# BUILDING RESILIENCE LOS ANGELES

## *A Primer for Facilities*

A Project of USGBC-LA

Building Resilience LA

U.S. GREEN BUILDING COUNCIL CHAPTER LOS ANGELES

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# BUILDING RESILIENCE LOS ANGELES

## *A Primer for Facilities*

*A Project of USGBC-LA*

October 4, 2016

Dear Reader,

The guide you have in your hands (or on your screen) is the result of thousands of volunteer hours diligently spent during the first two years of the Building Resilience project. USGBC-Los Angeles Chapter opened our arms as a home for this ambitious project because our leaders want to invest in making positive impacts, specifically in areas that are most affected by climate change. We look around Los Angeles and see buildings and communities that are not prepared for the changes we know our region will face. We see disadvantaged communities adversely affected by high heat days, poor air quality, and lack of access to healthy foods, transportation, and jobs. We know we can do better. We aim to provide guidance on processes and technologies that building owners and managers can use to play a part in working with their communities toward a more equitable, vibrant future.

USGBC-LA has been working on impactful programs to support social equity for the past five years. Our Green Janitor Education Program provides resources and builds skills for janitorial workers throughout California. The Greenbuild Legacy project, called the Eco-Tech Makerspace, provides access to STEM learning with cutting-edge technology for young people in Gardena. The BuildSMART trailer, on loan from our neighbors in Ventura, has had over 3,000 visitors to discover energy efficiency and water conservation technology. We're broadening our programs to include Green Building Professional Skills Training, professional development to support women, and more opportunities to connect students with the career pathways that will open for them in the green economy. We see all of these as sustainability AND resilience strategies.

Sustainability in Los Angeles is about policy, technology, culture, and PEOPLE! This is why we embarked on the creation of this guide, our gift to you and to all who are striving toward resilient buildings and communities to heal our planet and create unity among our citizens. There aren't any prerequisites, just a process to get you started at whatever point you find yourself. There aren't any credits, just tools to help you organize teams and preparedness efforts to make your building operations better today.

We invite you to peruse the guide and send us feedback. This is a work in progress and there is much more to be done. Please share case studies of your work, and get involved with our Building Resilience program as we pilot projects to make Los Angeles a more healthy, sustainable, and resilient city.

Sincerely,

Dominique Hargreaves
Executive Director
US Green Building Council-Los Angeles Chapter

October 16, 2016

Dear Angelenos,

South Los Angeles Teen CERT Collaborative recently shared with me one of their mottos, which is that "collaboration is the new currency." Partnerships are an essential component in resilience-building and help us do more with less. The City of Los Angeles continues to partner with various public, private, and nonprofit organizations to move our own resilience-building efforts forward.

Critical partnerships for the Office of Mayor Eric Garcetti have included the 2014 partnerships with seismologist Dr. Lucy Jones and the U.S. Geological Survey, and the Mayor's seismic safety task force that produced the Mayor's Resilience by Design report.[1]

In 2013, Los Angeles also became a partner in 100 Resilient Cities, the global program pioneered by the Rockefeller Foundation [2]. The City of LA has been collaborating closely with the USGBC-LA in all of its Building Resilience-LA activities, including developing this guide and supporting case study projects and toolkits to help organizations become "neighborhood resilience centers."

As the first Chief Resilience Officer for the City of Los Angeles, my primary objective is to initiate and grow collaborations and partnerships, both with the City Administration and Departments and with the private, public, and NGO sectors. Resilience requires interdisciplinary teams to address urban problems, whether we are working to decrease susceptibility to fires following a major earthquake or to mitigate the urban heat island effect.

Experts in emergency management, sustainability, infrastructure, economic opportunity, and others in all sectors are actively assisting the Mayor's Office with the preparation of a Resilience Strategy which will be another step in the City's resilience-building practice.

As you continue down a path of making your business, building, and neighborhood more resilient, please include partnership-building as a major component of the work you do. Reach out to your local, regional, state, and federal government partners to leverage and encourage collaborative resilience-building. And please count the City of Los Angeles among your partners (whether or not you live within city boundaries) as I know we will need to partner with you in the coming weeks, months, and years to make Los Angeles a more resilient city.

Sincerely,

Marissa Aho

Marissa Aho
Chief Resilience Officer
City of Los Angeles, Office of Mayor Eric Garcetti

[1] *www.lamayor.org/resilience-design-building-stronger-los-angeles*

[2] *www.100resilientcities.org*

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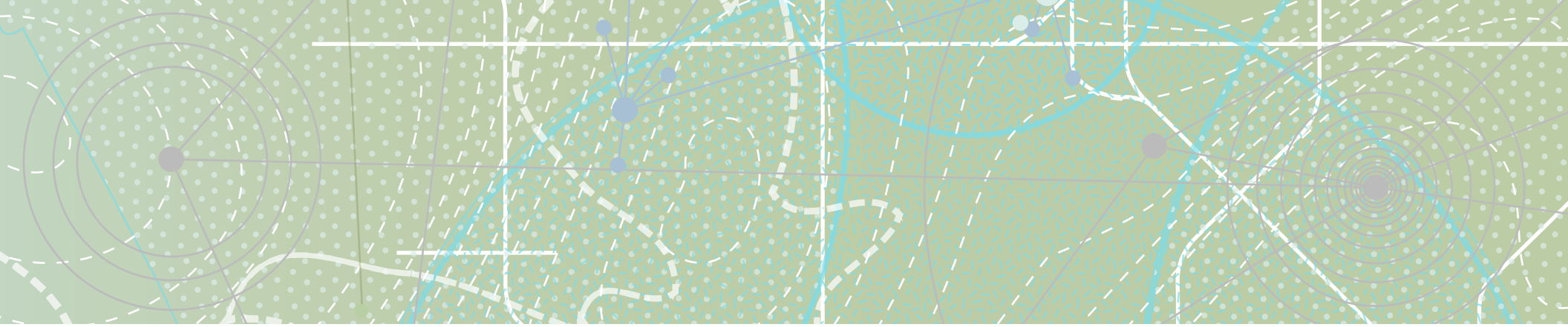

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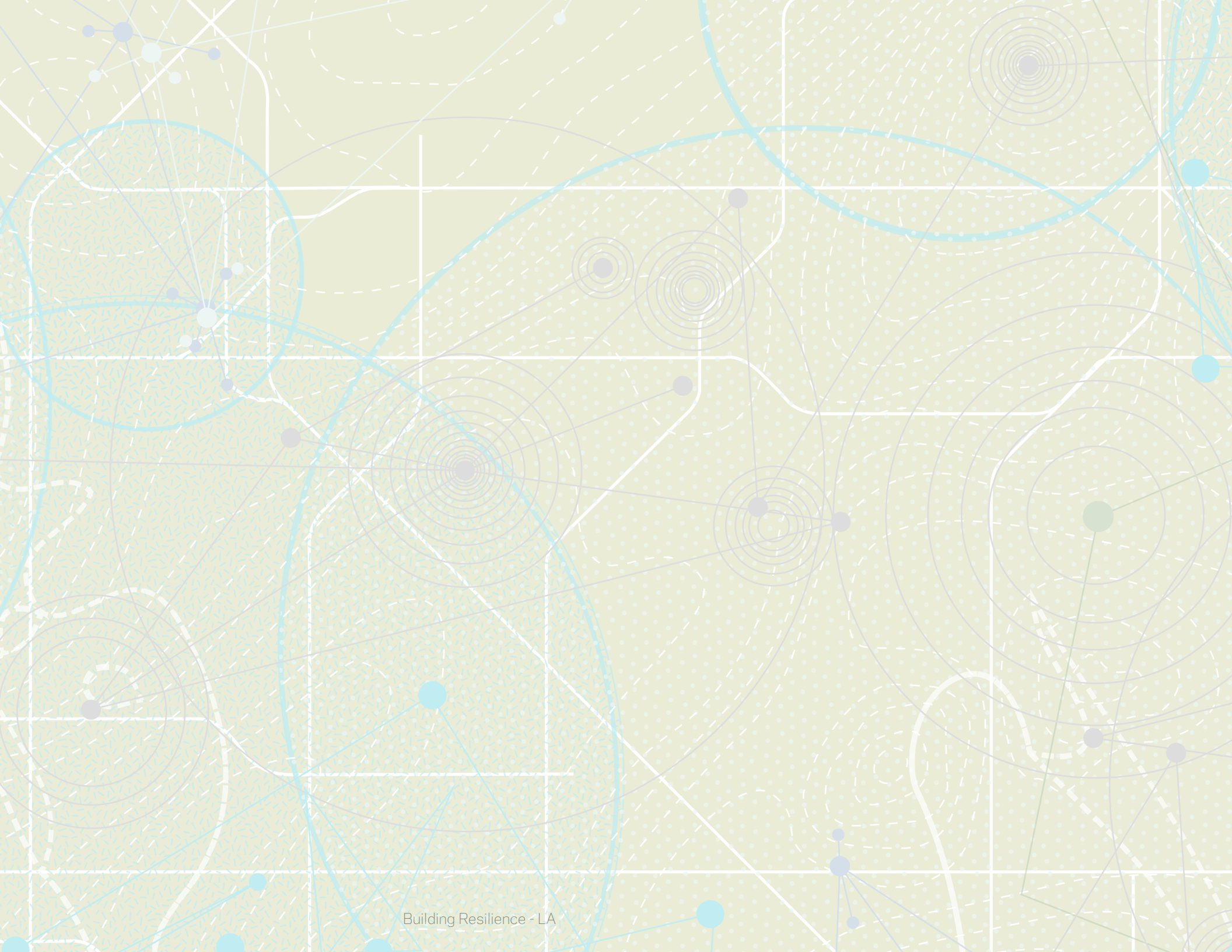


# Foreword

## *USGBC-LA and BRLA*

USGBC-LA's Building Resilience-Los Angeles (BRLA) program is designed to utilize the momentum of the green building movement to prepare our region for a changing world. BRLA is concerned with community resilience. We focus on how buildings function as critical links in a larger system that extends to the organization, the neighborhood, the city and the region, as well as to the many individual stakeholders throughout.

The green building movement, with the U.S. Green Building Council (USGBC) at the forefront, has initiated a sea change toward sustainability in the built environment. Considerations around building energy, water use, and indoor environmental quality are fast becoming industry standards. In calling attention to the environmental performance of buildings, green building practices break down traditional silos between architects, engineers, contractors and other practitioners, enabling a systems-based approach to design, construction and operations. Nor have these developments been limited to the United States. Over the past 15 years, USGBC's Leadership in Energy and Environmental Design (LEED) green building rating system has directly shaped the design and construction of 11.4 billion square feet of space in more than 150 countries.[3]

Sustainability is about a sense of urgency about the future. Resilience brings this sense of urgency to the present. Climate change isn't just about future generations—we need to be prepared now. For all the progress that the green building movement has made, we believe there is still much work to be done. To that end, BRLA is bringing together practitioners from across the industry—including architects, engineers, facility owners and operators, and experts in public health, community organizing, disaster science, emergency preparedness and insurance—to look at buildings in new ways. Our objective is to empower organizations at the building or campus level to go beyond survival and become partners in a thriving Los Angeles metropolitan area. We aim to encourage informed decision-making in the ongoing management and operations of existing buildings, decision-making that supports the organizations they house and the communities they're in. We believe that

[3] www.usgbc-la.org

local organizations—from small nonprofits to large multi-national corporations—have a pivotal role to play in bringing resilience to the region.

Over time, it is the goal of BRLA to build:

- A **coalition** of organizations working toward a resilient Los Angeles;
- A **step-by-step process** for evaluating risk, engaging community and implementing integrative solutions that benefit for-profit and community-based organizations at the building scale;
- A **library of case studies** demonstrating how various projects are tackling the issues critical to resilience in our region;
- A **template** for adapting the program to other regions; and
- A **platform** for supporting a peer-to-peer network and performance benchmarking.

The *Building Resilience-Los Angeles Primer for Facilities* is a foundational step in this broader program. Our purpose in the guide is not to develop detailed metrics and targets—that will come—but to encourage organizations to think systemically about resilience. In time, we will work with pilot projects to continue testing the process, distilling it into toolkits for different types of organizations and challenges.

Southern California is home to an exceptional degree of diversity. It is true of our people, our natural systems, our built environment and the threats we face. The region is, for this reason, an ideal testing ground for ideas and strategies that may benefit the rest of the world. The *BRLA Primer for Facilities* is the first step toward a national, or even an international program.

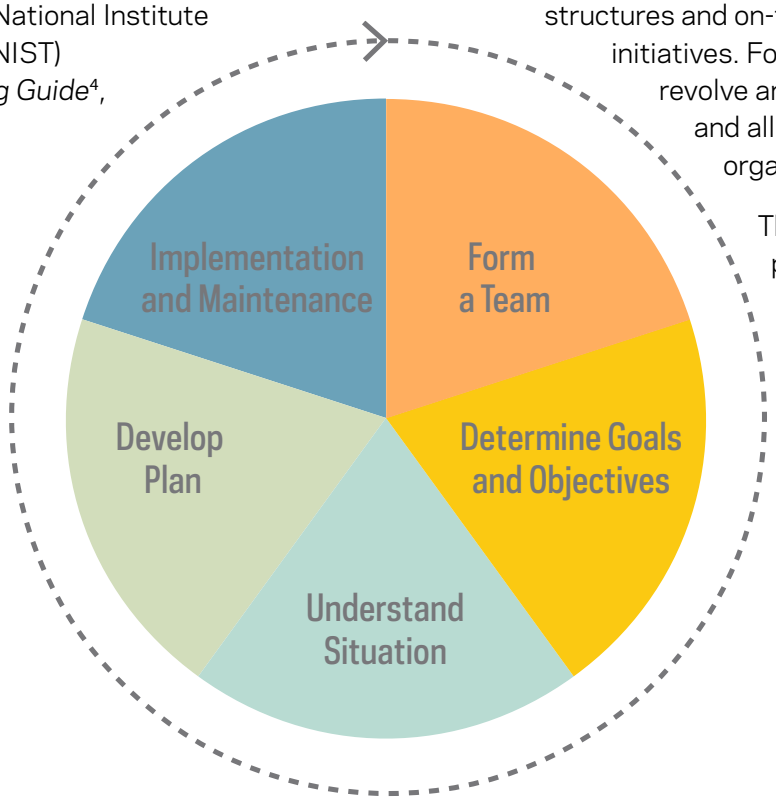
Ultimately, however, resilience initiatives must respond to the local context. This guide should be used to help you develop your own understanding of resilience processes, providing examples that you can incorporate into your own tailored program, one that makes sense for your business, location and community.

# About This Guide

The *BRLA Primer for Facilities* focuses on the development of a process to make your buildings and organizations more resilient. It is not a design standard or a guideline for new construction. It is not a rating system or a set of metrics. It is not a measure of absolute resilience (if there is such a thing). Rather, it provides a framework for viewing your building, organization and community as part of a system, a framework that will enable you to make decisions geared toward ever-greater levels of resilience over time.

This guide will introduce you to some of the core concepts of resilience, then walk you through a process to evaluate, plan for and implement a resilience program of your own. The process, based loosely on the National Institute of Standards and Technology (NIST) *Community Resilience Planning Guide*[4], includes the following steps:

- Form a Team
- Understand the Situation
- Set Goals and Objectives
- Develop a Plan
- Implement and Maintain




We have included examples and case studies throughout to illustrate core ideas and demonstrate the range of creative approaches that resilience can involve.

The process we outline here is designed to apply to a range of organizations and scales. Our recommendations may seem more relevant to larger organizations with multiple locations, insofar as these types of organizations are more likely to have specialized staff able to take on such an endeavor. Keep in mind, however, that the recommendations apply to smaller organizations, only in different ways. The strategies for larger organizations, for instance, are more likely to revolve around developing centralized corporate structures and on-the-ground teams and initiatives. For smaller businesses, they may revolve around forming relationships and alliances with similar organizations.

Though inspired by the NIST planning process, the BRLA Primer for Facilities differs from the NIST guide in several key ways. NIST focuses on planners and other practitioners in local government, which typically

[4] www.nist.gov/el/resilience/community-resilience-planning-guides

leads the process and brings private sector into the process (although businesses may also initiate the process). BRLA is intended for people working in organizations in the private sector. In order to tackle resilience initiatives, private organizations need to be certain—and able to verify—that those initiatives will also make good business sense.

NIST focuses on buildings and infrastructure , which includes both publically-owned and privately-owned buildings and structural systems, and public policy. BRLA focuses primarily on private property, although the process can be initiated by public agencies on their own buildings. NIST typically focuses on neighborhood-scale projects, while BRLA is finer-grained, focusing on the building and campus level. Finally, NIST addresses both existing infrastructure and planned projects. BRLA is geared toward the ongoing operations of existing buildings over time. As such, we have eliminated the planning step for plan adoption, as this is not typically an on-going activity.

Our focus is helping private organizations—from small businesses to large corporations—employ resilience strategies at the building and campus level. We believe that developing resilience internally will give an organization the tools it needs to engage, day to day, in its broader community, and that such engagement builds social capital that can foster greater cooperation during an emergency.

The guide was developed out of almost three years of collaborative research and dialogue by a steering committee of local experts from a range of fields. The dialogue, however, is far from over. We welcome your feedback, recommendations and stories.

# Executive Summary

## *Introduction*

In this time of rapid change, Building Resilience-Los Angeles was developed to help organizations manage risk within their buildings and communities by making life better today. Companies are facing increasing levels of uncertainty due to the combined forces of climate change, urbanization and population growth. Disruptions are inevitable, and disasters are increasingly likely. The way that organizations understand, prepare for and bounce back from unforeseen events can have dramatic impacts not only on internal processes but on the broader community. Similarly, how communities respond and recover can profoundly affect businesses. *Investing in community resilience makes business sense.*

BRLA aims to provide a new approach to managing risk that prevents problems while creating value and opportunity. By breaking down silos and fostering understanding and interconnection, we strengthen the system as a whole.

The *Building Resilience-LA* Guide focuses on the building as a nexus of human activity. It presents a framework for understanding your building in the larger context of your organization and, beyond that, your community. We believe that effective management of the built environment not only improves performance but also provides an opportunity to bring people together and solve problems, big and small.

This guide will show how following BRLA's smart and simple steps now can prepare your business for the dangers we live with and transform it for the better. Those who incorporate resilience into their buildings, business processes and communities stand to fare better in a disaster, responding more quickly and recovering more fully, and to prosper on a daily basis.

This guide focuses on Southern California, but the process is readily adaptable to any location.

# *Our Definition of Resilience*

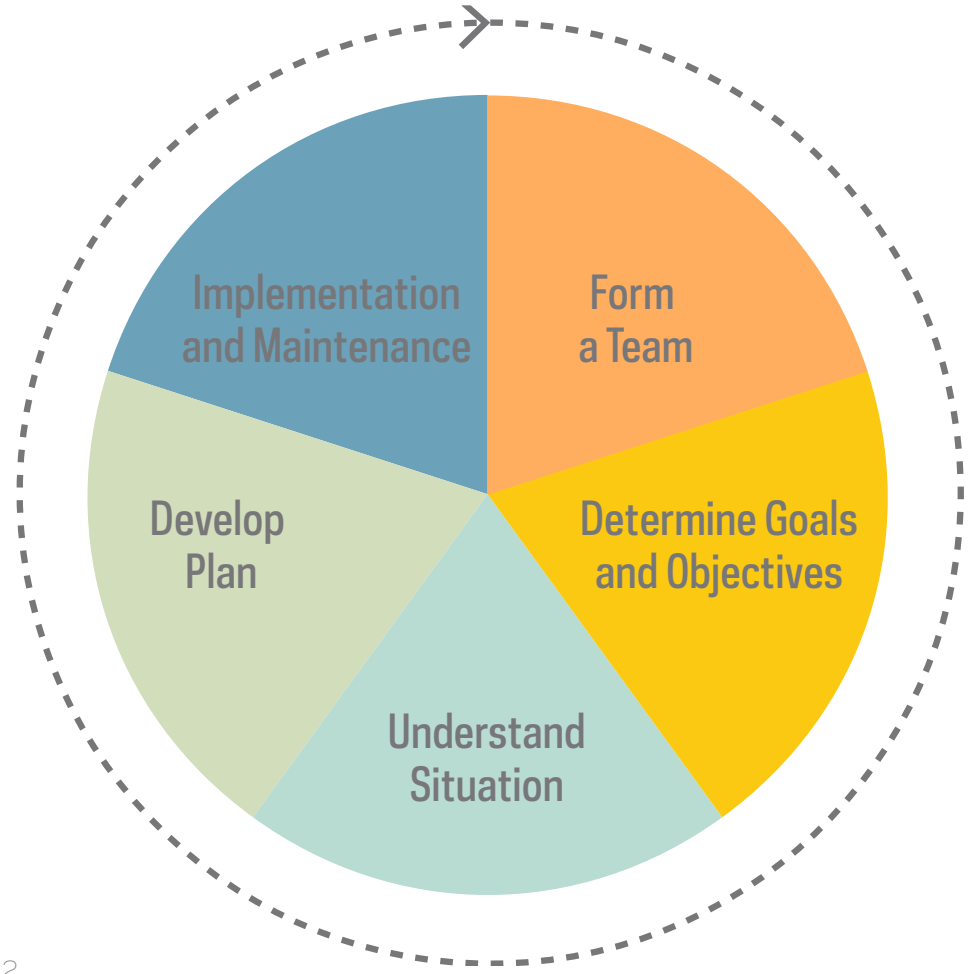
BRLA builds resilience. We define resilience as *the capacity to survive and thrive in the face of stressors and shocks*. Shocks are the headline-grabbers—the earthquakes, fires, floods, terrorist attacks and other events that can jolt us from the status quo and force us to take action. Stressors, such as aging infrastructure, poorly performing buildings, environmental pollution, poverty and income inequality, and chronic public health challenges, are problems in their own right and also reduce society's ability to bounce back from shocks.

BRLA focuses on community resilience, where buildings and the organizations they house serve as critical nodes in the larger system. There are three core aspects of community resilience, all of which must be considered:

- **Physical**—buildings, infrastructure and the natural environment
- **Social**—community cohesion, social equity and public health
- **Economic**—business continuity and workforce development

Resilience is an ongoing process. Local conditions change, and so do the strategies we need to respond. This requires a culture that can understand the physical, social and economic landscape in order to enact the right strategies under the appropriate conditions.

Building Resilience-LA supports the following outcomes:



# *We're All in This Together*

Research has shown that one of the best predictors of recovery after a disaster is the level of connection within a community.[5] Neighbors who know each other, organizations that work together, and communities that can bridge social, political and economic divides have the best chance of responding quickly, recovering fully, and leveraging change to become better and stronger. Creating community is about making change, not just giving charity.

Supporting community cohesion and social equity may be some of the more challenging aspects of an integrative approach to resilience. Issues of race, class and power can be unavoidable when looking at underlying stressors within a community. To achieve the deepest and most meaningful transformations, starting conversations to build a central team and supportive community over time may be the most important resilience actions we take.

[5] *For example, see: Aldrich, Daniel P., Building Resilience: Social Capital in Post-Disaster Recovery, Chicago: University of Chicago Press, 2012.*

# Private Sector and Public Good

Local governments across Southern California are taking steps to improve the resilience of infrastructure and public systems. But the private sector must play a major role if our region is going to become resilient to the threats we face. There are many reasons for the private sector to act. Here are a few:

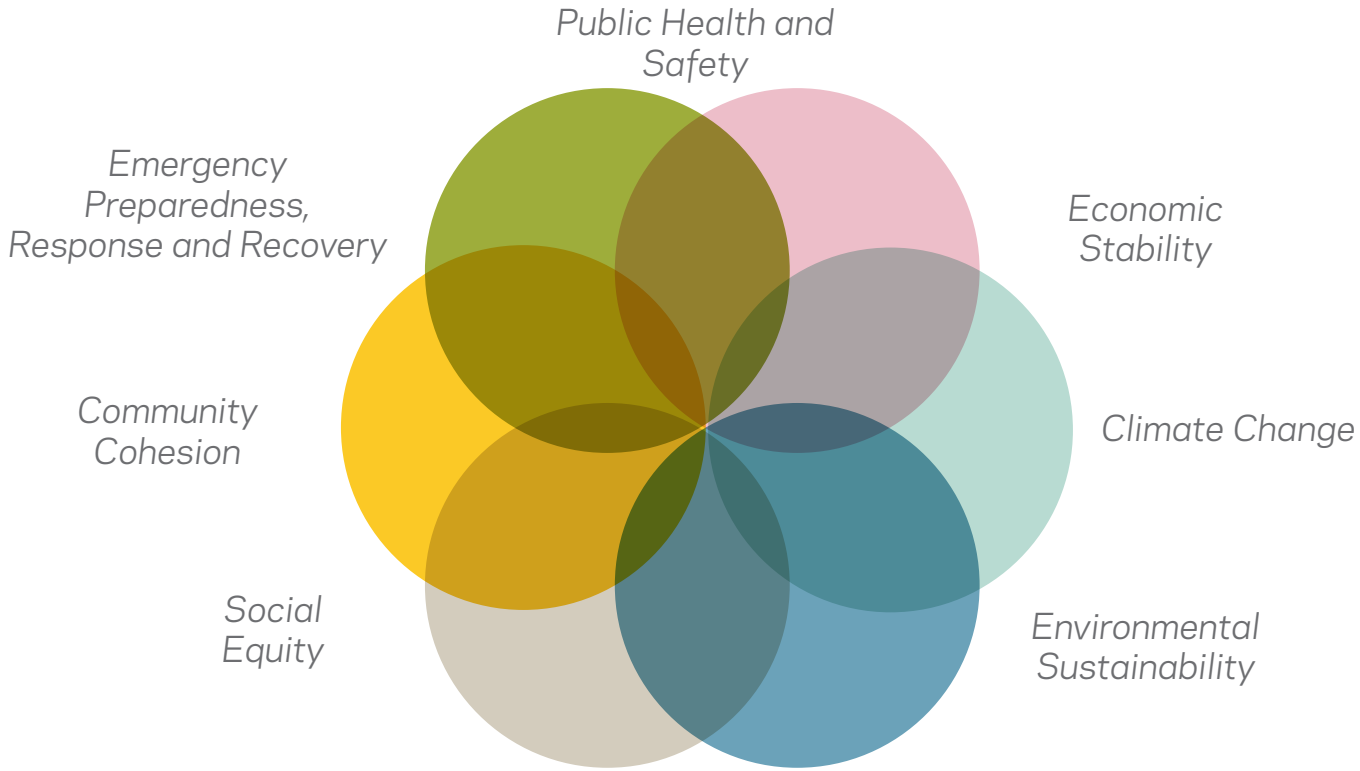
1. **Resilience is good for business.** Investing in strategies that help you become more flexible, adaptable and robust in the face of change can yield value even if disaster never comes. Being able to manage risk and foster resilience can help you negotiate better insurance terms, minimize losses and leverage new opportunities. It can also create soft benefits ranging from employee productivity and retention to improved brand association. NIST estimates that $1 in preparedness is worth $4 in recovery.[6] The goal of BRLA is to help that $1 of investment stretch as far as it can go.

2. **The cost of doing nothing could be catastrophic.** The price tag of even modest disasters can very often reach the billions. In addition to loss of life and property damage, disasters can have major impacts on business productivity and can devastate the local economy. A careful risk assessment process is useful to help determine where an organization's greatest vulnerabilities lie, and how to get the most benefit from shoring them up.

3. **Resilient infrastructure is distributed.** LA's highly-centralized infrastructure is aging and vulnerable. Disruptions to energy or water systems could leave businesses unable to operate. Investments to bring clean energy generation or water capture and reuse onto private property can create value for property owners.

4. **During emergencies, communities may need to survive on their own.** Local agencies and first responders may be quickly overwhelmed during a crisis. Businesses that train their people about what to do in an emergency, set aside provisions, and connect with their communities are well-poised to make it through tough times.

[6] *Multihazard Mitigation Council. Natural hazard mitigation saves: an independent study to assess the future savings from mitigation activities. Washington D.C.: National Institute of Building Sciences, 2005. www.preventionweb.net/publications/view/1087*




# The Process Steps

## STEP 1: FORM A COLLABORATIVE TEAM

Resilience is about relationships and collaboration. Within any organization, it is critical to clearly identify who needs to lead the effort, who needs to participate, and who needs support. Forming a team involves incorporating the resilience process into how business is done.

### The Core Team

The first step in forming a team is to identify a project manager and the core group of team members who will be responsible for the overall effort. The core team will be responsible for providing leadership, managing the implementation, and communicating with both the internal organization and the external community.

**Engaging Stakeholders:** There are many types of stakeholders and they will vary according to location and type of organization. The core team should identify how to work with internal and external stakeholders, with a particular focus on vulnerable populations. Over time, resilience can become a part of your organization's culture

in a way that makes all stakeholders members of the resilience team—from the employees who are able to adapt as conditions change, to maintenance staff trained as first responders, to neighbors who know how to work together in an emergency. Members of a community build trust through experience. Relationships must be founded in reciprocity and a sense of shared common interest.

## STEP 2: SET GOALS AND OBJECTIVES

Goals enable stakeholders to align around a shared purpose and direction. They help establish priorities and can serve as a litmus test for evaluating courses of action. The most useful goals require you to stretch and let you measure your progress. There are different types of goals that can help guide your resilience effort:

- Long-term organizational planning goals
- Shared community goals
- Performance goals for disaster readiness, response and recovery

## STEP 3: UNDERSTAND THE SITUATION

Understanding the situation means having a realistic picture of the organization, its assets, and how it functions within the larger urban ecosystem. It begins with assessments and setting baselines and evolves over time as shocks and stressors arise. The first step in understanding the situation is to collect existing information. Existing business plans, sustainability plans, business continuity plans and emergency management plans are all relevant.

**Assessing the System**: To more fully understand the strengths, weaknesses, opportunities and strengths of an organization, it can be useful to break the assessment into specific elements, such as:

- Organization identity and function
- Location
- Management and governance
- Plans and policies
- Information and communication
- Buildings
- Assets
- Workforce
- Community
- Whole System

The purpose of these questions is to begin to understand your organization as a complex system. From there you can start to identify critical gaps, find relationships and synergies, and evaluate alternative strategies. You can also have a stronger baseline understanding from which to move forward and make decisions.

Some Important Tools to Help You Understand the Situation:

- Mapping
- Risk Assessment
- Scenario Planning
- Economic Analysis

## STEP 4: DEVELOP A PLAN

A resilience plan should go beyond the scope of an emergency management plan or business continuity plan to include ongoing mechanisms for working with the broader community to build relationships and address underlying vulnerabilities.

Your resilience plan should include at least the following:

- Team member roles and responsibilities
- Goals and objectives
- Strategies and projects
- Schedule
- Budget
- Metrics for evaluating performance
- Communication strategies

### Establish Criteria for Vetting Objectives and Projects

As you develop your plans, you face an almost infinite number of potential projects and programs. To help decide which to take on, develop a list of criteria to evaluate each initiative for prioritization.

### Approving and Adopting Plans

Team development and stakeholder engagement throughout the planning process can help ensure that the plan reflects the needs and resources of the participants while minimizing unwelcome surprises. A collaborative planning process can prevent shock when the final plan is released, and is often even more important than the final document. Top-down leadership is essential, as is support from the people responsible for carrying out the day-to-day implementation. (Note that while Approving and Adopting Plans is broken out into its own step in the NIST process, we have combined it with the planning process here for two reasons. One is that in the private sector, plans do not typically go through the same rigorous approval process as they do in the public sector. Second, it is not typically a part of on-going operations.)

## STEP 5: IMPLEMENTATION AND MAINTENANCE

Implementation is rarely one monolithic activity. Most resilience plans will involve a variety of steps implemented by different groups of people in different ways over different time periods. The best approach is to build momentum with early wins and move forward at a rate you can sustain. Set up the required governance, define implementation performance metrics, and agree on control measures. Refine your approach until you find a system that works for your organization. Look for solutions that require the simplest processes, the fewest steps and the smallest number of moving parts. Create an implementation calendar and build community throughout.

### Bounce Forward

Implementation isn't the end of the resilience process, and planning isn't over once implementation starts. In order to ensure continual improvement, you will need to connect with your team, evaluate the situation, make plans and implement decisions that meet your goals on a regular basis.

Be ready to capture those moments of disruptive change, when people are most likely to be open to new ideas and solutions, to working together and investing in the future. Nobody should hope for a disaster, but we can make ourselves ready to leverage disaster when it does occur—toward a future that is just, sustainable, healthy and resilient.

# Section 1: Introduction and Core Concepts

## INTRODUCTION

Building Resilience-Los Angeles was developed to help us all become more prepared for disasters by improving our lives and our communities every day. The mission of BRLA is to improve community resilience, one building at a time, by applying the momentum and technical capacity of the green building movement and the power of grassroots organizing to connect and strengthen the community. We bring the concept of resilience to the building scale, using the green building model to create market demand for leadership. We know that buildings and the organizations that occupy them can serve as centers of community resilience for all.

This is not a call for altruism. It is a call to leverage core business strengths to help your organization survive and thrive in the face of disaster. Resilience is more than business continuity planning—it weaves together business processes, facilities operations and community connection.

If you've spent any time at the movies, you know that Los Angeles is obsessed with its own demise. Angelenos love watching their region get invaded by aliens, swallowed by earthquakes, smothered by volcanoes, buried by ice, overtaken by zombies and deluged with sharks. Real disasters will be less spectacular but can be every bit as destructive. We know that earthquakes are inevitable. Floods, droughts, heat waves and fires are real and growing more frequent and severe with climate change. Our greatest hope lies not in waiting for a hero but in empowering ourselves as a community to face these challenges in new and innovative ways.

*The mission of BRLA is to improve community resilience, one building at a time, by applying the momentum and technical capacity of the green building movement and the power of grassroots organizing to connect and strengthen the community.*


USGBC-LA has partnered with SCOPE, a community-based organization in South LA, to explore strategies for building resilient communities. SCOPE is showing USGBC-LA how to engage communities and support issues of concern in low-income communities of color and other vulnerable populations. Together we are retrofitting their facility and designing programs to create a Neighborhood Resilience Hub. (SCOPELA.org)

*Credit: intuArch*

BRLA aims to help organizations prepare for disasters in ways that make life better today. To do this, we need to understand our situation comprehensively, recognizing both the stressors we manage today and the hazards we will face in the future. Only then can we employ our resources efficiently, with the fewest number of interventions. We simply can't afford to build fortresses that protect us from one problem at a time. By understanding organizations and communities as systems, we can find solutions that protect us while also creating economic opportunity, a higher quality of life, social equity and a better world.

The *BRLA Primer for Facilities* focuses on the **building** as a nexus of human activity. It presents a framework for understanding your building in relation to the larger system of your organization and, beyond that, your community. We believe that effective management of the built environment not only improves performance but also provides an opportunity to bring people together and solve problems, big and small. Buildings provide the context for daily life and interaction. The ways we manage and operate them over time can leave us exposed to disaster or can set us up to adapt and thrive. Whether your organization is a large corporation with facilities around the world or a small business in  a single building, its influence doesn't stop at the property boundary. Your ability to connect, plan and integrate can put you and your whole community on the road to resilience.

This document will show how following BRLA's smart—and simple—steps can prepare your business for the dangers we live with and transform your organization for the better. **Resilience isn't just good for society, it's good for business.** Those who incorporate resilience into their buildings, business processes and communities stand to fare better in a disaster, responding more quickly and recovering more fully. They are also able to leverage disaster into positive change, using the disruption as a springboard into a brighter future. This guide is about more than preparing for calamity. It is about becoming more flexible, durable, connected, just, healthy and profitable.

***Resilience makes a property more attractive:*** *Projects built and maintained with resilience in mind enjoy advantages such as greater marketing, sales and leasing success by offering assurance about the integrity of the project and its ability to continue to function through or recover quickly from severe weather. More resilient projects can benefit from better financing options, more competitive insurance rates, greater long-term savings on maintenance, and higher overall value compared to more vulnerable properties. Where resilience efforts are planned in tandem with sustainability measures, the results are likely to lead to greater returns on investment.*

*–Urban Land Institute, "Returns on Resilience: The Business Case"* [7]

## A NOTE ABOUT THE CASE STUDIES IN THIS GUIDE

Throughout this guide, we have tried to provide examples and case studies of key concepts and principles. But inclusion in this guide doesn't mean that a project is "resilient." It simply means that it illustrates a particular resilience strategy. Resilience is a dynamic attribute that can be hard to quantify. There are very few fully realized examples of projects that are successfully addressing resilience in a systemic way across all hazard types for all parts of their community. Everyone has room to improve. That said, we hope that the examples provided shed light. We welcome your stories, lessons learned, data and experience with implementing different aspects of resilience in your own work and organizations, in order to grow the library of case studies to continue advancing the field. Visit our website: resilience.la

[7] *uli.org/wp-content/uploads/ULI-Documents/Returns-on-Resilience-The-Business-Case.pdf*

# GOING DEEPER—CORE DEFINITIONS AND CONCEPTS

## *Our Definition of Resilience*

BRLA builds resilience. We define resilience as *the capacity to survive and thrive in the face of stressors and shocks.*

Shocks are the headline-grabbers—the earthquakes, fires, floods, terrorist attacks and other events that can jolt us from the status quo and force us to take action. Stressors are the currents that can flow just under the level of our awareness, the daily wear-and-tear on our lives.

Stressors can undermine our ability to respond and recover. Examples include aging infrastructure, poorly performing buildings, environmental pollution, poverty and income inequality, and chronic public health challenges.

*"To be resilient is to be aware, adaptive, diverse, integrated, and self-regulating."*

*Judith Rodin, The Resilience Dividend: Being Strong in a World Where Things Go Wrong*

BRLA knows that resilience happens at many scales, from the individual up to cities and nations. Most major resilience efforts currently focus on local government. For example, the 100 Resilient Cities[8] program provides a resilience framework, financial and logistical support, and technical expertise to cities around the world. Many other programs focus on the public sector, targeting mayoral support and technical guidance. This focus makes sense. Cities are tasked with the functions of public safety, protecting critical infrastructure and supporting the public good. For this reason, governments have an essential role to play in promoting community resilience. But government can't do it alone. Today's challenges require all of us to be involved.

BRLA focuses on community resilience, with buildings and the organizations they house serving as critical nodes in the larger system. This is about creating capacity for the entire community—for those within and those beyond the walls of the building—so they can all emerge from shocks better, stronger and healthier than they were before. There are three core aspects of community resilience, all of which must be considered:

- **Physical**—buildings, infrastructure and the natural environment
- **Social**—community cohesion, social equity and public health
- **Economic**—business continuity and workforce development

Organizations that understand the physical, social and economic systems in which they operate can be their best while preparing for the worst.

[8] *See www.100resilientcities.org. Los Angeles is a participating city in the 100 Resilient Cities program*

BRLA proceeds with the understanding that resilience is not a one-time event, nor is it an end-product. It is not a checklist or a certification; it is an ongoing process. Local conditions change and so do the strategies needed to respond. Dealing with change requires a culture in which the physical, social and economic landscape is understood well enough that enacting the right strategies under the appropriate conditions comes naturally. It requires good governance or leadership to enact these strategies from the top and the engagement from citizens at the bottom. Just as a body needs different forms of exercise over a lifetime to be healthy, organizations need flexible ongoing processes to stay nimble.

Building Resilience-Los Angeles supports the following outcomes:

a. **Emergency Preparedness, Response and Recovery**—training, informing and preparing participants to react and respond to disruptions in order to save lives, limit damage, survive without outside support and rebound quickly to a place of vitality

b. **Social Equity**—promoting fair and just access to services and opportunities for all

c. **Economic Stability**—enabling business operations to thrive in the face of disruptions and expanding economic vitality in the surrounding community

d. **Environmental Sustainability**—reducing the need for off-site resources and managing natural systems for the long term

e. **Climate Change**—reducing greenhouse gas emissions (mitigation) and preparing for its impacts (adaptation)

f. **Community Cohesion**—facilitating a sense of connection, collaboration and participation in decision-making; fostering a sense of place and inclusiveness

g. **Public Health and Safety**—protecting and promoting public health on a daily basis and in emergency situations; identifying, eliminating or minimizing hazards at their source to reduce the frequency and severity of disasters

Reducing hazards (where possible), addressing underlying vulnerabilities, and improving adaptive capacity are essential themes that run through each of these areas.

## PRINCIPLES OF RESILIENT DESIGN

What do resilient systems look like? They vary widely. But Alex Wilson and his colleagues at the Resilient Design Institute in Vermont have developed these ten principles based on work following Hurricane Katrina and other disasters.

### THE RESILIENT DESIGN PRINCIPLES

1. Resilience transcends scales.
2. Resilient systems provide for basic human needs.
3. Diverse and redundant systems are inherently more resilient.
4. Simple, passive and flexible systems are more resilient.
5. Durability strengthens resilience.
6. Locally available, renewable or reclaimed resources are more resilient.
7. Resilience anticipates interruptions and a dynamic future.
8. Find and promote resilience in nature.
9. Social equity and community contribute to resilience.
10. Resilience is not absolute.

More details and a wealth of information on resilience can be found on the Resilient Design Institute's website: www.resilientdesign.org.

# We're All in This Together

Research has shown that one of the best predictors of recovery after a disaster is the level of connection within a community.[9] Neighbors who know each other, organizations that work together, and communities that bridge social, political and economic divides have the best chance for responding quickly, recovering fully and leveraging change to become stronger.

> *"Disasters are not equal opportunity events. They affect different groups in different ways. Whereas some can easily anticipate and respond to hazard threats, others find it more difficult, if not impossible. […] In the aftermath, recovery can be highly uneven, with some parts of a community recovering while others lag behind. The uneven nature of recovery can jeopardize the overall vitality and resiliency of a community and bring into question its future."*
>
> *Jaimie Hicks Masterson et. al., Planning for Community Resilience: A Handbook for Reducing Vulnerability to Disasters*

*We define a community as a group of people who can come together and organize.* In a community, people build a common frame of reference over time, create a sense of shared experience, and solve problems together. Informal interactions and shared projects can make a difference when things become chaotic. This interaction goes beyond the typical practice of corporate social responsibility because it is based on reciprocity. Creating community is about making change, not just giving charity.

There is a myth that disasters bring out the worst in people.[10] In reality, they can bring out the best. Disasters and other disruptions give people an opportunity to make a positive difference and be a part of something larger than themselves. Those opportunities can be cultivated, supported and amplified even if disaster never strikes. On the other hand, social divisions which can exist as underlying stressors can exacerbate shocks. For example, blackouts in New York in 1977 (unlike other similar blackouts) resulted in widespread looting and rioting across the city because they occurred at a time of severe economic decline and social tension. [11]

Supporting community cohesion and social equity is one of the more challenging aspects of an integrative approach to resilience. The skill sets needed for effective community engagement are outside the scope of many businesses. Issues of race, class and power are bound to arise when looking at underlying stressors within a community. But starting conversations, building a central team and maintaining a supportive community over time may be the most important resilience actions you take, since they can lead to the deepest and most meaningful transformation. Initial efforts may not be appreciated. Conflict is natural and differing viewpoints are needed in order to effect change. Find ways to establish a foundation of trust to open the door to a better quality of life for all.

[9] *For example, see: Aldrich, Daniel P., Building Resilience: Social Capital in Post-Disaster Recovery, Chicago: University of Chicago Press, 2012.*

[10] *For example, Rodriguez, Havidan, Joseph Trainor, and Enrico L. Quarantelli. "Rising to the challenges of a catastrophe: The emergent and prosocial behavior following Hurricane Katrina." The annals of the American academy of political and social science 604.1 (2006): 82-101.*

[11] *"Why the 1977 Blackout Was One of New York's Darkest Hours." Jennifer Latson. Time Magazine, July 13, 2015. time.com/3949986/1977-blackout-new-york-history/*

Events like CicLAvia enhance resilience by bringing people together, encouraging physical activity, and promoting bicycling

*Credit: Gaston Hinostroza*

Volunteers from American Red Cross, LAFD Cadet and CERT programs, Tzu Chi USA, Hope Worldwide and My Safe LA help the LA Fire Department celebrate after installing fire alarms in homes in South LA.

*Credit: LAFD Photo by David Ortiz*

# *Private Sector and Public Good*

*Shouldn't the government be doing this?*
*Yes, but they can't do it alone.*

The movement toward a resilient region requires all of us. Local government takes the lead on infrastructure, emergency response, land use planning, building codes and many other aspects of resilience. But there are many reasons for the private sector to play a part. Here are a few:

1. **Resilience is good for business.** In other words, disasters are bad for business. Even in situations that don't involve loss of life, the disruption of regular operations can wreak havoc on organizations large and small. Businesses that are prepared, with personnel who are trained and connected to their community, can become heroes rather than victims.[12] By changing the ways they manage their physical assets and developing relationships with internal and external stakeholders, organizations can create a better world as well as a better brand.

NIST estimates that $1 in preparedness is worth $4 in recovery.[13] The goal of BRLA is to help that $1 of investment stretch as far as it can go. Rather than trying to solve one problem at a time, the BRLA process is designed to help you identify interventions for your organization that will solve many problems at once. Some people call these multiple solutions "co-benefits."

For businesses, resilience can create:

- Less uncertainty
- Business continuity
- Reduced losses
- Faster recovery
- Better financing terms
- Lower insurance rates
- Lower operating costs
- Ability to leverage new opportunities
- Stronger community relations
- Better employee retention and job satisfaction
- Positive brand association
- Quality of life and public health for building occupants and the surrounding community

[12] *Rodin, Judith. The Resilience Dividend: Being Strong In A World Where Things Go Wrong. PublicAffairs, 2014.*

[13] *Multihazard Mitigation Council. Natural hazard mitigation saves: an independent study to assess the future savings from mitigation activities. Washington D.C.: National Institute of Building Sciences, 2005. www.preventionweb.net/publications/view/1087*

2. **The cost of doing nothing can be catastrophic.** The price tag of modest disasters can often reach the billions. In addition to loss of life and property damage, disasters can have a major impact on business productivity and can devastate the local economy.

According to the Institute for Business and Home Safety, an estimated 25 percent of businesses never reopen in the wake of a major disaster. [14]

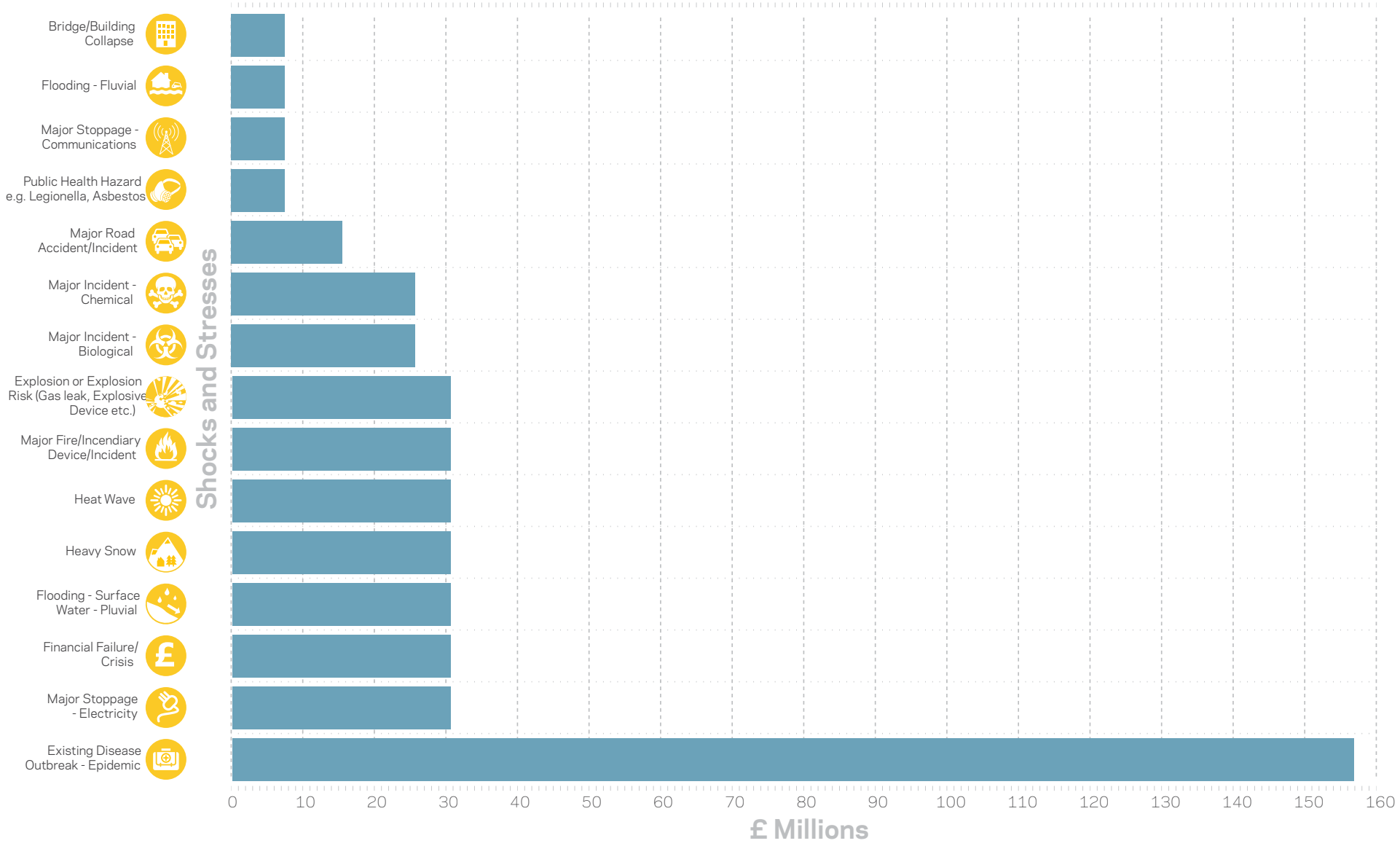
Investments in resilience range from simple, low-cost or no-cost preparedness measures to major capital improvements. Such expenditures can be hard to justify because the return on investment is shrouded in uncertainty. How do you justify spending money on seismic retrofits if an earthquake never comes? A careful risk assessment process is useful to better gauge where an organization's greatest vulnerabilities lie and how to get the most benefit from shoring them up. The systemic process proposed in this guide is designed to help you solve as many problems and prepare for as many events as possible using the fewest number of interventions.

Ruins of the Canterbury Television Building in Christchurch, New Zealand, which collapsed in an earthquake on 22 February 2011, killing 115 people.

*Credit: Gabriel Goh*

[14] *Small Business Administration. "Disaster Planning." www.sba.gov/managing-business/running-business/emergency-preparedness/disaster-planning*

*Cost of doing "nothing" – Annualized cost of identified shocks - ©BuroHappoldEngineering*



**Resilient infrastructure is distributed.** LA's highly-centralized infrastructure is aging and vulnerable. For example, according to the *LA Times*, about one-fifth of the city's water pipes are more than 85 years old and approaching the end of their lifespans, leaving them subject to leaks and failures (not to mention damage during earthquakes). The price tag for replacing them exceeds $1 billion.[15] Disruptions to energy distribution or water import systems could leave businesses unable to operate. Investments to bring clean energy generation or water capture and reuse onto private property can create value for property owners. Strategies like passive solar and rain gardens not only reduce strain on overburdened infrastructure but can also increase thermal comfort.

For example, many modern buildings have been designed to rely heavily on mechanical ventilation and lighting, making them uninhabitable when the power goes out. Passive solar strategies both improve the energy efficiency of buildings and keep them habitable when the grid goes down. Resilience encourages self-reliance.

3. **During emergencies, communities may need to survive on their own.** Local agencies and first responders may be quickly overwhelmed in a crisis. The ability to survive without government services for 72 to 96 hours is known as passive survivability. Businesses that train their employees to act in an emergency, that set aside provisions, and remain in close connection with their communities are well-poised to make it through such a situation. Businesses may have facilities, nonprofits may have grassroots networks, and neighbors may have a variety of resources and needs. Pooling these assets together can be transformational for neighborhoods and have long-lasting benefits.


Billboard in Los Angeles that says "Being prepared for an emergency begins with 'hello'" emphasizes that community resilience is based on strengthening the social fabric of our communities

*Credit: David Eisenman*

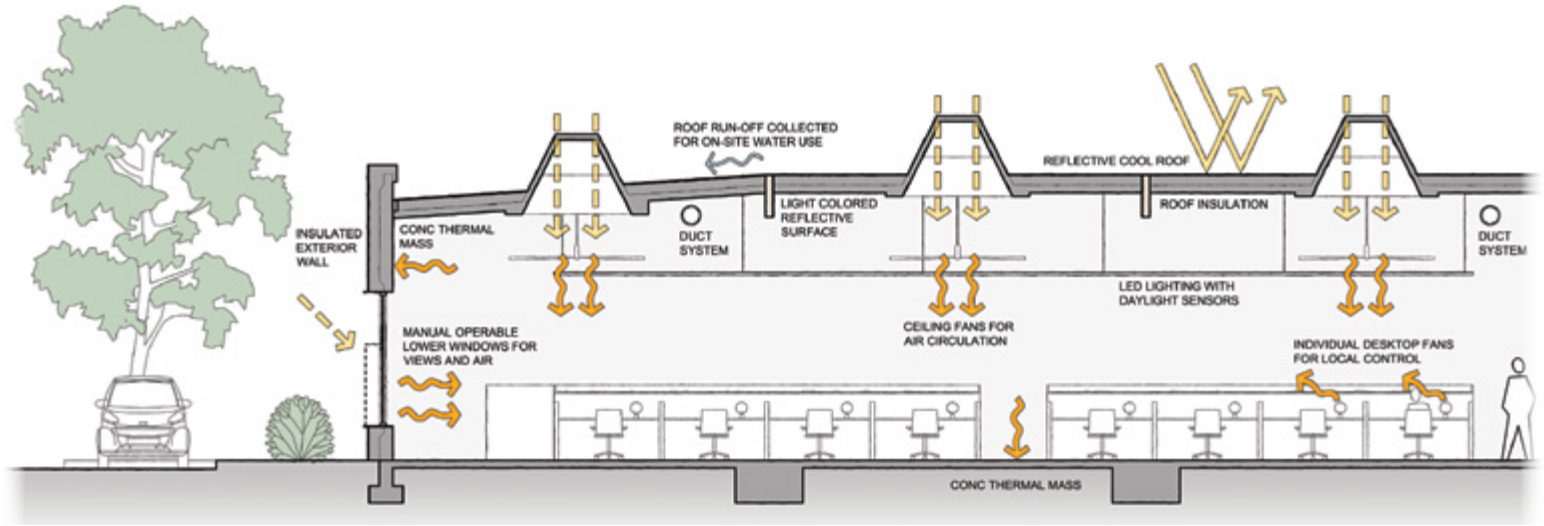
[15] *graphics.latimes.com/la-aging-water-infrastructure*

*"Climate resilience is much more than an environmental issue. The success of our economy is directly linked to the well-being of people in our communities. For Google, operating our business while making a positive environmental impact has been core to our values as a company since its inception. Our users, customers, shareholders, neighbors, and employees trust us to do the right thing, just as they trust in the reliability and security of our products and services. Climate resilience is a global challenge and enabling positive action with access to information is as essential to our business as it is to the future health of the environment we all share."*

*Kate Brandt, Lead for Sustainability at Google*

Diagram of the natural ventilation and lighting strategies at the Indio Building

*Credit: David Hertz and Skysource*




## CASE STUDY: INDIO BUILDING NET ZERO ENERGY PASSIVE SOLAR RETROFIT

One attribute of passive survivability in buildings  is that they demand fewer outside resources like electricity and natural gas, provide healthier indoor environments, and remain habitable when the power goes out. The office building at 435 Indio Way in Sunnyvale was an unlikely candidate for a passive solar strategy. The 30,000-square-foot single-story concrete tilt-up structure was built in the 1970s, and like many others in Silicon Valley and across California, it was poorly insulated, seismically unsound and aging ungracefully.

Its owner, Kevin Bates, president of SHARP Development, decided to retrofit the building as a net-zero energy-passive solar building to reduce operating costs, promote sustainability and attract tenants. He hired Integral Group, Hillhouse Construction and RMW Architecture to implement the project. By combining elements such as wall and roof insulation, operable windows, skylights, and ceiling fans with solar thermal and photovoltaic panels, the project reduced the size of the required mechanical system by 80 percent.

The building requires no electric lighting during the day and has an annual energy bill of zero because of the solar energy it feeds back into the grid. The retrofit added $50 of value per square foot to the renovation and is expected to have a payback period of three to four months. SHARP Development was able to secure a tenant in three months, instead of the 18 months typical for such a space in the area. Overall, the project takes the burden off the local grid, provides a healthy and well-lit interior for its occupants, and makes economic sense for its owner. These strategies take it a step closer toward resilience.

David Hertz stands in front of the Skysource 150 installed in his Venice office. The unit generates up to 150 gallons of water per day

*Credit: Damien Fahernfort*

**CASE STUDY: TURNING AIR INTO WATER (AND FOOD, AND COMMUNITY)**

Southern California is a dry place. People are typically surprised when they learn that it is possible to make drinking water from the air. David Hertz is showing what can be done in his Venice, CA architecture firm. He has installed two adiabatic water distillation units made by Skysource. The smaller one is in the office kitchen and makes plenty of drinking water each day for his team. The larger one, about the size of a large air conditioning unit, can make up to 150 gallons per day. As that is more than the firm can use, the water is piped around the community for growing food. They also have a fountain in the back alley offering free water. The office, including the water units, is 100% solar powered. This is some of the most environmentally friendly water in LA.

The San Francisco Federal Building is naturally ventilated.

*Credit: Arup*

**CASE STUDY: THE SAN FRANCISCO FEDERAL BUILDING CAN OPERATE WITHOUT POWER**

The United States Federal Building in San Francisco is one of the first major US office buildings to be naturally ventilated for more than 70 years. The 18-story tower's open office floors are effectively ventilated throughout the year with automatically operable windows. In the event of a loss of power, permanently-open louvers integrated into the building façade guarantee code-minimum ventilation rates to building occupants. Operable windows modulate from closed to open to control interior comfort conditions. Unlike conventional office buildings in California, the Federal Building can support occupancy through extended periods of power loss.


Occupy Sandy used a church in New York City to distribute supplies to neighborhoods affected by Superstorm Sandy.

*Credit: David Eisenman*

## CASE STUDY: IN A DISASTER, EVERYONE HAS A ROLE TO PLAY

When Superstorm Sandy hit New York, it sent a deluge of up to five feet of water through parts of Brooklyn. Debris cluttered the shoreline and thousands of residents found themselves without basic services. In the absence of comprehensive state and FEMA relief, it was up to the community itself to unite and organize a response.

But in late 2012, New York wasn't the picture of unity. In many communities, anger still festered over the kinds of socio-economic divides highlighted by the Occupy movement.[16] Many accused the police and city government of turning their backs on working-class New Yorkers. In dense, transit-oriented Red Hook, some residents resented a 360,000 square-foot IKEA store built four years prior.

Nevertheless, when disaster struck, activists and businesses overcame their residual suspicion to rebuild their community. Built over an elevated foundation and equipped with a durable generator, Red Hook's IKEA store served as a local nerve center for FEMA and the Small Business Administration. Residents flocked to IKEA for supplies, and the company provided space for community organizers to meet with government responders.[17]

Among those community activists were groups like Occupy Sandy,[18] an offshoot of Occupy Wall Street dedicated to organizing direct community support from volunteers. Faced with Sandy's aftermath, political debate took a back seat as Occupy Sandy assembled a network of aid distribution sites and the digital infrastructure to coordinate it all. [19]

About a week after the storm ended, Red Hook was the site of a joint government-Occupy relief point. Tensions remained, but everyone had a role to play. Businesses like IKEA provided space, power, and resources. Agencies like the NYPD and the National Guard provided security. And grassroots organizations like Occupy Sandy built volunteer networks who knew the community well. Long after the disaster, Occupy Sandy continued its work in neighborhoods like Red Hook, supporting the rebuild with small business incubation and long-term mutual aid networks.

After Sandy, Red Hook's diversity worked to its benefit. The neighborhood's many stakeholders, often at odds, came together to provide direct relief and the infrastructure to bounce back after the storm. The response to Sandy's destruction showcased how the private sector can work with government and community organizers to face environmental challenges.

[16] *Time Magazine. "Best of Enemies: Why Occupy Activists Are Working with New York City's Government" http://nation.time.com/2012/11/13/best-of-enemies-why-occupy-activists-are-working-with-new-york-citys-government*

[17] *Next City. "Why IKEA, a New Urbanist Development and a Park-in-the-Making All Withstood Sandy"*

[18] *Occupy Sandy. http://occupysandy.net*

[19] *New York Times. "Occupy Sandy: A Movement Moves to Relief" http://www.nytimes.com/2012/11/11/nyregion/where-fema-fell-short-occupy-sandy-was-there.html?pagewanted=all&_r=0*

# Section 2: The Building Resilience Process

## PROCESS OVERVIEW

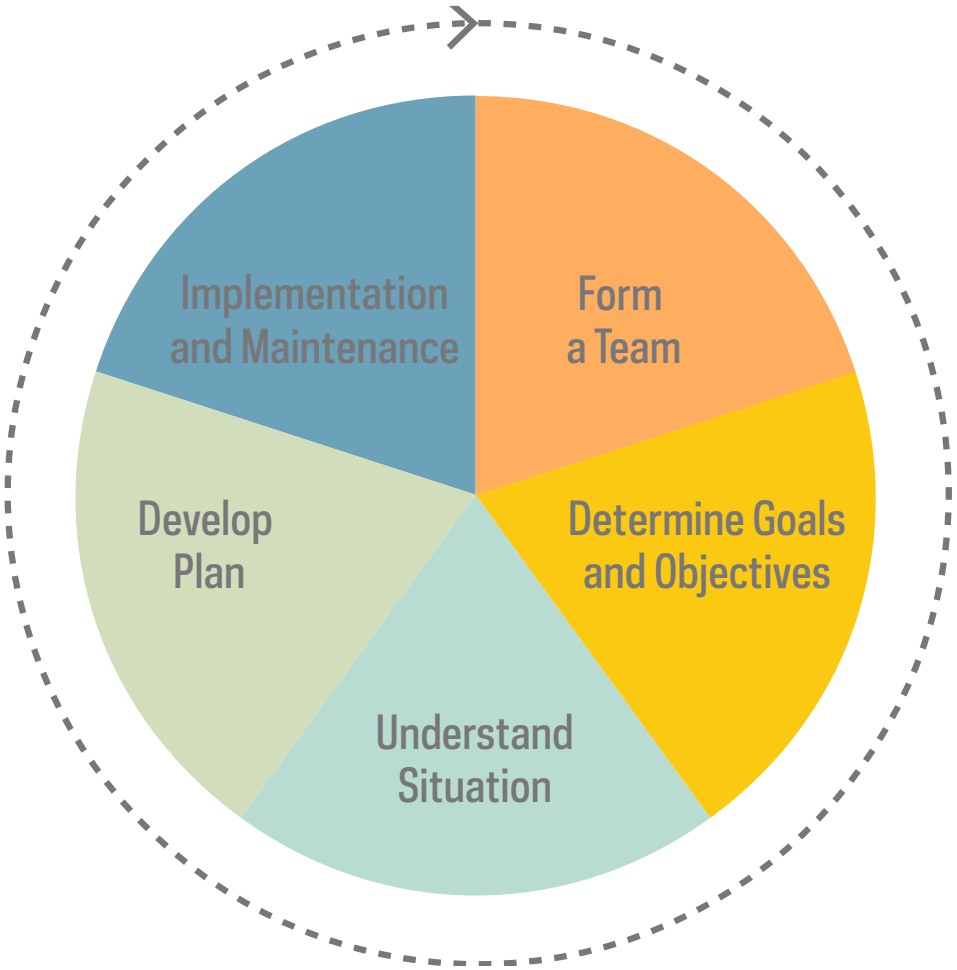
The Building Resilience Process will assist building owners and their users to develop a deeper understanding of how their physical building and its ongoing operations and maintenance impact the organizations it houses and the communities it touches. The goal is to modify the way organizations do business today so they can remain durable in the face of inevitable challenges in the future. Planning for change is never complete. This is a process of continual improvement.

Resilience is specific to place, meaning one solution may not be appropriate in all neighborhoods, cities and regions. Many resilience checklists detail the strategies your organization can implement to improve resilience.[20] This guide focuses specifically on the *process* of implementing, maintaining and continually improving resilience by leveraging available checklists and tools.

While there are hundreds of ways you can improve your business or organization's resilience, selecting the right combination depends largely on where you are, what your organization does, and the goals you would like to achieve. The BRLA process is designed to help you set priorities, make decisions, and become more resilient over time.

[20] *See for example Arup's REDi Rating System, the US Resilience Council's Seismic Rating System, the RELi Resiliency Action List + Credit Catalog and the Insurance Institute for Business and Home Safety Fortified for Safer Business programs.*

The process includes the following steps:




Most businesses or organizations will not be starting from scratch. Businesses are the culmination of multiple assets—people, structures, services and products. The key is to recognize which of these assets is already available and which are needed in order to move forward efficiently and effectively.

# THE PROCESS STEPS

## *Step 1: Form a Collaborative Team*

Resilience is about relationships and collaboration. Within any organization, it is critical to clearly identify who needs to lead the effort, who needs to participate, and who needs support. Forming a team involves making sure the resilience process is incorporated into how business is done.

Resilience teams perform many functions, including:

- Initial project planning
- Ongoing project management
- Bridging silos across departments or branches of the organization
- Engaging internal and external stakeholders
- Expanding skills, training and capacity
- Fostering and supporting a sense of community cohesion

Larger organizational resilience teams should include diverse business functions and representation across the entire organization. For organizations with multiple locations, there should be teams at each facility or campus connected to a corporate leadership team.

### THE CORE TEAM

The first step in forming a team is to identify the core group of stakeholders who will be responsible for the overall effort. Resilience is an ongoing process requiring ongoing commitment. The core team will be responsible for providing leadership, managing the implementation, and communicating with the internal organization and the external community.  Stakeholder buy-in and engagement is critical.

Questions to consider when forming the core team:

- Who are the champions of the organization?
- Who is in a position to make informed decisions?
- Which business functions need to play an active role?
- Who will organize the work, schedule the meetings and set the agendas?
- Who will make sure everyone stays on task?
- How will decisions get made?
- Who will track all of the action items over time to measure, verify and improve performance?

While emergency management and sustainability departments are logical places to look, remember that champions can be found anywhere, from executive offices to the mail room.  Also remember that strong core teams will strengthen and evolve over time. New members may be added and the group may break into sub-groups to address new initiatives or respond to different challenges.

Camden teams participate in emergency response drills.

Credit: Camden Properties

## CASE STUDY: CAMDEN: BUILDING A TEAM OVER TIME

In 1998, a fire broke out in a 233-unit apartment complex owned by Camden Properties in Atlanta, Georgia. Sixty-four apartments sustained fire damage and more than 120 units were affected. It fell to Camden's regional vice president, Melinda Graham, to coordinate the response. While the company had a comprehensive emergency plan in place, there was much she had to learn on the fly, from how to help relocate residents to how to deal with insurance claims, while supporting employees through their own trauma in the days and weeks after the incident.

In the years after the fire, there were other events that impacted Camden Properties—earthquakes, fires, even an active shooter. In each case, Melinda had the knowledge and experience to lead her team through the response and recovery. But she also learned that her own resources and the company's safety manual were not enough in themselves. She needed to build a team. "The people on the ground were not prepared," she says. "They needed actual drills and exercises, not just reading. They never referred to the manual in an actual emergency because the manual was so comprehensive. We needed a way to break it down and get everyone up to speed."

She hired a safety trainer, Chris Wharton of Basecamp Expeditions. Together, they began engaging teams at the corporate, regional and property levels in exercises and tabletop scenarios to learn how to organize resources and solve the problems they might face in different types of disasters. Topics included life safety and communication procedures, the use of protective gear, the determination of gathering spots and team coordination. Melinda and Chris leveraged the free training and standardized terminology of the National Incident Management System (NIMS)[21] as a framework to ensure consistency and interoperability with government agencies and others. They created simple checklists for people to use in actual emergencies. They participate in California Earthquake Awareness Month and the Great Shakeout every October.

Melinda's next step is to expand the teams beyond staff. They will be working with firefighters and other agencies, connecting with other businesses and community members. They are actively reaching out to residents directly and through social media, and will be inviting residents to participate with them in the next Shakeout.

The process has had many benefits for the company. Camden Properties is now known to be actively managing risk and is considered an attractive company to do business with by insurance companies. They believe that this translates into getting the most competitive insurance rates. The staff find the training exercises meaningful. Equipping employees to deal with situations efficiently can help prevent loss. Many employees have brought the lessons they've learned into their own homes. This process of continual improvement is spurring Camden to look for new and innovative ways to work together and be prepared, and is saving the company money on a daily basis.



[21] www.fema.gov/national-incident-management-system

## Google's Surprising Findings on What Makes a Successful Team

As a data-driven company with more than 30,000 employees who primarily work in teams, Google has a lot of ideas about what makes a team successful. When the staff of its People Operations department set out to analyze team activity using interviews and other data, they expected to find an ideal algorithm of skill sets and personality types. It turns out they were wrong. What they found instead was that who was on a team mattered less than how individual team members interact. They determined that all successful teams share five key dynamics:

1. **Psychological safety:** Can we take risks on this team without feeling insecure or embarrassed?
2. **Dependability:** Can we count on each other to do high-quality work on time?
3. **Structure and clarity**: Are goals, roles and execution plans clear?
4. **Meaning of work:** Are we working on something that is personally important for each of us?
5. **Impact of work:** Do we fundamentally believe that the work we're doing matters?

Psychological safety is considered so essential that guidance on how to foster it is posted across Google's offices, in places where people are most likely to read it—even on bathroom stall walls.

These findings have important implications for resilience work, where effective teamwork is essential and building partnerships is fundamental.[22]

[22] See Julia Rozovsky. "The five keys to a successful Google team." Web blog post. The Water Cooler. 17 November 2015. rework.withgoogle.com/blog/five-keys-to-a-successful-google-team/

**Engaging Stakeholders:** After settling on the core team that will provide structure for the effort, consider the other stakeholders, internal and external, across your organization. There are many types of stakeholders and they will vary according to the location and type of organization.

Stakeholders include all those who benefit from an organization's activities and could be negatively impacted when the organization suffers. This goes beyond proximity to include downstream businesses. For example, a data control center that fails could impact businesses in other cities, not only those nearby.

Start with proximity. Think about the leadership of your organization and those departments that are pivotal to decision-making. Acknowledge the blind spots that may become apparent as the resilience process progresses. Recognize that few internal teams have ready skills in community engagement. Allow the structure of the team to be flexible and malleable. By setting clear goals and expectations for participation among stakeholders, your organization can leverage needed expertise, skills and perspectives.

Stakeholder engagement outside the organization can be a difficult task, particularly for the private sector. The key is to be clear about why you are reaching out, what you expect to offer, what you expect to gain, and what you are asking participants to provide. Being transparent is better than

SCOPE facilitates community dialogue to inform development of California climate policy.

Credit: SCOPE

creating inflated expectations you are not prepared to meet, even if that means initially offering very limited information. It is also important to remember that the various stakeholders in a community have different levels of vulnerability and access to resources.

Over time, resilience can become a part of your organization's culture in a way that makes all stakeholders members of the resilience team—from the employees who are able to adapt as conditions change to maintenance staff trained as first responders to neighbors who know how to work together in an emergency. This only happens, however, when there is meaningful two-way dialogue. Members of a community build trust through experience. Relationships must be founded in reciprocity and a sense of shared common interest.

*Be clear about why you are reaching out, what you expect to offer, what you expect to gain, and what you are asking participants to provide. Being transparent is better than creating inflated expectations you are not prepared to meet.*

## Examples of Stakeholders:

- Internal departments and staff, including:
  - Sustainability
  - Facilities
  - Risk management
  - Emergency management
  - Planning
  - Finance
  - Communications
  - Personnel
  - Maintenance, custodial, groundskeeping, operations
  - Security
- Unions and other employee organizations
- Independent or outside contractors
- Customers
- Suppliers
- Neighbors
- Nearby businesses
- Local government agencies (such as the mayor's office, your elected neighborhood or city representatives, fire and police, parks and recreation, building and safety, public works, emergency management and human services)
- Utilities
- Schools
- Hospitals and healthcare organizations
- Community groups
- Religious organizations
- Organizations serving vulnerable populations
- Peer organizations
- Families of employees

## Building Social Equity Through Meaningful Community Engagement: Five Strategies for the Green Building Sector

Laura Muraida, Research Director

Strategic Concepts in Organizing & Policy Education (SCOPE)

*Know the community and its existing vulnerabilities, disparities, assets and capabilities*

Our neighborhoods, including our buildings, infrastructure, and green spaces, reflect and often perpetuate existing social and racial inequalities. Building true community-level resilience requires addressing inequality and marginalization by developing strategies to overcome barriers to community engagement, informed decision-making, empowerment and overall community health. Resilience leverages existing assets to ensure meaningful engagement and project outcomes.

An authentic community engagement strategy recognizes diversity and community knowledge, and responds with flexibility and inclusivity in design approaches. Factors to consider when designing community engagement strategies include language barriers, literacy levels, community mobility/isolation, community trauma, levels of familiarity with resilience and green building concepts, and the need for targeted strategies for underrepresented populations. Engagement efforts should build upon existing community infrastructure, social networks, trusted messengers and shared histories. Resilience practitioners must build trust by working with formal and informal community leadership, community organizations and existing institutions from the start.

*Clearly define the scope of the community engagement effort, the purpose of the effort, the population to be engaged and the desired outcomes*

It is essential that resilience practitioners and community members build a shared understanding around why a particular community's participation is valuable and how their participation will inform project outcomes. Trust and unity are built through direct and constructive communication. Clarity, transparency and adherence to the highest of ethical standards are essential when working with community members. However, it is important to accept the collective right to self-determination. Building community resilience isn't about charity but about engaging communities to increase their own collective resilience.

Best practices include the following: utilizing culturally appropriate tools for communication; ensuring accurate and consistent information throughout the engagement process; involving community as early as possible in the process; outlining roles and responsibilities; ensuring democratic representation and decision-making; and developing formal agreements, ground rules and community engagement planning documents.

*Approach community engagement as a capacity-building strategy*

Community resilience strategies from the building to the regional level should meaningfully address community needs and vulnerabilities. Engaging community members in identifying both needs and solutions can be a valuable collaborative learning process. Ensuring that community members are active participants in the earliest stages of resilience planning and program implementation increases community buy-in, spreads knowledge, and can lead to the development of evolving roles for community residents from stakeholders to project advisors.

Populations most vulnerable to shocks and stressors must be at the center of resilience-building efforts. True community-driven partnerships build community knowledge, decision-making power, and both human and political capital for vulnerable populations. With authentic engagement, community members feel empowered to develop solutions that strengthen their resources, mobilize community assets, and address the specific challenges they face. Resilience practitioners should consider the need for long-term technical assistance, training and additional resources for community-driven interventions and solutions.

*Build a foundation for long-term engagement*

Community resilience-building is an ongoing process and change is a fundamental part of it. Building a strong foundation for long-term community engagement grounded in trust and nurtured through consistent bidirectional communication keeps engagement efforts moving forward.

The most successful community partnerships and capacity-building efforts require long-term investments of time and financial resources. That said, communities operate in different stages of development. For this reason, it is critical to begin by developing a shared understanding of existing community conditions, one that informs the development of clear goals and outcomes. Engagement efforts should be embedded throughout the project. As community members develop their leadership abilities as active project partners, the likelihood of sustained engagement and effective project programming increases.

*Be prepared to evaluate and modify the community engagement process*

While community engagement efforts should support your overall project goals, they must also be flexible enough to meet the changing needs of the community. It may become necessary to modify strategies to ensure that the right community members are at the table and that all voices are heard equally. Consider employing quantitative and qualitative methods of evaluation and encouraging community and partner feedback.

Community-driven processes should build the power to change relationships—interpersonal and collective—in the private, public and non-governmental sectors. Community engagement efforts may lead to the development of new coalitions, resource allocations, policies or programs. You must anticipate and be ready to respond to these changes.

## Key Resource: Tools for Creating Community Resilience

The Los Angeles County Community Disaster Resilience program is a collaborative resilience effort for communities led by the LA County Department of Public Health. Publically-available resources include a step-by-step Resilience Builder toolkit to help you identify your community, form collaborative partnerships, make plans and take actions. Tools also include a detailed work plan template.[23]

For additional training, RAND offers the interactive "Building Resilient Communities: An Online Training"[24] that can walk you through the core issues and help you develop an action plan.

These resources can help jumpstart your understanding and implementation of community resilience-building, one of the most essential and challenging aspects explored in BRLA.

### CASE STUDY: PEER ORGANIZATIONS—BECAUSE RESILIENCE CAN TRANSCEND COMPETITION

Entertainment studios are like miniature cities filled with diverse activities, building types and populations. Making sure the studio community is prepared and trained to respond to any likely emergency is a huge job.

While entertainment companies compete for every eyeball, they share common interests when it comes to public safety. The studios of Los Angeles—Sony, Disney, Warner Brothers, NBC-Universal and others—regularly meet to share best practices in emergency preparedness. This network of peers exchanges information and resources on an ongoing basis. They review ideas for employee preparedness trainings and observe each others' drills, providing feedback and suggestions. The result is that emergency management personnel have access to a broad range of expertise and support beyond their own organization.

On occasion, the studios leverage competition between their companies to promote training. The Studio Block Party CPR Challenge in September 2014 pitted one studio against another in a competition to see how many employees could be trained in CPR in one day. The studios partnered with local agencies and the Red Cross. As a result of the challenge, more than 1,700 employees received training that could one day save a life.

[23] www.laresilience.org/resources

[24] www.rand.org/pubs/tools/TL109.html

# Step 2: Set Goals and Objectives

Goals let stakeholders align around a shared purpose and direction. They help establish priorities and can serve as litmus tests for evaluating different courses of action. The most useful goals require you to stretch and enable you to measure your progress. Goals should be aspirational—when you meet your goals, it's time to set new ones.

There are different types of goals that can help guide your resilience effort:

**Long-term organizational planning goals:** Long-term goals focus on why your organization is engaging in a resilience effort, what you hope to accomplish overall, and how the effort will fit with your core functions and operations. Long-term goals might include:

- Ensuring continuity of operations and the ability to return to normal operations following disruptions of different types
- Capitalizing on strategic risk management
- Promoting a sense of community among employees and in the surrounding community
- Enabling the organization to support the community in times of disaster
- Becoming a recognized resilience leader in the community (or nationally or internationally)


Gensler staff in the LA office

Credit: Gensler

## CASE STUDY: GENSLER—SETTING GOALS FOR EXCELLENCE AND INNOVATION

When Gensler moved to its new downtown LA office, it made several goals related to resilience and sustainability. The company developed a healthy workplace initiative to support activity and movement throughout the new space. It also sought to "future-proof" its environment by creating a flexible, adaptable space that would allow the firm to grow without making major renovations or investing in new resources. These goals, combined with a commitment to environmental performance, resulted in a renovation that received a LEED for Commercial Interiors Platinum rating.

The health impacts of prolonged sitting at work have been well-documented. To promote the health of its employees, Gensler located centers of core activity, such as break rooms and production spaces, on different floors and in different sides of the building. Desks are not equipped with trash cans or printers—they are located in centralized areas so employees need to get up and walk. A healthy lifestyles committee has been established to support a culture of health. It plans weekly activities like exercise boot camp and yoga.

Knowing that the configuration of the work environment can restrict change and stifle creativity, Gensler designed its space for maximum flexibility. The entire configuration, from workstations to artwork, can be easily reconfigured, accommodating growth with little disruption and minimal waste of materials.

In addition to achieving Gensler's initial goals, this combination of strategies has helped to create a sense of community connection within the workplace, a core ingredient of resilience.

## Avoiding Conflicting Goals: Passive Survivability and the Internet of Things

Greg Shank

Principal, Altura Associates

It is common to associate sustainability, resiliency and smart building automation as complimentary issues when discussing buildings and communities. Access to building performance data and the networked Internet of Things (IoT) promise to enable new levels of energy efficiency and lower carbon footprints. But isn't there a natural tension and competition between passive survivability (a core principle of resilient design) and high-tech IoT strategies? For example, as more devices are connected to and automated by a cloud-based network, it may become harder for the occupants of a building to live in that building if the power and/or network goes down for an extended period of time. Are you implementing an adaptive system that can recover from extreme events and conditions or simply limiting the conditions under which the building can function effectively?

As the real estate community seeks to connect and automate everything that uses energy in a building, here are specific questions we can ask to bring resiliency into the process to ensure that the near-term benefits of new technology also promote long-term resilience:

- Do the building management systems make it easy for the operators and occupants to understand how the building functions and how their actions and behaviors impact the system? New technologies that make building operations more transparent and intuitive improve resiliency and survivability by empowering people to respond to disruptions and change with adequate information and tools.

- Should the basis for determining emergency power requirements be updated or re-thought based on the level of connectivity and automation in the building? Emergency power generation and circuit design may be based on out-of-date assumptions regarding what should be considered critical load.

- Can you use the strength of networked systems and cloud computing infrastructure to engage a larger community to support a specific building or neighborhood? Consider how the building management system can remain "up" during disruptive events to provide an additional channel for communications and support.

These are just a few questions that can help align the goals of resiliency, passive survivability and smart building automation. A truly high-performance building serves its occupants well under all conditions, not just the familiar and optimized baseline design condition.

**Shared Community Goals:** One of the first exercises for working with community stakeholders may involve establishing shared goals. Look for common interests and issues that you can tackle together. Gather stakeholders and ask, "What is it you need most in the community?" Listen hard to their answers and explore items that would be mutually beneficial and that you can work on together.

Shared community goals might include:

- Creating mutual systems of support for responding to and recovering from disasters
- Creating mechanisms for mutual support across organizations to improve the local economy and create good jobs
- Working together to bring healthy fresh food to the community
- Collectively addressing local impacts of climate change

## CASE STUDY: SCOPE—BECOMING A NEIGHBORHOOD RESILIENCE HUB

Some organizations may find that their core mission already includes goals of community resilience. For example, the mission statement for Strategic Concepts in Organizing and Policy Education (SCOPE),[25] a community-based nonprofit in South Los Angeles, reads:

SCOPE builds grassroots power to create social and economic justice for low-income, female, immigrant, black and brown communities in Los Angeles. To do this, SCOPE organizes communities, develops leaders, collaborates through strategic alliances, builds capacity through training programs, and educates South LA's residents to have an active role in shaping policies that affect the quality of life in our region.

For an organization like SCOPE, being present in the community is itself a resilience strategy. In fact, SCOPE (originally called AGENDA) was founded after the 1992 civil unrest. Its facility, a city-owned former fire station, is located near the intersection of Florence and Normandie Avenues, where those historic events were centered. For such an organization, building community and addressing underlying vulnerabilities—in this case poverty, a lack of good jobs, and other injustices present in this low-income community of color—come naturally. SCOPE has an active network of over 500 members, South LA residents who organize for change. Much of their work has focused on building a just green economy. SCOPE is a natural pioneer to explore what it means to become a neighborhood resilience hub.

In 2014, SCOPE and USGBC-LA began to explore what a more systemic approach to resilience might look like, examining physical, social and economic aspects. Starting with the core community-building functions of SCOPE, we looked at how SCOPE's physical presence in the neighborhood could be further leveraged both on a day-to-day basis and in emergencies. The core team includes SCOPE and USGBC-LA staff, as well as intuArch, Arup, Thornton Tomasetti, Turner Construction, Cal Poly Pomona and LADWP. The broader SCOPE community has been actively engaged through community workshops and meetings, neighborhood walks, and field trips to other sites to learn about emerging sustainability and resilience technologies.



[25] Scopela.org

Community meetings don't have to be boring or contentious. SCOPE hosts community members at a celebration and makes the visioning process fun.

Credit: SCOPE

One of the major discoveries in the systems assessment process was that SCOPE's facility is currently underused. Therefore, a significant retrofit is planned to help SCOPE better meet its core mission and serve the community in times of need. The retrofitted building will demonstrate emerging green and resilience technologies such as solar energy generation and storage, gray water capture and reuse, and atmospheric water harvesting. It plans to use these technologies to inspire and train local residents. It is reconfiguring its space to make it more adaptable to a wider array of training and community meeting needs, and it is exploring what it would mean to train its own staff and use its own facility for disaster response efforts.

Key lessons learned to date include:

- **The process doesn't always go in order.** As goals are set and plans are made, new team members become necessary. As implementation unfolds, goals and plans need to change.
- **There is value in addressing physical, social and economic systems at the same time.** While these aspects of the system require different sets of plans and strategies, linking them opens up new opportunities to maximize value that might otherwise be missed.
- **Good facilitation is key when working with the community.** Community meetings need a clear purpose, agenda and facilitator so that people feel their time is well-spent and their voices are heard.
- **Building a fortress is not the goal.** Assessment of the building revealed some code issues and limits to the structural system that restrict its role as a designated gathering space in case of earthquakes. Having that information lets the team decide which problems can be fixed and what should simply be planned around, making for better preparedness and flexibility.

Goals serve as guideposts, even as strategies change. Leveraging SCOPE's core work, its people and its facility in an integrative way will help it achieve its resilience goals over time.

**Performance Goals for Disaster Readiness, Response and Recovery:** It can be useful to set goals specific to different types of disasters to determine what level of readiness you want to plan for. This can be done both internally, within the organization, and with community stakeholders. Start by reaching out to local agencies, such as city emergency management departments, since many of them can provide information and technical support. The goals that you set in this area, and the level of detail required, will vary significantly based on the nature of your organization. For some organizations, it may be enough to know that their buildings meet basic fire and life safety codes, which ensure that people can escape after earthquakes or other disasters, but may not guarantee that the building will remain functional. Other organizations, such as hospitals or utilities that provide critical services, need detailed goals defining which buildings, equipment and core functions must remain safe and operational under different conditions.

The NIST *Community Resilience Planning Guide* includes detailed instructions for how to set performance goals related to disaster in its section "Step 3: Setting Goals and Objectives." [26]

Example of earthquake damage to an un-retrofitted soft first story building.

Credit: City of Los Angeles

## Did You Know? Los Angeles Now Requires Seismic Building Retrofits

Los Angeles Mayor Eric Garcetti teamed up with earthquake scientist Dr. Lucy Jones to look at how Los Angeles could become more resilient to earthquakes. They identified two building types that are particularly vulnerable:

- Pre-1980 non-ductile reinforced concrete buildings
- Pre-1980 soft first story buildings

If you own or occupy these types of buildings, retrofitting them should be a high priority, since they can collapse in an earthquake. Following the findings, the City passed an ordinance requiring retrofits. Soft first story buildings have seven years to complete construction on renovations; non-ductile reinforced concrete buildings have 25 years.[27]

[26] National Institute of Standards and Technology. Community Resilience Planning Guide for Buildings and Infrastructure Systems, Vol. I. Washington D.C.: U.S. Department of Commerce, May 2016. www.nist.gov/el/resilience/upload/Community-Resilience-Planning-Guide-Volume-1.pdf

[27] City of Los Angeles Department of Building and Safety. "Soft-Story Retrofit Program" and Non-ductile Concrete Retrofit Program." ladbs.org/services/core-services/plan-check-permit/plan-check-permit-special-assistance/mandatory-retrofit-programs

**Setting Objectives**

Objectives break goals down into measurable and achievable pieces. For example, if your goal is to become a recognized leader in resilience, your objectives might include the following:

- Providing all operations and maintenance staff with Community Emergency Response Team (CERT) Training[28] within one year
- Developing a program to ensure that all employees and contractors earn at least a living wage[29]
- Retrofitting and certifying the seismic performance of your buildings using either the U.S. Resiliency Council Seismic Rating System[30] or Arup's REDi Rating System[31] within the next three years
- Initiating development of a neighborhood-scale emergency response plan within one year using the Five Steps to Neighborhood Preparedness Plan[32] in collaboration with local community groups, businesses and residents.

*Credit: SCOPE*

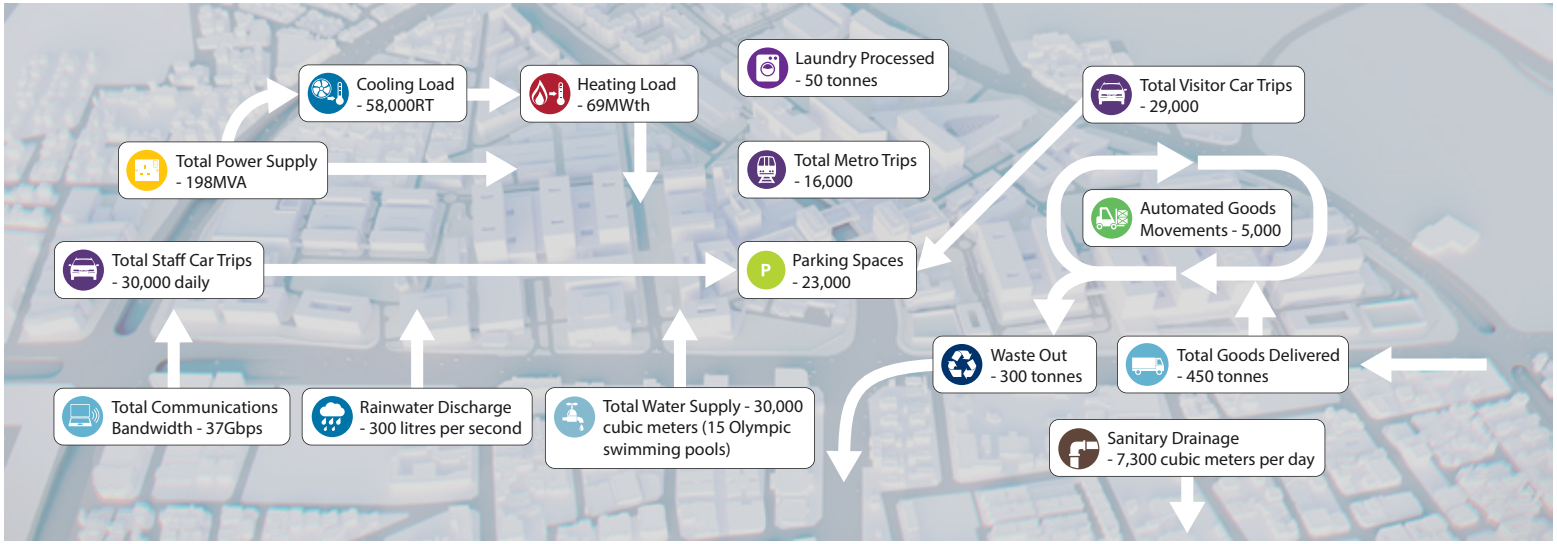
[28] www.fema.gov/community-emergency-response-teams

[29] livingwage.mit.edu

[30] www.usrc.org

[31] publications.arup.com/publications/r/redi_rating_system

[32] 5steps.la/the-5-steps




System Diagram of Hamad Bin Khalifa Medical City in Qatar Plans

Credit: Buro Happold

## CASE STUDY: HAMAD BIN KHALIFA MEDICAL CITY IN QATAR PLANS FOR CASCADING EFFECTS

The Hamad Bin Khalifa Medical City in Qatar is an existing healthcare campus undergoing a major renovation. The campus covers more than 25 million square feet, more than 10 million of which are a hospital. When completed in 2030, the facility will house nearly 70 percent of the country's healthcare facilities, and its ongoing operation is critically important to Qatar's well-being. Resilience, therefore, is essential. Buro Happold was engaged to provide a comprehensive approach to resilience planning.

The overarching goal of the project is ambitious: "Patients will be seen at the right time, in the right place by the right staff, for the right condition. They will receive the right treatment, delivered to the right standards with the least disruption to their well-being, within continually flowing service models." To get there, the facility needs to be prepared for any disruption and to ensure that it can respond and recover from any changes.

As part of this process, key risks were identified and prioritized. Of the 48 identified hazards, there were 15 high-risk hazards, 22 medium-risk hazards and nine low-risk hazards. These were grouped in terms of infrastructure impact and used to inform a business impact assessment across the entire master plan. The highest-risk hazards identified were:

- Pandemics and epidemics
- Natural hazards, including flooding and dust storms
- Infrastructure failures such as power outages and information and communications technology failure

Buro Happold created a detailed systems map to evaluate critical flows through the whole system and clearly define interdependencies, charting how disruption to one element can rapidly disrupt connected or dependent parts. This lets the relative risk to each component be clearly identified, along with the systemic risks that failure in any one element could cause. Simply put, it allowed every aspect of the site to be assessed in terms of risk and value to the whole system, which in turn allowed relative resilience demand to be measured per component. This assessment for what are often termed "cascading impacts" will allow a design that minimizes these risks and helps operators prepare for them.

## Failure Is an Option: The Safe to Fail Framework in Action

Cris B. Liban, D.Env., P.E.

Executive Officer, Environmental Compliance and Sustainability

LA Metro

In the realm of public infrastructure, there is a constant need to prioritize which structures are built; and to what extent existing structures are repaired or maintained to ensure the highest and best use of limited capital and human resources.

The Los Angeles County Metropolitan Transportation Authority (LA Metro) has incorporated the safe-to-fail framework in its resiliency program as a way of optimizing the utility and use of infrastructural investments. Under this framework, failure is understood and managed (where relevant) in a controlled and planned manner that facilitates rapid recovery. Most importantly, this recognizes the possibility that failure cannot be eliminated. This is a fundamental shift in the traditional concept of resiliency wherein hardening of assets to ensure continuity of service is often stressed.

LA Metro's Resiliency Indicator Framework (LA Metro, 2015) provides guidance to the agency's designers, constructors, and operations and maintenance professionals on how to incorporate a safe-to-fail framework into the project. Objectives of the framework may be "achieved through innovative design methods [to complement traditional, incremental risk-based design], or through specific 'modularity'. Modularity in the framework can be characterized by; a) system components having enough independence so that damage or failure of one part or component of a system has a low probability of inducing failure, or b) system components being constructed in a 'modular' manner that facilitates rapid rebuild / restoration following failure."

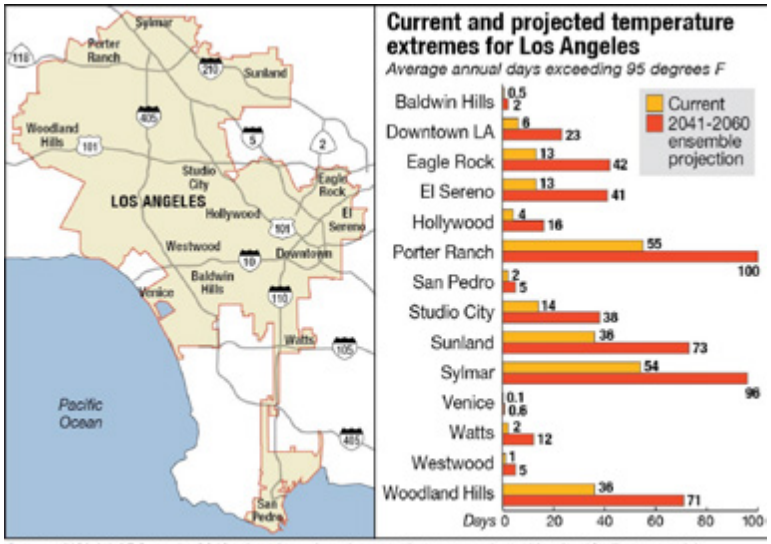
The safe-to-fail framework takes a different tone during implementation, however. In the case of a bridge project for example, would one under a safe-to-fail framework simply retrofit an existing bridge to allow for rapid rebuild/restoration and therefore continuity of service using the same aged infrastructure? Or would it be better to simply build a new bridge? It is a fascinating public policy debate that is worth watching.

The framework isn't restricted to infrastructure. It can apply to buildings as well as processes. The key is to recognize that disruptions are inevitable, and to plan accordingly to prevent cascading points of failure throughout a system.

## Key Resource: Enterprise Green Communities' Ready to Respond Tools for Resilience

Following Superstorm Sandy, Enterprise Community Partners developed a series of resilience tools to assist with preparedness, response and recovery. While these tools were specifically developed for residential property managers, they can be a useful starting place for many other property managers and organizations. The first tool is a short, anonymous survey that can help you quickly evaluate overall levels of readiness.

Other Enterprise resources include a Disaster Staffing Toolkit, Strategies for Multi-Family Housing Resilience (which focus on extreme weather and storm surges), and a Speaker Series Video Library with more than 100 videos on topics like building operations and maintenance, resilient energy strategies, resident engagement and planning for seniors. All of the tools can be found on Enterprise's Ready to Respond website.




Source: UCLA LARC study, 2012; chart based on the mean/average projected by the 18 climate models

Location matters.

This map shows the impact of climate change on projected high temperature days throughout Southern California. See research.atmos.ucla.edu/csrl/

Image courtesy of Alex Hall at UCLA.

***Keep in mind that situations are dynamic.***
*The more data an organization has the ability to collect, integrate and respond to changing situations, the more resilient it will be. The goal is not to collect a large quantity of data on one occasion, but to create a framework for capturing and making sense of incoming data on a day-to-day basis, one that can be used to make smart decisions when the time comes.*

# Step 3: Understand the Situation

Understanding the situation (sometimes called situational awareness) means having a realistic picture of the organization, its assets, and how the business or organization functions within the larger urban ecosystem. It begins with assessments and setting baselines, evolving over time as shocks and stressors arise.

The first step in understanding the situation is to collect existing information relating to the resilience categories within this guide. Existing business plans, sustainability plans, business continuity plans and emergency management plans are all useful items to gather. In addition, plans developed by local, regional or statewide agencies may be helpful, such as comprehensive plans, hazard mitigation plans, and recovery plans.

There are many ways to evaluate organizations, ranging from financial performance metrics to employee surveys. A resilience assessment might consider how an organization deals with emergencies, its capacity to adapt, what risks it faces, and the sensitivity of its core functions to disruption. The answers to these questions will vary widely depending on the type of organization. Office buildings, for example, have very different tolerance for disruption than hospitals, and will therefore have different management strategies, policies and levels of preparation.

**Assessing the System:** To fully understand the strengths, weaknesses, opportunities and strengths of an organization, it can be useful to break the assessment into specific elements, such as:

- **Organization identity and function**—what does an organization do, why does it exist, what is it good at?
- **Location**—where is the organization located and how does it fit into the geographic context?
- **Management and governance**—how is an organization managed and how are decisions made?
- **Plans and policies**—what plans and policies already exist that relate to, support or hinder resilience, and how is performance tracked?
- **Information and communication**—how does information flow through the organization during normal times and during emergencies?
- **Buildings**—how are buildings managed and maintained, and what conditions are they in?
- **Assets**—which assets are most critical, and what would happen if they failed?
- **Workforce**—who works for the organization (directly and indirectly) and what are their skill sets, resources, and working conditions? How do these compare to leading organizations in your industry?
- **Community**—who are the customers, neighbors, visitors, peer organizations and other members of the organization's communities, and what are their strengths, needs and vulnerabilities?
- **System**—how do all of the above interact with each other?

The purpose of these questions is to begin to understand your organization as a system. The answers don't necessarily lead to specific actions you should take. Rather, they help create a detailed portrait of your situation, and how the parts interact. From there you can start to identify critical gaps, relationships and synergies, and evaluate alternative strategies. You can also have a stronger baseline understanding from which to move forward and make decisions.

There are more example questions provided in the Appendix 2 that may be useful in your assessment process.

Assessing the system also includes understanding the different groups in your community, with particular attention to vulnerable community members. In some cases, community leaders will have the best information (particularly leaders of local organizations who do significant community engagement on their own). Census data and local government agencies can be useful sources as well. Beyond that, you can survey other members of the community, from rank and file workers to individual residents, to get a fuller perspective.

The National Association for the Advancement of Colored People (NAACP) has released a detailed set of indicators to evaluate social vulnerability to climate change.[38] This document can provide a good reference point for assessing the vulnerability of stakeholder groups. By finding ways to address underlying community vulnerabilities, you can create value for your organization as well as community resilience.

Answering these questions (and others that relate more specifically to your business) is a first step toward becoming a more resilient organization, informing you of where your vulnerabilities lie. Some answers will remain fairly fixed—the size of a building, for example. Others could change daily—such as the number of temporary employees or visitors on site.

From the information collected, decide which metrics are most important to track and measure, and at what frequency they must be measured in order to meet your resilience goals (as identified in Step 3). Record the metrics you select in your resilience plan (as developed in Step 4) and re-evaluate throughout the implementation process (Step 5).

Document baseline conditions based on the process you've completed thus far. This gives you a strong indication of what you have and what you need to do to improve your resilience. This can also be used to reflect conditions of resilience over time as programs are implemented.

## Key Resource: Assessing the Building and the Retro-Commissioning Process

Retro-commissioning is a process for evaluating and improving the efficiency of existing buildings, similar to a building "tune-up." It is a well-established practice in green building operations and has been shown to be extremely cost-effective. According to a study by the Building Efficiency Initiative, typical costs can range "from $0.13 to $2.00 per square foot, while payback ranges from 0.2 to 2.1 years. Overall energy savings can reach approximately 15 percent." [33] In some buildings with sophisticated automation systems, operators are moving toward a practice of "on-going commissioning," using sensors to identify problems in real time.

Typically, retro-commissioning focuses on mechanical, electrical and (occasionally) plumbing systems. Maintaining these systems promotes resilience by keeping the building in good working order and preventing GHG emissions. And the value of commissioning can be further leveraged in a variety of ways to support resilience, including:

- Inclusion of fire and life safety systems in the scope
- Verifying performance of energy generation and storage, backup energy systems, water harvesting systems, and the operation and quality of water storage systems
- Assessment and maintenance of critical or vulnerable system components
- Ensuring that the systems can be shut down safely, and that manual override capabilities are in order
- Synchronization with inspections of seismic or other structural protection measures

By linking commissioning, a core component of sustainable operations, projects can streamline the evaluation process while more effectively managing risk.

[33] Building Efficiency Initiative. "Retro-Commissioning: Significant Savings at Minimal Cost." 2013. www.buildingefficiencyinitiative.org/articles/retro-commissioning-significant-savings-minimal-cost

Metro owns a wide variety of assets, including Metro Headquarters building and Union Station.

Credit: Basil D Soufi

## CASE STUDY: LA METRO—ASSESSING THE SYSTEM OF TRANSPORTATION ASSETS

LA Metro is currently responsible for moving more than one million people around the region every day. Metro owns and operates numerous rail lines, bridges and tunnels that cross fault lines and flood zones. Some of its structures date to the 19th century. It is critical infrastructure upon which millions of lives depend.

In 2014, Metro performed a Climate Vulnerability Assessment (CVA) to identify the risks climate change poses to its critical assets. As a result of this and other climate adaptation efforts, it developed a set of resiliency indicators to be used in the agency's planning, construction and operational activities. It codified these indicators in the Resiliency Indicator Framework, an internal tool intended to help agency staff evaluate resilience of an asset, group of assets, or the entire agency, in order to help prioritize climate change adaptation implementation priorities.

The Framework identifies 20 technical and 41 organizational indicators. In evaluating a given asset, the assessor selects a score for each indicator on a scale of one (least resilient) to four (most resilient). Technical indicators are weighted according to a predetermined four-tier scale based on the agency's core values and priorities. All of the indicator scores are then compiled into one overall weighted resiliency score on a scale of one (least resilient) to 10 (most resilient). The purpose of the scoring and weighting system is to prioritize certain resiliency indicators t to ensure that the agency's limited funding will be channeled in line with its key priorities.[34]

This step of evaluating assets on the ground will help Metro make informed decisions.

[34] Source: AECOM. Resiliency Indicator Framework. Los Angeles County Metropolitan Transportation Authority, December 2015. media.metro.net/projects_studies/sustainability/images/resiliency_indicator_framework.pdf

*Some Important Tools to Help You Understand the Situation*

**Mapping:** Geography matters. An organization's location is a key to understanding the challenges and opportunities it will face. Corporations with multiple locations should evaluate geographic factors for each individual facility. Historical and current maps are essential to determine whether you are located in a flood zone or fire-prone area, a food desert or a place with limited access points. Maps can also inform you of nearby resources, area demographics and environmental conditions.

Keep in mind, however, that many maps are based on historic information and may not be sufficient to evaluate the future, particularly as the climate changes. New maps are being generated constantly to chart climate change predictions and these are important to consider. The Federal Emergency Management Agency (FEMA), for instance, is redrawing all of the flood hazard maps of the United States to reflect these new realities. These maps form the basis of many entitlement decisions and insurance rates.

**Risk Assessment:** Uncertainty creates challenges for businesses as they determine where and how to manage resources. Most organizations base decisions on past experience, but one of the surest certainties today as climate change unfolds is that the future will be different from the past. There are many tools to help organizations make rational plans in the face of uncertainty.

One way to evaluate the risks that organizations, buildings and their stakeholders face is to create a framework for evaluating relevant data points. There are many types of risk assessment, each of which has its own tools. These tools help you calculate the level of risk by identifying the types and sizes of hazards, their likelihood, and the vulnerability of the system. The diagram below, from FEMA's Ready.gov website, provides an example:

**Scenario Planning:** Scenario planning has long been used by corporations to plan for the future. It is an interactive process for exploring alternative, plausible futures and what those might mean for strategies, policies and decisions. It requires thinking about the contextual forces that are driving change and engaging multiple perspectives to brainstorm resilient solutions. Scenario planning is particularly useful because it enables participants to think through many aspects of a system and consider how they will respond to different kinds of change. In developing potential scenarios, the aim is not to predict the future but to better understand the behavior of the system as a whole.

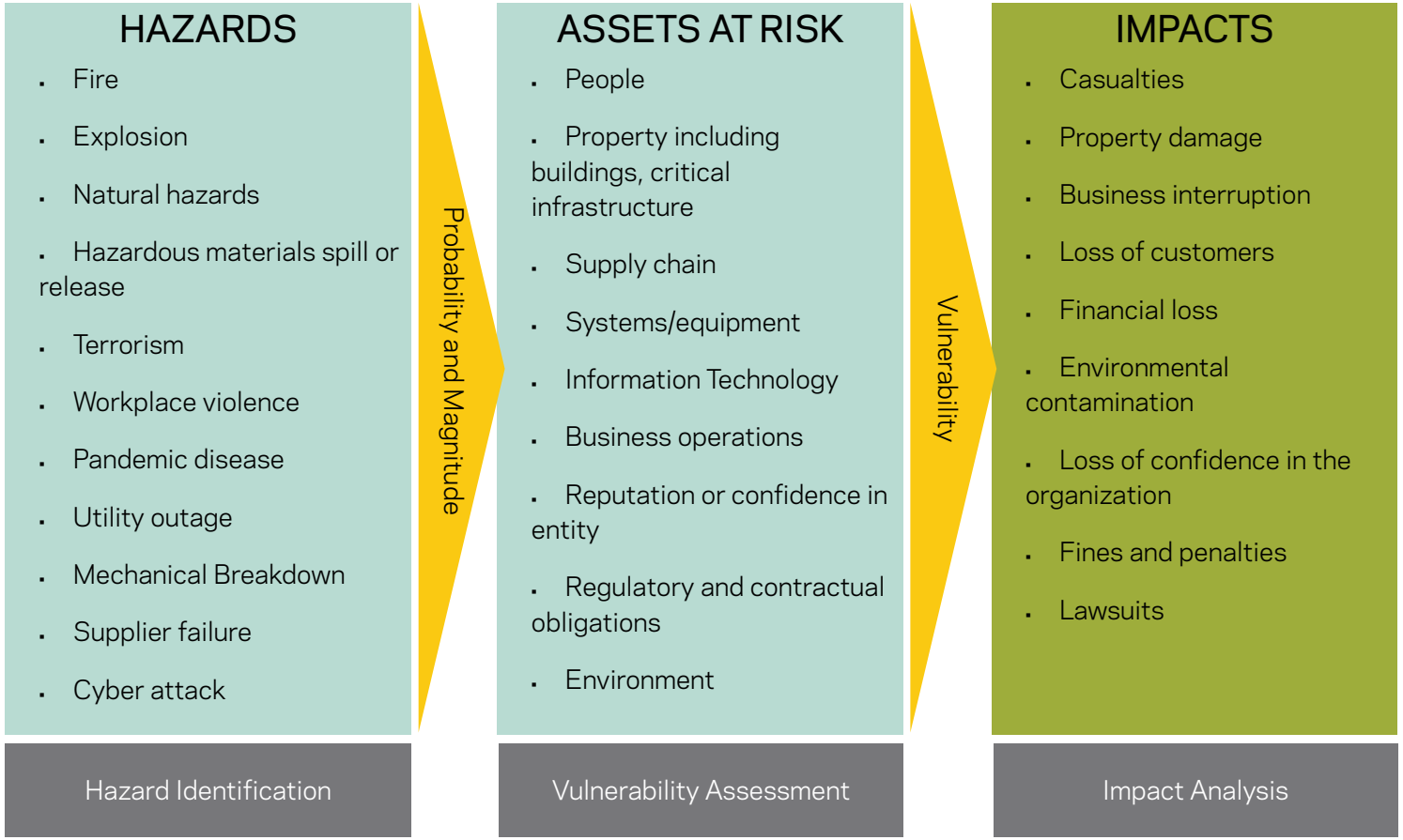
**Economic Analysis:** Any time an organization has an important decision to make about a potential project or initiative, some level of economic analysis is needed. Too often, that analysis focuses solely on first costs—for example, which piece of equipment is cheaper to purchase and install. The green building movement has helped broaden that discussion to include life cycle costs—such as, how much will each piece of equipment cost to own and operate over the life of the building? Reductions in utility

*As your understanding of the community deepens, be sure to bring that information back to the team. There is a strong relationship between understanding and engaging the community. Both are essential to building community resilience over time.*

## Key Tool: Buro Happold's Resilience Insight Tool

Buro Happold has developed an open-source tool that can be used by cities and organizations to better understand the hazards they face and the underlying vulnerabilities within their systems. The interactive tool allows users to identify key shocks and stressors and diagnose vulnerability and adaptive capacity in the areas of society and community, governance and economy, and environment and infrastructure. The tool then generates a report that can be used to help identify priority areas for improving resilience.[35]

[35] http://www.burohappold.com/what-we-do/specialisms/risk-and-resilience/resilience-insight-tool/




Ready.gov provides a number of free resources for businesses to evaluate and prepare for a wide variety of threats.


Partners Healthcare in Massachusetts is conducting a detailed climate risk assessment across all of its facilities.

Credit: Arup

## CASE STUDY: PARTNERS FACILITY RESILIENCY AND OPERATIONAL IMPACT STUDY

Lives depend on the on-going operation and resilience of healthcare facilities. Disasters like Hurricane Katrina and Superstorm Sandy have revealed that many healthcare organizations were not designed to withstand the kinds of disruptions they are likely to face in the future.

Partners Healthcare in Massachusetts is not waiting for the unexpected to catch it off guard. The nonprofit healthcare system has retained Arup, in collaboration with Woods Hole Group and the University of Massachusetts-Boston, to conduct climate risk assessments across 30 of Partners' healthcare facilities, including hospitals, community health centers, clinics and research-based laboratories. Assessments will involve the development of climate scenarios for sea level rise, storm surge, precipitation, temperature and wind, as well as identification of the types and general extent and intensity of these impacts on the facilities and overall operations.

Physical vulnerability assessments are being developed in collaboration with Partners' key stakeholders to determine the most at-risk operations in each campus. The resulting data will be used to understand the risks across the entire system, including the extent of preparedness for extreme weather events and seismic hazards. Understanding the hazards each facility might face, as well as the likelihood and the level of damage that could occur, can help organizations prioritize action and make sure they are prepared when the community needs them most.

## Risk Management, Insurance and Sustainability: Seven Things You Should Know

Steve Bushnell

Principal, Stephen Bushnell + Associates

1. Sustainability and risk management focus on pretty much the same issues. Managing your risk and developing green and sustainable strategies for your building or business both require a consideration of how you identify opportunities and risks and make plans to maximize one while mitigating the other.

2. Insurance is an important part of risk management, but your actions toward understanding and managing your risks are even more important. The right insurance program can enhance your green and sustainable strategies by better protecting your property, your tenants and the public.

3. Not all insurance policies are equal. Some insurance companies offer broader coverage for green buildings or even pay to make your property greener after a loss. There are also variations between insurers. Unless you get a zen-like peace from reading the small print on insurance policies, you should work with an expert insurance agent or a knowledgeable consultant to buy the best and broadest coverage.

4. Some insurance companies offer a rate discount for LEED certified buildings. Be advised, however, that pricing of commercial insurance can be very subjective and cyclical, changing from year to year. Availability of coverage is an issue too. Some building owners report that it is very difficult to buy insurance in wildfire-prone areas.

5. You can manage your risk and become more attractive to insurance companies if you become more resilient. This means recognizing the risks you face and taking action to mitigate them. For example, avoid combustible plants within 100 feet of your building if you are in a wildfire area. Or upgrade older electrical, plumbing and HVAC systems with new, energy-efficient, green and safer options. Interestingly, insurance company studies point to malfunctioning electrical and plumbing systems as the largest causes of property losses in older buildings. You can also protect the health and well-being of your employees, tenants and the public by implementing green cleaning practices and eliminating slip, trip and fall hazards on your property and parking lots. Manage your risks and get greener all at the same time.

6. Invite your insurance pro—your agent or consultant—to become part of your green/sustainability team. This is a great way to make sure the insurance companies understand what you are dong to manage your risks and improve your sustainability. The insurance expert might also give you some great out-of-the-box ideas about how to improve your sustainability strategies.

7. This means that you will find that you will get the broadest insurance coverage that is best for your business at the best price no matter what the insurance market is doing to your competitors and you will discover an important ally in your mission to become greener.

bills, for instance, are an important aspect of the return on investment that comes with more efficient solutions. Durability, flexibility and ease of maintenance can also factor into life cycle cost analysis.

Resilience planning is more complex because it requires planning for uncertainty. For example, it may cost more to install an advanced structural system than it would to build a minimally code-compliant building. How much will you save, however, when the stronger building makes it through an earthquake intact? The question then becomes: how big of an earthquake should you plan for?

The National Institute of Standards and Technologies (NIST) has developed a guide for thinking through these complicated trade offs, the *Community Resilience Economic Decision Guide for Buildings and Infrastructure Systems.*[36]

*Bringing It All Together*

There are many different ways to evaluate your current situation, what your strengths are, and where your opportunities lie. Many organizations regularly develop SWOT matrices (a planning tool to examine strengths, weaknesses, opportunities, and threats). This type of simple evaluation can be applied across the ecosystem of an organization to evaluate resilience.

When the assessment is complete, the core team and the stakeholders will have a better understanding of their organization's inner workings and the broader system in which it operates. At that point, it is time to begin making plans. Potential projects, policy changes and retrofits should be listed and prioritized according to need and level of effort. This list may feel overwhelming at first. The next section, "Setting Goals and Objectives," provides a framework for the process of setting priorities and making decisions.



[36] nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1197.pdf

# Step 4: Develop a Plan

Often when people think of developing a resilience plan, they think of emergency management plans. While emergency management plans are critical, they are only part of the picture. A resilience plan should go beyond the scope of an emergency management plan to include ongoing mechanisms for working with the broader community to mitigate hazards, build relationships, address underlying vulnerabilities, develop adaptive capacities, and share responses to disasters of different types.

There are many ways to cater resilience planning to the type of planning exercises your organization regularly performs.

| Traditional Disaster Preparedness Approach Focuses On: | Community Resilience Approach Focuses On: |
|---|---|
| **Individual households** and their readiness to respond to emergencies | **Community members working together** to respond to and recover from emergencies |
| **Disaster-specific** functions | Merging of other community efforts that build **social, economic, and health well-being** |
| **Government's response** in the first few days and weeks after a disaster | **Diverse network of government and nongovernmental organizations** in preparing for, responding to, and recovering from disaster |
| **Emergency plans and supplies** only | **Collaboration and engagement** of the whole community for problem-solving |
| Self-sufficient **individuals or households** | Self-sufficient community through **neighbor-to-neighbor connections and strong social networks** |

Source: Uscher-Pines, L., Chandra, A., and Acosta, J. "The promise and pitfalls of community resilience." Disaster Med Public Health Preparedness. 7(6) (December 2013): 603-606.

For some organizations, it may make sense to simply embed resilience plans into other planning processes. For others, particularly those who deal in high levels of confidential information, it may make sense to develop two plans—one that is internal and one that is community-facing.

Planning is an open-ended process. There is an endless number of strategies you could choose to implement, so how do you decide? There is, of course, no one right way. Relying on an organized process, however, can help you to better vet, select and commit to initiatives and establish mechanisms for ongoing implementation and improvement.

Remember that your plan is a form of communication. Whatever methods you settle on, your resilience plan should include at least the following:

- Team member roles and responsibilities
- Goals and objectives
- Strategies and projects
- Schedule
- Budget
- Metrics for evaluating performance
- Communication strategies

As you develop your plan, try to identify a mixture of easier and more challenging initiatives. Look for "quick wins" to build momentum, as well as ambitious goals that may stretch your knowledge or resources. Support collaboration and innovation. Consider a mix of physical improvements in the built environment, process improvements and training programs.

*Establish Criteria for Vetting Objectives and Projects*

As you develop your plans, you face an almost infinite number of potential projects and programs. To help decide which to take on, develop a list of criteria to evaluate each initiative. Criteria might include:

- Timeframe
- Cost (short and long term)
- Level of complexity/difficulty
- Ability to complete in-house
- Number of goals an initiative helps to further
- Number of stakeholder groups that it supports
- Opportunity for team-building or collaboration
- Visibility
- Transformative potential
- Criticality of targeted system

A spreadsheet can be helpful to keep track of your criteria, as well as your overall goals and objectives. You can score each item (high/medium/low or a number) to determine how efforts are proceeding. Such a document can be used to calibrate your team, helping stakeholders see resilience through a similar lens and bringing clarity to future projects.

Whatever form the plan takes, plans should outline strategies that:

- Mitigate hazards—take steps to reduce or eliminate sources of potential risks
- Address vulnerabilities—shore up the places that are vulnerable to risks that cannot be mitigated
- Build adaptive capacity—enable systems to respond to disruptions and recover quickly and fully

Appendix 1 includes a list of strategies that may be appropriate for different types of projects. The list is targeted toward Southern California, but can be readily adapted for other areas. In this guide, we are primarily focused on the process of how to evaluate and prioritize strategies, rather than defining exactly what those strategies should be, as they will vary dramatically across project types and locations. But essentially the strategies that you select will form the meat of your plans.

There are many topics that can be included in your planning process. Here are a few to address specifically:

*Emergency Management Planning*

There are many good tools already available for developing basic emergency management plans. For example, see FEMA's Emergency Preparedness Resources for Businesses and the LA Emergency Management's Five Steps to Neighborhood Preparedness.  The FEMA template focuses primarily on the internal organization. The Five Step plan focuses primarily on neighborhoods, and is typically driven by local residents. These plans provide excellent foundations for organizations wishing to participate in or lead community-scale preparedness efforts. Ready LA  also has useful information.

Emergency plans should identify roles and responsibilities during emergency situations. These roles can be populated entirely by organization staff, or in partnership with other organizations or community members. The important thing is that the people assigned to these roles clearly understand their responsibilities and have been properly trained in all related processes and procedures.

Emergency plans should not be lengthy documents that sit on the shelf. To be useful, they need to be simple, clear, and regularly used and tested. More important than creating the document is using it for regularly-scheduled trainings, table-top exercises and drills.

UCLA facilities workers push water away from buildings after flooding from a broken water main on Sunset Blvd. in 2014.

Credit: ajstream

## CASE STUDY: UCLA—PREPARING FOR THE UNFORESEEABLE

by Art Kirkland

Director of Emergency Management, UCLA

The University of California, Los Angeles sits on the edge of a desert. Although the Stone Canyon Reservoir sits just to the north of campus, due to its level of earthquake resilience, there is little danger of a rupture and resulting flood. UCLA does not sit in an area that is typically subject to flash flooding from mountain run-off. For all these reasons, flooding is not a hazard for which UCLA does extensive emergency planning. However, on July 29, 2014, a 90-year-old, 30-inch water main ruptured on the northeast border of the campus. More than 20 million gallons of water were released on campus in a period of just over 12 hours. Response to flooding was suddenly a priority.

The UCLA response to this flood was largely a success and there are a number of lessons learned that apply to any emergency, but especially to unplanned events such as this. These lessons relate to planning, communications and flexibility. As Dwight D. Eisenhower once said, "Plans are useless, but planning is indispensable."

UCLA did not have a plan for how to respond to a massive water main break. However, we do have plans for activating resources in an emergency as well as an established planning process. Within less than an hour of the initial notification of the flooding, the campus Emergency Operations Center (EOC) was open, operational and coordinating the response.

Members of the EOC had experience in working together in a number of different scenarios and had thoroughly practiced the incident response planning sequence. Even though the emergency was unique, the prior planning process allowed the staff to quickly develop plans and responses to the current emergency.

As George Bernard Shaw once said, "The single biggest problem in communication is the illusion that it has taken place." Communications during an emergency are tricky. Immediately upon verification of the extent of flooding, the UCLA Office of Emergency Management activated the BruinAlert system to notify constituents. Unfortunately, this system was designed to notify staff, faculty and students during the school year. At the end of July, a large segment of the population on campus was "none of the above." Prospective students tour campus with parents, camps of every nature are in session, and people come just to visit the UCLA campus. Additionally, the owners of the almost 1,000 vehicles parked in two flooded underground parking structures needed information specific only to them. Using non-traditional means such as Google and Facebook to reach out to constituents allowed staff to get the word out. More importantly, these methods allowed them to open a two-way conversation, providing the necessary information to the correct constituents. This process was vital to the success of the UCLA response.

"Semper Gumby (Always Flexible)" is the unofficial motto of Emergency Management. In this case, improvisation and adaptation were the keys to a successful response. Rather than starting from zero, being flexible and changing standing plans allowed UCLA to respond quickly. At the same time, refusing to hold on to a procedure just because it was established often leads to dysfunction. The art to this balance is deciding when to use exactly what you have, when to modify, and when to start from scratch.

Planning, communications, and flexibility did not ensure the success of the UCLA flood response in 2014. However, they were clearly contributing factors in what turned out to be a very successful response to a totally unpredictable event.

*Resilient Facilities Operation Planning*

Sustainable or green facilities operations and maintenance (O&M) is closely related to resilient facilities management, and efforts in one area can directly support the other. Green O&M can help reduce utility bills, reduce demand on energy and water infrastructure, and lower greenhouse gas emissions. It can help you detect and repair leaks quickly. It can also protect indoor air quality and reduce the amount of chemicals and pesticides used, keeping occupants and the environment healthy. Programs that encourage bicycling, purchasing local or non-toxic materials, or eating fresh food can promote health as well. The operational structures and processes developed for the LEED for Existing Building Operations and Maintenance certification can provide a foundation for this type of planning.

There are some aspects of resilience that are not captured by typical green O&M processes, however. Structural inspections, retrofits and inspections of emergency systems and supplies, for instance, are typically separate and are often forgotten. It is standard to have emergency kits on the premises, but less likely that those kits are adequate and freshly stocked. Supplying and refreshing emergency food and water supplies can help prepare for a disaster, and it is also helpful to develop relationships with local food banks or other organizations given that some supplies need to be replaced and could be donated on an annual basis.

Many sustainability measures can be made more resilient by thinking through the types of changes and shocks the building systems and community are likely to experience. For example, how will the building's HVAC systems perform under the effects of climate change? What will happen to the building's automation system if the power goes out? If a project includes on-site clean energy generation (such as solar panels), explore whether that system could be used for backup power.

In cases where a green O&M program already exists, look at existing strategies through the lens of resilience goals. Where no green O&M program is in place, resilience planning can illustrate opportunities for developing one. For example, if a building needs significant seismic retrofits, it may make sense to conduct green retrofits at the same time.

SCOPE brings community members on a tour of the LADWP Smart House so they can see for themselves what a resilient energy future can look like.

Credit: SCOPE

## CASE STUDY: FOR A HIGH RISE IN SAN FRANCISCO, PLANNING FOR SEISMIC PERFORMANCE IS ESSENTIAL TO GOALS OF RESILIENCE, SUSTAINABILITY AND EXCELLENCE

Building codes focus on life safety to protect people following an earthquake. Significant damage to structural and architectural components are allowed, as long as the occupants can safely get out alive. But there is no requirement that the building is re-occupiable or even repairable after this earthquake scenario. According to research conducted by Arup and Stanford University[37], state of the art high-rise buildings that meet current seismic codes are still expected to require significant costs to repair and to suffer almost two years of downtime after a major quake. Many developers, and the general public, are surprised that the code requirements are not more stringent.

When the development team from Jay Paul Company began the design of 181 Fremont in downtown San Francisco, their goals were to provide high levels of sustainability and an excellent tenant experience. They did not see the code performance level as consistent with these goals because buildings that must be vacated for two years following a major earthquake are neither green nor high-performing for their tenants.

181 Fremont is a 56-story mixed-use building that will be the tallest residential building on the West Coast and the second tallest in San Francisco when it is completed in 2017. It is being constructed to meet LEED Core and Shell Platinum certification, and includes an innovative on-site gray water treatment system that will be used for irrigation and toilet flushing. Jay Paul Company instructed architect Heller Manus and structural engineer and resilience consultant Arup to design the building to meet the resilience-based seismic design and planning approach outlined in the Resilience-Based Earthquake Design Initiative (REDi™) Rating System. The project will achieve a Gold rating, which is designed to allow re-occupancy within days after a major earthquake and functionality once utilities are restored. REDi was developed by Arup to provide a framework for owners, architects, and engineers to implement "resilience-based earthquake design." According to Arup, the innovative structural design actually saved 3000 tons of steel (25% of the building weight), which further supported sustainability goals.

Other resilience measures include additional protection of architectural components (such as facades), elevators and stairs. Measures will also be taken by the owner to prepare for quick recovery, including retention of a structural engineer who can make rapid post-earthquake inspections, and training of building personnel to follow emergency shut-down and re-start procedures for elevators, because waiting for outside vendors to perform these functions can take weeks. All combined, these measures raise the bar not only for seismic resilience but for our very understanding of what a high-performance building should do.

An image of 181 Fremont in San Francisco, showing its innovative structural system.

Credit: Heller Manus Architects



[37] *www.structuremag.org/?p=10005*

Civic engagement is a sign of a resilient community. SCOPE hosts get out the vote parties.

Credit: SCOPE

*Community Engagement Planning*

Community engagement can be one of the more challenging aspects of resilience-building. People across communities can have widely different interests, different life experiences, and different access to resources, which can lead to conflict. It can be helpful to build into your plans ways to identify and work with different stakeholder groups. It is also important to develop ways to handle conflict. Think about ways to leverage aspects of resilience to bring people together. For example, if you are going to install a gray water system, can installation be used as a training opportunity that includes local workforce development groups?

Particular attention should be paid to working with vulnerable populations, who will experience a disproportionate impact from shocks, and already bare the brunt of many stressors, including low income communities, communities of color, immigrant populations, children, the elderly and populations with disabilities or other health issues. Consider where these populations are represented in your broader community and how they interface with your organization or building. What resources do you have or might you put in place to support them, both on a daily basis or during emergencies?

Many organizations do not have the in-house staff or skill sets needed to manage a productive community engagement process. Your plans should identify your strategies for addressing this, whether you plan to rely on informal engagement or launch a more in-depth process with community partners or facilitators. For many businesses, community engagement may simply start by sitting down with one or two local organizations, such as community councils, government agencies, religious organizations and other nonprofits, to brainstorm common concerns. The simple act of bringing people together can be a great start.

## CASE STUDY: LITTLE TOKYO AS AN ENDURING COMMUNITY ADVOCATE

Sometimes threats to a community come not from disasters but from otherwise good ideas. In 2000, with the advent of the Metro rail expansion, the residents of Little Tokyo became concerned that if the rail system were to be built above ground, their community could disappear. Little Tokyo was established in the 1880s by Japanese immigrants and had survived threats ranging from Japanese internment to ongoing development pressures. Under the umbrella of the Little Tokyo Community Council, local businesses and residents sought to find a better way to address future potential conflicts with developers. The Community Council brought together nearly 100 stakeholders with various perspectives and influence, both inside and outside Little Tokyo, giving each a single vote in decisions.

In 2013, the Council included over 200 people in a design workshop to re-envision Little Tokyo, with the goal of asserting a local identity. Participants understood that small businesses were at the heart of the community and its well-established culture. Their goal became one of place-keeping to maintain relevance in a fast-changing urban setting. Their working definition of sustainability was built on the pillars of culture, history, economics and the environment. They found new ways to work with agencies and developers through partnership rather than conflict.

An analysis of the Metro rail expansion through Little Tokyo helped the Council realize that people will move through and within the community differently in the future. This change will impact the future need for parking spaces, freeing up space that could be used for other purposes. The Council partnered with UCLA on a mobility study to understand how people will visit Little Tokyo in the future in order to bolster local business plans. It explored opportunities to use space that will become available for solar power, storm water management, urban agriculture and waste management.

The Council moved from a reactionary body to one that is proactive and visionary. Agencies like Metro have likewise become more transparent about the processes they must follow. As a result, trust between community businesses and outside entities such as Metro has improved and the groups are better able to work through challenges when they arise.

Structure helps move decisions forward. Equal voting power on the council gives small businesses a voice that could otherwise be lost to large, well-funded organizations. Creating opportunities for real and meaningful engagement builds understanding and this is needed in both directions—the community informs Metro about the Japanese culture of the neighborhood and Metro helps the community understand the technical language and regulatory processes it must adhere to. Their work together over the years has resulted in a foundation of trust for multiple stakeholders—public and private—to find integrative and mutually beneficial solutions.

Little Tokyo Watchtower in Japanese Village Plaza

Credit: Stephen Friday

*Business Continuity Planning*

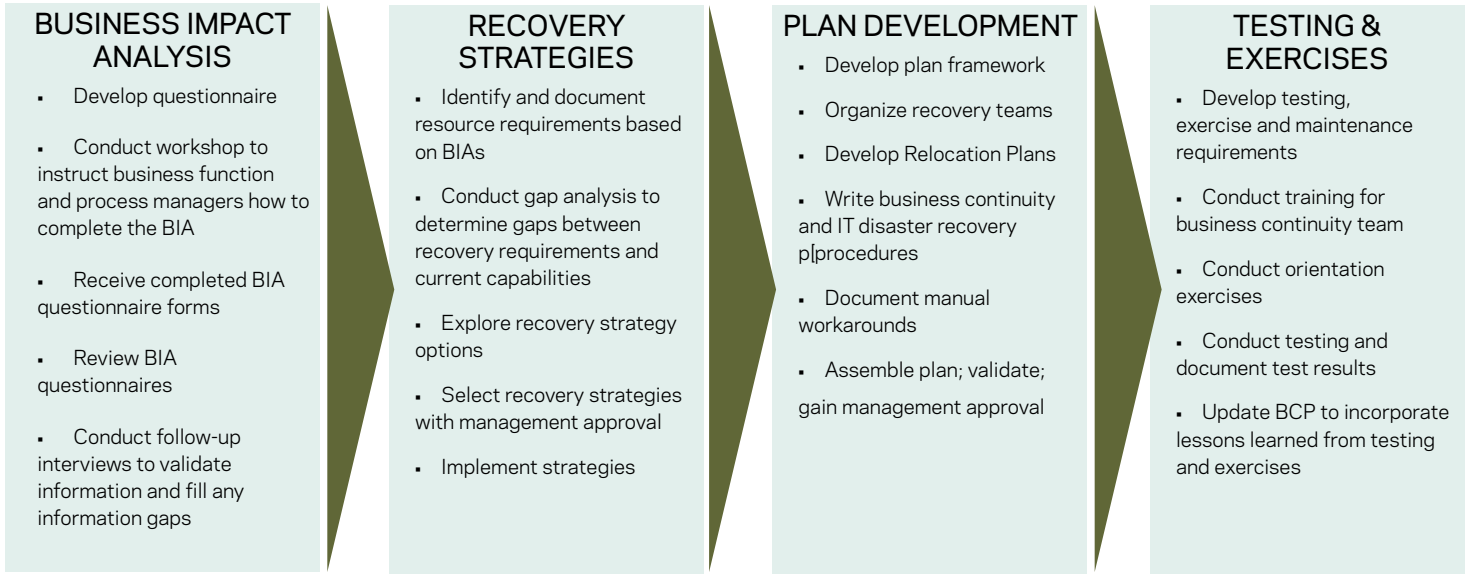
Business continuity planning is becoming increasingly common in large organizations. With more-sophisticated technology leading to increased inter-connectivity, businesses have become both more resilient and more vulnerable. For example, organizations with offices around the world can shift operations from one place to another in the face of on-the-ground disruptions or disasters at one location. On the other hand, cyber-attacks can be more devastating than the actual loss of a facility, since they can hamper all operations globally.

Resilience plans should include identification of the most vital organizational functions and the processes that must be initiated in cases where those functions have been disrupted. FEMA's Ready.gov breaks business continuity planning into the following steps:

*Planning for Continual Improvement*

Recall that each of the steps in the resilience process is itself a resilience strategy. That means that when you finish your plans, you are only at the beginning.

One tool that can help organizations plot a course for ongoing capacity-building and process improvement is the Capability Maturity Model (CMM). CMM was initially developed as a methodology for developing software, but it can be readily adapted to support the improvement of a variety of processes. The model can be used to help organizations chart their course along increasing levels of "maturity," from ad hoc approaches to fully integrated and optimized processes. The maturity levels are typically labeled one through five, and these levels are charted across the columns of a spreadsheet (see table). Goals are then charted along the rows. Each goal is broken into clusters of activities that, when performed, will result in the




Source: www.ready.gov/business/implementation/continuity

## CASE STUDY: WORKING WITH LOCAL PARTNERS TO LEARN FROM DISASTERS—PLANNING FOR RECOVERY AND PREVENTION

After Hurricane Sandy, the Southwest Brooklyn Industrial Development Corporation (SBIDC) commissioned Dewberry to conduct an assessment of what happened to three kinds of small businesses representative of the area: light or artisan manufacturing facilities, mid-size manufacturing facilities and restaurants.

Red Hook, a southern Brooklyn neighborhood with a history as a port and trading center, was hit hard by the storm. The area had avoided a major disaster for decades, even though historically significant storms have hit the area once or twice a century. Along the waterfront, businesses were inundated with 6 – 8 feet of water, fully submerging many basements. The electrical grid and transportation system also suffered significant damage. Recovery was hindered by a lack of in-place recovery programs and mechanisms. Because outside support was slow to come, several local organizations and businesses stepped in and self-organized to provide basic services like meals, debris removal, cleaning and sanitizing, fundraising, communication, networking and the issuance of small recovery grants to businesses.

Dewberry's hazard mitigation report outlines a variety of permanent, ongoing and temporary mitigation measures that could be readily implemented in typical Brooklyn small business building spaces at low cost based on the damage they observed in these representative businesses. Recommended retrofits focus on both permanent and temporary wind protection, flood protection, and the protection of electrical, plumbing and data systems. Recommendations also included retrofits of electrical infrastructure and municipal tree trimming that the businesses could not implement themselves, so that community members could come together and organize for those measures. A companion Storm Preparedness Guide outlined ways small businesses can evaluate their hazard exposure and risk, develop an emergency preparedness plan and more fully strengthen business operational practices to reduce impacts of significant storms and emergencies, reducing downtime and impacts to the business and its workforce.

By working in detail with the SBIDC, multiple businesses were able to benefit from detailed inspections and recommendations focused on a few representative members. The cost information enabled other businesses to prioritize action and plan ahead for future storms. A one-day community workshop was conducted at the end of the project to introduce hazard mitigation and storm preparedness concepts to participants. This allowed other Brooklyn small businesses and community leaders to observe mitigation strategies as well as connect with their neighbors to develop their own mitigation and storm preparedness strategies.

Red Hook, Brooklyn was severely damaged by Hurricane Sandy.

Credit: Michael Fleshman

achievement of a defined goal.

We have charted each of the resilience process steps used in this guide as goals, and demonstrated which clusters of activities might signify increasing levels of maturity for each one.

Note that this table is meant only as an example. Organizations will need to determine for themselves where they are starting from, where they hope to get to, and what clusters of activities will successfully get them there.

*Approving and Adopting Plans*

One of the most important aspects of any planning process is creating will and alignment around a purpose. Team development and stakeholder engagement throughout the planning process can help ensure that the plan reflects the needs and resources of the participants while minimizing unwelcome surprises for any sector of the community. The collaborative process can prevent shock when the final plan is released. Even the best plans can be rejected if they are developed in a vacuum, in isolation from critical stakeholders. Top-down leadership is essential, as is support from the people responsible for carrying out day-to-day implementation.

# CAPABILITY MATURITY MODE

## CAPACITY LEVEL

| Activity | 1 (Getting Started) | 2 | 3 | 4 | 5 (The Vision) |
|---|---|---|---|---|---|
| **BUILD A TEAM** | Core internal team established | Core internal team working in ad hoc way with all departments; emergency staffing established; ad hoc engagement with some external stakeholders | Core internal team working regularly with all departments; emergency staff train together sporadically; regular engagement with diverse external stakeholders | Core internal team includes active champions in all departments; emergency staff train together regularly; regular engagement with diverse external stakeholders; community-wide partnerships developing to address vulnerabilities and prepare for shocks | All organization members are empowered around resilience; stakeholders including vulnerable populations actively participate in community building and have a voice in decision making and a sense of interdependence |
| **SET GOALS** | Organization has a clear mission statement and guiding principles | Organization has established internal resilience goals and engaged stakeholders to begin establishing shared goals | Clear goals and objects established for internal operation and shared goals and objectives with community and received buy-in from all relevant stakeholders | Organization has interrelated goals around resilience with clear and achievable metrics and targets that include stakeholder input | Organization regularly revisits goals and targets to track achievement and update with participation from stakeholders |
| **UNDERSTAND THE SITUATION** | Some assessments of baseline conditions across organization, building and assets, and community completed | All assessments of baseline conditions across organization, building and assets, and community completed and updated on ad hoc basis; information and communication gap assessment across internal departments and external stakeholders completed | All assessments of conditions across organization, building and assets, and community completed and updated regularly; plan developed to address information gaps across internal departments and external stakeholders; emergency communication plan developed | All assessments of conditions across organization, building and assets, and community updated regularly and shared effectively across organization; processes implemented to address information gaps across internal departments and external stakeholders; emergency communication plan implemented | Timely information about physical, social and economic systems shared and understood across internal and external stakeholders in a way that facilitates adaptive decision making, alleviation of stressors and effective response and recovery from shocks |

# CAPABILITY MATURITY MODE

## CAPACITY LEVEL

| Activity | 1 (Getting Started) | 2 | 3 | 4 | 5 (The Vision) |
|---|---|---|---|---|---|
| **DEVELOP PLAN** | Organization has plans around some areas of operations but not necessarily tied to resilience or to each other | Organization collects and evaluates existing plans and creates bridges between gaps. Begins engaging stakeholders to develop shared plans. | Organization has developed resilience plan focused on short term objectives, begins developing neighborhood emergency plans and other basic shared objectives | Organization has woven resilience into all operational plans and planning efforts and includes details to implement short/ medium and long term goals. Has received input on internal plans from stakeholders, and has participated in or led neighborhood resilience plans | Organization has living plans that are distilled for regular use and are understood by all stakeholders. Plans enable synergies across internal and external systems in an on-going way. Plans are updated regularly to continuously improve performance and support internal and external stakeholder engagement. |
| **IMPLEMENTATION** | Organization begins implementing simplest and easiest strategies aligned to implementation plan | Organization implements more difficult strategies aligned to implementation plan; regularly maintains critical systems, meets sporadically with community. | Organization implements most difficult resilience strategies aligned to implementation plan; has regular maintenance and inspection, implements regular trainings, meets regularly with community. | Organization has a well-established implementation calendar to review implementation of resilience strategies and updates implementation plan, works actively on building teams internally and externally. | Organization actively engaged in process improvement efforts across all categories with all stakeholder groups including mechanism for adaptive implementation plan; has mechanisms for real time response to wide range of events; all stakeholders feel vested in and regularly participate in resilience efforts. |

## CASE STUDY: TOYOTA AND THE KAIZEN OF RESILIENCE

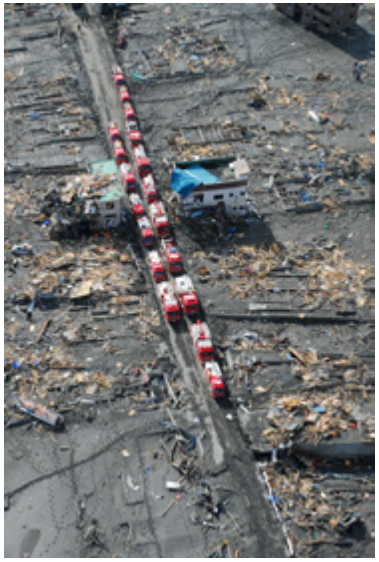
When the Tohoku earthquake and tsunami ballooned into the Fukushima Daiichi nuclear disaster in 2011, the Toyota Motor Corporation was already renowned for its efficient supply chain and continually-improving (kaizen) production principles. But the disaster still exerted a terrible toll.

The company's ultra-efficient just-in-time manufacturing process was put on hold for months as factories in northern Japan struggled to reopen. Toyota's sole computer chip supplier could no longer deliver once its only factory had been destroyed. During the previous fiscal year, nearly 60 percent of Toyota's vehicles had been manufactured in Japan. Without backup sources for critical components, production and global sales plummeted.

In Fukushima's wake, Toyota made resilience a hallmark of its business strategy. It found ways to incorporate strategies like flexibility, redundancy and community engagement into its kaizen framework. Taking a deep survey of its supply chain to identify weak links, the company created RESCUE (REinforce Supply Chain Under Emergency), a database of information on how more than 6,800 standardized parts move through the production process. If one supplier goes out of commission, RESCUE ensures that a workaround can go into effect.

Toyota's current business continuity plans stress communication, with both suppliers and the wider community. Since 2011, the company signed multiple disaster support agreements with local municipalities such as Toyota City, Miyoshi City, Tahara City and Susono City, focusing on those at higher risk. By agreeing to provide resources like vehicles and electricity to the areas around its facilities, Toyota can increase the pace of recovery after a disaster, helping its own operations get back on track faster. When two earthquakes hit Japan's manufacturing belt in April 2016, Toyota's semiconductor supplier Renesas Electronics was ready to immediately transfer production to an undamaged plant if its main one went offline.

Toyota understands that maintaining supply chains is only part of the story. It also works to take care of the communities where its materials come from. By planning to support the people, the businesses, the materials and the infrastructure, Toyota is working to put whole communities on the path to recovery.[37]



Emergency vehicles staging in the ruins of Sukuiso Japan following the tsunami in 2011 that caused widespread damage to Northern Japan

Credit: US Navy

[37] For more on Toyota's risk management plan, see http://www.toyota-global.com/sustainability/csr/governance/risk_management/.

# Step 5: Implementation and Maintenance

Implementation is rarely one monolithic activity. Most resilience plans will involve a variety of activities implemented by different groups of people in different ways over different time periods. The best approach is to build momentum with early wins and move forward at a rate you can sustain.

Implementing a resilience plan may require some tinkering. To be effective, be sure that the systems you've put in place actually work and make adjustments to those that do not. Set up the required governance, define implementation performance metrics and agree on control measures. It's best to delineate these measures in the plan development stage, so it is only a matter of execution when the time comes. If minor adjustments don't fix the rough edges, refine your approach until you find a system that works for your organization. Look for solutions that require the simplest processes, the fewest number of steps, the smallest number of moving parts.

## *Implementation Phasing*

Routine inspections and regular maintenance are important aspects of resilience. Create an implementation calendar that regularly cycles through your entire system—everything from the retro-commissioning of HVAC systems to testing emergency alarms.  Select dates that make sense for your organization and are easy to remember. Perhaps you schedule the assessment of key performance metrics in time to share at company meetings or to include in corporate social responsibility reporting forms. Schedule community events to coincide with other local occasions, such as sporting events or art walks. Set the date for the annual donation and replacement of emergency food supplies on your boss's birthday. Whatever works for your team.

Some resilience initiatives, such as retrofits, equipment installation and other capital projects, may require hiring specialized consultants or firms. Other initiatives, such as ongoing maintenance, security, supplies or food programs, may require hiring sub-contractors. Look to support other organizations that share your community resilience goals, for example by hiring locally and selecting firms with fair and sustainable labor and business practices. Look for partners you can work with over time, and bring these partners into your resilience process.


The La Kretz Innovation Campus provides a bike share program for its occupants to promote alternative transportation and public health.

Credit: LA Cleantech Incubator

## CASE STUDY: LA CLEANTECH INCUBATOR PROVIDES A LABORATORY FOR RESILIENCE

Developing a green economy is one of the most promising strategies for making the LA region better overall. That means an economy that generates good jobs, encourages distributed and clean technology, and facilitates the transition away from fossil fuels.[38] That's why the City of Los Angeles, the LA Department of Water and Power (LADWP) and many other partners came together to form the LA Cleantech Incubator (LACI). LACI incubates close to 30 emerging cleantech companies, providing them with mentorship, support and resources as they form, develop and grow. Portfolio companies work on a wide range of emerging technologies, from energy storage and next generation batteries to atmospheric water harvesting and "living machines" that produce healthy food, pure water, and renewable energy.[39] LADWP has also located its own R&D lab on site.

To house this program, LACI renovated a 60,000 square-foot 1920s warehouse in Downtown LA's Arts District to form the La Kretz Innovation Campus. The building is made of unreinforced brick. In order to meet seismic requirements, a supporting steel structural system was required. The facility now includes an advanced prototype manufacturing center and equipment, laboratories and machine shop. The site has a 175 kilowatt photovoltaic solar canopy, a first-of-its-kind grey water filtration and reuse system, bioswales and stormwater capture, a cool roof and micro-grid system, and is pursuing LEED Platinum. All of these elements contribute to sustainability and resilience of the physical campus.

The La Kretz center also fosters social capital. The collaborative workspaces, open offices, conference rooms, event spaces and informal gathering spaces offer opportunities for connection. In addition to the portfolio companies, La Kretz offers space for local companies and non-profits (including USGBC-LA's Building Resilience-LA program). This supports an environment of collaboration and innovation for building occupants and visitors.

LACI is dedicated to continual improvement. Next on the agenda are initiatives to support diversity and to develop integrated emergency management plans and programs.

[38] United Nation Sustainable Development Knowledge Platform. "Green Economy." sustainabledevelopment.un.org/index.php?menu=1446

[39] laincubator.org/companies

## CASE STUDY: METRO BRINGS IT ALL TOGETHER

Lack of access to fresh, healthy food has been linked to obesity and other health problems. Areas that lack such access are called food deserts, defined by the US Department of Agriculture (USDA) as urban settings that do not "have ready access to fresh, healthy and affordable" food. Food deserts abound across the LA area, particularly in lower-income neighborhoods, where there are far more fast food restaurants and liquor stores than grocery stores or produce markets.

LA Metro is a transportation agency, not a food provider. But it understands that in order to be the most effective at providing transportation, it must take the whole system of community needs into account. So it formed a team. In 2013, Metro joined with the City of Compton, Green Hope USA and Urban Leaderpreneurs to address Compton's designation as a food desert. As a result of this partnership, Metro decided to examine the entire Blue Line for where local partnerships to create mobile, virtual, and farmers' markets could reduce food deserts, improving the health of the local community through access to healthier food.

To understand the situation, Metro studied the Blue Line by:

- Mapping the distance between rail stations and healthy food;
- Surveying nearly 400 patrons about current shopping habits, perceptions about food and preferences;
- Researching a variety of food solutions, ranging from mobile and virtual markets to farmers' markets;
- Reaching out to local partners who could manage local programs; and
- Examining potential impacts to the stations and the community.

Metro set goals around improving access to farmers' markets and other fresh food sources along its routes, and it made plans focused on communication and partnerships. Now it is working with partners to implement the following strategies:

- A communications campaign aboard buses and trains to inform the public about scheduled farmers' markets located within walking distance from a Metro stop.
- An on-line interactive map of farmers markets near Metro Rail and Transitway stations.
- Direct work with the farmers' market at the Compton station along the Blue Line to expand from a seasonal to a weekly event.
- A 10% discount program for all Metro Blue Line riders who shop at the farmers' market in the Compton Station.

Overall, the program is simple, but the potential benefits are huge. As a result of engagement, Metro expects to increase ridership, improve public health, support local farmers and the local economy, and build community.

Metro marketing materials promote farmers markets to riders and ridership to market-goers.

Credit: LA Metro


## *Bounce Forward*

Implementation isn't the end of the resilience process, and planning isn't over once implementation starts. In order to ensure continuous improvement, you will need to connect with your team, evaluate the situation, make plans and implement decisions that meet your goals on a regular basis.

A strong resilience program will help you roll with disruptions and rebound from disasters. Understanding the situation can help you anticipate disruptions and prepare for them before they happen. It will give you real-time information that can save lives and property when disaster strikes. Make sure those information flows are open and functioning properly, and that backup communication plans are practiced regularly as part of the emergency preparedness regimen.

But don't stop there. Be ready to capture those moments of disruptive change, when people are most likely to be open to new ideas and solutions, to working together and investing in the future. Nobody should hope for a disaster, but we can make ourselves ready to leverage disaster toward a brighter future when it does occur—toward a future that is just, sustainable, healthy and resilient.

The site of the Newport Beach Civic Center and Park utilizes vegetated swales with check dams, and bioretention basins to promote biofiltration, infiltration, and retention. The wetlands provide attenuation of stormwater run-off, protecting downstream properties from flooding during extreme rain events. This not only provides hazard mitigation by reducing flooding, it also provides habitat, open space and supports local water supply

Credit: David Wakely

# Appendix

# APPENDIX 1: SAMPLE STRATEGIES

Developing a framework for making decisions and implementing initiatives in a logical way is essential to resilient operations. However, a framework doesn't answer the question of what exactly you need to do in a given circumstance. The answer to that question depends entirely on where you are, what you do, and what you want to accomplish.

There are many excellent resources available that outline specific resilience technologies and strategies. Some are specific to building type and region. For example:

- **The Enterprise Green Communities Strategies for Multifamily Building Resilience** provides detailed guidance for residential buildings. It is primarily targeted toward buildings that are subject to sea level rise, storm surge and extreme storms.

- **The Institute for Sustainable Architecture's Envision** incorporates resilience and sustainability strategies into the design of infrastructure projects.

- **Arup's REDi Rating System** and the **U.S. Resiliency Council's Verified Earthquake Rating** each take different approaches to protecting buildings from earthquakes.

- **RELi** modeled after LEED, is a comprehensive list of resilient design criteria. It is extremely broad and includes strategies for a wide range of issues across multiple hazard types, with a primary focus on building design.

Below are brief summaries of several measures that may make sense in Southern California. These summaries are not meant to be comprehensive but to offer snapshots of key regional priorities. Where possible, we have provided links to more detailed guidance from other sources:

# SHELTER

Buildings provide context and structure for our daily activities and operations. They also provide shelter during emergencies. Whether or not your building is located in a high-hazard zone, there are actions you can take to plan for and mitigate disaster. Create an indoor environment that is safe and healthy for building occupants. Structure your space to support and adapt to ongoing organizational demands. Consider how the building might best serve occupants and neighbors in an emergency. What would happen if the building were deemed unfit for occupancy? Where would the occupants go and what would happen to your organization? On the flip side, what would it take for your building to become a shelter for the displaced occupants of other buildings?

**Resilience Strategies**

1. Choose safe locations

   a. If selecting a new building or site, look for one that is not in a high-hazard zone

   b. Mitigate local hazards to the extent feasible

   c. Make sure you have appropriate insurance coverage, including earthquake insurance

2. Verify the condition of the building's structure and services

   a. Inspect and if necessary retrofit buildings to meet seismic standards; consider the level of seismic resilience appropriate to business functions and use the REDi or U.S. Resiliency Council's rating system to determine the expected seismic performance

   b. Engage a structural engineer to inspect the building prior to any earthquakes so that he or she can recommend retrofits and maintenance measures and be on-call to inspect the building after an earthquake to speed re-occupancy; ensure the inspection includes not only the primary structure and façade connections, but also secondary elements used to secure finishes like ceilings, lighting, and equipment

   c. Address any structural issues that could be impacted by other hazards, such as storms or erosion

   d. Perform an existing conditions survey on the building's mechanical, electrical and lighting, plumbing, fire alarm/protection, security/access, and data/IT systems to identify code compliance issues, aging systems and equipment, and leaks or potential faults; use the survey to prioritize upgrades to address potential vulnerabilities

3. Promote daily performance and address underlying vulnerabilities

   a. Create a flexible, adaptable and healthy workspace to support core business functions

   b. Verify and maintain indoor air and water quality

   c. Provide space for collaboration and interaction between internal and external stakeholders

   d. Use durable, flexible, non-toxic furniture and finishes

   e. Ensure that building operators are well-trained in the resilient operations of all building systems

   f. Implement a regular inspection and maintenance schedule that includes basic performance as well as emergency systems and supplies

   g. Provide shaded exterior areas, particularly along walking routes and transit connections to protect the health of occupants during high heat days

   h. Provide programs and processes to support worker health and well-being

   i. Support human rights, diversity, a living wage and equal opportunity to all workers and contractors

j. Support local hiring initiatives

4. Enable passive survivability

a. Design or retrofit buildings with passive solar strategies to protect thermal comfort in the event of a power loss

b. Provide windows that open to ensure buildings can be adequately ventilated even during a power loss

c. Store and properly maintain emergency supplies, food and water for occupants and other stakeholders that will last 72 to 96 hours after a disaster strikes

d. Design redundancy, backup and manual functionality into all critical systems

5. Prepare for community disaster response and recovery

a. Consider becoming a neighborhood resilience center, providing shelter and resources for the surrounding community during a disaster[40]

b. Train building operators, custodians and other staff to serve as emergency first responders

c. Host Community Emergency Response Team (CERT) training sessions for occupants and community members

d. Identify buildings that could provide immediate shelter for evacuees or space for immediate services to the community in the wake of a disaster

e. Identify the major services, providers or infrastructure needs a building or business will require to continue functioning after a disaster

f. Identify providers outside the area that will be available to fill immediate needs such as food and water

g. Identify skill sets within your workforce that can support your organization and others during and after emergencies, and make those people available when recovery support is needed

## Key Tools and Resources

1. REDi Rating System: publications.arup.com/publications/r/redi_rating_system

2. U.S. Resiliency Council Verified Earthquake Rating: http://www.usrc.org/building-rating-system

3. Insurance Institute for Business and Home Safety FORTIFIED for Safer Business program: disastersafety.org

4. Building Occupancy Resumption Program (BORP): sfdbi.org/borp-guidelines-engineers

5. RELi Resiliency Action List + Catalog: c3livingdesign.org/?page_id=5110

6. LEED Pilot Credits for Resilience: http://www.resilientdesign.org/leed-pilot-credits-on-resilient-design-adopted/

7. Community Emergency Response Team (CERT) Training: www.fema.gov/community-emergency-response-teams

8. Living Building Challenge: living-future.org/lbc

9. NYC Green Codes Proposals: urbangreencouncil.org/proposalstatus

10. International Living Future Institute JUST program: justorganizations.com

11. International Well Building Institute Well Building Standard: www.wellcertified.com

12. Ready to Respond: Strategies for Multifamily Building Resilience: www.enterprisecommunity.com/resources/ResourceDetails?ID=0100907

[40] *USGBC-LA is currently working with the City of L.A., SCOPE and other partners to develop and define the neighborhood resilience center concept and to provide associated tools.*

# WATER

One of Southern California's greatest vulnerabilities is its reliance on imported water. As the California population continues to grow, water demand increases. Climate change has disrupted the rainfall patterns that our water system was designed around. The Sierra snow-pack, which has served as our natural water reservoir, is being disproportionately disrupted. The loss of water supply following an earthquake could also be devastating for the region, preventing firefighting efforts, threatening public health and undermining the economy.

As a result of flooding and erosion that took place when Los Angeles first began to grow, the city developed a network of concrete channels to get water off the streets and to the ocean as quickly as possible. This is a classic example of solving only one problem at a time. While this system does prevent flooding in urban areas, it fails to retain the water for other uses. What we need now is a decentralized, flexible water system that utilizes every drop possible. Capturing, using and re-using water from local sources, including rain, gray and municipally-reclaimed water is essential to meeting current and future water needs. Los Angeles County, in partnership with many local cities and agencies, has developed new guidance to encourage the use of alternative water sources both indoors and out.

**Resilience Strategies**

1. Reduce demand for water
   a. Install water efficiency fixtures
   b. Use drought-tolerant landscaping
2. Meet daily water demands with alternative sources
   a. Minimize impervious surfaces and promote storm water infiltration; channel storm water into landscaped areas to provide irrigation
   b. Use captured storm water, gray water and/or municipal reclaimed water for appropriate uses, such as toilet flushing, irrigation, cooling tower makeup or laundry
   c. Install an atmospheric water harvesting machine
3. Prepare for community disaster response and recovery
   a. Store a minimum of three days of safe drinking water for each building occupant on-site
   b. Connect fire suppression systems to municipal reclaimed water systems or other alternative water sources
   c. Ensure that plumbing fixtures can operate during a black-out with battery-operated fixtures; provide at least one battery-operated lavatory and water closet plumbing fixture in restrooms so access to potable water is available when hard-wired fixtures are nonoperational.
   d. Plan ahead for sewage conveyance if the water supply is interrupted
   e. Provide showers within the workplace should workers no longer have access to running water in their homes
   f. Provide manual pumps and filters to enable stored alternative water sources to serve as drinking water in emergencies
   g. Become a neighborhood resilience center and provide emergency drinking water for community members, with quantities to be determined by the role and function of your organization and in agreement with the community
4. Engage the community in water planning
   a. Enact neighborhood-scale storm water infiltration projects to provide multiple benefits to the community

b. Organize groups of neighbors to more successfully demand resources such as reclaimed water connections

c. Leverage retrofit projects as job training or community gathering opportunities

d. Pool resources to invest in emergency water systems or other water-related projects

## Key Tools and Resources

1. LADWP Water Incentives: www.losangelesworks.org/resources/ladwp-incentives.cfm

2. Los Angeles County Department of Public Health Guidelines for Alternate Water Sources: Indoor and Outdoor Non-Potable Uses: publichealth.lacounty.gov/eh/docs/ep_cross_con_AltWaterSourcesGuideline.pdf

3. TreePeople: www.treepeople.org/resources

4. Living Building Challenge: living-future.org/lbc

5. WELL Building Standard: www.wellcertified.com/well

6. LEED Passive Survivability and Functionality During Emergencies: www.usgbc.org/credits/passivesurvivability

7. The Institute for Sustainable Architecture's Envision: sustainableinfrastructure.org/envision/

8. Insurance Institute for Business and Home Safety FORTIFIED for Safer Business program: disastersafety.org/fortified/safer-business/

9. NIST Community Resilience Planning Guide: www.nist.gov/el/resilience/guide.cfm

10. Elmer Avenue Neighborhood Retrofit Demonstration Project: dpw.lacounty.gov/wmd/svw/docs/Elmer_Avenue_Factsheet.pdf

11. Sky Source and Skywell (atmospheric water harvesting providers) www.skysource.org; skywell.com

12. American Society of Landscape Architects Resilient Design Solutions: www.asla.org/resilientdesign.aspx

# ENERGY

Energy efficiency and other strategies that reduce greenhouse gas emissions are an important aspect of resilience. Reducing energy usage reduces demand on a brittle, centralized grid system. On-site energy generation helps distribute capacity.

It might seem counterintuitive to include back-up energy generation in a resilience program. Ideally, emergency back-up power needs would be addressed through clean energy resources or, more typically, a variety of on-site sources, such as diesel fuel, natural gas, solar photovoltaic systems, hydrogen fuel cells, or wind turbines. At this time, however, in Los Angeles, most photovoltaic systems installed on rooftops cannot be utilized for back-up power, even if they include energy storage capabilities. Technology that would enable these systems to disconnect from the grid during power outages exists, but for a number of reasons it is generally blocked by building codes. Pioneer projects are needed to work through these challenges with regulators, clearing the way for back-up energy possibilities.

**Resilience Strategies**

1. Use passive strategies to reduce energy demand
   a. Consider strategies like building insulation, cool roofs, high performance operable windows and exterior shading to provide natural ventilation, lighting and passive survivability
2. Install and maintain energy-efficient fixtures and equipment
   a. Retrofit lighting, HVAC and other electrical systems
   b. Regularly inspect, tune and retro-commission building systems
3. Generate clean energy on-site
   a. Install solar thermal and/or photovoltaic panels
   b. If site conditions allow, consider wind or other clean energy sources
   c. Install energy storage capacity to decrease demand for grid energy
   d. Install solar-powered electric vehicle charging stations
   e. Install a solar-powered atmospheric water harvesting system
4. Prepare for community disaster response and recovery
   a. Assess critical systems of building and business operations and determine associated minimum energy requirements
   b. Provide an on-site alternative energy source for a backup generator
   c. Work with local agencies to create pathways for using solar power for emergency back-up power when the grid is down
5. Engage in community energy planning
   a. Consider serving as a neighborhood cooling center for high heat days
   b. Provide emergency backup power and outlets for community functions, such as cell phone charging
   c. Work with the community to develop micro-grid or district energy systems
   d. Pool resources with the community to purchase backup generators

## Key Tools and Resources

1. Los Angeles Department of Water and Power Incentives: www.losangelesworks.org/resources/ladwp-incentives.cfm

2. Living Building Challenge: living-future.org/lbc

3. LEED Passive Survivability and Functionality During Emergencies: www.usgbc.org/credits/passivesurvivability

4. Performance Excellence in Electricity Renewal (PEER) Energy Rating System: peer.gbci.or

5. Insurance Institute for Business and Home Safety FORTIFIED for Safer Business program: disastersafety.org/fortified/safer-business/

# FOOD

Resilience requires a reliable source of healthy, fresh food. While this may seem obvious, healthy food is not always available for all people in our region. Our local food security faces a number of challenges. Urbanization has progressively pushed farms out of Southern California. An increasing percentage of the food consumed locally is imported, even while California agriculture provides food for much of the nation and the world. Local agricultural soils are often paved over and lost.

The distribution of food is also problematic. Many Southern California residents live in "food deserts" with little access to grocery stores with fresh produce, and must rely for their sustenance on fast food restaurants, convenience stores and liquor stores. Food deserts are predominantly located in low-income communities of color, which further exacerbates stressors related to poverty. Nutrition-related illnesses including obesity and diabetes are on the rise. Workers in the food industry are some of the lowest paid and most poorly treated in the U.S. Soup kitchens and other emergency food providers operate at full capacity already and become increasingly strained during emergencies. In addition, many businesses lack sufficient emergency food supplies.

**Resilience Strategies**

1. Support local agriculture and provide fresh food
   a. Restore on-site soils and plant edible landscaping
   b. Source any food provided on site, such as in cafeterias, from local sustainable farms
   c. Provide access to local farmers' markets
   d. Create a partnership with a community-supported agriculture program to provide fresh produce to your employees or other stakeholders on a regular basis
2. Address food deserts and support food workers
   a. If you are located in a food desert, consider ways to support healthy food access, such as providing space for a farmers market or a food co-op
   b. If your organization is a food provider, adopt the Good Food Purchasing Policy developed by the Los Angeles Food Policy Council.
3. Prepare for community disaster response and recovery
   a. Store and maintain emergency food supplies for occupants and other stakeholders
   b. Set a date to annually replace stored food supplies and donate last year's supply to an emergency food supplier prior to any expiration dates

## Key Tools and Resources

1. Food Access Research Atlas: www.ers.usda.gov/data-products/food-access-research-atlas/go-to-the-atlas.aspx

1. LocalHarvest Community Supported Agriculture guide: www.localharvest.org/csa/

2. Los Angeles Food Policy Council Good Food Purchasing Policy: goodfoodla.org/policymaking/good-food-procurement

3. Food Chain Workers Alliance: foodchainworkers.org

4. Homeless Shelter Directory guide to Los Angeles Food Pantries, Soup Kitchens and Food Banks: www.homelessshelterdirectory.org/cgi-bin/id/cityfoodbanks.cgi?city=Los%20Angeles&state=CA

5. Los Angeles Times map of local farmers markets: projects.latimes.com/farmers-markets

6. TreePeople: www.treepeople.org/resources

# NATURAL AND OUTDOOR SPACES

There is no clear dividing line between the built environment and the natural environment; the two aspects of our system are deeply interconnected and interdependent. The soils, habitat and watershed local to your building can have a profound impact on your organization's resilience. For example, dry brush or tree limbs overhanging your building can increase fire risk. Pesticides used in landscaping can damage the health of your grounds workers. Impervious surfaces across your site increase the risk of flooding. On the flip side, shade trees and drought-tolerant landscaping can reduce heat islands, provide habitat, prevent erosion and support mental health. Manage your site to mimic natural processes that reduce the need for outside inputs while serving as many functions as possible.

**Resilience Strategies**

1. Mitigate site risks
   a. Design, landscape and manage your site to prevent flooding or erosion
   b. Minimize impervious surfaces
   c. Plant defensible and fire-safe landscapes
   d. Provide shaded areas, particularly along walking paths and near transit
   e. Avoid the use of pesticides and chemical fertilizers
2. Maximize site benefits
   a. Use permaculture design principles to create sustainable, beneficial landscapes
   b. Provide outdoor space for recreation and community gathering
   c. Partner with local community groups for shared use of outdoor spaces
   d. Protect and restore local habitats
   e. Train workers in sustainable landscape practices
   f. Work with the local community to demand and implement public parks
   g. Design for beauty
3. Prepare for community disaster response and recovery
   a. Train employees on how to turn off gas supplies and take other necessary precautions in an emergency
   b. Designate outdoor gathering spaces for building occupants and other stakeholders

## Key Tools and Resources

1. The Sustainable SITES Initiative: www.sustainablesites.org

2. Permaculture: Principles and Pathways Beyond Sustainability (2007), by David Holmgren: permacultureprinciples.com/resources_principles.php

3. University of California Cooperative Extension Sustainable and Fire Safe Landscapes: ucanr.edu/sites/SAFELandscapes/Defensible_space,_fire_safe_Landscaping,_and_fire_hazard_reduction/

4. Insurance Institute for Business and Home Safety FORTIFIED for Safer Business program: disastersafety.org/fortified/safer-business

5. TreeMapLA: www.opentreemap.org/latreemap

6. TreePeople: www.treepeople.org/resources

7. Trust for Public Land Parks for People—Los Angeles: www.tpl.org/our-work/parks-for-people/los-angeles

8. American Society of Landscape Architects Resilient Design Solutions: www.asla.org/resilientdesign.aspx

# COMMUNICATION

Clear and inclusive communication networks are at the heart of resilient organizations. The content, participants and infrastructure of communication systems all need to be considered in day-to-day operations as well as in emergency situations. Communication is critical to building a sense of connection within organizations and with the broader community.

Efficient internal communications systems improve workplace collaboration, operational efficiency and interdepartmental connection. When these systems falter, business operations become slow and inefficient. A culture of communication that promotes respect, honesty and transparency can support workers' mental health and provide a shared sense of purpose, leading to higher levels of productivity and worker retention. This creates greater cohesion when disruptions occur. The same principles hold in communicating with external stakeholder groups.

With the development of the internet and other technological advances, communication infrastructure has become ever more critical, but also ever more vulnerable. A breakdown of this infrastructure could be catastrophic for individuals and businesses during a disaster. Organizations are vulnerable to the loss of centralized data systems and cloud networks, as well as to opportunistic cyber-attacks. Careful planning around day-to-day communication systems, the durability and diversity of communication channels, cyber security, business continuity planning and emergency communication protocols is essential.

Social media greatly expands the modes that can be used to communicate within and across stakeholder groups, and to distribute all types of information quickly. Social media networks don't just diversify the ways that organizations can broadcast information to stakeholders. They also allow for interactive communication across organizations, stakeholders, first responders and government agencies. Best practices in this arena are developing quickly, and recent disasters provide many lessons learned.

**Resilience Strategies**

1. Focus on internal communication systems

   a. Promote open, respectful and transparent communications in all aspects of the organization, all levels of management and in all teams

   b. Require training on communications systems for all personnel, including how to use them in emergencies and how to use backup systems in case of system failure.

   c. Assess and improve interdepartmental communications systems

   d. Design workplaces to promote interaction and collaboration

2. Promote interaction and collaboration with community stakeholders

   a. Identify community partners and develop collaborative projects

   b. Host community events such as block parties, trainings and workshops

   c. Develop an integrated social media strategy that allows for effective information flow, building community in normal times and readily adapting to emergency situations.

3. Incorporate communication systems into business continuity planning

   a. Look at all modes of communication currently used by the organization to assess vulnerabilities and opportunities to strengthen, distribute and diversify

   b. Collaborate with communication companies and local

government to develop fortified communication systems

4. Develop emergency communication systems

   a. Develop clear roles, responsibilities and communication channels for emergencies

   b. Provide equipment and training in alternative communication systems, such as radio systems

   c. Develop alternative communication protocols in collaboration with local emergency management agencies

   d. Conduct emergency scenario drills that account for disruption to communication systems

## Key Tools and Resources

1. City of Los Angeles Resilience by Design: www.lamayor.org/resilience-design-building-stronger-los-angeles

2. Google re:Work: rework.withgoogle.com

3. FEMA National Incident Management System: www.fema.gov/national-incident-management-system

4. National Association of Amateur Radio: www.arrl.org/courses-training

5. Enterprise Green Communities Disaster Staffing Toolkit: www.enterprisecommunity.com/solutions-and-innovation/green-communities/ready-to-respond/disaster-staffing-toolkit

6. FEMA Social Media in Emergency Management Training training.fema.gov/is/courseoverview.aspx?code=is-42

# APPENDIX 2: EXAMPLE SYSTEM ASSESSMENT QUESTIONS

| SYSTEM ASSESSMENT | | |
|---|---|---|
| *System Element* | *Sample Questions* | *Implications* |
| | Organizational Assessment | |
| Organizational Identity and Function | ▪ What is your mission and core purpose?<br>▪ Who owns the organization?<br>▪ What are its core functions?<br>▪ What is the organization good at?<br>▪ What skill sets are available in-house at each location?<br>▪ What are the attributes of your brand?<br>▪ What are your plans for growth in the short, medium, and long term? | The core mission, purpose, skills and ownership of an organization can determine which aspects of resilience might be most essential and how much flexibility they will have in implementing associated strategies |
| Location | ▪ Where is the organization headquartered?<br>▪ Where is each facility? Each asset?<br>▪ At each facility, where do critical resources such as energy and water come from? How diversified and robust is local infrastructure?<br>▪ How far do workforce and visitors have to travel to get to the site?<br>▪ What are the nearby transit options?<br>▪ Who are the neighbors?<br>▪ What are the different local communities?<br>▪ What are the local micro-climates, soil conditions, solar access?<br>▪ What are the local hazards? | Location is essential in that it determines what physical hazards exist and who will be impacted directly |
| Management and Governance | ▪ How is the organization managed?<br>▪ If the organization has multiple locations, what is the nature of interaction between the central headquarters and each facility?<br>▪ What is the departmental structure, and what is the level of coordination across departments?<br>▪ How are important decisions made?<br>▪ How is information shared?<br>▪ How does the organization deal with change?" | The way an organization is managed will determine how flexible it is, how information flows, and how resilience can be implemented |

| SYSTEM ASSESSMENT | | |
|---|---|---|
| *System Element* | *Sample Questions* | *Implications* |
| Plans and Policies | ▪ What plans and policies does the organization have in place that relate to various aspects of resilience, such as sustainability, emergency management, business continuity, social responsibility, etc.?<br>▪ How are these plans and policies implemented, tracked, measured and improved?<br>▪ How integrated are each of these plans into overall business practices and across departments?<br>▪ Are there staff or teams specifically dedicated to implementing related policies in these areas?<br>▪ Are these areas integrated into employee performance evaluations?<br>▪ Does the organization disclose its performance in these areas (for example via a corporate social responsibility program such as GRI or GRESB)? | Organizations that have well-developed and implemented policies and procedures around sustainability, emergency management, business continuity, social responsibility, etc. may find resilience to be a natural extension of these efforts. Organizations that do not yet have such policies in place may have the opportunity to take a fresh look at these issues. |
| Information and Communication | ▪ How does information flow into the organization?<br>▪ What sources of information do you evaluate on a regular basis to make different types of decisions?<br>▪ What metrics do you currently use to evaluate the performance of your organization?<br>▪ How readily is information shared between business functions or departments?<br>▪ How is information shared across the organization (horizontally and vertically)?<br>▪ How does information flow out of the organization to external stakeholders?<br>▪ How does information get distributed to employees in case of emergency?<br>▪ Are there communication protocols in place in case of emergency? What about when standard communication systems are down?<br>▪ Are there designated communication leaders to contact building occupants in case of emergency?" | Information flow is essential to resilience. People need access to relevant information in order to understand the situation and make appropriate decisions. Honesty and transparency build trust. Critical information related to emergencies needs to flow, even when typical channels are cut off. |

| SYSTEM ASSESSMENT | | |
|---|---|---|
| *System Element* | *Sample Questions* | *Implications* |
| **Building and Asset Assessment** | | |
| Building Ownership and Control | ▪ Does the organization own or lease the building(s)?<br>▪ Who pays the utility bills?<br>▪ Who is responsible for regular maintenance?<br>▪ Renovations or improvements?<br>▪ What is the organization's span of control? | Organizations that own their own buildings will have the most control and incentive to make improvements. Those that do not may need to recruit the landlord onto their resilience team. |
| Facilities Management | ▪ How is the building managed?<br>▪ Are there on-site building operators, custodial staff or security personnel?<br>▪ If so, are they direct employees of the company or are they contractors?<br>▪ Is there a building management or automation system? | On-site building operational staff can be a key resource in resilience programs, particularly if they report directly to the organization (or a highly engaged partner). They can be trained to manage risk and become first responders. Building automation systems can help identify problems early on, but need to be designed with manual overrides in case the power goes down. |
| Sustainability | ▪ What sustainability measures are in place, if any?<br>▪ Are the buildings sustainably managed (for example using LEED for Existing Buildings and Operations)?<br>▪ Are there any uses of alternative water supplies (such as gray water or captured stormwater)?<br>▪ Is there any on-site energy generation?<br>▪ Have the indoor air and water quality been tested, and if so what are the results?<br>▪ What landscaping and stormwater management systems are in place? | Many sustainability initiatives can provide a foundation for resilience measures at both the building and regional scale. |
| Structure and Seismic Integrity | ▪ Does the structure meet basic fire and life safety codes? Earthquake codes?<br>▪ Has the building been designed or evaluated to meet specific seismic performance levels designated beyond code requirements? Does the organization maintain earthquake insurance? | In earthquake-prone areas, verifying basic seismic safety is essential. The City of Los Angeles is now requiring retrofits of certain vulnerable building types. Only 10% of buildings in Southern California have earthquake insurance, which leaves many organizations exposed with minimal protection from loss. |

| SYSTEM ASSESSMENT | | |
|---|---|---|
| *System Element* | *Sample Questions* | *Implications* |
| Emergency and Security Systems | ▪ What emergency management systems are in place?<br>▪ Is there on-site storage of emergency food, water and/or supplies?<br>▪ If so, are they regularly maintained or replaced?<br>▪ Are the fire and life safety systems regularly tested and maintained?<br>▪ Can the building be occupied if the power is out?<br>▪ Are there open areas outdoors that can serve as gathering spaces?<br>▪ Has the building been designed to withstand particular natural hazards?<br>▪ Is there a source of backup power?<br>▪ Are there on-site security personnel?<br>▪ What data security systems are in place? | In the event of a disaster, communities may need to survive on their own without outside help for several days. Emergency procedures and supplies can save lives and property and put organizations more quickly on the road to recovery. |
| Overall Functionality | ▪ What activities take place in the buildings and on the site?<br>▪ Does the site meet the needs of the occupants?<br>▪ Does the design allow for changes and growth in the organization?<br>▪ In what ways does the space promote or prevent physical activity, interpersonal interaction or collaboration?<br>▪ Are the spaces accessible and supportive to people of all abilities?<br>▪ In what ways is the organization nimble?<br>▪ What are its stiffest or least flexible points? | Buildings can play a role in keeping occupants healthy and supporting productivity on a daily basis. |
| Other Assets | ▪ What other types of assets does your organization own or control (for example computers, vehicles, equipment, etc.)?<br>▪ Which assets are critical to on-going operations?<br>▪ How diversified or redundant are these assets (in other words, are there back-ups if one fails)?<br>▪ Which are most vulnerable?<br>▪ What assets do you have that could benefit your community in a disaster? " | Many organizational functions rely on the uninterrupted operations of systems and equipment. Conducting criticality assessments appropriate for your particular industry can help you determine where vulnerabilities in your system exist. |

| SYSTEM ASSESSMENT | | |
|---|---|---|
| *System Element* | *Sample Questions* | *Implications* |
| | **People** | |
| Workforce | ▪ What are the different types of employees or long term contractors that are part of the organization?<br>▪ Where do they live?<br>▪ What is the salary range?<br>▪ What percentage of employees earn less than a living wage for the local area?<br>▪ What types of training and professional development programs does the organization offer to employees of all levels?<br>▪ What health and wellness measures do you offer?<br>▪ What diversity measures, local hiring measures or other social equity measures do you provide? | Your workforce is your greatest asset. Making sure that people have what they need to be personally resilient, including healthcare, fair wages and opportunities for training and advancement, can help ensure that they have the ability to adapt and can be there when you need them most. |
| Community | ▪ What does the organization provide to the community (e.g. employment, education, community, etc.)?<br>▪ What does it need from the community?<br>▪ How does the organization interact with different stakeholder groups?<br>▪ Is the organization involved in any community improvement projects or any community engagement processes?<br>▪ What are the demographics for each stakeholder group?<br>▪ Which stakeholder groups or sub-groups are most likely to be vulnerable and why?<br>▪ Have you conducted a vulnerability assessment or health impact assessment or partnered with others who have done so?<br>▪ How does the organization interact with or support vulnerable populations? | Your organization does not exist in a vacuum. It is a vital part of the geographic and functional community that surrounds it. Understanding what role your organization fills in the community, and how it is supported by the community, is critical to creating resilience. Developing relationships and partnerships with many different types of people and organizations and finding mutually beneficial solutions to shared challenges should be the heart and soul of your resilience program. |

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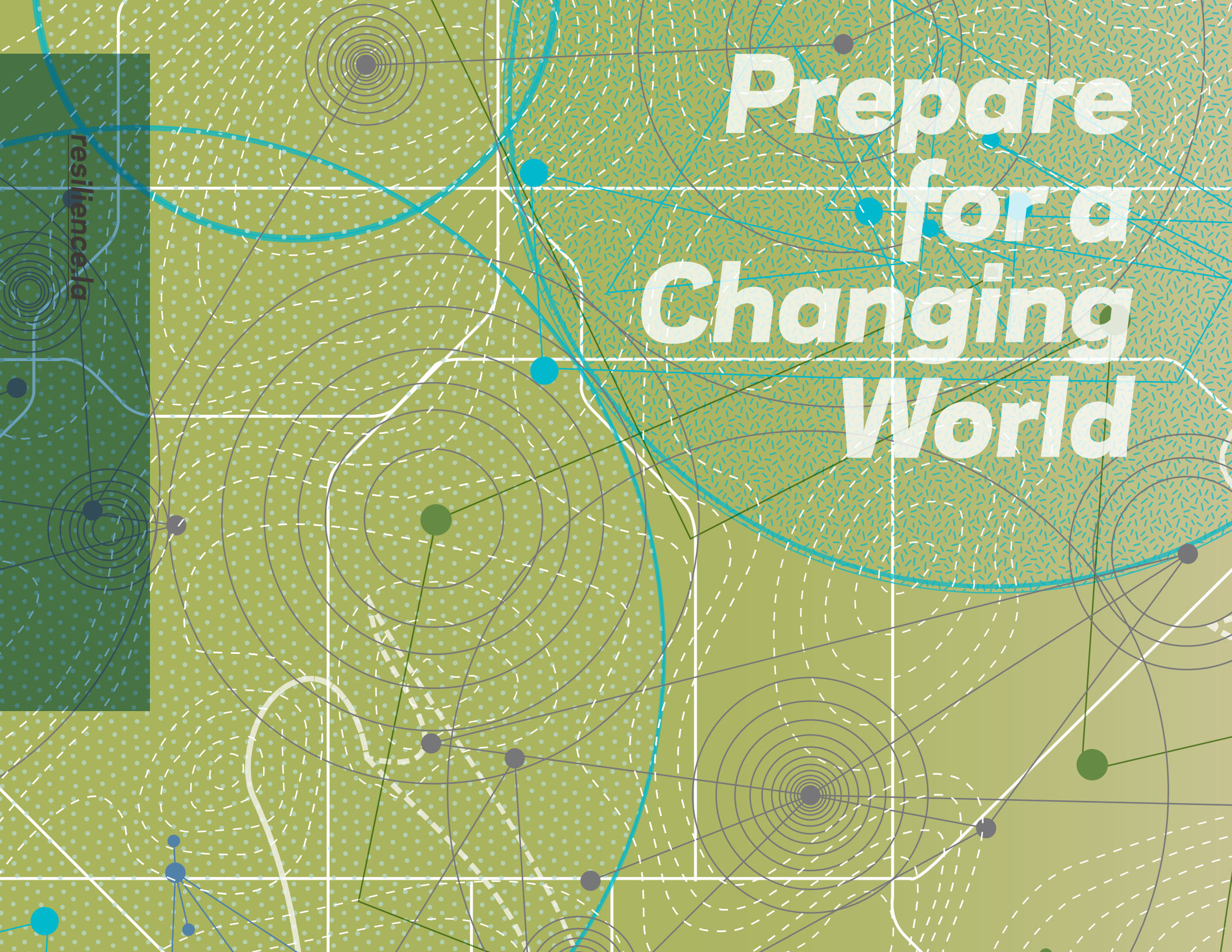
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