The Sendai Framework for Disaster Risk Reduction 2015-2030: Reflections and insights from the Global Engineering Community

Input Paper to the Sendai Framework Mid-Term Review
The UNDRR’s Sendai Framework for Disaster Risk Reduction is undergoing a formal mid-term review to take stock of implementation and impact since its launch in 2015, understand what context shifts have occurred, and identify how to accelerate uptake to 2030 and beyond. There is currently no formal policy position from engineers on the Sendai Framework.

The International Coalition for Sustainable Infrastructure (ICSI), with support from the Institution of Civil Engineers (ICE), led a multi-lingual consultation to elicit the views from the global engineering community. This publication is the only contribution from the engineering community that will feed into the formal Mid-term Review process of the Sendai Framework.

Although the Sendai Framework is aimed at national governments, its implementation is a multi-stakeholder effort, and engineers have a key role to play. The following recommendations from the paper are highlighted as areas where the engineering community can bring a significant contribution to accelerate their implementation.

**The role of DRR and resilience needs to be highlighted in relation to global agendas**

There is a need to elevate Disaster Risk Reduction (DRR) and resilience in relation to the Sustainable Development Goals (SDGs) and other global agendas, and to better connect them to other systemic drivers and priorities.

**Develop and implement systemic risk and resilience frameworks and establish resilience-focused agencies and governing bodies**

There is an urgency to develop policies, regulations, codes, plans or other mechanisms that encourage or enforce the uptake of DRR and resilience measures, and to establish agencies or bodies that oversee their implementation. Multi-national agencies can play a key role assisting during the pre-development phase and enhancing local capacities during implementation.

**Accelerate improvement of data collection, analysis and methodology through technological advances and sustained investment**

Improved understanding of technological abilities and increased investment are needed to accelerate development and uptake of new technology beyond its current trajectory. Technological advancements can push the envelope of traditional risk assessments that include resilience thinking to deal with uncertainty, systemic complexity, and long-term approaches that incorporate climate change impacts.

**Encourage multi-disciplinary cross-sector collaboration among experts to tackle complex challenges**

Extensive collaboration among expert groups from different backgrounds (engineers, planners, social scientists, climate scientists, data scientists, finance experts etc.) is needed to develop better assessments and build local capacity during project implementation. There is also a need for the engineering community to engage more proactively and provide input into policy development and early-stage project development.

**Educate policymakers, practitioners, and the public on DRR and resilience concepts**

Education could enhance understanding of the importance of DRR and resilience. Educating and building capacity of policymakers is a priority, since they are responsible for developing regulations and incentives to increase the uptake of DRR and resilience. Enhancing capacity of practitioners at local level is urgently needed, and educational settings and civil society have a key role to play here.
ABOUT ICSI

The International Coalition for Sustainable Infrastructure (ICSI) was founded in 2019 by The Resilience Shift, the American Society of Civil Engineers (ASCE) and its ASCE Foundation, the Institution of Civil Engineers (ICE), the Global Covenant of Mayors for Climate & Energy (GCoM), WSP and LA Metro, among others.

We bring together a global coalition of change agents from across the engineering, investment, city and philanthropic communities committed to bold action to solve the systemic problems that exist at the intersection of climate change, ecosystem degradation, ageing infrastructure, and underinvestment.

ICSI is the global movement for engineering action on infrastructure sustainability, resilience and climate change. We place engineers at the forefront of climate action, harnessing their ability to provide solutions and matching it with urgent demand. The solutions we develop and promote will deliver impact on the ground, where it is needed most.

ICSI was created to bring the practical, science-based and solution-oriented perspective for which engineers are known to solve the systems-level problems surrounding infrastructure underinvestment, climate change, and resilience. From its origin, ICSI has been committed to driving action towards instilling sustainability and resilience as the cornerstone of every decision in the infrastructure lifecycle. Built upon a commitment to tangible and collaborative action, ICSI continues to broaden participation across other stakeholder communities to accelerate the innovation, adoption and scaling of people-centred, sustainable and resilient infrastructure solutions that support sustainable development for all.

sustainability-coalition.org
ACKNOWLEDGEMENTS

The content of this paper is based on findings from a global consultation comprising a multi-lingual survey and a series of 1-to-1 interviews with experts in disaster risk reduction (DRR) and resilience conducted by ICSI and the Institution of Civil Engineers (ICE). The authors are grateful to all the stakeholders that provided their time and knowledge to provide input for this paper.

A special thanks goes to the expert interviewees:

Avi Schnurr, Prof. David Alexander,
Dr. Craig Davis, Prof. Emily So,
Dr. Dave Brunsdon, Prof. Enrico Zio,
Dr. George M. Karagiannis, Prof. Liz Varga,
Dr. Haibo Chen, Prof. Mark Pelling,
Dr. Igor Linkov, Prof. Richard Dawson,
Dr. Jenny Yeung, Prof. Sabih Gatea Khisaf,
Dr. José Macharé Ordoñez, Prof. Stephen Flynn,
Dr. Matthew Free, Prof. Thomas O’Rourke,
Dr. Monica Cardarilli, Prof. William Powrie,
Dr. Stergios-Aristoteles Mitoulis, Richard Baldwin,
Dr. Tracy Hatton, Romain Pison,
Dr. Vilas Mujumdar, Stefan Kohler,
Nicole Boothman-Shepard, Thomas Lewis,
Peter Hall, Will Arnold,
Prof. Anawat Suppasri, and Winfred Gichuru.

Additionally, we would like to thank the Institution of Civil Engineers (ICE) and Stantec for their support in gathering evidence for this consultation and the Engineering Leadership Group for their contribution. Finally, we thank Dan Thompson at University College London (UCL) for his brilliant authorship and tremendous efforts in bringing it all together. Any errors or omissions are solely the responsibility of the authors, not the contributors.
The year 2023 marks the midpoint in the implementation of the Sendai Framework (SF) that was launched in 2015, along with other UN frameworks such as the 2030 Agenda for Sustainable Development. The UN General Assembly requested a midterm review to determine best practices and areas of strengthening for policies, programs, and investments at all levels.

The mid-term review offers a crucial opportunity to reflect on our current risk governance and risk management mechanisms, in order to identify what changes are needed for the 2023-2030 period to implement the Sendai Framework, and achieve its goals. The review works to take stock, identify emerging issues, uncover context shifts, and build coherence with other frameworks, to better address the systemic nature of risk and so realize regenerative and sustainable development.

Engineers play a crucial role in developing and managing the built environment, they are key implementers of disaster risk reduction (DRR) – as well as disaster risk management (DRM) more broadly - and resilience, as they develop the required guidance and standards for projects. Therefore, their perspective serves as a valuable contribution to the Midterm Review of the Sendai Framework (MTR SF).

There is currently no official policy position from engineers on the Sendai Framework. The International Coalition for Sustainable Infrastructure (ICSI) is making a voluntary contribution to provide the engineering community’s perspective on the implementation of the Sendai Framework thus far, the context shifts that have taken place since its launch and the actions required to accelerate its implementation going forward. ICSI is the world’s biggest coalition of engineers. It was founded in 2019 by organizations with decades of industry, government, and academic knowledge and experience. Since its inception, ICSI and its partners have focused on mobilizing engineering action on sustainability and resilience in infrastructure. ICSI’s focus on practical applications, along with its global engineering network, make the coalition suitable to gather and review the engineering community’s comments on the MTR SF.

This paper presents the results of a consultation with over 200 engineering practitioners and experts from across the globe.

Section 2 presents the methodology for undertaking the consultation and analyzing responses.

Section 3 highlights findings of the retrospective review, which looks back at progress and challenges related to the implementation of the Sendai Framework and, more broadly, of DRR and resilience approaches since its launch in 2015.

Section 4 highlights context shifts that have occurred since the launch of the SF and identifies future trends that might impact on the implementation of DRR and resilience.

Section 5 looks ahead to 2030 and beyond and it offers recommendations on how to strengthen the SF, and DRR and resilience more broadly.

Supporting materials from the consultation are included in the annexes.
**WHAT IS THE SENDAI FRAMEWORK?**

The Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework) was the first major agreement of the post-2015 development agenda and provides Member States with concrete actions to protect development gains from the risk of disaster. It was endorsed by the UN General Assembly following the 2015 Third UN World Conference on Disaster Risk Reduction (WCDRR), and advocates for:

- The substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.
- It recognizes that the State has the primary role to reduce disaster risk but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders.

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**THE SENDAI FRAMEWORK OUTLINES SEVEN GLOBAL TARGETS TO BE ACHIEVED BY 2030:**

**SUBSTANTIAL REDUCTIONS**

- A. Reduce global disaster mortality
- B. Reduce the number of affected people globally
- C. Reduce direct economic loss in relation to GDP
- D. Reduce disaster damage to critical infrastructure and disruption of basic services

**SUBSTANTIAL INCREASES**

- E. Increase the number of countries with national and local disaster risk reduction strategies
- F. Substantially enhance international cooperation to developing countries
- G. Increase the availability of and access to multi-hazard early warning systems

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*Seven global targets of the Sendai Framework for Disaster Risk Reduction*
**HOW DOES THE SENDAI FRAMEWORK ALIGN WITH THE SUSTAINABLE DEVELOPMENT GOALS?**

The Sendai Framework works hand in hand with the other 2030 Agenda agreements, including The Paris Agreement on Climate Change, The Addis Ababa Action Agenda on Financing for Development, the New Urban Agenda, and ultimately the Sustainable Development Goals (SDGs).

The Sendai Framework outcomes are a product of interconnected social and economic processes, as are the SDGs. The Sendai Framework is in alignment with, and integral to the progress of, the SDGs. For example, Sendai Framework monitoring is designed to complement the monitoring of 11 SDG indicators, specifically related to SDG 1, 11 and 13. The diagram below outlines some of the key synergies between the two agendas.
2. METHODOLOGY

A mixed-methods approach was adopted to undertake this consultation, which has included a survey and semi-structured interviews, with a focus on qualitative responses; it has been complemented with a limited literature review. Guidance from UNDRR was used to inform the scope and structure of the consultation while adapting the core research questions for the stakeholder group, i.e., the engineering community.

The methodological approach sought to minimize bias during this process, when possible. Quantitative data was gathered by analyzing the number of respondents who expressed a particular sentiment (e.g., found governance to be inadequate) or highlighted a specific trend (e.g., the rising role of technology), to support the strength of the qualitative analytical section (see Section 2.1 for more information).

2.1 Data collection methods

Qualitative data were collected from more than 200 respondents from over 50 countries, see Figure 1. Qualitative data were collected over the course of several weeks through an online survey and bilateral remote video interviews. For specific details on the surveys or the interview, please see the appendix.

In the analysis, the reference terms “respondent” and “response” can refer to people who responded to the survey and people who were interviewed. The terms “survey respondent,” or any iteration, refers to the surveys specifically while “interviewees” only refers to interviews.
CONSULTATION TARGET GROUP

The consultation targeted professionals with engineering backgrounds who typically had substantial experience in DRR, resilience, or a related field. The target group included a few professionals in related fields who work with engineers, such as emergency management. ICSI tapped into its partners’ networks, particularly the Institution of Civil Engineers, the American Society of Civil Engineers and Word Federation of Engineering Organisations to maximize the outreach of the consultation. The survey also included some respondents who were earlier in their career, while the interviews focused on experts with senior-level positions. Relevant experts were selected for the one-to-one interviews from ICSI’s networks, and more interviewees were identified through the experts’ own networks.

GLOBAL SURVEY

Initially, one survey was developed based on the MTR SF thematic areas identified by UNDRR. A review of the field of online surveys by Evans and Mathur finds that online surveys offer advantages in terms of global reach and increased sample sizes. The survey was developed on the online platform, SurveyMonkey®.

The original survey was Sendai-Specific and consisted of 50 questions that were organized into three parts (see Annex C). The first part (nine questions) consisted of some informational questions (e.g., name, email, sector, expertise, etc.). The second part (40 questions) included questions covering retrospective, current, and prospective reviews of the SF. The final section (ten questions) focused on questions related to the UN Sustainable Development Goals (SDGs). The final section was not represented in the report as the answers to these questions are outside the scope of the report.

Initial survey responses indicated that some respondents knew little about the specifics of the SF. In response, ICSI developed a second survey that focused on disaster risk management more broadly. This Generic survey was nearly identical in structure to the Sendai-Specific survey but substituted the language on the SF for language related to DRR and resilience. Two questions in part two of the Generic Survey were eliminated altogether, reducing the survey to 48 total questions (see Annex D).

Both surveys (Sendai-Specific and Generic) were maintained throughout the collection process to capture specific information related to the SF and to expand access to other engineering perspectives that had not directly interacted with the framework. The survey was translated from English into Spanish and French to increase access; however, almost all responses were in English.

Given the multiplicity of definitions related to DRR and resilience, UNDRR’s definitions of DRR and resilience were used to maintain fidelity to the framework as much as possible.

Resilience

“The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management.”

Disaster Risk Reduction

“Disaster risk reduction is the policy objective of disaster risk management, and its goals and objectives are defined in disaster risk reduction strategies and plans. It is aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development.”
CHARACTERIZATION OF SURVEY RESPONDENTS

In total there were 189 survey responses from over 50 countries. The countries that were most represented included UK, US, India and Nigeria.

Below the figures illustrate the spread of sectors and years of experience held by the Sendai survey respondents.

**Survey respondent’s sector**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>13%</td>
</tr>
<tr>
<td>Civil Society</td>
<td>10%</td>
</tr>
<tr>
<td>Academia</td>
<td>18%</td>
</tr>
<tr>
<td>Public</td>
<td>28%</td>
</tr>
<tr>
<td>Private</td>
<td>31%</td>
</tr>
</tbody>
</table>

**Survey respondent’s years of experience**

<table>
<thead>
<tr>
<th>Experience</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5</td>
<td>13%</td>
</tr>
<tr>
<td>5-15 years</td>
<td>22%</td>
</tr>
<tr>
<td>15+ years</td>
<td>55%</td>
</tr>
<tr>
<td>Retired</td>
<td>5%</td>
</tr>
</tbody>
</table>

![Number of respondents](chart.png)

**Figure 1: Countries represented in the interviews and surveys**
Semi-structured online video interviews with global experts were conducted as part of the consultation. Research from Harrell and Bradley has shown how semi-structured interviews have captured data for targeted groups of people, provided that the researchers were aware and attempted to mitigate cultural and other biases during the collection and analysis phases.6

A semi-structured interview template was developed by deriving and combining the most critical questions from the online survey and the areas identified by UNDRR. These questions followed a similar thematic order as the online survey and were used as the basis of semi-structured interviews. Interviews were scheduled for 45 minutes, with interviews taking 40 minutes to 1 hour. Depending on the expert’s level of knowledge with the SF, the interviewers would ask questions specifically in relation to the SF or to DRR and resilience more broadly. All interviews were conducted in English and interview notes were typed in English. Interviewers also recorded the interviews, with the interviewees’ consent, to ensure accuracy and add information during the post interview process.

### 2.2 Data analysis

Data from the surveys and interviews were analyzed using a mixed-methods approach with a priority for qualitative results, which were expressed in the form of statements. Quantitative data were derived after the qualitative data collection by categorizing statements into discrete themes.7 Themes were derived by categorizing clusters of responses based on their similarities rather than grouping them based on a priori labels, which aligns with a conventional content analysis as described by Hsieh and Shannon.8 Numerical quantities of these themes were used to denote the strength of the statement across the group of respondents (e.g. 50% of respondents found that governance played a major role in impeding the implementation of the SF). This type of analysis assumes that the qualitative results could be analyzed and grouped collectively across respondents, which some research has questioned.9 To mitigate some biases, a multi-phase analysis was undertaken by different teams to analyze the surveys and the interviews as explained below. In addition, key findings from this consultation were sent to a sub-set of the expert group for their feedback and validation.

The engineering firm Stantec undertook the preliminary data analysis of the global survey results. A Microsoft machine-learning software was used to conduct a keyword and sentiment analysis of the survey results. These results identified trends among respondents (e.g., respondents who noted improvements in local planning) and catalogued them numerically. A team from Stantec independently reviewed the results and highlighted additional groupings and edited software-generated groupings when necessary. The trend analysis of the interview follow-up notes was conducted by the ICSI team. Keywords and sentiment were recorded from the follow-up notes only. Transcripts of the interview recordings were not analyzed due to inaccuracies in the software that generated the transcripts. Interview recordings were reviewed to gather specific quotes or other specific data.
Results from analysis of the surveys and interviews overlapped significantly. Although respondents expressed varying levels of disagreement within both assessments, no trends in disagreement could be correlated to the survey and interview. However, responses between the survey and the interviews differed in the volume and scope of issues addressed. Generally speaking, the survey covered a broader range of topics but lacked the depth of response compared to the interviews. This disparity seems to have arisen from the different formats of the data collection process. Only selected questions were asked during the interviews to compress data collection into an interview of approximately 45 minutes. The interview format also seemed to have enabled respondents to answer questions at a greater depth than the survey, which suffered from fatigue bias.

2.3 Literature review

A limited review of academic and grey literature was undertaken and used to support or enrich some of the commentary in the paper, when applicable. The literature demonstrates that the engineering community is actively engaged to implement DRR, resilience, the SF, and other related global frameworks.

Using literature also serves two practical functions for this paper. First, it bolsters the arguments made by respondents or clarifies other arguments made by the respondents. Second, it provides the reader with additional materials to understand a featured argument or proposed solution in greater depth. With this said, the use of secondary literature was not intended to serve as an exhaustive review, but as a compliment to the qualitative data, which is the focus of this paper. Sources were derived from a literature review conducted for this paper, along with specific literature provided by ICSI’s expert pool.

Engineering Community’s Commitment to DRR, Resilience and SDGs

The American Society of Civil Engineers (ASCE) has developed a range of policy statements related to DRR and related issues, such as diversity and infrastructure. These statements include ASCE’s commitment to funding research for resilient infrastructure, since the ASCE finds the current infrastructure standards to be “insufficient to provide the resources necessary to identify the most effective ways to mitigate natural and man-made hazards.” In response, ASCE asserts that, “funding is critical to America’s critical infrastructure and to the health and safety of the nation and its citizens.”

[10]
2.4 Biases and mitigation strategies

Several potential biases have been identified throughout the development and implementation of the survey and interviews and are discussed below. In addition, they have been noted in the text of the following three sections. For example, this paper notes if a particular group posed an assertion or solution to provide the reader with more clarity on the origins of the assessment.

SAMPLE BIAS

The consultation intentionally targeted individuals from the engineering community from different backgrounds, experience level and geographies. However, it is acknowledged that the findings presented in this paper are based on a limited sample. The analysis notes emerging trends across the data but does not extrapolate them to represent the entire engineering community.

GEOGRAPHICAL BIAS

The geographical bias was reduced by ensuring that all UN regional groups were represented in the surveys and interviews. The consultation tried to broaden country representation as much as possible, which is represented in the range of countries selected by the respondents. In addition to geographical bias, the consultation also aimed for a representative sample of respondents by country income level (per World Bank data). Multiple responses from countries of all income levels were received. Representatives from high-income countries were overrepresented and representatives from the lowest income countries were underrepresented proportionally. Interviewees were almost exclusively from middle- to high-income countries.

SECTOR BIAS

Respondents and interviewees were segmented by professional sector: academia, the private sector, the public sector, civil society, and other. Several professionals had significant experience across multiple sectors and a few respondents seemed to struggle with the definitional distinction between “civil society” and “other.” Nonetheless, the results of the survey indicate that a relatively even distribution was achieved across academia, the private sector, and the public sector, which were the focus sectors for this review due to their size and impact. Similar results were achieved in the interviews; however, the interviews had greater proportional representation from academia. In addition, several of the experts more clearly bridged sectors and, as such, were included in both sector assessments, see Annex A for more information.

OTHER BIASES

Some additional confounds are worth noting. A global or national analysis does not account for some of the cultural, socio-economic, and other differences within countries. Respondents’ professional experiences skewed toward urban areas. Some of these biases were mitigated by asking questions related to cultural attitudes, with a particular focus on indigenous knowledge. Interviewees were provided the opportunity to describe how cultural attitudes impacted the application of the SF. Limited responses were received from specific cultural and socio-economic subcategories, which highlights another significant bias worth noting, especially for the survey data.

Most questions for the survey and the interviews were optional. An analysis of survey results suggested response fatigue, as questions at the end of the survey received significantly less responses. An attempt was made to minimize this bias in interviews by asking for follow-up questions in thematic areas that were lacking in the survey.
2.5 Limitations

This paper provides an initial identification of the current state of implementation of the SF, context shifts that have occurred and those that are on the horizon and priority areas, gaps and potential solutions to accelerate its implementation going forward. These were identified through consultation with experts and members of the global engineering community. Although efforts have been made to maximize outreach and minimize biases, it should be noted that this research is not meant to be an exhaustive exercise and findings represent the views of a sample of the global engineering community. Further consultation and research would be required to validate these results.
This section highlights trends, successes, opportunities, and challenges specifically related to the implementation of the SF and DRR themes within the framework since its launch in 2015.

Governance, education, and collaboration appeared among the most recurrent themes in this section. Although it is difficult to capture how respondents viewed DRR progress holistically across these categories and interviews, it seems that more respondents evaluated that some or little progress had been achieved than very minimal progress or no progress. The number and quality of responses suggest that data collection and methods of data collection had achieved among the most progress. The variety of responses made it unclear which elements had made the least progress. Overall, the consultation found that the capacities highlighted in this paper have not achieved sufficient levels to meet current or future needs.
3.1 Progress towards the Outcome, Goal, and Targets of the Sendai Framework

This section examines respondents’ opinions regarding the advancement of the Outcome, Goal and Targets of the SF.

Progress on the Outcome and Goal. Respondents in the Sendai-specific survey were asked a question related to the outcome and goal of the SF. Interviewees were also asked a question about the goal of the SSF. Although all interviewees provided useful observations on the progress related to DRR and resilience, or an aspect of the SF, none of them responded to the outcome or goal directly (these contributions appear in the sections below). A copy of the outcome and goal were not included in the interview, which likely explains some of the lack of response from interviewees. For this reason, this analysis is derived from the 58 responses in the Sendai-specific survey. Overall, respondents were evenly divided on progress, with just over half of them noting some progress on the outcome and goal. Most respondents who highlighted some progress linked it to the adoption of DRR frameworks or improved DRR governance. Others also noted some progress with data collection methods, particularly related to early warning systems.

Progress on the Targets. Only a few of the respondents mentioned at least one of the seven global targets specifically, while other respondents implicitly discussed the global targets. Each global target received at least one response; however, the most discussed global targets were E, F, and G, as defined below. Overall, responses from the survey and the interviews indicate mixed views of progress related to the Sendai targets, with just under half of respondents finding little to no progress and just over half of respondents highlighting some progress attributable to the SF. Several commentators highlighted progress for a specific target, but not for another. No clear regional, sectoral, or other bias could be identified as influencing a response. More detailed findings on the topics covered by the targets are presented in subsequent Sections 3.2 to 3.6.

**TARGETS A AND B**
Substantially (A) reduce global disaster mortality and (B) reduce the number of affected people globally by 2030, aiming to lower the average global mortality per 100,000 people between 2020-2030 compared with 2005-2015. Most respondents did not differentiate between these two goals, with slightly more than half of the respondents noting that the SF had achieved progress on these goals. Most of the responses that noted progress in these targets attributed them to progress in targets D, E, and G. In particular, respondents attributed developments in national and local DDR strategies (Target E) to have contributed positively to these two targets.

**TARGET C**
Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030. This target was the least discussed target, as few commentators noted it explicitly or implicitly. Given the number of limited responses, there was no clear trend that emerged for this target.

**TARGET D**
Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030. Responses to this question were expanded to include the entire built environment, since most of the responses did not focus on infrastructure specifically. Almost all responses noted some improvements to the built environment; however, many of these responses claimed that this progress was not sufficient to meet current needs.
TARGET E

Substantially increase the number of countries with national and local DRR strategies by 2020. Although respondents differed in their view of progress for this target, more respondents identified progress in achieving this target. The few respondents who identified no progress with this target at the national level seemed to come from lower-income countries; however, the respondent pool was insufficiently large to draw a definitive conclusion. Several interviewees with nationally established plans also noted some deficiencies at the local level, particularly for lower-income and rural communities. Those who identified progress in this area highlighted two key reasons: higher levels of income and education, and championing from political leadership. In one example highlighting the importance of political leadership, an interviewee noted how a mayor in Los Angeles championed an initiative to incorporate resilience into all city departments. In another example, political leadership in New Zealand achieved greater integration of DRR in healthcare and education at the national level.

TARGET F

Substantially enhance international cooperation with developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030. This target was expanded to include sub-national cooperation across all countries, given the range of responses that focused on sub-national cooperation. Respondents had mixed reviews on international cooperation, with most finding that it had improved. The few respondents who noted a lack of cooperation at the sub-national level highlighted a lack of resources and weak political structures as reasons for a lack of cooperation. Respondents who indicated an improvement highlighted the importance of education and best practices as highlights. More information can be found in Section 3.5.

TARGET G

Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030. Most respondents noted improvements to target G since the adoption of the Sendai framework, at the local and national levels. Many responses identify technological innovation as key to this progress for warning systems and the dissemination of disaster risk information. Several responses highlighted an increase in public communication through social media. Despite identified areas of progress, several respondents noted room for improvement in terms of the better data collection, via using the most current technology, and more adoption. Although most comments generally indicate progress with risk assessment, most risk assessments have focused on the impacts to single hazards, like flooding, or a single system, like transportation. Systemic or interdependencies across risk assessments have been neglected. More information can be found in Section 3.2.
3.2 Progress in Risk Assessment, Information, and Understanding

Most interviewees noted progress in this category, especially related to the development and use of risk assessment and information. Nonetheless, responses indicated that this category required significantly more work to meet an acceptable baseline of responses. According to respondents, the topic area of data collection has experienced the greatest improvement. Lack of systemic risk assessments and failure of stakeholders to understand risk as key gaps.

Based on your experience and area of work, to what extent are investments by the public (including national and local governments) and private sector risk-informed?

- 13% Always risk-informed
- 27% Mostly
- 58% Sometimes
- 2% Never
DATA COLLECTION HAS INCREASED, AND METHODS HAVE IMPROVED

Overall, analysis of the survey and interviews seems to indicate that data collection and use have improved more than most other components in DRR. Increased data use has driven risk assessments and allowed for the implementation and development of warning systems. Some commentators have noted that a rise in data collection methods have benefitted from technological improvements in detection and analysis. Despite an overall improvement in data collection, some responses noted that more data is needed to conduct risk assessments at a system level and over the long term.

SYSTEMIC RISK ASSESSMENTS ARE NOT BEING UNDERTAKEN, LARGELY DUE TO LACK OF COORDINATION, CAPACITY, AND INVESTMENT

Most respondents noted that risk assessments had made some progress since the adoption of the Sendai Framework but were not systemic in their approach. In particular, respondents identified that risk assessments should consider more fully the interdependent nature of risk. As one interviewee surmised:

"the phrase ‘interconnected’ is too weak. We must address the interdependent nature of risk." 12

Although many respondents have noted an increase in risk assessments over the last several years, particularly flood risk assessments, they also observed that these assessments have focused on single-hazard or single-sector impacts and do not capture the entire picture. Currently, these assessments have failed to account for cascading effects related to risk. Failure to lifeline infrastructure like electrical grids, for example, has caused more damage than the initial hazard event in many cases. In the case of flooding, a systemic assessment could include impacts on mental and physical health.

Several challenges to developing these types of risk assessments included capacity limitations with current tools, lack of coordination, lack of investment or narrow investment, and political barriers or a lack of political incentives. Interviewees in particular highlighted issues with capacity limitations of current tools due to technological and data collection limitations. A few interviewees highlighted that coordination had compounded these issues. In one interviewee's opinion:

“We’re now in a position where with the sort of computing power we’ve got and the modeling power, we can actually do very high fidelity, fine grain analyses [...] Sadly, not many institutions have this holistic modelling capability, as a range of different disciplines need to be involved.”

More information on coordination can be found in Section 3.5. Several commentators noted that investment may be driving a lack of coordination (see Section 3.4). Of the reasons provided, policy and governance were identified as among the largest contributors to a lack of coordination. Some commentators noted that government regulations have not been leveraged sufficiently to encourage systemic risk assessments, or risk assessments generally, which they believe can accelerate their uptake.

DIFFICULTIES WITH CAPTURING ADDITIONAL BENEFITS AND LONG-TERM ANALYSES

In addition to challenges with capturing systemic risk, all respondents who discussed the capture of additional benefits from DRR assessments, including environmental and social benefits, noted the difficulty in quantifying these benefits or attaching a value label. Difficulties quantifying these types of benefits seemed to be cross-cultural. Lastly, respondents found that risk assessments have insufficiently captured long-term impacts, such as climate change. Most critical infrastructure has a lifespan that easily exceeds half a century, so failure to capture long-term change can have cascading impacts on the delivery of basic services. In terms of income bias, a few commentators observed that much of the progress of long-term assessments, and risk assessments more generally, seems to be concentrated in urban centers or wealthier areas. The same core challenges facing
systemic risk were highlighted for capturing additional benefits and including long-term analyses (see previous subsection).

**LACK OF UNDERSTANDING OF RISK AND RESILIENCE CAN HINDER IMPLEMENTATION**

According to several respondents, DRR and resilience suffer from a lack of understanding, especially from the public and policymakers. In their analysis, a lack of conceptual understanding hinders the adoption and use of risk assessments, along with broader issues with risk governance and DRR (see following Section 3.3 for governance issues discussion).

Lack of public knowledge can derail the results of risk assessments. Even in countries with a public that is more informed on risk, like Japan, insufficient public understanding still can contribute to human settlement in high-risk areas, despite the results of a risk assessment. According to a 2015 article, 75% of residents in Japan live in high-risk areas.13

Lack of understanding has also prevented the implementation of risk assessments at the policy level. In New Zealand, experts and other stakeholders are increasingly conducting hazard risk assessments; however, findings from many of these assessments are not implemented due to lack of government understanding. Another commentator noted that technical assistance provided by multi-national agencies has not been implemented due to a lack of capacity at the national and local levels.14
3.3 Progress in Risk Governance and Management

Risk governance and management received among the most comments of any concept from the surveys and the interviews. Respondents noted the importance of governance and management of DRR and resilience more broadly, such as investment, risk assessments, collaboration, and phases of the disaster-risk mitigation cycle (preparedness, response, mitigation, and recovery).

Has the establishment of national and/or DRR strategies and plans resulted in expanded efforts in risk reduction?

| 29% No | 71% Yes |

Figure 3: Survey results on DRR strategies

Risk governance and management measures have improved since the launch of the Sendai Framework. Most respondents found that risk governance measures had improved since 2015. Nearly 2/3 of survey respondents from across geographies and income levels found that national, planning, and organization had changed to align with the SF. Similarly, more than 2/3 of survey respondents noted that establishment of national and/or local DRR strategies and plans resulted in expanded efforts in risk reduction.

Most of the improvements referenced have focused on the management and reduction of single hazards (see the subsection on systemic risks in 3.B). Responses also suggest some disagreement on progress, particularly in the USA and UK, with some respondents reporting “yes” to progress and some reporting “no.” These disagreements may be a result of higher representation from these two countries. It is also important to note that many of these comments focused on governance at national and international levels. When asked to comment on progress related to governance at the local level, several interviewees noted that areas that were wealthier, more politically progressive, and had recent experience with disasters were more likely to adopt and implement risk governance. Other responses implied that this assessment may not be true, as they highlighted local efforts in lower-income areas in Africa and Southeast Asia.

Although most respondents have noted some progress related to governance, many of the same respondents asserted that current governance structures have hindered progress. In terms of governance structure, several respondents noted that the lack of a centralized governance structure was hindering DRR, while others noted that over-centralized measures had hindered governance measures. Comments did not seem to correlate specifically with a particular governance structure in the respondent’s country of origin or occupation. In addition, although many of the survey results highlighted issues with governance, responses from interviewees provided explanations for the impact of these governance failures on DRR. For this reason, many of the examples in this section draw from interview responses.
SIX CRITICAL DEFICIENCIES WERE OBSERVED IN RISK GOVERNANCE AND MANAGEMENT:

1. LACK OF STANDARDS

Some countries, such as the USA and Australia, lack an official mechanism that allows governments to evaluate if the baseline standards for building codes are sufficient to safeguard people or to provide continuity of services, in the case of infrastructure. Other countries lack baseline standards for most of their structures. One respondent from Peru estimated that 70% of buildings in their country had been built without standards. Lack of standards impeded the development of hazard models and analyses (see Section 3.2), along with standards for emerging technologies. One interviewee from the UAE asserted that

“we are designing composite structure 3D printing, but we don’t have the standard for the printing here in UAE.”

2. LACK OF ENFORCEMENT OF DRR

A few respondents noted the importance of enforcement mechanisms, like regulation, in driving rapid change. In their assessment, a lack of laws and regulations has hindered the uptake of DRR and resilience in the public and private sectors since most actors will not prioritize the importance of DRR and resilience. One commentator put it bluntly:

“if [DRR is] optional, people will take the easy way out and disregard it.”

3. MISMATCHED INCENTIVES

This section includes a lack of incentives for DRR measures and competing incentives that would cause governance structures to avoid or ignore implementing DRR measures. Several commentators suggested that the development of better policies could help incentivize uptake in DRR. Most of the incentives focused on the development of financing mechanisms or funding streams.

Other commentators noted that competing political incentives caused policymakers or other entities to choose competing objectives over DRR, which were often attached to financial drivers or desires for re-election. For example, a local government has chosen to resettle known hazard areas due to direct or indirect revenue from development, which poses one of the greatest risks to ‘Build Back Better’ (BBB) initiatives. A discussion of government investments is highlighted in Section 3.4 on investment in risk and resilience. In addition, public shortsightedness and retroactivity related to DRR seem to be a negative byproduct of governance systems that rely on election cycles. In several respondents’ opinions, short-term election cycles orient public decision-making away from long-term projects, which are critical to enhance resilience. Similarly, respondents noted that this structure of governance often resulted in an underinvestment of public resources in preparedness and recovery processes like ‘Build Back Better’, which shifted most DRR activities to response activities by default.

4. SPEED OF GOVERNANCE IMPLEMENTATION

In a similar vein, a few respondents noted that a general lack of speed from governance mechanisms to implement best practices or risk findings have insufficiently reduced risk. In Japan, for instance, long wait times to implement zoning and land use best practices have caused people to return to known hazard areas.
5. GOVERNMENT ACCOUNTABILITY

Several commentators also noted that a lack of accountability on which entities are responsible for DRR often results in a governance vacuum of DRR measures entirely. Although there was an insufficient number of responses in this category to indicate a definitive trend, most of the responses that highlighted accountability were from within the public sector. Some commentators attributed this to a lack of political courage or a lack of understanding of the nature of risk (see the above subsection on mismatched incentives or Section 3.2 for more information on lack of understanding). A few respondents explicitly noted the prevalence of corruption or a focus on re-election, which undermines governance for DRR and resilience and has increased a general lack of public distrust. In the words of one interviewee:

“real information is often hampered by lack of credible information from the authorities.”

6. COORDINATION ACROSS LEVELS OF GOVERNMENT AND WITH OTHER SECTORS.

Respondents highlighted multi-level coordination as one of the critical aspects related to progress, which is further highlighted in Section 3.6 on collaboration, cooperation, and partnerships.
3.4 Progress in Investment in Risk Reduction and Resilience

Comments related to investment generally were limited, which is likely due to the scope of the study and somewhat to the participants’ professional backgrounds. Given the limited number of responses, the term ‘investment’ includes both financing and funding. A few respondents highlighted examples of increased investment; however, no respondent found that investment in risk reduction and resilience was sufficient to meet current and future needs. Several respondents commented on lack of investment and fewer still commented on specific areas or funding approaches that hindered risk reduction and resilience. Most of these commentators were interviewees, as the semi-structured nature of the interviews seemed to allow interviewees to highlight or expand upon concepts and comments related to funding more easily. Comments highlighted areas of improvement, which are outlined below.

**MULTI-NATIONAL AND NATIONAL INVESTMENTS IN DRR AND RESILIENCE PLAY A KEY ROLE, BUT THEY ARE NOT CONSISTENT AND, OFTEN, NOT EQUITABLY DISTRIBUTED**

Based on responses, investment from multi-national and national entities played a leading role in investment over the last several years. One interviewee highlighted the Horizon Europe program, which provides resources and funding for systematic risk assessments at the European level and beyond the European borders. Another example highlighted The World Bank programs for small island nations to inform their investments and their use of resources. These programs have helped increase capacity and built more resilient structures. Nonetheless, some respondents noted their concerns with implementation gaps from multi-national projects (see Section 3.6 for more information). Several commentators noted that national governments also have invested in risk and resilience. Several respondents noted that lack of consistent investment from public governments hindered the development of DRR projects and response efforts. Based on responses from interviewees, local investment tended to concentrate on wealthier and more urban areas. One interviewee also noted that lack of sufficient financing and funding, along with the structure of competitive funding processes, discourages the types of collaboration that are essential to enhancing DRR.

**INVESTMENT IN HIGH RISK OR CHALLENGING PROJECTS IS LIMITED AND REQUIRES UPFRONT INVESTMENT IN RISK MODELS**

A few respondents noted that current investment does not seek to address the most difficult challenges facing DRR and resilience, even though these challenges require the most investment. One respondent surmised that the system of financing and funding discouraged investment in this area since challenging projects were more likely to fail and not render a return, unlike projects with more conservative parameters.

Some respondents highlighted that models play a key role in making the business case for investing in DRR and resilience projects. Other respondents noted that building complex models requires significant upfront investment, creating a negative feedback loop that discourages investment and modeling. An example from one interviewee captured this feedback loop aptly

“If London flooded, how many billions of pounds will be spent on recovery? This would then justify spending more on resilience. But it is expensive to run this modeling in the first place!”
3.5 Progress in Disaster Preparedness, Response, and ‘Build Back Better’

The UNDRR defines Build Back Better as “the use of the recovery, rehabilitation and reconstruction phases after a disaster to increase the resilience of nations and communities through integrating disaster risk reduction measures into the restoration of physical infrastructure and societal systems, and into the revitalization of livelihoods, economies and the environment”.

Following Superstorm Sandy, then-Mayor of New York City, Michael Bloomberg, spearheaded an initiative to incorporate preparedness and mitigation initiatives into city projects and city departments, which reduced risk. Bloomberg’s initiative also included an assessment of climate risks, especially to public buildings and infrastructure. In Los Angeles, a set of directives from local leadership enabled cities to identify aspects of infrastructure that were more at risk and systematically develop a plan to repair them before or after a hazard event. The mayor also created resilience officers to help spearhead this effort.

Respondents had mixed opinions on progress in preparedness, response, and ‘Build Back Better’ plans, with slightly more than half noting that these DRR activities had achieved some progress. Although each of these activities is unique to DRR, most respondents did not provide distinct answers for each activity, with the exception of comments related to the concept of ‘Build Back Better’, which several commentators noted explicitly. Responses from surveys and interviews indicated four areas that had hindered or enhanced progress in these DRR activities, which are highlighted below. In addition, some respondents also noted that data collection and analysis efforts played a role in the progress (or lack thereof) related to these DRR activities (see also Section 3.2).

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Has preparedness for response, as well as recovery, rehabilitation and reconstruction, improved since implementation of the Sendai Framework in 2015?

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Figure 4: Survey results on improvements since 2015

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The role of governance

Of the respondents who provided a comment for this section, many noted governance as a reason for progress or capacity gaps related to preparedness, response, and ‘Build Back Better’ initiatives. Respondents specifically underlined planning and coordination as key elements of these DRR activities. Several respondents noted broadly that the advent of preparedness and recovery plans had improved these aspects of DRR. Most respondents who noted gaps also highlighted a general lack of plans related to preparedness, response, and recovery. Comments on coordination also seem to hinder progress in these DRR categories. In some areas with more robust planning, for example, respondents noted that government agencies had not integrated existing plans to coordinate response and recovery more effectively. A few others observed that a lack of coordination had caused failures across these activities, particularly in response efforts. On the extreme end, some respondents felt that a lack of coordination enabled leaders to exonerate themselves of responsibility. Although most interviewees highlighted gaps, a few interviewees highlighted positive examples of how governance enhanced preparedness and ‘Build Back Better’ initiatives, which are highlighted in the case study below.

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IMPLEMENTATION OF ‘BUILD BACK BETTER’

Most respondents and many interviewees who commented on BBB highlighted a gap between the concept of BBB and its implementation. Although a few responses noted that BBB had been somewhat achieved with the adoption of better building codes and standards, others suggested that even these standards did not meet minimum levels of resilience. Other experts noted that BBB failed to be implemented due to governance issues like competing incentives and the speed of implementing change (see governance Section 3.4 for more information). In this view, several interviewees also noted that BBB should consider not building back at all.

In addition to issues with implementation, one non-engineering respondent asserted that BBB had become too conceptually narrow to focus on technical standards and practices. In their assessment, this view of the concept discounted the importance of governance and other social factors.

“Too many response and reconstruction efforts [are] constrained by the interests and pressures of development and fall short of meeting their potential; too often, reconstruction is incomplete with temporary shelter becoming permanent, ... [and] with relocation in particular seldom resulting in enhanced life chances”.

Some progress with ‘Build Back Better’ initiatives was noted by two interviewees who agreed that strong governance, coordination, planning, and funding drove this effort.

EDUCATION AND TRAINING

Most respondents noted that a lack of education and training had hindered progress with these activities; however, a few respondents highlighted the positive benefits of public education. Responses highlighted the public and practitioners as target education groups. A few respondents who highlighted these gaps noted that a lack of education hindered public investment in DRR and resilience initiatives and limited the public from seeing their responsibility in these initiatives. Areas with increased levels of public education noted improvements in these activities, such as preparedness. Public outreach programs in Hong Kong, for instance, have reduced landslide risk by educating private landowners on best practices for slope maintenance. In the words of one Italian resident with an engaged public:

“we needed a new ambulance for the town, so we all marched down to the ambulance station, opened our wallets, and six weeks later [there were] two state-of-the-art cardiac arrest ambulances – brand new – parked outside the town hall for inspection.”

In addition to public involvement, several respondents also noted that a lack of education among practitioners prevented these activities from being implemented at the local level. This is further discussed in Section 3.2.

INVESTMENT

Several comments asserted that a lack of investment (financing and funding) has contributed to a limited uptake of these DRR activities. Several interviewees noted that initiatives to ‘Build Back Better’ often cost more than policymakers have allotted for recovery programs, hindering their efficacy. A few respondents also highlighted the importance of additional funding for emergency funds. Nonetheless, most comments noted a general need for more funding related to these activities rather than specific targets (for a broader conversation on funding, see Section 3.4).
3.6 Collaboration, Partnership, and Cooperation

Similar to the comments on governance, this section received among the greatest number of comments across survey and interview respondents. Although many respondents indicated an increase in collaboration, partnership, and cooperation in some distinct regions or sectors, almost all respondents claimed that current levels of collaboration and partnership were insufficient or inadequate. Key themes identified in the consultation are highlighted below.

**MULTI-LEVEL COORDINATION**

Although several commentators noted an improvement across coordination efforts, most commentators asserted that coordination across levels of governance needs improvement. Several commentators highlighted issues with coordination between public governance on international, national, and local levels. According to these commentators, inadequate coordination can hinder or prevent the implementation of DRR and resilient projects, since most projects are implemented at the local level.

**PUBLIC-PRIVATE COLLABORATION**

Several commentators highlighted that private sector coordination has improved DRR and resilience capabilities. Commentators who noted progress included almost every global region and income level. Despite the improvements in public-private partnerships, other commentators noted that relationships with the private sector could be improved. These comments also included almost every global region and income level. One of the experts interviewed posited that public-private partnerships increased governance difficulties since public and private stakeholders responded to different incentives.

**REPRESENTATION OF MARGINALIZED AND VULNERABLE GROUPS**

This consideration was highlighted in the survey responses only as interview questions did not specifically focus on this topic. Around 2/3 of survey respondents found that indigenous and local knowledge had guided risk assessments and risk-informed decision making. It is important to note, however, that more than twice as many respondents skipped the question than those who answered the question, which may skew the data. In addition, some of the responses seemed to indicate that the respondent was commenting on local knowledge only. An identification of indigenous knowledge from respondents was represented across country regions and income levels. One respondent from Nigeria reported that community chiefs and leaders are part of meetings and decision-making in their areas of jurisdiction. Many other respondents noted that indigenous collaboration was nascent, with significantly more collaboration needed.

Have women, persons with disability, youth, and other marginalized groups contributed to these efforts?

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Figure 5: Survey results on contribution of marginalized groups

In a similar vein, more than half of respondents noted that women, persons with disability, youth, and other marginalized groups contributed to preparedness, response, and ‘Build Back Better’ activities, which is supported by academic and gray literature. Nearly 1/3 of respondents who noted some progress in this area also highlighted the need to make more significant progress on this front. In the words of one respondent:

“of course they have [become more involved] but insufficiently and this is because they have been inadequately integrated in the process.”

Responses did not seem to correlate to a specific region or income level.
ENGAGEMENT WITH THE PUBLIC

In addition to governmental and private sector collaboration, most commentators highlighted a need to involve the public more directly into the decision-making process. Several interviewees expressed the importance of public engagement in helping to remedy a general lack of local participation. Italy was highlighted as an example where enhanced public engagement has enabled the country to increase capacity in DRR activities, especially response activities. Following a 2007 tornado, the town of Greenburg, Kansas (USA) rebuilt buildings and infrastructure to reduce its carbon footprint and water consumption, which also serves as an example of a local ‘Build Back Better’ initiative.  Despite most comments highlighting the need for increased public participation, one commentator from Japan, a country with strong emphasis on public involvement in decision-making processes, cautioned that an over-involvement of the public could slow project implementation.

Engagement with experts. Comments on expert engagement were among the most received comments related to this topic, especially from interviewees. Most respondents are experts, which may explain somewhat the volume of comments on this topic. These comments can be divided into: i) engagement among experts, and ii) expert engagement to improve capacity building for key stakeholders. Engagement among technical experts was identified to enhance decision-making tools, strategies, and responses related to DRR and resilience. Several respondents asserted that the complexity and scope of DRR required expert collaboration. Examples in the past several years include UNDRR’s Science and Technology Advisory Group, the National Preparedness Commission in the UK, and the Intergovernmental Authority on Development’s group on climate in eastern Africa. Several respondents also noted that expert collaboration could help surmount limitations in response and recovery operations. As one respondent reflected:

“the COVID[-19 pandemic] was half medical and half emergency. But, as there were no experts in emergency management, decisions were being made by medical professionals, and this resulted in excess deaths.”
Although some areas have achieved some progress with implementing DRR measures, such as the enforcement of Myanmar’s building code, capacity building and knowledge remain challenges for many sectors and areas, especially at the local level (also see Section 3.2). Several respondents, many of them interviewees, identified that lack of expert engagement had contributed to this gap.

ENGAGEMENT WITH THE ENGINEERING COMMUNITY

Respondents expressed specific concerns about partnerships and cooperation with and within the engineering community, which may be because most of the respondents were engineers by training. Several respondents noted the importance of collaborating with engineers to develop policy and other guidance, as their background enables them to serve as a practical link between strategic goals and implementation on the ground. As discussed in Section 5.2, engineers are too easily considered solely for their ability to conduct risk assessments. UNDRR would benefit from further engagement with these communities, especially around the development of policies and standards.

UNDRR should also encourage collaboration between engineering communities and national governments. Many respondents also noted the need to increase collaboration among engineers. The engineering community is not monolithic; many engineers lack the knowledge or interest to implement DRR and resilience measures. Several interviewees highlighted the importance of formal education (see Section 5.2) as a way to build formal capacity. Most of the respondents who offered recommendations in this category noted the importance of engineering societies in fostering capability and interest related to DRR and resilience.

Multi-stakeholder initiatives and partnerships focused on DRR and resilience

The Resilience Shift

The Resilience Shift was created by two highly respected global firms – Lloyd’s Register and Arup – who have come together to assure the future of critical infrastructure, which is fundamental to the sectors in which they work. This initiative has been focusing on creating useful resources for practitioners wanting to put resilience in practice.²⁷

Tomorrow’s Cities

Tomorrow’s Cities is the Urban Disaster Risk Hub of the United Kingdom Research and Innovation (UKRI) Global Challenge Research Fund (GCRF), which collaborates with local stakeholders to develop a comprehensive methodology for facilitating the risk-sensitive design of future cities. Recognizing the importance of collaboration in short-term success for project implementation and long-term success of capacity building, the fund has a dedicated arm composed of several committees to support collaboration across the private sector, public sector, and academia.²⁸
4. CONTEXTUALIZING THE SENDAI FRAMEWORK AND OTHER DRR ACTIVITIES

Section 4.1 provides a review of context shifts and emerging issues since the launch of the SF in 2015, including responding to and recovering from the COVID-19 pandemic and climate crisis. Section 4.2 explores contextual shifts and anticipated topics of concern going forward to 2030 and beyond, which should be considered in prioritizing, accelerating, and amplifying actions and recommendations identified in Section 5. It is important to note that for cogency, not every contextual framework identified was highlighted for review. Rather, comments cited by more than one respondent were highlighted. Several of the contextual issues in this section overlapped with themes covered in Section 3.1 review of the retrospective context shifts and emerging issues in section 4.1 and current and future context shifts indicates a significant overlap in several of the themes, including technology, hazards, and systemic complexity and risk.
4.1 Context shifts and emerging issues since the launch of the Sendai Framework

This section outlines shifts that have occurred since the launch of the SF in 2015 and that have impacted implementation of DRR and resilience over the last several years. Some of the shifts highlighted in this section predate 2015. Shifts that predated 2015 were included if they continued to have a discernable impact during 2015 to 2022. In addition to the trends outlined below, respondents noted or reiterated governance issues, which are included in Section 3.3.

HAZARDS HAVE INCREASED, WORSENED BY CLIMATE CHANGE

In terms of the volume of responses, survey respondents highlighted this trend more than any other contextual shift driving change. Given the scope of the assessment and background of the respondents, almost all of responses highlighted natural hazards. Some responses emphasized a single catastrophic event, such as the 2022 floods in Pakistan or Storm Eunice in the UK. Other responses highlighted an overall trend, such as an increase in the volume of flooding in China over the last two years. Flooding was among the most commonly identified hazards to increase in recent years. Pandemics and related biological hazards were also highlighted as an emerging threat. More importantly, several commentators suggested that an increase in hazards and hazard awareness was driving an increase in public interest for DRR and resilience, which is discussed in the next section.

PUBLIC AWARENESS OF DISASTER IMPACTS AND DRR ACTIVITIES HAS INCREASED BUT MORE NEEDS TO BE DONE

Although several commentators have highlighted gaps in public involvement for DRR projects (e.g., in the decision-making process), a number of respondents highlighted an increase in public awareness for DRR activities. According to them, an increase in public awareness of these activities presents an opportunity to make the case to invest in more DRR projects. Most commentators who noted this trend suggest that increased public awareness is not concentrated in a specific region or income level. As discussed in the retrospective review (see Section 3.3), several commentators noted that experience with hazard events was correlated with an increase in public awareness, as in the case of New Orleans following Hurricane Katrina. One interviewee asserted that increased awareness was concentrated in the global north and higher-income countries.

Irrespective of the concentration of public awareness, interviewees noted that public awareness requires proper guidance and stewardship, which is often lacking. For instance, the public cannot distinguish between DRR and similar climate action initiatives, which could lead to misunderstandings regarding investment needs and priorities. In addition, the rise of public awareness has been accompanied by a rise in misinformation and distrust which threatens to undermine some of the effects of an increase in public awareness. This trend also has been identified in recent academic studies.

THE ROLE OF DRR AND RESILIENCE NEEDS TO BE HIGHLIGHTED IN RELATION TO OTHER GLOBAL AGENDAS

The number of frameworks and resources related to DRR, resilience, and climate change have increased significantly in the last several years. Although this proliferation suggests an increase in the number of entities addressing DRR and related initiatives, some commentators, many of them interviewees, highlighted several challenges resulting from this increase.
For one, the lack of a common standard has compounded the confusion over the concepts that are critical to DRR, like resilience. In the words of one interviewee:

“we need at least an agreement across the board regarding what is resilience and how is this measured. There are more than 50 different resilience metrics, for example, [which] is not communicable.”

Secondly, some respondents noted that the proliferation of frameworks has created some confusion regarding how to integrate them and has even generated competition in some cases. One interviewee asserted that:

“all these global frameworks have been good for the world, but there has not been a systematic or clear connection between all these initiatives. [For example,] how is carbon management going to enhance biodiversity alongside reducing disasters, and deliver economic benefits?”. An interviewee noted that the “regulatory frameworks of Sendai have taken a back seat to SDGs.”

TECHNOLOGICAL ADVANCEMENTS HAVE RESULTED IN IMPROVED RISK UNDERSTANDING AND MANAGEMENT

Many respondents suggested that technological advancements have aided in developing better risk assessments and resilient solutions over the last several years. For example, several interviewees referenced digital twins as a technological innovation to improve simulation of complex scenarios across complex systems. Another interviewee highlighted the application of technological-driven stress testing as an emerging method that has benefitted from technological advancements, which is supported by recent studies on these types of technologies.31 Surveillance, detection, and early warning systems also have developed increasing capabilities at reduced costs (see Sections 3.2 and 3.6 for more information on early warning systems). Public dissemination tools like social media have increased public outreach and response capabilities. Despite the advancements in technology, several commentators noted that personnel working in DRR and resilience could better understand and integrate existing technologies into analytics and solutions. In the words of one interviewee:

“there is a need for more […] research and awareness of the technology to intervene before the next event.”

Have any measures been taken within your area of work to integrate DRR and resilience management with actions addressing climate change, sustainable development, biodiversity, public health and sustainable food systems?

27% No 73% Yes

Figure 7: Survey results on integration of DRR
4.2 Current issues and future context shifts to 2030 and beyond

Most comments indicated a continuation of the trends from the past few years, with some changes in how those trends will impact societies in general and DRR in particular. For instance, climate-related hazards are expected to increase in intensity in the future. Societal and systemic pressures, along with their impact on vulnerable populations are coming to the fore. Several respondents noted the need for increased governance and cooperation, with a focus on international collaboration and the development and implementation of frameworks and policies.

**Climate Change Impacts Will Continue to Cause Concern, Particularly in the Case of Compounded Threats**

Several respondents asserted that hazards would continue to present future threats, especially hazards linked to climate change. Those who commented on the severity of climate-induced hazards expected it to increase. Pandemics and similar biological hazards were also identified as threats. Other respondents highlighted new threats like water scarcity and food security as an emerging issue of concern. In one interviewee’s words:

“I am very worried about the lack of food and water security, and the promulgation of war as a result.”

Several respondents emphasized that the impact of additional hazards would increase pressures on already fragile social systems and threaten populations, especially vulnerable populations.

**The Rising Complexity and Systemic, Interconnected Nature of Risk Will Create Additional Societal and Systemic Pressures, Particularly for Vulnerable Groups**

Although a few respondents noted the rise in societal and systemic pressures over the last several years, a substantial number of respondents claimed that the rising complexity and fragility of systems probably would increase pressures on basic social functions, particularly for vulnerable groups. Some commentators spoke generically about systemic complexity and did not highlight a specific aspect of it.

Other commentators, interviewees in particular, highlighted lifeline infrastructure (power, water, transport, ICT) as a driving force, given its increasing complexity, exposure to hazards, and its importance in the delivery of basic goods and services.

Commentators highlighted several impacts from increased systemic vulnerability including inadequate healthcare, energy crises, waste management, and supply chain shortages, which would impact vulnerable populations in particular, a point that is also substantiated by the literature. Comments highlighted indigenous peoples, urban populations, and low-income groups as particularly impacted over the next several years. Several interviewees raised the issue of equity and asserted that DRR and resilience strategies could be at risk of threatening vulnerable populations if not carefully enacted, such as displacing poorer populations due to housing price increases from a resilient initiative or overlooking marginalized groups in land-use planning.

**Digital Technologies Will Play a Pivotal Role in the Implementation of DRR and Resilience**

Despite the importance of technological improvements in the past several years, even more commentators highlighted the importance of technology in the future than in the past. Most commentators highlighted a continuation of the same trends as the previous few years and suggested that they expect technology to continue improving. Similar to the review of technological impacts over the last few years, several commentators who highlighted the importance of digital technologies noted that these technologies likely would require additional work and focus to integrate them into DRR and resilience initiatives more fully. For example, one interviewee posited that emerging surveillance and sensor technology could be adapted for DRR use; however, more work was needed to implement these technologies in DRR. Another interviewee asserted:

“In 10 years we will have technology guiding everything, digital twins, AI technology for scenario and models. More work needs to be done on how the new technologies will help [with DRR activities].”
Looking forward to 2030 and beyond, this section will seek to offer recommendations to address some of the gaps raised in Sections 3 and 4, along with highlighting other areas of improvement. Like all other sections, comments included DRR and resilience more broadly except for recommendations for realizing the outcome and goal of the SF.

Governance and collaboration were identified as cross-cutting themes that form the basis of many of these recommendations. Most comments provided by survey respondents were generic in nature. This focus on generality may be due to the difficulty addressing broad problems with specific solutions, or the open-ended nature of the questions.
5.1 Recommendations for realizing the Outcome and Goal of the Sendai Framework

Almost no commentators from the survey or the interview provided direct feedback on how to improve the outcome and the goal of the SF. Nonetheless, almost all the recommendations outlined below will indirectly improve the goal. For example, survey respondents who commented on the goal of the SF noted the importance of public education, expanding frameworks, improving inclusion, and increasing cooperation between experts, governments, and local stakeholders. The one interviewee who provided a direct comment on the outcome and goal recommended that UNDRR expand its mandate to collaborate with sub-national entities directly, as this could facilitate project implementation.

5.2 Recommendations for Risk Assessment, Information and Understanding

**ACCELERATE IMPROVEMENT OF DATA COLLECTION AND ANALYSIS THROUGH TECHNOLOGICAL ADVANCES AND SUSTAINED INVESTMENT**

As discussed in Sections 3 and 4, respondents noted that data collection for risk assessment and monitoring can and will be improved in the next several years. Improvements in data collection will be driven by technological advancements and creative applications of these tools. With this said, several interviewees asserted that increased investments could accelerate data collection beyond its current trajectory. Other commentators also noted that innovative applications of current tools could improve data collection methods. Some ways to accelerate data collection include collaboration with experts across different disciplines and sectors related to DRR, including finance, sustainability, and nature-based solutions. Improving understanding was one of the most highlighted themes among interviewees and survey respondents.

**DEVELOP METHODOLOGIES AND SOLUTIONS THAT ADDRESS SYSTEMIC IMPACTS, CAPTURE ADDITIONAL BENEFITS, AND INCORPORATE CLIMATE CHANGE IMPACTS**

As noted in Section 3, many commentators noted that risk assessments and resilient solutions need to be more systemic, plan for the long-term, and capture additional benefits. Many commentators posited solutions related to systemic impacts and long-term changes. Fewer provided suggestions regarding how to capture additional benefits, which may indicate the need to improve benefits evaluation methods. Responses suggested two recommendations that could improve benefits capture: collaboration among experts, local stakeholders and vulnerable populations, and incorporating benefits capture into policy or governance. Most comments on technological advancements highlighted that they could enable risk assessments to capture more systemic complexity (see Sections 4.1 and 4.2). The development of new methods, such as stress testing, and improvements in digital technology, like digital twins, could move risk assessments toward more systemic and long-term approaches (see Sections 4.1 and 4.2). Others posited that increased collaboration with expert groups would also improve assessments. These commentators noted that expert collaboration should span technical disciplines (e.g., engineering, mathematics, some natural sciences) as well as social sciences and humanistic disciplines (sociology, economics, etc.). These expert groups should also engage more with local stakeholders and practitioners (see Section 5.5). However, Section 3 noted that these types of risk assessments are costly. In this light,
several commentators recommended that experts devote more time and resources to communicate the benefits risk assessments and to understand more fully the needs of competing agendas that could capture funding. One interviewee suggested that finding a local practitioner or policymaker to serve as a champion for risk assessment could enhance these communication efforts and reduce the burden on experts. Specific recommendations on funding and financing are included in Section 5.4.

**EDUCATE POLICYMAKERS, PRACTITIONERS, AND THE PUBLIC ON DRR AND RESILIENCE CONCEPTS**

Many respondents posited that increased education could enhance understanding of the importance of DRR and resilience. Responses highlighted the public and policymakers as target education groups outside of the engineering community. Improving public education could offer the benefit of increased public buy-in for resilience projects, increase public understanding of disaster risks, and may contribute to a culture of risk awareness and resilience, which is especially important for countries with a voting electorate. One interviewee also noted that an increasingly educated public is key to forming a volunteer corps for emergency response and recovery. Finding a balance will differ across countries based on their political landscape. Several suggestions to increase public awareness and education included dissemination through traditional media outlets like newspapers, television, radio and through public institutions like libraries and museums. As discussed in the previous sections, several commentators noted a general rise in public distrust that could be linked to traditional outlets, posing a challenge for traditional forms of dissemination.

Educating policymakers and practitioners at the national and local levels was also identified as a key priority, since policymakers are often responsible for developing regulations and incentives that encourage the uptake of DRR and resilience principles. In particular, respondents highlighted the importance of enhancing local capacity, as most projects are implemented at the local level. Some respondents noted that formal education systems, like secondary schools and universities, should offer training (or additional training) specifically related to DRR and resilience. Respondents offered other suggestions regarding how experts could interact and educate policymakers, including the integration of indigenous knowledge, which can be found in Section 5.5.

In addition to technical and political capabilities, several respondents with backgrounds in emergency management and public service highlighted the need for improved training and increased frequency of training for emergency response efforts.
5.3 Recommendations for Risk Governance and Management

It is important to note that many commentators, especially interviewees, asserted that public policy generally shapes private action, making public governance and management critical to driving DRR and resilience actions downstream from the private sector. A handful of commentators disagreed, arguing that corporate and capitalist interests shape public policy and governance much more than vice versa. Irrespective of the impact of governance on the private sector, these recommendations emphasize the prominent role of risk governance and management in creating an enabling environment for the development and implementation of DRR and resilience.

Although governments have made some progress to increase capacity for DRR and resilience (see Section 3.D), almost all respondents have noted improvement areas for governments to meet current and future needs. These areas include personnel and technical education and training (see Sections 5.2 and 5.5), improving investment (see Section 5.4), developing frameworks and multi-functional departments, and general improvements to governance structures. Recommendations related to risk governance and management can be focused on two separate categories and do not apply equally to all countries. The first category focuses on actions by governments to improve the uptake of DRR and resilience. Actions most highlighted among respondents include incentivizing development of DRR and resilience projects, increasing the development and implementation of frameworks, and increasing protection for vulnerable populations. The second category focuses on governments’ behaviors to improve DRR and resilience, which includes themes like responsibility, transparency, and leadership. Most of the recommendations in this second category are not unique to enhancing DDR and resilience and benefit governance more broadly.

**Support Implementation of DRR and Resilience Throughout the Project Lifecycle**

Given the general lack of DRR and resilience projects identified in Section 3, several commentators provided recommendations spanning the project lifecycle from pre-development to maintenance and end-of-life. Similar to comments on government capacity, many respondents who provided suggestions on incentives highlighted the importance of public investments, especially in the pre-development through implementation phases, which is further discussed in Section 5.4. Several commentators emphasized the importance of multi-national agencies to assist during the pre-development phase and enhance local capacities during the implementation stages. Other commentators noted the importance of planning and best maintenance practices that could enhance retrofitting and rehabilitation of projects, like critical lifeline infrastructure.

**Develop and Implement Systemic Risk and Resilience Frameworks and Establish Resilience-Focused Agencies and Governing Bodies**

Despite the adoption of DRR frameworks over the past several years (see Section 3.4), commentators still noted significant gaps. The term ‘frameworks’ in this case refers to a system of laws, policies, rulings, codes, plans, or other written mechanisms that encourage or enforce the uptake of DRR and resilience measures. Commentators did not offer specific frameworks that would be most effective, which could be attributed to a lack of specific questions on this topic, the commentators’ professional backgrounds, and the variety of political context represented in the solicitation. Many of these commentators noted that the systemic nature of these frameworks could be improved. At the international level, several respondents cautioned that the development of these frameworks should be standardized to improve collaboration and reduce confusion, which is discussed more in Section 5.5. In addition, a few commentators also suggested that the development of policies could help to foster a culture of resilience among the public (see Section 5.2).
In their words:
“people do not understand the shared responsibility. We need policies, legislation, and incentives to motivate people to change.”

Most respondents who provided input on framework development noted the importance of engagement with experts, see Section 5.4. Improving, and in some cases enforcing, building codes and other building standards was one of the most highlighted recommendations across survey respondents and interviewees, as many indicated that building codes were insufficient to address current or future risks. These recommendations are supported by a robust literature on the importance of building codes to all aspects of the built environment, including critical infrastructure.34 One public sector interviewee suggested that regulatory agencies could enforce resilience initiatives or targets, which is explored in the paragraph below. Irrespective of the development and implementation method used, several commentators underlined the importance of conducting routine updates to these frameworks, given the dynamic nature of threats and solutions.

A few commentators, most of them interviewees, also highlighted a need to build or enhance dedicated agencies for DRR and resilience at all levels of government. The term ‘agency,’ in this case, refers to any government entity with a thematic focus on DRR and resilience and a legal mandate to produce or collect knowledge, provide guidance, or enforce these themes. Increased focus from interviewees probably arose from an increased emphasis on specifying recommendations during interviews. In the words of one interviewee,

“[Civil protection] should be considered on level with streetlights and waste management.”

Several respondents noted the importance of having a governing body dedicated to DRR and resilience, which could help streamline funding, assign responsibility, and promote enforcement. Other suggestions to enhance government capacity include collaborations with experts and expert groups (see Sections 5.5 and 5.2).

The development and enhancement of a government body could help with transparency and enforcement, which is an existing gap in many countries.

**Enhance Protection of Vulnerable and Marginalized Communities Through Implementation of DRR and Resilience**

Several commentators, many of them survey respondents, highlighted the importance of protecting vulnerable populations, given that these populations are likely to experience even higher levels of exposure to hazards and could face disproportionate impacts from disasters (see Section 4.2). The focus from survey respondents compared to interviewees could be attributed to the structure of survey questions, which focused more heavily on vulnerable populations than the interview questions. Most survey responses did not include specific suggestions for good risk governance or management and instead focused on advancing legal and social protections for the vulnerable populations. One survey respondent articulated a need to integrate DRR principles into social sectors more fully. In their words:

“Risk awareness and related resources should be integrated into the policies and practices of service sectors such as welfare, community care, health, and civil affairs networks serving vulnerable populations.”

Increasing direct engagement and collaboration with vulnerable populations was the most cited suggestion among all respondents to increase protection for these groups (see Section 5.5). One interviewee cautioned against an overemphasis on specific populations, however, which could hamstring DRR and resilience projects in their estimation.

**Assign and Clearly Communicate Responsibilities for DRR, and DRM More Broadly**

The retrospective review outlined how mismatched incentives pose a challenge to risk governance and management (see Section 3.4). In response, a few commentators asserted that assigning responsibility to specific public and private actors can help align incentives for preparedness, response, and recovery.
In terms of preparedness and mitigation projects, one interviewee suggested that a single agency take the lead responsibility and assign other groups responsibility for aspects of the project based on their stake. A public agency could enforce this assignment, similar to the U.S. Environmental Protection Agency’s approach for remediating projects in the United States. Other interviewees also noted that assigning responsibility would help during response and recovery efforts, such as outlining who pays following a disaster event. Assigning responsibility also could lead to the private sector assuming more risk, which could be reflected in private behaviors and attitudes. Assigning responsibility also may help to reduce the rise in public distrust, which deserves more attention.

**INCREASE ACCOUNTABILITY AND TRANSPARENCY IN DECISION-MAKING FOR DRR AND RESILIENCE**

In a similar vein as the previous section, several commentators highlighted the need to improve transparency in governance, which could improve understanding and accountability. As one interviewee observed:

> “government agencies are overwhelmed by the severity and complexity of acknowledging those risks, and they're very worried about the economic health of their communities, they're worried about flight by people who have economic means [...] These are very real barriers that inhibit a transparent and open discussion and planning around threats.”

A survey respondent concurred, noting a need for more courageous governance.

Several interviewees suggested that some governments were approaching a crisis point related to DRR and resilience. In their analysis, governments needed to be transparent on the limits of their commitment to DRR and resilience in order to clarify public expectations. As one interviewee claimed:

> “governments should either implement [DRR initiatives] at the appropriate levels [of resilience] for all parties or should publicly acknowledge why they cannot do so. For example, that they will never be able to fully draw down on risks due to the root of these risks, such as lack of attention to marginalized communities, greed, corruption, etc.”.

Foster support from leadership across all levels, including local communities. Several commentators emphasized the importance of securing approval and support from leadership as crucial to the development and implementation of DRR and resilience projects. In the words of one interviewee:

> “consistency of visionary leadership is so important, and you see this being successful in the improvement of Singapore’s living conditions over the last 100 years.”

Los Angeles and New York City were also highlighted as examples of successful resilience and DRR implementation through leadership. A few respondents asserted that the government should lead the initiative to integrate resilience thinking across all sectors, since the private sector will follow out of mandate or other incentive. Three respondents noted that buy-in from leadership, including leadership from marginalized communities, could assist with communicating DRR and resilience, or a particular solution, to the public and to other policymakers, as these groups could be more receptive to this information from leaders.
5.4 Recommendations for Investment in Risk Reduction and Resilience

Although this section received fewer specific recommendations, which could be due to the backgrounds of the respondents or the questions, many respondents highlighted the importance of investment as a driver for DRR and resilience activities. Like the retrospective review on investment, the term ‘investment’ includes financing and funding.

**INCREASE PUBLIC INVESTMENT IN ASSESSMENT, PREPAREDNESS, RESPONSE, AND RECOVERY CAPABILITIES**

Concurrent with the need to improve other areas of governance, several interviewees also noted the necessity of additional investment to improve capacity related to risk assessment, preparedness, response, and recovery efforts. No clear trends emerged across the survey or interview responses, and suggestions included the development of emergency funds, education for students, local government capabilities, the development and implementation of frameworks (as discussed in Section 5.3), and climate adaptation strategies. Critical infrastructure was the only theme highlighted across multiple respondents. The range of comments could be due to the variety of participant’s areas of interest within DRR and resilience. The range of comments also suggests that the range of DRR and resilience activities in need of funding is extensive.

Many commentators did not specify the source for this investment (public sector, private sector, etc.). Commentators who specified a general source expected or noted that the funds would likely come from the public sector. Nonetheless, several comments indicated concerns regarding an ability to increase public investment, given competing objectives, existing governance issues (see Section 3.4), or the feedback loop between requiring data to secure investment and requiring investment to gather data (see Section 3.3).
DEVELOP MECHANISMS TO MOBILIZE PRIVATE INVESTMENT IN RESILIENCE-BUILDING PROJECTS

Respondents were divided on the utility of engaging the private sector and unlocking private sector investment, with most respondents noting that increased engagement with the private sector could be possible and beneficial. In the words of one interviewee:

“big national governments need to provide incentives so companies can use profits to do good.”

Only a few respondents provided specific examples on how to incentivize the private sector, which may be due to the lack of specific questions in the survey and the interviews on this topic. For instance, several interviewees asserted that government should encourage private firms to adopt best practices into their business operations and portfolios but did not specify which best practices would offer the most utility. One interviewee offered government subsidies as an example of how to incentivize the private sector.

Most comments focused on the role of encouraging private firms to examine the long-term impacts of their investments, which is addressed in the following subsection. In the words of one survey respondent:

“many times, demonstrating that these measures are less expensive than an emergency response scenario can help their implementation.”

Several respondents expressed more skepticism that the current incentive structure of the private sector could be properly leveraged to develop and implement DRR and resilience initiatives. According to one interviewee:

“the developed world (industrialized economies) needs to find alternative paths to industrialization to produce wealth.”

PRIORITIZE INVESTMENTS TO FOCUS ON SYSTEMIC, LONG-TERM IMPACTS

Similar to the solutions proposed for risk assessments and understanding (see Section 5.B), many commentators noted that investments needed to focus more on systemic, long-term impacts. Several respondents noted that investments can incorporate systemic aspects by producing better risk assessments and solutions and by understanding and focusing their strategy on long-term impacts. According to some of the respondents, this would help to prioritize investments. In this vein, a former public official and expert focused on infrastructure investments claimed that:

“the best thing to do would be to understand that this cannot be done overnight and change our budgets and policies to reflect this understanding. Infrastructure systems have long lifecycles. Instead of ripping up current systems, which would be prohibitively expensive and take a long time to complete, prioritizing and retrofitting or developing resilience measures gradually is the most cost-effective strategy in the long run.”

Several respondents emphasized the importance of investing in systemic risk assessments and solutions, given their importance in generating more effective investment. To encourage the development of risk assessments, one respondent noted that investment needed to be channeled into more experimental projects. According to them, investment in research (grants, etc.) encourages low risk/standard projects, rather than higher risk and higher impact projects, which are more likely to deliver systemic and long-term results.
5.5 Recommendations for Collaboration, Partnership and Cooperation

Collaboration, partnership, and cooperation was one of most cited recommendations by respondents, which seems to underscore the importance that the engineering community places on this topic. The focus on expert collaboration, in particular, may be attributed to the fact that many of these commentators are experts. Comments were organized into four thematic subsections below.

**PROMOTE A COMMON UNDERSTANDING FOR DRR AND RESILIENCE, AND ENCOURAGE GOVERNMENT-TO-GOVERNMENT KNOWLEDGE TRANSFER**

In light of varying levels of capacity, capability, governance, and other key inputs for DRR and resilience at the national level, several respondents emphasized the importance of sharing best practices among governments. In their estimation, government knowledge sharing would help other governments avoid developing capacity and capabilities from scratch. The other benefit of government-to-government knowledge transfer would be the promulgation and implementation of a standard international framework, which some interviewees noted was needed (also see the Section 4.1). One interviewee stated:

"we lack a global approach in disaster risk reduction. Governments need to sit together to sort this out together."

Another interviewee concurred by stating that:

"there should be a common framework and way to talk about disasters."

These interviewees’ desire for a common international framework could seem interesting given that the SF seeks to serve as a standard international framework for DRR. The need for standards has received increased attention from all sectors of DRR and resilience, including infrastructure.36

**ENCOURAGE MULTI-DISCIPLINARY CROSS-SECTOR COLLABORATION AMONG EXPERTS TO TACKLE COMPLEX CHALLENGES**

Most respondents observed that the nature of DRR and resilience, coupled with emerging threats like climate change, require extensive collaboration among expert groups to develop better assessments. Increased collaboration could also help channel resources into developing fewer, more comprehensive assessments, as a few respondents noted that the explosion and variety of risk assessments may be overwhelming and confusing for practitioners. Some interviewees also noted that collaboration with experts across related sectors, such as sustainability and nature-based solutions, could reduce the potential for competition among these sectors. Most commentators who provided specific suggestions for expert collaborations highlighted the importance of think tanks, societies, and advisory groups. In one interviewee’s estimation, UNDRR could encourage more expert collaboration by convening more groups of experts from diverse backgrounds for studies and projects, similar to UNDRR’s approach during the inception of the SF. In addition, several respondents noted the importance of developing expert engagement to expand the focus of these groups from risk assessments and built-environment solutions only. In these respondents’ opinions, experts should be engaged in developing strategy and policy, which is the focus of the following subsection.

**SEEK INPUT FROM A DIVERSE GROUP OF TECHNICAL EXPERTS IN THE DEVELOPMENT OF POLICIES AND PROJECTS, INCLUDING FROM THE ENGINEERING COMMUNITY**

As discussed in Section 5.2, enhancing capacity of practitioners was one of the most highlighted suggestions. Several respondents who provided concrete suggestions to increase collaboration with practitioners noted that project development and execution presented opportunities for collaboration. Several responses highlighted the importance with building local capacity, as local practitioners are often responsible for project implementation, operations,
and maintenance. A few interviewees highlighted the importance of working to improve the capacity of under-resourced areas, given the obstacles that these areas can face to apply for a grant or technical assistance, let alone implement and maintain a project. Technical assistance was identified as an opportunity for engagement. According to these comments, identifying and building capacity in these areas is likely to remain a significant challenge to 2030 and beyond, but crucial to the implementation of DRR and resilience projects globally.

Several commentators also highlighted the need for experts to engage more with policymakers. The need for the engineering community to engage more proactively and provide input into policy development and early-stage project development came across as a strong point of feedback from the consultation (see Section 3.6). Commentators offered several more specific options for collaborations with policymakers than with practitioners. Interviewees who collaborated with government extensively over their careers advocated that policymakers adopt advisory panels or advisors for DRR and resilience. The inclusion of advisors would help reduce the technical demands on the policymakers, while increasing the influence of technically-driven DRR and resilience measures in policy, which is important to incentivize investment and create an enabling environment for DRR and resilience.

ENGAGE WITH AND LEARN FROM LOCAL COMMUNITIES AND INTEGRATE LOCAL KNOWLEDGE IN DRR AND RESILIENCE INTERVENTIONS

Several respondents noted that local knowledge needed to be integrated more fully into DRR and resilience practices. A few noted that incorporating local and vulnerable populations into these practices would help with preparedness, response, and ‘Build Back Better’ initiatives.37 One interviewee provided a preparedness example:

"Kuala Lumpur traditionally had homes and buildings built on stilts, which survive frequent flooding. However, now many of the homes are built on the ground and they do not survive the flooding. Traditional construction methods like these, if properly researched and following appropriate code of practice standards, are successful in terms of resilience."

As discussed in Section 5.3, several respondents suggested that incorporating local and vulnerable populations would increase buy in.
ENDNOTES


5. UNDRR, “Disaster Risk Reduction: Definition.”


