

מחקר 1001575393 : מסגרות רגולטוריות ומדיניות לשיקום בטווח בינוני וארוך  
אחרי רעידת אדמה גדולה בישראל

## Disaster Recovery Program Action: A Typology

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31.12.2024

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The success of post-disaster recovery can only be assessed against context-specific recovery goals. These must be defined within a specific local or national context, given preferences and priorities, institutional and regulatory frameworks, available resources, culture, and the nature of the disaster. Thus, two recoveries may look similar, while one held up as a success and another considered problematic. Similarly, successful disaster recoveries may differ significantly from each other. Furthermore, recoveries are rarely deemed *successful* overall, but rather a mix of successful aspects and aspects that could have been improved. That is, it is difficult- and perhaps, meaningless- to attempt to classify a process as broad and complex as recovery on an ordinal success scale. Rather, given that recovery processes are comprised of numerous and varied subprocesses and tasks, assessing aspects of recovery that were successful and aspects that could have been improved is both a more accurate reflection of reality and produces more useful information, to local planners, citizens, those learning from the experience, and all those involved in recovery efforts.

Therefore, the purpose of this document is not to present criteria for assessing disaster recovery success, but to outline a framework for creating and analyzing recovery plans and processes. That is, this document presents a typology of disaster recovery actions, all of which should be included to some degree in a recovery scheme. However, the balance between types of actions should vary based on the local context and preferences. Policymakers should purposefully shape the balance that best fits local needs, while being aware of the trade-offs that inevitably come with any policy decision. The typology here includes **process-oriented aspects of recovery**, **outcome-oriented aspects of recovery**, and **assessment**, all of which should be included to some degree in a recovery plan. The combination of tasks and balance between factors should be decided in the local context. Thus, this paper presents a **cluster of measures** by which to plan and assess post-disaster recovery. Furthermore, **precision**, **interconnectivity**, and **tradeoffs** are discussed as three relevant parameters of the recovery typology. First, a brief introduction to disaster recovery outlines the definition, timeline and scope of recovery. Process and outcome aspects of recovery are then discussed, followed by assessment and typology parameters.

**Table 1: Typology of recovery**

Process			Assessment	Subjective
Efficient <i>Pre-existing organization infrastructure Speed Professional management Effective planning</i>	Participatory <i>Community integration Inclusive and collaborative processes Empowerment and community orientation</i>			
Outcomes				Objective
Restoration	Improvement	Stability		

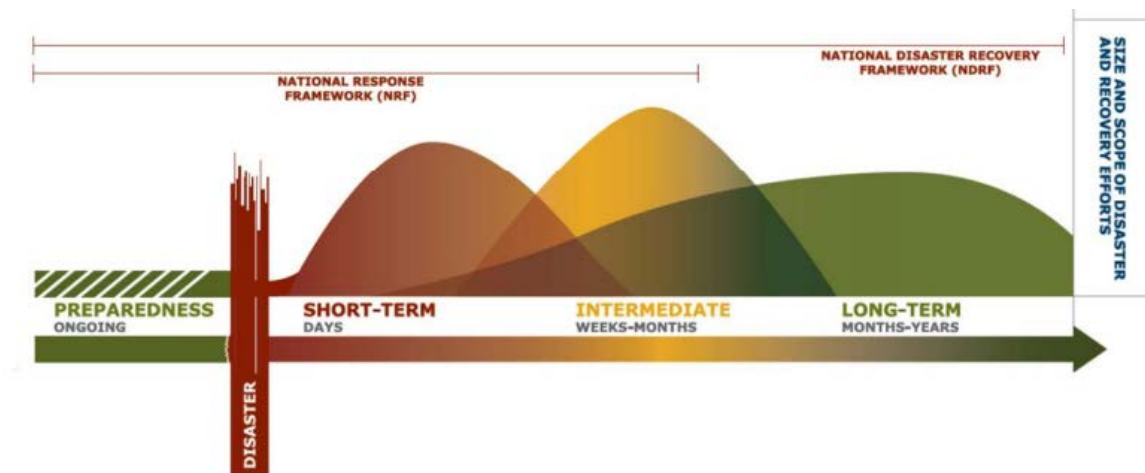
## Introduction to Disaster Recovery

The disaster cycle is usually divided into four stages: mitigation, preparation, response and recovery. While mitigation and preparation occur before disaster strikes, disaster response is initiated with the onset of the disaster and continues through the immediate aftermath of the disaster. Recovery occurs as the disaster concludes and continues for months, years, or decades, depending on the nature of the disaster and the success of recovery efforts. Efforts to mitigate and prepare for the next disaster are integrated into the recovery.

A commonly cited definition set out by Smith and Wenger (2007) stresses the process aspect of recovery, describing disaster recovery as “the differential process of restoring, rebuilding, and reshaping the physical, social, economic and natural environment through pre-event planning and post-event actions.” The definition is broad and touches three critical variables that shape the recovery story: (a) the goals of rebuilding (including the potential of recovery to affect societal change), (b) the areas of society that require attention during recovery, and (c) the process of recovery planning, decision making, and implementation, including timeframes. Every recovery must define all three variables, specifying each within a specific spatial and temporal context. As the definition specifies, recovery is a differential process that needs to be tailored to the place and population. However, identifying common recovery themes and standards is beneficial to recovery planning.

By definition, a process has a temporal aspect. Thus, over the past half century, scholars have refined the chronological conceptualization of recovery. In

their classic work *Reconstruction Following Disaster*, Haas and colleagues describes disaster recovery as an ordered, predictable process (Haas et al., 1977). According to this early modeling, the recovery could be divided into stages: emergency response, restoration of public services, replacement of capital stock to pre-disaster levels, and engaging in construction that pushes society beyond pre-disaster levels and involves economic growth and development. Subsequent research showed that real-time recoveries did not fit well into these proposed stages (Berke et al., 1993, Chang 2010). Rather, scholars began conceptualizing disaster recovery as a non-linear and dynamic process, lacking clear, orderly decision-making, in which various phases, systems, and roles have been shown to interact and overlap with each other (Jordan and Javernick Will, 2013; Brown et al., 2008). However, despite the recognition of recovery as a dynamic process, scholars and practitioners still divide the recovery into chronological phases. At the basic level, recovery is recognized as having short-term, intermediate and long-term aspects. However, these phases overlap and interact with each other, as demonstrated in the recovery continuum presented in FEMA’s National Disaster Recovery Framework (FEMA, 2016), in Figure 1. There is continuous debate about exactly which functions fall into which phase and which benchmarks mark the completion of a phase (Smith, 2011).



**Figure 1: Recovery continuum, from the FEMA National Disaster Recovery Framework (FEMA, 2016).**

Recovery occurs in all areas of society. Economic recovery, social recovery, and physical/environmental recovery are all critical. The process and outcomes

associated with each area of society are unique. However, each area should receive ample and appropriate attention in the local and national context.

*Economic recovery:* Economic rejuvenation is a central part of rebuilding a society after a disaster. Specific economic sectors impacted by a disaster must be rebuilt with carefully crafted policies aimed at creating sustainable and resilient solutions (FAO, 2023). In general, economic recovery occurs at four levels: the individual and household level, the individual business level, the industry level, and the macro-level.

The areas of the economy that require rejuvenation are highly dependent on characteristics of the local economy and the specific nature of disaster impacts. However, in all cases attention should be given to financial services, access to assets and resources, employment creation, business recovery and enterprise development and the monitoring all areas of economic recovery (The SEEP Network, 2017). Additionally, specific policies should target impacted industries, based on the nature of the industry and the local post-disaster context. Commonly, indicators of economic recovery progress include employment rates, household incomes, business counts (as compared with pre-disaster level), standard of living, tax revenue of GNP and changes in housing valuation (Jordan and Javernik-Will, 2013).

*Social Recovery:* Social recovery refers to the restoration of a functional, healthy, inclusive, equitable, empowered, and interconnected society. This includes, but is not limited to, the restoration of social support services, educational services, mental health services, and physical health services. Additionally, it may include the facilitation of community mourning and processing trauma, restoring trust and cohesion, and rebuilding or strengthening a sense of community.

*Physical and Environmental Recovery:* Physical reconstruction after a disaster is usually the most obvious indicator of recovery. It often requires the most immediate attention as well. Included in physical and environmental recovery is the reconstruction of housing stock and businesses; rebuilding or repairing schools, hospitals, and public buildings; restoring critical infrastructure; and cleaning and repairing the environment. It may include relocating buildings, revising zoning, or redesigning areas. Additionally, depending on the disaster, it may include a lengthy processes of cleaning and purifying areas contaminated by radiation or other dangerous materials.

## I. The Disaster Recovery Process

Definitions of disaster recovery usually emphasize **recovery as a process**. For instance, in addition to Smith and Wenger's definition above, Contreras and colleagues (2018) define recovery as "a complex multi-dimensional long-term process of planning, financing, and decision making after a disaster." Ensuring the high quality of this process is not only critical as a means of producing effective and high-quality output, but the process *in itself* can serve to heal and revitalize the community. Furthermore, the process of rebuilding a community is an opportunity to improve organizational arrangements and invest in development processes. Thus, in former U.S. President Bill Clinton's original propositions for *Build Back Better* (BBB), several propositions outline how to improve the process of rebuilding society. For instance, proposition six states that "The UN, World Bank, and other multilateral agencies must clarify their roles and relationships, especially in addressing the early stages of a recovery process." (Clinton, 2006) Other discussions of BBB detail effective recovery management, legislation that facilitates recovery (Mannakkara and Wilson, 2014), and the importance of recovering quickly (Hallegatte et. al., 2018).

The recovery process should be both **efficient** and **participatory**. While some aspects of efficient and participatory processes are symbiotic, other aspects are independent or at odds with each other. For instance, some have pointed to the participatory processes in New Zealand as a factor that has hindered the efficiency and speed of the recovery process. At the heart of the issue, there is an inherent trade-off between speed and participatory deliberation- both of which are necessary in the post-disaster setting. This trade-off is discussed at length in analyses of disaster recovery (Platt and So, 2017; Platt and So, 2014).

### Efficient recovery processes

An efficient process implies a balance of timeliness and quality. Speed that comes at the expense of quality is not efficient in the long-term. Efficiency implies a rational, scientific approach, based on expertise and standards of good management. It implies efficiency both in time and resources. Literature points to several characteristics, which facilitate an effective and rational process and have the potential to enhance the efficiency of the recovery process.

### Pre-existing organizational infrastructure

An effective recovery does not begin after a disaster, but rests on pre-existing organizational arrangements and infrastructure. A well-managed recovery draws both on routine and adaptive management expertise (Kushma and Slick, 2023). While routine expertise refers to the professional knowledge and know-how concerning managing the aftermath of a disaster, adaptive expertise refers to the capacity of existing governing bodies to innovate and change in the face of unexpected and new developments. Limits to the extent of planning, the multi-faceted, interconnected, and cascading nature of post-disaster problems, and the window of opportunities to make societal changes in the post-disaster climate make adaptation critical (Kushma and Slick, 2023; Alesch et al., 2009; Johnson and Olshansky, 2017). Thus, the recovery governance structure should primarily coordinate and support other agencies who have routine expertise and experience in specific areas (Johnson and Olshansky, 2017; FEMA, 2016). A highly functional and effective routine management structure bodes well for the management of a disaster and recovery. Good management practices include the clear delineation of roles and responsibilities, as well as the creation of effective stakeholder networks. (FEMA 2016; Olshansky 2005).

Robust interorganizational and inter-agencies linkages and relationships during normal times also have a strong influence on disaster recovery (Kushma and Slick, 2023). While linkages between agencies and levels of government are critical, no less critical are communication channels between civil society and government. Hatton and colleagues (2023) describe the positive impact of preexisting connections and networks of businesses, as well as communication channels between the business community and government, on business recovery in New Zealand. They suggest that the creation of relationships between civil society and government in normal times is critical to enable bottom-up initiatives both in regular times and during disaster recovery.

### Speed

The importance of speed in disaster recovery is intuitive. A quick recovery minimizes disruption and the overall impact of the disaster. The World Bank lists *building back faster* as one of three core components of BBB, and shows that a 66% reduction in reconstruction time (with no compromised quality) would reduce well-being losses by 14% globally (Hallegatte et al., 2018). The speed of the recovery process generally focuses on the physical rebuilding. However, social aspects of

recovery must also be addressed with immediacy, though not rushed to an end. Speed is often at odds with quality and deliberation (Platt and So, 2017). Decision makers must decide how to navigate this tension within the specific post-disaster context.

Literature discusses both facilitating and managing speed. Planning, preparedness, and availability of resources are all suggested as variables that facilitate a speedy recovery (Hallegatte et al., 2018; Platt, 2018). These will be discussed in-depth in the section on pre-disaster recovery planning, but includes contingency planning, a clear allocation of responsibilities, efficient and practiced decision making, contingent financial arrangements, and pre-disaster arrangements with private sector companies, particularly with regards to cleanup and construction (Takemoto et al., 2021; Hallegatte et al., 2018; Platt, 2018). Platt (2018) shows that government decision making and policies have more influence on the speed and quality of recovery than exogenous variables such as the scale of disaster, demography, and pre-disaster economic conditions. International cooperation also facilitates a speedy response and recovery (Hallegatte et al., 2018).

The *management* of speed is another aspect of a quick and effective recovery. In his article about *time compression* after a disaster, Olshansky (2005) posits that speed in recovery is a fact, rather than a choice. That is, in the recovery period, numerous decisions in many fields that are usually made over a long period of time are compressed into a short period of time. The speed of decision-making and action is inevitable and inescapable. The challenge becomes the effective management of speed, including the implementation of efficient planning and prioritization. Olshansky suggests dividing tasks into those that must be done immediately, mid-term projects that receive more thought and planning and long-term projects that will receive extensive attention.

### Professional Management

The organizational and financial management of the recovery process is a key determinant of successful recovery planning and implementation. Platt (2018) shows that while exogenous factors (such as size of impact, population demographics and economic factors) have little impact on recovery success, recovery management and decision making impact both the speed and the quality of recovery.

In their analysis of six case studies of major disaster recoveries worldwide, Johnson and Olshansky (2017) note that recovery management structures vary by country. While China and New Zealand took a centralized approach to recovery



management, Japan took a partly decentralized approach, and the United States, India and Indonesia took a decentralized approach. Although all management must have some aspects of decentralization and local management, the overall administrative structure of recovery management is determined by the political and social context. Regardless, there are aspects of recovery management that can be implemented within any administrative structure and promote successful recovery, including governance structure, coordination and stakeholder management, decision making, financial management and incorporation and management of information. These aspects are discussed below.

#### *Governance structure*

It is increasingly common for governments to create an emergent governance structure to oversee and coordinate all aspects of recovery, as opposed to relying on existing coordination mechanisms between agencies (Liu et al., 2016; Johnson and Olshansky, 2017; Mukherji et al., 2021; Fenglar et al., 2008). Generally, existing government structures lack the capacity to support and manage a recovery process. Examples of emergent recovery governance structures include the Canterbury Earthquake Recovery Authority (CERA) in New Zealand and the National Reconstruction Agency in Japan. Although the scale and nature of specific organizations differs, generally, the recovery governance body draws from government resources and allows the complex and multi-faceted recovery process to be monitored at one address, facilitating coordination, communication, collaboration and efficiency among multiple stakeholders and actors (Johnson and Olshansky, 2017; Mukherji et al., 2021). According to Johnson and Olshansky (2017), the role of government in disaster recovery is to “mobilize financial resources, provide technical assistance to public and private actors, invest in infrastructure and public facilities to catalyze private development, act as a credible data repository, serve as a focal point of communications, and provide leadership that can support and further the actions of all the other recovery actors. (p. 9).” That is, the governance structure should primarily serve leadership and coordination functions.

In their qualitative study of post-disaster governance structures, Mukherji and colleagues (2021) note the importance of overcoming some of the challenges faced by the recovery governing authorities, including minimizing time to the authority's operationalization, ensuring sufficient manpower, outlining clear priorities, cultivating efficient inter-agency coordination, and including municipal governments in decision making processes.

#### *Coordination and Stakeholder Management*

One of the most important aspects of recovery management is managing a variety of stakeholders and coordinating efforts among various actors, as well as creating horizontal and vertical government collaboration and coordination (Johnson and Olshansky, 2017; FEMA, 2016). This is key in creating unity of effort during the recovery process. Without this coordination, recovery goals risk becoming obscured due to the confusion or lack of motivation of key stakeholders (Mannakkara and Wilkinson, 2014).

Coordination of stakeholder efforts should be managed by the overseeing body created to lead the recovery (Mannakarra and Wilkinson, 2014). Some suggest that this is, in fact, the primary role of the recovery governance structure, as it directs existing agencies and organizations to continue doing what they do best, but guides these efforts towards a coherent recovery program (Johnson and Olshansky, 2017). At a basic level, coordination requires defining the roles and responsibilities of stakeholders in all sectors (FEMA, 2016). This includes the clear delineation of roles and responsibilities of international actors, as well as domestic organizations. Links between the government and civil society organizations, non-profits, and private sector organizations formal and robust (Schmidt et. al., 2023). Additionally, stakeholders should be kept well-informed, stakeholder resources and skills should be efficiently leveraged to support recovery efforts, stakeholders should be included in decision-making where relevant, and the overseeing body should facilitate the cooperation and coordination among stakeholder groups involved in the recovery effort.

Smith (2011) recommends the use of alternative dispute resolution (ADR) techniques to navigate stakeholder dynamics and coordination. Furthermore, the recovery governance structure should empower networks and build capacity throughout society, in order to facilitate collective action (Johnson and Olshansky, 2017).

#### *Decision Making and Prioritization*

Effective decision making is critical in driving the recovery process. There is often tension between deliberation and speed in decision making (Platt and So, 2017; Olshansky and Johnson, 2017). Johnson and Olshansky (2017) recommends that managing post-disaster time compression can be achieved by either prioritization, increasing planning capacity, or decentralizing. Prioritization manages time compression by suggesting decision makers take a differential approach to recovery decision-making, prioritizing speed for some projects and deliberation for others (Olshansky et. al., 2012). That is, effective decision-making is dependent on effective prioritization and vice versa.

The parameters for prioritization must be determined by the context and recovery goals. However, a consistent, systematic, and transparent approach should be used to prioritize recovery tasks. For example, in the case of rebuilding critical infrastructure, a rebuild driver- that is, a critical infrastructure system that determines which locations are prioritized for all critical systems - may be selected to avoid duplication, unnecessary digging, and unnecessary interruptions to traffic (Liu et al., 2016). Although some modeling exists for the prioritization of economic recovery projects (for example, see Yu et al., 2014), most quantitative prioritization modeling concern infrastructure recovery. Similarly, there are many models and software-based methods for prioritizing construction projects (Mohammadnazari et al., 2022; Baxter et al., 2020; Liu et al., 2016). Decision makers must devise a method for prioritizing social and economic aspects of recovery.

The decision-making process should also be information-based and inclusive of relevant stakeholders and the local community. These aspects are discussed in other subsections.

#### *Financial Management*

The recovery period is often characterized by a flood of funding from numerous sources directed towards a myriad of projects and goals. Managing the flow of finance effectively is one of the key challenges in recovery management (Johnson and Olshansky, 2017). Speed is of essence (Rouhanizadeh et al., 2020). However, the need for accountability is also heightened, both because of donor demands and the centrality of fostering public trust during a recovery. Given these factors, routine finance structures require adjustment during this period (Fengler et al., 2008). Sometimes reforms that augment accountability and transparency can become permanent (Johnson and Olshansky, 2017). A detailed review of recovery financing structures is beyond the scope of this analysis. However, careful attention should be paid to creating an effective financing arrangement. FEMA's NDRF, specifies that "effective financial and program management" includes "understanding which funding sources could finance recovery; knowing how to administer external funding programs; having a system of internal financial and procurement control and external audits; and maximizing the use of local businesses to aid recovery of the local economy (p. 50)." Johnson and Olshansky (2017) add the importance of creating debt allowances and borrowing mechanisms for local governments and nongovernmental organizations impacted by a disaster.

In addition to a well-planned financing structure, policymakers must ensure that resources are being allocated to programs and materials that meet community needs. Smith (2006) notes that the amount of financial resources allocated to recovery is not always coordinated with recovery outcomes since assistance does not always meet local needs. Furthermore, often the ruling political party uses funding to show its own priorities and garner support (Johnson and Olshansky, 2017). Ensuring that funding sources are directed according

to recovery goals and needs is critical and complex, given the number of independent organizations contributing to the recovery process. Given this, Liu and colleagues (2016) note the necessity of flexibility in the pre-disaster funding plan, as to allow for funds to be directed as needs arrive after a disaster.

Finally, ample resources must be made available, not only for recovery project outputs, but for aspects of the recovery process that may be overlooked. Budgets should include costs of communication, planning, data, public involvement, revision, and contingencies (Johnson and Olshansky, 2017). Additionally, Schmidt and colleagues (2023) draw attention to the importance of direct resource flows to non-profit organizations, which are often strategically positioned to be effective facilitators of recovery, but may lack funds or resources, especially if impacted by the disaster. This includes creating efficient mechanisms for administering loans to non-profits and for reimbursing non-profit organizations for their work during the recovery process. Furthermore, the budget should be assessed and revised as the recovery progresses,

#### *Incorporation and Management of Information*

The incorporation of information in decision making refers to the use of data and information to effectively make decisions and plan, whereas the management of information includes the effective collection, processing, storage, and distribution of information. Both are critical (Johnson and Olshansky, 2017). Effective recovery planning and implementation depends on good information (Clinton, 2006). Data collection is necessary during the pre-disaster and disaster phases, as well as throughout the recovery. Pre-disaster planning should include plans for data collection during and after a disaster. Information bases should be both robust and accessible to various stakeholders (Song et al., 2017; Liu et al., 2016). This serves as the basis for making informed and timely decisions, tracking progress, and coordinating effectively with various stakeholders (FEMA, 2016; Hallegatte et. al., 2018). For instance, in their analysis of critical

success factors during the 2011 Christchurch Recovery, Liu and colleagues (2016) describe the process of mapping damage to water and sewage systems. This data was then shared with planners, operators, decision makers and other stakeholders, in order to facilitate coordination and effective decision-making across a range of stakeholders involved with the recovery.

This is not only true of critical infrastructure and built environment recovery, but of social and economic aspects of recovery as well (Seismic Safety Commission, 2013). In order to facilitate effective information management and incorporation, Johnson and Olshansky (2017) suggest having regular meetings with groups that include representatives from multiple stakeholders and planners, communication of information by newsletter or website, and creating data repositories, such as data centers or clearing houses. There should be a bi-directional flow of information between decision makers and stakeholders. For instance, while civil society and faith-based organizations benefit from updates and data transfer from the government and other actors, they can also provide critical information about the local context (Schmidt et al 2023).

### Effective Planning

Recovery planning should occur both before the disaster and after the disaster. Pre-event recovery planning increases the effectiveness, timeliness, efficiency and quality of post-event recovery (FEMA, 2016; Crowley, 2017; Johnson et al., 2023; Smith, 2011). Smith (2011) notes that, in practice, disaster recovery is largely reactive and relies on post-disaster adaptive planning. However, the volatility and stresses of the post-disaster environment may give way to political opportunism. Furthermore, pre-event planning is more conducive to facilitating participatory and deliberative processes. Thus, the pre-event delineation of recovery goals, priorities, and arrangements can bolster the effectiveness of the recovery process. With good pre-event planning, post-disaster planning can focus on the implementation of preexisting recovery goals (FEMA, 2016). That is, pre-event planning can lay a foundation of values and principles reached through a deliberative and inclusive process that guide a needs-based and value-based approach to recovery (Smith, 2011). The participatory

aspect of recovery planning will be discussed further in the section on participatory recovery processes.

Pre-event planning occurs on both the national and local levels (Schmidt et al., 2023). On the national level, there should be a framework for recovery, such as FEMA's National Disaster Recovery Framework (NDRF). The national framework establishes a set of best-practice recovery principles and priorities with which to manage a successful recovery process and describes the institutional context of recovery operations (FEMA, 2016; Schmidt et al., 2023). It does not replace, rather guides, detailed local disaster recovery planning. FEMA's framework covers the core capability areas of planning, public information and warning, operational coordination, economic recovery, health and social services, housing, infrastructure systems, and natural and cultural resources. For each core capability area there are critical tasks suggested to local authorities. It also gives guidance for operational planning and framework application. Additionally, the roles and responsibilities of actors and coordinating structures of numerous stakeholders are detailed. That is, it describes the basic structure in which different levels of government operate during the disaster recovery period (Schmidt et al., 2023).

Regarding local pre-event planning, according to the NDRF (FEMA, 2016), "When done in conjunction with local and regional comprehensive community development and mitigation planning, pre-disaster recovery planning helps to establish roles, responsibilities, and partnerships; lay out recovery priorities and policies; incorporate hazard mitigation strategies in the wake of a disaster; and identify post-disaster processes and coordination. (p. 26)." It is critical that plans detail institutional arrangements, including coordination structure, decision-making process structure, and defined roles and responsibility during the recovery period (FEMA, 2016; Hallegatte et al., 2018; Berke et al., 2014). In their case study of pre-event disaster recovery planning in Seattle, Washington (USA) and Wellington, New Zealand, Johnson and colleagues (2023) note the importance of local recovery plans to include detailed structure for disaster recovery leadership and governance, as well as the horizontal and vertical relationships between the governing body during recovery to other agencies and organizations. Supportive roles, such as legal and policy guidance, logistic coordination, resource allocation, planning, communication, community engagement and financial management should also be detailed.

In an assessment of 87 local disaster recovery plans, Berke and colleagues (2014) suggest definitions and indicators for recovery plan quality. These are divided into direction-setting principles and action-oriented principles, including the definition of goals relating to many areas of society, detailing disaster scenarios, policies guides for recovery given different disaster scenarios, interorganizational coordination, participation mechanisms and implementation strategies and monitoring of recovery. These indicators are presented in Table 2.

Table 2: Indicators for recovery plan quality, as found in Berke et al., 2014

Direction-setting principles	Action-oriented principles
<p><b>I. Goals: Future desired conditions that reflect breadth of values affected by the plan.</b></p> <ol style="list-style-type: none"> <li>1. Transformative goals to build back better (examples). <ul style="list-style-type: none"> <li>• blight removal</li> <li>• smart growth (more trans-oriented development)</li> <li>• enhanced public safety (relocate development to safer locations)</li> <li>• more equitable distribution of services and facilities</li> </ul> </li> <li>2. Restorative goals to alleviate losses efficiently and quickly (examples). <ul style="list-style-type: none"> <li>• economic resumption to keep businesses alive</li> <li>• replace/repair development to prior conditions</li> </ul> </li> </ol> <p><b>II. Fact base: An evidence-based foundation to derive future disaster scenarios and recovery policy options.</b></p> <ol style="list-style-type: none"> <li>1. Identify hazards</li> <li>2. Estimate current population and property exposed</li> <li>3. Scenarios of disaster impacts with varying hazard severity and exposure from alternative development patterns</li> <li>4. Capability assessment of existing plans, regulations, staff expertise</li> </ol> <p><b>III. Policies: Flexible guides that account for possible future disaster scenarios that vary in severity and location of impacts, and changes in local needs and capacities through different phases of recovery (examples):</b></p> <ol style="list-style-type: none"> <li>1. Temporary building moratorium</li> <li>2. graduated standards for activating bldg. acquisition/relocation</li> <li>3. Post-disaster housing siting/supply policies</li> <li>4. Provisions for adjusting capital improvements for public facilities</li> <li>5. Provisions for change in land use regulations</li> <li>6. Damage thresholds for change in bldg code stds</li> </ol>	<p><b>IV. Interorganizational coordination: Coordination for mobilizing resources and adaptively managing recovery in ways that fit changing post-disaster needs and take advantage of opportunities that open and close quickly.</b></p> <ol style="list-style-type: none"> <li>1. Identifies representatives of lead local recovery task force charged with directing rebuilding (federal, state, local, nongovernmental)</li> <li>2. Identifies external organizations that serve as resource providers from the disaster assistance network (federal, state, local, nongovernmental)</li> </ol> <p><b>V. Participation: Engage the public to build a knowledgeable constituency able to create a plan that reflects local values, needs, and capabilities, and enable ongoing public input throughout the recovery process.</b></p> <p>Identifies techniques to engage the public:</p> <ol style="list-style-type: none"> <li>1. During pre-disaster planning</li> <li>2. After a disaster event to adaptively manage the recovery process to fit changing needs/conditions (examples of techniques during/after a disaster): <ul style="list-style-type: none"> <li>• designate communication liaison</li> <li>• citizen advisory committee</li> <li>• public meetings for comment</li> <li>• media releases (radio, television, local paper)</li> <li>• other (website, public notice, public surveys)</li> </ul> </li> <li>3. Include a narrative on who was involved in pre-disaster planning, how they participated, and how they affected evolution of plan</li> </ol> <p><b>VI. Implementation and monitoring: Involves implementation actions, and tracking plan performance</b></p> <p>Identifies:</p> <ol style="list-style-type: none"> <li>1. Post-event roles/responsibilities</li> <li>2. Pre-event maintenance (e.g., mock exercises, training) to keep implementers familiar with plan</li> <li>3. Criteria to guide determination of partial/full activation of plan</li> <li>4. Monitoring indicators to track outcomes, use of recovery funds, and evaluate and adapt policies</li> </ol>

Note: All indicators under each recovery plan quality principle are coded: mentioned = 0, not mentioned = 1.

In addition to detailing governance structure and institutional arrangements, pre-event recovery planning should include the long-term recovery goals (Garnett and Moore, 2010; Berke et al., 2014), including the identify areas where long-term resilience can be improved, in order to give direction to post-disaster upgrading (FEMA, 2016). Plans should also provide access to information and data that can guide the recovery (Hallegatte et al., 2018; Berke et al., 2014) and provide flexible policy guides and plans on critical issues such as service provision to residents during the recovery period (Johnson et al., 2023). Finally, plans should be created in a



participatory and deliberative process including a wide range of stakeholders and community representatives (Johnson et al., 2023; Schmidt et al., 2023) also outline mechanisms for facilitating a participatory processes during recovery (Berke et al 2014; Schmidt et al., 2023).

Some planning aspects inevitably occur post-disaster, as part of the recovery process. As with all areas of policy, careful planning is critical to ensure the quality of results. Particularly in places lacking pre-disaster recovery plans, some scholars have recommended the “slow down to speed up” approach, recognizing that creating thorough plans and building consensus among stakeholders will ultimately create a faster and smoother recovery process (Johnson and Olshansky, 2017). Ideally, post-disaster planning is guided by goals and plans outlined in pre-disaster recovery plans, but gives a concrete shape and direction to these principles, based on the hazard impact and post-disaster context. Recovery planning should be comprehensive in scope and involve a variety of stakeholders (FEMA, 2016). It should address critical strategic and policy questions associated with the BBB philosophy, such as improving urban planning and design and requiring high-standard building codes in reconstruction (Platt, 2018). Ultimately, it should establish concrete programs, responsibilities and timelines for reconstructing society.

### Participatory Recovery Process

Recovery processes must not only be efficient, but also participatory. It may be argued that participation- to an extent- enhances efficiency. That is, incorporating local knowledge during the process is likely to enhance the long-term effectiveness of outcomes. While this may be true, the normative value of participation in the recovery process goes beyond its contribution to efficiency. A participatory process not only recognizes the importance of the process itself to recovery, but acknowledges that democratic values of civic participation, incorporating local preferences and input, social inclusion, and equal opportunity play an important role in guiding the recovery process.

### Community integration

The recovery process rests on integrative aspect of community and must be adapted to these aspects. These integrative aspects are also referred to as the community’s social capital infrastructure. Aspects of this infrastructure should be enhanced in advance of a disaster. During the process of planning for and recovering

from a disaster, the social capital infrastructure of the community should be noted, adjusted for, and strengthened.

Community integration is key to recovery success (Smith, 2011; Berke et al., 1993; Aldrich, 2012). Berke and colleagues (1993) created a typology of four types of communities based on combinations of low and high vertical and horizontal integration. While horizontal integration refers to the strength of the sense of community (i.e., the links of community members to each other), vertical integration refers to linkage between the community to various levels of government and other sources of resources. Both types of integration play a key role in recovering from disasters: while the former creates a framework for mutual social support and the potential for collective action, the latter increases access to resources. Both types of integration create the social and organizational infrastructure for participation in the recovery process.

More recently, Aldrich (2012) modeled the integration of communities as three types of social capital: bonding, bridging and linking capital. While bonding social capital refers to the intra-community links among similar people, bridging capital refers to links with people who are different, within the same geographic space. Horizontal integration includes both bonding and bridging capital. Linking capital refers to the linkage between the community and levels of government or resources. Disaster recovery has been shown to be linked to all types of social capital (Aldrich, 2016; Aldrich and Meyer, 2015). In a case study of tornado recovery in Joplin, Missouri, Arendt (2023) notes the importance of pre-existing interrelationships and high levels of trust between leadership and residents in facilitating a community-empowered recovery process.

### Collaborative and Inclusive Planning

The recovery process should take a whole-community approach and be inclusive of all segments of society, stakeholders, and government agencies. FEMA's NDRF guiding principles include both (a) individual and family empowerment, which includes caring for and supporting all disaster victims and (b) engaged partnerships and inclusiveness, which includes the whole community being involved in the recovery process (FEMA, 2016). These point to two important aspects of inclusiveness in the recovery process: community support and community involvement (Mannakkara and Wilkinson, 2014). Firstly, the recovery process must provide support mechanisms, tailoring efforts to the household-level and to vulnerable

populations (Hallegatte et al., 2018; Mannakkara and Wilkinson, 2014). A recovery that does not incorporate principles of equity and inclusiveness has the potential to exacerbate existing inequalities and perpetuate them into the future (Finucane et al., 2020). Institutional barriers and other forms of social discrimination must be examined and bypassed. For instance, Rivera and colleagues (2022) document the role of procedural vulnerability in limiting the access of low-income families to FEMA support. Community support also includes fostering community cohesion and keeping the community well-informed (Mannakkara and Wilkinson, 2014).

Secondly, the recovery must receive input from all members of society, including different demographic groups and community stakeholders (FEMA, 2016; Song et al., 2017; Arendt, 2023). This includes keeping the public well informed, as well as creating mechanisms to elicit feedback from the public. The benefits of a participatory process are broad and widely agreed upon, though the empirical support backing this sentiment is somewhat tenuous. It is generally assumed that public participation facilitates recovery by giving participants a sense of control, identifying realistic and effective solutions, increasing cost-effectiveness, nurturing an independent society and building public trust (Vallance, 2015; Olshansky, 2005; Arendt, 2023). Mediums for eliciting and fostering participation are less agreed upon. Vallance (2015) distinguishes between public participation in recovery decision making and public participation in recovery activities, such as debris removal and delivering support to victims. Examples of mechanisms for public participation range from passive informational campaigns and relatively passive surveys of public satisfaction levels as feedback (Liu et al., 2016), to eliciting ideas from the public, such as the *Share an Idea* campaign after the 2011 Christchurch earthquake in New Zealand (Carlton, 2013), to collaborative decision making and/or empowering civil society to act autonomously (Vallance, 2015).

It is important to note that participatory recovery processes can also serve to marginalize underrepresented social groups (Hamideh, 2020). It is critical that decision makers are aware of this and take measures to assess and prevent marginalization.

Additionally, it is important to include the private sector and non-profits in the recovery effort. Enlisting their participation not only helps tailor the response to the needs of the community, but also incorporates community resources in order to create an efficient recovery (FEMA, 2016). Non-profits are often able to coordinate

networks for volunteers, assist with sheltering, and provide a wide range of social support functions, depending on the nature of the organization. The private sector also provides goods, services, employment, and an understanding of the business environment and community needs. Furthermore, recovery from the Great East Japan Earthquake showed that when implementing disaster risk management (DRM) principles into the recovery, the participation of all sectors is critical (Takemoto et al., 2021).

Creating an inclusive recovery also mandates eliciting community and stakeholder participation in the recovery planning process. Creating collaborative planning processes may enhance the effectiveness of plans and may increase their chances of implementation. In this sense, disaster recovery planning is no different from other type of collaborative policy or program planning. Collaborative planning can occur in numerous ways, including holding public meetings, creating focus groups with key stakeholders and public representatives, and consulting with existing neighborhood organizations or leadership.

This type of collaborative recovery planning should primarily occur during the pre-event recovery planning stage. Creating an environment conducive to deliberation and participation is one of the key benefits of pre-disaster recovery planning. The time pressure of the post-event environment renders it less conducive to the deliberative and inclusive planning process that high-quality and effective recovery plans require. This is described succinctly by Smith in his 2011 guide for recovery planning:

*Post-disaster planning is done in an environment that can be hostile to important preconditions of success, such as the meaningful involvement of the members of disaster recovery assistance networks in a sustained, deliberative process. Conversely, pre-event planning allows members of assistance networks to invest the time and resources needed to foster cooperative behavior, assuming that appropriate incentives and sanctions are in place. For disaster recovery planning to succeed, it also requires that communities actively participate in the process. And the ability to facilitate a participatory process aimed at developing a vision for the future is an important function of the practicing planner. The use of inclusive planning strategies can help to bridge seemingly intractable disputes and identify mutually compatible outcomes. Planners are among*

*a growing number of professionals who have embraced the use of ADR techniques, including policy dialogue, mediation, facilitation, and negotiation, as a means to address multiparty conflict and seek consensus (Smith, 2011, p.6)*

#### Local empowerment and community orientation

Recovery is inherently a local phenomenon and should be driven by the preferences and vision of the effected community (Clinton, 2006, FEMA, 2016; Gjerde and de Sylva, 2018). One of the guiding principles in FEMA's NDRF is leadership and local primacy, including the recognition that the local or state government has a primary role in disaster recovery while the Federal government has a supportive function. A centralized, top-down approach to recovery often fails to effectively meet local needs (Gjerde and de Sylva 2018). While the precise administrative recovery structure varies by place and the preexisting administrative structure of the government, the administrative structure of recovery requires some degree of devolution (Olshansky and Johnson, 2017). Furthermore, local primacy should be stressed during the establishment of recovery vision and goals. Any effective recovery must be based on a comprehensive and nuanced understanding of local need (Smith, 2011), as well as empower residents rather than view them as passive victims (Johnson and Olshansky, 2017). Local stakeholders, including civil and faith-based organizations have the intimate community knowledge and cultural understanding necessary to create satisfactory recovery goals, as well as implement recovery programs (Schmidt et al., 2023).

Academic literature provides many illustrations of local empowerment in recovery (Arendt, 2023; Garnett and Moore, 2010; Kusumasari and Alam, 2012; Hatton et al., 2023). In their analysis of eight disaster recoveries, Garnett and Moore (2010) found that successful recoveries emphasized local empowerment, in addition to organization, leadership, and sustainability. These practices ranged from local hiring and communication to community consultation and building local capacity for local self-reconstruction. Kusumasari and Alam (2012) demonstrate how local-wisdom was effectively incorporated into the recovery after the 2006 Indonesian earthquake. Residents outlined the recovery vision and took the lead in implementing recovery programs, while the government provided ample resources to support the process. Hatton and colleagues (2023) describe the linkages and two-way

communication between the business community and decision makers as critical in facilitating a recovery process that empowered local businesses.

It is also important that decision makers adopt a community-oriented approach to recovery. According to FEMA's NDRF, recovery "includes the continuation or restoration of services critical to supporting the physical, emotional and financial well-being of impacted community members. It includes restoration and strengthening of key systems and resource assets that are critical to the economic stability, vitality, and long-term sustainability of the communities themselves (p. 1)." That is, the rebuilding process should be oriented towards the restoration of the community wellbeing. But the rebuilt society and the recovering society should reflect the priorities, needs and lifestyles of the community (Zhou et al., 2022, FEMA, 2016). This includes special attention be paid to the provision of social support and educational services, healthcare, and economic drivers during the recovery period. As recovery progresses, programs and progress should be assessed through the lens of resident and community wellbeing.

## II. Disaster Recovery Outcomes

Disaster recovery is ultimately rendered successful based largely on the outcomes of recovery programs and their success rebuilding society in a satisfactory manner. If a successful process centers around efficiency and participation, the success of recovery outcomes hinges on quality. Catch phrases such as *build back better*, *build back safer*, and *build back stronger* refer to the quality of outcomes. Speed and the quality of outcomes are often at odds with each other during the recovery process (Platt and So, 2017; Olshansky, 2005). However, both are critical. As mentioned previously, efficiency accounts for both of these aspects.

Recovery outcomes can be characterized as restoring, improving, or stabilizing society. That is, these characteristics reflect empirical realities, with no normative bearing. All three are adopted to some degree in large-scale recovery scheme and can be balanced according to community preferences and local context. Ideally, recovery schemes facilitate the improvement and sustainability of society. However, the benefits of restorative aspects cannot be ignored, considering the social importance of place and familiarity.

Most projects include aspects of all three characteristics. However, the balance of these factors and prioritization varies by project. For instance, repairing and seismically strengthening a severely damaged school building is mostly restoration with a modest aspect of improvement. Relocating the school to a safer location, a location that is more useful to the community, or redesigning it to better fit community needs puts an emphasis on improvement, while maintaining a small degree of restoration. Building a temporary school quickly for medium-long term use while deliberations continue concerning the permanent structure puts an emphasis on stability, while retaining aspects of restoration and improvement.

### Stabilization

This aspect seeks to return stability to society, in order to facilitate continued functioning. The stabilization of society after recovery is inevitable. That is, societies inevitably stabilize at some point after a disaster, though the quality of life at the point of stabilization can vary significantly. This occurs alongside the processes of restoration and improving society. However, stabilization is usually the focus in initial, short-term disaster recovery. Stabilization in this context does not refer to the long-term sustainability of society, but the “return to normal” after the initial disruption during a disaster. For instance, recovery projects that build short-mid term temporary housing units or that offer economic incentives to damaged businesses prioritize stabilization.

Managing the stabilization of society is part of managing the *time compression* which inevitably occurs in the aftermath of a disaster (Olshansky et al., 2012). That is, residents must be given options to continue their lives. However, this requires a multitude of decisions and actions to take place within a limited time frame. As detailed above, the time associated with return to normalcy is associated with high economic losses, increasing the incentive to find solution that provide enough stability for the continued functioning of society.

### Restoration

There are extensive restorative efforts after a disaster, as buildings are reconstructed and repaired. Recovery is sometimes conceptualized as *bouncing back*. For instance, assessing recovery using a *bounce back* conceptualization would measure recovery against pre-disaster society realities, implying that recovery serves to return society to the pre-disaster status-quo. Bouncing back seeks to restore life

quickly to what it was. Rebuilding life as it was requires less planning, generates less friction with stakeholders, and can be completed relatively quickly.

In addition to the de facto restoration that occurs after a disaster, restoration is sometimes normatively preferable largely due to the role of place attachment. Thus, in places with high levels of place attachment, the community often desires restoring life as it was and rebuilding a familiar environment (Chamlee-Wright and Storr., 2009). Place attachment can influence a resident's choice to relocate from a high-risk or damaged area both before or after disasters (Swapan and Sadeque, 2021; Bukvic et al., 2022; Qing et al., 2022). In recent years, this topic has received an abundance of research attention. Scholars have identified variation in levels of place attachment in individuals vary based on demographic, socioeconomic, spatial and psychosocial variables (Jamali and Nejat, 2016). For instance, rural residents often have higher levels of place attachment than urban residents. While place attachment is sometimes framed as a force obscuring ideal relocation or recovery patterns, it also must be considered a social capital structure that should be preserved as much as possible throughout the recovery process.

It is important to note that purely restorative projects are not recommended. Restoration is only recommended when it comes with a measured degree of improvement. For instance, a damaged building should undergo seismic strengthening and comply with updated building codes upon its repair. In such cases, the improvement is technical, while the heart of the project is restorative.

### Improvement

Scholars, policymakers, and practitioners suggest recognizing recovery as an opportunity for improving society. This is particularly apparent in the UN Office of Disaster Risk Reduction's definition of disaster recovery as "restoring or improving of livelihoods and health, as well as economic, physical, social, cultural and environmental assets, systems and activities, of a disaster-affected community or society, aligning with the principles of sustainable development and 'build back better', to avoid or reduce future disaster risk (UNDRR, n.d.)"

*Build Back Better* (BBB) has been the mantra of disaster recovery for nearly two decades, since former US president Bill Clinton introduced the term in 2005 in his role as UN Secretary General's Special Envoy for Tsunami Recovery (Clinton, 2006). The Sendai Framework for Disaster Risk Reduction 2015-2030 lists four priorities for action, the last of which is "Enhancing disaster preparedness for



effective response, and to ‘Build Back Better’ in recovery, rehabilitation and reconstruction (UNDRR, 2015). The term continues to appear in policy plans and research to this day. Given its prominence, a brief discussion of the term *build back better* follows.

Although *build back better* has been repeated by both academics and practitioners, the parameters of “better” remain murky (Tatham and Houghton, 2011). The lack of consensus about what constitutes *better* building back can obscure recovery progress. In their book on the recovery after Hurricane Katrina, Olshansky and Johnson (2017) note that there was a broad consensus among varied stakeholders that the recovery should be used to make improvements. However, there was little consensus concerning the nature of improvements. Due to the ambiguity of the term *build back better*, some have preferred using terms such as *build back greener*, *build back smarter*, or *build back safer* (Fernandez and Ahmed, 2019; Der Sarikissian et al., 2021). Others have attempted to set parameters for building back better. In general, there are two notable aspects to the term: one is disaster-centered and the other is development-centered. At times practitioners and researchers use the term exclusively referring to one aspect, while at times they refer to some combination of both. According to the first aspect, building back better means rebuilding the community such that it is better prepared for future disaster (Francis et al., 2018). That is, recovery should decrease the community’s vulnerability to disasters. In this context, build back better is a critical aspect of disaster risk reduction (DRR), as is evidenced by the Sendai Framework (UNDRR, 2015). This aspect of the term is more frequently highlighted. The second notable aspect of the term highlights the potential of the recovery period to serve as an opportunity to increase development and improve the quality of life in the community. For instance, Fernandez and Ahmed (2019) write that that build back better should “encourage disaster affected communities to seize the opportunity to improve conditions physically, socially, economically, and environmentally” and Miles (2013) suggests that rebuilding Iraq be used to improve educational accessibility for disabled children.

The two aspects have significant overlap. The 10 BBB propositions originally put forth by Clinton (2006) include both aspects, but are geared more at DRR and effective recovery management. For instance, Proposition 3 states that “Governments must enhance preparedness for future disasters” while Proposition 10 states that “Good recovery must leave communities safer by reducing risks and building

resilience.” However, other propositions are centered around improving aspects that contribute both to DRR and development, such as Proposition 2, which states that “recovery must promote fairness and equity” and Proposition 8 which states that, “From the start of recovery operations, governments and aid agencies must create the conditions for entrepreneurs to flourish.”

Based on an analysis of relevant literature Mannakkara and Wilkson (2014), the most prolific BBB researchers, propose a framework for understanding and operationalizing BBB that consists of four primary categories: disaster risk reduction, community recovery, implementation, and monitoring and evaluation. Disaster risk reductions is divided into two sub-categories, the improvement of structural design and land-use planning. Community recovery is further divided into psycho-social recovery and economic recovery and innovation. Implementation includes both management of stakeholders and legislation and regulation. Monitoring and evaluation are applicable to all other aspects and assess the recovery in light of BBB principles.

Even when the term *build back better* is not used, the underlying concept of BBB is critical to recovery: Recovery should be leveraged to improve the pre-disaster society. This is true of all aspects of society, not just structural aspects. For instance, the outcomes of the recovery process can extenuate and increase existing inequalities (Muñoz and Tate, 2016). On the other hand, the recovery process can theoretically be used to create a more equitable society by reshaping structural social barriers and providing more equitable access to social and economic opportunities (Clinton, 2006). This not only means that relief and support must be accessible to all and tailored to specific needs (Hallegatte et al., 2018), but that reconstruction plans should consider ways to increase equity (Smith and Wenger, 2006).

Another aspect of improvement in recovery is enhancing the sustainability of society, including the resilience of society against future disasters. The sustainability of disaster recovery outcomes refers to the potential longevity of the rebuilt society. The recovery should be long-lasting in the face of the numerous stresses and trends of the modern world. This requires rebuilding in line with sustainability principles, including the balance of weighing environmental and social values and considerations (Smith and Wenger, 2007). As this concept applies to the physical reconstruction, recovery should aim to improve energy efficiency, lower environmental impacts of society, and improve the quality of the built environment, including ensuring that

building codes are followed and improving the sustainability of critical infrastructure (Smith and Wenger, 2006; Garnett and Moore, 2010). The UNDP's proposed areas for assistance after the 2023 earthquake in Turkey lists a number of ways to *build back greener*, including the installation of solar panels while repairing public buildings (UNDP, 2023). Sustainable recovery also calls for improving other areas of social and economic development as well, including increasing economic opportunities and creating a more inclusive and equitable society (Smith and Wenger, 2006; Mannakkara and Wilkinson, 2014).

One aspect of a sustainable and stable society is the incorporation of disaster risk reduction (DRR) principles into disaster recovery. This is generally agreed upon as a key tenant of BBB (Francis et al., 2018; Sarikissian et al., 2021; Mannakkara and Wilkinson, 2014) and its importance is stressed in the literature (Takemoto et al., 2021; Chang, 2010). As Priority 4 of the Sendai Framework for Disaster Risk Reduction (UNDRR, 2015) states, "Disasters have demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of a disaster, is a critical opportunity to 'Build Back Better', including through integrating disaster risk reduction into development measures (p. 20)." Often this is described in the context of building a more resilient society (Hallegatte et al., 2018, FEMA, 2016; Sarikissian et al., 2021).

Disaster recovery DRR is generally divided into two categories: structural and non-structural measures. Structural improvements include improved compliance with building codes and regulations, structural upgrading and retrofit, improvements in structural designs of buildings and systems, including the incorporation of robustness and redundancy in critical infrastructure systems (Francis et al., 2018; Mannakkara and Wilkinson, 2014; Takemoto et al., 2021; Sarikissian et al., 2021). Sometimes these require regulatory changes or adjustments in building codes themselves (Government of Turkey, 2023). Non-structural improvements generally focus on land-use and zoning, such the implementation of risk-based zoning (Francis et al., 2018).

### III. Assessment

In their BBB framework, Mannakkara and Wilkinson (2014) list *monitoring and evaluation* as one of four principles, alongside risk reduction, community recovery and implementation. This principle is applicable to all other principles and should be performed at all stages of the disaster cycle, including throughout the recovery process. The goals of monitoring and evaluation should be both to incorporate lessons learned into disaster recovery planning for the future, as well as give feedback that can shape the continuation of the recovery efforts. Although these aspects are critical, monitoring and evaluation are often neglected. In their review of disaster recovery evaluation, Ryan et al. (2016) find that many disaster recovery programs are not properly evaluated. Those that are often utilize process evaluation, without evaluating outcomes or impacts of recovery programs.

The assessment of recovery is complex. Assessment of recovery varies in many ways, including by :

1. *Unit of Analysis*: The unit of analysis varies greatly in different assessments of recovery and include possibilities such as: individuals, households, communities, geographic-political units (such as census tracts, cities, counties, or countries), businesses, and infrastructure (Jordan and Javernick Will, 2013).
2. *Time Frame*: Recovery is a slow process that takes place over several years. Measuring recovery over a time frame too short could result in the premature declaration of recovery successes or failures (Brown et al., 2008). However, a long time frame gives more room for the influence of exogenous trends.
3. *Perspective*: The outcomes of recovery assessment will be influenced by the perspective represented in the assessment. For instance, research has recorded a gap between the perception of recovery at the individual or household level versus the perception of government administrators (Brown et al., 2008).
4. *Type of Data*: The type of data used in recovery varies greatly between evaluations. While some recovery evaluations make use of public available data or objective statics provided by government authorities (such as percentage of housing units reconstructed), others use survey data or remote sensing data.

Assessment of recovery can either use objective or subjective measures. Both give important insights into the quality of the recovery process and outcomes. Ideally, objective and subjective assessment should be used in some combination. They should be used to assess both the process and the outcomes of recovery against the goals of each. While formative and process evaluation can be used to evaluate the

recovery process, the impact of recovery programs- i.e, recovery outcomes- can be assessed using summative evaluation. (These types of assessment are briefly defined in Table 3.) Before the discussion of subjective and objective assessment methods, two cautionary notes concerning recovery evaluation merit mention. Firstly, when evaluating recovery, it is important to be aware of potential misuse of evaluation. The ability to make accurate and meaningful comparisons between different geographic areas or different disasters is limited (Chang, 2010). Comparisons may be unfair and have negative repercussions for communities (Dwyer and Horney, 2014). Furthermore, there is some concern that evaluation results could be misused by politicians either to cut or expand funding inappropriately (Dwyer and Horney, 2014). Secondly, it is important to note that measuring recovery should carefully consider the impact of exogenous trends (Chang, 2010).

**Table 3: Types of Evaluation**

Types of Assessment:
Formative: Evaluates a program before its implementation, including its feasibility and appropriateness.
Process: Evaluates the implementation process of a program.
Summative: Evaluates the effectiveness of the program in achieving its ultimate goals and producing change

### Objective Assessment

Objective assessments of recovery use indicators of recovery progress, such as percentage of rebuilt housing stock and percentage of the population in permanent housing. There have been some tools created to assess recovery progress and evaluate the quality of recovery (Brown et al., 2008; Horney et al., 2018; Hettige et al. 2018). There are cases in which recovery indexes have been created by government bodies or research institutes in the wake of a specific disaster. For instance, the Brookings Institute created an index to track recovery after hurricane Katrina (Brookings Institute, 2009) and the Japanese National Institute for Research Advancement created

an index for tracking recovery after the Great East Japan Earthquake in 2011 (NIRA 2011).

Other assessment tools and frameworks have been created in a policy or academic context unrelated to a specific disaster. For instance, Chang (2010) proposes a generic model for assessing disaster recovery based on time series data. The model measures recovery in four areas: population, housing, businesses, and the economy and is designed to facilitate comparisons between various disasters and places. There are other tools intended to be used by practitioners to facilitate self-assessment and direct policy during an ongoing recovery after a disaster (Dwyer and Horney, 2014; Horney et al., 2018). Take, for instance, the Recovery Indicators Tool. The tool proposes numerous indicators for ten focus areas that address financial, process, social and public sector aspects of recovery (Dwyer and Horney, 2014). French and Kousky (2023) propose a more flexible framework for post-disaster recovery assessment, divided into aspects of social recovery, economic recovery and the recovery of physical infrastructure. While they define domains (specific topics for each broad category), they only suggest potential indicators, leaving the final choice flexible. Other approaches use remote sensing to track recovery in various locations (Ghaffarian et al., 2020; Brown et al., 2008; Sheykhmousa et al., 2019).

Summative recovery assessments using objective indicators tend to adopt a conceptualization of recovery either as a *bounce back*, *build back better*, or stabilization process. Adopting a *bounce back* orientation to recovery assessment is relatively common and simple. Recovery is measured compared to what existed prior to the disaster. For instance, when 100% of the housing stock that existed before the disaster is rebuilt, this task is considered successfully completed. This has some significant theoretical and methodological drawbacks. On the theoretical level, there are normative reasons to take issue with the implied assumption that a successful recovery returns society to a pre-disaster status quo. In fact, this stands in contrast to the majority of recent literature on recovery, which stresses the dynamic nature of recovery and improvement as a part of successful recovery. Methodologically, the assessment of recovery may be confounded by exogenous variables (Chang, 2010), as it does not account for post-disaster trends unrelated to the disaster and recovery efforts. This can be addressed by using a counterfactual comparison approach to recovery assessment, which compare the post-disaster society to the theoretical society that *would have* been, had the disaster had not occurred. On a practical level,

this often involves a comparison to similar areas (often in the physical proximity of the place of disaster) that were unaffected by the disaster (Cheng et al., 2015). This approach rectifies some of the methodological drawbacks of the *bounce back* assessment by adopting a quasi-experimental research design, often based on matching. However, it also introduces uncertainties and possible inconsistencies that are unavoidable with such forecasting, especially when measurement of recovery occurs over a significant period of time (sometimes a decade or longer) after the occurrence of the disaster (Chang, 2010). Furthermore, this approach has the same normative drawbacks as the previous approach, primarily, the assumption that the primary function of recovery is to rebuild the pre-disaster society as it was. As previously mentioned, this is at odds with recovery literature.

Another approach to assessing recovery is to assume stabilization as the goal of recovery. This assessment of recovery examines the volatility or variability of various indicators measured repeatedly over time. The methodological drawbacks of this approach primarily center on the definition of stabilization. Chang (2010) proposes that such a definition must be descriptive, as opposed to normative. The fact that it does not have the normative assumptions of the previous approaches may be an advantage or drawback, in different situations.

### Subjective Assessment

If the success of recovery depends on the satisfaction of residents and communities that recovery programs aim to serve, subjective measures of recovery assessment should be used alongside objective measures. For this reason, many surveys are designed with both objective and subjective questions (Weiss et al., 2014).

Subjective assessment of recovery is usually based on surveys. The most common subjective recovery assessment is surveying individuals concerning the perceptions of their own recovery. This type of survey may assess the individual's perception of disaster victimhood, situational improvement, access and availability of resources, perceived restoration of normalcy, feelings of security, mental-emotional health, social position, quality of life and wellbeing, and satisfaction with various aspects of their life (Raker et al., 2023; Kimura et al., 2014; Sullivan and Sagala, 2020, Weiss et al, 2014; Sato et al., 2021, Wang and Li, 2020) Others have used in-depth semi-structured interviews to assess household recovery (Sou et al, 2021).

Subjective community-level recovery assessments are more difficult and less common than individual-level assessments. Hettige et al (2018) suggest methodology based that combines key informant interviews, focus group discussions, cases studies, observations and household surveys to assess community recovery. Other have surveyed individuals about their perceptions of community recovery (Bergstrand and Mayer, 2020).

Subjective assessment has not only been used to assess individual and community recovery, but also to evaluate the impacts of recovery policies and give important policy feedback. Interviews and focus groups, especially with important stakeholders, are sometimes used to assess the impacts of complex recovery processes and policies (Chang et al., 2014). Surveys also used in this context. For instance, Wang and Li (2020) ask about individuals' perception of the fairness of government recovery programs.

#### IV. Parameters of recovery programs and policies

Three important parameters are relevant to all recovery programs and policies, regardless of where they fit into the typology presented above. These are: precision, interconnectivity and tradeoffs. Each should be carefully weighed when crafting a recovery strategy.

**Precision:** Policies related to each typology category should be applied at different levels. For instance, a response must be coordinated in order to be efficient and effective. This coordination must occur at multiple levels: between government agencies, between departments of an office, and even between individuals within a given department. Similarly, improvement-oriented outcomes should target national-level, community-level, and individual-level improvements. Recovery success can be maximized when these results are streamlined at all levels.

**Interconnectivity:** The typology categories (process, outcomes, and evaluation) are interconnected in nature. All recovery plans have processes and outcomes. The quality of outcomes are dependent on the quality of the process. Furthermore, recovery assessment should provide critical feedback that impact the continued trajectory of both outcomes and processes. A successful recovery plan



recognizes the interconnected nature of these factors and gives ample emphasis to each aspect of recovery.

**Tradeoffs:** Although all types of recovery actions dependent on the implementation of all other types of actions, there are inherent tradeoffs between items as well. For instance, an extremely participatory process will likely come at the expense of efficiency. Similarly, a focus on long-term improvement may come at the expense of earlier stabilization. These tradeoffs must be considered and weighed carefully. Ultimately, the normative litmus test of recovery programs is local context and preference.

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