Toward a More Resilient Community

An Overview of the Community Resilience Planning Guide for Buildings and Infrastructure Systems

Community Resilience

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

OVERVIEW

Despite the high costs and disruptions from natural, technological, and human-caused hazards, most communities don't consider their vulnerability to be a priority compared with other, more pressing demands.

Some communities may not plan, thinking it will be too expensive. Others may take planning steps, but lack a comprehensive, risk-based approach that is tailored to their community's need for maintaining vital services. In both cases, they miss opportunities to protect lives, livelihoods, and quality of life. That is the problem the *Community Resilience Planning Guide for Buildings and Infrastructure Systems* addresses, offering a practical approach for leaders to improve their community's resilience.

This "Guide-at-a-Glance" is a brief introduction to this new resource from the National Institute of Standards and Technology (NIST).

RESILIENCE PAYS

Community Resilience is the ability of a community to prepare for anticipated hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

Think of resilience planning as preventive care, but for the buildings and the infrastructure systems—the "built environment"—that are facing disaster risks.

These are the structures and technological "systems" that residents rely on for essential services and most activities of daily living, and that underpin the social and economic fabric of their community. By planning, prioritizing, and acting, communities can improve their resilience over time, in a cost-effective manner consistent with their long-term development goals.

If a disruptive event does strike, communities with resilience plans will be ready to respond, recover, and then build back better if rebuilding is necessary. Beyond equipping them to maintain and restore vital services, communities that plan and carry out resilience strategies will be better prepared for future events, making them more attractive to businesses and residents alike.

The *Guide* is a "living" document that will be updated as we learn from experience and through research. The *Guide* can be downloaded at www.nist.gov/el/resilience/guide.cfm.

1. FORM A COLLABORATIVE PLANNING TEAM

- Identify leader
- Identify team members
- Identify key stakeholders

2. UNDERSTAND THE SITUATION

Social Dimensions

- Characterize social functions & dependencies
- Identify support by built environment
- Identify key contacts

Built Environment

- Identify and characterize built environment
- Identify key contacts
- Identify existing community plans

Link Social Functions & Built Environment

- Define clusters

3. DETERMINE GOALS & OBJECTIVES

- Establish long-term community goals
- Establish performance goals
- Define community hazards
- Determine anticipated performance
- Summarize results

4. PLAN DEVELOPMENT

- Evaluate gaps
- Identify solutions
- Develop implementation strategy

5. PLAN PREPARATION, REVIEW, AND APPROVAL

- Document plan and strategy
- Obtain feedback and approval
- Finalize and approve plan

6. PLAN IMPLEMENTATION AND MAINTENANCE

- Execute approved solutions
- Evaluate and update
- Modify strategy as needed

Community Resilience

NIST National Institute of Standards and Technology U.S. Department of Commerce

The *Guide* was developed by NIST in collaboration with public and private stakeholders from state, local, and federal governments, utilities, regulators, standards developers, industries, and academia.

It provides an adaptable, flexible method that allows any community to develop individualized long-term resilience plans and goals, based on available resources and needs. It details a six-step planning process that a community can use to tailor to its particular circumstances.

The following pages explain more about the recommended six steps.

Just taking the first step can help your community move toward greater resilience. The complete *Guide* follows the process as it is put into practice in the hypothetical city of Riverbend, USA.

FORM A COLLABORATIVE PLANNING TEAM

STEP 1

PARTNERING FOR SUCCESS

The most effective community resilience efforts are championed by a planning team. The team provides leadership throughout the process and engages stakeholders and the broader community. Local government is the logical convener.

Your team also needs a designated community official working with the team to collaborate with other public and private organizations and individuals.

County, state, or federal agencies with facilities or infrastructure in the community, as well as public and private owners and operators of buildings and infrastructure systems, should be part of the team. It also is important to include local businesses and industries, social organizations, and other community groups.

Typical local government representatives come from:

- Community development
- Public works
- Emergency response
- Building departments

CAUTION

Teams must be fully inclusive, right from the start. Local government should take the lead, but planning teams must be truly collaborative undertakings, with inclusive participation at all phases.

STEP 2

SEEING THE BIG PICTURE

It is critical to have a solid understanding of your community's entire preparedness situation. That involves characterizing its social dimensions and its built environment, and identifying dependencies between and among the social services that make life in your community possible and desirable. The connections between those services and the built environment also must be identified.

Social functions address the needs of individuals and institutions, including:

- Government
- Business and industry
- Financial
- Media organizations
- Religious, cultural and community services

Identify buildings and infrastructure systems that support these social functions, then group, or cluster, these systems into subsets that support common functions.

Take the time to inventory the social characteristics of your community, including the requirements and condition of the built environment, as you prepare to address hazard risks.

CAUTION

When it comes to hazard events and disaster planning, communities tend to plan in a shorter time horizon, focusing on immediate post-disaster steps needed to respond to the need for food, water, and shelter rather than on longer-term social and economic needs.

STEP 3

CUSTOMIZE

Every community has its own long-term goals for resilience. Some examples include the following:

- Attracting business investment or major educational institutions
- Expanding recreational facilities while addressing the need to make more appropriate use of land at risk of flooding
- Strengthening the ability of government and critical facilities to function after hazard events

Whatever your situation, determining and getting agreement on those goals from your key stakeholders is a critical part of this planning process.

Remember, your resilience goals should include both your built environment and social dimensions. State explicitly how different types of construction are expected to perform in different hazard events, based on how they will affect members of your community.

MATCHING HAZARDS AND COMMUNITY PERFORMANCE

A community's performance can be evaluated at three levels for each hazard:

- Routine
- Design
- Extreme

This helps a community understand how the built environment will perform and recover over a range of hazard types and levels. It is vital information to community leaders as they set priorities and implementation strategies for resilience.

The *Guide* offers explanations of these three levels for each major type of hazard.

For example, planners may decide that critical facilities should experience little interruption or damage in a design hazard event since these facilities are needed to support recovery and emergency services to the rest of the community. It might be

CAUTION

Social goals may be too readily assumed, rather than stated explicitly. Be careful not to assume the performance of a particular structure or infrastructure system. Conduct a thorough assessment, including consultation with key stakeholders.

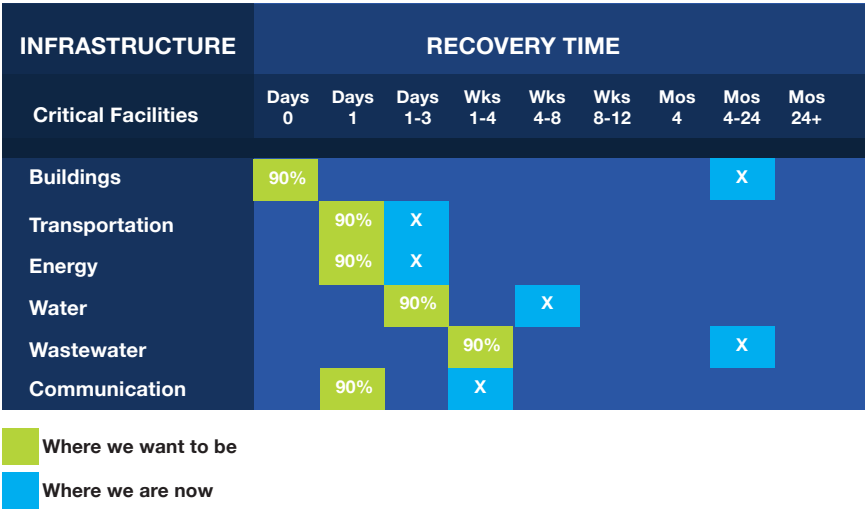
important for certain transportation routes, like key bridges, to remain serviceable compared with other routes, especially if they happen to carry critical water supply lines to your people.

Goals should be independent of particular hazards. After all, the community's needs ideally will be fulfilled regardless of the type of hazard the built environment experiences.

IDENTIFY HAZARDS

Once performance goals are set, identify the prevailing hazards in your area. Only then is the likely as-built performance determined—in terms of expected recovery time—for each group, or cluster, of buildings and infrastructure systems that supports social needs.

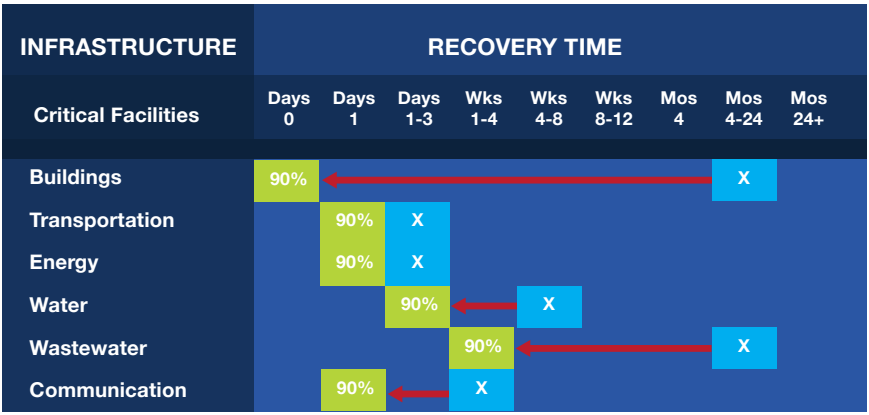
A summary table from the Riverbend, USA example in the *Guide* shows how the anticipated performance of the built environment compares to the community's desired performance goals for a design earthquake event.



The table indicates that Riverbend's buildings had some of the largest resilience gaps. Wastewater was another. The *Guide* walks users through the preparation of similar matrices for their sectors that include buildings and infrastructure systems at each level of hazard event: Routine, Design, or Extreme [see text box on previous page].

CLOSING THE GAPS

With performance goals and anticipated performance in hand, "resilience gaps" become readily apparent. The Planning Team then sets priorities for closing those gaps based on the community's larger goals, using both long- and short-term investments.



Administrative policies as well as construction investment solutions are identified at this point—based on priorities—and are designed to address specific needs for the community to mitigate damage and to optimize recovery time.

CAUTION

Resources for addressing gaps in community resilience are always constrained. It is important that your community consider longer-term resilience and possible cost avoidance, along with other factors. For example, in making land use-related decisions, it also is critical that vulnerable populations' needs are taken into account.

Administrative activities tend to carry low implementation costs but can yield significant long-term benefit [see text box].

Land-use planning is a typical administrative tool. Strategies can be adopted before a hazard event takes place, reducing potential damage and disruption.

Alternative land use and redevelopment strategies may be a key part of the resilience planning process for many communities. For example, they are often relied upon in seismic and flood-prone hazard areas.

Solutions can be temporary or permanent. The key is to be thoughtful about creating the right mix of solutions that will match priorities and available resources.

ADMINISTRATIVE SOLUTIONS CAN BE LOW COST, YET EFFECTIVE

Among options communities may want to consider:

- Integrating resilience plans with the General Plan as well as plans for Emergency Operations, Land Use, Infrastructure, Transportation, Housing, Economic Development, and Sustainability.
- Integrating resilience plans with the FEMA Mitigation Plan and prioritizing mitigation grant requests.
- Developing processes and guidelines for post-event assessments and repairs that will accelerate the evaluation process, including the designation of buildings that can be “used during repair” after an event.
- Collaborating with adjacent communities, including mutual aid during response and recovery phases.
- Developing education and awareness programs to enhance understanding, preparedness, and opportunities for community resilience.

STEP 5

PREPARING FOR ACTION

By this stage, the goals, characteristics, and needs of the community, from both the social and built environment perspectives, have been identified and assessed. Resilience gaps also have been identified, and the team has created and prioritized administrative and construction solutions.

Now is the time to prepare a plan that documents all of those in a way that is meaningful to community stakeholders, so they can review and comment on the proposed approach. No two communities will do this the same way.

Ideally, the process is inclusive, transparent, and deliberative, and the resulting plan is actionable and has the support of the community-at-large.

CAUTION

It is tempting to prepare plans in piece-meal fashion, focusing on just a few aspects of the resilience plan or to consider infrastructure sectors individually. It is also easy to get bogged down in details. By being inclusive, transparent, and deliberative there is a greater chance that the plan will be understood, appreciated and supported by the larger community. After all, the community will need to embrace and otherwise support the plan.

STEP 6

MOVING FORWARD

If the team has done a thoughtful job in its assessment, plan preparation, and review—and if it has successfully engaged its key stakeholders—the community will begin executing the administrative and construction solutions in the approved plan.

Typically, work begins quickly on short-term solutions while longer-term plans are worked on, likely in conjunction with other local, state, federal, tribal, and regional government jurisdictions.

However, your work is not done. It is important for the community to evaluate the plan periodically and to update or fine-tune it.

Someone—potentially some members of the Planning Team—must own this part of the process. Also, maintaining communications with the community-at-large is crucial. Take nothing for granted.

CAUTION

The team has likely generated a lot of momentum while doing the analysis and during plan development and review. Its leadership may be exhausted, and implementation may be turned over to individual departments of the local government, or to the owners and operators of key infrastructure systems, with minimal tracking or coordination. With no single resilience leader for the community, implementation may be suboptimal and the community's resilience plan will probably not be fully achieved, exposing your community to greater risks of damage from future hazard events.

WHAT TO EXPECT

The National Institute of Standards and Technology is committed to its investment in community resilience planning, ensuring that the Guide remains relevant and useful. To meet this goal, NIST is working in several ways to help you to put the full Guide into practice:

- The Guide and companion documents and tools can be downloaded at ***www.nist.gov/el/resilience***.
- NIST has Guide Briefs which provide methods and best practices to complement the Guide, with additional rationale, guidance, and references for implementing the six steps in the planning process
- An online tool, known as EDGe$ (based on the Economic Decision Guide), helps with selecting cost-effective, infrastructure-based community resilience projects. The tool offers an easy-to-follow approach describing the cost and benefits for multiple resilience options that a community may be considering.
- Multiple communities—of different jurisdictional type and sizes—across the country are now using the Guide to plan for improved resilience as they address a variety of potential hazard events. See the Success Stories capturing the highlights of their experiences, including lessons learned at ***www.nist.gov/el/resilience***.

OTHER ASSISTANCE

Improving community resilience isn't easy; there are no magic answers. The Community Resilience Planning Guide for Buildings and Infrastructure Systems walks you through a process that is likely to help. This "Guide-at-a-Glance" offers a quick overview of the process.

For more information and answers to your questions about the Guide, and to receive regular updates, contact ***resilience@nist.gov***.

Have a suggestion? Please forward your observations and ideas to: ***resilience@nist.gov***.

Community Resilience

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

December 2018