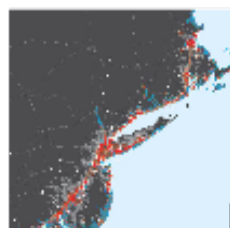
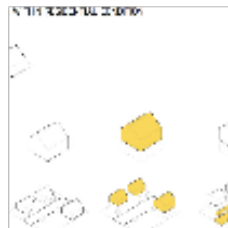
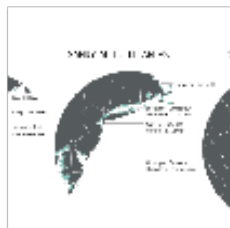
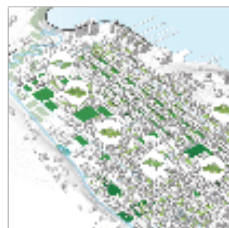




town hall meeting, Christie  
re about Sandy aid



# **resilience by design:**

## can an innovative approach deliver more?

Professor Helen Lochhead  
UNSW Built Environment  
SBE16 Sydney



# wicked problems

the challenges of our time

**novelty**



novelty

+

scale



novelty

+

scale

+

complexity



**uncertainty = challenge**

BAU is not an option





**damage  
\$65 billion**



**damage**  
**\$65 billion**



**loss of Life**  
**117 people dead**



**damage**  
**\$65 billion**



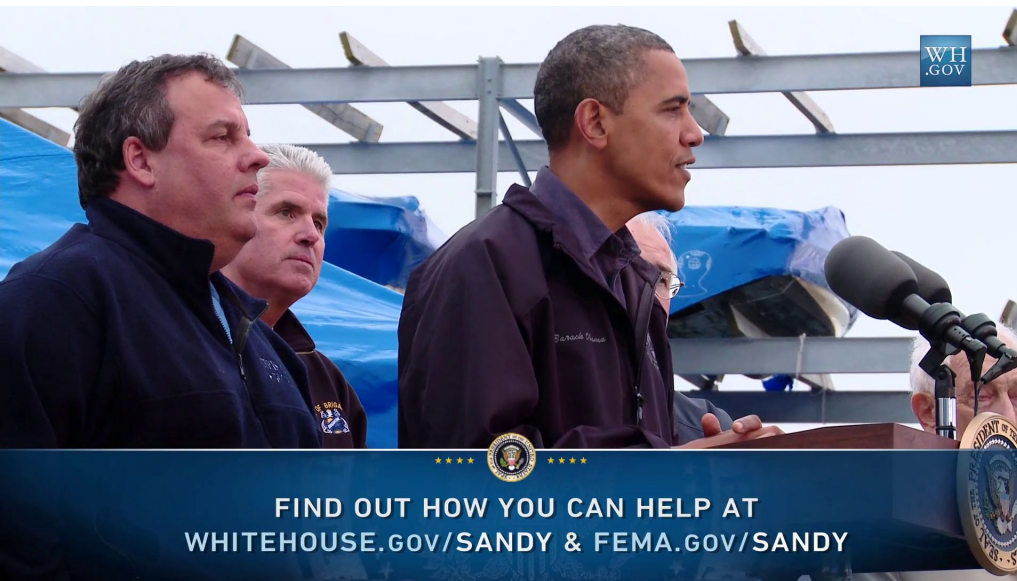
**loss of Life**  
**117 people dead**



**200,000**  
**displaced**  
**from their homes**

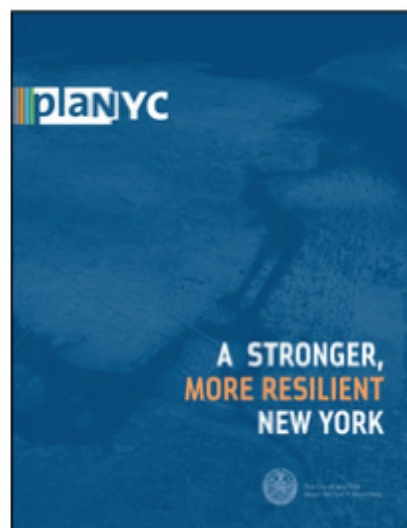


\$ vs \$\$\$\$



# Opportunity

out of disaster comes the opportunity to do things differently



[Background](#)
[The Competition](#)
[For Applicants](#)
[Resources](#)
[Media & Events](#)

RISE: NYC is a competition designed to identify and deploy creative new technologies and solutions to make New York City businesses more resilient to the impacts of future storms, sea level rise and other effects of climate change. Through the competition, up to \$30 million is available to fund projects that use innovative measures to make the city's buildings and infrastructure networks in areas impacted by Hurricane Sandy and/or vulnerable to future storms more resilient.

**Rosetta Elkin and Michael Van Valkenburgh Investigate Structures of Coastal Resilience: The Ocean State**

Oct 25, 2014

As part of a grant from the Rockefeller Center and the US Army Corps of Engineers, four teams representing four academic institutions (Harvard, Penn, Princeton and CU/NY) are critically examining the various methods of response and reaction to shifting littoral regions along the Northeast coast. The project, titled Structures of Coastal Resilience (SCoR) is instigated under the understanding that an interdisciplinary approach to the problem of coastal resiliency can function along different scales and sites in order to complement and augment initiatives already put forth by the USACE, acknowledging that response is fundamentally a design-related matter.

The GSD Harvard team, led by **Rosetta S. Elkin**, will include **Michael Van Valkenburgh**, **Olivier Shepard**, and **Michael Luegering**, with ongoing student support through independent study, research and an upcoming spring option studio (2014). Rhode Island is the GSD subject of study, awarded as a regional framework that will

Rosetta Elkin and Michael Van Valkenburgh investigate Structures of Coastal Resilience: The Ocean State as a continuous condition. The research will extend beyond designers to instigate associations with

# REBUILD BY DESIGN

An Initiative of the President's Hurricane Sandy Rebuilding Task Force

In Collaboration With  
NYU's Institute for Public Knowledge  
Manhattan Art Association  
Regional Film Association  
Van Alen Institute

Lead Sponsor  
The Rockefeller Foundation

With Support From  
Dorinda Bank American Foundation  
Bancor Foundation  
Bancor Foundation  
The JPFF Foundation  
The New Jersey Recovery Fund

## Rebuild by Design: Innovating Together to Create a Resilient Region

### Events

To find an upcoming event, click on the flags in the map.

Map data ©2014 Google, TomTom

Upcoming Event Past Event

# **resilience by design**

can design make a difference?



# REBUILD BY DESIGN

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Hurricane Sandy Rebuilding Task Force

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Regional Plan Association  
Van Alen Institute

Lead Supporter  
The Rockefeller Foundation

With Support From  
Deutsche Bank Americas Foundation  
Hearst Foundation  
Surdna Foundation  
The JPB Foundation  
The New Jersey Recovery Fund

## What is Rebuild by Design?

Innovating Together to Create a Resilient Region



Hurricane Sandy was unlike any storm before it. The unprecedented damage revealed the true threat that weather events pose to our communities, states and greater region. While everyone affected by the storm continues to push forward with the recovery process, Sandy has made it clear that we cannot simply rebuild

# Promoting Resilience Post-Sandy Through Innovative Planning and Design

***#rebuildbydesign***

# How was RxD different?

- **an open ended question** - no problem statement or brief
- **regional approach** *not* project approach
- **interdisciplinary** talent pool
- informed by **research**- both expert *and* design based research
- open source - **collaborative** not competitive
- challenged existing structures - focus on **coalition and capacity building**
- commitment to **implementation**

**RxD process**

## Project partners



Mayor's Office of  
Recovery and Resiliency



GOVERNOR'S OFFICE OF STORM RECOVERY



Deutsche Bank



The Hearst  
Foundations

NEW JERSEY RECOVERY FUND

# stage 1

**June - Aug 2013**

*International Call for talent*

## **Milestone**

*10 multidisciplinary teams  
selected.*

# stage 2

**Aug - Oct 2013**

*Design based research*

## **Milestone**

*Public presentation of research  
and 40 design opportunities.*

*10 shortlisted*

# stage 3

**Oct 2013 - April 2014**

*Design development and  
outreach*

## **Milestone**

*Jury selects proposals for  
implementation*

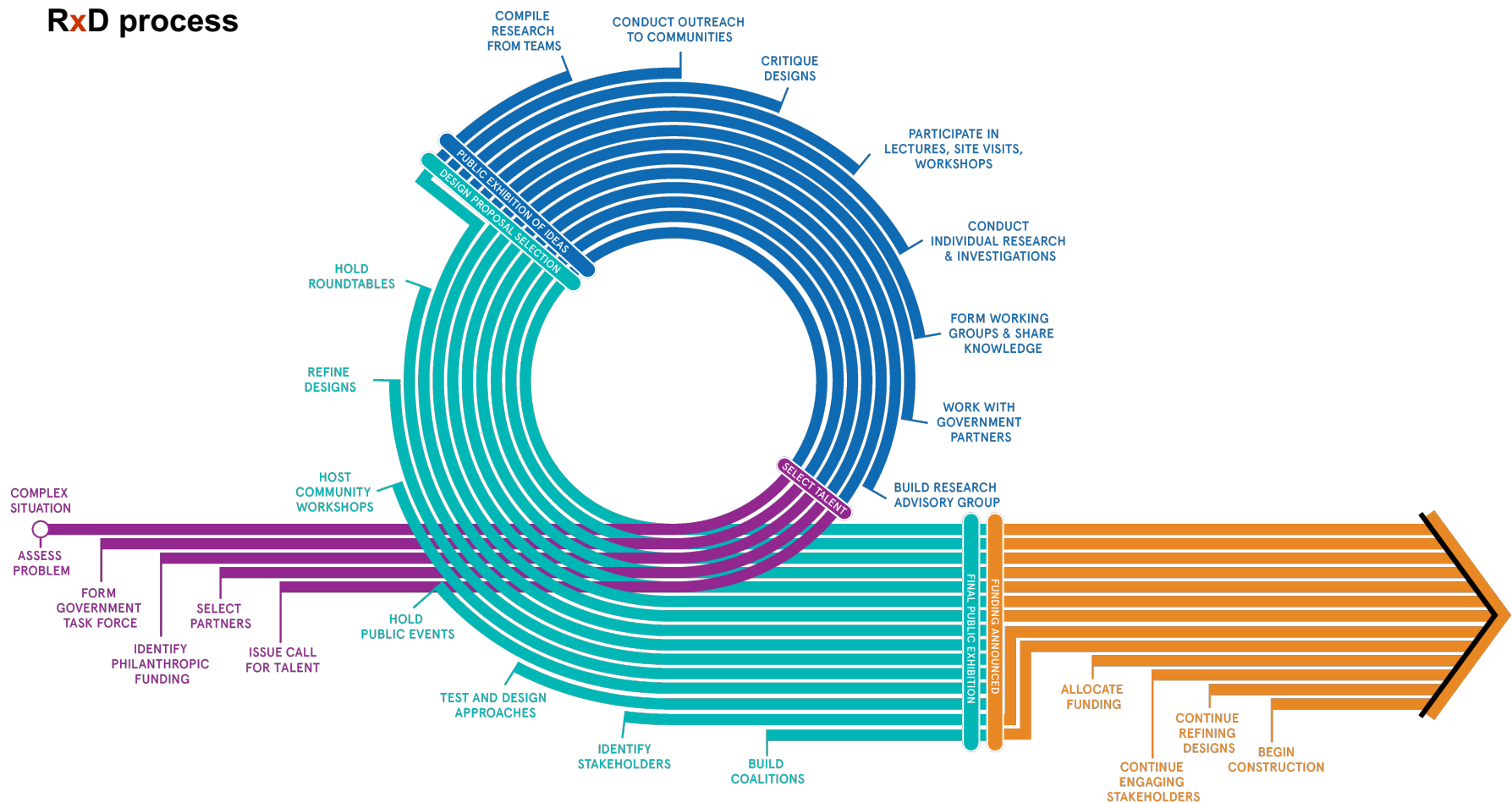
## 10 interdisciplinary teams

### 200+ experts

**BIG** (Bjarke Ingels Group) with One Architecture, Starr Whitehouse, James Lima Planning + Development, Project Projects, Green Shield Ecology, AEA Consulting, Level Agency for Infrastructure, and the Parsons School of Constructed Environments // **HR&A Advisors, Inc. with Cooper, Robertson & Partners**; Grimshaw Architects; Alamo Architects; Langan Engineering; W Architecture; Hargreaves Associates; and Urban Green Council // **Interboro** Partners with Apex; Bosch Slabbers; Center for Urban Pedagogy; David Rusk; Deltares; H+N+S Landscape Architects; IMG Rebel; NJIT Infrastructure Planning Program; Palmbout Urban Landscapes; Project Projects; and TU Delft // **MIT CAU + ZUS + URBANISTEN** with Deltares; 75B; and Volker Infra Design // OMA with Royal HaskoningDHV; Balmori Associates; and HR&A Advisors // **PennDesign/OLIN** with PennPraxis; HR&A Advisors; and eDesign Dynamics // Sasaki Associates with Rutgers University and ARUP // **SCAPE/LANDSCAPE ARCHITECTURE** with Parsons Brinckerhoff, Dr. Philip Orton // Stevens Institute of Technology, Ocean & Coastal Consultants, SeArc Ecological Consulting, LOT-EK, MTWTF, The Harbor School and Paul Greenberg // **Waggonner and Ball, unabridged Architecture**, and the Gulf Coast Community Design Studio, Yale's Urban Ecology and Design Laboratory and ARCADIS, Long Island Sound and the Northeast Atlantic region // **WXY/West 8** Alan Blumberg, Davidson Laboratory, Stevens Institute; ARCADIS; Maxine Griffith; Kei Hayashi, BJH Advisors; Kate John Alder, Rutgers University; Yeju Choi, Nowhere Office; William Morrish, Parsons the New School for Design; Verisk Insurance Solutions; In dialogue with: Robert Young, Program for the Study of Developed Shorelines, Western Carolina University; Orrin Pilkey, Duke University; Mary Edna Fraser // **OMA** with Royal HaskoningDHV; Balmori Associates; and HR&A Advisors // **Sasaki** Associates with Rutgers University and ARUP



RxD process



# stage 1

**June - Aug 2013**

*International Call for talent*

**Milestone - Aug 2013**

*10 multidisciplinary teams  
selected.*

# stage 2

**Aug - Oct 2013**

*Collaborative design based  
research* **Milestone**

*Public presentation of research &  
40 design opportunities.*

*10 shortlisted*

# stage 3

**Oct 2013- April 2014**

*Design development and  
outreach*


**Milestone - April 2014**

*Jury selects proposals for  
implementation*

**RxD Process:**  
collaborative design based research



# REBUILD BY DESIGN

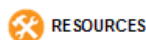
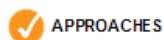
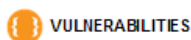
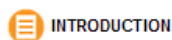
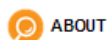
 [Back to rebuildbydesign.org](#)

## Research Report: A Regional Analysis

Search the report

An Initiative of the President's  
Hurricane Sandy Rebuilding Task Force

In Collaboraton With  
NYU's Institute for Public Knowledge  
Municipal Art Society  
Regional Plan Association  
Van Alen Institute



# REBUILD BY DESIGN: A REGIONAL ANALYSIS

This report provides an overview of the research findings and the design opportunities that grew out of the second stage of RBD. The ideas within were developed to address local needs in the region affected by Sandy, but the designers and scholars who produced them are all-too-aware that the security threats stemming from climate change know no borders. We hope and believe that the research presented here will be useful for communities throughout the United States, and beyond. We are all in this together.





# RxD Process

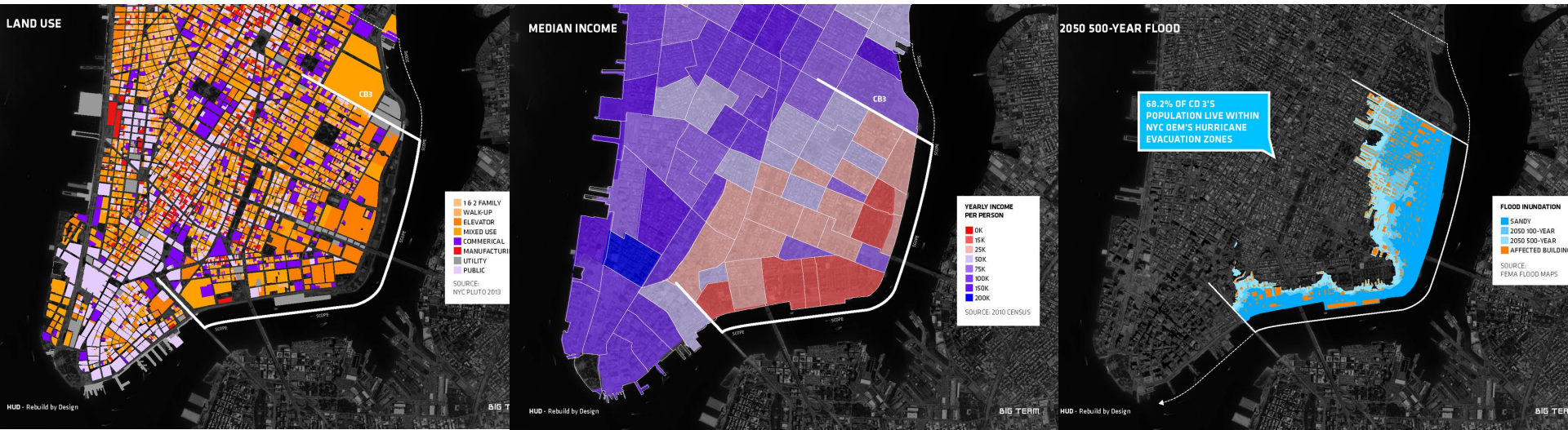
## framing research questions:

### BIG

**Flood Defense and Resiliency** What are the most viable flood defense infrastructures and resiliency measures being considered to protect NYC? What are the benefits and liabilities of various large scale defense (i.e. Sea Wall) v. small scale mitigation (i.e. distributed Local Wetlands) solutions?

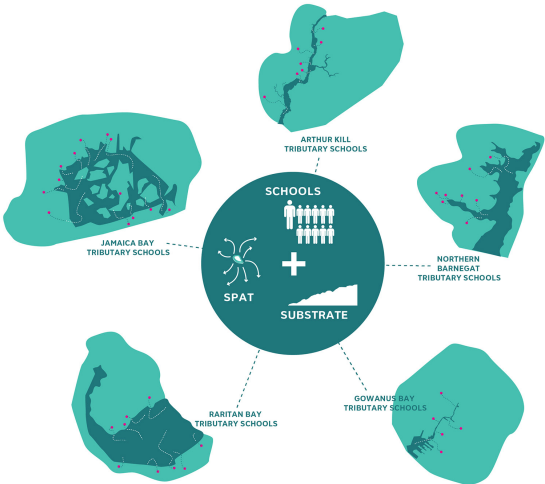
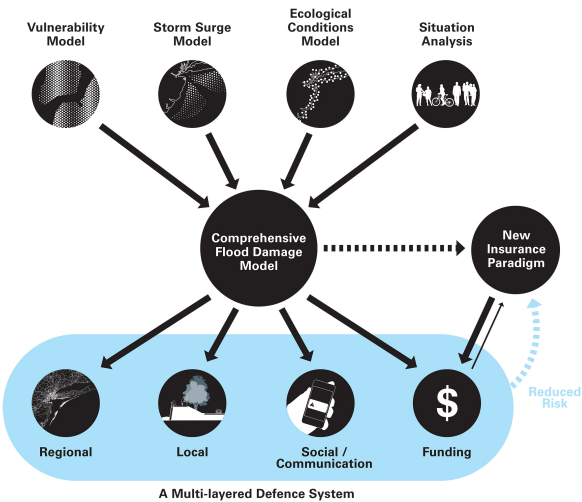
**Hybrids** Flood defense notwithstanding, what is NYC's 'wishlist' of major infrastructure improvements or additions over the next 30-50 years to sustain the city's growth and future ambitions? In Transport? Green Space? Are there ways that viable resiliency infrastructures, both green and grey, can be hybridized with these major infrastructures in ways that are synergistic in their effects on the city, as well as enhanced in their financial and political viability? Can these infrastructures be hybridized with social programs and activities?

**Growth** How can these infrastructures generate new opportunities for development and the accommodation of growth, or avail elsewhere in the city new opportunities? Where should growth take place for expansion to occur in a resilient way?

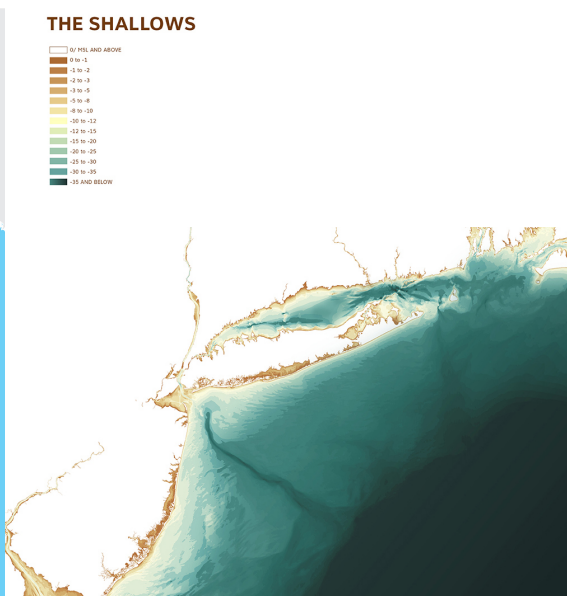
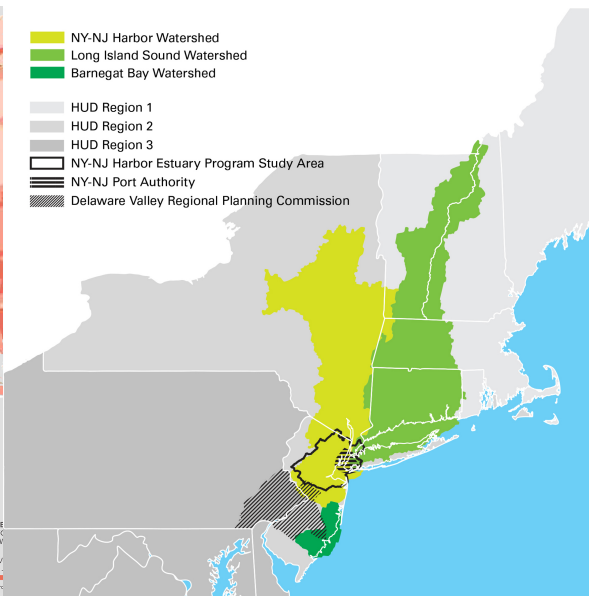
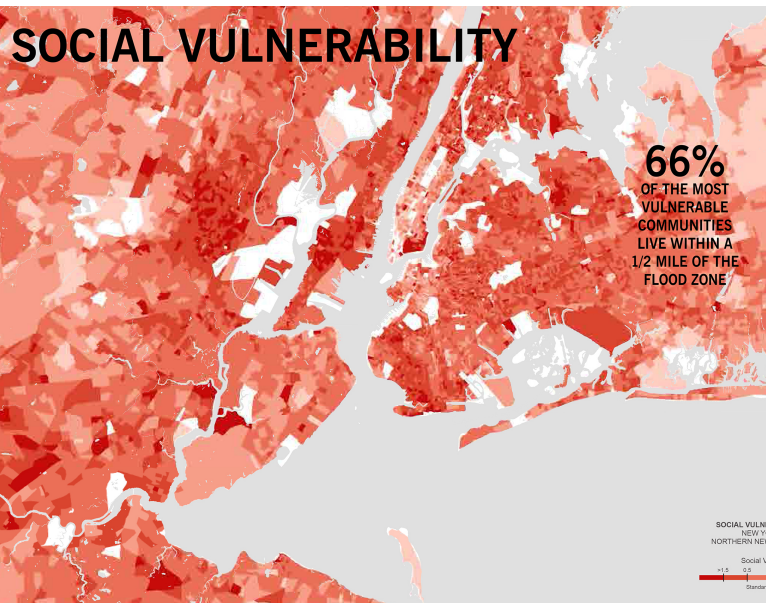




**RxD Process**  
**Design Based Research:**  
WXY/West 8  
OMA  
SCAPE/Landscape Architecture

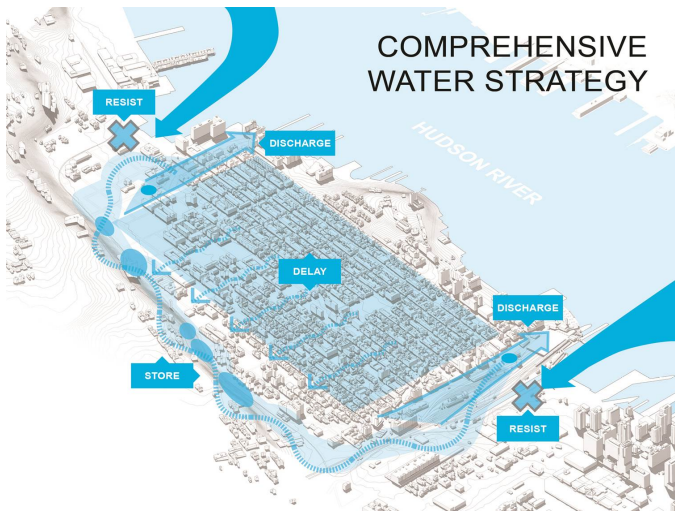
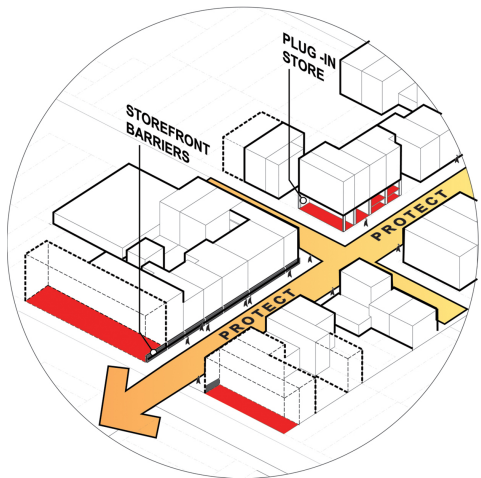
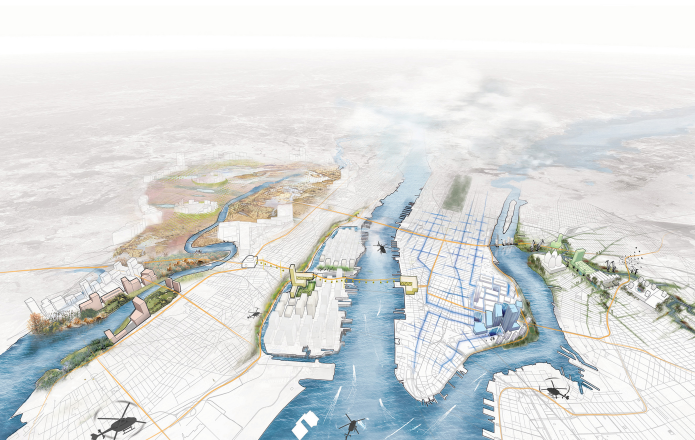


**RxD Process**  
**Design Based Research:**  
**GIS**  
Scenario modelling



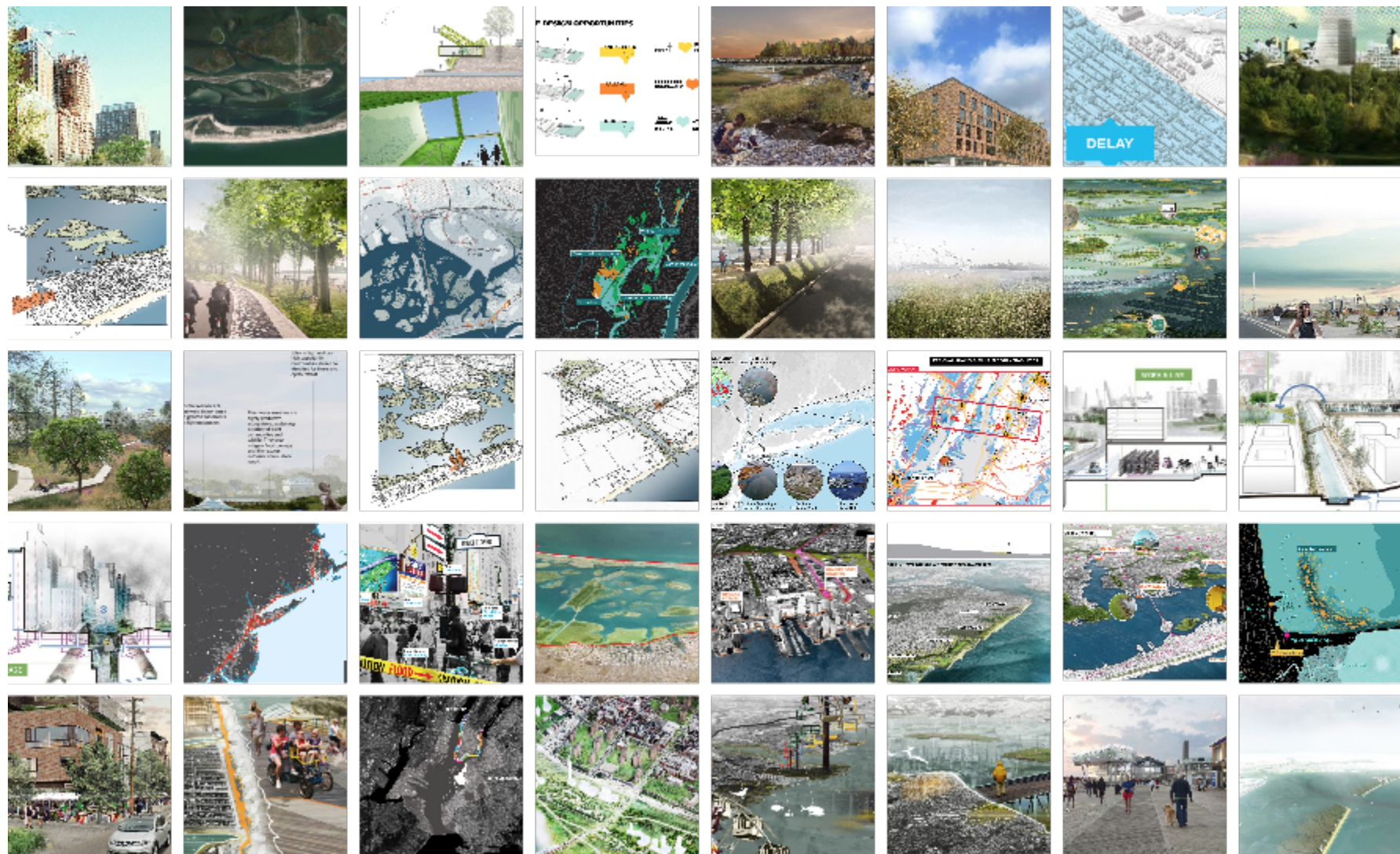
**RxD Process**  
3D visualisations

#1 REGIONAL STRATEGY: A DELTA OF RESILIENCY DISTRICTS



**40+ proposals**







**RxD Process**  
**10 locations**  
**10 schemes shortlisted**



# stage 1

**June - Aug 2013**

*International Call for talent*

## **Milestone**

*10 multidisciplinary teams  
selected.*

# stage 2

**Aug - Oct 2013**

*Design based research*

## **Milestone**

*Public presentation of research  
and 40 design opportunities.*

*10 shortlisted*

# stage 3

**Oct 2013- April 2014**

*Design development and  
outreach*

## **Milestone**

*Jury selects proposals for  
implementation*

## RxD Process

### design development and outreach

**MARCH 13**  
**2014 - 6:30 PM**

**Innovating for a Resilient Rockaway**

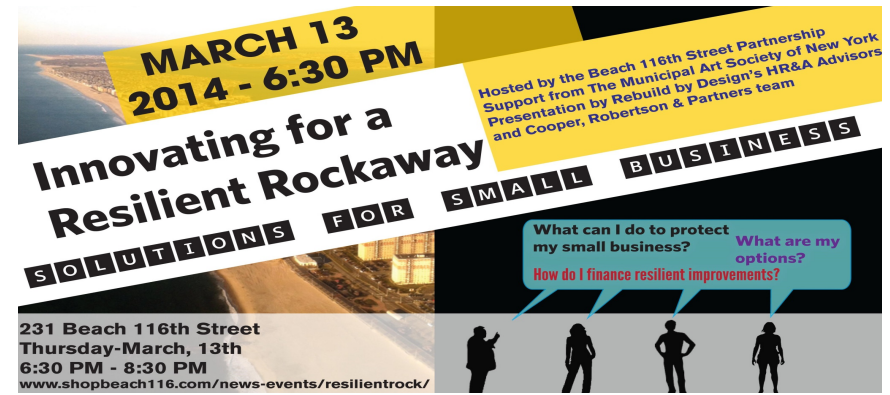
**SOLUTIONS FOR SMALL BUSINESS**

Hosted by the Beach 116th Street Partnership  
Support from The Municipal Art Society of New York  
Presentation by Rebuild by Design's HR&A Advisors  
and Cooper, Robertson & Partners team

What can I do to protect my small business?  
How do I finance resilient improvements?

What are my options?

231 Beach 116th Street  
Thursday-March, 13th  
6:30 PM - 8:30 PM  
[www.shopbeach116.com/news-events/resilientrock/](http://www.shopbeach116.com/news-events/resilientrock/)



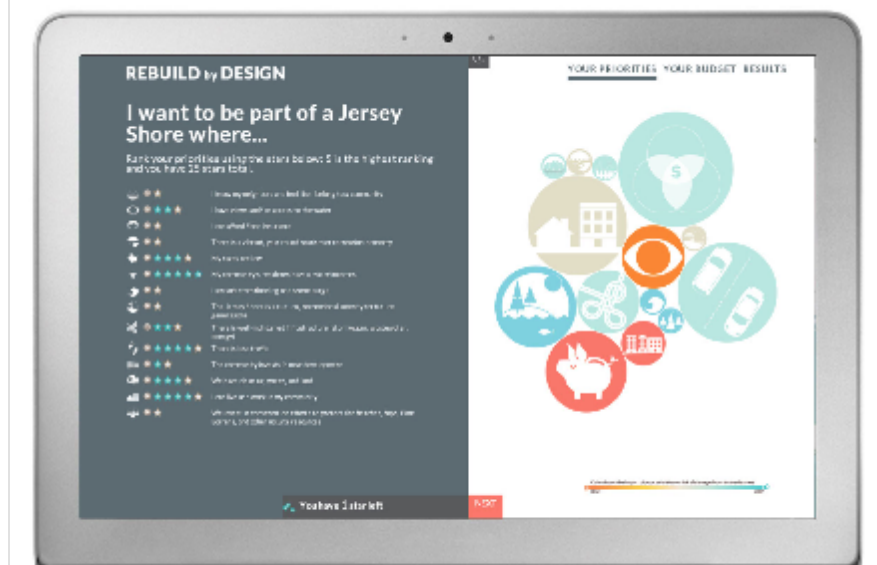
## RxD Process

### design development and outreach

WWW.REBUILDBYDESIGN.CROWDGAUGE.ORG



WWW.REBUILDBYDESIGN.CROWDGAUGE.ORG

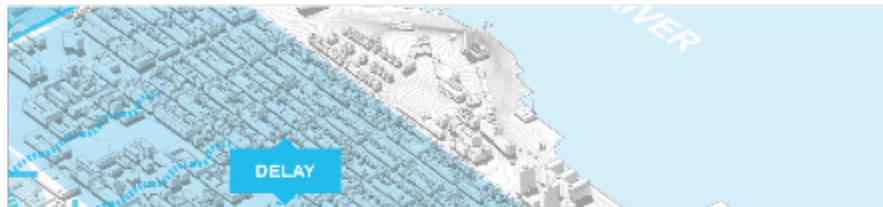


# Key RxD themes





# New Fire Island





# Key RxD themes

- **green, blue** and grey **infrastructure** prevailed,
- new more **regionally based governance models**,
- online tools and **educational initiatives to build capacity**
- **place-based** solutions that had wider application and **ability to scale up**
- **enhanced existing** strategies
- **richness** of ideas and depth of **resolution**

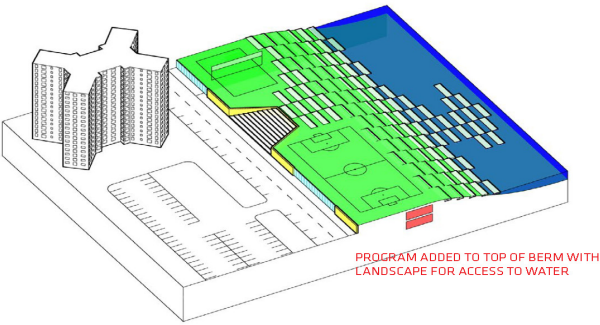
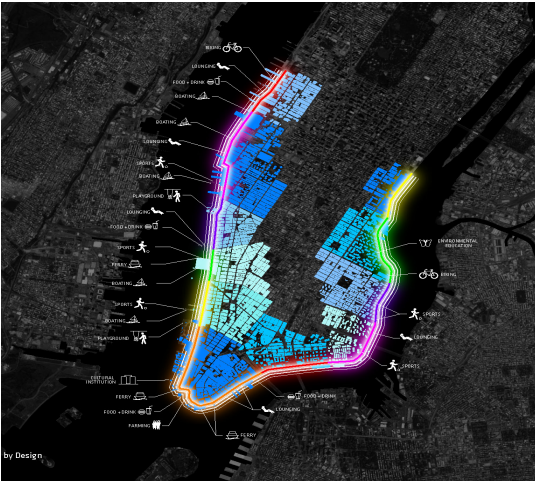
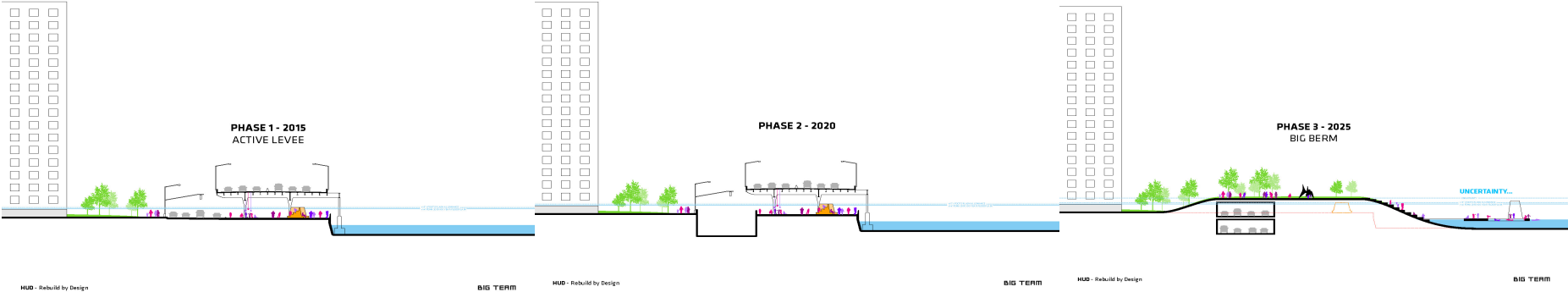
# big infrastructure

**Big U / BIG**

**Barrier Island - Blue Dune / WXY/West 8**

**Oyster Reef – Living Growing Breakwaters /SCAPE/Landscape Architecture**

RxD Process  
Design proposals: **Big U** / BIG





# granular approach

**Strategy for New Jersey / Sasaki**

**Hunts Point / Penn + Olin**

**Redhook / HRR&A**

**Nassau / Interboro**

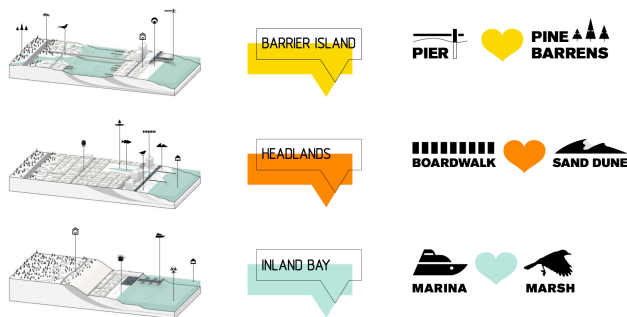
**Bridgeport/ Unabridged**

# RxD Process

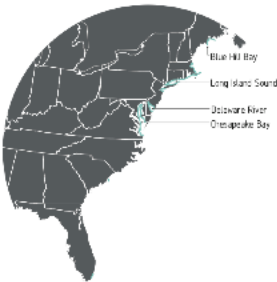
## Design proposals:granular approach

### Strategy for Jersey coast / Sasaki

#### THREE DESIGN OPPORTUNITIES



#### ATLANTIC SEABOARD

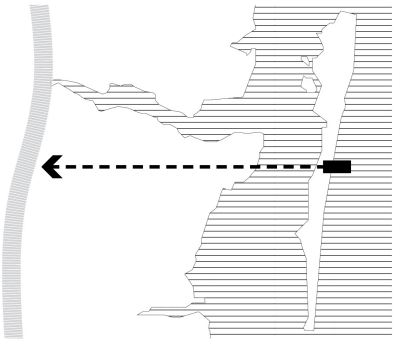
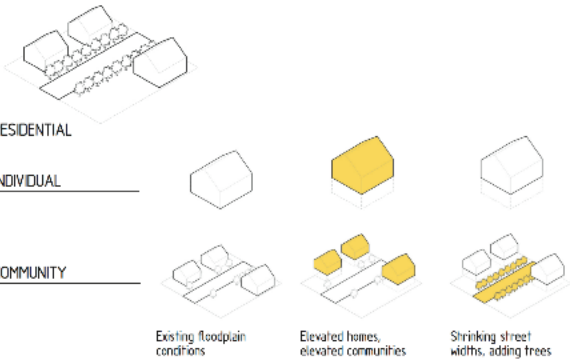


#### SANDY AFFECTED AREAS

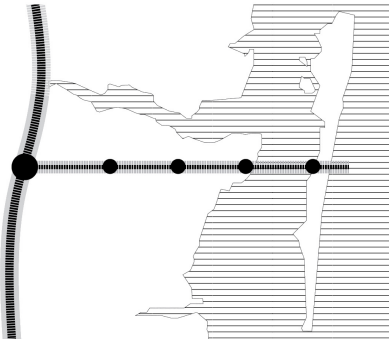


#### COMMUNITY RESILIENCY TOOLKIT

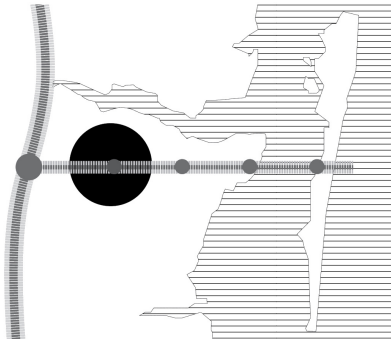
EXAMPLE FOR HOUSING WITHIN RESIDENTIAL CONDITION



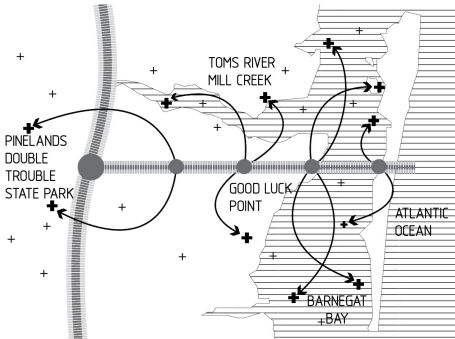
PIER AS TRANSECT: OCEAN TO PINELANDS



INTRODUCE RESILIENT TRANSPORTATION



ENCOURAGE INLAND DEVELOPMENT



DEVELOP ECO-TOURISM

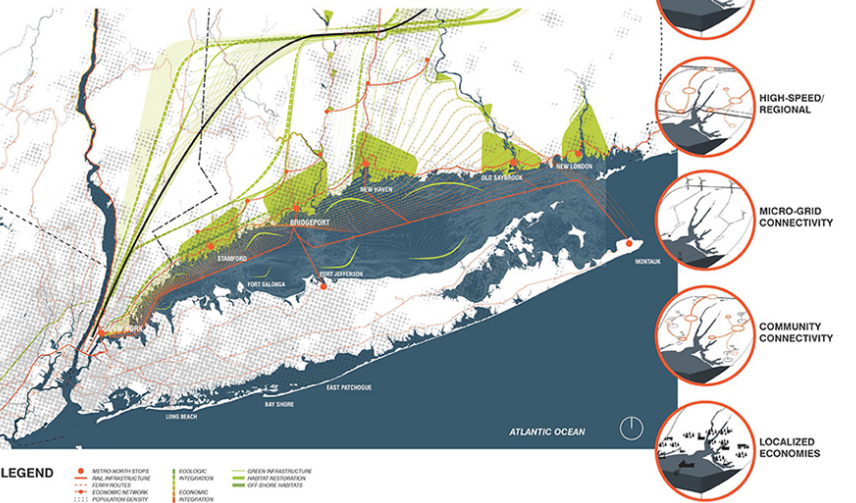


# RxD Process

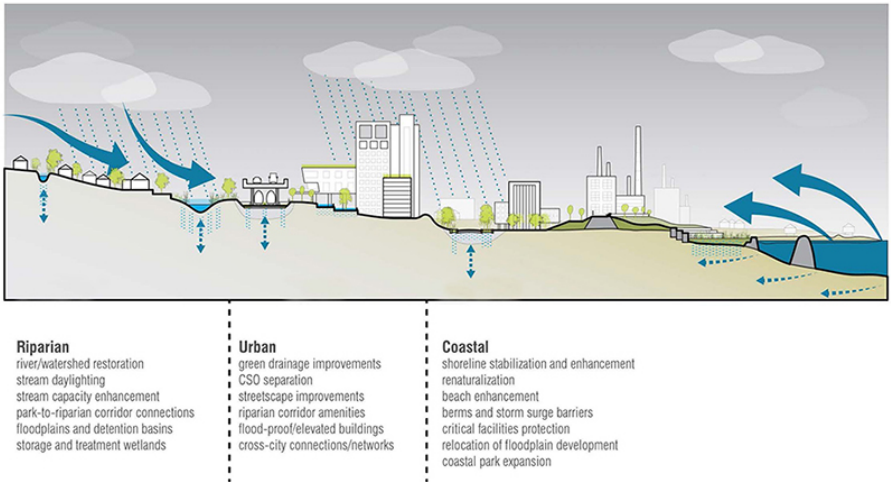
## Design proposals: granular approach

### Bridgeport/ Unabridged

REBUILD BY DESIGN: RESILIENT BRIDGEPORT  
 PROTOTYPE FOR THE SOUND: ECONOMIC AND ECOLOGICAL CONNECTIVITY



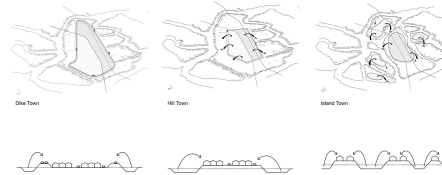
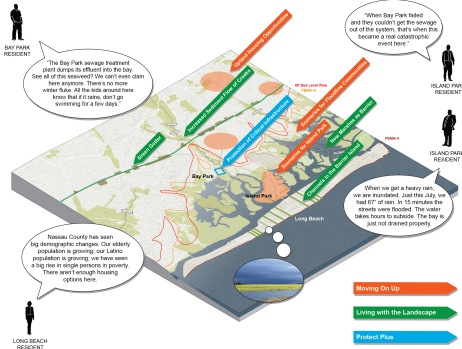
REBUILD BY DESIGN: RESILIENT BRIDGEPORT  
 RESILIENCE FRAMEWORK



# RxD Process

## Design proposals:granular approach

### Nassau / Interboro



Scenarios for Island Park



Channels in Barrier Island



## RxD Process

Design proposals: granular approach

Hunts Point / Penn + Olin

### Symbiotic Infrastructure



# green/blue infrastructure

Hoboken / OMA

Meadowband / MIT + ZUS



**RxD Process**  
**Design proposals: green/blue infrastructure**  
**Hoboken / OMA**





# HOBOKEN

## RETENTION



PONDS/BASINS

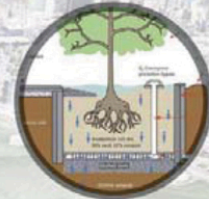


UNDERGROUND

# DETENTION



GREEN ROOFS



TREE PITS

## INFILTRATION

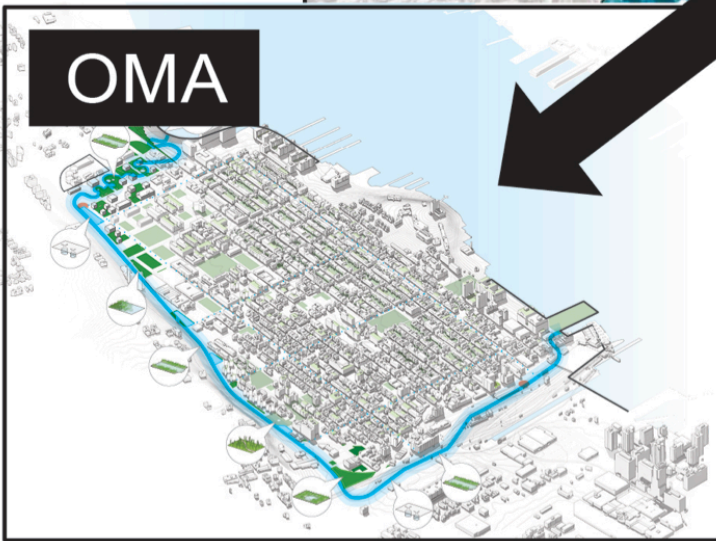


BIOSWALES



STORMWATER  
PLANTERS

# OMA

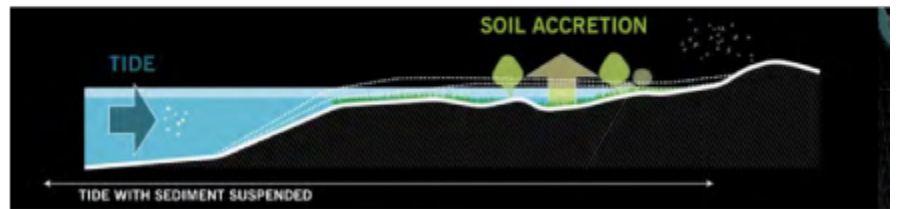
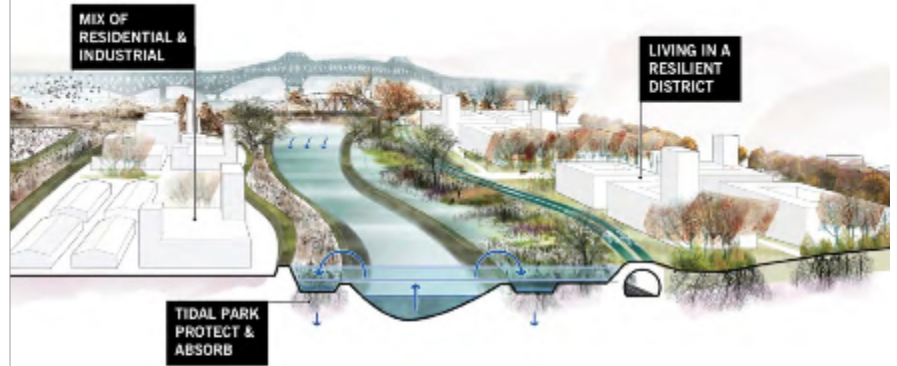


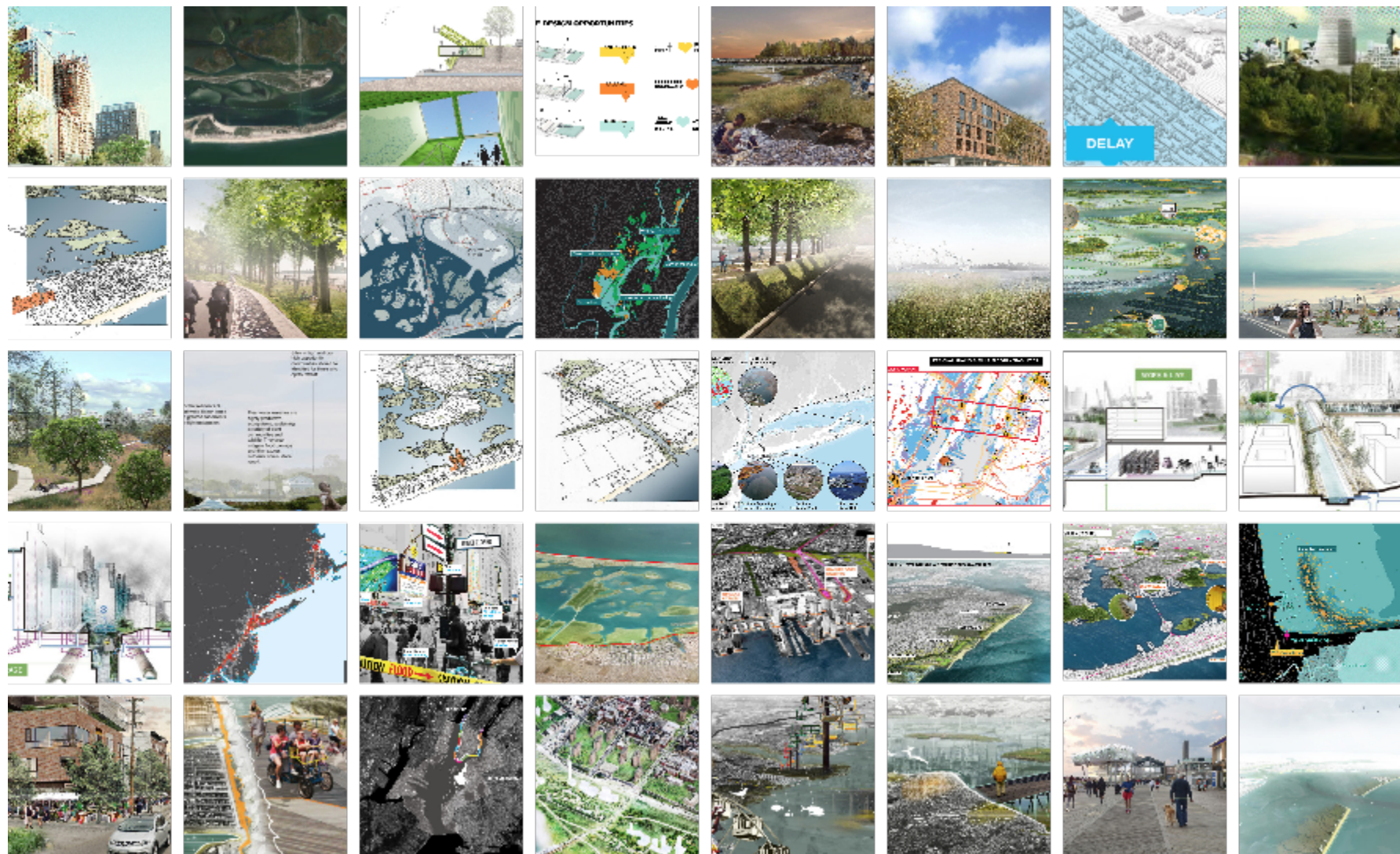


## RxD Process

Design proposals: green/blue infrastructure

Meadowband / MIT + ZUS





**RxD innovations**

# Key Rx**D** innovations

- **Process structure** – open, adaptive, collaborative
- Expert **and** collaborative design-based research
- **Engagement** - innovative and inclusive outreach
- **Proposals** – holistic, **promoted resilience by design**
- **Implementation** - incentives to get buy-in
- **Potential Impact**



# **RxD challenges**



# Key RxD challenges

- Regulatory, institutional, jurisdictional and political barriers
- **Implementation hurdles:** procurement processes favour BAU
- **Time constraints:** quick fixes vs long-term complex solutions, urgency vs process fatigue
- **Funding gaps:** focus on capital projects

**RxD outcomes**

# \$930m 7 funded projects

## NEW YORK CITY:

- **\$335M:** The BIG U in Manhattan, NY
- **\$20M:** Lifelines in Hunts Point, Bronx, NY

## NEW JERSEY:

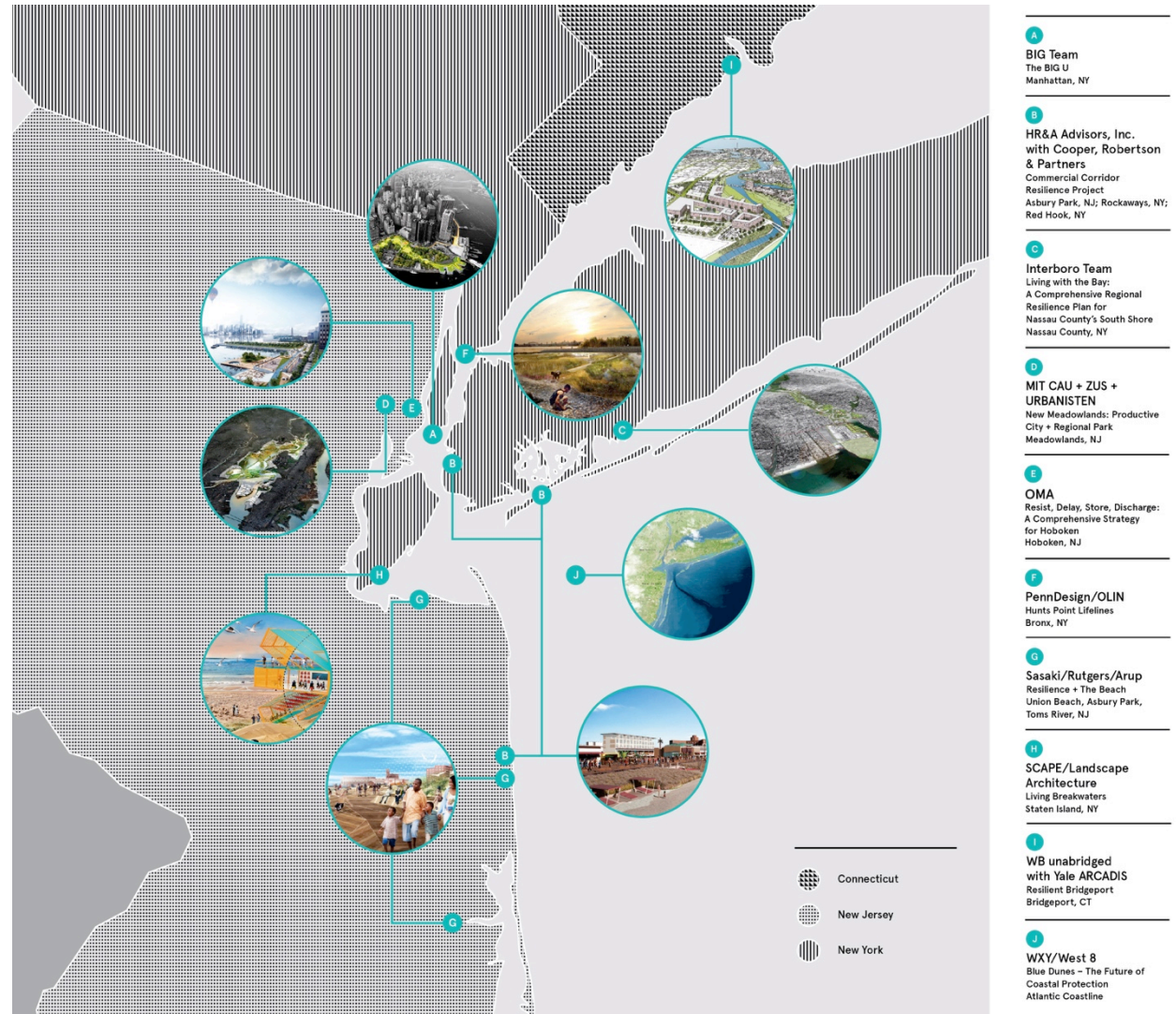
- **\$230M:** Resist, Delay, Store, Discharge in Hoboken, NJ
- **\$150M:** New Meadowlands NJ

## NEW YORK STATE:

- **\$125M** Living with the Bay in Nassau Long Island
- **\$60M:** Living Breakwaters, Staten Island, NY

## CONNECTICUT

- **\$10M:** Resilient Bridgeport, CT



# National Disaster Resilience Competition

Bringing resilience tools and expertise to communities across the United States.

## OVERVIEW

Between 2011 and 2013, the federal government spent \$136 billion on disaster relief in the United States, an average of nearly \$400 per household per year. During that time, President Obama declared major disasters in 67 communities in the United States across 48 states, plus Puerto Rico and Washington, D.C.

## Meet the winners.

Announced by President Obama in 2014, the **National Disaster Resilience Competition** was developed to help U.S. communities recover from prior disasters through innovative resilience projects.

**67** disaster-affected communities  
**13** competition winners  
**1** billion dollars to rebuild better

#RebuildBETTER

## Related Initiatives

[100 Resilient Cities](#), [Rebuild by Design](#),  
[New Orleans](#)

## Similar Topics

[Resilience](#),  
[Transportation and Infrastructure](#),  
[Transform Cities](#)

## Key Documents





# 100 RESILIENT CITIES + REBUILD BY DESIGN

## ' REBUILD BY DESIGN

IN PARTNERSHIP WITH 100  
RESILIENT CITIES

[ABOUT](#)

[OUR WORK](#)

[NEWS & EVENTS](#)

[DIGITAL MEDIA](#)

Inspiring cities around the world.

As Part of 100 Resilient Cities, Rebuild by Design Expands Its Model for Resilience Planning



## CITY INITIATIVES



### SAN JUAN, PUERTO RICO

Rebuild is working with The City of San Juan on a resilience pilot in the neighborhoods of Playita, Shangay, and El Checo to address multiple...



### MEXICO CITY, MEXICO

Rebuild by Design is using its collaborative research and design approach to help Mexico City develop a plan for Xochimilco, a UNESCO cultural...



### OAKLAND, USA

Working with the City of Oakland, West Oakland Environmental Indicators Project, and Streetwyze, Rebuild launched "Building a Resilient Oakland: It...



### SAN FRANCISCO BAY AREA

Rebuild by Design has been working with Bay Area counties to create a design challenge inviting design experts to collaborate with community...



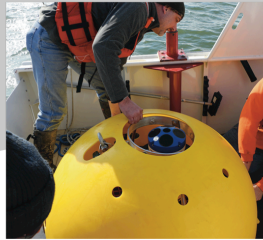
### BOSTON, USA

Rebuild partnered with the City of Boston and the Green Ribbon Commission to create a plan to address five specific elements: climate forecast...

Belgrade - November 2016

# ELEMENTS OF EFFECTIVE ENGAGEMENT

12 Best Practices of Community Engagement from the Past 2 Years



**"You are the experts in your neighborhood and we are pairing you with technical experts"**

**- Kathy Dorgan, Resilient Bridgeport**

Communities are defined by the people who live and work within the buildings and occupy the streets, each defining the unique fabric of their neighborhood. One of our founding philosophies at Rebuild by Design is that the community members who use these spaces are the local experts who should help define its program. Grounding that philosophy in the realities of each of our projects ensures the development of sustainable relationships between community members, design teams and government.

Since the U.S. Department of Housing and Urban Development (HUD) announced the funding of seven projects in the Hurricane Sandy region two years ago, state and city governments have studied, tested, and refined each project in preparation for implementation. In that time, governments with the help of designers, engineers, architects, planners, specialists, and other experts have used various techniques to engage the community and successfully prepare the Sandy region for a changing climate. Each community is unique and it is important for each project team to strategize how to best tap into that community's local

Resilience by Design University (RBD U) gives the next generation of architects, landscape architects, urban designers, and planners the tools to embrace principles of resilience as a central tenet of design.

# **RESILIENCE BY DESIGN UNIVERSITY**





## Research & Policy

Rebuild by Design's collaborative research and design approach is heavily rooted in understanding issues from multiple perspectives. By bringing together outside talent and local experts, Rebuild connects big picture problems with replicable solutions that can be embraced by communities and governments alike.

Further building on its collaborative problem-solving approach, Rebuild regularly researches and surveys the outcomes from its projects and initiatives to help others learn from the experiences. It also documents the policy and regulatory barriers communities encounter as they work through proposed solutions. This process helps inform governments and innovators as they design and implement future projects.





Jilka Janssen

## EXHIBITIONS



### CATALYZING AN URBAN RESILIENCE MOVEMENT: 100 RESILIENT CITIES WITH REBUILD BY DESIGN

For the first time in human history, half the world's population is concentrated in cities. At the same time, the intertwined threads of...



### REBUILD BY DESIGN HURRICANE SANDY DESIGN COMPETITION EXHIBITION

In the spring of 2014, ten teams showcased their innovative proposals for a more resilient Sandy-Affected region. Seven teams were selected as...



Rebuild by Design brought together:







town hall meeting, Christie  
re about Sandy aid

