

This document is intended to provide you with a copy of the questions that are asked in the Small Development Grant Proposal Submission [form](#), so that you can prepare, share, and edit your answers prior to submission.

Please note: All proposals for the SDG program must be submitted through the [form](#) to be considered for funding.

Name of Submitter: Thomas Pike

Your Email: thomas.pike42@gmail.cm

Is your project Sponsored or Affiliated? Affiliated

Select Your Project: Mesa

Proposal Title: Python Frontend for Mesa

Two Sentence Summary of Proposal:

The goal is to build a Python based frontend option for Mesa that is easy to use, easy to extend, and easy to sustain. Based on discussions with Mesa's user community, a Python front end is highly desirable to make communication and validation of models, particularly in an academic setting, easier and more effective.

Description of Proposal:

No more than 750 words (4,500 characters max)

Mesa's current frontend is written in JavaScript. With a heavy academic user community, this has presented significant hurdles, over the years, for users who are just learning Agent Based Models (and sometimes coding) and teachers who want to focus on the science of emergent phenomena from complex systems. This obstacle has also been identified for advanced users who want minimal coding hurdles as they conduct esoteric research that need unique

customizations. This project is an effort to mitigate these complications, so users can focus more on the science of their research and less on the coding.

The plan is to select an open source python frontend framework (e.g. Dash, Panel, StreamLit) as evidenced by Mesa discussion #1622 and prototyped through Mesa Examples pull request #36 and #37. Once an optimal configuration is selected, the plan is to build a standard data interface that allows exchange of information and signaling between Mesa simulations and the frontend.

Deliverables:

A python frontend, once implemented, will allow Mesa users to build custom dashboards that can be used to:

1. Start/stop a simulation.
2. Analyze simulation data and visualize parameters in real time.
3. Generate interactive plots with tooltips/ zoom/ filtering features to visually communicate and explore model dynamics.
4. Re-create the dashboard elements (charts/ plots/ tables) without re-running the simulation.
5. Develop interactive apps inside Jupyter notebooks.

This will provide a Python based front end option that provides the same features as the current front end with enhancements (i.e. interactive apps inside Jupyter) to make Mesa more accessible and usable to our diverse, global community.

Please explain the benefit of this proposal including:

- Impact to the project
- Impact to the scientific ecosystem
- Impact to the community

No more than 400 words (2,500 characters max)

This project will benefit the user community by making Mesa significantly more accessible. This increased accessibility will provide users across Mesa's diverse community greater ability to develop, customize and share their models.

This project will benefit the scientific ecosystem by (1) increasing rigor, (2) allowing greater focus on the phenomenon of interest, and (3) improving communication. This project will help increase rigor as interactive visualizations are a critical tool in verifying and validating the complex dynamics of the simulations. It will allow greater focus on the phenomenon of interest by reducing technical obstacles to interactive visualizations and increasing user ability to build unique customizations that are relevant to their field of study. This project will improve communication by making models easier to communicate and discuss allowing for improved collaboration across disciplines.

This project will benefit Mesa by providing a pure Python end to end option, making it easier for more people to contribute to any aspect of Mesa.

Amount Requested:

\$5,400

Brief Budget Justification: (Please include hours and/or pay rates)

How will the money be spent?

The cost and timeline are modeled on a Google Summer of Code large project for a student based in Germany. The time for a large project is considered 350 hours.

As this will not occur over the summer, and to account for the contributors course load, the timeline uses the maximum Google Summer of Code timeline of 22 weeks.

Timeline of Deliverables:

Please include specific timelines showing when you will achieve the proposed work.

With notification of selection on July 28th. Timeline is intended to go from 1 August 2023, to 1 January 2024. Specific dates are based on projected Mesa development meetings. Discussions will be continuous via Github discussions and merge requests.

12 August - Python Frontend Framework Selected

9 September - Basic skeleton of front end created

14 October - Working prototype with desired features

11 November - Develop test, refine and ensure code is complaint with contributor standards

9 December - Update tutorials and education support

1 January - Final clean up and release new Mesa version

Has someone been identified to carry out the work in the proposal?

If YES:

Ankit Kumar. Student in Germany who demonstrated capability through through his proposal development and contributions to Mesa Examples repository (merged pull requests 36 and 37)

If NO: How will someone be identified to carry out the work?

Please list the name and email address of a project leader(s) who has approved this proposal.

Jackie Kazil - jackiekazil@gmail.com

Rht - rhtbot@protonmail.com

Boyu Wang - boyu.wby@gmail.com

For OFF-CYCLE proposals ONLY:

Why isn't it possible to submit this proposal during a regular funding round? Why is this an urgent request?

i.e. - if you are submitting a request outside of the three formal calls for proposals, what is the justification?