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Infographic on Post-Earthquake Functional Recovery Performance

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**NIST Research Brief
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Research Summary

In the U.S., building codes and standards have been developed to reduce the likelihood of building collapse but do not address the loss of building functions or recovery times due to earthquakes. When scaled to the community level, negative consequences, such as lack of access to jobs and schools and, ultimately, population displacement, may occur. Buildings and infrastructure systems can be improved to better meet the needs of users and occupants after natural hazard events. These needs include the ability to reoccupy and resume functions and services across the assets that most benefit society.

Research in earthquake engineering and social science has advanced a new performance objective called **functional recovery** that supports the design of assets to meet needs beyond what is currently required by codes and standards. Implementation of functional recovery design will enable buildings and infrastructure systems to sustain less damage in earthquake events and return to a basic level of service more quickly, reducing downtime for key societal activities as well as direct and indirect costs of damages, repairs, or demolition.

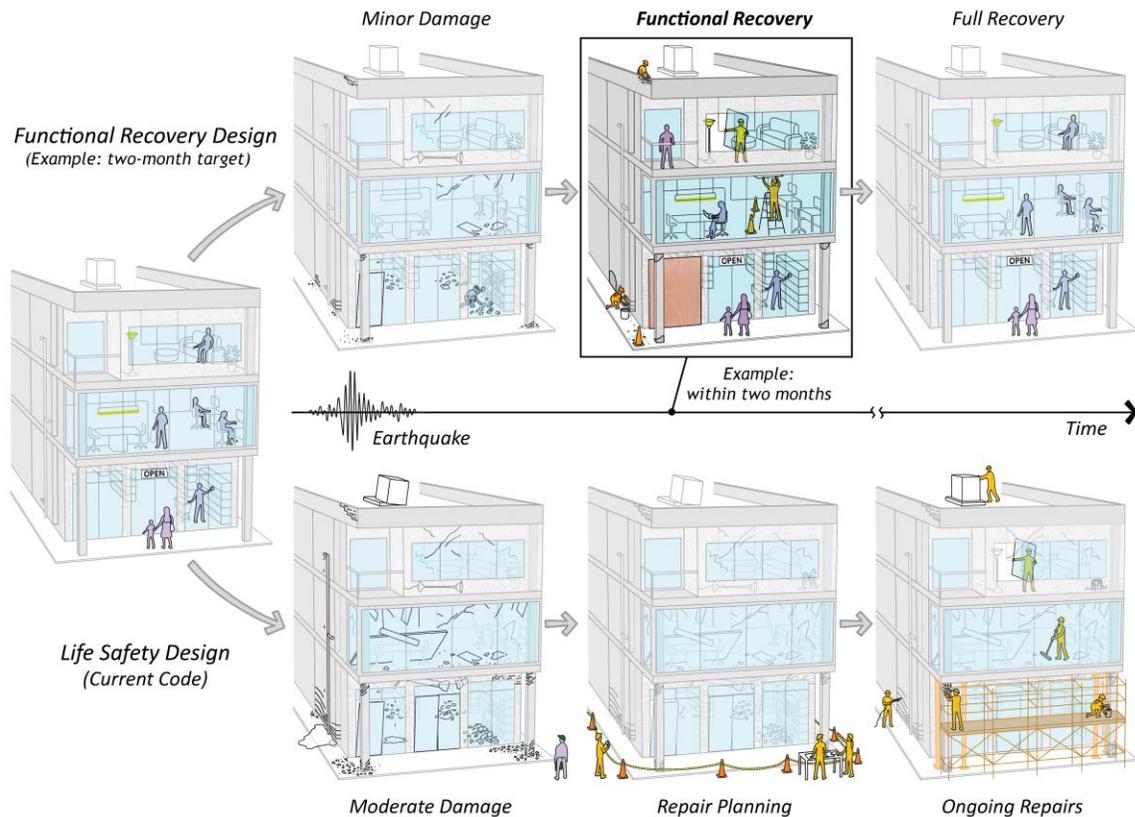
Research Advancement Details

Functional recovery was formally defined in the NIST-FEMA Report to Congress (NIST SP 1254) to further advance ongoing work in the earthquake and community resilience fields. Subject matter experts (NIST SP 1269) are providing input on developing maximum acceptable recovery time targets. Functional recovery targets the capacity to support the recovery of basic intended functions or services, which are typically less than full pre-event functionality.

Committees are currently drafting provisions for codes and standards to enable assets to avoid moderate to severe damage and long recovery times which, in turn, would improve community resilience. Although functional recovery concepts and design recommendations are currently being developed for earthquake hazards, the findings can be leveraged for application to other natural hazards in the future.

Avoiding damage and costly or lengthy repairs from natural hazards can provide significant societal benefits to the public. The infographic below helps to illustrate the improved recovery trajectory between current design practice and the new functional recovery performance objective under development for buildings. This infographic demonstrates that after an earthquake event, functional recovery design enables users to more quickly reoccupy, repair, and resume a building's basic functions and services as compared to current code (life safety) design. This image was created for NIST by Aher Structural Graphics, LLC and is licensed under a Creative Commons Attribution 4.0 International License. An image file can also be downloaded at: <https://nvlpubs.nist.gov/nistpubs/rb/NIST.RB.4-infographic.png>.

Scenario Illustrating Functional Recovery Performance Compared to Life Safety Design



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