

JUMP into STEM

Resilience for All in the Wake of Disaster

August 16, 2021

jumpintostem.org

Context

Increased frequency and severity of natural or manmade disruptive events



Damage to natural and built environment & infrastructure

Threat to public health, safety, and well-being



Underserved, marginalized and vulnerable communities suffer the most and lack the capacity to withstand and recover



Context (cont.)

Underserved, Marginalized and Vulnerable Communities

- Experience barriers to social, economic, political, and environmental resources due to:
 - ethnic and racial discrimination
 - low socioeconomic status
 - disadvantaged background
 - illness
 - disability
- Live in rural or impoverished urban areas
- Have a higher risk for poor health

Underserved, marginalized and vulnerable communities suffer the most and lack the capacity to withstand and recover



The Challenge

Develop **holistic solutions**
to improve the **resilience** of the **built environment**,
making **equity** a central focus of the proposed solution
by strengthening the ability of communities
—especially those that are **underserved, marginalized and vulnerable**—
to **adapt, persist, and recover** in the event of **natural or manmade disruptive events**.

The Challenge

Develop **holistic solutions** to improve the **resilience** of the **built environment**, making **equity** a central focus of the proposed solution by strengthening the ability of communities—especially those that are **underserved, marginalized and vulnerable**—to **adapt, persist, and recover** in the event of **natural or manmade disruptive events**.

Defining the Challenge

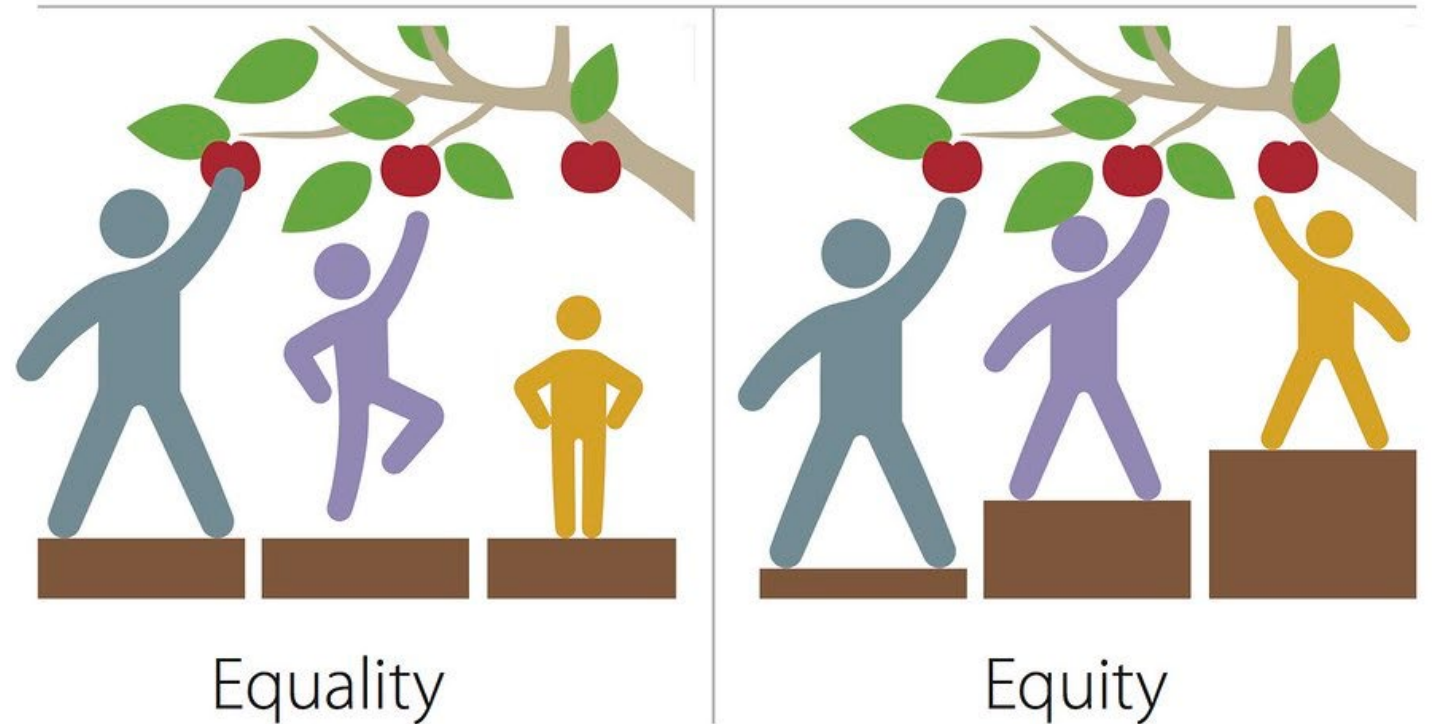
Equity

Equality = Sameness

- Giving everyone the exact same resources

Equity = Fairness

- Allocation of resources needed to reach an equal outcome

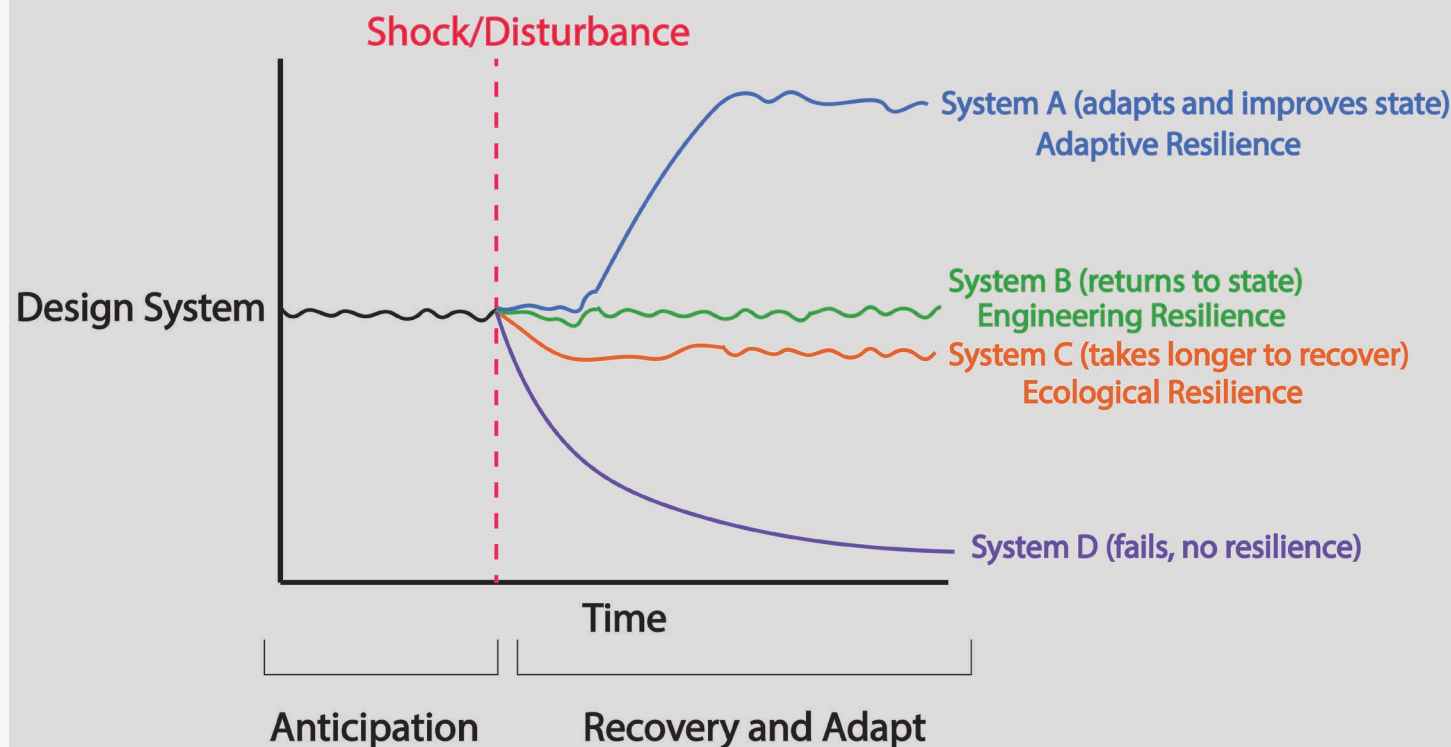


"Equity vs Equality" by [MN Pollution Control Agency](#), is licensed under [CC BY-NC 2.0](#)

Defining the Challenge

Resilience

- **Resilience** is the ability to adapt to, persist during, and rapidly recover from a disruptive event



“System Response to disruption” by Ghaliqamm, is licensed under CC BY-SA 4.0, via Wikimedia Commons

Defining the Challenge

Built Environment



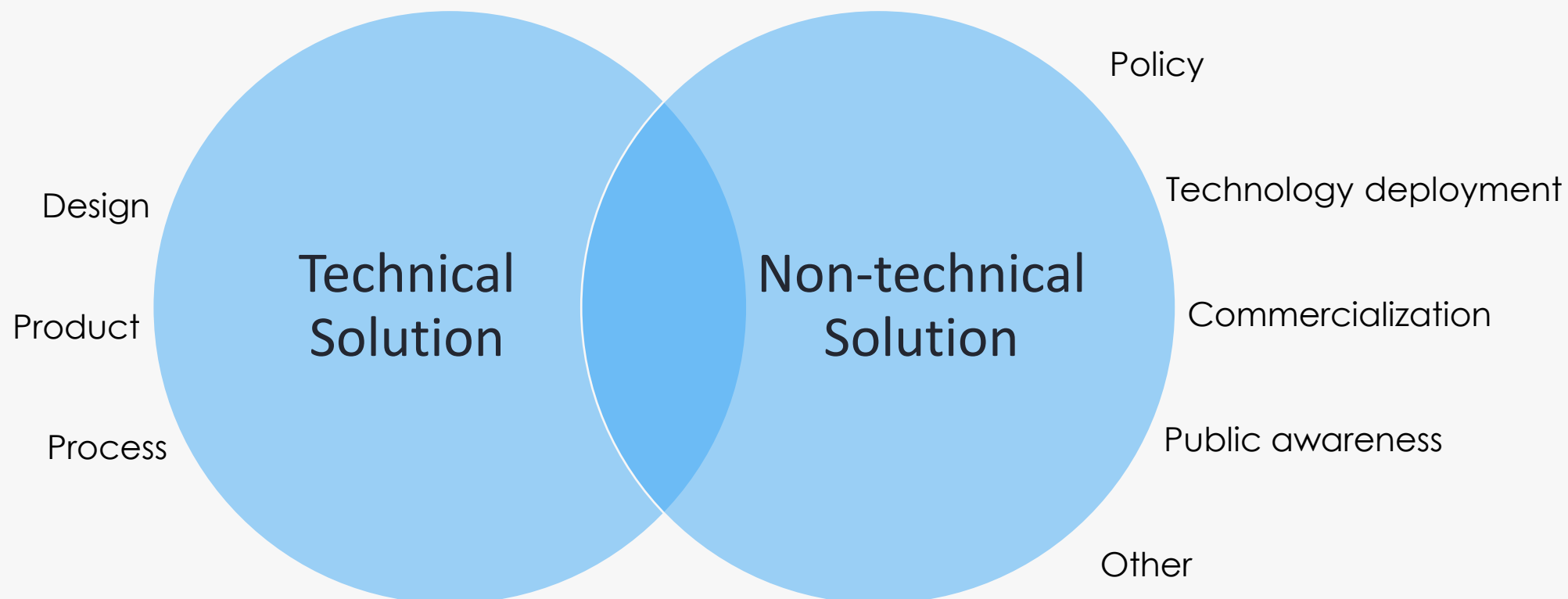
Built environment includes all of the physical parts which support human activities

- Buildings, building systems
- Open spaces, parks
- Transportation facilities (e.g., roads, bridges, railways, airports)
- Utility distribution systems for electricity, natural gas, water
- Communication towers for telephone, radio, internet



Defining the Challenge

Holistic Solution



Key Characteristics of Resilience

A solid blue circle containing the word "Robustness" in white text.

Robustness

The ability to maintain critical operations and functions in the face of a crisis.

A solid blue circle containing the word "Resourcefulness" in white text.

Resourcefulness

The ability to skillfully prepare for, respond to, and manage a disruption.

A solid blue circle containing the words "Rapid Recovery" in white text.

Rapid Recovery

The ability to return to normal operations as quickly and efficiently as possible after a disruption.

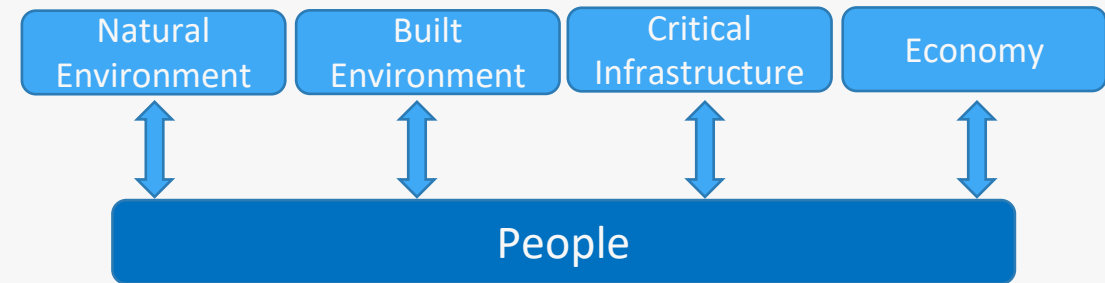
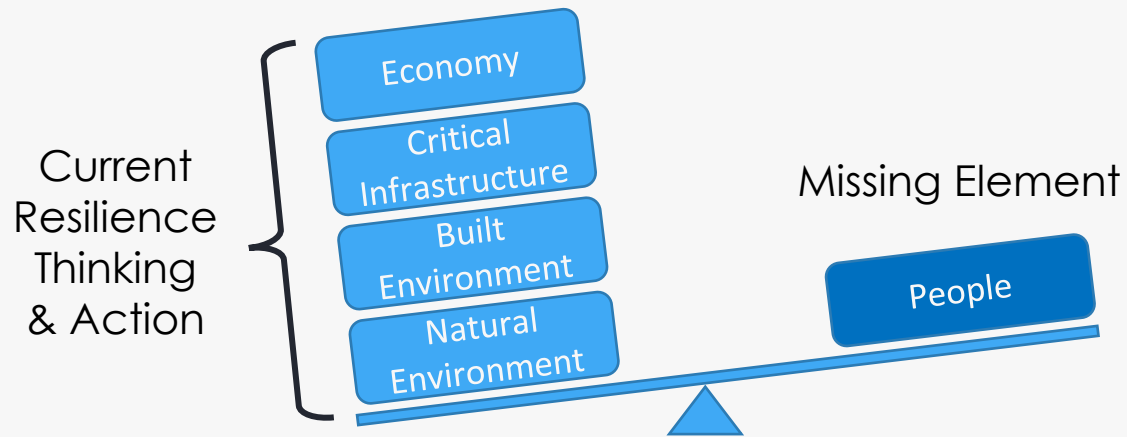
A solid blue circle containing the word "Redundancy" in white text.

Redundancy

Having back-up resources to support the originals in case of failure.

Equitable Resilience

- **Equitable Resilience** brings together the strategies for resilient design accounting for the **social distribution of stresses and responses** to the disaster



Equity should NOT be an afterthought,
or a box to check

Adapted from: Martin, Atyia. "Boston's Resilience Strategy: Resilience and Racial Equity," YouTube, uploaded by GBH Forum Network, September 16, 2016, <https://www.youtube.com/watch?v=sZA1Dk6iCFc>

Examples

Building Resilience



- Design of building structure, enclosure, systems, operations, building use for existing buildings and new construction
 - Disaster preparedness, mitigation, recovery
 - Hazard-specific
 - Passive strategies for prolonged periods of loss of power, heating fuel, or water
 - Grid-Interactive efficient buildings
- Building code and standards
- LEED credits for resiliency in new construction

Examples

Community & Infrastructure Resilience



- Requires multipronged approach
 - Resilient building stock
 - Resilient infrastructure (utilities, transportation, communication)
 - Resilience hubs
 - Incentive programs
 - Funding mechanisms
 - Education/outreach programs
- Includes smaller/incremental strategies as well as larger-scale coordinated programs

Additional Resources

Building Design for Resilience

- <https://www.wbdg.org/resources/hazard-specific-building-resilience-considerations>
- <http://www.cplusga.com/wp-content/uploads/2016/06/enterprise-manual.pdf>
- [https://www.greenribboncommission.org/archive/downloads/Building Resilience in Boston SML.pdf](https://www.greenribboncommission.org/archive/downloads/Building_Resilience_in_Boston_SML.pdf)
- <https://www.resilientdesign.org/resilient-design-strategies/>
- <https://rmi.org/our-work/buildings/pathways-to-zero/grid-integrated-energy-efficient-buildings/>

Community Resilience and Equity

- <https://www.epa.gov/smartgrowth/creating-equitable-healthy-and-sustainable-communities>
- <https://archplan.buffalo.edu/content/dam/ap/PDFs/NYSERDA/Climate-Resilience-Strategies-for-Buildings.pdf>
- https://www.boston.gov/sites/default/files/file/document_files/2017/07/resilient_boston.pdf
- <https://www.usgbc.org/sites/default/files/boston-resiliency-case-study.PDF>
- <https://resilientcitiesnetwork.org/communities/resilient-recovery/>

Additional Resources

Toolkits for Design and Assessment for Resilience

- <https://toolkit.climate.gov/>
- <https://www.usgbc.org/sites/default/files/2018-USGBC-Resilience-Brief-041118.pdf>
- <https://www.iisd.org/cristaltool/download.aspx>
- <https://books.bk.tudelft.nl/index.php/press/catalog/view/isbn.9789463660327/730/612-1>

LEED Pilot Credits on Resilient Design

- <https://www.usgbc.org/resources/leed-resilient-design-pilot-credits-brief>

Related Articles

- <https://www.resilientdesign.org/the-leed-pilot-credits-on-resilient-design-are-back-up/>
- <https://www.greenbiz.com/article/how-resilience-will-shape-future-building-design>
- <https://www.resilientdesign.org/putting-thermal-resilience-in-the-leed-pilot-credits-to-the-test/>

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Thank You!