ISABEL

MINIMIZE COSTS AND MAXIMIZE BENEFITS IN THE TRANSITIONARY EUROPEAN REGIONAL LABOUR MARKETS

mInimize coSts and mAximize Benefits in the transitionary European regional Labour markets

Deliverable Nº5.1

First ISABEL FAROROM Observatory

WP5: Data Analysis Tools and Visualisations on JCD and its uneven effects

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Abstract:
During an era of data abundance, the efficient consumption of data for the recognition of patterns and the formulation of conclusions is imperative. Specifically, for the necessary actions regarding the Just Green and Digital Transition, making informed decisions is critical. FAROROMO (FAir Green transitiOn of Regional labOur Markets Observatory) is a tool that aims to assist researchers and policy makers in their journey of finding answers and solutions, by streamlining the process of data navigation. To achieve that, FAROROMO offers robust data visualizations, revolving mainly around map representations. At the same time, the User Interface is designed to be user-friendly, so that the knowledge acquired via the ISABEL project can be accessible to the general public, as well.

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Executive summary

This report presents the deliverable 5.1 showcasing the development of the FAROROMO observatory, which is a user-friendly observatory and data visualisation system designed to analyse the socially and geographically uneven impacts of Just Green and Digital Transition processes across Europe. Built on the ArcGIS Enterprise ecosystem and enhanced with custom GIS, Python, JavaScript, database, and API capabilities, FAROROMO enables interactive map-based exploration of job creation and job destruction patterns across multiple geographical scales. The platform supports dynamic dashboards, spatial data filtering, user-uploaded datasets, map layer management, and export functions, while future development will integrate ISABEL Data Lake resources, AI-driven adaptive visualisation, clustering techniques, automated insights, and personalised user interaction. Through its place-based and spatial justice-oriented approach, FAROROMO will support policymakers, researchers, VET providers, career guidance practitioners, stakeholders, and the wider public in understanding regional labour market transformations and co-creating equitable policy pathways for the Just Transition.

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1. Introduction

During an era of data abundance, the efficient consumption of data for the recognition of patterns and the formulation of conclusions is imperative. Specifically, for the necessary actions regarding the Just Green and Digital Transition, making informed decisions is critical. FARO ROMO (FAir Green transitiOn of Regional labOur Markets Observatory) is a tool that aims to assist researchers and policy makers in their journey of finding answers and solutions, by streamlining the process of data navigation. To achieve that, FARO ROMO offers robust data visualizations, revolving mainly around map representations. At the same time, the User Interface is designed to be user-friendly, so that the knowledge acquired via the ISABEL project can be accessible to the general public, as well.

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2. Tech Stack

In order to achieve the goals of the task, a flexible tech stack was used, based mostly on Geographic Information System (GIS) software. Custom tools were developed for functionality that was deemed important and original.

2.1 ArcGIS Server

The core of FAROROMO is the ArcGIS software suite by Esri Inc. To host FAROROMO, the University of Western Macedonia provided a server, where ArcGIS Enterprise was successfully set up. The version used was 11.3 and all necessary modules were installed properly to offer a wide array of developer capabilities, but also to ensure satisfactory performance for the web applications that will be served to end users. The server is designed to host a custom, heavily-modified ArcGIS Experience, which will be fed data from ArcGIS Web Maps and other geographical data forms provided by the ISABEL infrastructure and the users themselves.

2.2 ArcGIS Experience Builder

The Experience Builder is one of the many developer tools in the ArcGIS ecosystem. It is a no-code editor designed for web applications that utilize GIS functionality. A complete website can be designed with the Experience Builder, using ready-to-use, customizable blocks, called *widgets*. The result is a node.js web app. FAROROMO is an Experience, created with this tool, but features some custom widgets, programmed for specific tasks that are out of the scope of the editor. ArcGIS offers an SDK to officially support the development of custom widgets like these, which are written in Typescript and Javascript and use the React library. More functionality is expected to be integrated to FAROROMO with the development of custom widgets in the future.

For the display of information on maps, some ArcGIS Web Maps have been prepared with data that were available from the Just Transition Observatory (JT-O), ENTRA Lab's observatory for metrics regarding the environment, climate change and the work landscape. In the current version of FAROROMO, these Web Maps are attached to the Experience application as the main source of information for visualizations. Furthermore, for development purposes, the four available maps are now displayed multiple times along the map categories. In the future, data from the servers of the ISABEL project (Data Lake) will be processed dynamically by FAROROMO in order to create a vast number of possible visualizations on demand.

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3. Functionality

3.1 Data visualization on maps

The map is the heart of FAROROMO. The website offers a collapsible menu on the top to select a base map to display below. Each map features a description and a thumbnail. Upon selection, the interactive map below will update and a longer description will appear on the right. This text area can contain information about the units used, the current state of the available dataset and advice on how to interpret the data.

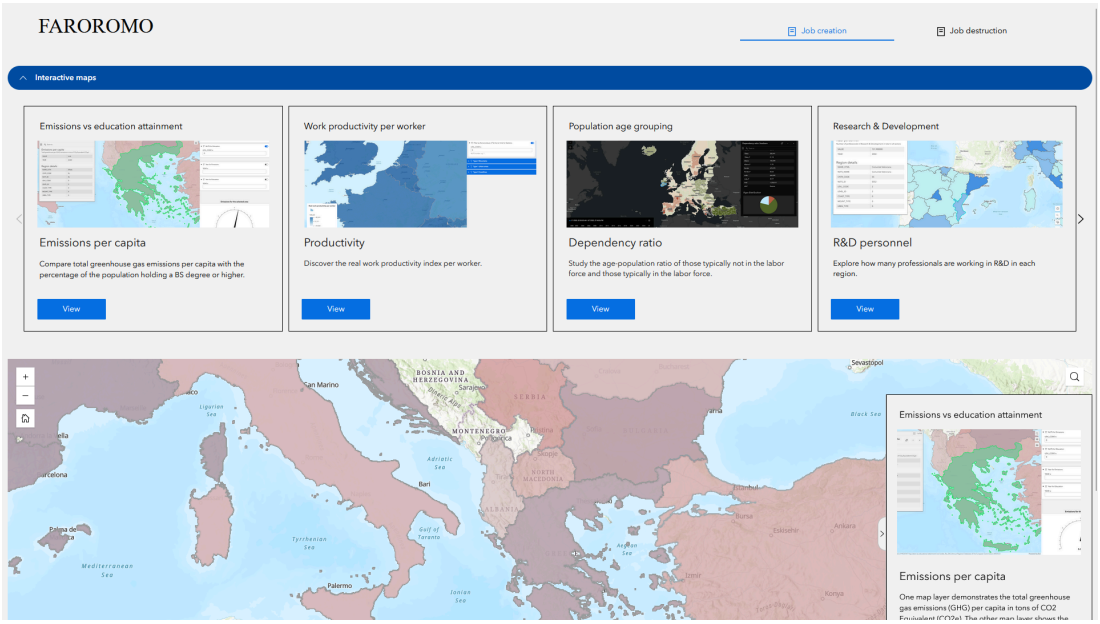


Figure 1: FAROROMO screenshot, main view.

Maps are divided into categories that can be accessed by different tabs. On the top right of the website, the current category can be selected. There are currently two map categories, “Job Creation” and “Job Destruction”. The integration of more tabs in the future is supported.

The map contains several tools, including the usual functions that would be expected from an interactive, digital map and some more advanced mechanisms. Some of the basic features are pan, zoom, rotation, search, reset and fullscreen view. In addition, each area on the map can be pressed for more information. A pop-up appears on click, with numerical values and sometimes charts for this region.

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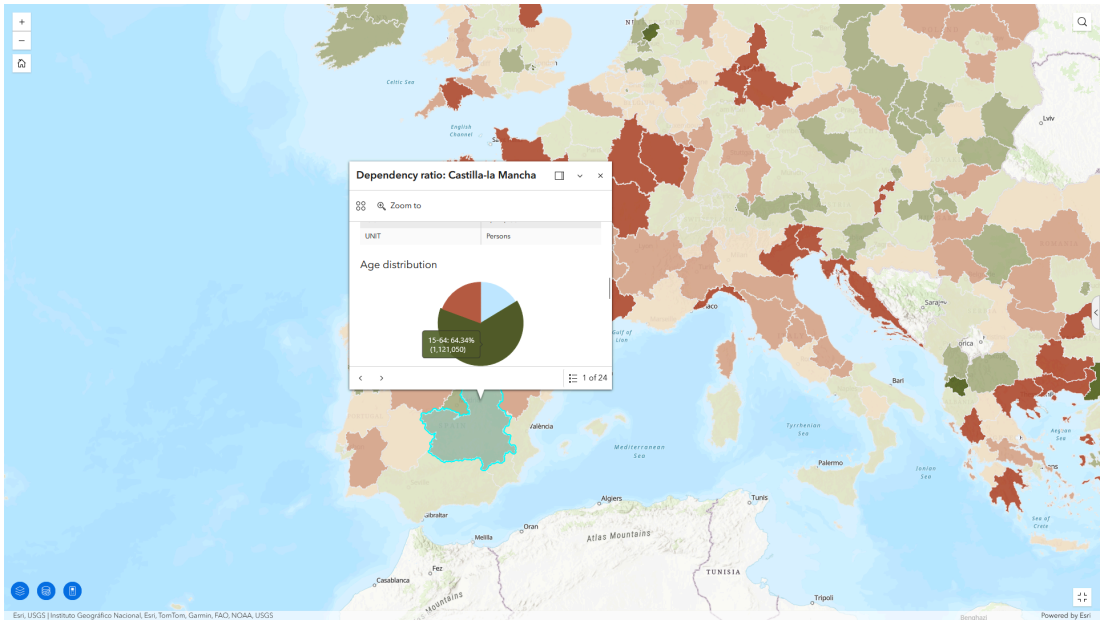


Figure 2: FAROROMO screenshot, region chart in fullscreen view.

On the bottom left there are 3 extra circular buttons. The first one is about the map layers and allows changes in visibility, opacity and order of the potential multitude of available map layers, among other functions. It also contains a legend for each layer.

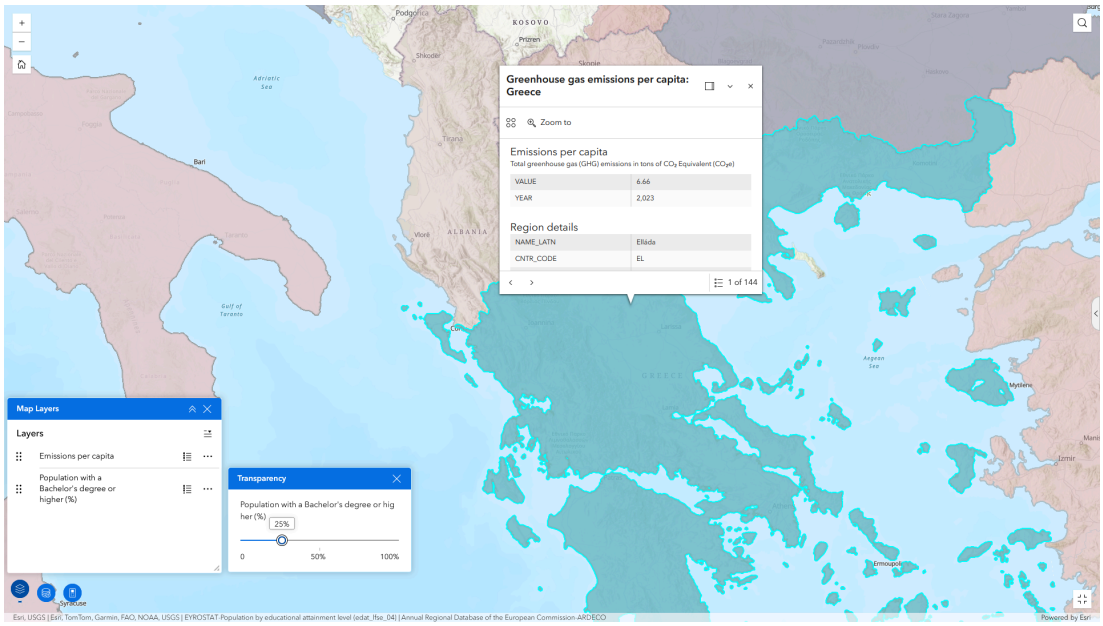


Figure 3: FAROROMO screenshot, map layers.

The second button opens the menu for the user to upload their own geographical data (see *3.3 User Data*) and the last circular button allows the application of predetermined filters on the data and therefore the visualization on the map, as well (see *3.2 Data filters*). On the bottom center of the map, there is an arrow for a collapsed table view. On click, it brings up a dynamic table with the current dataset and a lot of extra features. This table window is resizable and has one tab for each map layer.

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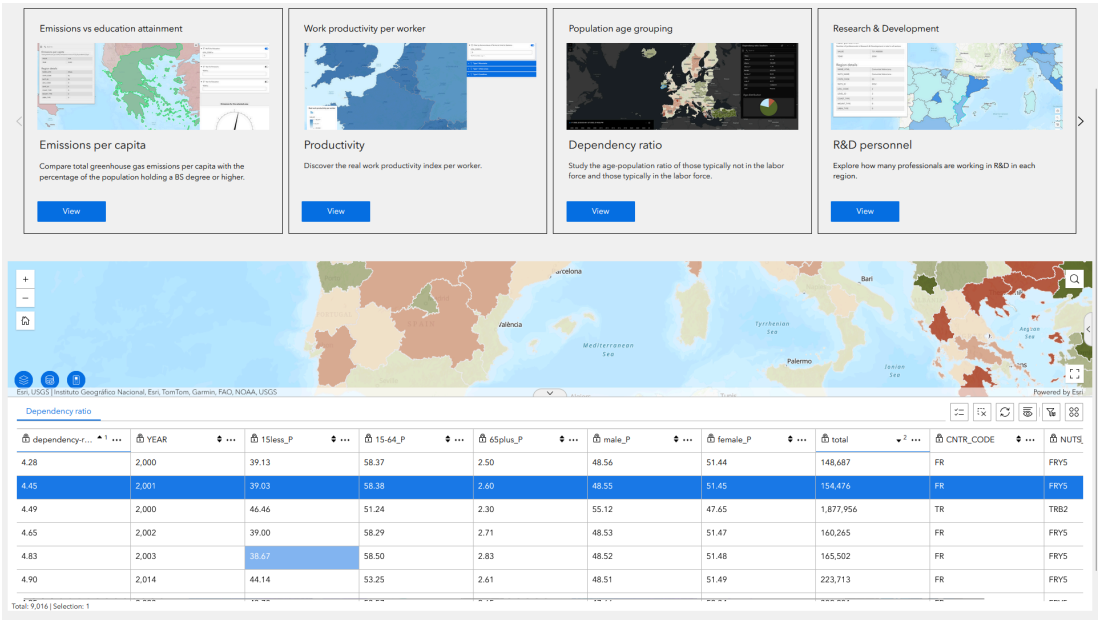


*Figure 4: FARO*ROMO *screenshot, table view.*

The columns and rows displayed can be customized and there is also an option to dynamically hide data from regions of the map that are outside of the screen at any given moment.

3.2 Data filters

There are two types of filters in FAROROMO maps. The predetermined filters that are made in advance for each map and the custom filters that can be created by the user. The third circular button at bottom left of the map, brings up the menu of predetermined filters, that are different for each map. These can be toggled on and off and may contain customizable fields. By default, each map has one filter enabled regarding the NUTS region displayed. Since most maps can work with multiple levels of geographical segmentation, NUTS (Nomenclature of Territorial Units for Statistics) levels are used to offer many different views. The enabled filter forces only NUTS 0 data to load initially and the rest of the levels are loaded when needed (lazy loading), to improve the loading time of the website. This is one of several optimization tricks that are employed to increase performance. Maps are also loaded lazily.

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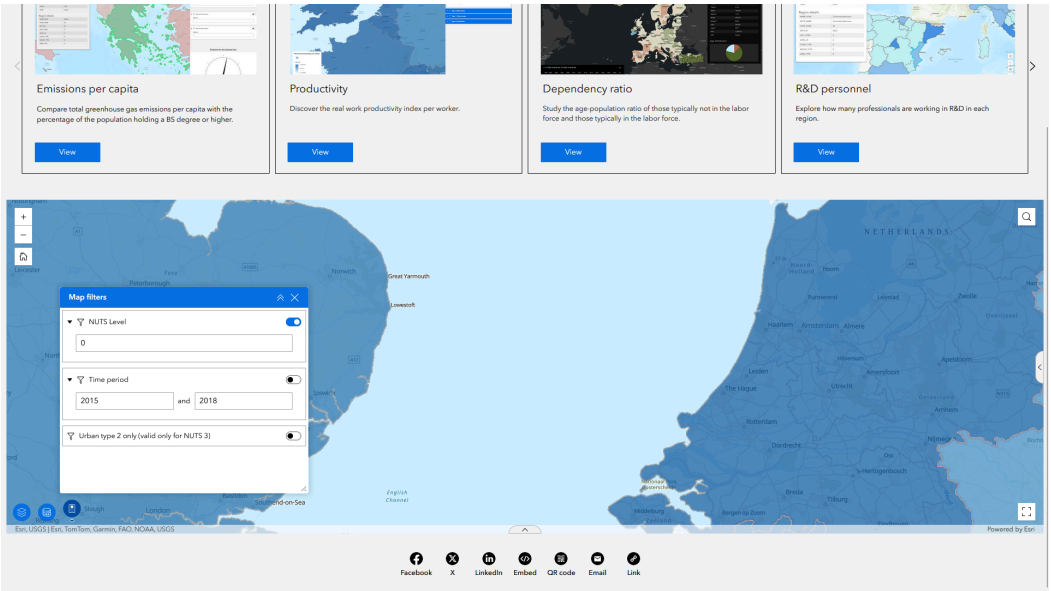


Figure 5: FARAROMO screenshot, recommended filters.

The tool to create custom filters is accessible through the top right of the table view. The user can create any number of filters and combine them, for each map layer, by placing constraints on any variable of the data.

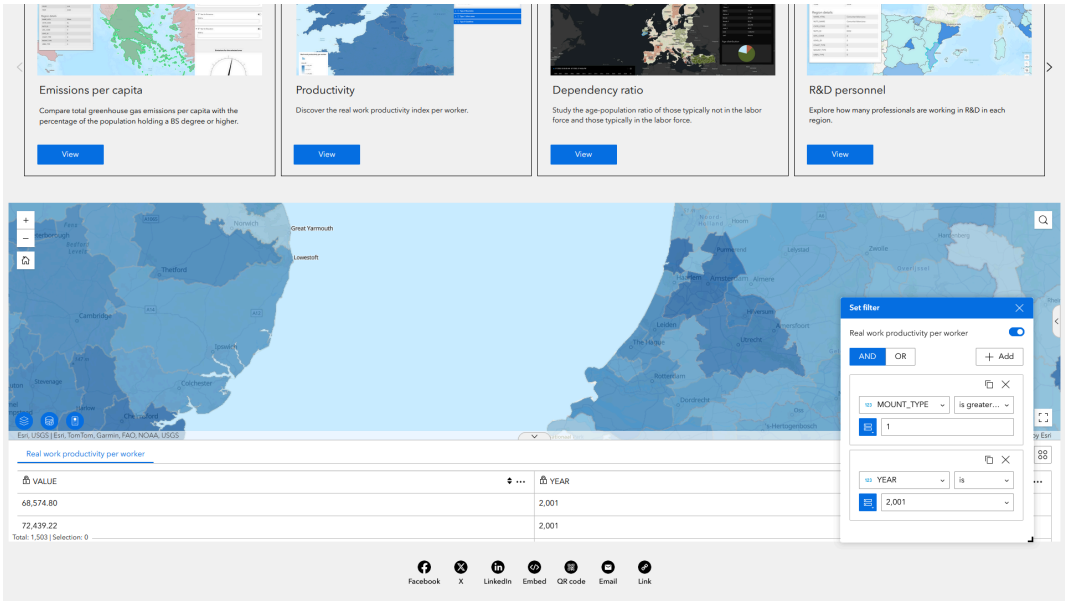


Figure 6: FARAROMO screenshot, custom filters.

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3.3 User data

The user can upload their own datasets, such as KML or GeoJSON, to FAROROMO for cross-examination or pattern recognition. The option is available via the second circular button on the bottom left of the map. Upon upload, the map will refresh to host the new data on a newly created layer. Through the map layer menu, the user can adapt the added data, including the option of changing the new displayed regions to any color.

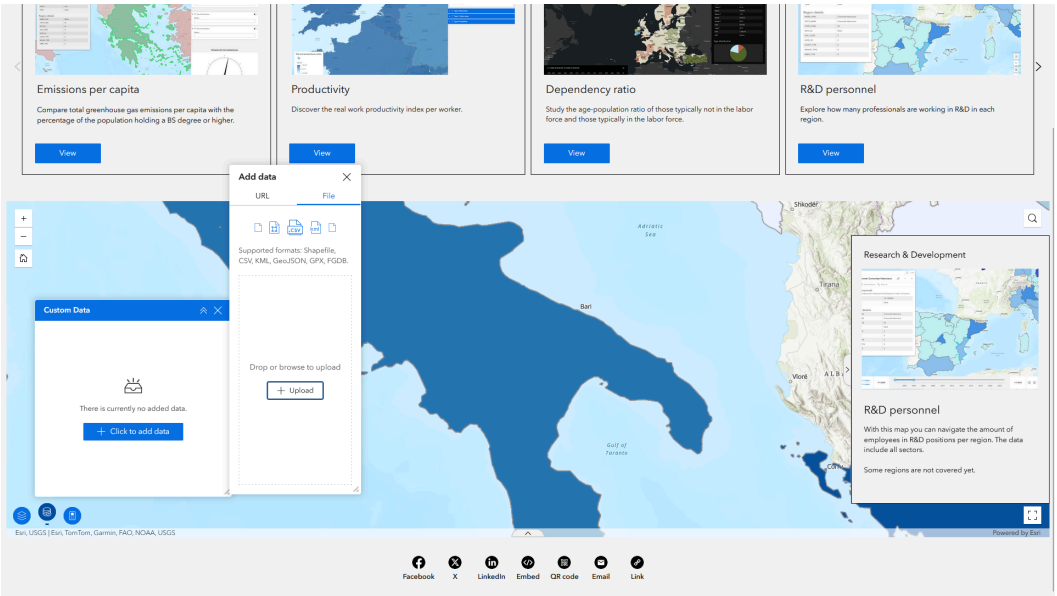


Figure 7: FAROROMO screenshot, custom map data.

All tools mentioned previously can be applied to user data, too. On top of that, there is an option to export the uploaded data and download them. This can be useful in situations where extensive data filtering of user data has altered the uploaded file. Supported export formats include JSON, GeoJSON, CSV, Shapefile, KML and FGDB. As a result, FAROROMO can also be used for data transformations. In the current version of FAROROMO, the files uploaded by the user stay in the browser and are processed exclusively locally. In the future, it is planned to extend this tool, by allowing the transfer of user data to the ISABEL infrastructure (Data Lake), in order to offer data permanence. In that case, the user will be able to retrieve map layers created in previous sessions, even if they logged in from a different device.

Map data can also be added with a URL instead of a local file. Through the same menu, the user can provide any publicly available web service address, including the public resources of the ArcGIS cloud or open map layers from private servers.

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4. Conclusion

FAROROMO is a web app that will be able to provide a very diverse audience with the tools required to tackle challenges around the comprehension of visual information on job creation and job destruction, due to the Just Transition. After several development cycles, the User Interface has reached a satisfactory level of maturity and the infrastructure has been prepared to accommodate the needs of the final web application. Technical difficulties have been overcome with carefully designed ad hoc solutions. We are looking forward to extending the present capabilities and completing a competitive application for dynamic data visualization.

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Demo Links

Video: FARAROMO - June deliverable video.mp4
Web App: FARAROMO v1.0

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