



STEPPING BACK FROM THE EDGE OF DISASTER
CAPITAL PLANNING FOR RESILIENCY

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In recent years, disaster preparedness has become increasingly important for local government officials. Most disaster preparedness efforts have emphasized reacting to a disaster quickly and effectively in order to minimize losses. However, recognition is growing that this is not enough. Rather than planning a response to failures of current infrastructure or systems, governments have begun to realize the importance of resiliency, that is, *the capacity of infrastructure and operations to respond to and recover from emergencies*. Resilient systems “reduce the probabilities of failure, the consequences of failure (such as deaths and injuries, physical damage, and negative economic and social effects); and the time for recovery.”¹ Hence, resiliency makes the consequences of an extreme event less severe from the outset and reduces the time required to get back to normalcy.

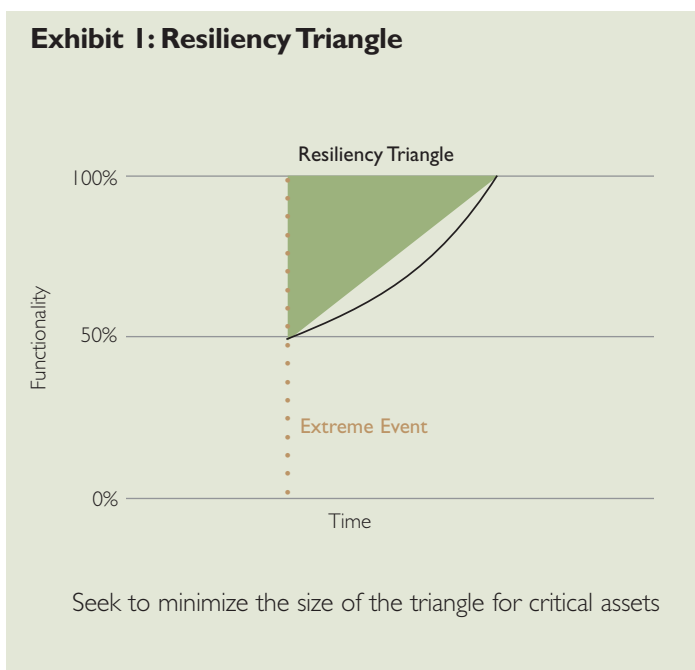
The resiliency concept is best illustrated by the “resiliency triangle,” shown in Exhibit 1.² The triangle represents an asset’s capacity and the time required to resume full functionality after an extreme event. The objective of resiliency-building efforts is to minimize the size of the triangle for critical assets. For example, a fire station that is constructed using techniques and materials that go beyond normal standards could better withstand a hurricane than another fire station built to current standards. This would reduce the loss of functionality from high-wind damage. Consequently, the size of the triangle

along the vertical axis of Exhibit 1 would be reduced. As another example, a government that maintains off-site backup of its critical information systems would be able to restore full functionality much more quickly, even if the original system was totally destroyed. This type of resiliency planning would reduce the resiliency triangle along the horizontal axis.

Transportation systems, public utilities, and public safety installations are essential to disaster mitigation, response, and recovery and are therefore high priorities when planning for the resiliency of public assets. As providers of these assets, local governments have a crucial part to play in building a more resilient nation. Building resiliency will not be easy, and the capital improvement planning process is the focal point for the careful preparation and investment required. The purpose of this article is to identify ways in which local governments might revise their capital planning processes to explicitly incorporate resiliency concepts.

THE RESILIENCY PLANNING PROCESS

Exhibit 2 summarizes capital planning for resiliency. The process has three phases: identifying needs, prioritizing needs, and funding. The rectangles depict the core activities in the process, while the gray, rounded boxes indicate critical supporting tools and techniques. The following sections describe each of the three segments in more detail.

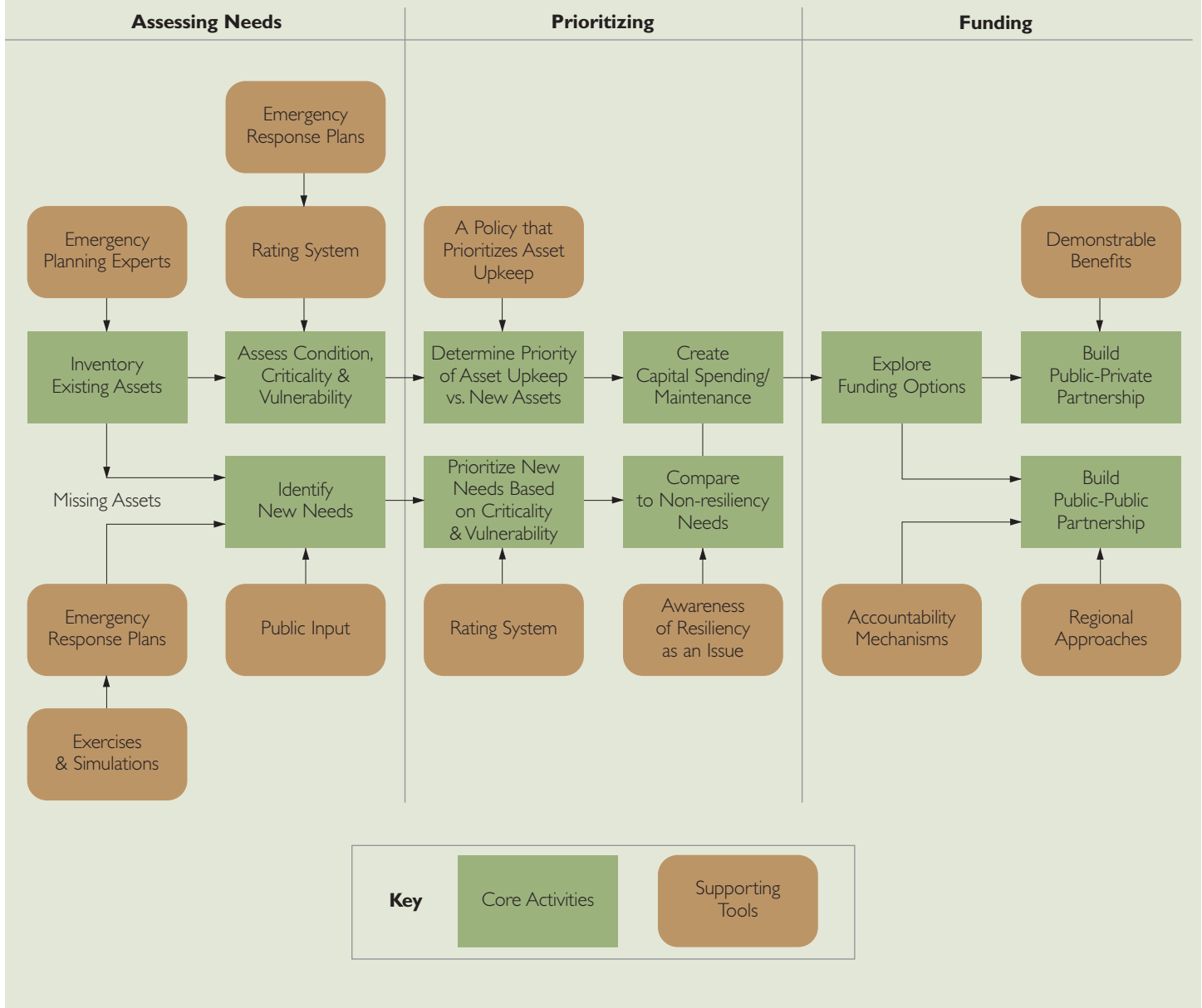


IDENTIFYING RESILIENCY NEEDS

A comprehensive asset inventory is the basis for assessing and bolstering resiliency. It identifies the government’s assets and the condition they are in. This allows a government to determine what systems are in place, what new systems may be needed, and where asset condition may need to be improved in order to reduce the resiliency triangle’s size.

An asset inventory that focuses on resiliency must be conducted using a cross-functional approach. An inventory is typically performed by public works personnel, with support from the finance function. Public safety experts also need to be involved, however, to assess the “criticality” and “vulnerability” of assets. While a resiliency triangle can be developed for any asset, the size of the triangle is more critical for some assets than for others. As a simple example, a water tower is more critical than a swimming pool. Naturally, most distinc-

Exhibit 2: The Resiliency Capital Planning Process



tions will be less clear. This is where a public safety expert's trained eye is indispensable. Public safety expertise also is needed to assess vulnerability. For example, a 911 call center is clearly critical. It may be extremely well maintained yet still be vulnerable. Perhaps it was not built to withstand the increasingly violent force of hurricanes that a coastal community finds itself subject to, or maybe it is too accessible to vehicular traffic, making it vulnerable to a car-borne bombing attack or similar act. By distinguishing critical assets and rec-

ognizing and addressing vulnerabilities, resiliency efforts can be planned.

Asset inventory systems often incorporate a formal condition assessment or score. The asset inventory could also subjective scores for criticality and vulnerability. (See an example in Exhibit 3.) Ideally, a scoring system should be anchored or backed by criteria or principles that support the rating system's validity and reliability, i.e., that the rating system will produce results useful for decision making and that it will pro-

Exhibit 3: Asset Resiliency Assessment Worksheet

Asset Name _____

Asset Location _____

Criticality

Please select a criticality score for the asset

Not Critical				Very Critical
1	2	3	4	5

If rated a 3, 4, or 5, please answer the following:

- Where in the government's disaster preparedness plans is this asset addressed? _____
- What in the disaster plan justifies this asset as "critical"? _____
- What simulation results support your rating? _____
- Does any other information support your rating? _____

Vulnerability

Please select a score for each of the following aspects of vulnerability.

- **Robustness.** The ability to withstand extreme event without significant degradation of performance.
- **Redundancy.** The extent to which asset can be substituted for if significant degradation occurs.
- **Resourcefulness.** The ability of system to diagnose & prioritize problems & initiate solutions.
- **Rapidity.** The ability to quickly restore performance, contain losses, & avoid disruptions.

	Excellent		Fair		Poor
Robustness	1	2	3	4	5
Redundancy	1	2	3	4	5
Resourcefulness	1	2	3	4	5
Rapidity	1	2	3	4	5
Average					

Please explain ratings for each category where you assigned a 1 or a 5: _____

Summary

Criticality Score	+	Vulnerability Avg. Score	=	Total

Assets with the highest scores are the highest priorities for resiliency enhancement.

Please describe any other critical assets or systems that this asset depends upon to function: _____



duce similar results even when the ratings are made by different individuals.

Disaster preparedness plans are the basis for assessing the relative criticality of assets. The plans should identify assets that would be most important in responding to events that pose the greatest threat to the community. Plans should be supported by table-top and live exercises and simulations. These help identify weaknesses to extreme events and where new or improved assets could reduce those weaknesses. Those assets deemed to be most critical would be held to a stricter standard when evaluating vulnerability.

While a formal rating system provides the basis for helping the finance officer formulate and fund a plan to make the community's assets more resilient, it cannot totally supplant on-the-ground experience. Therefore, the finance officer should be a major participant in disaster preparedness rehearsals so that she can better understand budgetary requirements related to making assets more resilient. For example, in the City of Cambridge, Massachusetts, the finance director participates in disaster response exercises to prepare him to better direct resources during an actual event, but also to gain a greater appreciation of capacity improvements the city may need to plan and budget for.

An important feature of resiliency building is its resonance with the community. Governments should engage the public to get a broader perspective on resiliency needs. Existing relationships are a good place to start. For example, economic development business retention visits by community and economic development officials could be used to identify business continuity threats that firms perceive from potential community-wide disasters. More particular relationships between local businesses and public safety officials also can be established. For example, the City of Cambridge is home to a thriving biotechnology sector. The city's fire chief maintains close relations with these firms due to their specialized needs for emergency response support.

The general public can be engaged using public involvement tools like surveys and focus groups. Such activities will provide government officials with a unique perspective and will help to generate interest in the issue — an important consideration when additional funding from the community may be required. Existing forums can be used to discuss resiliency. The City of Savannah, Georgia, for instance, worked with neighborhood associations to review potential disaster scenarios in order to ascertain how the public would react. Who would they call? What would be their main sources of information? Where would they go if they could not stay in their homes? These discussions can not only suggest vulnerabilities in government systems (e.g., inadequate call intake capacity, lack of community shelters in the right locations), but can also provide the opportunity to educate the public on preferred behaviors in times of emergency and to build public trust in their government's ability to respond to a disaster.

New community engagement modes can also be considered. For instance, individuals with specialist roles that are out in the community every day and that are knowledgeable about land uses may be sought out for input. These individuals may be on the government's own staff, work for other governments, or work in the private sector (e.g., private utilities, construction contractors).

SETTING RESILIENCY PRIORITIES

Upon completing the assessment, there will almost certainly be more needs than there are funds available. A good resiliency rating system, with a tie to disaster planning, is key to prior-

Expert Judgment in Ratings

No rating system can ever eliminate the need for expert judgment, nor should it. The inherent knowledge and feel for the issue that public safety experts have should be part of assessing criticality and vulnerability. Even a rating system that is more subjective in nature, without the supporting criteria described in this article, can be useful for starting the resiliency conversation. However, government should work toward ultimately establishing criteria that help the government frame the discussion and make choices.

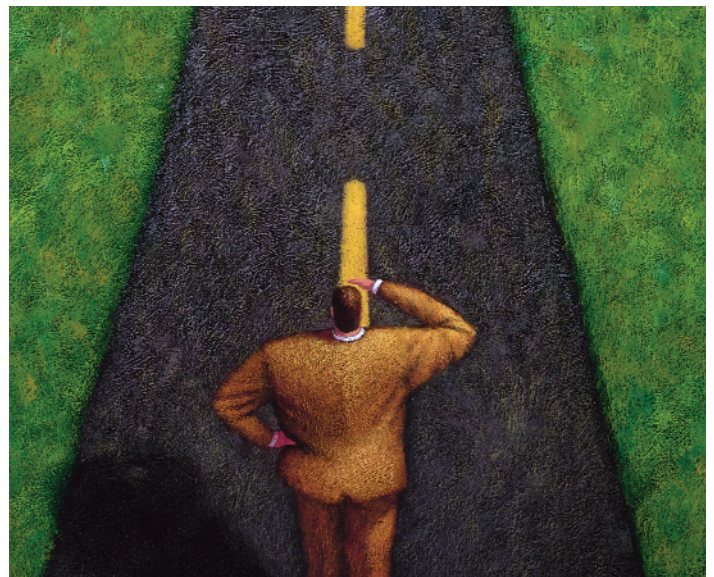
itizing investments. A framework similar to that described for assessing asset condition can be used to prioritize resiliency improvements. Proposals for new assets should be assessed based on how critical they are in helping the community withstand extreme events it has the greatest exposure to. For example, in south Florida, an improvement designed to protect against hurricanes is far more critical than one designed for earthquakes. Disaster plans and exercises should help identify the most critical types of investments.

The bigger question may be how to prioritize resiliency against other community needs and desires. Resiliency is only one of many competing considerations in the capital planning process. How can governments establish resiliency as a priority compared, for example, to economic development, community quality of life, or day-to-day service needs? The first step is to raise the visibility of resiliency as an issue so that it can be given fair consideration. Recent events ranging from 9/11, to Katrina, to the I-35 bridge collapse in Minneapolis have highlighted the importance of resilient assets. Local conditions such as hurricane or earthquake vulnerability or a local industry that works with highly hazardous materials also can be used to illustrate the need for resilient assets. Simulation exercises and after-action reports can highlight the specific needs of a community. Resiliency concepts also can be woven into strategic planning, financial planning, and disaster planning to raise awareness among elected officials.

Working with the media to bring positive attention to resiliency-enhancing projects can also be productive for raising community support. An integrated capital planning and

emergency planning process combined with an effective method for reporting progress on resiliency-enhancing projects can provide the basis for a media story. In all cases, candid communication of how the government is doing on resiliency-building efforts and a sober assessment of the risks faced from resiliency deficiencies is central to starting up and maintaining a credible resiliency program. Even if the media take a negative tact with the story, the fact that government is aware of and working on the issue may increase the public's confidence in the government.

Choosing between resiliency improvements and other community priorities may not always be necessary. An asset that is a high priority for resiliency improvements might also provide value across other priority areas. Improving capacity to withstand and respond to certain types of extreme situations may improve the business climate, thus contributing to economic development goals. For instance, Cambridge is one of only a handful of local public safety departments with a "Class I" ISO rating (it has high capacity to respond to highly hazardous events), which is very important given the prevalence of biotechnology firms in the local economy. While biotechnology firms' affinity for the Cambridge area is due mostly to other factors, , the business community's confidence in the city's first-class emergency response capabilities helps improve the business environment. In another example, combining recreation and community shelter functions can contribute both to resiliency and quality-of-life goals.



Total Community Resiliency

In addition to improving the asset needs assessment, community engagement will help bolster efforts to build community resiliency beyond capital assets.

Resiliency can be greatly enhanced by placing high priority on maintenance of existing assets. In many cases, resiliency will be best achieved by keeping existing assets up to standard. If an asset's functionality falls below 100 percent, its resiliency triangle is that much larger. The City of Savannah follows a policy of giving top priority to investing in maintenance and refurbishment of existing assets in its capital planning process.

Ultimately, a comprehensive capital improvement plan is needed to facilitate funding considerations for the most critical projects for asset maintenance and new resiliency needs.

FUNDING RESILIENCY

It is no secret that local government finances are already under pressure due to service needs and revenue limits. In this environment, how can governments provide sufficient funding for enhancing resiliency? The foundation is a solid planning approach, including needs identification, prioritization, and a phased approach to spending for resiliency investments.

A sound plan can help stretch existing dollars by building synergies between capital project spending and other community needs. Examples include multi-use facilities or roads that not only handle civilian traffic, but also meet needs for accessing critical/vulnerable areas of the community in emergencies. Assets can be acquired that go beyond the minimum specifications needed for normal operations in order to build redundancy and robustness. A solid planning approach also takes a long-term perspective in analyzing costs versus benefits: investing now in more resilient, robust assets may reduce annual maintenance requirements, thereby reducing total lifecycle costs.

While getting the most out of current resources is critical, most governments will eventually need to provide new fund-

ing for resiliency. At that point the government will need to seek support for added funding outside the organization, whether from voters or from higher levels of government. A solid planning approach helps to build credibility with funding authorizers so they have confidence that the government has identified the most important investments and that the projects will be successful. The following sections describe how governments may be able to access new funding streams.

Public-Private Partnerships

Private firms value a more resilient community. The ability to continue or get back to doing business quickly despite an extreme event preserves a firm's cash flow. Locating in a more prepared community can mean lower insurance costs. Therefore, local government may be able to realize additional revenues by enhancing resiliency in ways that matter to the business community. To do so, the public sector must make a business case for the service and the private sector must per-

ceive benefit. This starts with knowing the business community and working with it to understand the nature of risks. If local businesses perceive that government has a real knowledge of their concerns, then they will be more confident that a new public service

will provide benefits. For example, in Savannah many local industries work with hazardous chemicals. The Savannah fire department interacts with these local businesses to understand what chemicals they have on their sites, in what quantities, and what the delivery schedules are. By knowing these facts, the city can be aware of times when quantities may be particularly high or when the chemicals may be on the move and therefore potentially more vulnerable.

Government should be specific about the benefits that will be provided — what can businesses expect to receive for their investment? In Savannah's case, the city proposed investing in specialized hazardous material response capabilities and assets. This would reduce insurance rates for local businesses, improve business continuity, and help improve the reputation of the businesses in the community with local residents, who were wary of the danger presented by the chemicals. Savannah then worked with a local manufacturers' council to develop a fee structure to cover the costs of the new assets.

Government must demonstrate financial sustainability in tandem with resiliency enhancement.

The private sector can also be a good source of in-kind donations. The planning processes should be used to communicate needs to the private sector and invite help in the right areas. Hanover County, Virginia, does not have much space that can be used for community shelters. Rather than investing in new facilities, it is exploring partnerships with local not-for-profits and churches to designate their facilities as community shelters and to work with these entities to reduce their facilities' vulnerability.

Insurance Partners

The City of Seattle, Washington, worked directly with insurance companies to promote its resiliency programs. Insurers could promote potentially lower rates directly to their clients and were, in many cases, a more credible messenger on the issue than city government.

Public-Public Partnerships

Regional approaches have great potential for resiliency enhancement due to economies of scale. The urgency of resiliency makes cooperation between jurisdictions easier. By working with surrounding governments, the City of Savannah implemented a public safety worker communication system and the City of Coral Springs, Florida, built an emergency public radio station. The City of Seattle, Washington, goes beyond intergovernmental cooperation and works with non-municipal utilities and private hospitals in a more comprehensive approach to resiliency.

Intergovernmental funds are a crucial source of financing. Regionalism is attractive to granting agencies because it lowers their coordination costs (there are fewer grantees to work with) and because they can achieve more results for their grant dollars (they benefit from economies of scale as well). In fact, Savannah, Coral Springs, and Seattle were all recipients of state and federal funds for their projects and cite a regional approach as critical to their grant seeking.

A good planning and reporting process leads to opportunities for outside funding. If government can consistently demonstrate that its resiliency programs obtain results and, preferably, that results impact an area greater than its own boundaries, then

opportunities for funding improve. The planning process must demonstrate that existing assets are maintained. Funders want to know that their investment will not break down when funding ends.

The pressures on government finance apply to federal and state governments as well as local governments, so it is unlikely that sufficient intergovernmental funding will be available to satisfy all, or perhaps even most, local government needs. At some point, many local governments will probably have to ask the voters for additional funding, whether through bond referenda or authorization for new taxes. Effective planning, including the use of illustrative exercises and simulations, gives the public confidence that new funding will be well spent. For example, the City of Seattle dubbed its resiliency planning effort "Project Impact" and made a concerted and visible effort to promote it to the community. Consequently, the citizens of Seattle approved a fire facilities and emergency response levy in 2003, which included funding to retrofit the city's fire stations to better withstand earthquakes, among many other preparedness improvements. The levy passed with 69 percent approval. By comparison, a more recent transportation levy passed with only 53 percent approval. While it is impossible to attribute the entire outcome to Project Impact, the city believes it had a significant beneficial effect.

Public involvement in planning demonstrates that government takes community views seriously and gives the community greater "ownership" of a plan. Earmarking funding for a specific project in a plan may help build public confidence that new money will be spent for high priority needs. The City of Coral Springs proposed an initiative specifically for reinforcing the city's public safety facility. The bond was approved by 84.4 percent of the voters — the highest approval rate ever in Coral Springs.

After funding has been approved, the public should be kept apprised of the project's results. Reporting can focus on value created for the public, such as new assets that were purchased or built. It also can describe private benefits created, such as the actual savings accruing to residents and businesses from lower insurance rates. Seattle has maintained its Project Impact Web site (www.seattle.gov/emergency/programs/projectimpact) to help keep its citizens informed of progress made on resiliency enhancing projects. The site provides a