



SPHERE-PPL Annual Meeting & Workshop

Environmental Modelling & Forecasting

SPHERE-PPL Team

Wednesday 14th January 2026

Spatial, Health & Environmental Research using
Probabilistic Programming Languages





Welcome!

Spatial, Health & Environmental Research using
Probabilistic Programming Languages





Agenda

Timings	Activity	Description
9:30-10:00	Arrivals & Registration	
10:00-10:15	Introduction from the SPHERE-PPL Team - Will Pearse	Meet the team and an introduction to the vision
10:15-10:40	Keynote 1 - Julie Smith	ADAS
10:40-11:00	Keynote 2 - Robin Freeman	ZSL
11:00-11:25	Coffee Break	
11:25-11:35	Presentation - Rich Wood	Forecasting Severe System Pressure in the NHS
11:35-12:20	Break-Out Discussion	Activity 1 - Identifying key challenges in environmental science
12:20-12:50	Break-Out Feedback	2-minute presentations on challenges
12:50-13:50	Lunch	



Agenda

Timings	Activity	Description
13:50-14:00	Lyme Disease Contest Prize Giving	
14:00-14:10	Presentation - Will Pearse	Building a Forecasting Contest
14:10-14:45	Break-Out Design	Activity 2 - Groups design forecasting contests
14:45-15:15	Break-Out Feedback	Group feedback and discussion of contest priorities
15:15-15:40	Coffee Break	
15:40-16:05	Keynote 3 - Eric Daub	The Alan Turing Institute
16:05-16:15	Presentation - Will Pearse	What can SPHERE-PPL do for you?
16:15-16:35	Break-Out Discussion	Activity 3 - Brainstorming requests for workshops, training and support
16:35-16:55	Break-Out Feedback	Creating a community priority list
16:55-17:00	Wrap-Up	



Facilities & Accessibility

First floor zoning and capacity plan



Key

- | | | |
|------------------------------|---------------------------------|--------------------------------|
| ■ Open meeting space | ■ Socialising and collaboration | ■ Private/shared offices |
| ■ Bookable meeting space | ■ Desking/workstations | ■ Office facilities |
| ■ Project/team collaboration | ■ Non bookable booths | ■ Training and internal events |
| ▼ Fire exit | ■ CEO office | ▲ Height adjustable desk |

**The
Alan Turing
Institute**

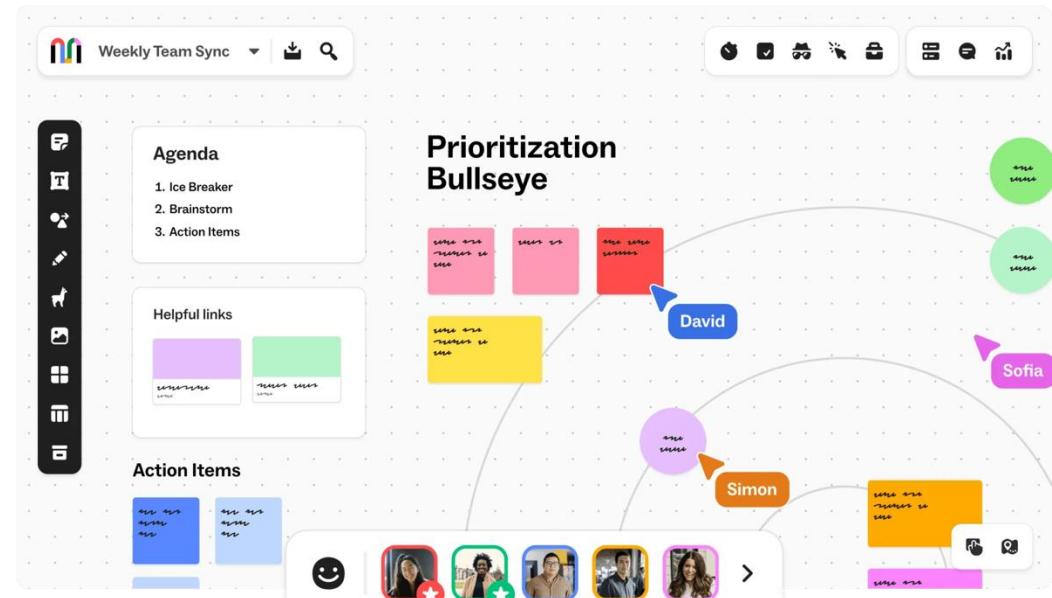


Mural

We will be using Mural for all the activities:

- Activity 1: <https://shorturl.at/rtEzv>
- Activity 2: <https://shorturl.at/1ahdl>
- Activity 3: <https://shorturl.at/SxCEd>

Password: forecast
(No need to create an account)





Code of Conduct

- **Respectful Communication:** Communicate with others in a professional and considerate manner. Be mindful of diverse perspectives and experiences. Avoid interrupting others and listen actively.
- **Inclusive Language:** Use inclusive language that avoids any discriminatory or offensive remarks. Be mindful of gender, race, ethnicity, religion, sexual orientation, and other personal attributes.
- **Active Participation:** Engage actively in discussions and activities. Share your insights and perspectives while being mindful of others' contributions.
- **Professional Conduct:** Maintain a professional demeanour throughout the workshop, including during breaks and social events.
- **Mobile Devices:** Minimize distractions by silencing mobile phones or using them only during breaks, unless they are essential for workshop activities.





Introduction from the SPHERE-PPL Team

Spatial, Health & Environmental Research using
Probabilistic Programming Languages





CUT TO WILL P SLIDES





Outcomes of the Day

- This full-day event will bring together experts in a range of fields from industry, academia, and government to discuss cutting-edge research and explore collaborative opportunities within environmental science.
- Meeting participants will:
 1. Network with policy specialists and data scientists to discuss issues through a common language
 2. Identify forecasting challenges that the SPHERE-PPL Community will undertake and contribute to the design and outcomes of these endeavours to maximise their impact.
 3. Prioritise the training and support provided by SPHERE-PPL to the community to expedite the development of analytical capabilities where they are most urgently required



Keynotes

Spatial, Health & Environmental Research using
Probabilistic Programming Languages





Keynotes



Julie Smith – ADAS



Dr Robin Freeman – ZSL



Coffee Break

Refreshments are around the corner in the kitchen areas





CUT TO RICH WOOD SLIDES

Spatial, Health & Environmental Research using Probabilistic Programming
Languages



Activity 1 - Identifying Key Environmental Challenges



How its going to work!

- **Stage 1 - Break-out Discussions (45 minutes)**

- Split into teams
- 45 minutes to talk about key environmental challenges that relate to modelling & forecasting
- Add them to the Mural Board
- Don't worry about finding solutions, we will do that in this afternoon's session

- **Stage 2 - Group Feedback & Contest Priorities Vote (45 minutes)**

- Each team will have 2 minutes to present what they think is the biggest challenge they discussed
- These will form the basis of our forecast contest discussions later!



Activity 1 – Group Feedback



Lunch Break

Refreshments and food are around the corner in the kitchen areas!



Welcome Back!

Timings	Activity	Description
13:50-14:00	Lyme Disease Contest Prize Giving	
14:00-14:10	Presentation - Will Pearse	Building a Forecasting Contest
14:10-14:45	Break-Out Design	Activity 2 - Groups design forecasting contests
14:45-15:15	Break-Out Feedback	Group feedback and discussion of contest priorities
15:15-15:40	Coffee Break	
15:40-16:05	Keynote 3 - Eric Daub	The Alan Turing Institute
16:05-16:15	Presentation - Will Pearse	What can SPHERE-PPL do for you?
16:15-16:35	Break-Out Discussion	Activity 3 - Brainstorming requests for workshops, training and support
16:35-16:55	Break-Out Feedback	Creating a community priority list
16:55-17:00	Wrap-Up	



Lyme Disease Contest Prize Giving

Spatial, Health & Environmental Research using
Probabilistic Programming Languages



Activity 2 – Designing a Forecasting Contest





How its going to work!

- **Stage 1 – Building a Forecasting Contest (10 minutes)**
 - Quick presentation from the SPHERE-PPL team on how the forecasting contests are going to work mechanically and what makes a good contest
- **Stage 2 – Break-Out Discussions (40 minutes)**
 - Split into teams aligned to the identified key challenges.
 - Using the Contest grids on the Mural Board, start designing a forecasting contest
- **Stage 3 - Group Feedback (40 minutes)**
 - Each team will give an overview of their proposed contest
 - Indicative vote on what would provide greatest impact





Building a Forecasting Contest

From Questions to Insights

Dr Will Pearse

Spatial, Health & Environmental Research using
Probabilistic Programming Languages



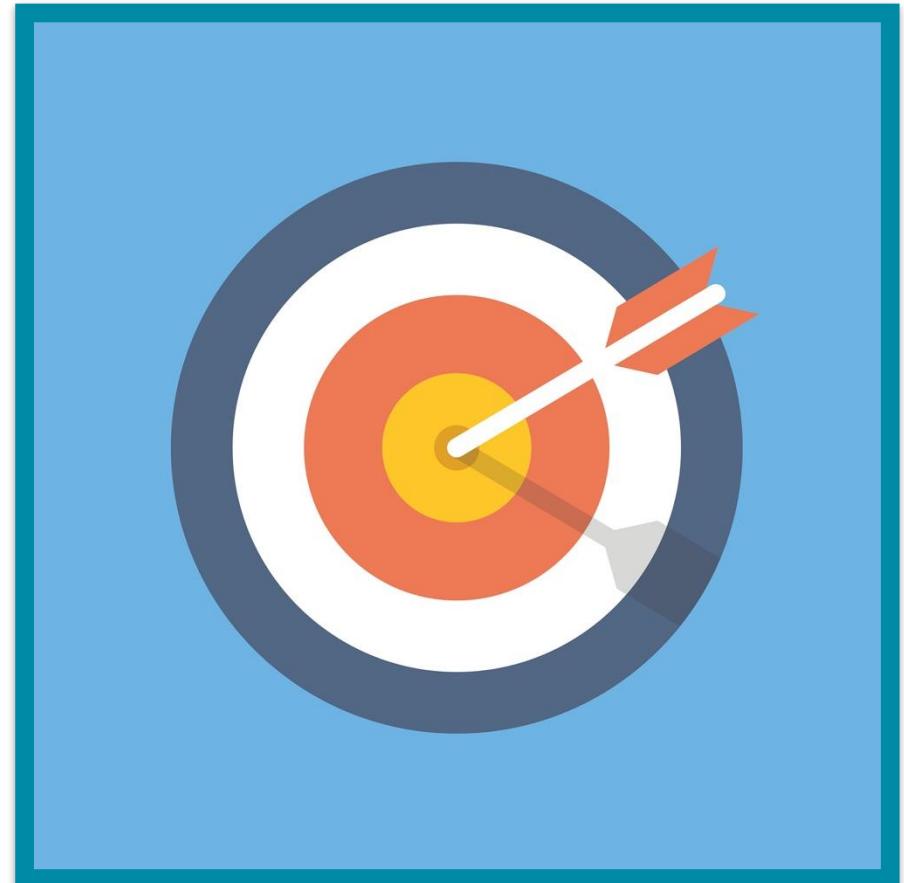
Why do a Forecasting Contest?

Grand Vision

- An open-source and globally-accessible competition to find innovative and accurate ways of predicting something.
- A conduit for connecting stakeholders with analytical capability.

Smaller Scale

- Find answers to the challenges we talked about earlier!
- Put resources and insights into your hands.



SPHERE-PPL Framework

A [Github Repo](#), that can be cloned, edited and then collated by contest organisers, using our [Forecasting AggregatoR App \(FARA\)](#).

FARA can:

- Find all contest submissions automatically
- Check entries for errors and issues
- Be customised for any GitHub-based contest
- Condense all results and synthesise insights

FARA - Forecast AggregatoR App

Welcome to FARA

FARA (Forecast AggregatoR App) is a tool that finds all forked repos taking part in forecasting competitions and checks each submission before cloning the repos locally.

Instructions

1. Select the owner of the competition
2. Select the competition repo
3. Enter the name of the file to check (this is usually a forecast in a csv format)
4. Enter the destination folder where the repos will be cloned (this will autofill with the FoRKast app directory)
5. Click the 'Run FARA' button to start the process

Outputs

All submissions that pass the checks will be cloned to the destination folder (each within their own folder named `owner_repo`)

If there are any errors, the repos with issues will be named in the folder called 'Errors'. Each repo will have a text file with the errors listed.

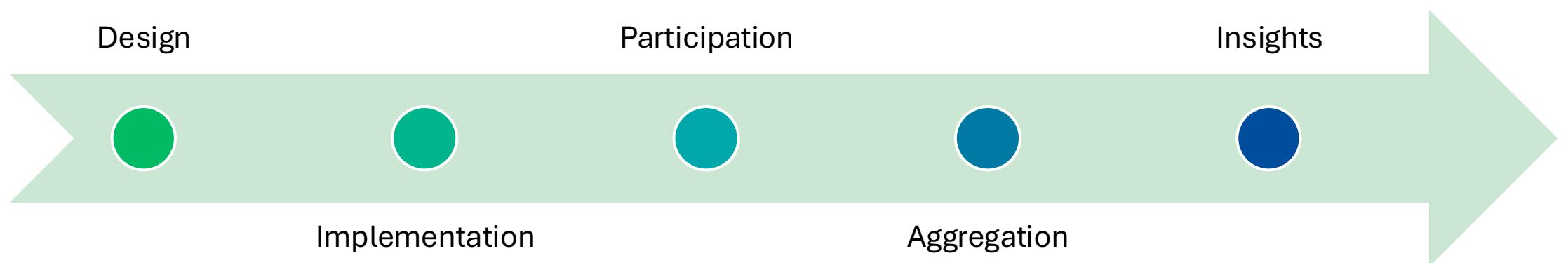
If the cloned repo folders already exist within the destination folder, FARA will not overwrite them. To clone any updated repos, please delete the older versions

Customising FARA

This app can be edited to find forks of any repo and check any file and the checks can also be customised to suit the competition requirements. Head to the [SPHERE-PPL Forecast-AggregatoR](#) to find the code and make changes. This app can also be used in conjunction with our contest template repo to run your own forecasting contests: [SPHERE-PPL Forecasting Contest Template](#).



Journey of a Contest



Considerations

Design

What are the Key Challenges we want to solve?
Who will benefit from the forecasts?



Implementation

What datasets can we use openly?
Are there any specific strategies or tools that we want to see?



Participation

Can we engage with a diverse set of teams?
Do they have enough time?
How can we best support them?



Aggregation

How should we aggregate all the entries?
Do we want to build a new model based on the findings of the contest?

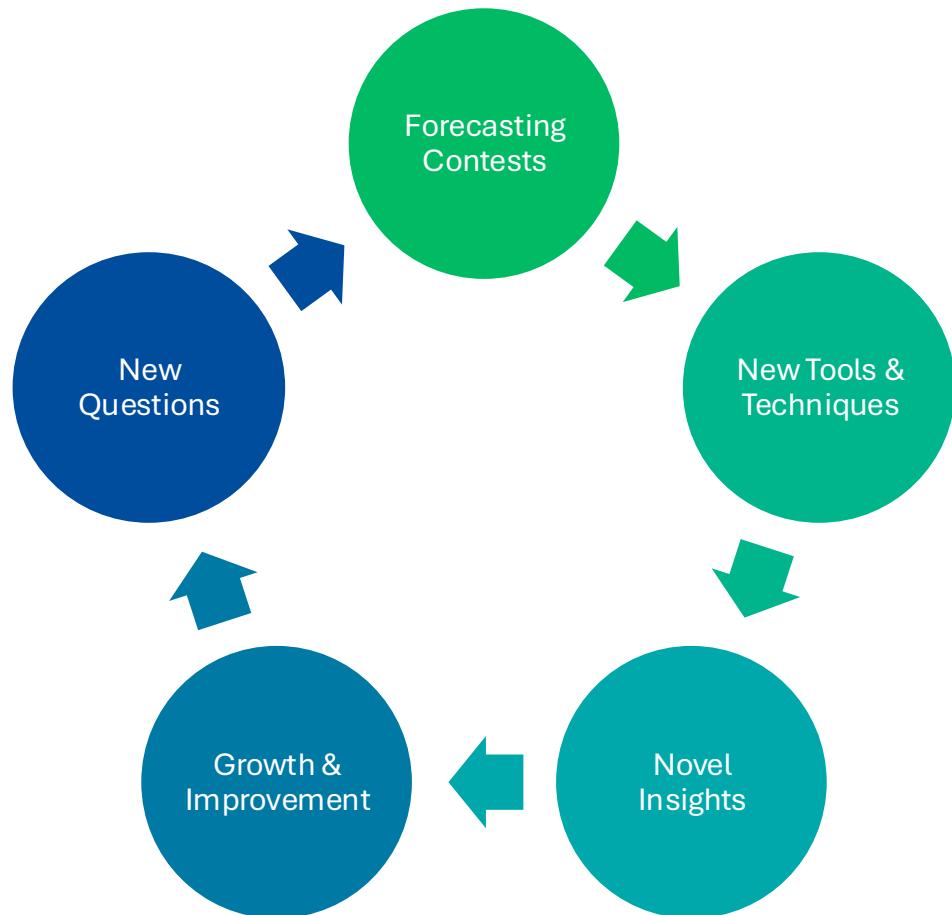


Insights

What format would create the most impact?
How can we disseminate the results and maximise usefulness?



Maximising Value to Stakeholders



Example - CVDs

Key Challenge	Future burden of Cardiovascular Disease (CVD)
Exam Question	Forecast the number of new cases of CVD in the UK for each year from 2024 to 2034, stratified by age group and sex.
Usable Data	<ul style="list-style-type: none"> PHE Data (Trends in CVD mortality, morbidity, and risk factors) ONS Data (population projections, mortality rate, socioeconomic factors)
Output Format	<ul style="list-style-type: none"> Table of forecasted numbers Summary report Deployable app
Other Information	Include coronary heart disease, stroke, and heart failure

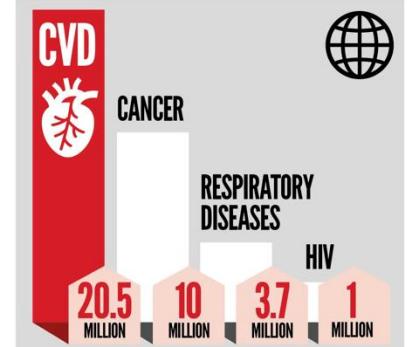


CARDIOVASCULAR DISEASE THE WORLD'S NUMBER 1 KILLER

Cardiovascular diseases are a group of disorders of the heart and blood vessels, commonly referred to as **heart disease** and **stroke**.



GLOBAL CAUSES OF DEATH



RISK FACTORS FOR CVD



Sources: World Health Organization;
IHME, Global Burden of Disease

info@worldheart.org
www.worldheart.org

f worldheartfederation
t worldheartfed
g worldheartfederation



How its going to work!

- **Stage 1 – Building a Forecasting Contest (10 minutes)**
 - Quick presentation from the SPHERE-PPL team on how the forecasting contests are going to work mechanically and what makes a good contest
- **Stage 2 – Break-Out Discussions (40 minutes)**
 - Split into teams aligned to the identified key challenges.
 - Using the Contest grids on the Mural Board, start designing a forecasting contest
- **Stage 3 - Group Feedback (40 minutes)**
 - Each team will give an overview of their proposed contest
 - Indicative vote on what would provide greatest impact





Key Environmental Challenges



Activity 2 – Group Feedback



Coffee Break

Refreshments are around the corner in the kitchen areas



Keynotes

Spatial, Health & Environmental Research using
Probabilistic Programming Languages





Keynotes

The
Alan Turing
Institute

Dr Eric Daub – *The Alan Turing Institute*

Spatial, Health & Environmental Research using
Probabilistic Programming Languages



Activity 3 – Building a Community





How its going to work!

- **Stage 1 – What can SPHERE-PPL do for you? (10 minutes)**
 - Quick presentation from the SPHERE-PPL team on what the future holds
- **Stage 2 – Brainstorming requests for workshops, training and support (20 minutes)**
 - Split into groups and make a list of different ideas that would help you make progress in your area (added on the Mural Board)
 - Include as many details as possible!
- **Stage 3 – Creating a community priority list (30 minutes)**
 - Each team will give an overview of their requests
 - Discussion around how the SPHERE-PPL community can best facilitate and maximise value



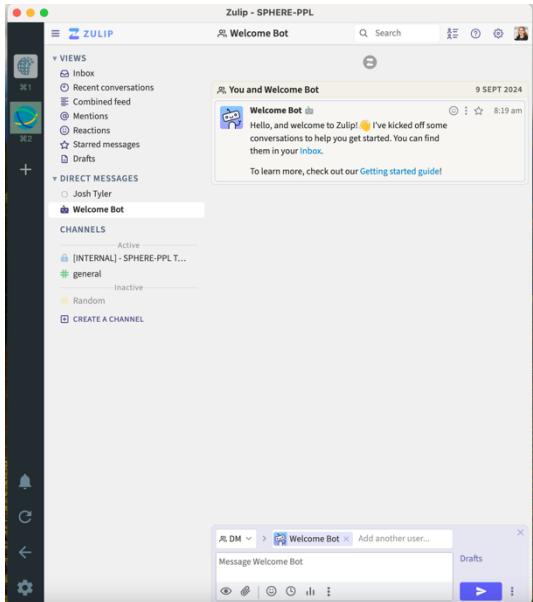


What can SPHERE-PPL do for you?

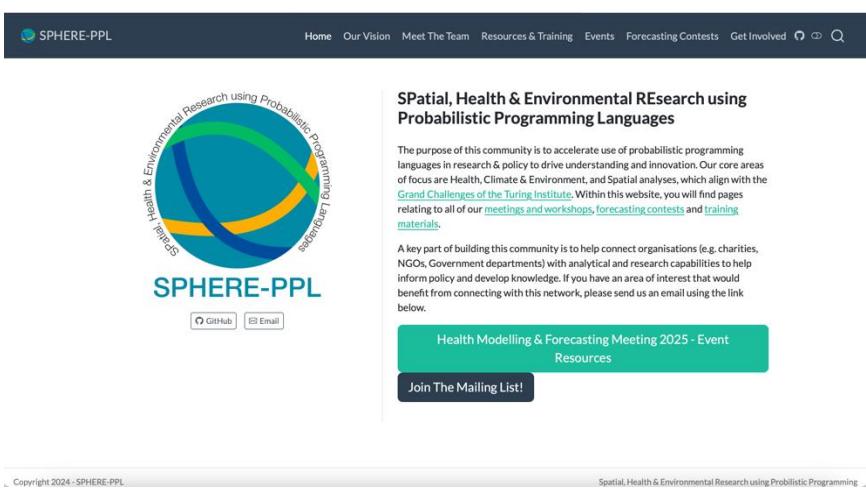
- The network's primary goal is to connect data-scientists, researchers and policy-makers, to enable high-quality modelling and data-driven decision-making.
- The SPHERE-PPL project has funding to facilitate workshops, training and targeted support on both fundamental modelling & probabilistic programming, alongside events and sessions like today, working directly with stakeholders.



What we've done so far



A screenshot of the Zulip messaging platform. The sidebar shows channels like 'general' and 'Drafts'. A message from 'Welcome Bot' says: 'Hello, and welcome to Zulip! I've kicked off some conversations to help you get started. You can find them in your inbox.' Below the message is a link to the 'Getting started guide'.



The homepage of the SPHERE-PPL website. It features a circular logo with blue and green colors and the text 'SPHERE-PPL'. Below the logo, there's a section for 'Health & Environmental Research using Probabilistic Programming Languages'. It includes a paragraph about the purpose of the community, mentioning the Grand Challenges of the Turing Institute. There's also a section for 'Health Modelling & Forecasting Meeting 2025 - Event Resources' and a 'Join The Mailing List!' button.



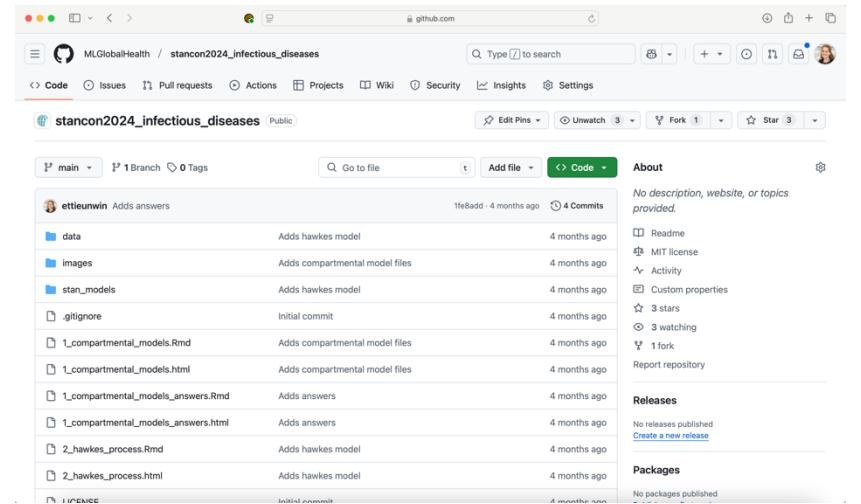
StanCon 2024
Conference on Stan programming and Bayesian Modeling
Oxford University, UK. September 2024



Symposium for Bayesian Modelling
Jan 22 2024



Spatial, Health & Environmental Research using Probabilistic Programming Languages



A screenshot of a GitHub repository page for 'stancon2024_infectious_diseases'. The repository has 1 branch, 0 tags, and 4 commits. The commits are listed as follows:

Commit	Description	Date
data	Adds hawkes model	4 months ago
images	Adds compartmental model files	4 months ago
stan_models	Adds hawkes model	4 months ago
.gitignore	Initial commit	4 months ago
1_compartamental_models.Rmd	Adds compartmental model files	4 months ago
1_compartamental_models.html	Adds compartmental model files	4 months ago
1_compartamental_models_answers.Rmd	Adds answers	4 months ago
1_compartamental_models_answers.html	Adds answers	4 months ago
2_hawkes_process.Rmd	Adds hawkes model	4 months ago
2_hawkes_process.html	Adds hawkes model	4 months ago
LICENSE	Initial commit	4 months ago



How its going to work!

- **Stage 1 – What can SPHERE-PPL do for you? (10 minutes)**
 - Quick presentation from the SPHERE-PPL team on what the future holds
- **Stage 2 – Brainstorming requests for workshops, training and support (20 minutes)**
 - Split into groups and make a list of different ideas that would help you make progress in your area (added on the Mural Board)
 - Include as many details as possible!
- **Stage 3 – Creating a community priority list (30 minutes)**
 - Each team will give an overview of their requests
 - Discussion around how the SPHERE-PPL community can best facilitate and maximise value



Activity 3 – Priority List



Wrap-Up

- We've reached the end of the day!
- Please complete the Feedback Survey!



Thank-You!

For more information, please visit www.sphere-ppl.org or email
the team at info@sphere-ppl.org.

