OVERTURE MAPS
FOUNDATION

Eliminating the Hidden Tax: How GERS Transforms Geospatial Data Integration

GERS

Introduction

Humans have long used maps to better understand, explore, and navigate the world. Maps have shaped and reshaped our economies, societies, cultures, and political landscapes. In today's digital world, maps are becoming an increasingly essential part of our daily routines. Exiting a freeway? Your smartphone map directs you to the correct lane to make the next turn. Dining out? An application, informed by a map, tracks how busy a restaurant is, impacting your decision on whether to go there. In business, maps can mean the difference between some consumers and all consumers finding your store. They inform decisions on where best to locate new stores, roads, and services. They help truckers deliver goods on time so factory production lines stay on schedule. They inform residents of fast-moving wildfires, advise insurance companies of levels of risk, and aid emergency response decisions.

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Maps rely on data. As we collect and share more data—via sensors, self-driving cars, social media posts, and more—maps become richer. But there's a challenge associated with more data. That challenge is attaching the right data to the right place, the right building, the right road, or even the right part of a road—again and again as our world changes—so that maps reflect the detailed richness that users require today. Doing this sounds easy, but it's anything but. Data doesn't arrive in a standard format like Lego bricks do; it comes in all shapes and sizes with unique elements and identifiers based on what it is and who collected it. Someone must first harmonize and shape the data so that it works with other data and systems. Then, similar processes need to happen over and over as the data is updated—be it once a decade, like the Census, or every minute, like the weather.

A Fingerprint for Everything

To address this challenge, the Overture Maps Foundation developed the Global Entity Reference System, or GERS.

Overture is building the largest cache of "open" map data in the world. "Open" means that anyone can use the map data without having to pay for it or deal with onerous license restrictions on data usage. The foundational datasets provide a base layer of highly accurate but commoditized map data that businesses can then build on to deliver a wide variety of services.

GERS IDs are like human fingerprints—they provide a unique identifier to every entity in those datasets, including 2.6 billion building footprints, 64 million places, over 321 million road segments, and nearly 447 million addresses as of June 2025.

In the same way that fingerprints are unique to each person, GERS assigns a unique identifier to each entity in the Overture datasets. Think of a restaurant in a building on a corner in New York City. Overture's Places dataset would associate this restaurant with a unique GERS ID. Using that ID, other companies can supply additional data about that restaurant, such as up-to-date menus, recent restaurant reviews, and even weather data to track outdoor dining temperatures. A restaurant reservation system may use this GERS ID, enabling simple interoperability with other tools. These companies can trust that the unique GERS IDs attach the right data to the right place.

"In the digital world, we can add layer after layer of data to the map. But today, this layering work is performed as one-offs, with each mapping team investing duplicative efforts. With GERS identifiers, Overture is making the data work we've invested available to all, enabling less duplicative, complex matching. Once a dataset is associated with GERS, it can be layered repeatedly without additional effort. The unique identifier helps application developers accurately attach that rich data to the right entity," says Marc Prioleau, Overture Maps Foundation's Executive Director.
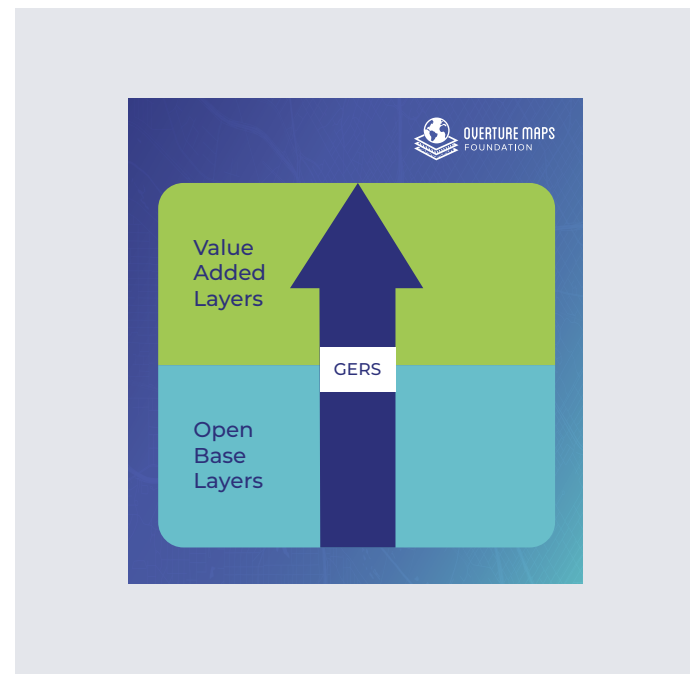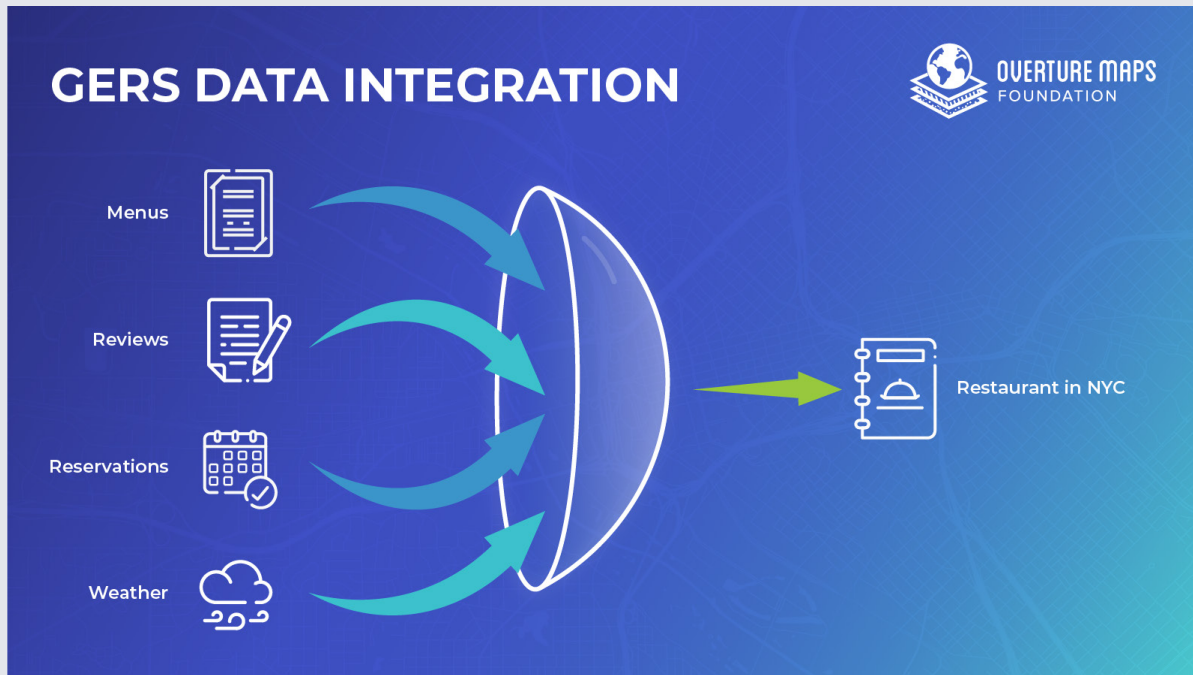
The GERS IDs are "a foundational piece of Overture and one of the differentiating attributes of the Overture databases," says Jan Erik Solem, Chair of the Overture steering committee and Director of Maps at Meta, which is a founding member of Overture. "Overture combines a set of stable IDs and open datasets that chain data together in ways that people have not been able to do before."

Meta has switched its internal mapping solution over to Overture. Already, billions of Facebook and Instagram users are able to see Overture map data. Microsoft, another Overture founding member, uses data from Overture in its Bing and Azure maps, which consumers and businesses then use to create products.

Having GERS IDs on map entities will make it easier for all kinds of businesses to have a "basic map to build whatever they want at a lower cost," says Jeffrey Hightower, Microsoft Vice President. "Having stable IDs will let people and companies focus on what they want to do with maps instead of struggling to join together the map data they need from different sources."

This whitepaper will cover why GERS matters, how it's unique, how companies are shaping and beginning to use GERS, and how they expect to apply it in the future.

Why GERS Matters

Mapping applications get better as we layer more data on their maps. We now get real-time traffic reports referencing the exact spots on the road where incidents are happening. We get pictures, reviews, and reservation information about restaurants. First responders get entrance and exit data on buildings and indoor maps to help them respond to emergencies.

All of this is great for consumers and users of mapping technology, but it's a nightmare for the application providers who have to pull together these diverse datasets and ensure they're accurate and up-to-date. Behind the scenes of what shows up on a smartphone screen is data that is often fragmented, siloed, and inconsistent.

All of this means that businesses that want to build something using external datasets first have to spend a lot of time, money, and effort making sure that the mention of "Joe's coffee shop in this dataset is the same as this Joe's coffee shop in that dataset," Hightower says. "It's a constant battle."

Overture's collaborative approach to mapping solves these problems by:

- **Aggregating data:** Diverse data sources include Meta, Microsoft, TomTom, open map data communities (e.g., OpenStreetMap), and government agencies. Overture joins and standardizes this data with a common schema. This reduces or eliminates fragmentation and inconsistent data and allows everyone to benefit from these efforts.

- **Making the IDs open, global, and entity-based:** There are other reference systems in the mapping world that use IDs that have one or two of these qualities, but only Overture's have all three. They're all required to establish a standard for unique IDs that can work for all.

First, why entity-based? Because GERS is based on actual entities, it's more specific than other ID systems, which often specify locations by latitude and longitude. People think in terms of places—buildings, shops, roads, addresses, and neighborhoods—not coordinates. And the data they want is similarly tied to those entities.

Second, our world is more interconnected and global than ever. Companies do business around the world. Supply chains are global. Impacts on one climate spread to others. With a global ID system, different countries or regions no longer have different names, descriptions, terms, or conventions for the same thing. That, too, makes it easier for data sources to attach to the right entity, no matter where it is.

Openness is what differentiates Overture from many other leading mapping endeavors. Overture's data—and thus GERS IDs—are available for all to use. There are other entity reference systems, but most are not open or are only open for a particular country. Instead, a company or, in cases of government data, a national mapping agency controls the use of the data and identifiers. Those owners might share some data but not all of it, or they may not share underlying data that describes the IDs.

As a result, companies may not know if the data they have access to today will require a different license or cost structure later. Data that companies or governments share with closed systems may end up locked away in those databases, or a proprietary map owner may favor one entity over another in terms of what's on the map and what data can attach to it. Also, a reference system may work in one country but not in the rest of the world. No doubt, closed ID systems technically work, but their closed nature is limiting for everyone but the owner of the system.

Overture and GERS, by contrast, provide an open reference system for open data on a global basis from start to finish. "By making it open versus proprietary, it allows anybody to see the whole database and consume the pieces they want," says Meta's Solem.

Ensuring Interoperability

"Interoperability is a very difficult problem in geospatial work when you have many data sources," says Siavash Shakeri, Maps Product Manager at TomTom, a global leader in location technology and an Overture founding member. Without interoperability, you end up with "one map for one thing and another map for another, and then those maps grow and grow." With GERS IDs, "any data source can gather their data, combine it, and bring it to the one-map ecosystem. GERS is like a connector between your data and my data, so we can say 'the store on this road is the same on your database as it is on mine.' "

"Existing solutions enable the same thing. But GERS makes it simpler to make those kinds of connections," says Deane Kensok, ArcGIS Content CTO of Esri, a company that provides digital mapping and analytics software that over 650,000 organizations use, including Fortune 100 companies, national governments, and educational institutions. "Right now, you need to use software to do these things. Someone has to do the heavy lifting to relate features to features spatially. If you have GERS IDs, it is a simple join, very fast and very efficient. Within minutes, you can join a hundred million buildings together."

Therefore, interoperability drives more use cases and faster innovation. With open standards and stable IDs, application developers don't need to build and rebuild a base layer—they just add their dataset and application on top of the base layer. Businesses, government agencies, non-profits, and analysts can more easily combine data from multiple sources to find new correlations that facilitate our understanding of what's happening at a building or in a region.

## Pop-up for Overtime Buildings layer, with info from USA Structures layer
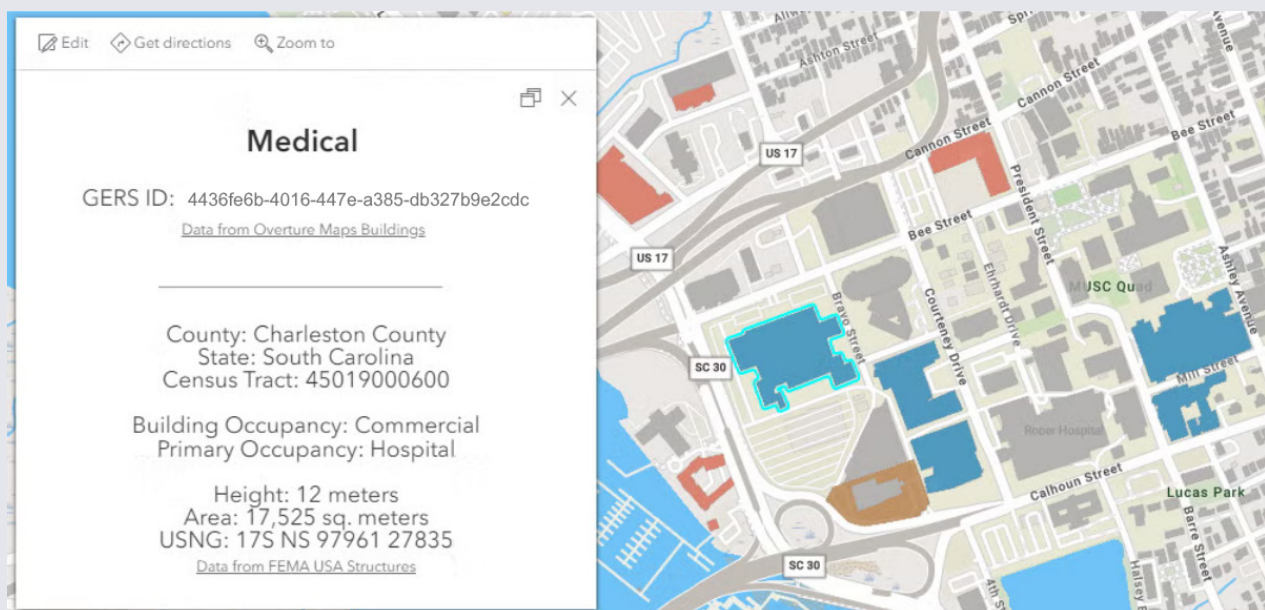
Esri recently did exactly that, combining Overture building data with data from FEMA on 75 million structures to add information such as occupancy, addresses, and height measurements and enable custom pop-ups and enhanced data visualization.

"The ability to easily connect disparate datasets dramatically increases their value. More data connections create more perspectives; and more answers to more questions," writes Drew Breunig in a blog discussing GERS and the benefits of "standardizing place."

Safeguarding ID Stability

While the world is always changing, a lot also stays the same. A GERS ID is attached to a unique entity. For example, imagine there's a building that houses a museum. It has one GERS ID in the Overture Buildings database. The museum is also a point of interest in the Overture Places database with a separate GERS ID. The building and museum are distinct entities, according to Overture, and they have distinct GERS IDs. If the museum moves across town, its GERS ID will change, but the "building" GERS ID stays with the vacated building. If developers knock the building down and construct a new venue to house the museum, the museum's "point of interest" GERS ID remains consistent, but the building's GERS ID changes.
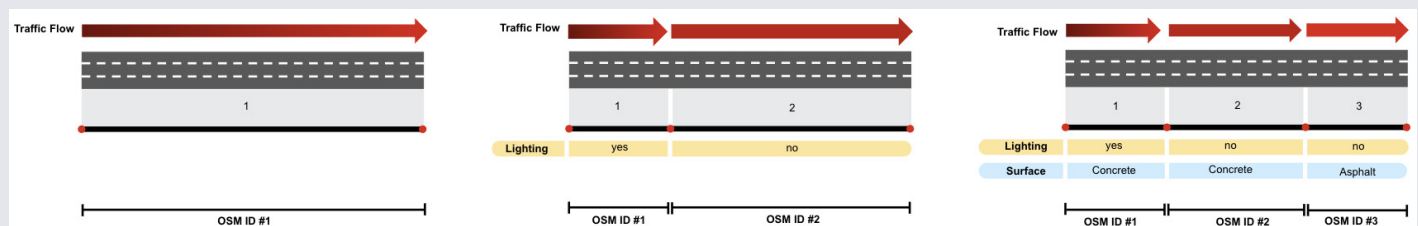
With GERS, Overture is in the process of standardizing rules for when it should or shouldn't create new IDs so that IDs remain stable, data providers know what to expect, and no one has to re-run huge pipelines of data every time one feature changes. Instead, GERS provides a monthly log of what changes.

In the field of transportation, for example, Overture's Transportation team uses data from OpenStreetMap that covers more than 300 million segments of roads, railways, ferry routes, pedestrian paths, and other travel modes.

The team then developed rules to determine when and how Overture should add or alter GERS IDs. For instance, Overture assigns roads in its dataset unique IDs based on their geometry and not on attributes such as speed limits or lighting conditions.

Frequently changing IDs creates extra work for developers because each time they add a new ID, they must update the data associated with it too. This leads to a lot of small road segments and excess data, which impacts the performance of any product or service that uses the map. By limiting ID changes, "everything is less bulky and more simple," says TomTom's Shakeri.

Addresscloud processes mountains of data "in minutes," which "used to take months," to ensure that the system attaches the right risk data to the right building.
—Mark Varley, Addresscloud CEO and Founder.

Early Adopter Uses GERS

While Overture just released its first general availability datasets in mid-2024, early adopters are already using the datasets and GERS IDs.

Addresscloud, a location intelligence platform serving the global insurance market, uses Overture building data and GERS IDs to deliver risk scores to insurers so that they can set the right prices. Addresscloud processes mountains of data "in minutes," which "used to take months," says Mark Varley, Addresscloud CEO and Founder, to ensure that the system attaches the right risk data to the right building.

How so? Addresscloud caches Overture's building and GERS ID data so that when an insurer requests a risk score, most of the data is already ready to run the remaining calculation using incoming data, whether that be flood, wildfire, or crime data.
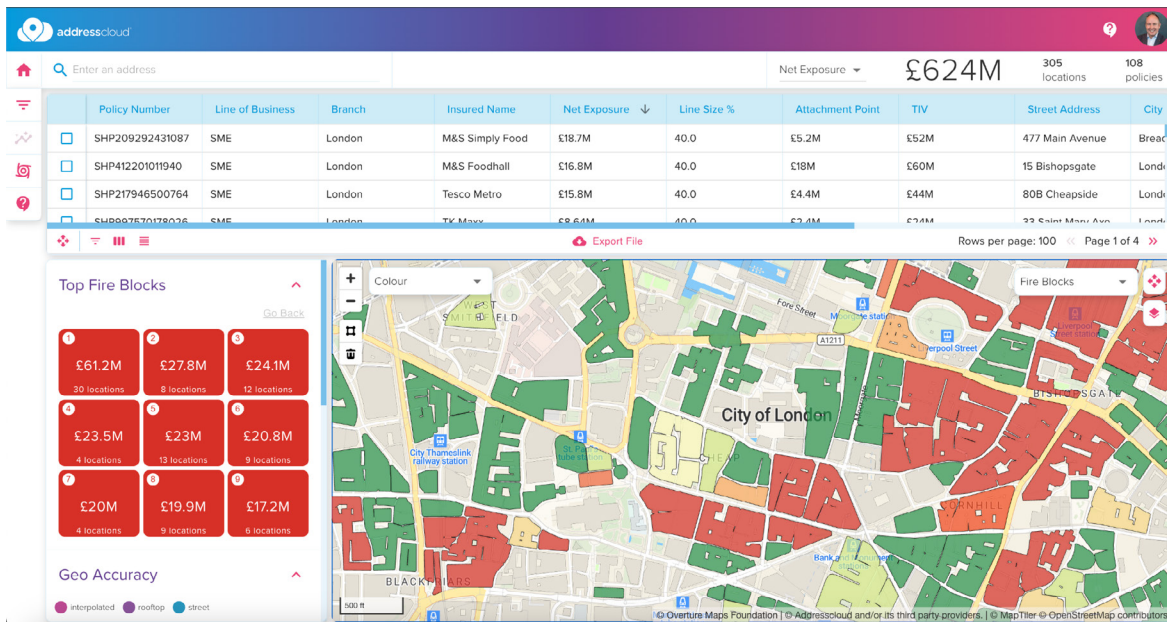
The Addresscloud Risk platform showing fire accumulation blocks based on Overture data

Since the Overture buildings each have stable IDs, Addresscloud doesn't have to re-run identifying data each time. Without unique identifiers for each building, Addresscloud would have to change everything again and again as insurers ask for information. "It would be a nightmare," Varley says.

Also, because the Overture data is open, Addresscloud doesn't have to engage a proprietary data owner to access the information each time—at a cost. Also, its insurance customers can then store the latest set of data for future use. With proprietary data sources, insurers may only have access to underlying data for a set period of time before they can no longer use it.

The combination of a big set of building footprints—2.6 billion in Overture—and stable IDs "gives us the spatial backbone to deliver what our customers need without charging them a fortune and to do it at scale," Varley says.

Founded nine years ago, Addresscloud now serves more than 50 commercial and residential insurance companies, including several in the U.S. It uses Overture and data from more than 40 databases, such as those tracking flood, earthquake, fire, and crime risk. Using GERS in Europe, Addresscloud calculated flood risk for 300 million buildings, and it recently completed risk scores for 155 million buildings in North America to assess flood and wildlife risk. Soon, it will provide flood risk scores for Australia, New Zealand, and Africa. In France and the U.K., "we've done every peril or risk an insurer would be interested in," Varley states.

In addition to geographic risk data, Addresscloud will use Overture's building attributes, such as height and footprint, and assign additional attributes to the GERS IDs, including age, construction type, and use. All of these factors impact risk calculations.

More targeted and accurate insurance risk assessments—which richer data drives—will ultimately help both consumers and insurers. "Any savings insurers achieve should be reflected in premiums," says Varley. Also, insurers who more accurately calculate risk can win market share with more competitive pricing.

More Use Cases

While Overture's datasets sound massive, they're a drop in the bucket in terms of all the spatial data in the world. Esri's customers make three to five billion requests per day to its base maps and other geospatial services, which draw from tens of petabytes of data that Esri manages in the cloud to serve its customers. (For reference, the Library of Congress holds about 21 petabytes of digital data.)

All of those Esri customers "maintain a lot of information about assets that are important to them," says Esri's Kensok. For example, FEMA has information on buildings, the Census has information on communities, and Weather.gov has information on weather, and many other companies track data on supply chains.

Most of those large datasets also maintain their own unique IDs for their data. "That is a feature and a bug," Kensok says. If everyone has their own unique IDs, interoperability is hard to pull off. Overture, by defining a global ID system and keeping it stable, will "be the first, non-proprietary solution to have global stable IDs across many themes," states Kensok.

In three to five years, as GERS withstands the test of time and Overture's datasets continue to expand, the aim is for data providers to make their data "GERS-enabled" so that all data can easily attach to all other data. "Success would mean there are open and proprietary datasets from thousands of organizations around the world that have been GERS-enabled," says Kensok. "We're planting the seeds of that now. If we are successful, we won't have to twist any arms. Organizations will just adopt it out of their own self-interest."

Microsoft sees a similar future. "We are fully embracing GERS as to how we model our data, and we're encouraging the geospatial industry at large to adopt this," Microsoft's Hightower says. He adds that having such an industry standard would also enable Microsoft to have "greater confidence" in the data it purchases with regard to applications. Such a world will enable all kinds of use cases.

In transportation, for instance, TomTom's Shakeri sees a future in which road histories better inform applications that deal with things such as traffic analytics, accident data, distribution logistics, emergency response, transportation planning, refined speed limits, and road construction. As self-driving cars grow in number, cities and car makers will demand the best traffic and road data to optimize performance and safety. Access to that data will be key.

In other industries, Overture and GERS IDs will enable advancements in 2D and 3D maps and, eventually, in augmented reality applications for mobile devices and wearables. As government agencies attach data via GERS, counties could more easily build maps of health data by city. Nations could do the same with poverty, or they could identify patterns revealing signs of climate change or opportunities in oil, gas, wind, and solar. Data will become more accurate and diverse as satellite imagery improves, cameras collect more images, and artificial intelligence-infused applications assess data for patterns. Addresscloud is already making plans to use Overture's Places dataset to help insurers understand the adjacency risk as well. Rather than assess risk by looking only at a specific building, it will also assess the risk of adjoining buildings or other features.

Meanwhile, Esri's integration of FEMA data with Overture data will enable new use cases, such as thematic mapping and 3D visualization and analysis, which will be "invaluable for future applications in fields like urban planning and infrastructure," Kensok says.

Steering Members

amazon   Meta   Microsoft   tomtom

Raising the Tide for All

With digital maps and vast streams of incoming data, there's no limit to how rich real-time maps can become, benefitting consumers, companies, and governments. Overture's rapid growth underscores this potential.

In under two years, it has attracted almost 40 contributing companies in addition to the founding members Amazon, Meta, Microsoft, and TomTom. Contributing members now include household names such as Uber, Tripadvisor, and Cariad (which develops automotive software for Volkswagen), and other companies from industries spanning insurance underwriting, geospatial, consumer navigation, ride sharing, autonomous vehicle navigation, and augmented reality.

Overture expects many more members to join and contribute to its efforts, and, with GERS IDs, everyone can rest assured that the right data gets to the right place.

GERS "raises the tide for the entire industry," says James Killick, a veteran of the mapping industry and author of the blog Map Happenings. "Whether entities are in banking, insurance, economic development, climate change, manufacturing, automotive, and so on, they'll have a layer of data to which they can easily attach other data and do analytics more easily than they could before." Such enhanced analytics, which utilize detailed information about cities, communities, consumers, weather patterns, land use, transportation patterns, and more, will improve the well-being of hundreds of millions of people across whole continents. As Killick states, "it all starts with a map."
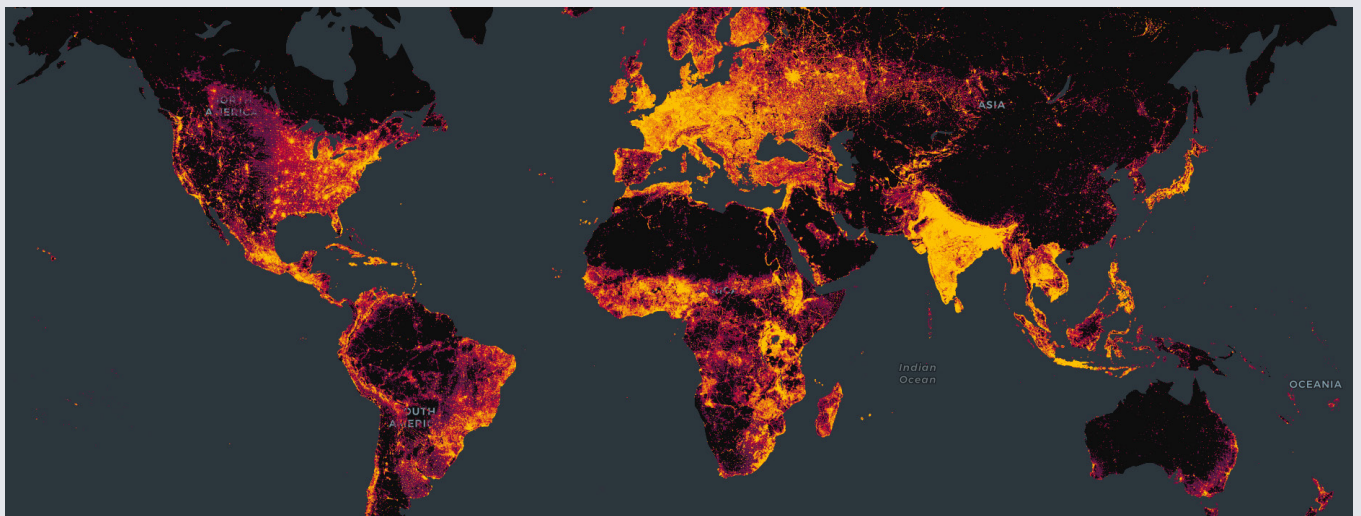
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