

# ALBUQUERQUE SMART CITY

CREATING SMART COMMUNITIES BY COMBINING THE LATEST  
SMART TECHNOLOGIES WITH INNOVATIVE SOLUTIONS

PROSPECTUS PRESENTATION

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# LET'S GO SOMEWHERE BOLD

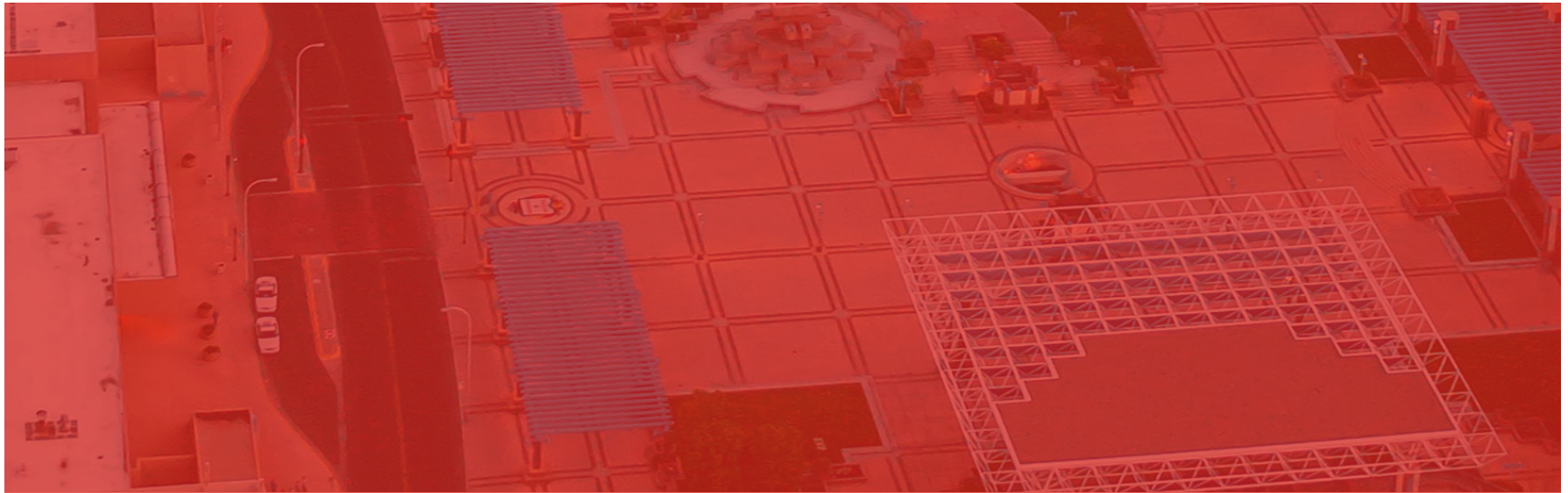
## WELCOME TO ALBUQUERQUE!

Albuquerque has long been a source of innovation. Looking back at our past successes, we can proudly say the first clean room was developed here. Microsoft was created here. One of the first 10,000 websites in the world was created here. Central New Mexico Community College, University of New Mexico, Sandia National Laboratories, Air Force Research Labs, and Los Alamos National Laboratory are continuing this tradition of innovation. From ideation to conception to development, we accomplish much with fewer resources than others.

Our achievable goal is to be a Smart City hub for the nation and the world.

At the City of Albuquerque, we don't use technology for technology's sake. We're not gathering data just because we can. Instead, we're looking at real world problems and opportunities that can be overcome or realized to positively impact the lives of residents and visitors. We do this by combining people, technology, and data in an innovative and responsible way.





Smart City development should be about looking at solution sets. We aren't looking for an answer to a single problem, but rather how can we reuse proven ideas and components and re-apply them to different scenarios?

At the same time, we want to be cognizant of concerns, e.g. privacy and equality, that these technologies raise. We want to create something that will help us feel more secure without also making us fearful. We're taking a holistic viewpoint as we continue to develop solution sets for our Smart City initiatives. Albuquerque, the 32nd largest city in the United States, is already a reflection of what the rest

of the country will look like in the future in regards to demographics. Albuquerque is a mix of old and new, from 300-year-old buildings to brand new. We know that we face real challenges and that others face the same challenges across the globe.

We're using Smart City technology to prepare us for the challenges of the present and the future. Our Proving Labs – controlled, real-world environments – allow us to safely test and experiment with the aim of answering these questions and many more.

*Brian Osterloh* | **DIRECTOR**

# SMART SOLUTIONS

## TAKING THE HYPE OUT OF THE HYPOTHESIS

If a trash truck can become a multi-data sensor that can monitor street issues (e.g. potholes, abandoned vehicles), then the same sensors can be placed on a drone to obtain the same data during an emergency situation. Data collection should lead to decision automation as well as problem pre-emption.

We're working on solutions that can be applied to multiple problems by blending people, technology, and data to bring value to our vibrant, diverse community. This creates greater value than fixing individual problems.



DARING



# SMART PARKING

## PROBLEM

- Obtain real-time information on parking lot status, e.g. open bays.



## SOLUTION

Monitor bays, leading to:

- Better availability information
- Better enforcement:
  - Monitoring duration/time vehicles have been in a particular spot
  - Detecting double-parked cars
  - Alert suspicious activity or vandalism



## RESULT

- Parking lot safety and efficiency increases.



# SMART LIGHTING

## PROBLEM

- Effectively direct groups during an emergency.



## SOLUTION

- Smart Node-equipped street lights programmed to light in sequence toward an exit, providing a clear and easy path for people to follow.



## RESULT

- In situations where panic may take over, (e.g. security threat at a sporting event), easily communicated directions may save lives.
- May also allow more efficient parking before the start of an event.



# SMART CROSSWALKS

## PROBLEM

- Identify unsafe situations, e.g. trips and falls, in the crosswalk area.
- Keep pedestrians using crosswalks safe from vehicles and improve Albuquerque's high pedestrian fatality rate.



## SOLUTION

- Alert traffic that an unsafe situation (e.g. vehicle at high speed pedestrian in crosswalk) exists.
- Heat map analysis of pedestrian crossing behaviors near crosswalks (e.g. using the crosswalk, jaywalking) to identify design potential improvements.



## RESULT

- Enforcement actions use real data to make crosswalks safer with specific improvements at individual sites (e.g. unique visibility or mobility concerns at particular crosswalks).



# SMART SOUND DETECTION

## PROBLEM

- Reduce record homicide rate in New Mexico (63% of which involve guns) by quickly informing the public or APD of a local dangerous event e.g. a gunshot.
- Improve quality of data by accurately associating reports with calls. This provides a better understanding of when and where incidents take place.



## SOLUTION

- Automatically detect events e.g. a gunshot which then allows Real Time Crime Center to take further action:
- Automated dispatch of officers:
  - Improved environmental response. Smart Node-equipped street lights used by RTCC provide changes to area brightness that meets the needs of the tactical situation. Other options include flashing, strobing, or other visual cues in order to alert nearby civilians.



## RESULT

- By monitoring data, we are able to discover trends of areas with higher than average incidents and implement preventative action.





# NOT JUST DREAMING, DOING

## TESTING THE LATEST TECHNOLOGIES WITH REAL-WORD SCENARIOS

The Proving Grounds includes Pino Yards and the Camera Lab at 4th and Marquette. These locations provide the opportunity to put various smart technologies, both hardware and software, to a real-word test.

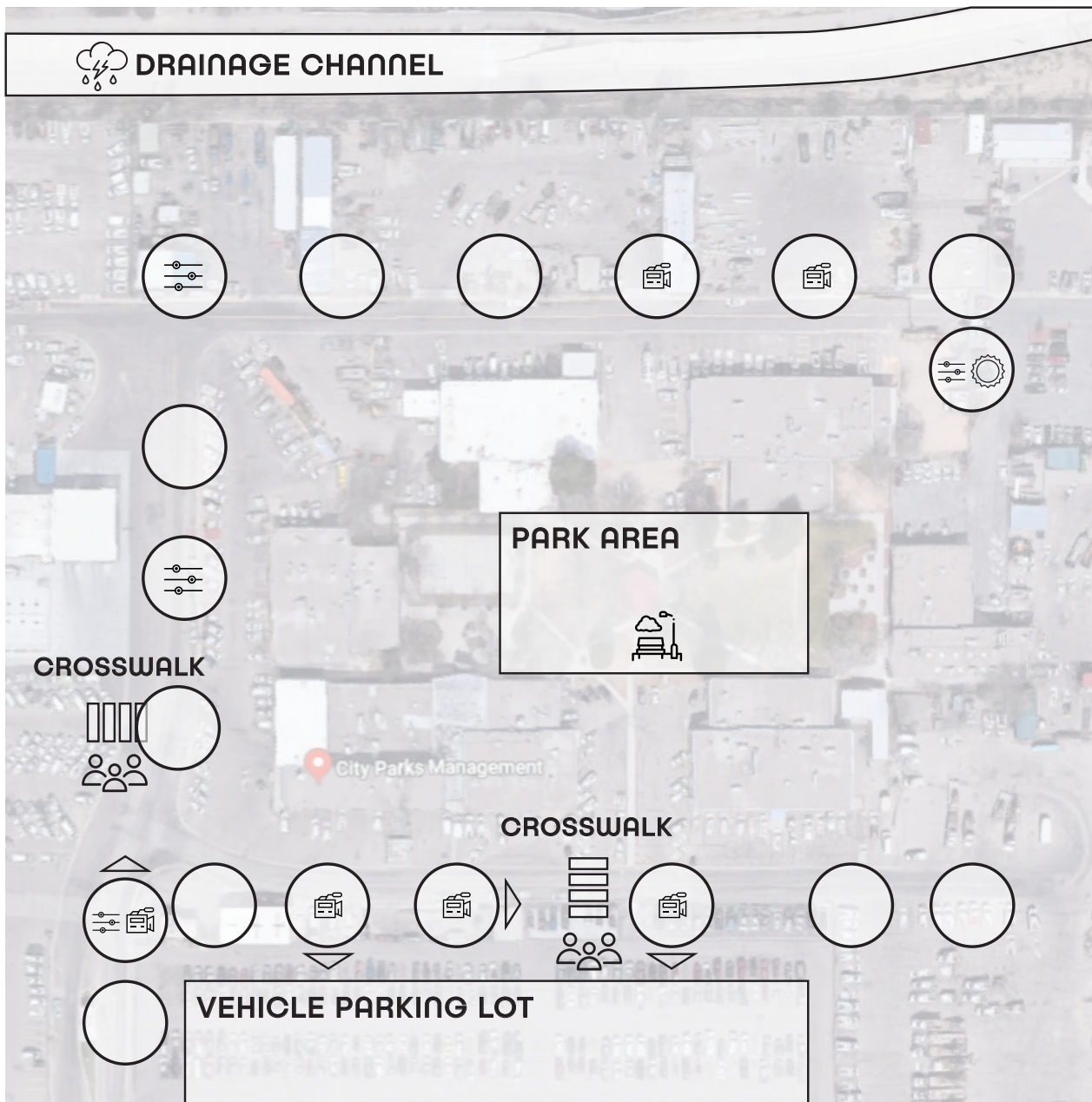
These locations are working, living environments with a varied urban framework covering a large area. Outside contractors and collaborators can perform tests and demonstrations of various hardware and software.



# PROGRESSIVE



**DRAINAGE CHANNEL**



# SMART COMMUNITIES PROVING LABS

## PINO YARDS SITE



### SMART SPOT PARK

Provides improved smart coverage of a large area.



### PEDESTRIAN & VEHICLE BEHAVIOR

Key points, like crosswalks, provide pedestrian and vehicle patterns.



### FLOOD ALERTS

Smart devices placed at key arroyo overlook spots automatically detect the height and flow of water and then alert the public.



#### SMART LIGHTING

Placed on light poles and are remotely controlled with full brightness options.



#### CAMERAS

Provides data on pedestrian and vehicle patterns and interactions at crosswalks, and parking lot data, e.g. available spots and security alerts.



#### ENVIRONMENTAL SENSOR

A multi-input sensor that gathers environmental conditions, eg. air quality and temperature.



#### SOLAR LIGHT

Provides battery power to smart devices like smart lighting.

# THE TECHNOLOGIES

## CUTTING EDGE INNOVATIONS GETTING IT DONE

Incredible new technologies for Smart Cities are available now, and more are on the way. Technologies (e.g. smart lighting, cameras) are at their best when combined with other hardware and software components. On its own, smart lighting can help monitor light outages and intelligently regulate brightness to save power.

Paired with hardware and software, e.g. gunshot detection, the impact can be even greater because an alert from the gunshot detection system could automatically notify police of shots fired, and the smart lighting could illuminate the scene.



# INNOVATIVE



# SMART LIGHTING



TRL 3: PILOT PRODUCTION



NEXT LEVEL: Q1 2020

TRL (TECHNICAL READINESS LEVEL)

- Remotely controlled with full brightness options.
- Used for event-specific lighting and outage reports.



# RESOLUTE



# ENVIRONMENTAL SENSOR



TRL2: LABORATORY PROOF OF CONCEPT



NEXT LEVEL: Q2 2020

- A multi-input sensor that gathers environmental conditions, e.g. air quality and temperature.
- Placed at various locations and elevations, location-specific data is gathered.



# RESOLUTE

# PARKING LOT CAMERA



TRL2: LABORATORY PROOF OF CONCEPT



NEXT LEVEL: Q2 2020

- Used in conjunction with AI, these cameras provide data, e.g. available spots, security alerts, and more.



# RESOLUTE

# GUNSHOT DETECTION



TRL3: PILOT PRODUCTION



NEXT LEVEL: Q2 2020

- Placed on light poles or other public fixtures, these sensors provide automatic alerts when loud sounds are detected.
- Detecting other acoustic signatures, e.g. screeching tires, may be possible.



# RESOLUTE

# THE INITIATIVES

PUTTING IT ALL TOGETHER WITH REAL RESULTS

Combining smart hardware and software into smart solutions creates real-world improvements in economic development, public safety, and environmental health.



## PUBLIC SAFETY

In addition to providing alerts (e.g. gunshot detection or trip and fall incidents), smart spots can gather usage data at key public points, e.g. crosswalks or parks. We can monitor pedestrian and vehicle patterns to predict yield rates at intersections and crash rates. Crosswalks that frequently have crashes or other incidents can get extra on-site monitoring, e.g. enforcement action or design changes. Other enhancements to the design of the crosswalk itself, e.g. flashing lighting or special paint, can be deployed and evaluated to see if they have an impact on the overall safety of the crosswalk.



## ECONOMIC DEVELOPMENT

With the famous Kirtland Air Force Base and Sunport, many Albuquerque residents likely assume much of our cargo distribution is by air. Instead, about 90% of goods, materials, and products sold in Albuquerque stores are trucked here. With smart transport and connected access, we can make it easier for goods created or received here to be distributed via self-driving train or truck. We can become a hub for both production and distribution of goods - made easier by smart and connected technologies.

We can attract companies to Albuquerque with Smart City technology. By adding smart transport to the more than 250 acres of undeveloped land near the airport, we can make air cargo a feasible and attractive opportunity for companies.



## ENVIRONMENTAL HEALTH

A large part of the appeal of Smart City technology is actionable data. By placing environmental sensors throughout Albuquerque, for example, we can get an ongoing, real-world understanding of criteria, e.g. pollutants. This can let us run comparative data and test other technologies. For example, is the net air quality better at bus stops when using electric buses or diesel buses?

# PERSEVERING



# SMART SPOT

MULTIPLE TECHNOLOGIES WORKING TOGETHER



TRL1: TECHNOLOGY IDENTIFICATION



NEXT LEVEL: Q1 2020

Turn any location - fixed or mobile - into a connected, intelligent spot that provides real-time feedback and interaction to create an involved feedback loop between Albuquerque and its residents. This can be used at various places, e.g. the Balloon Fiesta Park, bus stops, Albuquerque parks, and mobile crime labs.

As an example: a bus stop shelter could be equipped with cameras, smart lighting, WiFi, and speakers. If the RTCC receives an alert or report, they can alter that location's lighting or warning sounds to the shelter loudspeakers.



# VISIONARY

# SMART TRASH TRUCK



TRL1: TECHNOLOGY IDENTIFICATION



NEXT LEVEL: Q1 2020

- Almost every street in Albuquerque is traversed by a trash truck once a week.
- Smart cameras, sensors, and connectivity attached to trash trucks automatically spot and report problems, e.g. potholes or disabled street lights.



# FORWARD

# DRONE

🕒 TRL2: LABORATORY PROOF OF CONCEPT    ⌚ NEXT LEVEL: Q2 2020

- Adding smart cameras and environmental sensors to a drone during an emergency where streets are not accessible allows emergency managers to assess damage by using Artificial Intelligence (AI) to compare images taken before and after the event.
- The tree canopy conditions are monitored and reported.
- Drones are able to conduct safer and more efficient roof inspections.



# FORWARD

# SMART CITY PARK



TRL2: LABORATORY PROOF OF CONCEPT



NEXT LEVEL: Q2 2020

- Improve safety and communication access in the 280 parks in Albuquerque.
- Multiple Smart Spots can be deployed at various locations throughout a park to provide improved smart coverage of a large area, e.g. the Balloon Fiesta Park. This may include improved WiFi coverage.



# FORWARD



# SMART BUS STOP



TRL1: TECHNOLOGY IDENTIFICATION



NEXT LEVEL: Q1 2020

- Smart lighting, gunshot detection, cameras, and WiFi on bus shelters allows police to be notified when an acoustic signature matching a crash or other loud noise is detected.



# FORWARD

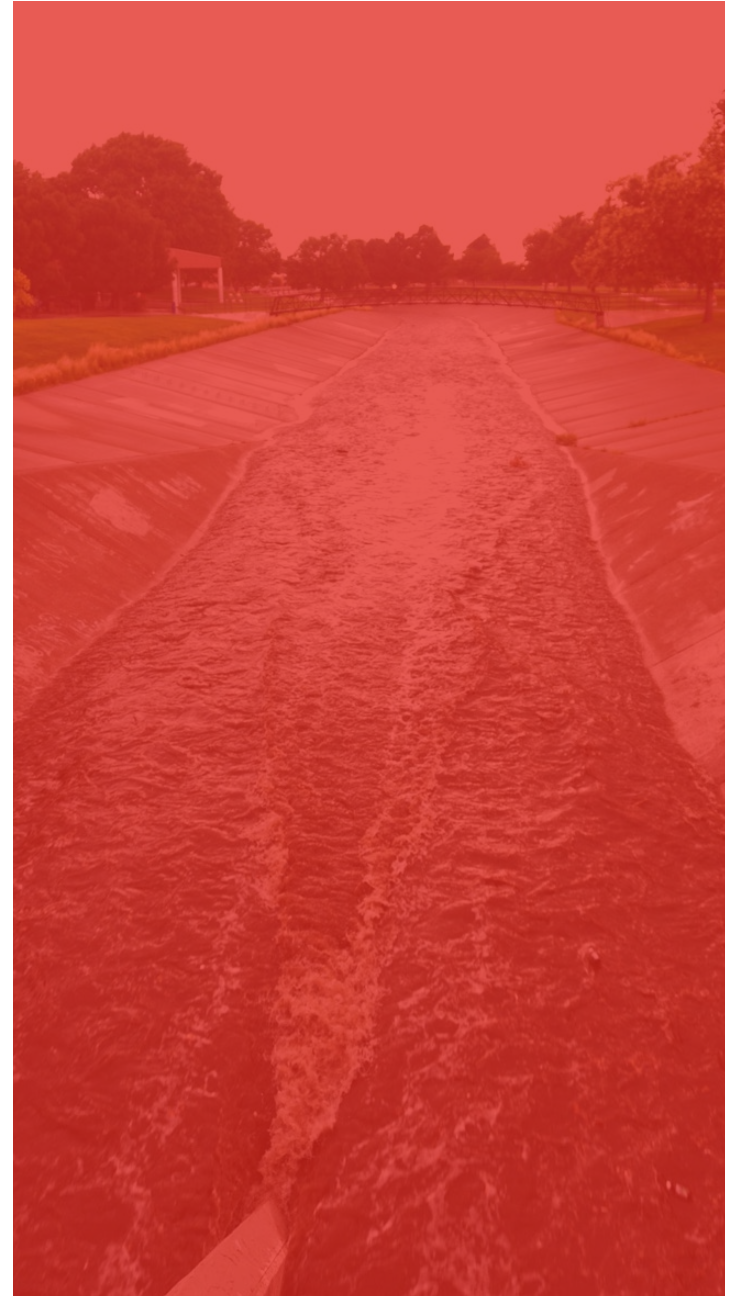
# SAFETY & MOBILITY

USING TECHNOLOGY TO CREATE A SAFER, MORE  
MOBILE, MORE ENJOYABLE CITY EXPERIENCE

The goal of Smart City initiatives is not just to produce data, but to improve safety, communication, and mobility. By adding Smart City technology to key points in Albuquerque, we can use trash cans, bus stops, or crosswalks to identify ongoing issues or opportunities in a better, automated, and intelligent way.

Equipping crosswalks with Smart City technology to capture pedestrian and vehicle activity can help us identify particular locations that might have a higher crash rate. They can also provide insight into what alternatives (e.g. flashing lights) may successfully improve the safety of a crosswalk. Providing connected vehicles with signal light data, could let the driver choose to avoid red lights by reducing speed.

Our goal is not only to use this technology exclusively to enforce, but rather to help the decision-making process to create a safer, more mobile, and more enjoyable experience in Albuquerque.



# AMBITIOUS

# PEDESTRIAN & VEHICLE BEHAVIOR



TRL1: TECHNOLOGY IDENTIFICATION



NEXT LEVEL: Q1 2020

- Key points, e.g. crosswalks and bus stops, provide pedestrian and vehicle patterns.
- Where are crosswalks best being used? Which have the most incidents?
- We can answer these kinds of questions and make informed decisions with this kind of data.



# ADVENTUROUS

# CRASH ALERTS



TRL1: TECHNOLOGY IDENTIFICATION



NEXT LEVEL: Q1 2020

- Crosswalks, lights, and other points are equipped to detect acoustic signatures like squealing tires or crashes.
- Identification of high incident areas, fault type, and other actionable data, allowing resources to be deployed more effectively.



# ADVENTUROUS



# FLOOD ALERTS



TRL1: TECHNOLOGY IDENTIFICATION



NEXT LEVEL: Q1 2020

- Drowning is the second leading cause of accidental death in New Mexico for ages 1 to 44 years old. Each year over 8,000 people drown in this country. Nearly 4,000 of these drownings occur during the summer months of June, July, and August.
- Smart devices placed at key arroyo overlook spots automatically detect the height and flow of water and then alert the public.
- Smart devices can employ AI algorithms to identify potential people in the water who may require assistance.

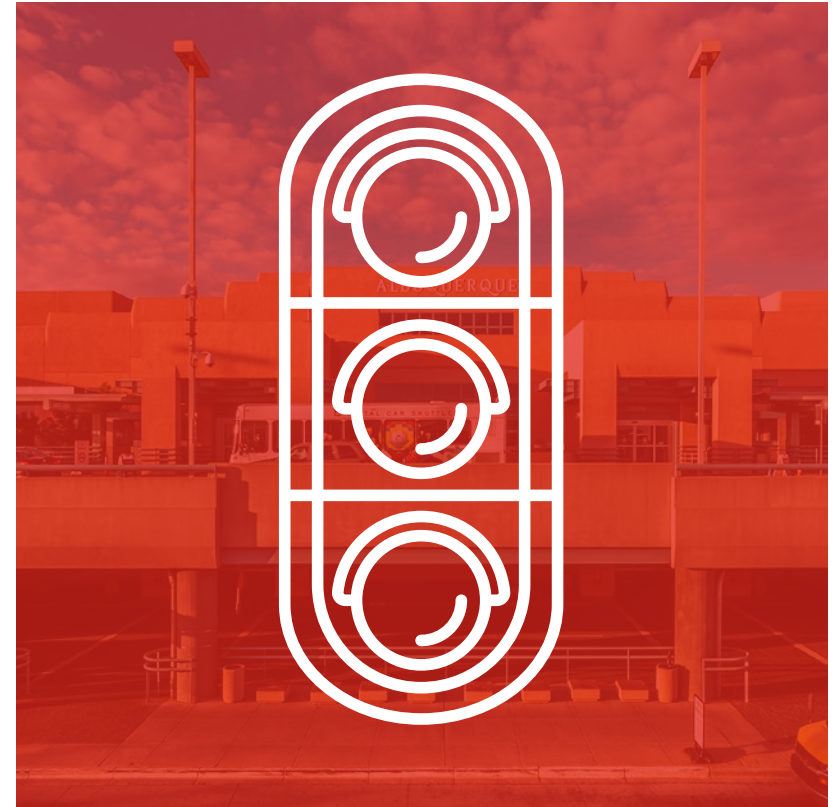


# INNOVATIVE

# TRAFFIC SIGNAL PRIORITIZATION

🕒 TRL2: LABORATORY PROOF OF CONCEPT    ⌚ NEXT LEVEL: Q2 2020

- By understanding traffic flow more accurately, traffic light timing is improved to provide a smoother and more efficient driving experience.
- Other potentials, e.g. altering signal lights for emergency vehicles, is also another safety-impacting opportunity.



# INNOVATIVE

# CONNECTED VEHICLES



TRL2: LABORATORY PROOF OF CONCEPT

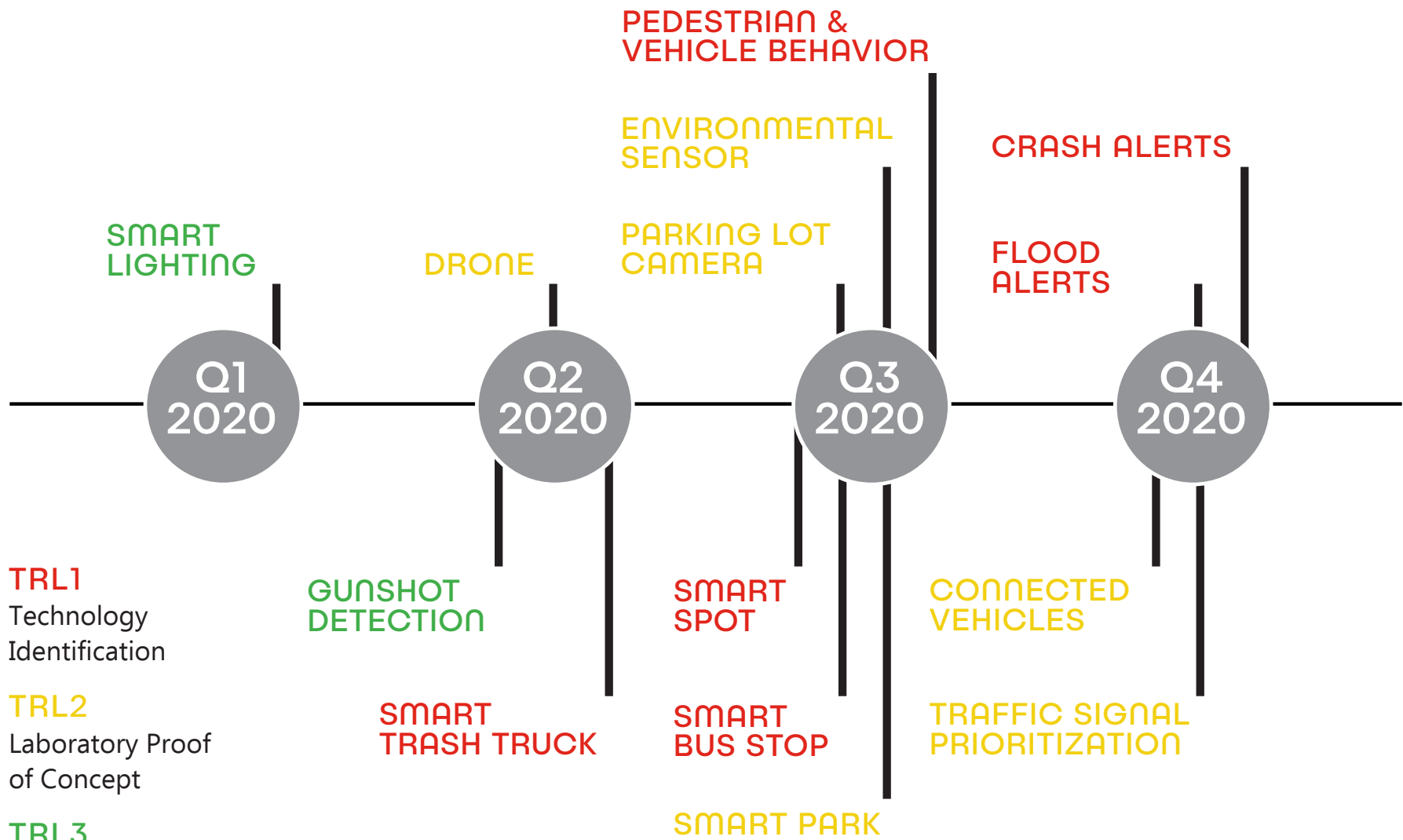


NEXT LEVEL: Q2 2020

- Equipped vehicles receive alerts for traffic light timing, emergency vehicle presence, traffic slowdowns, etc.
- This leads to a more pleasant driving experience and, potentially, greater vehicle efficiency.



# INNOVATIVE



**TRL1**  
Technology  
Identification

**TRL2**  
Laboratory Proof  
of Concept

**TRL3**  
Pilot Production

**TRL4**  
Production

**TRL5**  
Sunset

### TECHNICAL READINESS LEVEL (TRL)

This chart shows the current anticipated time that the specified technology will complete its current stage of implementation and proceed to the next.

# SMART ECOSYSTEM

**WORKING CLOSELY WITH CNM, UNM,  
& PRIVATE SECTOR FOR TESTING**

To prepare for the Smart City revolution, we need to make sure that there are enough trained technicians and data analysts who understand how to build, deploy, use smart technology across cities. We are working with our local education partners to make Albuquerque the learning center for Smart Cities.

## HIGHLIGHTS

- Partnering with Deep Dive Coders IOT Bootcamp (CNM Ingenuity, Inc., "Deep Dive Coding Bootcamps", 2018, p. <https://deepdivecoding.com/>)
- Working with UNM, CNM and other agencies to form a joint Internet of Things (IoT) Committee to collaborate on and share ideas





# TECHNOLOGIES & PARTNERS

PROUDLY PARTNERING WITH THE BEST



## WANT TO JOIN US?

**YOUR LOGO HERE**

Please provide an eps or ai version if available. A high-quality jpg or png is also acceptable.

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