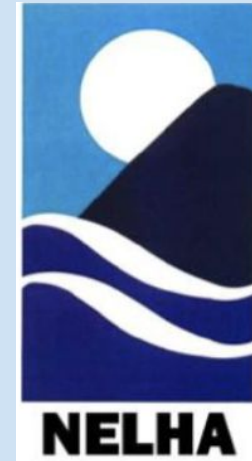
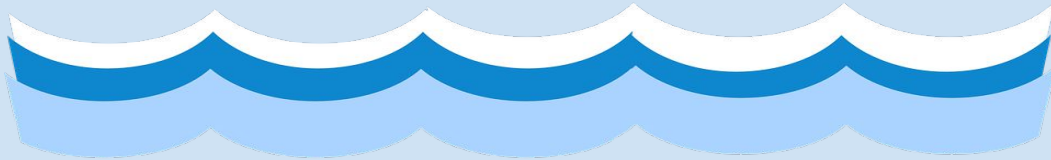


# Infrastructure Risk Assessment Analysis for NELHA's Seawater Pumping System

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Laboratory of  
Hawaii Authority  
Mentor: Keith Olson

# NELHA Seawater Pumping System

- NELHA operates a 24/7/365 seawater pumping utility that supplies seawater to its clients within the HOST park







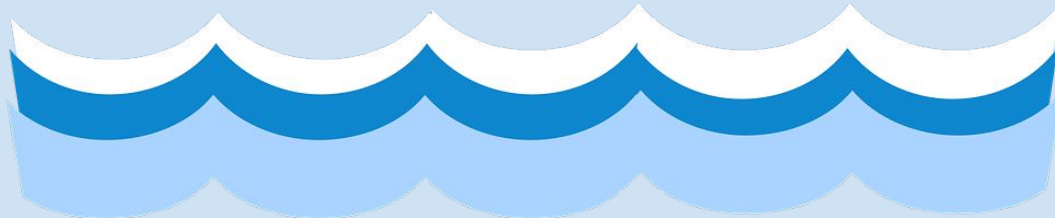
# Need for the Project

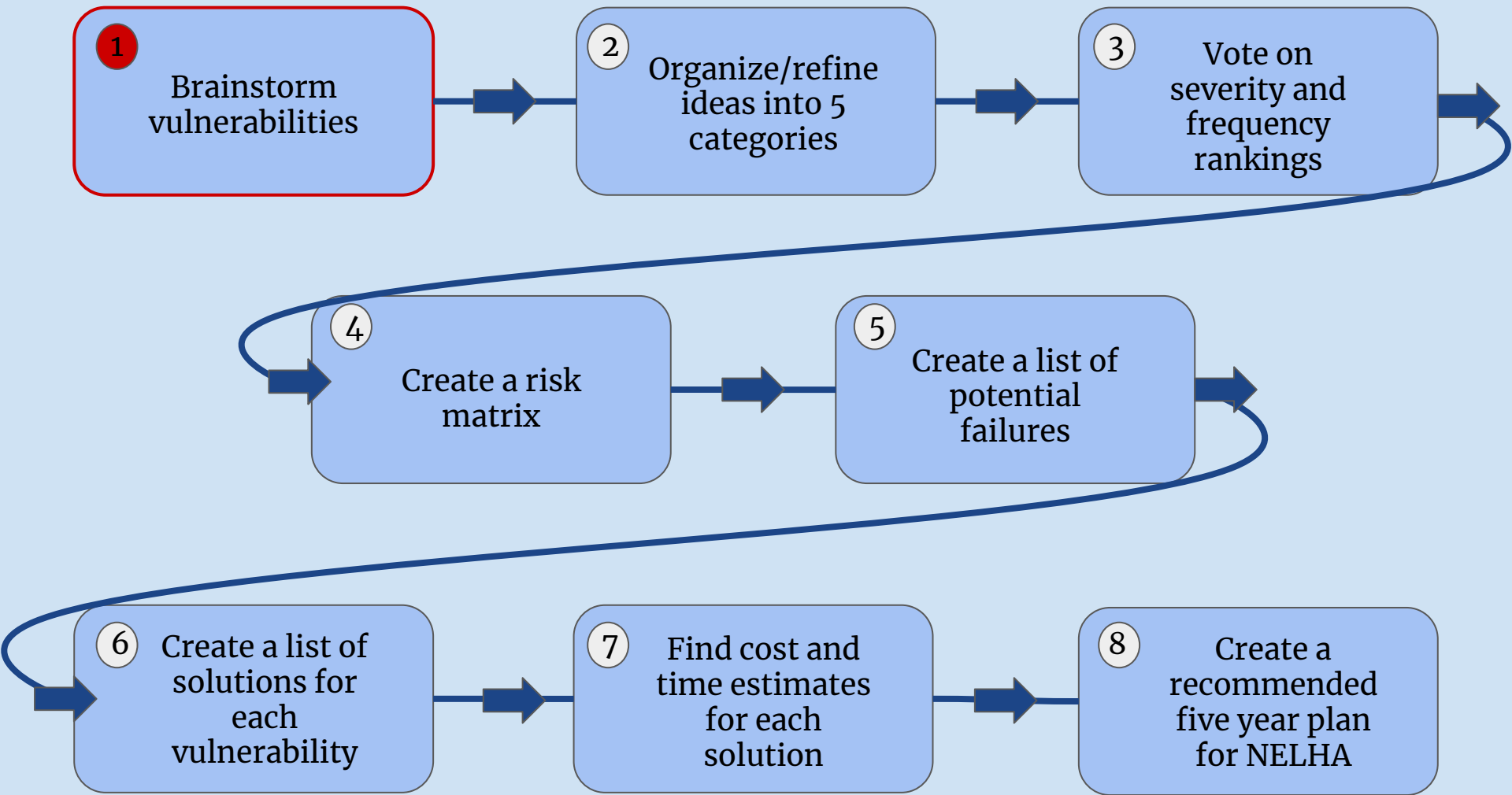
- Currently no way to assess the “readiness” of the system.
- Lack of a central organization location can lead to ineffective use of funding and resources.
- Goal: Identify preventative systems that will gradually increase the pumping network’s reliability and readiness to deal with failures.

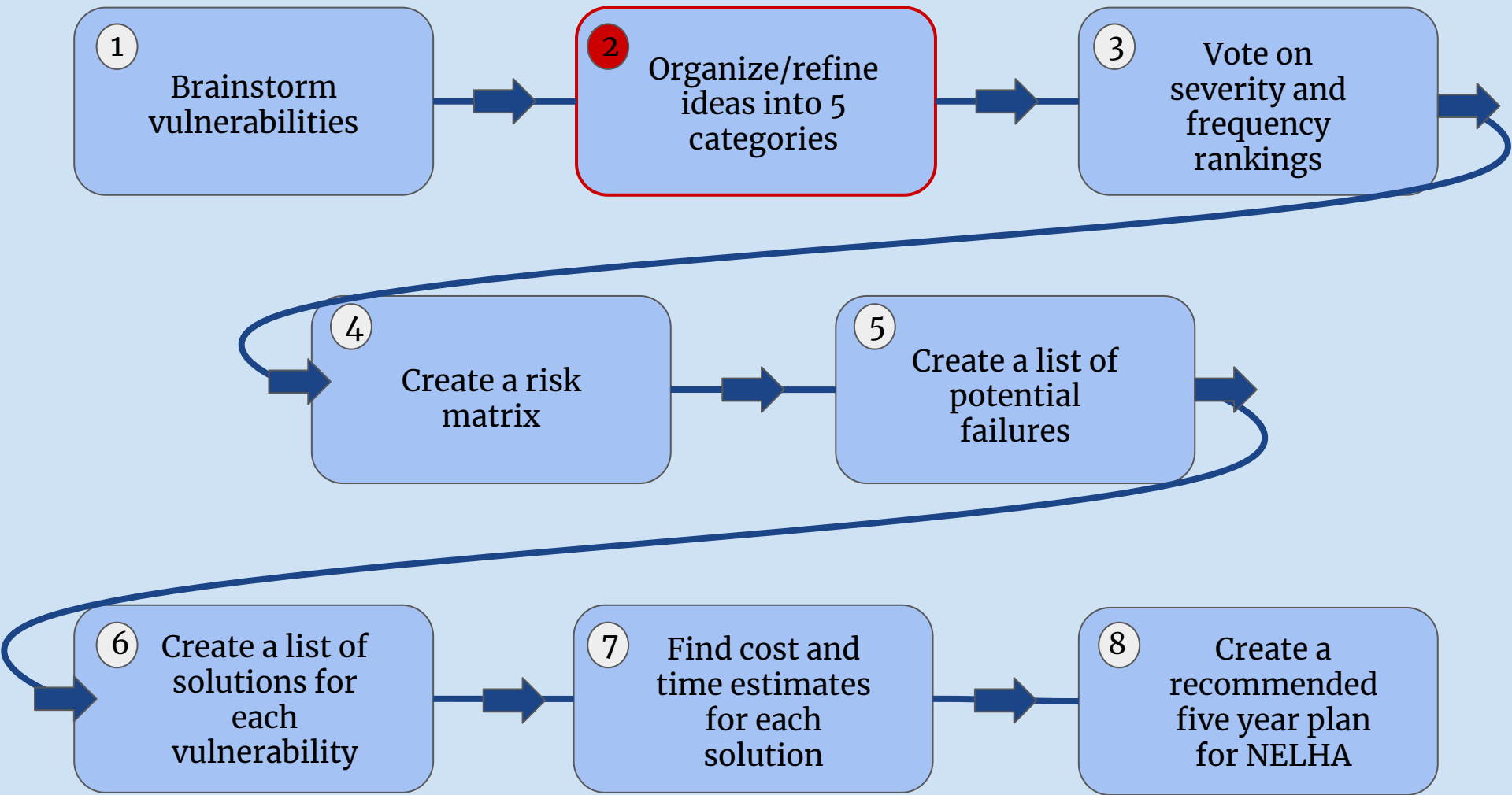


# Project Description

- A risk assessment report for the vulnerabilities that exist in NELHA's seawater pumping system.
- To be used by the NELHA Operations team in the future to better inform them on how to allocate their time and resources effectively.
- Key components
  - Identify **vulnerabilities** within each sector of the system
  - Provide **solutions** to alleviate each vulnerability
  - Provide a **cost and time estimate** for each solution







# Categories of Vulnerabilities

Distribution System



Sump System



Electrical System



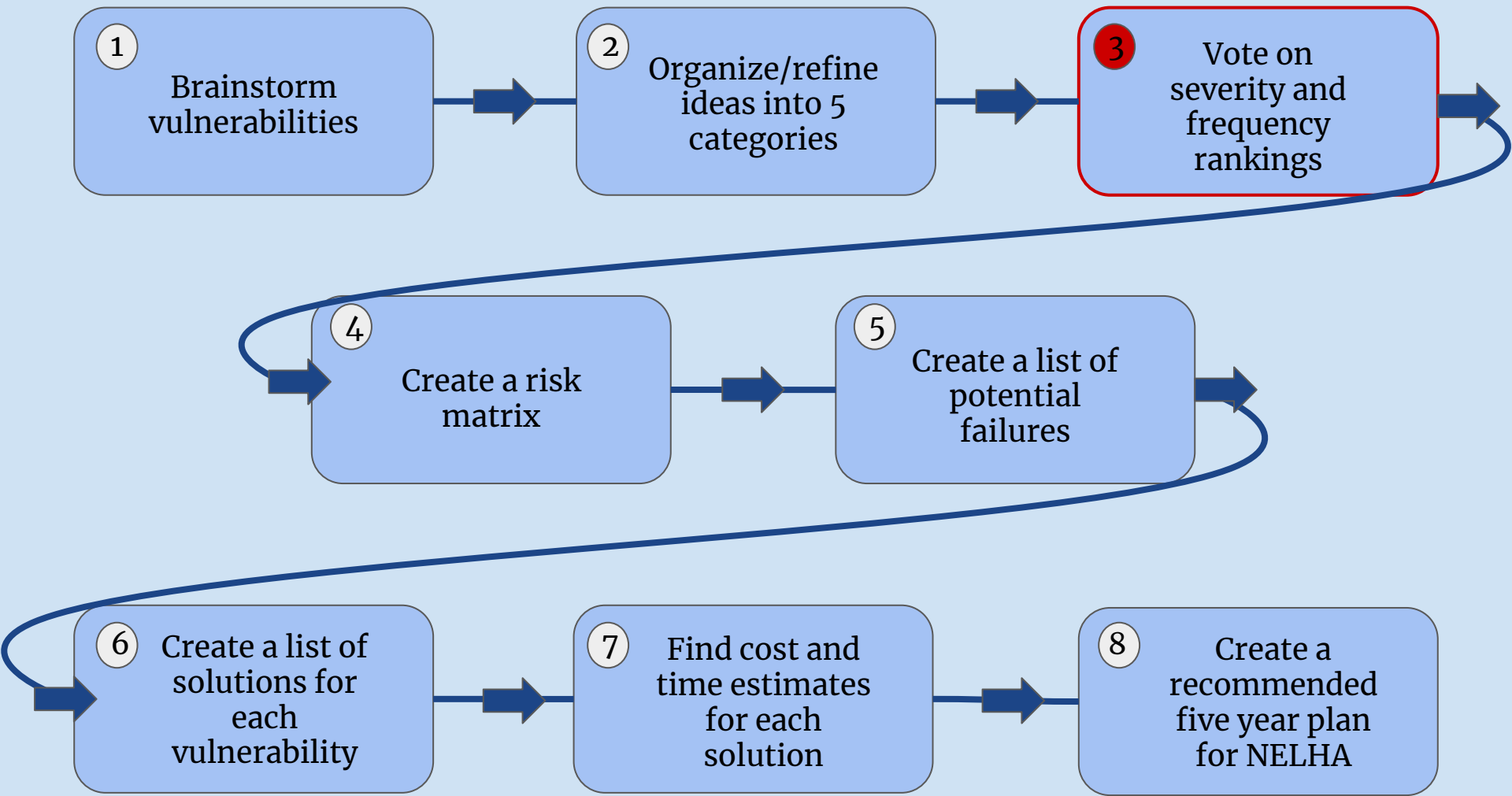
Pump System



General







# Severity Classifications

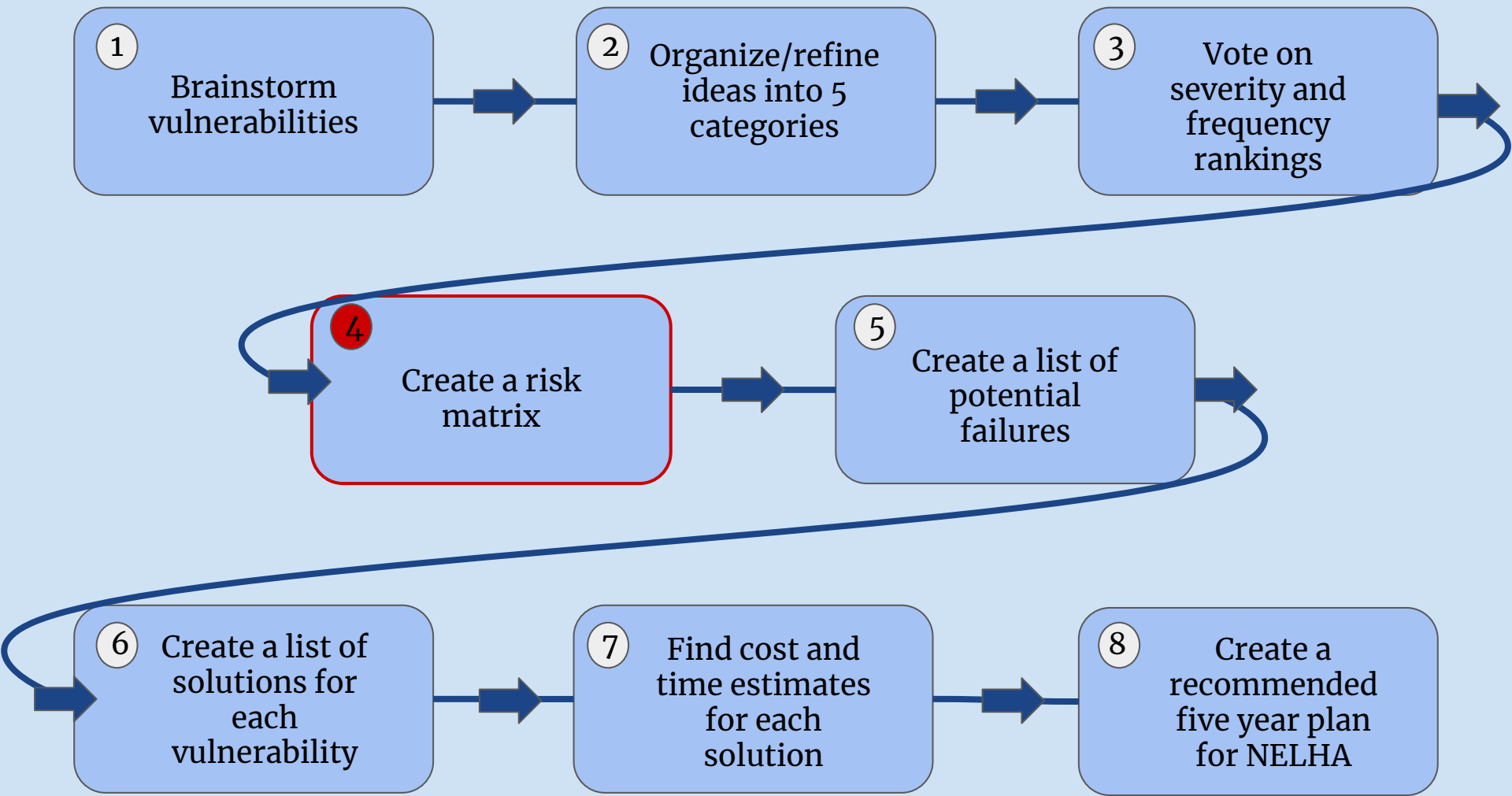
<b>I</b>	Could results in the death and/or 4-8 hours of pump downtime and/or >\$500,000 in damages.
<b>II</b>	
<b>III</b>	
<b>IV</b>	No injury and/or no downtime of the pumping system and/or <\$5,000 of damages.



# Frequency Classifications

<b>A</b>	A vulnerability that occurs up to daily.
<b>B</b>	
<b>C</b>	
<b>D</b>	A vulnerability that occurs less than once every 5 years.

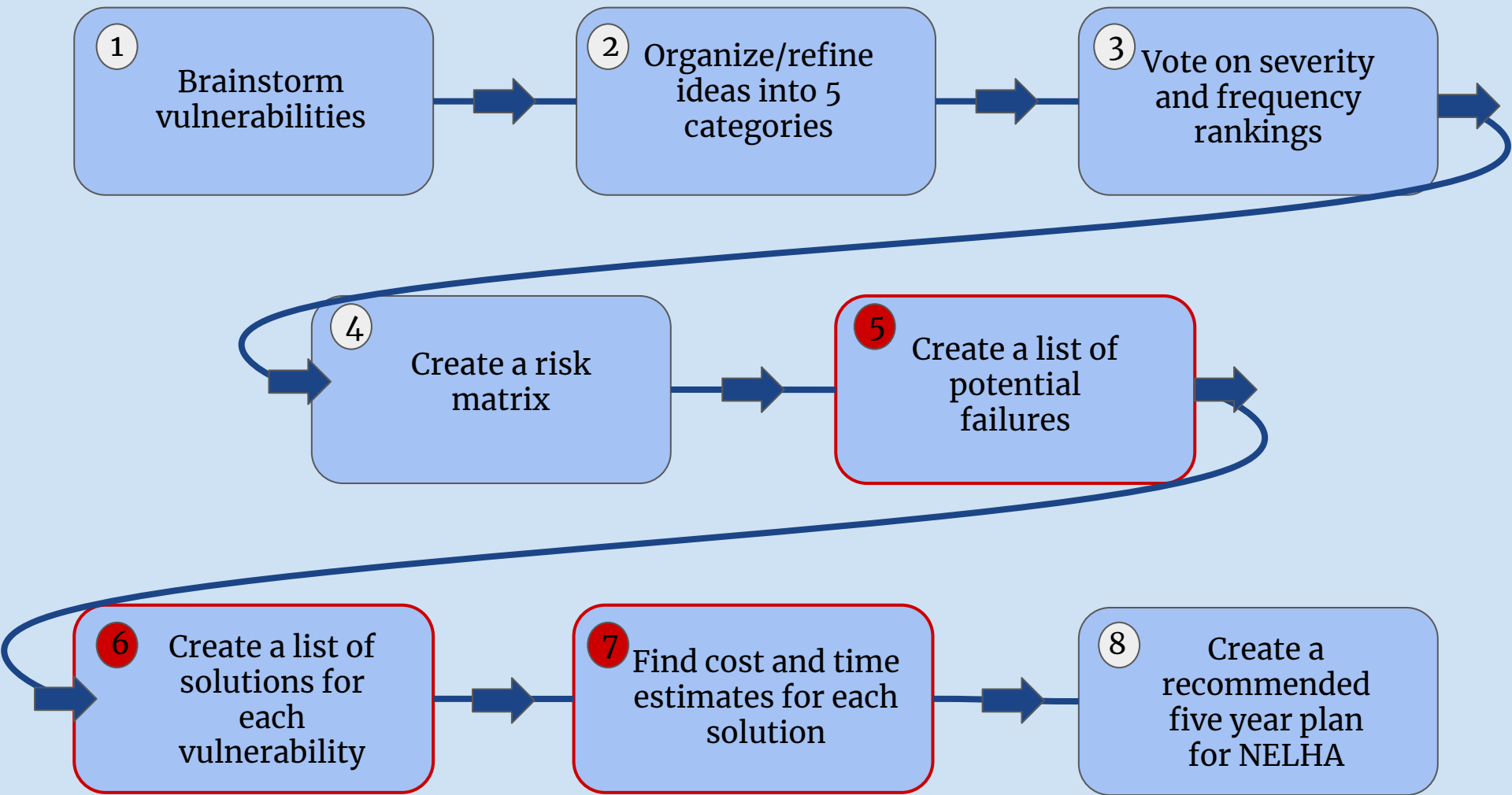






# Risk Matrix

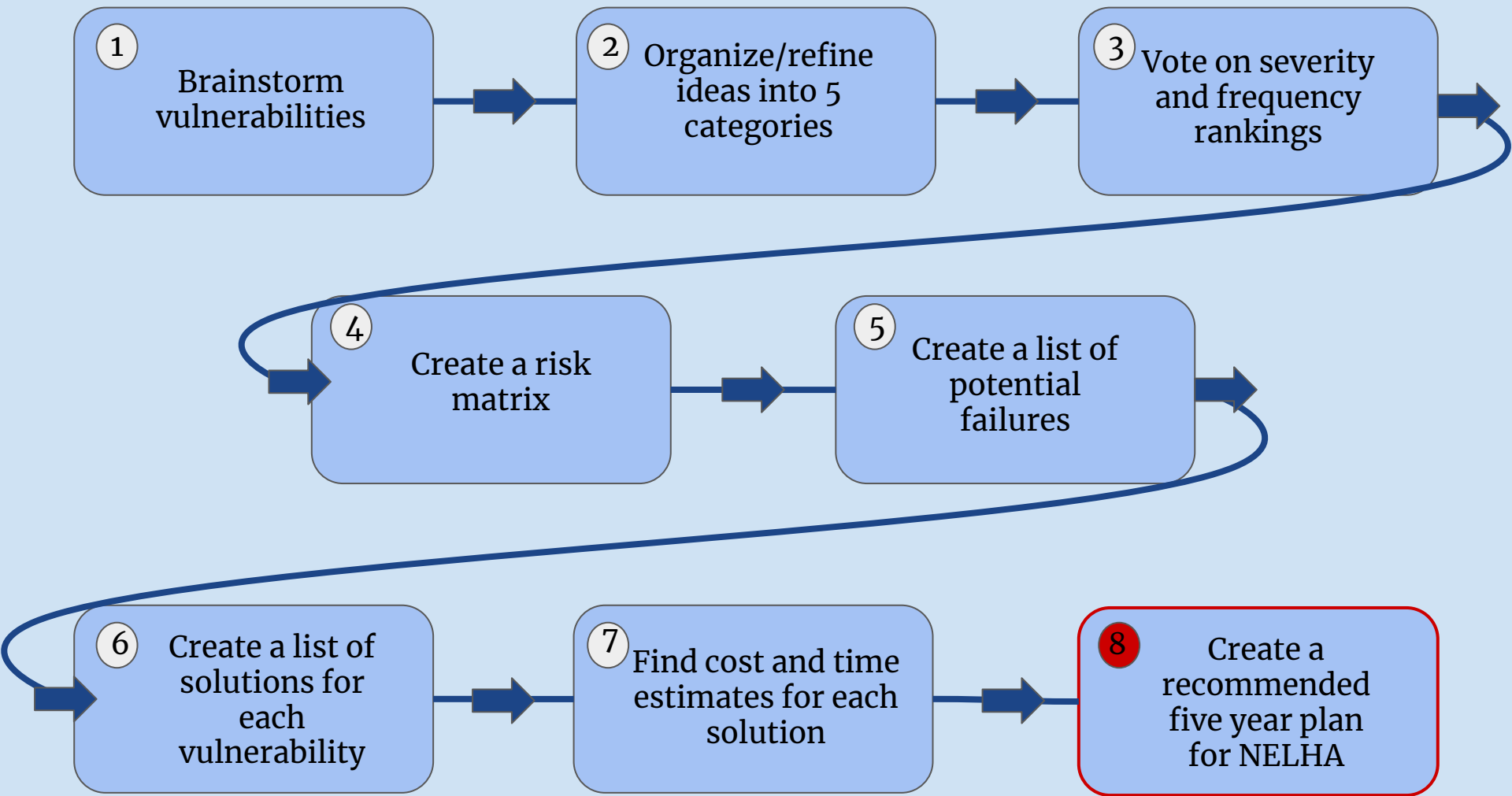
	1: Catastrophic	2: Critical	3: Moderate	4: Negligible
A: Frequent	High: Localized grid outage			
B: Probable		Serious: Absence of Flygt pump repair kits in NELHA inventory		
C: Occasional			Medium: Inability to isolate distribution zones in pipeline system	
D: Improbable				Low: Unknown transformer oil degradation



# Risk Assessment Table

Vulnerability	Possible Failures	Severity	Frequency	Solution	Cost	Time
Lack of safety requirements for an open sump	Potential for injury/death of workers	<b>I</b>	<b>D</b>	<ol style="list-style-type: none"><li>1. Create an SOP</li><li>2. Buy life preservers</li></ol>	\$50/vest	1 week to create an SOP



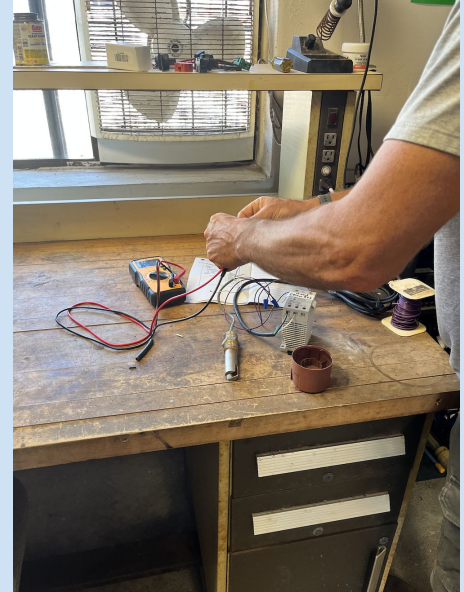




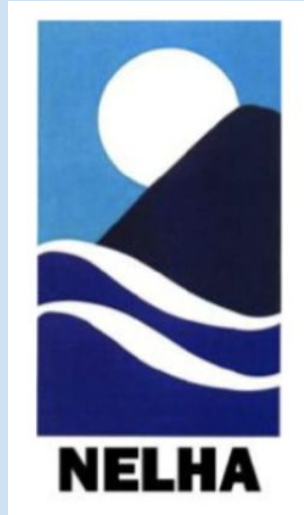
# Five Year Plan



- Immediate Action:
  - Cross training
  - Safety protocols
- One Year Project:
  - Combination of RC and Farm Compound electrical system
- Two Year Projects:
  - Upgrade emergency callout phones
  - Install UPS systems on every component
- Five Year Project:
  - Resolve biofouling issue



# Mahalo



Keith Olson

NELHA  
Operations Team:

Brian, Kevin,  
Chad, Dean, Tony,  
Steven

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- Canada-France-Hawaii Telescope



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