

Google's Geospatial Ecosystem: A Model for Spatial Data Infrastructure

Point of Contact: Holli Howard, hollihoward@google.com, Google Maps (+ each POC per showcase)

Thank you, Open Geospatial Consortium for the opportunity to present Google's geospatial ecosystem. Our intent here is to foster public and private collaboration and give insight into the future of interoperability. This submission demonstrates how Google's powerful, user-focused geospatial products embody and advance modern Spatial Data Infrastructures (SDIs).

Google offers numerous prospective examples of an exemplary spatial data infrastructure. We are providing a few examples under both the Data and Technology and People themes. Additionally, we have included other potential ideas in a concise format for discussion throughout this process, and we welcome building upon these as they align with the development of the SDI for the U.S. government and global partners.

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Showcase Item 1: Public and Private Collaboration for Enhanced Mobility, Sustainability and Stronger Economies

Google Maps Content Partners and Waze for Cities

CFC Category: People; Data and Technology

POC: Holli Howard, Google Maps

Theme: Public Private Approaches to SDI development

Google actively collaborates with governments across the globe via our Google Maps Content Partners (GMCP) program and through Waze for Cities. GMCP empowers authoritative government bodies to seamlessly share high-quality, trusted geospatial data, while Waze is powered by its users' dedication.

Google Maps Content Partners

Empowering Governments as Geospatial Data Authorities Google Maps Content Partners empower governments as key data authorities. We team up to integrate their official data (like

roads, boundaries, and real-time closures) directly into Google Maps. This gives our hundreds of millions of users the most accurate, local info, improving navigation and helping them find critical services. This partnership shows how sharing government data on popular platforms maximizes its impact for public good and aids decision-making for everyone. This collaborative approach underscores Google's commitment to a truly integrated, user-centric global SDI, where authoritative government data plays a vital role. The geospatial data generated provides powerful insights that fuel Google Maps user experience and showcase the specialized data each government and partner agency provides.

Demonstrator Links: <https://contentpartners.maps.google.com/>

Empowering Citizens as Geospatial Data Contributors Waze for Cities exemplifies a successful public-private partnership where citizens continuously contribute to a real-time, crowdsourced geospatial data ecosystem. This system helps cities improve efficiency and safety with instant traffic and hazard information. User-generated data, including road disruptions, is integrated into public sector workflows and displayed on Google Maps, offering valuable insights into traffic patterns and road safety. Road disruptions including hazards and construction submitted to Waze are also transferred and displayed on Google Maps

Demonstrator Link: [Waze for Cities](#)

Google's Partnership with USDOT: Enabling smoother traffic and navigation in the US

The **National Address Database (NAD) 1.0** in the U.S. is an invaluable open resource for various partners. Several years ago, Google collaborated with the **U.S. Department of Transportation (USDOT)** to highlight the benefits of integrating NAD data with Google Maps.

This partnership aimed to encourage states to contribute their address data to the NAD as well as enhance navigation on Google Maps. By doing so, Google committed to importing this data and incorporating it directly into Google Maps, significantly enhancing the accuracy and comprehensiveness of location information available to the public. This initiative has been remarkably successful, leading to a notable increase in the number of states joining the NAD since the program's promotion. This continued collaboration not only ensures Google Maps remains a highly accurate and reliable tool for navigation and location-based services across the United States, but also enables use of the authoritative data produced by the US Agencies. .

National Address Database 2.0 - Action Plan through the National Geospatial Collaboration (POC: Eric Kolb)

The National Address Database (NAD) 2.0 Action Plan aims to achieve nationwide coverage of 911-validated address points for open use, reduce federal spending, and improve service delivery. It addresses current challenges like incomplete coverage, data freshness, and

accuracy, and proposes solutions through collaboration, gap-filling with commercial data, and promoting 911-validated data. The plan details two main goals: achieving 100% nationwide coverage and ensuring a simple, flexible data model that supports 911 validation, with objectives and actions for each. It also includes information on the working group, stakeholder analysis, communication plan, challenges, risks, and resource needs. This showcases Google's ongoing commitment to supporting national geospatial initiatives and the evolution of SDIs towards more comprehensive, accurate, and publicly accessible data. The NAD 2.0 action plan aligns with the paper's theme of public-private approaches to SDI development by outlining a collaborative strategy to enhance foundational geospatial data.

Showcase Item 2: Geospatial Reasoning

CFC Category: Data and Technology

Point of Contact: David Schottlander, Google Research

We believe that in the future, Large Language Models (LLMs) can become pivotal actors in the geospatial analytics ecosystem. This paradigm shift necessitates a proactive effort to define and structure the data and services available on the underlying technical infrastructure, ensuring they are amenable to consumption and interpretation by LLMs. By doing so, we hope to enable more intuitive, powerful, and automated geospatial problem-solving that leverages advanced AI capabilities for greater efficiency, insight, and global impact.

We're introducing a research effort that is investigating the use of generative AI for developing agentic workflows and assistants that can perform geospatial reasoning, allowing integration of public domain and private datasets, and custom climate and remote sensing foundation models. We hope to enable generation of significant insights in application areas such as crisis response, public health and [climate resilience](#). It expands upon existing capabilities, like those found in Google Earth, by enabling developers to construct specific workflows on the Google Cloud Platform to manage complex geospatial inquiries using Gemini. Gemini orchestrates inference and analysis across various data sources, including Google's own models and datasets, proprietary information, and public domain data, to develop a reasoning chain that delivers quick and dependable answers with insights and data visualizations.

Demonstrator site: [Link](#)

Showcase Item 3: AI Powered Satellite Embeddings

CFC Category: Data and Technology

Point of Contact: Emily Schechter, Google Earth Engine

Narrative/Project Description: The Earth Engine Data Catalog hosts petabytes of Earth observation imagery, yet transforming raw pixels into accurate maps and actionable insights remains an ongoing challenge. **Google's new Satellite Embedding Dataset**, a revolutionary image collection that leverages multi-source, multimodal deep learning can help scientists create better maps significantly faster and with fewer manual annotations. Unlike traditional deep learning models requiring users to fine-tune weights and run their own inference, this dataset provides precomputed, analysis-ready embedding vectors, effectively packing deep-learning-powered feature extraction into every pixel. Satellite Embeddings can be used for pixel-based similarity search, supervised and unsupervised classification, and change detection analysis using the Earth Engine API.

Demonstrator site: [Link](#)

Showcase Item 4: Standards and Web-APIs

CFC Category: Standards, Micro-service architecture examples.

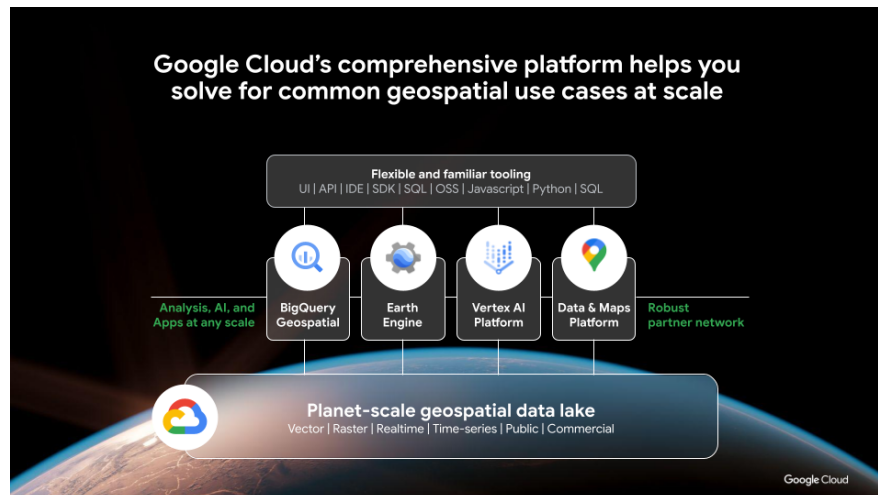
Theme: Data & Technology

Narrative: Powerful implementation for data sharing:

- Google is interested to collaborate and optimize the current [CAP-based standards](#) to tackle a broader range of critical events, including wildfires, hurricanes, floods, and other crises. This expansion would ensure comprehensive coverage for vital, life-saving information, leveraging both Google's own detection capabilities for certain events and the integration of authoritative government-provided information, such as evacuation alerts and shelter details.
- **Photorealistic 3D Tiles:** Offers [immersive visualization](#) via an open standard-aligned API ([OGC 3D Tiles](#)). This demonstrates how commercial entities can provide high-quality, foundational data that any government agency or developer can readily build upon and integrate using standardized web APIs, promoting "plug and play" interoperability without vendor lock-in.
- **Places API:** Assigns stable Place IDs for every location, creating persistent, globally unique identifiers. This enables seamless connection of disparate datasets, fostering data interoperability.

One potential Demonstrator Link: mapsplatform.google.com

Potential Item: Google Cloud's 'Comprehensive Platform' including Vertex AI, Earth Engine, Big Query Geospatial and Google Maps



[AI integration with Earth Engine, BigQuery and Maps](#)

CFC Category: Technical Innovation (AI-driven action), Intelligent search and discovery.

Theme: Data & Technology; People

Narrative: Google Earth Engine is arguably the world's most powerful platform for planetary-scale geospatial analysis. It perfectly integrates a massive data catalog, a powerful AI-driven analytical engine, and a collaborative user base. Earth Engine empowers scientists and governments to derive actionable insights directly in the cloud from petabytes of satellite imagery and geospatial datasets. This enables rapid change detection, trend mapping, and quantification, facilitating intelligent search and discovery—a key objective for modernizing SDIs to support informed decision-making and AI-driven action.

Demonstrator: <https://earthengine.google.com/> (Google Earth Engine data catalog and public tutorials/case studies)

[Slides with Use Cases](#) (need to request access)

END SUBMISSION
