

Leverage **ethically sourced raw location data** for relevant, accurate, and profitable business intelligence

SOLUTION BRIEF

Goal

Our mission is to enable the ethical collection and use of raw location data so businesses and governments can leverage actionable location intelligence in compliance with the data privacy regulations.



Introduction

Mobility data comprises GPS signals from moving devices (smartphones, tablets, wearables, etc.) or static signals from SDKs, beacons, WIFI, points-of-sale etc. In aggregate form, mobile location data is extremely valuable for governments and businesses across a gamut of functions.

For example, by assessing footfall at a location, data scientists and market researchers can gauge and forecast performance for a Point of Sale or region. Studying mobility in disaster-prone regions can improve preparedness for calamitous events, help bridge socio-economic gaps, and more.

As with any form of big data, sourcing and utilizing location data comes with challenges. In this solution brief, we will talk about how organizations can improve their understanding of location data supply chains, procure high-quality data, and make profitable, data-driven decisions; all while staying compliant with privacy regulations.

We will also discuss a few real world applications inspired by real customer success stories where location data has delivered actionable intelligence for public and private sector organizations.

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NEED FOR LOCATION DATA

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ABOUT QUADRANT

The need for location data

In a world where consumer behavior is constantly evolving, it is important to take the guesswork out of decision-making and rely on data-driven intelligence. Anonymized location data (in conjunction with third-party data such as census or purchase data) is widely used by various industries to understand who their customers are, what their buying potential is, and more.

Using raw location data signals, businesses can visualize people's movement patterns in the physical world. When observed over time, these patterns provide valuable insights that can be leveraged by businesses to improve their products and/or services, strategize expansion, boost ROI, and improve customer experience.

Similarly, governments, researchers, and non-profit organizations need intelligence derived from mobility data to launch people-centric development programs. For example, analysis of location data allows city administrations and governments to build smarter cities, improve public transit systems, manage disasters, and more.



Due to the utility of human mobility data, both the usage of and demand for location intelligence across various industries have increased significantly. **In 2021, the global market for location intelligence was valued at \$14 billion and is expected to reach \$51.25 billion by 2030, expanding at a CAGR of 15.6%.**

Furthermore, we have seen the pandemic alter people's lives in significant ways over the past few years. The post-pandemic era is characterized by frequently occurring, turbulent economic and geopolitical developments that change people's sentiments, needs, and consumption patterns for various services. **Mobile location data is the only way to get relevant and up-to-date insights on real-world behavioral changes.**

CHALLENGES

With an increasing demand for location-based intelligence, data providers are primarily focused on offering high volumes. As a result, low-quality and fraudulent data have become commonplace. This means that data scientists – despite the use of advanced algorithms and software – are prone to generating false insights.

Decisions informed by fraudulent and low-quality data hurt a company's bottom line. What's worse is that the effects only reveal themselves the insights are utilized for decision-making. Furthermore, inconsistent coverage, inflexible pricing models, and duplicated or overlapping feeds make location-based solutions costly and unscalable. There are also challenges around the ethical use of geospatial data. Storing, using, or sharing non-compliant data results in reputational damage as well as financial and legal penalties.

Let's look at the most common challenges plaguing the location data industry.

Lack of transparency in data sourcing

Location data comes from various sources, including cell tower triangulation, mobile apps, Bidstream, and indoor positioning systems such as Wi-Fi or beacons. **Many location data providers are not upfront about their sources.** They boast high Daily Active User (DAU) counts at cheap rates without disclosing how they procure such data.

Different sources of location data represent varying levels of accuracy and adequacy. For example, GPS data collected from first-party mobile devices is often very accurate and insightful but lacks scale. On the other hand, Bidstream data (collected from ad servers when ads are served on mobile apps and websites) is easy to obtain at scale but lacks precision – and is therefore quite unreliable. Beacons and Wi-Fi networks are also reliable sources for small-scale analyses but are limited in terms of coverage. **It is important that organizations understand where data is coming from so they can assess its suitability for their specific use case.**



Lack of compliance with data privacy laws

Multiple leading technology companies have been exposed for monetizing their users' data without obtaining explicit consent. This brought the issue of data privacy into the limelight and forced governments and regulatory bodies to develop legal frameworks to address the problem.

Today, even though over 100 countries have data-privacy laws in effect, **many location data vendors are not compliant with such regulations when sourcing or monetizing data.** There's a lack of understanding about what kind of data is classified as Personally Identifiable Information (PII) and protected by privacy laws. The language of privacy regulations is also ambiguous as some location data attributes are considered PII under special circumstances and some are not. This puts organizations at risk of fines due to non-compliance along with reputational damage.

Lack of flexibility

Most often data vendors have rigid business practices and pricing models that force customers to buy their whole data feed or subscribe to a long-term contract when they only need data from a smaller region for a specific, one-off project.

This inflexibility can act as a huge barrier for small- and medium-sized businesses or researchers because it prevents them from leveraging location intelligence for critical humanitarian and business use cases.

Lack of quality control

Data vendors aggregate location data from multiple sources. Consequently, their datasets contain a sizeable portion of overlapping and duplicate records. This is a huge problem because these inflated datasets are poor quality and expensive.

The lack of quality assurance from vendors passes the burden of data preparation on to the client – which adds significant delays and costs to their analyses.

Limited coverage

Businesses need access to large and consistent data volumes across different geographies (for mobility insights) to power their platforms and services. Most location data feeds are characterized by fluctuating data counts and poor coverage across different regions of interest.

Moreover, coverage is especially bad for low-density suburbs and rural areas. **Most vendors do not offer data for such regions because it is not as profitable as data for urban settlements.**

Other limitations

Low smart-device penetration - When it comes to location data, vendors can provide large datasets for dense areas with high smartphone penetration rates. However, they cannot provide significant volumes of location data for less dense settlements with low smartphone penetration rates.

Lack of awareness amongst publishers - Due to several leading technology firms making headlines for data-privacy breaches (Twitter, Meta, T-Mobile, etc.), mobile app publishers are extremely cautious about sharing user location data. **There is a lack of understanding about what kinds of data constitute PII and how to obtain user consent properly.** Additionally, most publishers are not aware that mobility data does not infringe on user rights when it is analyzed in an anonymized and aggregated form.

Disruptive policies from OS providers - Leading OS providers and platforms that host apps make sweeping, unannounced changes that make it very difficult for third-party apps to collect and monetize user data. These dominant market players claim such measures are designed to protect user privacy – which is evident from sound initiatives like recollecting consent permissions. However, due to their uniform approach towards sensitive and non-sensitive data alike, **these policies cause significant fluctuations in the overall volume counts of all location data vendors.**



QUADRANT'S SOLUTION



Ethically sourced location data

Quadrant **sources location data directly** from its point of origin – GPS signals **from first-party, opt-in mobile devices**. We gather data via Server-to-Server (S2S) integrations from a network of trusted publisher partners that are located all over the world.

We also have a very careful screening process for use cases that our data is contributing to. We take each use case into consideration before selling our data. Our data consultants thoroughly examine what is going to happen to the data a client has asked for, how they intend to use it, and so forth. We do not hesitate in turning a buyer away if they intend to use our data for unethical purposes.

Coverage and availability

We source anonymized **location data from 200+ countries for urban, suburban, and rural regions**. Our data feed offers extensive geographical coverage as well as consistent average monthly and daily counts. Before onboarding a supplier, we assess their suitability by evaluating key metrics such as DAU / MAU counts, horizontal accuracy, hours seen per day, and more. **We selectively onboard suppliers that add unique, incremental value to our overall data pool.**

Our data science team helps clients **extrapolate data** so that they can build accurate simulations. As a result, customers can overcome volume constraints for regions with a lower smartphone penetration rate.

Flexible options, pricing, and delivery

Quadrant's location data offering is versatile and tailored to a customer's needs. Large companies that require huge datasets and wish to conduct all data analysis in-house can subscribe to our entire data feed, whereas small businesses can leverage our data for a smaller region or period for one-off projects.

Our adaptability to fit the client brief is unmatched. Most of our customers choose us over competitors for flexibility alone.

We can create a custom plan for each customer based on the following factors:

- Annual Agreement: yearly contract with renewal options
- Project Based: short-term agreements
- Current Data: low-latency feeds
- Historical Data: data from 2019 onwards
- Geography: city and country level
- Volume: as per requirements
- Delivery Cadence: daily or every 5-10 minutes
- Delivery modes: AWS, Azure, GCP, FTP/SFTP
- Custom Processing: In-house data cleansing and structuring

Rigorous quality control and customer support

Quadrant employs several quality assurance protocols to ensure our customers receive location data of the highest quality possible.

Whether you are feeding location data to your in-house visualization software or using AI models to generate manual reports – cleansing and preparing data can be time-consuming and resource-intensive.

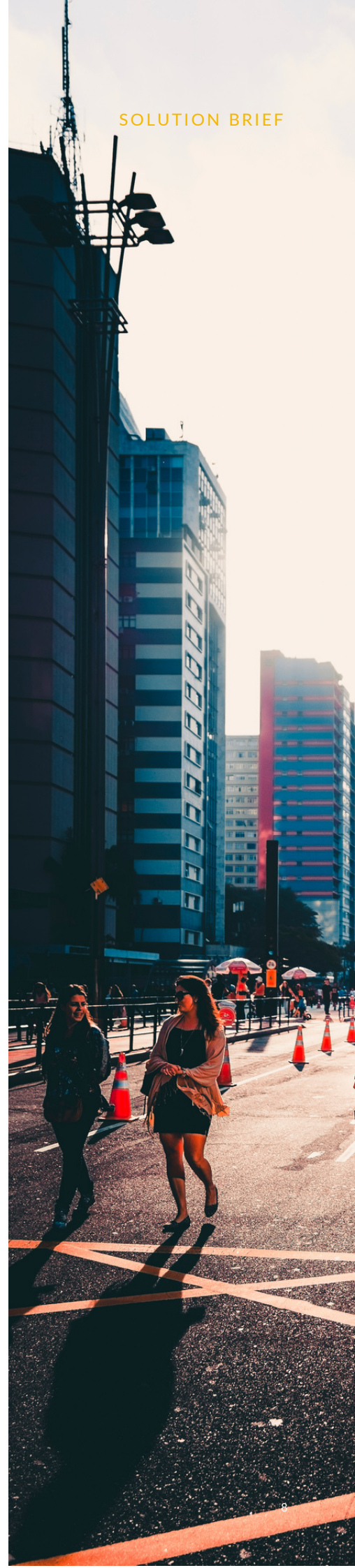
Quadrant's in-house data engineering and data science functions do the heavy lifting before the data even reaches your servers. We deduplicate the feed, remove overlaps, eliminate incomplete records, and reduce latency to maximize the value of the data you pay for.

Our data science team has built all the basic algorithms and queries needed to get started with location-based analyses. These algorithms and additional data science support are available on demand.

Fully compliant with data-privacy frameworks

Quadrant takes the issue of data privacy seriously. We are of the belief that data can and should be used to drive positive changes in communities without infringing on people's right to privacy.

Unlike data that is collected on websites and social media, location data sourced from mobile devices is free of context, i.e., it doesn't record a person's identity, demographics, or any other form of PII.



Most companies use aggregated, historical data over months or even years to understand large-scale movement patterns. As such, there's no real-time tracking involved. The only data attributes in our feed that are personally identifiable (according to some regulations) are the ad IDs (IDFA or AAOD) collected by OS providers. Users, however, can easily change this ID from time to time or can let them get updated automatically when changing or resetting their devices.

Moreover, we only collect data from users who opt-in and give explicit consent for sharing their location. For app publishers that do not have an existing consent management platform, we offer QCMP – our proprietary consent management platform – free of charge. QCMP is an IAB TCF-certified solution that records the entire consent lifecycle on an immutable blockchain! As a result, our customers can safely leverage location data while remaining compliant and audit ready.

Data transparency and provenance

Our blockchain arm, Quadrant Protocol, is an integral part of our multifaceted approach toward increasing supply chain transparency. We document the relationships between buyers, providers, and suppliers through Data Smart Contracts and leverage a mechanism called 'Data Stamping' to attach a unique identifier to each transaction on the Quadrant Chain. By doing this, **we allow our customers to see exactly where their data is coming from and when they started receiving it.**



Ethically sourced
location data



Extensive coverage
and availability



Flexible options, pricing,
and delivery



Rigorous quality control
and customer support

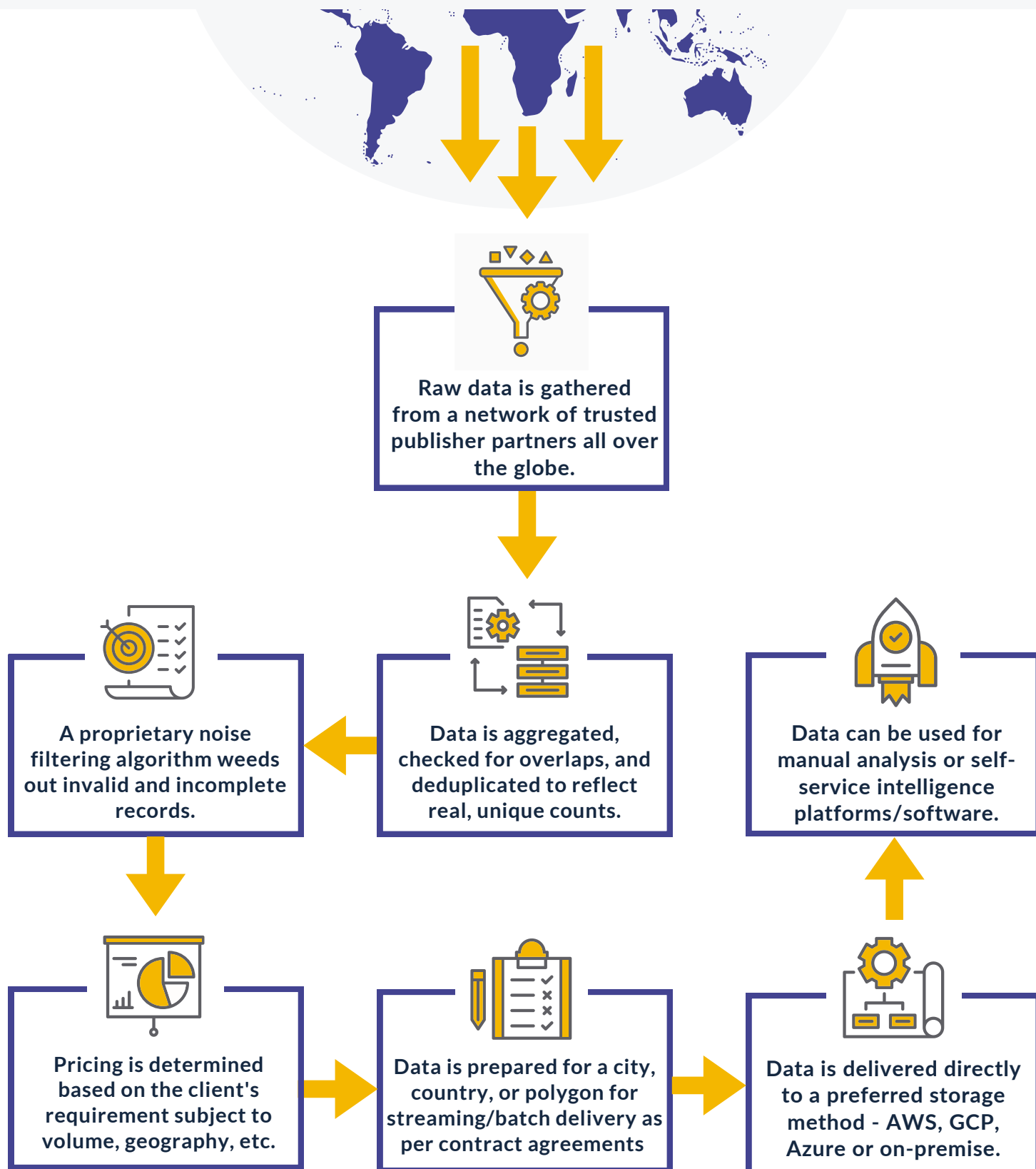


Fully compliant with data
privacy frameworks



Data transparency
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HOW IT WORKS



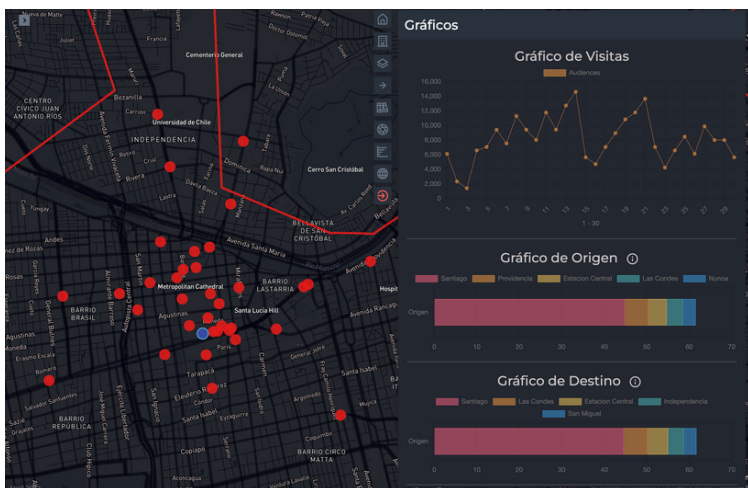
USE CASES | CUSTOMER SUCCESS STORIES

Business Intelligence and Data Visualization

As a highly accurate proxy for people's movement, location data holds immense potential for driving optimization across an enterprise.

Mobility and visitation insights enable companies across the industry spectrum to enhance marketing ROI, strategize expansion activities, generate competitive intelligence, increase supply chain efficiency, and more. Consequently, it is an essential tool for firms that specialize in data science and visualization.

Mapoteca – Latin America's leading geospatial data hub – utilizes Quadrant's human mobility data to power its intuitive, self-service analytics platform. Their platform allows companies to produce tailored audience intelligence at the microscopic (neighborhood) and macroscopic (country-wide) levels with just a few clicks. As a result, Mapoteca's clients have been able to assess the performance of their brick-and-mortar stores, facilitate successful expansion plans, determine market opportunities, inform product strategy, and more.



Mapoteca trusts Quadrant to power their state of the art platform and offers quality location insights for their customers across a host of industries. Image shows OD analysis and mapping for visitors' data around pharmaceutical outlets in Chile

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Marketing & Advertising

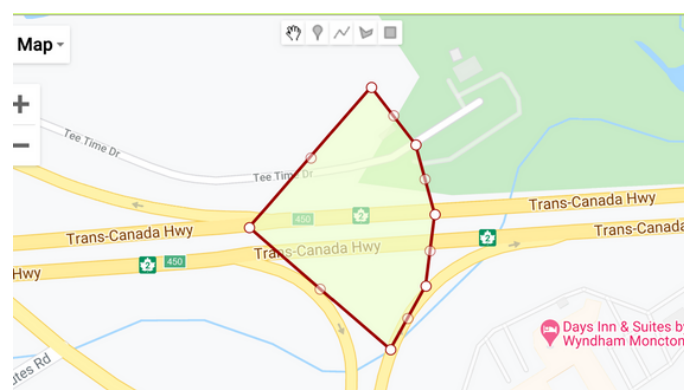
Effective advertising across online and offline channels is contingent on communicating the right message to the right people at the right time. Location data is a great resource that businesses can harness to achieve this goal. Insights generated from **footfall studies** also **allow firms to identify target audiences, measure ROI on outdoor advertisements**, and more. Collectively, such measures make marketing initiatives highly impactful. One of our partners, **Applied Post** - a Canadian consumer analytics firm employs a proprietary location intelligence platform to help retail brands improve their marketing ROI.

Identifying audiences & executing targeted campaigns

Applied Post analyzed foot-traffic data for home improvement retailers in several Canadian cities. Afterward, they combined the resulting insights with data from surveys and loyalty programs to create comprehensive consumer profiles. Consequently, their client was able to launch targeted marketing campaigns to better engage existing customers and poach buyers from their competition.

Determining attribution for Out-of-Home (OOH) ads

Conventional methods of gauging ROI on outdoor media – such as causal impact analysis – are unreliable. Applied Post correlated footfall data around a liquor distributor's billboards with said distributor's retail outlets. By using this approach, the client was able to measure the conversion rate of their offline marketing campaigns.



Graphical representation: Determining ROI of an offline OOH campaign by geofencing a billboard's view cone and correlating data with actual traffic at the retail outlets to assume conversion rates.

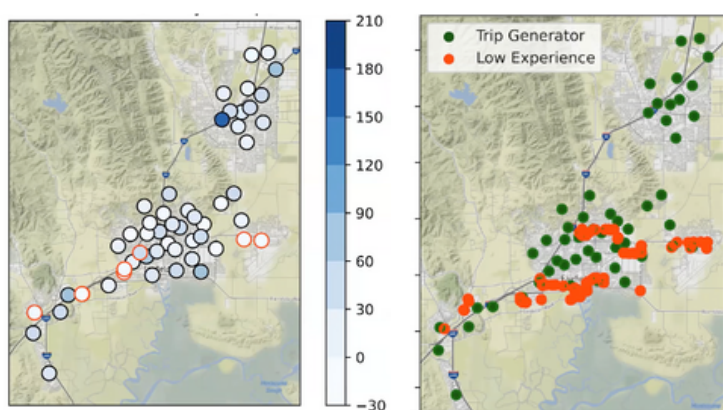
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Public Transportation and Traffic Management

Location data allows **transport economists and government officials to develop a comprehensive picture of large-scale movement patterns**. Such intelligence plays a crucial part in executing projects that make public transit systems more effective and accessible – thereby improving the quality of life for urban citizens. Additionally, mobility insights allow transit authorities to gauge ROI on transport infrastructure, reduce congestion, and more.

Innovate Mobility, a leader in transit consulting, helped the City of Fairfield California's transit division secure \$1 million in federal funding to redesign its public transportation network.

Using location data, the city identified and addressed pandemic-induced changes in commute patterns. Movement patterns were then used to determine the discrepancy between transit supply and demand, identify underserved regions, and selected low-density routes that would benefit from a cost-effective microtransit services.



Innovate Mobility's data scientists use Quadrant's raw location data to depict major trip origin and destination centers in the form of centroids. Through complex clustering, they pair these centroids to establish large-scale travel patterns. Travel patterns are then overlaid on the existing public transit network to determine how well these routes are served. Combined with census data, analysts can further identify where vulnerable communities live and what their day-to-day travel experience is like.

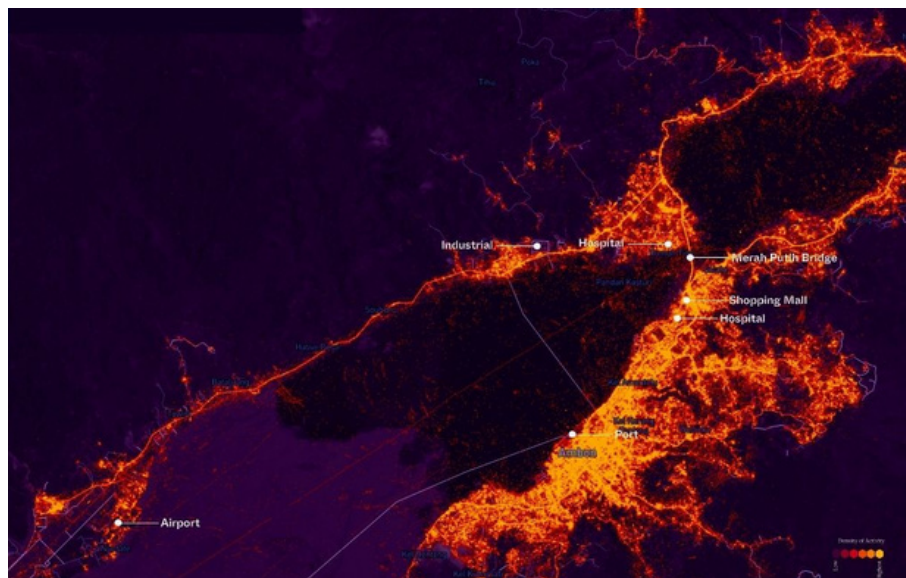


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Humanitarian Relief Efforts

Government officials and disaster management experts can leverage location intelligence to improve the effectiveness of response plans in the aftermath of a natural disaster such as an earthquake, wildfire, or flood. Additionally, they can also utilize mobility studies to measure the socioeconomic impact of such events and enhance a city's Disaster Risk Reduction (DRR) strategies.

Asian Development Bank (ADB) used Quadrant's mobile location data to assess mobility patterns in Maluku (Indonesia) after it experienced a 6.5 magnitude earthquake. By comparing movement patterns before and after the earthquake, researchers were able to identify areas that had sustained significant socio-economic losses and highlight how public and private-sector entities were responding to the disaster. Insights like these inform plans to enhance the island's resilience to such events in the future.



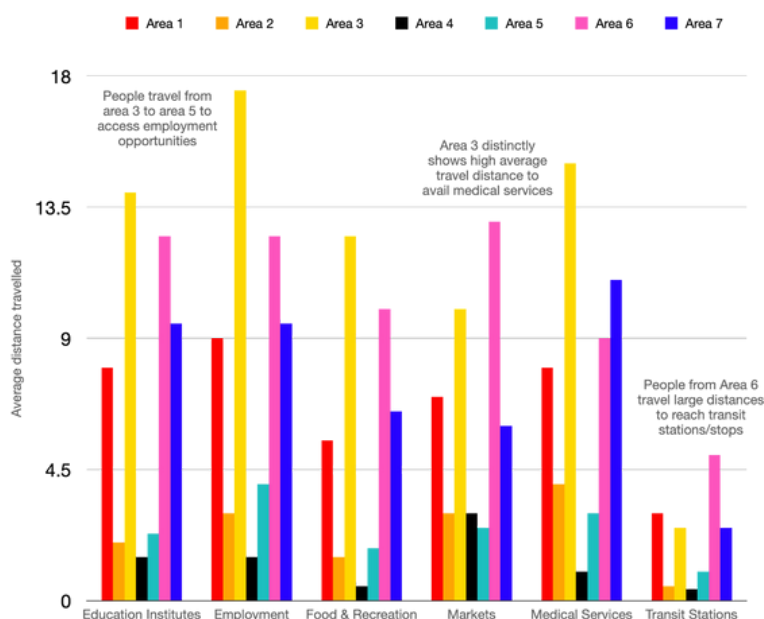
Location data can help determine the geographical distribution of a population in the aftermath of a natural disaster - which is critical for impact assessments. The heat map above depicts the normalized activity profile of Ambon Island for an average 24-hr day in Sept. 2019. The region is aggregated into hexagons - which are colored based on the hourly count of unique devices in each cell. This process is used to identify areas with the most and least human activity at any given time. Yellow cells represent locations with the greatest number of people over the avg 24 hour period.

[READ THE ARTICLE](#)

Research and Academia

Researchers and academicians rely on location data to identify and mitigate systemic urban challenges to improve people's quality of life. Analyzing location data allows them to determine people's needs and evaluate whether existing public services – including public transit networks, recreational facilities, schools, hospitals, etc. - fulfill citizens' requirements.

Scholars from a renowned public research university use Quadrant's location data to assess the availability and accessibility of transit infrastructure in Maputo – Mozambique's capital. They generate insights from mobility and Point-of-Interest (POI) visitation data to determine the city's primary trip generation and high-demand zones. By dissecting mobility data at multiple scales, their findings illustrated the inequitable distribution of public transit services. As a result, they are able to recommend changes to make said services more effective and accessible for all socio-economic groups.



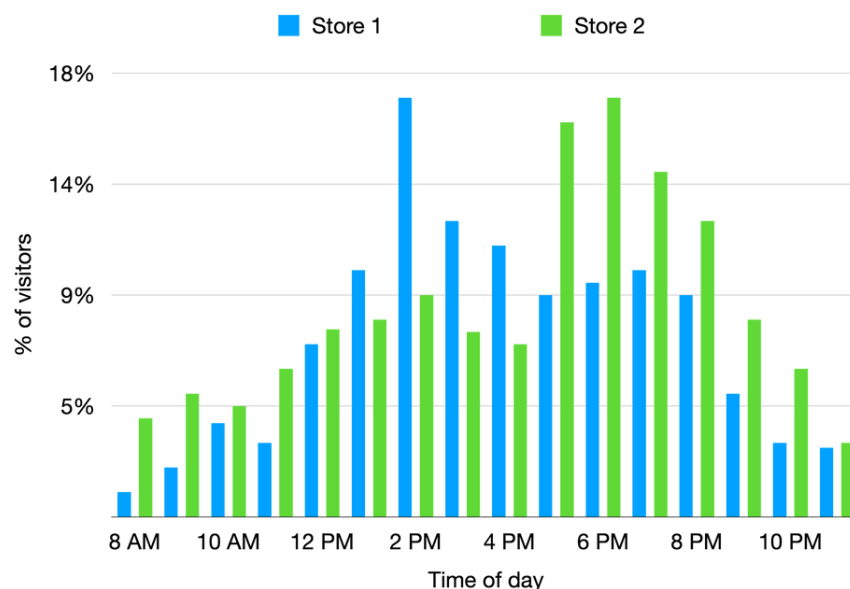
The graphic above shows the varying distances that people from different areas must travel to access employment, healthcare, education and other facilities. The researchers leveraged clustering techniques to examine mobility patterns for different POIs - which allowed them to showcase how public transit accessibility and effectiveness varied according to socio-economic class.

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Retail Footfall and Visitation

To succeed in the hyper-competitive retail industry, businesses need access to a reliable form of intelligence that can act as a basis for key decision-making. Location data – a precise indicator of people's movement patterns, and therefore, preferences – is an accurate source of consumer intelligence because it allows retailers to evaluate market share, assess and enhance outlet performance, improve customer retention strategies, and more.

One of our customers, **PREDIK Data-Driven**, is a leading provider of market intelligence solutions. In one project, PREDIK Data-Driven compared footfall data for two competing fast-food outlets in Monterrey Nuevo Leon (Mexico) to produce competitive insights for their customer. In another project, they utilized location data to uncover foot-traffic patterns for competing supermarkets. These insights paved the way for their client to **improve its interior design, product placement, and operational efficiency** – resulting in enhanced customer experience and greater sales.



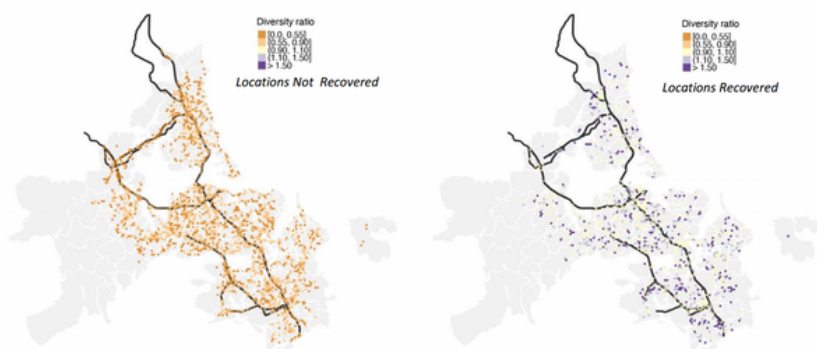
The graph above represents how footfall numbers varied across the two competing super-markets by time of day. Granular insights from such analyses allow retail brands to improve resource allocation, staff efficiency, and more.

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Urban Planning and Smart Cities

Location intelligence can play a crucial role across several domains of urban planning. By studying people's movement patterns at small (block or neighborhood) and large (city-wide) scales, urban development practitioners can generate insights around place use and citizens' behavior, inform smart city planning, and more.

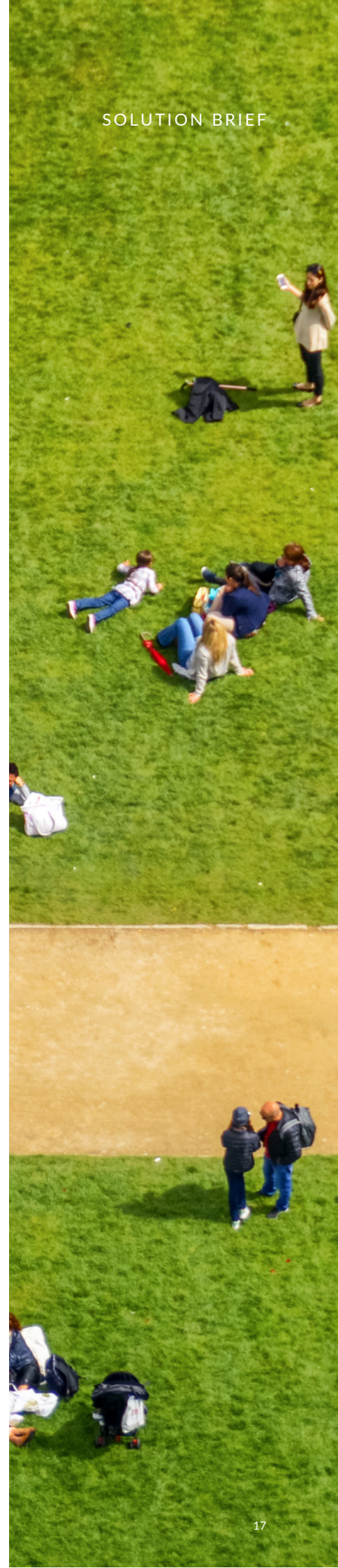
Researchers from the University of Auckland utilized Quadrant's location data to evaluate post-pandemic movement patterns in Auckland, New Zealand. They studied pre- and post-lockdown mobility data to construct home-to-destination networks, determine population density, and calculate the diversity of visitors at various locations. Through these analyses, the researchers established citizens' enthusiasm for outdoor recreational facilities and recommended measures to make them safer, accessible, and visually appealing.



Graphical representation: The images here show few of many visuals built by researchers using R to understand the frequency and density of visitors to specific POIs during various phases of the Covid-19 lockdown.

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In a similar project, an Australia based urban planning company worked for a major transit authority in Australia to study public transport utilization. They compared audience volumes across areas against dominant modes of transport. Doing so allowed them to measure transit demand by locality and identify popular routes and places. **Their findings acted as vital intelligence that helped the city redesign its transit systems, urban layouts etc. to address post-pandemic commuting needs.**



Finance and Insurance

Location intelligence is a valuable resource for all types of financial institutions. Mobility and visitation analyses allow retail banks to identify areas with significant human activity. With these insights, **banks can identify suitable locations for their branches and stand-alone ATMs.**

Within the realms of residential and commercial insurance, studying mobility patterns allows analysts to better estimate general liability risk. As a result, they can **craft policies that accurately reflect different levels of exposure and enhance profitability.**

Investment banks and hedge funds can utilize footfall trends and visitation studies to get a jump start on their competition. These insights allow investors to pinpoint promising ventures without having to wait for quarterly or yearly sales reports. Additionally, they can utilize such studies to execute predictive analytics for their portfolios and reduce their exposure before it is too late.

Tourism - Seasonal Marketing Programs

Mobility-based insights hold immense potential for businesses that have seasonal upticks in activity. By correlating information on where customers come from, which travel modes they primarily use, and the places they visit often with third-party data (demographic, transaction, etc.), companies can prioritize investments, optimize marketing, adjust offerings/pricing, and more.

A popular winter apparel company acquired Quadrant's location data to generate comprehensive insights on tourists who frequent the ski mountains of Aspen, Colorado. They utilized mobility data for OD analyses and identified states with significant portions of their target audiences. These insights allowed them to launch targeted campaigns in states with greater potential for returns, rather than exhausting huge budgets on nationwide marketing programs.



Businesses rely on geospatial information to make sense of their surroundings. When observed over a period of time, movement patterns provide valuable insights that can be leveraged by businesses or governments to propagate the consumption of their services, expand availability, boost ROI, improve customer experience, and gain competitive advantage. Our customers trust us for the consistency, quality, and coverage of our mobile location data. Combined with our manually collected and verified, on-demand POI database, we have the unique capability to be a holistic, one-stop-shop data partner for you.

Quadrant (An Appen Company) is a global leader in mobile location data, POI data, and corresponding compliance services. Quadrant provides anonymised location data and location-based business solutions that are fit for purpose, authentic, easy to use, and simple to organise. We offer data for almost all countries in the world, with hundreds of millions of unique devices and tens of billions of events per month, allowing our clients to perform location analyses, derive location-based intelligence, and make well-informed business decisions. Our data is gathered directly from first party opt-in mobile devices through a server-to-server integration with trusted publisher partners, delivering genuine and reliable raw GPS data unlike other location data sources. Our consent management platform, QCMP, ensures that our data is compliant with applicable consent and opt-out provisions of data privacy laws governing the collection and use of location data. To learn more about Quadrant's mobile location data, **talk to a data consultant today!**

Reach us at:

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