Long Island Climate Resilience Index (LI-CRI)

Development of metrics to quantify impacts of infrastructure investment to address community vulnerabilities

NYS RISE

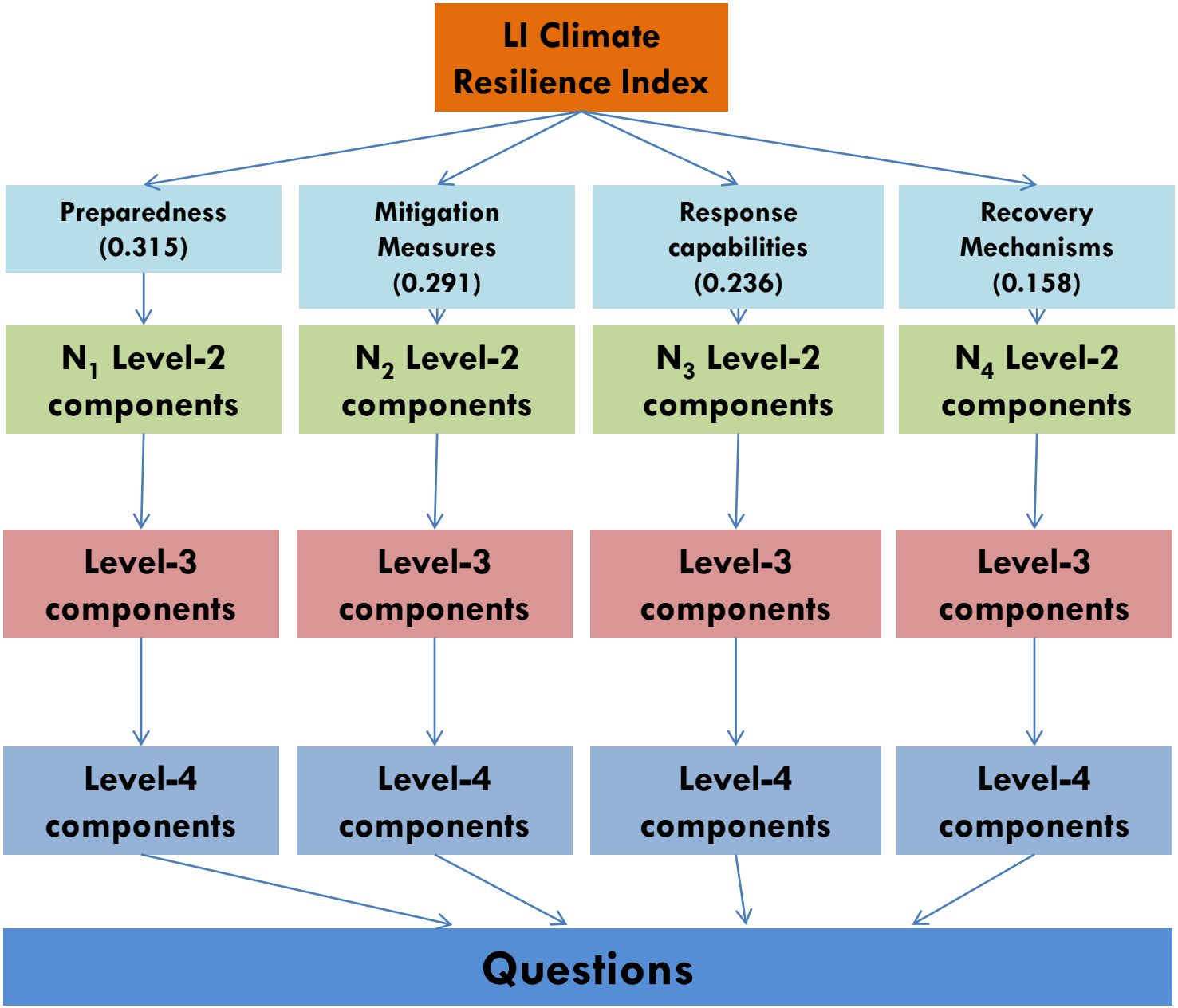
Resiliency Institute for Storms & Emergencies

LI-CRI OBJECTIVE

- to develop Long Island Climate Resilience Index (LI CRI) as a measurement index
  - to measure and monitor Long Island's resilience to climate extremes;
  - to evaluate the impacts of infrastructure investment on the resilience/vulnerability;
  - To guide decisions for special events, investment, or other action
  - and for policy-makers to better engage the public.
- Four Components
  - Preparedness
  - Mitigation measures
  - Response capabilities
  - Recovery mechanisms

Approach

- LI CRI is based on decision analysis and multi-attribute utility theory (MAUT), and is defined by the aggregation of several indices characterizing the components and subcomponents
- Developed index system, and Google survey tool for data collection
  - Survey key facility personnel (operations manager, utility manager)
- **Δ LI CRI = f (investments in infrastructure & practice)**


LI Climate Resilience Index
Preparedness (0.315)
Mitigation Measures (0.291)
Response capabilities (0.236)
Recovery Mechanisms (0.158)
N_1 Level-2 components
N_2 Level-2 components
N_3 Level-2 components
N_4 Level-2 components
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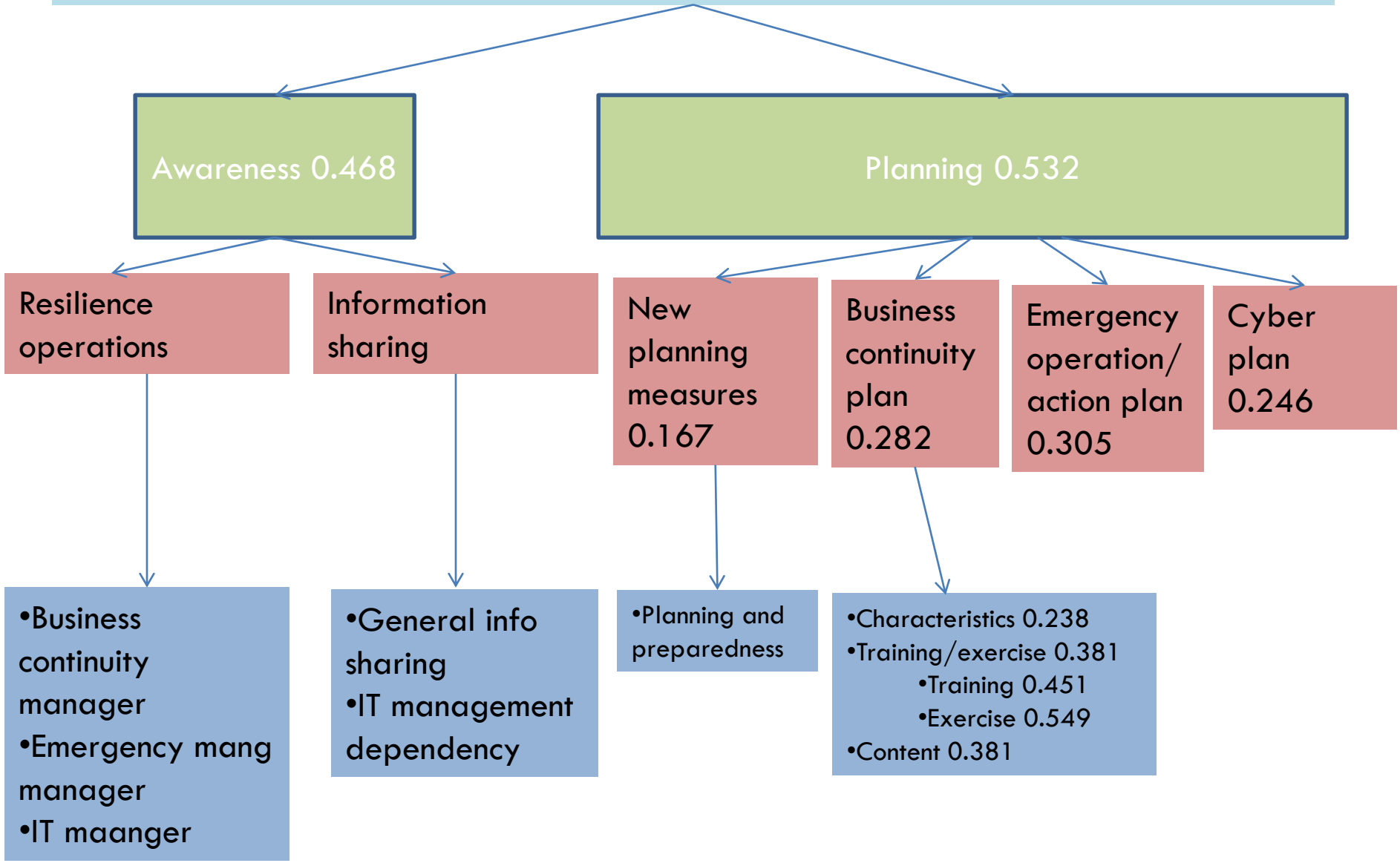
Questions

Preparedness (0.315)



Business continuity Plan Exercises (illustration)

		Baseline			Improvements		
	Weight	Answer	Value	Weighted index	Answer	Value	Weighted index
Tabletop (practical or simulated exercise)—no external responders	0.131	Yes	100	13.1	Yes	100	13.1
Tabletop—include external responders	0.161	no	0	0	YES	100	16.1
Functional (walk-through or specialized exercise) no ext	0.196	yes	100	19.6	yes	100	19.6
Functional—incl ext resp	0.241	no	0	0	YES	100	24.1
Full-scale (simulation or actual event)—no ext resp	0.285	no	0	0	YES	100	28.5
Full scale—incl ext resp	0.343	no	0	0	YES	100	34.3
Exercise documented, etc	0.255	yes	100	25.5	yes	100	25.5
Index value				58.2			161.2

PREPAREDNESS (0.315)

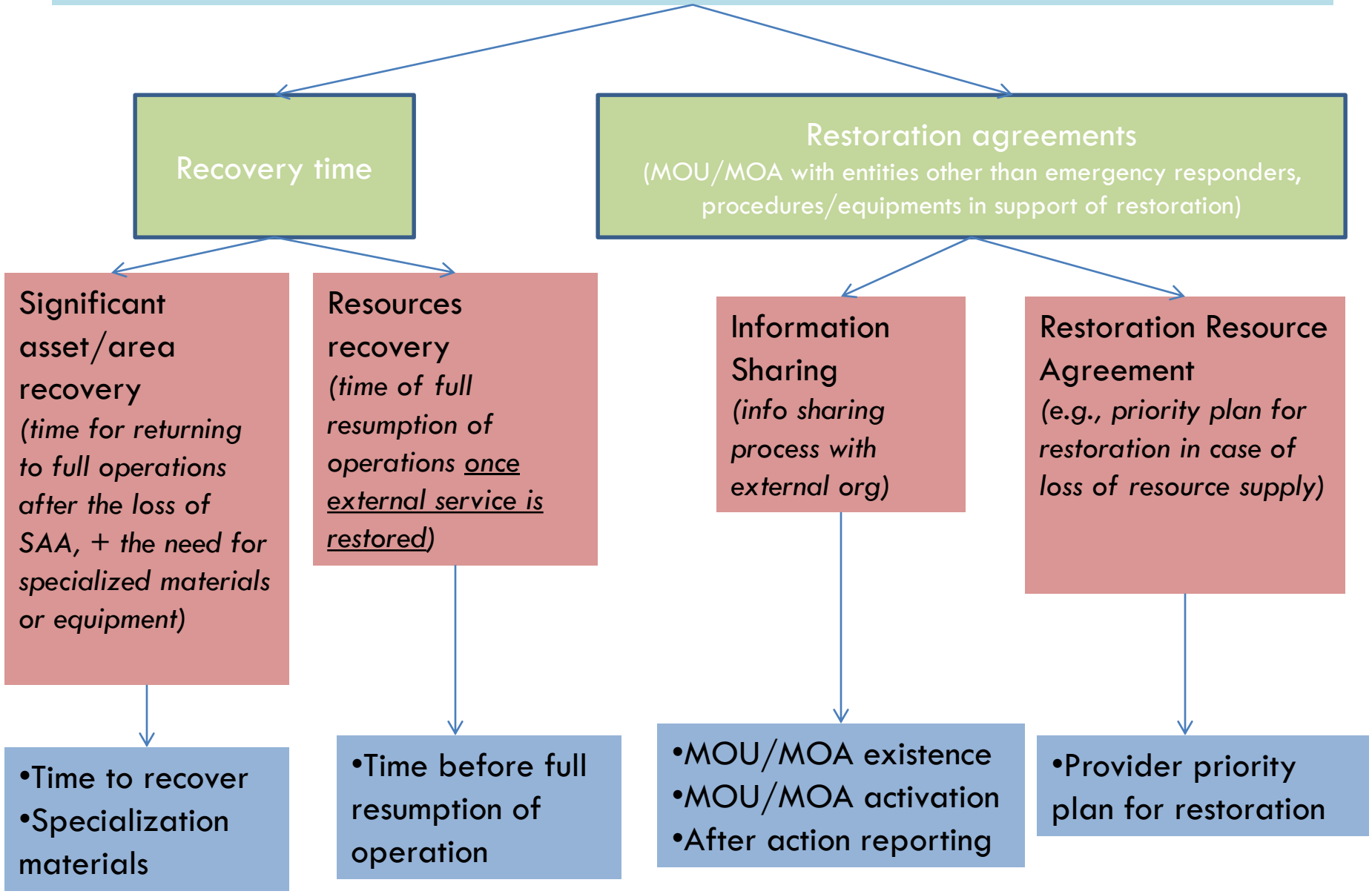
	Weight	Old Index	New index
• 0			
• Awareness (L-2)	0.468	67.46	67.46
– Resilience operations			
• Business continuity manager			
• Emergency management manager			
• Information technology manager			
– Information sharing			
• General info sharing			
• IT management dependency			
• Planning (L-2)	0.532	49.51	**54.81**
– New planning measures	0.167	0	0
• Planning and preparedness			
– Business continuity plan	0.282	61.13	**79.92**
• Characteristics	0.238	62.14	62.14
• Training/exercises	0.381	48.32	**97.63**
– Training	0.451	36.3	36.3
– Exercises	0.549	58.2	**161.2**
• Content	0.381	73.28	73.28
– Emergency operation/emergency action plan	0.305	58.7	58.7
• Characteristics			
• Training/exercises			
• Content			
– Cyber plan	0.246	58.4	58.4
• Characteristics			
• Training/exercises			
• Content			

- Preparedness (L-1) index
  - Old index= awareness + planning = 31.57+26.34=57.91
  - New index= awareness + planning =31.57 +**29.16**=**60.73**
- LI-CRI change

		Baseline		improvements	
	Weight	Index	Weighted index	Index	Weighted index
Preparedness	0.315	57.91	18.24	60.73	19.13
Mitigation	0.291	35.68	10.38	35.68	10.38
Response	0.236	18.41	4.34	18.41	4.34
Recovery	0.158	51.17	8.08	51.17	8.08
			41.04		**41.93**

Summary: the 4 improvements in slide #7 raise the LI-CRI index from 41.04 to 41.93

Recovery Mechanism (0.158)



Mitigation measures (0.291)

- Facility's capabilities to resist a threat or to absorb the consequence
- Mitigation construction
  - Natural hazards
  - New mitigation measures
  - …..
- Alternate site
- Resources mitigation measures
  - Electric power
    - Sources
    - Alternates and backups
    - Impact prevention
  - Natural gas
    - Connections
    - ….
  - Communications
  - IT
  - Transportation
  - Critical products
  - Water
  - Wastewater

Next steps

- Finish and peer review the index structure and questions
- Develop the relative importance and weighting factor
- Collect data on electricity infrastructure: before and after Hurricane Sandy
- Analyze the data and summarize the findings