

# Developing a High Injury Network: What to Know Before You Start

From UrbanLogiq 

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# What is a High Injury Network?

A brief introduction to High Injury Networks, also commonly called Priority Safety Corridors

A **High Injury Network** (HIN) is a road safety analysis framework that helps public agencies identify the most dangerous road segments in their jurisdiction and thereby direct resources to high-impact improvements. Advocated for by the **Vision Zero Network**, many federal, state, and local agencies are using HINs as a key pillar in their strategies to eliminate traffic-related fatalities.

Currently, there is no standardized methodology for generating HINs or measuring their impacts. As a result, there is a lot of variance across public agencies. Throughout this guide, we make a case for standardization and highlight key considerations that road safety professionals should take into account when getting ready to generate a HIN.

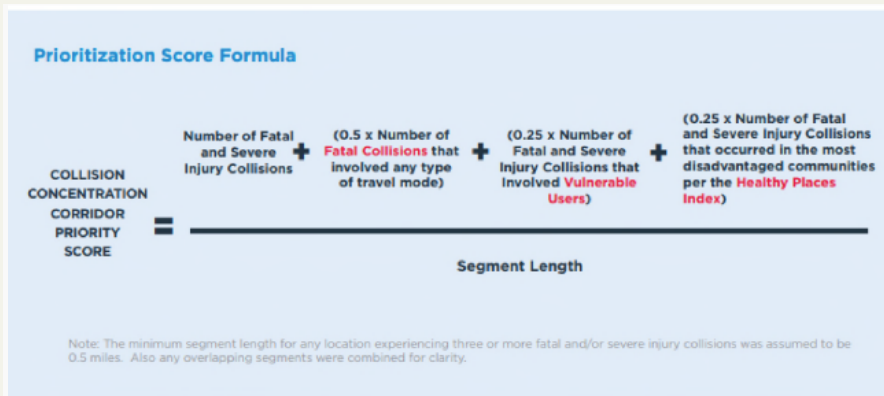
## A thoughtfully generated HIN is a valuable tool to help public agencies:

- **Understand** where the majority of crashes, especially KSI crashes, occur
- **Prioritize** Vision Zero Initiatives and safety improvement projects
- **Inform** traffic safety communications and outreach campaigns
- **Be data-driven** in applications for safety grant applications and reporting
- **Measure** road safety improvements and countermeasures over time

# No standard methodology

Learn how HIN and Safety Corridor methodologies vary from jurisdiction to jurisdiction

Depending on each jurisdiction and its priorities, the criteria for a HIN or [Safety Corridor](#) are weighted differently in determining if a road or segment qualifies to be included.



*Example scoring formula from Los Angeles County*

The most commonly used methods to rank high crash zones include but are not limited to:

- 1. Crash frequency method:** Counts the number of crashes at a specific location over a time period, typically three to five years.
- 2. Crash density method:** Normalizes crash frequency by a given road length or area (e.g., [crashes per ¼ mile](#)).
- 3. Crash rate method:** Counts the number of crashes during a time period normalized by the traffic volume (or exposure) to crashes.

# Lessons from other public agencies

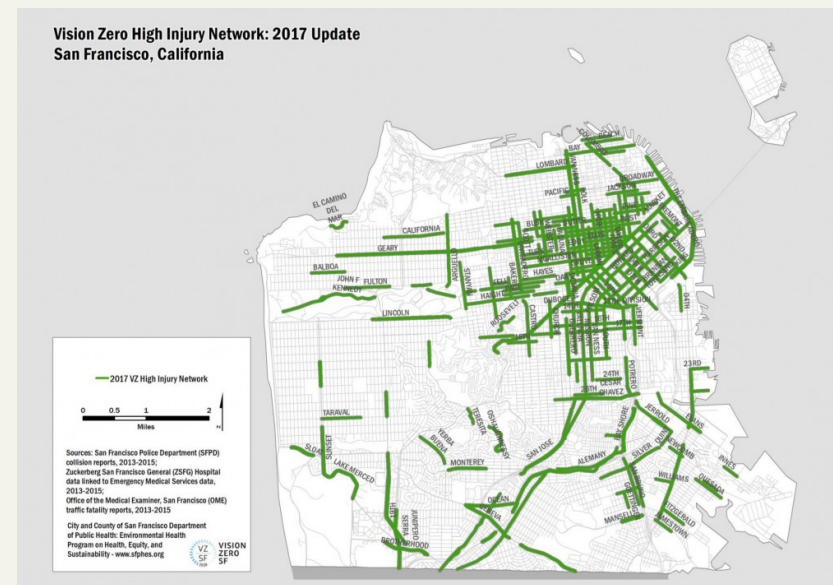
A look at how several U.S. public agencies select corridors to include in their HINs

Below we summarize the [methodologies used in several cities, including San Francisco, Portland, and Seattle](#) as examples of how each jurisdiction prioritizes high-crash areas. The differences showcase the disparity in how Safety Corridors are defined.

**San Francisco:** Each street and segment block is converted into quarter-mile overlapping sections and scored based on the weighted number of injuries or fatalities per mile. To be included in the city's HIN, the corridor must meet a specified threshold.

**Portland:** High crash streets are generated for each category: pedestrians, cyclists, and vehicles. Cyclists and pedestrian crash networks are combined with the vehicle crash network *if* the vehicle crash resulted in a

fatality or serious injury. Portland's [PBOT Equity Matrix](#) is also incorporated to help prioritize investment in underserved and marginalized communities.



[Example of a High Injury Network in San Francisco](#)

# Lessons from other public agencies

A look at how several U.S. public agencies select corridors to include in their HINs continued



**Seattle:** Defines its Priority Corridors based on a crash rate of total crashes per a million vehicles entering a corridor. The threshold is 1.5 standard deviations above the city's mean collision rate. The mean collision rate is

the crash rate of all the corridors combined divided by the number of corridors.

Developing a HIN helps determine **geographic areas where crashes are concentrated.** That information then enables city staff, law enforcement, and other stakeholders to define causes and prioritize safety countermeasure accordingly.

**The challenge is the lack of a standardized methodology.** Standardizing factors such as the definition of a 'corridor,' the definition of 'high injury' and the minimum quantity of data required to develop a HIN would go a long way in encouraging industry-wide collaboration and opportunities to secure funding specific to HINs.

“The challenge is the **lack of a standardized methodology.**

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# What to know before you start

Key things to keep in mind before you start developing a HIN

Before diving in and generating your HIN, consider the following things:

- Do you have the **internal resources**, such as a GIS specialist or spatial software to help manipulate and visualize the data?
- What data you have, what data do you need, and where will you **get the data** from?
- Have you considered **common data challenges** (outlined on page 11)?
- Have you engaged **key stakeholders** including other departments and the public?
- How do you plan to **measure the impact** of the countermeasures you implement?



In 2021, the Southern California Association of Governments (SCAG) produced a [HIN Development Checklist](#) to help public agencies assess their readiness and understand the steps involved in the development process.

This is one effort of many to increase the sharing of best practices and provide standardized guidance with regards to HIN development.



# What data do you need?

A look at how much data you will need for your HIN

**When it comes to generating a HIN it's all about the data.** The more accurate and high coverage the data, the easier it is to determine your focus areas. The bare minimum includes accurately geolocated crash data and a GIS or Open Street Maps (OSM) layer of your community's road network. Where crashes are happening (down to the intersection and segment) is a vital question you'll need to answer to later determine the 'why'.

The devil is in the details and knowing the severity of injuries, whether they were fatal and who was involved, i.e., pedestrians and cyclists, is crucial when determining how a crash will be weighted and the HIN classification of a road/segment.

Historical crash data will help you understand whether

a road or segment should qualify as part of the HIN. Typically, a sample size of at least 3-5 years worth of crash data is needed to know if a road/segment has always been dangerous or if something has changed.

## **Other types of data might include:**

- Crash history (discussed above)
- Traffic volumes including bike and pedestrian counts
- Roadway assets
- Speeds (posted and observed)
- Demographics, i.e, Census
- Equity related data
- Zoning and land use

*Many factors impact crash rates and severity, from street design to weather to zoning and land use, etc.*

*Visualization is a powerful tool to validate that your High Injury Network takes these factors into account.*

*Identifying and visualizing the High Injury Network allows cities to focus on impactful changes to those disproportionately affected by it.*



**Duong Vu**  
Data Scientist, UrbanLogiq

# Data challenges and considerations

## Common data challenges in the HIN generation process

When organizing the data that your jurisdiction will use for your HIN, it's likely that you will run into some of the common data challenges outlined below:

### **Data is inconsistent or incomplete**

Crash data accuracy is different everywhere. Because it is mostly collected manually, formatting may vary depending on the individual who recorded the information. Crash data may also lack information about the collision or provide inaccurate information about where (e.g., geolocation) and how the crash occurred. Crash data can also come from multiple sources, i.e., from the police, from hospitals, or from insurance companies, which lends to inconsistencies in formatting.

### **Data is not available in a timely manner**

Typically there is a lag between the time between when crash data is collected to when analysis starts. Moreover, due to the manual processes described above, crash data

requires time to transcribe and share between a police department, hospital, insurance company etc., and the relevant transportation department.

### **Data takes a long time clean and analyze**

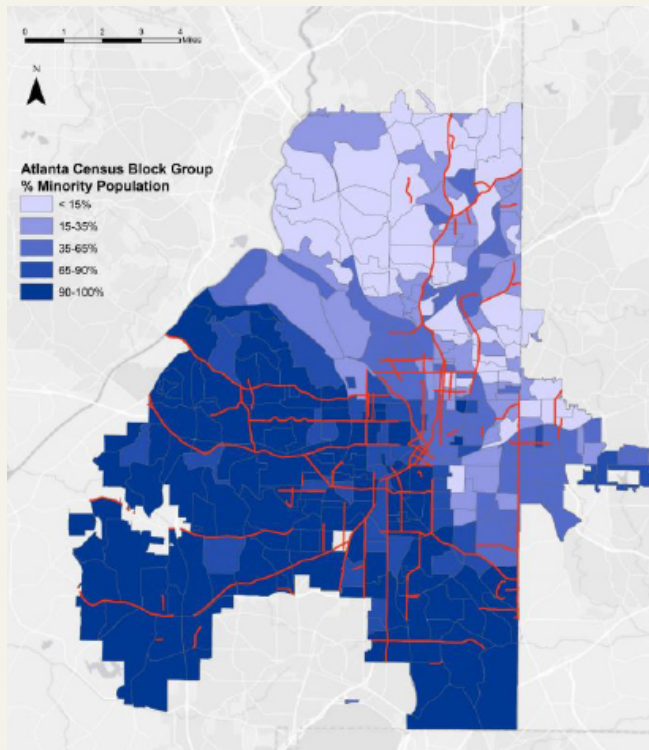
Once the data reaches the transportation department, a good deal of data engineering might be needed to address formatting inconsistencies before the data can be analyzed effectively. Check out our [Data Engineering 101 Guide](#) to explore more steps that data goes through to prepare it for analysis.

### **Data is not analyzed in context**

Analyzing crash data alongside other information that could be impacting crash rates and crash severity helps cities to devise modern and effective road safety strategies. This could include traffic volumes, pedestrian movements, zoning/land use changes, demographic changes, bicycle network changes, traffic signalization, and more.

# High Injury Networks and equity

Why agencies must prioritize equity in their HIN development



[The City of Atlanta's High-Injury Network and Percent Minority Population by Block Group](#)

Every community is different, so analyzing data that is comprehensive and representative helps to consider the nuances of each particular neighborhood. One of the reasons safety corridors are needed is to help determine where to prioritize the use of resources. Including demographic data in HIN determination helps ensure a more holistic equity analysis. Several jurisdictions already consider demographic data in their HIN methodology but that approach isn't yet adopted nationwide. For example, Atlanta uses "equitable target areas" to reflect neighborhoods with lower socioeconomic status and higher levels of minority and/or senior populations. If a roadway segment is within an equitable target area, it is given a higher score than a road segment that isn't. This approach gives traditionally under-invested communities an increase in priority.

**Note:** Grants such as [Safe Streets For All \(SS4A\)](#) are part of a multi-prong approach from the US Federal Government to disseminate funds to directly help make communities safer. There is an increasing emphasis on equity as a fundamental pillar in grant applications. Tracking it as part of your safety programs will set you up for success in funding opportunities later!

# Measuring the impact of your HIN

Why it's important to measure the impact of your initiatives

Measuring the outcomes from actions informed by the HIN is extremely important. It helps you to determine if the changes you made have had any real effect, and if not you can direct additional analysis to further investigate.

Consider the following questions during your analysis:

- **Did we reduce** the total number of crashes?
- **Did we reduce** the average severity of crashes?
- **Did we increase** compliance with traffic laws?
- **Did we reduce** unsafe driver behavior?
- **Did any of our Priority Corridors disappear** from the network the following year?

Without accurate data and tools for analysis, it will be impossible to tell whether your efforts were successful.

*“Measuring the outcomes from actions informed by the HIN helps you to determine if the changes you made had any real effect.”*

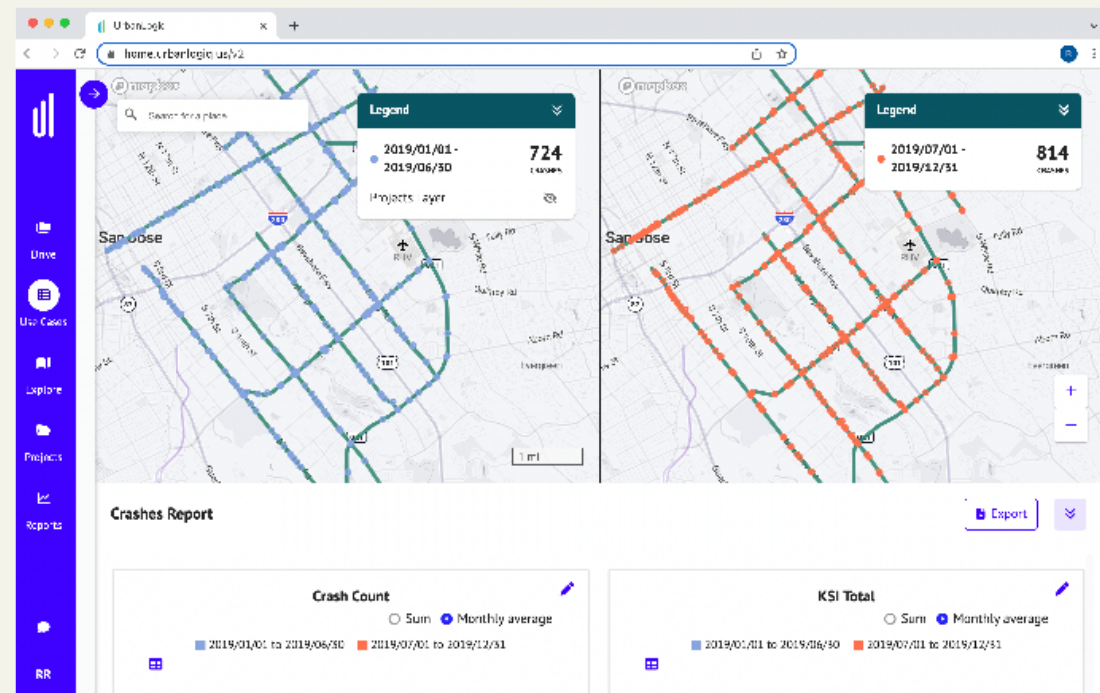
# Why standardization matters

Why it's beneficial to standardize the methodology for generating HINs

As we discussed above, there is currently no standard methodology across government for generating a HIN. Even the definition of a Safety Corridor within a HIN differs among different cities within the same state.

This means it's hard to compare data year-over-year or to measure the impacts of policy changes and crash reduction strategies.

Following the same methods and/or same definition would make it easier for cities to compare year-over-year improvements on the corridors that were identified for safety improvements.



*Crashes along Vision Zero Safety Corridors in the first half of 2019 compared to the second half of the year*

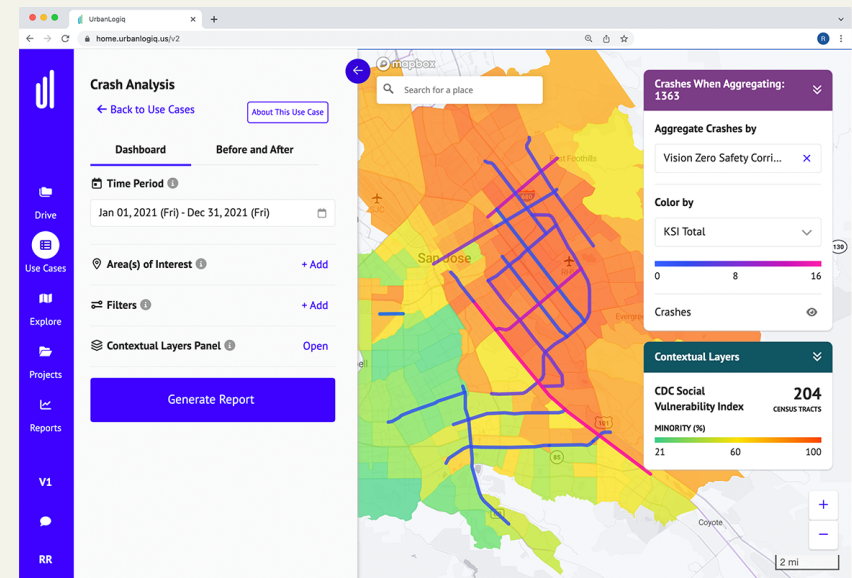
# How UrbanLogiq helps

How UrbanLogiq helps road safety professionals with their HINs and beyond

UrbanLogiq helps road safety professionals generate an accurate and reliable HIN based on bringing forward a recommended, standard approach to public agencies. Our standard HIN methodology utilizes the following best data practices to ensure network accuracy and consistent measurement:

- **A consistent definition** of corridors and intersections
- **A consistent definition** of a high injury event (e.g., “Killed or Severely Injured”)
- **A consistent and maintained data model** utilizing cleaned local crash data sources

Public officials can then visualize and analyze their completed HIN in our user-friendly [Crash Analysis Tool](#) alongside their existing crash data and other relevant contextual information. Crash Analysis makes it fast and easy to monitor the health of your network and measure how countermeasures are affecting your HIN over time.



*Example of layering Vision Zero Safety Corridors with equity-related data to determine overlap in the UrbanLogiq platform*

**Interested to learn more? [Contact us](#) today to schedule a demonstration!**

# About UrbanLogiq

UrbanLogiq is a software platform that integrates and visualizes data to provide fast insights for government. We work with agencies ranging from municipalities under 100,000 in population, to regional governments, states and provinces, and many agencies in-between. As a data agnostic platform, we integrate diverse data sets to produce insights and metrics configured to department-specific needs.

By centralizing data from multiple sources and combining them into one easy to use geospatial interface, UrbanLogiq enables public officials to make faster, more affordable and accurate decisions. We provide streamlined data processing and integration, meaning agencies do not have to spend time data wrangling and cleaning; instead, they can quickly and easily access all the data they need without any of the headache.

Through our work with governments across North America, we've been recognized on the inaugural list of GovTech Magazine's Best International Technology Companies, named a favorite company by TechCrunch, and one of the top five smart city companies to watch by TechNYC.






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## Additional resources:

-  [What Is a Safety Corridor?](#)
-  [3 Tips to Optimize Your Safe Streets and Roads for All \(SS4A\) Action Plan Application](#)
-  [How Spatial Data Analysis Can Help Public Officials Improve Road Safety](#)
-  [UrbanLogiq's New Crash Analysis Use Case Is Here](#)
-  [Advancing Vision Zero: The Power of Contextual Data](#)





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Building better communities with data