



Supporting the
All-Atlantic Ocean Research
and Innovation Alliance

AAORIA Intergenerational Hackathon Challenge 1

“Digital Innovation for Coastal Resilience”



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1 Introduction

1.1 Background and context

“Coastal resilience is not a foreign concept in the Indigenous world. Indigenous peoples have always been environmental knowledge creators, users, and stewards. Coastal resilience knowledge was and is embedded in Indigenous practices and cultural principles.” This is adapted from a quote by *Stephanie Russo Carroll*.

According to UNESCO, around 40% of the world's population lives within 100 km of the coast. Among them are approximately 27 million Indigenous Peoples who depend directly on ocean and coastal ecosystems. Indigenous knowledge systems offer something fundamentally different from conventional science. They hold complexity without reducing it to isolated parts. They position humans within nature, not separate from it. Such knowledge can contribute valuable insights into environmental change, ecosystem dynamics, coastal hazards, adaptation strategies, and community resilience. However, despite increasing recognition of its importance, Indigenous local knowledge (ILK) often remains underrepresented in formal scientific, governance, and decision-making frameworks.

The All-Atlantic Ocean Research and Innovation Alliance (AAORIA) and its Coastal Resilience initiatives provide an important opportunity to strengthen inclusive, pan-Atlantic knowledge exchange. Building on these existing structures, there is growing potential to develop mechanisms that improve accessibility, visibility, and practical usability of diverse forms of knowledge across Atlantic communities, institutions, and regions.

1.2 Problem statement

A major barrier to integrating Indigenous and local knowledge into coastal resilience frameworks is not necessarily the absence of knowledge, but the difficulty of translating knowledge across languages, communication styles, technological access levels, and institutional expectations.

Many existing systems are primarily designed around scientific or policy-oriented formats, which can unintentionally limit participation from communities whose knowledge is shared through oral traditions, storytelling, lived practice, visual media, or local languages. As a result, valuable knowledge may remain inaccessible, insufficiently documented, or disconnected from decision-making processes.

There is therefore a need for approaches that do not simply collect information, but actively facilitate the translation, adaptation, and responsible sharing of knowledge between contributors, researchers, educators, policymakers, and coastal practitioners.

1.3 Objectives

The objective of this hackathon challenge was to develop a prototype and concept for an Indigenous and Local Knowledge Platform integrated within the existing AAORIA Coastal Resilience Hub. The proposed solution aims to:

- enable accessible, multilingual contribution of ILK through multiple communication formats;
- support translation of knowledge into audience-specific products, including educational, policy, and scientific outputs;
- preserve attribution consent, and traceability of contributions;
- strengthen inclusive knowledge exchange and collaboration across Atlantic coastal communities, researchers, and decision makers.

2 Proposed Solution

2.1 Concept overview

The proposed solution is an **Indigenous and Local Knowledge (ILK) Platform** integrated into the existing AAORIA Coastal Resilience Hub. The platform is designed as a **knowledge translation and delivery service** that enables diverse forms of local, Indigenous, and community knowledge to be contributed, adapted, and shared across multiple audiences and contexts.

The concept addresses a central challenge identified during the Hackathon: valuable coastal knowledge often exists, but is difficult to integrate into institutional, scientific, educational, or policy settings because it is communicated through different languages, formats, and knowledge systems. The platform therefore focuses not only on collecting knowledge, but also on making it accessible, interpretable, and usable without requiring contributors to conform to scientific or institutional communication norms.

2.2 Technical design

The proposed prototype is designed as a workflow that supports the collection, translation, adaptation, and delivery of Indigenous and local knowledge within the existing AAORIA Coastal Resilience Hub (Figure 1). The technical design prioritises accessibility, interoperability, and usability across diverse linguistic, technological, and institutional contexts.

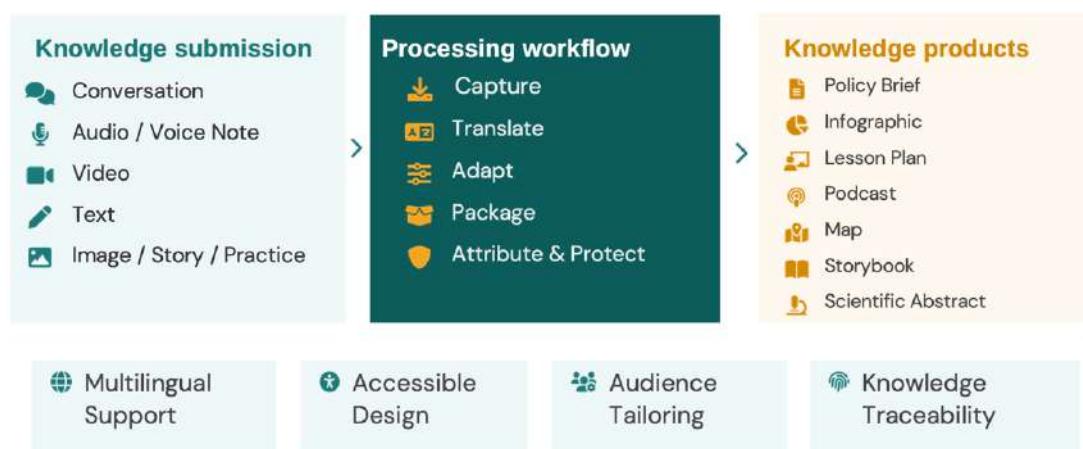


Figure 1. Conceptual workflow of the Indigenous and Local Knowledge (ILK) Platform integrated within the AAORIA Coastal Resilience Hub, highlighting multimodal knowledge submission, processing workflow, and audience-specific outputs

2.2.1 Knowledge submission

The knowledge submission component is designed to lower barriers to participation by allowing contributors to communicate in formats that are familiar, accessible, and appropriate to their local context. The platform supports multiple forms of knowledge expression, including voice notes, audio recordings, video, photographs, text, and messaging applications such as WhatsApp. By enabling contributors to submit knowledge in the way it naturally exists, the platform seeks to broaden participation while preserving context, meaning, and contributor agency from the earliest stage of the workflow.

2.2.2 Processing workflow

Following submission, contributions enter a processing workflow designed to support multilingual accessibility, knowledge translation, and quality assurance. The prototype combines AI-assisted processing with human moderation to enable scalable handling of diverse knowledge formats while maintaining contextual integrity and contributor trust.

AI-supported tools are used to perform tasks such as transcription of audio and video content, multilingual translation, metadata extraction, and preliminary content structuring. These functions help bridge linguistic, communication, and formatting barriers that may otherwise limit the usability or discoverability of submitted knowledge across different audiences and institutional settings.

Human moderation constitutes an essential component of the workflow. Moderators review processed content to identify potential inaccuracies, verify metadata, confirm consent and attribution requirements, and provide contextual oversight where automated systems may be insufficient. This approach is intended to preserve meaning, reduce the risk of misinterpretation, and support responsible handling of culturally sensitive or community-owned knowledge.

2.2.3 Knowledge products

A central feature of the proposed platform is its ability to transform submitted knowledge into products tailored to audience-specific needs. The platform therefore seeks not only to preserve knowledge, but also to increase its practical usability across institutional, educational, and community settings.

Depending on contributor preferences, intended audiences, and application needs, submitted material can be translated into a range of knowledge products, including policy briefs, educational lesson plans, scientific-style abstracts, podcasts, infographics, public summaries, story maps, and museum or outreach materials. This flexible output model enables a single contribution to support multiple pathways of communication and engagement.

2.2.4 Integration to Coastal Resilience Hub

Following processing and moderation, approved knowledge contributions and derived knowledge products are incorporated into the Coastal Resilience Hub through searchable and map-based interfaces. This enables users to explore contributions by geographic location, thematic focus, knowledge type, or application area, while supporting interoperability and facilitating connections

between coastal communities, decision makers, projects, and related resilience experiences across the Atlantic.

2.3 Target users

The platform is designed to support a broad range of contributors and users involved in coastal resilience, knowledge exchange, education, and decision making across the Atlantic context. Two main user groups are envisioned: knowledge contributors and knowledge users.

Knowledge contributors

The platform aims to lower barriers for participation by enabling contributions from individuals and communities whose knowledge is often underrepresented in conventional scientific and policy systems. Potential contributors include Indigenous local communities and knowledge holders, fishers and coastal resource users, teachers and educators, community organisations and civil society groups, etc.

Knowledge users

The platform is intended to support multiple audiences that require knowledge products adapted to different communication and operational needs. Potential users include policymakers and coastal managers, researchers and scientific institutions, museums and outreach organisations, NGOs and community-based initiatives, AAORIA programmes and Beacon Sites.

2.4 Accessibility and sustainability

Accessibility and long-term sustainability are important of the proposed solution.

The design considers practical accessibility challenges, including differences in digital literacy, language, technological access, and internet connectivity. Features such as mobile-friendly participation, low-bandwidth compatibility, and future offline functionality aim to reduce barriers to engagement.

Sustainability of the platform depends not only on technical infrastructure, but also on governance, moderation, partnerships, and community trust. By embedding the prototype within the existing AAORIA Coastal Resilience Hub, the concept leverages established networks and infrastructure while creating a foundation for phased development, collaborative stewardship, and future scaling.

3 Added Value and Challenges

3.1 Added value

The proposed platform addresses a persistent gap in coastal resilience initiatives by focusing not only on knowledge collection, but on knowledge translation, accessibility, and practical usability. By enabling contributions through diverse communication formats and adapting content into audience-specific outputs, the concept supports more inclusive participation and broader integration of Indigenous and local knowledge across scientific, educational, policy, and community contexts.

3.2 Limitations and challenges

While the proposed concept demonstrates strong potential, several challenges remain for future development and implementation. AI-assisted processing may introduce risks related to contextual misinterpretation and handling of culturally sensitive knowledge, which highlights the continued importance of human moderation. Meanwhile, operational sustainability depends on factors beyond technical design, including governance frameworks, consent and attribution mechanisms, funding, and trusted partnerships with communities and institutions. Differences in digital access, language, literacy, and connectivity across Atlantic regions may also influence participation and require adaptive implementation strategies.

4 Future Development and Scaling

The proposed prototype is intended as a scalable concept that will be further developed through phased implementation within the Horizon EU project funded under the call *HORIZON-CL6-2025-02-COMMUNITIES-03: Innovative solutions for resilient and climate-adapted coastal communities in the Atlantic*. A logical next step will involve refinement of the prototype architecture and user interface, followed by pilot testing with coastal communities and partner organisations to evaluate usability, accessibility, and contextual relevance. The implementation will be carried out in close cooperation between the project, the Hackathon Team and the AAORIA community. Future expansion could also include collaborations with museums, aquaria, educational centres, and conference events, where the platform could be explored through interactive exhibitions, educational tools, or public engagement activities.

5 Conclusion

The proposed **Indigenous and Local Knowledge Platform** addresses an important challenge in coastal resilience: not only the recognition of diverse knowledge systems, but their effective translation across communities, institutions, and decision-making contexts. Through accessible knowledge contribution, multilingual and multiformat processing, audience-specific products, and integration within the existing AAORIA Coastal Resilience Hub, the concept seeks to strengthen the visibility, usability, and practical uptake of Indigenous and local knowledge across the Atlantic.

While implementation will require further development, governance design, and community co-creation, the prototype demonstrates a feasible pathway toward more inclusive and interoperable knowledge exchange. Building on existing AAORIA infrastructure and partnerships, the proposed approach provides a foundation for sustainable implementation and stronger connections between coastal communities, educators, researchers, and policymakers, contributing to more equitable and collaborative coastal resilience initiatives.

