

A methodology toward holistic long-term resilience planning: Rhode Island Pilot Study

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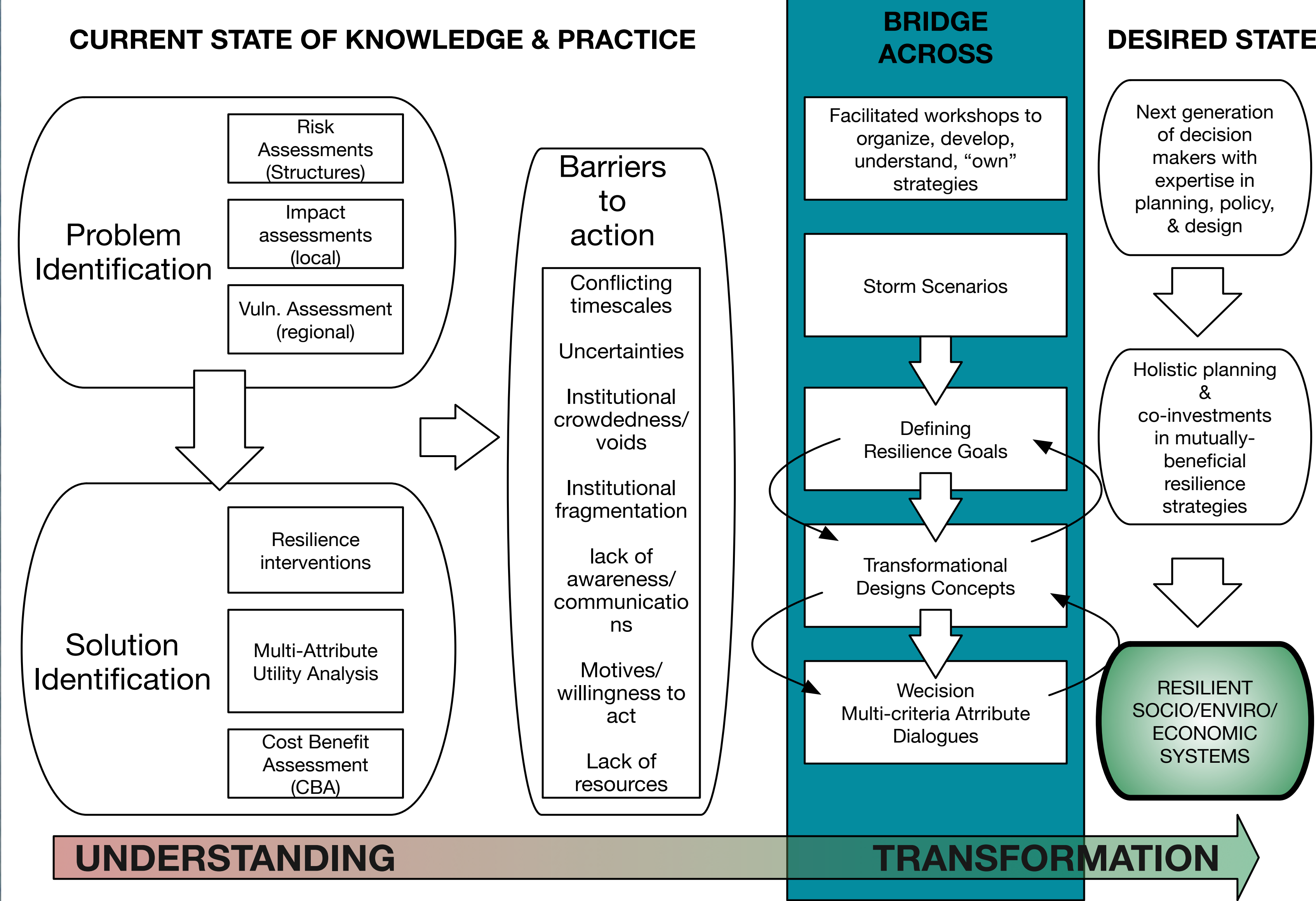
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Introduction

This project piloted new communication tools to address the question: **How can a more holistic approach to planning reduce long-term climate risks?** Increased frequency of extreme ocean weather events requires investments in coastal resilience to reduce the costs of future climate-driven events.[1] Storm risks and responsibilities for resilience investment distribute across a wide spectrum of public and private stakeholders [2]. While separate private business actions and government programs for ports have received attention, less thought has been given to *collective action* by businesses and port authorities [3], the essence of holistic planning as we propose it here. This project engages stakeholders at the community level in order to incorporate their interests, concerns, and initial reactions to long-term resilience concepts.

Literature Review

Research has focused on the local municipality or regional level [4], suggesting that determining adaptation pathways for a particular community benefits from engaging various stakeholder groups. In a review of planning documents in three developed countries, Preston et al. [5] suggest that planning at the local level as opposed to the national or regional level, better addresses adaptation, because community interests, problems, and strategies are more easily defined. Without support from stakeholders, management decisions are unlikely to be successfully implemented [6]. Input helps assess and identify future socioeconomic impacts that can result from hurricanes striking at seaports. Impact and option for adaption assessment are often first steps in the adaptation process. This project begins a community supported dialogue around increasing port system resilience.



Four long-term resilience concepts for the port of Providence

1. Protect

Computer-generated image of new hurricane barrier design to protect the port of Providence from a 21ft storm surge.

2. Relocate

Relocate moves port infrastructure out of exposed areas. The example depicts the Exxon Mobil Terminal in East Providence. The berth is located adjacent to the channel, but the terminal is located inland at 50ft elevation.

3. Accommodate

Examples of accommodate options that alter existing buildings and infrastructure to increase resilience.

4. Do Nothing

Doing nothing entails that the impacts that result from the storm scenario occur when the next storm happens. The image above shows inundation from a 21ft storm surge at the port to Providence.

Port of Providence

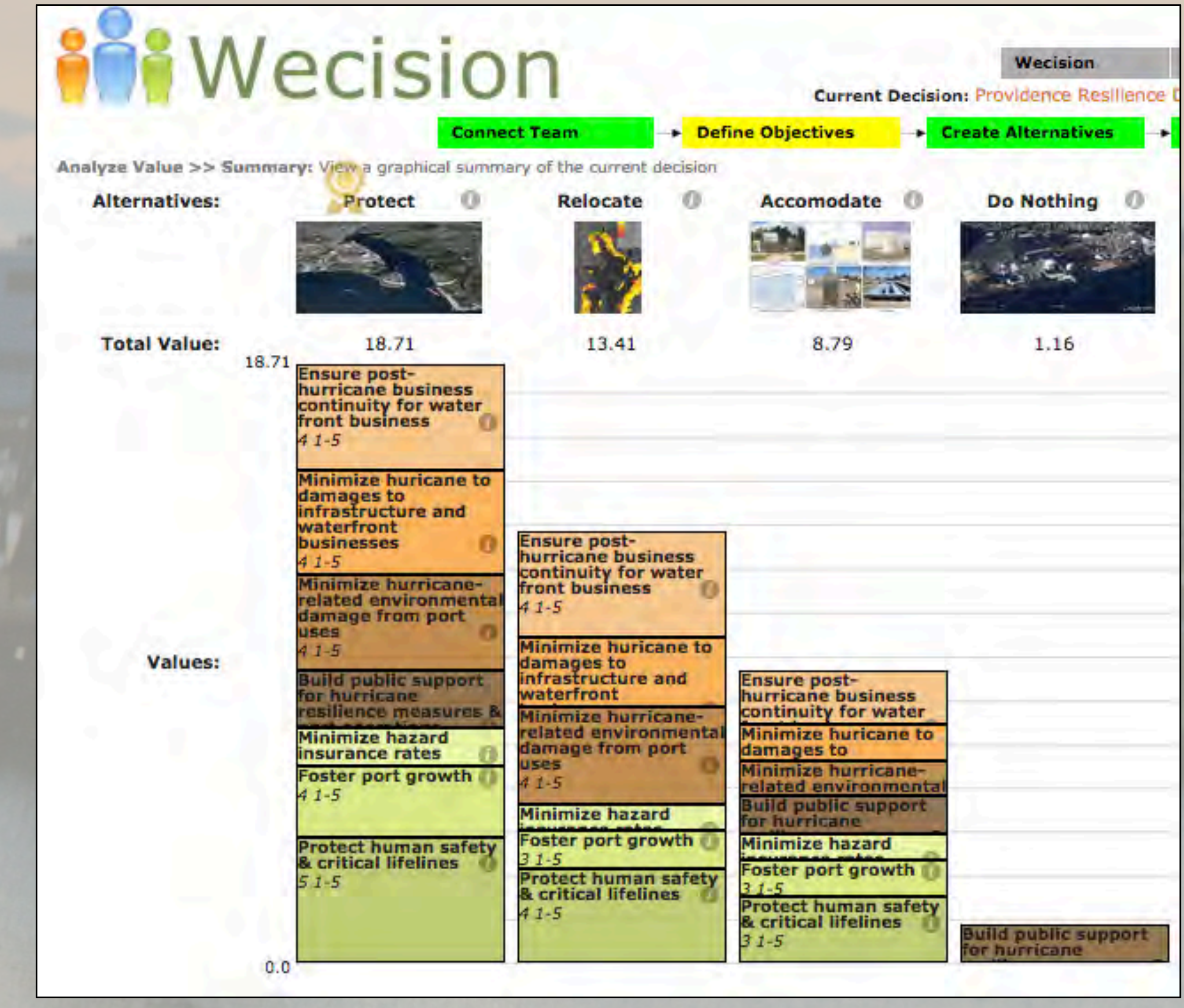
- 1,500 acres south of the City and at the head of Narragansett Bay 46th largest port in the U.S..
- region's main energy import facility.
- 25+ companies utilize the port
- \$340 Million in economic benefit to the state of Rhode Island (2008).
- 453 direct and 291 indirect jobs totaling \$37 Million in income [7].



Workshop methodology

With funding from FHWA and RIDOT, we conducted a pilot workshop in August 2015 with 28 industry, government, and non-profit stakeholders of the port of Providence.

- Assessed perceptions of resilience strategies and infrastructure vulnerability by presenting a storm scenario overlaid on port infrastructure.
- Tested 3D disaster visualizations to help stakeholders contextualize impacts on the region and on individual businesses if no preventive actions were taken.
- Proposed hurricane resilience concepts to engage stakeholders in broad, long-term thinking
- Applied a decision support tool called Wecision -- a real-time, interactive, decision-making tool that allowed stakeholders to weigh the costs and benefits of specific actions.



Preliminary Workshop Results

- Results were gathered from conversations at five tables of five-to-six stakeholders:
- Concern for damages to navigation channel and adjacent road infrastructure (access to I-95/I-195), as well as resulting delays to commerce
 - Concern for debris, debris cleanup, and the "battering ram" effect it can have on other structures and vessels.
 - Demand for central organizing body to coordinate long-term resilience efforts and facilitate communication between port community.
 - Private investment in resilience must have co-benefits and result in additional profit-making opportunities.
 - 3D disaster visualizations served as a useful prompt to stimulate dialogue.



Next Steps

- Refine workshop tools, Wecision interface, and workshop methodology based on participant feedback.
- Develop more robust disaster visualizations and models.
- Conduct additional workshops in Providence and other RI ports.
- Compile and synthesize findings into report and recommendations for RI decision makers.
- Conduct follow up survey with stakeholders to identify workshop impacts on business planning.

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