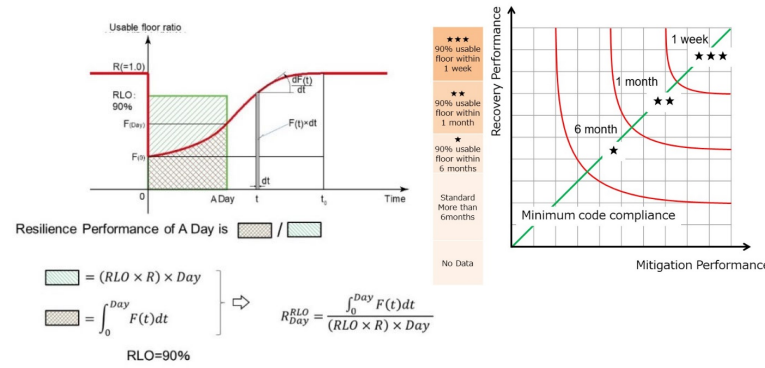


Developing Resilience Sustainable Index of Building

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Resilience is an important aspect of building performance, and various efforts have been made to reduce downtime during disasters, such as implementing base isolation and preparing backup generators for blackouts. There have been several proposals aimed at evaluating the resilience performance of buildings, with a specific focus on downtime. These evaluations target the short-term impacts on recovery immediately following a disaster. However, there is the possibility that buildings may experience multiple earthquakes during their lifetime. We would like to expand the present resilience index concept to the lifetime resilience of buildings. We propose the lifetime resilience performance of a building is assessed by examining the relationship between the actual usable floor area throughout its lifetime to the planned available floor area. This assessment involves breaking down the building's resilience performance into components such as planning and maintenance, structural elements, non-structural components, and facilities. Moreover, each component is evaluated from the perspectives of aging, damage from hazards, and recovery capacity.

Expanding AIJ resilience performance index concept



Norio Maki, Atsushi Nishimoto, Shiro Sakamoto, Karamaki Torisawa, Resilience Index and BCP Level of Buildings, AIJ proposal, The 13th International Conference on Structural Safety and Reliability (ICOSSAR 2011), June 21-25, 2011, Shanghai, P.R. China, J. Li, Pol D. Spanos, J.B. Chen & Y.B. Peng (Eds)

Basic Concept of Resilience Sustainable Index

Resilience Sustainable Index

Evaluation index(s) = $\frac{\int_0^T F_u(t) dt}{\int_0^T F_{pu}(t) dt}$

$F_u(t)$: Actual usable floor area (considering disaster impact)
 $F_{pu}(t)$: Planned using floor area T: Year (planned service period)

Actual usable floor area: $F_u(t)$

$$F_u(t) = s \cdot F_f(t) \cdot (aF_s(t) + bF_{ns}(t) + cF_m(t)) + \alpha$$

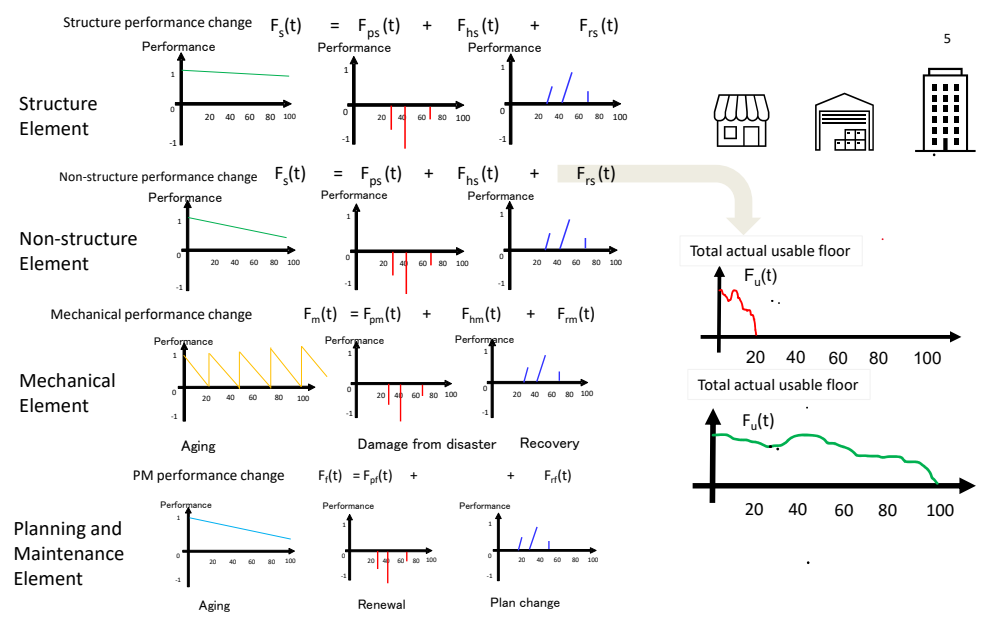
$F_f(t)$: Structural performance index	$F_m(t)$: Mechanical performance index	$F_{pm}(t)$: Planning and maintenance performance index
$F_{ns}(t)$: Nonstructural element performance index	s : Building scale coefficient	α : correction factor
a, b, c : weight coefficient, $a+b+c=1$		

Total actual usable floor

Total planned using floor area

Office building

How Can we Measure Resilience Sustainable Index?



Examples of Resilience Sustainable Index

