INTRODUCTION

IN CASE OF EMERGENCY

A true global catastrophic risk is something widespread in scope, significant in severity, and (hopefully) rare in frequency. A fatal car crash, or the extinction of one animal species can make for a tragic story, but it is not a global catastrophe. The odd thing is, the worse the disaster, nuclear war or malevolent super-AI — the more our stories about them change from tragedy to thriller.

Post-apocalyptic narrative can be bleak like Cormac McCarthy's *The Road*, or it can be batty, like *Shaun of the Dead*. Most lie somewhere in the middle — dangerously tantalising portrayals of survivors of plagues, asteroid-strikes, or technological collapse — where we can imagine ourselves as the lucky few, heroes living by our wits in a well-prepped shelter or foraging in an abandoned landscape — a 21st century Wild West.

No rent to pay, no taxes, no urgent emails — would a simpler existence really be so bad? The Futurists espoused the 'cleansing' force of war, and the Victorians commissioned uncountable paintings of collapsed civilisations, their classical ruins romantically succumbing to rot. We are in an apocalyptic renaissance, surrounded by dystopian narratives, especially in film where bleak futures sell. It's worth asking why, and also examining how, our society

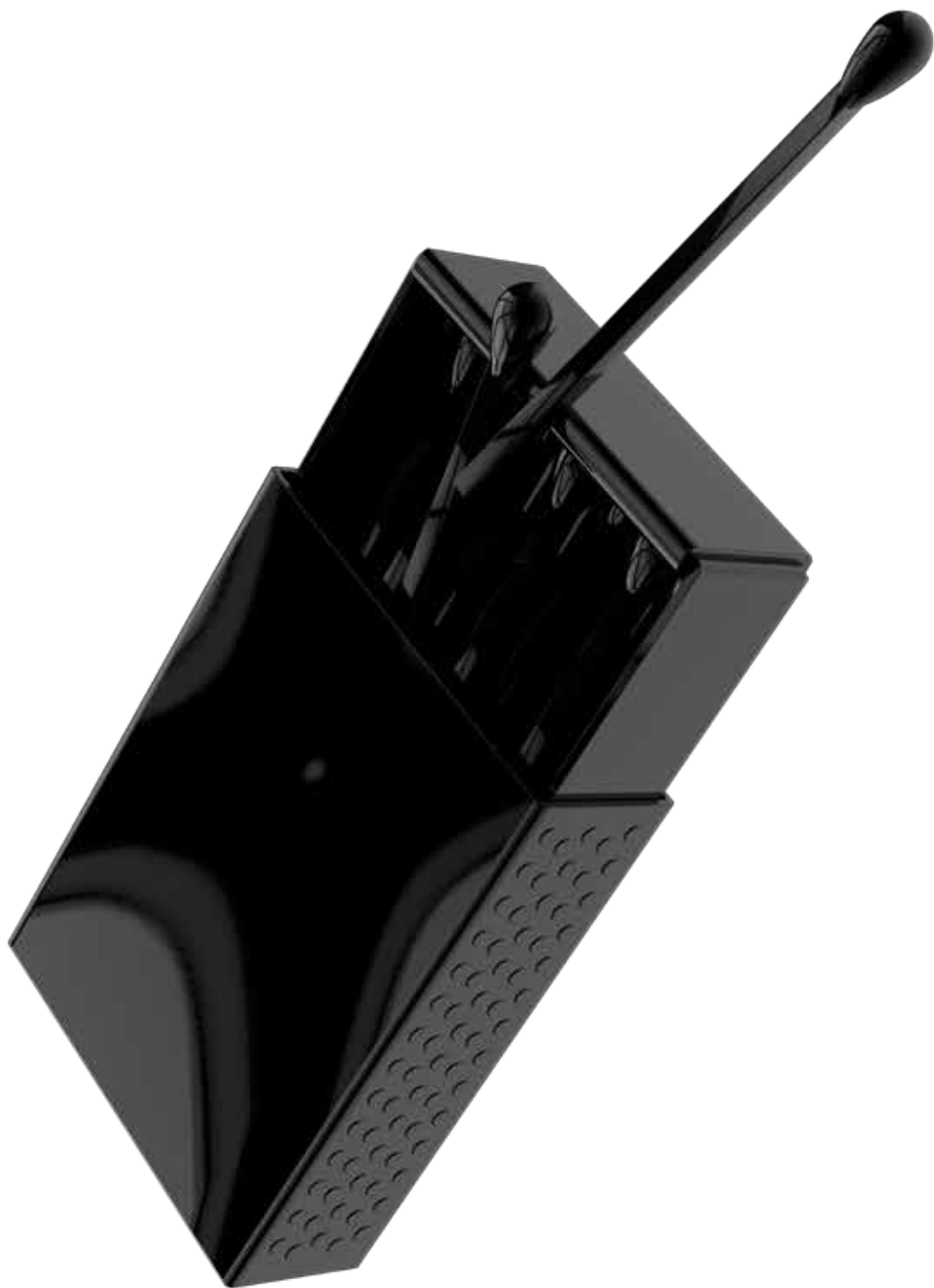
deals with — not just portrays — these low-odds, high-cost catastrophes.

How should scientists and communicators cultivate social conversations about global catastrophic risks? Simply providing information doesn't change people's mind about climate change, as a study by Martin Pachen for the Purdue Climate Research Centre indicated in 2006. Could artists, Hollywood, sci-fi writers and other cultural creators play a part? From a social science perspective, it's not clear whether disaster films (often with questionable scientific content) make people more or less aware of risk. Research by Anthony A. Leiserowitz published by *Environment* in 2004, did show that the film *The Day After Tomorrow* had a significant effect on people's perception of climate change. The Economic and Social Research Institute will survey exhibition visitors to find out how framing affects perception of these global risks. And a group of new commissions pairing artists with four Science Foundation Ireland (SFI) -funded research institutes will examine aspects of humanity's future in the face of specific global catastrophic risks.

In general, human society is bad at preparing for dangerous, low-probability events. Yet culturally, we are surrounded

by portrayals of exactly this, from Netflix to our national theatre. Scientists working in fields as disparate as immunology and astronomy are researching topics that could have a very real effect on our ability to prevent, prepare for, or survive a catastrophe. We should think carefully about our plentiful cultural conversations about catastrophe, where science and culture are colliding before our eyes, before it's too late.

The exploration of catastrophic risk is not a solitary pursuit. It requires the merging of ideas and input from a variety of people, disciplines, organisations and perspectives. Science Gallery at Trinity College Dublin is incredibly grateful to our programme partners, Science Foundation Ireland (SFI), the NTR Foundation, and the Health Research Board (HRB) for their support in bringing this exhibition to fruition as well as all the expert advice we have received during its development from our advisors, Leonardo group, and other institutes. **IN CASE OF EMERGENCY** is the result of many minds thinking on how best to delve into the complexities of catastrophic risk — we welcome you to this speculative and momentary clash with the end of the world.



ESSAYS

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# **WE ARE POORLY EQUIPPED FOR MAKING DECISIONS ABOUT CATASTROPHES**

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**PETE LUNN**

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**ECONOMIC AND  
SOCIAL RESEARCH  
INSTITUTE  
(ESRI)**

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**ESSAYS**

**IN CASE OF EMERGENCY**

Our brains process probabilities in a coarse fashion, barely distinguishing between one-in-a-thousand, one-in-a-million, and one-in-a-billion risks. It is only a slight exaggeration to say that the human brain codes risks in about five categories: 'won't happen', 'unlikely', 'fifty-fifty', 'likely', and 'will happen'.


Human beings are evolved organisms. No other life form has ever had the opportunity to adapt to cope with extremely low probability catastrophic events. How could they, given how rarely such events occur? Consequently, we are poorly equipped for making decisions about unlikely but massive catastrophes.

Sure, we can understand the technical meaning of, say, a one-in-ten-thousand chance, but we do not and cannot accurately process such tiny probabilities in our decision-making; we have no intuition for them. Yet the advance of science is such that humans can now identify multiple catastrophic risks.

We can estimate their probabilities and consequences, and even estimate the degree of confidence we have in those estimates. But what then? Suppose we have resources to allocate. Is it better to spend them mitigating a one-in-a-thousand risk of a catastrophe that would devastate a continent, or a one-in-a-

million risk of the complete extinction of the species?

So, for all the brilliant things a human brain can do, you and I do not possess the mental equipment to make decisions like these — no one does.



ESSAYS

IN CASE OF EMERGENCY



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# THE HUMAN SPECIES WILL DIE OUT BECAUSE OF INABILITY TO REPRODUCE BIOLOGICALLY

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CLIONA O'FARRELLY

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PROFESSOR OF  
COMPARATIVE  
IMMUNOLOGY,  
TRINITY COLLEGE  
DUBLIN

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IN CASE OF EMERGENCY

The evolution, success, survival and demise of most species span millions of years. Humans have only been on the planet in our present form for thousands of years, and it is not likely that we will be around for many more thousands. The emergence of intelligence and language (the large brain!) in *Homo sapiens* has accelerated our success faster than any other species on the planet. The same intelligence and linguistic ability will inevitably accelerate our own demise.

Most educated human societies now experience falling rates of reproduction — many countries in Europe and the Americas are below replacement. Even the BRIC countries (Brazil, Russia, India and China) have plummeting birth rates. Personal choice by (mainly!) educated female populations contributes significantly to this decline. However, rates of infertility amongst couples seeking to reproduce have also shot up in recent years. Five decades ago, medical textbooks estimated that one in ten couples would experience infertility; now, current textbooks quote figures of one in six. Numbers and quality of human sperm have been falling steadily for over forty years. Interest in sexual activity is declining amongst young people. Workplace stress, sleeplessness, obesity,

loss of circadian control, social media and spiralling levels of screen time are all thought to contribute. Ongoing chemical pollution of water, air, soil, and our food chain is having unmeasured effects on human physiology, immunology, endocrinology — and reproduction.

The net result of all this is that we will probably just peter out as a species, leaving the planet to bats, cockroaches, microbes and all the other species who seem to manage their existence better!



ESSAYS

IN CASE OF EMERGENCY

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# CATASTROPHE AND POPULAR CULTURE

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**AILISE BULFIN**

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**DEPARTMENT OF  
ENGLISH, NATIONAL  
UNIVERSITY  
OF IRELAND,  
MAYNOOTH**

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ESSAYS

IN CASE OF EMERGENCY

Images of catastrophe saturate modern popular culture. From mega-tidal waves in films like *The Day After Tomorrow* and *Geostorm* to howling clouds of ash and dust in *The Road* and *Interstellar*, these images are embedded in our visual culture and help provide a framework for how we think about real catastrophic risks.

Every summer, blockbusters compete to portray the demise of life as we know it in innovative ways, while streaming services like Netflix have vast catalogues of similar TV series. Post-apocalyptic scenarios proliferate in mainstream cinema, and that individual embodiment of the apocalypse, the zombie, is everywhere. Even the term ‘apocalypse’ has lost its original religious meaning and become a convenient everyday shorthand for referring to the set of feared catastrophes depicted in these narratives. So what are we to make of all this bleak imagery?

Many commentators argue that we live with an abiding sense of escalating crisis and imminent social collapse, and an accompanying belief that, as individuals, we are all but powerless to do anything about it. This is particularly true for the vital issue of anthropogenic climate change, a major subject of recent films. Watching or reading about fictional


disasters has been shown to provoke the same visceral emotional responses in our bodies as when we experience real events. Even though we know the fictional events are unreal, the emotional impact combined with knowledge of real threats has potentially profound effects.

Certainly the endless recycling of catastrophic images works to confirm negative assumptions and may reinforce apathy. However, viewers are capable of producing sophisticated responses to even simplistic popular narratives, with surveys showing that people listed many positive changes they would consider making in response to the unrealistic rapid climate-change scenario in *The Day After Tomorrow*.

Adaptation is the key word here — mass catastrophes that cause drastic irrevocable change are relatively rare and adaptability a key human quality. The important thing is to begin to change the narrative, to decouple the prevalent association between the environment and disaster, and to highlight the many positive social changes that adapting to climate change may produce.

How this is achieved in a culture addicted to the spectacle of mass destruction is a big question. However, few catastrophe narratives are entirely

nihilistic and many contain the counter-assumption that human ingenuity will provide some kind of workable solution to the emergency.





EXHIBITS

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## 64 THINGS TO WORRY ABOUT

BLUE GOOD. RED BAD. DON'T WORRY. 2016

ROBBY COLLINS, RADICAL DESIGN RESEARCH (IE)

*64 Things To Worry About* is a living picture. A grid of diffused lights in a deep wooden frame, designed to be hung on a wall in place of a clock, providing a heat map of the state of the world.

Each light in the 8x8 grid represents a specific danger indicator, including radiation levels, seismic activity, global warming, and the use of certain critical words on social media. If most of the lights are in the blue/green range, all is well. If they start shifting to the red end of the spectrum, or turning off, then it's time to gather your loved ones and make your peace with the world.

The frame twinkles gently and updates every ten minutes, providing a quick indication of whether you can continue getting on with your life with an easy mind, or if you should start stocking up on non-perishable goods.

In this era of #fakenews, it's good to have a direct line to the apocalypse. This piece is designed to be treated as a piece of furniture to be hung in every home.

## BIO

Robby Collins practices as Radical Design Research, a speculative design house which imagines products of the near future and uses the exploration of these artifacts as a way to reveal the hidden pitfalls in tech solutionism and digital hegemony.

Robby has been tinkering with programming, music, electronics and fictions for far too long. In recent years, he has been increasingly involved with combining activism with technology and has recently earned an MSc in Interactive Media. He has co-founded an art centre and a hackerspace but is now happier to work in his own quieter place, reaching out with regular lectures and workshops promoting design fiction and speculative design.

radicaldesignresearch.com  
@robmakesthings

## AN OLFACTORY PORTRAIT OF THE AMAZON RAINFOREST

INTERACTIVE PERFUME INSTALLATION ABOUT THE AMAZON, 2017

CATHERINE SARAH YOUNG (PH)

What do we lose if we lose the Amazon? *An Olfactory Portrait of the Amazon Rainforest* explores the vanishing Amazon through scent. This ecosystem includes flora, fauna, and indigenous communities. Smell is closely related to memory, and so in smelling the scents, perhaps you can recall some of your memories and create a personal relationship with the rainforest.

The Amazon, which sequesters tonnes of carbon from the atmosphere and helps stabilise our climate, is currently under threat from deforestation, mining, and other destructive human activities. The ephemeral nature of smell is also intended to be a metaphor for this vanishing rainforest.

Catherine Sarah conducted research for this project while being immersed in the Amazon jungle for ten days in Brazil in July 2017. The scents were created through chemical distillation and perfumery techniques. This is a continuation of her olfactory explorations, beginning with *The Ephemeral Marvels Perfume Store*, a perfume line of things we could lose because of climate change.

## BIO

Catherine Sarah Young is an artist, designer, and writer whose work explores emerging technologies and alternative futures through interactive storytelling and sensory experiences. She has collaborated with scientists, companies, chefs, artists, think tanks, and museums around the world. Catherine Sarah is the founder of *The Apocalypse Project*, an interdisciplinary platform that explores climate change and our environmental futures, and *Future Rx*, a platform for sustainability and environmental choices. She has spoken internationally about her work at various conferences and workshops, and has received grants and fellowships in New York, Barcelona, Seoul, Singapore, San Francisco, Palo Alto, Medellín, and the Amazon.

theperceptionalist.com  
apocalypse.cc  
@catherineyoung

# EXHIBITS

## CAN YOU PREDICT DISASTER?

RESEARCH STUDY INVESTIGATING RISK PERCEPTION, 2017

THE BEHAVIOURAL SCIENCE TEAM AT THE ESRI (IE)

An interactive exhibit that lets you take part in science (as well as learning about it). The Behavioural Science Team at the ESRI (The Economic and Social Research Institute) have prepared a real research study that will run throughout the course of IN CASE OF EMERGENCY; they are interested in finding out how different people predict all sorts of catastrophes. Visitors will be given the opportunity to (anonymously) volunteer their best guesses about the likelihood of different types of catastrophe, from viruses gone wild to asteroids hitting earth. This study will help the team to better understand how humans process risk and think about catastrophes. At the end of the exhibition, they will analyse and publish their results as a scientific paper.

## BIO

The Behavioural Science Team at the ESRI is a team of psychologists and behavioural economists who conduct research studies that provide evidence for policy. They carry out experimental studies and field trials to understand how people make decisions, how people's decisions are affected by the way information is provided, such as marketing practices, and whether policy interventions can help. Currently, they are working on applying behavioural insights to areas as diverse as consumer decision-making, pensions, health, and the environment. Deirdre Robertson and Pete Lunn created this study for IN CASE OF EMERGENCY to find out more about how we all may perceive or misperceive risk.

@esri

# IN CASE OF EMERGENCY

## CDS MESS

A CARD GAME ABOUT FINANCIAL INSTRUMENTS, 2015

DEREK CURRY, JENNIFER GRADECKI, DEVIN WILSON (US)

*CDS Mess* is a card game that teaches players how Collateralised Debt Obligations (CDO) and Credit Default Swaps (CDS) were used in the subprime mortgage crisis. In 2010, Derek Curry and Jennifer Gradecki founded Bankster Games, an initiative that makes digital and analog games designed to teach players who lack expertise in finance how complex financial instruments work and how they are used (and misused). Bankster Games uses play to facilitate experiential learning so that players may better understand financial fraud and complex financial instruments with the goal of increasing the possibility of public oversight in the highly technical realm of finance. *CDS Mess* is their first analog game.

The basic gameplay of *CDS Mess* is similar to the game *Rummy*. The instructions have several variants that mimic proposed regulations of credit default swaps that were never enacted, so that players can experience the impact regulations can have on how financial instruments affect society.

Bankster Games is premised on the idea that future financial collapses are preventable if the public can better understand how finance works to advocate for change or intervene in the process.

## BIO

Bankster Games is an initiative founded by Derek Curry and Jennifer Gradecki in 2010 as they were completing their Master of Fine Arts programme at the University of California, Los Angeles. In response to the 2008 financial crisis, Bankster Games creates digital and analog games that illustrate aspects of financialisation to people outside of finance in a way that is fun and accessible. Derek and Jennifer are artist-theorists completing their PhDs at SUNY Buffalo, and both are assistant professors at Northeastern University's College of Art Media and Design. Derek and Jennifer created it with Devin Wilson, an artist-theorist completing his PhD at Georgia Tech.

bankstergames.com  
@jgradecki  
@Devin\_Wilson  
@Derek\_C\_Curry

## DISASTER GAMES

When the Science Gallery Dublin team set to work gathering board games with apocalyptic themes, we were surprised by just how many there were. As humans, we certainly like to play out our doom from the safety of our living rooms. You can find a selection of disaster boards games in the Doomer Bar. Grab a few friends and experience as many different end-of-the-world scenarios as you can stomach. Do not pass go, do not collect €200, do not stop to feed the zombies.

Games include:  
*This War of Mine*  
*Dead of Winter*  
*Hotshots*  
*Pandemic*  
*Nuclear War*  
*Coup*

@SciGalleryDub

## DOOMSDAY CLOCK

Bulletin of the Atomic Scientists (US), 1945–2017

The Doomsday Clock is not a physical clock; it's a symbol, designed to warn us about how close we are to the end of the world. The closer we are to midnight, the closer we are to doomsday. It was conceived by the *Bulletin of the Atomic Scientists* in 1947 when the biggest threat to the human world was nuclear war. However, since then, the world has progressed and climate change has been included in the decision-making for the hand-setting of the clock since 2007.

It has been reset 22 times altogether, and is now set at two and a half minutes to midnight — a change made in 2017. When deciding what time to set, the Science and Security Board of the *Bulletin* take into consideration the number and kinds of nuclear weapons in the world, the parts per million of carbon dioxide in the atmosphere, the rate of sea level rise, and the degree of acidity in our oceans. They also look at attempts taken by leaders and citizens alike to combat these dangers, and how these are followed through.

@BulletinAtomic

## EXHIBITS

## EPIDEMIC EVENT HORIZON

SPREADING PATTERNS OF PANDEMICS IN A GLOBALISED WORLD, 2013-2017

DIRK BROCKMANN (DE)

Today, global mobility takes place on a complex network of more than 25,000 connections between more than 4,000 airports worldwide. More than three billion passengers travel each year on the global air transportation network, travelling more than fifteen billion kilometres in total every day — three times the radius of our solar system.

Because of this global connectivity, emergent epidemics, like the 2009 flu pandemic, spread in a complex and seemingly unpredictable way. This is because we still think in terms of traditional geographic distances.

If we look at spreading patterns from the perspective of a virus, we can replace geographic distance with a more suitable notion of distance: if many passengers travel between two locations, they are effectively closer, and when few people travel between two airports, they are further apart.

Given a particular outbreak location — for instance, an airport in West Africa during the Ebola crisis — we can use this new notion of effective distance in combination with computer simulations to compute the most likely pathways to other locations in the world via air traffic, and illustrate how close a given airport is to the outbreak location. The interactive tool can be used to select potential outbreak locations and identify, on the fly, how a virus will travel.

BIO

Dirk Brockmann studied theoretical physics and mathematics and is a professor in the Department of Theoretical Biology at Humboldt University of Berlin and the Robert Koch Institute, Germany's federal institute for public health. He studies complex systems in biology, physics, social sciences and epidemiology. He has pioneered the studies of human mobility using proxy data and has discovered universal scaling laws in human mobility based on the analysis of geographic movement patterns of dollar bills collected at the online bill-tracking website [wheresgeorge.com](http://wheresgeorge.com).

[rocs.hu-berlin.de](http://rocs.hu-berlin.de)  
@DirkBrockmann

ESSENTIAL KNOWLEDGE: A SERIES OF DRAWINGS TEACHING BASIC SKILLS FOR SUCCESS IN CHALLENGING SITUATIONS

DRAWINGS TEACHING SUCCESS IN CHALLENGING SITUATIONS, 2011-2017

COLIN MATTHES (US)

In 2012, Colin Matthes spent a year on the barren Atlantic coast of Ireland, where the weather is an ever-present and dominating factor in people's daily lives — from extreme rain to harsh, gusting winds. Each day, the artist would need to take the hour walk from his cottage to the studio. "I would find myself screaming and laughing, freezing and soaked, on these walks across rock in the middle of nowhere, and I began to imagine all the ways people have 'made do' here for generations with access to almost nothing," he says. "What would I need to know in order to thrive while stranded here? These considerations were the beginning of *Essential Knowledge*."

This series of work has continued to grow since Colin's time in Ireland. For the past five years, he has worked this a series of drawings, teaching skills for success in challenging situations. He has made forty drawings while working in three countries and gathering content from personal experience, research, and imagination. The subjects range from surviving a grizzly attack to soothing a baby, from making coffee on the road to constructing a mobile border wall.

BIO

Colin Matthes grew up in an old farmhouse a mile away from a village with three bars, a post office, and the world's greatest junk parade. Installing temporary electricity at small town county fairs, wiring trailer parks, and punk rock formed the way he makes things and views the world.

Lately, he has been bringing his infant daughter too close to bears, making graphics for activist campaigns, working too many jobs, and visualising his versions of essential knowledge.

[colinmatthes.com](http://colinmatthes.com)  
@ColinMatthes

## IN CASE OF EMERGENCY

## EYJAFJALLAJÖKULL

ASH FROM EYJAFJALLAJÖKULL, 2010  
VOLCANO HOUSE (ISL)

When a sub-glacial eruption occurs, the volcano melts gigantic amounts of the glacier, which falls into the volcano. This combination of water and magma creates a bubbling cauldron with tiny explosions which, in turn, creates this incredibly fine ash but produces no lava. This was present in the ash cloud that created significant air travel disruption in 2010.

### BIO

Volcano House is a geology museum right in the heart of downtown Reykjavik. Their aim is to educate visitors about the phenomena of Iceland's volcanoes and showcase how it has affected this small population.

[volcanohouse.is](http://volcanohouse.is)

## FRAMEWORKS OF ABSENCE

IMPRINTING SPECIES LOSS TO COUNTER  
FUTURE EXTINCTIONS, 2006-ONGOING

### BRANDON BALLENGÉE (US)

Brandon's work reflects that we are in the middle of a biodiversity crisis, often referred to as the Anthropocene or sixth great extinction. Species are disappearing at upwards of a thousand times the natural rate. Hundreds, perhaps thousands of animals have disappeared from the Americas in recent centuries. Such extinctions started when the Europeans first colonised these new lands and have continued until today with recent losses like the Eastern Cougar (2013), Pinta Island Tortoise (2012), Florida Fairy Shrimp (2011), and many others.

Responding to this, Brandon physically cut images of missing animals from historic prints and publications printed at the same time in history when the depicted species became extinct. The resulting image minus the subject is what he refers to as a *Framework of Absence*.

Acquired over several years, these prints, dating from 1585 to 2014, reflect the long term and continued decline of biodiversity. The cut animal images are burned and cremated remains are gathered. Participants are then asked to scatter these ashes in memory to species gone. This action is intended as a transformative event for individuals: at once imprinting species loss at a personal level and also importantly an invocation towards a conservation mindset to counter future extinctions.

*The Frameworks of Absence* is accompanied by the *Book of the Dead*, a memorial book of lost species that is available to the public.

### BIO

Brandon Ballengée was born in 1974, he is a visual artist, biologist and environmental activist based in Arnaudville, Louisiana. Brandon creates transdisciplinary artworks inspired from his ecological field and laboratory research. Since 1996, a central investigation focus has been the occurrence of developmental deformities and population declines among amphibians and other ectothermic vertebrates. Since 2016, he has been a Postdoctoral Research Associate at the Museum of Natural Science at Louisiana State University and is a 2017/18 Smithsonian Artist Research Fellow at the National Museum of Natural History (NMNH) and Smithsonian American Art Museum (SAAM) in Washington D.C. examining species missing from the Gulf since the 2010 oil spill.

Ballengée's artwork has previously been exhibited throughout the USA and internationally in eighteen countries. His art has been featured in numerous major publications, including *ARTnews*, *The New York Times*, *New Yorker*, *The Observer* (UK), *The Guardian* (UK), and *BBC News* (UK).

@bballengée  
[brandonballengée.com](http://brandonballengée.com)

# EXHIBITS

# IN CASE OF EMERGENCY

FUTURE MINERS: EXAMINING FUTURE  
FABRICATION AND MANUFACTURING  
MODELS WITHIN LIVING SYSTEMS

LIVING SYSTEMS, MATERIAL RESOURCES,  
SUSTAINABILITY, 2016

### JENNY LEE (GB)

This piece was created in collaboration with iCrag, the Irish Centre for Research in Applied Geosciences.

As the global population rises, so does our dependence on nature's resources to sustain human life. But humankind's activities have had a detrimental effect on our ecology — climate change, a rapid decline in biodiversity and a growing population are stretching our planet beyond its ability to regenerate.

With depleting resources, we are facing critical challenges in how we continue to meet the growing needs of society.

In the not-so-distant future, humankind has run out of resources; in order to sustain human life, humankind must become nature's preserver, protector and carer. No longer can humankind continue to exploit nature; instead it must develop a symbiotic relationship with nature to enable both living entities to co-exist in the future. Humankind must not only embrace nature, but also question how each precious material is utilised — should we save lives using gold for disease detection, or to adorn the body for aesthetic means?

The mining industry has provided the fundamental building blocks for human development. The supply of metal and mineral products has underpinned human endeavour through millennia. However, Earth's resources are finite and current mining methods are not sustainable.

Biomining is an innovative extraction method using existing living systems in nature to obtain desired metals from ores.

### BIO

Jenny Lee's work is driven by design fiction methodologies, creating speculative narratives and design probes to elicit critical debate and discussion around the social, ethical and environmental implications of how we choose to utilise science and technology to craft a better tomorrow.

The hybrid approach of her practice is grounded in aesthetic sensibilities and inherent codes of human design, which has inspired the cultivation of original ideas that make tangible the most poignant of our social, ethical and environmental futures.

Jenny describes herself as an agent of change using materiality and design as a tool to provoke meaningful public engagement in questioning mankind's role in the preservation of our future environments.

[aikieu.com](http://aikieu.com)  
@studioaikieu  
@iCRAGcentre

## GRB-LOCATOR-ARRAY

EXPLORING THE REAL-TIME DISTRIBUTION  
OF GRBS, 2017

FIONA MCDONALD, DAVID MURPHY, NEIL  
SMYTH, BRIAN MURPHY, DANIEL VAGG,  
JOHN QUINN & ANTONIO MARTIN-CARRILLO  
(IE & ES)

This piece was created in conjunction with researchers at CONNECT, the Science Foundation Ireland Research Centre for Future Networks and Communications and at AMBER, a Science Foundation Ireland funded centre that provides a partnership between leading researchers in materials science and industry.

Gamma-ray bursts (GRBs) are extremely energetic explosions that have been observed in distant galaxies. In a few seconds, they can release three times as much energy as the Sun will in its entire lifetime. A GRB aimed at the Earth could deplete the ozone layer, cause acid rain and initiate a round of global cooling from as far as 6,500 light years away. Such a disaster may have been responsible for the mass die-off of 70% of marine creatures that thrived during the Ordovician period, 488 to 433 million years ago.

The collaborative project *GRB-Locator-Array* explores real-time data from the Gamma-Ray Coordinate Network, which records the distribution of GRB locations detected by the spacecraft Integral, Fermi and Swift, and the real-time light curve data from Swift. This data is tracked in real time, but as GRBs have travelled billions of light years from distant galaxies before they are detected by the spacecraft, in some ways, the exhibit lets us look into the past. Thus, through a series of interventions exploring data-driven sculpture, data sonification, LoRaWan technology and augmented reality, the *GRB-Locator-Array* allows viewers to contemplate space-time, distance and our place in the multiverse.

### BIO

Fiona McDonald is an artist-in-residence with the High Energy Astrophysics Group at UCD and visiting lecturer on the Interaction Design MA, NCAD, Dublin. Her works look at live networks and explore the idea of making these communication/data systems tangible or physical.

David Murphy is a PhD researcher in the UCD Space Science Group and is the systems engineer for EIRSAT-1 — Ireland's first satellite.

Antonio Martin-Carrillo is an Adjunct Assistant Professor at UCD School of Physics.

Neil Smyth is an artist and researcher at CONNECT in Trinity College Dublin.

Brian Murphy is working on CONNECT's Pervasive Nation IoT network at TCD.

Daniel Vagg is systems architect for Parameter Space Limited, UCD.

John Quinn is an Associate Professor at UCD School of Physics.

[fionamcdonald.digital](http://fionamcdonald.digital)  
@connect\_ie



## KEEPALIVE

PERMANENT OUTDOOR SCULPTURE,  
SPRINGHORNHOF NEUENKIRCHEN, 2015

ARAM BARTHOLL (DE)

*Keepalive* looks just like a normal rock from the outside. There is no sign that the stone, which lies inconspicuously in Lüneburger Heide on the edge of idyllic Hartböhn, contains hundreds of digital books. An internal thermoelectric generator and WiFi router must be activated by lighting a fire under the rock before an electronic survival guide library can be accessed. Data and text can also be added by smartphone or laptop.

Aram is a media artist who works with paths of knowledge and information communication that work against the developments of the digital age and question our handling of data. In this and other projects, he undermines power structures and control mechanisms in the use of internet services and data transmission, mostly through the introduction of a random, uncontrollable element.

In *Keepalive*, the stone itself becomes the data medium. In a very archaic, but at the same time clandestine manner, information can be exchanged only locally — in contrast to networked servers, services and clouds worldwide, this rock is not connected to the internet. You have to get close to nature in the countryside, find the stone and make a fire to activate the data source. Anyone can do it once they have found out the exact location of the stone from either the nearby Kunstverein Springhornhof or another source.

Following the advice in the survival guides prepares you — this is the promise at least — for solo survival in the chaotic world of computer programming as much as for solo survival in the wilderness. *Keepalive* examines what ‘survival’ really means and sounds out our true needs. The work resists the centralising forces of the Internet, raises questions about the democracy of knowledge management and ignites an autonomy backlash.

## BIO

Aram Bartholl's work creates an interplay between internet, culture and reality and questions how our taken-for-granted communication channels influence us. Aram asks not just what humans are doing with media, but what media is doing with humans. Tensions between public and private, online and offline, techno-lust and everyday life are at the core of his work and his public interventions and installations, often entailing surprisingly physical manifestations of the digital world, challenge our concepts of reality and incorporeality. Aram has exhibited at the Museum of Modern Art, New York (MOMA); Skulptur Projekte Münster; and London's Hayward Gallery as well as conducting countless workshops, talks and performances internationally. Bartholl lives and works in Berlin.

arambartholl.com  
@arambartholl

## M-ARK (MICROBIOME ARK)

HUMAN MICROBIOME SATELLITE TO  
KICKSTART PANSPERMIA, 2017

BYRON RICH (CA)

This piece was created in collaboration with CURAM, the Science Foundation Ireland Centre for Research in Medical Devices.

*M-Ark* is a project that tackles the prospect of a future in which humanity has rendered our planet inhospitable; a prospect made all the more possible with the United States pulling out of the Paris Agreement. *M-Ark* uses the philosophically compelling theory of panspermia, the idea that life on earth originated from microscopic life on asteroids that collided with earth, as its underpinning purpose. *M-Ark* is a small satellite that carries on board a human microbiome, capitalising on the theory that humanity evolved out of the necessity of its microbiota. Microbiota is the ecological community of commensal, symbiotic and pathogenic microorganisms found on all multicellular organisms including bacteria, archaea, protists, fungi and viruses. This small satellite will be designed to crash back down to earth at a point at which climate conditions have once again become favourable, kick-starting panspermia.

## BIO

Byron Rich is an artist, professor and lecturer born in Calgary, Alberta, Canada. His work exploring speculative design, biology futures and tactical media has been widely shown and spoken about internationally. He pursued a degree in New Media at the University of Calgary before finding himself in Buffalo, New York where he obtained a Master of Fine Arts in Emerging Practices at the University at Buffalo. He now teaches Electronic Art and Intermedia at Allegheny College in Meadville, Pennsylvania.

byronrich.com  
@CURAMdevices

# EXHIBITS

## MODERN FOSSILS (GLOBAL WARMING)

REMNANTS OF THE LAST SURVIVING  
HUMANS, 2017

HEARTLESS MACHINE (US)

These solid concrete sculptures depict the final moments of the last few remaining humans, after the planet has been rendered uninhabitable by pollution and reckless wasting of resources. The fossils are part of a larger series based on over-consumption and wastefulness, mostly focusing on extinct technology. Each piece is cast using a handmade rubber mold and a secret blend of concrete, to simulate the look, feel, and permanence of stone.

## BIO

Chris Locke spent his formative years in and around Washington DC, immersed in art, history, and science. After graduating from George Washington University, he founded Heartless Machine, and moved to Austin to pursue a career in art, which evolved into a career in teaching.

Well-versed in a wide range of fabrication skills, including metalworking, fine woodworking, theatrical set construction, and mechanics, he finds great joy in the challenges and processes of creating, and enjoys sharing those skills with others.

Chris's art blurs the lines between man and machine, old and new, and science and art. He also creates work that heavily relies on the concepts of waste avoidance and social commentary.

He has participated in several festivals and gallery shows across the US, and sells work worldwide through his own website. He has been featured in several books and major magazines in several languages, and fantasizes about someday being regarded as “the David Hasselhoff of welding”.

heartlessmachine.com  
@restequalrust

## NEW SURVIVALISM

SURVIVAL, BUG-OUT BAG, UNCERTAIN  
FUTURE, COMFORT BLANKET, 2014

PARSONS & CHARLESWORTH (GB)

Since the threat of nuclear cataclysm in the mid-twentieth century, survivalism has embedded itself in the public consciousness as an attitude for those intent on planning for the worst case scenario. In the face of recent financial, political and environmental turmoil, there has been increased interest in survivalism, but few progressive ideas as to what it might mean. Typically, survivalists focus on tried-and-tested means — rejecting new technology and going back to basics, and stockpiling food, medical supplies and possibly weapons. As an approach, it is generally insular and antisocial — yet, as a subject, it is universal when we consider what we would do in the face of disaster.

*New Survivalism* is a series of alternative survival kits, or bug-out bags, for three fictional protagonists: The Biophotovoltaics Hacktivist, The Re-Wilder, and The Object Guardian. Using designed objects and storytelling, the project reveals the survival strategies of a disparate set of protagonists, each with a very different take on what they ‘need’.

Bug-out bags are portable kits for short-term evacuation after a disaster. As a limited set of objects, the contents are an embodiment of the owner's values and principles — a comfort blanket for their uncertain future. *New Survivalism* asks: What alternative scenarios of survival are there that avoid the bunker mentality, and respond to current research into technological change, environmental conditions and belief systems?

## BIO

Working across a variety of media, Parsons & Charlesworth create objects, installations, texts and images that encourage reflection upon the current and future state of our designed culture. By employing objects and futures alongside narrative and speculation, new ways of living are prototyped, often proposing what does not exist yet and asking — what if it did?

Founded by designers Tim Parsons and Jessica Charlesworth, the studio is a grounding place to explore how issues like climate change, personal survival and happiness can be reconsidered using designed objects as agents of change, to generate meaning and comment on important issues.

Parsons & Charlesworth have presented and exhibited extensively internationally. Their work is featured in various private collections and in the permanent collection at the MAK Vienna.

Tim Parsons is Associate Professor and Chair of the Designed Objects programmes and Jessica Charlesworth is a lecturer in Designed Objects in the Department of Architecture, Interior Architecture and Designed Objects, both at the School of the Art Institute of Chicago.

parsonscharlesworth.com

# IN CASE OF EMERGENCY

## PRIMARY EMERGENCY DOCUMENTS

Are you curious to find out what the Irish government has planned for an emergency? Do you know what the American government's proposal is to deal with a zombie apocalypse? We have collected primary emergency documents for a range of speculative disasters for our Doomer Bar. The Centers for Disease Control and Prevention in the U.S. advises that every family should be prepared with an emergency plan, and should discuss simple things like their escape route. If this is something you have never considered before, then this could be your chance to get some invaluable information on the topic.

@SciGalleryDub

## QUICK FIXES

The world is battling many different problems and potential apocalypses. But in the face of this adversity, humanity has invented many innovative ways to tackle these issues. *Quick Fixes* delves into these somewhat ridiculous and playful plans. If you felt disappointed that an important issue wasn't covered by the exhibits in the show, then you may be happy to hear that it's probably been covered by *Quick Fixes*. It also raises the question: Do we sometimes ignore a problem and try to solve it too late? For example — do we really need to invent robot bees, rather than dealing with the issues that are causing colony collapse in the first place?

@SciGalleryDub

# EXHIBITS

## SELECTIONS FROM THE MANUAL FOR CIVILIZATION

### COLLECTION OF BOOKS TO RESTART CIVILIZATION, 02014

#### THE LONG NOW FOUNDATION (US)

This collection of books contains selections from the *Manual for Civilization*, assembled by the Long Now Foundation and housed in The Interval in San Francisco, California. The full collection, when completed, will contain around 3,500 volumes to help restart civilization. The books are collected in four categories: Rigorous Science Fiction; The Mechanics of Civilization (how-to books); The Cultural Canon (works of literature, philosophy, religious texts); and Long-term Thinking and Futurism. Once the collection is full, new books can be added only by voting another book off the shelves. Over time, the conversation about what is in and out of the collection, and why, will become one of the most important aspects of the collection.

#### BIO

The Long Now Foundation was established in 01996 to develop the 10,000 Year Clock and Library projects, as well as to become the seed of a very long-term cultural institution. The Long Now Foundation hopes to provide a counterpoint to today's accelerating culture and help make long-term thinking more common. Through their projects and programmes, they hope to foster responsibility in the framework of the next 10,000 years.

longnow.org  
theinterval.org  
@longnow  
@interval

## SITUATION ROOM

### COMPLEX QUESTIONS RAISE DIFFICULT CHOICES...

The *Situation Room* is an immersive experience where visitors are faced with complex questions and difficult choices. Visitors take on the role of the Catastrophe Citizens' Assembly, where they are asked for their input on a range of catastrophic emergency scenarios. Through game play, voting, and discussion, the Catastrophe Citizens' Assembly must debate scientific, logistical, and ethical issues surrounding some of the biggest risks and threats to human species survival and the continued existence of life on Earth.

What would you do in the case of an emergency? What if what's best for you and your family isn't best for the people of Ireland, or for the human species, or for another species? What if a tsunami hits? Or a pandemic wipes out continental Europe? Is unchecked artificial intelligence a bigger threat than a food systems breakdown? Through a mix of humor and serious debate, the *Situation Room* provides a space, context, and props for imagining the end of the world and how humanity can act in the best interest of ourselves, our fellow species, and the planet that supports it all.

@SciGalleryDub

# IN CASE OF EMERGENCY

## THE ANTIBIOTIC RESISTANCE QUILT

QUILT MADE FROM ANTIBIOTIC RESISTANT BACTERIA, 2017

ANNA DUMITRIU (IN COLLABORATION WITH KEVIN COLE, NICOLA FAWCETT AND JOHN PAUL) (GB)

This cosy embroidered quilt hides a dark side; it uses actual infectious bacteria to reveal the emerging threat of antibiotic resistance, the ability of disease-causing organisms to combat the medicines we use to treat them.

The quilt is impregnated with actual traces of the most significant drug-resistant bacteria, such as strains of *Klebsiella pneumoniae*, *E. coli*, *Pseudomonas aeruginosa* and *Methicillin-resistant Staphylococcus aureus* (MRSA) grown on multi-coloured dye containing agar jelly, normally used for diagnosis. Some of the patches of silk have polka dots where discs of antibiotic impregnated paper have been effective in preventing the bacteria from growing. On other contrasting patches, the antibiotics have been completely overgrown by potentially deadly multidrug resistant bacteria that have evolved to beat our available treatments. The patches of silk were all sterilised prior to the exhibition.

Other patches of silk are impregnated with *E. coli* bacteria that have been genetically modified by the artist using a technique called CRISPR to remove its drug resistance abilities, suggesting that in the future, techniques such as synthetic biology might help solve the present crisis.

## BIO

Anna Dumitriu is a British visual artist working at the cutting edge of biomedical research, combining fine art, BioArt and craft techniques with microbiology, technology and synthetic biology. She has shown exhibits at the Picasso Museum in Barcelona; Laboratory Berlin; Museum of Contemporary Art in Taipei; Centre for Art and Media, Karlsruhe (ZKM); and the V&A. Her work is held in several major collections including the Science Museum London and Eden Project. She is artist-in-residence at the Modernising Medical Microbiology Project at the University of Oxford; and a visiting research fellow in the School of Computer Science at the University of Hertfordshire, Brighton and Sussex Medical School; and at the Waag Society.

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@annadumitriu  
@modmedmicro  
@DrNJFawcett

## THE BLUE ZONE

REDISCOVERY OF THE SHOWCASING OF A NUCLEAR HERITAGE, 2016

STÉFANE PERRAUD & ARAM KEBABDIJAN

*The Blue Zone* takes the audience on a journey of time weighted with history. The project is presented as a prospective study, carried out by an international scientific committee, to showcase a long neglected artistic heritage: nuclear memorial. *The Blue Zone* displays a genetically modified forest, planted on an old nuclear waste storage site in Bure, France, several years after its opening, by Stéphane Perraud, an early 21st century artist. 400 years later, in 2415, the leaves of this clonal colony of quaking aspen, unique to their kind, take in oxygen by turning blue and covering the floor of the forest in an azure carpet once autumn arrives. However, we do not know the primary purpose of this remarkable site, visited by thousands of tourists daily. Fictional tablets mention an ancient forest, to which a whole series of beliefs are attached; an imposing bibliography, attached to the trunks of the trees, alluding to the forests of the Great War, planted throughout the region of Meuse in order to stabilise the chemical agents that have polluted the soil. These references, accounts, fables, historical facts, like the ruins of an ancient fortification surrounding the area, seem to camouflage the nuclear waste as well as highlighting how impossible it is to forget.

## BIO

Stéphane Perraud is an artist with a background in performance and multimedia. Since 2008, he has been exploring the impasses and difficulties of what we call 'new media'. He performs a constant 'back and forth' between plastic and performative art. In 2010, he made nuclear energy and radioactive material one of his main areas of practice. He has approached this through several ways including fixation of Cherenkov radiation in a fluorescent aquarium, reconfiguration of the table of unstable isotopes and luminous representations of radionuclides,

In order to better understand the present, he uses a prospective approach to record his work. This project is an archaeology of the future.

For several years, Stéphane Perraud has been collaborating with writer Aram Kebabdijan. Together they created *Isotopia*, a semi-deserted polar island they use as a laboratory and as the place where the realisation of the works they imagine is possible.

# EXHIBITS

## THE BUSH BLASTER

A STRAP-ON POLLINATION CANNON, 2017

MIKE BIANCO (US & AU)

*The Bush Blaster* is a satirical strap-on pollination cannon, placed in the context of the current global honeybee crisis, and poking fun at the human proclivity to try and 'engineer' technological solutions rather than make serious social changes.

## BIO

Mike Bianco is an American-born artist, curator, cook, researcher, activist, and beekeeper. Bianco's art practice employs a number of methods, ranging from sculptural objects to socially engaged performances, and broadly engages the intersections of politics, the environment, interspecies relationships, and the impending 'century of crisis'. Mike's work has been exhibited in numerous international venues, ranging from the Perth Institute of Contemporary Arts, Western Australia, to the Kenpoku Art Festival in Ibaraki, Japan.

biancoprojects.com  
@iamhomoapis

## THE CHINESE "DUST BOWL"

DESERTIFICATION CAUSED BY ECOLOGICALLY DAMAGING HUMAN ACTIVITIES, 2006

BENOIT AQUIN (CA)

Deserts now cover 18% of China, and a quarter of them were caused by ecologically damaging human activities. Overexploitation of arable land, overgrazing and increasingly deep drilling for water are at the root of what has become the Chinese "Dust Bowl", a phenomenon that hasn't been seen since the 1930s, when the American Midwest and Canadian Prairies suffered from a devastating drought. China's situation is quickly becoming the world's most massive and rapid conversion of arable land into barren sand dunes. The resulting sand is picked up by the wind and transported (in the form of giant sandstorms) all over China and into Korea, Japan, and even North America.

In an effort to reverse the situation, the Chinese government has initiated the largest environmental restoration initiative the world has ever seen, and has begun a mass exodus of environmental refugees displaced by the advancing sand.

## BIO

Humankind's relationship with the environment is a common denominator in Benoit's work as a whole. The environment thus becomes a generic term to define dynamics involving social, economic and spiritual elements. Benoit believes in the power humans have to create their future. His documentary projects have depicted catastrophic oil spills, overexploitation of arable land, and poor agricultural techniques and resource-extraction methods.

His work resides in several collections, including the Montreal Museum of Fine Arts, Canada; the National Gallery of Canada; the Library of Congress in Washington, USA; and the Collection Pictet in Geneva, Switzerland. Benoit is the recipient of the *National Magazine* Silver Award for Photojournalism and Photo Essays (2007) and the Prix Pictet (2008) and is represented by Galerie Hugues Charbonneau in Montreal, Canada.

benoit-aquin.com

# IN CASE OF EMERGENCY

## THE END OF 'THE END OF HISTORY'

PREDICTIONS FOR AN UNPREDICTABLE WORLD, 2015

RODRIGO LEBRUN (BR & FR)

In 1890, English writer William Morris published *News From Nowhere*, outlining his multidimensional view of a socialist utopia. In the book, change was brought about by a situation of crisis through which new paradigms and a new society emerged. *The End of the 'End of History'* is a series of three fictional animated essays describing the years following the aftermath of the 2008 financial crisis.

Drawing parallels to William Morris' work, the project speculates on how macroeconomic events could lead to new economic crises, and the respective social responses and novel economic systems that could follow them. The series comprises of three animations exploring the different outcomes to those events; 'News from Somewhere', 'The Big Freeze' and 'Destructive Destruction'.

Each film also doubles as an interactive installation. When activated, oil, gold and dollar prices are used in real time to disrupt the narratives. This works as a reminder of the relentless and pervasive influence exerted by economics beyond the spheres of finance.

## BIO

Rodrigo Lebrun is a French/Brazilian artist based in the UK. He holds an M.A. in Design Interactions from the Royal College of Arts, London (RCA) under the supervision of professor Tony Dunne. His practice examines conflicting narratives that have emerged regarding digital technology and the hegemony of Western capitalism, and the role of both in financial crisis, consumption, nationalism and identity.

It is in this backdrop of instant reward versus long term collapse that the artist looks at alternatives to what professor Francis Fukuyama calls "The End of History".

The artist uses algorithms to create narratives that harness the invisible power of data and bring to surface a world informed by digital liberalism.

lbrn.org

## THE MARKER PROJECT

COMMUNICATOR OF RADIOACTIVE DANGER TO THE FUTURE, 1991

MICHAEL BRILL AND SAFDAR ABIDI (US & PK)

Human language has a 2,000 year cycle of survival, after which it dies. So how do you communicate the danger of a radioactive waste facility to people who come upon this facility, buried under a desert, 10,000 years from now? The U.S Department of Energy explored this challenge in the early 1990s by inviting a team of designers, architects, linguists, material engineers and anthropologists to design a method of communicating with the future.

Michael Brill and Safdar Abidi, both architects, had investigated Mike's thesis that physical form communicates to people without the use of language or symbols. This thesis speculates that human beings have a primal reaction to physical form based on a number of aspects including scale, texture, lightness, darkness, enclosure, and expanse. For example, for centuries people have visited Stonehenge, though it does not have language, symbols or other legible messages. *The Marker Project* explores a few designs to communicate peril and danger to future inhabitants of the planet.

## BIO

Safdar Abidi is an architect who lives and works in Canada. Originally from Pakistan, Safdar has always been fascinated by the role of culture in human experience, and the connections to place and people that culture provides. While studying architecture at the University of Buffalo, Safdar met and became friends with Michael Brill. Mike used to lead a design studio called The Natural Language of Form once every few years. Safdar took part in this studio, and investigated the design of a place that communicated the feelings of connectedness to a place and the loss of such place, without the use of any symbols or language. *The Marker Project* was a collaboration between Mike and Safdar as part of this ongoing investigation. Mike authored the concepts in collaboration with Safdar, and the artwork was developed by Safdar.

# EXHIBITS

## VOYAGE ON THE PLANET

SURVIVAL KIT FOR ADVENTURE, 2013

CHIH CHIU (TW)

There is a subtle and mysterious sense of a world in a state of flux, particularly when we see the rise of air pollution in crowded urban landscapes. Humans are curious about the unknown and wish to explore new territories. This survival kit facilitates us to do that. It allows us to continue to exist where we physically and spiritually belong, adapt to changing environments, and keep our original dreams as a compass for adventurous journeys.

## BIO

Chih uses absurdity, poetry and a range of intriguing materials to create physical objects that explore social and cultural mobility.

chiuchih.com  
@chiuchih26

## XENOPHON: ALMANAC OF TOMORROW

AN IMAGINED SURVIVAL GUIDE FOR TOMORROW, 2017

MCGIBBON O'LYNN (2017)

This piece was created in conjunction with researchers at CURAM, the Science Foundation Ireland Centre for Research in Medical Devices at NUI Galway.

The world today faces more threats than we can comprehend. Most of these are caused by humankind: nuclear war, climate change, inequality, societal breakdown and pollution are a few examples. So can the science of today be used to inform the ways in which we can survive the disasters of tomorrow? McGibbon O'Lynn's futuristic almanac, created in conjunction with researchers at CURAM Centre for Research in Medical Devices at NUI Galway, proposes a multitude of bio-tech inspired responses to a state of emergency. *Xenophon: Almanac of Tomorrow* is a trans-disciplinary, mixed media interactive work which confronts us with the question of what life would be like after an apocalypse and the strange ways in which people may have to change in order to survive.

## BIO

Irish artist Siobhan McGibbon, and writer and lecturer Maeve O'Lynn began collaborating together on *The Xenophon Project* in 2015; the project arose from Siobhan's period as artist-in-residence on the Chimera Art and Science Programme at CURAM, the Centre for Research in Medical Devices, at NUI Galway.

They employ a multi-disciplinary approach, combining contemporary arts practice with narrative and scientific research to imagine the future of the human species. With each body of work, McGibbon O'Lynn continue to build upon the narrative of this post-human world, pondering different dimensions and the consequences of bio-enhancements. McGibbon O'Lynn have exhibited in *The Future is Already Here*, Galway City Museum (2015) and *Why is it Always December*, The Millennium Court Arts Centre, Portadown (2016). Extracts from *The Xenophon Project* have also been published in the Winter 2016 issue of the literary journal, *The Stinging Fly*. Upcoming exhibitions include Tulca Festival of Visual Arts in Galway in November 2017 and Droichead Arts Centre, May 2018.

xenophonproject.org  
@xenophonproject  
@CURAMdevices

# IN CASE OF EMERGENCY



The artists would like to acknowledge the following for their support.

#### AN OLFACTORY PORTRAIT OF THE AMAZON RAINFOREST

Catherine Sarah Young would like to thank LABVERDE Art Immersion Program in the Amazon and the INPA National Institute of Amazonian Research in Manaus, Brazil for their support of this project.

#### APOCALYPTIC POSTERS

Science Gallery Dublin would like to thank the New York Historical Society for permission to use Thomas Cole's *The Course of Empire: Destruction*, oil on canvas (1836).

#### CDS MESS

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#### KEEPALIVE

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#### M-ARK

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#### NEW SURVIVALISM

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#### THE ANTIBIOTIC RESISTANCE QUILT

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#### THE CHINESE "DUST BOWL"

Benoit Aquin would like to thank Patrick Alleyn, the writer, who worked with him on the Chinese "Dust Bowl" project.

#### THE END OF 'THE END OF HISTORY'

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#### XENOPHON: ALMANAC OF TOMORROW

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## CREDITS

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#### AMBER

AMBER (Advanced Materials and BioEngineering Research) is a Science Foundation Ireland funded centre that provides a partnership between leading researchers in materials science and industry. AMBER researchers work with materials that will transform everyday products of the future, from mobile phones to knee implants, batteries to beer bottles. AMBER is jointly hosted in Trinity College Dublin by CRANN and the Trinity Centre for Bioengineering, in collaboration with University College Cork and the Royal College of Surgeons in Ireland.

#### CONNECT

CONNECT is the world-leading Science Foundation Ireland Research Centre for Future Networks and Communications. CONNECT is funded under the Science Foundation Ireland Research Centres Programme and is co-funded under the European Regional Development Fund. It engages with over 35 companies including large multinationals, SMEs and start-ups. CONNECT brings together world-class expertise from ten Irish academic institutes to create a one-stop-shop for telecommunications research, development and innovation.

#### CÚRAM

CÚRAM is a national research centre advancing research and development in the medical device sector. Supported by Science Foundation Ireland, CÚRAM enhances Ireland's standing as a major hub for the global medical devices industry. Based at NUI Galway, CÚRAM works with industry and clinical partners to radically improve health outcomes for chronically ill patients by enhancing and developing both traditional and new combinational medical devices from molecular design stage to implant manufacturing. Follow @curamdevices on Twitter and read more at [www.curamdevices.ie](http://www.curamdevices.ie)

#### ICRAG

iCRAG, the Irish Centre for Research in Applied Geosciences, is Ireland's national geoscience research centre, supported by Science Foundation Ireland, the European Regional Development Fund and industry partners. Their mission is to transform geoscience research and education in Ireland, by driving discovery, delivering economic and societal benefits, and advancing public understanding of their science.

iCRAG's multidisciplinary research transcends industry and academic boundaries to address key research challenges in the fields of energy security, raw materials supply, groundwater protection, and safeguarding the geomarine environment.

Comprising 150 researchers and seven research institutions across Ireland, and collaborating with more than sixty industry partners, their vision is to help unlock Ireland's natural resources through developing improved technical knowledge and innovative techniques, which are embedded within the industr

## IN CASE OF EMERGENCY

## EXHIBITION 3D DESIGN

Colm McNally

## EXHIBITION 3D BUILD

Shadow Creations Ltd

## RESEARCHERS

Emma Conley  
Joanna Crispell

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For more details on the people behind the scenes, please visit [dublin.sciencegallery.com/staff](http://dublin.sciencegallery.com/staff)

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## ABOUT SCIENCE GALLERY

In 2008, a forgotten corner of Trinity College Dublin was transformed into a living experiment called Science Gallery Dublin. Through a cutting-edge programme that ignites creativity and discovery where science and art collide, the nonprofit encourages young people to learn through their interests. Since its opening, almost three million visitors to the gallery have experienced more than forty unique exhibitions ranging from design and violence to light and love, and from contagion and bio-mimicry to the future of the human species and the future of play. Science Gallery Dublin develops an ever-changing programme of exhibitions and events fuelled by the expertise of scientists, researchers, students, artists, designers, inventors, creative thinkers and entrepreneurs. The focus is on providing programmes and experiences that allow visitors to participate and facilitate social connections, always providing an element of surprise. Science Gallery is an initiative of Trinity College Dublin and kindly supported by our founding partner, Wellcome Trust, and by our 'Science Circle' members — Deloitte, ESB, Google, ICON, and NTR Foundation. Science Gallery Dublin receives support from programme partners Bank of Ireland, Intel Ireland, The Ireland Funds, the Health Research Board (HRB), The Marker Hotel and Walls to Workstations. It also receives government support from the Department of Culture, Heritage and the Gaeltacht and Science Foundation Ireland. Science Gallery Dublin's media partner is *The Irish Times*. For more information, visit: [dublin.sciencegallery.com](http://dublin.sciencegallery.com).

## ABOUT SCIENCE GALLERY INTERNATIONAL

At the vanguard of the STEM to STEAM movement, Science Gallery International is leading the creation of the world's first university-linked network dedicated to public engagement with science and art, igniting the creative potential of young people globally to tackle the world's biggest challenges. Through its galleries, pop-up programmes and touring exhibitions, the Global Science Gallery Network has reached millions of 15 to 25-year-olds with inspiring and participative transdisciplinary programmes featuring emerging research and ideas from the worlds of art, science, design and technology. Galleries are currently in development at King's College London, the University of Melbourne, the Indian Institute of Science, and Ca' Foscari University of Venice, with a Science Gallery Lab at Michigan State University (Detroit) and expansion of Labs into Latin America and Africa planned by 2020. To learn more about Science Gallery International, visit [international.sciencegallery.com](http://international.sciencegallery.com).

# CREDITS

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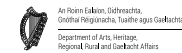
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DR MARTIN NAUGHTON

DR BEATE SCHULER



# IN CASE OF EMERGENCY

**NOTES**

**NOTES**



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