

# CRISIS HACK

Improving Global Humanitarian Response

Hack:  
Thurs 26 — Sat 28 April 2018

At the Geovation Hub

1 Sekforde St  
Clerkenwell  
London  
EC1R 0BE

# Welcome to CrisisHack 2018!

In this brochure, you will find everything you need to get started prior to the main Hack event taking place April 26-28, 2018. All the information you need is provided here, from crisis case studies and background information via available data resources to judging criteria and judges.

Our world is in constant danger from natural and man-made disaster. The risk of flood, famine, hurricanes, earthquakes and disease is ever present. We are already seeing the impact of climate change in rising sea levels and extreme weather events. Aid budgets are stretched and volunteers under pressure. The global humanitarian response community are in desperate need of innovation, and we're relying on you to make that happen. Continue reading to find out more about how you can get involved in CrisisHack 2018.

CrisisHack 2018 would like you to prototype and test a solution to one of the following case studies: UK Floods, and the Urban Sanitation Crisis. Whilst some of the characters featured are fictional, the needs they represent have been validated by real humanitarian organisations. At the end of the hack weekend, your solutions will be pitched to a panel of judges and potentially receive funding through the Geovation Programme. Up to £10,000 is available for the right idea.

Now it is over to you to bring your skills, ideas and passion to the forefront and use technology and tools to build a solution that could make a real difference to people in the UK and all over the world.

# Agenda

## Thursday, 26 April 2018

- 17:00 — Introduction to CrisisHack
- 17:10 — Briefing Session
- 17:20 — Speed Pitches, followed by open Q&A
- 18:00 — Drinks, Hacking & Team Brainstorming
- 20:45 — Event Closes, optional pub visit

## Friday, 27 April 2018

- 08:00 — Arrival
- 08:20 — Introduction to Geovation's Accelerator Programme
- 08:30 — Hack away!
- 12:30 — Lunch
- 13:30 — Hack, Hack, Hack!
- 18:00 — Dinner & Drinks
- 19:30 — Wrap Up Hacking
- 20:45 — Event Closes

# Agenda cont.

Saturday, 28 April 2018

- 08:00 — Arrival
- 08:15 — Final Hacking & Pitching Preparation
- 12:30 — Working Lunch available
- 13:30 — Final Pitching Preparation
- 14:00 — Introduction to Judges, and Pitches
- 15:30 — Judges Confer & Drinks Reception
- 17:00 — Winner Presentation & Closing Remarks
- 17:30 — Event Closes

**Please note:** Timings are subject to change, depending on the final number of registered teams as well as unforeseen circumstances.

# Crisis Case Study: UK Floods 2013 - 2014

The UK experienced a spell of extreme weather with sequence of storms from mid-December 2013 to February 2014, making it the wettest period since 1876. Around six major storms hit through this period, separated by intervals of two to three days.

The Environment Agency issued over 160,000 warnings to homes and businesses, giving people vital time to take actions to reduce the impact of the flooding. By February 2014, it is estimated that 413 homes have been flooded across the country and farmland has been inundated with no sign of immediate relief from the continuing weather conditions.

The army has been providing assistance and relief operations to complement the many emergency services personnel and volunteers across the country.

The International Charter *Space and Major Disasters* was activated three times throughout this period in December 2013, January 2014 and February 2014.

Dates: December 2013 – March 2014

Locations: Southern England and East Coast of England



# User Persona 1: Environment Agency



**User need:** How to improve the water / non-water identification in both urban and rural environments.

In support to our work during flooding incidents we are always looking to improve our data and information. One of these areas is in improving our flood outline mapping and how we make best use of available data. In particular Earth Observation data from satellites.

We are looking to explore two approaches with regards to using this data.

The Environment Agency (EA) and the Met Office have a joint Flood Forecasting Centre (FCC) that provides daily advice through its Flood Guidance Statements. Daily flood outlines from satellite data that could be used to check these national and regional forecast models are our first requirement.

A key question is whether this could be delivered automatically with an acceptable level of accuracy.

At another level our on the ground Area teams need an accurate picture of what is the current flood extent, and how quickly is the flood water receding? How accurate and reliable is this, and can it be provided daily?

We know the satellite data cannot provide an absolute answer to date. However, communications teams, the media and social media, public, EA management, and requests from COBRA downwards are always after a relevant answer to this question 'what is the current flood extent and how quickly is the flood water receding'. We know the image data cannot identify all the flood water and there is often uncertainty over the flood extent. Therefore, we have a second requirement around how can we portray and visualise this uncertainty, in both rural and urban areas.

**NB:** These are fictional characters based on true facts and personas.

## About SSGP

The *Space for Smarter Government Programme* (SSGP) is a strategic, national programme established in 2014, led and funded by the UK Space Agency.

At its most fundamental, SSGP is a technology enabled change programme that aims to increase the public sector's use of space data and technology, and to stimulate innovation and growth in the UK.

SSGP helps Government departments overcome challenges related to understanding how to best access, use and deploy satellite data and applications in different policy and delivery contexts by providing relevant training to government, and demonstrating capability through various mechanisms.

## SSGP's work in Disaster Risk Management and Emergency Services

Disaster Risk Management and Emergency Services are key cross-cutting topics that SSGP has focused on throughout 2017/18. End users already benefit from space enabled applications and services; such as GPS for positioning and navigation, satellite communications in remote regions and earth observation imagery of natural disaster zones. There is, however, low awareness amongst the public sector of existing space related resources available to them such as the *Copernicus Emergency Service* and the *International Charter Space and Major Disasters*.

SSGP's participation in CrisisHack 2018 aims to improve awareness and to increase the uptake of existing data and services at a local and national level, especially in relation to the data, which is made available through the *International Charter Space and Major Disasters* to see what can be done to optimise its use.

## Crisis Case Study: The Urban Sanitation Crisis

Over the last ten years there has been significant investment in new toilet technologies to meet the needs of underserved communities. These new innovations do not need sewers, reduce water usage and reclaim valuable nutrients from human waste. Despite these advances, there has been no change in the proportion of people without access to proper sanitation.

In 2017, the World Bank reported that poor data had led to an ineffective allocation of resources. The current data gap has also prevented the sanitation sector from tracking its progress in providing sanitation for people living in cities. Sanitation organisations are collecting large quantities of data on their operations, but this data is rarely shared and used to understand the state of sanitation in a city. Without this analysis, sanitation funders cannot direct their investments effectively, and sanitation providers cannot identify where their services are needed most.



# User Persona 1: Robert Kumasi, toilet emptying business owner in Lusaka, Zambia



**User need: How to improve route optimisation for waste collection services in an informal settlement.**

I run a business emptying toilets in an informal settlement in Lusaka, Zambia. Most of the toilets in these settlements in Lusaka are off-grid – they are not connected to a sewer line – so the waste is stored in a pit, a removable container or a septic tank. People call us when their toilets need emptying, and my team go along and empty the toilet. Without the crucial service that we provide, the toilet would fill up and overflow. This not only reduces the number of available toilets in an area where sanitation facilities are in short supply, but it also creates a huge health hazard in the community.

I want to understand if I can use geospatial data to optimise the routes that my team take when they go to empty a toilet. For this I need to know two things: the location of the toilet and how accessible it is to vehicles. For example, large exhaustion trucks cannot travel down narrow, unpaved streets so I need to know how wide the roads are close to the full toilet. I also want to be able to be proactive with my services, so I need to predict which toilets are going to fill up more often using the population density in Lusaka.

Ideally, I would like to not only be able to optimise collection routes for existing toilets, but also forecast where new toilets are needed and can be built. This would allow me to expand sanitation services to more people, while helping me to reduce my costs and forecast demand better.

**NB:** These are fictional characters based on true facts and personas.

## User Persona 2: Linet Mfula, head of strategy at ToiletWorks, a large social enterprise working in southern Africa



**User need:** How to validate existing urban sanitation data share by other sanitation organisations.

ToiletWorks builds toilets and provides sanitation services in informal settlements across southern Africa. I am in charge of deciding where we should be expanding our operations to, and I need good quality data to

tell me where new toilets should be built.

At the moment, when we are considering expanding into a new area, we commission local enumerators to survey existing sanitation services there. The enumerators use either mobile phones or clipboards to record the location and features of sanitation infrastructure (toilets, sewer lines etc) and the customers who use them. To validate the data, enumerators usually cross-check each other's records, or a group will randomly re-survey locations. This process is very expensive and time consuming, and the same location can end up being surveyed multiple times by different sanitation organisations.

In the past we have received data from other organisations, but it is very difficult for us to validate this data without commissioning another survey of our own. I want to find a way to validate this data cheaply and quickly, so that I can use data collected by other organisations to make decisions about where ToiletWorks should expand to next.

**NB:** These are fictional characters based on true facts and personas.

## About Gather

*Gather* brings people and data together to solve the urban sanitation crisis. By 2020, we want to be transforming sanitation provision in 15 cities, getting proper toilets to 26 million people. Toilets change everything. They keep girls in school, keep kids healthy, increase productivity and keep cities clean. Cities cannot thrive without sanitation, but today three billion people do not have access to proper sanitation in cities across the world. Toilets are being built but without proper data it's impossible to know where they're needed most. *Gather* has pioneered an innovative, collaborative approach to solving this problem.

## How we are helping to solve the urban sanitation crisis

*Gather's* solution is a sector-wide data strategy to change how sanitation organisations collect, share and use data. A key part of our work is making geospatial data useful to sanitation organisations. In March 2018, we hosted the world's first urban sanitation data dive, kickstarting the creation of a data standard for urban sanitation data. We help the sector identify where new sanitation services are needed and track progress towards Sustainable Development Goal 6.

At the Crisis Hack we want to look at how we can use technology to validate existing sanitation data, and how we can drive efficiencies and bring down costs for sanitation organisations providing crucial services in slums in southern Africa.



# Available Data

Some available data for the Urban Sanitation Crisis

Data set	Format	Details
Sanitation in Kanyama in Lusaka, Zambia	CSV	Detailed toilet census undertaken in the informal settlement of Kanyama. Survey was done in 2017.
Basemap	OSM	From OpenStreetMap
Population density	Various	Open access data set published by WorldPop, showing 100m x 100m population density data for Zambia
Topography	.hgt, .shx, .shp, .xml, .sbx, .sbn, .prj	From NASA

# Enablement & Support

*IBM® Cloud* is a platform that helps developers build and run modern apps and services. It provides developers with instant access to the compute and services they need to launch quickly, iterate continuously and scale with success. With services across mobile, IoT, *IBM Watson®* and more, *IBM Cloud* is an ideal platform to power the next wave of apps that thrive on data.

So that you can develop your ideas rapidly the *IBM Cloud Platform* is available to all developers and provides access to various runtimes such as bare metal and virtual servers to containers and serverless. There is a strong DevOps set of services such as Continuous Pipeline and Auto-scaling that integrated directly with many of the development environments.

See: <https://console.bluemix.net/catalog>

In addition there is a very powerful set of REST API accessible services. These include The Weather Company, Data & Analytics, Mapping, Integration services, IoT, Blockchain and AI services Powered by *Watson*.

As well as the services there is related code, content and community on GitHub via IBM Code:

<http://developer.ibm.com/code>

At *CrisisHack* we will provide a set of voucher codes for you to access this rich environment of services.

In addition there is a powerful Data Science Platform, which helps develop Machine Learning and Deep Machine Learning models that can be integrated back to an application via APIs using the *Watson studio* service:

<https://datascience.ibm.com>

## Enablement & Support cont.

Another important approach to analytics is Stream Computing, which analyzes a broad range of streaming data—unstructured text, video, audio, geospatial, sensor—helping organizations spot opportunities and risks, and make decisions in real-time.

IBM Streams: <https://ibmstreams.github.io>

IBM Streaming Analytics: <https://www.ibm.com/cloud/streaming-analytics>

Just announced is PAIRS Geoscope, which is a new cloud-based service that makes it easier for developers to work with large amounts of geospatial data from across a wide variety of sources. The service handles ingesting, integrating and managing the data and allows developers to focus on their queries. PAIRS can take in anything from geotagged IoT data from sensors to weather data, census data, aerial imagery and even tweets or news data from the Google-backed GDELT Project.

PAIRS Geoscope: <https://ibmpairs.mybluemix.net>

GDELT Project: <https://www.gdeltproject.org>

Finally two really cool video playlists really help you understand the power of “Building with Watson and using *Watson Analytics*”.

See here [https://www.youtube.com\\_watch-3Fv-3](https://www.youtube.com_watch-3Fv-3) and here [https://www.youtube.com\\_watch-3Fv-3D6Qxg](https://www.youtube.com_watch-3Fv-3D6Qxg)

## Judges



### **ROLY COCKWELL, ACOS J5 Force Development and CRE Geo, Joint Forces Intelligence Group UK MoD**

Colonel Cockwell assumed his current appointment in Joint Forces Intelligence Group (JFIG) in August 2016. He is responsible for developing the Group's long term strategy, medium and short-term plans, training requirements, and for oversight of the Defence Intelligence Centre for Intelligence Innovation (CII). As Commander Royal Engineers (Geographic) (CRE Geo) he has functional responsibility for all aspects of the Royal Engineer Geographic capability and its personnel across Defence, including internationally.



### **SARA HUNTINGDON, Space for Smarter Government Programme Manager, UK Space Agency**

Sara joined the UK Space Agency in July 2015 to lead the *Space for Smarter Government Programme*. Since October 2017, she has taken over as the UK Representative on the Board of the *International Charter for Space and Major Disasters*. She previously worked in a variety of technical, procurement, project management and business change roles within the UK Ministry of Defence. She started her career with BNFL *Magnox Generation* after graduating with a first class honours degree in Engineering Physics from *Loughborough University*.

## Judges cont.



**EVE MACKINNON, PhD Researcher, UCL**

Eve is a WASH (water, sanitation and hygiene) specialist. Her PhD is focused on developing risk management frameworks to identify and control exposure to faecal contamination in container based sanitation (CBS) systems.

Eve has previously worked with *Action Against Hunger* in South Sudan to implement humanitarian and non-conflict longer term WASH projects and with Oxfam in Myanmar to coordinate regional WASH activities responding to the needs of 40,000 internally displaced persons.



**ANDREW RICHMAN, Geomatics Team, Applications Manager, Environment Agency**

Andrew is responsible for the team of technical experts delivering flood outline data during incidents and GIS/remote sensing data analysis for a variety of EA projects. During the winter 2013/14 floods the team delivered flood outlines for the Environment Agency and wider government. Andrew was the Project Manager for two of the three International Charter Space and Major Disasters calls during this period.

Andrew is a Geographer with a CV in project and team management of operational remote sensing work. He has over 25 years working in applied GIS and EO projects within both industry and government, with an MSc in Applied Remote Sensing. He advises across a range of applied Earth Observation projects within the EA and DEFRA.

## Judges cont.



**ESTHER SHAYLOR, WASH Knowledge and Communications Advisor, Oxfam GB**

Esther is a WASH (water, sanitation and hygiene) engineer with experience working in Asia and Africa. She has worked in both the private and non-profit sectors developing sustainable market-based approaches to sanitation and WASH service delivery. Esther has designed successful programmes that bridge the divide between humanitarian response, emergency preparedness and development. Esther also coordinates the Sanitation Community of Practice (SanCop) in the UK and sits on Gather's panel of expert advisors.



**ALEX WROTTESLEY, Head of Geovation, Ordnance Survey**

Alex is an entrepreneur with 20 years' experience building media and technology businesses. Alex leads the Geovation team, helping entrepreneurs and innovators launch and grow new ventures that use spatial data and insight to deliver ground-breaking new products and services.

# Judging Criteria

## Innovation & Impact (20%)

- Does the solution meet needs outlined in the challenge, or discussed with the CrisisHack team?
- Is the idea addressing humanitarian response needs?
- Is it a new idea, or a new way of delivering an existing product or service?

## Technical Strength of Solution (15%)

- How well were the provided data sets used?
- How technically impressive is the solution?
- Is it manageable by the developing team?
- Does the team understand where improvements may still be needed?

## Design (15%)

- Is the solution intuitive and clear?
- Has the user experience been considered?

## Practicality & Feasibility (20%)

- How realistic is the solution?
- Is the solution SMART?

## Business Potential (20%)

- Does the solution have longevity?
- Is there true potential to make the product market ready?

## Quality of the Pitch (10%)

- Clear identification of the problem being solved
- Concise demonstration of the solution and how it works
- Memorable, proven understanding of the impact and potential of the development
- Timely presentation & finish

While the weighting for quality of pitch is the lowest, teams still have to be present to do the pitching in order to be considered for the prizes. Focus is simply put more on the product & longevity of the idea, than the overall pitching quality.

**Please note:** the above criteria is a guideline for you and the judges only.

# About Geovation

*Geovation* helps Britain's location and property startups address social, economic and environmental challenges using open innovation methodologies. We help the location and property technology industries grow and develop by offering hands on support, education, workspace and software development resource in a world-class location. Our team helps entrepreneurs and innovators create and build new ventures that use spatial data and insight to deliver ground-breaking products and services.

## Geovation Programme Partners



Geovation is an initiative of Ordnance Survey  
in association with HM Land Registry



Ordnance  
Survey

HM Land  
Registry











## What happens next?

Now it's over to you to bring your skills, ideas and passion to the forefront and use technology and tools to build your solution before and during the main hack on April 26 - 28.

## Get started

You should have received an email from Slack, inviting you to join the CrisisHack 2018 channel. Slack is where you will be able to download all datasets, get all relevant updates, ask questions, and book a slot at a tech surgery with a member of the CrisisHack team. If you haven't registered yet, visit the link below to join now.

[crisishack2018.slack.com/signup](https://crisishack2018.slack.com/signup)

## Contact us

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