



# **CAPARDUS - Capacity-building in Arctic standardization development**

Coordination and Support Action under EC Horizon2020  
Grant Agreement no. 869673

Project coordinator: Nansen Environmental and Remote Sensing Center

## **Deliverable 6.1**


### **Report on the Arctic Practice System co-design work**

**Type: Report**

Start date of project: 01 December 2019      Duration: 36 months  
Due date of deliverable: 31 May 2020      Actual submission date: 29 October 2022  
Lead beneficiary for preparing the deliverable: IEEE

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Version	DATE	CHANGE RECORDS	LEAD AUTHOR
1.0	27/10/2022	First version	Pearlman

<b>Approval</b>	Date: 29.10.2022	Sign.  Coordinator
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### *EXECUTIVE SUMMARY*

Access to Arctic practices is currently fragmented and limited, since these practices are held on diverse platforms across disciplines and cultures. An Arctic Practices System (APS) will be a sustained resource to offer more uniform discovery and access. It can link methods that may be related or interdependent. It can link people who create a practice with those who use them. It can support capacity development. These characteristics for an APS were seen in the responses to the workshop survey described in this report. A successful example of the concept is the operational Ocean Best Practices System.

The form of the Arctic Practices System is not yet known as its capabilities must be built from user requirements. Thus, engagements with the stakeholder communities are essential for understanding both the needs for and benefits of an APS.

The workshop in Svalbard 6-9 August 2022 was a productive opportunity to engage with a mixture of natural, social and political scientists and an excellent opportunities to exchange information and ideas. The most significant outcomes of the survey and discussions were a clear priority for an APS where practices are easily discoverable and accessible. The APS should support both community practices and standards. It should be the foundation for sharing practices and forming networks of like-minded users. The complexities of Intellectual Property Rights and Privacy need to be handled appropriately both for government regulations and for Indigenous Peoples.

An APS pilot built upon the Ocean Best Practices System Repository has been used to evaluate key attributes of an APS design. This has pointed to needs for support of multiple languages and for adapting the current operational elements for ease of use

(under diverse cultural and natural conditions). This looks feasible, but there needs to be Arctic-related use cases as discussed at the workshop to validate the requirements.

As a highlight, the survey pointed to the level of interest in the APS from the meeting participants through their answer to two questions: 80% said they would deposit their practices into the APS and 50% said they would like to participate in the design study. The collaboration potential seen in the Svalbard CAPARDUS workshop can be pursued in advancing the APS as an opportunity for the Arctic.

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## 1 Introduction

Responding to the challenges of climate change, food security and natural hazards in the Arctic requires trusted observations that are intercomparable. Owing to the scarcity of established instrumented Arctic observation sites, community-based observations and citizen science are becoming essential assets, but consistency of methodologies is needed for observations and other types of shared practices that can support meaningful collaborations. These collaborations should be across all stakeholders. From this perspective, progress is needed on bridging world views, concepts and practices represented in monitoring and information systems as well as for responses to Arctic challenges.

Documented practices improve knowledge sharing across the Arctic. As Arctic observing grows, Arctic practices support scaling of observing systems and consistency in quality of data. Arctic practices also support the definition and collection of Shared Arctic Variables envisioned under SAON's Roadmap for Arctic Observations and Data Systems (ROADS). Ultimately, knowing the methods used for monitoring and data offers transparency and furthers trust.

Practices and standards are the two most common dimensions present in broadly accepted methodologies and serve to ensure consistency in achieving a trusted product or end state. Best practices and standards are part of a continuum of community agreements [Pulsifer et al, 2019]. Practices, in the way the term is used in this deliverable, are descriptions of methods, generally originated bottom-up by individual organizations.

If a practice (sometimes also called a method or methodology) has been shown to consistently produce superior results than others, and has been adopted by more than one organization or group of practitioners, it usually starts to be accepted as a Standard Operating Procedure (SOP) and may evolve into a community-agreed best practice [Simpson et al, 2018]. Practices may become standards if established by panels in standards organizations or equivalent [Pearlman et al, 2019].

For Arctic practices, considerations of co-design and broad stakeholder and rights holder participation increases the value that Arctic practices can have in creating and maintaining Arctic observing systems (Eicken, et al 2011; Eicken, et al 2016; Christoffersen et al 2019). The documentation of Arctic practices was identified in the Ocean Decade Arctic Plan where, "relating to risks and disasters, translating scattered knowledge, providing supporting tools and documenting best practices therefore constitute a dedicated challenge in need of several specific lines of actions" (Ocean Decade Arctic Plan 2021). Thus, there is increasing recognition that access to and understanding of best practices for the Arctic is emerging as a priority.

When Arctic practices cover the formation of information and knowledge to support decisions at local and regional levels, a broad range of cultural perspectives needs to be included. "Two-eyed seeing"—Etuaptmumk in Mi'kmaw—is a concept championed by Mi'kmaq Elder Albert Marshall. It proposes that integrating the diverse scientific traditions, systems, and methods of Indigenous and western knowledge can result in

innovative advancements. [Leonard, et al 2022; Reid, et al 2021]. These perspectives should underlay methods for taking observations as well as using the derived information.

Under the CAPARDUS project, the concept and design of an Arctic Practices System (APS) is being pursued. See Figure 1 for the development process. As noted above, to achieve a transparency and balance in the APS, a co-design process is necessary. Originally, the approach was to use a series of workshops in four pilot areas, Greenland, Russian Siberia, US Alaska and Norwegian Svalbard. Through most of the project, the COVID pandemic eliminated the possibility of direct engagement with these communities. Finally, in August 2022, a multidisciplinary CAPARDUS workshop was held in Svalbard. The meeting included interactions among sociologists, natural scientists, data managers, community planners and others. [Iverson, et al 2022]. This report covers the segment of the workshop that was focused on collecting requirements for the APS. This is discussed in Section 3 of this report.

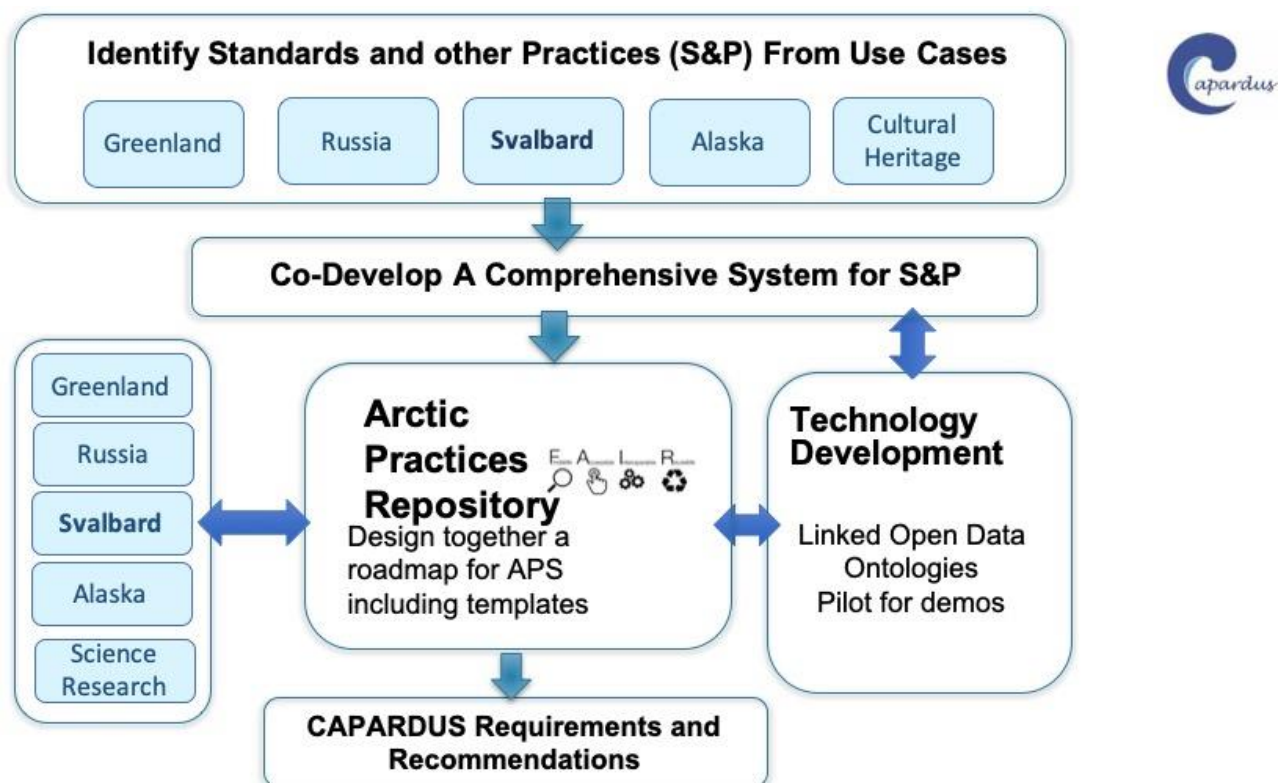


Figure 1 Schematic of APS development process

## 2 Arctic Practices System Objectives and Evolution

### 2.1 Objectives

Co-developed Arctic Practices will be instrumental in bridging cultures of practice and deepening trust across diverse stakeholders and regions. Building this basis of transparency and trust will be central to the evolution and success of an APS. Ensuring

transparency and full access for the documents in the APS goes beyond simply creating an open, documented process. Recognizing the need to bridge cultures, the lessons learned from an increasingly large body of work in fields such as science and technology studies and Indigenous data sovereignty highlight the importance of understanding the context and process of developing and applying practices and standards (broadly defined). This body of work confirms the importance of using processes with dialogues that are equitable and inclusive and are mindful of historical and current misuse of research, observations and data.

To design an Arctic Practices System, a series of underlying principles should be considered. Some of these are listed below. [Pearlman, et al 2022]

- 1 Stakeholder and Rights Holder Engagement* - Broad stakeholders and rights holders (including academic researchers, industry, Indigenous organizations or knowledge holders and others) should be engaged throughout the creation and evolution of APS and Arctic practices from initial concepts to implementation and use.
- 2 Stakeholder and Rights Holder benefits* - there needs to be a clear rationale for how each of the Stakeholder and Indigenous Knowledge Holder/rights holder communities' benefit from an Arctic Practices System and how it can support their needs and goals.
- 3 Retaining context* – the APS should be able to retain the context of the practices to understand if a practice is appropriate for another specific purpose.
- 4 Open Access and Intellectual Property Rights* - an open access policy must be balanced against community rights for information control.
- 5 Sharing Know-how* - to achieve geographic and culturally attuned coverage, practices should be accessible in different languages, modalities (e.g., documents or videos or audio recordings) and sourced from all regions.
- 7 Capacity sharing* - educational tools should be integrated into the design of the APS to accelerate how new participants learn Arctic practices.

Using these principles to build an APS concept would result in a requirements discussion which would be abstract and possibly difficult to engage with. The ability to test concepts and trade off APS attributes is an important part of the community engagement and design study. Thus, the CAPARDUS Project is examining how the Ocean Best Practices System (OBPS) framework [Pearlman et al 2019, Buttigieg et al 2019], created under UNESCO IOC, can serve as a pilot for an Arctic Practices System (APS) with community inputs and experience of the Project team.

## 2.2 APS Pilot

The OBPS Repository (<https://www.oceanbestpractices.net>) is designed to enhance the functionality and search capabilities for methodologies for all elements of the value chain from data collection to information use. A key requirement is easy discovery by stakeholders with diverse backgrounds, both technical and cultural. Thus, supporting user search needs flexibility. The OBPS repository uses advanced semantics and

natural language processing to improve discovery of appropriate methods, which includes the automatic tagging of document content against recognized vocabularies. Best practice documents can be comprehensive, containing many best practices in a single document. In such cases, a singular practice may not be easy to find. Content tagging at a granular level allows easy discovery of details. Granular refers to the ability to do detailed discovery at a paragraph level. These tools promote and increase the value of present content in the repository.

The repository supports machine-to-machine interfaces. This allows other systems to query repository content and improves the visibility of the repository content. For example, with a standardized search methodology and the assignment of DOIs, Internet search tools such as Google index the repository content, supporting global dissemination of best practices.. The open source software used for the search tools also provides a development platform for enhancing growth and community support. Thus, the OBPS repository is a natural pilot for evaluating APS attributes.

With more than 1700 method description, the repository creates grouping of methods, termed "communities". For the Arctic pilot, an Arctic Community was created to capture the documents identified through the CAPARDUS project. The exercise has progressed well and has expanded to include Polar (to include the Antarctic at the request of the Thematic Working Group on Capacity Sharing of the Arctic Observing Summit. The Community is now the "Polar Community" in the repository with 157 practices documents included.

### 2.3 Insights from the APS Pilot

Through use of the APS pilot on OBPS, several characteristics were identified for the APS. These include inclusion of document and access to them in multiple languages. To allow scalability and limit the requirements for human intervention, there is interest in automated language translations. Google provides a free multilingual neural machine translation service. This was tested and supports reasonable translations in more than 60 languages. However, there are limitations which are still under consideration. One is that Indigenous Peoples' languages for Arctic communities are not available. The second is that the translations do not always have sufficient accuracy when addressing the details of a methods description. Some of the language translations are more mature and comprehensive than others and translations between European languages, for example, produce better results. However, it has been tested in OBPS that terms in different languages and different script will still retrieve documents matching that search.

The OBPS uses six complementary ontologies to offer content search services for ocean stakeholders. In moving to multiple languages and working in the Arctic, additional ontologies will be needed. The OBPS pilot is examining options.

In another test using the APS pilot, the submission of Arctic Practices was tested. The metadata descriptions of the practices are comprehensive to facilitate search. Working with the CAPARDUS partners, the complexity of the metadata led to need for help and



explanations during the submission process. While this was not an issue since there are comprehensive User Guides offered and an OBPS help desk, it is not scalable in the long term for “non-standard” languages. This initiated discussions on options to simplify or introduce machine assistance to the submission process, which are still underway. The Svalbard workshop offered the opportunity for OBPS to share the OBPS concepts and provide video instruction on the submission process. Ideally, the ingest process could be automated. This remains a future goal.

When practices are created and documented, it is recommended that originators use templates created by OBPS for the documents to improve consistency and machine readability. Recommended content coverage is outlined and includes metadata templates, which describe the practices ,e.g. author, publisher, data, but also science attributes like SDG, EOY, Maturity level, etc., also should be completed as mentioned above. The OBPS templates cover practices from observations to applications. In the APS, there needs to be expansion of these templates to be inclusive as the APS engages with different cultures and ways of recording common methods.

OBPS has moved to include videos in the repository and will further need to extend it collection to recorded oral histories and descriptions based on experience gained from the work as a pilot APS. These extensions will more broadly support capacity sharing across cultures and experience. Recently, the APS pilot agreed in collaboration with the Thematic Working Group on Capacity Sharing and the new CATALYST platform of the EU-PolarNet 2 to support a hub for capacity sharing. This is the result of growing interest in the APS-envisioned capabilities.

The work with the APS Pilot, the CAPARDUS team, other programs in the EU Polar Cluster are creating a vision and inputs for the APS path forward. The work is also impacting global perspectives on creation and adoptions of practices and standards. An October 2022 workshop organized by the Ocean Best Practices System hosted a session on Arctic Practices and Community-Based Monitoring. The workshop in Svalbard that is the topic of this report was another important forum for understanding user needs. Inputs from these events will be incorporated in the planning for the APS design.

### **3 The Sessions at the Svalbard Workshop**

The CAPARDUS workshop at Svalbard in August 2022 was a hybrid event which engaged three complementary but very different disciplines. There was a group focused on community based monitoring; another with interests in preserving and touring cultural heritage sites; and a third in data management and Arctic Practices. The combination of natural, data and social scientists stimulated productive interactions. For the APS concept and design requirements, the workshop had a session dedicated to APS on Tuesday (Day 3) that was valuable in capturing inputs from the diversity of participants.

The schedule for the APS presentations and discussions consisted of three blocks. The first was a description of the APS concept and a demonstration using the APS pilot for



Arctic Practices discovery. The participants were then introduced to a survey of APS requirements. The survey was completed online in the morning. For the survey questions, see Appendix 2. Results of the survey are given in the following section "Workshop Outcomes". With the survey complete, the participants moved to the third APS activity which was breakout sessions with specific questions to address. The three questions posed to the participants were:

- (1) Identify use cases that you are engaged in that are good demos
- 2) What practices (methods) are used in these use cases (do they exist)?
- 3) What would be good to have in the APS for the use cases?

The participants self-selected into two breakout groups. One was on community-based modeling (CBM) and the other was on cultural heritage. Both groups addressed the questions and provided a summary of their discussions. These are provided in the next section. The CBM breakout session is shown in Figure 2.



*Figure 2 Breakout session on APS requirements*

## 4 Workshop Outcomes

### 4.1

### Survey

### feedback

As mentioned in the previous section, the Svalbard workshop participants came from a mix of academia, industry and research institutions, and the primary focus of their work was either Arctic operations (i.e. tourism), community based monitoring, cultural heritage management, Capacity Development and/or Community Resilience/Health, reflecting a strong social science orientation of the group. See Figure 3.

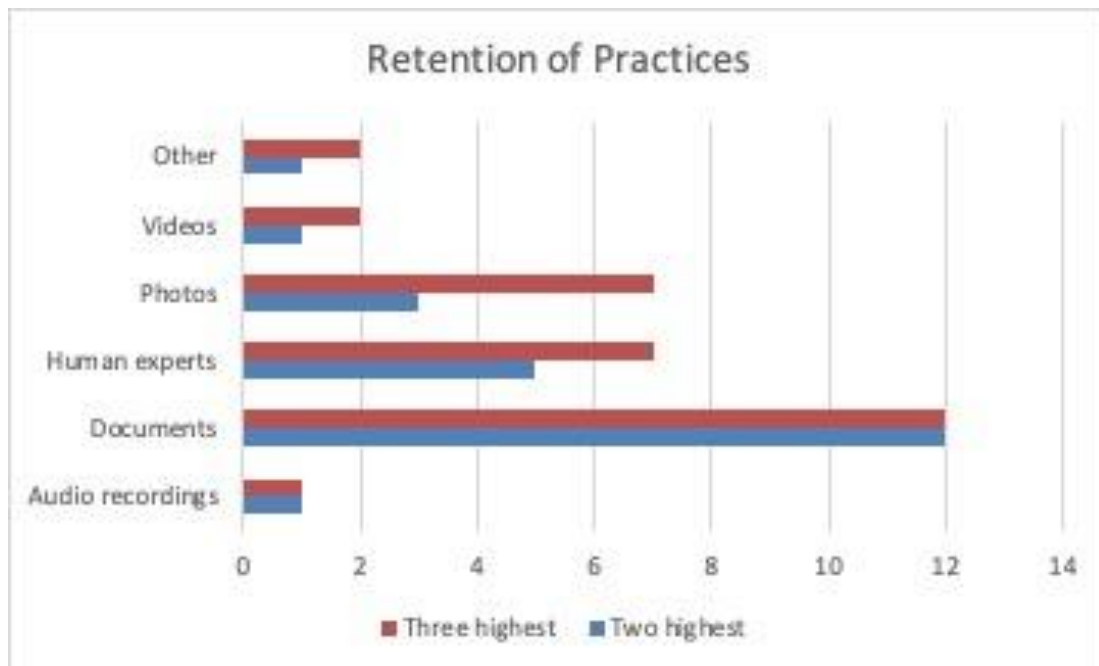
In examining the details of the interest area, the first two priorities are shown in Figure 3. Other topics such as community resilience do not appear in the first two, but are noted as a lower level for more than a third of the respondents. Some respondents responded with activities not in the list such as tourism. These suggest that the backgrounds of participants are broader than their top priority.



*Figure 3. Professional Areas of Workshop Participants (top 2 priorities of multiple choices)*

Responding to the survey, virtually all (92%) indicated that they create methods/practices (mostly contained in documents) and that these were worth storing. Respondents indicated their practices were stored in various ways (see Figure 4). Most think an APS would be an effective way to share their practices. Looking at the storage options, several points are worth noting. Most of the participants identify documents as the major means of describing and saving their practices. When asked in another question what type of storage is used, participants indicated publications, web pages, internal file systems, national repositories, etc. This is a strong indication from this sample that the storage is fragmented and for some types identified, such as web sites and internal file systems, the practices documents may not be sustained

in the long term. Looking beyond documents at the other methods in Figure 4, the use of human experts for retaining process knowledge is seen. This is also not sustainable over the long term. In the Figure, the participants could make multiple choices responding to the question of storage type. Combining the top two priority selections, participant responses are shown (blue). When a third priority is added (red), increased use of human experts and photos is observed. The numbers are individual responses and there are not enough responses to use statistics for analyses. Almost all respondents recognized the value of an APS for central access and long term sustainability of practices.



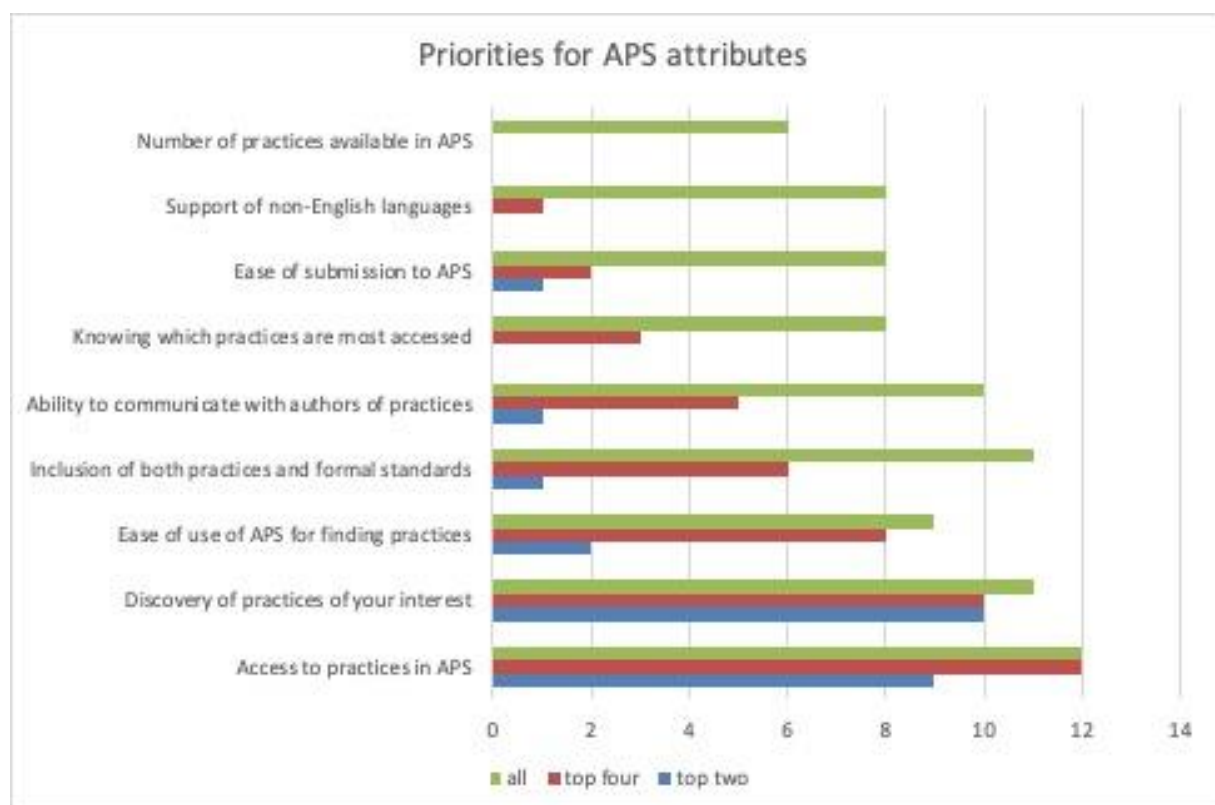
*Figure 4 Retention/storage methods for Practices*

Most respondents have to follow policies, guidelines and standards in recording and implementing their practices, but there was some contradiction with regard to use of formal (de jure) standards in that most, even those that mentioned specific standards and guidelines in describing how their practices were managed, responded "no" to that question. When asked whether their existing practices should become de jure standards the positive and negative responses were balanced.

Turning to the question of what attributes of the repository should be prioritized. The participants were given an array of options to prioritize and selection was done by participants in their order of recommended priority. Looking then at responses (see Figure 5) by combining the two highest priorities (blue), then the combination of the four highest (red) and finally the entire set of priorities (green), interesting trends can be observed.

Discovery, access and ease of use were primary (things that any repository should support), but Ability to communicate with authors of practices and Inclusion of both practices and formal standards were also selected by many. See Figure 4.

An interesting priority is the desire to be able to communicate with the authors of practices. This is a reflection that Arctic stakeholders are a broad and diverse community that do not routinely interact. It was anticipated that the availability of non-English language documents would be a priority and, as a consequence, non-English documents were introduced into the APS test bed (OBPS). The responses including the first two clearly emphasizes discovery and access of practices. Adding two more priority levels (to include 1+2+3+4), increasing interest in ease of user access to standards and access to authors. Including votes on all priorities, there is now added interest in number of practices available as well as support of use of multiple languages. This is interesting because the requests for languages in addition to English have been strong in other feedback received by OBPS. This may be indicative that the responders here have strong English skills. A complementary question reaffirmed the high priority of discovery and access. Asked why specifically the participant would recommend the APS to a colleague, a majority of the answers cited discovery or access as the reason..



*Figure 5 Priorities for APS characteristics*

In another question, the priority choice of user access methods was requested. 83% of the respondents selected a web browser as their first choice and mobile phone app was a second choice of a majority. The dominant organizations of survey respondents were academic and research institutions that typically have good internet access. Experience in developing countries with limited communication infrastructure, indicates that the use of mobile phones for information retrieval is the dominant method, suggesting that alternative access approaches may be important in the Arctic.

Responses to two other questions were quite interesting. A way to measure level of interest is to ask if people want their practices in the APS. Over 80% of respondents said yes. Another question to the participants was if they would participate in APS requirements discussions. Over 50% responded positively. Again, the reader is reminded the sample size is small and this audience consists of well educated professionals.

Moving away from multiple choice questions to those which allowed open ended responses, participants indicated that the APS is important because it would better provide information that would help users compare different practices and the ability to store practices in the form of images, video and audio recordings. Also, permanence, i.e. assurance that the system will persist, as well as having links to other repositories were mentioned as important features. There was also a comment that the APS would provide real value in accessing and assessing gray literature.

An important message regarding design requirement for the APS came in this response:

*I think it is important that the people working locally should address local actors to inform, discuss, and have dialogue meetings, workshop etc. to involve the different actors in the process, and establish trust and ownership.*

A response to a question regarding paths to sustainability for the APS is important for us to consider:

*That people trust it, that people see the value in information being stored in this way, that people understand the mechanisms behind it.*

Summarizing the many comments and responses in the survey, participants highly valued sustained and consistent discovery and access to Arctic practices through an APS and felt it would contribute to their work. They were interested in ways to contact authors of practices, thus having a path for networking. APS also offered opportunities to have broader exposure of their work practices to others. Support for capacity development and the education of a new or changing generation was noted.

## 4.2 Breakout feedback

The decision to have breakout sessions was to have smaller groups allowing for more contributions by participants to discussions. It was expected that there could be a



complete mix of disciplines in each session, but, with each person self-assigning, the participants grouped according to their topical interests. There first group focused on CBM and crisis management and the second group on cultural heritage and social factors in Arctic communities. As noted in Section 3, the two breakout groups were asked to address three questions:

- (1) Identify use cases that you are engaged in that are good demos
- 2) What practices (methods) are used in these use cases (do they exist)?
- 3) What would be good to have in the APS for the use cases?

#### **4.1.1 First Breakout Group Report**

The first group identified four areas for use as case studies and related Arctic Practices. Their perspectives were broad and numerous suggestions for use cases and best practices were discussed. These are highlighted in the following list.

### **Topic 1: Resource management in the Arctic natural environment**

#### *Case Studies*

- fishing
- hunting
- living

#### Related Guidelines and practices

There are many practices relating to these three topics. Many of them are described in oral traditions, storytelling and education. Capturing these is an interesting and important challenge for the APS. A dialogue with Finn Danielsen and Siberian colleagues pointed to specific areas such as harvest licensing, adaptation to climate change and other factors that are related through stories.

### **Topic 2: Crisis Management for the Arctic:**

#### Case Studies

- Natural hazards
- Manmade Hazards
- Geopolitical/war/response
- broken communication cables( Svalbard)

#### Related Guidelines and practices

- Plans for evacuations of ships and inhabitants of Longyearbyen
- Greenland report
- Collaboration at work. with Arctic Safety Centre, UiT, Longyearbyen local council perhaps focused on snow warnings
- Coast Guard
- Helicopter Services
- Local driven emergency action plan?

In rural communities and small towns, services for emergency response may be more limited than in larger cities and the importance of effective services becomes a high priority. Adoption of well chosen methods to avoid hazards or improve the response efficiency is important

### **Topic 3: Arctic Operators:**

#### *Case Studies*

Rescue Management

Commercial cruises

Red Cross operations

Research

Military/ Coast Guard

#### *Best practices/ guidelines:*

- AECO
- Sysselmesteren/ The Governor's office
- Polar Code
- University of Svalbard (UIS)
- Folkehøgskole/ Public High School
- Arctic Council/ Working Groups
- Experienced Knowledge( TBDs?)
- Local Experience ( TBDs?)

The interactions between Arctic Operators and the community is significant. Large tour ships bring resources to the community but also draw upon community resources. Case studies and guidelines for examining constructive symbiotic interactions can be informative. Rescue management, Military/Coast Guard operations build an operational environment through defining what should be done and what should not. These are best practices, not all of which are formally documented. This area is an ideal use case if the appropriate connections and collaboration is available.

### **Topic 4: Communication procedures/ networks**

#### *Case Study*

Communication in the Arctic and remote regions

#### *Best practice/ guidelines:*

- Arctic Safety Center
- Arctic Nature Guides
- AECO
- Sysselmesteren/The Governor's office

Response to the challenges of effective communication in remote regions benefits from agreed practices. There are multiple players that interact and form a network underpinning for rural welfare.



#### 4.1.2 *Second Breakout Session Report*

There are many potential use cases which can be envisioned. In the Svalbard region, with the close contact between humans and nature, use cases can be complex and challenging. The Breakout started with asking what is the common ground across use cases. These are people contact, guidelines, laws that are controlling the area, conflicts, Svalbard Environmental Act conflict with Norwegian Cultural Heritage Act.

This leads to obvious questions, for the participant's professional focus areas, of how is the research going to be impacting humans, local population? Transcriptions from events cannot always be imported into a shared database. One practice is simply how to ask for access and rights. Another practice is how you process the knowledge that is needed and how to deal with GDPR privacy issues. This, of course, relates to Practices of how to work with communities.

The group recognized the differences between qualitative data of social sciences and quantitative data of natural sciences. We need systems that can manage both and that is the challenge. For example, it is likely practices will be per region on how to do research. This suggests that a database per region on good practices is warranted. Does this mean there is a network of regional repositories or can all the practices be sheltered in a single internet accessible repository?

Expanding the topic on interacting with communities further, dialogue and sensitivity when working with indigenous peoples is an underlying foundation for trust. Respect is the most important. Arctic Council and Indigenous Peoples council also have a lot of work and data. A user-friendly adaptation for the APS so that local communities can easily access information in the APS is essential. It is appreciated that language and internet access is a challenge.

The APS repository must take into consideration how research and data are collected. How do you capture measures that are not quantitative? How do I get a logical construct, that satisfies my thinking needs? How can a structure of information be built that addresses community issues, social issues and research needs simultaneously? How can the research community have better sensitivity, access to the most recent papers and information about a local community they are researching? An issue can be that people in the community might not be willing to share to a global audience. In particular, there can be experiences that they do not want to share widely but would like to share with someone who has built trust with them. These questions relate to philosophies of Intellectual Property ownership from different perspectives. Researchers need to find out how to go about these delicate situations. We need a cookbook.

The APS repository is more about methods and guidelines. Not this is the results of my data but, this is how I got my data. The strength of this repository is access to grey literature. Examples are methods that Dina has used in Svalbard are specific for Svalbard. Three different archeologists might interpret a site in three different ways. This points to a bottom-up approach to practices. These can address protocols for working with communities. Rules of how to work with people. Discussion about

appropriate measures. The problem with researchers that come for 2 weeks and extract data from the community and then interpret it somewhere else and the results never get back to the community. There are processes that can help such as several different groups that need information, combine efforts and only ask the questions once. This will reduce the "fatigue" within communities (e.g. Longyearbyen).

### **Identify use cases from what you are engaged in that are good demos?**

SSSI is a very good example of how researchers have organized themselves. Three Research council of Norway founded projects all working together. Cultcoast, PSSH, Altcoas. As this is carried out, a good use case is how to address the Cultcoast need for permits in Svalbard.

Another use case could be a model for creating workshops. The minutes from those workshops should be accessible to researchers. Team up with SSSI and produce the workshop together. Local ownership extended beyond locals and AECO.

This leads to the question of what would be good to have in the APS for the use cases?

- a. Something that would serve academics, private sector and communities.
- b. Grey literature
- c. Operators, private sector, need to be able to use it
- d. Good cases where efforts have been combined to avoid participator fatigue
- e. Legal roles, stakeholder analysis, governance roadmap, and other federal entities that are good to know about. Specific for each region. This differs much in the Arctic area.

With the above as a common foundation for addressing Arctic communities including use cases, what other areas should be considered?

- If we were to make guidelines for social science research, what would we want to look at?
- Where does the Svalbard environmental protection act apply, and how are the complications with other legal frameworks or how does it collide with the culture heritage act?
- Should different regions set up different guidelines?
- Different regions, different countries, different legal frameworks. Can this be embraced by one set of guidelines?
- How can a line be drawn between natural or quantitative information/data and social or qualitative information/data?
- One practice is how you ask, another is how you treat the answers. GDPR is an important issue to approach the information

- Systems that can handle both quantitative and qualitative information/data might not be able to be combined. This same question may not apply to procedures and practices because they are about how to collect data and do not keep the data itself?
- The ability to adapt to the people working in the different regions, and their needs for the system, should be inherent in the APS
- What we do can be considered invasive or assaulting (GDPR becomes very important in terms of identifiable information)
- How do you capture methods that are not quantitative? How do you build a structure that reflects social science questions? With the least environmental impact
- We should share information about for instance a tribe, that they have a cultural practices, etc. There is information you can get, but not share. The practices information should deal with how to achieve such information, not necessarily the information in itself, best practices in how to approach the people and share the information
- The repository is more about method descriptions etc.
- Methods are very often tailored to a certain case area, but lessons learned can be of great value when developing a parallel method for a new case. Method protocols that may be available for quantitative methods are not as easy to create for qualitative methods. Qualitative information is always subject to interpretation, related to situations, and are not replicable (very seldom).
- A use case should be guide training, so guides will be the most important target group. When you google arctic citizen science, lots of interesting turn up such as articles about local culture, local challenges, local topics related to for instance tourism, behavior, etc.

Another use cases:

- Guidelines for how to approach and organize research at Svalbard. An example of one approach is:
  - three research projects co-organize their approach to avoid fatigue in terms of contacts to the public bodies, local community etc. (CULTCOAST, PCCH, AlpineArcticDecay, all funded by the Research Council of Norway)
  - Rules for how to behave in the community. Learnings from example AECO workshops with local communities. The discussions from those workshops could be accessible to researchers.
  - Involve the tourist companies, AECO, Visit Svalbard in how research can give a larger sense of ownership, and good grounds for i.e. citizen science
  - SSSI
- Measure the impact of research projects for the community
  - Guidelines for important subjects to have in mind when designing a research project, in terms of dissemination and targeting of results
  - Roadmaps for public management organization in the different regions
  - Roadmaps for legal framework structures

- Roadmaps for academic and research infrastructure, ongoing projects, available results etc.
- AECO: describing the interaction between the different tourist operators

*What would be good to have in the APS for the use cases?*

- Something that would serve researcher, private sector, local community, to get beyond the existing databases and academia. How can this be useful for other operators than academia?
- Combine efforts to avoid fatigue amongst the objects for the research
- What can be done to reduce the impact of the magnitude of visitors, not only to nature and culture, but to the local community?
- Grey literature
- Roadmaps for public management organization in different regions
- Roadmaps for legal framework structures
- Roadmaps for academic and research infrastructure
- Learnings on permitting

The discussions from the two breakouts address opportunities in the Arctic for practices that will impact both the natural and human environments. With the complexities in working these areas, there is clearly a need for common practices and a location where they can be accessed. There will not be one size fits all and practices may relate to regional or local conditions. From the suggested use cases, there are places to start and lessons to be learned, not only for the participants, but also for the design of the Arctic Practices System. A collaboration is likely to be the best practice with one or two use cases to pilot and test the needs and effectiveness of an APS

## 5 Summary and Conclusions

Access to Arctic practices is currently fragmented and limited, since these practices are held on diverse platforms across disciplines and cultures. An Arctic Practices System can give more uniform discovery and access, if it has widespread community buy-in and a critical mass of practices. It can link methods that may be related or interdependent. It can link people who create a practice with those who use them. These characteristics were seen in the responses to the workshop survey described in this report. A successful example of the concept is the operational Ocean Best Practices System.

The form of the Arctic Practices System is not yet known; whether it is a single system or a system of discipline- or geographically-related systems? Thus, engagements with the stakeholder communities are essential for understanding both the needs for and

benefits of an APS. While gathering community inputs is not a one step process, systematic engagement with key stakeholders is of great importance.

The workshop in Svalbard was an unusual and productive opportunity with its mixture of natural, social and political scientists and the excellent opportunities to exchange information and ideas. For the Arctic Practices System, it was an opportunity to present a concept to an audience unfamiliar with the developments, to have them reflect on their needs through a survey and then through discussion groups.

The most significant outcomes of the survey were a clear priority for an APS where practices are easily discoverable and accessible. The APS should support both community practices and standards. It should be the foundation for sharing practices and forming networks of like-minded users. The complexities of Intellectual Property Rights and Privacy need to be handled appropriately both for government regulations and for Indigenous Peoples.

An APS pilot built upon the Ocean Best Practices System Repository has been used to evaluate key attributes of an APS design. This has pointed to needs for availability of support for multiple languages and for adapting the current operational elements for ease of use (cultural and natural conditions). This looks feasible, but there needs to be Arctic-related use cases to validate the requirements which can be tested in the APS pilot.

As a highlight, the survey pointed to the level of interest in the APS from the meeting participants through their answer to two questions: 80% said they would deposit their practices into the APS and 50% said they would like to participate in the design study. The collaboration potential seen in the workshop can be pursued in advancing the APS as an opportunity for the Arctic.

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## 7 Appendix 1

### Agenda for the APS discussions at the Svalbard Workshop

#### Tuesday 9 August 0900- 1700: – Session on Arctic Practice System

UNIS classroom B128 Kapp Mitra and Kapp Schoultz

*An Arctic Practices System (APS) is envisioned to be a sustained repository for practices related to environmental observations, resource exploitation and other activities in the Arctic. A 'practice' means a documentation in digital form of how things are done for example in observation of a specific ocean phenomenon. What an APS should do will be identified in dialogue with people living or working in the Arctic with knowledge about practices in their daily work.*

09:00 – 09:30	The APS concept – introduction: Jay Pearlman
09:30 – 10:00	Demonstration of the Arctic Community in the Ocean Best Practice System: Pauline Simpson
10:00 – 10:15	Discussion on needs and desired functions for the APS: Jay Pearlman
10:15 – 10:30	Intro to Arctic Practices survey: Siri Jodha Khalsa. Paper version distributed; on-line access at <a href="https://www.surveymonkey.com/r/QNFYJVZ">https://www.surveymonkey.com/r/QNFYJVZ</a>
10:30 – 11:00	break
11:00 – 11:30	Complete the APS requirement survey
11:30 – 12:00	<p>Introduction to the breakout session: Goals of breakouts on potential demonstration cases. Describe what is a use case of CBM and other actions. The goal is to identify 3 or more use cases for further consideration (each breakout group).</p> <p>Three questions:</p> <ol style="list-style-type: none"> <li>(1) Identify use cases from what you are engaged in that are good demos</li> <li>(2) What practices (methods) are used in these use cases (do they exist) ?</li> <li>(3) What would be good to have in the APS for the use cases ?</li> </ol>

13:00 – 13:20	SIOS Knowledge Centre: Ilkka Matero, SIOS
13:30 – 15:00	Group work in breakout session
15:00 – 15:30	break
15:30 – 16:00	Co-creation of knowledge in planning and decision-making: Lisbeth Iversen, NERSC/AHO
16:00 – 17:00	Breakout reports, discussion of APS concepts
17:00 – 17:30	Wrap-up



## 8 Appendix 2 Questions of the Svalbard APS survey

- Q1 Please provide your family name
- Q2 Please provide your given name
- Q3 Please provide your email
- Q4 What is the name of your organization?
- Q5 What type of organization are you in? (Check one or more)
- Q6 What do you focus on in your Arctic work? (indicate one or more topics that you are active in; choose 1 for the one where you put the most effort)?
- Q7 If your area of interest is not listed above, please add it here
- Q8 For your work, do you create ways of doing things (which we will call practices in this survey)?
- Q9 If you answered yes for Q8, in what format do you record your practices or maintain knowledge of a practice? (you may choose more than one, please prioritize the ones selected with number one being the highest priority)
- Q10 How are documented practices for your community currently managed?
- Q11 'What are some examples of policies, guidelines, rules, standards that impact the manner in which you implement your practices?'
- Q12 Have you adopted any formally-recognized (we call these "de jure") standards in your work (such as ISO standards)?
- Q13 If your answer to Q12 is yes, list any de jure standards that you use in your work
- Q14 Would you like to see any of your current practices become de jure standards? Please answer yes or no. Also, if yes, tell us which.
- Q15 What are your priorities for APS characteristics (in descending order of importance with 1 being top priority); click on the box at left to set a priority'
- Q16 For your Arctic work, is there any other characteristic for the APS not already listed in that you think should be considered?
- Q17 Can you see an APS as an effective way to share your practices? (Yes or No), Please describe if yes.
- Q18 What type of access to APS should be included in the user interface? (you may chose more than one)
- Q19 For design requirements, which communities or people do you think we should engage first? Please add specific contacts if you have them.
- Q20 If you were to recommend the APS to a colleague, which one or two specific characteristics would most likely cause you to make a strong positive recommendation?
- Q21 Would you be interested in participating in the APS requirements discussions?
- Q22 If you think an APS would be valuable to you and your community, what are some mechanisms you can think of that would lead to its long-term sustainability?
- Q23 Looking forward three to five years, what are the most important advances you would like to see in the way that practices are maintained and used?
- Q24 Would you like to see any of your current practices registered in an Arctic Practices System?
- Q25 Please provide any references or further information that you believe would be useful for the APS requirements or operation
- Q26 Do you have any additional comments you would like to make concerning the proposed APS?

This report is made under the project  
**Capacity-building in Arctic standardization development (CAPARDUS)**  
 funded by the European Commission Horizon 2020 program  
 Grant Agreement no. 869673.



Project partners:

No	Acronym	Participant Legal Name	Country
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