Toitū Te Whenua
Land Information
New Zealand

Enabling Integrated Marine Management

Part 1: Technical Proof of Concept

Appendix 7:

Use Case Summary: Toitū Te Whenua Land Information New Zealand

21 September 2022

Te Kāwanatanga o Aotearoa
New Zealand Government

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Toitū Te Whenua LINZ: Supporting Emergency Response through Data Integration

Use case overview

During an emergency event the LINZ Geospatial Incident Management team can be contacted to help monitor and provide geospatial data to support a response. The LINZ use case aimed to test the value of the Datamesh technology in responding to a maritime emergency incident.

LINZ ran an oil spill emergency response exercise (the exercise), working primarily with Maritime New Zealand (MNZ), and alongside other organisations who have a role in marine pollution responses.

As well as testing LINZ' Coordinated Incident Management System (CIMS) processes, the exercise included a live test of the Datamesh, it's performance in linking and sharing numerous big data sets between response agencies and enabling the development of a common-operating picture.

Prior to the exercise LINZ worked with MNZ to identify the key datasets that would be required in a maritime emergency. Approximately ten different LINZ Data Service (LDS) dataset were linked to the datamesh prior to the exercise. Other datasets were requested and linked from Oceanum (Predict Wind), Te Arawhiti, DOC, MPI to support the emergency exercise.

Key Findings

The Datamesh proved beneficial throughout the exercise, increasing the speed agencies were able to find and share new data upon request.

Shared workspaces were created within the Datamesh (by supplier Oceanum) enabling multiple agencies (LINZ, MNZ, DOC, and MPI) to access a secure space, to share data, and build a common operating picture. A future instance of the Datamesh would allow user to create their own workspaces which could be shared with other agencies. This set up would benefit agencies building a common operating picture in an emergency event.

Feedback on Datamesh testing was positive, with data import, data selection, search functionality, Datamesh display, and metadata functionality tested. Current limitations of some functionality were noted and have been developed into future requirements,

including a minimum metadata schema, previewing of datasets, and bulk data import functionality (full details of requirements on page 8).

Project Outputs

Findings from LINZ use case were reviewed against the project outputs with recommendations developed following the review.

Output 1	Achieved
Connections between existing GIS web services and/or datasets (without replicating the data across to this system); supporting faster and lower-cost computation of bulk data than existing systems.	

- Datasets from a variety of organisations were connected to the datamesh. This includes dataset from DOC, MPI, Te Arawhiti, and the LINZ data service.
- Existing web service data is connected to the datamesh, and the data is streamed to the datamesh.
- Sharing of data was quick during the emergency exercise. Once data was uploaded and shared with a user it could be viewed by refreshing the datamesh.
- Package building and exporting of data took less than 10 minutes. This is significantly faster as it would take more than 10minutes to share one dataset through current data sharing channels LINZ uses.
- When downloading a package (group of datasets) a copy of the data is created. Packages would need to be re-downloaded if data is updated.

Output 2	Achieved
Interoperability of various data formats, standards, and scales	

- All datasets were ingested, could be downloaded, and analysed in GIS tools.
- The datamesh supports a wide variety of data formats, including, met ocean formats, GIS formats (raster and vector), and time series data. These formats were relevant for the emergency exercise.
- Some LDS datasets were unable to be ingested. This is due to LDS Web Title Map Service (WTMS) pre render tiles which do not transfer well for analysis.
- Metadata is fully customisable and populated by the data owner.
- There are limitations on file sizes and visualisation, particularly with raster datasets. This limitation is due to the way the datamesh is interfaced to through web browsers.

- Packaging of datasets can cause download limitations but the datamesh provides feedback where there is a limitation. Datasets can be downloaded individually, pending limitation of the browser.

Output 3	Achieved
A web service (conforming to OGC API standards) enabling users to query and stream data into their own GIS systems and analysis platforms.	

- QGIS can be connected to the datamesh via API without having to go through the datamesh.
- Other applications were not tested for this use case.
- This functionality was tested QGIS and met the criteria, however it was not tested in ArcGIS.

Output 4	Achieved
Safe and secure access to sensitive data repositories.	

- Datasets are natively locked down to the data owner. Owners can edit their data permissions and share with another user group.

Output 5	Achieved
A spatial catalogue viewer with query functionality such as searching and filtering.	

- Datasets extents can be viewed in the datamesh, the ability to visualise the data through the datamesh would be additionally advantageous.
- Spatial and temporal filtering is possible.
- Viewing all dataset extents created an overly busy map interface. The ability to group data by theme or type layers and turn layers on/off would be useful.

Output 6	
Access to analytical tools (source code) using open formats.	**Not Applicable**

Output 7	
	Not Applicable

Insights/models from analytical queries run across multiple datasets.

Output 8

Performance of the system meets partners' and users' needs. **Achieved**

- Building of data package and export was successful. Individual layers are easy to download but a good understanding of the package download process is required. Guidance would be beneficial in this space.
- The datamesh provides a quick and easy way for sharing datasets between organisations in an emergency event.
- All data types could be exported from the datamesh and imported into ArcGIS as expected. There were issues with importing time series data into the datamesh however it is noted that this is not a datamesh issue.
- Knowledge of GIS data and formats would benefit datamesh users. Improvements to the User Interface would be required to if access by the public was required.
- MNZ feedback included: benefit using the datamesh to find available data and locate original data sources.

Meets needs of user		Finding
Data import functionality	Yes	Enables users to connect datasets more easily. e.g., Users can connect an existing LDS layer.
Data selection tool	Yes	This includes point, radius, and polygon filtering.
Display in datamesh	Yes	Datamesh display map show enough location detail with taking away from dataset outlines. Preview of selected datasets prior to export The ability to toggle on and off different layers and data types would be useful in reducing clutter.
Live data feed	Partially	Data is live/up to date in the datamesh. Once downloaded as an instance of the data and imported into GIS software it is no longer live. Packages would need to be re-downloaded to update data.
Metadata	Yes	Customisable, not locked into schema.
Search functionality	Yes	Search functionality works well as long as the metadata is entered correctly.

Recommendations

High Level Recommendation

- Aotearoa New Zealand should look to move towards a marine spatial data sharing system.
- A lead agency should be confirmed to progress the development of a business case.
- Findings from the Integrated Marine Management technical proof of concept should be used to develop business case requirements.
- Organisations and staff with a role in a marine emergency response should be aware of an agreed platform for creating a common operating picture.

Technical Requirements Recommendations

- Ability for users to create of shared workspace environments. A workspace enables users to see a selected subset of the datamesh that is customisable. In an emergency event, workspaces would help create a common operating picture.
- A datamesh facilitated prompt when ingesting new datasets, for data license and access permissions. This would have saved time and created efficiencies during the emergency exercise.
- Consider alternative interface options to negate limitations of browsers constraints for large datasets.
- Future datamesh should have preview of all datasets.
- A standard way of grouping and layering dataset. This prework has been done by NZ Marine Geospatial Working Group.
- A minimum metadata schema that aligns with the schema of the NZ Marine Geospatial Working Group.
- A bulk dataset import functionality.
- Large (greater than 100mb) datasets should be hosted in the cloud and then connected to the datamesh.
- Guidance documents for those new to the datamesh; particularly for building and exporting packages.
- An additional plugin could be developed in QGIS or other commonly used GIS software packages to provide more functionality, querying for example