



SimWrapper at SANDAG

Implementing a visual matrix data inspection tool
at SANDAG using SimWrapper

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Agenda

- Introduction
- Overview of SimWrapper:
 - Understanding SimWrapper
 - Key Features
 - Workflow
- SANDAG's Implementation of SimWrapper
- Live Demo
- Q&A



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We acknowledge the contributions of WSP and independent consultant Billy Charlton in this work.

What is SimWrapper?

A Visualization Platform for Transportation Simulations

- SimWrapper is an open-source, web-based dashboard and data visualization tool
- Designed to help users of transport microsimulation models (e.g., MATSim, ActivitySim) understand and interpret their model outputs
- Allows users to inspect model outputs via a website, supporting various data formats

Key Features

- **Interactive Dashboards:** Create dashboards with typical charts and graphs for transport planning data (e.g., trip origins, lengths).
- **3D Mapping Engine:** Visualize network volumes and transit ridership with Deck.gl for spatial clarity.
- **Custom Configurations:** Save dashboard configurations in YAML files for standardized views across projects.
- **Local and Cloud Access:** Access outputs from local folders (with Chrome/MS Edge).

Who Uses SimWrapper?

Origin

Originally developed at Technische Universität Berlin

Widespread Adoption

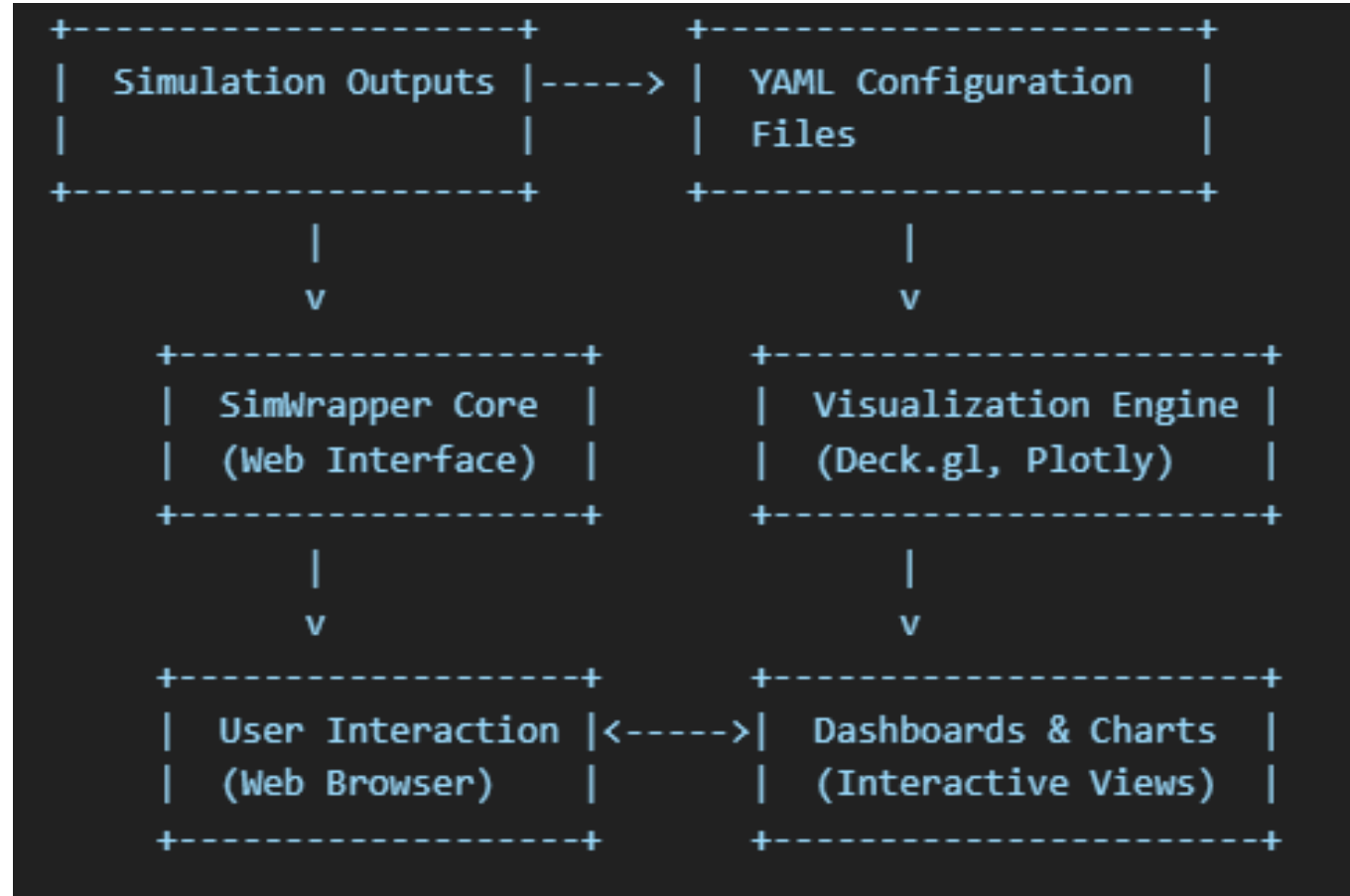
Widely used in Germany, Europe, and globally

Key Projects

Utilized for projects involving ActivitySim and BEAM models

How SimWrapper Works

- **Simulation Outputs:** Data files generated by transportation microsimulation models.
- **YAML Configuration Files:** Text files that define how to visualize the data.
- **SimWrapper Core:** Web-based platform that serves as the interface for users.
- **Visualization Engine:** Libraries like Deck.gl and Plotly used to render interactive visualizations.
- **User Interaction:** With the visualizations through a web browser, exploring and analyzing the data.



Key Existing Use Cases for SimWrapper

Transportation Simulation Analysis

Designed for visualizing results from large-scale simulations like **MATSim** and **ActivitySim**.

Interactive Dashboard Creation

Build customizable dashboards to explore

- Network link volumes
- Agent movements
- Aggregate maps
- Scenario comparisons

Research Data Visualization

Offers statistical charts, maps, and summary tools for deeper insight into complex datasets.

Scenario Comparison & Policy Analysis

Analyze differences across simulation runs to evaluate planning or policy impacts.

Sharing & Collaboration

Publish dashboards online to share insights with **colleagues, stakeholders, or the public**.

SimWrapper at SANDAG: Enhancing Matrix Data Visualization

Problem

Existing tools at SANDAG lack the functionality to efficiently view, review, or compare essential matrix outputs from their activity-based model

SimWrapper Solution

SimWrapper addresses this by providing powerful mapping capabilities

Current Application

Exploring SimWrapper's potential for developing a skim matrix visualizer

Cloud Integration: Overcoming Data Access Barriers

SANDAG's Infrastructure

Utilizes a cloud-based modeling infrastructure ideal for storing model outputs like OMX files.

The Challenge

SimWrapper needs modification to support authenticated access to managed cloud data lakes, where files are not local or on public servers.

Previous Demonstrations

SimWrapper has shown impressive speed for local multi-gigabyte OMX files by accessing data "on-demand".

Cloud Performance

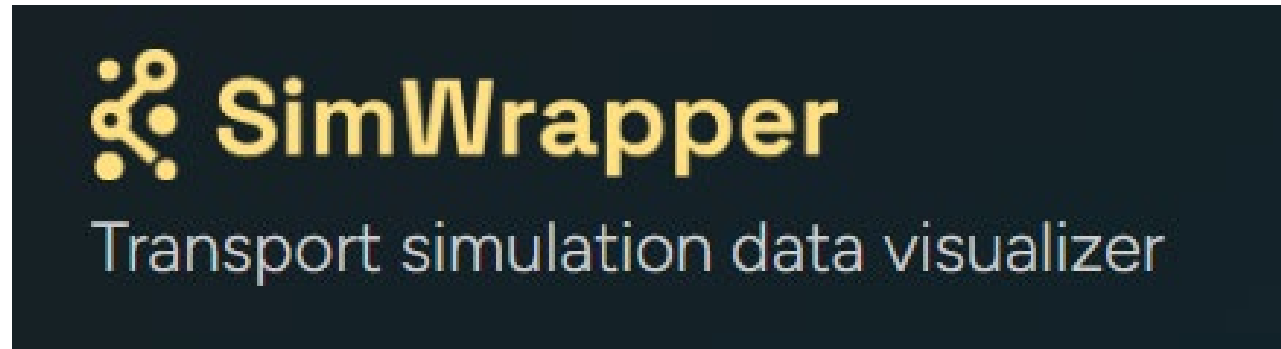
Performance expectations differ in cloud scenarios, requiring optimized data connections.

Why This Work Matters: Benefits & Future Vision

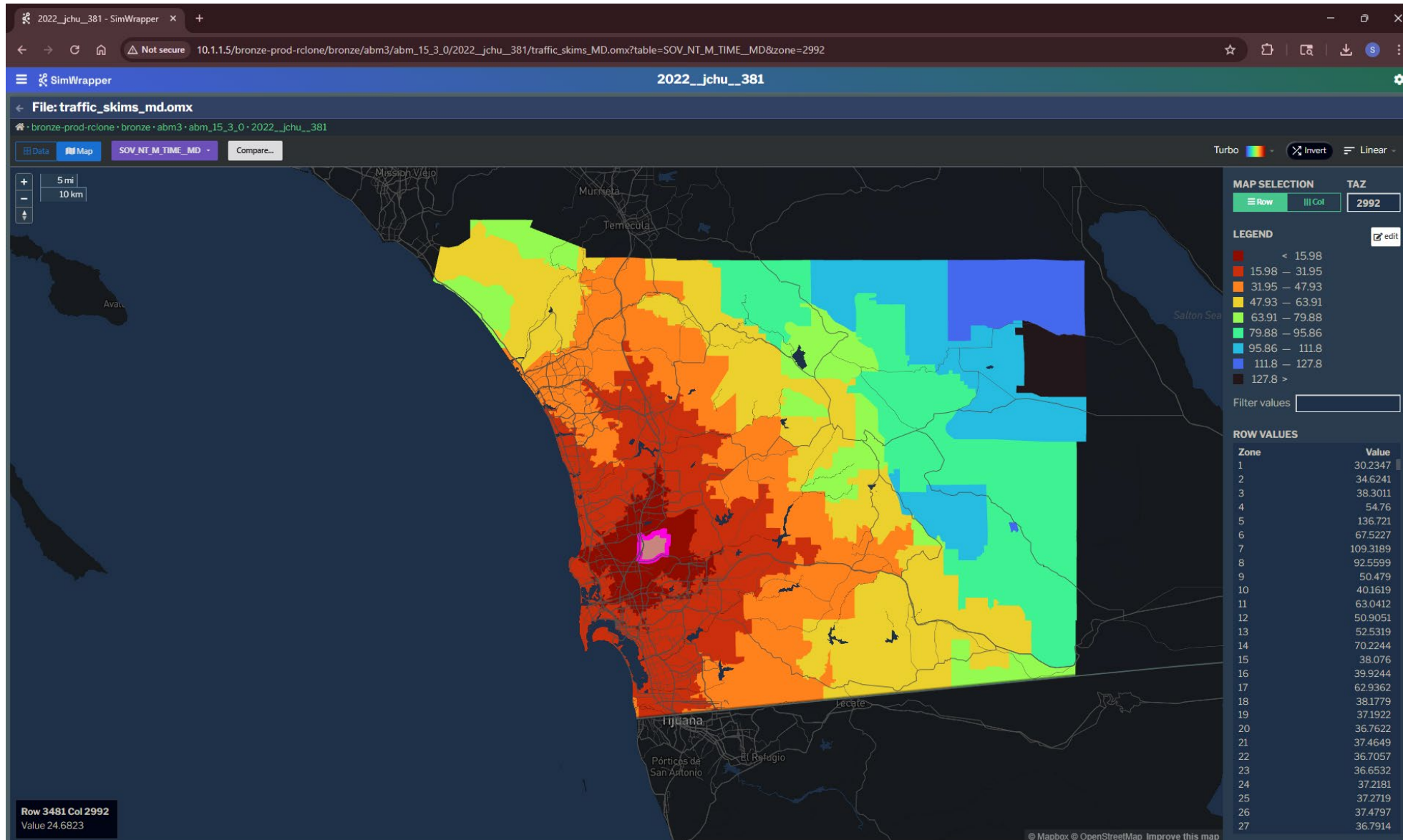
- **Practical Use Case:** Provides SANDAG with a crucial tool for understanding essential activity-based model outputs.
- **Broader Impact:** Connecting SimWrapper with cloud service providers will benefit many future users as more workloads migrate to remote computer facilities.
- **Scalability Proof:** Success with SANDAG-sized datasets demonstrates viability for smaller data sizes and workloads.
- **Open-Source Commitment:** This work is 100% open source and available on [GitHub](#)
- **Long-term Vision:** Further integrate SimWrapper as a complement to existing SANDAG data analytics systems.

Live Demo: skim viewer

Spatially visualizing matrix data from local



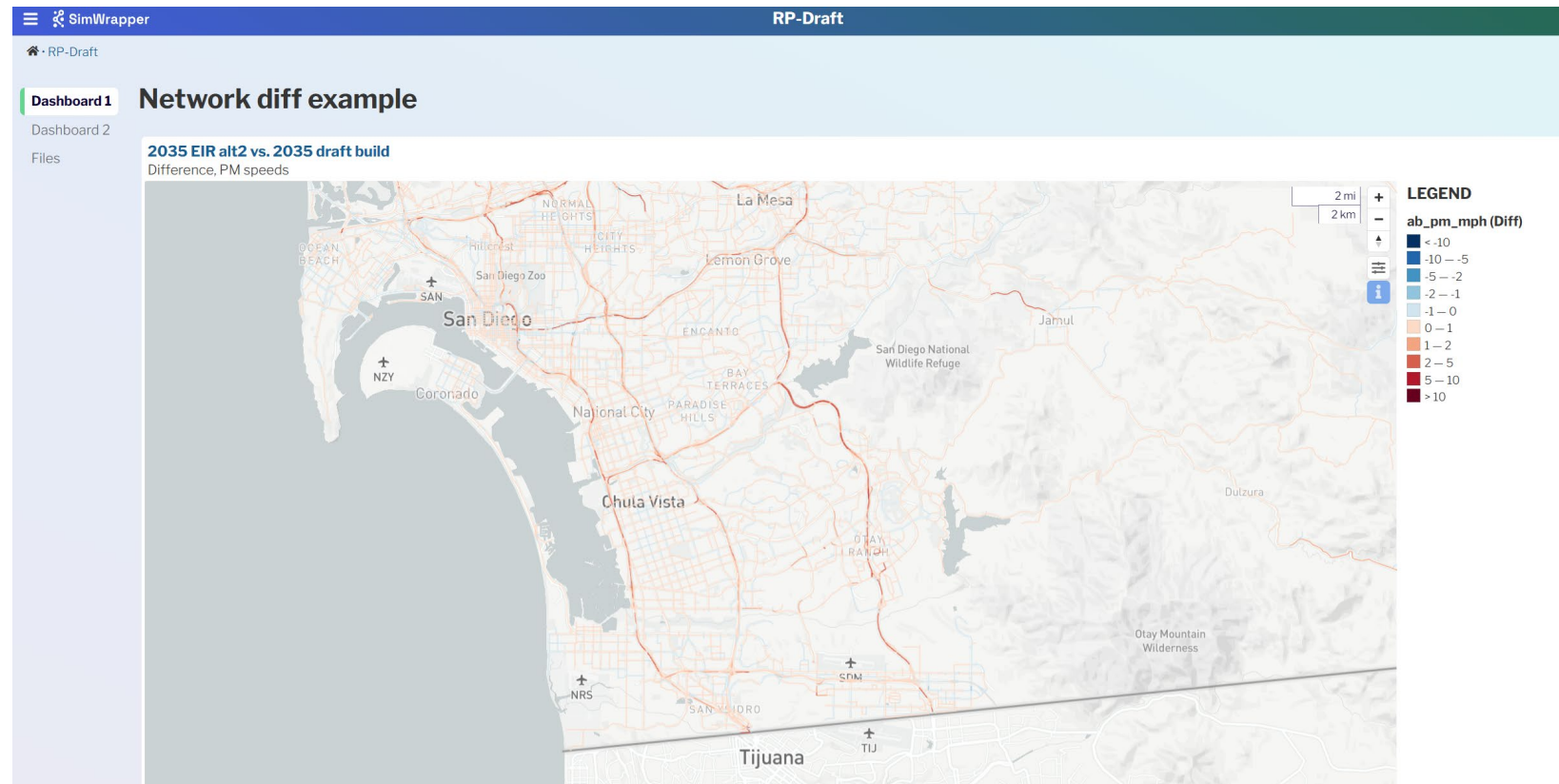
Traffic Skims – Mapping (accessing data from Cloud)



Other Use Cases

Scenario Comparison and Analysis

SimWrapper helps users easily compare and analyze different simulation scenarios, enabling them to assess the impact of various planning decisions or policy changes.





Questions & Discussion

Thank you!

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