

# **Trade-offs and Synergies in Designing for Resilience and Sustainability**

**U.S. Department of Commerce**

**National Institute of Standards and Technology**

**Generic Clearance for Community Resilience Data Collections**

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## **1. Explain who will be surveyed and why the group is appropriate to survey.**

**Survey Group:** The goal of this collection is to consider the tradeoffs and synergies between the concepts of resilience and sustainability in the built and natural environments. An urgent paradigm shift is needed from looking at resilience and sustainability as independent characteristics of infrastructure, and the systems infrastructure supports, to valuing these characteristics in tandem: including climate change mitigation and adaptation strategies as prioritized by Executive Orders 13990 and 14008. The research goal is to survey individuals working and researching in fields related to architecture design, engineering (civil and structural), urban (town/city) planning, governance, social and physical sciences to understand the relative trade-offs and synergies in designing for resilience and sustainability in their respective fields of expertise.

**Why is it appropriate to survey this group:** The research objective is to examine the understanding of sustainability and resilience across fields that address these objectives regularly. This research approach includes the aggregation of knowledge from multiple expert stakeholders, thus offering a model that represents an integrated interdisciplinary perspective of sustainability and resilience (i.e., a meta-model). The aggregated meta-model will be presented back to participants for validation purposes, but also for individuals to be provided an opportunity to augment their disciplinary mental model.

## **2. Explain how the survey was developed including consultation with interested parties, pretesting, and responses to suggestions for improvement.**

This survey instrument was developed by NIST researchers. It gathers details to address: (1) respondents' previous experience with sustainability and resilience (personal and professional), (2) demographic/cultural details, and (3) perceptions of resilience and sustainability. This approach includes the aggregation of knowledge from multiple expert stakeholders, thus offering a model that represents an integrated interdisciplinary perspective of sustainability and resilience

(i.e., a meta-model). The aggregated meta-model will be presented back to participants for validation purposes, but also for individuals to be provided an opportunity to augment their disciplinary mental models (i.e., perspective) with more intermingled, multifaceted knowledge from their peers.

The instrument was developed with feedback from and pretested with members of NIST's Community Resilience Program and the American Society for Civil Engineers.

### **3. Explain how the survey will be conducted, how customers will be sampled if fewer than all customers will be surveyed, expected response rate, and actions your agency plans to take to improve the response rate.**

The survey will be administered as an electronic survey using an email to drive study volunteers to a simple URL. The survey is expected to take a maximum of 8 minutes to complete. The respondent will have access to the electronic survey for at least a two-week period. This way, the respondent has time to organize completing the survey at a time that is most convenient to her/his/their work schedule.

**Sampling:** Experts will be invited to join this survey via personal invitation and working through invitation by professional organizations that have an interest in this topic, such as, but not limited to the American Society for Civil Engineers.

**Responses:** There will be 200 respondents who are expected to complete this survey. The respondents are expected to take a total of 8 minutes to complete.  $200 * 8 \text{ min} = 1600 \text{ min.} = 26.66 \text{ burden hours.}$  It is expected that we will have a 100% response rate.

**Response Rate Improvement:** We will send advance emails and reminder emails to volunteers. For those who do not respond in two weeks we will substitute another expert in the same field of study.

### **4. Describe how the results of the survey will be analyzed and used to generalize the results to the entire customer population.**

It is expected that the findings of this survey will inform the understanding of the team in terms of tradeoffs across sustainability and resilience planning. There is significant debate concerning the trade-offs that may exist between sustainability and resilience objectives, such as climate adaptation and mitigation, economic and environmental costs, equity considerations, affordability and risk reduction, short and long-term consequences, and spatial variations and focus. These complexities are exacerbated by uncertainties associated with event risks and valuations across long timeframes. Decision makers must act in this complex space that also includes balancing impacts across diverse stakeholders with varying priorities and concerns, which requires using multiple disciplinary techniques and data sources. Further, evaluating resilience and sustainability impacts resulting from multi-objective decisions is difficult because each is measured in different ways, and the knowledge necessary to fully capture this complexity is distributed over many areas of expertise that span the physical, social, and environmental

domains. Enabling cross-pollination across the currently fragmented disciplinary endeavors will require that experts co-develop shared knowledge and identify generalizable planning and design rules for weaving sustainability and resilience principles.

Results of this study will help inform these critical discussions and help provide frameworks that combine analysis of sustainability and community resilience moving forward.