

# IMPROVING SEN2CUBE.AT WEB APPLICATION VISUALIZATION CAPABILITIES

## Introduction

The purpose of the thesis is to improve the visualization capabilities of Sen2Cube.at web application for visualizing images considering **advanced cartographic methods** and a **User-Centered approach**. The research begins by understanding the current condition of Sen2Cube.at system through **user evaluation, internal discussion, and SWOT analysis**. Then, formulating Sen2Cube.at **visualization capabilities thresholds concept** and transforms it into practical guidelines and image map models. The last part of this thesis focuses on developing **User-Centered geovisualization tools** that are needed by the current users, particularly in terms of **inferring the semantic enrichment image maps**. This thesis brings concepts of **how to improve web-based visualization tools, particularly in big EO data analysis web application**, by applying modern cartography principles. The future work might continue to the next stage, such as interaction & usability studies, implementation and debugging. Besides the above results, this study is also proof that **modern cartography methods are still relevant to be applied to web map applications** by incorporating with **UI/UX study**. So, the **user experience could be levitated**.

concept of sen2cube.at web application

Data cube system (ODC Open Data Cube) storing images and image derived products for fast querying through time "on-the-fly"

Optical satellite image and associated fully automatic data-derived information layers

Semantic content-based queries through time and space in user defined AOIs by a graphical inference engine

The Sen2Cube.at national semantic Earth observation data cube for Austria

sen2cube.at

1. Worldwide applicable automatic semantic enrichment in different granularities with SIAM™

2. EO data cube in a scalable Docker infrastructure as application-agnostic, generic factbase

3. Web-based graphical inference engine translates semantic models from the knowledgebase into data cube queries against the factbase

4. Semantic querying language with application-specific visual models and custom outputs:

Shared knowledgebase

Generic factbase (data & information)

2015 today 20 TB data 13.000 images

source: sen2cube.at

Workflow

user evaluation SWOT analysis Internal discussion

Visualization capabilities thresholds

a set of image map models

wireframing & UI prototype

cartographic elements widget

symbology widget

map layout & map element guidelines

software/ web application

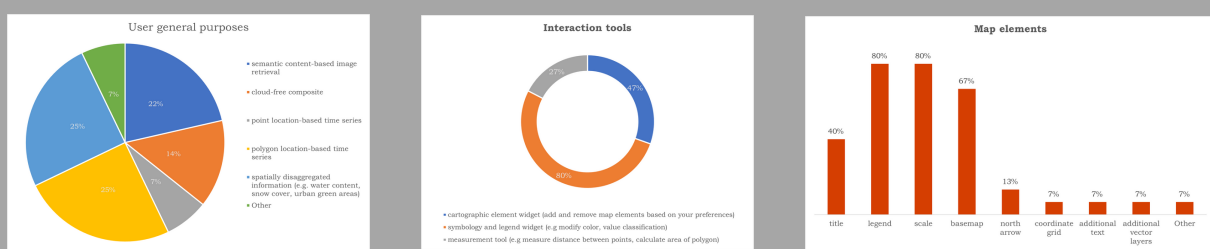
LimeSurvey user questionnaire

ArcGIS Pro QGIS image map models

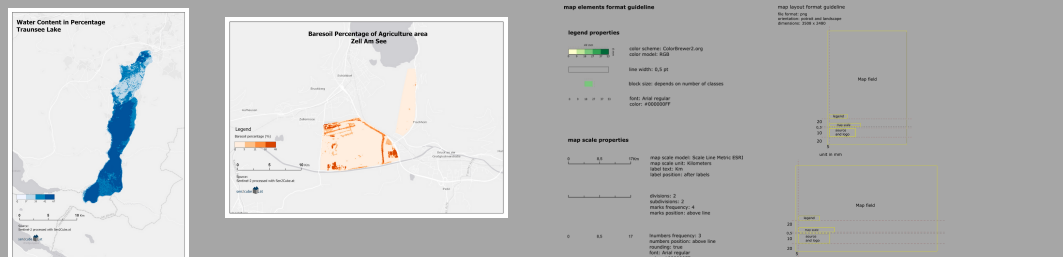
Figma wireframing & UI prototype

## Results

1 User-Centered design paralleled with the **modern cartography method** is the main scope of this study, then use Sen2Cube.at web application as the object of study concerning the rising number of active users. The study begins with inspecting Sen2Cube.at system thoroughly from the stakeholder and the users side. **User evaluation** is conducted in two session: questionnaire and in-depth interview. Several concerns have emerged. One particular concern is **the visualization of inference model image map**.



2 The assessments that were conducted in this study focused on how to improve concerned matter from a cartography point of view, by **understanding the user's need**. In summary, there are two visualization interactions that potentially to be added: symbology & legend modification, and add/remove map elements. Then, resulting in **concept of visualization capabilities thresholds**, thus transformed into **practical guidelines and examples of image map models**.



3 Visualization tools prototype and a **Hi-fi wireframe** were created as the medium for communicating the possible cartographic **UI designs** of the Sen2Cube.at system and demonstrate how the **symbology widget & cartographic element widget** can be applied.

wireframe and UI prototype

Visualization

Layer: Layer\_name#1 Layer button

discrete number of classes: 0 Data type button

Legend: Legend button

Map elements: scale legend basemap

Add Text

symbology widget cartographic element widget