POLICY PAPER

Data-driven subnational decision-making in the Arctic

The standards of data applicability and understandability

Pavel Tkach and Adam Stepien, Arctic Centre of the University of Lapland

ARCTIC PASSION

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101003472

ARCTIC CENTRE
University of Lapland

Contents

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Tromsø cityscape. Photo © iStock/mantaphoto.

Executive summary

This policy paper is about messages subnational policymakers, managers, and experts would like to convey to data and knowledge producers in the Arctic.

The language of science and research, with its intricate and academic terminology, is yielding to the language of everyday communication. This phenomenon is not a reflection of the literacy level of policymakers in the Arctic but rather the result of municipal managers' inability to spare additional time to use dictionaries or seek assistance from scientific institutions in interpreting the incoming data and knowledge. Consequently, overly technical reports, with an abundance of numbers and formulas, inhibit the decision-making processes and contribute to the need for additional work for municipal managers, who are tasked with translating data and scientific reports to fit requirements for policymakers. Moreover, the scope of work of municipal managers also includes ongoing communication with policymakers, necessitating their understanding of not only the content of scientific output(s) or data but also the data background and methodologies applied in its collection. The consultations conducted by the University of Lapland Arctic PASSION team with local/regional stakeholders indicated that existing approaches to data and report production are unsuitable for stakeholders who lack an extensive academic background. The purpose of this policy paper is to elaborate on the primary messages about data/reports production received by the University of Lapland team from subnational managers and decision-makers. The overall message includes the request for R&D projects, such as Arctic PASSION, to have a "human face - simple and attentive to local needs" in scientific outcomes and products that will be disseminated to municipal and regional administrations across the Arctic.

The policy paper builds on insights obtained through semi-structured interviews with relevant stakeholders from all Arctic states (except for Russia), as well as on a session and workshop organised by the Arctic PASSION during the Rovaniemi Arctic Spirit Conference in November 2023.

In addition, this policy paper includes an overview of the distribution of responsibilities between different levels of governance and different departments and agencies with respect to the issues of relevance for Arctic PASSION pilot services, including wildfires, lake ice, shipping safety and ambient air quality. Also, national, regional and local policies and legislation relevant to these issues are indicated. The need to have a better overview of the local and regional authorities' responsibilities for various sectors and problems was also raised as a gap by subnational decision-makers during the aforementioned workshop at the Rovaniemi Arctic Spirit Conference. We hope, therefore, that this overview serves Arctic PASSION pilot services in further identification of decision-makers relevant for their work as well as contributes – albeit in a small way - to the cooperation between Arctic municipalities and regions by allowing decision-makers to understand better the role of municipal and regional authorities in governing different Arctic challenges.

Key findings

- The databases that are available on an international and national level, as well as the individual data that is submitted to municipalities, may not always be applicable to the structural and developmental features that are specific to each municipality. In many instances, it is not feasible to downscale data to a concrete locality. This situation necessitates that municipal administrations undertake additional efforts to gather data that is more locally applicable, which can be an arduous and resource-intensive process.
- The use of technical jargon in data reports provided to municipalities has been identified as a potential barrier to full comprehension of the information by policymakers, who typically lack a technical background.
- The key responsibility of experts operating in the environmental, climate, and sustainability departments of municipal administrations is to receive data, reproduce it, and explain to policymakers why the data and the issue at hand are significant and actionable. Having socio-economic conclusions in data reports related to a particular community in question is essential for making further decisions based on the provided data as much actionable as possible.
- Data sources and collection methodologies form the data background to which many policymakers pay attention in their interactions with subnational civil servants and municipal experts. That emphasises the significance of ensuring that data is collected and reported transparently and consistently, especially when used in the context of policymaking.

Introduction

Arctic PASSION aims to bring Arctic Data into action – and data can be relevant for many communities and stakeholders.[1] From the beginning of the project, subnational decision-making authorities in the Arctic have been targeted as future end-users of data and information streamlined and operationalised through different activities carried out in the project. Interviewed stakeholders indeed expressed a need for new or better data related to climate and environmental targets. Nevertheless, from the start of the Arctic PASSION project, among the key concerns of decision-makers was not necessarily the availability of information but rather the lack of understandability[2] and insufficient applicability[3] of data and (or) knowledge produced by scientists and researchers.

Therefore, this policy paper outlines the standards of applicability and understandability of data and knowledge for representatives of regional and municipal administrations working with politicians and policymakers.

The developed policy paper is also relevant for the Arctic PASSION project and for the Pan-Arctic data systems, as it highlights insights of experts (from local climate/environmental/sustainability departments working on synthesising information into reports for policymakers) with respect to the standards and perceptions of understandability and applicability of scientific knowledge. That should benefit the further development of interoperable Arctic data systems and targeted data services.

In addition, the policy paper also provides an overview of the distribution of responsibilities in Arctic jurisdictions for issues covered by selected Arctic PASSION pilot services (wildfires, lake ice safety, ambient air quality, maritime safety).

This overview is to support institutions, data providers and Arctic PASSION researchers in targeting appropriate levels of governance, departments and agencies with respect to promoting data services and engaging decision-makers in their development.

The policy paper opens with a methodology overview and presentation of the collected results, followed by a critical discussion. A table appends this with the overview of the distribution of governance responsibilities for selected issues.

1. Takala, M. (2023). Arctic PASSION Data Management Plan. GitHub. https://github.com/ArcticPASSION/DataManagementPlan/blob/main/ap-dmp.pdf
2. The degree to which data has attributes that enable it to be read and interpreted by users, and are expressed in appropriate languages, symbols and units in a specific context of use (ISO 25000 STANDARDS https://iso25000.com/index.php/en/iso-25000-standards/iso-25012/122-understandability#:~:text=The%20degree%20to%20which%20data,understandability%20are%20provided%20by%20metadata)
3. The fact of being true or useful in a particular case or situation (Oxford Dictionary https://www.oxfordlearnersdictionaries.com/definition/english/applicability)

Methodology and timelines

From the beginning of 2022, the University of Lapland team asked different categories[4] of stakeholders (primarily subnational decision-makers) how scientists can help policymakers. The responses received suggest that data content and data formats are important aspects. A series of semi-structured in-depth interviews was conducted, revolving around two key questions: "What is your primary concern or complaint about the scientific data you are working with?" and "What are your criteria for readability and understandability of data?" 21 experts from the following municipalities and organisations across the Arctic were interviewed between September 2023 and March 2024:

- Alaska Municipal League, USA
- City and Borough of Sitka Administration, Alaska, USA
- Juneau City and Borough Council, Alaska, USA
- Government of Nunavut, Canada
- Whitehorse Municipal Administration, Canada
- Avannaata Municipal Administration, Greenland
- Reykjavik City Administration, Iceland
- Akureyri Municipal Administration, Iceland
- Torshavn Municipal Administration, Faroe Islands
- Faroese Environmental Agency, Faroe Islands
- Narvik Municipal Administration, Norway
- Tromsø Municipal Administration, Norway
- Umeå Municipal Administration, Sweden
- Skellefteå Municipal Administration, Sweden
- Oulu Municipal Administration, Finland

The responsibilities of these experts include the development of executive reports related to climate, environment and (or) sustainable development to support politicians and policymakers in making evidence-based decisions. In other words, these experts are intermediaries between science (data/knowledge they receive from scientific experts) and evidence-based decision-making (conclusions/ recommendations these experts provide to policymakers). The respective stakeholders have been approached by employing previously collected contacts in municipalities across the Arctic and sending direct interview requests. The consultation round also included the discussion with subnational policymakers at the Arctic PASSION workshop, "Science and evidence-based policymaking: towards new steps with the Arctic PASSION project and Arctic Mayors' Forum", organised by the University of Lapland and the Arctic Mayors' Forum at the Rovaniemi Arctic Spirit Conference in November 2023. The workshop report can be found here: https://zenodo.org/records/10635350.

The overview of the legal responsibility has been carried out by researching online legal bases of the Arctic states, investigating academic literature and referring to official webpages of municipalities and regions across the Arctic states.

Arctic spirit conference. Photo © Arctic Centre University of Lapland

4. These categories included Mayors of the Arctic cities, Public servants, Researchers at National Science Institutions and Data Providers, Environmental/Climate/Sustainability Managers working in regional and municipal organisations.

The standards of data applicability and understandability

"A good start would be to make the data readable and understandable for the people/positions it concerns. For example, all informants should be presented with the results they are "part of".

© Representative of Avannaata Municipal Administration, Greenland

"We want to find information in forms that are easily accessible. I think this lack of accessibility is a problem for research in general. It would be useful to have data easier to find/easily reachable and accessible at regional and municipal levels."

© Representative of the Government of Nunavut, Canada

"We would like to have more information on socio-economic indicators for people and societies in the Arctic and maybe also more comparative data."

© Representative of Tromsø Municipal Administration, Norway

Decision-makers' concerns with scientific data and information

Municipal experts argue that **data produced at the international or national level may not always be applicable to specific municipalities**, particularly those located in northern regions of Arctic states. In certain instances, the data cannot be downscaled to the individual municipality. This trend has been evident in discussions with representatives from the United States, Canada, and Sweden. For example, an expert from the City & Borough of Sitka (USA) highlighted that the data concerning emissions and other climate-related indicators received by Sitka is a "downscaled Juneau City & Borough" that does not include the unique structural and developmental features of Sitka, such as its high level of renewables in the local energy mix. Similarly, municipal experts from Whitehorse (Canada) pointed out that data for northern territories of Canada is generally produced for Yukon, Northwest Territories, and Nunavut together, without considering the peculiarities of each territory and different regions within the territories. Therefore, municipal experts should allocate additional time to downscale data to their respective localities if technically feasible. To respond to these challenges, some authorities - for example, Canadian northern municipalities, as well as Swedish municipalities of Umeå and Skellefteå - collaborate with local energy companies to fill in the "applicability gaps".[5]

The interviewees highlighted the **absence of socio-economic conclusions in technical reports** and those dedicated to natural science and environmental processes, such as climate change. The key responsibility of experts operating in the environmental, climate, and sustainability departments of municipal administrations is to receive data, reproduce it, and explain to policymakers why the data and the issue at hand are significant and actionable. The primary focus of policymakers, particularly at the local level, is to enhance living standards and quality of life for the communities they represent. Consequently, their attention is usually centred on the socio-economic conditions of a specific community. The expert from Akureyri, Iceland, explained, *"When it comes to politicians and work with politicians – they are usually concerned about the costs of potential transitions."* Because of that, usually, typical questions politicians ask are: "How that (data/event) will affect our society?" and "What do you think we can do in order to improve the lives of our people?". Many municipal experts have been developing socio-economic implications on their own. However, the process is time-consuming. The use of technical jargon in data reports provided to municipalities has been identified as a potential barrier to full comprehension of the information by policymakers, who typically lack a technical background.

5. Applicability gap refers to apparent inconsistency between conclusions and recommendations provided in a particular report for a municipality/region to local structural and developmental features of the municipality/region in question. Structural and developmental features are supposed to be considered in the process of drafting the report/analysis.

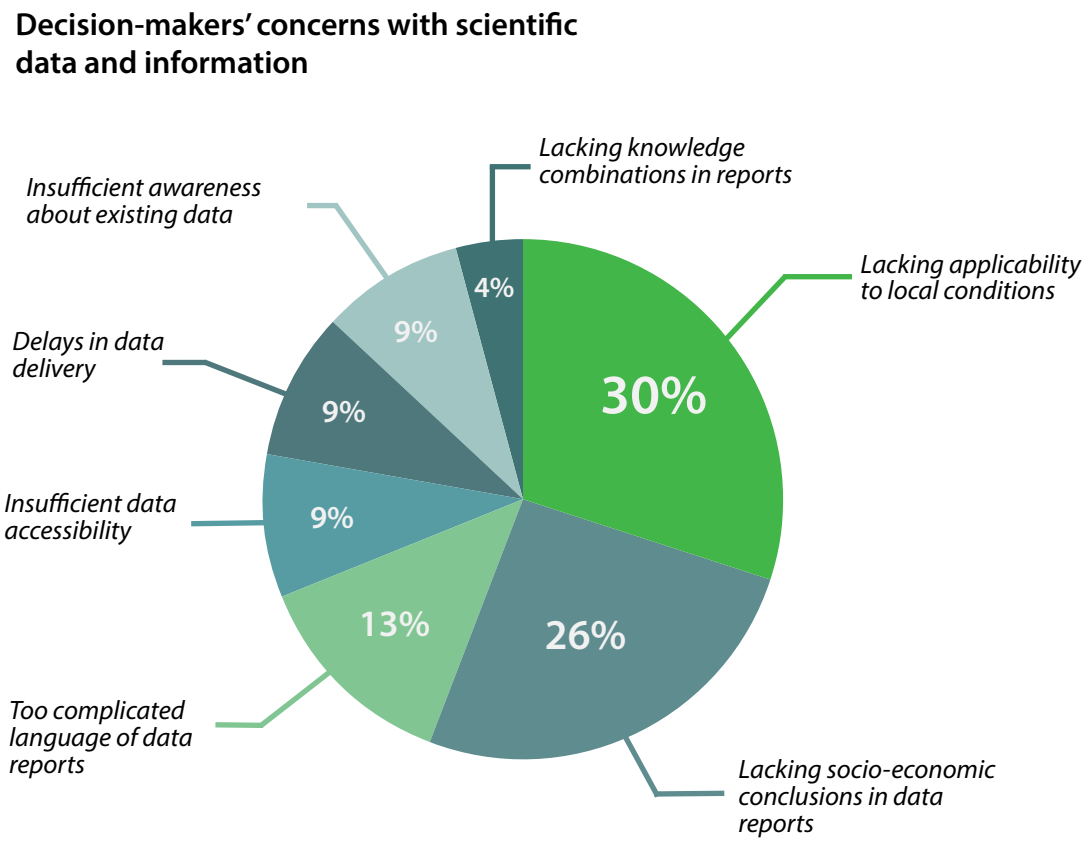

Figure 1. *Responses to the question, "What is your primary concern/complaint about the scientific data you are working with? The percentages indicate the share of respondents who mentioned a given issue as their primary concern.*

Therefore, municipal experts suggested that "science translation" should both comprise simplification of the technical language of scientific reports and incorporate a "human face" into these reports.

The issue of data accessibility is particularly pertinent for municipalities with limited financial and human resources. For example, an expert from the Government of Nunavut, Canada, remarked, "You have to look everywhere for data, and we do not have one place where you can have the data. We want to define what is good information quickly. We want to find information in forms that are easily accessible. I think this lack of accessibility is a problem for research in general. It would be useful to have data easier to find/easily reachable and accessible at regional and municipal levels." Almost all experts interviewed reported experiencing a "databases jungle" at least once in their careers, where they had to allocate additional time to navigate various databases, consider data criteria, and ultimately select the most appropriate option. In addition, experts noted insufficiently developed communication channels. In some cases, people in municipalities were required to fill out contact forms on particular websites and wait weeks for a response from the scientists responsible for providing data. In multigovernmental jurisdictions, such as Alaska (USA), Yukon, NWT and Nunavut, with a lot of open-access databases maintained at different levels of governance, experts highlighted cases where these databases were broken and had not functioned, implying the lack of ongoing control and maintenance over online databases.

The lack of awareness about international open-access databases has emerged as a common concern. Municipal experts and policymakers working within a limited area often do not have an obligation to browse international databases, and finding and accessing such data is deemed overly time-consuming. Nonetheless, municipal experts have expressed their interest in international products and services, but they stressed that more/better information is needed from data providers and developers. The awareness of existing datasets is also relevant for Indigenous communities and their governance structures, where the availability of technical resources can be even more restricted than for Arctic municipalities. Thus, as Alaskan experts emphasised, *"... for the community leaders they may not be aware that there are a lot of datasets that state and federal actors have produced and have available. [...], but also just like capacity, for a lot of our local governments, they are fiscally constrained with resources. And so even if they were aware, it is going to mean little because they are already trying to keep so many things in the air."*

The issue of **the delays in data provision and their impact on setting workloads** has been raised in municipalities experiencing accelerated growth and

People and buildings in Akureyri, Iceland. Photo © iStock/Gestur Gislason.

industrialisation. Such municipalities are characterised by fast-paced population growth and rapid industrial development. For instance, experts from Skellefteå, Sweden, have underscored the importance of up-to-date data in planning decision-making processes, noting that even data that is one year old can become inappropriate or irrelevant for further use. For Norwegian municipalities that develop climate budgets annually, timely access to all emission inventories is highly important. An expert from Narvik municipality noted that lengthy data verification processes complicate further reporting, making it difficult to develop accurate climate budgets. In light of these challenges, it is crucial for municipalities to prioritise the timely access of accurate data to facilitate effective decision-making processes.

The experts from Greenland identified a **significant gap in integrating knowledge and data coming from different research projects and different databases**. The data used in reporting is often generated by international scientists conducting fieldwork, and there is a pressing need for greater collaboration between institutions and projects to ensure more harmonised reporting of new knowledge towards decision-makers. At the very least, scientific reports and data coming from different sources should not contradict each other.

Criteria for readability and understandability of data

This section tackles the question of the characteristics of information that affect its readability and understandability for the specific category of end-users: Arctic local and regional decision-makers.

Municipal experts most often refer in this context to **clearly defined sources of information/data** used in developing findings and analyses. They have highlighted the importance of being able to scrutinise and interpret the data themselves in cases where the data producers have not dealt with all aspects relevant to the particular municipality and/or arrived at inconsistent conclusions. Furthermore, having clearly defined sources is essential for municipal experts to ascertain the reliability of the raw data used in elaborating the given report or project deliverable. Each expert has their own criteria for assessing the reliability of data, which is typically based on their individual experiences. However, very - if not most - often, the perception of reliability is based on the reputation of the data producer. Additionally, part of experts' responsibilities entails communicating with policymakers, and explaining the data background – in terms of reliability, trustworthiness and relevance for a particular locality - is a critical aspect of such communication. This is also due to the strong politicisation of certain topics in policymaking (e.g. regarding climate change), where unreliable or untrustworthy data can have adverse long-term implications for policymaking. Effective communication between experts and decision-makers relies, therefore, on explicitly defining the sources of data or information utilised by data providers.

Another major concern noted by interviewed experts was the **"overtechnicality" of the content**. To ensure that data is understandable and useful, simplicity of structure and text is essential. This is crucial for accurately conveying findings and conclusions and catering to an audience without relevant experience or scientific background. In the development of scientific reports/conclusions, an expert from Juneau City & Borough suggested adapting the communication to a sixth-grade reading level, utilising simple and non-technical language. Simplification of reports enhances comprehension and the effective dissemination of information.

Good quality analyses should **include data interpretation and provide an extensive explanation of how to utilise the data**. An interviewee from Umeå Municipality, Sweden, generalised what policymakers want to know: *"What does it actually mean?" They need more substance in data – what could this data be used for, not just data, but also related tools?"* Those tasked with producing reports/analyses/recommendations for policymakers must be knowledgeable about the application of the data, the relevant tools, and the individuals who can provide further context. Additionally, it is essential to provide a thorough methodological explanation. Different organisations

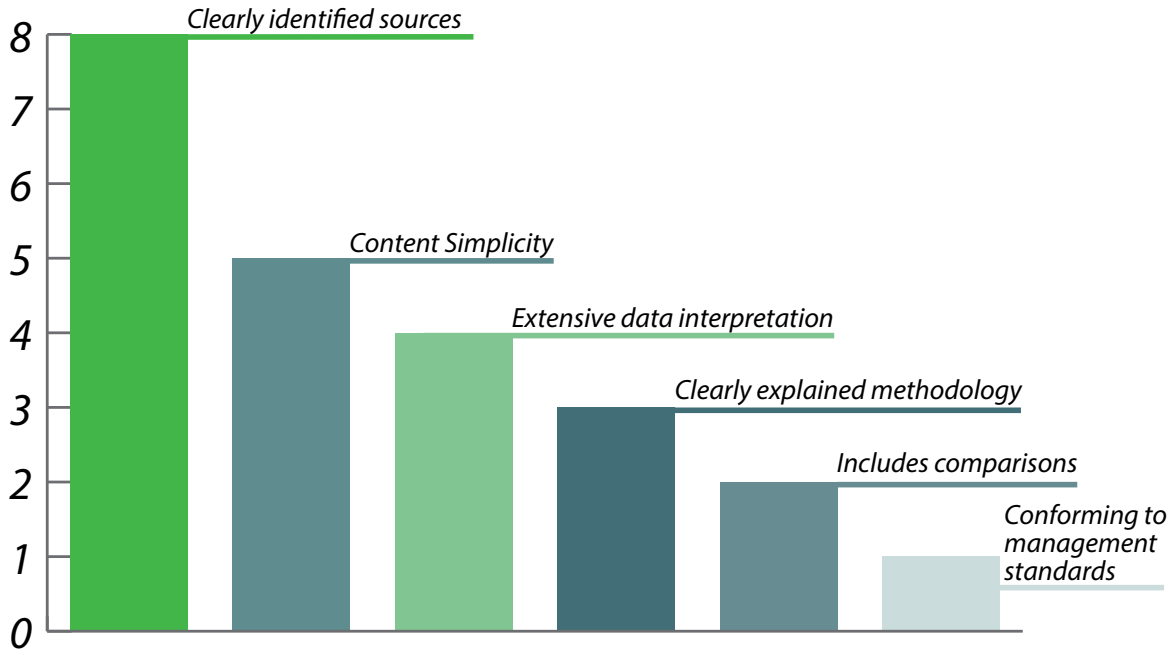

***Figure 2**. Responses to the question, what are your criteria for readability and understandability of data? Maybe you can share some points that data should have to be considered applicable and understandable. The y-axis indicates the number of interviewed persons mentioning a given challenge with data readability and understandability.*

Torshavn. Photo © iStock/Gianfranco Vivi.

utilise different approaches to collect and different models to analyse the same data, which may lead to different conclusions. Policymakers are interested in the methodology employed (albeit presented in a way that is understandable to non-professionals), as well as the sources and the socio-economic impact of specific events and the impacts of potential mitigation measures.

Municipal experts, mostly in Finland, Sweden and Norway, in the development of executive analyses for policymakers tend to integrate some **comparative perspective** into the materials they produce. This perspective is typically applied to the comparison of different municipalities within a single country. However, recent trends indicate that municipal experts are increasingly interested in conducting comparative analyses between their respective municipalities and similar localities across the Arctic. That is expected to enable the benchmarking of challenges across the region as well as facilitate knowledge exchange between municipalities. Ultimately, this is expected to enhance the knowledge exchange between different municipalities. The overview of the distribution of responsibilities between governance levels and agencies/departments, presented at the end of this policy paper, constitutes a small contribution to facilitating comparative perspectives and the exchange of experiences and good practices between Arctic municipalities.

The experts from Sitka, Alaska and Torshavn, Faroe Islands, highlighted that **every jurisdiction can have its own risk assessment and management rules and guidelines**. Usually, internal risk assessment and management rules conform to international guidelines, such as ISO 31000. Therefore, it was mentioned as desirable to have the data and reports/analyses conforming to the global and local risk assessment and management standards so the information received is easily applicable to adopted risk assessment templates/frameworks.

Ideas towards recommendations

It appears that in the policymaking context, the language of science, with its academic terminology, is yielding to the language of everyday communication. That is not a reflection of the literacy level of Arctic policymakers but rather the result of limited time resources of municipal managers to seek assistance from scientific institutions in interpreting the incoming data, information and knowledge. Notably, experts from Iceland, Norway, and Sweden have repeatedly highlighted that policymaking is a dynamic process with time-bound deadlines for adopting specific policies or strategies. In this regard, challenges such as the "information/databases jungle," the absence of clearly identified data sources, and the presence of excessively technical content cause municipal managers to allocate more time for preparatory work for further communication with policymakers. Furthermore, the expectations of municipal and regional administrations towards national and international research projects are evolving. One expectation is for the projects to include a socio-economic dimension. All experts remarked that if the potential project targets subnational decision-makers, the project results should include conclusions about impacts on societal behaviour, potential changes in quality of life and living standards and economic development. The R&D projects are thus expected to be multidisciplinary and reduce the disproportion between natural and social science in the scope of researched issues.

Based on the interactions with Arctic local decision-makers, we propose preliminary ideas towards recommendations on the format and content of the material/information R&D projects and data providers provide to municipal and regional administrations across the Arctic.

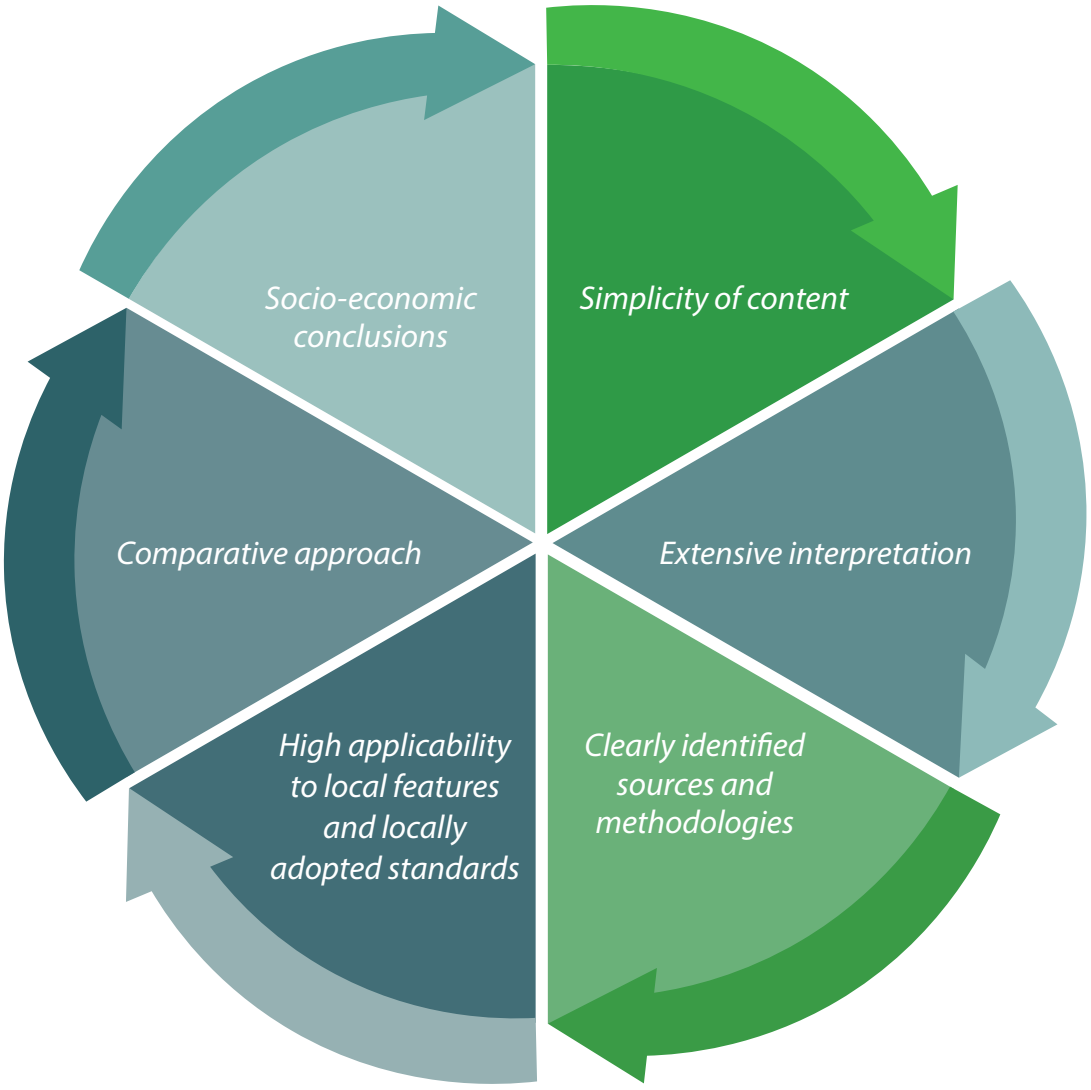

***Figure 3**. Circle of elements of "good-quality" reports for use in municipal/regional administrations.*

- When conducting scientific research, researchers and R&D project teams should consider the implications of their findings on policymaking and politics. To ensure that relevant stakeholders are informed and can make informed decisions, socio-economic perspectives should be included in technical reports and deliverables. To this end, the data producer should address the following questions in the conclusion of the report, analysis or policy paper: "How will the research findings or data impact the socio-economic functioning of the community or location in question?" and "How will the research findings or data impact societal behaviour in the community or location in question?"

- Carefully evaluate the developmental characteristics of every municipality that the data provider/R&D project is investigating for the purpose of generating reports or deliverables. Each observed attribute has the potential to impact the ultimate applicability of research or scientific products to local conditions. To effectively execute this recommendation, it is crucial to research population growth fluctuations, economic development trends, the energy production and consumption structure of the specific location, and locally applicable laws and guidelines.

- Research results or outcomes should be provided in a way that is usable and easily understandable for people without extensive technical and (or) natural science experience or background, including often politicians.[6] In order for research findings to affect policy decisions, they need to be communicated in a language used by policymakers. During the Arctic PASSION scoping workshop with subnational policymakers and other stakeholders in 2022,[7] an expert from Alaska, USA, pointed out that the primary feature of easily understandable reports is to have fewer numbers/formulas and more maps and pictures. In general, interviewed experts highlighted that the most convenient data formats for them to work with are maps that do not contain too many numbers and use colours to identify different perspectives. However, at the same time municipal experts working in different departments of the municipal administration are dealing with providing policymakers with explanations of data related to a particular municipality/region. So, it is of the utmost significance that the understanding of municipal experts aligns with the goals and ideas of data producers.

- Except for the interest in the socio-economic implications of the particular subject, data producers should remember the importance of clearly indicated sources of data and methodologies employed in collecting the data (including socio-economic data). All of that forms the data background to which many policymakers pay attention in their interactions with subnational civil servants and municipal experts.

- Institutions and projects maintaining online databases need to remember that the project ends not by finalising the reports closing the project but by landing the product to end-users. The outreach to end-users should be long-term, beyond the end of projects and anchored in institutions that contributed to a given project. There should be some level of control over the up-to-dateness and accuracy of data and conclusions provided, as well as over how the data is used, in order to prevent misuse of the provided information.

- Science institutions and R&D projects should render the dissemination of the research into a functioning strategy. Local stakeholders are not obliged to browse international data sources for their work, so scientists contact the municipalities/regions and promote their research to that category of stakeholders. To facilitate this, producers can compile mailing lists that include representatives of municipal and regional administrations, who can be kept up-to-date with relevant research results.

6. Tkach, P., & Stepien, A. (2024). Arctic PASSION (ULAP)-Arctic Mayors Forum session and workshop report (Rovaniemi Arctic Spirit 2023). Zenodo. https://doi.org/10.5281/zenodo.10635350
7. Stepien A., & Tkach P. (2022). Meeting Brief: Data-driven Subnational Decision-making in the Arctic. Zenodo. https://doi.org/10.5281/zenodo.7090739

Acknowledgements

This policy paper is produced as a part of Task 7.4: Consultations with decision-makers at the sub-national level and its leading institution. The task is implemented by the University of Lapland, and is carried out within Arctic PASSION's Work Package 7, focused on supporting coherent policy- and decision-making.

The Arctic PASSION (Pan-Arctic Observing System of Systems Implementing Observations for Societal Needs) project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101003472 and is a part of the EU Polar Cluster network of EU-funded projects.

Bibliography

Alaska Federation of Natives (2018). Public Safety and Security in Greenland, Arctic Canada, and Alaska. Native Federation. https://www.nativefederation.org/wp-content/uploads/2018/12/AFN-AKDayPublicSafetyBriefing-ONLINE.pdf

ISO 25000 (n/d). Understandability. https://iso25000.com/index.php/en/iso-25000-standards/iso-25012/122-understandability#:~:text=The%20degree%20to%20which%20data,understandability%20are%20provided%20by%20metadata)

Nordic Council of Ministers (2023). Environmental law and procedure in the Nordic countries. Norden. https://pub.norden.org/temanord2023-522/2-environmental-law-and-procedure-in-the-nordic-countries.html

Nordic Forest Research (2021). Knowledge Compilation on Forest Fires in the Nordic Region, Report. Nordic Forest Research. https://nordicforestresearch.org/wp-content/uploads/2021/10/rapport-210928-2.pdf

Stepien A., & Tkach P. (2022). Meeting Brief: Data-driven Subnational Decision-making in the Arctic. Zenodo. https://doi.org/10.5281/zenodo.7090739

Takala, M. (2023). Arctic PASSION Data Management Plan. GitHub. https://github.com/ArcticPASSION/DataManagementPlan/blob/main/ap-dmp.pdf

Tkach, P., & Stepien, A. (2024). Arctic PASSION (ULAP)-Arctic Mayors Forum session and workshop report (Rovaniemi Arctic Spirit 2023). Zenodo. https://doi.org/10.5281/zenodo.10635350

Appendix: Distribution of responsibilities in Arctic jurisdictions

This section presents an overview of the distribution of responsibilities between different levels of governance and between relevant governmental agencies, as well as lists pieces of legislation that are relevant for issues where pilot services within Arctic PASSION are being developed (wildfires, ambient air quality, lake ice safety, shipping safety). The information was compiled in response to the request from pilot services.* The overview is also a response to the needs expressed by the local Arctic decision-makers, who need to understand better the differences between the governance set-up for various issues they deal with in order to be able to compare and cooperate between Arctic municipalities and to be able to identify relevant good practices appropriately.

*Nordic Council of Ministers (2023). Environmental law and procedure in the Nordic countries. Norden. https://pub.norden.org/temanord2023-522/2-environmental-law-and-procedure-in-the-nordic-countries.html; Alaska Federation of Natives (2018). Public Safety and Security in Greenland, Arctic Canada, and Alaska. Native Federation. https://www.nativefederation.org/wp-content/uploads/2018/12/AFN-AKDayPublic SafetyBriefing-ONLINE.pdf; Nordic Forest Research (2021). Knowledge Compilation on Forest Fires in the Nordic Region, Report. Nordic Forest Research. https://nordicforestresearch.org/wp-content/uploads/2021/10/rapport-210928-2.pdf

Wildfires

FINLAND

Who is responsible?

- *National level:* The Ministry of the Interior is responsible for wildfire management policies.
- *Forest and Parks Authority:* Overall responsibility for forest management.
- *Regional (state-regional) level:* Regional rescue departments (Pelastuslaitos - Pelastustoimi) - are the main responsible institutions for wildfire prevention, preparedness, and response.
- *Municipalities:* Own fire brigades and emergency services. Collaboration with state authorities during emergencies

Relevant legislation/policies

- Forest Act (1093/1996);
- The Forest Damage Prevention Act (1087/2013);
- Rescue Act (379/2011);
- Forest and Parks Authority guidelines

SWEDEN

Who is responsible?

- *National level:* The Swedish Civil Contingencies Agency oversees national civil protection, including wildfire management. It runs "Brandrisk Skog och Mark" service. Swedish Meteorological and Hydrological Institute provides information services. In addition, Skogforsk is a national council for cooperation between authorities and forest/forestry stakeholders, incl. the private sector.
- *Counties:* County Administrative Boards coordinate wildfire prevention and response.
- *Municipalities:* own firefighting services and emergency management plans. Collaboration with state and county authorities during emergencies.

Relevant legislation/policies

- Civil Protection Act (2003:778);
- Forest Act (1979:429);
- Environmental Code (1998:808)

NORWAY (incl. Svalbard)

Who is responsible?

- The Directorate for Civil Protection and Emergency Planning is responsible for coordinating national efforts in emergency preparedness and response, including wildfires. The Red Cross plays an important role in emergency response.
- *Counties:* County administrative boards (Fylkesmannen) and regional emergency response centres are primarily responsible for response actions.
- *Municipalities and state national services:* Implementing wildfire prevention measures, managing local fire services, and coordinating with national and county authorities.

Relevant legislation/policies

- Emergency Preparedness Act
- Act on Municipal Emergency Preparedness, Civil Protection Measures and the Civil Defense (Civil Protection Law) (LOV-2010-06-25-45);
- Forest Act (No. 31 of 2009);
- Nature Diversity Act (19 June 2009 No.100);
- Act on Business and Industry Preparedness (LOV-2011-12-16-65)

ICELAND

Who is responsible?

- Primarily the responsibility of national authorities. The Icelandic Forestry Service, Icelandic Environment Agency, as well as Icelandic Association for Search and Rescue (ICE-SAR, Slysavarnafélagið Landsbjörg) cooperate on prevention, preparedness, and response efforts. (thus far, wildfires were not a major issue in Iceland).
- In emergencies, the National Commissioner is responsible for declaring an emergency and alert levels at any given time in consultation with the regional police chief. The National Crisis Response Centre is the central agency for coordinating responses to emergencies and crises.

Relevant legislation/policies

- Civil Protection Act No 82/2008;
- Icelandic Environmental Act;
- Act on Civil Protection and Emergency Preparedness (Lög um almannavarnir og viðbragðsvaldi) (82/2008);
- Law on the National Crisis Response Centre

GREENLAND

Who is responsible?

- Department of Environment and Contingency Management has primary responsibility for all emergency prevention, preparation and response, and oversight over fire stations. At the policy level, the responsibility lies with the Emergency Services Commission.
- The Danish Emergency Management Agency provides assistance in situations where the Government of Greenland requires assistance. Police remain formally under Danish authority (led by the Chief Constable in Greenland).

Relevant legislation/policies

- Emergency Preparedness Act

FAROE ISLANDS

Who is responsible?

- The Faroe Islands Emergency Management Agency (Landsbjørg) is the main body responsible for addressing any emergency situations and search and rescue operations, coordinating police, municipalities, and voluntary services actions. Faroe Islands do not have a national emergency service.

Relevant legislation/ policies

- Emergency Preparedness Act (implemented by the Ministry of Fisheries)

CANADA (Nunavut, NWT, Yukon)

Who is responsible?

- *Federal level:* general policies, regulations, funding, and support for research and development. Department of Public Safety Canada plays the key role here, including via the national Government Operations Centre (coordinating whole-government response). Police (Royal Canadian Mounted Police - RCMP) and armed forces may be mobilised.
- *Provincial/territorial level:* the primary responsibility for wildfire prevention, preparedness, and response. Management of firefighting resources. Development of fire management plans. Coordination with local governments and indigenous communities. Nunavut: Department of Community and Government Services (Nunavut Emergency Management); Northwest Territories Emergency Management Organization; Yukon Emergency Measures Organization (responsible for coordination and response)
- *Municipalities and First Nations:* Municipalities and communities often have their own firefighting services and emergency management plans. They may also implement bylaws related to wildfire prevention and preparedness. In Yukon, First Nations and municipalities have primary responsibility for responding to localised emergency events via their own emergency plans. They may request the Yukon government for assistance. The territorial government also takes responsibility for emergencies exceeding local capacities or when First Nations do not have an emergency plan in place.

Relevant legislation/policies

- *Federal legislation:* Emergency Management Act (SC 2007, c. 15)
- *Federal policies:* Wildland Fire Strategy; Wildland Fire Management Manual; Emergency Management Assistance Program
- *Nunavut:* Nunavut Emergency Measures Act (SNu '2007,c10);
- *NWT:* Emergency Management Act (SNWT 2018,c.17), NWT Emergency Plan (current: 2018)
- *Yukon:* Civil Emergency Measures Act (RSY 2002, c. 34); Emergency Coordination Plan (current: 2011)

ALASKA, US

Who is responsible?

- *State of Alaska:* Alaska Division of Homeland Security and Emergency Management leads emergency response overall, including in cooperation with the private sector on critical infrastructures. The Division of Forestry is responsible for wildfire management, including coordination of firefighting efforts, providing training, and conducting prevention programmes.
- *Boroughs:* some have their own fire departments and emergency services. Collaboration with state agencies during wildfire response/actions. In most boroughs, Borough Emergency Management Offices will have primary responsibility. Village Public Safety Officer Program operates in many locations. There is an important role for local volunteer organisations.
- *Federal:* The Federal Emergency Management Agency provides support when emergencies exceed state capacities, coordinating federal resources and funding. In addition, the Department of Defence operates the Center for Excellence in Disaster Management & Humanitarian Assistance.

Relevant legislation/policies

- *Federal:* National Wildfire Coordination Group's Interagency Standards for Fire and Fire Aviation Operations
- *Alaska:* Forest Resources and Practices Act (FRPA, AS 41.17)

Ambient Air Quality

FINLAND

Who is responsible?

- Finnish Environment Institute (SYKE) is responsible for air quality monitoring.

Relevant legislation/policies

- Government Decree on Air Quality (79/2017)
- Environmental Protection Act (527/2014)
- (EU Air Quality legislation applies, Ambient Air Quality Directive 2008/50/EC)

SWEDEN

Who is responsible?

- Swedish Environmental Protection Agency – Naturvårdsverket (air quality monitoring and regulation)

Relevant legislation/policies

- Environmental Code (1998:808) includes air quality standards (EU Air Quality legislation applies: Ambient Air Quality Directive 2008/50/EC)

NORWAY (incl. Svalbard)

Who is responsible?

- Norwegian Environment Agency (Miljødirektoratet) is responsible for air quality monitoring and regulation.

Relevant legislation/policies

- Pollution Control Act (No. 6 of 1981)

ICELAND

Who is responsible?

- The Environment Agency of Iceland (Umhverfisstofnun) is responsible for air quality monitoring and regulation.

Relevant legislation/policies

- Act on health concerns and pollution control (7/1998, amended 144/2013) (standards for air quality and emissions regulation)

GREENLAND

Who is responsible?

- The Ministry of Nature and Environment oversees environmental regulations

Relevant legislation/policies

- Environment Protection Act (No. 9 of 2011)

FAROE ISLANDS

Who is responsible?

- Faroe Islands Environmental Agency (Umhvørvisstovan)

Relevant legislation/policies

- Order about air pollution from ships (11.12.2017)

CANADA (Nunavut, NWT, Yukon)

Who is responsible?

- Federal: Environment and Climate Change Canada provides guidance and standards.

Relevant legislation/ policies

- Canadian Environmental Protection Act (SC 1999, c. 33) and Canadian Ambient Air Quality Standards (under CEPA).
- Of relevance: Canadian Motor Vehicle Emissions Regulations (SOR /2003-2)

ALASKA, US

Who is responsible?

- Department of Environmental Conservation is responsible for air quality regulations and monitoring programs.

Relevant legislation/policies

- Alaska Clean Air Act (CSSB 103(RES))
- Federal: Clear Air Act (42 USC 7401)

Lake Ice Safety

FINLAND

Who is responsible?

- Municipalities and regional rescue departments (Pelastustoimi) cooperate on information/prevention and response (especially with larger incidents). Finnish Transport and Communications Agency (e.g. regarding ice roads) and the Finnish Environment Institute take part in information provision.

Relevant legislation/policies

- Rescue Act (379/2011);
- Legislation related to overall water safety.

SWEDEN

Who is responsible?

- Primary responsibility of municipal (fire, police and ambulance services). National Civil Contingencies Agency may provide support if requested and in case of larger accidents. Involvement of the Swedish Civil Contingencies Agency and the Swedish Transport Administration regarding information.

Relevant legislation/policies

- Civil Protection Act (2003:778);
- Set of legislation on overall water safety.

NORWAY (incl. Svalbard)

Who is responsible?

- *National level:* The Directorate for Civil Protection and Emergency Planning coordinates national emergency response efforts. The Red Cross plays an important role in emergency response. Water Resources and Energy Directorate is involved in prevention.
- *Counties:*
- *Municipalities:* fire, police and ambulance services.

Relevant legislation/policies

- Outdoor Recreation Act (Friluftsloven) (28 June 1957 No.16)
- Water Resources Act (Vannressursloven) (Act No. 82 of 2000)
- Local regulations on lake ice safety are highly varied.

ICELAND

Who is responsible?

- Icelandic Association for Search and Rescue (ICE-SAR, Slysavarnafélagið Landsbjörg) and the police are responsible.

Relevant legislation/ policies

- Civil Protection Act No 82/2008;
- Act on Civil Protection and Emergency Preparedness (Lög um almannavarnir og viðbragðsvaldi) (82/2008)

GREENLAND

Who is responsible?

- Department of Environment and Contingency Management has primary responsibility for all emergency prevention, preparation and response.

Relevant legislation/policies

- Emergency Preparedness Act

FAROE ISLANDS

Who is responsible?

- The Faroe Islands Emergency Management Agency (Landsbjørg) is the main body responsible for addressing any emergency situations and search and rescue operations, coordinating police, emergency services, municipalities, and Red Cross actions.

Relevant legislation/policies

- Emergency Preparedness Act (implemented by the Ministry of Fisheries)

CANADA (Nunavut, NWT, Yukon)

Who is responsible?

- The main responsibility for lake ice safety is with the territorial governments, including policy and firefighting services (in municipalities and communities).
- *NWT:* Department of Municipal and Community Affairs
- *Yukon:* Department of Community Services
- *Nunavut:* Department of Community and Government Services

Relevant legislation/policies

- NWT Emergency Management Act (SNWT 2018,c.17)
- Nunavut: Emergency Measures Act (S.Nu. 2007,c.10)
- Yukon: Civil Emergency Measures Act (RSY 2002, c. 34)

ALASKA, US

Who is responsible?

- The primary responsibility is with borough and community services. Village Public Safety Officer Program operates in many locations.
- The Alaska Division of Homeland Security and Emergency Management is responsible for emergency preparation and response. It cooperates with the Department of Military and Veterans Affairs, which oversees the Alaska National Guard and has a key role in emergency operations, as well as with the Alaska Department of Health and Social Services.
- The Alaska Department of Natural Resources and the Alaska Department of Fish and Game have responsibility for information and prevention.
- Village Public Safety Officer Program operates in many locations.

Relevant legislation/policies

- Alaska Statutes Title 5: Amusements and Sports; Local Defense Forces; Public Lands; Reindeer; Unorganised Borough (provisions related to outdoor activities)
- Alaska Department of Natural Resources provides regulations on the use of state-owned lands and waters, including public safety in the course of ice fishing on using snowmobiles on the bodies of water.
- Some boroughs established local legislation on the use of water bodies, including safety issues.

Shipping Safety

FINLAND

Who is responsible?

- Border Guard (Rajavartiolaitos)
- Transport and Communications Agency (Traficom)

Relevant legislation/policies

- Search and Rescue Act (Act No. 973/2012)

SWEDEN

Who is responsible?

- Coast Guard (Kustbevakningen)
- Maritime Administration (Sjöfartsverket).

Relevant legislation/policies

- Search and Rescue Act (Act No. 1249 of 2015)

NORWAY (incl. Svalbard)

Who is responsible?

- Coastal Administration (Kystverket)
- Joint Rescue Coordination Centres

Relevant legislation/policies

- Search and Rescue Act (Act No. 43 of 22 June 2007)

ICELAND

Who is responsible?

- Icelandic Coast Guard (Landhelgisgæsla Íslands)
- Cooperation with: Icelandic Association for Search and Rescue (ICE-SAR, Slysavarnafélagið Landsbjörg).

Relevant legislation/policies

- Search and Rescue Act (Act No. 33/2007)

GREENLAND

Who is responsible?

- Up to 3nm, the Government of Greenland has overall management responsibility. Some communities have voluntary SAR teams.

Beyond 3 nm:

- Danish Maritime Authority
- Danish Navy
- Joint Arctic Command

Relevant legislation/policies

- Maritime SAR Act (Søredningsloven) (Act on safety investigations of marine accidents, no. 457 of 18 May 2011); Maritime Safety Act (Søsikkerhedsloven) (Act on the Safety at Sea) (Denmark, no. 1629 of 17 December 2018);
- Danish Maritime Authority Regulations

FAROE ISLANDS

Who is responsible?

- Danish Maritime Authority
- Danish Navy
- Joint Arctic Command

Relevant legislation/policies

- Maritime SAR Act (Søredningsloven) (Act on safety investigations of marine accidents, no. 457 of 18 May 2011); Maritime Safety Act (Søsikkerhedsloven) (Act on the Safety at Sea) (Denmark, no. 1629 of 17 December 2018);
- Danish Maritime Authority Regulations

CANADA (Nunavut, NWT, Yukon)

Who is responsible?

- Canadian Coast Guard has primary responsibility.
- In addition, the Royal Canadian Air Force provides aerial support for Search and Rescue (SAR) operations.
- Transport Canada is responsible for enforcing maritime transport regulations, including port state control in line with international standards and Canadian legislation.
- At the territorial level, emergency management organisations in Yukon, NWT and Nunavut can support SAR efforts and coordinate local voluntary organisations.

Relevant legislation/policies

- Canadian Aeronautical and Maritime Search and Rescue (CAMSAR) (B-GA-209-001/FP-001, DFO 5449);
- Canada Shipping Act (SC 2001, c. 26)

ALASKA, US

Who is responsible?

- United States Coast Guard (USCG) has the main responsibility. It can be supported by Alaska State Troopers and local, voluntary SAR organisations.
- Alaska Department of Transportation and Public Facilities carries out maritime transport infrastructure oversight, including safety infrastructure (buoys, lighthouses and other navigational aids).

Relevant legislation/policies

Federal legislation:

- Ports and Waterways Safety Act (1072, 46 USC Ch. 700);
- Merchant Marine Act of 1920 (Jones Act, Pub. L. 66-261);
- National Contingency Plan under the (Federal) Water Pollution Control Act;
- US Coast Guard Regulation;

Alaska state legislation:

- Alaska Administrative Code (Title 18: Conservation of Natural Resources);
- Alaska Statutes Title 5: Amusements and Sports; Local Defence Forces; Public Lands; Reindeer; Unorganised Borough (maritime safety and SAR operations within Alaska's territorial waters);
- Alaska Administrative Code Title 7: Health and Social Services (provisions for responding to maritime emergencies and protecting human health during SAR operations);

This policy paper is about messages subnational policymakers, managers, and experts would like to convey to data and knowledge producers in the Arctic. It builds on insights obtained through semi-structured interviews with relevant stakeholders from all Arctic states (except for Russia), as well as on a session and workshop organised by the Arctic PASSION during the Rovaniemi Arctic Spirit Conference in November 2023.