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Design for Resilience

Develop and implement projects that
reduce disaster risks equitably

Center for Emergency Management and Homeland Security
Arizona State University



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Download the Design for Resilience Guide and Workbook



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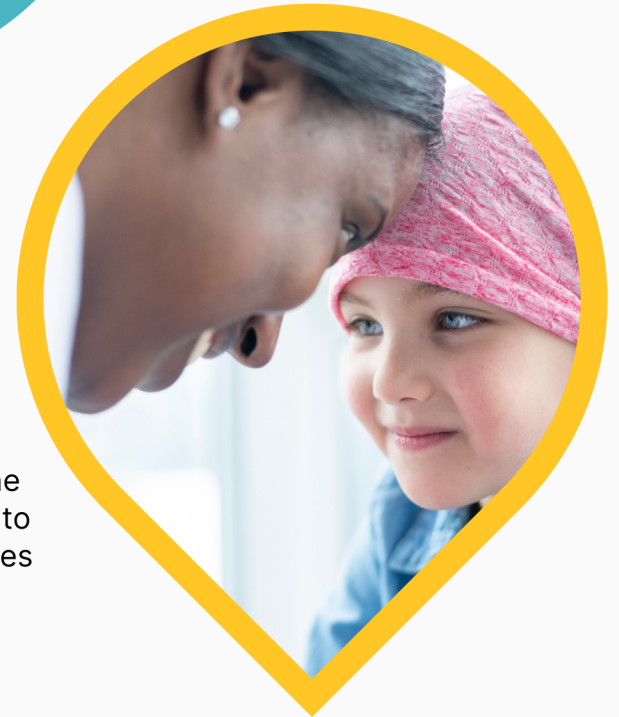
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Introduction

Moving the Resilience Needle Forward

The Benefits of Resilience

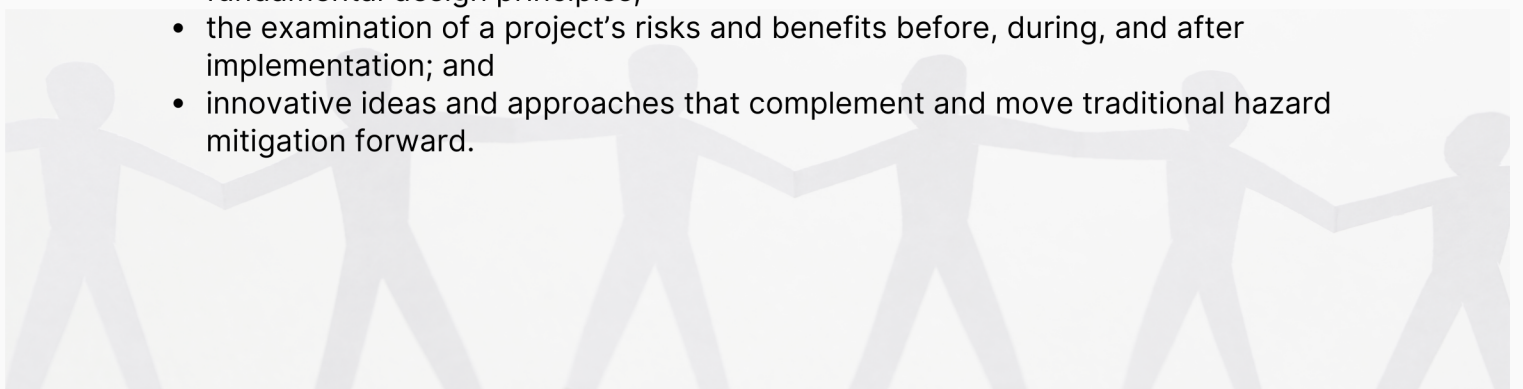
The U.S. Department of Housing and Urban Development (HUD) seeks to reinforce and expand practices that reduce the impacts of hazards and disasters by building greater community resilience. The *Design for Resilience Guide* reflects HUD's dedication to improving the capacity of state and local (sub-)grantees and others to implement risk-reducing projects that build long-term community resilience.



Design for Resilience Guide

The Design for Resilience Guide is particularly useful for scoping and evaluating projects aimed at reducing disaster risk. Through questions, the Guide and its accompanying Workbook prompt users to reflect on the inclusion and quality of project components such as local risks, community needs, stakeholder engagement, financial sustainability, and more. The *Design for Resilience Guide* emphasizes

- risk-informed decision-making that permeates all community planning activities;
- the contextualization of the need and value of a project as part of a local roadmap for risk reduction;
- the holistic development of a project idea aimed at assisting underserved populations, particularly those in high-risk areas;
- the incorporation of community belonging and equity considerations as fundamental design principles;
- the examination of a project's risks and benefits before, during, and after implementation; and
- innovative ideas and approaches that complement and move traditional hazard mitigation forward.

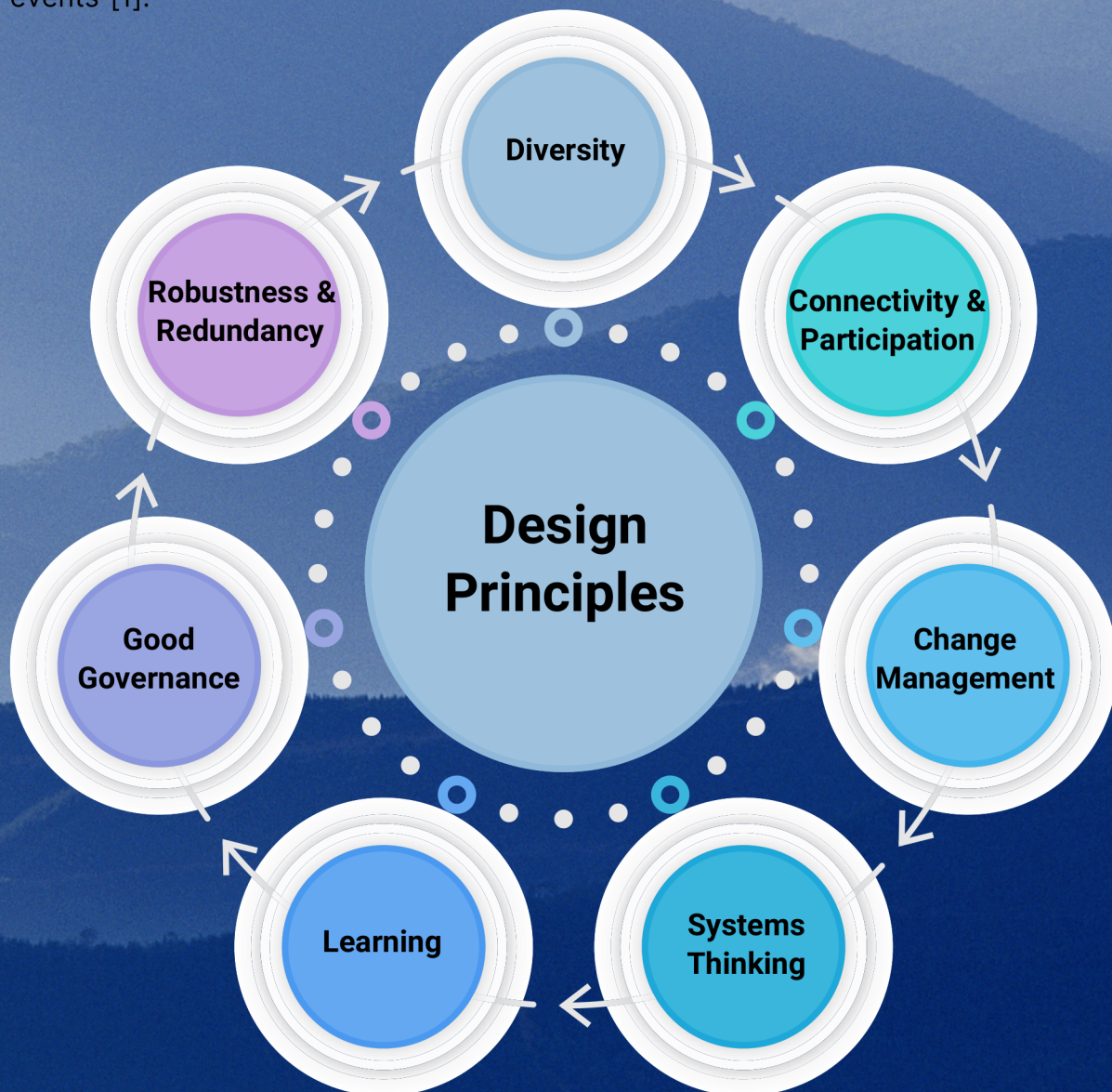


Resilience Defined

In the context of the Design for Resilience Guide, resilience is the process and outcome of disaster risk reduction efforts. Here, resilience relates to a community's "ability to minimize damage and recover quickly from extreme events and changing conditions, including natural hazard risks"[2] as well as "the ability to prepare and plan for, absorb, recover from and more successfully adapt to adverse events"[1].

The Approach

The Design for Resilience Guide develops and applies resilience thinking to the design of risk reduction and community development projects. The Guide translates the design principles [1] into question prompts that inform project design and evaluation. These resilience principles include [1]:



[1] National Research Council. 2012. Disaster Resilience: A National Imperative. Washington, DC: The National Academies Press. <https://doi.org/10.17226/13457>.

[2] HUD Consolidated CDBG-DR notice.

Why use the Design for Resilience Guide

Translating concepts into practice

Mission

Resilience is the imperative criterion for project design, selection, and implementation.

Resilience in service of disaster risk reduction

Every project related to community development, disaster recovery or hazard mitigation must conscientiously and consistently design for resilience to reduce disaster losses and risks.

Goal

To Integrate resilience design principles to reduce disaster risk by pursuing projects that are valued, inclusive, informed, impactful, integrated, responsible, resourceful, flexible, and adapted to future conditions.

The Guide

The Design for Resilience Guide includes a hands-on component (subsequently referred to as “the Workbook”) to design, prioritize, evaluate, select, screen and/or implement community development and disaster recovery projects with significant resilience benefits.

The Audience

State and local (sub-)grantees and anyone conceiving projects related to community development, hazard mitigation, disaster recovery, and/or disaster risk reduction strategies and plans.

The Community

Projects become contextualized by community needs and are an integral part of a local roadmap for risk reduction.

The Approach

The Workbook translates resilience design principles into project-relevant themes and thematic elements. Each project element consists of mostly open-ended questions to elicit information that contextualizes the need and value of the project.

The Benefits

The explicit deliberation and articulation of design choices bring transparency to the project design hereby highlighting potential areas for improvement. Pre-existing perspectives, biases, experience with, and assumptions toward resilience can be communicated to stakeholders.

The Commitment

The Guide treats equity as a cross-cutting domain of resilience. Equity and climate justice are integrated into every theme.

The Benefits

Engaging the Design for Resilience Guide may feel like extra effort, but tangible benefits are flowing from its use. The design of projects and their implementation will become more



VALUED

by implementing risk reduction and disaster recovery projects that address legitimate community needs.



INCLUSIVE

by understanding the needs and solutions for underserved populations through engagement, conversation, and community-centric design approaches.



INFORMED

by leveraging best practices and incorporating evidence-based knowledge to keep up with increasing vulnerabilities and climate change.



IMPACTFUL

by maintaining project benefits beyond the project period and sustaining or even expanding them will multiply project benefits.



INTEGRATED

because synergies between risk reduction and disaster recovery projects will emerge and compound through a coordinated execution of a resilience roadmap.



RESPONSIBLE

since every community investment must count in light of climate change and the increasing severity and frequency of natural hazards.



RESOURCEFUL

through new ideas and funding streams that create opportunities for locally adapted solutions.



FLEXIBLE

through workforce development, training, and cross-jurisdictional coordination and collaboration that build and provide local capacities needed for the implementation of resilience projects.



ADAPTED

by aligning community-wide planning to drive resilience forward and prepare for the future.

Every community investment should contribute in small and large ways toward building resilience. Every investment must count to combat the increasing frequency, severity, and cost of extreme events.

To assist in the identification and expansion of the resilience potential in community and disaster recovery projects, The Design for Resilience Guide offers thematically organized question prompts. These prompts translate resilience concepts (e.g., learning, change management, diversity and redundancy) into project-relevant considerations thereby making resilience more achievable and tangible.

The Purpose of this Guide

The purpose of the Design for Resilience Guide is to disrupt the vicious cycle of disaster destruction and recovery. To achieve this, the Guide encourages state and local grantees to

- avoid returning to pre-disaster states and instead go further, to think long-term;
- build a resilience strategy and risk reduction roadmap from which all investment decisions flow;
- elevate projects rooted in community needs that tangibly reduce the effects of disasters in the short- and long-term;
- use project choices and funding decisions to align and strengthen climate change and resilience priorities;
- synergize development and capital investments with resilience priorities, especially those identified in community plans (e.g., master plan, climate action plan, hazard mitigation);
- develop the capacity to conceptualize and realize projects with resilience;
- secure long-term societal and financial support for projects; and
- leverage synergies across multiple funding sources (e.g., HUD, EPA, FEMA, USDA).

Developing before and rebuilding after a disaster must become better and more effective. Resilience must become the imperative criterion for project design, selection, and implementation [3].

[3] National Research Council. 2012. Disaster Resilience: A National Imperative. Washington, DC: The National Academies Press. <https://doi.org/10.17226/13457>.



When to use the Design for Resilience Guide

Practicing resilience thinking

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Grant Requirements with Value Added

The Guide is grounded in the local context and risk reduction needs of the community. Too often projects are designed solely with grant and program requirements in mind. It is easy to lose sight of how a project can be most impactful to the community when trying to comply with grant specifications.

The Guide offers an approach to designing shelf-ready projects that align with community plans, needs, and strategies while simultaneously adhering to funding requirements. This ensures that the community proposes and implements projects that reflect local demands as much as it responds to the funding opportunity.

Choose Resilience

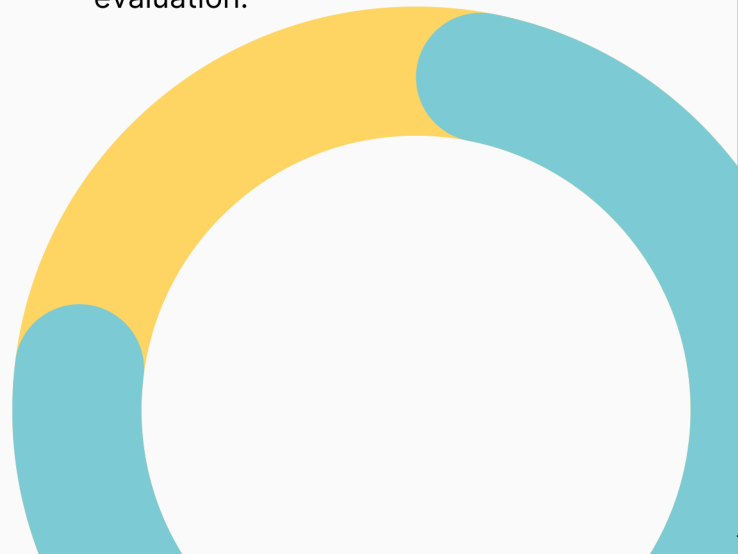
The Guide may also be used to compare or evaluate projects based on their adherence to design principles for resilience. This helps identify projects with the most resilience benefits for the community rather than relying on evaluation tools such as FEMA's Benefit-Cost-Analysis (BCA) or resilience scorecards, which assign a singular metric to projects independent of community support, scale or resilience character of a project.



Three Use Cases

The Design for Resilience Guide offers three use cases:

1. project conceptualization
2. project screening, and
3. project monitoring or evaluation.



Project Conceptualization	In the early phase of project design, the themes and prompts of the Guide, empower users to incorporate lessons learned from past projects and overcome common shortcomings such as lack of community support, high staff turnover, unsustainable maintenance costs, and more.
Project Screening	Prioritizing and sequencing projects relies on understanding which projects are feasible and fundable. The development of a roadmap of resilience projects, though—an essential step to contextualizing the importance of a singular project in advancing resilience—demands further understanding of the value a project brings, i.e., the transformative, additive, or supplemental character of a project. For example, a project that addresses long-standing needs is a transformative resilience project whereas a project type that has been repeatedly funded and implemented may have only a limited added benefit.
Project Monitoring and Evaluation	Universally applicable project management and evaluation criteria such as the burn-rate of project funds, adherence to project timetables and deliverables, tend to offer limited insight into the qualitative achievements and resilience value of a project. Although the grantee-centric nature of the Design for Resilience Guide utilizes community-proposed project metrics over prescribed metrics, the Guide still captures the entire suite of resilience capitals, i.e., infrastructure, sociocultural, economic, institutional, and environmental.

Commitment to Equity and Climate Justice

The Design for Resilience Guide

Cross-cutting Theme(s)

The Design for Resilience Guide commits to improving equity. This Guide treats equity as a cross-cutting domain of resilience. Equity is integrated into every theme of the guide.

Systemic challenges make some community residents more physically and socially vulnerable to the adverse effects of natural hazards. These residents are less able to prepare for, respond to and recover from the impacts of disasters and climate change.

The processes and outcomes of climate change as well as disaster response and recovery often deepen these pre-existing inequities. The Design for Resilience Guide recognizes these inequities as barriers to resilience and climate change adaptation.

Participation and Inclusion

Risk reduction projects must deliver benefits equitably and culturally responsive without burdening underserved or marginalized populations with, for example, the environmental or social costs of a project. Equity requires that projects not only deliver benefits but, perhaps even more so, consider how the benefits are generated, and received, and to whom the benefits accrue.

Recognizing trusted partnerships, social networks, diversity, and lived experiences within a community are central to the long-term success of resilience projects. This requires that projects (and their design) become more accessible through participation, inclusion, and a whole of community approach. Projects that are not supported or maintained by a community fail.



How to use the Workbook

From resilience principles to design themes, elements and prompts

The Design for Resilience Guide = Brochure + Workbook

In addition to this brochure, The Design Guide for Resilience includes an Excel-based workbook.

The resilience principles outlined previously are embedded into nine project design themes covered in the Workbook, which are:

- Project Overview
- Project Background
- Project Operations
- Disaster Risk Reduction
- Belonging and Equity
- Housing
- Infrastructure
- Ecosystem Services
- Communication and Education

Download the Design for Resilience Guide Workbook



at <https://tinyurl.com/2t3deaxr>

or

<https://cemhs.asu.edu/content/hud-cost-effectiveness-cdbg-dr>

Projects at a Glance

1. Project Overview

2. Contacts and Glossary

3. Project Background

4. Project Operations

5. Disaster Risk Reduction

6. Belonging and Equity

Housing

Infrastructure

Ecosystem Services

Communication and Education

Most Prompts are Open-Ended Questions

Each project design theme in the Workbook consists of three to six elements (see next page). For example, the project management theme includes elements related to project management, project metrics and data management, financial sustainability, and project risks. Within each element, users find prompts addressing specific resilience issues that could or should be considered if applicable to the project and/or use case. Most prompts are framed as open-ended questions allowing users to elaborate on how a project addresses the resilience needs of the community served.

How does your project...

Please describe the...

Design Themes and Elements

In addition to the nine project themes, the Workbook collates project contacts, project-relevant terminology/glossary, and offers a “Projects at a Glance” component to summarize project information in a comparative way.



Project Overview

- Project Summary
- Community Characteristics
- Supplementary Project Metrics
- Project Strengths and Weaknesses



Project Background

- Project Context
- Community Context
- Governance
- Built Environment
- Resilience Capacity



Project Operations

- Project Management
- Project Metrics and Data Management
- Financial Sustainability
- Project Risks



Disaster Risk Reduction

- Risk Exposure
- Risk Reduction
- Risk-Informed Decision-Making
- Critical Facilities and Lifelines
- Disaster Recovery
- Consolidated Planning



Belonging & Equity

- Underserved Populations
- Community Voices
- Project Benefits
- Community Assets
- Project Burdens



Housing*

- Loss Reduction
- Affordable Housing
- Renters
- Community Development and Benefits
- Capacity



Infrastructure*

- Loss Reduction
- Community Development and Benefits
- Capacity
- Energy
- Water
- Public Transportation



Communication & Education*

- Knowledge Base
- Engagement Strategy
- Communication Infrastructure
- Communication Risks



Ecosystem Services*

- Loss Reduction
- Ecosystem Vulnerability
- Community Development and Benefits

*optional theme

Users are not expected to address all Workbook themes, elements, and question prompts. Ideally, all prompts within a theme should be answered. The goal is to advance project design by integrating resilience principles.

It is expected that some question prompts cannot be answered for every project design or may be irrelevant. Skipping prompts that cannot be answered at the time or are irrelevant to a project is perfectly okay though. This is not a test.



Workbook Example: Project Operations Theme

SECTION 4: PROJECT OPERATIONS				
Instructions				
This section should provide information on how the project operations, personnel, finances, and potential projects risks are managed.				
When an element item has been completed, insert the check mark symbol, and the coverage field will turn automatically green, and the completion count will update.				
Coverage	Element Number	Project Management		
✓	4.1 Capacity:	Does the community you serve have the necessary capacity, skills, and resources to administer the project? If so, please give specific examples. If not, where are the gaps and how will they be addressed?	Please enter your answer.	
	4.2 Timeline:	Have you clearly articulated benchmarks and hard deadlines for the project's progress? What are these?	Please enter your answer.	
	4.3 Scope of Work:	Do the responsibilities assigned to specific groups, units, individuals, organizations, or government sectors contributing to the project have clearly defined timelines? If yes, please explain.	Please enter your answer.	
	4.4 Longevity:	Is there a set end/completion date of the project or is it expected to run long-term? If so, what funding will cover continual maintenance/ operation of the program?	Please enter your answer.	

The Workbook consists of nine project themes. Each theme contains three to five topics. Each topic contains question prompts to be answered by the user.

Stepping through the Workbook

From resilience principles to design themes, elements and prompts

Resilience in Service of Community

Commit to Design Principles for Resilience

Mainstream Resilience

Projects built on resilience practices will lessen disaster impacts, shorten recovery time, transform recovery into rebuilding better, respond to the needs of the community, especially for underserved neighborhoods, and lead more consistently to risk-informed decision-making. Situating risk reduction efforts within a resilience framework helps communities to overcome persistent vulnerabilities and elevates the importance of equity and climate justice as principles central to reducing disaster risk.

Integrate Resilience

To reduce disaster losses and risks, any project related to community development, disaster recovery or hazard mitigation must more conscientiously and consistently design for resilience, not solely design for quick recovery, resistance (e.g., building and infrastructure) or mitigation (e.g., generators, hardening of facilities, stormwater management). Designing for resilience goes beyond isolated efforts of stand-alone projects and one-off projects.

2 Resilience in Service of Disaster Risk Reduction

Identify where the Project fits in

A Strategy for Resilience

For risk reduction efforts to be effective, efforts and investments must be strategic and coordinated across all community planning and development. Risk reduction strategies should include measurable and achievable reduction and/or resilience goals over a specified time horizon.

Conflicting Goals

Consolidating and aligning resilience goals across plans is challenging. Jurisdictions likely have some plans (e.g., climate action plans, hazard mitigation plans) that work toward resilience while others undermine resilience. Taking stock of conflicting issues is imperative to addressing them. An awareness of duelling community goals will lead to locally innovative and responsive approaches that are situated in the reality of jurisdictional dynamics.

Project Origins

The Design for Resilience Guide prompts users on multiple occasions to elaborate on a project's origin and its value and contribution to the community's risk reduction strategy. Ideally, users can situate their projects within established planning frameworks, such as climate action, comprehensive, mitigation and capital investment plans. The development of a coordinated and effective project pipeline will generate risk reduction benefits beyond the capacity of a singular project.

Not Hazard Mitigation

A state or local hazard mitigation plan may be a starting point to identify local needs and risks but it does not represent a community-wide strategy. Local hazard mitigation plans tend to lack measurable risk reduction goals and do not consider project prioritizing, sequencing, or compounding benefits.



Theme	Element #	Prompt
Project Background	Strategic Project Portfolio (3.1)	How does your project fit into existing risk reduction priorities within your community?
Disaster Risk Reduction	Project Value (5.18)	Please explain how your project is critical to reducing disaster losses in the community you serve (e.g., avoided future emergency relief; avoided cost of displacement; providing or refurbishing public infrastructure).



Theme	Element #	Prompts
Disaster Risk Reduction	Access to Resources (5.35)	How does your project improve equitable access for underserved populations to resources (e.g., services, temporary housing, transportation, food, water, utilities, health care, financial assistance, information, etc.) during a disaster?
Belonging & Equity	Prioritization of Underserved Communities (6.1)	How do the resilience actions your project takes prioritize underserved communities impacted by disaster?

3

Resilience in Service of Equity

Address the Needs of Underserved Residents

Direct Benefits

The Design for Resilience Guide prioritizes projects that create benefits for underserved residents. There are several opportunities in the Workbook to elaborate on what makes residents underserved (e.g., long-term exposure to unmitigated environmental risks) and how a project generates direct benefits for these residents.

Chronic Vulnerabilities

Chronic disenfranchisement and dis- or under-investments compound physical and social vulnerabilities. It is a whole of community effort to reduce widening disparities in residents' ability to prepare for, respond to, and recover from disasters. Risk reduction projects must avoid furthering existing burdens and inequities.

Explore

- situating projects in areas where project benefits afford the greatest equitable impacts;
- leveraging synergies across community development programs and projects;
- creating opportunities to learn about a community's willingness and extent to commit and pursue resilience;
- providing pathways for participation, engagement, and buy-in; and
- building capacity before, during, and after a project is implemented to ensure sustainability and longevity of risk reduction benefits.



4 Resilience in Service of Partnership

Build Trust, Build a Team

Internal and External Partners

Build long-term and trust partnerships. Meaningful partnerships are imperative to reach consensus and clarity on project parameters, value, and scope. Project-internal teams as well as external partnerships should be representative of the community and relevant to the project at hand.

Partners can advocate, implement, support, provide resources (e.g., data, technical expertise, funding, personnel), build bridges, guide, evaluate, fundraise, and more.

Consider

- managing expectations and defining clear roles and responsibilities;
- engaging partners regularly and providing mechanisms for conversation, exchange of ideas, and co-design;
- compensating partners for their efforts;
- letting partners drive the project assuming necessary administrative and managerial support can be provided or offered;
- providing childcare at or transportation to meetings;
- identifying gaps in your partnerships; and
- leveraging multidisciplinary team science and strategies

Be a Good Steward

Good stewardship over project funds and good governance that makes project benefits meaningful, accessible, and equitable relies on the inclusion of stakeholders from government, businesses, local non-profit organizations, neighborhood groups, faith-based organizations, academia, and more.

Not every project calls for an extensive list of partners. Managing many partners is time-consuming. Leveraging and growing partnerships effectively requires empathy, communication and conflict management skills, patience, and time. Partnerships are not a checkbox. They are imperative to project success and should therefore be recognized, valued, and integrated into the project.



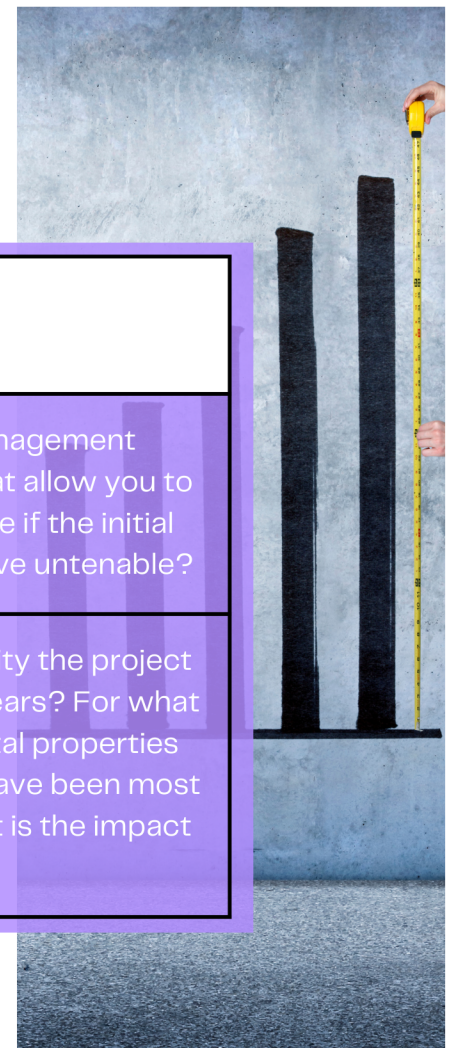
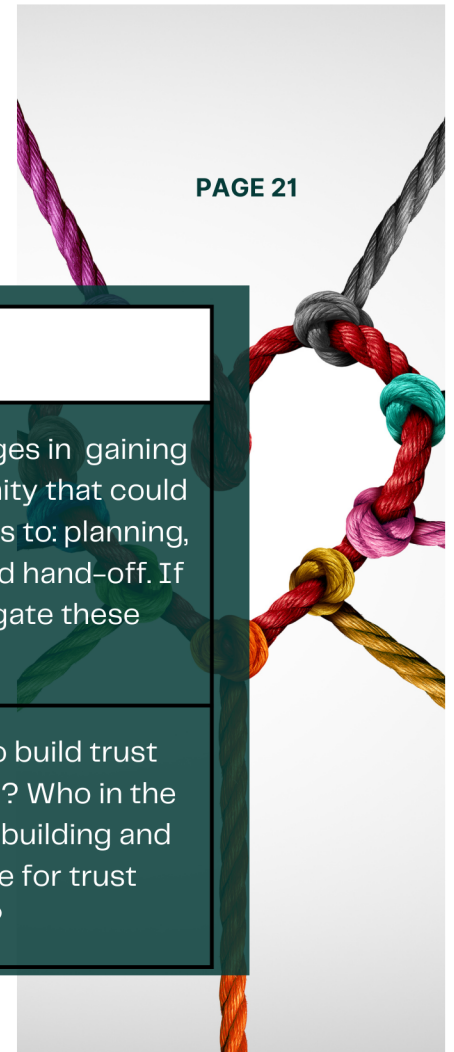
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Workbook Examples

Theme	Element #	Prompts
Project Operations	Stakeholder Buy-in (4.5)	Do you foresee potential challenges in gaining trust /buy in within the community that could effect your timeline with regards to: planning, implementation, completion, and hand-off. If yes, how do you plan to mitigate these challenges?
Communication & Education	Building Trust (10.1)	How does your project plan to build trust within the community it serves? Who in the project is responsible for trust building and what resources do they have for trust building activities?

5

Theme	Element #	Prompts
Project Operations	Change Management (4.18)	Please explain the project management mechanisms you have in place that allow you to revise, evaluate, or change course if the initial project's resilience objectives prove untenable?
Housing	Trend in Rental Prices (7.21)	Have rental prices in the community the project serves increased over the last 5 years? For what reason (e.g., shortage of safe rental properties after disaster)? Which residents have been most affected by these changes? What is the impact on your project?



5 Resilience in Service of Measurement

Anticipate and Adapt to Change

Design for Future Conditions

Climate change makes it increasingly difficult for people to cope with more damaging and more frequent disasters. In some regions, disaster impacts are turning into chronic and generational burdens. Today's projects must be designed for tomorrow's condition and capable of withstanding and adapting to further changes. For example, consider using downscaled climate scenarios and future thinking techniques to build change into the project design, particularly changes that have a high likelihood of occurrence.

Changing Fast and Slow

Change can be fast or slow-moving. A resilient project anticipates—and ideally detects change early on, especially slow-moving changes and project feedback. This requires observational systems and data collection systems. It also takes new or modified processes and evidence-based decision-making to utilize new information. While information on future environmental conditions (e.g., sea-level rise, temperature) is widely available, it is exceedingly difficult to predict what the potential local consequences (e.g., lower property values, inability to purchase homeowner's or wildfire/wind insurance, out-migration, decline in crop yields, ecosystem degradation) may be.

Obstacles to Change

Adjusting the course of a project based on new information or new circumstances can be challenging: Funding agencies dislike modifications to timelines, project scope and deliverables. Administrators oppose the bureaucratic avalanche triggered by significant changes. Grantees tend to equate change to failure. Grantees often lack the necessary flexibility within a project's scope (e.g., funding, personnel) to implement change and overcome unforeseen shifts and obstacles due to the rigidity of the pre-allocation of funds and other resources.



The Workbook offers question prompts that probe for a project's capacity to adapt. For example, by anticipating change, budgets and timelines may be crafted with variable allocations enabling the project to respond to change.

6 Resilience in Service of Sustainability

Maximize A Project's Resilience Potential

Beyond the Funding Cycle

Shuttered projects at the end of funding cycles or degrading projects due to lack of maintenance or ineffective implementation squander future, and possibly current, resilience benefits. Designing for resilience means thinking and planning beyond the present funding cycle. This may include funding to expand project opportunities, to overcome barriers that precluded effective implementation, to transfer the project to new, long-term stewardship, or simply to account for future maintenance costs. Maximize the financial stability of projects by synchronizing or sequencing funding streams with relevant timelines, the right dollars, and the right pipelines.

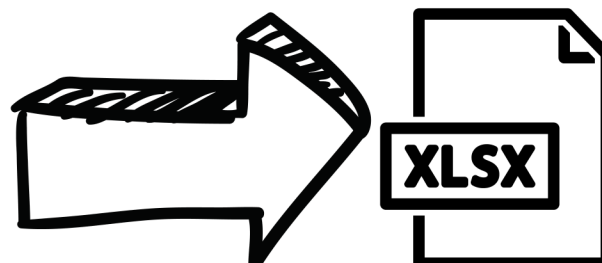
Funding is a Benefit

Project funding is not solely a means to an end. Funding mechanisms themselves can be novel, as can the addition of unique funding streams or financial partnerships. However, funding requirements can also hamstring projects. Demands to expend allocated funds may not align with the project team's readiness to deploy and implement activities. Beware of the bureaucratic process!

The Workbook utilizes prompts that distinguish between the sustainability of project funding, novel funding mechanisms, the accrual of resilience benefits (and to whom), and other economic benefits a project may bring to the local community.

Theme	Element #	Prompts
Infra-structure	Infrastructure co-Benefits (8.18)	How does your project create and maximize co-benefits of infrastructure investments through (e.g, through partnerships with small, minority, women owned businesses), innovative financing, revitalization, etc.)?

Download the Workbook and get started.

Additional Resources

References and links to grant opportunities and helpful information



Funding Opportunities

U.S. Department of Housing and Urban Development:

- Community Development Block Grants (CDBG/CDBG-DR)
- Indian Community Development Block Grant (ICDBG)

Federal Emergency Management Agency:

- Building Resilient Infrastructure and Community Program (BRIC)
- Safeguarding Tomorrow Revolving Loan Fund Program (STRLF)

Environmental Protection Agency:

- Environmental and Climate Justice program (ECJ)

For additional funding opportunities, see the U.S. Climate Resilience Toolkit at <https://toolkit.climate.gov/content/funding-opportunities>.

Additional Resources

- HUD [Climate Portal](https://www.hud.gov/climate), <https://www.hud.gov/climate>
- FEMA [National Resilience Guidance](https://www.fema.gov/emergency-managers/national-preparedness/plan/resilience-guidance), <https://www.fema.gov/emergency-managers/national-preparedness/plan/resilience-guidance>
- The White House [National Climate Resilience Framework](https://www.whitehouse.gov/wp-content/uploads/2023/09/National-Climate-Resilience-Framework-FINAL.pdf), <https://www.whitehouse.gov/wp-content/uploads/2023/09/National-Climate-Resilience-Framework-FINAL.pdf>
- U.S. Global Change Research Program Fifth National Climate Assessment, <https://www.globalchange.gov/nca5>

Acknowledgements

We would like to thank the HUD team and representatives of the City of Tempe, AZ for participating in workshops and interviews as part of the development of the Design for Resilience Guide.



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TO
ADAPT**



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**Contact us
for further
inquiries**

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