



## The Smart City Evolution: A Roadmap for Vision Zero

In 2016, over 40,000 people in the United States died in a traffic crash, the most fatal year since 2007, resulting in estimated costs of [\\$62 billion](#) according to the [National Safety Council](#). To address this dire and deepening problem, 27 municipalities have committed to [Vision Zero](#), a global policy initiative with the goal of zero deaths and serious injuries from traffic crashes.

[Open Data Nation](#) (ODN) along with Microsoft, conducted ground-setting, comprehensive research to support Vision Zero municipalities and save lives. Specifically, we aimed to reveal common challenges, identify best practices, and expose opportunities to use data to inform decision making and prepare for autonomous vehicles. Over the course of 2017, ODN interviewed administrators from 25 municipalities across 23 US states and conducted detailed surveys of data in 40 municipalities with populations ranging from 46 thousand to 8.5 million people. Learn more about this initiative on [Microsoft's blog](#) or at [OpenDataNation.com/vision-zero](#).

From this research, ODN defined a novel typology, the “Smart City Evolution,” which characterizes municipalities into four stages -- initiative, descriptive, active, and adaptive -- as they transform from developing Vision Zero action plans to a position of data and technological sophistication.

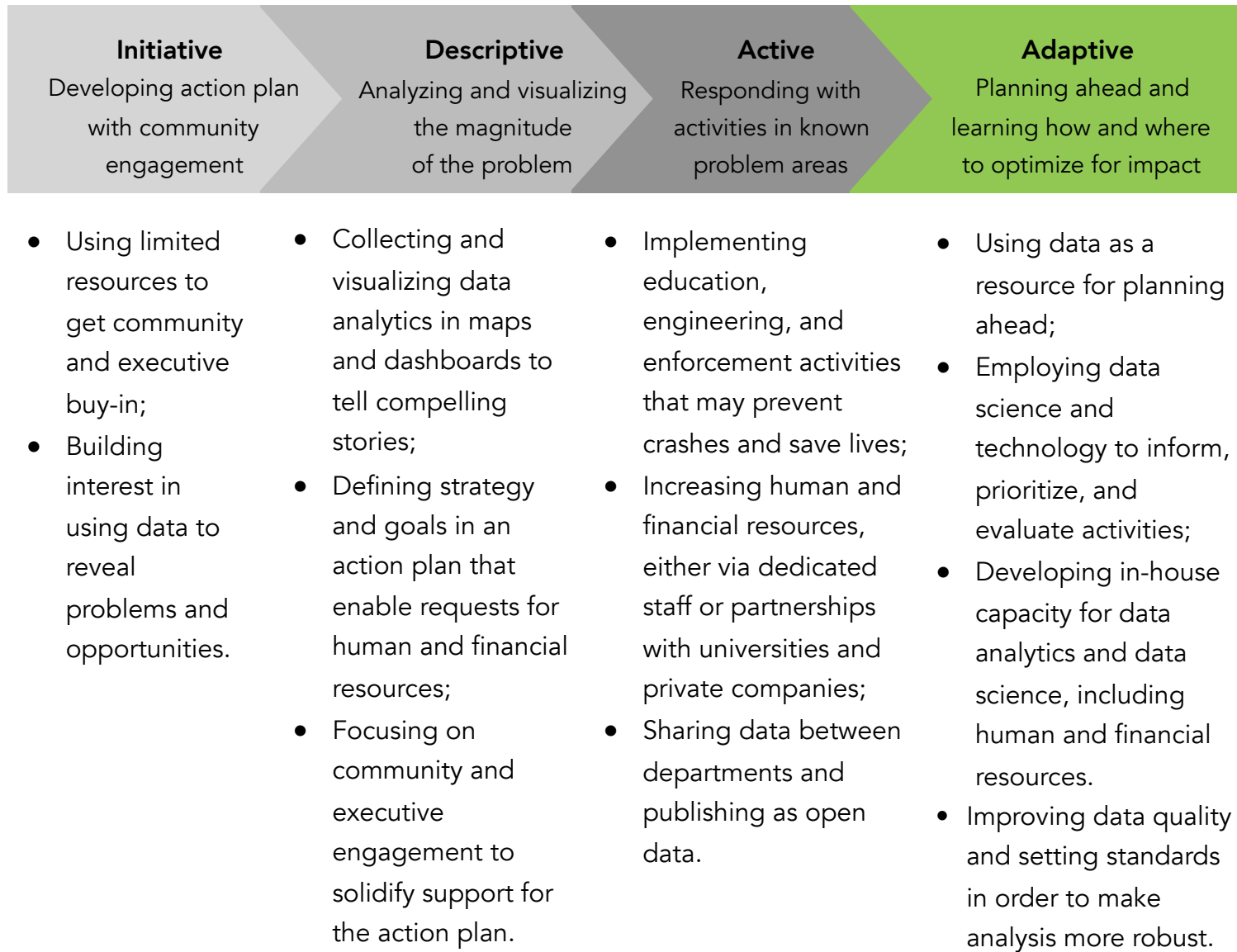
The Smart City Evolution is intended to be a roadmap, providing strategies that clarify the path for all to zero traffic deaths. It will help Vision Zero municipalities chose a course of action best suited to local circumstances and based on its potential for the greatest impact; effectively and efficiently deploy their resources in education, engineering, and enforcement activities (the “three E’s”); and quantify how many crashes and deaths are avoided.

The four stages of the Smart City Evolution are:

- 1) **Initiative** Developing action plan with community engagement
- 2) **Descriptive** Analyzing and visualizing the magnitude of the problem
- 3) **Active** Responding with activities in known problem areas
- 4) **Adaptive** Planning ahead and learning how and where to optimize for impact



## An Overview: The Smart City Evolution



## Adaptive

*Planning ahead and learning how and where to optimize for impact*

*"There is excitement for predictive modeling here... people are ready for the next step."*

Municipalities in the Adaptive stage are rare; only 12% of those surveyed are Adaptive. Those in the Adaptive stage use data to inform future decisions and choices, prioritize human and financial resources, and evaluate the impact of their investments.

Adaptive stage places supplement hotspot maps of crashes with data science techniques and tools, including predictive algorithms and machine learning. Using data science, Adaptive places consider and compare interventions and chose a course of action based on its potential for the greatest impact. They bring together data from multiple agencies to address cross-cutting challenges, such as equity.

Adaptive places know whether and what activities are working. Using data science, they can quantify how many crashes and deaths are avoided when they intervene with education, engineering, and enforcement activities. With this knowledge, they are able to effectively and efficiently deploy resources to reduce crashes, balance this with priorities such as equity, and adjust as circumstance change and new issues emerge. Because it may take time to measurably reduce crashes, Adaptive places face the challenge of maintaining focus and human and financial resources for Vision Zero.

### **Strengths of Adaptive places include:**

- Using data as a resource for planning ahead;
- Employing data science and technology to inform, prioritize, and evaluate activities;
- Developing in-house capacity for data analytics and data science, including human and financial resources;
- Improving data quality and setting standards in order to make analysis more robust.

### **Our recommendations for Adaptive places include:**

- Design a sustainable strategy that can accommodate shifts in executive or community buy-in, fluctuating workloads, and emerging issues and crises;
- Contract partners with expertise to build, maintain, or improve data science algorithms to find efficiencies and supply innovative technologies;
- Strategize to share and consume data to and from autonomous vehicles;
- Share experiences with places in earlier stages of the Smart City Evolution to assist others in making the case for data science capabilities.



## Active

*Responding with activities in known problem areas*

*"I don't want to wait until something happens to react to it. I want to be proactive."*

Active places are the most common; more than one-third (36%) of those surveyed are in the Active stage. Active places are implementing a number of education, engineering, and enforcement activities simultaneously. In the Active stage, there is executive and community buy-in and oftentimes collaboration with universities and private companies to augment data analytics and technological capabilities.

Active stage places use maps and dashboards to locate crashes and display historical data across multiple departments including: transportation, police, fire, and emergency management. They are monitoring trends to determine whether traffic crashes are going up or down in the aggregate. Unlike Adaptive stage places, Active places are not using data science and consequently find it challenging to evaluate their impact, separate from other intervening factors (e.g., inclement weather), on reducing crashes and fatalities.

### **Strengths of Active stage places include:**

- Implementing education, engineering, and enforcement activities that may prevent crashes and save lives;
- Increasing human and financial resources, either via dedicated staff or partnerships with universities and private companies;
- Sharing data between departments and publishing as open data.

### **To become Adaptive, Active stage places might:**

- Use technology to automate manual, time-consuming data analytics that divert staff time away from strategic planning;
- Source data science techniques from places in the later stages of the Smart City Evolution or expert partners;
- Strategize to share and consume data to and from autonomous vehicles;
- Demonstrate impact and solidify executive and community buy-in to evolve from Active to Adaptive stage within six months.



## Descriptive

*Analyzing and visualizing the magnitude of the problem*

*"If it's really hard to put [the data] together, it's really hard to make those decisions."*

Nearly a third (28%) of municipalities interviewed are in the Descriptive stage. Descriptive stage places are collecting data and may be using maps to visualize crashes. They use descriptive data analytics and dashboards to display the state of affairs, formalize action plan commitments, and request a budget for financial and human resources.

Descriptive places, unlike Active places, are not yet using their data to drive decisions about where and when they will intervene. Most often education, engineering, and enforcement activities are selected based on political priorities, the loudest voice at meetings, or anecdotes. With an ad hoc approach, it may be challenging for Descriptive stage places to make a large and measurable effect on reducing crashes and fatalities.

### **Strengths of Descriptive stage places include:**

- Collecting and visualizing data analytics in maps and dashboards to tell compelling stories;
- Defining strategy and goals in an action plan that enables requests for human and financial resources;
- Focusing on community and executive engagement to solidify support for the action plan.

### **To become Active, Descriptive stage places might:**

- Identify and work towards useful performance metrics sourced from those in the later stages of the Smart City Evolution;
- Show the costs and return on investment of comparably sized and resourced places in later stages of the Smart City Evolution;
- Frontload planning with goals and milestones to evolve from Descriptive to Adaptive stage within two years.



## Initiative

*Developing action plan with community engagement*

*"We have so much data in this city and so much of it is manually maintained or hard to get at."*

Of the municipalities interviewed, about one-quarter (24%) are in the Initiative stage. Municipalities contemplating a commitment to Vision Zero also likely fall into this category. Initiative places focus on building community and executive buy-in. They are most often in the process of identifying financial, human capital, and data resources to support their Vision Zero efforts.

Municipalities in the Initiative stage focus on a variety of community engagement and planning activities including: drafting an action plan, hosting meetings with community stakeholders, marketing and communications, and building connections across departments. With what limited human and financial resources that exist, Vision Zero advocates in Initiative places are working to get data to describe and visualize the magnitude of traffic crashes.

### **Strengths of Initiative stage places include:**

- Using limited resources to get community and executive buy-in;
- Building interest in using data to reveal problems and opportunities.

### **To become Descriptive, Initiative stage places might:**

- Engage executives, community, and agencies with examples of comparably sized and resourced places in later stages of the Smart City Evolution;
- Structure and format data according to best practices of places in later stages of the Smart City Evolution for analysis, visualization, and publication;
- Frontload planning with goals and milestones to evolve from Initiative to Adaptive within three years.

## **About Open Data Nation ([opendatanation.com](http://opendatanation.com))**

Open Data Nation (ODN) uses urban administrative data to reveal leading indicators of risk and plan for safety. ODN's award winning machine learning platform delivers business intelligence to save lives, reduce business risk, and improve financial efficiency.

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