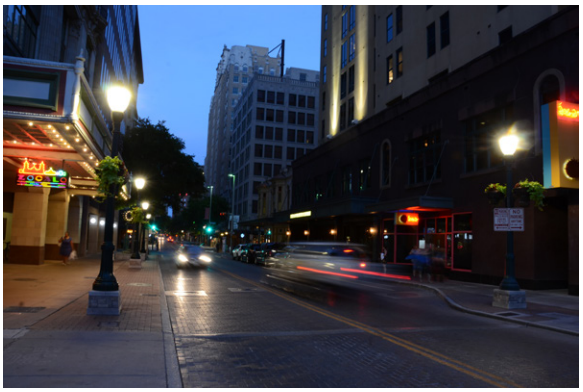
Appendix 05
Smart City Case Study Review



Houston Street at night

Quincy Street looking south at night

San Antonio's Office of Innovation has incubated a number of use cases, currently being considered for deployment in Innovation zones of the City. A detailed critical assessment of each of the eleven (11) cases is provided below.

Feasibility Scoring of 2018-19 Proposed Smart City Use Cases

A review of eleven (11) Downtown Innovation Zone Smart City use cases was conducted as a part of this master planning effort. The Office of Innovation assisted in this analysis by providing further background on the project and its goals. Based on current IoT implementation practice and technology status seen in the marketplace in the 2018 calendar year, a general feasibility rating was assigned to each initiative to represent the practicality of executing the specific innovation in San Antonio at the current time. This rating represents a general appraisal of these use cases and is not intended to be a detailed or high level technical assessment. Outside experts in IoT technologies and related deployments should be engaged for more thorough analysis of these use case proposals.

The Feasibility Ratings overview:

1. A Rating – High feasibility for implementation
2. B Rating – Good feasibility for implementation
3. C Rating – Moderate feasibility for implementation
4. D Rating – Suspect feasibility for implementation
5. F Rating – Low feasibility for implementation

Case Study 01

Parking Sensors/Camera – Downtown Innovation Zone

Deploy parking sensors on City pedestrian lights and/or street lights to utilize smart street and traffic poles.

Feasibility Rating: B

(with deployed remote sensors) C- (On-pole sensing or cameras only)

Comments:

Well established precedents for deployed interactive parking sensor systems in cities throughout North America and Europe. Mid-level technology maturation and good marketplace acceptance in urban centers. Sensor deployment, both within-street and integrated with meters most reliable of available systems. Streetlight poles can serve as data gathering and communication points for deployed remote sensors.

Using pole mounted cameras for parking status detection works best in open parking areas like surface lots, not city centers, where reliability goes down without deployed sensing.

References

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http://sfpark.org/how-it-works/the-sensors/

https://www.accessmagazine.org/fall-2016/cruising-for-parking-lessons-from-san-francisco/

http://sfpark.org/how-it-works/open-data-page/

https://www.good.is/articles/san-francisco-s-real-time-smart-parking-system-is-up-and-running

https://www.researchgate.net/publication/324577458_Detecting_On-Street_Parking_Spaces_in_Smart_Cities_Performance_Evaluation_of_Fixed_and_Mobile_Sensing_Systems

https://www.newscientist.com/article/mg21328506-100-parking-sensors-to-take-pain-out-of-finding-a-space/

https://www.smartcitiesworld.net/transport/transport/smart-parking-gets-smarter

CURBSIDE ON-STREET DIGITAL SIGNAGE – DOWNTOWN INNOVATION ZONE

Deploy street light pole and digital curbside signage which allows for remote programming changes to allow parking or restrictions associated with diverse activity and operations as needed.

FEASIBILITY RATING: B+

COMMENTS:

Well established precedents for on-street digital signage in cities throughout North America and Europe. Mid-level technology maturation and moderate or better marketplace acceptance in urban centers. Signage placement on light poles may be limited to vehicular streetlight poles, as pedestrian pole heights will not work with many digital signage elements, due to potential obstructions created lower on the pole.

REFERENCES

https://www.wired.com/2012/11/streetlights-smart-cities/

https://broadsign.com/blog/smart-cities-better-urban-experience-with-digital-signage/

https://internet-of-things-innovation.com/insights/the-blog/smart-cities-improving-digital-signage/#.XBwaulxKiUk

Case Study 03

Air Quality Sensors

Deploy parking sensors on City pedestrian lights and/or street lights to utilize smart street and traffic poles.

Feasibility Rating: B+

Comments:

Air quality sensors are readily available in the marketplace and are wide-ranging in both capability and cost (as low as $300 for wireless communicating, simple surface installs to $4,000+- for fully integrated long-life sensor with a wide range of capabilities). Sensor reliability is good with some self-diagnostic versions available. There are significant precedents for review. High-level technology maturation and good marketplace acceptance.

The key to all sensor based Smart City systems is communication and reporting, and more specifically a communication backbone which allows real-time data acquisition and analysis. Existing Mesh network available through CPS infrastructure would be adaptable to air quality sensor needs, however, a more widespread deployment of this and other sensors may dictate modifications to that network in order to more efficiently handle the digital traffic and to provide access to a deeper set of analysis tools.

References

https://www.silverspringnet.com/solutions/smart-cities/smart-cities-street-lights/

https://enterpriseiotinsights.com/20170523/channels/fundamentals/20170523channelsfundamentalshow-street-lights-enabling-smart-cities-tag23-tag99

https://internetofbusiness.com/poles-apart-five-cities-getting-smart-city-street-lighting/

https://carto.com/blog/chicago-array-of-things/

https://datasmart.ash.harvard.edu/news/article/a-guide-to-chicagos-array-of-things-initiative-1190

DEPLOY WI-FI HOTSPOTS

Deploy Wi-Fi Hotspots to Common Use Areas throughout the City.

FEASIBILITY RATING: B

COMMENTS:

Wi-Fi based light poles are standard in many cities, often as a part of a larger deployment using other locations. Monitoring of use and signal efficiency is useful and a good way to gain insight into usage trends.

REFERENCES

https://internetofbusiness.com/poles-apart-five-cities-getting-smart-city-street-lighting/

https://www.wired.com/2012/11/streetlights-smart-cities/

https://internetofbusiness.com/poles-apart-five-cities-getting-smart-city-street-lighting/

https://www.latimes.com/socal/daily-pilot/news/tn-dpt-me-hb-poles-20180227-story.html

Case Study 05

911 Call Boxes

Implement 911 Call Boxes at various locations to provide increased communication access and more timely notification to emergency services and public safety first responders to expedite responses to emergency requests.

Feasibility Rating: Incomplete

Comments:

Wi-Fi based 9-1-1 services are standard in many cities. Hard wired versions are not. The emergency "buttons" at light poles to alert responders to emergencies in progress, with hailing devices and remote monitoring, are a possibility.

References

https://www.techrepublic.com/article/new-smart-city-traffic-project-takes-off-in-portland-or/

http://possibility.teledyneimaging.com/smart-cities-see-by-the-street-lights/

AMBIENT NOISE SENSORS

Implement Ambient Noise Sensors to provide real time information to public safety first responders to expedite and inform on public safety concerns.

FEASIBILITY RATING: B+

COMMENTS:

Ambient noise sensors can service a wide variety of needs. Similar to air quality sensors outlined in use case #3 above, ambient noise sensors are readily available in the marketplace and are wide-ranging cost (as low as $225 to 400 for wireless communicating, simple surface installs to $2,500+- for fully integrated long-life sensor with a wider range of capabilities). Directional acoustical devices – including focused sound monitoring – are an emerging area for crowd and conflict areas. Degradation of Sensor fidelity is often a problem with some of the lower end sensor products. Some are furnished with self-diagnostic features. There are significant precedents for review. High-level technology maturation and good marketplace acceptance.

The key to all sensor based Smart City systems is communication and reporting, and more specifically a communication backbone which allows real-time data acquisition and analysis. Existing mesh network available through CPS infrastructure would be adaptable to ambient noise sensor needs, however, a more widespread deployment of this and other sensors may dictate modifications to that network in order to more efficiently handle the digital traffic and to provide access to a deeper set of analysis tools.

REFERENCES

https://motherboard.vice.com/en_us/article/qkvedp/the-plan-to-surveil-the-sounds-of-cities

https://datasmart.ash.harvard.edu/news/article/a-guide-to-chicagos-array-of-things-initiative-1190

Case Study 07

Traffic Cameras

Implement Traffic Cameras to actively monitor vehicular traffic to reduce congestion and improve traffic flow.

Feasibility Rating: B

Required coordination with existing City traffic camera systems may reduce this to a C due to cost of deployment and integration.

Comments:

Cameras are a well understood outdoor observation tool. Many cities use them for traffic monitoring and control, mostly mounted to city traffic poles and mast arms. Signal quality is important for real-time feedback and data analysis. It is not known if any are already installed on the CPS mesh network, but coordination with existing traffic cameras in San Antonio would be important for any deployment to lighting poles.

References

https://www.wired.com/2012/11/streetlights-smart-cities/

https://internetofbusiness.com/poles-apart-five-cities-getting-smart-city-street-lighting/

https://www.latimes.com/socal/daily-pilot/news/tn-dpt-me-hb-poles-20180227-story.html

DOWNTOWN DIGITAL SIGNAGE – DOWNTOWN INNOVATION ZONE (CCDO)

Install informational digital signage on light poles in strategic locations within the downtown business district.

FEASIBILITY RATING: B+

COMMENTS:

Well established precedents for on-street digital signage in cities throughout North America and Europe. Mid-level technology maturation and moderate or better marketplace acceptance in urban centers. Signage placement on light poles may be limited to vehicular streetlight poles, as pedestrian pole heights will not work with many digital signage elements, due to potential obstructions created lower on the pole.

REFERENCES

https://www.wired.com/2012/11/streetlights-smart-cities/

https://broadsign.com/blog/smart-cities-better-urban-experience-with-digital-signage/

https://internet-of-things-innovation.com/insights/the-blog/smart-cities-improving-digital-signage/#.XBwaulxKiUk

Case Study 09

Air Quality Sensors

Include Air Quality sensors on Smart Light Posts.

Feasibility Rating: B+

Comments:

Air quality sensors are readily available in the marketplace and are wide-ranging in both capability and cost (as low as $300 for wireless communicating, simple surface installs to $4,000+- for fully integrated long-life sensor with a wide range of capabilities). Sensor reliability is good with some self-diagnostic versions available. There are significant precedents for review. High-level technology maturation and good marketplace acceptance.

The key to all sensor based Smart City systems is communication and reporting. Existing Mesh network available through CPS infrastructure would be adaptable to air quality sensor needs, however, a more widespread deployment of this and other sensors may dictate some modifications to that network in order to more efficiently handle the digital traffic.

References

https://www.silverspringnet.com/solutions/smart-cities/smart-cities-street-lights/

https://enterpriseiotinsights.com/20170523/channels/fundamentals/20170523channelsfundamentalshow-street-lights-enabling-smart-cities-tag23-tag99

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https://carto.com/blog/chicago-array-of-things/

https://datasmart.ash.harvard.edu/news/article/a-guide-to-chicagos-array-of-things-initiative-1190

https://www.transportation.gov/sites/dot.gov/files/docs/Portland%20Vision%20Narrative.pdf

EV CHARGING STATIONS

Include EV Charging capability on Smart Light Posts.

FEASIBILITY RATING: C-

COMMENTS:

Technical challenges are power in access and the inability to service multiple users simultaneously.

REFERENCES

https://www.greenbiz.com/article/smart-citys-blueprint-ev-infrastructure

https://www.smartcitiesdive.com/news/tech-that-turns-light-poles-into-ev-chargers-wins-nyc-climate-award/530111/

https://internetofbusiness.com/poles-apart-five-cities-getting-smart-city-street-lighting/

Case Study 11

Temperature Sensors

Include Temperature sensors on Smart Light Posts.

Feasibility Rating: B+

Comments:

Temperature sensors, like those of other sensors for air quality and noise, are well understood and proven. Some are furnished with self-diagnostic features. There are significant precedents for review. High-level technology maturation and good marketplace acceptance.

The key to all sensor based Smart City systems is communication and reporting, and more specifically a communication backbone which allows real-time data acquisition and analysis. Existing Mesh network available through CPS infrastructure would be adaptable to temperature sensor protocols.

References

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https://www.digitaltrends.com/home/cities-looking-become-smart-need-look-beyond-adding-sensors/

https://www.sensorsmag.com/components/smart-city-project-santander

http://www.libelium.com/products/plug-sense/models/

http://www.govtech.com/data/Smart-Cities-Understanding-the-Untapped-Value-of-Sensor-Data.html