



# AUSTRALIAN GEOSPATIAL- INTELLIGENCE ORGANISATION (AGO) ANALYTICS LAB PROGRAM

## DATA GENERALISATION PROPOSAL BRIEFING DOCUMENT

Questions and further information can be provided by:

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[Document Control](#)  
Date: 11 August 2023  
Version: 1.0  
Last Modified By: Roshni Sharma  
Approved By: Kate Williams

## Objective

The AGO's Analytics Labs Program (AGO Labs), coordinated through FrontierSI, was created to help AGO better access innovative technology and trial new ways of working with industry. Specifically, AGO is keen to attract a wider pool of companies and technologies to draw on for automated geospatial intelligence. The Program aims to address AGO challenges and build new industry capability through short-term projects with Australian and New Zealand-based companies. AGO Labs Challenge Topics focus on machine learning and analytics challenges for producing automated imagery analysis.

Successful demonstrator projects may have the opportunity to progress to an additional limited operational testing phase.

## What is AGO Labs?

AGO Labs is a way for AGO to rapidly assess new technology capability through a challenge-based innovation program. From this process, learnings can be gathered about the barriers and opportunities for AGO to work with an increased breadth of companies. In turn, this could lead to a long-term mechanism for AGO to access, and provide, a pipeline of activities to industry for testing new innovations and thinking in analytics.

Initial successful projects will be funded up to \$100,000 for Proof-of-Concept projects for projects up to six months in length. An additional \$50,000 and 3 months may be provided to some projects to undertake limited operational testing, though this process will be considered as a stage gate at the end of the Proof of Concept, and the focus on the Call for Proposals should focus on the Proof-of-Concept stage, rather than the operational testing stage.

The Challenge Topic is briefly described below. It is recommended that organisations read the full description of the challenge topic to understand background, use cases and evaluation criteria for each of the challenge topics. Further information is given in Appendix A of this document.

## Challenge Topic: Rules to Map by...

This challenge aims to accurately automate data conversion from 1:50K to 1:100K. A full outline of the challenge is available in Appendix I of this document.

## Timeline

Interested parties may submit an AGO Labs project proposal by completing a short proposal, using the template downloaded from the [AGO Labs page](#), and emailing to the FrontierSI AGO Labs Project Manager, Roshni Sharma, at [agolabs@frontiersi.com.au](mailto:agolabs@frontiersi.com.au) by **10:00 pm (AEST), Monday 18 September 2023**.

Projects will be shortlisted by a panel with representatives from both AGO and FrontierSI. Applicants may be contacted to provide further details on their proposals. Successful Projects will be notified in August 2021. Projects are expected to start in September 2021 and be delivered within a timeframe of six months.

## Additional Resources

A public information session webinar will occur on **Wednesday 6 September 2023 at 10:00 am (AEST)** – registration for this is available at <https://bit.ly/AGO-data-generalisation>. This webinar will include a presentation of the aims of the AGO Labs program, as well as interactive Q&A with AGO and FrontierSI representatives. A registration link for the webinar will be provided on the [AGO Labs page](#). Additional questions can be directed to FrontierSI at [agolabs@frontiersi.com.au](mailto:agolabs@frontiersi.com.au)

## Project Data

The following data from AGO is available to access upon request to assist the preparation of submissions. [Please register your interest here](#) to be provided with access a portal where this data is held.

This data is available for use on this project only.

### **Project Dataset: available upon request:**

- Shoalwater Bay Training Area TDS 6.1 1:50,000 data (vector data, captured 2022)

### **Additional Material available upon request:**

- GAIT (QA/QC software utilised by AGO)
- User Guide GAIT 28
- Licence/Release Notes (TDS Data release notes\_
- TDS Specification Documentation

## Project deliverables

Successful projects will be required to, at the end of their round, provide a presentation and final report to FrontierSI and AGO outlining:

- the approach they have taken
- a description of the project outcomes within the context of the selected challenge question
- a demonstration of the outcomes showcasing achievements
- an overview of lessons learnt
- suggested options for AGO to engage and work more effectively with AGO Labs

Delivery of outputs for AGO to access and test iteratively throughout the project, as well as delivery of derivative datasets and related source code created during the project is also required. Training material related to this is desirable.

## Budget

Proof-of-Concept projects will be funded with a budget of up to \$100,000. There is no requirement that additional funding will be provided to the project by applicants.

As this activity will help companies pilot technology with AGO for potential future deployment, it is expected that applicants will not operate with full commercial rates, but instead will budget the project at-cost plus 30% overheads.

For projects that are considered particularly successful and make it through a stage gate assessment between AGO and FrontierSI at the end of their Proof-of-Concept phase an additional \$50,000 and three months will be provided to undertake limited operational testing.

The proposal response should focus on the \$100,000 Proof-of-Concept only, operational testing will be discussed later in each successful project.

## Evaluation Criteria

Projects that meet the following criteria will be considered, for further information please refer to the AGO Labs Proposal Response Template found on the AGO Labs website <https://frontiersi.com.au/agolabs-data-generalisation/>

### Required

- Project outputs that will address the challenge topic
- Ability of AGO to access and test outputs iteratively during the project
- Outcomes that can be operationalised beyond the Proof-of-concept project
- Project approach and outputs that address the challenge topic
- Intended approach is appropriate in scope, proposed methods and measurement of success
- Presence of project management and communication strategies to support the project approach
- Project offers value for money
- Potential for collaboration following the Challenge project stage

### Desirable

- Commitment to Diversity and Inclusion
- In-kind contributions from project partners (e.g., staff time, equipment, IP).

## Intellectual Property

Project Intellectual Property (Project IP) in the capability demonstrators produced during the Project will be owned by the participating partner, in agreement with the lead partner. The AGO is granted a perpetual licence to use any Project IP created for Defence Purposes generally (other than Commercialisation) including internal research, development, education and training. In relation to the use of software, source code and project code provided by a project partner, the licence will end at the conclusion of the relevant Project, and the AGO will be required to uninstall and decommission the relevant material promptly following the end of the licence term.

Ownership of Background IP of participating partners for the capability demonstrators will be retained by the participating partners.

AGO will own the project IP in the report required to be produced by participating partners in each demonstrator project.

## Constraints and Requirements

- The Australian Government contribution will be limited to \$100,000 per project for the Proof-of-Concept
- Projects should be completed in a period of approximately three to six months
- A final project report and presentation is required at the end of the AGO Labs project
- The lead organisation must be a company from Australia or New Zealand

## Appendix I: Challenge Question

### Rules to Map By...

Accurate automation of data conversion from 1:50K to 1:100K with accuracy

#### Overview:

This challenge aims to investigate solutions for automation of data conversion from 1:50k to 1:100k scales, to military specifications (MILSPEC).

#### Problem Statement

Users of maps are more able to quickly and accurately interpret spatial information about new and changing environments when they are already familiar with the symbology, colours and level of detail from a standard product. As such it is essential that AGO mapping products adhere to military specifications (MILSPEC).

AGO cartographers are required to accurately create data and maps at a defined scales to documented specifications as part of their everyday activity. This involves using existing datasets and imagery products to create a number of individual layers that represent the following 7 themes: Hydrography, Physiography, Transportation, Population, Industry, Vegetation and Hypsography. These datasets must conform to specifications *within* the theme, but also *between* the themes, for example a lake cannot overlap a built-up area. To add to the complexity, these rules change as the map scale changes, and features that were represented as a polygon at a large scale might change to a point at a smaller scale, or even be removed entirely.

AGO is interested in ways to embed the complex MILSPECs into a rule based process, that develops new compliant data at 1:100K for original data captured at 1:50k based on existing ESRI workflows.

AGO is looking for innovative solutions that:

- Use advanced data models to link feature geometry and attributes at different scales
- Create data that complies with rules within datasets and between datasets at 1:100k
- Develop automated process to generalise data

#### Desired Outcomes

Desired outputs will include:

- Commercial data models/algorithms/rulesets/tools/processes, that aligns with existing ESRI workflows (i.e. Defense Mapping 1:50k – 1:250k generalisation)
- Automated QA processes that embed MILSPEC rules.

#### Data

AGO will provide existing data for this challenge, including:

- Compliant 1:50k sample dataset over an existing training area.
- Commercial imagery
- Gait (AGO QC software)
- Specifications and reference notes

#### Use Cases

The following stories are provided as guidance to challenge responses but should not be considered definitive - AGO is willing to entertain modifications to the following list or additional use case/s:

- As an **analyst** I want to create MILSPEC compliant data at 1:100K from existing 1:50K data.

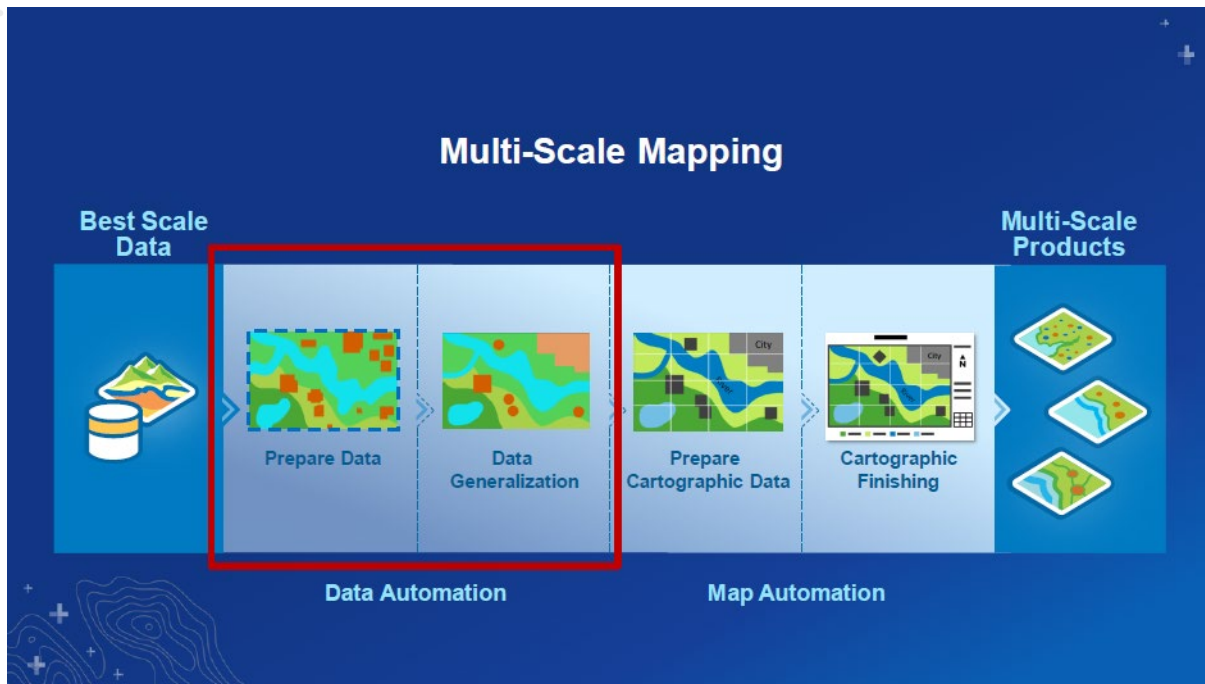


Figure 1 - Esri Tools for Topographic Cartography - Slide 7



Figure 2 - Esri Tools for Topographic Cartography - Slide 12

## Generalization Tools in ArcGIS

- **Analysis**
  - Erase
  - Identity
  - Buffer
  - Graphic Buffer (10.5)
  - Near
  - Generate Near Table
- **Conversion**
  - Feature class to feature class
  - Table to Table
- **Data Management**
  - Integrate
  - Add Geometry Attributes
  - Copy Features
  - Delete Features
  - Feature To Line
  - Feature To Point
  - Feature To Polygon
  - Feature Vertices to Points
  - Minimum Bounding Geometry
  - Multipart To Singlepart
  - Repair Geometry
  - Split Line At Vertices
  - Unsplit Line
  - Add Field
  - Calculate Field
  - Append
  - Copy
  - Delete
  - Dissolve
  - Eliminate Polygon Part
  - Make Feature Layer
  - Select Layer By Attribute
  - Select Layer By Location
  - Get Count
- **Spatial Analyst**
  - Topo To Raster
  - Raster Calculator
  - Polygon To Raster
  - Point To Raster
  - Con
  - Contour
  - Raster to Point
- **Model Only Tools**
  - Select Data
  - Calculate Value
  - Iterators
- **Production Mapping**
  - Aggregate Polygons
  - Calculate Visual Specification
  - Convert Polygons
  - Delete Dangles
  - Delete Polygons and Extend Lines
  - Extend Polygon Sides
  - Fill Gaps
  - Generalized Shared Features
  - Increase Line Length
  - Increase Polygon Area
  - Production Centerline
  - Production Clip
- **Defense Mapping**
  - Hydro Centerline
  - Production Dissolve
  - Prune Hydro
  - Remove Cutbacks
  - Remove Self Intersections
  - Repair Bad Geometry
  - Split Narrow Polygons
  - Thin Hydro Features
  - Thin Spot Heights
- **Cartography**
  - Aggregate Points
  - Aggregate Polygons
  - Collapse Road Detail
  - Create Cartographic Partitions
  - Delineate Built-Up Areas
  - Merge Divided Roads
  - Simplify Building
  - Simplify Line
  - Simplify Polygon
  - Smooth Line
  - Smooth Polygon
  - Thin Road Network
  - Detect Graphic Conflict
  - Propagate Displacement
  - Resolve Building Conflicts
  - Resolve Road Conflicts
  - Feature Outline Masks
  - Update Override

Figure 3 - Esri Defense Mapping: Cartographic Map Production - Slide 11

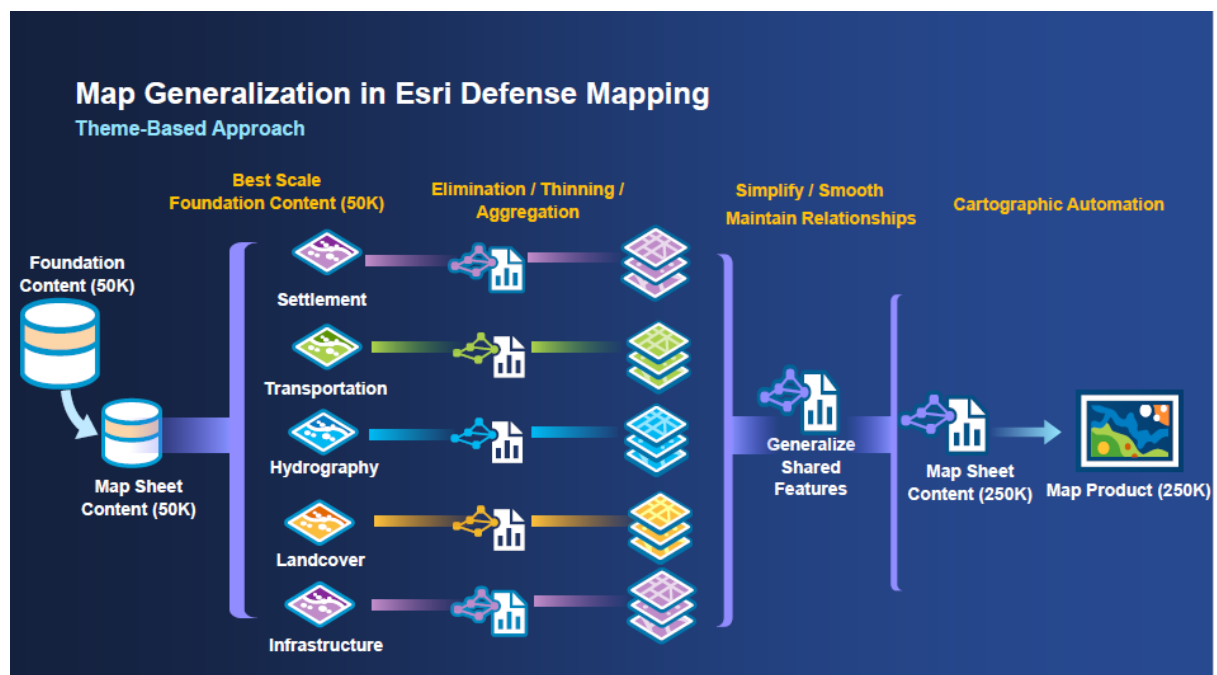


Figure 4 - Map Generalization in Esri Defense Mapping - Slide 15