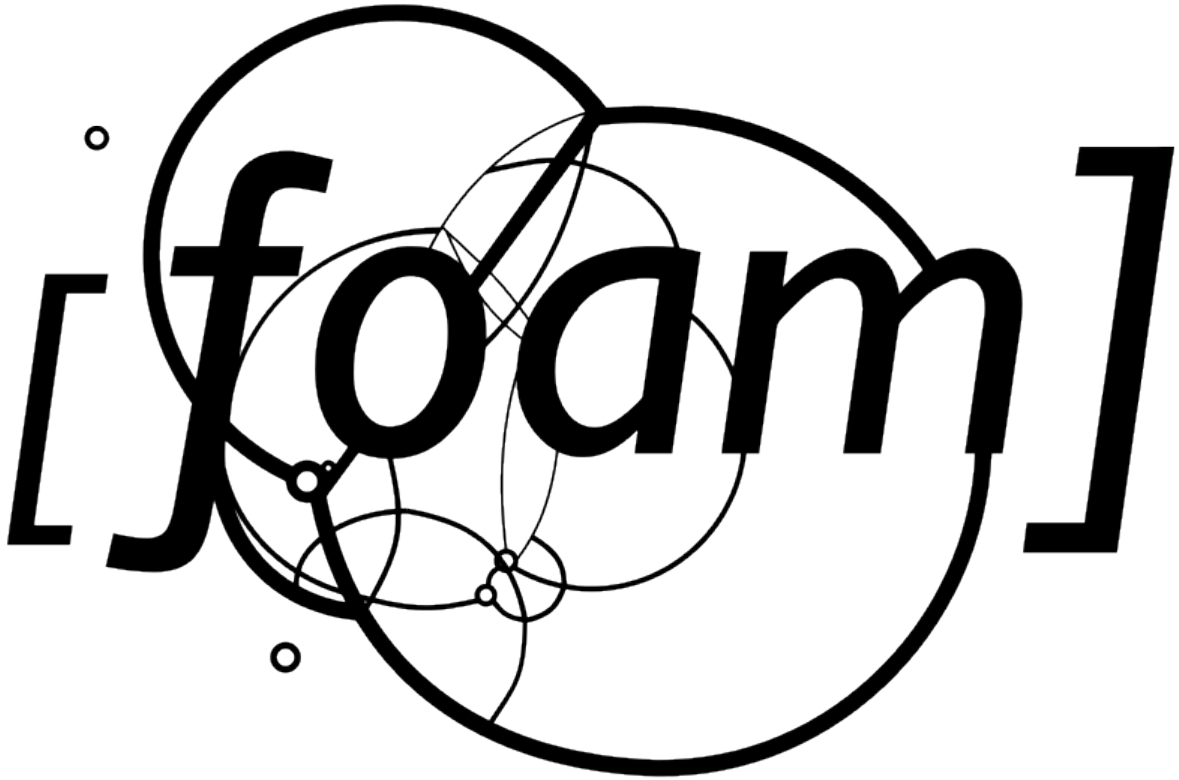


FoAM Kernow selected activities 2018

https://fo.am/studios/kernow/
kernow@fo.am

FoAM is a network of transdisciplinary labs at the intersection of art, science, nature and everyday life. We live in chaotic times with no obvious answers to complex issues such as climate change, social inequality and economic uncertainty. Our approach is to foster a sense of agency for people from all walks of life, guided by the motto ‘grow your own worlds’.

At the FoAM Kernow studio we are usually found enabling people to develop creative and confident relationships with science and technology, merging our experience in science, programming, arts and design in a broad range of transdisciplinary research and education projects.

This review shows selected projects from the FoAM Kernow studio in 2018 – you can also read more about the FoAM network at the end of the review.

Ecological technology

While much technology harvests our time, personal data, and promotes increased consumption, we are instead interested in developing systems to better understand the planet we live on, encourage more sustainable behaviours, and reduce inequalities. These projects often use solutions with an eye to more international issues, such as off-grid technology for use in developing countries.

Arts and music

Our arts and music projects provide critical perspectives on technology and everyday life. We are developing methods for more transparent fabrication – allowing the things we make to be understood, fixed, and recycled. The division between arts and sciences quickly becomes nonsensical as we draw from a tangle of disciplinary approaches.

Science for citizens

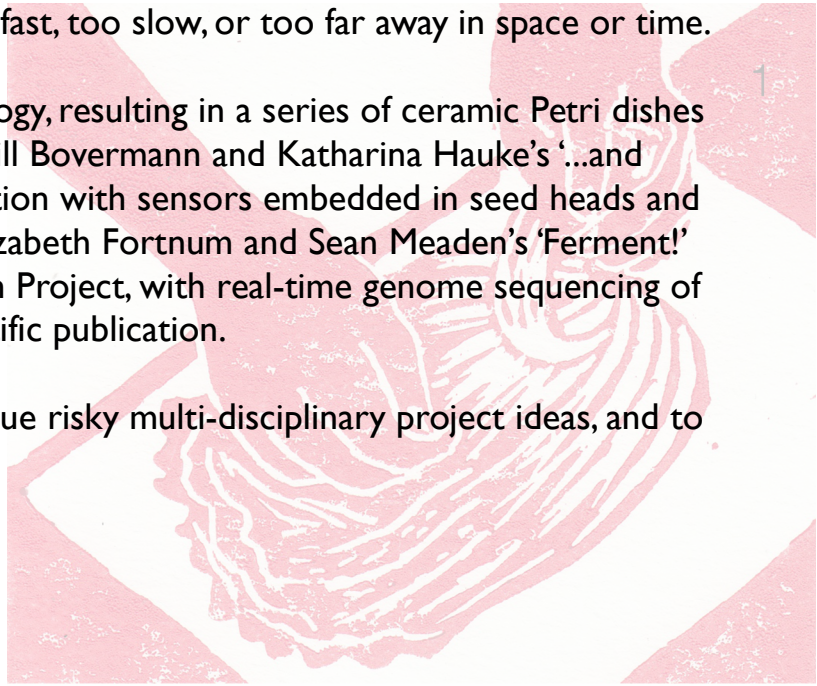
One of our core activities is enabling people to develop creative and confident relationships with science and technology. We address the severe societal problem of knowledge inequality by developing new approaches to broaden participation in scientific research, and championing the open access movement.

Invisible Worlds Residencies
https://fo.am/activities/invisibleworlds/

The Invisible Worlds Residencies were a new collaboration between FoAM and the Eden Project, funded by the Wellcome Trust and Arts Council England. From an open call attracting applicants from around the globe, three residencies were selected to explore phenomena beyond our senses: too vast, too small, too fast, too slow, or too far away in space or time.

Rosanna Martin's 'Disintegrated Rock' residency involved ceramics and geology, resulting in a series of ceramic Petri dishes fused with geological samples, designed to be viewed under a microscope. Till Bovermann and Katharina Hauke's '...and then we see if we will be friends' residency ended with a tiny sound installation with sensors embedded in seed heads and miniature domes, making live music from environmental data. Hoon Kim, Elizabeth Fortnum and Sean Meaden's 'Ferment!' residency combined kimchi fermentation using unusual plants from the Eden Project, with real-time genome sequencing of the ferments' bacterial communities, and is now being written up as a scientific publication.

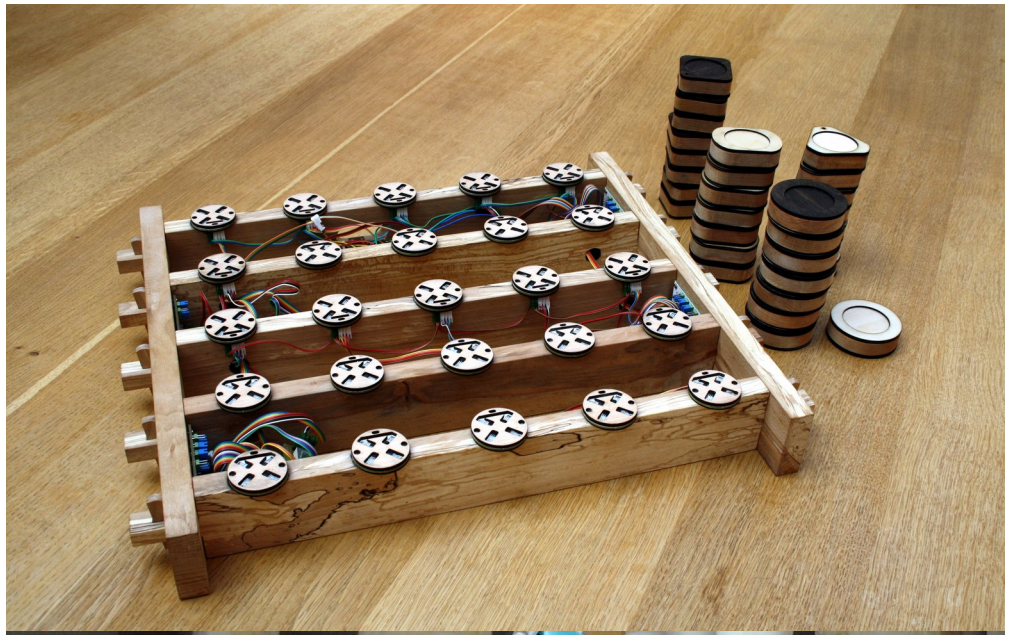
The residencies offered a rare funded opportunity for our residents to pursue risky multi-disciplinary project ideas, and to develop new and unusual collaborations.

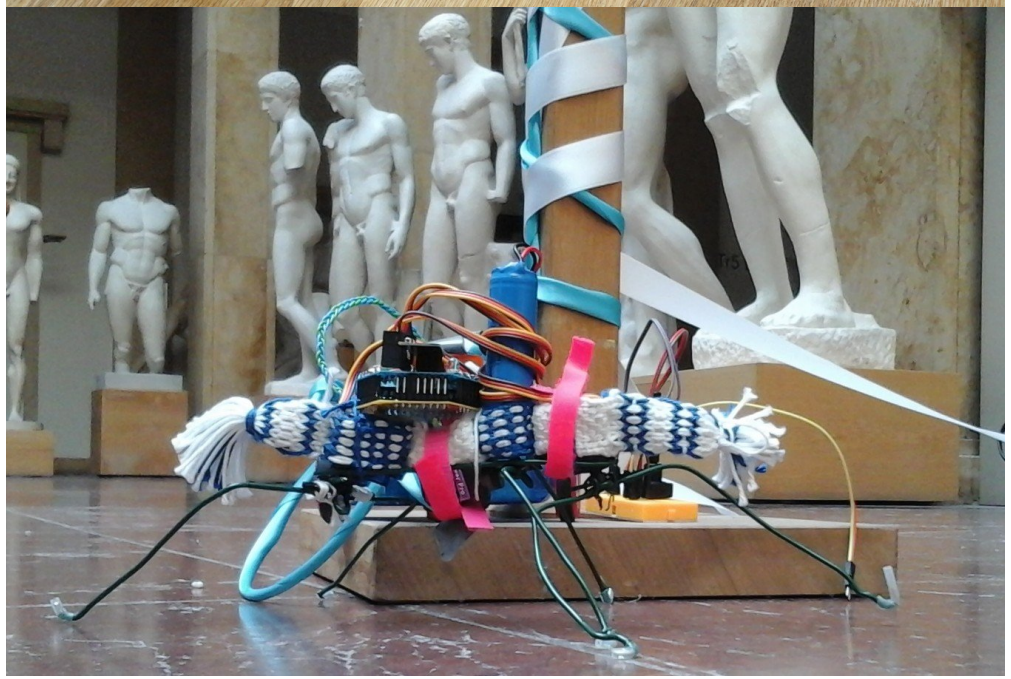


Penelope
https://fo.am/activities/penelope/

How can we make tools that help understand the ancient weaver's mind? How they calculated and solved the first recorded mathematical proofs, embedding them in pattern. How do certain forms of technology define our relationship with the world? For the Greeks of antiquity, weaving was the fundamental link to the cosmos. Today we use computational structures to reason about ourselves and our society, our computers replicating the pattern manipulating circuits that link them with the textile technology they were originally built from.

The Penelope project is a 5 year European Research Council project by Ellen Harlizius-Kluck with Flavia Carraro, Giovanni Fanfani and Alex McLean alongside FoAM Kernow. In 2018 we designed and constructed tangible programming systems for livecoding looms. The Pattern Matrix is now exhibited at the Deutsches Museum in Munich (the world's largest science and technology museum). Tiny woven robot swarms have begun to come to life, and are learning to manipulate ancient loom technology, and a new fabric version of the Pattern Matrix has been developed for easier transportation.





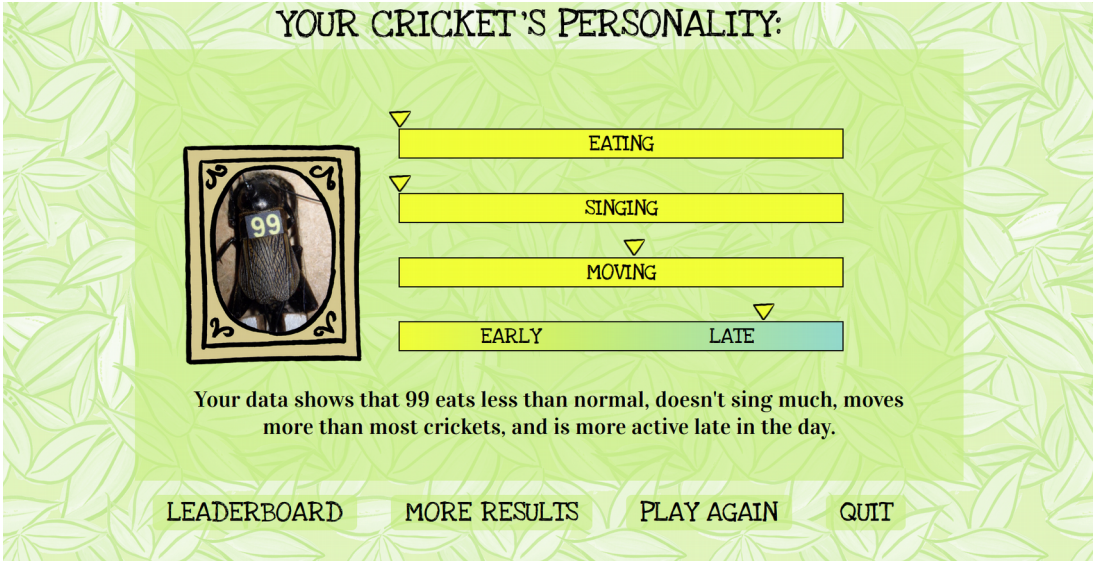
Cricket Tales
https://fo.am/activities/crickets/

In a secret field in Northern Spain, hundreds of cricket burrows are monitored using CCTV. This is the first long-term study on the behaviour of wild insects, run by Prof. Tom Tregenza's Wild Crickets research group at the University of Exeter.

Cricket Tales is a citizen science project developed in collaboration between FoAM and the Wild Crickets researchers, and funded by the Natural Environment Research Council. By tagging events in the cricket CCTV videos, players contribute directly to research which will determine whether crickets have individual personalities.

The results will tell us whether some crickets are more active in the morning, while others are more active at night. This tells us how flexible their lifestyles are, which in turn gives us an indication of how insects might cope as our climate changes.

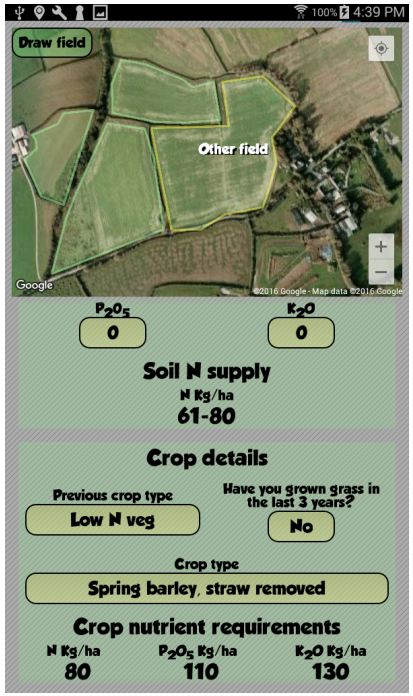
At the end of each game play, the latest results are displayed, including the data just contributed. This means the players are the first people in the world to see the latest results, which is after all one of the most appealing aspects of doing scientific research.

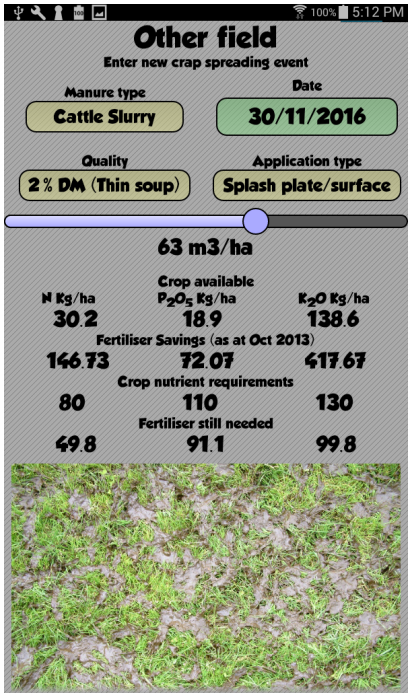


AccessLab
https://fo.am/activities/accesslab/

AccessLab is a workshop format that we designed with two simultaneous motivations: To decentralise research skills so a broader range of people are able to access/use scientific research, reducing inequality, and to expose science researchers to the difficulties of using their research as an outsider, creating new open access advocates.

Following our pilot events in 2017, AccessLab caught the eye of the Natural Environment Research Council, who funded a series of three workshops for 2018. In continued partnership with the British Science Association, the workshops were held in Penzance for the marine sector, Exeter for journalists/media, and finally Plymouth for policy makers. A comprehensive how-to is now available via the link above, for others wanting to develop similar events. AccessLab was originally made possible through funding from FEAST Cornwall.





The Farm Crap App

https://fo.am/activities/farm-crap-app/

In the UK, farmers have to report the nutrients they spread on their fields to the government. This is made easier by buying commercially produced fertiliser with the nutrient values printed on the bag. Meanwhile, farm manure goes to waste because the nutrients are less straightforward to quantify.

The Farm Crap App means farmers can plug in manure, crop and muck spreading information to get the nutrient values quickly and freely, without needing to employ a consultant to decipher the Agriculture and Horticulture Development Board documentation.

In 2018 we received Agritech Cornwall funding (which is European Regional Development Funding) to complete the Crap App in collaboration with Duchy College and Rothampstead Research.

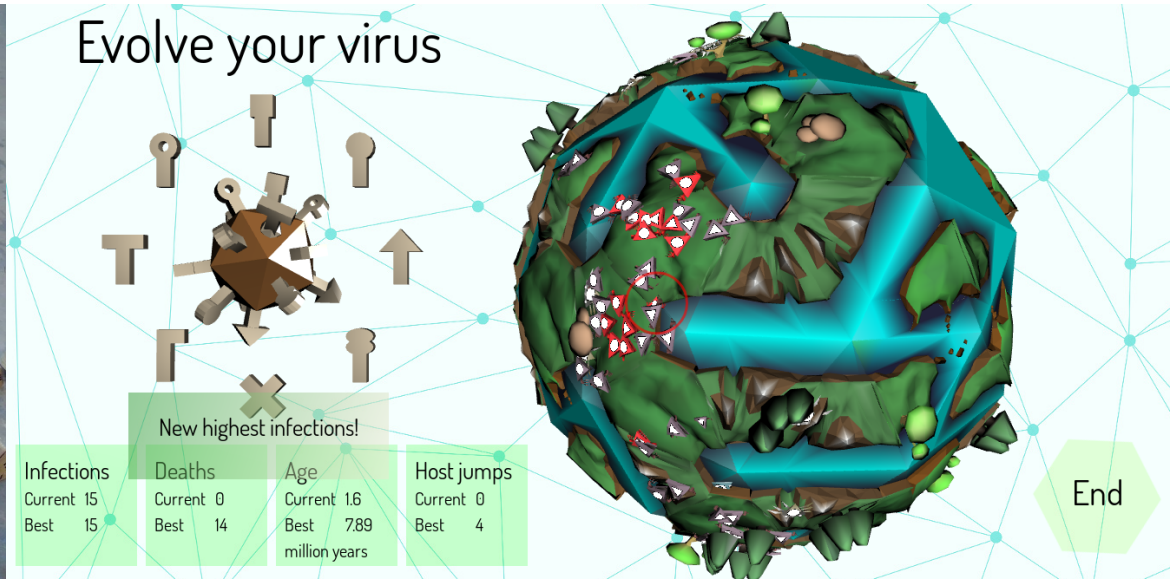
We are working with farm advisers, contractors, regulators, compost producers and machinery manufacturers to design a simple method for secure peer-to-peer data sharing, and we'll also be including all crop and manure types in the system for the first time meaning that the Crap App will be fully functional ready for launch in 2019.

Viruscraft
https://fo.am/activities/viruscraft/

What determines the ability of a virus to infect some hosts but not others? Working with evolutionary biologist Dr. Ben Longdon, and funded by the Wellcome Trust, we're developing a collaborative game and tangible interface to explore virus host shifts – where a virus jumps from one host species to another.

Changing plug-in shapes on the outside of a large wood virus structure means players can evolve their virus, infecting and jumping to new hosts on a screen-based world – and interacting directly with host-pathogen co-evolution simulations. Much of the system has been developed through open events with contributions from people from all walks of life. In early 2019 we'll be running the final Viruscraft workshop, testing the system as an installation at the Eden Project.

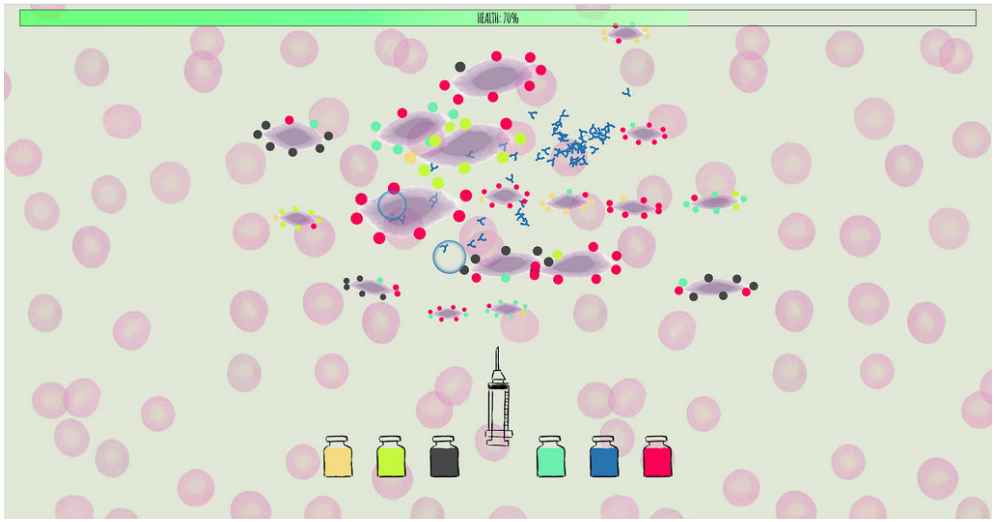
As with our Penelope project – we emphasise developing physical technology that is transparent (people can understand how it is made), fixable, and recyclable at the end of its life.

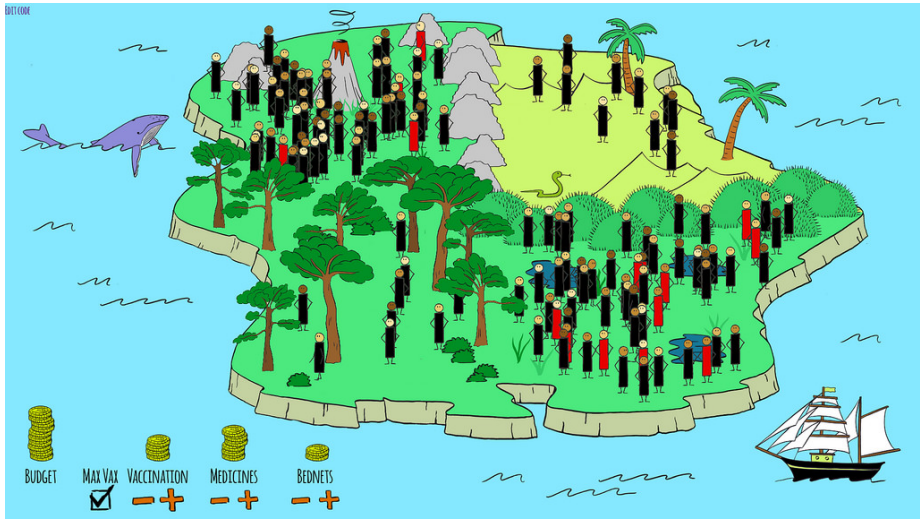


Citizen Science Installations

We now have two permanent touchscreen installations in the Invisible Worlds exhibition at the Eden Project. This provides an ideal venue for testing and implementing our new citizen science games, with over a hundred players every day, and tens of thousands of players contributing data for each game. The game installations are very appropriately located between the laboratory and the soft play area.

As we make everything we do open source, we often get requests to use our games in other venues - in 2018 we made a bespoke modification of our Nightjar citizen science game for the Natural History Museum in London, as part of their 'Life in the Dark' exhibition, and translated our butterfly wing pattern evolution game for the Fête de la Science in French Guiana.





Malaria Minigames
https://fo.am/activities/malaria/

Together with Prof. Matthew Higgins at the University of Oxford, we developed two minigames about malaria for installations at the Royal Society Summer Exhibition 2018, funded by the Wellcome Trust. At the moment, vaccinations are only effective for some malaria parasites - but Matt's group is researching a new type of vaccination which targets proteins that are present on the surface of all malaria parasites.

In the first game, the player keeps malaria parasites under control by firing 'vaccines' at them, learning that instead of firing randomly, it pays to look for the universal vaccination. The second game is a playable simulation. There is an inhabited island, with four different environments. The player has access to a budget and can make decisions about how much to spend on various mitigation approaches - normal vaccinations, special vaccinations that target all malaria parasites, antimalarial drugs and bed nets. The results of budget changes are immediately visible as people on the island recover or become unwell.

This commissioned project interested us because we've been thinking about how to make playable simulations for policy makers. The ability to play with the research means that people can more thoroughly understand it, and explore the impacts of various policy decisions.

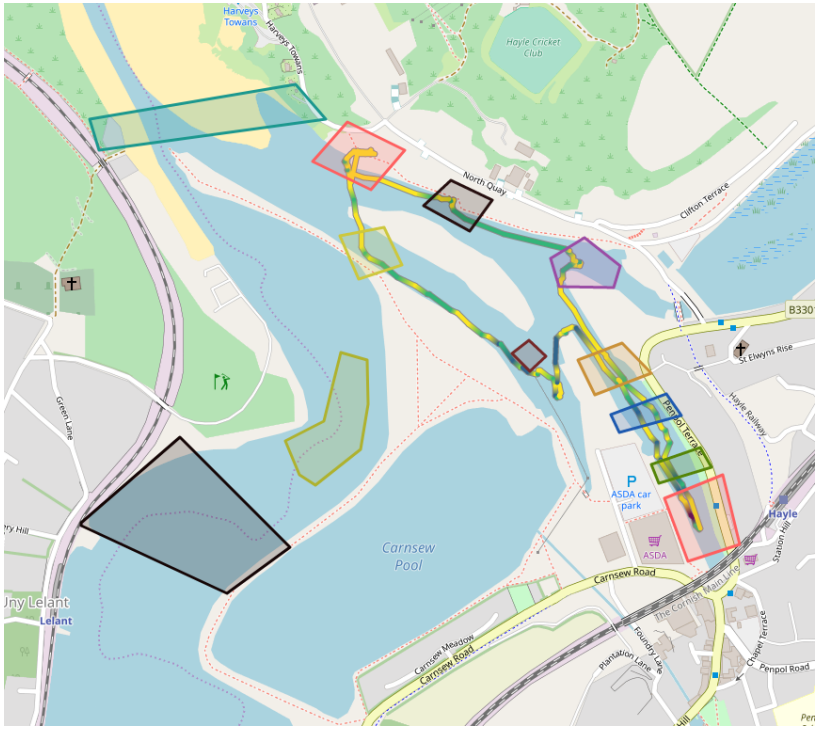
Sonic Kayaks

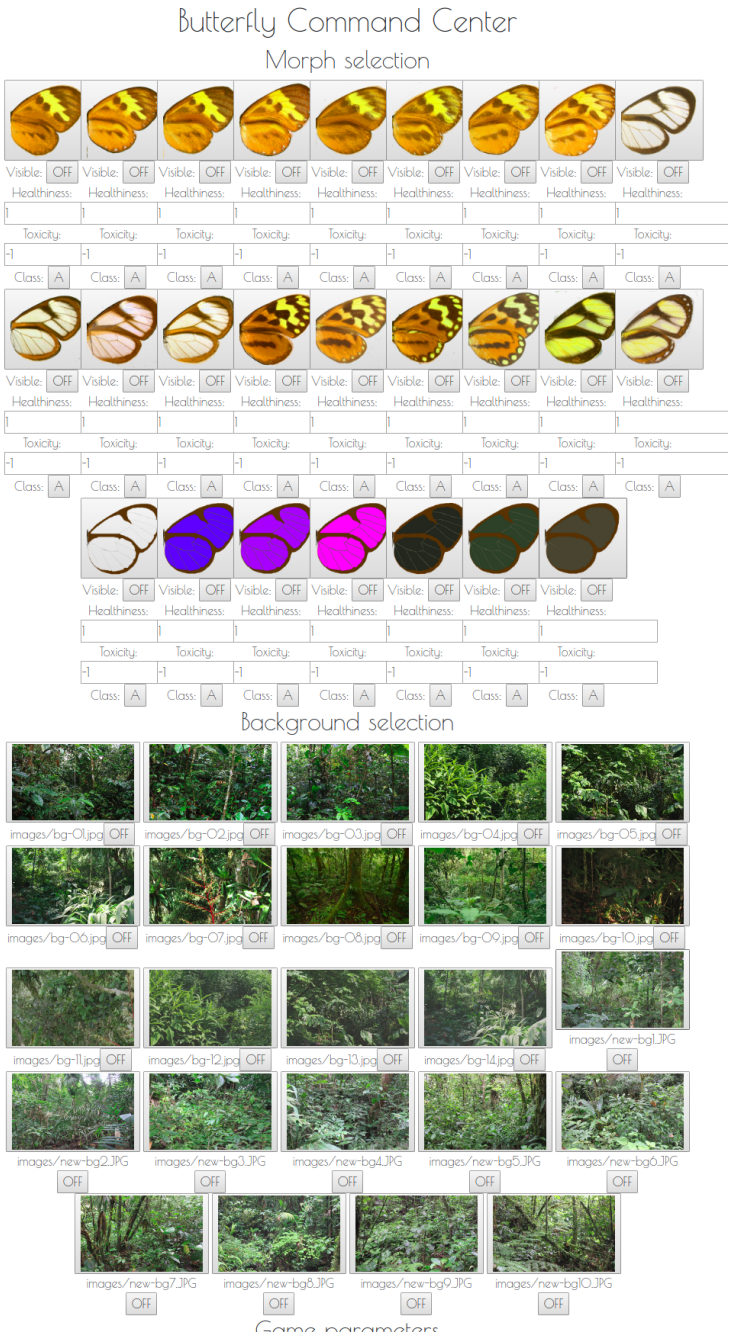
https://fo.am/activities/kayaks/

The Sonic Kayak is a musical instrument with which to investigate nature. Kayaks rigged with underwater environmental sensors generate live music from the marine world, providing the paddler with an extra dimension of senses to explore the underwater climate, while gathering fine-scale geo-referenced climate and environmental data. Originally the Sonic Kayaks were developed with sound artist Kaffe Matthew, marine researcher Dr. Kirsty Kemp, and later with underwater sound expert Dr. Jo Garrett.

In 2018 the project continued to develop. Remote sensing PhD student James Duffy joined us on a Natural Environment Research Council funded secondment for three months, working on waterproofing and beginning to develop an automated online mapping system for the data collected. We were also approached by Access Lizard Adventure, who wanted to see whether the sonification system could provide greater independence to kayakers who have visual impairments. We are now testing a bespoke version with the kayak club, funded by Smartline (European Regional Development Funding).

This project has also previously received funding from FEAST Cornwall and the British Science Association.





Clearwing Butterflies

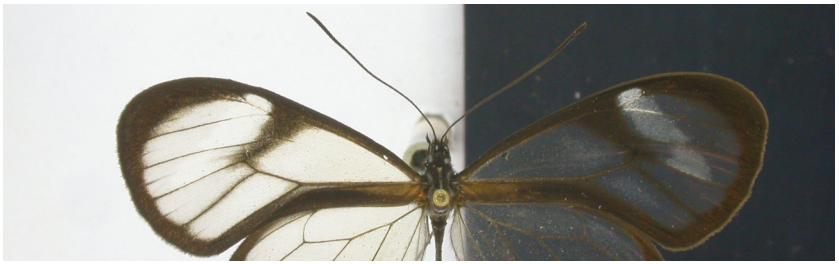
https://fo.am/activities/clearwing-butterfly-citizen-science-game/

The Clearwing Butterfly game is a citizen science experiment we have developed with Mónica Arias, Doris Gomez and Marianne Elias at the Institut de l'Information Scientifique et Technique and the Centre d'Ecologie Fonctionnelle et Evolutive in France.

The researchers want to know why some species of butterflies living in South American tropical forests have evolved transparent wings, and specifically how this adaptation might benefit them. The game features a moving background with fluttering leaves, designed to closely resemble the natural environment where the butterflies live.

As we wanted to give the researchers something they could use for future experiments and adapt without needing our support, we built a "Butterfly Command Centre" where anyone can change how the game works, including what butterflies and backgrounds are used.

The project was funded by the French National Research Agency and the Human Frontier Science Program.



Mongoose2000
https://fo.am/activities/mongoose-2000/

Mongoose 2000 is a behavioural research tool for use in remote areas lacking reliable internet connectivity or power. Developed for the Banded Mongoose Research Project at Exeter University for use in their field site in Uganda, Mongoose 2000 uses a Raspberry Pi to synchronise behavioural observation data across multiple Android tablets used for daily recording of mongoose behaviour. A full description of the system was published in PloS One as 'Data collection and storage in long-term ecological and evolutionary studies: The Mongoose 2000 system'.

Mongoose2000 is one of our longest running projects – in 2018 we have been adding to the system with a re-developed database to more safely store twenty years of research data, and an automated system to transfer the data in near real time from Uganda to the UK. This project has been funded by the European Research Council and the Natural Environment Research Council.

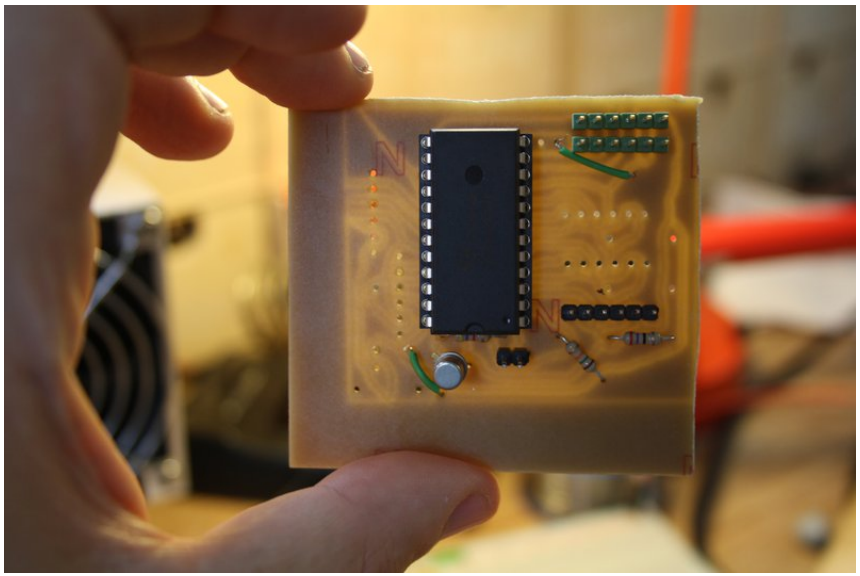

Photo by Faye Thompson

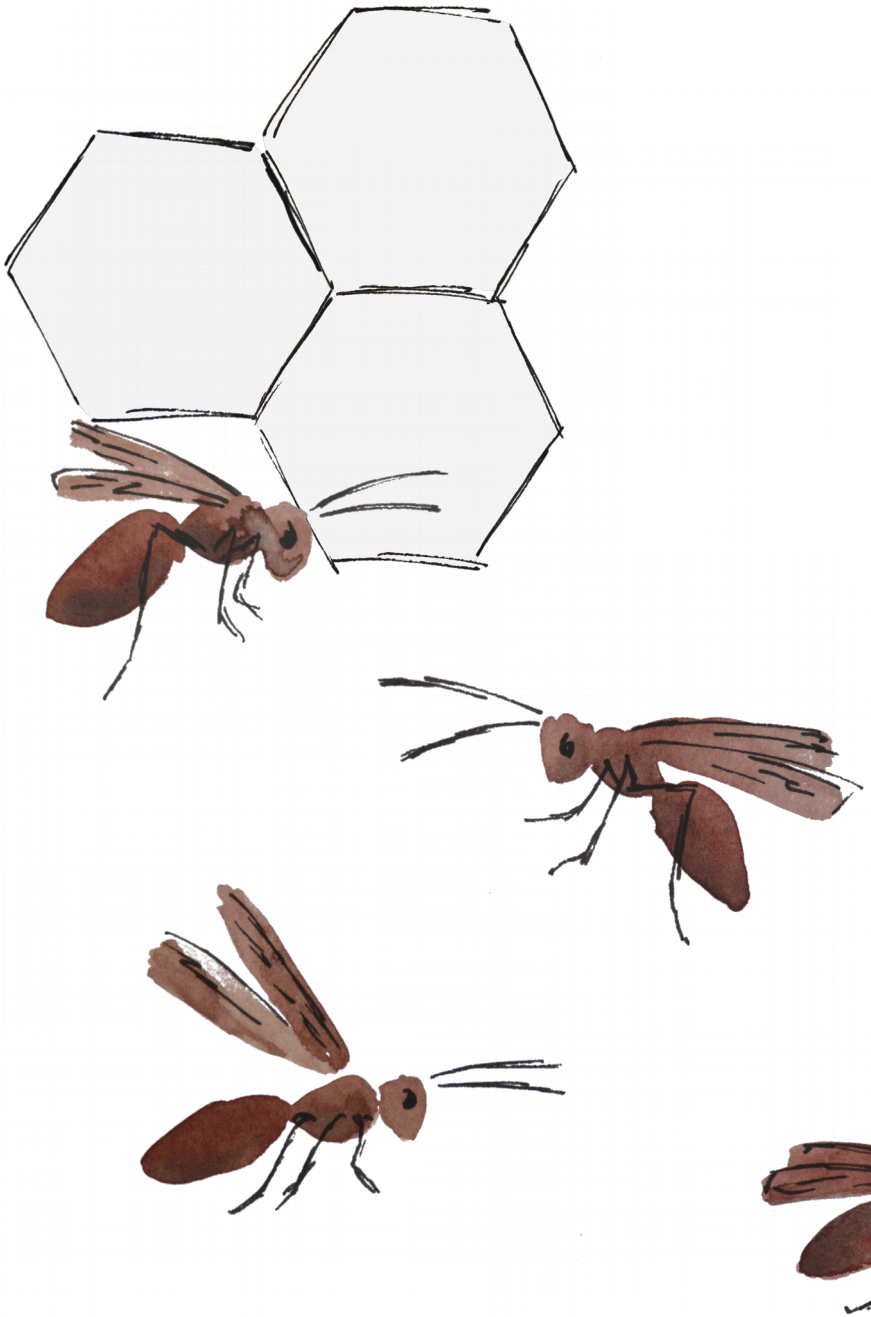
Technology after Collapse
https://fo.am/blog/2018/10/29/making-circuit-boards-cnc-machine/

The philosophy underlying contemporary 'seamless' technology production seems to be one of endless energy, bountiful resources and waste being someone else's problem. Whenever a philosophy starts to look shaky, there are huge opportunities to try different ideas. For example, what happens if we instead use infrastructure collapse as a working assumption for design?

One of the strategies we've been exploring at FoAM Kernow is using our hardware projects to research different ways of building things. Our approach of design assuming collapse has resulted in a much higher awareness of our supply chains, as well as our dependence on manufacturing in places with less environmental and health regulation.

We aim to make our technology straightforward to understand, fix, modify, and recycle once it is no longer useful – perhaps the antithesis of most modern design. Often this means using wood, standard fixings, and large components that can be re-used. Printed circuit boards have been an ongoing unsolved problem, with manufacturers having high minimum quantities for purchases, and using materials that are undesirable. Since we usually make one-offs, we spent part of the year learning to use a tiny CNC machine to cut our own circuit boards, which are now in use for Viruscraft and Penelope. This has substantially reduced waste and sped up our prototyping time, but the materials involved still need some further consideration.





Behaving Genes
https://fo.am/activities/behavinggenes/

Some insects form complex social groups, and the behaviours underlying these social groups are influenced both by the species' genetics and by the environment that they live in.

Together with Dr. Seirian Sumner at University College London, and funded by the Natural Environment Research Council, we are developing a game for exhibition and online use that will allow people to build their own wasp society, toying with the limits of biology.

The player will be able to take on the persona of different wasp species, making life choices about where to build a nest, whether to build it alone or with others, and how to allocate brood to different jobs. When environmental catastrophes hit, the resilience of the social structures will be tested.

Encouraging empathy with other species, including ones that we traditionally oppose, can only be beneficial in the current climate of anthropocentrism and ecological breakdown.

Publications in 2018

Marshall HH, Griffiths DJ, Mwanguhya F, Businge R, Griffiths AGF, Kyabulima S, Mwesige K, Sanderson JL, Thompson FJ, Vitikainen EIK, Cant MA (2018) Data collection and storage in long-term ecological and evolutionary studies: The Mongoose 2000 system. PloS One, 13, e0190740.

Anderson K, Hancock S, Casalegno S, Griffiths AGF, Griffiths DJ, Sargent F, McCallum J, Cox DTC, Gaston KJ (2018) Visualising the urban green volume: Exploring LiDAR voxels with tangible technologies and virtual models. Landscape & Urban Planning, 178, 248-260.

Campbell LJ, Hammond SA, Price SJ, Sharma MD, Garner TWJ, Birol I, Helbing CC, Wilfert L, Griffiths AGF (2018) A novel approach to wildlife transcriptomics provides evidence of disease-mediated differential expression and changes to the microbiome of amphibian populations. Molecular Ecology, 27, 1413-1427.

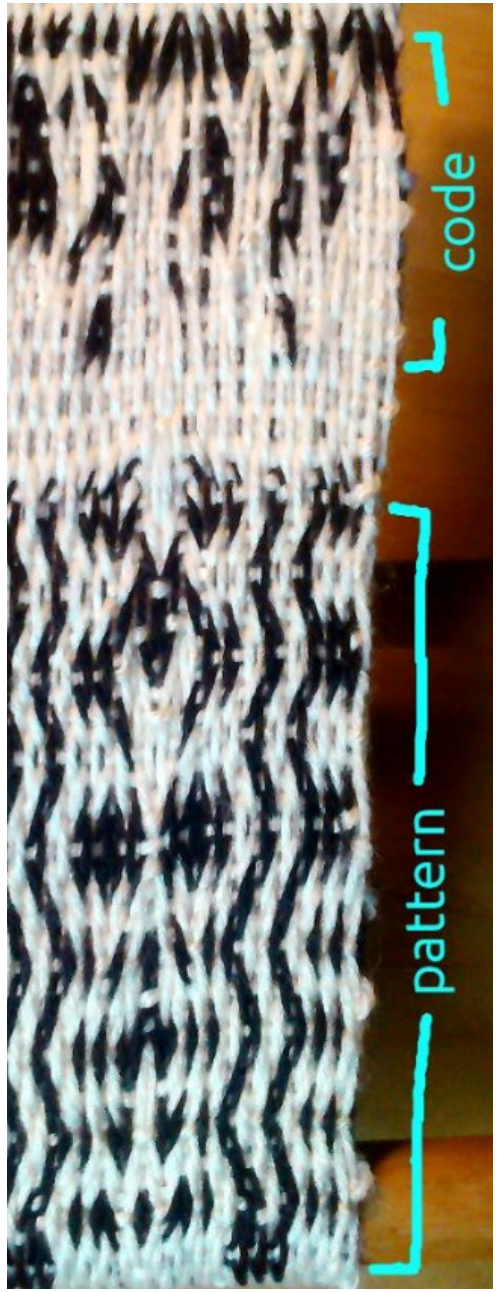
Campbell LJ, Garner TWL, Tessa G, Scheele BC, Griffiths AGF, Wilfert L, Harrison XA (2018) An emerging viral pathogen truncates population age structure in a European amphibian and may reduce population viability. PeerJ, 6, e5949.

McLean A, Griffiths DJ, Harlizius-Klück E (2018) Digital Art: A Long History. ICLI 2018 4th International Conference on Live Interfaces. (in press).

The work of the FoAM network was covered in Blueprint magazine, issue 360, Learning labs: Co-creating a new educational structure.

Our Midimutant project with Aphex Twin was covered in MagPi magazine, issue 65, Aphex Twin Midimutant.

The Sonic Kayak project was covered in The Naked Scientists, on 11 April 2018, Sonic Kayaks – Sound Science.



More about FoAM

FoAM Kernow is one of six studios in the FoAM Network – with colleagues and friends running studios in Amsterdam, Brussels, Nordica (based between Sweden and Italy), Filfla (in Malta), and Earth (a nomadic studio, acting as a connector between the network's internal and external nodes).

Our organisational structure is an ongoing experiment in its own right. FoAM Kernow is a non-profit (company limited by guarantee), we make all our work open source, publish our research open access, have equal pay for all, use 100% renewable energy and don't fly for work. Other FoAM studios take different approaches, meaning we can run separate organisational experiments and projects in each of the six studios, making the most of the local bureaucratic and environmental constraints and opportunities.

This year brought change throughout FoAM network. A new studio called FoAM Filfla launched in Malta, FoAM Kernow moved to a larger space in Cornwall, we undertook a full revamp of our centralised FoAM website, welcomed several new members to our studios, and held our first joint open studio event involving the whole network (funded by Cultivator Cornwall). As global structures such as the membership of the EU come under pressure, we strengthen and adjust our flexible networks across Europe in anticipation of great changes yet to come.

We have been lucky to work with some brilliant people in 2018, who have brought difficult questions and challenging projects for us to learn from – and we thank you for that!

It continues to be impossible to explain what we do. We will likely never have an elevator pitch or straightforward job titles – and perhaps if we did, it would indicate that something had gone wrong. In our rapidly changing world, the big problems will not be solved by specialists. Generalism and adaptability are crucial – for humans as for all other species.

In 2019 we will continue our work building deeper interactions between people from all walks of life, enabling people to explore topics that are far from their comfort zones, facilitating a sense of agency, encouraging empathy with our planetary co-inhabitants, and of course, asking 'if things weren't how they are, how could they be?'…