Coachella Valley Regional Mobility Dialogue Series

Results and Summary

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Transportation Planning and Smart Cities:
The Next Steps for the Coachella Valley

Mar 26, 2019

Introduction

Technology is making it easier for everyone and everything to become instantaneously connected. Cities have begun to harness the power of technology through the creation of "Smart Cities" projects. In the realm of transportation, smart cities projects are created with the idea of taking on the challenges of improving mobility and reducing traffic congestion.

This Dialogue looked at the ways Coachella Valley (CV) cities could adopt Smart City concepts in order to address these challenges. The panel of experts provided an in-depth look at the general concept of Smart City initiatives, as well as a look into different initiatives undertaken by municipalities and businesses.

Our guest speakers touched on relevant issues in the technology space as it pertains to how Smart Cities can and have facilitated transportation in various regions such as the Coachella Valley, the Inland Empire and San Diego. The experts invited to speak on this topic included:

- **Sanjiv S. Gupta**, Chairman/Co-Founder of Irepa International
- **Jason Anderson**, President and CEO of Cleantech San Diego
- **Kjeld Lindsted**, Product Manager for NoTraffic

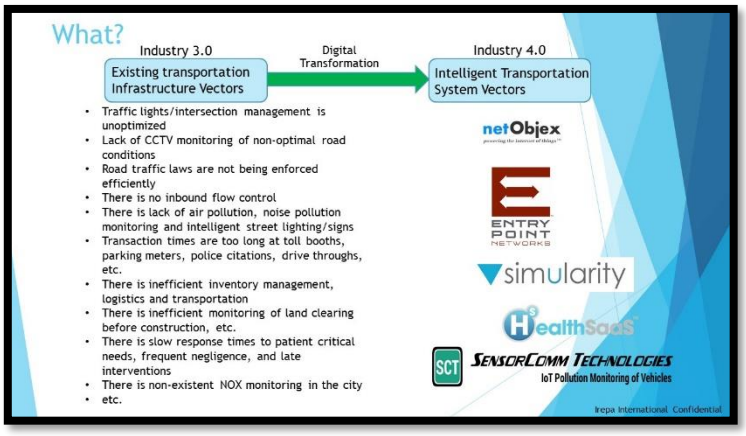
The main takeaways from this Dialogue entailed a discussion on how smart cities can set the stage for the Coachella Valley to be a corridor for sustainable development, through the use of technology such as the internet of things (IoT). New technologies are set to improve both safety and better traffic management during seasonal peaks. We learned how San Diego has developed many advances in the smart cities space including a "Smart Bay." Also discussed were clean and renewable technologies, and the economic impact of climate action plans on the region. Lastly, we looked at smart intersections and their ability to more efficiently manage the flow of traffic to reduce congestion and delay.

Sanjiv S. Gupta – Chairman/Co-Founder, Irepa International

Sanjiv Gupta began with a description of the region as being primarily a resort town–with high levels of tourism, legacy agriculture, wind farms, cultural events, retail, golfing, retirees, casinos, resorts and parks. The challenge of extreme traffic congestion, which large cities with a denser urban population experience, has not yet impacted the Coachella Valley. With the current level of development, the CV has an opportunity to become a technology and innovation corridor without destroying the natural biodiversity.

Mr. Gupta believes that this is the perfect time to transform the Valley by implementing new technologies in the region. "The Valley can be very autonomous, it can be very sustainable without the urban sprawl that you see in all the other counties in California," said Gupta.

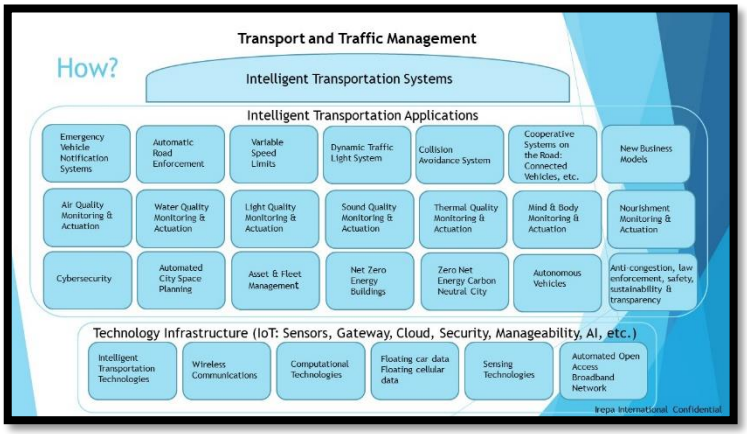
There are also a number of things that can be changed with the digital transformation from the existing infrastructure to the intelligent transportation system (Industry 4.0 or the Fourth Industrial Revolution). With the advancement and popularity of autonomous electric cars, and connected electric cars, there is huge potential to transform. One of the possible solutions is the implementation of smart traffic intersections. “Traffic lights and intersections today are not smart, they're not dynamic. You'll be sitting at a traffic light near the Home Depot off of 111 forever,” said Gupta. With IoT, we can monitor whether conditions for a faster response to make corrective actions is possible. All updates and management of the IoT devices can be done remotely–reducing time and money spent on fixing problems.



Gupta also discussed road traffic laws and enforcement. Our roads today are filled with distracted drivers on cell phones and aggressive drivers. Gupta states that there should be technology implemented to deter such behavior with the right corrective actions. “So road traffic laws need to be enforced using those cameras. They are doing this in Oregon already. In Portland, Oregon, if you run a red, you will see a ticket in your mailbox and you better pay that,” said Gupta.

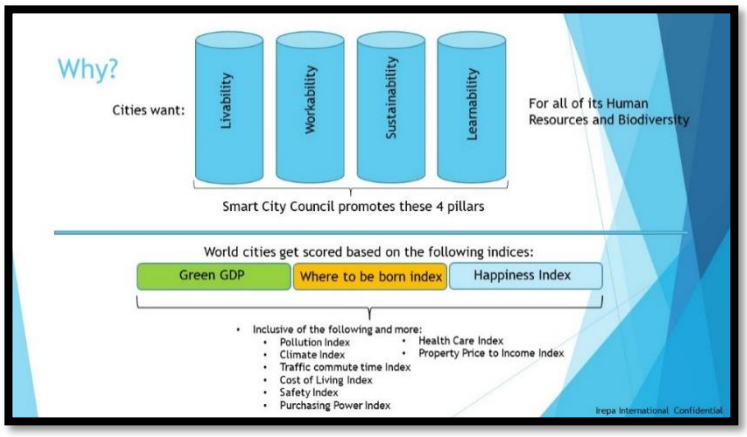
Gupta also talked about inbound flow control. Given the popularity of seasonal events in the region, there may not be adequate infrastructure to accommodate the influx of people and cars, resulting in gridlocked intersections and neighborhoods. This also brings pollution, namely air pollution and noise pollution have an impact on human well-being, both physical and mental health. Intelligent street lighting and signs as well as smart parking can help combat this problem.

Today, we are still experiencing long transaction times for simple things like toll booths and police citations. Gupta proposes a more efficient approach by way of digital tokens to better facilitate these processes. Gupta also touched on efficient transportation in the logistics industry saying, “fleet management, asset management, the integrity of the products that you're sending, making sure they don’t spoil, all of that needs to be done with internet of things (IoT).”

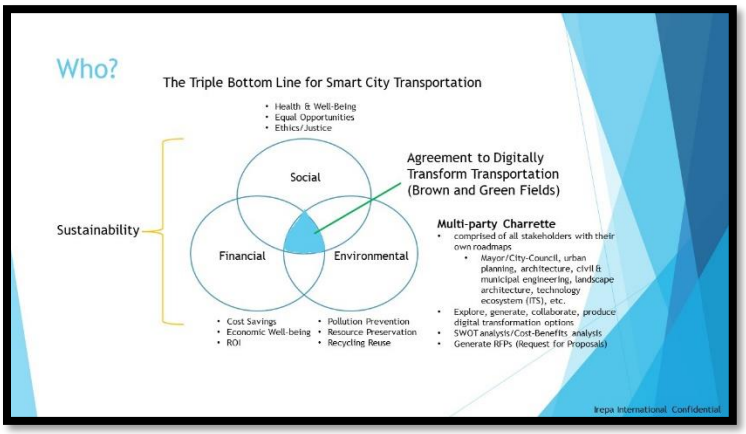


The four pillars to a smart city council are:

- Livability
- Workability
- Learnability
- Sustainability



These four pillars provide a metric to evaluate various indices. For example, a green GDP is important. "You can have a great GDP, but only after destroying the entire environment. This is a great GDP, but it's not a green GDP," said Gupta. "Green GDP is where you do produce a lot of goods and services, however, you do it without destroying the environment."

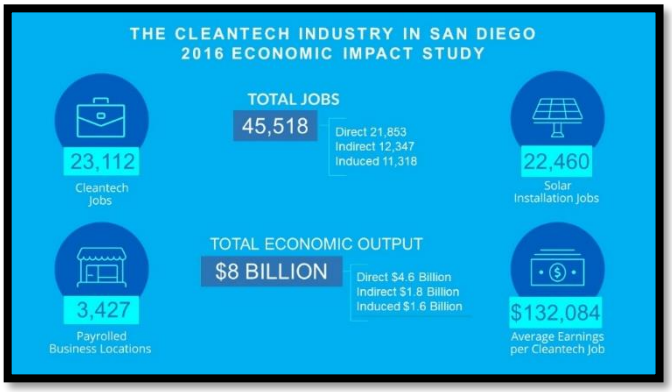


This is a concerted effort that needs to be made by all the cities in the region as well as technology leaders. Gupta believes the call to action is now. "We're in a perfect storm here, we have a great opportunity to make change now. So the key is to assemble the stakeholders, review road maps, perform SWOT (Strengths, weaknesses, opportunities, threats), and a cost benefit analysis," said Gupta.

<u>Jason Anderson, President/CEO, Cleantech San Diego</u>

Jason Anderson started by giving a brief history of Cleantech San Diego. It was started about 12 years ago as a renewable energy trade association. The purpose was to create an economic development organization focused on technology development and deployment of renewable energy and clean technology in San Diego. As California moves towards renewable energy and cleaning up the environment, it has been a great opportunity to really grow San Diego using smart city technologies. Over 100 businesses, universities, governments and NGO's collaborated to work with Cleantech San Diego to achieve more sustainable development for both the economy and the environment.

Some private sector members include: AT&T; Black & Veatch; Cisco; Bank of America; Qualcomm; ENGIE; Nuvve; Avangrid Renewables; Solar Turbines; Current powered by GE; Measurable; Primo Wind; Baker Electric Home Energy; EDF Renewable Energy; and Itron. The public sector members and academic institutions include: the City of San Diego; San Diego International Airport; Port of San Diego; City of Chula Vista; City of Carlsbad; San Diego Gas & Electric (SDG&E); Helix Water District; the Metropolitan Water District; UC San Diego; Scripps Institution of Oceanography; CSU San Marcos; and the University of San Diego. The clean tech space has grown drastically and the impacts on the economy are significant.



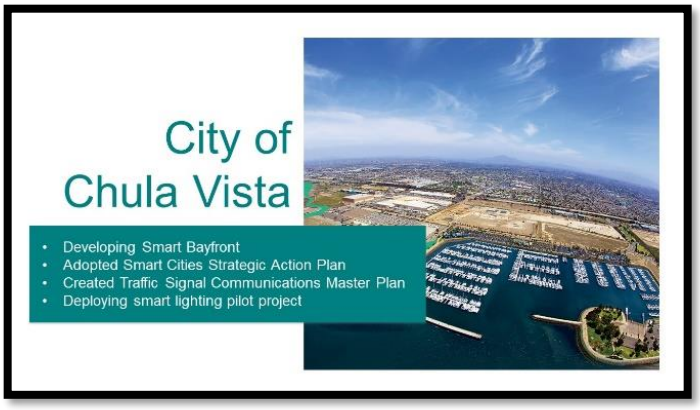
The 2016 Economic Impact Study on the Cleantech Industry in San Diego shows that there are a total of 45,518 jobs in the industry with 21,853 directly attributed to Cleantech, an additional 12,347 indirectly, and 11,318 induced jobs. Meanwhile, there is a total economic output of $8 billion with $4.6 billion directly, $1.8 billion indirectly, and $1.6 billion induced.

Anderson stated that there are nine San Diego cities that have adopted Climate Action Plans, which is very significant from both an environmental perspective as well as an economic perspective. There is a constant monitoring of the progress of the Climate Action Plans in conjunction with the annual report to gauge the progress and impact they have on the region. From a renewable energy generation perspective, 45% of the local energy is sourced from renewables, mainly due to SDG&E Sunrise Powerlink that connects San Diego and Imperial County. In addition, as more cities adapt Climate Action Plans and renewable energy goals, solar installations have begun to rise. Solar installations play a significant role, to which San Diego ranks number two in the country in the quantity of solar installations.

In the advanced transportation space, there is a concentrated focus on electric vehicles. According to Anderson, there are about 32,000 electric vehicles in the San Diego region with about 1,600 public charging stations. SDG&E, through its "Power Your Drive Program", is building out infrastructure for public charging to support the increased growth of electric vehicles.

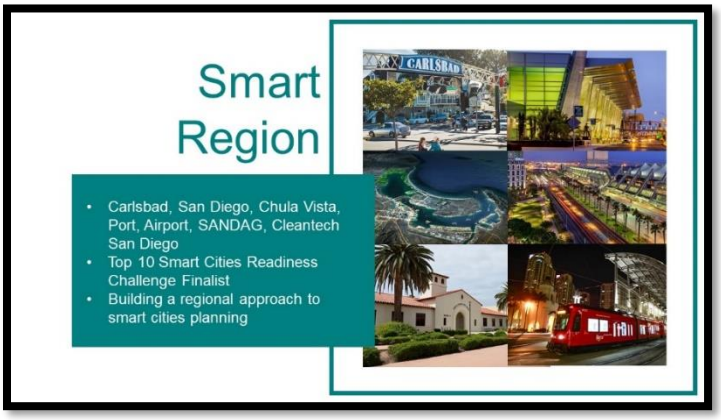
The city of Chula Vista has become a testing ground for autonomous vehicles and drones. The San Diego Association of Governments (SANDAG) and Caltrans are working together to build this research park. An important component to all of this is energy storage. As Anderson states, “you can generate all the renewable energy in the world but if you can’t store it, sometimes it means nothing. We've seen that quite often but, again from a regional perspective, and from a state perspective, [we are] very focused on building the energy storage into our grid. So we've got the world's second largest battery storage facility.” Currently there are 814 energy storage projects installed with a total of 21MW in San Diego County.

Smart Cities San Diego started with the goal of building out the infrastructure to support electric vehicles. “We are working now with public, private, and academic organizations to really advance our smart cities deployment in our region” said Anderson. The focus has been on greenhouse gas emissions and economic development, but given the advancement in technology, there has been an added focus on tying in IoT and equity as it pertains to adopting the climate action plans. The City of San Diego has deployed the world’s largest city-based IoT streetlights platform. General Electric is in the process of installing 4,200 streetlights sensors in the region. Meanwhile the City of Carlsbad is in the process of adopting a smart cities road map, which will be dubbed “Connective Carlsbad.” Finally, in the City of Chula Vista, there is a “Smart Bayfront” project. “They're doing on-site energy generation and distribution, they’ll have autonomous vehicles connected cars—all within the blueprint of this this project,” said Anderson. The City of Chula is also working on a smart lighting project, among other things.



The San Diego airport is another “smart city lighthouse” for the region. They are currently generating a significant amount of electricity on-site on their microgrid, which delivers 80% renewable electricity. The airport also uses water reuse projects, parking guidance, and electric vehicle charging. The Port of San Diego administration building has a smart building pilot that allows them to monitor their energy usage. Some of their current projects include a traffic monitoring system with sensors, a microgrid at 10th Ave Green Terminal, an advanced payment system for events around the port, sustainable freight demonstration projects, and a significant installation of electric vehicle chargers for employees. In addition, SANDAG is working on a smart mobility plan, smart signal strategies, and planning. They are also supporting cities and the development of their climate action plans. “The military just signed an MOU with the city of San Diego to collaborate on researching and installing smart cities technologies” said Anderson. The military is seen as a leader in technology development and deployment in the San Diego County as they are actively developing drone technology, security, and mobility.

"We have identified our priorities, we have identified our guiding principles, we are finalizing our governance structure, and then we will start to move forward on how we want to develop projects while maintaining some autonomy with the cities and SANDAG," said Anderson. Cleantech is focused on maintaining safety, mobility, energy and sustainability. "We have a number of guiding principles, especially around assuring equity, enhancing connectivity in our region and at the same time creating platforms that are open, secure, and private," said Anderson. It is also very important that all this moves forward without the public feeling threatened, in a big brother manner as it relates to privacy concerns. Anderson concluded that there are nearly 30 projects on the books and Cleantech San Diego is currently working to build them out.



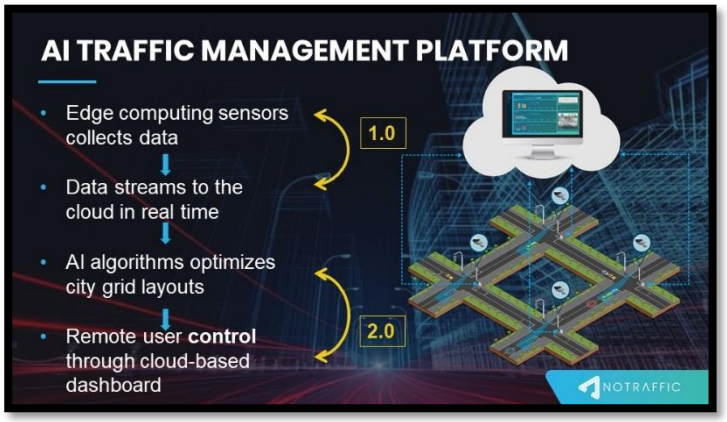
Kjeld Lindsted, Product Manager, NoTraffic

The closing speaker, Kjeld Lindsted currently works with NoTraffic and was the former smart city Program Manager for the city of Redlands. NoTraffic is an Israeli tech startup that is working on traffic management systems.

The Lindsted believes we are moving into the "smart city 2.0" phase. Smart cities is a concept that developed from the private sector where commercial tech experiences from companies, such as online shopping with Amazon, search engines from Google and communication with Apple, have allowed consumers a whole new way of doing things. The shopping/searching/communicating experience is pushing governments to process various procedures such as, giving out licenses and permits with newer technology to increase efficiency. Local governments have been playing catchup, but it has not worked out the way people expected. Smart cities 2.0 concepts have a lot more to do with equity and how to make things fair in terms of access, and transportation.

“Most people when they think of innovation, they think of taking the process in the way it’s existed from the last decade or few decades, whatever the case might be, and somehow digitize it,” said Lindsted. In the City of Redlands when there was a problem, such as a streetlight going out, people were able to report it using the 3-1-1 app and eventually that streetlight was changed, but no one knows how long it will take. People had no insight on the process. Lindsted and his colleagues concluded that they should be very responsive to all the complaints to improve customer service. In addition, they can let the customer know the stage of the process, and when it is fixed.

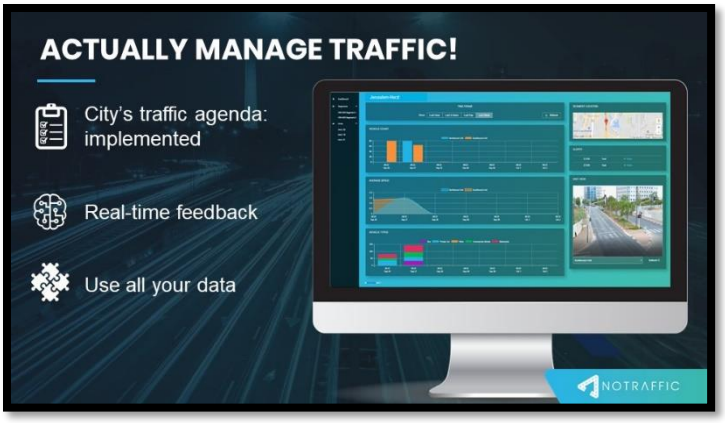
“It is taking the way the process already exists and making it an electronic, a digital version, but we really haven’t changed anything about what that process does for citizens,” said Lindsted. City officials ultimately came to the realization that people simply wanted working streetlights, not necessarily a robust customer service system. Instead, fixing the underlying problem became the better solution. “That is sort of next level innovation. It’s what it would look like if you built it today, it wouldn’t be a really complex process to solve the problem after the fact, and it would be solving the underlying problem initially,” said Lindsted. No Traffic is using that innovative thinking and applying it to traffic management. The goal is to fix the underlying problem, instead of trying to improve an existing output from the problem. Before this new wave of technological advancements, there was a traffic cop that would direct traffic. After this, light bulbs were used with a mechanical dial timer that would be set to go around in a fixed pattern. NoTraffic approaches our infrastructural needs by visualizing what it would look like using today’s technology, for example the kind of technology we have in our cell phones.



NoTraffic’s platform, as Lindsted elaborated, “Is built on installing sensors at traffic signals. Those sensors understand the flow of traffic, and the demand for all the road users. It doesn’t matter if its pedestrians, school buses, or passenger vehicles. And then that data streams to the cloud in real time and that’s where we start to do some interesting things with it.”

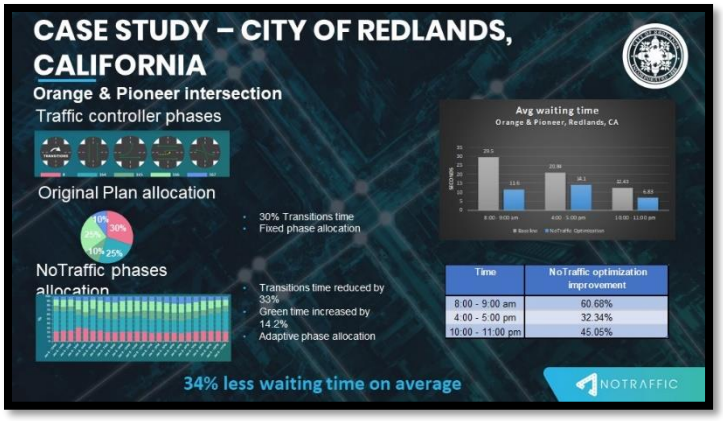
Lindsted added that the next level of the process includes sending the data collected from the sensors to a central space that makes decisions on the overall city traffic grid through artificial intelligence (AI) algorithms. Therefore, the decisions made by the system are based on real time demand. “You have a congestion problem on your particular street, what kinds of policies do you want to run? Are we prioritizing pedestrians? Are we setting up a transit corridor? Are we allowed an emergency vehicle preemption?” said Lindsted. It is now possible to set a series of policies for a city’s traffic signals that can be implemented through connected signaling. This improves decisions making and the traffic flow.

The results seem to be very promising as noted by Lindsted. In the City of Redlands, NoTraffic is running a pilot program and the results are beginning to be noted. At one specific site, there are rush hour peaks with people travelling to and from work. There is also a school nearby, which creates double peaks. There is a rush hour peak and then a school peak. And these peaks, at times, overlap from different directions. So, for at least a short period of time, roughly half an hour, there is extremely heavy traffic congestion in this location.



Prior to implementing the smart traffic signal at this location, there were long turning queues that made it very difficult for the traffic to move efficiently. For example, a left turn signal would turn green and no cars would be able to turn left. This made it impossible for the through traffic on the opposite side to advance. Therefore, at this one particular intersection, the traffic back up would impact the main crossroads. “People were not able to make their turn and would be blocking the through traffic and it was kind of a worst case scenario for a traffic signal,” said Lindsted.

After the smart traffic signal was installed, the system can calculate the demand from all of the users in real time. From there, intelligent decisions are made on how to allocate the right amount of green time most efficiently. According to Lindsted, there was a 60% reduction in delay, which was an equivalent to adding 60% street capacity without having to build any real infrastructure. Lindsted added that, “If you are in the traffic engineering space, 34% less average waiting time, meaning time that you as an individual spend waiting at that signal reduced by more than a third, that's a big deal.”



Again, having a proper understanding of the underlying problem can significantly increase the chances of delivering the right solutions to effectively resolve resident’s concerns. Lastly, Lindsted believes that this process has brought the smart city movement full circle and delivers on the promises made by experts and pundits alike. It shows the public why we should continue to invest in the smart city space.

Moving the Dialogue Forward: Ideas from the Participants

After the presentations, Dialogue attendees discussed the ideas presented and worked together in groups to find solutions to move the issue forward. The top ideas from each table have been categorized and summarized below.

Work together to implement smart city concepts. A number of participants discussed the importance of cities working together to implement smart city concepts in the Coachella Valley.

- All nine cities need to work together to implement smart city concepts, there needs to be a better collaborative effort throughout the county.
- Coachella Valley should look at what Redlands and San Diego are currently working on to become progressive smart cities and take the steps necessary for Coachella Valley to become one.
- There needs to be better communication between all nine cities to work together.

Can smart cities help preserve the habitat and culture in the Coachella Valley? Participants expressed concern about the environment in the region, and how smart city concepts might help maintain the local habitat.

- Can these new technological advancements help with the conservation of growth in residences, wildlife and transportation?
- Implement smart city concepts to be sustainable and help species in the Coachella Valley.
- Think about how housing is built out and how we can protect the habitat and local species.

The Leonard Transportation Center (LTC) at California State University San Bernardino (CSUSB), presented a bi-monthly dialogue series on topics relevant to the future of transportation in the Inland Empire. The series, which was open to the public, was sponsored by HNTB Corporation and was held every other month starting in February 2018.

Dialogue topics ranged from understanding the current mobility dilemma and its causes to potential solutions like congestion pricing, transit; emerging technologies such as autonomous and connected vehicles and new ways of funding transportation infrastructure. Attendees had the opportunity to hear from transportation experts and engage in vigorous discussion about the transportation challenges facing the Inland Empire.

About Leonard Transportation Center

The Leonard Transportation Center (LTC) at California State University, San Bernardino opened in 2006 with a focus on regional transportation needs. The vision of Bill and Barbara Leonard was to create a center that focuses on the unique transportation opportunities and challenges the Inland Empire faces. Today, the LTC is working to expand its research and student engagement programs. Focal points include transportation management and governance issues, development of new technologies, and transnational studies. Their vision is to work collaboratively to seek solutions to assist residents, businesses, government and nonprofit agencies, and international partners to work together on improving sustainability and quality of life in the Inland Empire. For more information, visit www.csusb.edu/ltc.