CA Review _____

CITY COUNCIL

Staff Report

Meeting Date:	Jan. 14, 2020
To:	Mayor and City Council
From:	Scott Chadwick
Staff Contact:	David Graham, Chief Innovation Officer david.graham@carlsbadca.gov or 760-434-5992
Subject:	Connected Carlsbad: An Inclusive City Innovation Roadmap

Recommended Action

Adopt a resolution approving Connected Carlsbad: An Inclusive City Innovation Roadmap

Executive Summary

For many years the City of Carlsbad has been deploying technology and using data in ways that demonstrate it is on a path to be a more connected community. Given what has been accomplished to date and the need to be strategic going forward, a connected community roadmap that sets goals for city innovation and an associated action plan is needed to guide the city while also communicating these efforts to the public.

Based upon City Council approved projects, existing city documents, previous IT assessments and interviews with departments a preliminary roadmap and a collection of initiatives and ideas were being presented to the City Council on April 23, 2019.

Our effort aims to take a human-centered focus that is inclusive in the development of the roadmap. Based upon feedback from the City Council, staff initiated a public input process to solicit community feedback and ideas. Based upon that information, Connected Carlsbad: An Inclusive City Innovation Roadmap (Connected Carlsbad) has been revised and is being presented to the City Council for approval. An associated action plan is also being presented which will be a dynamic document that is regularly updated as new initiatives are approved by the City Council on through the annual budget process case-by-case basis.

Discussion

Demand from the public for greater connectivity, more convenience and more robust information is rising, and the City is strategically adapting to meet those demands. The City has a track record of using data and technology to improve decision-making and the lives of residents.

As the needs of residents, visitors and businesses rise so does the complexity of providing services to the community. New technology brings new challenges around integration, change

management, legacy system replacement, data management and public policy. A roadmap and corresponding action plan can be a valuable tool for the city and inform the co-creation of a connected community with the public.

Connected Carlsbad and its associated action plan is a collection of existing initiatives that shows a more comprehensive picture of what the city is doing to create a more connected community. It is also a strategic guide that identifies future projects and initiatives.

Recognizing the dynamic nature of technology, this strategic approach is intended to provide roadmap goals that have longevity. The action plan, which would implement Connected Carlsbad, would be continuously updating based upon public input and city needs.

The roadmap being presented has been informed by City Council approved projects, existing city documents, previous IT assessments, a global scan of connected community efforts and over 100 interviews with city staff. Based upon that internal and external engagement five roadmap goals have been developed. They are:

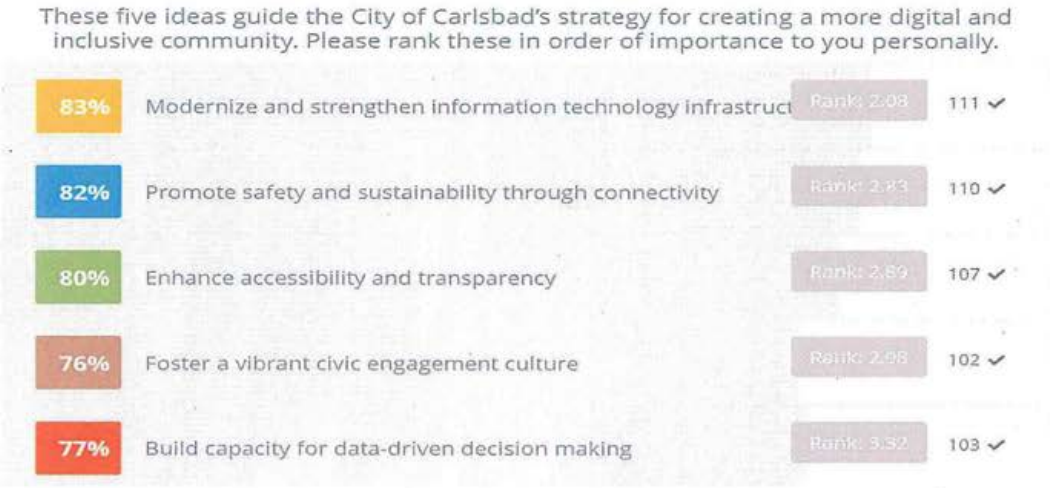
- Pursue Communitywide Digital Transformation
- Build Capacity for Data-Driven Decision Making
- Foster a Vibrant Civic Engagement Culture
- Enhance Accessibility and Transparency
- Promote Security and Sustainability through Connectivity

The first goal has been revised from the original goal of "Strengthen and Modernize IT Infrastructure" to a more community inclusive approach to digital transformation. Through the engagement process we discovered that a broader and more aspirational goal may provide greater vision for what can be accomplished with the community.

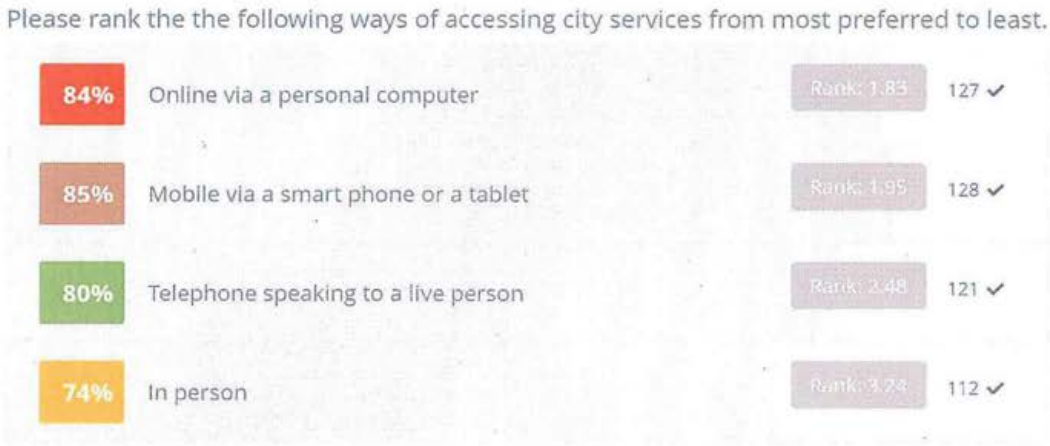
Community Engagement

Since the preliminary roadmap was presented to the City Council staff has engaged with the community. The results of this engagement led to revisions that included approaching the overall strategy with an adopted roadmap and a dynamic action plan that would be regularly updated. It also informed a digital survey that had over 200 participants who provided both quantitative data and quantitative information through approximately 400 comments. The key results of this survey provide valuable insights for the roadmap and action plan.

Regarding the five ideas that guide the roadmap there was consensus regarding the top three.

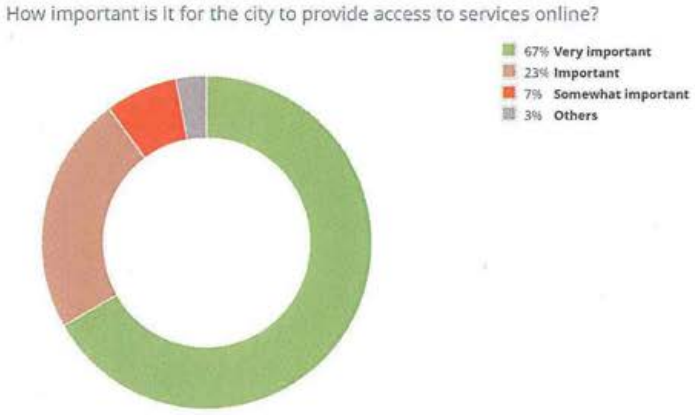


We were also able to gauge the public preference when engaging with the city.



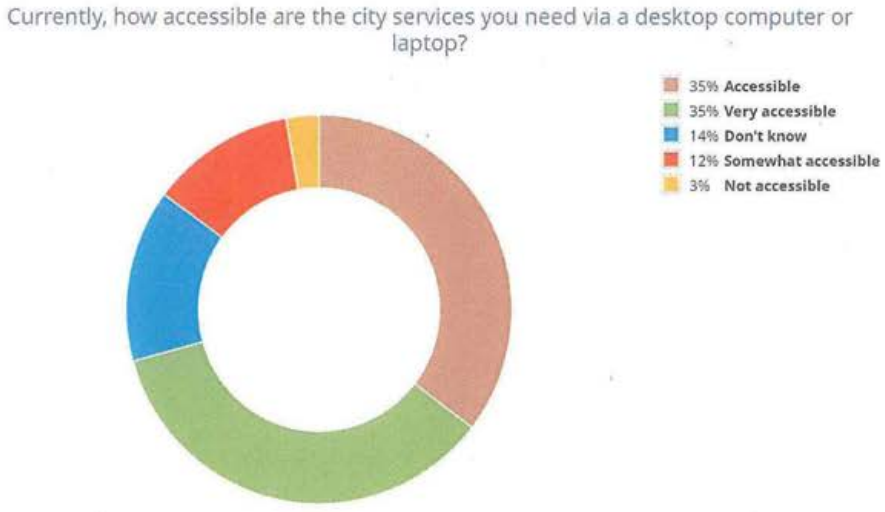
The similar ranking of connecting via a personal computer or mobile device mirrors the global trend in the rise of mobile devices as the growing way people want to connect with all things. This data should inform current and future initiatives that wish to connect with the public digitally. Providing a web presence that is primarily focused on people accessing that service via a personal computer or laptop will miss a significant number of users and lead to greater frustration with the public that chooses to connect with the city digitally.

We found that providing access to services online was either important or very important to 90% of the respondents. This is important when making decisions regarding how the city offers its services.

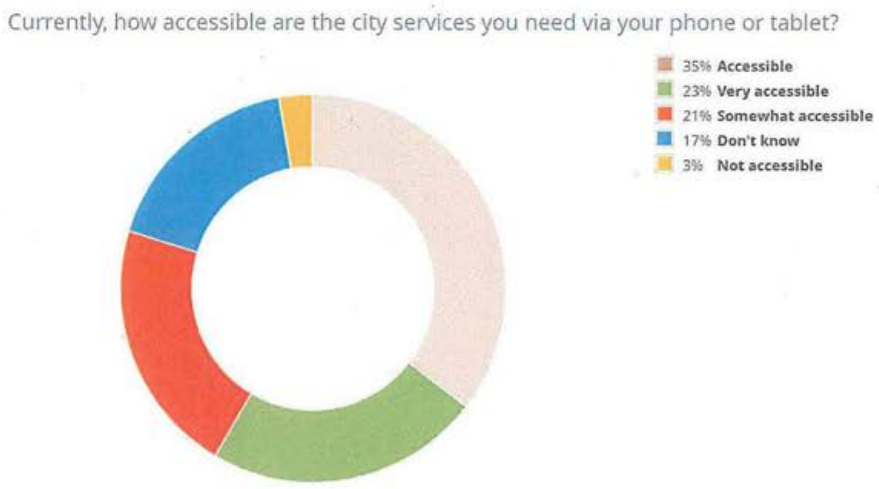


When asked what services people currently utilize in person, online or via phone, libraries, parks and recreation and paying utility bills rose to the top. All three areas have online, and in-person services and have made a concerted effort to provide inclusive digital access to their services.

Knowing that the public wants to connect with the city begs the question of how well we are currently providing access to services online. The previously mentioned data makes it clear that personal computer or mobile access are two important means of connecting with city services. The city received fair marks for accessibility on a traditional computer.



Recognizing the trend towards more mobile connectivity the city received slightly lower marks on accessibility via mobile devices.



Since mobile connectivity will continue to rise and likely become the most broadly adopted method of digital access the city should consider opportunities and challenges associated with mobile device access.

Turning to specific policies or initiatives, when asked how concerned the participants were in maintaining the privacy of the information that is provided to the City, 60% were very concerned and 20% were somewhat concerned. This validates the pro-active approach the city has taken considering privacy and cybersecurity when adopting new technologies. The hiring of a new data science and business intelligence manager, which the City Council approved in the FY 2019-2020 budget, will assist in ensuring clear citywide data policies that protect privacy while encouraging citywide data-driven decision making.

Finalizing the Roadmap and Action Plan

Some revisions have been made to the roadmap based upon the on-going efforts since the draft went to the City Council. First, the roadmap is shifting from focusing on the "smart city" term and more towards city innovation and connected communities. While the term "smart city" is one that is used globally, and many of the efforts the city has undertaken are considered "smart city" technologies, the term connected community seems to better fit with our city as it is a more inclusive term. The city is also known to be home to many companies in the innovation economy and many community innovators so connecting the city with the concept of innovation seems to be a perfect fit.

Second, as referenced earlier the goal of modernizing and strengthening information technology infrastructure has been expanded to encompass digital transformation communitywide. This includes consideration of outward facing offerings for our residents in addition to the fundamental systems needed to run a modern government. For example, it may include the consideration of improved public wi-fi, expansion of city services available online or on mobile devices and the ongoing effort to simplify the process of the public accessing city services. The City Council took a significant step to modernizing and strengthening our IT infrastructure when it approved the agreements for an improved digital information network

operated by the city primarily using existing fiber infrastructure on December 17, 2019. There is significant work still to be done to provide access to services that would benefit our residents, visitors and businesses but building reliable communication infrastructure is an important step to creating the backbone for future city efforts.

Third, given the changing nature of types of projects that aim to achieve the Connected Carlsbad goals, it is being recommended by staff that the City Council approve the roadmap by resolution and support the initial action plan. The action plan will dynamically updated based upon future City Council actions and annual budget approval. This will provide the greatest visibility to the City Council and public on how the roadmap goals are being achieved.

Conclusion

The history of the city is one that clearly demonstrates that it has been on the path of being a connected community or what others would call a smart city. This path has been driven by decisions to improve the lives of residents as well as city operations. Finalizing a roadmap that is approachable to the public, sets clear goals for city staff, and demonstrates the intent of the city towards the community is an opportunity to continue moving our organization into the future. Connected Carlsbad and the action plan will build on the thoughtful decisions of the past while laying a strategic roadmap for the future.

Fiscal Analysis

There is no fiscal action directly associated with this item. Recommendations for any additional resources will be made through the annual budget process, or on a case-by-case basis.

Next Steps

City staff will finalize an action plan based upon the presentation to city council and will regularly update it based upon future actions that align with the goals outlined in the roadmap. Individual initiatives may also be subject to future community outreach based upon the nature of the proposed initiative. Staff will provide regular updates to the city council regarding the process of the various initiatives that are consistent with the Roadmap.

Environmental Evaluation (CEQA)

Pursuant to Public Resources Code section 21065, this action does not constitute a "project" within the meaning of CEQA in that it has no potential to cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment and, therefore, does not require environmental review.

Public Notification

The item was noticed in accordance with the Ralph M. Brown Act and was available for public viewing at least 72 hours prior to the scheduled meeting date.

Exhibits

1. City Council Resolution
2. Connected Carlsbad: An Inclusive City Innovation Roadmap
3. Draft Connected Carlsbad Action Plan

RESOLUTION NO._____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CARLSBAD, CALIFORNIA, APPROVING CONNECTED CARLSBAD: AN INCLUSIVE CITY INNOVATION ROADMAP

WHEREAS, the City of Carlsbad is committed to continuing to strategically invest in improving connectivity for its residents, visitors and businesses; and

WHEREAS, the rapid rise of technology presents opportunities to provide greater service to the public; and

WHEREAS, it is estimated that by 2025 over 75 billion devices globally will be connected to the internet; and

WHEREAS, a siloed approach to technology adoption may waste resources; and

WHEREAS, the community outreach efforts have identified that the public has interest in accessing more city services; and

WHEREAS, Connected Carlsbad: An Inclusive City Innovation Roadmap provides a strategic framework that communicates the City's approach to the public on creating a more connected community and provides a guide for current and future initiatives.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Carlsbad, California, as follows:

1. That the above recitations are true and correct.
2. The attached Connected Carlsbad: An Inclusive City Innovation Roadmap is hereby adopted.

PASSED, APPROVED AND ADOPTED at a Regular Meeting of the City Council of the City of Carlsbad on the __ day of _____, 2020, by the following vote, to wit:

AYES:

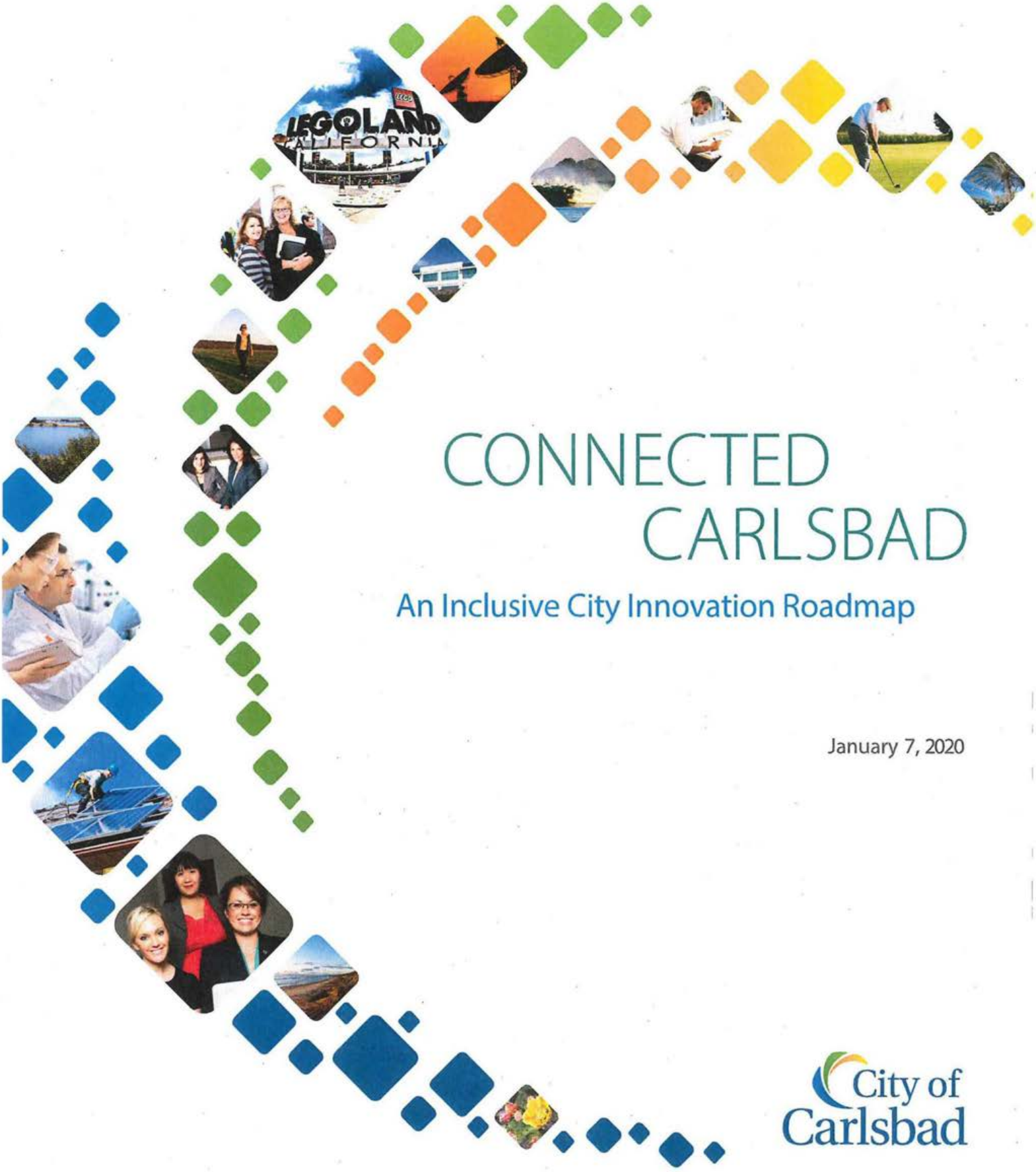
NAYS:

ABSENT:

_____
MATT HALL, Mayor

_____
BARBARA ENGLESON, City Clerk

(SEAL)



CONNECTED CARLSBAD

An Inclusive City Innovation Roadmap

January 7, 2020

City of Carlsbad

CONNECTED CARLSBAD

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OVERVIEW

The rapid evolution of business, government and consumer technology over the past decade has changed daily life to a degree not seen since the rise of the automobile a century ago. Smartphones and nearly ubiquitous high-speed internet in metropolitan areas have revolutionized the way we stay in touch with each other, the way we bank, the way we shop and the way we travel. New vehicle technology is changing the way we drive and park our cars. As the adoption of new technology expands, making life ever more convenient and in other ways more complicated, the expectations of the public and what they demand from government has changed too.

The City of Carlsbad has long used technology to solve public problems. Until recently, city initiatives were often developed in silos to meet the limited needs of a single city program or department. The ever-increasing connectivity and integration of technologies demands a more unified approach, guided by a common understanding of needs and priorities with a focus on fiscal realities.

The roadmap will unite current initiatives with future ideas

Connected Carlsbad: An Inclusive City Innovation Roadmap is designed to provide a high-level, organized guide to the principles that matter to the city in creating a more connected community. This roadmap and its associated action plan is based on City Council approved projects, existing city documents, previous IT assessments and interviews with departments, combined with a global scan of other cities and best practices that have emerged from leading smart city thinkers and Carlsbad-specific community engagement. The roadmap is organized into five primary goal areas supported by an action plan of projects and initiatives.

The first goal, **Pursue Community-wide Digital Transformation**, focuses on the foundational elements, including connectivity, up-to-date hardware and software, and a robust security strategy while providing an aspirational vision for the future.

The second goal, **Build Capacity for Data-Driven Government**, focuses on the policies, procedures and staffing necessary for the city to fully capture the value of emerging models of data analytics.

The third goal, **Foster a Vibrant Civic Engagement Culture**, builds upon the first two goals with a human-centered perspective that an engaged city that uses data and technology in a way that respects people and their privacy will support a vibrant culture where residents, organizations and businesses are invested in their community and its future.

The fourth goal, **Enhance Accessibility and Transparency**, recognizes that open government and approaching problem-solving from an accessibility perspective leads to better outcomes for all.

The fifth goal, **Promote Safety and Sustainability Through Connectivity**, leads to understanding the interconnected nature of our communities that can achieve environmental, mobility and sustainability goals when approached in a cross-departmental and community informed manner.

Since the city already has existing infrastructure and capacity, work on achieving some of these goals is already underway. The initiatives that are underway have been guided by previous city action. This roadmap serves as a general guide to unite current initiatives with future ideas, spark collaboration, foster innovation and promote sharing.

THE CURRENT STATE OF CITY INNOVATION

Among cities of its size, Carlsbad is already a leader in deploying advanced technological and data tools to provide better services for the community. Examples include:

- The Carlsbad @Your Service app gives community members a quick and convenient way to report issues they see around town.
- The Carlsbad City Library uses a data analytics service to evaluate and calibrate its collections to ensure that each branch has the books, movies and other materials that best serve local residents.
- The Planning department offers an "e-zoning" map that helps users quickly determine what land-use zone a property is in, the assessed acreage of the property, what school district the property is in, and related information.
- The traffic signal network and management center is centrally connected, the largest network of its kind in the region, and upgrades are being made to make the network dynamic and adaptable.
- The utilities department has full deployment of advanced metering infrastructure that has improved accuracy, reduced on-site visits and provided analytic capability that has saved millions of gallons of water and hundreds of thousands of dollars.

Connected communities should be prepared for the risks associated with deploying new solutions

Over the next five years, technological advances will depend more directly on the interconnected nature of city systems. The next wave of innovation in local government is the use of data to drive efficiency and innovation to reach better outcomes for the community. The adoption of devices and sensors is generating an exponentially larger stream of data. In 2018, estimates were that 90% of the data in the world had been generated in the previous two years. City officials recognize that data is a strategic asset that can be used to gain insights and surface ways to improve city operations and services. To realize the value of this asset, however, the city must address issues such as data governance and the capacity of city staff to organize and analyze data.

In 2018, the City Council approved the creation of a new position, the Chief Innovation Officer, who worked cross-departmentally to develop this roadmap and and guide its implementation. Carlsbad is among the few cities in the country that have prioritized innovation by dedicating this type of resource. Most cities with robust innovation programs are large metropolises, such as Los Angeles, Boston and San Francisco; and of the 14 cities that have received formal recognition from What Works Cities, only two (South Bend, Indiana, and Topeka, Kansas) are comparable in population to Carlsbad.

City innovation is sweeping through cities of all sizes and geographies. Approaching challenges in new ways, being open to new technology, and deriving insights from the community are all a part of a culture of innovation. Embedding innovation at all levels of the organization can lead to a more agile and engaged workforce that delivers for residents, businesses and visitors. Beyond technology innovation is about people and the people local government serves.

UNDERSTANDING AND MITIGATING RISKS

An effective strategic approach to being a connected community requires the city to fully consider and prepare for the risks associated with technology and data. While vendors might demonstrate how a project works in the most favorable environment, city staff must be equipped to consider all ramifications before moving forward with an initiative. This section identifies and describes some of the most common risks.

I. **Security Vulnerabilities**

Without proper security measures in place, a city's exposure to cyber-attacks grows as more devices, systems and services are connected. This is also known as a growing "attack surface." Historically, most of a city's devices were kept inside a building, such as City Hall or Operations Center. As the City has grown, devices are located in multiple buildings and vehicles. This risk will be mitigated by incorporating security efforts into the action plan.

II. **Diversion of Resources**

City staff have a finite amount of time to devote to their work. Implementing new technologies and data strategies often requires staff to spend less time on their current duties in order to provide enough time to work on new initiatives. This risk is especially prevalent in pilot programs, where the pilot is a project in addition to a standard city process. This risk will be mitigated in multiple ways – in some cases, the Technology Leadership Committee will play a role in addressing and managing resource allocation, while in others these decisions will need to be made by the City Council with public input.

III. **Mitigating Bias Toward Technological Solutions**

As the private sector churns out an ever-increasing array of technological solutions to public problems, the city may be conditioned to look first for a technological solution to a problem. It is important to consider that technology may not always be the best solution. To avoid skewed decision-making resulting from technological bias, city staff wil ensure that an evaluation of non-technological solutions is included as part of the decision-making process.

A CULTURE OF CONTINUOUS IMPROVEMENT

Being a connected community is about more than just having the right software applications, or the most cost-effective devices, or the best network configuration. Those technical pieces are simply the means to an end. Ultimately, it is the people in Carlsbad — city employees, local businesses, residents, students and visitors — that matter.

> If you forget about the people you will miss the point of being a connected community

Many existing processes have been in place for years, some for decades. The challenge of changing systems and adapting to new processes is as much about the people involved as it is about getting the technology right, and it can be challenging, both for staff and for the public to adapt. Initiatives to implement the roadmap goals should include a human-centered approach that:

- Creates opportunities for internal buy-in and engagement
- Highlights the need for training opportunities for both staff and the public
- Recognizes the importance of community engagement in the decision-making

The constantly changing nature of technology requires dynamic approaches to its use and implementation. Becoming a connected community requires a platform of people who understand the need for continuous improvement and are equipped to adapt. The roadmap and action plan, informed by people inside and outside the organization, not only serves as a guide, but also as a way to generate buy-in from everyone involved.

THE FUTURE STATE OF CITY INNOVATION

As the city pursues the roadmap goals the future state of a more connected community is bright. This can include:

- Lightning fast digital information network that allows for the adoption of new technologies without the barriers of broadband infrastructure speeds.
- Citywide data policy and systems that provide more information and insights to residents, visitors, businesses and employees driving greater collaboration and improved city operations.
- Expanded community engagement tools that allow residents to provide feedback and get answers to their requests in an even more timely manner
- Age-friendly accessibility to all the city has to offer by growing our intergenerational approach to our residents and visitors
- Improved mobility that reduces carbon emissions, improves public safety and makes it convenient to get around.

With over fifty initiatives currently listed in the action plan the opportunities these examples provide barely scratch the surface of what the city can accomplish by pursuing the roadmap and implementing the action. However, it must be accomplished in concert with the community if it is truly going to be an inclusive approach to city innovation.

CO-CREATION WITH THE COMMUNITY

Success in becoming a more connected community relies on authentic engagement with residents, visitors and businesses. While the goals in this roadmap were vetted with the public the practice of on-going community engagement is crucial to success. As the action plan is implemented, the city will thoughtfully consider the right approach to engage the public. Engaging with the city through participating in outreach, accessing services, and experiencing community should lead to a valuable relationship that increases on-going connection.

We are co-creating an inclusive future for all

A PATH TO THE FUTURE

The best way to demonstrate what the city means by the five roadmap goals is by putting them into action. To this end an action plan has been developed with the initiatives, projects, policies and tactics to achieve the goals. Designed to be agile, the action plan will have a digital presence and as projects that support the goals are completed, the digital presence will be updated providing the public with information on what the goals mean in practice.

Connected Carlsbad is more than a document, some ideas, and projects, it is a ongoing an engagement to co-create a connected community for all. Built upon the wise decisions of the past and with a steady eye ahead, this approach will serve the city well as it serves the people today and tomorrow.

ACKNOWLEDGEMENTS

A special thank you to the Connected Carlsbad consulting team, led by the smart city folks at Madaffer Enterprises as well as to the following organizations that provided valuable information that was consulted in the development of this document:

- What Works Cities
- Smart Cities Council
- The Harvard Technology and Entrepreneurship Center
- The Center for Government Excellence at Johns Hopkins University
- The Ash Center at Harvard Kennedy School
- The Data Governance Institute
- The Behavioral Insights Team
- The Sunlight Foundation
- The American Civil Liberties Union
- Connected Communities Collaborative
- The National League of Cities
- Future Cities Catapult
- Dr. Nishal Mohan, Founder of mohuman
- Dr. David Ricketts, Senior Innovation Fellow at Harvard TECH

City of Carlsbad

CONNECTED CARLSBAD ACTION PLAN

PURPOSE

This document complements Connected Carlsbad: An Inclusive City Innovation Roadmap by providing the current or future initiatives that support the five pillars of the strategy. The goals are:

- Pursue communitywide digital transformation
- Build capacity for data-driven decision making
- Foster a vibrant civic engagement culture
- Enhance accessibility and transparency
- Promote security and sustainability through connectivity

The Connected Carlsbad Action Plan is intended to be a dynamic document that is updated regularly as new initiatives are launched and previous initiatives are completed. It will also have a digital presence that allows the public to better understand the goals through the accomplishments that are achieved. Updates to the action plan initiatives will be informed by the annual budget process, actions of the City Council and administrative actions that complement the five goals of the roadmap.

1. PURSUE COMMUNITY-WIDE DIGITAL TRANSFORMATION

Establish a cross-departmental approach to technology leadership

Background: Making decisions on technology implementations is a challenging, complex task. What is the true cost of a project? What is the most appropriate funding source? Which projects should be completed first? How well does a proposed solution meet the objectives and standards we've established as an organization? Is the scope of this project appropriate?

The challenging nature of these decisions is exacerbated by the expanding reach of technology and the increasingly interdisciplinary nature of emerging technologies. The committee provides a collaborative forum for key staff from across the organization to validate and prioritize technology implementations. The TLC also provides a structured venue to explore how particular configurations of a technology implementation may positively or negatively affect others within the organization.

The committee is an ongoing, indefinite initiative. Meetings may be held on a monthly, bimonthly or quarterly basis depending on workload.

Status: Formation of the committee is scheduled for February 2020.

Upgrade, replace or retire software applications

Background: The city uses more than 100 software applications to manage everything from registration for recreation classes to timekeeping for hourly employees. Most software applications require regular care and maintenance, typically in response to vendor updates and upgrades designed to patch security vulnerabilities or to add features or functionality. When software updates are neglected, the application becomes less valuable over time.

The city currently has many software updates that have been deferred, with some applications approaching a point where the vendor no longer provides support or updates for the currently installed version. These critical updates are underway, but due to resource constraints, will take time to work through.

Status: Underway

Evaluate transition to an Enterprise Resources Planning system

Background: City business processes - such as finance, human resources and asset management – inherently involve the generation and management of high volumes of complex information. Over the last several decades, the city has gradually transitioned these processes from ink and paper to software applications tailored to the needs of individual departments. While these applications increased efficiency over archaic paper-based processes, there is still significant opportunity to further improve the efficiency and performance of business processes by considering applications from an citywide or enterprise perspective. This is a focus of citywide digital transformation which is taking a more strategic approach to the city's systems rather than adopting solutions for a specific need. Using an enterprise resource planning (ERP) model is consistent and complimentary to a strategic citywide approach to digital transformation.

Timing: Evaluation is currently underway as the city considers how to address its legacy systems.

Transition to single identity for users of city services

Background: Depending on their use of city services, a Carlsbad resident may have up to half a dozen different account usernames and passwords they must keep track of for their interactions with the city. Examples include:

- Water and sewer billing
- Carlsbad @Your Service app
- Carlsbad City Library
- Recreation passes and permits
- Business licenses

Maintaining login credentials for so many different services is inconvenient for users and in some cases deters the public from using these systems altogether. Many of the frustrated users require staff assistance to sort

out their login problems, or they require staff assistance. The time spent dealing with these complexities undermines the original goal of creating efficiency.

As the city's customer-facing applications are upgraded and integrated, city staff will work to reduce the number of separate account identities a resident or business owner needs to maintain to interact with the city online. Ultimately, the goal is for users to only need to remember one login credential to be able to access any city service.

Status: Ongoing

Evaluate options for a citywide asset management system

Background: Asset management is critical to ensuring the ongoing maintenance, monitoring and replacement of city assets. Software can be used to optimize maintenance to control costs and ensure smooth operations. New devices are coming on the market to assist in providing better data regarding the status of assets. With greater visibility into the assets owned by a city more data-driven decisions can be make regarding operations. The current applications used by the city to manage its assets are disparate and, in many cases, involve manual process. Evaluating solutions that could lead to improved asset management citywide is prudent if the city wants to maintain a high level of service and responsibly manage its resources.

Status: Underway

Replace obsolete and noncompliant city devices

Background: The city is bound by federal and state laws and regulations, as well as private agreements with certain service providers, to comply with a variety of rules and regulations regarding its devices. Some of the most significant of these include: Criminal Justice Information Services (CJIS) security standards, which govern access to criminal justice information shared between local, state and federal law enforcement authorities; Health Insurance Portability and Accountability Act (HIPAA) standards, which protect the privacy of health information shared with the city through emergency medical services; Payment Card Industry (PCI) data security standards, which ensure the security of credit card payment processing system. In addition to ensuring compliance with regulatory and industry standards, the city must keep up with the process of updating antiquated devices, such as desktop computers that are no longer supported or portable devices that have reached the end of their useful life.

Status: Ongoing

Transition to a unified communications platform

Background: Like many mid-size enterprise organizations, the city still uses a legacy telephone system that operates using analog communications over a separate network from the rest of the city's communications systems. Many elements, such as network switches, are at or near the end of their useful life, and

replacement parts are increasingly difficult to obtain due to market trends toward the adoption of IP telephony. Moreover, legacy telephony cannot accommodate common modes of communication, including digital voicemail and video conferencing. A unified communications platform provides the city with advanced, modern features, such as the ability to forward calls to an office phone line using a cell phone in the field. It also reduces the risk of system disruptions and outages due to faulty equipment. Unified communications are also more easily scalable, simplifying the process and reducing the costs of expanding or changing phone lines and services.

A wide selection of unified communications platforms exists from several major vendors. A significant consideration in transitioning from analog/legacy telephony to a unified communications platform is the need for bandwidth. The city's current network is not adequate to support IP telephony. This is a significant element to be considered within the citywide network master plan.

Status: Underway with expected completion in late 2020.

Assess and refine data storage and cloud strategy

Background: The city's data is currently stored and backed up in a variety of on-site and off-site locations, but primarily on-site at city facilities. As cloud computing solutions become increasingly powerful and more finely tailored to the specific needs of government systems, the city will determine whether it is more efficient and effective to store data in an off-site data center or to transition more applications to the cloud. The determination of where particular applications and data are most appropriately stored should be completed through an assessment associated with the overall digital transformation efforts being pursued by the city.

Status: Future initiative

2. BUILD CAPACTIY FOR DATA DRIVEN GOVERNMENT

Establish a performance management program

Background: The city uses a variety of performance management measures, some of which. In the past, the city used a comprehensive performance management structure, but this approach was discarded due to doubts about the relevance of given performance measures and doubts about the efficacy of the approach as a whole. However, over the past several years, several think tanks and nonprofit organizations have developed new best practices for performance management, using strategies that take advantage of the latest developments in enterprise resource planning and data management.

Developing an industry-leading performance management program is a long-term initiative of process optimization that is heavily dependent on success in the earlier objectives and initiatives described within Goal 2. Early steps to re-establish and enhance existing performance measures can begin taking place immediately but due to workload will likely not begin until 2020. Development of an advanced performance management

program will likely not begin until 2022, after an ERP transition is completed and significant additional capacity for data analytics is developed.

Timing: Future initiative

Develop a data governance team

Background: More than merely a byproduct of city operations, data is a strategic asset that can be extremely valuable for generating insight, setting priorities and making decisions. Clear and consistent governance of the data is critical to ensure the city maximizes the value of the asset.

The data governance team is the group of city employees responsible for developing and implementing policies and practices related to the management of data across the organization. The data governance team defines data, establishes decision rights, determines which datasets are open, prioritizes the publication of data, resolves problems, evaluates and mitigates risks, and communicates policies and outcomes across the organization.

Carlsbad's data governance team will be led by the Chief Innovation Officer and include key representatives from IT and from each organizational unit that works directly with data. The team should start small, with a limited scope, and gradually work to expand as it builds on early successes. In the initial stages, much of the data governance team's activities will be focused on developing and adopting an open data policy. In later stages, the data governance team's activities will turn to refining data governance policies and creating accountability through the use of data audits.

Leading smart cities are experimenting with different approaches to data governance. For example, some cities include members of the public as part of their data governance teams, similar to the audit committees of some cities which have both city staff, elected officials and community members as part of the committee. Part of the scope of the data governance team is to determine the best and most effective structure for the committee.

Status: Underway. The data science and business intelligence manager approved in the FY 2019/2020 budget will be on-board by February 2020.

Evaluate adoption of an open data policy

Background: Free public access to information held by local governments has been the norm since the California Public Records Act (CPRA) was adopted in 1968. That act, however, is based on a system of reactive rather than proactive disclosure. The proliferation of high-speed Internet over the past 15 years has spurred a new transparency movement toward the proactive release of government data, especially raw data. Due to the vast amounts of data managed by local governments, however, and the serious implications of inaccurate or improper disclosures, it is critically important that cities pursuing an open data model adopt an open data policy. Open data policies typically address three broad areas:

1. What data should be open to the public
2. Uniform standards for data releases
3. Data governance and policy

Carlsbad's data governance team (Initiative 2.1.1) will have primary responsibility for developing an open data policy, conferring with data stakeholders, and bringing forward a policy for City Council approval. The data governance team will also periodically review and make recommendations for updates to the open data policy as circumstances and best practices change.

Status: The data science and business intelligence manager will evaluate the value of adopting an open data policy in 2020.

Establish practices to maintain data quality

Background: Without high-quality data, the value of data as a strategic asset can be severely limited. Before data can be relied upon for insight and intelligence, it must be clear, accurate, consistent and reliable. The data governance team will be responsible for establishing practices and processes for maintaining data quality, which may include:

- Completing periodic, targeted audits of data accuracy
- Standardizing formats for common data categories (such as dates or addresses)
- Providing clear opportunities for data users to provide feedback on data quality
- Establishing a corrective process once an issue with data quality is discovered'
- Providing disclosures for datasets known to have accuracy or quality concerns

Status: The data science and business intelligence manager will develop citywide data policy including quality in 2020.

Create and maintain a data inventory

Background: A data inventory is a detailed description of the datasets maintained by the city, including attributes such as: name, general description of contents, source, owner, publication status and frequency of updates. By building a data inventory, the city will have a more complete picture of the data it collects. The process of developing the inventory may also show that similar datasets are being maintained by different staff in different places, which provides an opportunity to improve efficiency. The process of creating and updating the data inventory encourages staff from different departments to build valuable relationships that will help advance the city's open data goals.

The city likely has hundreds, if not thousands, of datasets spread across multiple servers and databases. Not all datasets are equally valuable, and some datasets may have little to no value to the public or even internal users — it will be the responsibility of the data governance team to determine the scope of the inventory

based on assessment of the relative value of particular datasets as well as the capacity of staff to work on the inventory.

Status: The data science and business intelligence manager will work with IT on creating and maintaining a data inventory as a part of developing the city's overall approach to data.

Provide data training for staff

Background: As the city increasingly turns to data-driven decision-making using business intelligence tools, there will be a growing need to ensure staff have the skills and comfort level necessary to fully utilize these tools. Training must address issues such as: how to use available data to make decisions, and how to assess and mitigate security risks associated with data that is made public. Trainings will take a variety of formats. One approach that many leading cities have used is the "data academy," a series of training sessions designed to equip city staff with the skills they need to use data effectively. For example, the City and County of San Francisco's data academy offers courses such as "Intro to Power BI," "Intermediate Tableau," and "Data Usability." Courses range from two to eight hours. In addition to the educational value, the data academy also provides a venue for connection and relationship-building among the city staff working in different departments or teams, creating new opportunities for inter-departmental teamwork and innovation. Some vendors (such as Tableau) provide free online training courses that can be used in place of or as part of the data academy. Courses are also available using paid subscription services – for example, Jonathan Reichental, former CIO for the City of Palo Alto, offers courses on data governance through Lynda. It will be the responsibility of the data governance team to determine the most appropriate curriculum based on cost, time commitment and effectiveness.

Status: In 2019, the Chief Innovation Officer provided initial data training to certain staff. In various departments data training occurs. In 2020, the data science and business intelligence manager will work to develop an approach to data training for staff.

Continue to build capacity for geospatial data analysis

Background: City staff for decades have used mapping tools to analyze data, identify trends and make informed decisions. This type of analysis, however, has been limited to data contained within GIS applications. More recently, software has been developed that enables staff to pull data from non-GIS applications, integrate it with data from other non-GIS applications, and visualize it using various map layers and dashboards in a GIS portal.

An example use case of this system involves the wastewater maintenance staff who check and replace valves and other equipment all over the city. Maintenance managers could use the portal to visualize which valves have already been serviced, and how long ago, in order to prioritize maintenance routes. The city's financial analysts can combine this information with procurement data to generate insights into what it costs to maintain the wastewater infrastructure in different zones throughout the city.

To enable these types of analyses, data from different applications must be pooled in a virtual data warehouse that can be accessed by GIS software and configured within a unified, secure portal accessible to staff across the organization. The task of building a data warehouse is complicated by a variety of factors, such as how frequently the data should be updated, how pulling data affects the performance of city business applications, data security, bandwidth and storage needs, etc. IT staff are currently working with a consultant to assess and develop recommendations for the business intelligence data architecture that would enable this type of analysis. IT staff are also working on limited-scope pilots of the GIS portal to test functionality and evaluate the needs of users.

Status: Ongoing

Create performance dashboards

Background: Performance dashboards (sometimes referred to as executive dashboards) take city data and present performance trends in a simplified graphical format that can be easily understood by the general public. Dashboards help create transparency into government operations and can improve accountability by providing public access to the city's key performance indicators.

Dashboards can show virtually any key performance indicator. City dashboards commonly display metrics such as:

- Response times for police and fire personnel
- Amounts spent to date and progress made on specific projects or initiatives
- Sales and property tax collections by month or year
- Number of active business licenses
- Average turnaround time to repair potholes
- Number of street lane miles repaved to date
- Graffiti removal rates

Depending on the performance indicator, dashboards can be updated automatically in near-real time, or at less frequent intervals. Displaying data closer to real-time puts a greater strain on the databases that supply the information; as a result, most cities update dashboard data on a daily, weekly or monthly basis. Updating dashboards manually, however, takes valuable staff time for a task that otherwise should be automated. The Chief Innovation Officer and data governance team will be responsible for determining the best approach, including what metrics to display, how often updates are made, and whether updates are made manually or automatically.

The timing is heavily dependent on the scope of the dashboard. Using public safety as an example, the first phase of a performance dashboard might display figures that are already provided in an annual report. An intermediate phase dashboard may integrate with public safety databases to show monthly or weekly response time figures. An advanced phase may allow users to break down response times by neighborhood and crime type.

Status: Future initiative. As a part of establishing data policies, inventory and governance, the visualization of that data will be a priority of the data science and business intelligence manager based upon departmental needs.

Regularly review data security and audit processes

Background: The city has several policies and procedures in place to protect the security of city systems and data. As the city continues to expand technologies, systems and data sources across the organization, it is important to comprehensively review and re-assess these policies and procedures to ensure they are effective, consistent with each other, consistent with other city policies. Beyond policies and procedures, it is also crucial that the city continually evaluate and recalibrate its security monitoring and incident management systems. There continue to be new and emerging approaches to information security in the context of municipal government which the city must be vigilant to understand.

Status: Underway

ADDITIONAL INITIATIVES

The following initiatives are under consideration or require further refinement before inclusion.

- Continue to develop human capital in the Information Technology department

3. FOSTER A VIBRANT CIVIC ENGAGEMENT CULTURE

Expand the use community engagement tools

Background: The city has traditionally relied on in-person meetings, workshops and written surveys as the primary means of gathering community feedback and ideas to guide decision-making. Face-to-face interaction will continue to be central to the city's engagement efforts, but it will also be supplemented by new tools and methods that simplify and automate the process of gathering and analyzing feedback. The city has expanded its use of digital tools and is evaluating the efficacy of those tools as well as new tools. The goal will be to use the right method and messenger that will result in the highest quality data for the city.

Status: Ongoing

Expand the capabilities of a city app

Background: The city currently has Carlsbad @ Your Service, a resident request mobile and personal computer application. Users can report issues such as potholes, traffic signal timing, graffiti and street lights, and interact with city staff assigned to resolve reported issues. Given the expanded use of mobile devices and current integration issues with the existing application, the city should consider a strategy to deploy an expanded city app that provides a greater offering beyond service requests. This could serve as the mobile hub for the regular requests for information that the city receives from the public as well as a place to resolve their complaints.

Status: Underway

Create an open data portal and public data visualization

Background: The large body of data generated and collected throughout the normal course of city operations present significant and valuable opportunities to glean insights and create value by solving problems both public and private. Yet there are limits to the city's capacity to realize the value of all the data it holds. By offering an open data portal, the city facilitates the ability of academic researchers, other public agencies, businesses, nonprofit organizations, and community members to process city data.

It is important to recognize the distinction between an open data portal and a public records portal. Public records are generally understood to be documents created in the normal course of city business, such as meeting agendas, reports, assessments. Open data refers to the assortment of raw data the city maintains, such as geographic coordinates of city assets, data generated by traffic signal controllers, and dollar amounts of payments made to vendors.

It is also important to recognize the distinction between an open data portal and a performance dashboard. While the two can be closely related, they are not necessarily the same. The data portal provides sets of raw numbers or other attributes, whereas a dashboard provides visualization and interpretation of the raw data.

Timing: Future initiative

ADDITIONAL INITIATIVES

The following initiatives are under consideration or require further refinement before inclusion.

- Formalize a citywide operational performance management system

4. ENHANCE ACCESSIBILITY AND TRANSPARENCY

Continue to expand digital education and access

Background: The Carlsbad Library offers training to the community through a variety of programs at library facilities. While interest in productivity software training has declined, interest in creativity software training has grown, as reflected in the establishment of the Dove Library's Exploration HUB, which provides free classes and training on the use of video editing, graphic design, coding, 360-degree video, circuitry and 3D printing tools.

During the digital engagement for Connected Carlsbad, library services were one of the most cited services that people accessed. The comments about the experience were very positive. Continuing to find ways to connect digitally and support educational offerings will help improve the quality of life for library patrons and city residents.

In addition to interactive training opportunities, the library is also working to digitize more of its collection, such as the collection of oral histories at Cole Library, to make it available to anyone online. The library also plans to put together video tours of the community, such as the Barrio neighborhood, or public art throughout the city.

Status: Ongoing

Improve public wi-fi access

Background: The city offers free public wi-fi at most city buildings, including recreation centers, as a service to the community. The range of wi-fi service is typically limited to the inside of buildings and may extend up to a few feet from the building exterior. Given the current broadband connect and many locations, public wi-fi may not be reliable. Additionally, access outside of city buildings but at city locations is intermittent and not consistent. The locations where it is available is also limited.

During the Connected Carlsbad outreach there was interest expressed in expanding public wi-fi to the beaches. There has also been discussion of expanding wi-fi to outdoor locations such as parks.

At a minimum the city should improve the reliability of wi-fi at the locations where it is offered. The city may also want to consider the costs and benefits of expanding public wi-fi to outdoor locations.

Status: Future initiative

Enable online permitting and tracking

Background: The city's central platform for managing the permitting process is was adopted in 2016. Since that time, city staff have been working diligently to implement and refine the system. One of the most significant features still to be implemented is the online customer self-service module. Specifically, this module is designed to offer a public-facing permit tracking feature that provides users with granular details

about the status of permit applications. The most significant hurdle is adapting business processes to conform to the software.

Providing online permitting accessibility would provide a significant convenience for residents and businesses. Additionally, the ability to view permitting activity happening throughout the city through a web or mobile portal would increase transparency and likely reduce calls for information.

Status: Future initiative

Expand and simplify digital access for customer payment

Background: Members of the public make direct payments to the city for a variety of services, including business licenses, permits, recreational program registrations and water and sewer bills. The city has made significant progress toward facilitating these types of payments using online systems and automatic withdrawals, but there is still room for improvement. Simpler and more efficient payment systems have the capacity to substantially reduce staff costs, reduce frustration among the public, increase the public's trust in government, and improve payment compliance.

During the Connected Carlsbad digital outreach the ability to pay utility bills was one of the most cited activities that respondents did online. Expanding and simplifying the accessibility of residents to pay for city services online would provide a great benefit to the public.

Status: Underway

ADDITIONAL INITIATIVES

The following initiatives are under consideration or require further refinement before inclusion.

- Evaluate the utility of way-finding technology
- Support STEAM education and talent pipeline

5. PROMOTE SAFETY & SUSTAINABILITY THROUGH CONNECTIVITY

Upgrade police dispatch system

Background: The police department is moving forward with replacing its Computer Aided Dispatch (CAD) system, which was initially implemented in 2005 and last underwent a major upgrade in 2010 – 2011. The new CAD system will provide a broader range of functionalities that have been developed in recent years to improve police response to public safety incidents. For example, the current CAD system can tell dispatchers about any call at the same address within the last 90 days. A new CAD system could provide additional information, such as all recent calls in the same area from the same phone number. The new CAD could also

include information such as interior floorplans and photos of business when voluntarily provided by the business.

Timing: Underway

Explore geographic based tools to improve fire operations and response

Background: The Fire Department's performance target is to have an emergency response vehicle at the scene of the incident within six minutes of receiving a call, and to have the second emergency response vehicle at the scene within nine minutes of receiving a call, for 90 percent of all calls. The ability to achieve these targets depends heavily on the location of fire stations, the number and type of vehicles in those stations, and the number and type of personnel on duty. Fire officials have traditionally planned the location of fire stations and the number of fire personnel on duty at a given station using industry standard formulas that consider factors such as the number of structures, type of structures, and square footage of structures within a general area of the stations.

There is emerging GIS technology that can more precisely weigh the factors influencing demand for emergency resources. These factors may include irregular street designs, changing concentrations of occupants based on changing uses of structures, and trends in calls for service.

Status: Underway

Ensure adoption of relevant new technologies are mirrored into EOC

Background: The city's Emergency Operations Center (EOC) provides a central location for police, firefighters, medics and other city officials to meet and coordinate during large-scale emergencies such as wildfires, earthquakes, chemical spills and acts of terrorism. The EOC provides officials with real-time information, such as fire perimeters, as well as other information essential to emergency response decisions, such as the location of gas pipelines, schools, parks, etc. The EOC's value to city officials depends on the amount and quality of the information available during emergencies. As city departments implement new technologies — such as unmanned aerial systems (drones) and GIS mapping tools — city staff must evaluate how these technologies will be reflected in the EOC.

Status: Ongoing

Expand the use of traffic analytics tools

Background: The growing connectivity within the transportation sector is generating large amounts of data that can be tapped and analyzed to yield new insights about how traffic moves. These insights are valuable not only for traffic and transportation planning, but also for improving environmental sustainability and unlocking new insights for economic development.

The advanced traffic control systems that currently exist a prime opportunity area for traffic analytics with their ability to generate detailed automated reports about traffic patterns.

Traffic analytics can also be used to help the city measure its progress toward Climate Action Plan goals. New sensor technology enables city engineers to track the number of pedestrians and bicyclists using specific, providing insights toward where pedestrian and bicycle improvements are most needed.

There are also increasing opportunities for cities to collect data from the private sector for public use. Individuals' smartphone location data, gathered by a variety of apps, is stripped of personally identifiable information and is sold to data brokers, who then analyze it and repackage it for other customers, including cities. The city's economic development staff has already begun using this type of data to glean insights about commute patterns between the city's rail stations and business parks. Similarly, at least one GPS navigation app has created a program to freely exchange certain traffic data, enabling cities to make data-driven infrastructure decisions and to more easily share information about road closures and detours with drivers.

Status: Underway

Build out the advanced traffic signal controller network

Background: Over the past decade, the City of Carlsbad has invested significant resources to upgrade its traffic signal infrastructure from a 20th-century model based on rote timers and in-ground sensors to a 21st-century that uses video-based detection connected by a fiber-optic network to a state-of-the-art traffic management center. The next phase in this transformation is the upgrade of the city's traffic signal controllers.

Upgrading the traffic signal controllers provides a broad range of advanced functionality, much of which was not available with previous systems, including the ability to:

- Automatically adapt signal sequences based on real-time traffic conditions
- Integrate and communicate with connected and autonomous vehicles
- Make signals green for transit vehicles and emergency vehicles based on GPS location data

In 2018, the City Council approved a master purchase agreement with a vendor to upgrade the traffic signal controllers at 180 intersections within the city.

Status: Underway

ADDITIONAL INITIATIVES

The following initiatives are under consideration or require further refinement before inclusion:

- Expand energy efficiency and management efforts