# The Third Dimension in Web Maps – Experience Based on a Vector Tiles Service for the State of Bavaria

Johann Sehner

*Bavarian Agency for Digitization, High-Speed Internet and Surveying, Digital Maps Bavaria, Windischeschenbach, Germany  -
johann.sehner@ldbv.bayern.de*

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**Abstract:**

The **Bavarian Agency for Digitization, High-Speed Internet and Surveying** (LDBV) has developed a vector tiles web map based on various datasets, aiming at a high quality approach, short up-date-cycles, detailed and feature-rich, but also customizable, truly mobile and increasingly three-dimensional. The focus of this presentation are the **challenges and chances to visualize the third dimension** for a broad user base in a web browser or on a smartphone. Two rendering technologies have been primarily evaluated from our perspective as a service provider: The open source client **Maplibre GL JS** and the commercial software **Mapbox GL JS**.

The presentation wants to give **answers to the following questions**:

- Can the data of classical topographic maps be valuable for **relief presentation** in web maps?

- How to handle object cluster in the distance in **tilted maps** and visualize fog and sky?

- How to visualize **buildings** in varying levels of detail?

- How to integrate **terrain** data?

- How to use 3D **lighting**, directional and ambient light sources?

- How to integrate 3D models of **trees** and other objects?

- How to balance cartographic quality and **performance** of 3D views?

- What are the differences of Maplibre and Mapbox, JS and Native?

- What are the hardware and software requirements?

Modern web browsers and hardware can handle client-side three-dimensional map rendering. The software libraries are enhancing rapidly and updates are released regularly with new features. Extending web maps in the third dimension creates new challenges and requires **new approaches** related to **data processing, styling rules** (json), data delivery, and sometimes client development (javascript). **Compatibility** of vector tile services is already challenging in two dimensions, even more in three. But it is worth the effort, advancing slowly but surely to a digital twin of our environment.
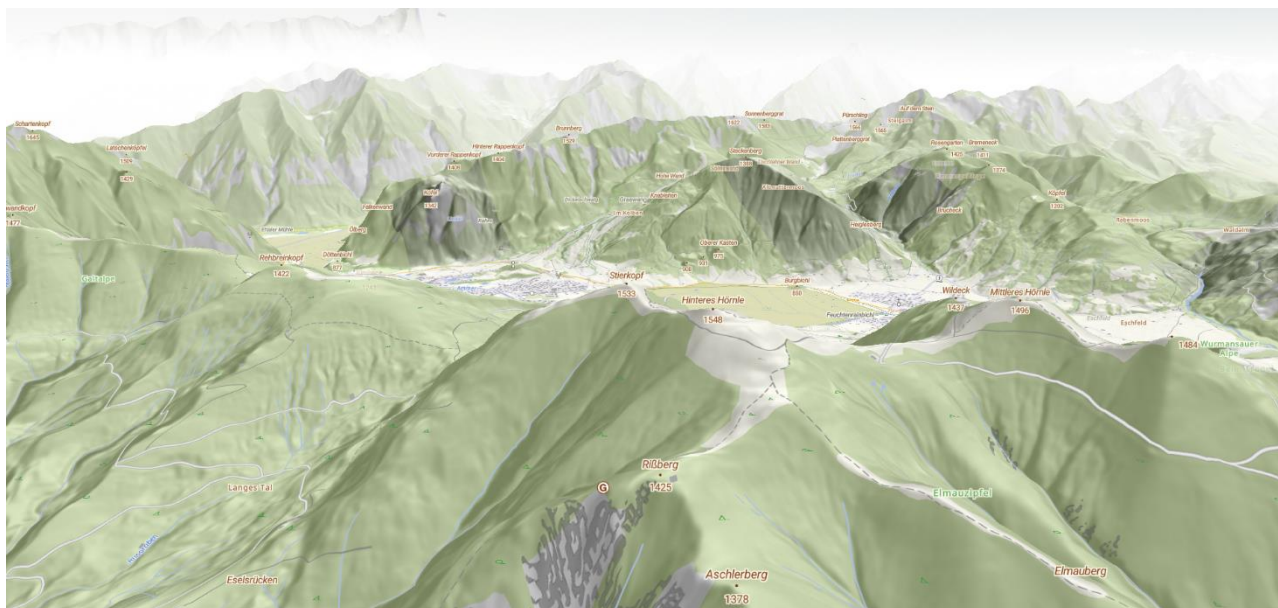
Figure 1. Label placement in tilted maps with terrain



Figure 2. Handling level of detail of trees and buildings and lightning effects

**References**

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