

OurRagingPlanet for Business & Academia

Open Data Innovation and Outreach Fund Final Report



OUR RAGING PLANET

DISASTER SIMULATION & BUSINESS CONTINGENCY

Introduction

OurRagingPlanet (ORP) was designed as a natural disaster education tool. It aims to help secondary school students contextualize experiences of communities around the world when thrust into extreme scenarios, by presenting worked examples within a local setting. It is primarily driven by and built upon OpenDataNI data.

This project progressed ORP towards several key goals:

- supporting real-world business continuity modelling
- bringing developers into the ORP community

This has opened up business opportunities and significantly increased our potential for impacting practical emergencies.

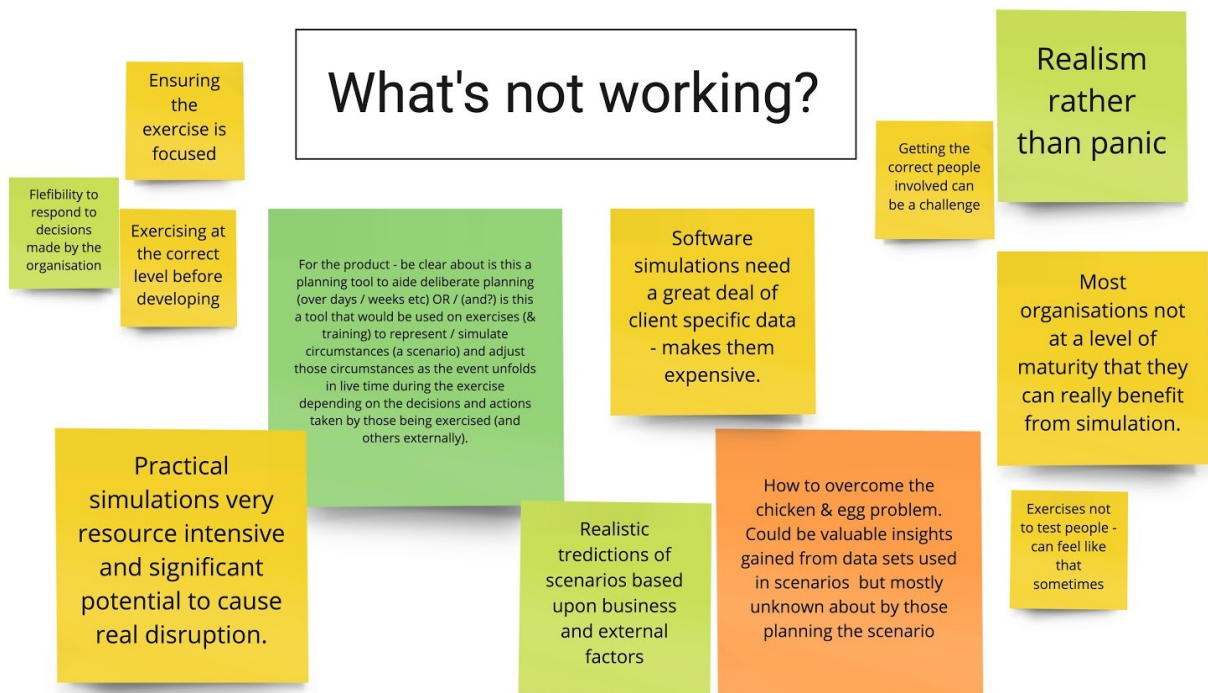
Key outcomes

Product management

Product workshops

We delivered product workshops with business continuity and resilience professionals and consultants from across public and private sectors in the UK and Ireland. The workshop was run remotely using Miro collaboration software, which allowed us to maximise the impact of our design thinking approach in the absence of in-person activities.

Below is an example board from one of our design thinking workshops with such professionals.



The workshops also allowed us to demonstrate the existing functionality OurRagingPlanet platform to business continuity professionals and extend our current business development reach.

Modeller interaction

In conjunction, we have conducted user research interviews with computational modellers and geography researchers in the academic field, such as Daniel Hobley from Landlab. This has provided us with a very clear understanding of how modellers could utilise the platform to iteratively test models.

To ensure a range of modelling backgrounds, we also reached out to key members of the FEniCS modelling community, another key numerical library used within our toolkit. At the time of this report, this user research is still on-going and we look forward to providing further updates as it progresses.

Integration of international Open Data and more data from OpenDataNI

In line with our objectives, we have also researched and integrated relevant geographical open data which could be used within the platform. Flax & Teal have recently partnered with Dr Patricia Marybelle Davies at Prince Mohammad Bin Fahd University in the Kingdom of Saudi Arabia. ORP-Sandstorms will allow students to experience the impact of natural disasters, such as earthquakes, wildfires, volcanoes and sandstorms, on people living in regions of the world different from theirs. Therefore, we have integrated a suite of datasets from data.gov.sa to furnish Saudia Arabian locations with relevant assets of educational interest.

The secondary schools involved in the project in the UK are situated in Belfast. This has given us the opportunity to add more street assets from OpenDataNI, such as street lights, to flesh out the existing datasets available in the front-end for Northern Irish learners.



Technical implementation

Core enhancements

This work has enabled significant extension of the extensibility of OurRagingPlanet. In particular, we have been able to both adapt and extend other open source work to enhance the business relevance of OurRagingPlanet.

Functionality

A number of key functionality improvements were added to the interface to assist self-driven use of the platform, resolving a critical blocker for business application.

Most notably, it is now possible for an unprivileged user to specify and initiate complex simulations through a simple front-end interface - not only to review them. An interface has been added for exploring a list of existing simulations, and better management of simulations and data per organisational account.

Serverless Flow

Initial work had proof-on-concepted moving the ORP processes into a serverless framework, This demonstrated the feasibility of the idea, and allowed us to scope the full implementation achieved in this project.

This has allowed us to:

- scale simulation processes independently, allowing for business-level support
- isolate simulations, improving ring-fencing of business data
- handle simulation failure robustly, so that users can contribute simulations without risking system breakage
- improve data handling so that there is a scalable way of handling varying sizes and quantities of dataset, according to business need.

This has also systemised the adding of new numerical models, where a small number of commands and a <50 line Python file is enough to add a basic simulation. Numerical models can now be built, stored, versioned and deployed through standard collaborative coding platforms, such as Github and Gitlab.

Used: 5.93 GB

| Name | Size | Last Modified |
|---|-----------|---------------------------|
| orp_simulation_015cce37-3ca2-4daa-abff-cea4a1269c44_query.json | 2.69 KB | Jan 7, 2021 10:13 AM ... |
| orp_simulation_04578320-9cc9-4655-b2e5-29d482cb0141_query_feature_arcs.json | 4.81 KB | Dec 30, 2020 10:58 PM ... |
| orp_simulation_04578320-9cc9-4655-b2e5-29d482cb0141_query_result.json | 1.69 MB | Dec 30, 2020 10:58 PM ... |
| orp_simulation_054485b1-56fd-4919-9d42-7da401f7a46d_query.json | 1.52 MB | Feb 10, 2021 2:12 PM ... |
| orp_simulation_06c41133-d633-444c-834d-88dec360d8da_query.json | 258 bytes | Jan 12, 2021 3:21 PM ... |
| orp_simulation_0754ccb8-c3be-4dbe-a36f-534cd800cce9_query.json | 1.90 MB | Feb 24, 2021 2:25 PM ... |
| orp_simulation_087798e7-b52c-4cc1-a072-2ffcc923dbd6_query_feature_arcs.json | 138 bytes | Dec 28, 2020 6:13 PM ... |
| orp_simulation_087798e7-b52c-4cc1-a072-2ffcc923dbd6_query_result.json | 273.25 KB | Dec 28, 2020 6:13 PM ... |
| orp_simulation_08e176d8-7250-432f-beb1-266fc66a460d_query_feature_arcs.json | 4.02 KB | Dec 28, 2020 9:19 PM ... |
| orp_simulation_08e176d8-7250-432f-beb1-266fc66a460d_query_result.json | 287.20 KB | Dec 28, 2020 9:19 PM ... |
| orp_simulation_08fffd2a8-5945-41ab-adc3-d7ff4cdc3273_query.json | 123 bytes | Dec 24, 2020 11:08 PM ... |
| orp_simulation_0c6fac5c-8204-4859-9745-de8da196705f_query_feature_arcs.json | 1.70 MB | Apr 24, 2019 7:40 PM ... |
| orp_simulation_0c6fac5c-8204-4859-9745-de8da196705f_query_result.json | 11.50 MB | Apr 24, 2019 7:40 PM ... |
| orp_simulation_0cdca92b-cb6b-4674-9ff1-23f90c24cf34_query.json | 76.89 KB | Feb 11, 2021 3:31 PM + |
| orp_simulation_0f3cbbbf-bca9-4d6e-a76f-66405eb07d93_query.json | 1.95 MB | Feb 12, 2021 8:47 AM ... |

Enhancing developer support

Developer tools

To bring ORP functionality to research and business, effective developer tooling is critical. For scalability, our own business model depends on cutting edge researchers and domain experts seeing ORP as a viable route to reach stakeholders. This means that they should be able to easily integrate their test-code, and so gain non-technical user interfaces via ORP that they can share with businesses, governmental bodies and NGOs. This both provides a testing service for modellers, and a means of selling ORP to businesses as first landing point for emerging research.

JSON-API

ORP had a minimal set of API endpoints, adhering to the JSON-API standard. This standard helps ensure programmatic access is systematic and predictable, and accelerates developers' adoption of platforms. Over the course of this project we significantly expanded these to allow programmatic creation, retrieval and listing of:

- simulations
- geographical/business scenarios
- numerical models
- physical phenomena

This significantly reduces the predictability challenges for new users, or our own team, when linking into OurRagingPlanet, and makes it quick and intuitive to write new components, such as emergency responder apps, training simulation suites, third-party plugins and academic software linked to ORP.

Python Client

To help developers interact with ORP, a Python client was written, using the new API routes. This allows quick set-up and interaction with an ORP instance from a terminal, or from a Python script.

OAuth Authentication

To let general users interact with the ORP instance programmatically, an OAuth flow was added - this is an industry standard for authenticating to an API server. This flow integrates with the Python client, allowing a login to be stored and reused, similar in process to AWS or Azure's command-line clients.

Internationalization

Linking in with our work with Saudi Arabian educators, we have been improving our internationalization. We have leveraged these improvements in this project.

Indian Disaster Planning

We have opened a dialogue with and, on request, proposed joint work with a new Indian national disaster planning research institute, linked to the internationally renowned Indian Institute of Technology network. Based on the extensions worked on in this project, if progressed, we are to supply:

- ORP along with training in natural disaster simulation
- Discounted rates on ORP use for incubator companies in India
- Application of ORP for testing to natural disaster scenarios in India

Multilingual Support

Through both this project and our parallel Saudi Arabian work, we have added multilingual functionality to OurRagingPlanet - not only suitable for Latin script, but with right-to-left support and the ability to use Arabic. We have integrated the ORP development process with a translation platform, allowing automatic integration translator input and an interactive process for them to work with. Translations have been provided by a native Saudi Arabian Arabic speaker, and we are due to use the platform with non-English-speaking users in May 2021.

| Context | English | Arabic (Saudi Arabia) | State |
|---|---------|--|-------|
| About OurRagingPlanet | | OurRagingPlanet من | ✓ |
| This is an educational resource intended to help students engage with the human impact of natural disasters by placing global phenomena in a local context. To do this, we bring together public data (drawing heavily on | | هذا مصدر تعليمي يهدف إلى مساعدة الطلاب على المشاركة في الآثار الناتجة من الكوارث الطبيعية على البشر من خلال وضع الظواهر العالمية في سياق محلي. للقيام بذلك، نجمع البيانات العامة (بالاعتماد بشكل كبير على اللغة العربية (المملكة العربية السعودية) | ✓ |
| Requirements | | المتطلبات | ✓ |

Summary

ORP has been driven by educational needs since its inception. However, this has had several needs that can be met by serving business and academia:

- commercial scalability - schools individually have limited budget, and fewer opportunities exist for LEA-level procurement,
- usage opportunities - an individual school may apply this to multiple subjects (we have current NI schools scoping this), but the total number of lessons per year is limited, whereas governments and businesses have consistent on-going need,
- impact - while individual students may get significant benefit from ORP, the framework has the potential to have benefits beyond its direct users in other settings – tens of thousands or millions in the case of natural disasters.

While educational applications remain at the heart of what we do, we are aware that our solution has the essential components to be applied to real-world problems in real-time.

This project has allowed a major growth towards business continuity and training use. In particular, it has enabled:

- greater understanding of user need within business continuity
- building relationships with business continuity and modelling communities
- validated user research
- developer tooling and SDKs, to onboard new users
- scalable, business-like flows
- professional data handling
- increased robustness and ring-fencing
- adaptability to new settings, geographical and businesswise

We have been able to pitch our services in a new global region, for the first time without reference to educational applications. We look forward to building towards a fully-fledged real-time disaster management platform, fully open source and sustainable.

We gratefully acknowledge the significant support, both instructive and practical, provided by the OpenDataNI team over the course of the ORP project and look forward to further showcasing work from NICS as our data portfolio expands.