

Epidemiological Modeling Portal



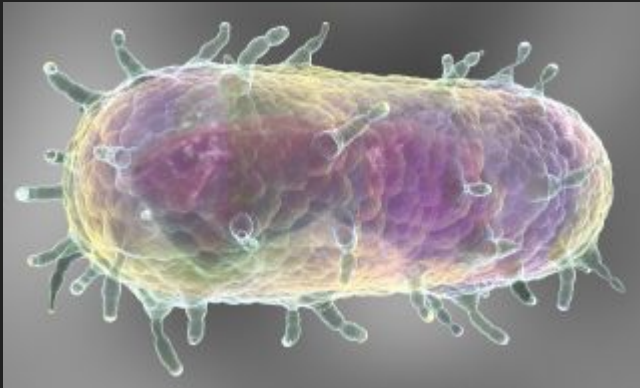
Pandemic Processing

Tanner Massahos, Joseph Eppinger, Anthony Schroeder
Mentor: Dr. Eck Doerry

Introduction

Plagues

- Plague of Justinian in 541 and lasted 200 years.
 - 25-50 million deaths
- Black Death during 1347-1350
 - Killed ~60% of the European population



West Africa Ebola Outbreak

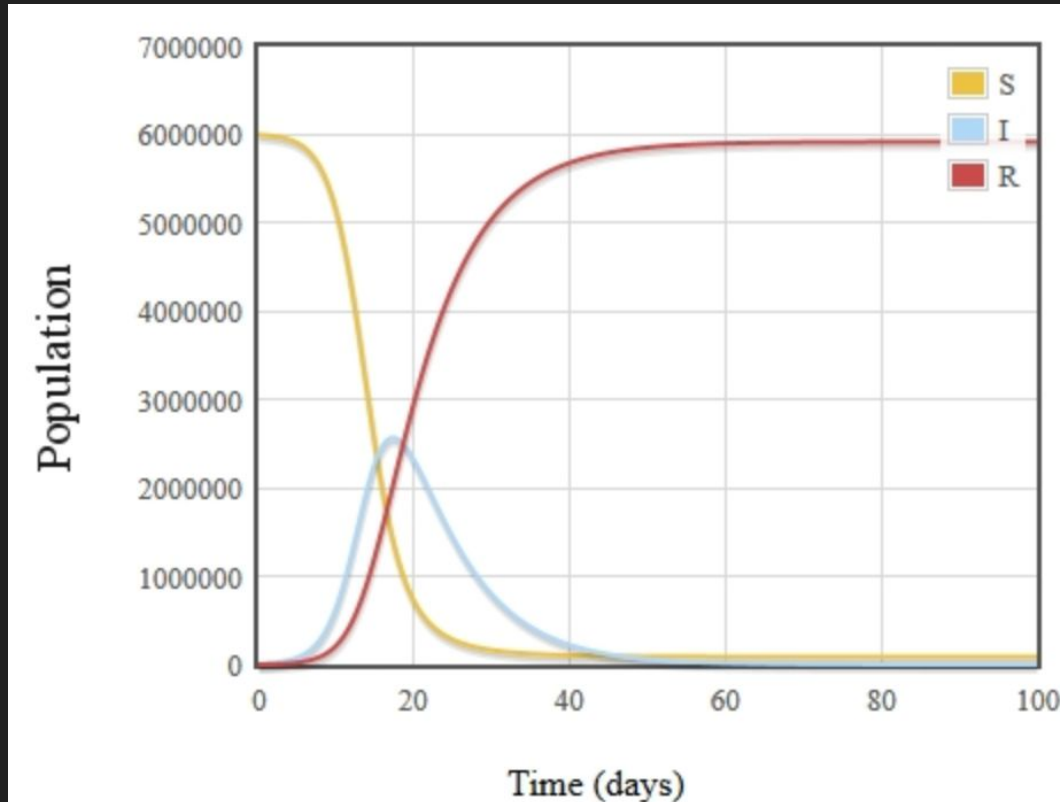
- Occurred December 2013 - June 2016
- 11,310 total deaths

What is Epidemiology and How Does it Help?

Epidemiology: The study of infectious disease and how it spreads within a population.

- Epidemiologists generate mathematical models to show the spread of infectious disease.
- These models can be used to predict the best time to vaccinate against infectious diseases.
- Proper timing is imperative to prevent the spread of infection.

SIR Model for Ebola



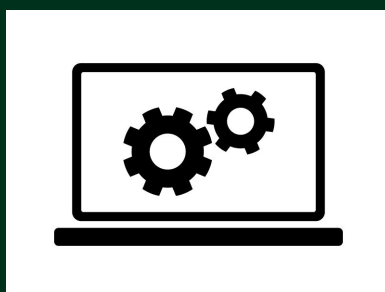
General Workflow

Collect
Data



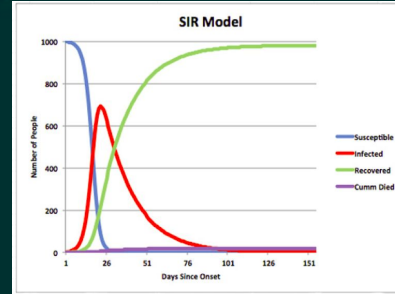
Data Sets
Researched Data

Model
Data



Modeling programs:
C
R
Python

Model
Implications



Build Predictions

Preventative
Measures



Distribute Vaccine

Our Client

Dr. Joseph Mihaljevic:

- Assistant professor in SICCS
- Researches and collects data concerning the spread of infectious disease
- Primary focus:
 - Ecological preservation through biocontrol
 - Controlling outbreaks of infectious disease

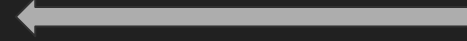
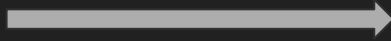


Problems

The current methodology lacks unity:

- Epidemiologists lack an efficient way to share their models
- These models can only appear in static form
- Discussion with the entire community only begins at publication
- Allowing other epidemiologists to use their code is dangerous in research.

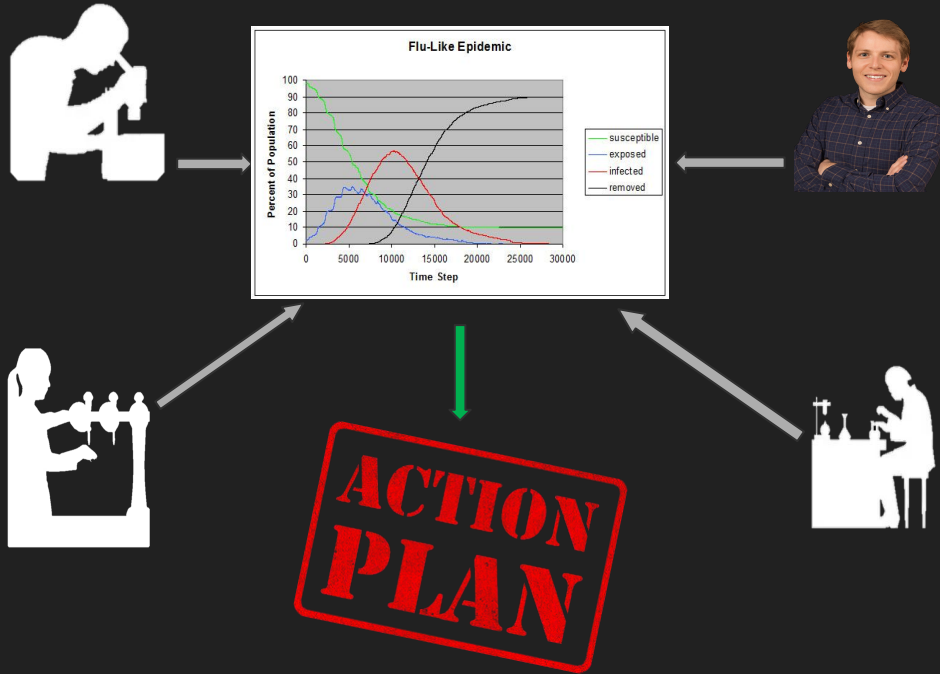
Modeling in Reality



**ACTION
PLAN**



EON: Epidemic Observation Network



EON will allow epidemiologists to:

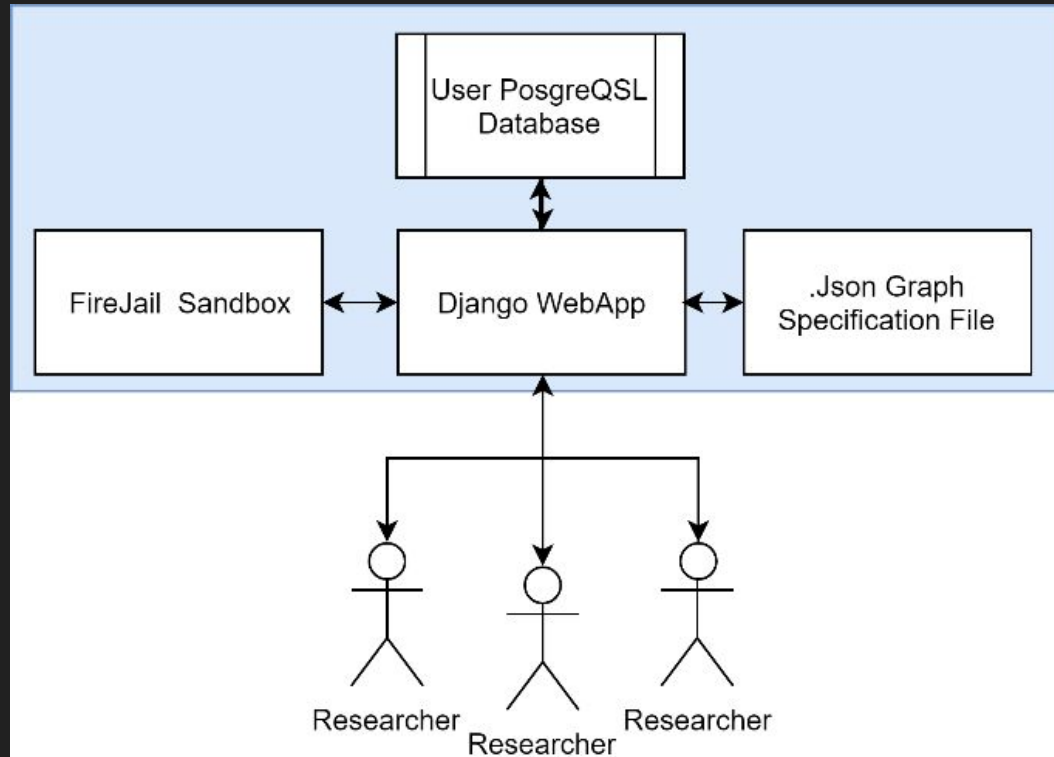
- Share models with the community
- Decide how their models appear to viewers
- Interact with and provide feedback on other models
- Discuss future models without a model fully developed yet
- Edit and share the code used to generate models

Key Requirements

Acquired through numerous client meetings.

- User accounts and management
- Allow users to upload custom models
- Allow a user to make these models public or private
- Allow users to run/explore uploaded models
- Support cloning, modification, and sharing of models
- Support multiple modeling languages
- Ability to extend with new languages
- Forum for the discussion of models

EON System Solution Diagram



Current Progress - Homepage



[Dashboard](#)

[Users](#)

[Forums](#)

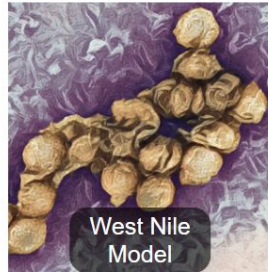
[Models](#)

EON

Cool tag line

The short description (or shortdesc) is arguably the most important component of a DITA topic, and is also one of the most difficult elements to write. Short descriptions should be written for every topic. Short descriptions serve multiple purposes within a document.

Popular Models:



Current Status – Forums



[Dashboard](#)

[Users](#)

[Forums](#)

[Models](#)

General Discussion

22

votes

New Ebola Model

I have created a new model for Ebola as it spreads through densely populated areas...

9

comments

Human

Virus

6 mins ago



user6490375

77

55

votes

Looking For Data On Xylella Fastidiosa

Does anyone have a sample I can use for a new model I can use for bacteria infecting...

14

comments

Bacteria

Oak

11 mins ago



Croolman

115

38

votes

Any Updates On This Data?

I saw an incomplete data sample a few weeks ago here. The thread has been locked...

8

comments

Virus

Moth

16 mins ago



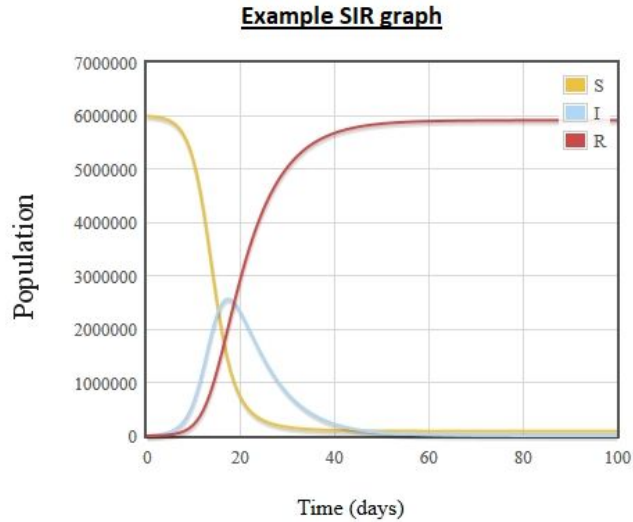
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11

Current Status - Models

- Dashboard
- Users
- Forums
- Models

Read Me L1 Error L2 Error **Example SIR graph**



Modifiable Parameters

Range

Range: (100 -1K)

800

Alpha

Range: (1 - 5)

4

Distribution

Range: (1 - 10)

1.5

Infectivity

Range: (10 - 100)

30

#Tags #KNN #CoolModel

Last Day Edited: Today

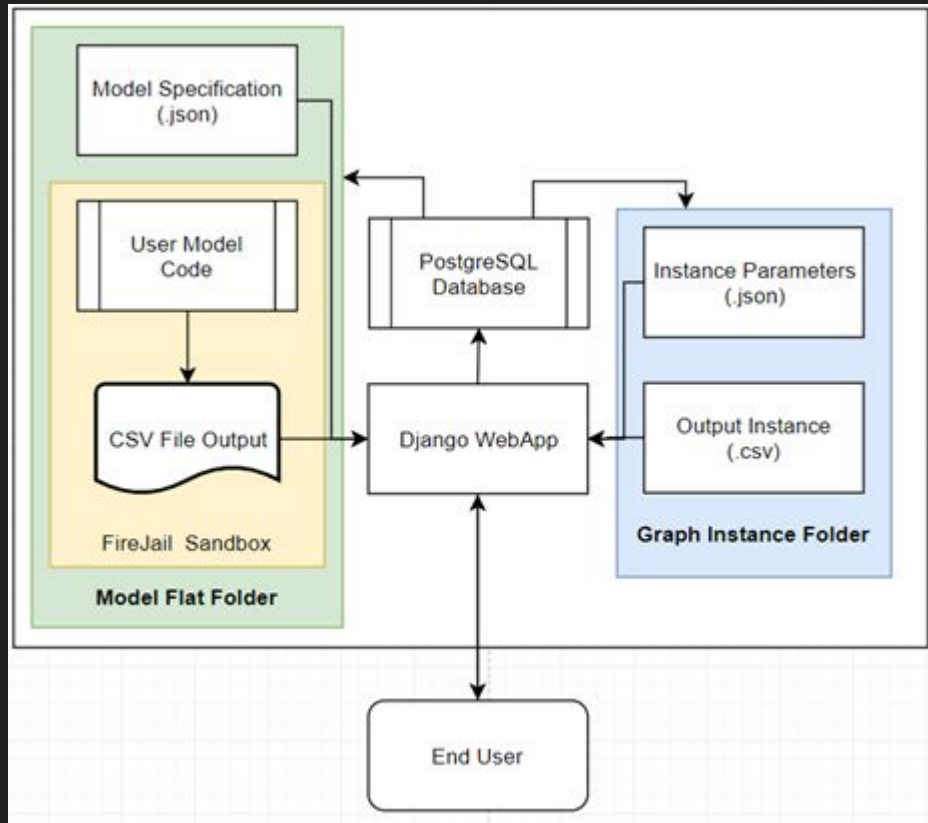


Model Smasher

Filter by:

Date

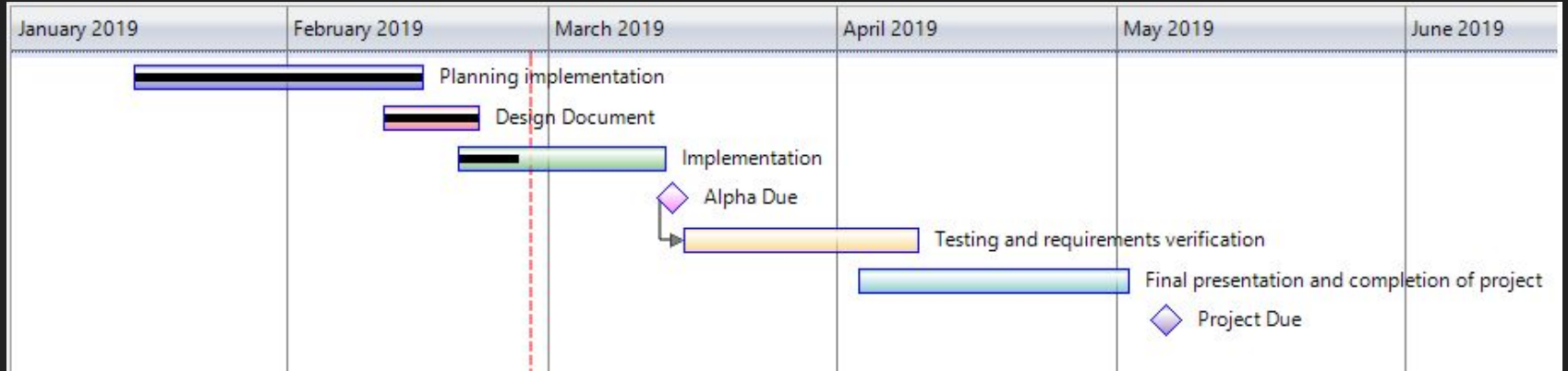
EON an In-depth View of Models



Risks/Feasibility

Risk	Severity	Likelihood
Individuals uploading/downloading malicious code	High	Low → None
User's programming language not supported	Medium	Medium → Low
Server overloaded with running models	Medium	Low
Difficult entry: New users may find the platform challenging to use	High	Medium → Low
Users wish to maintain IP rights to code	Medium/High	Medium → Low
Singular point of reference	High	High → Low

Future Plans



Conclusion

- Epidemiology is important when it comes to lessening the number of deaths due to infectious disease
- EON will speed up and optimize the current workflow
- Thus our application will be invaluable for assisting epidemiologists in their future endeavours