



Secure Tomorrow Series

Cross-Impacts Session

Facilitator Guide

Publication: June 2024
Cybersecurity and Infrastructure Security Agency

CROSS-IMPACTS SESSION FACILITATOR GUIDE

Secure Tomorrow Series

Non-federal facilitators: The Cybersecurity and Infrastructure Security Agency (CISA) has provided this toolkit as a starting point for your organization to address these critical issues. Please feel free to expand upon or adapt these exercises and tools to your needs. Please consult with your organization to consider what language or actions you will need to take in hosting a session.

GOAL

This activity allows participants to explore, in a structured way, emerging and evolving risks and risk mitigation strategies pertaining to the topics of advanced manufacturing, information and communications technology (ICT) supply chain resilience, and water availability. Participants will focus their attention on six intersections of (1) drivers of change and (2) National Critical Functions (NCFs).¹

Participants will come away with a better understanding of the ramifications of these drivers of change for different NCFs.

KEY OUTPUTS

- A list of plausible risks, organized around NCFs, pertaining to advanced manufacturing, ICT supply chain resilience, or water availability.
- A corresponding set of risk mitigation strategies that would increase security and resilience of critical infrastructure and critical systems supporting these NCFs.

RECOMMENDED PARTICIPANTS

[Please note: This activity requires between 8 and 12 participants. Invitations to participate should focus on individuals at the mid- to senior career level who are interested in exploring longer-term risks to critical infrastructure to enable effective risk management. In particular, individuals with interest and expertise in the three topics and individuals who are already familiar with strategic foresight are encouraged to participate. Please review the read-ahead for your topic of interest to better understand the associated drivers of change and NCFs that the session will potentially cover and use this knowledge to choose participants.]

¹ NCFs are those functions of government and the private sector so vital to the U.S. that their disruption, corruption, or dysfunction would have a debilitating effect on security, national economic security, national public health or safety, or any combination thereof.

[Once known, this section of the guide would list the participants, their titles, and the agencies/organizations they represent.]

FORMAT

This activity is designed for a period of four hours. The remainder of this facilitation guide is built around a virtual execution of the activity.²

SUPPORT STAFF

- Facilitator
- Documentation lead

SUPPORT MATERIALS

- Read-aheads outlining the drivers of change and NCFs for each of the cross-impacts session topics are available
- One-page primers on each topic
- Virtual meeting platform
- Web-based platform that provides a virtual whiteboard (to construct the matrix of drivers of change and NCFs) and allows for real-time voting of intersection points

PREPARATION

The facilitator should become familiar with the specific topic (of the three) that is being explored and should also review the facilitation talking points included in this guide. The facilitator should also review the list of participants and familiarize themselves with the background and affiliation of each participant. Depending on the participants and topic, the facilitator and session sponsor should also determine whether sending the one-page primer about the topic as an additional read-ahead is necessary. Participants should receive the read-ahead(s) at least one week before the session.

For virtual executions, the facilitator should be comfortable using the virtual platforms involved. Matrix displays (see the appendices) should be generated ahead of time, and the associated website link to access the display should be included with each participant's invitation.

² Please note: This activity can easily be converted for an in-person event. Participants would simply conduct the activities outlined in this guide on a white board or large wall, using sticky notes to display their ideas. For more details, please contact SecureTomorrowSeries@cisa.dhs.gov.

AGENDA (SAMPLE)

| | |
|----------------|--|
| 1–1:15 p.m. | Introductory remarks (welcome, participant introductions, objectives, and agenda) |
| 1:15–1:30 p.m. | Choose intersection points for discussion* |
| 1:30–3 p.m. | Discuss intersection points 1–3 (emerging risks, evolving risks, and risk mitigation strategies) |
| 3–3:15 p.m. | Break |
| 3:15–4:45 p.m. | Discuss intersection points 4–6 (emerging risks, evolving risks, and risk mitigation strategies) |
| 4:45–5 p.m. | Final thoughts and wrap-up |

* Depending on the topic and participants, the facilitator may want to precede this activity with an overview discussion about the topic, leveraging the topic subject matter experts who are participating. Facilitators should adjust the agenda accordingly.

GENERAL INSTRUCTIONS

- **Foster and maintain a collaborative, respectful atmosphere.** Encourage different observations, opinions, and perspectives. The discussions will explore a variety of policies, actions, and issues, and participants will likely display different degrees of expertise on a particular discussion topic. These discussions are a no-fault, not-for-attribution exercise that focuses on the identification, analysis, and generation of possible threats, uncertainties, and risk-management strategies for upcoming issues of concern.
- **Encourage participants to speak from their perspective.** Particular stakeholder groups may have prominent strategic needs. We can use a participant's unique perspective as a starting point for broadening the discussion to how it might apply to other stakeholder groups. If a participant is speaking from the perspective of a particular stakeholder group, remember to ask other stakeholder groups how this might also apply to their group.
- **Focus on critical infrastructure security and resilience.** Focus participants on linking whatever needs/issues are being discussed to a risk for critical infrastructure security and resilience. They can be indirectly connected and can certainly prompt a discussion about any complexities and tradeoffs involved, but we always want to come back to critical infrastructure security and resilience. In other words, as the group is identifying emerging or evolving threats, also have them elaborate on the connection to critical infrastructure, if it is not obvious.

ACTIVITY SESSIONS

- I. **INTRODUCTORY REMARKS (1–1:15 p.m.):** After welcoming participants and facilitating participant introductions, the facilitator will introduce the topic and objectives, as well as outline the agenda.

| | |
|-----------------------------------|---|
| Breakdown | <ol style="list-style-type: none"> 1. Welcome 2. Participant introductions 3. Review of objectives, topic of interest, and desired outputs 4. Agenda |
| Facilitator Talking Points | <ul style="list-style-type: none"> ▪ Suggest that participants keep their cameras on to make it easier to engage and have more free-flowing discussions. ▪ Determine ahead of time with the session sponsor whether participants will receive a copy of the notes from the session. If so, inform participants so they can focus on the discussion (versus taking notes). ▪ Provide background information on the specific topic of interest (see appendices for topic descriptions). Depending on the topic and participants, the facilitator may want to have a more expansive discussion about the topic (key concepts, current trends), leveraging the topic’s subject matter experts who are participating. |

- II. **CHOOSING INTERSECTION POINTS (1:15–1:30 p.m.):** The facilitator will display the topic matrix for the topic of discussion (Appendix A, B, or C) and give a brief tutorial on how to use the virtual platform to vote on priority intersection points in the matrix, which will serve as the main discussion points for the session. It is recommended that this take the form of virtual “dot” voting, assigning a set of five dots of the same color to each participant, which are used to indicate preferred intersection points on the virtual whiteboard. Participants will have up to three minutes to vote for the five intersection points they would like to discuss. The facilitator should work with the session sponsor ahead of time to determine the criterion for voting. Suggested options for the criterion include the following:

- Intersection points with the greatest impact;
- Intersection points that are the least understood; and
- Intersection points that represent areas of which participants have the most knowledge.

The facilitator will then review the virtual whiteboard and choose the six most popular intersection points for discussion in the next session.³ Given the potential for overlapping concerns across multiple NCFs and/or drivers of change, the facilitator should use their discretion to determine whether to combine two or more intersection points to discuss at the same time.

³ Alternatively, if the sponsor desires, the facilitator can arrange the selection process such that each selected intersection point addresses a different driver of change. To accomplish this, the facilitator may need to limit each participant to vote for no more than one intersection point in each row of the matrix.

| | |
|-----------------------------------|--|
| Breakdown | <ol style="list-style-type: none"> 1. Define drivers of change and NCFs. 2. Relay instructions for choosing intersection points. 3. Review matrix with participants' selections. 4. Choose six intersection points for further discussion. |
| Facilitator Talking Points | <ul style="list-style-type: none"> ▪ The facilitator should be prepared to help participants come to a common understanding of each of the drivers and NCFs listed in the matrix rows and columns. ▪ The facilitator should have some latitude in steering the group's selection of the six intersection points for discussion (e.g., helping break ties, encouraging broad coverage of multiple NCFs or drivers of change). |

III. **DISCUSSION OF EMERGING AND EVOLVING RISKS AND MITIGATION STRATEGIES** (1:30–4:45 p.m., with a 15-minute break at 3 p.m.): The facilitator will facilitate a group discussion around each of the six chosen intersection points focused on emerging risks, evolving risks, and risk mitigation strategies.

| | |
|-----------------------------------|--|
| Breakdown | <p>For each intersection point, facilitate discussion to expound upon risks and risk mitigation strategies (roughly 30 minutes for each intersection point). A discussion of uncertainties and ramifications related to the intersection point may help drive that discussion. During the discussion, the facilitator should visually display or highlight the current intersection point to help keep participants on topic. For example, the facilitator can draw a red rectangle around the current intersection point on the virtual whiteboard.</p> |
| Facilitator Talking Points | <ul style="list-style-type: none"> ▪ The goal for the facilitator is to keep the discussion as free-flowing as possible in order to identify a variety of potential risks and mitigation strategies. <ul style="list-style-type: none"> ○ It is okay for participants to disagree. ○ Generating new and different ideas is more important than building consensus. ▪ As an example, let us assume that a majority of participants chose the intersection point 6E for the topic of water availability (the intersection of the column “Supply Water” and the row “Emerging contaminants”; see Appendix C). <ul style="list-style-type: none"> ○ Start with the person(s) who voted for the intersection point to identify a risk that could arise from novel contaminants (e.g., pharmaceutical byproducts, perfluorinated compounds, nanoplastics) that could affect the ability to supply water. ○ Ask that person and others to expand on the risk. Why is it relevant? Why is it important? What are the implications/consequences if the risk is unchecked? ○ Finally, have participants identify plausible mitigation strategies to counter this risk. ○ Then solicit participants to identify another risk. |

| | |
|--|---|
| | <ul style="list-style-type: none"> ○ Continue in this fashion for 30 minutes and then move on to the next intersection point. ▪ Here are some general questions for each risk identified: <ul style="list-style-type: none"> ○ Are there specific implications at the local, state, regional, or federal level? ○ Are there specific implications for one or more critical infrastructure sectors? ○ Are there specific implications for CISA? ○ Are there specific implications for the public? ○ Are there current activities being undertaken to address this risk? ○ Are there best practices to build on? ○ How do you view/understand [insert driver of change]? How might this driver affect other drivers or trends on the matrix? What cascading impacts might occur that would link back to concerns for CI security and resilience? ○ Is there a precedent for or example of the risk mitigation strategy you are proposing? ○ Is the risk changing over time? How has the risk evolved? ▪ Encourage participants to use the platform’s chat function as a means for them to ask follow-up questions to each other, expand on statements made, and provide links to additional information. The chat can also serve as a parking lot for ideas. Facilitators should scan through the chat comments and, as appropriate, introduce comments into the discussion. |
|--|---|

IV. **FINAL THOUGHTS AND WRAP-UP (4:45–5 p.m.):** The facilitator will ask participants to highlight their key takeaways from the risks and risk mitigation strategies that they identified. Additionally, the facilitator will briefly inquire about any NCFs or drivers of change that were not addressed by any of the six intersection points selected.

| | |
|-----------------------------------|--|
| Breakdown | <ol style="list-style-type: none"> 1. Ask participants for key takeaways. 2. Identify and discuss any NCFs or drivers of change not covered. 3. Make note of participant interest in pursuing follow-up activities (e.g., sharing results and attendee contact information, building out top priority areas from the discussion, obtaining input and assistance on unaddressed portions of the matrix chart). |
| Facilitator Talking Points | <ul style="list-style-type: none"> ▪ Some wrap-up questions for participants include the following: <ul style="list-style-type: none"> ○ What were your key takeaways? ○ What was the most surprising or unexpected risk or risk mitigation strategy identified? ○ What was the most enjoyable part of this workshop? The least? Are there any improvements you would suggest? ▪ Look for any driver of change or NCF not chosen by any participant. Is there any reason why this driver or NCF wasn’t selected? |

APPENDIX A: ADVANCED MANUFACTURING

Topic description: The world has seen steady growth in the industrial internet of things, 3D printing, and the power of information and big data analytics in manufacturing. The remainder of this decade will likely see the continued maturation and convergence of these areas, which will introduce a range of vulnerabilities and possible disruptions to critical infrastructure systems. Integrated cyber-physical systems, data-based semi-autonomous networks, and digital manufacturing processes make almost anything in a decentralized manufacturing ecosystem vulnerable to cybersecurity attack or manipulation from malicious actors. Moreover, the expansion of advanced manufacturing processes for biological and medical purposes raises questions about toxicity, the biocompatibility of manufactured parts, and nefarious applications. In addition, supply chain risks and workforce challenges threaten the U.S. outlook on advanced manufacturing.

| Drivers of Change | National Critical Functions | | | | | | |
|-------------------------------|-----------------------------|--------------------------|----------------------|----------------------------------|---|---------------------------------|-----------------------------|
| | 1. Educate and Train | 2. Manufacture Equipment | 3. Produce Chemicals | 4. Protect Sensitive Information | 5. Provide Information Technology Products and Services | 6. Provide Metals and Materials | 7. Research and Development |
| A. Bioengineering | | | | | | | |
| B. Capability access | | | | | | | |
| C. Cybersecurity | | | | | | | |
| D. Heterogeneity ¹ | | | | | | | |
| E. Insufficient governance | | | | | | | |
| F. Sustainability | | | | | | | |
| G. Workforce disruption | | | | | | | |

¹Advanced manufacturing requires exchanging data across multiple systems (e.g., machines, sensors, human interface devices) from different vendors, which is often referred to as *heterogeneity*.

APPENDIX B: ICT SUPPLY CHAIN RESILIENCE

Topic description: Managing risk in the information and communications technology (ICT) supply chain is an evolving challenge that spans multi-billion-dollar black markets, geopolitical tensions, and rapid technological change. Present-day risks, such as counterfeit components and the diminished role of western governments in international standards-setting bodies, are likely to grow in both significance and complexity this decade. Evolving future challenges such as the rollout of 5G, the proliferation of artificial intelligence-enabled cyber weapons, and the increasing instability in domestic energy infrastructure will each add new layers of complexity to ICT supply chain risk management. These challenges will lead to numerous security, economic, and political consequences that will necessitate stronger governance and visibility, improved information sharing among relevant parties, and better training for those directly involved in the ICT supply chain.

| Drivers of Change | National Critical Functions | | | | | | |
|---|-----------------------------|---|----------------------------------|---|--|--|---|
| | 1. Operate Core Network | 2. Perform Cyber Incident Management Capabilities | 3. Protect Sensitive Information | 4. Provide Information Technology Products and Services | 5. Provide Internet-based Content, Information, and Communication Services | 6. Provide Internet Routing, Access, and Connection Services | 7. Provide Wireless Access Network Services |
| A. Artificial intelligence | | | | | | | |
| B. Edge computing and software-defined networks | | | | | | | |
| C. Extent of globalization | | | | | | | |
| D. Growing energy demands | | | | | | | |
| E. Internet standards | | | | | | | |
| F. Third-party testing | | | | | | | |

APPENDIX C: WATER AVAILABILITY

Topic description: Water of sufficient quantity and quality is essential for human health, economic productivity, and the operation of critical infrastructure. Major climatic, demographic, economic, and policy pressures on water resources will increase the risks of water shortages and rising water prices in the near term. In the long term, these pressures potentially will alter agricultural growing areas, damage ecosystems, disrupt water transportation routes, generate acute health crises, increase inequities in water access, and contribute to failures of water and wastewater infrastructure. The interconnected nature of water with food and energy ensures that disruptions in water availability will lead to a wide range of cascading effects throughout critical infrastructure sectors.

| Drivers of Change | National Critical Functions | | | | | | | |
|---|--|-------------------------|---------------------------|----------------------|---|-----------------|-----------------------------|---|
| | 1. Exploration and Extraction of Fuels | 2. Generate Electricity | 3. Maintain Supply Chains | 4. Manage Wastewater | 5. Produce and Provide Agricultural Products and Services | 6. Supply Water | 7. Support Community Health | 8. Transport Cargo and Passengers by Vessel |
| A. Aging infrastructure | | | | | | | | |
| B. Climate change | | | | | | | | |
| C. Competition for water resources | | | | | | | | |
| D. Cybersecurity | | | | | | | | |
| E. Emerging contaminants | | | | | | | | |
| F. Food, energy, water nexus | | | | | | | | |
| G. Groundwater mismanagement and drawdown | | | | | | | | |