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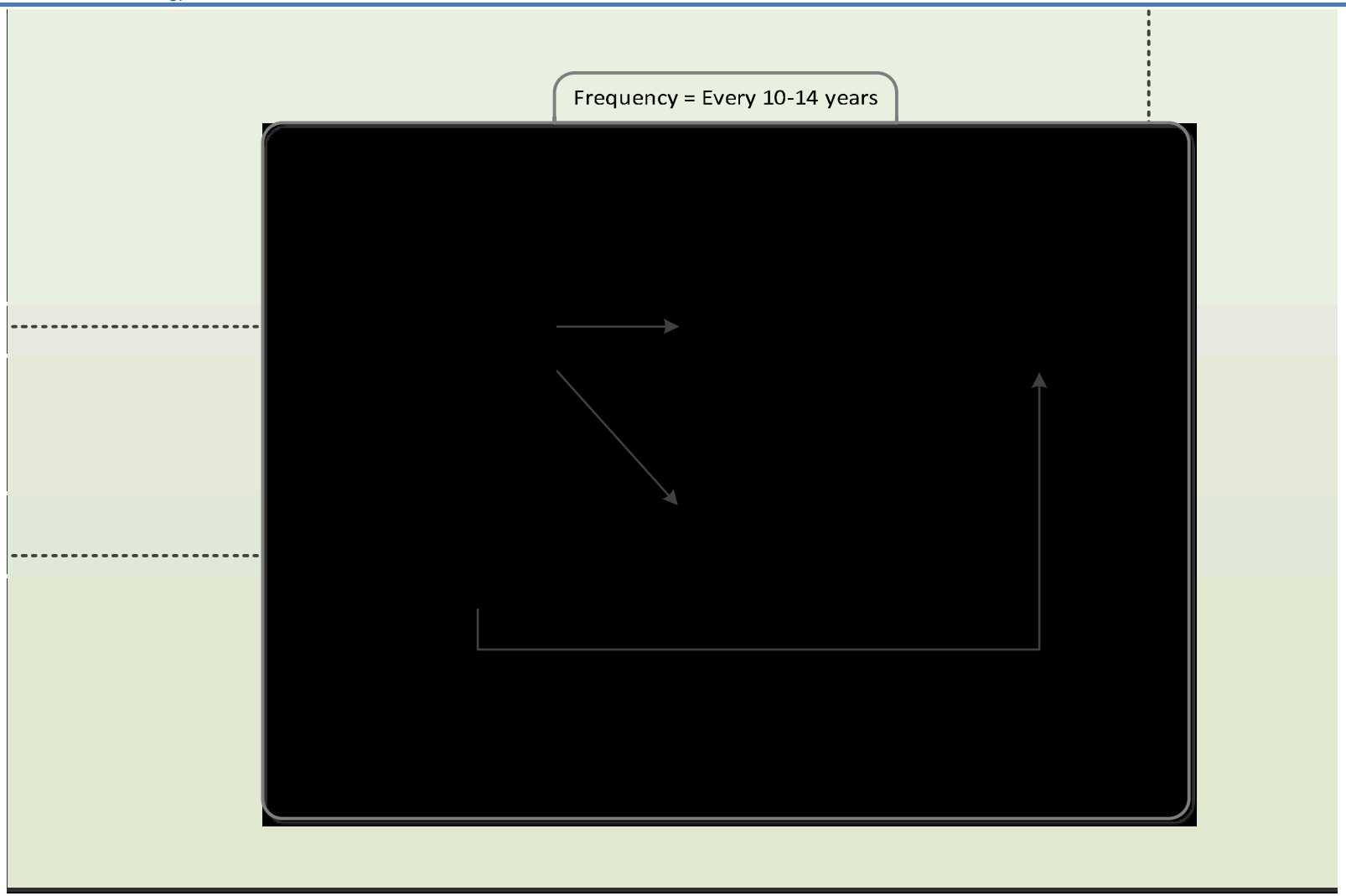
HES Process Overview

SAND2015-7916PE



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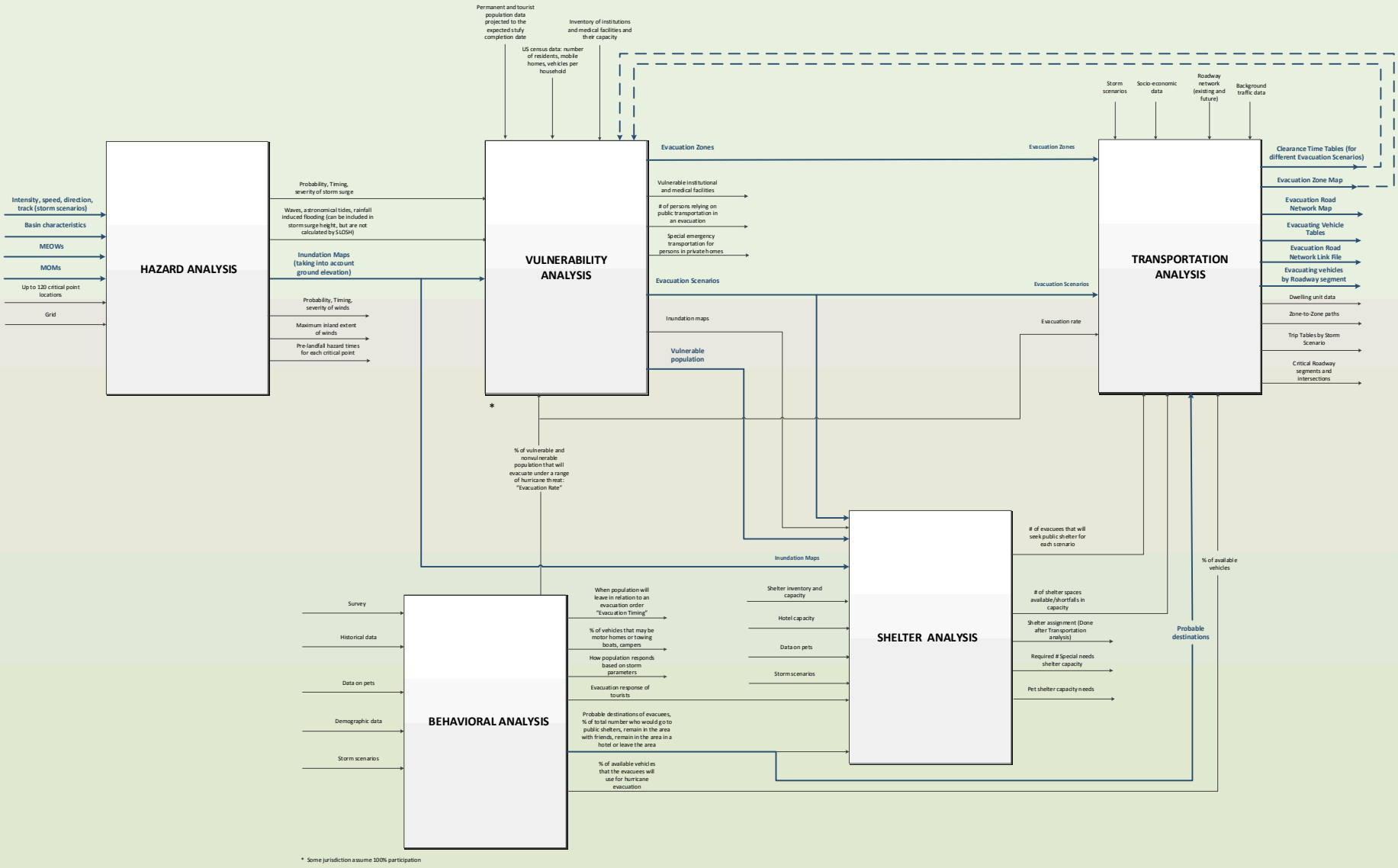
HES Process -Detailed



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Existing HES Process is Expensive and Lengthy

Analysis	"As Is" Cost	"To Be" Cost	"As Is" Length (months)	"To Be" Length (months)
Hazard	$60-$80k	$33-$41k	6-16	3 – 8
Vulnerability	$70-$100k	$42.5-$60.5k	7-18	5 – 12
Behavioral	$125-$160k	$38-$50k	10-17	2 – 4
Shelter	$35-$45k	$10-$12k	3-8	1 – 2
Transportation	$160-$230k	$43.5-$61k	12-19	2 – 4
Total	**$450-$615k**	**$123.5-$224.5k**	**38-78**	**13 - 30**

The HES modernization effort will result in cost reduction of up to 72% and time reduction of up to 66%.

- By leveraging SHERPA, a web-based software framework that links different models together, the HES process can be automated resulting in significant cost and time savings. The user will still have full control and increased visibility into the process.
- The new HES process will allow for standardization, while still allowing flexibility and customization at the local and state level.
- The new HES process will provide tools for easier coordination and communication between stakeholders.

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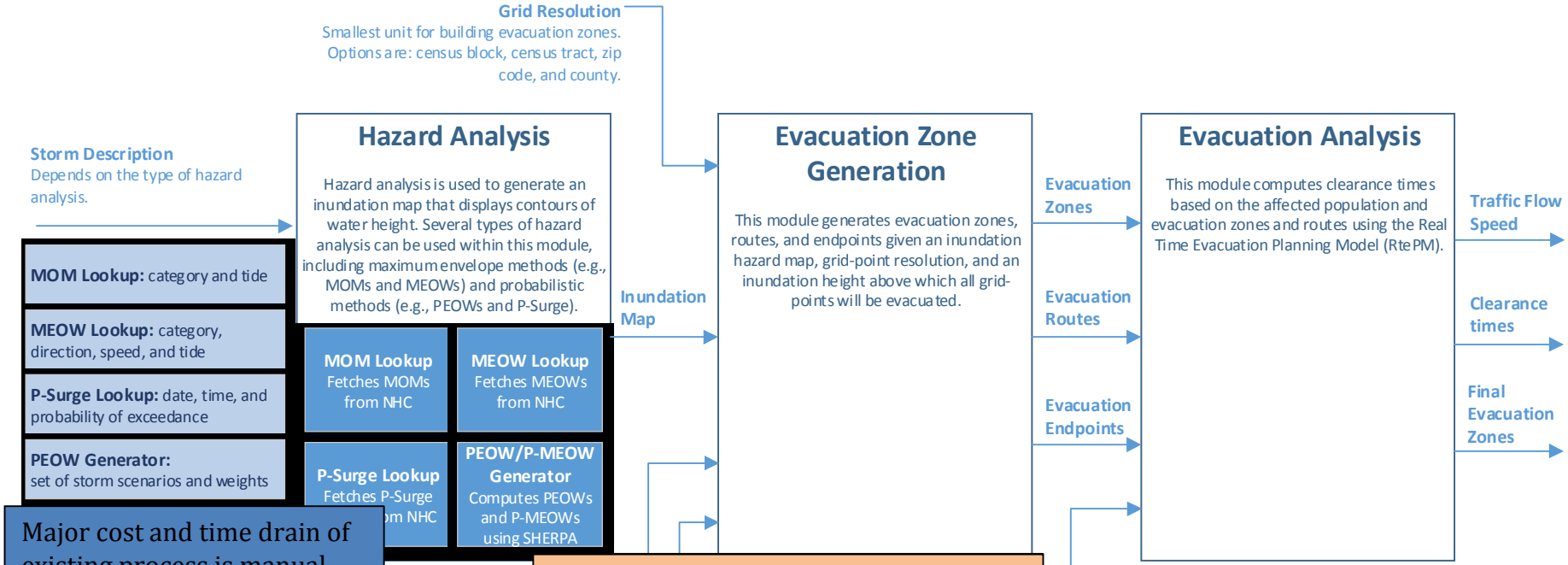
Modernized HES Process Overview

HES process will link three models together: Hazard analysis, Evacuation Zone Generator and Evacuation Analysis. User will be able to interact with outputs of each individual model or run a full simulation over a range of parameters. The process will provide more data and insight for a fraction of cost and time.



Major cost and time drain of existing process is manual processing of information and multiple iterations of coordination with Local and State government.

In the new process, stakeholders can design evacuation zones and calculate clearance automatically and make real time changes, reducing the number of iterations necessary for State and Local approval. (DEMO)

Users will be able to choose which models they want to use, allowing flexibility and local customization.

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NC Pilot

We are partnering with the State of North Carolina to conduct a HES Tool Pilot Study. The objective of the pilot is to use the HES Tool in parallel with NC's existing HES process, gather feedback, compare outputs, understand the root cause of potential discrepancies and continue the development of the tool.

- The NC HES was initiated in 2012, and is currently in their final stages of transportation analysis
- NC EMs have provided all their data from vulnerability and behavioral analysis
- We have used the tool to reproduce the results and generate the clearance times
- NC's Transportation analysis will be completed in October, at which time we will be able to compare the results

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NC Visit

- The team visited NC EM office in Raleigh, NC
- We showed our progress to date, learned more about their process, needs and pain points

- We demoed the HES tool with NC data for the Pamlico Sound
- Our calculated clearance time was 13h, while their 2002 HES showed clearance time of 11h (discrepancy most likely due to increase in population)
- We held a training session for using SHERPA and HES Tool

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NC HES/NC HES Tool Study

Hazard Analysis

- ✓ Storm information
- ✓ Basin ID
- ✓ MOMs at high tide
  - ✓ Above ground level
  - ✓ Above sea level

Behavioral Analysis

Conduct behavioral survey to calculate planning recommendations

Vulnerability Analysis

- ✓ Percent of available vehicles
- ✓ Determine flood contours at the county level
- ✓ Draw evacuation zones
- ✓ Identify affected critical infrastructure
- x Calculate vulnerable/special needs populations
- x Shadow evacuation

Shelter Analysis

- ✓ Shelter usage rates
- x North Carolina shelter database

Transportation Analysis

- ✓ Evacuation timing
- ✓ Evacuation rate
- ✓ Calculate clearance times
- ✓ Identify traffic routes
  - ✓ Potential areas of congestion
  - x Measures to relieve congestion
- x Specify evacuation end points

✓ Completed
x Not currently included

Current capability also includes the option for using MEOWs and batch analysis that provides a range of outputs giving the user greater understanding of uncertainty. Additional capability also includes economic impacts modeling.

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NYC Pilot Update

We have recently begun our partnership with NYC Emergency Management to conduct an additional HES Pilot Study. The objective of the pilot is to evaluate our HES tool, especially in an urban environment with a high population density, gather user feedback, and compare outputs against their updated HES process.

- NYC EM is currently updating their HES from the broader 2009 study
- NYC EMs have provided supporting documentation which we will use to reproduce results and generate clearance times
- We are currently planning an on-site visit to update NYC EMs and receive user feedback on the tool

HES Demo