Fisheries and Oceans Canada | Pêches et Océans Canada

# OCTOPUS

# Transforming Ocean Video Analysis with AI

A Department of Fisheries and Oceans (DFO) & Labs Canada Pilot Project

Overview for the GC Data Conference February 18-19, 2026

## Opportunity:

As part of a Labs Canada Experimentation and Innovation initiative, develop a pilot which modernizes digital science infrastructure and addresses key challenges in scientific research environments

## Result:

# Pilot Overview

**Vision** Establish a unified, adaptive AI solution that brings together human expertise and machine intelligence to deliver trusted insights.

**Objective** Leverage AI technologies to build an Object, Classification, Tagging, Organization, and Pattern Understanding Solution (**OCTOPUS**) to enhance the analysis of scientific data, improve monitoring capabilities and support decision-making processes for DFO

## Approach

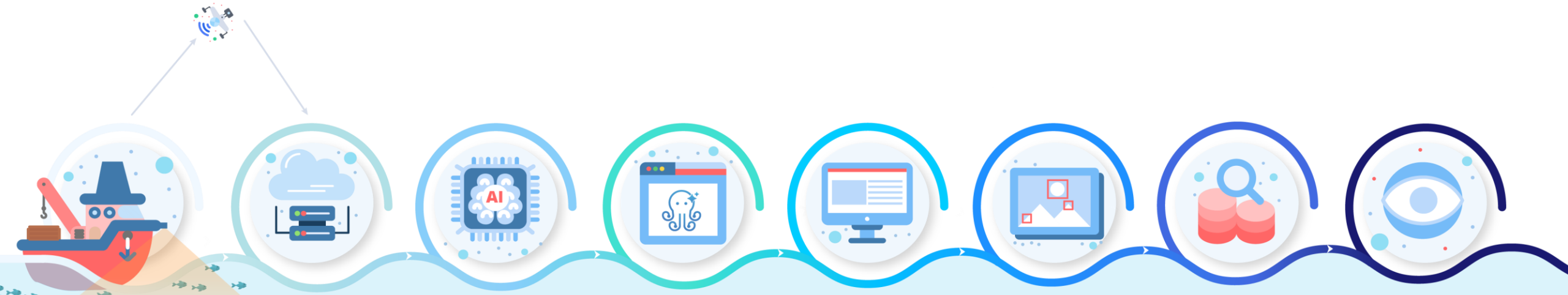
- Leverage the **Enterprise Data Hub (EDH)**, a DFO platform which enables secure data sharing and provides tools for data governance, analytics and visualization.
- Build on existing EDH ingestion pipelines by integrating **AI analytics**.
- Collaboration between **Chief Digital Officer Sector** (CDOS), **Office of the Chief Data Steward** (OCDS) and **Shared Services Canada** (SSC)
- Leverage **AI technologies** (i.e., computer vision, machine learning generative AI)
- Deliver in **agile increments** to have a minimum viable product by Jan. 2026 and a total duration of 7 months (i.e. September 2025 to March 2026)

# Guiding Principles

## For a scalable, secure, and collaborative AI solution

- **Agility & Flexibility:** Create a modular design for diverse data sources and future scalability. The enterprise solution will be designed to meet the complex needs of DFO by integrating and automating business processes across different departments.
- **Collaboration:** Apply a human-centered design process informed by ongoing user research and feedback from scientists and researchers.
- **Innovation:** Harness cutting-edge AI and machine learning technologies to drive advanced video content analysis. The team will collaborate with industry leaders such as Microsoft to accelerate innovation and ensure best-in-class solutions.
- **Connectivity & Security:** Meet government data security protocols and ensure robust data governance.
- **Broad Applicability:** Support diverse science disciplines, including environmental monitoring and fisheries management.

# How Does OCTOPUS Work? A User Journey




## Vessel Input

Fishing vessels transmit monitoring data in real-time using a camera device installed on board to record events and activities.

## Data Received

The Enterprise Data Hub (EDH) Data Exchange Service receives incoming data and securely stores it on DFO infrastructure.

## Data Connection

Users upload files directly or connect to a storage account (cloud or on-premises) to access and manage the collected data.

## User Input

Users manually upload media and enter prompts, then select:
**AI Analysis Tool** for instant content analysis, tagging, and summaries, or **Data Annotation Tool** to create and edit training datasets for AI models.

## AI Output

The system analyzes the content, displays a preview, generates tags, provides a summary and users interact with the model.

## User Feedback

Users correct or edit labels, add annotations to images and video as well as analyze content.

## AI Update

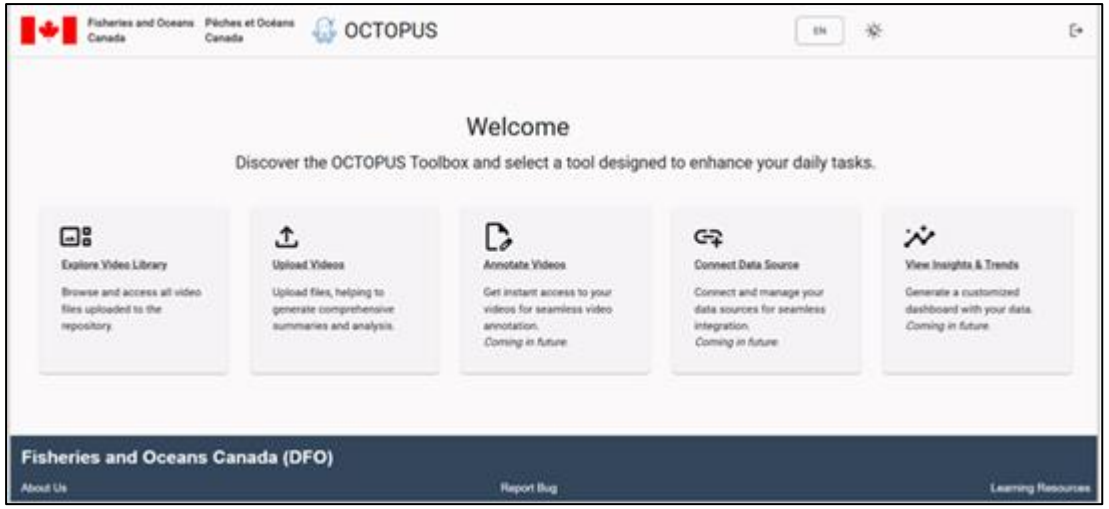
The system learns from user feedback and improves future results and object detection.

## User Review

Users judge the quality of the content (option to give a thumbs up/down to rate the output), make further edits if needed and save changes.

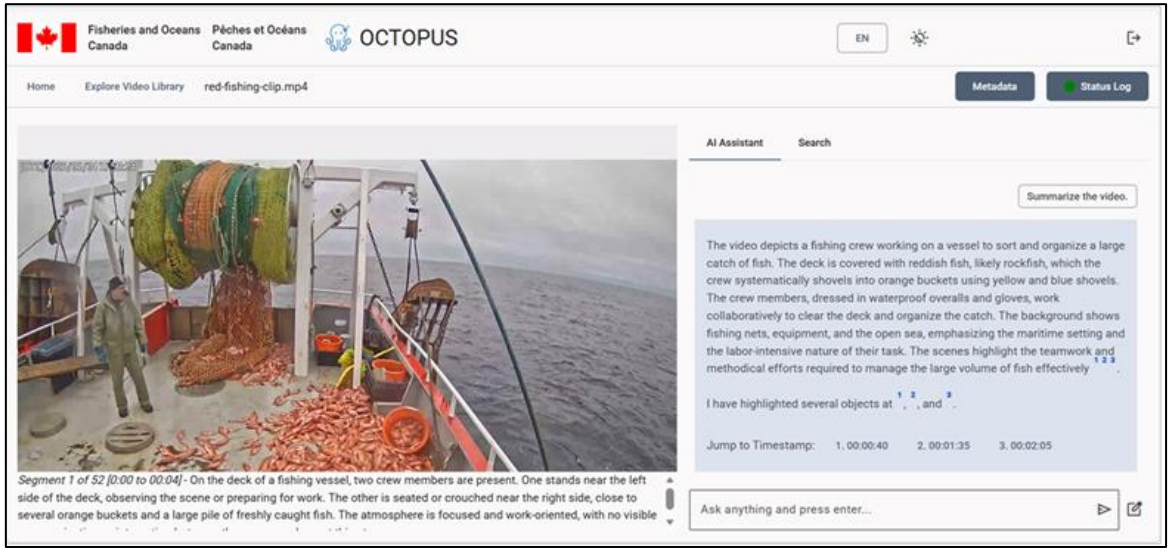
**USER TOUCHPOINTS**

# Sample User Interaction with OCTOPUS




## User Can

- Explore video files they want to secure into departmental infrastructure
- Select and upload video files of interest
- Allow AI Assistant to analyze the video
- *In future, the user will be able to annotate the video adding metadata and tags of interest, using the AI Assistant.* *E.g. this is a rockfish*




- Interact with the AI Assistant for AI powered analysis of the video *E.g. How many small, medium and large rockfish are swimming?*
- *In future, the user will be able to train the AI Assistant by reviewing and adjusting the output as desired.* *E.g. this is not a rockfish*

# Potential Use Cases for OCTOPUS as an Ocean Video Analysis Solution

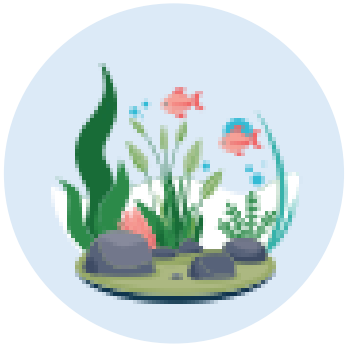
## Fisheries Management

Species ID and Abundance Monitoring

Bycatch and Discard Detection

Catch and Logbook Verification

Gear and Vessel Identification



## Aquatic Ecosystems and Conservation

Marine Debris and Pollution Detection

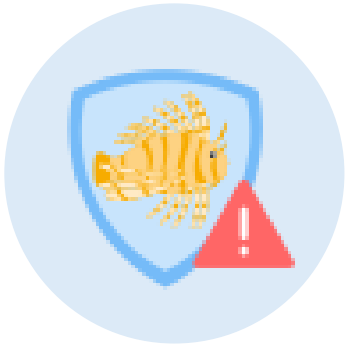
Habitat Mapping and Classification

IUU Fishing and Vessel Anomaly Detection

## Protected Species

Marine Mammal Detection and Tracking

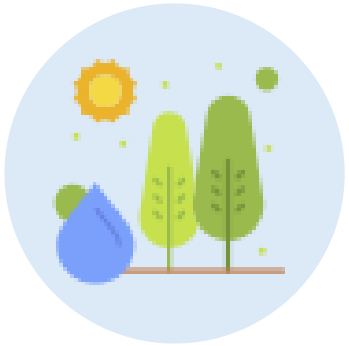
Behavioral and Environmental Analysis



## Invasive Species Risk Management

Watercraft Detection and Compliance Checks

Automatic Identification System (AIS) Habitat Surveillance



## Climate and Environmental Science

Ecosystem Change Detection (Bleaching, Blooms, Sediments)

Integrated Marine Observation With Sensors

# Summary

## OCTOPUS: Transforming Ocean Video Analysis with AI

- OCTOPUS addresses key challenges in scientific research environments by enabling enhanced video analysis and data stewardship.
- Users benefit from streamlined workflows, actionable insights, and collaborative tools, such as interacting directly with the AI-powered chatbot to analyze video data.
- The initiative reflects a collaborative effort with Labs Canada and partners, showcasing potential for cross-departmental innovation.
- OCTOPUS is currently in development as a pilot initiative; future decisions on broader deployment will follow further review and evaluation

# Thank you for your interest!


*For more information or to explore collaboration opportunities, please contact*

*DFO.EDHSupport-SoutienCDE.MPO@dfo-mpo.gc.ca*