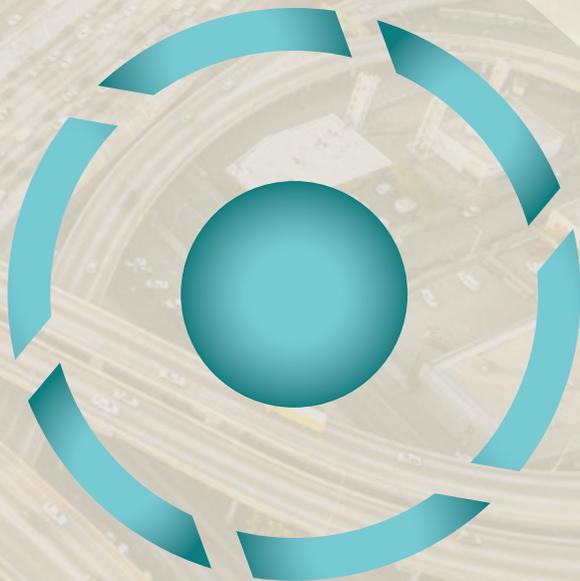


# Strengthening SoCal

Southern California  
Disaster Risk Reduction Initiative



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# Strengthening SoCal

Southern California Disaster Risk Reduction Initiative





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**We can't wait for others to give  
direction or resources – we must  
take the reins ourselves.**

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## INTRODUCTION

### Why This Initiative?

**F**ew things in civic life are certain, but experts can agree on one thing: there will be a major natural hazard event in Southern California that will impact cities, the state, and the nation. Knowing this, our communities and civic leadership need to collectively prepare to stop damage that is preventable. The Southern California Disaster Risk Reduction Initiative is led by a group of business and civic leaders who have come together to tackle this mitigation to prevent the inevitable disaster from becoming a catastrophe. The initiative is intended to inspire a shared vision and meaningful action.

What follows below and more fully in the subsequent pages, are the five focus areas that need to be addressed with recommendations that can be achieved with concerted efforts through private and public sector policies and actions:

1. Infrastructure Interdependencies
2. Education on True Impacts
3. Social Capital as a Solution
4. Fire Following Earthquakes
5. Addressing Gaps in the Building Resilience

The notion that “people need to take care of themselves after a disaster strikes because their government won’t” is a message that may resonate and connect with the frustration many leaders feel upon hearing our cities and communities are not resilient enough to withstand a catastrophe. Communities that recover quicker are those that come together, whereas slower recovery occurs when individuals are less connected. The reality is communities don’t thrive when their government is at odds with citizens and they won’t be resilient in the face of disaster either. “You’re going to be on your own” isn’t the solution to creating a more resilient community. We need to make sure that resilience is woven through the fabric of society and the community is ready, willing and able

to come back and thrive. No one is going to come in and “rescue” our communities, and government can’t solve the preparedness and mitigation aspects of this problem alone. We can’t wait for others to give direction or resources – we must take the reins ourselves. Doing nothing isn’t an option.

### Why Now?

In the last seven years, Los Angeles and Southern California have invested private and public resources, including financial capital, human capital and political capital, to build a more resilient future for the region. Many expert studies have been funded and executed (such as USGS’s Shake-Out and ARkStorm Scenarios) and just this year, the City of Los Angeles released a city-specific plan to address limited issues under the City’s purview. Further, the national conversation around resilience has been advanced and heightened by the work of groups like the Rockefeller Foundation and others who are moving cities to address their issues. With the reception received by city and business leaders by these recent reports and studies, awareness has been heightened to the importance of these issues and more must be done to support and guide those responsible for and concerned about the future of the region.

## DEFINITIONS

**RESILIENCE** Resilience is a term that has seen a significant increase in use over the last few years. What is “resilience?” One answer comes from Presidential Policy Directive – Critical Infrastructure Security and Resilience (PPD-21)<sup>1</sup> which defines resilience as “the ability to prepare for and adapt to changing conditions, and withstand and recover rapidly from disruptions.” Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents. For this effort, resilience comes to mean being able to thrive when there is a strain to our social or economic system. It focuses on investment strategies and mitigation efforts to harden against the disaster from becoming a catastrophe by preventing or lessening the impact to begin with.

**COMMUNITY** According to researchers, there are four elements necessary to create a sense of community: membership, influence, reinforcement and shared emotional connection.<sup>2</sup> Membership is the feeling of belonging or of sharing a sense of personal connection. Influence can be described as a sense that members matter and can make a difference, that this influence is bi-directional. Reinforcement is the integration and fulfillment of needs, a sense confidence the group will meet my needs. The last element is a shared emotional connection.

## Why Southern California?

The world looks to Southern California for leadership on many things from entertainment to fashion and innovation – why should it not look to this region for leadership on disaster risk reduction? Southern California serves as a true “laboratory” for hazards, being exposed to the threat of all major natural hazards from the annually occurring wild-fires and floods to representing 50% of the nation’s seismic risk. More than the risk we collectively face, the region has a unified identity that doesn’t stop at the city limits of the over 200 municipalities. We recognize that what works here may or may not directly apply to other areas of California, but this effort can serve as a case study for regions looking to address their ability to move towards impact mitigation to thrive after a disaster.

## Target Audience

This report is for those who have the power to create resilience. Southern California’s local governments and decision-makers in business are the primary audience for whom this report is directed. For those with business interests in Southern California, it’s not just about losing your business but losing your market.

## Defining the Goal

This effort is focused on actions that reduce the impact of the next disaster by focusing on mitigation and moving away from the notion of simply “preparedness.” We don’t intend to mandate what others “should” do, but we aim to provide a context through which the targeted audiences can see themselves. The goal after the disaster is for the region to be open for business, able to get back up and running in the shortest amount of time and not extend the restoration period. Recommendations are structured, including short and long-term mitigation efforts, to lessen or eliminate economic shocks to community and give priority to adopting strategies that increase resilience while promoting economic growth.

## How this Effort Fits into Other Efforts

The National Preparedness Goal describes the concept of “whole community” as “a focus on enabling the participation in national preparedness activities of a wider range of players from the private and nonprofit sectors, including nongovernmental organizations and the general public, in

conjunction with the participation of Federal, state and local governmental partners in order to foster better coordination and working relationships.” This is the fundamental work of the SoCalIDRR Initiative. The goal is not to do new research, but to build on existing work such as that undertaken in 2014 in the City of Los Angeles through Mayor Garcetti’s “Resilience by Design” program and the work through the last decade in Southern California through the Great ShakeOut, SCAG’s symposiums and the latest research around the topics of disaster resilience. Taking what we know and targeting actions to address the greatest issues to support the goal is the fundamental work of the Initiative.

Further, this effort supports the work of many companies who already have robust business continuity plans. Even when business planning takes place, it needs to consider the interconnectedness of the community in which they are located and where their customer base is. It is our thought that our recommended strategies working in tandem with more entity-specific business continuity planning will maximize the post-catastrophe economic rebound in Southern California. Business continuity can only go so far in this regional economy for large businesses and resilient businesses are a key part of a sustainable economy.

## Keeping It Simple

Emergency managers have ever-growing lists of things to do in order to be prepared and respond. Research shows that people fail to prepare because it’s too complicated and overwhelming. We herein identify simple recommendations that can be taken as first steps to reduce the impact of a disaster. These suggestions are intended to be manageable and doable in a near term while still looking at the big picture.

## FOCUS ISSUES

To build a more resilient community in Southern California, recommendations contained herein relate directly to our most likely and sweeping threat, earthquake.<sup>3</sup> Though many issues exist that could be addressed, the Executive Committee determined the following five issues were the most compelling. Each could be and has been, the focus of other studies and programs; but taking the best resources and compiling them here leads to focused outcomes that can be enacted.



# 1. Infrastructure Interdependencies

To physically get resources, people and goods into Southern California, there are limited ways to enter. Critical access points, such as the Cajon Pass and the Tejon Pass, have inherent vulnerability built in, especially after a major San Andreas earthquake when they could be cut off. If we don't do something, we're leaving ourselves exposed to isolation and a challenge to efficient recovery because of the importance of those access points to the region.

To address and reduce the impacts after an event is to address the critical infrastructure that is needed to sustain our society and economy. These have been identified, primarily, as:

- Water (ground water, retention, distribution systems etc.)
- Sewer
- Power and Fuel (natural gas, electricity, petroleum, the Grid, etc.)
- Telecommunications/Internet
- Transportation (road, rail, ports, airports)

In most circumstances, you need at least one of these systems working to let another function (natural gas starts electric generation, water cools telecommunications hubs, etc.). This interdependency requires special attention to mitigate dramatic impacts to the region that can be addressed with advanced coordination and support.

Further complicating matters in Southern California, the aforementioned fault crossings create a specific issue to our infrastructure. Since the San Andreas Fault is the biggest and fastest moving fault in Southern California, when it moves it will cut across the eastern part of the region and, in doing so, cut most lifelines in and out of the area since most cross at the same access points. Addressing this major vulnerability, especially as it relates to the other critical infrastructure and pipelines, is key to maintaining the social and economic viability of the region.

Looking to other seismically vulnerable cities can reveal steps needed in our own region. For instance, Wellington, NZ, though smaller in size and population, has worked to address their lifeline issues as a primary function of building resilience and viability after their likely 7.5 earthquake on their Wellington Fault.<sup>4</sup>

To address Infrastructure Interdependencies requires a focus on where these lifelines interact

and depend on each other. Though each system and lifeline in and of itself requires attention to mitigate against impacts, the recommendations below focus on the areas where two or more infrastructure systems interact and depend on each other.

## RECOMMENDATIONS

### Near Term

1. **Develop a permit facilitation/expediting process for lifeline mitigation projects.** Local government and other regulators should work to make sure that critical infrastructure projects that mitigate future impacts should be expedited to help reduce costs for customers and get improvements in place before the next disaster. Mitigating the impacts of the disaster should be prioritized over other planning needs. A model, local resolution could be developed which can address this sometimes complicated balance of safety and process.
2. **Develop land use policies that prioritize the protection of critical infrastructure.** Areas that would serve the community before and after a disaster as a resource need to be protected before the event. These protective actions and investments should be prioritized to protect sites for the long-term versus the short-term benefit. Local governments should integrate the mitigating features into land use plans. This effort will require working with public safety agencies to define the critical sites without making them more vulnerable by disclosing their vulnerabilities.
3. **Prioritize lifelines to areas designated as emergency response resources (evacuation centers, staging areas, etc.)** Certain areas throughout the region have been predetermined as locations for assemblage and utilities should coordinate the resources supporting those areas as well as coordinating the use of those locations as staging areas. Strengthening the connections to these areas will allow for a more effective response and recovery to an event, but also eliminate the need to first try to bring lifelines to a special location while at the same time trying to restore regular service to the region. Local government and utilities should coordinate where these locations will be and what lifeline resources will be



*Aerial View, Downtown Los Angeles*

**To address infrastructure interdependencies requires a focus on where these lifelines interact and depend on each other.**

needed to make sure they can function immediately and through the anticipated duration of the recovery and response. Working together, lifeline operators and government can work efficiently to strengthen the infrastructure at and to these key locations.

- 4. Establish a public works-utility coordination council to meet to regularly before a disaster to address interdependencies and mitigating actions.** Each county, through their public works director or otherwise designated executive, should convene a working group of their county's lifeline infrastructure operators and public works officials at the county and city level to facilitate the planning process to determine what will be done when the large event happens in an effort to cut "red tape" and save time and resources. Representatives from the major lifeline infrastructure operators including those listed in the introduction to this section should be included. More than just post-event coordination, this group should focus on how utilities will operate together to both mitigate the impact and coordinate for effective recovery. Modeling current coordination around major transit construction work (like subways or light rail), in a particular corridor for mitigation can be done at the same

time and reduce impact and using compatible and integrated mapping software and IT tools will enhance coordination. The committee should also tackle what incentives could be offered to expedite projects, reduce burdens and save tax-payer money.

### **For More Information and What's Being Done Right Now...**

In 2015, LA County and Southern California Edison worked with FEMA, CalOES and other partners to establish the Southern California Critical Lifelines Work Group. The group is working to make sure communication and efforts are coordinated in advance of an event. This would be a place some of the recommendations could be further developed. Additionally, CalOES is facilitating a cross-sector conversation to talk about these issues at a state-wide perspective with the private sector. This would bring state and federal resources together with the private entities to start working out plans to address mutual vulnerabilities.



## 2. Education on True Impacts

The last large earthquake on the San Andreas fault in Southern California occurred in 1857 when Los Angeles had 4000 residents. Thus, the communities of Southern California do not have a civic memory of the impacts of a very large earthquake. Too many Southern Californians believe that getting ready for the next Northridge is enough.

The idea of understanding and communicating the most plausible impacts from a large disaster in Southern California is still emerging. Scenarios to describe the impacts of the largest events are drawing on science to better communicate some of these ideas and we are starting to try to explore how recent changes in our society, especially the development of the internet economy, can create new resilience and new vulnerabilities. We need to better understand the answers and then we need to communicate that information more effectively. We, as society, are just coming to grips with what the outcomes will be.

Experts and civic leaders all have the responsibility to make sure information is getting to the right people in the right way. Local government and support organizations can easily get overwhelmed by a disaster. When you have the engagement of the community, it will be easier to recover.<sup>5</sup>

Decisions are sometimes made without the full understanding of the impacts and only with greater interaction between sectors can better decisions be made. Decisions made with greater detailed information will lead to better decisions, as well.

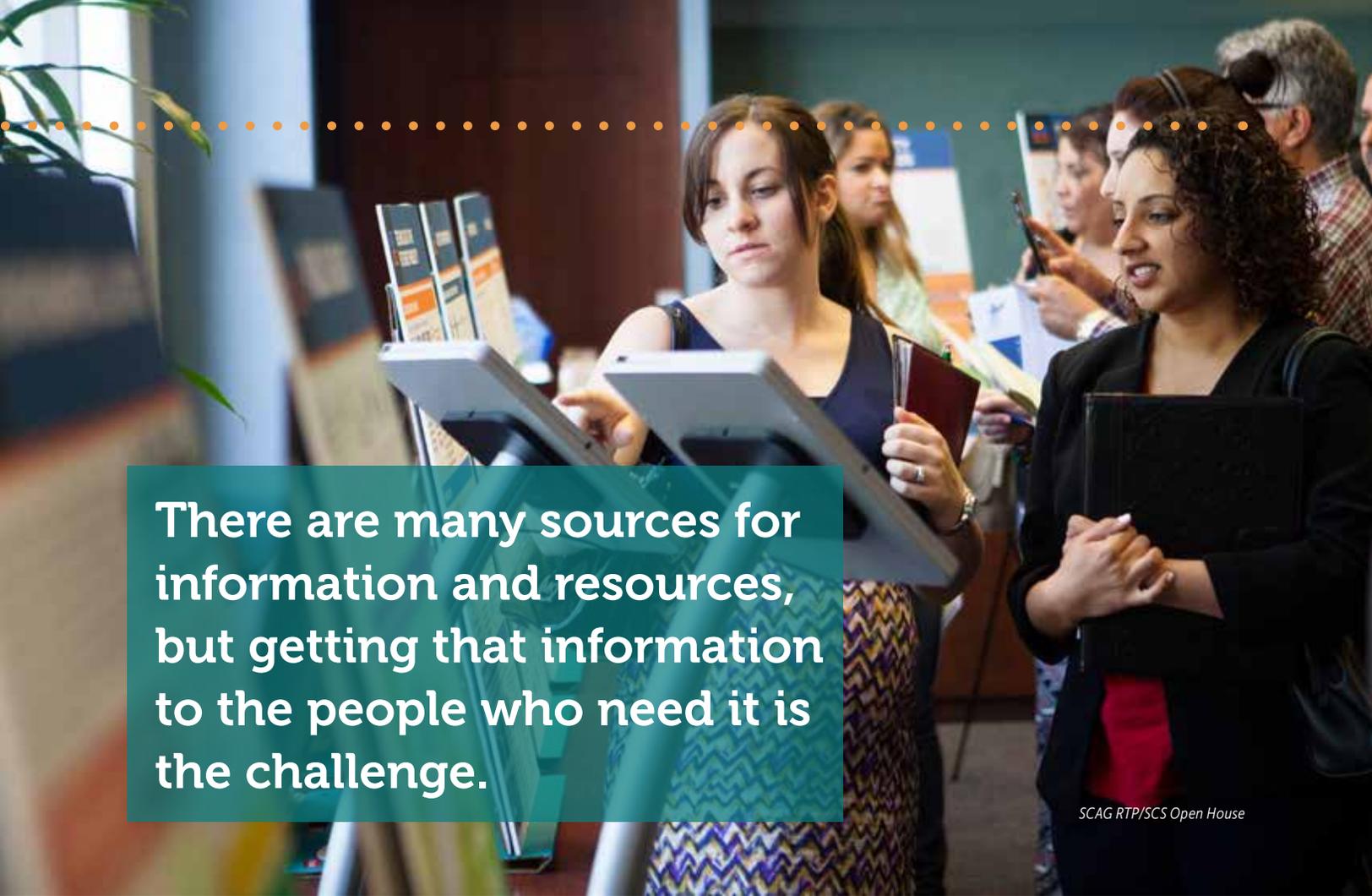
Much is known about what will happen after an earthquake or other major disruption, but often this information doesn't reach those who have the power to make changes to reduce the negative outcomes. Experts know that water and power delivery systems could be off for weeks, housing for tens of thousands could be damaged and specific aspects of our infrastructure could be disrupted or rendered unusable. By creating a repository of stylized knowledge, getting the right facts about what we know could happen to the right people will allow for better decisions to be made. This includes policy-makers at the local level and in agencies, but also civic and business leaders – their knowledge of the severity of the risk can lead to solutions that can be offered with the risk so preventative actions can be taken.

There are many sources for information and resources, but getting that information to the people who need it is the challenge.

### RECOMMENDATIONS

#### Near Term

1. **Create a task force to audit and bring forth the information on true impacts needed to be disseminated.** By understanding the key issues that must be communicated based on the current expertise that exists, a task force can make sure local leaders have the right information to make informed decisions based on realistic information. This task force should identify what information is needed/could be used, assemble what is available and work with researchers to identify the gaps and the associated prioritization. Further, using on the ground examples of community experience would further the explanation of these sometimes complicated issues. A regional entity such as the Southern California Association of Governments (SCAG) can put together such a task force that can assess the information as well as target audiences for that information.
2. **Encourage cities to adopt an information and dissemination strategy.** Once the information has been gathered, getting it to the right entity to disseminate is key. Cities should be encouraged to get this nuanced information into the hands of those that have the power to take action. Local residents may need some of the information, but local civic and business leaders may be more of the target. Each city and community will know who needs this information and the best way to get it to them.
3. **Highlight the regional economic clusters that are major employers/economic drivers that would be disrupted by a major natural disaster and share this information with local jurisdictions. Develop a set of strategies to mitigate the impacts on the various industries.** To preserve the viability of the region, our industry clusters must be supported to remain, especially in the wake of a disaster. For instance, Los Angeles is a large manufacturer for aerospace. A major disruption could be the



There are many sources for information and resources, but getting that information to the people who need it is the challenge.

SCAG RTP/SCS Open House

last straw that allows them to leave and not come back. Each county and their respective economic development organization should work to understand their key economic clusters and work with their local jurisdictions to understand the impact of disaster and how mitigation for each industry may be different.

4. **Develop public policy framework and resource to allow to more effective response, especially as related to allocation of funds in an expeditious manner.** Each local jurisdiction and SCAG should work to strengthen the ability for the region to respond. In previous decades, the region worked to develop these plans. An effective concept was a SCEPP plan that focused on planned after actions so they could be coordinated.<sup>6</sup> As an example, after the Northridge Earthquake, local jurisdictions had to scramble to access resources for long-term recovery and often those funds were spread out politically instead of where the most need was or were not spent at all. Avoiding these occurrences will lead to a quicker ability to address the impact and a more comprehensive assessment of what might be needed to be repaired based on what can't be mitigated due to time or resources.

5. **Look to <http://restoreyoureconomy.org/> and create a local portal to accompany it.** Local economic development organizations across Southern California should come together to look at creating a portal in line with the work done by the International Economic Development Council. This portal should be customized to speak to the impacts felt here in Southern California and offer region-specific actions and resources.

### For More Information and What's Being Done Right Now...

The International Economic Development Council (<http://www.iedconline.org/>) is focusing on mitigation efforts to maintain economies (and restore them).

In the Bay Area, SPUR (<http://www.spur.org/spur-program/disaster-planning>) is working to provide direct resources for planning for an earthquake for their region.

At the federal level, FEMA has an Earthquake Mitigation Program that supports efforts to mitigate losses from earthquakes through various mitigation programs for businesses and local governments (<http://www.fema.gov/earthquake>).



## 3. Social Capital as a Solution

# Our community resilience isn't going to fully be based on technical knowledge; it will be based on people knowing each other.

Because of its more suburban development patterns, embodied by books such as *Bowling Alone*, Los Angeles has long been viewed as a city where the notion of “community” is weak, leaving neighborhoods independent and people within neighborhoods isolated. This is true even in our preparedness messages, which promote personal preparedness but not community preparedness.

With a lack of social cohesion, our region will start behind the curve when trying to recover. Research into disaster recovery has repeatedly shown that communities with high social capital recover more quickly from the disruption of a natural disaster. Social capital is defined as a function of trust, social norms, participation and networking. Communities with social capital and a tradition of community activities can pro-actively participate in the reconstruction program and active community leaders can utilize social capital in the recovery process and facilitate collective decision-making.<sup>7</sup> The recovery experience in New Orleans after Hurricane Katrina’s devastation only serves to emphasize this point.<sup>8</sup>

Creating social capital, a real connection to your community, will enable neighborhoods to rebound and recover quicker. Faith communities and social organizations are a place to start this process but not stop. Looking at technology is one tool, but it goes beyond digital connections.

Instead of having meetings about “the disaster,” focus meetings on connecting people on a basic level. Our community resilience isn't going to fully be based on technical knowledge; it will be based on people knowing each other. The focus should be at a personal level between neighbors and associates, as well as at a larger but manageable and localized community level. Local leaders can be

important conduits for building these connections, as they know many key community leaders and can help spark community-building initiatives that lead to stronger person-to-person connections in every community in their cities.

## RECOMMENDATIONS

### Near Term

1. **Use the results of the “Education on True Impacts” information to engage the public [Section 2 of this report].** By providing new information that is compelling and thought-provoking will promote conversations between neighbors, colleagues and other Southern Californians. This stylized information can start conversations and allow individuals to connect more fully. Local governments can make sure this information is shared and suggest actions that can be taken to have neighbors connect and businesses can share this information with employees and encourage conversation (connection) at work and in their home communities, again focusing on solutions to the issues raised.
2. **Develop an easy-to-use program to foster disaster resilience and community connections in small neighborhood and community groups (blocks, churches, private schools).** Examples of existing neighborhoods coming together to combat crime via Neighborhood Watch are countless. In other places, more detailed neighborhood programs were developed and implemented such as “Map



CicLAvia, Samer Momani

your Neighborhood” in Washington State.<sup>9</sup> Block parties, National Night Out,<sup>10</sup> and other programs can be tailored for very specific locations. Local government can incentivize these activities by streamlining permit processes, providing micro grants (as little as \$100 can be a difference) and offering technical expertise to help empower neighbors to connect. Local businesses can support neighborhood efforts by rewarding employees who activate their neighborhoods and offer support to neighborhood efforts.

### Long Term

1. **Support annual opportunities that remind and refresh social capital in a real way.** By looking at existing community activities like ShakeOut, Open Street events like CicLAvia, National Night Out, etc., local communities can leverage community-building efforts to create stronger local connections. Building on the success of these events in a regularized way that makes community connections essential to daily life in Southern California will increase the chances for quicker recovery. Local government can work to make an

annual effort to make sure all neighborhoods, blocks and communities (geographic or interest) are being strengthened and supported.

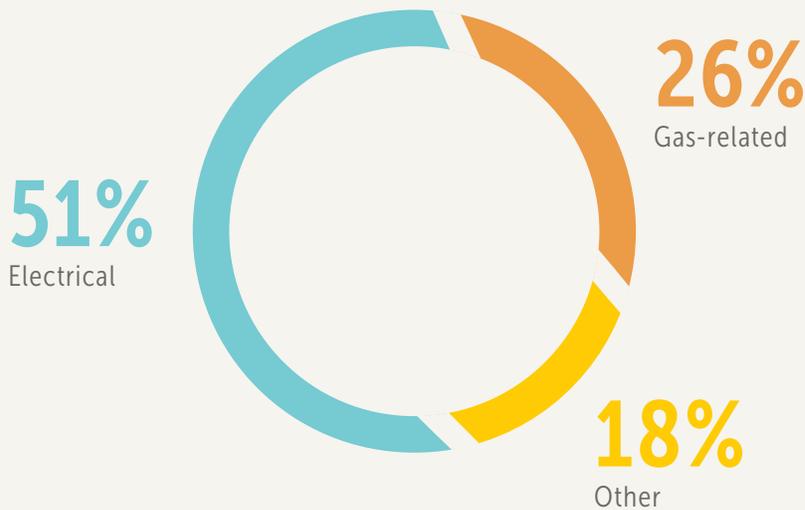
### For More Information and What’s Being Done Right Now...

Emergency Management and Departments throughout Southern California have resources to support neighbors coming together through basic information and more complex neighborhood projects like Map Your Neighborhood and The Five Steps.<sup>11</sup> Other resources exist such as the Shake-Out neighborhood resources.<sup>12</sup> Efforts to adapt the Seven Steps to Earthquake Safety<sup>13</sup> for faith communities could be further adapted to become a resource for neighborhoods, as well.



## 4. Fire Following Earthquakes

### CAUSES OF FIRE FOLLOWING THE 1994 NORTHRIDGE EARTHQUAKE



*Understanding the sources of ignition will help determine where to put resources.*

*Understanding this information leads to a path to address this issue and mitigate the losses. Stopping fires before they start reduces the exposure and allows limited resources to be more effectively deployed.<sup>15</sup>*

Source: Scawthorn, C., Cowell, A. D., and Borden, F. (1998). "Fire-related aspects of the Northridge earthquake." NIST GCR 98-743; National Institute of Standards and Technology Building and Fire Research Laboratory, Gaithersburg, MD, 1 v.

The effects of a large regional earthquake will be catastrophic, while the fires that follow the earthquake could double the direct losses of a Southern California Earthquake.<sup>14</sup> In the ShakeOut Scenario, there are more than 1600 fires that start. In this case, the goal is to: 1) prevent small fires starting and 2) work to extinguish fires before they grow too large. When fires becomes so big and widespread that it burns out of control, more is at risk than just a few structures.

### RECOMMENDATIONS

#### Near Term

- 1. Install Shaking Controlled Circuit Breakers (arc-fault circuit breakers)** Many fires start from the power coming back on when no one is around and lamps or other electrical devices setting off fires. This can be prevented by making sure the circuit breakers turn off following an earthquake and must be manually turned on by someone who is present. Local Government could consider codes requiring them at the time of sale, similar to automatic gas shutoff valves.

- 2. Increase the frequency and rate of remote control gas shut-off valves for natural gas transmission and high pressure distribution pipelines.** Remote Control Valves (RCVs) are a type of technology that allows valves to be opened or closed remotely by system operators from a central control location. Other valves are equipped with a control device that automatically triggers the actuator and shuts off the flow of natural gas in the event of a large pressure drop: Automatic Shut-off Valves (ASVs). Additionally, many of these valves provide routine pressure control to safeguard against exceeding the pipeline's maximum pressure. Upgrading or retrofitting valves on the pipeline system with RCV and ASV technology provides gas control operators with greater flexibility and shorter response times if it becomes necessary to close a valve or valves quickly in the event of an emergency, such as an earthquake. Local communities and natural gas operators should work together to expedite the installation of these specialized valves.



3. **Businesses should support employee’s understanding of this critical issue at work and at home by making sure every employee knows where gas, electrical and water shutoffs are located.** By shutting off utilities after an earthquake when needed, it prevents a fire from starting as well as maintains water pressure in the system for fire fighting efforts in the community. Businesses should be sure every employee is trained to do this at work and at home, as businesses have the ability to influence what happens at home.

### Long Term

1. **Upgrade current water (firefighting) systems and look at installing seismic-resistant pipes along targeted, backbone corridors or sections of the system.** Not every pipe in the system needs to be quake-proof, but by targeting key lengths of pipe in the system, enough can be in place to address the firefighting needs of the region.

2. **Focus on State aerial resources to support fire suppression post disaster.** After a large earthquake, many roads will be out even if you had resources available to move around. In order to extinguish larger fires or suppress them from growing, aerial support could be utilized. Not only would the current flames be extinguished, but by dropping fire retardant, other structures could be protected from catching fire. This investment is not for a “some day” hazard – this resource could be used for fighting the regularly occurring wildfires that hit the region and state. The state’s investment in these resources will support the mitigation efforts of local communities.

### For More Information and What’s Being Done Right Now...

Currently, the LA Mayor Garcetti’s “Resilience By Design” program addresses this issue by calling for the Los Angeles City Fire Department and the Los Angeles Department of Water and Power to coordinate and work on this issue.



## 5. Addressing Gaps in Building Resilience

This one earthquake sequence whose most damaging earthquake was magnitude 6.3, cost 20% the GDP of the whole country of New Zealand.

Consider the implications of the Building Code: it is designed to maximize life-safety<sup>16</sup> and not to minimize building damage or address financial losses. This standard means that while buildings may remain standing and protect occupants from collapse, they are not designed to remain usable after strong earthquakes. When a large earthquake strikes an urban center, we see that badly damaged buildings caused financial disruption not just to their owners, but to their tenants who lose a place to work or live and their neighbors who will be re-tagged during the aftershock sequence to protect against collapse of damaged structures onto its neighbors.

The Canterbury earthquakes in New Zealand in 2010-2011 were essentially the “design earthquakes” for the City of Christchurch. Almost all buildings met the code performance standards of life safety, but almost all in the epicentral region were so badly damaged that the whole Central Business District had to be closed and eventually almost all of the buildings were torn down. This one earthquake sequence whose most damaging earthquake was magnitude 6.3, cost 20% the GDP of the whole country of New Zealand.

This vulnerability has implications far beyond the single building, impacting the way the economic system and civic life functions in Los Angeles and all of Southern California.<sup>17</sup>

A gaping disconnect also exists between public expectation of the buildings around them and what is being delivered. Occupants may not know that a building built to code isn’t designed to be functional – renters, occupants and buyers should know the reality of their structure. Many people do not know that the building code only provides a life

safety standard and when they do realize this, they would be willing to pay somewhat more for a higher standard.<sup>18</sup>

To create a city of buildings that are functional requires addressing the most vulnerable buildings currently being used and the buildings that have yet to be designed.

### RECOMMENDATIONS

#### Near Term

1. **Develop a consensus menu of model building code options that can be adopted by local jurisdictions that moves beyond life safety and provides for various levels of functionality after receiving moderate to strong shaking.** By creating vetted options at various levels, local jurisdictions can move more effectively at addressing yet to be built buildings and eliminating the risk that is being designed into those buildings built to current code. SCAG, the League of California Cities and local jurisdictions can work together to create and adopt these options.
2. **Adopt mandatory retrofit for most dangerous buildings.** Only addressing future buildings doesn’t address those dangerous, existing buildings. It doesn’t make sense to require every building be retrofitted for functionality, but the most dangerous buildings, such as non-ductile concrete or soft first story, should be addressed. Each local jurisdiction would have to adopt their own retrofit rules. Looking to cities like San Francisco, Santa Monica



Christchurch, New Zealand Earthquake

and Los Angeles offers a model to achieve this essential life-safety function.

3. **Create a model scorecard (prototype) that could be used by each jurisdiction on vulnerable buildings.** By creating a simplified way for local jurisdictions to get an understanding of the complete picture of their non-single family home building stock, transparency in building performance would help the public and decision-makers to understand the reality of their built environment. Looking at simple items such as year built, type of construction, number of stories, etc., an inventory can reveal the implications of various levels of shaking on a community. SCAG and local jurisdictions could work together to develop and use this tool.

### Long Term

1. **Have the State of California require local jurisdictions to have “immediate occupancy” in new construction of buildings meeting certain criteria.** By having disconnected policies that make one jurisdiction less expensive than others due to lack of stronger building codes may put those that are committed to

safety at a disadvantage. To truly reduce risk to our building stock in Southern California, the State should address this issue by creating a program that requires cities to address the issue of existing and future building vulnerabilities.

### For More Information and What’s Being Done Right Now...

Currently, the International Code Council sets the policy on these issues and each jurisdiction in Southern California has the authority to amend their own code to reflect changes that go beyond the baselines of the ICC. Most local jurisdictions may not be aware of the impact of the minimum code and education would be the first step in achieving the recommendations. In California, the California Building Officials (CALBO) and The Structural Engineers Association of California (SEAOC) and its chapters, are engaged internally in addressing code issues.

The United States Resiliency Council (<http://usrc.org/>) is a group of structural engineers that have developed standards for evaluating the structural integrity of new and existing buildings.

## Acronyms

<b>CalFire</b> California Department of Forestry and Fire Protection	<b>SCAG</b> Southern California Association of Governments
<b>CalOES</b> California Office of Emergency Services	<b>SCEPP</b> Southern California Earthquake Preparedness Project
<b>FEMA</b> Federal Emergency Management Agency	<b>USGS</b> United States Geological Survey

## Endnotes

- <sup>1</sup> <https://www.whitehouse.gov/the-press-office/2013/02/12/presidential-policy-directive-critical-infrastructure-security-and-resil>
- <sup>2</sup> McMillan, D. W. and Chavis, D. M. (1986), Sense of community: A definition and theory. *J. Community Psychol.*, 14: 6–23.
- <sup>3</sup> The USGS and FEMA analyzed all of the faults across the nation and determined the expected loss from all of them. In that analysis, Los Angeles County alone represents one quarter of the expected losses of the whole country, an average of \$1.5 billion per year (FEMA, 2008).
- <sup>4</sup> <http://www.gw.govt.nz/assets/Emergencies-Hazards/Emergency-Planning/12-11-13-WeLG-report-to-CDEM-Joint-Committee-restoration-times-FINAL.pdf>
- <sup>5</sup> [http://www.fema.gov/media-library-data/20130726-1813-25045-0649/whole\\_community\\_dec2011\\_\\_2\\_.pdf](http://www.fema.gov/media-library-data/20130726-1813-25045-0649/whole_community_dec2011__2_.pdf)
- <sup>6</sup> <http://training.fema.gov/hiedu/downloads/ijems/articles/the%20southern%20california%20earthquake%20preparedness%20project%20%20evo.pdf>
- <sup>7</sup> Nakagawa, Y. and Shaw R., Social Capital: A Missing Link to Disaster Recovery, *International Journal of Mass Emergencies and Disasters* March 2004, Vol. 22, No. 1, pp. 5–34; Aldritch, Daniel, *Building Resilience: Social Capital in Post-Disaster Recovery*.
- <sup>8</sup> <http://www.lsu.edu/fweil/KatrinaResearch>
- <sup>9</sup> <http://mil.wa.gov/emergency-management-division/preparedness/map-your-neighborhood>
- <sup>10</sup> <https://natw.org/>
- <sup>11</sup> <http://5steps.la/>
- <sup>12</sup> <http://www.shakeout.org/neighborhoods/>
- <sup>13</sup> <http://earthquakecountry.org/sevensteps/>
- <sup>14</sup> <http://www.colorado.edu/hazards/shakeout/fire.pdf>
- <sup>15</sup> [http://disastersafety.org/wp-content/uploads/Fire-Following-EQ\\_IBHS.pdf](http://disastersafety.org/wp-content/uploads/Fire-Following-EQ_IBHS.pdf)
- <sup>16</sup> Liel, A., Haselton, C. and Deierlein, G. (2010, July 15). Using Collapse Risk to Inform Seismic Safety Decisions: California's Existing Reinforced Concrete Structures. *ASCE*, 137(4), 492-502.
- <sup>17</sup> Resilience By Design, (2014, December 11), Pages 36-37: [https://d3n8a8pro7vnm.cloudfront.net/mayorofla/pages/16797/attachments/original/1420504740/Resilience\\_by\\_Design\\_Full\\_Report\\_Dec\\_11\\_FINAL.pdf](https://d3n8a8pro7vnm.cloudfront.net/mayorofla/pages/16797/attachments/original/1420504740/Resilience_by_Design_Full_Report_Dec_11_FINAL.pdf)
- <sup>18</sup> Porter, Keith. Presentation at Caltech on June 8, 2015.





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