

APPENDIX A: GLOSSARY OF KEY TERMS

The terminology below defines the analytical vocabulary used consistently throughout this research. These terms are used with deliberate specificity; their precise meaning supports the report's evaluative judgments and should not be substituted for general usage.

Arctic Sustainment Modes and Lifeline Constraints. The framework used in this research for evaluating maritime, aviation, and overland (ALCAN) sustainment under Arctic disruption conditions. The framework treats each mode as a hierarchy element rather than as an interchangeable substitute: maritime is primary, aviation is critical but capacity-limited, and ALCAN provides constrained redundancy. This terminology is analytically distinct from the "Multi-Modal" framing used by the companion study, which examines human-systems resilience.

Business Critical Infrastructure. Privately operated physical lifeline systems on which Arctic homeland defense depends: fuel infrastructure, food and cold-chain distribution, transportation networks, communications systems, and medical and pharmaceutical supply.

Cascading Failure. A pattern in which the failure of one lifeline system propagates into other systems on which the first depended or which depended on the first. In this research, cascading failure is the primary mechanism through which the dual-theater scenario produces operational impact within the Days 0–14 window. The cascade is documented as transportation → workforce → readiness in its simplest form, with parallel cascades through fuel, communications, food, and medical pathways.

Cold-chain. The temperature-controlled logistics architecture through which pharmaceuticals, vaccines, perishable food, and other temperature-sensitive commodities are transported, stored, and dispensed. In this research, cold-chain failure under simultaneous power, fuel, and communications disruption is documented as non-recoverable within the Days 0–14 window, and pharmaceutical cold-chain pre-positioning is identified as a near-term mitigation priority.

Consent-dependent redundancy. A transit, supply, or sustainment pathway whose operational availability depends on the regulatory consent of a third state whose interests under disruption are not aligned with U.S. sustainment requirements. This research distinguishes consent-dependent redundancy from constrained but U.S.- or partner-controlled redundancy on the analytical grounds that consent-dependent redundancy can be eliminated at the moment of greatest need without any change in physical conditions. The Northern Sea Route under UNCLOS Article 234 is the canonical Arctic example.

Contested logistics. The doctrinal frame established in joint operations literature recognizing that adversaries can interdict, degrade, or contest the logistical pathways on which U.S. operations depend. In this research, contested logistics is treated as the operational condition under which the dual-theater scenario unfolds, distinguishing this analysis from benign-environment sustainment modeling.

Cook Inlet natural gas depletion. The projected exhaustion of Cook Inlet natural gas reserves on a 2030 trajectory, threatening the natural-gas-fired electricity generation serving Joint Base Elmendorf-Richardson, Anchorage, and the Railbelt. In this research, Cook Inlet depletion is treated as a structural condition that compounds maritime fuel-import dependency under any disruption scenario.

Days 0–14 Decision Window. The primary analytical focus of this research, encompassing the early phase of the dual-theater disruption scenario during which inventory buffers degrade, cascading failure initiates, and pre-staged coordination architecture either activates or does not. Time-to-failure thresholds across lifeline sectors are evaluated against this window throughout the analysis.

Defense Critical Infrastructure (DCI). Per National Security Memorandum 22, DoD and non-DoD networked assets and facilities essential to project, support, and sustain military forces and operations worldwide. Non-DoD owned DCI consists of assets from relevant critical infrastructure sectors and subsectors, including as defined by statute. In this research, the DCI frame establishes that mission assurance depends on civilian infrastructure that the Department of Defense does not own or control.

Defense Production Act (DPA). Statutory authority enabling federal allocation and prioritization of scarce industrial output, raw materials, and other resources under conditions of national defense necessity. In this research, DPA authorities are identified as the regulatory mechanism through which adjudicated allocations can be implemented during the Days 0–14 window if pre-staged adjudication protocols exist.

Dual-Theater Scenario. The bounded planning stress test that grounds this research: an adversary-induced degradation of West Coast maritime gateway operations (Days 0–14) concurrent with an Arctic escalation requiring rapid northern mobilization (Days 10–45). The scenario is a stress test, not a prediction, and is constructed to surface dependency, redundancy, and coordination conditions that benign-planning scenarios mask.

Dual-use infrastructure. Infrastructure whose operations serve both civilian and military requirements. In Alaska, the principal example is the Port of Alaska, which simultaneously sustains Anchorage civilian demand and Joint Base Elmendorf-Richardson defense operations. Dual-use infrastructure produces operational efficiency under normal conditions and concentrated risk under disruption.

Fantasy document. A planning document whose contents describe a coordination architecture, redundancy pathway, or operational capacity that does not perform under the conditions it purports to address. In this research, the term is used as a rhetorical anchor for exposing gaps between governance frameworks and actual operational capacity, distinct from documents that describe what should be done but cannot be done within the relevant window.

Force degrader. A condition that reduces the operational effectiveness of military forces, distinguished from force multiplier (which increases effectiveness). In this research, communications degradation, workforce attrition driven by household-level disruption, and pharmaceutical cold-chain failure are each identified as force-degrader conditions whose accumulation produces mission impact below the threshold of overt force-on-force interaction.

Inflection point. A specific moment within the disruption timeline at which the operational situation transitions from one phase to the next, typically because an inventory threshold is crossed, a workforce capacity limit is reached, or an institutional decision pathway is activated or fails to activate. Inflection points are identified throughout the time-phased degradation analysis in this research.

Joint Base Elmendorf-Richardson (JBER). The joint Air Force and Army installation in Anchorage, Alaska, headquarters of the Alaskan Command and 11th Air Force, and the principal defense operations node in Southcentral Alaska. In this research, JBER is treated as analytically inseparable from the surrounding civilian infrastructure, especially the Port of Alaska, the Cook Inlet natural gas system, and Anchorage water and sanitation utilities.

Jones Act. The Merchant Marine Act of 1920, requiring that cargo moved between U.S. ports be carried on vessels built in the United States, owned by U.S. citizens, and crewed by U.S. mariners. In this research, the Jones Act is treated as a structural constraint on maritime substitution capacity during disruption, with the waiver framework identified as the determining variable in whether maritime surge can be activated within the Days 0–14 window.

Just-in-time architecture. The supply chain configuration in which inventory is sized to consumption rather than to contingency, producing efficiency under normal conditions and rapid shortfall under disruption. In this research, Alaska’s commercial supply chain is characterized as a four-day Tacoma-to-shelf just-in-time architecture in which warehouse storage is minimal and stated reserve figures reflect inventory in transit and on shelves rather than in deep storage.

Master Dependency. A foundational system whose disruption simultaneously disables multiple downstream lifelines. Energy is the master dependency in the Arctic operating environment; the dependency chain Fuel → Power → Heat → Water → Communications → Coordination governs all downstream behavior.

Mission assurance. Per DoD Directive 3020.40, a process to ensure that assigned tasks or duties can be performed in accordance with the intended purpose or plan. In this research, mission assurance is treated as the operational outcome that the dependency mapping, risk assessment, and recommendations are constructed to support.

No-Fail Node. A point in the lifeline architecture whose failure produces statewide or installation-wide system collapse with no available substitute within the analytical window. In this research, the Port of Alaska, the Anchorage Water and Wastewater Utility intake, and the Cook Inlet natural gas system are identified as no-fail nodes for Southcentral Alaska and Joint Base Elmendorf-Richardson.

Northern Sea Route (NSR). The maritime transit corridor running along the northern coast of the Russian Federation between the Atlantic and Pacific. In benign-planning literature, the NSR is treated as a potential maritime rerouting option when Pacific gateway access is degraded. In this research, the NSR is treated as consent-dependent redundancy whose availability is determined by Russian assertion of regulatory control under UNCLOS Article 234 rather than by ice conditions or vessel-tracking capacity.

Operation Vittles (Berlin Airlift). The 1948–1949 U.S. and allied operation sustaining West Berlin by air after Soviet ground blockade. In this research, Operation Vittles serves as the historical anchor establishing the upper bound of aviation-only sustainment under conditions of constrained airfield access and weather, against which the feasibility of Arctic airlift substitution for maritime cargo is measured.

Operational Redundancy (or Real Redundancy). Redundancy that has been pre-positioned, exercised, resourced, and demonstrated to deliver required throughput under stress conditions consistent with the dual-theater scenario. Operational redundancy reduces risk during Days 0–14; paper redundancy does not.

Paper Redundancy. A redundancy that exists in planning documents, contracts, or contingency frameworks but does not perform at the volume, speed, or reliability required under disruption conditions. Distinguished from operational redundancy, which performs as documented. The gap between paper and operational redundancy is treated throughout this research as the core analytical concern rather than as an incidental finding.

Pre-event planning and relationship preconditions. The standing requirement identified throughout this research, that the planning, coordination, and relationship-building necessary to manage tribal and rural community impacts during Arctic infrastructure disruption must be established before the disruption occurs. Pre-event planning includes mapping which communities depend on which lifeline segments, identifying the failure thresholds at which humanitarian need exceeds local capacity, and documenting the authorities, logistics pathways, and points of contact required to deliver assistance under degraded conditions. Relationship preconditions include working familiarity between federal, state, military, and tribal entities; clarity on sovereignty, consent, and reciprocity in engagement; and operational trust developed through routine coordination rather than crisis-driven contact. Neither element can be generated on

demand. Crisis-initiated coordination cannot substitute for pre-existing protocols, and statutory consultation alone does not produce the working relationships that operational response requires. When these preconditions are absent, the foreseeable risks documented in this research, disproportionate community impact, delayed federal response, and competing demands on DoD capacity, materialize as predictable failures rather than as accepted residual risk.

Public-Private Partnership (P3) maturity. The FEMA framework characterizing the developmental stage of public-private coordination architectures across four tiers: Basic, Intermediate, Advanced, and Optimized. In this research, Arctic jurisdictions are documented as operating predominantly at the Basic or low-Intermediate tier, and advancement toward Advanced tier is identified as a mid-term recommendation.

Risk amplifier. A condition or system attribute that increases the severity or speed of cascading impact under disruption, distinct from the proximate cause of disruption itself. In this research, Alaska Native and tribal community vulnerability, cross-border governance gaps, and communications degradation are each identified as risk amplifiers in the dependency and risk-assessment analysis.

Seasonal Asymmetry. The condition in which the operational characteristics of Arctic infrastructure, transportation, communications, and human-systems performance differ substantially between summer and winter, with winter producing the binding constraints on capacity, throughput, and substitution. In this research, seasonal asymmetry is treated as a structural feature of the operating environment rather than as a contingent factor.

Single-Source Dependency. A condition in which one supplier, one node, or one provider is the sole pathway for a critical input. Crowley as the sole source of avgas for Alaska, Charlie's Produce as the sole produce wholesale node, and the Cook Inlet basin as the dominant Railbelt natural gas source are documented single-source dependencies.

Standalone Microgrid. A self-contained electricity generation and distribution system, typically diesel-based with limited renewable integration, that operates without interconnection to a larger transmission grid and without access to the mutual aid agreements available to interconnected utilities. Approximately 150 standalone microgrids serve Alaska communities outside the centralized Railbelt grid, distributed across geographically isolated locations where transmission interconnection is infeasible. Within this research, the standalone microgrid population functions as the analytically operative figure for repair logistics, workforce dependencies, and recovery options under disruption; the contrast with the Railbelt grid (which carries 79 percent of Alaska's electricity through a centralized architecture) frames the fragmented and non-redundant character of Alaska's energy system as a whole.

Substitution-limit modeling. The analytical approach that evaluates contingency alternatives by their operational throughput under realistic constraints rather than by their nameplate capacity. In this research, substitution-limit modeling is applied across maritime, aviation, and overland modes, and consistently establishes that planned substitutes do not perform at the volume, speed, or reliability that benign-planning models assume.

Subsistence Harvest. The traditional fish, wildlife, and wild-plant harvest that sustains rural Alaska communities outside the commercial food distribution system. Wild food harvest in Alaska totals approximately 18,000 tons annually, with replacement value approaching one billion dollars and supporting up to 98 percent participation in some rural communities. Within this research, subsistence harvest functions as a parallel food system whose degradation is independent of, but compounds, commercial food disruption. Both systems are currently under stress: commercial food distribution from the documented just-in-time architecture, and subsistence harvest from documented declines in fish and wildlife populations. The risk-amplifier finding for this research is that disruption affecting both pathways simultaneously produces food security outcomes more severe than either system's fragility alone would indicate.

Throughput vs. Capacity. Capacity describes what a system can accommodate under optimal conditions; throughput describes what a system can actually move under the specific stress conditions of the disruption environment. The existence of capacity is not evidence of sustainment feasibility; throughput, not capacity, is the analytically operative figure throughout this research.

Time-to-failure threshold. The duration after disruption initiation at which a specific lifeline system, inventory buffer, or coordination architecture transitions from constrained to acutely degraded. Thresholds are evaluated by sector in the Risk and Vulnerability Assessment and are treated as directional rather than as decision-grade quantification.

Tribal and Alaska Native communities as risk amplifiers. The framing this research applies to tribal and Alaska Native communities in the context of Arctic critical infrastructure risk. When the maritime, aviation, and overland (ALCAN) sustainment modes that supply Arctic Alaska degrade under disruption, tribal and Alaska Native communities experience disproportionate and accelerated service loss across food, fuel, heating, medical access, and communications. This is not a function of community fragility but of geographic and infrastructural position: rural and remote villages sit at the terminal ends of the longest, thinnest lifeline segments, with the fewest substitutes when an upstream node fails. The resulting shortfalls amplify broader continuity-of-society risk in two ways. First, humanitarian need escalates rapidly and visibly, creating demand for federal and DoD response that competes with mission-assurance priorities. Second, the absence of pre-event planning and pre-established relationships becomes a government liability, the shortfall is foreseeable, the population is identifiable, and the response window is narrow. The risk-amplifier framing is therefore not a characterization of the communities themselves but of the consequences of infrastructure failure reaching populations the federal planning architecture has historically underserved. The

companion study, *Continuity of Society in the North*, examines the inverse case, the operational capabilities these same communities bring to prolonged Arctic disruption and the relationship preconditions that make those capabilities accessible.

UNCLOS Article 234. A provision of the 1982 United Nations Convention on the Law of the Sea authorizing coastal states to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction, and control of marine pollution from vessels in ice-covered areas within the limits of the exclusive economic zone. In this research, Article 234 is treated as the legal instrument through which the Northern Sea Route is converted from a benign-planning redundancy into a consent-dependent pathway whose availability depends on conditions outside U.S. planning authority.

APPENDIX B: REFERENCE LIST

This research integrates government, academic, industry, and practitioner sources to assess community stability, workforce resilience, governance dynamics, civil–military coordination, family readiness, tribal and Alaska Native resilience, behavioral health surge capacity, and infrastructure performance affecting societal continuity and mission assurance under Arctic disruption conditions. Entries are listed alphabetically by author or organization. Italicized short-form citation tags in square brackets, used selectively in this report, key to the entries below.

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APPENDIX C: LIST OF ACRONYMS

The following acronyms appear throughout this report. Entries are grouped by category and listed alphabetically within each group.

Acronym	Full Term
AFN	Alaska Federation of Natives
AGU	American Geophysical Union
AHHA	Alaska Hospital and Healthcare Association
ALCAN	Alaska-Canada Highway
ANCSA	Alaska Native Claims Settlement Act
ASPR	Administration for Strategic Preparedness and Response (HHS)
BSF	Blue Star Families
CHAP	Community Health Aide Program
CISA	Cybersecurity and Infrastructure Security Agency
CNAS	Center for a New American Security
CONUS	Continental United States
CRS	Congressional Research Service
CSIS	Center for Strategic and International Studies
DHS	U.S. Department of Homeland Security
DHS&EM	Alaska Division of Homeland Security and Emergency Management
DoD	U.S. Department of Defense
DoDD 3020.40	DoD Directive 3020.40: Mission Assurance
DOE	U.S. Department of Energy
EOP	Emergency Operations Plan
ESA	European Space Agency
EUCOM	U.S. European Command
FEMA	Federal Emergency Management Agency
FPCON	Force Protection Condition
FRG	Family Readiness Group

FRS	Family Readiness System (Military)
GAO	U.S. Government Accountability Office
HDI	Homeland Defense Institute
HDAS	Homeland Defense Awareness Symposium
IHS	Indian Health Service
INDOPACOM	U.S. Indo-Pacific Command
JBER	Joint Base Elmendorf-Richardson
NATO	North Atlantic Treaty Organization
NAS	National Academies of Sciences, Engineering, and Medicine
NDAA	National Defense Authorization Act
NDS	National Defense Strategy
NMFA	National Military Family Association
NOAA	National Oceanic and Atmospheric Administration
NORAD	North American Aerospace Defense Command
NSR	Northern Sea Route
NSM-22	National Security Memorandum 22 — Critical Infrastructure Security and Resilience (2024)
PSEMA	Private Sector Emergency Management Association
RAND	RAND Corporation
SATCOM	Satellite Communications
SCAN	Supply Chain Analysis Network (FEMA)
SEOC	State Emergency Operations Center
SME	Subject Matter Expert
Title 10	Title 10, U.S. Code — Armed Forces (federal military authority)
UNCLOS	United Nations Convention on the Law of the Sea
USCG	United States Coast Guard
USNORTHCOM	United States Northern Command

APPENDIX D: METHODOLOGY – TECHNICAL REFERENCE

This appendix documents the methodological detail underlying the analytical lines of work described in the Research Foundation section of the body of this report. It is organized as a technical reference for HDI, NORAD, and USNORTHCOM reviewers seeking source-level verification of the analytical record, the methodological precedents on which the engagement design rests, and the protocols governing the strategic conversations and stakeholder engagement components. The full Reference List is documented in the Reference List appendix; this appendix references those entries by short-form citation tag rather than reproducing them. The Stakeholder Input Survey instrument itself, the fifteen items with response options and domain probes, is documented separately in Appendix E.

The research was designed as a three-month engagement under a compressed performance window. The methodological objective was not comprehensive coverage of every human-systems question in Arctic mission assurance; it was the construction of a coherent analytical foundation capable of supporting specific, decision-grade recommendations on the societal, governance, workforce, and tribal variables that shape mission outcomes within the time and resource constraints of the engagement. The research design therefore prioritizes analytical depth over engagement breadth, structured around three coordinated lines of work, literature review, strategic conversations with current and former NORAD and USNORTHCOM leadership, and structured stakeholder engagement, whose convergence carries the evidentiary weight of the findings.

D.1 Literature Inventory by Analytical Strand

The literature review was organized by the six analytical strands the research is structured to address: military family readiness and household stability under prolonged disruption; civilian and contractor workforce dynamics in austere environments; tribal governance and Alaska Native sovereignty frameworks; civil–military coordination under contested conditions; the governance architecture spanning tribal, municipal, state, federal, and military authorities in Alaska; and whole-of-society preparedness culture, including the Finland, Sweden, Estonia, and Latvia exemplars and the Civil Defense–era U.S. record. The sixth comparative strand was added in response to the explicit HDAS Research Focus Area question on national will and preparedness culture exemplars. Each strand is anchored by a small set of authoritative sources, summarized below, and supplemented by domain-specific literature documented in the Reference List.

Military family readiness and household stability strand. Blue Star Families conducts the most comprehensive annual survey of active-duty military family quality of life and sentiment in the United States; its findings on spouse employment, housing affordability, healthcare access, and willingness to recommend military service provide the closest available baseline measure of pre-crisis family strain. [8] The Penn State Military Families Research Institute produces empirically grounded research linking family well-being to

readiness, retention, warfighting capability, and lethality, the most direct evidentiary bridge between household stability and operational performance in the current literature. [39] The DoD Office of People Analytics serves as the Department's primary internal source for behavioral and survey data on retention intentions and the role of family and spousal support in service member decision-making. [54] The 2004 National Military Family Association report on family support during the post-9/11 surge period is included as a historical foundation document; it established the enduring readiness case for family support systems and identified gaps that this research updates for the Arctic disruption context. [35] RAND Corporation studies on military family support, spouse employment, and household readiness round out the empirical base.

Civilian and contractor workforce strand. Source coverage on the Alaska civilian and contractor workforce that sustains installations is drawn from federal labor and demographic records, state workforce assessments, and the contracted-services literature documenting installation dependencies on commercial labor. The workforce strand intersects materially with the lifeline architecture covered in the companion Project 1 study; this research draws on that overlap where civilian and contractor workforce sustainment becomes the human-systems expression of lifeline disruption.

Tribal governance and Alaska Native sovereignty strand. The Alaska Federation of Natives community resilience documentation, the Alaska Native Claims Settlement Act, and the National Academies' *Strengthening Indigenous America* provide the framing that grounds tribal engagement in sovereignty, consent, and reciprocity. These sources establish that tribal participation in mission-assurance research must occur on terms tribal governments determine, and that engagement protocols rather than aggregation defaults govern tribal input. The GAO Alaska Native Issues report and the GAO Alaska Native village threats analysis on infrastructure damage from erosion, flooding, and permafrost degradation supply the documentary record on federal programmatic access barriers and infrastructure exposure that ground the analytical work in this domain. [61]

Civil–military coordination strand. The State of Alaska Emergency Operations Plan establishes the validated state-level coordination architecture into which civil–military governance under disruption must integrate. [47] This document anchors the governance friction mapping in an existing, doctrinally recognized coordination baseline rather than in an idealized framework. Multi-jurisdictional coordination research from the Pacific Northwest applicable directly to Arctic governance, the FEMA Public-Private Partnership maturity framework, and the open-source contested-logistics literature supplement the state-level anchor with the cross-jurisdictional and operational-coordination dimensions. [27]

Governance architecture strand. The governance architecture spanning tribal, municipal, state, federal, and military authorities in Alaska is documented through a combination of state operational and planning documents (the Alaska Supply Chain Analysis: Baseline Report, the State of Alaska Mass Care Group Feeding Support Operations Guide, and Alaska Food Security and Independence Task Force materials), the Arctic Council Emergency Prevention, Preparedness and Response community preparedness assessment, and federal accountability and oversight records from the

Government Accountability Office. The governance architecture strand is where the literature most directly establishes the predictable points of friction between authorities under disruption, as distinct from the blue-sky coordination performance documented in steady-state planning records. [4; 7; 23; 48]

Whole-of-society preparedness culture strand. The comparative literature on Finland, Sweden, Estonia, and Latvia documents the institutional features through which these countries inculcate whole-of-society preparedness, universal civic-defense education, household preparedness expectations, dual-use infrastructure design, and the legal and cultural integration of civilian and military preparedness functions. The U.S. Civil Defense–era record (1950s through 1970s) supplies the domestic historical analog: a period in which household preparedness, community-scale resilience programming, and youth preparedness education functioned as a societal force in absorbing disruption. The strand establishes that the United States has no current equivalent of that preparedness culture, and that the absence is itself a variable in how disruption propagates through the population. [24]

Strategic context anchors. The January 2026 National Defense Strategy and supporting CSIS and CNAS analysis establish the strategic context in which Arctic mission assurance now operates, and the converging recognition that the human dimension of homeland defense is consequential to that mission. [13; 56] DoD Directive 3020.40 (Mission Assurance) and National Security Memorandum 22 establish the institutional grounding for treating non-DoD-owned civilian and community systems as variables in mission assurance scope. [55]

Domain-specific sources supporting the family readiness, workforce, tribal community, civil–military, governance, and preparedness-culture analyses, and the analytical deliverables developed in the body of the report, are documented in the Reference List and are not repeated here.

Given the three-month performance window, literature review carried the analytical weight of the research. It provided the specificity of human-systems failure thresholds, the precision of the governance friction mapping, and the identification of cascading societal risk pathways that are consistent across multiple independent sources. The literature record converges on four conditions that ground the human-systems analysis and shape every deliverable that follows. First, pre-crisis military family strain is empirically documented at levels that establish a fragile baseline well before any Arctic disruption begins, with declining recommendations to serve, financial precarity, and spouse employment friction recorded year over year. Second, the civilian and contractor workforce that sustains Alaska installations is geographically constrained, demographically thin, and dependent on commercial systems that the workforce itself has no authority to protect. Third, governance authority across tribal, municipal, state, federal, and military entities is fragmented in ways that produce friction under disruption rather than under blue-sky conditions, and the friction points are predictable. Fourth, the United States has no current equivalent of the Civil Defense–era preparedness culture that historically functioned as a societal force in absorbing disruption, and that absence is a variable in how disruption propagates through the population.

D.2 Mental-Models Methodological Foundation

The engagement design is methodologically grounded in the mental-models approach to risk research, which proceeds from the principle that decision-relevant risk information is what practitioners and decision-makers actually use to make choices under uncertainty, not what analysts would prefer that they used. The approach treats the gap between expert analytical models and practitioner working models as itself a finding, on the grounds that operational behavior under disruption is governed by the working models, not by the analytical ones. The mental-models approach is the methodological precedent for the survey architecture choice of role-based questions surfacing decision logic, threshold judgments, and substitution limits, rather than open-ended elicitation of practitioner opinion. It is also the precedent for the engagement principle that practitioner-vs-analytical divergences are treated as operationally consequential findings to be carried forward, rather than as practitioner error to be corrected. The mental-models foundation does not require attribution to specific named methodologists in the body of the report; it is documented here for reviewers who want the methodological lineage.[10]

D.3 Cross-Source Validation Patterns

Where individual findings rest on multiple independent sources, the convergence is noted in the body of the report. Particularly consequential examples are documented here as the cross-source validation record for the most analytically significant conclusions.

Pre-crisis military family strain is cross-validated across the Blue Star Families Military Family Lifestyle Survey, the Penn State Military Families Research Institute empirical research, the DoD Office of People Analytics behavioral and survey data, and the National Military Family Association's historical record. The convergent finding across these sources is that family strain on key indicators, declining recommendations to serve, financial precarity, spouse employment friction, housing affordability, and access to healthcare, is documented year over year at baseline levels that precede any Arctic-specific disruption and that establish a fragile starting condition for the dual-theater scenario. [8; 39; 54; 35]

Civilian and contractor workforce fragility is cross-validated across federal labor and demographic records, the 2023 Alaska Supply Chain Analysis Baseline Report, and the contracted-services literature on installation dependencies. [23] The convergent finding is that the workforce sustaining Alaska installations is geographically constrained, demographically thin, and dependent on commercial systems the workforce itself has no authority to protect. This combination produces a workforce-availability cliff that arrives faster than mission-assurance planning frameworks have historically modeled.

Governance friction across tribal, municipal, state, federal, and military authorities is cross-validated across the State of Alaska Emergency Operations Plan, the multi-jurisdictional coordination research from the Pacific Northwest, the Arctic Council EPPR community preparedness assessment, and the FEMA Public-Private Partnership maturity framework. The convergent finding is that authority is fragmented in ways that produce friction under disruption rather than under blue-sky conditions, that the friction points are predictable, and that the Day 3 to Day 7 governance inflection point is the period in which planning architecture is most consequential and least prepared. [27; 47]

The Civil Defense–era preparedness culture gap is cross-validated across the comparative literature on Finland, Sweden, Estonia, and Latvia and the U.S. historical record of household preparedness, community-scale resilience programming, and youth preparedness education from the 1950s through the 1970s. The convergent finding is that the United States has no current equivalent of that preparedness culture, and that the absence is a structural variable in how disruption propagates through the population rather than a cultural observation incidental to mission assurance. [24]

Tribal community vulnerability to compound disruption is cross-validated across the GAO Alaska Native village threats analysis on infrastructure damage from erosion, flooding, and permafrost degradation, the GAO Alaska Native Issues report on federal programmatic access barriers, the Behe and related Indigenous voices climate-adaptation literature, and the Alaska Federation of Natives community resilience documentation. The convergent finding is that compound vulnerability conditions are documented in the federal record, that functional coordination capacity between non-tribal institutions and tribal governments depends on pre-existing relationships that cannot be improvised under disruption conditions, and that statutory consultation mechanisms do not substitute for substantive operational engagement built over time. [61]

D.4 Strategic Conversations Protocol

Strategic conversations with current and former NORAD and USNORTHCOM leadership were conducted across the performance window. The conversations were not structured interviews and did not follow a fixed question set; they were operationally framed exchanges designed to validate analytical scope, surface mission-assurance equities, and confirm the relevance of the human-systems variables under examination to the planning concerns of the command.

Conversations were operationally framed rather than topic-survey framed. Each conversation opened with the dual-theater disruption scenario and the analytical premise that human-systems variables, military families, civilian and contractor workforce, tribal communities, and civil–military governance architecture, are operational variables in mission assurance rather than welfare considerations. The framing established the analytical context for the exchange and elicited validation, qualification, or correction of the framing itself.

Conversations were conducted under non-attribution protocols consistent with the broader research methodology. They did not request operational, classified, or installation-specific information. Where classified context would have refined a specific finding, the conversation noted the boundary, and the research record identifies the appropriate follow-on framework rather than attempting to substitute for the classified analysis. Conversations were not structured to produce uniform input: each leader brought distinct equities, operational, planning, force-development, regional, mission-assurance, and the conversations were calibrated to elicit the variables most consequential to the leader's domain. The synthesis treats the convergence of independent emphasis across leaders with different equities as the principal indicator of analytical robustness.

The conversations are not treated in this report as primary data; they are treated as analytical-scope validation. Findings, recommendations, and analytical claims throughout the report rest on the literature record and the structured stakeholder engagement, not on conversation content. This separation is deliberate and protects both the candor of the conversations and the analytical integrity of the report.

Three operational outcomes are reflected in the analytical framing of the deliverables that follow. First, the dual-theater disruption scenario, West Coast port degradation across Days 0–14 concurrent with Arctic escalation across Days 10–45, was validated as operationally relevant rather than as a worst-case theoretical construction. Second, the human-systems gaps under examination were confirmed as recognized at the command level: military family readiness, civilian and contractor workforce sustainment, and civil–military governance friction were each independently identified as research areas consequential for mission-assurance planning. Third, the Days 0–14 analytical window was confirmed as the operationally consequential horizon, with the Day 3 to Day 7 governance inflection point emerging from the conversations as the period in which planning architecture is most consequential and least prepared.

D.5 Stakeholder Engagement Instrument and Distribution

Structured stakeholder engagement was conducted primarily through a SurveyMonkey-distributed Stakeholder Input Survey, supplemented by a small number of informal, non-attributed conversations with select members of the PSEMA network. The Stakeholder Input Survey served as the principal instrument and consisted of fifteen items combining closed-ended ranking, multi-select, and open-ended response formats.

The survey used a core question architecture calibrated to the dual-theater disruption scenario and oriented toward four analytical objectives: surfacing governance friction across tribal, municipal, state, federal, and military authorities; identifying family and workforce sustainment thresholds at which household-level decisions begin to affect installation and mission readiness; mapping civil–military coordination gaps in the Days 0–14 window; and identifying the early-phase decision points at which authority structures are most likely to strain. The items were organized around six analytical emphasis areas, Failure Pathways, Throughput and Capacity Constraints, Resource Competition and Prioritization, Time Sensitivity, Substitution and Operational Reality, and Governance and Authority Gaps, with each emphasis area tied to a canonical home section in the body of the report for cross-reference. The full survey instrument, the six analytical emphasis areas, and the core question set are documented in Appendix E.

The question architecture applied to the structured engagement is grounded in a mental-models framework drawn from the multi-jurisdictional coordination literature. The premise: operators within a single domain tend to hold accurate mental models of their own system's vulnerabilities while holding incomplete or inaccurate models of the dependencies that link their system to adjacent ones. This is not a knowledge deficit in the ordinary sense; it is a structural feature of domain-specific expertise. The methodological implication is that engagement designed to elicit domain-specific perspectives in isolation will reproduce the same mental-model gaps that produce

coordination failure under disruption. Engagement designed to surface the cross-domain seams, the points at which one domain's assumptions about an adjacent domain's behavior under disruption diverge from the adjacent domain's own description of its behavior, produces operationally consequential findings that domain-specific engagement does not. The six analytical emphasis areas are calibrated to surface these cross-domain seams.

Distribution proceeded through PSEMA's network and through targeted outreach to sectors identified in the engagement plan, including the lifeline sectors examined in this research, the family readiness and behavioral health organizations relevant to the human-systems analysis, the emergency management and continuity practitioners engaged through the PSEMA network, and selected state, local, and federal coordination contacts identified through prior PSEMA engagements. The contact list is not a representative sample of the relevant sector populations; it is a purposive sample drawn from the PSEMA engagement architecture and supplemented by referral within that network.

The engagement window was reopened with an extended response deadline of April 30, 2026, to encourage adequate sector representation. Response handling was governed by the non-attribution protocol. Individual responses were not retained in an attributed form; aggregated thematic synthesis is the analytical product the instrument supports. The structured survey instrument produced thematic insights rather than statistically representative response percentages; convergent themes across survey responses, informal conversations, and literature are reported in the body of the report, not calculated response rates. Survey participation was self-selected, and the resulting respondent set is systematically more disposed toward cross-sector coordination than the sector population as a whole. The non-attributed aggregation approach was a precondition for candid engagement and is preserved throughout the analysis.

Where stakeholder input refines or extends literature-derived findings, the integration is documented at the section level rather than presented as a separate evidence stream. Where stakeholder input diverges from literature-derived findings, the divergence is treated as an operationally consequential finding to be carried forward rather than as practitioner error to be reconciled. This is the methodological precedent adopted from the mental-models tradition in risk research, which holds that decision-relevant risk information is what practitioners and decision-makers actually use to make choices under uncertainty, not what analysts would prefer that they used.

Supplemental input was gathered through informal conversations with select PSEMA network members. These exchanges were not conducted as formal structured interviews and were not governed by the survey instrument or its question architecture; they provided contextual validation of assumptions and dependencies surfaced through the survey and literature reviews, with findings reflected in the relevant analytical sections of the report rather than as a standalone block of practitioner data. They are weighted accordingly in the synthesis.

The community-risk dimension of the research design draws methodological precedent from the CRESCENT (Community Resilience Centers for Excellence in Natural and

Technological Hazards) framework for assessing community resilience under compound hazards. The CRESCENT precedent is relevant to this research not as a measurement instrument applied here, the three-month performance window did not permit a CRESCENT-style community-risk survey, but as a methodological anchor for the proposition that community resilience is a measurable, decision-grade variable rather than a soft welfare consideration. [37] The CRESCENT precedent grounds the analytical move of treating military family households, civilian and contractor workforce households, Alaska Native communities, and the general civilian population in Alaska as distinct vulnerability trajectories within the dual-theater scenario, rather than as a single Arctic population. The Community Resilience Index proposed in the Long-Term Recommendations section of the body of the report, measuring household preparedness levels, workforce redundancy, youth readiness participation, analog communications capability, fuel continuity resilience, and community mutual aid participation, is the operational extension of the CRESCENT precedent into the Arctic continuity-of-society context. Multi-year continuity-of-society modeling, identified in the same recommendation set, is the methodological development pathway through which the index moves from analytical proposition to decision-grade parameter.

D.6 Tribal Engagement Protocol

Tribal and Alaska Native organizational engagement is governed by sovereignty, consent, and reciprocity protocols rather than by the default aggregation framework that governs other stakeholder input. Within the engagement window for this research, tribal institutional engagement did not occur at a level sufficient to constitute primary data, and the report does not claim tribal participation it did not have. Tribal engagement is identified as a priority for future research, conducted on terms tribal governments determine, with sufficient time for the institutional relationships and consent architecture that meaningful participation requires. The framing that tribal engagement operates outside the default aggregation framework is itself documented as a methodological commitment of this research, not as a limitation of it.

D.7 Bounded Scope and Acknowledged Limits

The methodology is bounded by time constraints, the data accessible under non-attribution protocols, and the unclassified frame of the work. Four categories of limits warrant explicit acknowledgment and shape the recommendations developed in the final phase of the report.

First, the research does not produce decision-grade quantification of failure thresholds at the precision that command-level investment and pre-positioning decisions ultimately require. The Days 0–14 analytical frame is established with rigor, and the directional findings, that inventory buffers are measured in days, that cascading failure initiates within the first seventy-two hours, and that governance friction compounds degradation, are sound. Translating those directional findings into time-to-failure parameters expressed in hours and days, by commodity, location, and disruption condition, is identified as a follow-on research priority and is the substantive scope of the Multi-Year Continuity-of-Society Modeling recommendation in the long-term tier.

Second, the research operates from publicly available sources supplemented by limited structured stakeholder engagement under non-attribution protocols. Where classified context, proprietary commercial data, or installation-specific operational information would refine specific findings, the report identifies the boundary and recommends the appropriate follow-on framework. The intent is not to claim more than the methodology supports; it is to be transparent about what the methodology does and does not deliver.

Third, the research is engagement-window-bounded, and the stakeholder engagement component is bounded further by response rate, sector coverage, and self-selection within that window. The three-month performance period was sufficient to construct the analytical foundation, validate it against literature and stakeholder input, and identify the most consequential mitigation and recommendation priorities. It was not sufficient to fully operationalize the recommendations, conduct exercise-based validation of paper coordination architectures, or pilot the integrated Arctic logistics testbed concept that the long-term recommendations identify. Within the engagement component specifically, structured stakeholder calls were limited to a small select group, and survey response was concentrated in the operations, continuity, and emergency management end of the lifeline architecture rather than in upstream lifeline operators. Direct fuel and energy operator participation, direct maritime and port operator participation, and direct communications and telecommunications provider participation are below the levels that sector-specific quantitative claims would require. The non-attributed aggregation approach protects respondent confidentiality and was a precondition for candid engagement, but it limits the specificity with which individual findings can be sourced. Engagement findings are therefore treated throughout this report as directional validation of the analytical record and as identification of practitioner-versus-analytical divergences worth carrying forward, not as the basis for sector-specific quantitative claims in under-represented categories.

Fourth, tribal and Alaska Native organizational engagement did not occur within the engagement window, as described in D.6. This is identified as a priority for future research, with the sovereignty, consent, and reciprocity framing that institutional participation on terms tribal governments determine requires.

D.8 Companion-Study Coordination and Analytical Distinctness

This research is conducted under a shared scenario framework with the companion study, *Private-Sector Lifelines in the Arctic: Predicting and Assessing Risk to Critical Infrastructure*, which addresses the lifeline and infrastructure dimensions of the same disruption environment. The two studies are analytically distinct in scope and terminology but mutually reinforcing in conclusion. The shared scenario framework ensures findings are analytically comparable; the analytical distinctness ensures that each study delivers an integrated picture within its own scope without duplicating the other.

Terminology distinctness is maintained as a standing editorial guardrail. This research uses Multi-Modal Resiliency as its primary frame and treats human systems, military families, civilian and contractor workforce, tribal communities, and the civil–military governance architecture, as operational variables in mission assurance. The companion study uses Arctic Sustainment Modes and Lifeline Constraints as its primary terminology

for the four-mode sustainment architecture and the five-layer Arctic dependency framework and treats the paper-redundancy and operational-redundancy distinction as its organizing analytical commitment for substitution-mode feasibility and coordination-architecture maturity. Tribal and Alaska Native engagement in this research is held under sovereignty, consent, and reciprocity framing; the companion study addresses tribal and Alaska Native communities under risk-amplifier framing within its lifeline-architecture scope. Communications degradation is identified as a force degrader (never as a force multiplier) in both studies.

Citation conventions are aligned across the two studies. Inline citations are reserved for direct quotes, specific statistics, and named legal or policy authorities. Cross-source synthesis is stated as analytical finding rather than as source-attributed claim. The Reference List supporting this research is the comprehensive sourcing record for the continuity-of-society analysis; the companion study maintains a separate Reference List under its own analytical scope. Where the two reference lists overlap, the overlap is intentional and reflects the shared scenario framework, not a duplication of analytical scope.

APPENDIX E: STAKEHOLDER ENGAGEMENT DETAIL

This appendix provides the technical detail behind the Stakeholder Engagement section in the body of the report. The body section presents the substantive engagement findings, organized by sector and synthesized across sectors to identify the cross-sector convergences and divergences that carry forward into the Mitigation and Recommendations sections. This appendix documents the engagement instruments, the question architecture, the sector contact and response coverage, the analytical emphasis areas around which the question framework was organized, and the supporting detail that grounds the engagement findings in the body of the report.

Where Appendix A documents the methodological foundation of the research as a whole, this appendix documents the engagement component specifically. Together the two appendices make the research record auditable: a reader who wishes to evaluate the construction of the engagement findings will find the question architecture, the sector coverage, and the response handling protocol consolidated here.

E. 1 Engagement Design and Population

The structured stakeholder engagement component of the research was conducted along two complementary tracks. The principal track was a Stakeholder Input Survey distributed via SurveyMonkey to a contact list drawn from the PSEMA engagement architecture and supplemented by referral within the network. The secondary track was a small number of informal, non-attributed conversations with select PSEMA network members; these conversations provided contextual validation of assumptions and dependencies surfaced through the survey and the literature review. The conversations were not conducted as formal structured interviews.

The engagement population was purposive rather than representative. The contact list spanned the lifeline sectors examined in this research, energy and fuel, transportation and logistics, food and retail distribution, communications and data systems, medical supply and cold chain, warehousing and distribution, and emergency management and coordination entities, along with the family readiness, behavioral health, and community sustainment organizations relevant to the human-systems dimension of the research, and selected state, local, federal, and DoD installation liaison contacts identified through prior PSEMA engagements.

Tribal and Alaska Native organizational engagement under sovereignty, consent, and reciprocity protocols did not occur within the engagement window. Where tribal practitioner perspectives are reflected in the body section, those perspectives are drawn from public-record statements, federal consultation transcripts, and literature-documented practitioner positions rather than from attributed engagement with tribal governments or Alaska Native organizations. This boundary is discussed in detail in Appendix D.6

The April 30, 2026, extended response deadline closed the engagement window for the analysis carried into this report. The instrument and the question architecture are documented here as artifacts of the engagement design; they remain available to support follow-on engagement in subsequent research as identified in the recommendation architecture.

E.2 Stakeholder Input Survey Instrument

The Stakeholder Input Survey consisted of fifteen items combining closed-ended ranking, multi-select, and open-ended response formats. The instrument was designed to surface governance friction, family and workforce sustainment thresholds, civil–military coordination gaps, and the early-phase decision points where authority structures are most likely to strain. Item formats were calibrated to support comparative analysis across respondents and sectors: closed-ended ranking items produced ordinal data for thematic synthesis; multi-select items surfaced the dependencies and chokepoints respondents identified as operationally consequential; and open-ended items captured the practitioner observations through which the cross-sector assumption misalignments documented in the body section became visible.

The instrument was framed by the dual-theater disruption scenario as the operational reference frame. Each respondent answered the same question framework with respect to the same scenario, enabling the comparative analysis across sectors that the cross-sector assumption misalignment findings depend on. Respondents were not asked to volunteer proprietary, sensitive, or competitive data; qualitative thresholds, operational insights, and practitioner judgments were treated as sufficient.

Response handling was governed by the non-attribution protocol described in Appendix D.4. Individual responses are not retained in attributed form; the aggregated thematic synthesis presented in the body section is the analytical product the instrument supports. The structured survey produced thematic insights rather than statistically representative response percentages; convergent themes across survey responses, informal conversations, and literature are reported, not calculated response rates.

E.3 Question Architecture: Six Analytical Emphasis Areas

The structured question framework was organized around six analytical emphasis areas, each calibrated to the dual-theater scenario and each tied to a canonical home subsection in the body of the report. The six areas are designed to surface the cross-sector seams, the points at which one sector's assumptions about an adjacent sector's behavior under disruption diverge from the adjacent sector's own description of its behavior, that produce coordination failure under disruption and that the mental-models foundation in Appendix D.2 identifies as the analytical target of the engagement.

Failure Pathways

Probe lines in this area elicit the failure modes respondents anticipate within their own sector under the dual-theater scenario; the cascading effects respondents anticipate across adjacent sectors; the early-warning indicators respondents would treat as operationally consequential; and the sequence in which failure would propagate from initial disruption to community-visible impact. The Failure Pathways area is tied to the

Cascading Impact Narratives in the Infrastructure and Multi-Modal Sustainment Snapshot and to the Days 0–14 cascade analysis in the body of the report.

Throughput and Capacity Constraints

Probe lines in this area elicit the distinction between nameplate capacity and operational throughput under crew, equipment, weather, and coordination constraints; the conditions under which respondents have observed nominal capacity figures fail to reflect operational reality; and the pre-incident investments that would convert nominal capacity into reliable throughput under disruption. The Throughput and Capacity Constraints area is tied to the Maritime Dependency Dominance, Airlift Limitations, and Overland: ALCAN Constraints subsections of the Infrastructure and Multi-Modal Sustainment Snapshot.

Resource Competition and Prioritization

Probe lines in this area elicit the resources respondents anticipate will be subject to competing civilian and military claims under the dual-theater scenario; the adjudication mechanisms respondents understand to be currently in place; the adjudication mechanisms respondents believe should be in place; and the conditions under which respondents anticipate adjudication will be required to occur under time pressure with degraded information. The Resource Competition and Prioritization area is tied to the Civil–Military Resource Allocation Tensions section and to the Governance Friction Points subsection.

Time Sensitivity

Probe lines in this area elicit the time horizons over which respondents understand failure thresholds in their own sector to operate; the time horizons over which respondents anticipate external assistance and resupply to arrive; the time horizons over which respondents anticipate household and community visibility of disruption; and the relationship between sector time horizons and the Days 0–14 analytical window. The Time Sensitivity area is tied to the Day 3 to Day 7 governance inflection finding and to the food-buffer three-figure reconciliation developed in the body of the report.

Substitution and Operational Reality

Probe lines in this area elicit the substitution pathways respondents understand to be available under disruption — maritime to aviation, aviation to overland, fuel substitution, communications substitution; the operational reality of each pathway under Arctic stress; and the gap between substitution pathways documented in planning frameworks and substitution pathways operationally available. The Substitution and Operational Reality area is tied to the Substitution and Redundancy Reality Check at the Human Systems Layer in the Multi-Modal Resilience Framework and to the paper-versus-real distinction the research applies throughout.

Governance and Authority Gaps

Probe lines in this area elicit the governance authority structures respondents understand to apply to their sector under the dual-theater scenario; the points at which authority is ambiguous, contested, or unallocated; the coordination architectures respondents understand to be currently exercised against the scenario; and the coordination

architectures respondents identify as required but not currently in place. The Governance and Authority Gaps area is tied to the Civil–Military and Governance Mapping section, the Authority Structure: Who Decides What subsection, and the Institutional Coordination as a Risk Amplifier finding.

E.4 Sector Coverage and Engagement Intensity

Engagement was distributed across the analytical domains examined in this research. Substantial inputs concentrated around cascade dynamics, sector interdependency, risk mitigation, and recommendation shaping. The summary below documents the stakeholder categories engaged and the input domains each contributed; the matrix originally presented in the body of the report is reproduced here as the engagement-coverage reference.

Maritime and port operators.

Input domains: cascade dynamics, sector interdependency, risk mitigation, recommendation shaping. Engagement intensity: substantial.

Logistics and third-party logistics providers.

Input domains: cascade dynamics, sector interdependency, risk mitigation. Engagement intensity: substantial.

Energy and fuel distributors.

Input domains: sector interdependency, risk mitigation, recommendation shaping. Engagement intensity: substantial.

Telecommunications and satellite providers.

Input domains: cascade dynamics, risk mitigation. Engagement intensity: substantial.

Healthcare and emergency management organizations.

Input domains: risk mitigation, recommendation shaping. Engagement intensity: substantial.

Tribal and Alaska Native organizations.

Input domains: recommendation shaping (risk amplifier framing). Engagement intensity: moderate to substantial. Direct structured engagement under sovereignty, consent, and reciprocity protocols is identified as a near-term follow-on requirement; engagement intensity reflected here draws on public-record positions, federal consultation transcripts, and literature-documented practitioner perspectives rather than on attributed engagement within this research.

DoD installation liaisons.

Input domains: sector interdependency, workforce and operations. Engagement intensity: substantial.

Cross-border (U.S.–Canadian) entities.

Input domains: cascade dynamics, sector interdependency. Engagement intensity: moderate.

E.5 Cross-Sector Assumption Misalignments: Methodological Note

The most analytically valuable findings from the engagement were the cross-sector assumption misalignments documented in the body of the report, the seams at which operators from adjacent sectors held incompatible beliefs about each other's behavior under disruption. These misalignments are operator-level expressions of the paper-versus-real condition the research applies throughout: assumptions documented on paper across sectors fail to align with the operational capacity those sectors describe under disruption.

Methodologically, the misalignments are tractable only because the question architecture asked the same questions across sectors. Sector-specific engagement designed in isolation would not surface the misalignments; it would reproduce them, with each sector's perspective valid within its own domain and the cross-sector seam invisible to the engagement. The three recurring misalignment categories developed in the body section, downstream operators overestimating upstream resilience, regulatory and waiver pathway assumptions inconsistent across operators, and communications continuity assumptions diverging significantly across sectors, are the principal analytical products the engagement design supports. The Recommendations section of the body of the report converts each into a coupled investment line of effort.

E.6 Engagement Findings Carried Forward: Cross-Reference

Three engagement findings are carried forward into the Mitigation and Recommendations sections in the body of the report. They are restated here as cross-reference for readers working from this appendix:

First, the paper-versus-real condition is confirmed at the operator level across multiple sectors, validating the Substitution and Redundancy Reality Check at the Human Systems Layer developed in the Multi-Modal Resilience Framework as an operationally grounded conclusion rather than a documentary inference.

Second, the master-dependency role of energy is confirmed by operators across sectors, reinforcing the prioritization of fuel and energy resilience as the highest-return Tier 1 investment category developed in the Cost-Benefit Posture.

Third, the absence of pre-established civil–military coordination frameworks is identified by emergency management and lifeline operators as the single most consequential governance gap, validating coordination architecture and FEMA Public-Private Partnership maturity development as the highest-return, lowest-capital-cost mitigation category available within the current planning window.

E.7 Convergence Findings: Detailed Documentation

Three convergence findings emerged from the engagement and are documented in the body of the report. The detail behind each is reproduced here to ground readers working from this appendix in the engagement-level evidence.

Convergence on the Days 0–14 Cascade Pathway.

Across sectors, three operational concerns emerged with unusual consistency: transportation and logistics interruption as the earliest warning sign that infrastructure has begun to degrade; workforce shortages and absenteeism as the binding constraint on whether operations continue; and communications and IT system disruptions as the third recurring concern. The recurring sequence walks the cascade from the outside in: external transportation degrades first, internal workforce availability follows, and the coordination layer that would normally compensate is itself degraded by communications loss. No sector framed its own internal capacity as the cascade entry point; the cascade is overwhelmingly described as exogenous, originating in shared infrastructure and propagating inward. Practitioners describe fuel, power, and communications as failing together because they share underlying infrastructure, validating the analytical position that failure is convergent rather than sequential.

Convergence on the Human-Systems Variables that Determine Cascade Trajectory.

Engagement consistently surfaces workforce, family readiness, tribal coordination, communications, and behavioral health as the variables through which infrastructure disruption becomes operational degradation. The civilian and contractor workforce that operates installation support functions emerged as the population most consistently identified as the operational point of failure. Garrison leadership reported that workforce stability under disruption is the variable most likely to determine whether installation services hold or fail, and that current planning frameworks underweight it systematically. Family readiness practitioners confirmed that the Family Readiness Group decline is operationally consequential and that hybrid public-private-nonprofit-tribal models are the operational priority for rebuilding family readiness. Communications degradation was identified across all stakeholder populations as the failure mode that compounds every other failure mode. Behavioral health practitioners identified surge capacity as the operational ceiling on workforce sustainment.

Practitioners Already Know the Architecture They Need.

A consistent observation across stakeholder engagement was that practitioners, across military, civilian, tribal, and nonprofit roles, already know what coordination architecture would be operationally useful. The recommendations that emerged are not novel discoveries; they are operational asks articulated repeatedly across prior crises that have not been resourced or sustained between them. Pre-staging civil–military coordination protocols, hardening family communications, exercising paper governance architectures, building hybrid family readiness models, and engaging tribal partners under sovereignty, consent, and reciprocity were each identified by multiple stakeholder populations as actions that have been recommended before and remain incomplete. The implication is that the recommendations advanced in this research are not asking the planning system to discover new actions; they are asking it to resource, sustain, and exercise actions that

practitioners have already identified, and to do so before the next disruption rather than after it. This is the operational expression of the paper-versus-real lens established earlier.

E.8 Engagement Modality Limits

The engagement modality limits documented in Appendix A.10 apply directly to the engagement component of the research and are restated in operational terms here. Within the engagement component specifically, structured stakeholder calls were limited to a small select group, and survey response was concentrated in the operations, continuity, and emergency management end of the lifeline architecture rather than in upstream lifeline operators. Direct fuel and energy operator participation, direct maritime and port operator participation, and direct communications and telecommunications provider participation are below the levels that sector-specific quantitative claims would require. Engagement findings are treated throughout this research as directional validation of the analytical record and as identification of practitioner-versus-analytical divergences worth carrying forward, not as the basis for sector-specific quantitative claims in under-represented categories.

Survey participation was self-selected. Respondents who chose to engage are systematically more disposed toward cross-sector coordination than the sector population as a whole, which is a relevant consideration when interpreting the strength of the joint government-industry coordination consensus the engagement findings document. The non-attributed aggregation approach protects respondent confidentiality and was a precondition for candid engagement; it also limits the specificity with which individual findings can be sourced. The convergence-based synthesis logic documented in Appendix D.4 is the methodological response to that limit: where independent inputs from literature, strategic conversations, and stakeholder engagement converge on the same operational conclusion, the convergence carries the evidentiary weight that single-source attribution would otherwise carry.

Validation through structured stakeholder engagement, including direct interviews with operators across the sectors examined and direct engagement with tribal partners under the sovereignty, consent, and reciprocity protocol established in the Tribal and Alaska Native Resilience Assessment's Engagement Protocol section, is identified in the recommendation architecture as a near-term follow-on requirement and as the substantive scope of the Integrated Civil–Military Exercise Series Stressing Societal Sustainment Thresholds recommendation in the mid-term tier.

APPENDIX F: HISTORICAL PRECEDENTS REFERENCE

This appendix consolidates the historical precedents referenced or implied in the body of this report. Each precedent is summarized with sufficient detail for follow-on researchers to verify the parallel without re-deriving it. The precedents in this appendix are organized by analytical function rather than by chronology: they have been selected because each one establishes an upper, lower, or operational bound against which a claim made elsewhere in the report can be evaluated. Where a precedent is treated more fully in the body of the report, the appendix entry summarizes the operational facts and the analytical use; the supporting discussion is not duplicated here.

Galena Flood, May 2013

Yukon River ice-jam flooding of the village of Galena, Alaska, beginning on or about May 27, 2013, displacing approximately 70 percent of the village population and producing the largest inland Alaska riverine disaster of the decade. The Principal Investigator for this research supported the State of Alaska response under the Emergency Management Assistance Compact (EMAC), the interstate mutual aid framework administered by the National Emergency Management Association under Public Law 104-321. The deployment provided direct operational exposure to the conditions that distinguish remote Alaska disaster response from CONUS analogues: the absence of road access, the dependence on barge and air for resupply, the seasonal compression of the response window between break-up and freeze-up, the centrality of the village school as shelter and coordination node, and the dependence of every external responder on the community itself for situational awareness and cultural navigation.

Galena is cited in this research as the founding operational reference for the Principal Investigator's subsequent work on private-sector lifelines and societal continuity in the Arctic, and as the foundational case informing the design of the Arctic Youth Preparedness Awareness Campaign. The campaign's emphasis on community-resident knowledge as the load-bearing element of remote-disaster response, rather than as a supplement to external expertise, is drawn directly from the Galena deployment experience. Galena also establishes the operational baseline against which the 2025 Typhoon Halong event is evaluated in this appendix: the same structural conditions of remoteness, seasonal compression, and external-responder dependence on community capacity that defined the 2013 response were present in 2025 at higher intensity and across multiple villages simultaneously, with the additional variable that the affected population now had the communications tools to tell its own story in real time.

Typhoon Halong (Ex-Typhoon Halong) and the Yukon-Kuskokwim Delta Flooding, October 2025

The remnants of Typhoon Halong reached the Yukon-Kuskokwim Delta on October 12, 2025, producing a storm surge that flooded villages as far as 60 miles up the Kuskokwim River. The Bering Sea coastal villages of Kipnuk and Kwigillingok sustained the most severe damage. State and federal sources report at least one death, two persons missing, approximately 1,500 to 1,600 persons displaced across the affected region, and what the

Alaska National Guard characterized as the largest airlift in the state's history. In Kipnuk, the Alaska Department of Transportation and Public Facilities reported that approximately 90 percent of structures were damaged or destroyed; in Kwigillingok, approximately one-third of homes were knocked from their foundations. The state's top emergency manager, the Director of the Alaska Division of Homeland Security and Emergency Management, described the event as the most severe disaster of his 32-year career. Both Kipnuk and Kwigillingok have subsequently voted to relocate to higher ground; both villages have endured multiple federally declared disasters within a span of approximately 37 months.

The event is cited in this research for four distinct analytical purposes, each grounded in the continuity-of-society lens that organizes this report.

First, Halong illustrates the Days 0–14 window in actual operational form. Within hours of the storm surge, civilian rescue capacity in the affected villages was exhausted, U.S. Coast Guard rotary-wing assets were the load-bearing rescue platform, and the National Guard transitioned from rescue to mass-evacuation operations within a 48 to 72 hour window. The cascade from infrastructure failure to workforce displacement to community discontinuity unfolded on the timeline this research identifies as the analytically central window for civil–military adjudication, mass care activation, and pre-staged coordination architecture. The event substantiates the proposition that operational decisions made in the first two weeks determine the trajectory of recovery for years thereafter.

Second, Halong demonstrates what the report describes as the rising-generation communications inflection point. Residents of the affected villages used cellular and satellite-enabled social media platforms, predominantly Facebook, to document the storm, request rescue, locate family members, and communicate with media outside the region in real time as the disaster unfolded. The result was a fundamentally different information environment from that of the 2013 Galena event, in which the affected community's account of conditions reached outside audiences primarily through state agency channels and traditional media intermediaries.

In 2025, the rising generation of the affected villages told its own story, on its own terms, with photographs and video, in the same window during which external responders were still mobilizing. This is the operational reality the Arctic Youth Preparedness Awareness Campaign is designed to address: when the communications tools are in the hands of the rising generation, the question is no longer whether the story will be told but whether the preparedness preceding the disaster matches the communications capacity that follows it. The campaign frames the rising generation not as a population to be protected from disaster information but as the actual operational communicators of disaster information in their communities, and constructs preparedness messaging accordingly.

Third, Halong illustrates the operational consequences of tribal sovereignty under recovery conditions. The Senate Committee on Indian Affairs field hearings conducted in Anchorage and Bethel in May 2026 documented sustained tensions between federal agencies, federal contractors, and tribal leadership over recovery decision-making, communication channels, and the absence of any formal federal framework for

responding to climate-threatened Alaska Native villages. The hearing record establishes that tribal administrators in the affected communities learned of recovery actions in their own villages through social media posts rather than through government-to-government coordination. The event substantiates this research's framing of tribal engagement as a sovereignty, consent, and reciprocity matter rather than as a consultation-checklist matter and substantiates the recommendation that federal–tribal coordination protocols be pre-established rather than constructed under post-disaster stress.

Fourth, Halong illustrates the cumulative-disaster pattern that distinguishes Alaska's coastal villages from the CONUS disaster recovery baseline. Kipnuk has experienced three federally declared disasters in approximately 37 months. The 2024 Kuskokwim flooding was not been fully recovered when Halong struck. Federal disaster aid from the prior event was approved in January 2025, less than 10 months before the next major event. This pattern, in which the recovery window between disasters is shorter than the institutional response window required by the federal recovery system, is the operational condition under which continuity of society in the Arctic must be planned. The pattern is not anticipated to abate and is treated in this research as a structural feature of the Arctic operating environment rather than as a series of contingent events.

Operation Vittles (Berlin Airlift) and West Berlin Civilian Sustainment, 1948–1949

U.S. and allied operation sustaining the western sectors of Berlin by air after Soviet ground blockade of road and rail access. Operation duration June 1948 through September 1949. Where this precedent is treated in Private-Sector Lifelines in the Arctic of the PSEMA research program for the upper bound of aviation-only cargo sustainment, in this report Operation Vittles is treated for a different analytical purpose: the population-sustainment dimension. The blockade required sustaining a civilian population of approximately 2.1 million persons whose municipal authorities, household economies, and community institutions had to continue functioning under conditions in which every input of fuel, food, medicine, and electricity arrived by air on a contested timeline. The precedent establishes that societal continuity under sustained external sustainment is possible but is conditional on the pre-existing density of civilian institutions, the legitimacy of local governance under stress, and the willingness of the affected population to participate in collective rationing and self-organization at a level of cooperation that benign-planning models do not assume. In this research, Operation Vittles serves as the historical anchor establishing that the analytical question for Arctic societal continuity is not whether external sustainment can be delivered but whether the civilian institutions on the receiving end can absorb it without disintegrating, and that the latter question is the harder one.

COVID-19 Pandemic Household, Workforce, and Family Readiness Dimensions, 2020–2022

The COVID-19 pandemic operated as a multi-year stress test of the household, workforce, and family-readiness systems that this research treats as the human substrate of mission assurance. The pandemic produced sustained workforce attrition driven by household-level disruption rather than by enemy action: school closures cascaded into childcare

disruption; childcare disruption cascaded into reduced workforce availability; reduced workforce availability cascaded into degraded operational tempo across nearly every civilian and military function. Family Readiness Group structures in the military services were stress-tested at the household scale and, in many cases, were found to be designed for episodic deployment support rather than for sustained ambient disruption affecting all households simultaneously. Military families experienced the pandemic concurrently with the civilian population, eliminating the typical buffer in which military households continue to function while civilian institutions absorb the stress.

The pandemic is cited in this research as the closest contemporary analog for the household-scale, multi-month, ambient-stress condition that characterizes Days 14 through 90 of the dual-theater scenario. The operational lessons drawn in this research are three: that workforce attrition in the early weeks of household-scale disruption is not a function of physical impact but of the cumulative weight of household decisions made by household members who are also workforce members; that family readiness architecture designed for episodic deployment does not scale to ambient population-wide disruption without redesign; and that the most resilient households during the pandemic were those that entered the disruption with pre-existing preparedness habits, social networks, and community ties, not those that received the most external assistance after disruption began. Each of these lessons informs this research's recommendations on family readiness modernization, workforce continuity planning, and the Arctic Youth Preparedness Awareness Campaign.

U.S. Civil Defense Programs and the Whole-of-Society Preparedness Tradition, 1950–1994

U.S. Civil Defense as an organized federal–state–local–household enterprise originated with the Federal Civil Defense Act of 1950 and was carried successively through the Federal Civil Defense Administration, the Office of Civil and Defense Mobilization, the Office of Emergency Planning, and the Defense Civil Preparedness Agency, before being consolidated into the Federal Emergency Management Agency in 1979 and ultimately discontinued as a distinct program line in 1994. The program produced household-level preparedness guidance, community shelter inventories, school-based duck-and-cover instruction, the Emergency Broadcast System, and a sustained federal investment in the proposition that civilian population resilience was itself a defense capability. The Homeland Defense Institute's 2026 Research Focus Area explicitly invites the consideration of historical precedents no longer in common use, including Civil Defense, as candidates for reinterpretation under contemporary conditions.

Civil Defense is cited in this research not as a model to be revived in its original form, in which household-level preparedness was directed at single-threat nuclear scenarios and operated through a top-down federal information architecture, but as the historical demonstration that the United States has previously sustained a whole-of-society preparedness program at population scale and is therefore capable of doing so again under a different design. The contemporary national-will exemplars cited in the Homeland Defense Institute Research Focus Area — Latvia, Sweden, and Finland — each operate civil-preparedness programs that share the population-scale ambition of mid-twentieth-century U.S. Civil Defense while drawing on contemporary communications

architecture, decentralized community ownership, and adversary frameworks more analogous to current threat conditions. The Arctic Youth Preparedness Awareness Campaign described in this report is designed against the population-scale ambition of the Civil Defense tradition while adopting the communications architecture, community-ownership model, and decentralized framing of the contemporary Nordic and Baltic exemplars.

War Industries Board, Office of Production Management, Supply Priorities and Allocations Board, and War Production Board, 1917–1945

The War Industries Board (WIB) was established by Executive Order in July 1917 under the Council of National Defense to coordinate U.S. industrial mobilization for World War I. The Board operated for approximately sixteen months before achieving substantive operational effectiveness under Bernard Baruch’s chairmanship in March 1918. The Office of Production Management (OPM) was established in January 1941, the Supply Priorities and Allocations Board (SPAB) in August 1941, and the War Production Board (WPB) in January 1942 under Executive Order 9024 with priorities and rationing authority over the U.S. industrial base across military and civilian demand throughout World War II. Where this precedent is treated in Private-Sector Lifelines in the Arctic of the PSEMA research program for the industrial-allocation dimension, in this report the sequence is cited for a parallel proposition operating one level above: that the architecture of whole-of-society mobilization, including civilian rationing, household-level participation in resource conservation, and the institutional legitimacy required for population-scale compliance with allocation decisions, builds on prior architecture rather than emerging from improvisation. The civilian compliance dimension of WWII rationing rested on a public information apparatus, household-level rationing books, and community-level enforcement that took years to construct and would not have functioned without the prior Civil Defense, public health, and food-administration infrastructure on which it was layered. The sequence is cited in this research to substantiate the proposition that household-level participation in adjudicated allocation, including under conditions of acute scarcity, is a constructed capacity rather than a default one, and that the construction window is not compressible to the Days 0–14 disruption timeline.

Florida Division of Emergency Management Kids Get a Plan Campaign, 2008–Present

The Florida Division of Emergency Management’s Kids Get a Plan campaign, operated through the State Emergency Response Team and partner school districts since approximately 2008, is the longest-running state-level preparedness campaign in the United States designed around school-age children as primary preparedness communicators within their own households. The campaign’s analytical innovation is the recognition that children and adolescents communicate preparedness information into their households more effectively than adults communicate it laterally to other adults, and that household-level preparedness messaging is therefore most efficient when school-age children are treated as the messaging audience rather than as the protected population. The campaign is supported by classroom-integrated curriculum, household activity packets, and seasonal promotion tied to Atlantic hurricane season.

Kids Get a Plan is cited in this research as the operational and design foundation for the Arctic Youth Preparedness Awareness Campaign. The Arctic adaptation extends the Florida model in three respects relevant to the continuity-of-society framing of this research: it explicitly incorporates Alaska Native and tribal community ownership at the campaign design stage rather than as a downstream adaptation; it integrates the communications-tool reality demonstrated by the 2025 Typhoon Halong rising-generation social media response, treating the rising generation as the actual operational communicators in disaster onset rather than as passive recipients of adult-directed messaging; and it scales the messaging architecture to function across the entire span of the doer-generation cohort, the capable, mobile, action-oriented population segment that constitutes the largest unaddressed audience in current preparedness programming. The Florida program demonstrates that the operational concept is feasible; the Arctic adaptation responds to operational conditions, demographics, and communications capacities that the original program was not designed to address.

APPENDIX G: LEGAL AND POLICY AUTHORITY INDEX

This appendix indexes the legal and policy authorities referenced in the body of this report, with one-paragraph entries summarizing the relevance of each authority to Arctic societal continuity and civil–military adjudication under disruption. Full citations appear in Appendix B (Reference List). The entries are organized to reflect the authority structure across which adjudication actually operates in the Days 0–14 window: federal defense authorities first, federal civil-emergency authorities second, state and interstate authorities third, tribal sovereign authorities fourth, and the international and cross-border instruments fifth. Civil–military adjudication architecture must address allocation decisions across all five tiers concurrently.

Alaska Native Claims Settlement Act of 1971 (ANCSA), Public Law 92-203

Federal statute establishing the twelve Alaska Native regional corporations and approximately 200 village corporations and extinguishing aboriginal land claims in Alaska in exchange for the conveyance of approximately 44 million acres and the payment of approximately \$963 million. Relevant to this research as the foundational statute creating the unique Alaska Native corporate governance structure that operates alongside, and in some matters in tension with, traditional tribal government structures in Alaska. ANCSA corporations hold land, infrastructure, and workforce systems essential to Arctic sustainment; tribal governments hold sovereign authority over their members and, in many matters, over their lands. Civil–military adjudication protocols and federal–tribal coordination in disaster response must address both the ANCSA corporate structure and the tribal government structure as distinct authorities with distinct competencies.

Defense Production Act (DPA)

Statutory authority enabling federal allocation and prioritization of scarce industrial output, raw materials, and other resources under conditions of national defense necessity. Identified in this research as the regulatory mechanism through which adjudicated allocations across competing military and civilian demand can be implemented during the Days 0–14 window if pre-staged civil–military adjudication protocols exist. The COVID-19 pandemic federal allocation framework is the most recent operational case in which DPA authorities were exercised at scale across simultaneous military, federal civilian, state, and tribal demand, and the case substantiates the proposition that DPA effectiveness depends on the prior existence of allocation logic that can be implemented under the authority rather than constructed within it.

DoD Directive 3020.40, Mission Assurance

Establishes Department of Defense policy framework for mission assurance as the integrating concept for the defense of critical capabilities, assets, infrastructure, and information. Identifies non-DoD-owned infrastructure as a defense dependency. Cited throughout this research as the doctrinal foundation for the proposition that mission assurance depends on civilian critical infrastructure and on the civilian populations and

household systems that operate it. In the continuity-of-society framing of this report, DoDD 3020.40 is read in conjunction with NSM-22 to establish that the civilian population on which DoD depends is itself within the scope of the mission assurance framework, not adjacent to it.

DoD Instruction 3020.45, Defense Critical Infrastructure Program Management

Implementing instruction for DoDD 3020.40, defining roles and responsibilities for DoD's critical assets and infrastructures and establishing the Defense Critical Infrastructure Program (DCIP) management framework. Relevant to this research as the framework under which non-DoD-owned Defense Critical Infrastructure (DCI) is identified and protected, including the residential, school, water, sanitation, and community-services infrastructure on which the military workforce and military families depend in installation-adjacent civilian communities.

Emergency Management Assistance Compact (EMAC), Public Law 104-321

Interstate mutual aid compact ratified by U.S. Congress in 1996 and enacted as law in all fifty states, the District of Columbia, Puerto Rico, Guam, the U.S. Virgin Islands, and the Northern Mariana Islands. EMAC enables a state governor, through state emergency management officials, to request and receive personnel and equipment from other states before, during, and after a disaster, with workers' compensation, tort liability, license reciprocity, and reimbursement protections established in advance. Administered by the National Emergency Management Association (NEMA). The Principal Investigator for this research deployed under EMAC in support of the 2013 Galena response, and the 2025 Typhoon Halong response received EMAC personnel from multiple states including Texas and South Carolina in the recovery phase. EMAC is cited in this research as the operational mechanism through which the surge personnel capacity required for sustained Arctic disaster response is actually delivered, and as the legal architecture whose pre-existence enables state-to-state response timelines that federal mobilization timelines cannot match. The compact is treated in this research as a load-bearing element of the continuity-of-society framework rather than as a supplementary resource.

Federal Civil Defense Act of 1950 (as Historical Authority)

Federal statute, enacted in 1950 and amended through the 1980s, that established U.S. Civil Defense as an organized federal–state–local–household enterprise. The Act and its successor authorities were consolidated into the Federal Emergency Management Agency framework in 1979 and discontinued as a distinct program line in 1994. Cited in this research not as an operative legal authority but as the historical demonstration that whole-of-society preparedness at population scale was previously sustained under federal statutory authority and is therefore a precedented use of federal authority rather than a novel one. The Homeland Defense Institute's 2026 Research Focus Area explicitly invites consideration of historical precedents no longer in common use, including Civil Defense, as candidates for reinterpretation under contemporary conditions, and this entry is included to substantiate the historical legal foundation referenced in Appendix F.

FEMA National Resilience Guidance (August 2024)

Federal Emergency Management Agency guidance document, cited in the Homeland Defense Institute Research Focus Area as the source for the definitions of resiliency, hazards, and threats employed by HDI. Relevant to this research as the federal doctrinal anchor for the resilience framing that organizes both this report and the broader Homeland Defense Awareness Symposium 2026 research portfolio, and as the authority that establishes resilience as a collaborative whole-of-society undertaking rather than a sector-specific federal responsibility.

FEMA Public-Private Partnership (P3) Maturity Model

FEMA framework characterizing the developmental stage of public-private coordination architectures across four tiers: Basic, Intermediate, Advanced, and Optimized. Arctic jurisdictions are documented in this research as operating predominantly at the Basic or low-Intermediate tier with respect to the civilian populations, household systems, and community institutions that this report treats as the human substrate of mission assurance. Advancement toward the Advanced tier is identified as a mid-term recommendation. The framework is treated in this research as the operational measure against which the cross-sector coordination architecture recommendations of this report are evaluated.

Indian Self-Determination and Education Assistance Act of 1975 (ISDEAA), Public Law 93-638

Federal statute authorizing federally recognized tribes to contract with the federal government to operate programs that the federal government would otherwise operate on the tribe's behalf, including health, education, and social services programs. Operationally, the statute is the legal basis for the Alaska Native Tribal Health Consortium and the regional tribal health organizations that constitute the primary health care delivery system across most of rural Alaska. Relevant to this research as the authority establishing tribal operational control of the rural Alaska health care delivery system on which any continuity-of-society framework must depend, and as the legal expression of the federal trust responsibility under which government-to-government coordination in disaster response is conducted.

Jones Act (Merchant Marine Act of 1920)

Federal statute requiring that cargo moved between U.S. ports be carried on vessels built in the United States, owned by U.S. citizens, and crewed by U.S. mariners. Identified in this research as a structural constraint on maritime substitution capacity during disruption. The waiver framework, administered by the Department of Homeland Security with Department of Defense, Maritime Administration, and Department of Transportation coordination, is identified as the determining variable in whether maritime surge can be activated within the Days 0–14 window. In the continuity-of-society framing of this report, Jones Act considerations bear directly on the timeliness with which fuel, food, and pharmaceutical resupply can reach civilian Alaska communities under disruption, and therefore on the household-level inflection points that drive workforce and community decisions in the Days 0–14 window.

National Defense Strategy (NDS-2025)

U.S. national defense policy framework establishing strategic priorities, including Arctic operations and homeland defense doctrine. Cited in this research as the strategic-level authority connecting Arctic mission assurance to broader national defense objectives, and as the doctrinal anchor for the proposition that homeland defense, including the resilience of the civilian populations and communities on which the homeland defense workforce depends, is itself an enumerated national defense priority rather than a secondary or supporting concern.

National Security Memorandum 22, Critical Infrastructure Security and Resilience (30 April 2024)

White House policy framework defining Defense Critical Infrastructure and establishing federal coordination authorities for critical infrastructure resilience. Defines DCI as DoD and non-DoD networked assets and facilities essential to project, support, and sustain military forces and operations worldwide. Cited throughout this research as the strategic-level policy authority for the cross-sector coordination architecture the recommendations call for, and as the authority connecting the civilian-infrastructure dimension of mission assurance to the household, workforce, and community dimensions that this report treats as the human substrate of that infrastructure.

Pacific Northwest Emergency Management Arrangement (PNEMA)

Cross-border mutual aid arrangement among British Columbia, Yukon Territory, Alaska, Idaho, Oregon, and Washington State, providing the legal framework for state-province emergency management coordination across the U.S.–Canadian border. Relevant to this research as the operational instrument through which Alaska–Yukon and Alaska–British Columbia coordination is conducted in the dual-theater scenario’s overland sustainment dimension, and as the cross-border counterpart to EMAC for the Pacific Northwest and Alaska region. PNEMA is treated in this research as one of the authority frameworks that civil–military adjudication protocols must address explicitly rather than implicitly, given the centrality of Canadian cross-border dependencies to any Arctic sustainment scenario.

Posse Comitatus Act

Federal statute generally restricting the use of Title 10 federal military forces for domestic civilian law enforcement purposes. Relevant to this research as the structural rationale for the Title 10 versus Title 32 distinction in disaster response and as the legal context within which civil–military adjudication protocols must be designed to avoid both operational paralysis and unauthorized employment of federal forces in civilian law enforcement roles. The Act is treated in this research as a feature of the adjudication landscape rather than as an obstacle to coordination: pre-staged adjudication protocols are designed to function within the Posse Comitatus framework rather than to require its modification under stress.

Stafford Act

Robert T. Stafford Disaster Relief and Emergency Assistance Act

Federal statutory authority for FEMA-coordinated disaster response, including the Presidential disaster declaration framework, mass care operations, Individual Assistance, Public Assistance, the Hazard Mitigation Grant Program, and federal–state cost-share for disaster relief. Relevant to this research as the principal authority structure under which FEMA Region X coordinates Arctic disaster response and as one of the legal frameworks across which civil–military adjudication must operate. The 2025 Typhoon Halong response operated under a Stafford Act major disaster declaration; the May 2026 Senate Committee on Indian Affairs hearings documented the operational consequences when Stafford Act delivery timelines exceed the actual recovery window of climate-threatened Alaska Native communities. The Act is treated in this research as the framework whose timelines and authorities most directly constrain the Days 0–14 to Days 14–90 transition for affected civilian populations.

Title 10 and Title 32 Authority

Title 10 of the United States Code governs federal active-duty military forces under the Secretary of Defense; Title 32 governs National Guard forces operating under state authority while federally funded. The distinction is operationally consequential in disaster response because Title 32 forces can support law enforcement and civilian authorities in ways Title 10 forces typically cannot under the Posse Comitatus Act. In Alaska, the Alaska National Guard, the Alaska State Defense Force, and the Alaska Organized Militia each operate under distinct authority frames and are coordinated through state emergency management. The 2025 Typhoon Halong response, in which the Alaska Organized Militia’s Task Force Bethel conducted debris removal and infrastructure repair operations alongside federal Coast Guard and active-duty assets, illustrates the operational integration required across these authorities. Civil–military adjudication protocols must address allocation decisions across Title 10, Title 32, state defense force, and Alaska Organized Militia authorities concurrently.

Tribal Sovereign Authority and the Sovereignty, Consent, and Reciprocity Framework

Alaska Native and tribal governments hold sovereign authority over tribal lands, communities, and citizens. Sovereign authority is exercised under the federal trust responsibility, the Alaska Native Claims Settlement Act (1971), the Indian Self-Determination and Education Assistance Act (1975), federal tribal consultation policies, and government-to-government coordination protocols. This research treats tribal engagement as a sovereignty, consent, and reciprocity matter rather than as a consultation-checklist matter. The sovereignty principle establishes that tribal authority is not delegated by the federal government and is therefore not subject to revision in disaster response. The consent principle establishes that tribal participation in federal or state research, planning, or operational activity is voluntary and revocable. The reciprocity principle establishes that the federal or state party seeking tribal input owes something of equivalent value in return, typically in the form of access to research findings, joint authorship, or sustained engagement architecture. Civil–military adjudication protocols must address tribal sovereign authority alongside Title 10, Title

32, Stafford Act, DPA, and state authorities, and must do so under a framework of sovereignty, consent, and reciprocity rather than under a framework of consultation alone.

UNCLOS Article 234

(United Nations Convention on the Law of the Sea, 1982)

Provision of the 1982 United Nations Convention on the Law of the Sea authorizing coastal states to adopt and enforce non-discriminatory laws and regulations for the prevention, reduction, and control of marine pollution from vessels in ice-covered areas within the limits of the exclusive economic zone. The legal instrument through which the Northern Sea Route is converted from a benign-planning maritime redundancy into a consent-dependent pathway whose availability depends on Russian regulatory consent. Treated in this research as the canonical case of consent-dependent redundancy and as the international-law authority establishing that physical capacity and operational availability are not the same variable for any Arctic transit option that depends on third-state consent.

APPENDIX H: AUTHORITY TIER DETAIL

Department of Defense: Installation and Garrison Level

Installation commanders under Title 10 authority hold responsibility for force protection, mission execution, and on-base resource allocation. Garrison commanders manage installation services, housing, utilities, and family support infrastructure. The authority is real, and within its scope it is decisive.

The structural limits of this authority are consequential. Installations are not self-sustaining beyond short durations, typically less than fourteen days, without external civilian logistics. The civilian systems on which installation sustainment depends, including commercial food and fuel distribution, regional transportation, and the civilian and contractor workforce that staffs base operations, are outside the installation commander's authority entirely. The installation authority gap is therefore not a coordination problem but a structural one: commanders hold authority for mission execution but not for the civilian systems on which mission execution depends, and that gap operates as a force degrader throughout the early-phase window. The infrastructure dependencies that produce this condition are examined in the companion study; what matters for this research is that installation commanders cannot resolve sustainment shortfalls by exercising Title 10 authority alone.

State of Alaska

The Governor holds authority for emergency declarations, National Guard activation, and resource prioritization. Alaska DHS&EM manages state-level emergency coordination and the federal interface. The State of Alaska Emergency Operations Plan documents that the State Emergency Operations Center establishes response priorities, allocates scarce resources, coordinates interagency communication and situational awareness, and interfaces with federal support through FEMA and the Emergency Management Assistance Compact (EMAC). Control domains include statewide prioritization of fuel distribution, transportation access across air, marine, and limited road networks, and emergency logistics coordination.

The structural constraint is fundamental: the state has no direct control over privately operated supply systems and must allocate scarcity across urban hubs such as Anchorage and Fairbanks, remote villages, and military installations simultaneously. The Alaska EOP does not promise supply adequacy under disruption conditions; it is designed to manage allocation decisions among populations that all have legitimate survival claims on the same finite resources. State authority in a sustained Arctic disruption is therefore not authority over supply, it is authority over which populations absorb the deficit. The three populations examined in this research, military, civilian and contractor, and Alaska Native, all hold legitimate claims on state-prioritized resources, and the state has no predefined adjudication mechanism for resolving competing claims when scarcity is simultaneous. This is the analytical core of the civil–military governance friction that emerges in the early-phase window: not whether the state will act, but how it will choose

among populations that planning frameworks built around resource availability assumptions have not adequately required it to confront.

Local Governments: Municipal and Borough

Mayors, city managers, and borough officials hold authority over local public safety, utilities, shelters, and community services. Control domains include local utilities where available, public safety and sheltering, and community services. The structural limits are severe: minimal buffer capacity in food, fuel, and medical support means rapid dependency on state coordination, tribal networks, and nonprofit and private-sector support. Local governments effectively transition from resource providers to coordination nodes after approximately Days 3–5 of disruption, a transition that happens faster than most local emergency plans anticipate and that occurs simultaneously across multiple municipalities, multiplying the demand on state-level adjudication at precisely the moment state authority is most constrained.

APPENDIX I: TRIBAL ENGAGEMENT PROTOCOL DETAIL

The framework as adopted for this research operates in three components.

Sovereignty. Federally recognized tribal governments hold inherent sovereign authority over their citizens and lands. They are not subordinate to state or local governments, and they hold authority to declare emergencies and to seek Stafford Act assistance independently of the state, as the Authority Structure section developed in detail. The research engages tribal governance, Alaska Native organizations, and Indigenous knowledge in this deliverable through frameworks that recognize this sovereignty rather than embedding tribal partners within externally designed coordination architectures. Coordination failures during crises frequently stem from outside misunderstanding of this sovereignty under time-compressed conditions, a finding the National Academies' Indigenous disaster preparedness research documents explicitly.

Consent. Indigenous knowledge, including traditional ecological knowledge, subsistence practices, community governance traditions, and resource-sharing protocols, is held by tribal partners and shared at their discretion under protocols those partners establish. The documentation in this deliverable draws exclusively from published sources, federally accessible records, and prior research that has cleared its own consent processes; it does not extend into community-level data, place-based knowledge, or culturally sensitive information that would require direct tribal consent the research has not obtained. The analytical generality at which the resilience systems are documented in this deliverable reflects this consent constraint deliberately, and the research does not extend beyond the published record even when the analytical case for additional specificity could be made.

Reciprocity. The research is structured to provide reciprocal value to tribal partners in future engagement phases through the analytical framing of tribal communities as resilience amplifiers rather than as risk populations, through the policy recommendations that position tribal-designed and tribal-led programs as operational assets within Arctic mission assurance, and through the strategic case for engagement structures that respect tribal authority rather than circumventing it. The reciprocity commitment is operationalized in the recommendations developed later in this report, which place tribal partners in the role of designers and leaders of intergenerational resilience programs rather than recipients of externally designed interventions. The continuation statement at the close of this report identifies tribal engagement under sovereignty-consent-reciprocity protocols as a foundational element of Phase II research, in recognition that the analytical foundation developed here requires tribal partnership to be operationalized.

The dual character of tribal communities developed in the Authority Structure section, as populations of both high baseline vulnerability and high resilience capacity, can only be

acknowledged honestly under this protocol. Documentation that treats tribal communities solely as vulnerable populations collapses the resilience capacity into the vulnerability narrative; documentation that treats tribal communities solely as resilience assets extracts the resilience without acknowledging the conditions under which it operates. The sovereignty-consent-reciprocity framework is the engagement protocol that allows both characters to be acknowledged simultaneously, and it is the protocol under which the resilience systems documented below should be read.

APPENDIX J: ALASKA NATIVE CORPORATION PROFILES

Arctic Slope Regional Corporation (ASRC): North Slope

Arctic Slope Regional Corporation is the regional corporation for Alaska's North Slope and the largest Alaskan-owned and operated company. ASRC was incorporated in 1972 under ANCSA and is owned by approximately 14,000 Iñupiaq shareholders. Its corporate headquarters are based in Utqiagvik, with administrative and subsidiary offices in Anchorage and across the Lower 48. ASRC holds title to approximately 5 million acres on Alaska's North Slope, with land areas covering territory of significant oil, gas, coal, and base-metal sulfide potential. The corporation employs approximately 12,000 to 16,000 people across Alaska and the Lower 48 across six business segments: government contract services, industrial services, financial solutions, petroleum refining and marketing, energy support services, and construction with North Slope operations.

Three operational lines are most consequential for Arctic homeland defense continuity. First, ASRC's Petro Star subsidiary is an Alaska-based refiner producing refined fuels for in-state markets, including the aviation and heating fuels that downstream sustainment depends on. Petro Star's in-state refining capacity is one of the operational anchors of the in-state share of refined product, the infrastructure dimension of which is examined in the companion study. Second, ASRC's subsidiary Eskimos, Inc. (EI) operates as a fuel and automotive parts distributor to remote North Slope locations, providing the last-mile distribution capacity that connects regional fuel supply to the village-level workforce and household sustainment systems on which subsistence and seasonal workforce mobility both depend. Third, ASRC's North Slope operations and energy support services connect directly to the oilfield workforce, infrastructure, and industrial services that operate the petroleum production and transportation systems whose disruption would propagate across both the regional civilian population and any defense-relevant sustainment activities supported through the North Slope operating environment.

The North Slope region's operational geography, eight predominantly Iñupiat villages (Point Hope, Point Lay, Wainwright, Atkasuk, Utqiagvik, Nuiqsut, Kaktovik, and Anaktuvuk Pass) distributed across an extreme-Arctic environment with no road connection to the rest of the state, makes ASRC's sustainment role analytically distinctive: the corporation's operations, workforce, fuel distribution, and land stewardship constitute the substantial portion of what operates between commercial maritime resupply at the regional ports and the village-level household sustainment that determines whether the population can remain in place under disruption. ASRC's engagement in Arctic homeland defense planning is therefore not optional in any meaningful operational sense; it is the precondition for any continuity-of-society planning that addresses the North Slope.

Cook Inlet Region, Inc. (CIRI): Southcentral Alaska and the Anchorage and JBER Operating Environment

Cook Inlet Region, Inc. is the regional corporation for Southcentral Alaska, with regional boundaries that roughly follow the traditional Dena'ina territory. CIRI was incorporated in 1972 and is owned by approximately 9,500 shareholders of Athabascan, Iñupiat, Yup'ik, Alutiiq/Sugpiaq, and Aleut/Unanga descent. CIRI's headquarters are in Anchorage, and the corporation is Southcentral Alaska's largest private landowner, with subsurface holdings approaching 1.6 million acres. CIRI operates a diversified investment and operating portfolio across energy and infrastructure, real estate, government services, land and natural resources, and private equity and venture funds, with subsidiary operations across more than forty U.S. states. [CIRI-2024]

CIRI's sustainment role for the continuity-of-society analysis is structured around its proximity to the Anchorage and Joint Base Elmendorf-Richardson (JBER) operating environment, which is also the operating environment for the substantial portion of Alaska's civilian population, the state's largest commercial port, and the dominant air and intermodal logistics network. CIRI's energy and infrastructure portfolio includes Fire Island Wind, an 11-turbine wind generation facility on Fire Island near Anchorage that contributes regional power generation in the Railbelt system that serves both Anchorage and JBER. The Cook Inlet natural gas depletion trajectory, examined in the companion study, intersects directly with CIRI's operational footprint, and CIRI's engagement in Cook Inlet energy planning is therefore an operational variable in the Railbelt energy resilience picture that determines installation power continuity in the region.

CIRI's most operationally consequential affiliation for the human-systems analysis runs through its associated nonprofit, Southcentral Foundation, which jointly operates the Alaska Native Medical Center (ANMC) campus with the Alaska Native Tribal Health Consortium. Southcentral Foundation delivers comprehensive outpatient and inpatient services to more than 70,000 Alaska Native and American Indian people in the Anchorage Service Unit, with extended outpatient and inpatient reach to more than 155,000 statewide. The Medical Capacity section in Civil–Military Resource Allocation Tensions identifies the Indian Health Service and Alaska Native Medical Center system as a distinct architecture within the three-population medical access framework, and the cumulative cold-chain failure pattern documented in the Continuity Constraints section identifies tribal health system facilities as among the populations whose failure would compound rather than mitigate civilian healthcare capacity gaps under the dual-theater scenario. CIRI's sustainment role is therefore not limited to land, energy, and government services; it extends through Southcentral Foundation into the medical infrastructure on which a substantial portion of the regional Alaska Native population depends, and which participates in the broader Anchorage-area healthcare ecosystem.

Doyon, Limited: Interior Alaska, the Fairbanks Operating Environment, and the ALCAN Border

Doyon Limited is the regional corporation for Interior Alaska. Doyon was incorporated in 1972 and is owned by more than 20,000 shareholders, many of whom are of Athabascan descent. Doyon's corporate headquarters are in Fairbanks, and the corporation is the largest private landowner in Alaska, with title to over 11.8 million acres of an ANCSA entitlement that approached 12.5 million acres distributed across Interior Alaska, a region whose operational geography includes the longest border with Canada among Alaska Native corporation regions, the longest rivers in Alaska, the largest road network within any Native corporation region, and 34 villages, each represented by its own village corporation.

Three operational lines are most consequential for the continuity-of-society analysis. First, Doyon's Fairbanks-anchored operating footprint sits in the operating environment for Eielson Air Force Base, Fort Wainwright, and the broader Interior Alaska defense and civilian sustainment system, including Fairbanks International Airport and the northern terminus of the Alaska Railroad. Doyon's family of companies operates across oil-field services, government contracting, utility management, engineering management, information technology services, land and natural resource development, facility management, and tourism, with more than 800 employees worldwide and over 550 in Alaska as of recent corporate reporting. Second, Doyon's Interior land base is the territorial environment through which the ALCAN Highway transits and through which the cross-border surge logistics scenario in the working draft would necessarily route. The Arctic Sustainment Modes framework developed in the Scenario Conditions section identifies the ALCAN corridor as a constrained-redundancy mode with approximately 1,200 miles of Canadian transit and sovereign decision points U.S. planning cannot resolve unilaterally; the companion study develops the cross-border permitting, hours-of-service waivers, and pre-staged fueling and rest infrastructure constraints in detail. Doyon's land base, infrastructure, and tribal governance reach across the Interior corridors through which any ALCAN-based surge would operate, and Doyon's engagement in cross-border surge planning is therefore an operational variable in any realistic ALCAN sustainment scenario. Third, Doyon Tourism owns and operates hotel and tour properties at and near the entrance to Denali National Park (including Denali River Cabins, the Cedars Lodge, and the Kantishna Roadhouse), which sit on the principal road and rail axis between Anchorage and Fairbanks and which form part of the regional hospitality and lodging infrastructure that would be relevant to any large-scale evacuation or workforce mobilization scenario.

Doyon's 34-village land architecture, generated by ANCSA acreage entitlements ranging from 69,120 to 161,280 acres per village and producing the distinctive checkerboard pattern of Interior land ownership, is the structural condition through which any Interior-Alaska continuity-of-society planning must operate. The corporation's management of these lands focuses on the protection of traditional shareholder uses and on responsible economic development, and the same governance and engagement protocols that apply to ASRC and CIRI apply to Doyon: sovereign authority is retained at the corporate and village-corporation level, and engagement proceeds on terms agreed by the corporations and the tribal governments whose interests they represent.

NANA Regional Corporation: Northwest Arctic and the Kotzebue Operating Environment

NANA Regional Corporation is the regional corporation for the Northwest Arctic. NANA was incorporated in 1972 and is owned by more than 15,000 Iñupiat shareholders. NANA's corporate headquarters are in Kotzebue, with administrative offices in Anchorage and elsewhere. The corporation's land base covers approximately 36,000 to 38,000 square miles, roughly the size of Indiana, in Northwest Alaska centered on the Kotzebue Sound and its tributaries, with the Arctic Circle traversing NANA territory. Approximately 7,300 residents live within the region, more than 85 percent of whom are NANA shareholders.

NANA's sustainment role for the continuity-of-society analysis runs across three operational lines. First, NANA holds the land base on which the Red Dog Mine operates under a partnership with Teck Alaska that began with mine development in 1989. Red Dog is the world's largest producer of zinc, accounts for approximately ten percent of global zinc production, and is the source of approximately eighty to ninety percent of the Northwest Arctic Borough's revenue, with payment-in-lieu-of-taxes contributions to the borough that comprise the majority of borough budget. The mine employed approximately 600 full-time workers in 2022, with nearly 1,000 shareholders or family members working at Red Dog in 2023 earning over \$63 million in wages. The mine's ore deposits and life extension are matters of active corporate, tribal, and regulatory engagement, with current developed deposits expected to extend through 2031 and life-extension exploration ongoing. The continuity implication is direct: under a prolonged disruption scenario, the regional revenue base, the regional workforce sustainment, and the regional household economic stability that anchor Northwest Arctic Borough community resilience are all tied to operational continuity at Red Dog and to the mine's associated transportation and shipping logistics through the DeLong Mountain Transportation System and the Chukchi Sea port operations.

Second, NANA operates a substantial federal-contracting footprint through Akima LLC, a holding company headquartered in Herndon, Virginia, that NANA owns jointly with The Aleut Corporation. Akima provides services across information technology, systems engineering, base operations and logistics, aviation, protective services, and construction, supporting federal missions across more than 2,000 active contracts. Akima generated approximately \$2.2 billion of NANA's \$2.8 billion in 2024 revenue. The federal-contracting footprint includes mission-essential services for defense and other federal agencies and provides one of the working examples of how Alaska Native corporations sit inside the federal sustainment architecture rather than adjacent to it.

Third, NANA's subsidiary NMS provides food service, hotel management, and facilities operations across multiple Alaska locations, including hotels in Anchorage, Fairbanks, and Kotzebue, and is one of the named installation-support contractors at Joint Base Elmendorf-Richardson. NMS's operational role in installation services bridges directly to the workforce-family feedback loop developed in the Family Readiness and Human Factors section and to the civilian and contractor workforce analysis developed in the Workforce Availability section of Civil–Military Resource Allocation Tensions. The corporation's base-services workforce is drawn substantially from the same regional

populations whose household stability this research identifies as the operational variable through which workforce stability is determined.

NANA's natural-resources governance architecture includes a Red Dog Mine subsistence committee composed of Elders and hunters from the villages of Noatak and Kivalina that meets regularly with mine representatives to review subsistence and environmental issues. Shipping schedules are adjusted to minimize impact on sea-mammal hunts; caribou herd migrations are monitored, and haul-road traffic is regulated to protect the herd. The committee's function is the operational expression of sovereignty, consent, and reciprocity: subsistence, traditional harvest, and tribal authority are not constraints on operations to be managed around; they are co-equal governance inputs to the operations themselves. The same posture is the condition under which any continuity-of-society engagement with NANA proceeds.

APPENDIX K: RECOMMENDATIONS BY INVESTMENT HORIZON

The recommendations below consolidate the analytical findings of this report into a single, decision-grade reference, organized into three implementation horizons. Near-Term (0–12 months) covers policy clarifications, planning integration, pre-staged authorities, exercise activity, and low-cost mitigations executable within the current planning cycle. Mid-Term (12-36 Months) covers programmatic build-out, infrastructure hardening at existing nodes, contracting actions, and institutional architecture requiring sustained investment beyond a single budget cycle. Long-Term (36 Months or More) covers new infrastructure construction, doctrinal codification, multi-year research, and capital-intensive resilience investments.

The Five Criteria Framework tags identify which analytical drivers, Mission Impact, Cascade Risk Mitigation, Time Sensitivity, Feasibility, and Dual-Use Value, most distinguish each recommendation; the tags are not a score, weighting, or ranking. Lead and Supporting Partner attributions reflect the operational accountability and enabling-role architecture identified across the civil–military governance mapping, family readiness and human factors review, tribal and Alaska Native resilience assessment, and stakeholder engagement findings of this report. Tribal engagement throughout the recommendations operates under sovereignty, consent, and reciprocity protocols, on terms tribal governments and Alaska Native organizations determine.

Near Term Recommendations (0–12 Months)

Civil–Military Coordination Protocol Pre-Staging

Description: Develop and pre-stage protocols for civil–military resource adjudication, communication pathways, and decision authorities, closing the institutional gap that converts Days 0–14 societal disruption into operational risk when commanders, mayors, and tribal leaders face competing survival decisions without pre-established coordination architecture.

Five Criteria Framework Tags:

- Mission Impact:* High (Days 3–7 governance inflection determines whether disruption cascades into systemic failure)
- Cascade Risk:* Very High (resource-tension adjudication is master coordination function)
- Time Sensitivity:* High (Days 0–14)
- Feasibility:* Moderate (political complexity across Title 10, state, tribal authorities)
- Dual-Use Value:* High

Lead Partner(s): USNORTHCOM; Alaska DHS&EM; DoD Defense Coordinating Officer (Region X)

Supporting Partner(s): FEMA Region X; Alaska Native Tribal Health Consortium; Alaska Federation of Natives; tribal governments (under sovereignty, consent, and reciprocity); JBER installation command; PSEMA (convening, non-attribution intermediation)

Family Communications Hardening

Description: Establish redundant communications pathways for military families through commercial satellite providers, public safety communications systems, and installation family service offices, addressing the household-level information blackout pathway that degrades morale, retention, and operational focus when families cannot reach service members during prolonged Arctic disruption.

Five Criteria Framework Tags:

Mission Impact: High (force degrader amplifying every other failure mode)

Cascade Risk: Very High (workforce-family feedback loop runs faster when households cannot reach service members)

Time Sensitivity: High (Days 0–14)

Feasibility: High (equipment pre-positioning and analog protocols are well-established)

Dual-Use Value: High

Lead Partner(s): USNORTHCOM (installation family service offices); Air Force Personnel Center; JBER family readiness organizations

Supporting Partner(s): Blue Star Families; Armed Services YMCA; Military Housing Privatization Initiative partners; Iridium and Inmarsat (satellite redundancy); Alaska Public Safety Communications Services; PSEMA

Exercise-Based Validation of Paper Governance Architectures

Description: Convene structured tabletop and functional exercises that stress-test civil–military governance, tribal coordination, and family readiness architectures against the dual-theater scenario, converting paper-redundancy governance into operationally validated capacity at the layer where continuity of society either holds or fails.

Five Criteria Framework Tags:

Mission Impact: Moderate–High (surfaces gaps but does not close them)

Cascade Risk: High (addresses paper-vs-real distinction at coordination layer)

Time Sensitivity: Moderate

Feasibility: High (exercise mechanisms exist within current authorities)

Dual-Use Value: High

Lead Partner(s): USNORTHCOM; Alaska DHS&EM; FEMA Region X

Supporting Partner(s): CISA; DoD Defense Coordinating Officer (Region X); Alaska National Guard; tribal governments (under sovereignty, consent, and reciprocity); CNA; Ted Stevens Center for Arctic Security Studies; PSEMA

Family Readiness Group Rebuilding Through Hybrid Public-Private-Nonprofit Structures

Description: Rebuild Family Readiness Group capacity through hybrid public–private–nonprofit structures that address the decline of traditional FRGs, leveraging Blue Star Families, Armed Services YMCA, faith-based networks, and tribal community organizations to restore the household-level support architecture on which morale and operational performance under stress depend.

Five Criteria Framework Tags:

Mission Impact: High (workforce-family feedback loop integrity)

Cascade Risk: High (FRG erosion compounds with communications loss and proximity loss)

Time Sensitivity: Moderate (capacity build, but must exist pre-crisis)

Feasibility: Moderate (requires sustained hybrid partnerships and funding)

Dual-Use Value: Very High (operates in steady state as well as crisis)

Lead Partner(s): Air Force Personnel Center; USNORTHCOM (installation family service offices); JBER garrison command

Supporting Partner(s): Blue Star Families; Armed Services YMCA; Penn State Military Families Research Institute; faith-based networks; tribal community organizations (under sovereignty, consent, and reciprocity); The Salvation Army; PSEMA

Tribal Coordination Protocol Pre-Staging Under Sovereignty, Consent, and Reciprocity

Description: Establish pre-staged tribal coordination protocols developed and held by tribal governments and Alaska Native organizations on terms they determine, closing the structural coordination gap the Risk and Vulnerability Assessment identifies, on a sovereignty, consent, and reciprocity basis that respects tribal authority rather than positioning non-tribal institutions as intermediaries.

Five Criteria Framework Tags:

Mission Impact: High

Cascade Risk: Very High (absence of pre-existing relationships is the primary risk-amplifier condition)

Time Sensitivity: High (relationships must exist pre-crisis, not be improvised during it)

Feasibility: Moderate (requires tribal-led design under sovereign consent and reciprocity)

Dual-Use Value: High

Lead Partner(s): Alaska Federation of Natives; federally recognized tribal governments; Alaska Native regional corporations (ASRC, CIRI, Doyon, NANA); First Alaskans Institute

Supporting Partner(s): Alaska DHS&EM; USNORTHCOM; FEMA Region X; Denali Commission; Indian Health Service (Alaska Area); PSEMA (convening, non-attribution intermediation)

Household-Level Preparedness Extension to Underserved Populations

Description: Extend household-level preparedness programming, building on the FDEM Kids Get a Plan model and Arctic Youth Preparedness Awareness Campaign approach, to underserved Alaska populations including rural and tribal communities, school systems, and the civilian and contractor workforce currently outside preparedness programming.

Five Criteria Framework Tags:

Mission Impact: High (treats the thirteen-to-thirty demographic as strategic resilience asset)

Cascade Risk: High (household instability compounds workforce absenteeism)

Time Sensitivity: Moderate (capacity build, pre-crisis)

Feasibility: High (existing FDEM model, school system delivery channels available)

Dual-Use Value: Very High (steady-state public preparedness benefit at population scale)

Lead Partner(s): State of Alaska; Alaska Department of Education and Early Development; tribal governments (under sovereignty, consent, and reciprocity)

Supporting Partner(s): FEMA Region X; school systems statewide; military family readiness organizations; Blue Star Families; community nonprofits; Penn State MFRI; Alaska Federation of Natives; PSEMA

Workforce Continuity Planning for Civilian and Contractor Populations

Description: Develop workforce continuity plans for the civilian, contractor, and Alaska Native workforce on whom installation and lifeline operations depend, addressing the workforce-as-operational-variable finding that household insecurity, evacuation pressure, and competing community obligations translate directly into degraded installation and lifeline performance under prolonged stress.

Five Criteria Framework Tags:

Mission Impact: Very High (civilian and contractor workforce is the single most consequential point of failure)

Cascade Risk: Very High (workforce-family feedback loop operates as force degrader on mission outcomes)

Time Sensitivity: High (Days 0–14)

Feasibility: Moderate (requires multi-employer coordination and contractor engagement)

Dual-Use Value: Very High (steady-state workforce planning value)

Lead Partner(s): USNORTHCOM; Air Force Personnel Center; Alaska DHS&EM; JBER garrison command

Supporting Partner(s): Alaska Native regional corporations (ASRC, CIRI, Doyon, NANA); NMS; Anchorage Water and Wastewater Utility; Chugach Electric Association; Cold Regions Research and Engineering Laboratory; PSEMA

Mid Term Recommendations (12–36 Months)

Behavioral Health Surge Capacity Expansion

Description: Expand behavioral health surge capacity across tribal, civilian, and military systems, addressing the prolonged-stress mental health pathway that degrades family readiness, workforce stability, and community cohesion during extended Arctic disruption and that no near-term mitigation alone can close.

Five Criteria Framework Tags:

Mission Impact: High (behavioral health capacity is the ceiling on workforce surge availability)

Cascade Risk: High (accelerates workforce-family feedback loop, raises non-deployability)

Time Sensitivity: High (current surge capacity already exceeded)

Feasibility: Moderate (workforce development requires multi-year scaling)

Dual-Use Value: Very High (operational infrastructure equivalent to fuel storage and communications redundancy)

Lead Partner(s): Indian Health Service (Alaska Area); Alaska Native Tribal Health Consortium; Alaska Department of Health; Defense Health Agency

Supporting Partner(s): USNORTHCOM (installation behavioral health); Mass General Brigham; Johns Hopkins Medicine; tribal-led behavioral health programs (under sovereignty, consent, and reciprocity); Blue Star Families; PSEMA

Formalized Tribal Consultation Architecture

Description: Build a formalized tribal consultation architecture on terms tribal governments and Alaska Native organizations determine, progressing beyond episodic engagement to sustained institutional consultation that supports continuity-of-society planning across pre-incident, incident, and post-incident periods on a sovereignty, consent, and reciprocity basis.

Five Criteria Framework Tags:

Mission Impact: High

Cascade Risk: High (durable institutional coordination prevents risk-amplifier condition)

Time Sensitivity: Moderate

Feasibility: Moderate (requires tribal-led design and sustained sovereign consent)

Dual-Use Value: Very High

Lead Partner(s): Alaska Federation of Natives; federally recognized tribal governments; Alaska Native regional corporations (ASRC, CIRI, Doyon, NANA); First Alaskans Institute

Supporting Partner(s): USNORTHCOM; Alaska DHS&EM; FEMA Region X; Denali Commission; Indian Health Service (Alaska Area); Ted Stevens Center for Arctic Security Studies; PSEMA

Integrated Civil–Military Exercise Series Stressing Societal Sustainment Thresholds

Description: Build an integrated civil–military exercise series that explicitly stresses societal sustainment thresholds, family separation, household-level scarcity, behavioral health pressure, and tribal–installation–state authority adjudication, rather than treating these as second-order assumptions in infrastructure-focused exercises.

Five Criteria Framework Tags:

Mission Impact: High (institutionalizes societal-threshold validation)

Cascade Risk: High (addresses paper-redundancy condition at sustained-exercise scale)

Time Sensitivity: Moderate

Feasibility: High (builds on near-term tabletop validation)

Dual-Use Value: High

Lead Partner(s): USNORTHCOM; Alaska DHS&EM; FEMA Region X

Supporting Partner(s): CISA; Alaska National Guard; tribal governments (under sovereignty, consent, and reciprocity); Defense Health Agency; CNA; RAND Corporation; Naval Postgraduate School; PSEMA

Federal Cross-Sector Supply Chain Coordination Capability

Description: Build a federal cross-sector supply chain coordination capability that integrates household-level sustainment demand, food, fuel, pharmaceuticals, cold-chain medical supply, alongside infrastructure throughput, leveraging FEMA’s Supply Chain Resilience Center and SCAN framework with explicit Arctic continuity-of-society parameters.

Five Criteria Framework Tags:

Mission Impact: High

Cascade Risk: Very High (treats workforce and family-readiness variables as supply chain inputs)

Time Sensitivity: Moderate

Feasibility: Moderate (requires interagency coordination across FEMA, CISA, DoD)

Dual-Use Value: Very High

Lead Partner(s): FEMA (Supply Chain Resilience Center / SCAN); CISA; USNORTHCOM

Supporting Partner(s): Office of the Secretary of Defense (Industrial Base Policy); DoD Defense Coordinating Officer (Region X); Alaska DHS&EM; American Logistics Aid Network (ALAN); PSEMA

Long Term (36 Months or More)

Multi-Year Continuity-of-Society Modeling

Description: Conduct multi-year continuity-of-society modeling that builds on the human-systems dimensions established in this research, family readiness trajectories, behavioral health cascades, tribal governance dynamics, and civilian workforce sustainment, providing the longer-horizon analytical foundation that single-cycle research cannot deliver, including the Community Resilience Index.

Five Criteria Framework Tags:

Mission Impact: High (informs all longer-horizon human-systems decisions)

Cascade Risk: High

Time Sensitivity: Long

Feasibility: High

Dual-Use Value: High

Lead Partner(s): Homeland Defense Institute; Ted Stevens Center for Arctic Security Studies; RAND Corporation

Supporting Partner(s): Naval Postgraduate School; CNA; Penn State Military Families Research Institute; university-based Arctic research centers; Alaska Federation of Natives; tribal governments (under sovereignty, consent, and reciprocity); PSEMA

Longitudinal Family Readiness Studies Under Prolonged Arctic Disruption

Description: Conduct longitudinal family readiness studies that track household-level resilience, FRG-substitute performance, and morale trajectories across extended Arctic deployments and disruption periods producing the empirical foundation against which family readiness investments and policy decisions can be evaluated over multi-year horizons.

Five Criteria Framework Tags:

Mission Impact: High

Cascade Risk: Moderate–High

Time Sensitivity: Long

Feasibility: High (builds on Blue Star Families MFLS and Penn State MFRI baseline frameworks)

Dual-Use Value: High

Lead Partner(s): Penn State Military Families Research Institute; Blue Star Families; Homeland Defense Institute

Supporting Partner(s): USNORTHCOM; Defense Health Agency; RAND Corporation; National Academies of Sciences, Engineering, and Medicine; PSEMA

Operational Piloting of Integrated Human-Systems Resilience Frameworks

Description: Pilot integrated human-systems resilience framework, combining family readiness, civilian workforce continuity, tribal coordination, and civil–military governance, under live operational conditions during federally declared emergencies, large-scale exercises, and Arctic-specific TTX programs, converting frameworks from validated-on-paper to validated-in-operations.

Five Criteria Framework Tags:

Mission Impact: High

Cascade Risk: High (addresses paper-redundancy condition through operational validation)

Time Sensitivity: Moderate

Feasibility: Moderate (requires sustained commitment across multi-community pilots)

Dual-Use Value: High

Lead Partner(s): USNORTHCOM; Alaska DHS&EM; State of Alaska; tribal governments (under sovereignty, consent, and reciprocity)

Supporting Partner(s): Homeland Defense Institute; FEMA Region X; Indian Health Service (Alaska Area); Ted Stevens Center for Arctic Security Studies; RAND Corporation; university-based Arctic research centers; Alaska Federation of Natives; PSEMA

Arctic Societal Sustainment Testbed (Paired with Companion Study Infrastructure Testbed)

Description: Establish an Arctic Societal Sustainment Testbed paired with the companion study's Integrated Arctic Logistics Testbed, the institutional vehicle through which family readiness, tribal partnership, behavioral health, and workforce continuity interventions can be evaluated under realistic Arctic conditions alongside infrastructure and logistics testbed activity.

Five Criteria Framework Tags:

Mission Impact: High

Cascade Risk: High

Time Sensitivity: Long

Feasibility: Moderate (multi-agency, multi-tribal, paired with companion infrastructure testbed)

Dual-Use Value: Very High

Lead Partner(s): Homeland Defense Institute; USNORTHCOM; Ted Stevens Center for Arctic Security Studies

Supporting Partner(s): Cold Regions Research and Engineering Laboratory; RAND Corporation; Naval Postgraduate School; university-based Arctic research centers; Alaska Federation of Natives; tribal governments (under sovereignty, consent, and reciprocity); Alaska Native regional corporations (ASRC, CIRI, Doyon, NANA); PSEMA

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Q1

Military Operations or Command Leadership

Your Perspective1. Which sector best reflects your professional experience?(Select one)

Q2

Command or Senior Leadership

2. What role best describes your perspective in your organization or professional experience?(Select all that apply)

Q3

Reliable energy and heating

Community StabilityFor this survey, an Arctic disruption refers to a prolonged event that limits transportation, energy supply, communications, or resupply to Arctic communities and installations.Community stability refers to the ability of a community to continue basic daily functions and support residents, workforce, and military families through access to essential services.3. During an Arctic disruption, which one capability is most essential to maintaining community stability around military installations or operational areas?(Select one)

Q4

4. If communities or installations were forced to prioritize services during disruption, which capability must be preserved first to sustain both the population and military operations?(Please answer based on the services or capabilities your organization provides.)

Energy, food, medical, communication, transportation.

Q5

Community Dependencies5. From your operational experience, what resources or services are essential for communities and supporting organizations to continue operating during disruption?(Select all that apply)

Supply distribution and delivery networks,
Transportation Access (roads, ports, airfields),
Warehousing / Storage Capacity,
Fuel / Energy Supply,
Communications / Internet connectivity,
Power,
Security,
Water Availability,
Weather Forecasting / Situational Awareness,
Food Supply and Distribution System,
Medical Services,
Workforce Availability

Q6

6. Which of the dependencies identified above would be most difficult to replace or substitute during Arctic conditions?Arctic conditions refer to environments where extreme weather, long distances, and limited infrastructure reduce redundancy and make transportation, communications, energy supply, and logistics difficult to replace if disrupted.(Select all that apply)

Supply distribution and delivery networks,
Transportation Access (roads, ports, airfields),
Fuel / Energy Supply,
Water Availability,
Food Supply and Distribution System,
Workforce Availability

Q7

Early Stress IndicatorsEarly stress indicators are often the first signs that infrastructure systems supporting operations are beginning to degrade during a disruption. 7. During the first days of an Arctic disruption, which warning signs would indicate that the systems your organization depends on are beginning to degrade or fail?(Select all that apply)

Communications or IT system disruptions affecting operations
,
Delays or disruptions in supply deliveries,
Difficulty obtaining fuel, energy, or critical utilities,
Increased operational demand exceeding normal capacity
,
Safety, security, or facility access concerns,
Transportation or logistics interruptions affecting movement of goods or personnel
,
Workforce shortages or employees unable to report to work

Q8

8. During the first days of an Arctic disruption, which warning signs indicate that surrounding communities are beginning to experience strain?(Select all that apply)

Communications or IT system disruptions affecting operations

,

Delays or disruptions in supply deliveries,

Difficulty obtaining fuel, energy, or critical utilities,

Increased operational demand exceeding normal capacity

,

Safety, security, or facility access concerns,

Transportation or logistics interruptions affecting movement of goods or personnel

,

Workforce shortages or employees unable to report to work

Q9

9. When community systems begin to degrade during a prolonged Arctic disruption, which condition typically becomes critical first?(Select one)

Medical care and evacuation capability

Q10

Governance & Coordination10. During Arctic disruptions, where do coordination or decision-making challenges most often occur between organizations responsible for community support or operations?This may include coordination between local or state government, military installations, nonprofit or humanitarian organizations, private-sector operators, Tribal governments.

Government and local coordination and collaboration, primarily the Gov't not considering the local impacts.

Q11

Community Adaption11. When critical services are disrupted, what workarounds or adaptations do organizations or communities typically rely on to continue operating?Examples may include local resource sharing, alternate supply routes, community coordination mechanisms, or emergency support networks.

Resource sharing occurs all of the time but may be balanced when services are disrupted.

Q12

Operational Realities12. What assumptions about Arctic communities or operations are often unrealistic during disruption, such as assumptions about transportation access, workforce availability, infrastructure restoration timelines, communications reliability, or community resilience?

Resource sharing is a poor assumption and risk for the local community with a military mission nearby where they share energy, fuel, etc.

Q13

Strategic Insight13. What one investment, policy change, or coordination improvement would most strengthen resilience in your sector? Who would need to take action? (Select all that apply)

Government (federal, state, local, or tribal),

Industry or private-sector operators,

Joint coordination between government and industry

Q14

14. What do senior decision-makers most often misunderstand about Arctic community resilience and infrastructure disruption that this research should capture?Examples may include misunderstandings about transportation availability, supply chain timelines, workforce capacity, communications reliability, or the time required to restore critical services.

The reliance on sharing of resources between the local community and government.

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Last Modified: Tuesday, March 17, 2026 6:35:11 PM
Time Spent: 00:10:47
IP Address: 98.97.61.138

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Q4

4. If communities were forced to prioritize services, which capability must be preserved first?Examples may include: communications or information systems, fuel and heating, food distribution, transportation access, or medical care.

communications and information systems

Q10

Governance & Coordination10. During Arctic disruptions, where do coordination or decision-making challenges most often occur between organizations or partners involved in response or community support?This may include coordination between government agencies, tribal governments, military organizations, private-sector operators, nonprofit organizations, or community groups.Examples may include challenges related to authority, communication, resource prioritization, or cross-sector coordination.

Lack of inclusion as part of the incident command structures

Q11

Community Adaptation11. When critical services are disrupted, what workarounds or adaptations do organizations or community partners typically rely on to continue operating or supporting communities?Please answer based on your organization's experience or the communities, customers, or partners you support.

reduce hours, transition to remote work, and sheltering of staff to retain operations

Q12

Operational Realities12. What assumptions about Arctic communities or operations are often unrealistic during disruption?Consider assumptions related to transportation access, workforce availability, infrastructure restoration timelines, communications reliability, or community resilience.

assumption that the workforce will show up when their families are impacted

Q14

14. What do decision-makers (military / government leadership) most often misunderstand about Arctic infrastructure disruption that this research should capture?Examples may include misunderstandings about transportation availability, supply chain timelines, workforce capacity, communications reliability, or the time required to restore critical services.

How to address the vulnerable populations involved.

#2**COMPLETE**

Collector: Project 2 Link (Web Link)
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Last Modified: Wednesday, March 18, 2026 7:49:29 AM
Time Spent: 00:09:28
IP Address: 136.226.18.209

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Q4

4. If communities were forced to prioritize services, which capability must be preserved first?Examples may include: communications or information systems, fuel and heating, food distribution, transportation access, or medical care.

Power (fuel/heating)

Q10

Governance & Coordination10. During Arctic disruptions, where do coordination or decision-making challenges most often occur between organizations or partners involved in response or community support?This may include coordination between government agencies, tribal governments, military organizations, private-sector operators, nonprofit organizations, or community groups.Examples may include challenges related to authority, communication, resource prioritization, or cross-sector coordination.

Public-Private Sector coordination

Q11

Community Adaptation11. When critical services are disrupted, what workarounds or adaptations do organizations or community partners typically rely on to continue operating or supporting communities?Please answer based on your organization's experience or the communities, customers, or partners you support.

UNK

Q12

Operational Realities12. What assumptions about Arctic communities or operations are often unrealistic during disruption?Consider assumptions related to transportation access, workforce availability, infrastructure restoration timelines, communications reliability, or community resilience.

Transportation access and supply chain resilience

Q14

14. What do decision-makers (military / government leadership) most often misunderstand about Arctic infrastructure disruption that this research should capture?Examples may include misunderstandings about transportation availability, supply chain timelines, workforce capacity, communications reliability, or the time required to restore critical services.

Limited critical supply nodes (e.g., ports) and no redundant transportation systems.

#3
COMPLETE

Collector:	Project 2 Link (Web Link)
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Last Modified:	Wednesday, March 18, 2026 11:00:40 AM
Time Spent:	00:06:44
IP Address:	96.255.58.156

Page 1

Q4

4. If communities were forced to prioritize services, which capability must be preserved first?Examples may include: communications or information systems, fuel and heating, food distribution, transportation access, or medical care.

communications, energy, transportation

Q10

Governance & Coordination10. During Arctic disruptions, where do coordination or decision-making challenges most often occur between organizations or partners involved in response or community support?This may include coordination between government agencies, tribal governments, military organizations, private-sector operators, nonprofit organizations, or community groups.Examples may include challenges related to authority, communication, resource prioritization, or cross-sector coordination.

interagency coordination and prioritization

Q11

Community Adaptation11. When critical services are disrupted, what workarounds or adaptations do organizations or community partners typically rely on to continue operating or supporting communities?Please answer based on your organization's experience or the communities, customers, or partners you support.

Backup redundancies including food, comms, transport

Q12

Operational Realities12. What assumptions about Arctic communities or operations are often unrealistic during disruption?Consider assumptions related to transportation access, workforce availability, infrastructure restoration timelines, communications reliability, or community resilience.

mobility

Q14

14. What do decision-makers (military / government leadership) most often misunderstand about Arctic infrastructure disruption that this research should capture?Examples may include misunderstandings about transportation availability, supply chain timelines, workforce capacity, communications reliability, or the time required to restore critical services.

changes to Arctic environment / ice melt implications

#4

COMPLETE

Collector:	Project 2 Link (Web Link)
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Last Modified:	Friday, March 20, 2026 8:53:20 AM
Time Spent:	00:15:48
IP Address:	208.189.196.98

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Q4

4. If communities were forced to prioritize services, which capability must be preserved first?Examples may include: communications or information systems, fuel and heating, food distribution, transportation access, or medical care.

Fuel & Heating

Q10

Governance & Coordination10. During Arctic disruptions, where do coordination or decision-making challenges most often occur between organizations or partners involved in response or community support?This may include coordination between government agencies, tribal governments, military organizations, private-sector operators, nonprofit organizations, or community groups.Examples may include challenges related to authority, communication, resource prioritization, or cross-sector coordination.

Authority disputes, resource prioritization

Q11

Community Adaptation11. When critical services are disrupted, what workarounds or adaptations do organizations or community partners typically rely on to continue operating or supporting communities?Please answer based on your organization's experience or the communities, customers, or partners you support.

Locals and individuals who step up to the challenge

Q12

Operational Realities12. What assumptions about Arctic communities or operations are often unrealistic during disruption?Consider assumptions related to transportation access, workforce availability, infrastructure restoration timelines, communications reliability, or community resilience.

Infrastructure restoration due to limited outside access & remote areas

Q14

14. What do decision-makers (military / government leadership) most often misunderstand about Arctic infrastructure disruption that this research should capture?Examples may include misunderstandings about transportation availability, supply chain timelines, workforce capacity, communications reliability, or the time required to restore critical services.

Lack of access of private sector and NGO's outside of AK to remote areas

#5**COMPLETE**

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Q4

4. If communities were forced to prioritize services, which capability must be preserved first?Examples may include: communications or information systems, fuel and heating, food distribution, transportation access, or medical care.

Communications

Q10

Respondent skipped this question

Governance & Coordination10. During Arctic disruptions, where do coordination or decision-making challenges most often occur between organizations or partners involved in response or community support?This may include coordination between government agencies, tribal governments, military organizations, private-sector operators, nonprofit organizations, or community groups.Examples may include challenges related to authority, communication, resource prioritization, or cross-sector coordination.

Q11

Community Adaptation11. When critical services are disrupted, what workarounds or adaptations do organizations or community partners typically rely on to continue operating or supporting communities?Please answer based on your organization's experience or the communities, customers, or partners you support.

similar businesses with like resources

Q12

Respondent skipped this question

Operational Realities12. What assumptions about Arctic communities or operations are often unrealistic during disruption?Consider assumptions related to transportation access, workforce availability, infrastructure restoration timelines, communications reliability, or community resilience.

Q14

Respondent skipped this question

14. What do decision-makers (military / government leadership) most often misunderstand about Arctic infrastructure disruption that this research should capture? Examples may include misunderstandings about transportation availability, supply chain timelines, workforce capacity, communications reliability, or the time required to restore critical services.

#6

COMPLETE

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IP Address: 174.70.138.17

Page 1

Q4

4. If communities were forced to prioritize services, which capability must be preserved first?Examples may include: communications or information systems, fuel and heating, food distribution, transportation access, or medical care.

Fuel and heating

Q10

Governance & Coordination10. During Arctic disruptions, where do coordination or decision-making challenges most often occur between organizations or partners involved in response or community support?This may include coordination between government agencies, tribal governments, military organizations, private-sector operators, nonprofit organizations, or community groups.Examples may include challenges related to authority, communication, resource prioritization, or cross-sector coordination.

Agreement across government organization on resource allocation. Having a common operating picture to identify those in the biggest need verses those best connected getting their request in first.

Q11

Community Adaptation11. When critical services are disrupted, what workarounds or adaptations do organizations or community partners typically rely on to continue operating or supporting communities?Please answer based on your organization's experience or the communities, customers, or partners you support.

Flexibility in systems and transportation rules are critical to allowing organizations to solve problems. A box of rules restrain creative solutions. Letting enablers to be in the room when people recognize that they are blocked by their policies and procedures from performing task obviously needed to be done.

Q12

Operational Realities12. What assumptions about Arctic communities or operations are often unrealistic during disruption?Consider assumptions related to transportation access, workforce availability, infrastructure restoration timelines, communications reliability, or community resilience.

Transportation access is a huge obstacle to solve. The military is the main solution in the Arctic and their ability to be flexible is a huge factor on success.

Q14

14. What do decision-makers (military / government leadership) most often misunderstand about Arctic infrastructure disruption that this research should capture?Examples may include misunderstandings about transportation availability, supply chain timelines, workforce capacity, communications reliability, or the time required to restore critical services.

The transportation availability is one of the biggest enablers in an Arctic response. The coordination and resource availability is extremely critical.

#7**COMPLETE**

Collector: Project 2 Email Invite 2 (Email)
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Time Spent: 00:14:05
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Q4

4. If communities were forced to prioritize services, which capability must be preserved first?Examples may include: communications or information systems, fuel and heating, food distribution, transportation access, or medical care.

For communities at large basic services are essential to be preserved. Food, Water, Safe Sheltering, and Medical Care, Transportation

Q10

Governance & Coordination10. During Arctic disruptions, where do coordination or decision-making challenges most often occur between organizations or partners involved in response or community support?This may include coordination between government agencies, tribal governments, military organizations, private-sector operators, nonprofit organizations, or community groups.Examples may include challenges related to authority, communication, resource prioritization, or cross-sector coordination.

coordination and response to citizens on the county and city level

Q11

Community Adaptation11. When critical services are disrupted, what workarounds or adaptations do organizations or community partners typically rely on to continue operating or supporting communities?Please answer based on your organization's experience or the communities, customers, or partners you support.

Pre-established relationships between stakeholders

Q12

Operational Realities12. What assumptions about Arctic communities or operations are often unrealistic during disruption?Consider assumptions related to transportation access, workforce availability, infrastructure restoration timelines, communications reliability, or community resilience.

Assumptions associated with workforce availability

Q14

14. What do decision-makers (military / government leadership) most often misunderstand about Arctic infrastructure disruption that this research should capture?Examples may include misunderstandings about transportation availability, supply chain timelines, workforce capacity, communications reliability, or the time required to restore critical services.

Lack of situational awareness and hazard vulnerabiliti. Unless you live in the Artic you would not have a good understanding of the threat of cascading impacts to other sectors.

#8

COMPLETE

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Q4

4. If communities were forced to prioritize services, which capability must be preserved first?Examples may include: communications or information systems, fuel and heating, food distribution, transportation access, or medical care.

Food distribution - virtually everything is imported. Whether on an actual island or not, it is an island. So transportation is the great enabler. While power in general runs much of modern society, I see the arctic as a frontier where infrastructure is often disrupted.

Q10

Governance & Coordination10. During Arctic disruptions, where do coordination or decision-making challenges most often occur between organizations or partners involved in response or community support?This may include coordination between government agencies, tribal governments, military organizations, private-sector operators, nonprofit organizations, or community groups.Examples may include challenges related to authority, communication, resource prioritization, or cross-sector coordination.

Vertical coordination in which locals (maybe in a small community) have different priorities than higher levels (the total population). Horizontally, organizations must compete for the same limited resources and small pipeline to move them.

Q11

Community Adaptation11. When critical services are disrupted, what workarounds or adaptations do organizations or community partners typically rely on to continue operating or supporting communities?Please answer based on your organization's experience or the communities, customers, or partners you support.

The ingenuity, resilience, and teamwork of individuals in a community makes the biggest difference.

Q12

Operational Realities12. What assumptions about Arctic communities or operations are often unrealistic during disruption?Consider assumptions related to transportation access, workforce availability, infrastructure restoration timelines, communications reliability, or community resilience.

Having worked disasters in Pacific Islands, I assume the same bad assumption may persist that there is the same level of logistical throughput capability as CONUS. Do to limited logistics capabilities, every lode must be prioritized.

Q14

14. What do decision-makers (military / government leadership) most often misunderstand about Arctic infrastructure disruption that this research should capture?Examples may include misunderstandings about transportation availability, supply chain timelines, workforce capacity, communications reliability, or the time required to restore critical services.

Again, based on my experience, it is all about understanding the capabilities and limitations of logistics. We need to prioritize what needs to go first and in what amounts. There is an interplay. You don't start at the top and work down. You have to move things at all priority levels to some extent. That mixed load planning takes some art and science.

#9

COMPLETE

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Q4

4. If communities were forced to prioritize services, which capability must be preserved first?Examples may include: communications or information systems, fuel and heating, food distribution, transportation access, or medical care.

Community Lifelines. Time of incident may dictate fuel & heating, however, communications - voice or digital is important to let others know what is the need. Shelter, hydration, and sustenance are basic.

Q10

Governance & Coordination10. During Arctic disruptions, where do coordination or decision-making challenges most often occur between organizations or partners involved in response or community support?This may include coordination between government agencies, tribal governments, military organizations, private-sector operators, nonprofit organizations, or community groups.Examples may include challenges related to authority, communication, resource prioritization, or cross-sector coordination.

Restrictions for community and also placed upon private sector

Q11

Community Adaptation11. When critical services are disrupted, what workarounds or adaptations do organizations or community partners typically rely on to continue operating or supporting communities?Please answer based on your organization's experience or the communities, customers, or partners you support.

Public Sector desires to direct/prioritize private sector assets as they see fit.

Q12

Operational Realities12. What assumptions about Arctic communities or operations are often unrealistic during disruption?Consider assumptions related to transportation access, workforce availability, infrastructure restoration timelines, communications reliability, or community resilience.

That private sector normalcy can occur overnight if restrictions are lifted

Q14

14. What do decision-makers (military / government leadership) most often misunderstand about Arctic infrastructure disruption that this research should capture?Examples may include misunderstandings about transportation availability, supply chain timelines, workforce capacity, communications reliability, or the time required to restore critical services.

Private sector capacity and capability. That often the Public Sector is the roadblock because they feel they are the decision makers for the private sector operation.

#10

COMPLETE

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Q4

4. If communities were forced to prioritize services, which capability must be preserved first?Examples may include: communications or information systems, fuel and heating, food distribution, transportation access, or medical care.

Transportation Access, then health and medical

Q10

Respondent skipped this question

Governance & Coordination10. During Arctic disruptions, where do coordination or decision-making challenges most often occur between organizations or partners involved in response or community support?This may include coordination between government agencies, tribal governments, military organizations, private-sector operators, nonprofit organizations, or community groups.Examples may include challenges related to authority, communication, resource prioritization, or cross-sector coordination.

Q11

Respondent skipped this question

Community Adaptation11. When critical services are disrupted, what workarounds or adaptations do organizations or community partners typically rely on to continue operating or supporting communities?Please answer based on your organization's experience or the communities, customers, or partners you support.

Q12

Respondent skipped this question

Operational Realities12. What assumptions about Arctic communities or operations are often unrealistic during disruption?Consider assumptions related to transportation access, workforce availability, infrastructure restoration timelines, communications reliability, or community resilience.

Q14

Respondent skipped this question

14. What do decision-makers (military / government leadership) most often misunderstand about Arctic infrastructure disruption that this research should capture? Examples may include misunderstandings about transportation availability, supply chain timelines, workforce capacity, communications reliability, or the time required to restore critical services.

#11

COMPLETE

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Time Spent: 00:03:44
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Q4

4. If communities were forced to prioritize services, which capability must be preserved first?Examples may include: communications or information systems, fuel and heating, food distribution, transportation access, or medical care.

communications, power, transportation, and finance. IF those are working everything else can be addressed

Q10

Respondent skipped this question

Governance & Coordination10. During Arctic disruptions, where do coordination or decision-making challenges most often occur between organizations or partners involved in response or community support?This may include coordination between government agencies, tribal governments, military organizations, private-sector operators, nonprofit organizations, or community groups.Examples may include challenges related to authority, communication, resource prioritization, or cross-sector coordination.

Q11

Respondent skipped this question

Community Adaptation11. When critical services are disrupted, what workarounds or adaptations do organizations or community partners typically rely on to continue operating or supporting communities?Please answer based on your organization's experience or the communities, customers, or partners you support.

Q12

Respondent skipped this question

Operational Realities12. What assumptions about Arctic communities or operations are often unrealistic during disruption?Consider assumptions related to transportation access, workforce availability, infrastructure restoration timelines, communications reliability, or community resilience.

Q14

Respondent skipped this question

14. What do decision-makers (military / government leadership) most often misunderstand about Arctic infrastructure disruption that this research should capture? Examples may include misunderstandings about transportation availability, supply chain timelines, workforce capacity, communications reliability, or the time required to restore critical services.

#12**COMPLETE**

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Last Modified: Monday, April 27, 2026 5:02:47 PM
Time Spent: 00:45:14
IP Address: 38.25.56.206

Page 1

Q4

4. If communities were forced to prioritize services, which capability must be preserved first?Examples may include: communications or information systems, fuel and heating, food distribution, transportation access, or medical care.

food distribution

Q10

Governance & Coordination10. During Arctic disruptions, where do coordination or decision-making challenges most often occur between organizations or partners involved in response or community support?This may include coordination between government agencies, tribal governments, military organizations, private-sector operators, nonprofit organizations, or community groups.Examples may include challenges related to authority, communication, resource prioritization, or cross-sector coordination.

authority-related challenges when it comes to a multi-level government approach (federal, state, local, tribal), and the inclusion of stakeholders (communities, non-profits, and policy makers).

Q11

Community Adaptation11. When critical services are disrupted, what workarounds or adaptations do organizations or community partners typically rely on to continue operating or supporting communities?Please answer based on your organization's experience or the communities, customers, or partners you support.

Community and household level capital funds for emergencies.

Q12

Operational Realities12. What assumptions about Arctic communities or operations are often unrealistic during disruption?Consider assumptions related to transportation access, workforce availability, infrastructure restoration timelines, communications reliability, or community resilience.

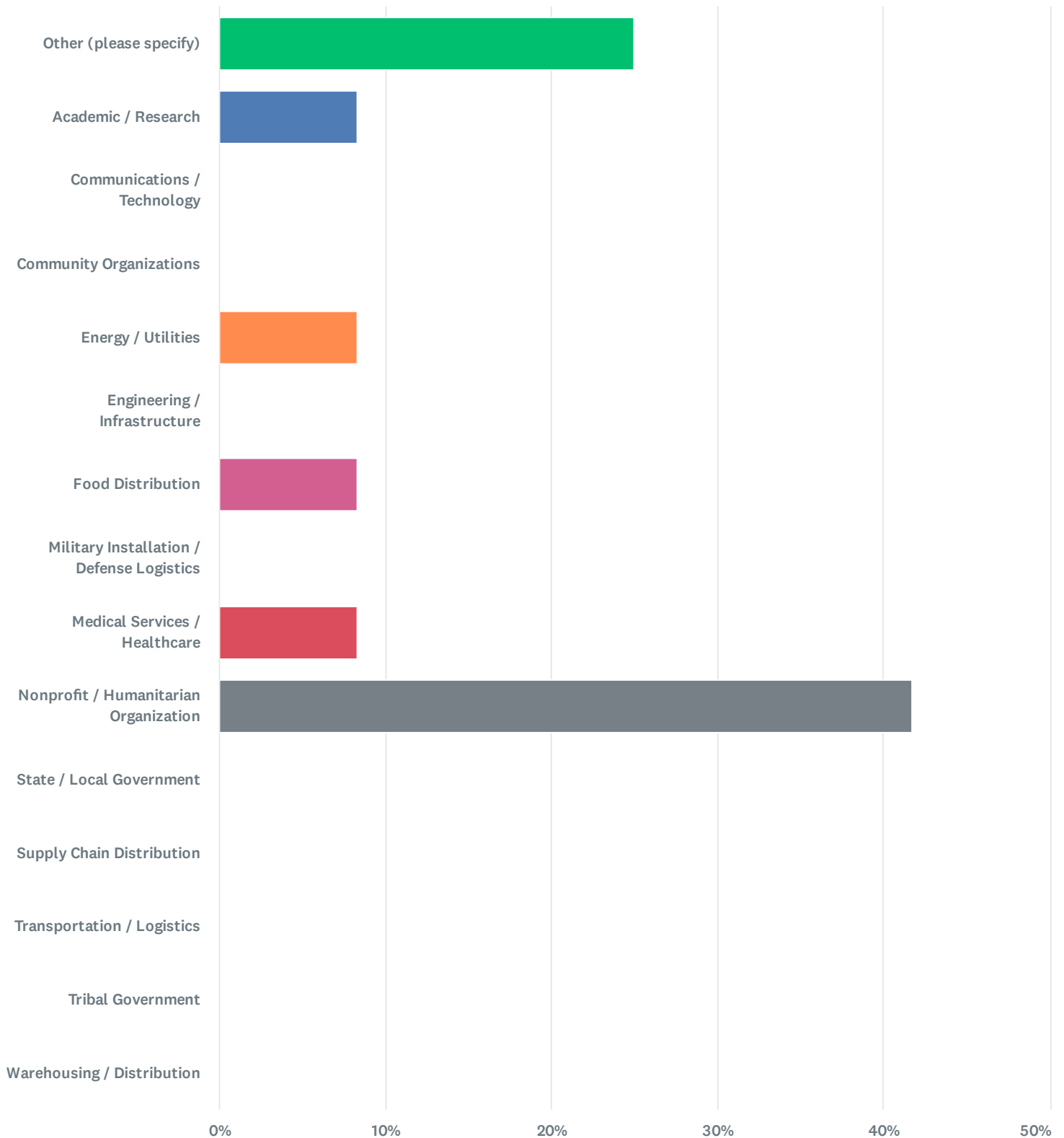
restoration timelines may be extended due to harsh weather conditions in the north.

Q14

14. What do decision-makers (military / government leadership) most often misunderstand about Arctic infrastructure disruption that this research should capture?Examples may include misunderstandings about transportation availability, supply chain timelines, workforce capacity, communications reliability, or the time required to restore critical services.

time required to restore critical services under extreme temperatures.

Q1
12 responses
Your Perspective1. Which sector best represents your perspective?(Select one)



RESPONSES (0)

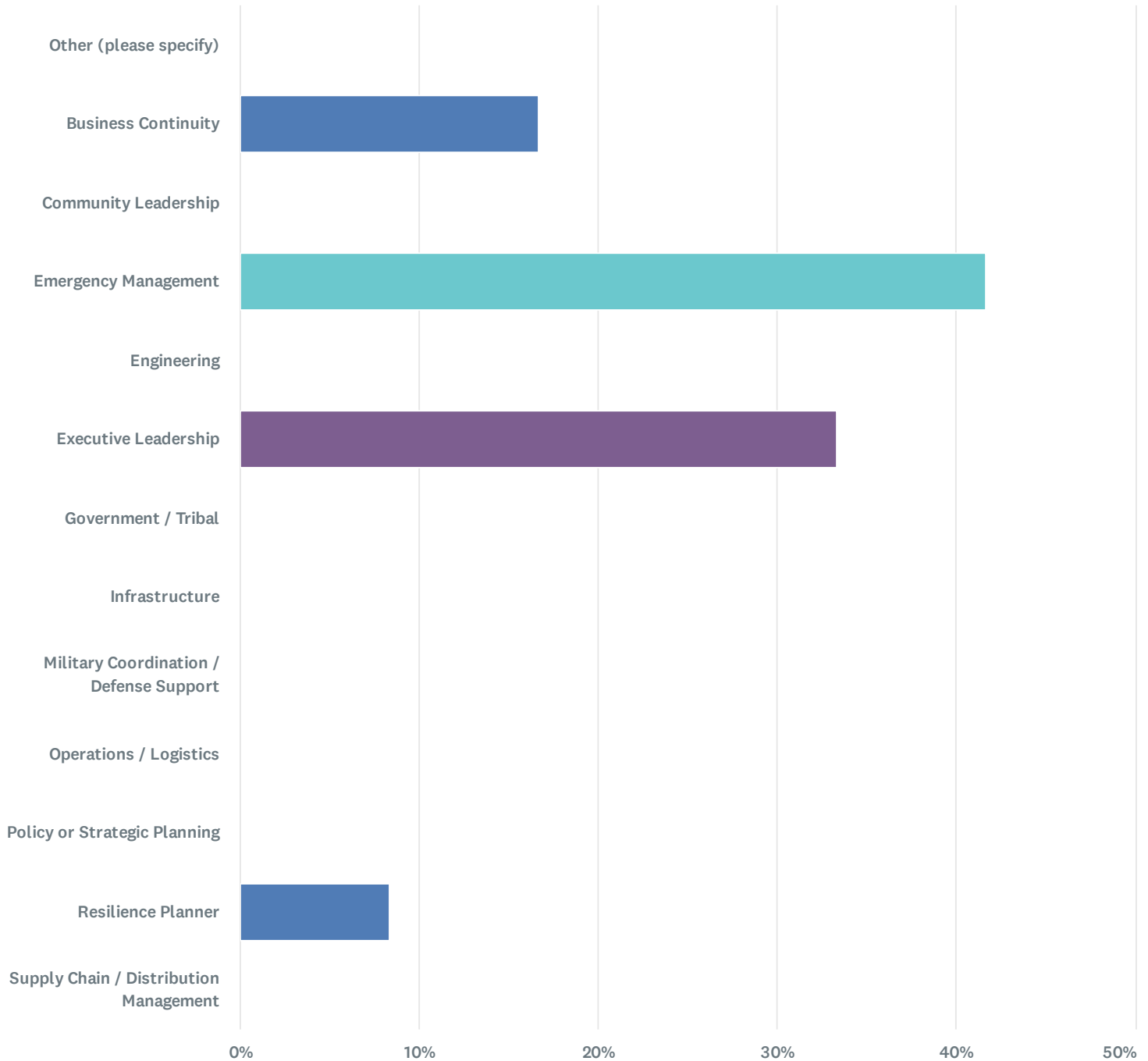
WORD CLOUD

TAGS (0)

Q2

12 responses

2. What role best describes your perspective in your organization or professional experience?(Select one)



RESPONSES (0)

WORD CLOUD

TAGS (0)



Filter: by tag ▼

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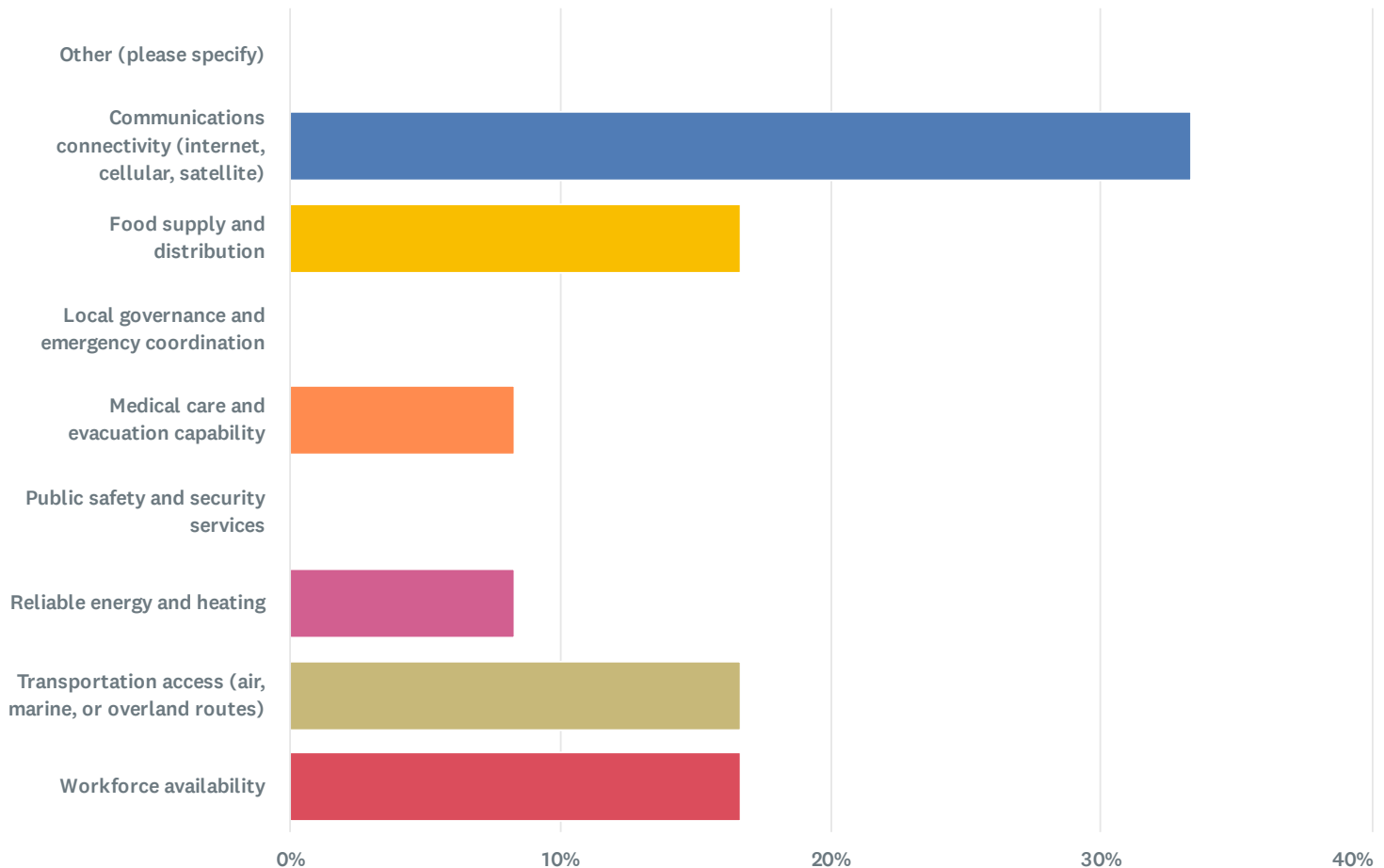


No responses yet

Q3

12 responses

Community StabilityFor this survey, an Arctic disruption refers to a prolonged event that limits transportation, energy supply, communications, or resupply to Arctic communities and installations.Community stability refers to the ability of a community to continue basic daily functions and support residents, workforce, and military families through access to essential services.³ During an Arctic disruption, which one service or capability would be most essential to maintaining community stability from your organization's perspective?(Select one)



RESPONSES (0)

WORD CLOUD

TAGS (0)



Filter: by tag ▼

by sentiment ▼

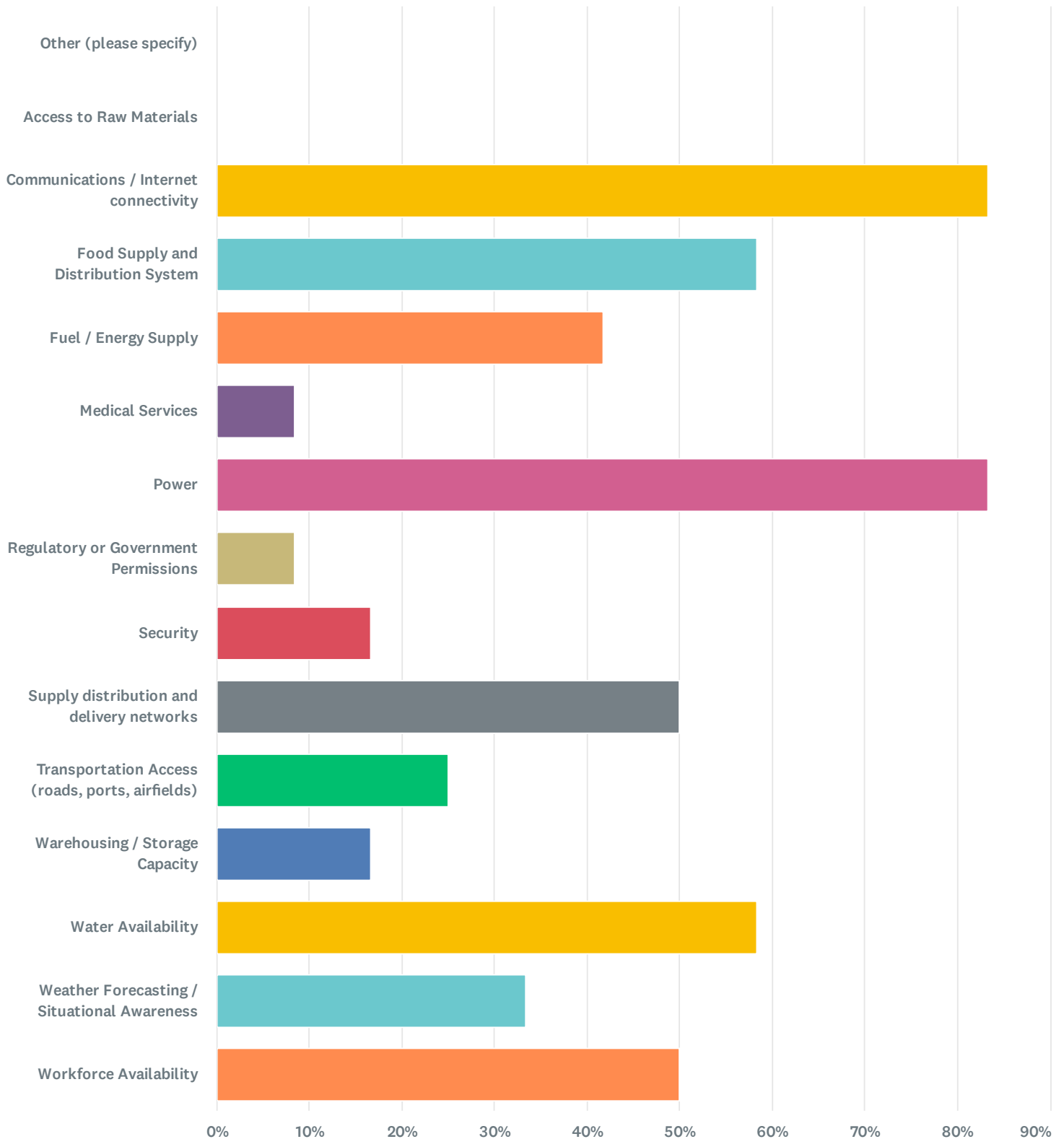


No responses yet

Q5

12 responses

Community Dependencies5. What resources or services are essential for your organization or community to continue operating during disruption?(Select all that apply)

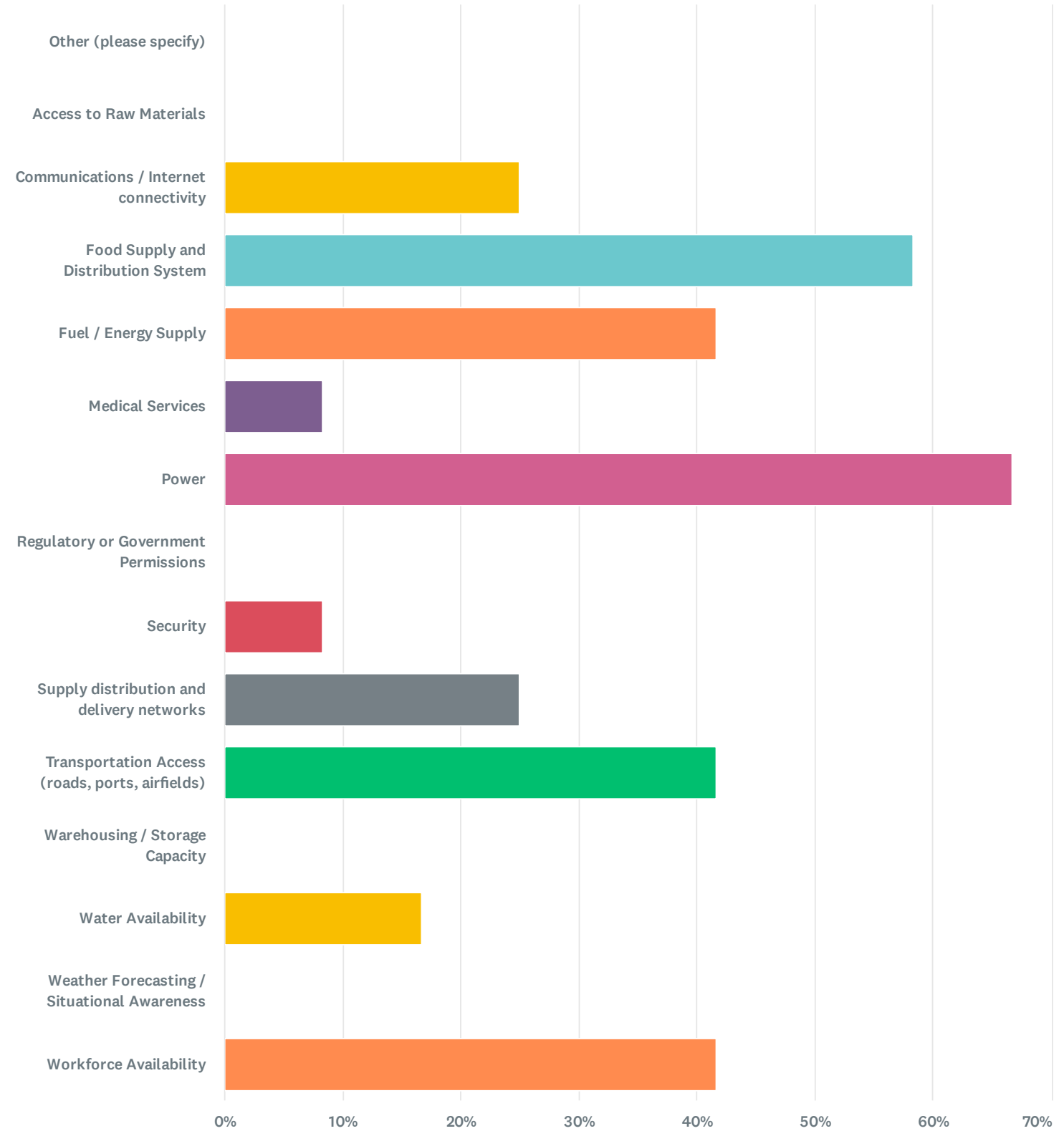


Q6

12 responses

6. Which of these dependencies would be most difficult to replace or work around during Arctic conditions?Arctic conditions refer to environments where extreme weather, long distances, and limited infrastructure reduce redundancy and make transportation, communications, energy supply, and logistics difficult to replace if disrupted. (Select up to three)

Multi-Modal Resiliency & Continuity of SocietyStakeholder Input Survey



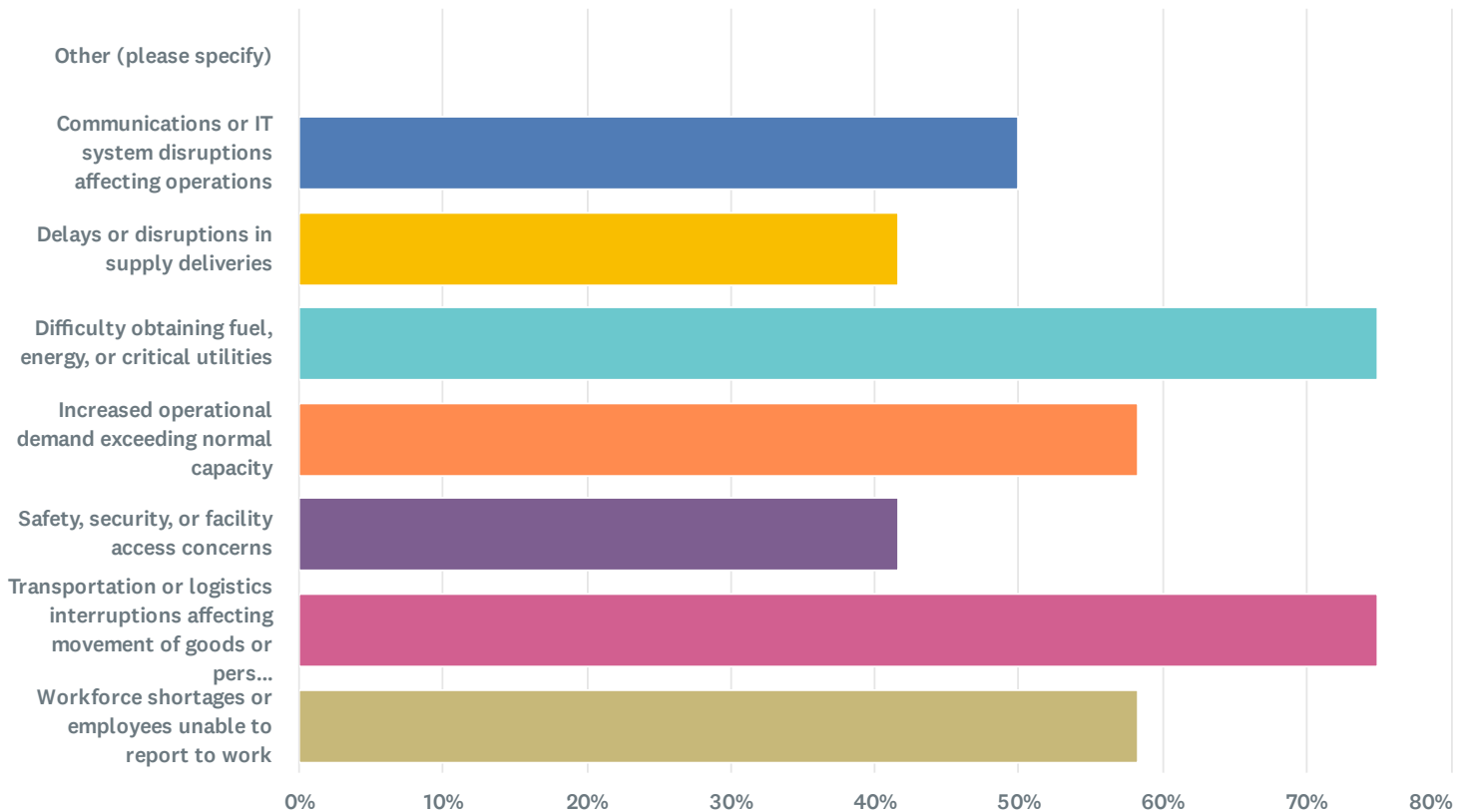
RESPONSES (0) WORD CLOUD TAGS (0)

? Filter: by tag ▼ by sentiment ▼

Q7

12 responses

Early Stress IndicatorsEarly stress indicators are often the first signs that systems are beginning to degrade during a disruption. The following questions focus on what you observe within your organization and within the surrounding community.7. During the first days of a disruption, which early warning signs indicate that your organization's operations are beginning to experience strain?(Select all that apply)



RESPONSES (0)

WORD CLOUD

TAGS (0)



Filter: by tag ▼

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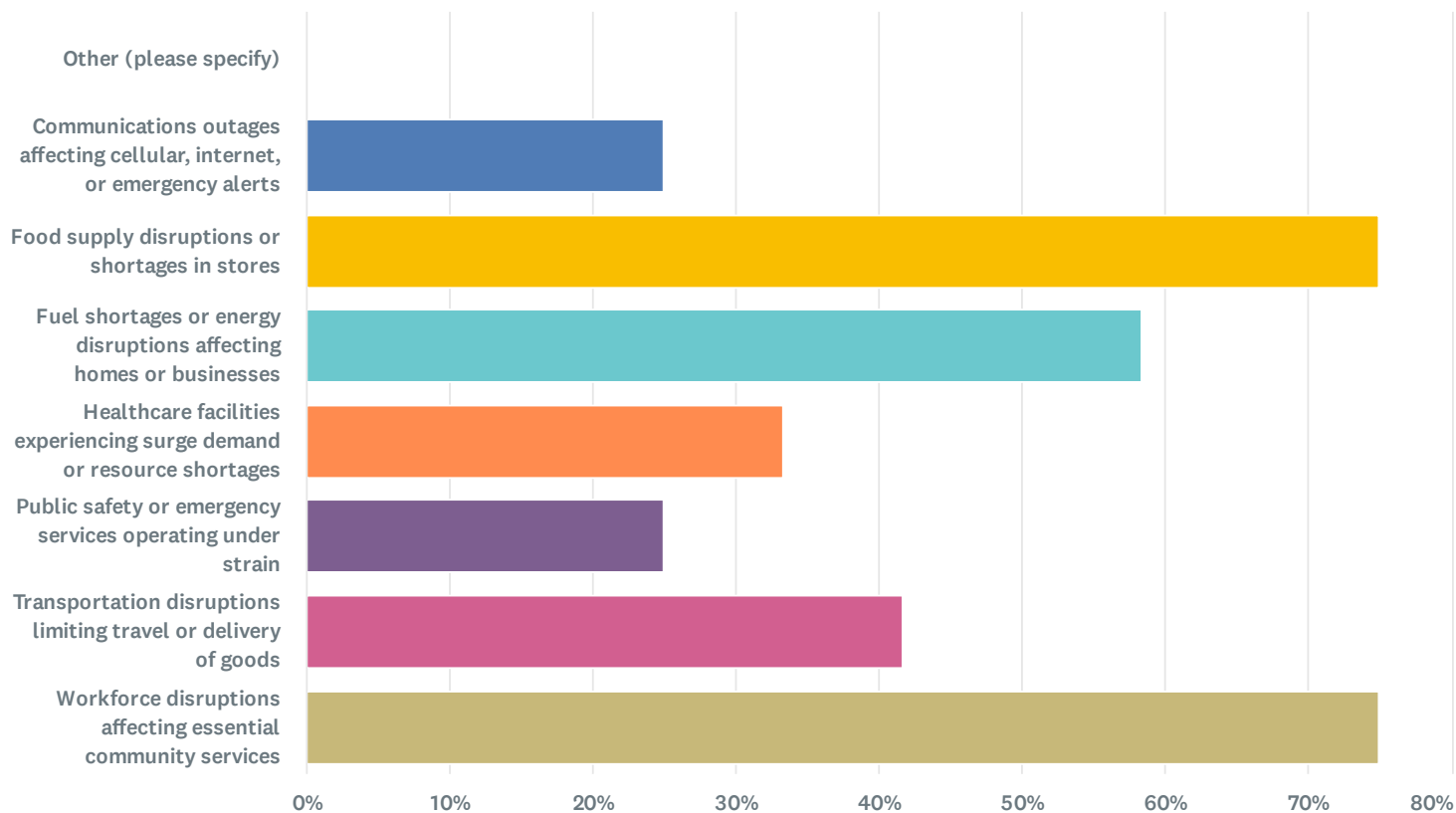


No responses yet

Q8

12 responses

8. During the first days of a disruption, which early warning signs indicate that the surrounding community is beginning to experience strain?(Select all that apply)



RESPONSES (0)

WORD CLOUD

TAGS (0)



Filter: by tag ▼

by sentiment ▼

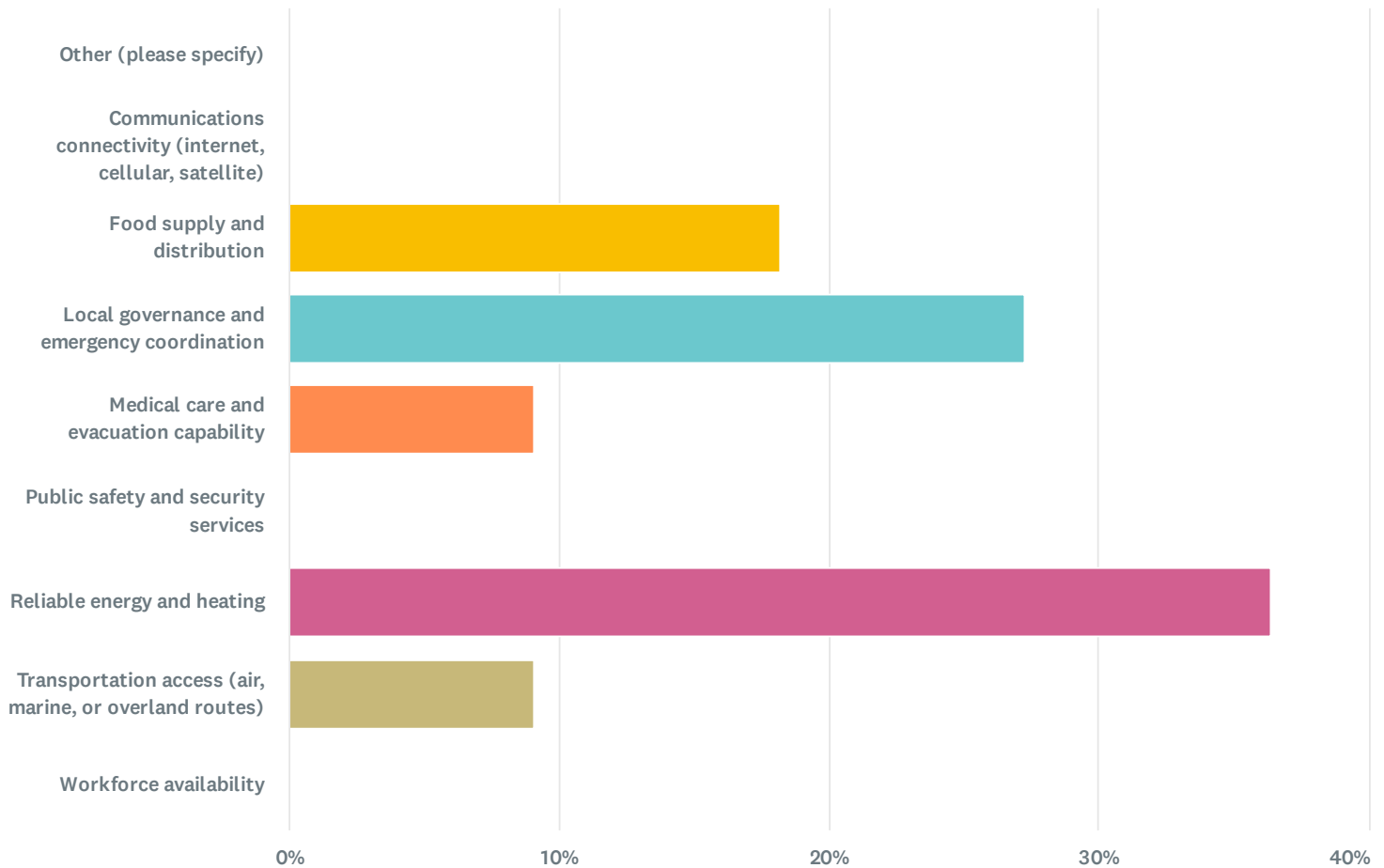


No responses yet

Q9

11 responses

9. When community systems begin to degrade during a prolonged Arctic disruption, which conditions typically becomes critical first?(Select one)



RESPONSES (0)

WORD CLOUD

TAGS (0)



Filter: by tag ▼

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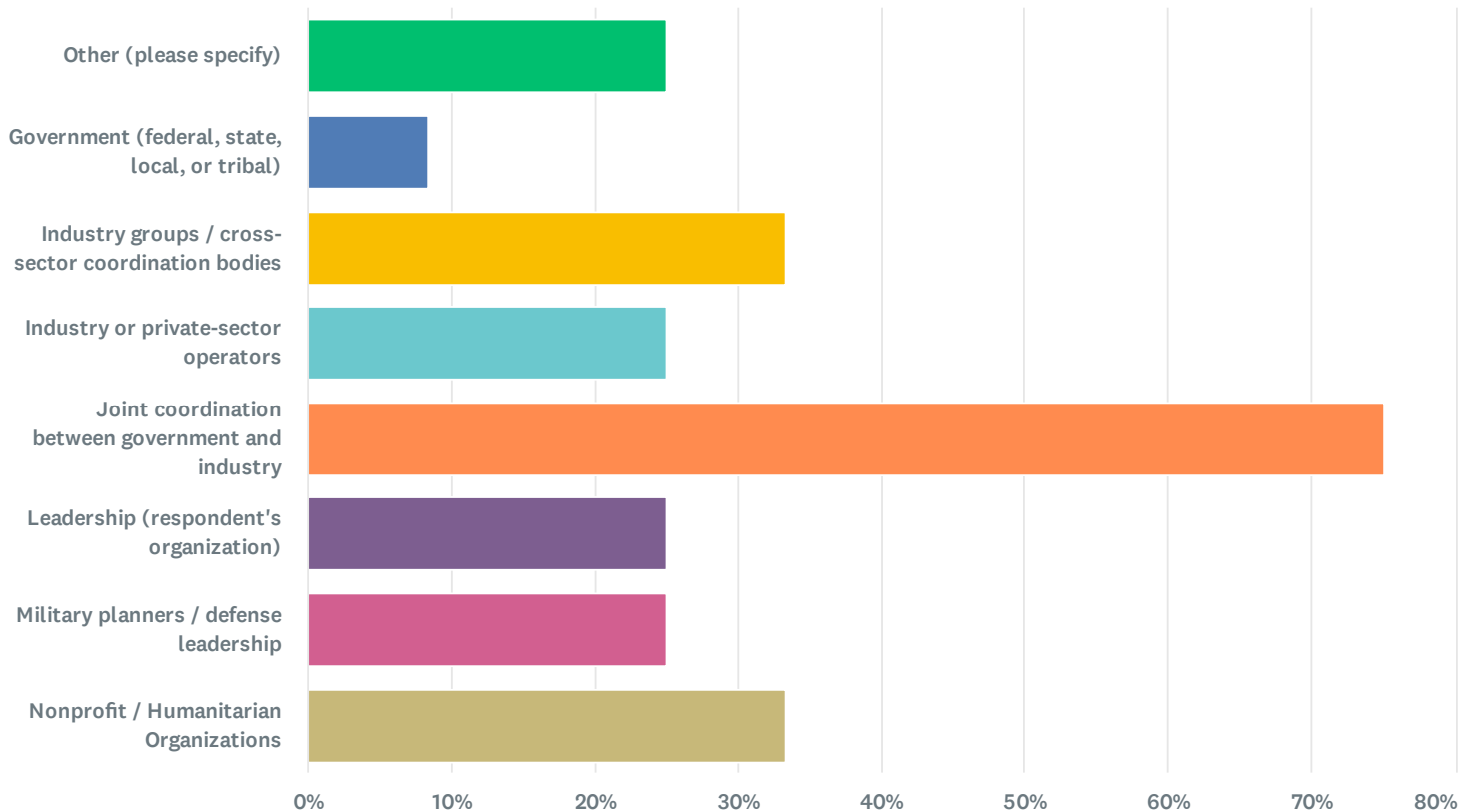


No responses yet

Q13

12 responses

Strategic Insight13. What one investment, policy change, or coordination improvement would most strengthen resilience in your sector? Who would need to take action?Examples may include infrastructure investment, regulatory change, improved coordination mechanisms, or new communication protocols.(Select all that apply)



RESPONSES (0)

WORD CLOUD

TAGS (0)



Filter: by tag ▼

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No responses yet