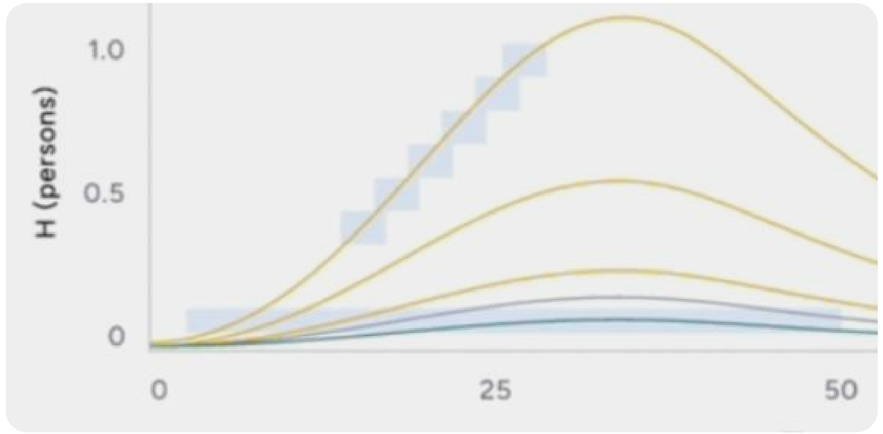
CASE STUDY

TERARIUM

A scientific computational notebook application

NEIL GRAHAM

terarium



Uncharted was commissioned by a US government-funded agency* to develop **Terarium**, a comprehensive modeling and simulation platform aimed at making the intricate process of scientific modeling and scenario testing more accessible to a diverse range of users.

*Due to security restrictions, only product screenshots approved for public release can be shown until the application is released.

MY ROLE

As a Product Designer,
I collaborated with another
designer, a product owner,
2 data scientists and 8 engineers.

- Reviewed research to discover user needs and pain points
- Designed wireframes and high fidelity prototypes
- Designed and expanded our component library
- Worked closely with Product and subject matter experts to define design strategy
- Translated complex sketches from data science subject matter experts into high fidelity prototypes
- Presented final design flows through video walkthroughs and virtual meetings with stakeholders
- Created animated micro-interactions with After Effects and Lottie.
- Provided support and guidance to our engineers during implementation, including making minor refinements to front-end code

DEFINING THE PROBLEM

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BUSINESS GOALS

Partnered with Product and Research to understand and define the primary business goals.

Make these processes more accessible

Make the intricate process of scientific modelling and scenario testing more accessible to a diverse range of users, from researchers and graduate students to policy analysts and decision makers.

Speed up current processes

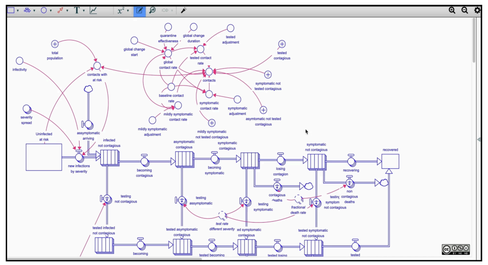
In this fast-paced world, decision makers need modelling forecasts in hours or days, not months and years. 10x the current speed of scientific modelling and scenario testing. What currently takes a year should take a month.

USER PAIN POINTS

Worked with Research and Product to identify user pain points and problems to solve.

Computational notebooks are constrained

They're bound to a single programming language, offer a linear narrative and require significant coding knowledge, especially for creating visualizations.



Graphical tools lack flexibility and capabilities

Graphical tools provide an appealing alternative, yet they often lack the flexibility and breadth of capabilities that coding provides.

SOLVING THE PROBLEM

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SOLUTIONS

Product facilitated a series of research sessions with SMEs, business stakeholders and end users in the scientific community.

These solutions formed Terarium's design foundation.

Workflow editor

A canvas (similar to Figma) where scientific papers, data sets and models are connected into a network of self-contained operators.

Dual view operators

A user can drill down into every workflow operator and choose to configure it in either of two views the wizard view or the coding notebook view. The wizard view shows the common configuration options of the operator that are selectable through easy to use UI elements with default values pre-selected.

Storage / selection of operator outputs

A drop down selector is included so the user can choose which iteration of execution results should be visualized, and output to downstream operators.

AI coding assistance

The AI can reason based on user query and act to generate executable source code in the appropriate programming language on their behalf.

DESIGN, TESTING & VALIDATION

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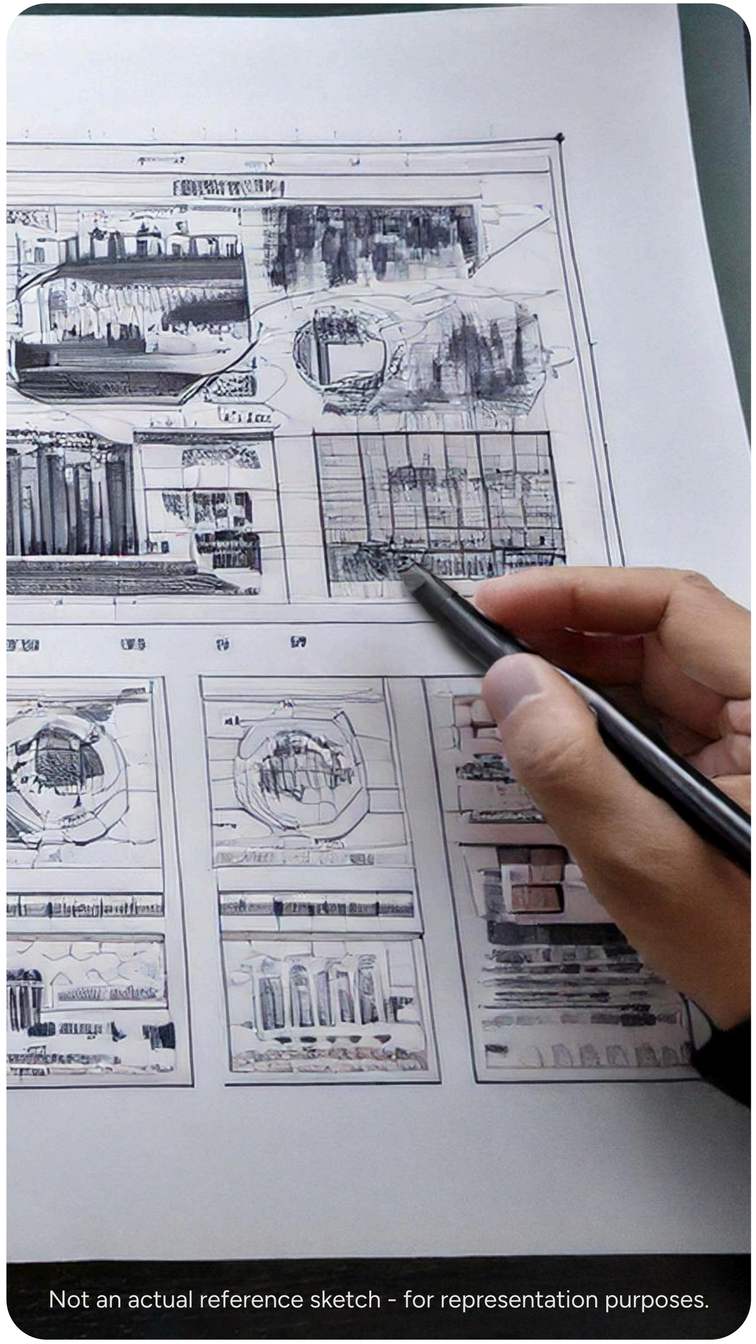
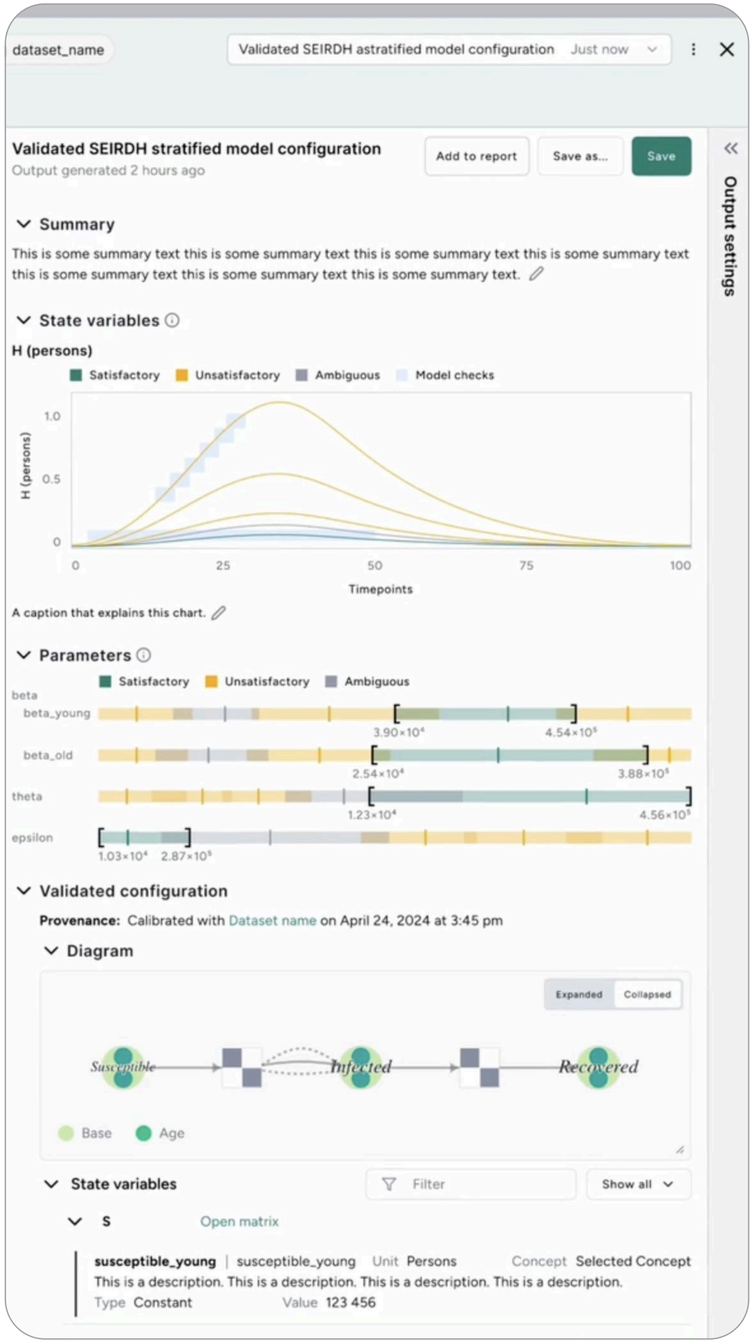
DESIGN

I worked with Product to translate our defined user needs into high fidelity prototypes.

I also collaborated with our in-house SMEs (data scientists) to transform concepts into intuitive UI designs, optimized for an easy to use, enjoyable user experience.



Not an actual reference sketch - for representation purposes.

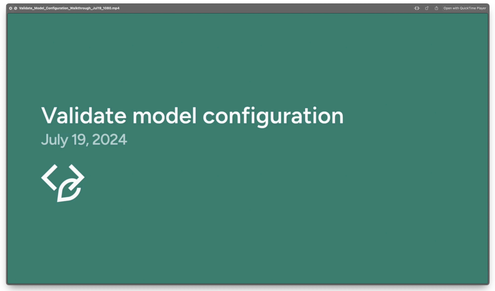


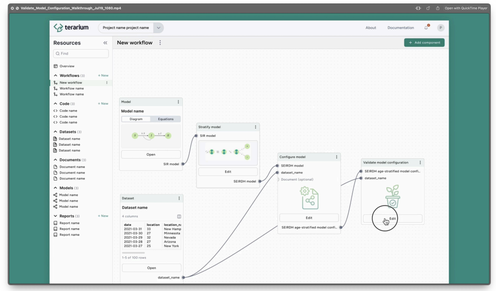
TESTING & VALIDATION

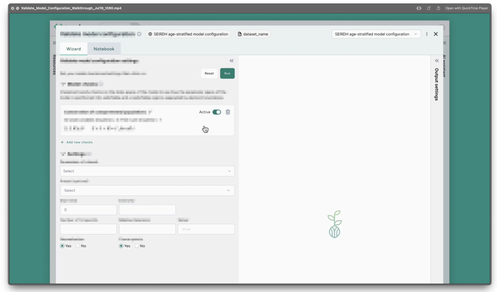
Prototypes were tested with end users. Additionally, we shared walkthrough videos of user flows with stakeholders and end users.

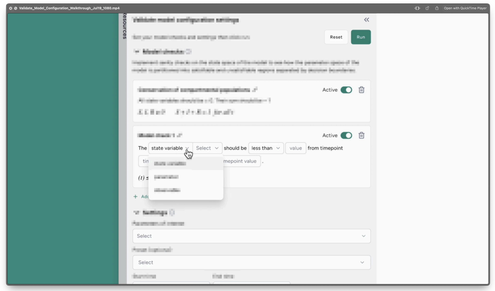
Iterative refinements were made based on feedback.

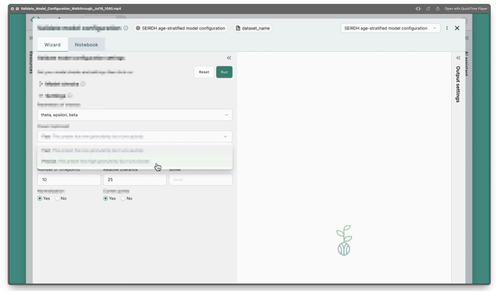
User flow walkthrough video screenshots

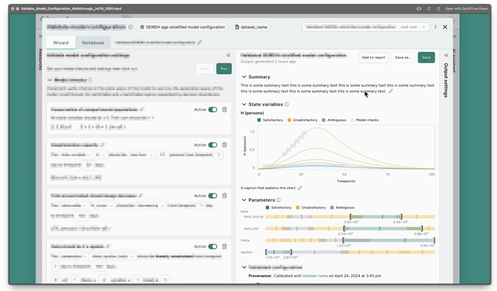












IMPLEMENTATION SUPPORT

I maintained and expanded our design system and component library, which were also used for other Uncharted applications in development. The design system was referenced often by our engineers.

Additionally, I provided reviews of implemented features to ensure alignment with our designs. I also created Github issues with annotated screenshots and met with engineers for brief chats or longer review meetings, providing continuous feedback and support.

Further along in the project, I also made front end code adjustments in the dev environment to ensure the application’s design was in alignment with the intended designs.

TERARIUM DESIGNS

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terarium

A knowledge, modeling and simulation ecosystem.

Welcome to the knowledge-modeling-simulation ecosystem built for researchers.

Empowered with the AI approaches and tools needed for the agile creation, sustainment, an enhancement of complex models and simulators that inform decision-making in diverse missions and scientific domains.

Evaluate and contribute to an accelerating scientific landscape.

Software developed by

uncharted

Questions? Email us at support@uncharted.software

Sign in

Username or email

Password

Login

Or sign in with

GitHub

From data to discovery

Accelerate scientific modeling and simulation using AI. Search available knowledge, enhance extracted models and data, and test scenarios to simulate real-world problems.

Get started

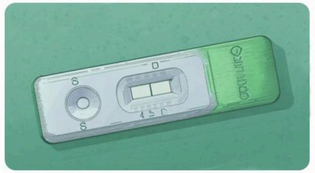
My projects | Public projects | Sample projects

Last updated (descending)

Cards | Table

+ New project

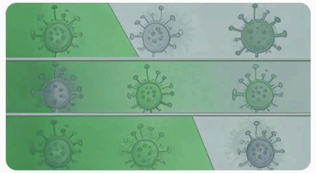
1 0 5 4



Effectiveness of COVID-19 Testing Strategies in Outbreak Control

Last updated Feb 20, 2024

1 0 0 0



Epidemiology of COVID-19 Variants of Concern

Last updated Feb 20, 2024

1 0 1 0

COVID-19 Vaccine Efficacy and Effectiveness Studies

Last updated Feb 20, 2024

1 0 0 0

COVID-19 Vaccine Uptake Analysis in Vulnerable Populations

Last updated Feb 20, 2024

1 0 0 0

Community Health Mapping for Disease Surveillance

Last updated Feb 20, 2024

Resources
Filter resources
Overview
Documents (2)
A modified age-structured SIR m...
SIDARTHE_Giordano2020.pdf
Dataset (5)
Italy_contact_matrix
test-dataset-wh
simulate_ES3_Q2
simulate_ES3_Q2_Determ3
SIDARTHE_dataset
Model (4) + New
ES2_2a_youth_novax
ES1_2ci_SEIRHD
Scenario 3 base model
SIDARTHE from equations
Workflow (5) + New
workflow 1
workflow 2
workflow 3
workflow 4
workflow 5
Upload resources

Effectiveness of COVID-19 Testing Strategies in Outbreak Control

Last updated Tuesday, February 20, 2024

Aims to assess the efficiency of various testing approaches in containing and mitigating the spread of COVID-19 outbreaks.

2 Document | 5 Dataset | 4 Model | 5 Workflow

Quick links

Upload resources | New model | New workflow | Compare models | New simulation

Resource Manager

Keyword search

Name	Modified	Type
A modified age-structured SIR model for COVID-19 type viruses.pdf		DOCUMENT
SIDARTHE_Giordano2020.pdf		DOCUMENT
Italy_contact_matrix		DATASET
test-dataset-wh		DATASET
simulate_ES3_Q2		DATASET
simulate_ES3_Q2_Determ3		DATASET
SIDARTHE_dataset		DATASET
ES2_2a_youth_novax		MODEL
ES1_2ci_SEIRHD		MODEL
Scenario 3 base model		MODEL
SIDARTHE from equations		MODEL
workflow 1		WORKFLOW
workflow 2		WORKFLOW
workflow 3		WORKFLOW

Notes

terarium

Effectiveness of COVID-19 Testing Strategies in Outbreak Control

About Documentation NG

Resources

Filter resources

Overview

Documents (2)
- A modified age-structured SIR m...
- SIDARTHE_Giordano2020.pdf

Dataset (5)
- Italy_contact_matrix
- test-dataset-wh
- simulate_ES3_Q2
- simulate_ES3_Q2_Determ3
- SIDARTHE_dataset

Model (4) + New
- ES2_2a_youth_novax
- ES1_2ci_SEIRHD
- Scenario 3 base model
- SIDARTHE from equations

Workflow (5) + New
- workflow 1
- workflow 2
- workflow 3
- workflow 4
- workflow 5

Upload resources

Model
SIR model
Diagram | Equations


Open
SIR model

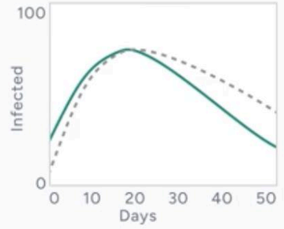
Configure model
SIR model
Dataset (optional)
2021 COVID-19 transmission in Ontario
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut molestie enim arcu, at semper tur...
No errors detected
Configure
2021 COVID-19 transmission in On...

Validate configuration
2021 COVID-19 transmission in Onta...
Model configuration
Entire configuration passes sanity check
Review test results
Validated model configuration
Save to model

Dataset
Ontario 2020
4 columns

date	location	location_na
2021-03-31	33	New Hamp
2021-03-30	27	Minnesota
2021-03-29	32	Nevada
2021-03-28	27	Arizona
2021-03-27	25	New York

1-5 of 100 rows
Open
Ontario 2020

Calibrate
2021 COVID-19 transmission in Onta...
Ontario 2020
Infected
Y-axis clipping Max 100


Configure
2021 Ontario Caibrated
Save as a new model

Stratify
SIR model

Configure

Notes

uncharted

Report an issue Request a feature

Stratify model

Documentation

Wizard | Notebook

Stratify model

The model will be stratified with the following settings.

Cartesian product

Name of strata: Age group

Select variables and parameters to stratify: S, I, R, β, γ

Enter a comma separated list of labels for each group. (Max 100)

Young, Old

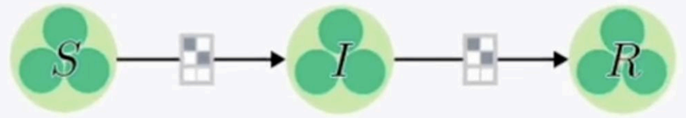
+ Add another strata group

Preview

Select output to display: Output 2

Rehydrate wizard with these settings

Expanded | Collapsed | Template | Flat | Equations | Diagrams



Base Age Transition No transition

Run again

Save as a new model

Close

Stratify model

Documentation

Wizard | Notebook

AI assistant | Python | Reset code

Stratify by location Toronto, Ottawa, Montreal. There are no interactions between members unless they are in the same location.

Hide thoughts | Discard generated code

```
output_3 = stratify(
   model = sir_model,
   key = "city"
   strata = ["toronto", "ottawa", "montreal"],
   cartesian_control = False,
   directed = False,
   structure = None # None = every possible 2-wise combination
```

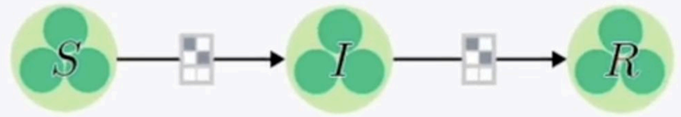
Preview

Select output to display

Output 2

Rehydrate wizard with these settings

Expanded | Collapsed | Template | Flat | Equations | Diagrams



Base | Age | Transition | No transition

Run again

Save as a new model | Close

SEIRDH age-stratified model configuration

dataset_name

Just now

Wizard | Notebook

Reset | Run

Active

Active

Active

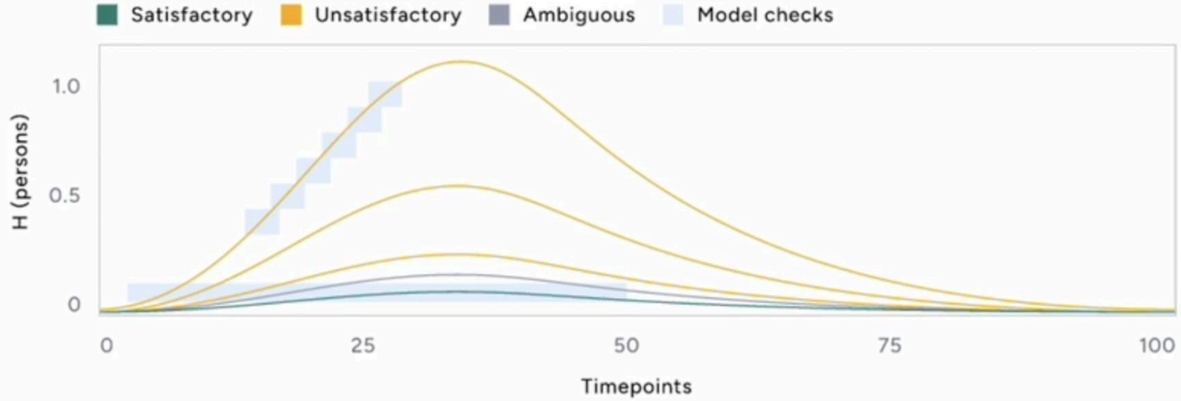
Active

Add to report | Save as... | Save

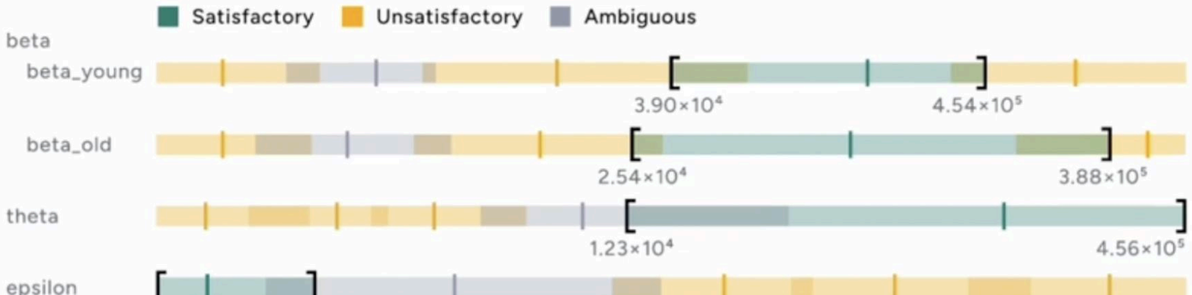
Output generated 2 hours ago

This is some summary text this is some summary text this is some summary text this is some summary text this is some summary text this is some summary text.

H (persons)



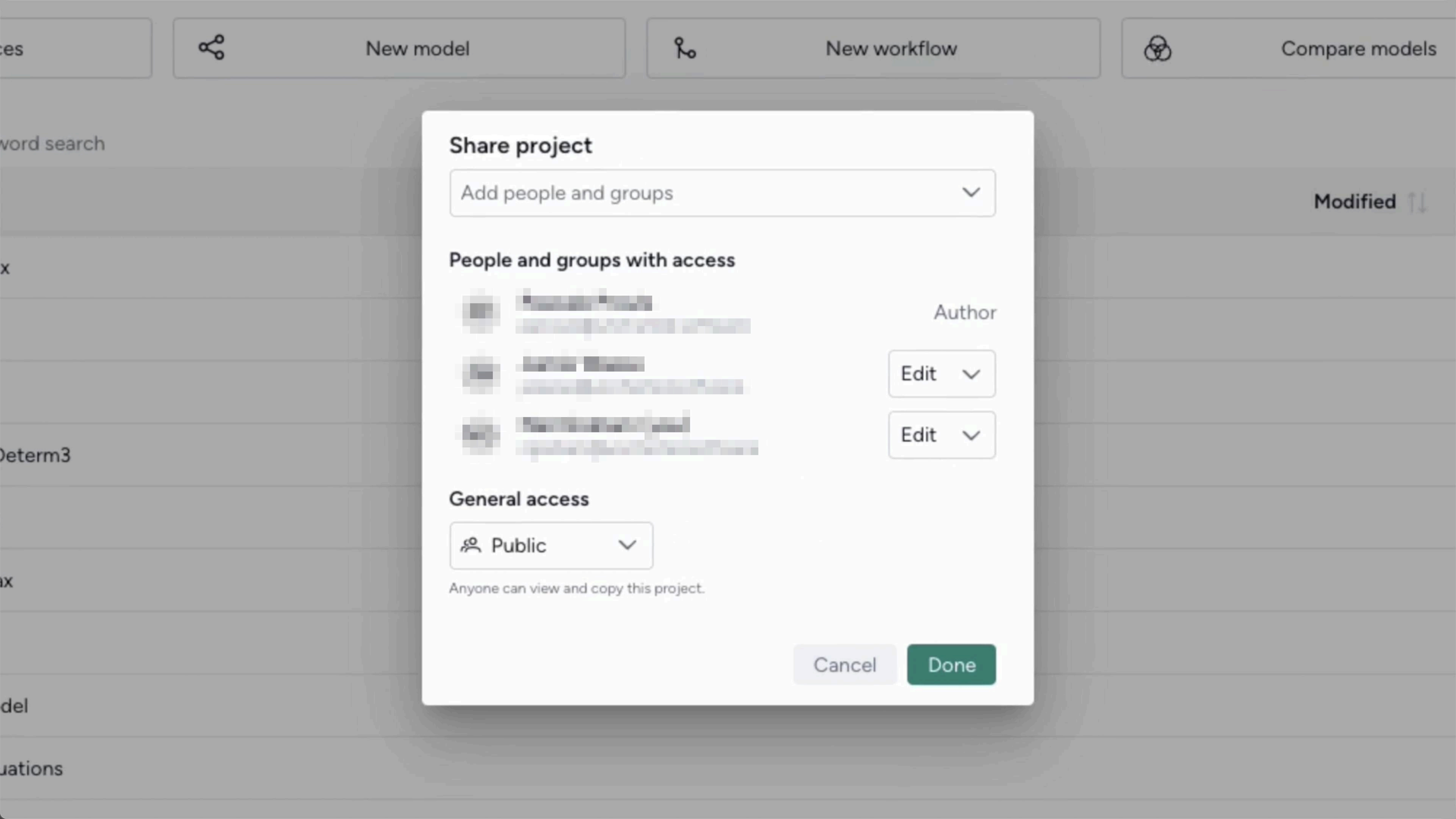
A caption that explains this chart.



Output settings

Resources

AI assistant


New model
New workflow
Compare models
Modified
Share project
Add people and groups
People and groups with access
Author
Edit
Edit
General access
Public
Anyone can view and copy this project.
Cancel
Done

MEASURING SUCCESS

Terarium (still in development) is receiving very positive reviews from both users and stakeholders.

We met our business objectives to make scientific modeling and scenario testing more accessible and dramatically increase the speed at which these testing processes are completed.

Additionally, we solved user pain points by reducing constraints of computational notebooks and simplified the creation of data visualizations.