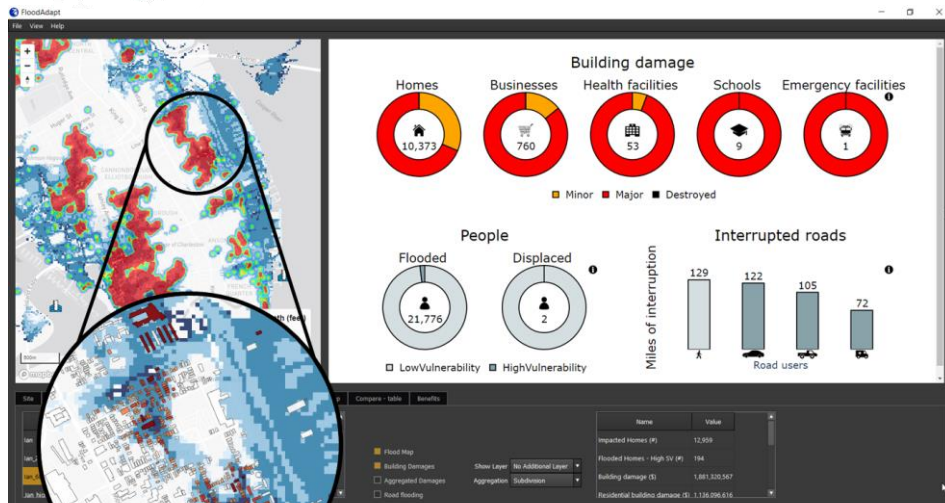


FloodAdapt a decision support tool for flood risk mitigation



Stendert Laan¹,
Kathryn Roscoe², Gundula Winter², Panos Athanasiou²,
Eskedar Gebremedhin¹, Lauren Schambach¹,
Ron Langhelm³, and David Alexander³

1. Deltares USA
2. Deltares (The Netherlands)
3. Department of Homeland Security Science and Technology Directorate

What determines future flood risk?

Types of events

High tides



Rainfall



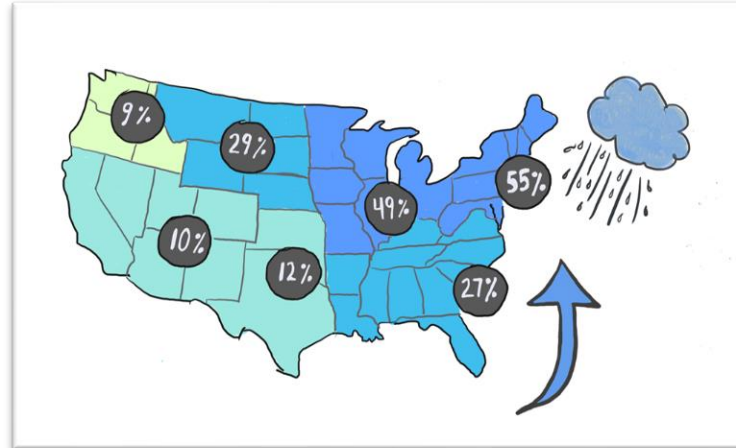
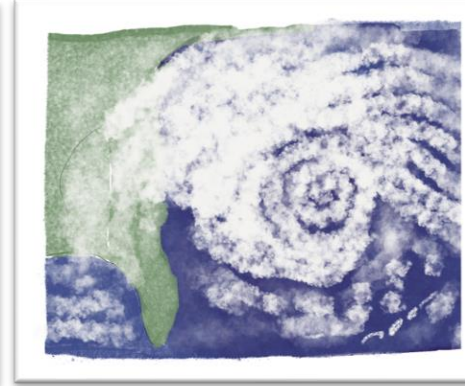
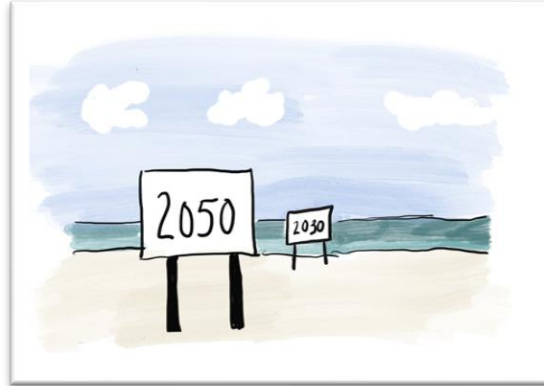
Hurricanes



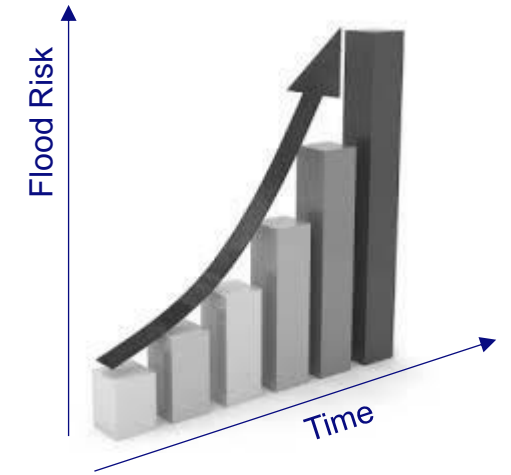
Nor'easters



Projections of changing conditions



Mitigation strategies



Flood-proofing

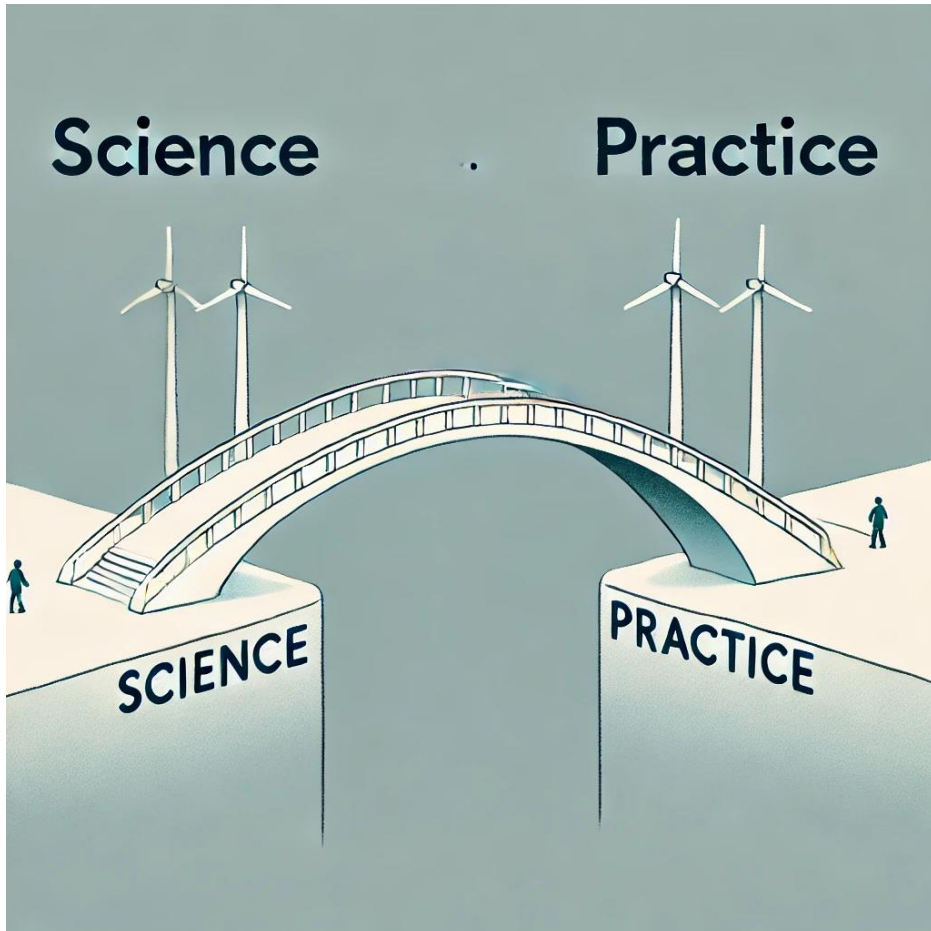


Buyouts



Elevation

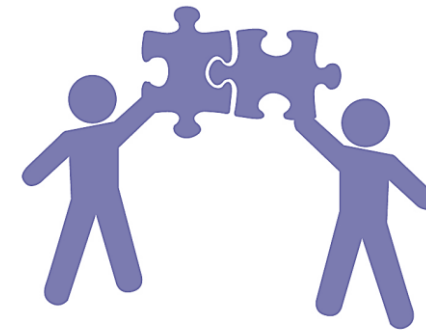
Modeling needs to be easier, faster, and **more accessible**



Deltares



**Science and
Technology**



City of Charleston

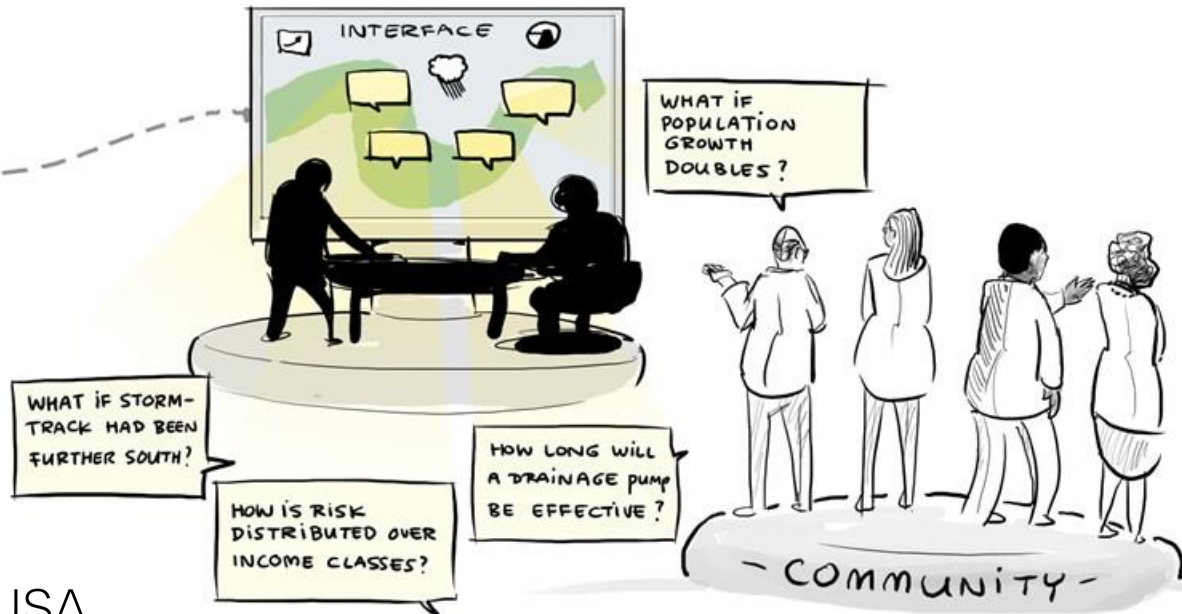
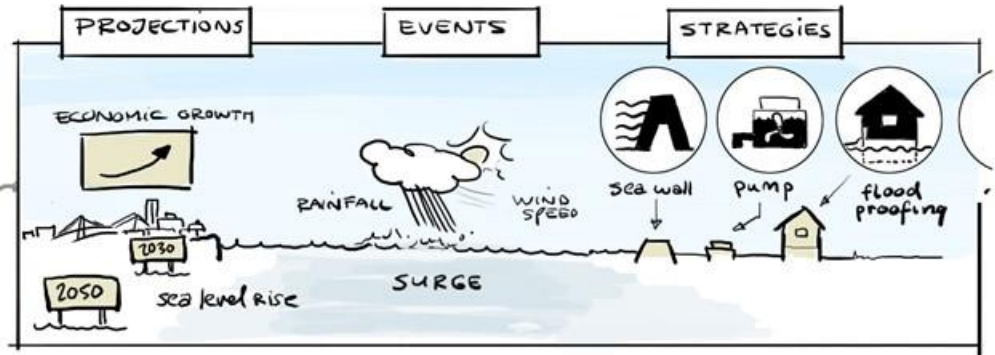
Maryland Department of Emergency Management

A community level adaptation planning and decision support tool

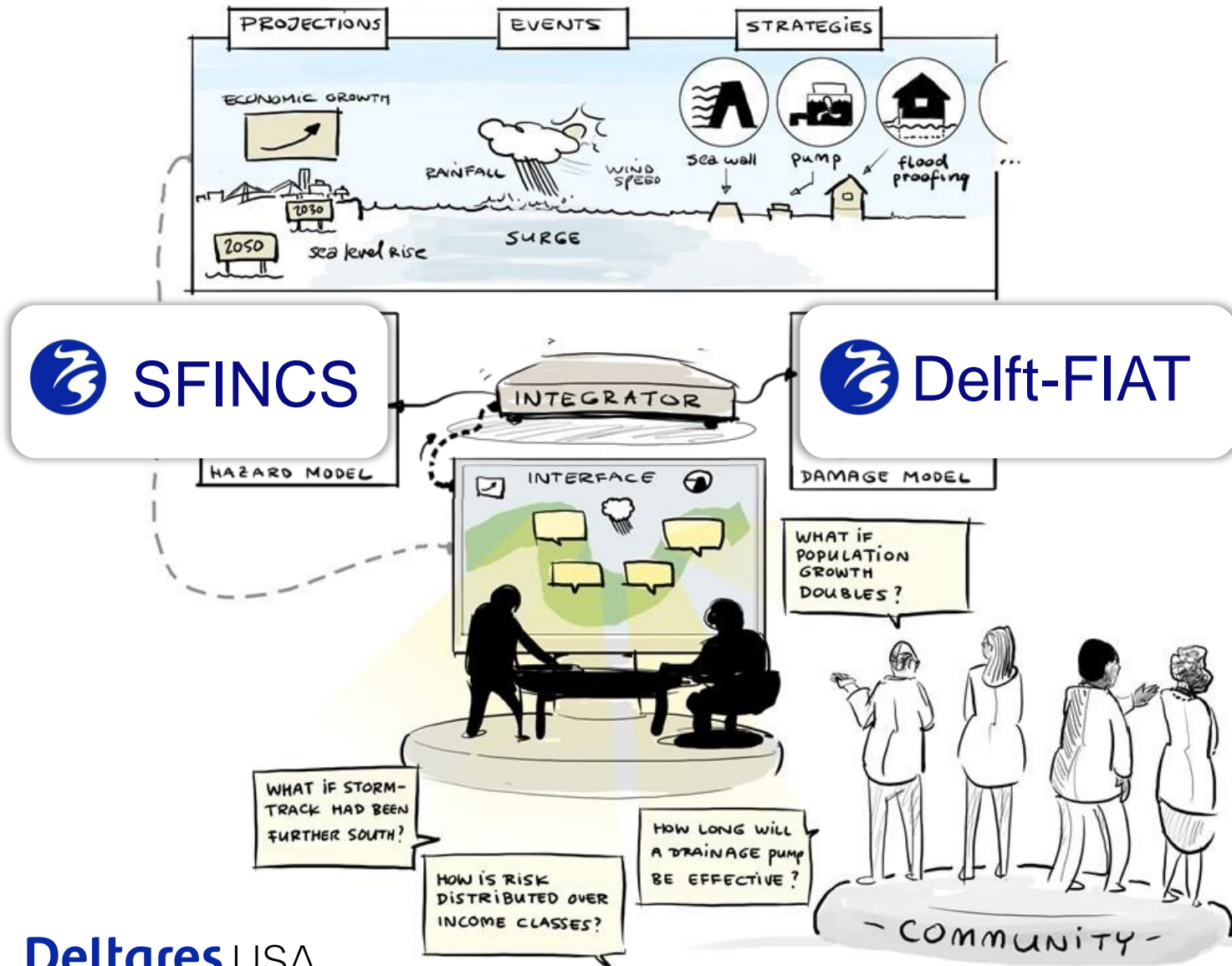
- FloodAdapt is a **decision support tool** that empowers people to **understand their flood risk** now, and in the future
- FloodAdapt helps you **explore what-if scenarios** and to **evaluate adaptation solutions**, like floodwalls, levees, pumps, floodproofing, buyouts, home elevations, and urban green infrastructure
- FloodAdapt facilitates **simulation of meaningful events** that connect with community members



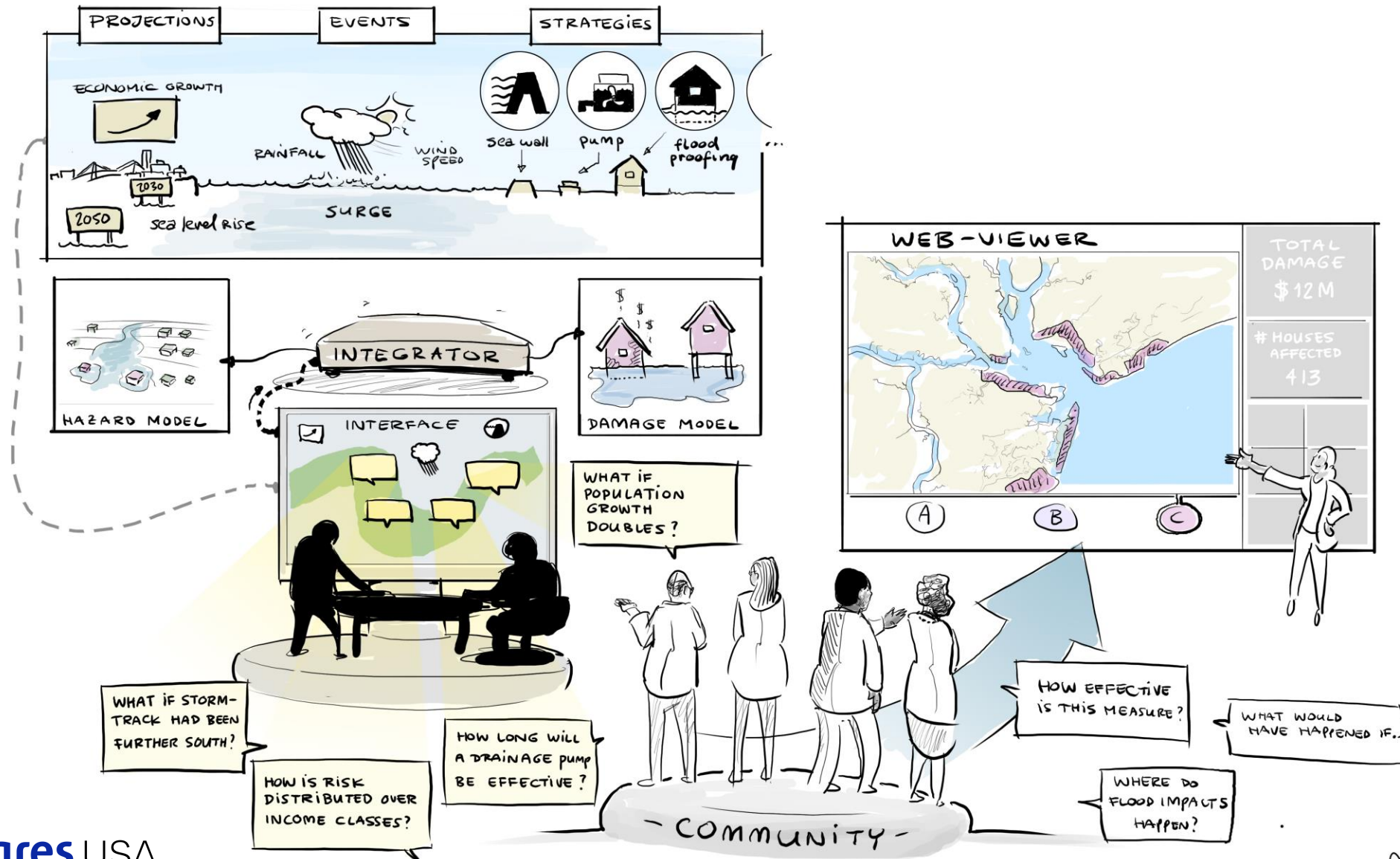
COMMUNITY FLOOD RESILIENCE SUPPORT SYSTEM



COMMUNITY FLOOD RESILIENCE SUPPORT SYSTEM



COMMUNITY FLOOD RESILIENCE SUPPORT SYSTEM



Unique feature: evaluate recent events

Compound flood event in Charleston: Nor'easter and high tides on 12/17/2023

Photo credit: Jared Bramblett
<https://meanhighwater.com/>

FloodAdapt

File View Help

mapbox

© Mapbox © OpenStreetMap Improve this map

Name	Date created	Projection	Event	St
noreaster_rainfall	2024-03-25 12:03	current	noreaster_rainfall	no_m
noreaster_rainfall_SLR_1ft_elevate_BFE	2024-06-06 14:00	SLR_1ft	noreaster_rainfall_eleva	
noreaster_rainfall_SLR_1ft_elevate_BFE_1ft	2024-06-06 14:00	SLR_1ft	noreaster_rainfall_eleva	

Name	Value
Impacted Homes (#)	2,429
Flooded Homes - High SV (#)	103
Building damage (\$)	160,659,493
Residential building damage (\$)	116,133,640

Flood Map
 Building Damages
 Aggregated Damages
 Road flooding

Show Layer: No Additional Layer
 Aggregation: Subdivision

Flood depth (feet)

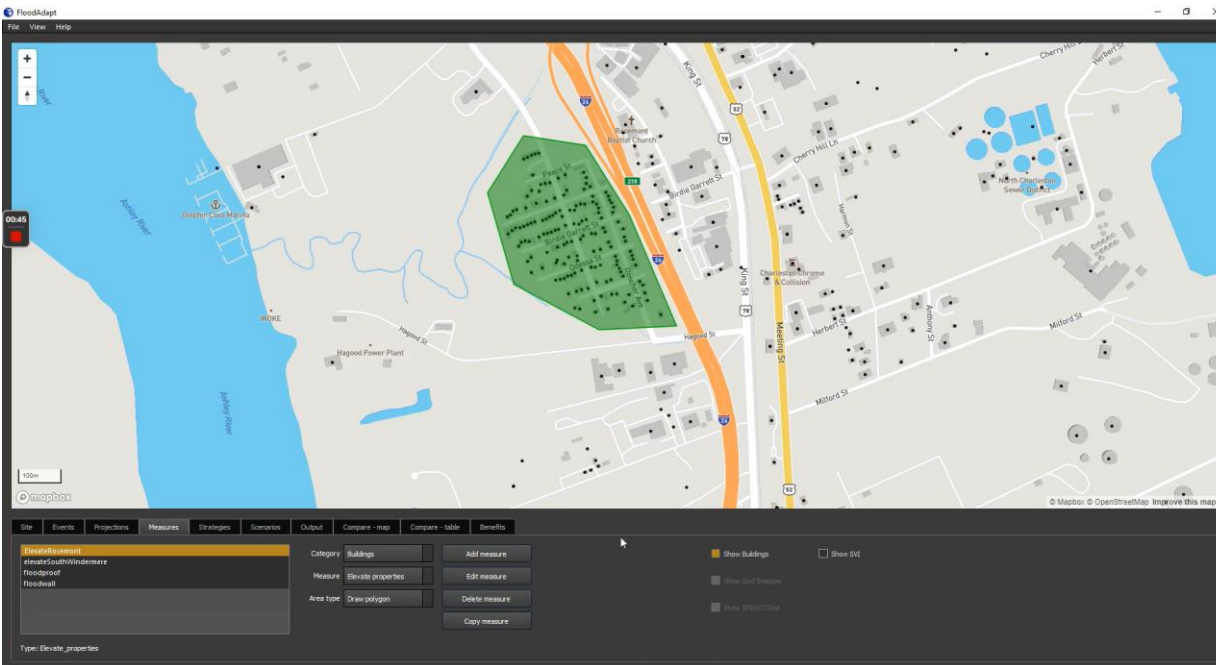
- > 5.0
- 3.0 - 5.0
- 1.0 - 3.0
- < 1.0



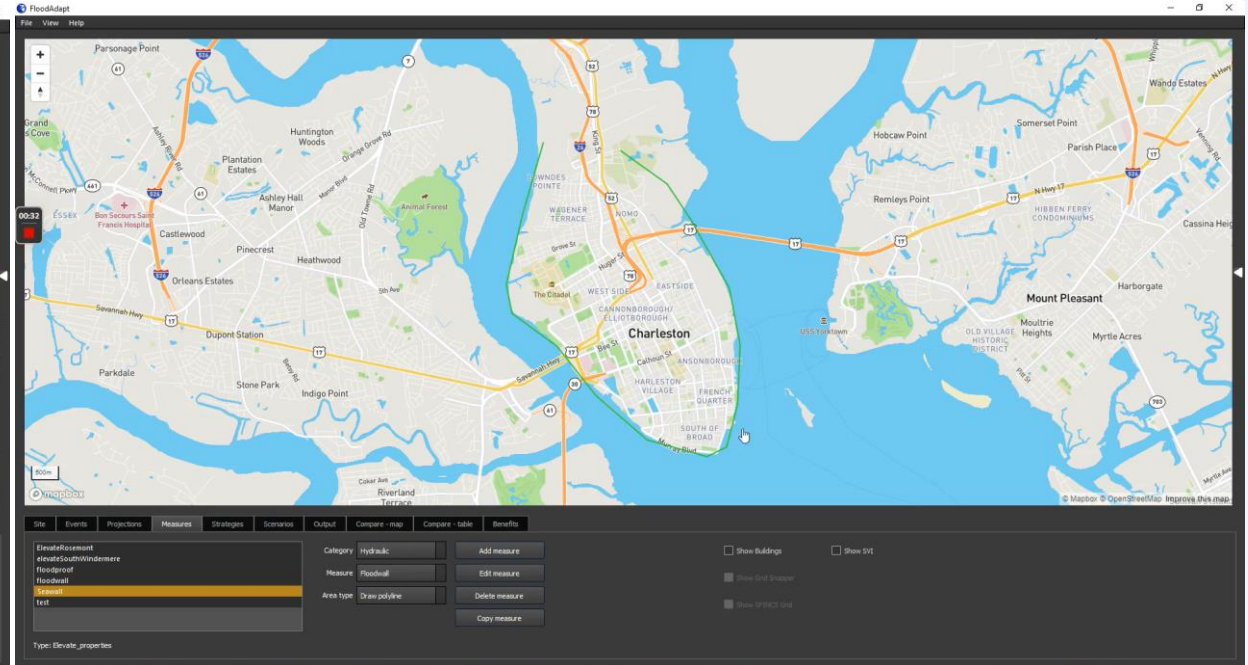
Unique feature: quick assessment of adaptation options

Specify actions the community can take and evaluate their effectiveness

Elevating homes to 2 feet above BFE



Peninsula seawall with 12 ft + NAVD88 elevation

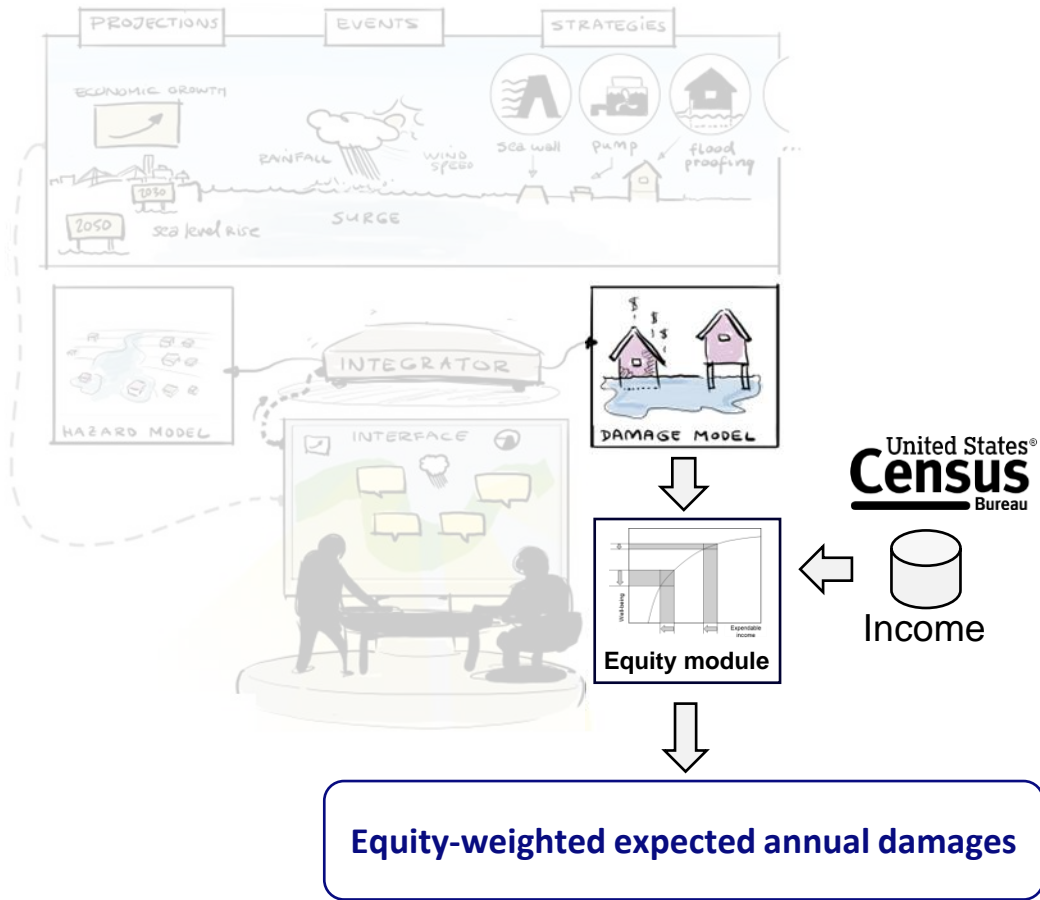


FloodAdapt includes a **Graphical User Interface** to:

1. easily set up hazard (SFINCS) and damage (Delft-FIAT) models
2. define future projections, compound flooding events and mitigation strategies
3. run simulations
4. visualize and inspect the outcome

Unique feature: consider equitable impacts and benefits

Insight into equity-weighted expected damage by considering social vulnerability



Environmental and Development Economics (2020), 25, 115–134
doi:10.1007/s11357-020-00027-5

EDE

RESEARCH ARTICLE

Social vulnerability in cost-benefit analysis for flood risk management

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*Corresponding

(Submitted 08 October 2019; Accepted 7 October 2019)

Accounting for risk aversion, income distribution and social welfare in cost-benefit analysis for flood risk management

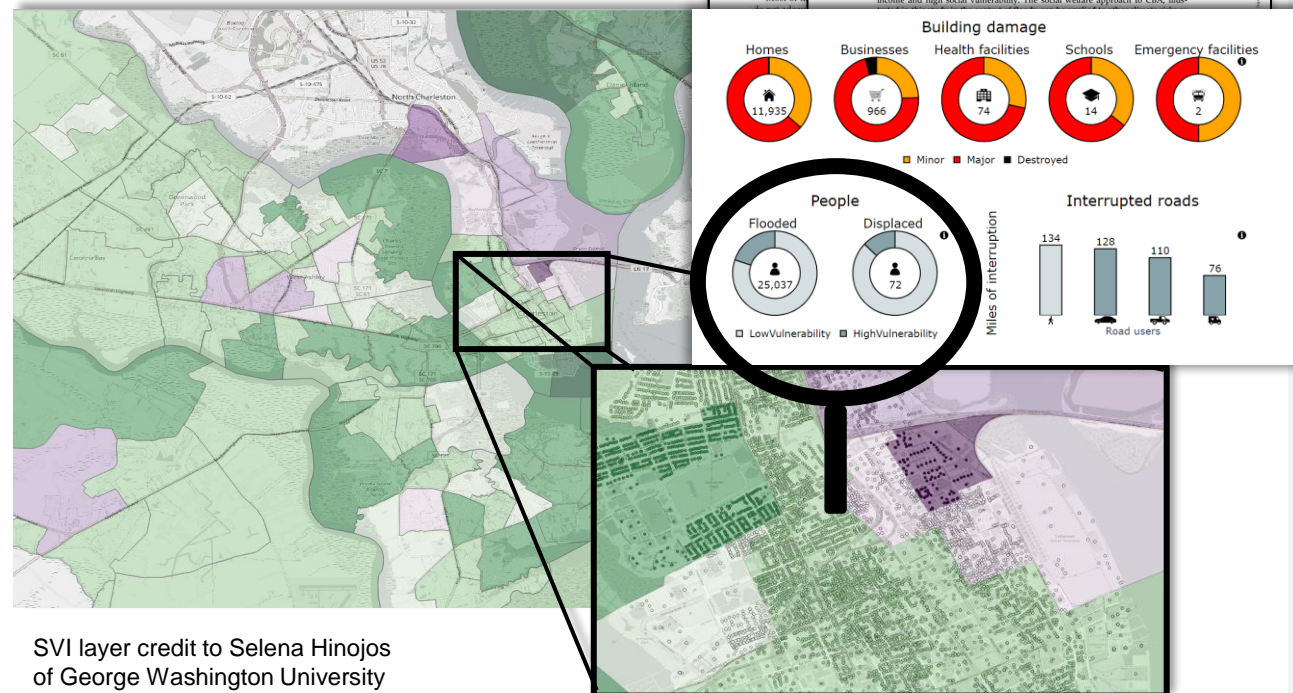
Jari Kind,^{1,*} W.J. Wouter Botzen^{2,3} and Jeroen C.J.H. Aerts²

Edited by Stéphane Hallegatte, Domain Editor, and Mike Hulme, Editor-in-Chief

Abstract
Traditional cost-benefit analysis (CBA) textbooks and guidelines recognize the objective of CBAs to improve social welfare—a function of well-being of all individuals, conceptualized by utility. However, today’s common practice to value flood risk management benefits as the reduction of the expected annual damages does not comply with this concept of social welfare, since it erroneously focuses on money instead of well-being (utility). Diminishing marginal utility of money implies that risk aversion and income differences should be taken into account while calculating the social welfare benefits of flood risk management. This is especially important when social vulnerability is high, damage compensation is incomplete and the distribution of income is regarded as unfair and income is not redistributed in other ways. Disagreement, misconception, complexity, untrained professionals, political economy and falling guidance are potential reasons why these concepts are not being applied. Compared to the common practice, a theoretically more sound social welfare approach to CBA for flood risk management leads to different conclusions on who to target, what to do, how much to invest and how to share risks, with increased emphasis on resilience measures for population segments with low income and high social vulnerability. The social welfare approach to CBA, illustrated

Keywords: social welfare, natural

1. Introduction
Worldwide damage from flood risk management often need to be evaluated properly. Most of the



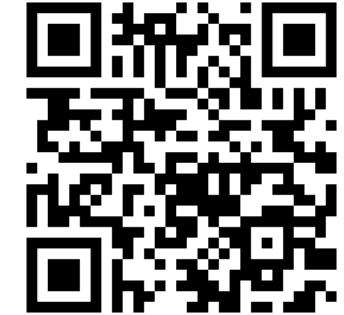
SVI layer credit to Selena Hinojos of George Washington University

Official release of FloodAdapt

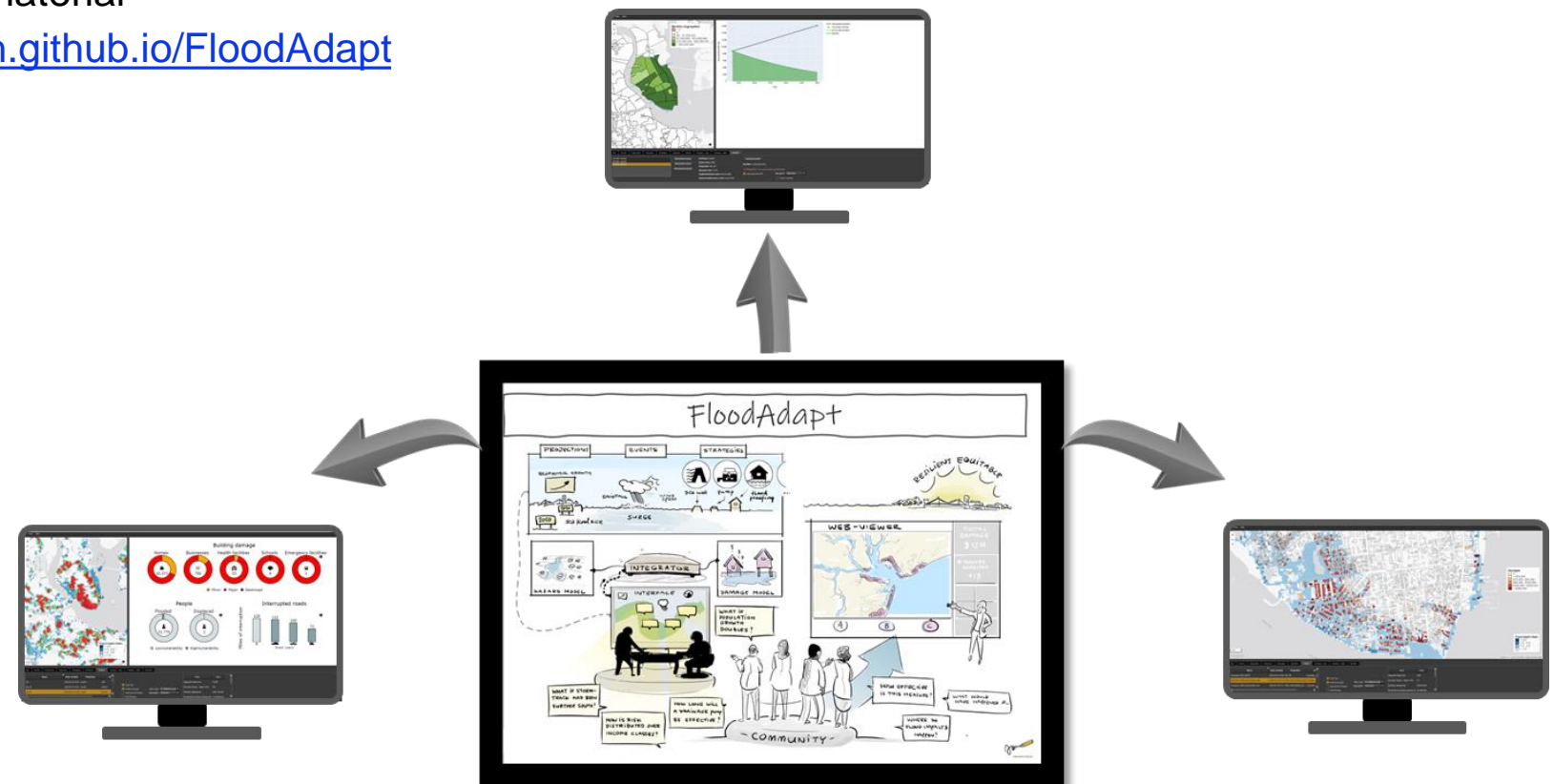
Release



Manual



- FloodAdapt Deployment in the coming weeks
 - First official validated release
 - <https://www.deltares.nl/en/software-and-data/products/floodadapt>
 - User manual and training material
 - <https://deltares-research.github.io/FloodAdapt>
 - Community of practice



Recent applications in the US

StoryMap



Forecast



- Forecasting hurricane impact on US coasts:

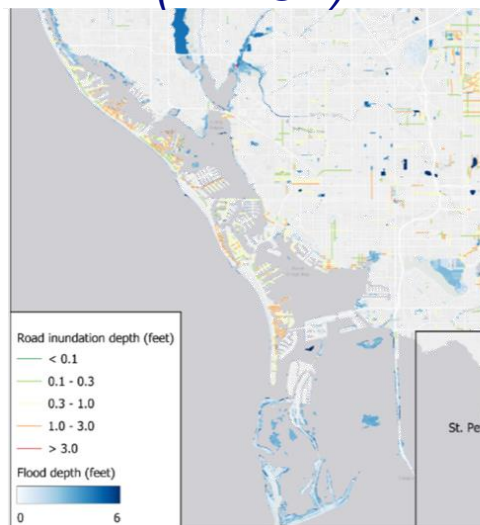
<https://storymaps.arcgis.com/stories/7384e6551be54d9393d64d9564ec1c7b>

- expected flood extent and depth (evacuation advice) – SFINCS
- expected road inundations (critical infrastructure) – RA2CE

- Forecasting system for National Oceanographic Partnership Program

http://cosmos.deltares.nl/nopp_event_viewer/index.html

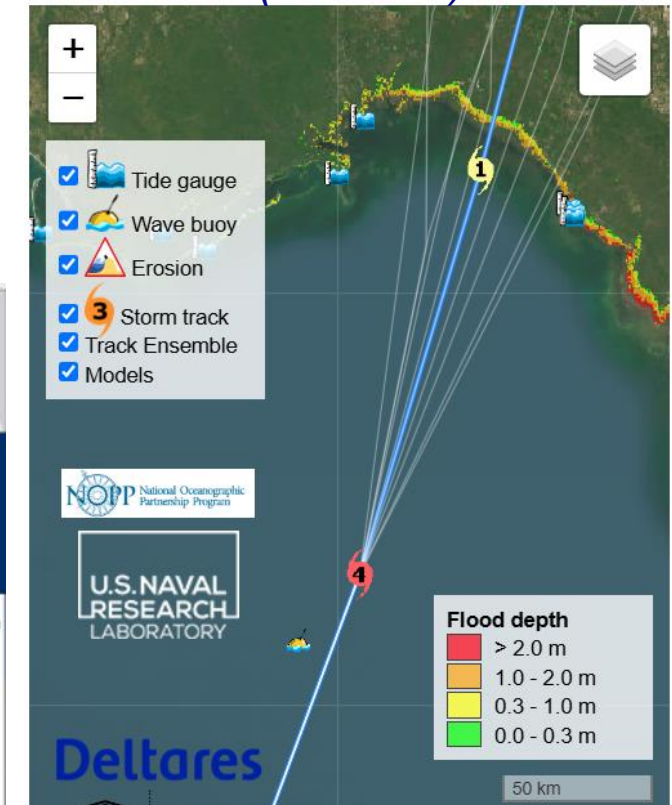
Road inundation
(RA2CE)



Flood extent and damage
(SFINCS and FIAT)



Forecasting System
(SFINCS)



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