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RESILIENCE PLANNING FOR FACILITY MANAGERS

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This article is part of a regular series in FMJ Extended contributed by IFMA's Environmental Stewardship, Utilities and Sustainability Strategic Advisory Group.

Recent natural disasters, such as the Japanese earthquake and tsunami in 2011, Hurricane Sandy in the United States in 2012, and the floods in Europe in 2015, have massively disrupted communities and economies across the world. As damage cost estimates to businesses, governments and individuals continue to increase, and as extreme weather events increase in frequency and magnitude of damage, more communities and organizations are focusing attention on resilience planning and investments.

In certain locations, resilience planning is required for all facility-related investments. For example, New York City added new requirements to its Building Code[1] and Boston requires a resiliency checklist for all projects.[2] Some organizations require resilience assessment and investments for all real property assets; for example, the U.S. Federal Government is required to assess and improve the resilience for all built facilities.[3]

The challenge for facility managers and other professionals responsible for the built environment is to understand the key concepts associated with resilience that impact buildings and employees. They should act to identify and prioritize major vulnerabilities and hazards, and incorporate resilience into operational and investment planning.

The risk profile of buildings is changing because of natural (e.g., extreme weather events) and human-caused events. IFMA and other organizations have an important role in developing capabilities and capacities within facility management to improve resilience through training and resource materials.

Defining resilience

Resilience can be seen as the capability of an organization or system to accommodate changes over time and to continue to function. The original concept of resilience was developed in the field of ecology in 1973 by Prof. C.S. Holling as "persistence of systems and their ability to absorb change and disturbance and still maintain the same relationships among populations."[4] More recently, the U.S. National Academies of Science, Engineering and Medicine defined resilience as "the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events."[5]

These types of changes can be divided into acute disruptions and chronic stressors. Acute disruptors include natural disasters (including storms), accidents (ranging from car accidents up to events such as Three Mile Island and Chernobyl) and malicious attacks (such as the World Trade Center bombing).

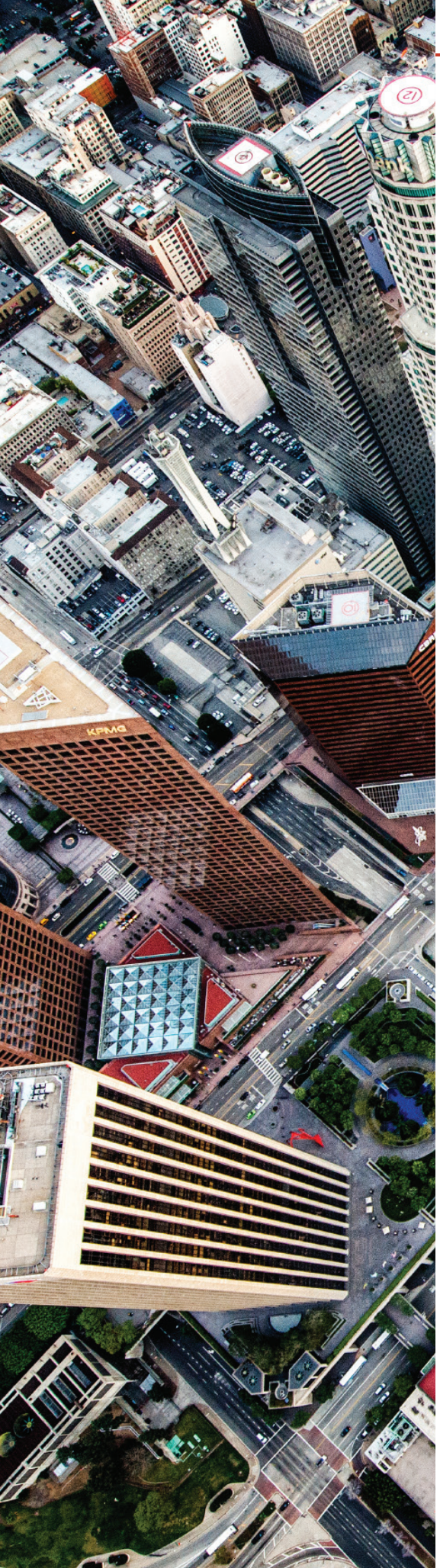
These events occur within a limited time period and cause immediate damage to built, social and natural systems. The damages can propagate to interdependent systems and cause secondary and tertiary damage. For example, the 1979 Loma Prieta earthquake in California caused a power outage and ruptured a gas pipeline, which started a fire. Without the electricity to pressurize the fire hydrant system, the fire had to be extinguished with other, more distant, resources.[6]

Chronic stressors tend to emerge over longer time frames, and include economic downturns (such as the 2008 international economic recession), social shifts (such as the increase in telework arrangements) and extreme climate change impacts (such as drought or sea level rise). These stressors may impair multiple systems simultaneously and may make it difficult to discern the discrete immediate and long-term impacts.

For facility managers, chronic stressors can alter the way in which the facilities are used and provide value for the organization. For example, a company that requires large quantities of water to operate its facilities may, during an extended drought, need to either curtail operations or relocate its facilities to ensure functionality.

Resilience and sustainability

Resilience is different from, but complementary to, sustainability. Sustainability can be defined as the balance among social, economic and natural systems to enable health, safety and well-being for all, and to ensure social justice, economic opportunity and environmental



regeneration. Sustainability strategies for the built environment often focus on improving the efficient and effective use of resources and reducing, eliminating and mitigating environmental impacts. These sustainability strategies can also improve resilience; for example, increasing the energy and water efficiency for a facility by 50 percent can allow that facility to function for twice as long on the same resources.

To optimize resilience, facility managers should incorporate sustainability into the resilience plan. For example, if there is a high probability of a blackout that will require backup power, FMs should plan first for the most efficient use of power under both normal and extreme conditions, and second, for that power to be provided by a fuel that will minimize greenhouse gas and other emissions.

IFMA's Environmental Stewardship, Utilities and Sustainability Strategic Advisory Group provides a number of sustainability support tools and educational products that directly impact resilience for the buildings managed by IFMA members. These include, for example, how-to guides, benchmark reports using tools such as ENERGY STAR's Portfolio Manager and a series of outreach programs on a variety of sustainability topics through channels such as FMJ articles, webinars, chapter outreach programs, newsletters, etc.[7]

Resilience planning for facility management

Resilience planning for facility management is the process through which an organization identifies the overall strategies and specific mitigation tactics it can employ to improve the capacity of its facilities to accommodate changes over time and maintain functionality.

Resilience planning is distinct from business continuity planning and disaster preparation. While business continuity planning and disaster preparation focus on immediate actions during and just after an acute disruption, resilience planning focuses on the longer-term functionality of the facility for the organization (and adjacent community) before, during, immediately after and long after a specific disruption or event. Facility management resilience plans are an increasingly crucial part of overall organizational planning for acute disruptions. They can also be critical inputs for an organization's strategic planning, particularly for maintaining mission-critical operations in the face of both acute disruptions and chronic stressors.

Below are four steps for FM resilience planning.

Steps

- **Identify and characterize currents assets**

  The first step of FM resilience planning is to identify and characterize all built, human and natural system assets directly associated with — or in close proximity to — the facilities in question. The data may include attributes such as the size, condition and function of the facility itself as well as the identification and prioritization of specific facilities that are core or unique to a particular organization, particularly the human resources and strategic operations of that organization.

  The data collected should also identify and characterize the critical infrastructure services (including transportation, energy, water, waste and communications), human capabilities, natural systems and other resources upon which each facility depends. Thus, resilience is strongly interconnected with the urban infrastructure in which the building resides.

A resilient building is not effective if its critical infrastructure services are not functioning.

- **Assess current and emerging vulnerabilities and hazards**
The second step is to assess current and emerging natural and human caused vulnerabilities and hazards to the facilities, people and natural resources, including threats to the adjacent communities and infrastructure services. Depending on the scope of the resilience planning process, priority may be given to acute disruptors that are most relevant for each location (e.g., climate change events such as drought and wild fires in California). The role of the FM is to define how to manage the vulnerability analysis, convene the stakeholders that will be involved with a particular risk, assess the risks associated with a particular vulnerability (including the regulatory issues), and coordinate with recovery and continuity planning.

Effective resilience planning not only mitigates risks but also can significantly improve the long-term value of built facilities.

Multiple resources exist to identify location-specific vulnerabilities, such as local and state hazard mitigation plans (which are required in the United States under the Federal Emergency Management Act for disaster relief). These hazard mitigation plans record the timing and impacts of past extreme events, identify likely future extreme events, and describe current and future mitigation efforts.

Additional resources may include local, regional or national assessments of climate change impacts, including extreme heat, drought, sea level rise and storm surge, and hurricanes/cyclones. The U.S. recently released the National Climate Assessment, which provides an assessment of climate change impacts by region and sector.[8] For example, the U.S. Army Corps of Engineers studied the vulnerability of the U.S. North Atlantic coast, specifically major population centers and infrastructure assets, to flooding and storm surge under scenarios that include almost four feet of sea level rise in the next 100 years, and rated the vulnerability of different regions.[9]

This step for facility management will also assess the degree to which an extreme event (or a series of such events) will damage each facility, and to what extent the FM team and organization may be able to maintain functionality despite the damage(s). For example, a facility site may flood during extreme rains; if the floods only affect the parking lot and other noncritical functions, this facility is less vulnerable to that hazard than a facility that has permanent damage to critical functions (such as power loss), or compromises health (such as mold growth).

This step should also assess the extent to which damage to a facility may cause harm or damage to nearby people or adjacent facilities. For example, if loss of fire protection during an event could cause a fire or explosion, or release of hazardous materials or gases, the organization is highly vulnerable to this risk for this facility.

- **Identify and assess resilience interventions**
During the third step, facility managers identify and assess potential interventions to reduce the vulnerabilities, and improve resilience of the facility and the organization as a whole. Interventions can include: 1) capital investments to modify, augment, or buffer real property assets; 2) operations and procedures to manage the human, built and natural systems; and 3) initiatives to redirect human or natural system flows to reduce damage and harm. The potential interventions should be prioritized with respect to the criticality of the functions and operations, and protection of human life across the full portfolio of facilities.

Certain interventions may be "stopgap" actions that provide immediate benefit for high probability events, while other interventions may require a progressive series of actions that together reduce the vulnerability or improve the capacity to absorb the impact or recover quickly. Resources for specific interventions for existing buildings include Building Resilience in Boston: Best Practices for Climate Change Adaptation and Resilience for Existing Buildings,[10] Retrofitting Buildings for Flood Risk,[11] and multiple publications from the U.S. Federal Emergency Management Agency, including Unreinforced Masonry Buildings and Earthquakes: Developing Successful Risk Reduction Programs.[12]

Appropriate interventions will be specific for each location, organization, facility and operation, and may include collaboration and coordination with neighboring properties, local communities and regions, and other organizations. The impacts of acute disruptions and chronic stressors will not be limited to a specific place, or necessarily be apparent

immediately, and prudent resilience planning will consider the full systems impacts of these changes.

- **Incorporate resilience into all investment and operations planning**
  The final step is to incorporate FM resilience planning in all capital investment and operations plans. The construction of new facilities and the renovation of existing facilities should explicitly consider assets, vulnerabilities and resilience interventions as a matter of course, and leverage the progress achieved through sustainability actions. It is less expensive to include resilience from the start than to come back after a disaster to rebuild or repair.

  Additionally, education and communication play an important role here. All stakeholders must understand how various risks impact the operational, financial and functional health of the organization as well as the organization's responsibility (and liability) for the health, safety and well-being of its employees and stakeholder communities. The stakeholders must be committed to and support the resilience plan.

Our industry is not doing enough to address resilience planning. It behooves organizations such as IFMA to educate members and share best practices in order to address this growing threat to the built environment and the health and welfare of employees. Effective resilience planning not only mitigates risks but also can significantly improve the long-term value of built facilities. **FMJ**

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