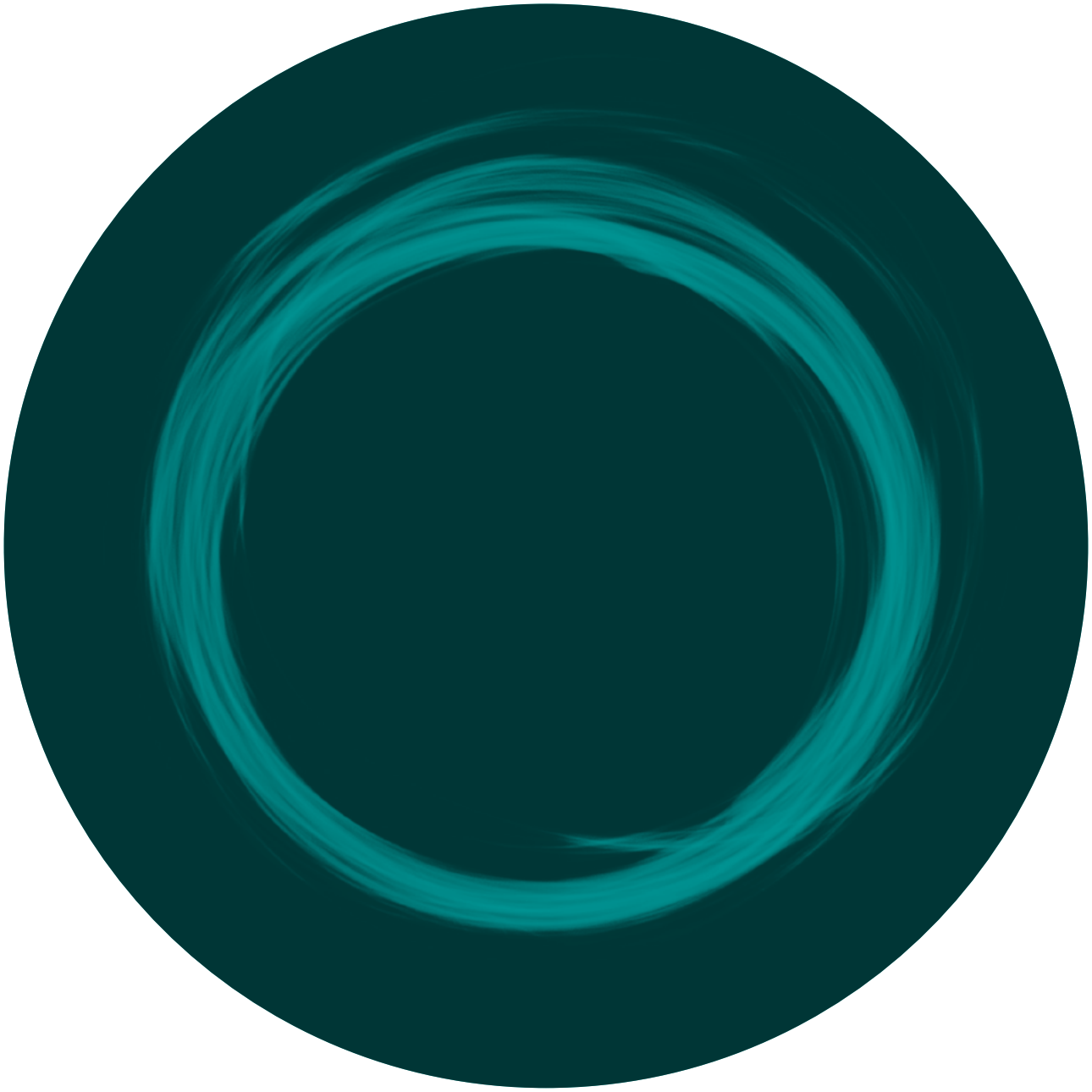
WHITE PAPER

Empowering Vision Zero with Data



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What is Vision Zero?

Vision Zero is a worldwide initiative begun by Sweden in 1987, a holistic approach to traffic safety that focuses on curbing and eliminating fatalities and severe injuries through road design, data analytics, and governance policies. In the United States alone, according to the National Highway Traffic Safety Administration (NHTSA QuickFacts 2019), traffic accidents cause 99 deaths and over 7000 injuries per day. To date, more than 40 communities in the U.S. have committed to a Vision Zero strategy, making mobility safer, healthier, and more equitable for all. The U.S. Transportation Department recently made the efforts federal, releasing an ambitious national safety strategy in January 2022.

Getting to zero traffic fatalities seems like an impossible task—after all, aren't traffic accidents due to inevitable human error? The answer is no. Accidents tend to be a culmination of human behaviors, speeds, design, technology, and local policies—all of which can be positively influenced with data and analytics.

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Empowering Vision Zero with a modern data fabric

Of the necessary nine elements, achieving a data-driven Vision Zero is the most technologically challenging and requires an upgrade for success. Most municipalities use point solutions generating lots of valuable data that is then stored in siloes—data that goes unshared and often unused. A modern data fabric is necessary to help bridge the gap in those point solutions, allowing for a more cohesive and data-driven approach to enabling decisions.

The first step in building a modern data fabric is choosing the right data and analytics platform—one that performs calculations, predict outcomes, and make recommendations in milliseconds. Older data and analytics platforms only describe what's happening and offer no predictions or prescriptions—good for rudimentary research, but not effective enough to reduce severe accidents to low numbers.

A modern data platform not only describes what's currently happening on roadways, but what will happen in the future—as well as providing the intelligence to execute real-time decision making and event correlation—encompassing three types of analytics (Figure 1).

Given the overhaul needed for older systems, the prospect of achieving Vision Zero may appear daunting, but municipalities can evolve their analytic journeys in phases with a scalable system that allows for growth over time.

A three-phase road map consists of:

1. **Descriptive Analytics:** Municipalities initially focus on integrating data for reporting, connecting the data to create a 360-degree view of the highway system. A data-centric environment describes things like how many incidents occurred in a day, where were the incidents, who was in them? Data informs the organization through key performance indicators, but only those within the organization have access.
2. **Predictive Analytics:** In this stage, municipalities collect data as it happens, answering questions like, What's the current traffic flow or what traffic lights are currently not operating? Municipality managers immediately see issues, conduct root cause analysis, and make informed decisions that positively change situations. Examples might include updating travel advisories and deploying resources based on changes in weather, upcoming events, road congestion/construction or accidents. Researchers can also model various scenarios with

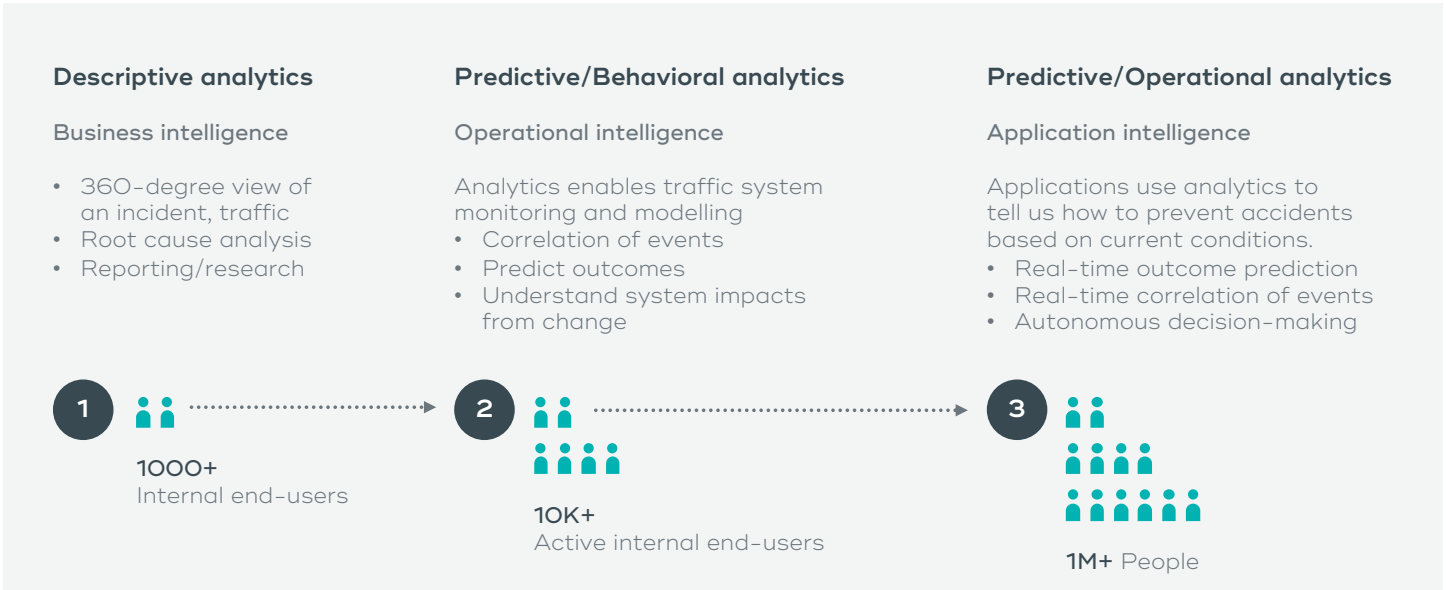

Figure 1. Analytic Continuum for Vision Zero

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data, such as by examining the impact on traffic flow of a redesigned traffic circle. Municipalities can see the possibilities coming down the pipeline. An organization becomes data-driven with every worker accessing and leveraging data for their decisions.

3. **Prescriptive / Operational Analytics:** The third phase of the analytics continuum is to operationalize the analytics. Data is not just consumed by the workers, but by smart cars, pedestrians, and drivers. Applications leverage the real-time 360-degree view of the roads and highway systems to make autonomous decisions that reduce the risk of fatalities. Smart cars receive data to make autonomous decisions, avoiding obstructions. Variable speed limit signs are automatically updated to slow traffic. Bikers get information about trouble areas in their path and pedestrians are rerouted to control congestion. Analytic models power applications with on large integrated data sets. Data becomes hyper-personalized based on the specific situation and what is known about the individual. Data is part of the fabric for the entire highway system, informing and impacting people and technology.

Organizations will quickly mature through the analytic continuum, applying analytics to improve outcomes in newer and better ways with the ultimate goal of being a data-driven organization that is eliminate fatalities and injuries.

Aligning Vision Zero business initiatives with outcomes

The most common problem for municipalities using a new data and analytics platform is a push to collect as much data as possible in the first phase, without a plan of how the data will be used.

Integrating data without purpose leads to half-baked data solutions, wasting time and money. To align outcomes with the Vision Zero initiatives, the transportation community must first understand both the decisions that can be made and the improvement opportunities for eliminating fatalities.

Transportation knowledge workers must define both business drivers and data requirements by answering these eight questions (Figure 2).

Only then can municipalities determine what data is required. This information value-chain ensures data is collected with purpose and aligned with business initiatives.

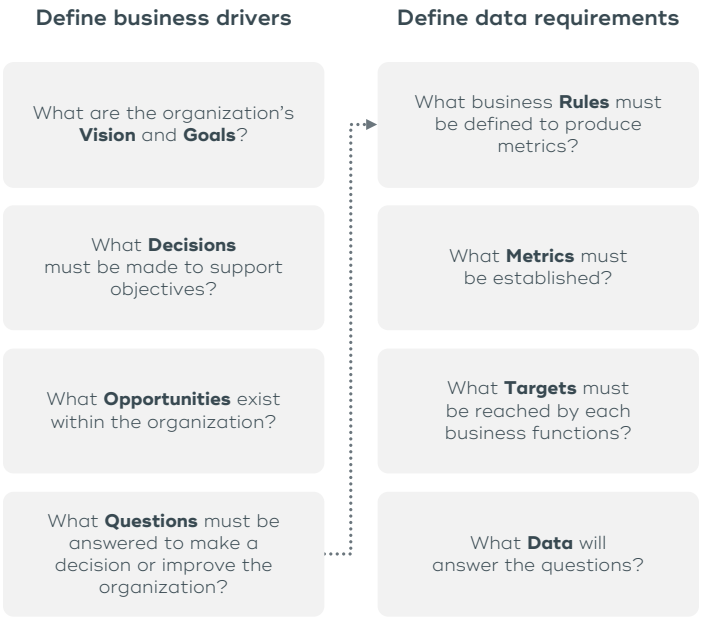

Figure 2. Pertinent Questions Drive Requirements

Bringing the data together for analytics and reporting

The commitment to a data-driven approach to "…gather, analyze, utilize, and share reliable data to understand traffic safety issues and prioritize resources based on evidence …" requires careful selection of a consolidated data and analytics platform to measure and support the other components of Vision Zero success such as an action plan, equity, cooperation, and collaboration.

The integrated data platform must be flexible and scalable enough to ingest a wide range of data from annual federal traffic fatality statistics to streaming roadway sensor data while simultaneously supporting data usage demands such citizen web portal inquiries, real-time analytic modeling to adjust variable speed

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limits, or longitudinal analysis of traffic patterns to support new safety-minded construction initiatives.

And given the volume, diversity and complexity of the data required, the platform must deliver comprehensive analytic functionality to make sense of the information, particularly in support of predictive and prescriptive analytics, such as modeling the impact of re-routing car traffic around an accident.

Only Teradata Vantage offers a platform robust enough to tackle the complex needs of Vision Zero and modernizing a data fabric, scoring highest in all four use cases in the 2021 Gartner Critical Capabilities for Cloud Database Management Systems for Analytic Use Cases, and named a cloud leader in the 2021 Gartner Magic Quadrant for Cloud Database Systems.

Figure 3 shows how a data platform is at the heart of the data ecosystem, providing capabilities that support a broad range of tactical and strategic analytic use cases.

Teradata Vantage encompasses all the key capabilities for a Vision Zero data platform, with:

- **Real-time data ingestion:** Data streams from road and vehicle devices and sensors and must be recent for decision-making.
- **Synchronized data:** Create a 360-degree view of data by matching road segments and accidents from different data sources.
- **Secure data:** Traffic incidents may contain personally identifiable data, or some data may not be viewable to all people. Ensure only the right people can see the right data at the right time.
- **Metadata capture:** The context of the data is extremely important to understanding why data is the way it is. The platform captures a wide variety of data context at different levels including the data set level all the way to the data point and make the data easily assessable to data consumers.
- **Multi-genre analytic support:** The environment provides a wide range of analytic capabilities. Such capabilities might include data visualization, statistical analysis, machine learning, text analytics, graph analytics, or geospatial analysis. The platform enables developing, training, and scoring analytic models. All the analysis is done at scale with the entirety of data available.

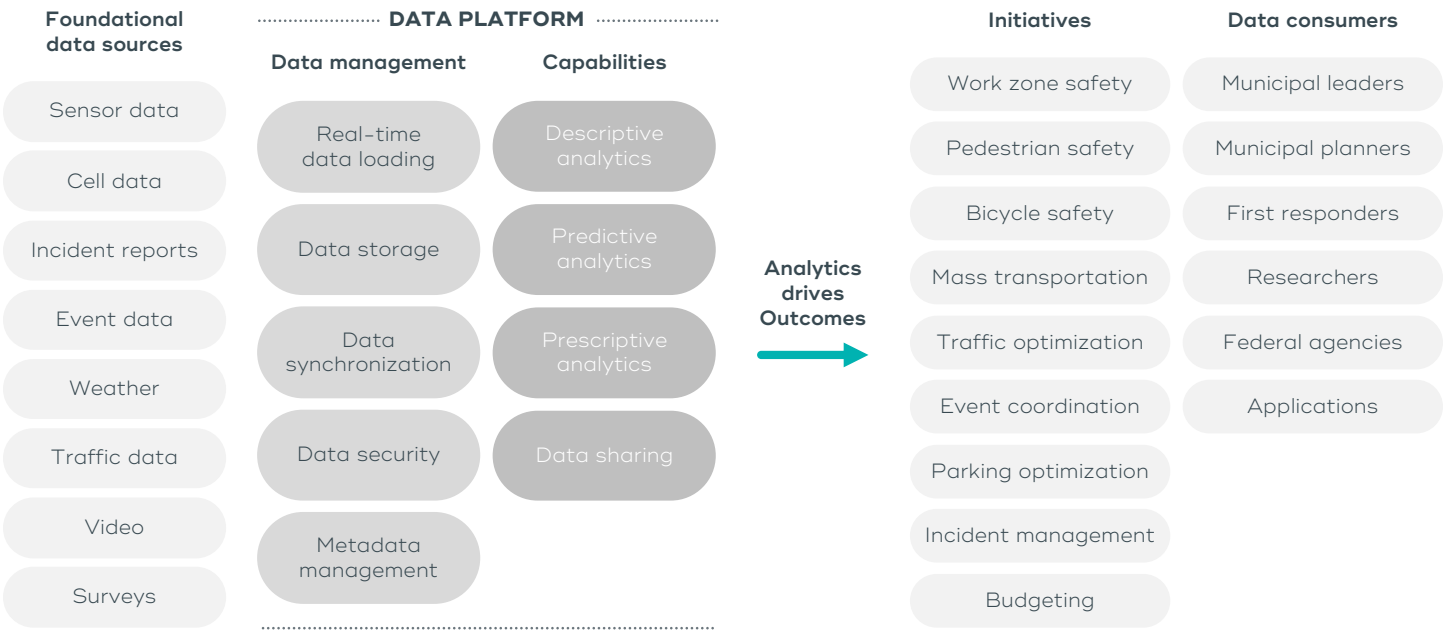

Figure 3. Municipal Data Platform

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- **Analytic tool of choice capability:** Users can leverage a wide variety of tools to access and analyze the data.
- **Data sharing:** Data is available via public data sharing exchanges or marketplaces.
- **Operationalizing analytics –** The environment handles millions of tactical queries from applications that score risk models and query data with SLAs and no downtime.

Only when a foundational data and analytics platform like this is established can a Vision Zero initiative be truly effective.

Action plan

Data will drive Vision Zero, but leaders must adhere to three pillars when building an ecosystem that can support data use and analysis:

- A focus on a data-driven culture: All stakeholders must buy into the need to use data to drive all decisions, collaborate, and share information and decision-making. This improves the data quality, understanding, and context of the data ecosystem, offering the best chance of success.
- Definition and prioritization of objectives and questions: Identify the funded business initiatives and questions that will define the data ecosystem and drive immediate successful data-driven outcomes.
- A systems-based approach: A data ecosystem is an environment that provides easy access to data for analytics. This requires investments in technology and a data platform to enable knowledge workers to successfully use the data. The old way of having different systems that cannot synchronize won't work.

According to the Vision Zero Network, achieving Vision Zero requires nine key elements:

1. **Political commitment.** The highest-ranking local officials must commit to passing local policies that lay out goals, timelines, stakeholders, and transparency.
2. **Multi-disciplinary leadership.** A local Vision Zero task forces should include high-ranking representatives from law enforcement, public health, the Mayor's office, the District Attorney, Emergency Services, and the local school district.
3. **Action plan.** A strategy must be created within one year of the initial commitment.
4. **Equity.** Stakeholders commit to an equitable approach to achieving Vision Zero by establishing inclusive and representative processes.
5. **Cooperation and collaboration.** Community stakeholders and government agencies should share goals and accountability.
6. **Systems-based approach.** Focuses on the systems, policies, and built environment that influence behavior.
7. **Data-driven.** City stakeholders must commit to gathering, analyzing, using and sharing reliable data.
8. **Community engagement.** City stakeholders must provide ample opportunities for public feedback at all stages.
9. **Transparency.** The city provides an annual report and regular updates.

Make decisions for today and the future

A data platform is just not a data store of data, it's a tool that could potentially provide every municipal worker, every pedestrian, every driver, every smart car, and every researcher with information that can avert an accident. With every decision and every action in transportation being informed through data, the world will achieve Vision Zero.

Municipalities must make decisions on modernizing their data ecosystems not just for Vision Zero, but to drive all potential smart city initiatives—streamlining services, assisting with natural disaster planning,

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informing policy-making, and more. A data fabric choice affects a municipality's entire future—so it makes the most sense to choose the top-ranked platform with multidimensional scalability and the greatest longevity—Teradata Vantage.

About Teradata

Teradata is the connected multi-cloud data platform company. Our enterprise analytics solve business challenges from start to scale. Only Teradata gives you the flexibility to handle the massive and mixed data workloads of the future, today.

The Teradata Vantage architecture is cloud native, delivered as-a-service, and built on an open ecosystem. These design features make Vantage the ideal platform to optimize price performance in a multi-cloud environment.

Our experience working with thousands of customers and partners around the world, across a wide range of verticals and industries, makes us the most effective platform for delivering business outcomes and unlocking unlimited value by turning data into your greatest asset. Learn more at **Teradata.com.**

For more information about Teradata Smart City solutions, visit **Teradata.com/smartcities**

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