FINAL REPORT OF THE EMERGING TECHNOLOGY OPEN WORKING GROUP

CITY & COUNTY OF SAN FRANCISCO

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About this Report

The Emerging Technology Open Working Group was led by City Administrator Naomi Kelly, the highest-ranking non-elected official of San Francisco City and County government. In this capacity, the City Administrator oversees the General Services Agency consisting of 25 departments, divisions, and programs that include the Public Works Department, and Department of Technology among others.

Supporting the City Administrator in this effort were a variety of technology and regulatory leaders in the City, including:

- Committee on Information Technology
- San Francisco County Transportation Authority
- DataSF
- Department of Technology
- Digital Services Office
- Mayor's Office on Disability
- San Francisco Municipal Transportation Agency
- Office of Civic Innovation
- Public Works

Acknowledgements

On behalf of the City Administrator's Office, we would like to thank all the different residents, community groups, and companies that attended the Emerging Technology Open Working Group. Without your interest and passion, none of this would have been possible.

We also want to thank the organizations that attended every meeting, including:

- Community Technology Network
- Daimler
- Healthright360
- Marble
- Microsoft
- Postmates
- sf.citi
- WalkSF
- Zipcar

We also want to extend a very special thank you to our facilitator OnStrategy who provided incredible support throughout the Open Working Group. Thank you.

To view a full list of organizations that participated, please visit:
https://emergingtech.sfgov.org/participants

Dear Mayor Breed and Members of the Board of Supervisors,

San Francisco has long been a center of innovation and technological progress, and local government has an important role to play in effectively managing this change. Over the last several years, we have seen a number of new technologies launched in San Francisco without public input. It is clear that technology is part of the social fabric of life in San Francisco. Yet as keepers of the public right-of-way and other public spaces, we must develop appropriate policy measures to mitigate risks and unintended impacts on San Franciscans and our infrastructure.

Last year, the Board of Supervisors passed a resolution asking my office to convene a Working Group to focus on San Francisco's response to emerging technology. We took a novel approach: invite every interested party, listen to their input, and find consensus on the immediate steps the City can take to balance everyone's concerns. With the input of community groups, industry, and experts, I am pleased to present recommendations to guide City and County of San Francisco policy in this important area.

My recommendations are as follows:

1. Create a "Front Door" for Emerging Technology to provide a central point of contact for companies and the public.
2. Improve communication with the community by informing technology companies of best practices to engage local residents and businesses.
3. Safety test and evaluate new technologies with clear evaluation criteria.
4. Support responsive policy development in areas such as equity, accessibility, privacy and data ethics.
5. Foster smart forecasting through expert collaboration.

These recommendations are intended to help us keep an open dialogue with the community to discuss the introduction of new technologies before their release. Measuring their impact will provide policymakers essential information to make informed choices. Transparency in the process will ensure public participation and improved outcomes.

The recommendations provide policymakers direction on how we can better incorporate new technologies in a way that will support our values. We look forward to continuing the discussion on how to build our public spaces to be welcoming and accessible to everyone.

Sincerely,

Naomi M. Kelly
City Administrator

Executive Summary

San Francisco values reflect the diversity and richness of our neighborhoods and the people who live and work here. Even as our city changes, our values help guide us towards the community we want to live in.

The Emerging Technology Open Working Group was led by City Administrator Naomi Kelly to help develop a series of policy and program recommendations for local government. These final recommendations reflect the contributions of community members, companies, local government, and many others.

A Definition for Emerging Technology
Emerging technologies are defined to include new technologies, applications of technology, and business models that:

1. Are in development and have only been tested at market level on a limited basis.
2. Will have a measurable impact economically, socially, or morally in the next five to ten years.
3. Do not fit within existing regulatory code.

Discussing the Impact of Emerging Technologies
The Open Working Group identified seven major tracks as the major cross-cutting issues emerging technologies present San Francisco.

Track 1 - Collaboration and Partnerships: There is often a lack of trust and understanding between companies and local government. Companies find it difficult to know where to start when interested in operating in the City.

Track 2 - Agile Permitting and Accountability: Regulation is often reactive and lacks a process to respond to rapidly changing technologies and business models.

Track 3 - Community Engagement and Priorities: The City should better communicate strategic goals, challenges, and priorities. Companies need help with understanding community needs.

Track 4 - Equitable Benefits: In some cases, technology only benefits certain types of people, expanding social and digital divides. Impacts from automation disproportionately affect workers from underserved communities.

Track 5 - Accessibility and Safety: Emerging technologies can negatively impact accessibility. The disability community's perspective needs to be shared with technology companies so they are not excluded.

Track 6 - Data Sharing and Privacy: There needs to be a process to share data between government and companies. Resident privacy is not always protected.

Track 7 - Forecasting: There needs to be a structure to talk about the future of technology and its impact on cities. Local government needs to anticipate impacts and proactively work with new technology companies.

Recommendations from the City Administrator

The following recommendations are from the City Administrator and describe some of the major deliverables and actions the City needs to take to better position San Francisco for the future.

Recommendation 1: Create A "Front Door" For Emerging Technology - San Francisco needs a single entrance for technology companies seeking to operate business in our public spaces. A Front Door to local government should be created for emerging technology companies in San Francisco to:

- Focus on the needs of residents, workers, small businesses, and visitors.
- Support adaptive and responsive policymaking.
- Manage a "certain and predictable" permitting process.

Recommendation 2: Improve Communication with the Community - The City should provide guidance to the technology companies on community needs and facilitate ongoing conversations. Some actions include:

- Develop a digital "Front Door" as a one-stop shop for City information.
- Act as a community liaison and communicate community priorities.

Recommendation 3: Safely Test and Evaluate New Technologies - The City should adopt a consistent and agile process that allows companies to safely develop and test products and services in public spaces. Careful evaluation and analysis of this testing phase will help inform the City of the extent of the service's impact and what permits may be required. Some actions include:

- Determine whether to permit testing of new technologies in San Francisco.
- Convene an interdepartmental group to establish evaluation criteria.
- Act as the primary liaison with companies during testing.

Recommendation 4: Support Responsive Policy Development - After testing emerging technologies, the Front Door should provide recommendations and hand off the permitting process to the appropriate agencies. The Front Door should provide technical expertise in the creation of legislation and permit frameworks specifically around equity, accessibility, privacy, data ethics, and data sharing. Some actions include:

- Make recommendations if a permit should be created and which Department is the best permitting authority.
- Determine data sharing requirements for compliance and enforcement.

Recommendation 5: Smart Forecasting through Expert Collaboration - The City should help build trust and strengthen relationships with technology companies, government, and the community. The Front Door should also regularly convene City stakeholders within local government to discuss upcoming technologies. Some actions include:

- Build collaborative partnerships and improve information sharing between cities.

Introduction

San Francisco values reflect the diversity and richness of our neighborhoods and the people who live and work here. Even as our city changes and we grapple with how to overcome our most pressing problems, our values help guide us towards the community we want to live in.

In recent years, new technologies have changed our society in many ways. This impact has been magnified with many of the world's most prominent companies located right here in San Francisco. Every day, we can see the next generation of revolutionary technologies being tested in our neighborhoods and on our streets. But even as our daily lives become more and more dependent on technology, we are still learning the extent of their impact.

The introduction of new and emerging technologies may hold a promise of better services and more convenience, but also bring new challenges and issues to overcome. Existing laws and regulations may not fully capture the impact of new technologies. For local government, our responsibility as a democratically representative body is to be stewards of the public interest and to protect the public from harm. Our rules and regulations reflect our community's needs and values.

The Emerging Technology Open Working Group was formed to host a dialogue on new and emerging technologies in our community. Originally called for by the Board of Supervisors, the working group was led by City Administrator Naomi Kelly to help develop a series of policy and program recommendations for local government.

Our work reflects the contributions of community members, companies, local government, and many others. We are proud of the tremendous support and engagement expressed throughout this process, and eager to faithfully represent their input in the final recommendations.

The following report contains an overview of our dialogue with the Emerging Technology Open Working Group and recommendations to prepare for the next generation of technologies.

For all information regarding the Emerging Technology Open Working Group, please go to our website at **http://emergingtech.sfgov.org/.**

San Francisco Values For Emerging Technologies

San Francisco embraces technology to enhance quality of life and our public spaces.

In 2018, the San Francisco's Board of Supervisors adopted Resolution 102-18 urging the City Administrator to create a working group to inform future legislation on emerging technologies. The intended purpose of the working group was to bring together community members, technology companies, and local government to support the City Administrator in the creation of policy recommendations.

Emerging technologies are defined to include new technologies, applications of technology, and business models that:

- **Are in development and have only been tested at market level on a limited basis.**
- **Will have a measurable impact economically, socially, or morally in the next five to ten years.**
- **Do not fit within existing regulatory code.**

Throughout the Open Working Group, we focused the dialogue on the impacts of technology rather than identify the next generation of technology products. However, our discussions referred to a variety of examples of "emerging technologies."

To help frame our discussion on the impacts and public benefits of emerging technologies, here are some prominent examples:

- Advanced Biometrics and Facial Recognition
- Algorithm Bias
- Artificial Intelligence and Machine Learning
- Autonomous Delivery Robots
- Blockchain
- Drones
- Transportation Network Companies
- Robotic Process Automation
- Virtual and Augmented Reality

Note: Definitions for common terms are available in Appendix A: Glossary of Terms.

The original resolution adopted by the Board of Supervisors identified several principles to include in working group discussions. These principles include:

- The Precautionary Principle states that every San Franciscan has an equal right to a healthy and safe environment and requires that our air, water, land, and food be of a sufficiently high standard that individuals and communities can live healthy, fulfilling, and dignified lives.
- Should provide a net common good, with consideration on whether such emerging technology benefits the few at the expense of the many.
- The safety, needs, and convenience of humans shall be prioritized over any emerging technology use.
- The needs of the most vulnerable members of our community, including seniors, children, and those with mobility or other limitations are adequately considered.
- The testing or piloting of any technology provide the greatest emphasis on ensuring public safety, including a manual human override as appropriate.
- Any direct or indirect costs on the use of public infrastructure should be paid by the owner or operator of the technology and not by the public.
- Data sharing with relevant public agencies should be a condition of any authorization to use the public realm.
- In evaluating the public benefit of any emerging technology, the potential impact on congestion on roads, sidewalks, and public spaces should be carefully considered.
- Where appropriate, provide preference to those technologies that support rather than reduce the labor force in San Francisco.
- Where appropriate and feasible, technologies should include labeling, individual permit identifiers, business information, and emergency contact information for those responsible for the deployment of products.
- Where technology should protect private information of individuals, such information should be protected and appropriate informed consent given.
- Public-Private partnerships in Emerging Technology should be considered and evaluated to the highest standard, including any benefits, impacts, and costs to the City or the public infrastructure.
- Any regulation should be nimble and responsive to changing conditions and demands.

Methodology:
Engaging Our Community

The City Administrator created the Emerging Technology Open Working Group in June 2018 to support the development of final recommendations. The Open Working Group met with the community over the following six months.

The Open Working Group's objectives were to:

- Engage the community and technology experts in the policy making process.
- Gather feedback on recommendations for a regulatory and permitting process that addresses use cases on land, in the air and water, inside buildings and underground.
- Develop a nimble and responsive governance framework that City Departments can use with emerging technology companies to partner with the City.

The Open Working Group meetings were broken into phases, with each building on the other to help the City Administrator develop final recommendations. Public meetings were pivotal points to gather input and provide direction for final recommendations.

RESEARCH PHASE. *Objectives:* City staff analyzes how other cities approach emerging technologies. Staff conduct interviews with experts to get perspective on problems and solutions.
LISTENING PHASE. *Objectives:* Gather information from the public on most important issues, identify problems for focus of the remainder of the project. Open Working Group Meeting Dates: July 9 & July 23
NEEDS IDENTIFICATION. *Objectives:* Identify the major values and problems we need to address Open Working Group Meeting Dates: August 17
SOLUTIONS DEFINITION. *Objectives:* Define what solutions must / not do and identify possible solutions to problems identified in previous phases. Open Working Group Meeting Dates: September 17
SOLUTIONS IDENTIFICATION. *Objectives:* Define what solutions must / not do and identify possible solutions to problems identified in previous phases. Open Working Group Meeting Dates: November 5

To help run the Open Working Group meetings, the City hired a outside facilitator OnStrategy. Over the course of five community meetings, 477 people RSVP'd to attend the meeting, 112 pages of session notes were written, and an additional 175 written comments were submitted via online surveys. In addition, the staff advisory team held a workshop with 19 departments, conducted 59 interviews with a variety of experts, and researched 28 cities and other organizations.

A full list of participating organizations is available at: https://emergingtech.sfgov.org/participants

Discussing the Impact of Emerging Technology

Opening the discussion to community groups, companies, and City staff provided a broad perspective on emerging technologies. The Open Working Group identified seven major tracks as the major cross-cutting issues emerging technologies present San Francisco.

Track 1 - Collaboration & Partnerships

Challenges:

There is often a lack of trust and understanding between companies and local government. Companies find it difficult to know where to start when interested in operating in the City. Each city's regulation is different without much sharing of lessons learned as to how they addressed specific technologies.

Guiding Questions:

- How might the City work with the community and emerging technology companies to solve common problems?
- How can companies and the City work and learn together to address the opportunities and impacts of emerging technologies?
- What incentives would be helpful to encourage collaboration with the City?
- How might we collaborate with other cities and jurisdictions with emerging technology deployments?
- How can we partner on critical safety, accessibility, and equity goals?

Track 2 - Agile Permitting & Accountability

Challenges:

Regulation is often reactive and lacks an agile process to respond to rapidly changing technologies and business models.

Regulation only recovers the cost of administering and enforcing permits, and does not take into account the costs related to the physical impacts of using public infrastructure.

Guiding Questions:

- How might the City better provide a certain and predictable permitting process for emerging technologies?
- How can we make the permitting process more agile and responsive?
- How do we make regulations easier to follow and understand?
- How can the public best engage with the City to ask questions and get feedback?

Track 3 - Community Engagement & Priorities

Challenges:

The City could better communicate strategic goals, challenges, and priorities in a way that new businesses and technology can solve. Companies need help with understanding community needs and opportunities and engaging with residents in neighborhoods.

Guiding Questions:

- How might we set goals for San Francisco in a way that involves everyone including residents, community groups, and businesses?
- How should City leaders work with the community to develop a vision for San Francisco?
- What are new ways the City can involve the community in decision making with regard to emerging technologies?

Track 4 - Equitable Benefits

Challenges:

Technology is underutilized in improving equity, and in some cases only benefits certain groups of people, expanding social and digital divides. Further, impacts from automation disproportionately affect workers from underserved communities.

Guiding Questions:

- How might we encourage new technologies that benefit all communities, especially low-income and underserved communities?
- What can we do to share the benefits of new technology?
- How do we prevent new technologies from expanding economic, social and digital divides?
- How do we protect underserved populations from new risks and dangers?

Track 5 - Accessibility & Safety

Challenges:

Depending on their application, emerging technologies can reduce accessibility. The disability community's perspective needs to be shared with technology companies so they are not excluded.

Guiding Questions:

- How might we make sure emerging technologies are safe and accessible to all SF residents, especially those with disabilities?
- How can we make sure people with disabilities can share the impact of new technologies on their lives?
- How do we make sure emerging technologies are safe to use in public spaces?
- How do we encourage design practices that emphasize improved accessibility and usability for all residents, including residents with disabilities?

Track 6 - Data Sharing & Privacy

Challenges:

There is no standard process to share data between local governments and companies. Resident privacy is not always protected.

Guiding Questions:

- How might the City encourage data sharing practices that promote a data-driven City while also respecting individual privacy?
- How do we best protect individual privacy?
- What technical and operational standards or practices are needed for data sharing with companies?

Track 7 - Forecasting

Challenges:

There is no formal structure with subject matter experts to talk about the future of technology and its impact on cities, making it difficult for local government to anticipate impacts and proactively work with new technology companies.

Guiding Questions:

- How might the City anticipate the next generation of technologies and business models?
- How can the City learn about new technologies, other than sales pitches?
- What kind of forum is appropriate to talk about the future?
- How can we better anticipate the impact of new technologies?

Recommendations from the City Administrator

Over the course of 2018, the Emerging Technology Open Working Group provided feedback on the impact of emerging technologies and possible policy actions. All input was consolidated for the City Administrator to develop policy recommendations to the Mayor and Board of Supervisors.

The following recommendations are from the City Administrator and describe some of the major deliverables and actions the City needs to take to better position San Francisco for the future. They are intended to help San Francisco embrace technology to enhance quality of life and our public spaces.

Recommendation 1:
Create a “Front Door” for Emerging Technologies

New and emerging technologies continue to be developed and launched in San Francisco. Permits are often required to operate on our streets and sidewalks but more is needed than just a new permitting process.
San Francisco needs to improve communication and collaboration with technology companies in order to anticipate the impact and benefit of their services, and make it clear what to do when a permit is necessary.

Recommendation: San Francisco needs a single entrance for technology companies seeking to operate in our public spaces. A Front Door to local government should be created for emerging technology companies in San Francisco.

Major responsibilities of an Emerging Technology Front Door include:

1. **Focus on the needs of residents, workers, small businesses, and visitors.** Local government should be an advocate for our community and help to create an ongoing dialogue so that new technologies benefit everyone.

   San Francisco also needs expertise to address the risks and challenges that come with some new technologies. The Front Door should bring forward community values around equity, accessibility, data ethics, cybersecurity, and privacy as new products and services are introduced in San Francisco.

2. **Support adaptive and responsive policymaking.** By definition, emerging technologies are still being developed and are not finished products. This makes evaluating impact that much harder for local government wanting to issue consistent and continuously relevant rules and regulations.

   The Front Door should understand how to adapt policy making to the prototyping process, and have experience creating controlled tests that both local government and future companies can learn from. The Front Door should lead impartial impact analysis in technical areas to better inform final policies.

3. **Manage a “certain and predictable” permitting process.** Ultimately, the Front Door should help companies understand what permits might apply to them and obtain the permits necessary to operate in San Francisco. Because emerging technologies may have impacts not accounted for in existing legislation, this process may include creating new legislation and new regulatory code.

San Francisco’s Emerging Technology Front Door should be staffed with professionals with strong technology credentials who understand our community values and our regulatory environment.

Establishing a Front Door for emerging technologies is only a first step. The following recommendations describe some of the actions the Front Door and the City need to engage in to adapt to new and emerging technologies.

Recommendation 2:
Improve Communication with the Community

To succeed at anticipating new technologies and adapting the regulatory rules and process for unforeseen issues, San Francisco needs to improve dialogue with the community and technology ecosystem.

Recommendation: The City should provide guidance to the technology companies on community needs and opportunities. It should be easy to talk to the City to ask questions and to learn about our highest priorities. In the same manner, the City should be able to gather basic information on what new innovations are on the horizon and what will be introduced into our public spaces.

The Front Door should help begin a conversation between residents and the companies themselves. The City can then act as a bridge to connect companies and the neighborhoods they are directly impacting.

Major Deliverables:

- **Develop a digital “Front Door”** through the City’s website and provide contact information. Online forms should be available to share basic information to start a dialogue when a company is considering launching. The website should be a one-stop shop for information on working with the City, especially if there are questions about permitting or regulation.
- The City should **act as a community liaison** and provide resources to facilitate communication between companies and neighborhoods. The City should pay particular attention to existing and evolving accessibility standards. As these new services are being developed, the City should help bring together a diverse group of stakeholders including people with disabilities, older adults, people of color, economically disadvantaged individuals, and others to make their voices heard.
- **The City should communicate community needs and priorities** and make information publicly available via our Open Data Portal, **with relevant dashboards highlighting priority areas.**
- When an opportunity arises, the City should also **call for solutions that help solve for specific challenges.**

Recommendation 3:
Safely Test and Evaluate New Technologies

By definition, emerging technologies are still in the development and testing phase. Their business models, use cases, and target markets are still being explored. For technologies that require testing in our public spaces, a new permitting process is needed.

Recommendation: The City should adopt a consistent and agile process that allows companies to safely develop and test products and services in public spaces. This requires adjusting the permitting process to support the prototyping and testing through limited deployments.

Careful evaluation and analysis of this testing phase will help inform the City of the extent of the service's impact and what permits may be required. The City should develop criteria to evaluate new services on the basis of City values, equity, accessibility, data ethics, cybersecurity, and privacy among others.

Major Deliverables:

- Front Door should **collect information on companies that seek to test products or services in San Francisco.** Information should be collected on the expected number of users, location, impacts, risks, past experience.
- The City should **support a community dialogue** to discuss upcoming tests and their results. Resources and contact information should be made available for community, accessibility, and government stakeholders to promptly address impacts and concerns that arise during tests.
- The Front Door should make an initial determination on whether to test the technology in San Francisco. **The testing approach must ensure fairness and competition for additional companies in the market.** In collaboration with permitting departments, the Front Door should decide if the category of technology needs (a) an existing permit, (b) temporary testing permit, (c) no permit needed, or (d) if no test is allowed in San Francisco.
- **Convene an interdepartmental group to establish evaluation criteria** for the temporary testing permits. The Front Door should provide expertise on accessibility, cybersecurity, equity, privacy and data sharing.
- If a testing permit is issued, Front Door staff should act as the **primary liaison with companies** during testing phase to report back concerns and complaints as well as steering the company toward the most positive outcome for our communities. The Front Door should **coordinate metrics, timeline, geographic boundaries, and data sharing agreements for evaluation and compliance.**
- Front Door should develop **universal design standards for accessibility and safety** that make clear any non-negotiable constraints.
- The Front Door should facilitate connections between residents, especially the disability community members through **User Testing Forums.** Resources should be provided on best practices in accessible product development and service delivery. Resources should be provided on best practices in accessible product development and service delivery.

Recommendation 4:
Support Responsive Policy Development

Emerging technologies that complete the testing phase and are approved for Citywide release may need a more formal permit to continue to operate. Given new and emerging technologies often present issues not fully accounted for in existing regulatory code, this process can be cumbersome. Going forward, San Francisco needs a standard process to update regulatory code to address emerging technologies in an agile, transparent, and timely manner.

Recommendation: After testing emerging technologies, the Front Door should provide recommendations and hand off the permitting process to the appropriate agencies. Emerging technologies may impact several different parts of life in San Francisco, from public health and safety to public spaces and infrastructure. The experts responsible for keeping our City safe and secure should be responsible for the ongoing oversight and enforcement of the rules.

The Front Door should continue to provide technical expertise in the creation of legislation and permit frameworks. In particular, policies around equity, accessibility, privacy, data ethics, and data sharing should be a collaborative effort that draws on lessons from the testing phase.

Major Deliverables:

- The Front Door should share the results of the testing phase to an interdepartmental permitting group, and **make recommendations if a permit should be created and issued. The Front Door will also identify which Department is the best permitting authority** and work with this permitting authority to make findings available at a relevant public hearing.
- In consultation with the companies and permitting authority, the Front Door should help **determine realistic and helpful data sharing requirements for compliance and enforcement.**
- The Front Door should continue to act as a **community liaison to facilitate communication** between companies and neighborhood groups to share results of temporary testing permit and next steps.
- The Front Door should help **share legislation templates** with other cities and across the region to support each other's legislation and standards.

Proposed Emerging Technology Permitting Model

	Discovery	Pilot Application/MOU	Pilot Evaluation	Legislation / Permission	Ongoing Evaluation
User Steps	◆ Company identifies market opportunity in SF with a new technology ◆ Approaches the “Emerging Tech Front Door” for information to pilot ◆ Conducts early community outreach	◆ Define business model ◆ Negotiate terms of pilot and data sharing rules ◆ Ongoing community engagement & user testing	◆ Present impact evaluation metrics in community forums ◆ Collect equity, accessibility, cybersecurity, privacy data	◆ Provide additional information as needed for BOS and permitting departments ◆ Continue community outreach	◆ Company scales business model to entire City, or as permit requires ◆ Company shares data as needed
City Steps	◆ Confirmation this is an emerging technology and level of scale worth engaging with ◆ Front Door identifies permitting authorities ◆ Provides information on ET pilot & permitting process ◆ Analyze evidence of impact in other cities ◆ Evaluate whether limited pilot in SF is warranted ◆ Draft pilot design and identify benchmark criteria for impact analysis	◆ Assemble evaluation steering committee ◆ Develop pilot terms & conditions (time, place, manner) ◆ Identify ultimate permit authority ◆ Identify what data the company must collect versus the City collects ◆ Issue pilot MOU	◆ Field observations ◆ Conduct equity, accessibility, cybersecurity, privacy assessment ◆ Make go/no go decision to get a permit ◆ If go, hand-off legislative & permitting process to permitting agency ◆ If no go, pilot stops	◆ Once legislation passes, create permit terms & conditions ◆ Issue permit	◆ Permitting department conducts periodic reviews and inspections ◆ If additional permit requirements added that existing agency does not have capacity to oversee, Emerging Tech Front Door to take responsibility
Agencies	**Lead:** Emerging Tech Front Door	**Lead:** Emerging Tech Front Door **Support:** Relevant Permitting Agencie	**Lead:** Emerging Tech Front Door **Support:** Relevant Permitting Agencies	**Lead:** Governing Permitting Agency **Conditional:** Emerging Tech Front Door	**Lead:** Governing Permitting Agency **Conditional:** Emerging Tech Front Door

Recommendation 5:
Smart Forecasting through Expert Collaboration

Technology is constantly changing and government is challenged to keep up with the opportunities and impacts of technology. The City needs to improve its capacity to forecast new technologies and leverage technological expertise to help create coherent and effective policy. San Francisco needs formal collaborative mechanisms to learn and gain expertise to reduce the reactive nature of emerging technology policymaking.

Recommendation: The Front Door should be a leader in creating partnerships with both companies and other cities. Not every technology will be created or initially launched in San Francisco, and we need a mechanism to learn from deployments in other places. In some cases, it may be better to develop an emerging technology in another city before coming to San Francisco.

The Front Door should also help build trust and strengthen relationships with technology companies, government, and community by hosting gatherings and talks about priority issues for our city.

Major Deliverables:

- **Build collaborative partnerships and improve information sharing between cities** to understand impacts and apply lessons learned, building on existing networks. San Francisco should also help establish a **“Bay Area Regulatory Sandbox”** to help encourage information sharing on new technologies. A sandbox will define spaces in cities to test out new ideas in safe environments that minimize negative risks but also understand potential for positive outcomes. Evaluations can be shared across cities and companies to create a regulatory learning environment.
- **Create regular forums** for conversations with companies, investors, and entrepreneurs considering deploying new technologies to engage with stakeholders and build trust.
- **Conduct research and issue Requests for Information (RFIs)** to identify, understand, and assess potential for impact and public benefit of emerging technologies.
- **Convene multi-departmental stakeholders** to review and assess possible impacts and opportunities with upcoming emerging technologies. An important step in spreading awareness of upcoming technologies and coordinating any regulatory efforts.

Long-Term Recommendations

Throughout the Emerging Technology Open Working Group, we heard many other recommendations that would help us succeed. Below are a series of additional recommendations from the Emerging Technology Open Working Group. San Francisco should consider adopting these recommendations over time.

- **Develop Community Outreach Standards:** The manner in which companies and local government interact with residents and neighborhoods varies widely. The City should look to the Fix-It Team and other effective models for community engagement to establish a series of standards. Fix-It Team website: https://sfmayor.org/neighborhoods/fix-it-team

- **Create a Jurisdictional Map of Permitting Authorities:** Navigating San Francisco's permitting process requires interacting with multiple different agencies who all have different steps and requirements. As a first step to streamlining the permitting process, San Francisco should develop a jurisdictional map of all the City's permits and processes.

- **Conduct a Cost Recovery Study on Public Spaces:** Companies that operate their business in public spaces may also be exacting additional cost on infrastructure, which require additional support and maintenance. San Francisco should conduct a cost-recovery study to understand the products that use public infrastructure and recommend a true cost-recovery program.

- **Create a Partner Scorecard that Tracks Company Compliance and Performance:** To help further transparency, San Francisco should create scorecards on permitted companies. This information can be used to help evaluate future applications and work done with the City.

- **Explore Partnership Opportunities where Emerging Mobility Services Support Public Transit:** In some cases, emerging mobility products may be able to support citywide transit goals. The City should explore options to work in partnership with these developing business models.

- **Conduct an Automation and Labor Vulnerability Study:** San Francisco needs to better understand the impact of automation on our labor force. The City should leverage research currently being conducted by the Office of Economic and Workforce Development to analyze new technologies and their labor impact.

- **Equity Impact Assessment:** San Francisco should consider conducting equity assessments to evaluate the impact of new technologies. Technology has the potential to both expand and shrink societal inequalities. The City should be deliberate in its policies and pilots to address equity issues.

- **Support a Equity Technology Fund to Help Lower Income Residents, especially those with Disabilities:** New technologies have the potential to transform our lives, especially those with disabilities or underserved populations. A dedicated fund to help populations in need with accessible and adaptive technologies.

- **Incentivize and Promote Apprenticeship Programs:** The next generation of jobs will require technology expertise. San Francisco should continue to incentivize apprenticeship programs with local technology companies to help train the next generation.

- **Incentivize Hiring Policies that Encourage Diversity:** San Francisco should help encourage technology companies to become more diverse. Through incentives and procurements, the City can help bring in new voices to the technology community.

- **Investigate a Third-Party Data Collaborative:** Sharing data between government and companies can be difficult as proprietary interests and transparency goals sometimes conflict and there is a lack of trust amongst partners. San Francisco should explore a third-party partnership to steward data sharing amongst regional partners and local companies. This collaborative would include considerations of governance as well as technology to support a high trust exchange of data among partners.

- **Hire an Ethical Data Use Officer:** Data privacy continues to be the emerging policy issue regarding technology. However, local government also has an imperative around transparency. Balancing these interests will require a new framework of thinking about the ethical use of data. San Francisco needs clear leadership and guidance to shape the ethical use of data both inside and outside of government.

- **Establish An Ethical Data Use Advisory Council:** To establish a governance framework for data sharing, cybersecurity, and privacy with companies operating in public spaces.

- **Explore Creating a Council of the Future:** San Francisco should consider creating a public-private committee to discuss the next generation of technologies. By having a public discussion with experts on new and emerging technologies, the City can better prepare for the next big thing.

Measuring Our Progress

To reach our vision of a City that embraces technology to enhance quality of life and our public spaces, we'll need to make a lot of changes.

Measuring our progress will allow us to track if we are making the right kind of changes that will help us achieve our vision. The following are a few criteria that we will use to measure our progress.

Initiating Connection & Foresight: The City has the capacity to forecast emerging technologies, while also providing a transparent engagement process.

- Does the community have a place to discuss or bring up a concern about a new technology?
- Do companies know who to talk to and where to go in the City?

Working with the City: The City communicates its priorities and needs while also providing guidance to companies on how best to operate.

- Is there a one-stop shop to understand City priorities and talk to staff?

Testing in the City: The City provides opportunities and guidelines for companies to test their technologies which can also better incorporate community input.

- Are residents aware and engaged in tests in their neighborhoods?
- Do companies have the ability to demonstrate how their product can operate safely and in an inclusive manner in San Francisco?
- Does testing help make technology products more accessible and inclusive?
- Has testing helped anticipate risks and prevent harm?

Formalizing Operations: San Francisco should keep pace with emerging technologies to appropriately regulate and permit their products.

- Are regulations able to adapt to emerging technologies?
- Is the permitting process certain and predictable?

Deepen Engagement and Community Partnerships: Emerging technologies should benefit communities of concern and reduce the digital divide.

- Is the City partnering with technology companies to solve urban challenges faced by all residents, especially those in the community of concern?

Conclusion

When a new technology company launches in San Francisco, it is joining our community. With so many technology companies in our backyard, San Francisco has a unique opportunity to collaborate with the technology sector to develop shared values of innovation for the public good. Creating a Front Door to technology companies can help San Francisco better prepare for the future. Through better communication and shared expectations, we can create a community we all enjoy living in.

Appendix A: Glossary of Terms

The Emerging Technology Open Working Group helped the City realize that a lot of the terminology that technologists and government use is hard to understand. This glossary is intended to help translate some of the common terms used between government, community, and technology.

Accessibility	Easily used or accessed. This includes enabling access for people with disabilities.
Adaptive Technology	Name for products which help people who cannot use regular versions of products, primarily people with disabilities.
Section 508 of the Rehabilitation Act	A federal law that requires federal agencies to make their electronic and information technology accessible to people with disabilities.
Agile	Agile software development is an approach to software development. It advocates adaptive planning, evolutionary development, early delivery, and continual improvement, and it encourages rapid and flexible response to change.
Algorithm	A sequence of instructions telling an application what to do.
Americans with Disabilities Act	A federal civil rights law that prohibits discrimination based on disability. It requires that state & local governments, and public accommodations ensure effective communication with individuals with disabilities, including equal access to services or information.
Artificial Intelligence	Computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.
Assistive Technology	Any item, piece of equipment, or product system that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.

Augmented Reality	A technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view.
Autonomous Delivery Robots	A technology service that uses robots to deliver products from point A to point B without direct human navigation.
Biometrics	An evolving form of authentication that uses distinctive, measurable characteristics used to identify an individual.
Blockchain	A blockchain is a decentralized, distributed and public digital ledger that is used to record transactions across many computers so that any involved record cannot be altered retroactively, without the alteration of all subsequent blocks.
Board of Supervisors	The legislative branch of the City and County of San Francisco. The Board consists of 11 members. Each member is elected on a non-partisan basis from a district where he or she lives.
Cease & Desist	A document sent to an individual or business to stop purportedly illegal activity ("cease") and not to restart it ("desist").
Communities of Concern	The definition of “communities of concern” is intended to represent a diverse cross-section of populations and communities that could be considered disadvantaged or vulnerable in terms of both current conditions and potential impacts of future growth.
Community Engagement	A dynamic relational process that facilitates communication, interaction, involvement, and exchange between an organization and a community for a range of social and organizational outcomes.

Data Ethics	Refers to systemizing, defending, and recommending concepts of right and wrong conduct in relation to data, in particular personal data.
Deaf	A particular group of deaf people who share a language – sign language and a culture.
Digital Divide	The gulf between those who have access to digital technologies and the skills to use them effectively, and those who do not.
Digital Economy	Refers to an economy that is based on digital computing technologies, although we increasingly perceive this as conducting business through markets based on the internet.
Digital Equity	Full and equal access to technology and its benefits for all people, regardless of demographics, with additional support for those who need it most.
Director's Order	Public Works Orders represent formal and official acts of the Department. For example, there are Orders that recommend that the Board of Supervisors approve something within Public Works' jurisdiction, Orders that announce Public Works/Administrative hearing officer hearings or decisions, and Orders that adopt Public Works regulations implementing various programs or laws, among other actions.
Disability	In California disabilities are broadly defined as conditions that limit a major life activity, including physical and mental disabilities, as well as medical conditions such as cancer or HIV/AIDS. California wdefinitions and protections can be broader than protections under federal law.
Drones	A drone is a flying robot that can be remotely controlled or fly autonomously through software-controlled flight plans in their embedded systems, working in conjunction with onboard sensors and GPS. Drones are more formally known as unmanned aerial vehicles (UAV) or unmanned aircraft systems (UAS).

Emerging Mobility	Emerging Mobility Service or Technology is one that automates three or more of the following services: • Driving • Routing • Reservations/orders • Vehicle tracking • Billing • Customer feedback • Matching/sharing • Crowd-sourced routing • (Un)locking Examples of Emerging Mobility Services and Technologies include ride-hail services, autonomous vehicles, bike share, and ride-pooling services.
Emerging Technology	Technologies that are perceived as capable of changing the status quo. These technologies are generally new but include older technologies that are still controversial and relatively undeveloped in potential.
Ethical Algorithm	Government leaders and staff who leverage algorithms are facing increasing pressure from the public to better understand the implications of using an algorithm, and be able to clearly articulate the potential risks and identify ways to mitigate them.
Facial Recognition	A biometric application that identifies or verifies a person by comparing and analyzing patterns based on the person's facial contours.
Jurisdiction	The official authority granted to a legal body to administer justice within a defined field of responsibility, e.g., California tax law. In federations like the United States, areas of jurisdiction apply to local, state, and federal levels.
Limited English Proficient (LEP)	Individuals who do not speak English as their primary language and who have a limited ability to read, speak, write, or understand English can be limited English proficient, or "LEP." These individuals may be entitled language assistance with respect to a particular type or service, benefit, or encounter.

Low-Income	Low-income is considered twice the level of the federal poverty level. The official poverty thresholds do not vary geographically, but they are updated for inflation.
Machine Learning	Machine learning is an application of artificial intelligence that provides systems the ability to automatically learn and improve from experience without being explicitly programmed.
Ordinance/Resolution	A piece of legislation enacted by a municipal authority.
Personal Identifiable Information (PII)	Information that can be used on its own or with other information to identify, contact, or locate a single person, or to identify an individual in context.
Pilot	Also called a feasibility study or experimental trial, is a small-scale, short-term experiment that helps an organization learn how a large-scale project might work in practice.
Public Domain	The state of belonging or being available to the public as a whole, and therefore not subject to copyright. Public domain refers to all the creative works to which no exclusive intellectual property rights apply. Those rights may have expired, been forfeited, expressly waived, or may be inapplicable.
Public Health	Public health promotes and protects the health of people and the communities where they live, learn, work and play. While a doctor treats people who are sick, public health workers try to prevent people from getting sick or injured in the first place.
Public Right of Way	Type of easement granted or reserved over the land for transportation purposes, this can be for a highway, public footpath, rail transport, canal, as well as electrical transmission lines, oil and gas pipelines. A right-of-way can be used to build a bike trail.

Public Space, Public Realm	The space around, between and within buildings that are publicly accessible, including streets, squares, parks and open spaces. These areas and settings support or facilitate public life and social interaction.
Request for Information (RFI)	Request for Information is a standard business process whose purpose is to collect written information about the capabilities of various suppliers. An RFI is primarily used to gather information to help make a decision on what steps to take next. Normally it follows a format that can be used for comparative purposes.
Request for Proposal (RFP)	A request for proposal is a document that solicits a proposal, often made through a bidding process, by an agency or company interested in procurement of a commodity, service, or valuable asset, to potential suppliers.
Robotic Process Automation	Robotic process automation (or RPA) is an emerging form of business process automation technology based on the notion of software robots or artificial intelligence workers.
Sandbox	A sandbox is a testing environment that isolates untested code changes and outright experimentation from the production environment or repository.
SF Digital Service	Is a team within the City that works with other City departments to improve public services through technology. The team is re-building the City's website and is re-thinking how public services are designed, by understanding what users need.
Sunshine Ordinance	It is an ordinance to insure easier access to public records and to strengthen the open meeting laws. The Sunshine Ordinance also outlines a procedure for citizens to follow if they do not receive public records they have requested.

Transgender	Denoting or relating to a person whose sense of personal identity and gender does not correspond with their birth sex.
Transportation Network Company	An organization that pairs passengers via websites and mobile apps with drivers who provide such services. Transportation network companies are examples of the sharing economy and shared mobility. Sometimes known as a mobility service provider (MSP) or ride-hailing service. Uber and Lyft are prominent examples.
Universal Design	An approach that ensures complete user experience, inclusive of people with disabilities and all users in mind. This approach can be applied to any product, whether that be a building, service or tool, solutions designed using this approach serves not only the needs of a single minority group, but creates an environment that is accessible and convenient for all. Universal Design is based on these 7 Principles: 1) Equitable Use - The design is useful and marketable to people with diverse abilities. 2) Flexibility in Use - The design accommodates a wide range of individual preferences and abilities. 3) Simple and Intuitive Use - Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills or current concentration level. 4) Perceptible Information - The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities. 5) Tolerance for Error - The design minimizes hazards and the adverse consequences of accidental or unintended actions. 6) Low Physical Effort - The design can be used efficiently and comfortably and with a minimum of fatigue. 7) Size and Space for Approach and Use - Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

Usability Testing	Usability testing is a technique used in user-centered interaction design to evaluate a product by testing it on users. This can be seen as an irreplaceable usability practice, since it gives direct input on how real users use the system.
Virtual Reality	The computer-generated simulation of a three-dimensional image or environment that can be interacted with in a seemingly real or physical way by a person using special electronic equipment, such as a helmet with a screen inside or gloves fitted with sensors.
Vision Zero SF	Vision Zero SF is the City's road safety policy that builds safety and livability into the streets, protecting the one million people who move about the City every day. The City and County of San Francisco adopted Vision Zero as a policy in 2014, committing to build better and safer streets, educate the public on traffic safety, enforce traffic laws, and adopt policy changes that save lives. The goal is to create a culture that prioritizes traffic safety and to ensure that mistakes on our roadways don't result in serious injuries or death. The result of this collaborative, citywide effort will be safer, more livable streets as we work to eliminate traffic fatalities by 2024.
Voluntary Product Accessibility Template (VPAT)	A self-assessment document completed by a vendor that provides relevant information on how their product or service claims to conform to Accessibility Standards.
Waterfall	The waterfall model is a relatively linear sequential design approach for certain areas of engineering design. In software development, it tends to be among the less iterative and flexible approaches, as progress flows in largely one direction ("downwards" like a waterfall) through the phases of conception, initiation, analysis, design, construction, testing, deployment and maintenance.
World Wide Web Consortium (W3C) standards	The World Wide Web Consortium (W3C) develops international standards for the Web: HTML, CSS, and many more. It includes the Web Content Accessibility Guidelines (WCAG) 2.0 and 2.1 which explains how to make web content and applications more accessible to people with disabilities.

Appendix B: Emerging Mobility Recommendations

In 2018, the San Francisco Transportation Commission adopted the Emerging Mobility Evaluation Report which looked at a variety of new technology companies launching products on San Francisco streets and sidewalks. Contained within the report is also series of recommendations which are shared below.

The Emerging Technology Open Working Group continued to build from the work conducted by the San Francisco County Transportation Authority and San Francisco Municipal Transportation Agency. Our hope is that both the recommendations by the City Administrator and the Emerging Mobility Report will be considered jointly when discussing the future of new technologies in San Francisco.

For the full report, please go to: **https://www.sfcta.org/emerging-mobility/studies**

Recommendation 1:
Proactively Partner

The SFMTA and the San Francisco Municipal Transportation Agency should develop a framework for emerging mobility pilots that considers this study's evaluation results and encourages the city to proactively partner with companies to develop innovative solutions to address unmet city transportation needs. This framework should consider partnerships with transportation companies, employers, developers, and civic and neighborhood organizations.

- Develop a Framework for Emerging Mobility Pilots
- Establish a Public-Private Emerging Mobility Task Force
- Pilot Mobility as a Service Application

Recommendation 2:
Collect Emerging Mobility Data and Conduct Research

San Francisco public agencies should develop a data reporting and warehouse strategy to coordinate and consolidate existing data streams. Additionally, the city should employ a travel decision study to understand travel behavior. Such a study could be combined with a mobile application pilot that studies traveler choices and factors that inform them.

- Develop a Data Reporting and Data Warehouse Strategy
- Conduct a Travel Decision and Behavior Study
- Pilot a 3rd Party Data Collaborative

Recommendation 3:
Regulate and Recover Costs

The SFMTA should harmonize existing permit programs related to emerging mobility and create a framework for new services. The emerging mobility permit program should administer a permit fee that considers the full cost to plan for and regulate these services. Similarly, the city should seek regulatory and/or impact fees to mitigate effects these services have on safety, city resources and investments, as warranted by research studies. The permit must also require a standard set of data necessary to conduct ongoing evaluation of these services and include standards for equitable provision of services to underserved areas and to people with disabilities.

- Harmonize existing permits and develop emerging mobility service permit framework
- Develop and Implement Emerging Mobility Impact Fee
- On-Street Shared Vehicle Parking Permit Program
- Develop and Implement an Emerging Mobility Business Tax

Recommendation 4:
Bridge Mobility and Access Gaps

The city should develop a user study to more clearly understand who uses emerging mobility services and for what purposes. This study should focus on equity gaps for low-income users and issues related to disabled access. The SFMTA and the Transportation Authority should also develop pilots to fill mobility and access gaps, such as for on-demand accessible services, late night transportation, school-related transportation, and in areas less well-covered by public transit.

- Reduce Barriers to Access
- Conduct an Equity and Disabled Access Study
- Pilot Late Night Transportation Options

Recommendation 5:
Support Public Transit and Prioritize Transit

The Transportation Authority and the SFMTA should continue to support the expansion of transit-priority facilities and methods to make transit service more competitive. The Transportation Authority and the SFMTA should collaborate in developing a series of studies related to rights-of-way prioritization, vehicle miles traveled, financial impacts, and cost-recovery. To support these studies, the Transportation Authority and the SFMTA should conduct pilot programs that improve first and last mile connectivity to transit stations.

- Continue to Support Expansion of Transit-Priority Treatments
- Conduct a Customer experience study
- Conduct a Right-of-Way Prioritization Study
- Conduct a Financial Impact Study
- Pilot First and Last Mile Connections to Transit

Recommendation 6:
Enforce Safe Streets

The SFMTA and the Police Department should increase enforcement of known emerging mobility conflict areas throughout the city and consider piloting enforcement blitzes to encourage safe operation. Similarly, they should seek legislative authority and implement a pilot that automates enforcement to promote safety, ensure more systematic adherence to traffic rules, and reduce enforcement costs. The SFMTA should also develop a Vision Zero study that studies collision rate trends and unsafe operations, determines whether there is a correlation with emerging mobility services, and identifies recommendations to reduce traffic fatalities.

- Conduct an Emerging Mobility and Vision Zero Study
- Increase enforcement of traffic rules and hours of service

Recommendation 7:
Manage Congestion at Curbs and on City Roadways

The SFMTA and the Transportation Authority should prioritize developing a curb management strategy that allocates and prices curb access appropriately. Such a strategy should be supported by curb management pilots with emerging mobility services and through a curb management prioritization study. The SFMTA should also develop and implement an emerging mobility streets design guide to reduce modal conflicts. Finally, based on current congestion levels on San Francisco roadways, San Francisco should move toward implementing a decongestion pricing and incentives system, whether through cordons or roadway user fees, to manage roadway congestion.

- Move towards implementation of a Decongestion Pricing and Incentives Program
- Develop a Curb Management Strategy
- Produce a New Mobility Street Design Guide

Appendix C: Staff Report - General Research Findings

In June 2018, the Emerging Technology Staff Advisory Team began interviewing experts and researching emerging technology in other cities. In all, the team conducted 59 interviews, researched 28 cities and other organizations, and had dozens of other interactions. The team also surveyed 80 participants who attended our first two Emerging Technology Open Working Group listening sessions on July 9 and July 23.

Who we interviewed	Listening Session Attendees
• **13** Community Groups • **7** Non-Profits • **17** Private Sector • **12** City Staff • **10** Government • Researched **28** Cities	• **57** Nonprofits • **51** Community Members • **29** Small Businesses and Industry • **22** Private Sector • **37** City staff

From this research, our team identified the parameters for the definition of emerging technology. We then used survey feedback to select guiding principles and identify City goals for emerging technology. Finally, we identify potential benefits and challenges associated with emerging technology as well as an initial list of recommendations.

The following notes reflect the Emerging Technology Staff Advisory Team notes upon the conclusion of the research phase in August 2018.

Definition of Emerging Technology

From City's perspective, emerging technologies include:

1. technologies,
2. applications of technology, and/or
3. business models

which:

A. are in development and have only been tested at market level on a limited basis;

B. The city identifies a public interest in governing because they are expected to have a measurable impact economically, socially, or ethically in the next five to ten years; and/or,

C. Do not fit within existing regulatory categories or schemes within San Francisco.

The first part of the definition captures how technology advances. For example, widespread connectivity has led to the creation of new technologies as well as novel business models. The second part of the definition identifies when the City wants to be involved: early on. Local government needs to be involved when the public is likely to be impacted and when the technology cannot be easily regulated within the City's existing model.

Guiding Principles

We asked survey participants from our Emerging Technology Open Working Group listening sessions to choose which principals they believed were most critical for the successful implementation of emerging technologies. The top ten results include:

1. Accessibility
2. Equity
3. Public Value
4. Regulation that is nimble and responsive
5. Net common good
6. Accountability
7. Collaboration
8. Public safety
9. Security
10. Sustainability

Going through the results in more detail, we also identified five major themes from the responses:

1. **Quality of life.** Respondents believed a primary goal for emerging technology should be improving the quality of life for residents. This includes increased public safety, justice, prosperity, and livability.
2. **Public-private relationships.** Respondents believed strong public-private partnerships were important for enhancing safety and providing equal services to all residents. Respondents described a responsive City framework that is not over burdensome and that fosters and promotes innovation.
3. **Equity.** Respondents wanted to create a technology ecosystem in San Francisco that delivers an equitable distribution of the benefits of technology across all residents.
4. **Innovation Leadership.** Respondents were well-aware of San Francisco's leadership as a center of innovation. They believed the best way to maintain this title is with a City leadership that is balanced and informed. City leadership should also allow the public to drive the process on technology decisions.
5. **Informed Community.** Respondents focused on the need for informed, connected, and supported communities that understand and benefit from the opportunity brings, especially with regard to a higher quality of life.

How can emerging technology benefit San Francisco?

City leaders throughout the world, subject matter experts, industry members, and community groups all provided explanations of how new emerging technologies might improve quality of life in San Francisco. Our survey participants also are enthusiastic about the potential of emerging technology. When asked in a survey whether technology can have a positive impact on their community, all 60 respondents rated at least a four on a scale from one to seven (seven being a very positive impact on the City). Even more encouraging, 78% of respondents rated a six or seven.

The benefits identified from our research and survey responses include:

- bolstering quality of life for residents,
- improving City functions, and
- increasing engagement between residents and City government.

These benefits ranged from concrete examples in other cities to more theoretical future benefits. Many caveated these benefits with potential tradeoffs, risks, and other considerations, which we focus on in the next section.

Participants suggested that new technologies can be used to improve equity and safety for residents, encourage creativity and sustainability, and foster community. For example, new technologies might help the City ameliorate food deserts, improve mobility for residents with disabilities, or reduce carbon emissions. Technology could also be leveraged to connect artists for public works projects or provide tools for communities to organize and problem-solve.

Participants believed that new technologies might also be used to help the City run more efficiently. Technologies might help city planners and businesses understand trends to make informed decisions, including understanding and tracking displacement. Emerging technology could also bring a more agile and adaptive approach to the way City services are delivered. Technologies might also help the City advance priorities by reducing costs and creating new revenue streams. Additionally, technology has the potential to streamline bureaucracy, allow the City to respond to citizen demands more quickly, and improve coordination among services.

Respondents also described ways emerging technology could improve engagement between residents and the City. For example, technology might democratize services, allowing residents to understand City functions and improving transparency and accountability. Technology might make civic duties easier, like voting. Technology also might allow residents to engage with public spaces in new ways.

Potential Challenges of Emerging Technology

In addition to identifying opportunities that technology presents for San Francisco, participants shared concerns about obstacles that could prevent the city from realizing its goals. Broadly, concerns can be sorted into three buckets, relating to concerns about the:

- public sector's role
- technology itself
- intersection of City government, technology, and the community

On the government side, some participants are concerned about the City's politics as well as its ability to be nimble, not overregulate, and to use data to make informed decisions. Participants worried that political calculations, special interests, and/or a lack of strong leadership might impede the successful implementation of emerging technology. Respondents also believed bureaucracy, including government silos and the instinct for rigid governance that is then interpreted differently within government are two barriers to creating an effective framework for emerging technology. Also highlighted are questions around whether the City can leverage data to identify problems and find solutions.

On the technology side, some participants responded that they were fearful of technology, while others focused on the potential for bad actors or issues of privacy, security, and safety. Participants voiced concern that companies might focus too narrowly on profits without mitigating unintended consequences of their products and services, leading to subpar privacy and security.

Participants also had broad concerns at the intersection of government, technology, and the community. This includes poor communication between and different pacing of government and technology companies, lack of accountability, and misaligned incentives between (and within) sectors. Participants also worried about a lack of awareness and outreach to communities and had limited faith that emerging technology would be used to target problems that are important to the community.

Potential Recommendations

The Working Group's initial research was focused on information gathering from experts and understanding the aspirations and concerns from advocacy organizations and communities. Along the way, experts and participants included recommendations to consider as the Emerging Technology Open Working Group moved forward. Below are some suggested recommendations, grouped by topic.

Big Picture recommendations:

- **Create a vision and goals.** Create a vision and series of goals for emerging technology companies to respond to when they're seeking to work in San Francisco.
- **Build a city network.** Convene a network of cities to encourage testing in small and mid-size cities that can inform governance across cities and provide paths for technologies to scale
- **Reinforce good behavior.** Find opportunities to praise and support PR for companies that enhance city values or goals

Regulatory recommendations:

- **Create a single "front door" with one point of contact in the City.** This could include a simple checklist that provides guidance on what companies can and cannot do and a mechanism to guide companies through the process and tell them who they need to talk to. This system should be designed to incentivize companies to engage with the City.
- **Experiment.** Use experimentation as a principle, and have a streamlined process for experimentation. One way to do this without fixing the market is to create testbeds, like FAA is doing with drones. Demonstration projects allow the city to have a standardized way to pilot new technologies.
- **Use outcomes oriented compliance.** Create a performance based system that says what the City seeks but not how companies have to get there for regulatory standards. For instance, define "this is what it means to be safe" and require companies to show how they can meet that standard.
- **Iterate.** Regulate adaptively and have a multi-step regulatory process. This relies on continuous monitoring to keep track of concerns, find problems, and propose and implement minimal regulations to solve them.
- **Give time to small companies.** Provide small and early stage companies with time to comply with new regulations in a way that doesn't put them out of business.

Equity and Accessibility recommendations:

- **Rely on community advocates.** Work with trusted organizations to reach vulnerable populations and train them to train residents on how to use new services
- **Use purchasing power.** Use government purchasing as an incentive to make products **accessible**
- **Find ways to engage affected communities.** Create a channel for people who haven't been able to participate or who have been disadvantaged through technology to open a channel of conversation. Do not try to work on these problems without having people who are affected by the problem there.

Data and privacy recommendations

- **Work with outside organizations for data analysis.** The City could pilot a partnership with a 3rd party (e.g. a university) to disaggregate and analyze data and create reports for the City.
- **Ensure interoperability.** The City should ensure data interoperability so more than 1-2 companies can emerge.
- **Don't reuse data.** Data gathered for one purpose shouldn't be reused for another purpose without checking in with the data source.
- **Require data collection transparency.** Regulate that companies provide transparency around what's going to happen with the data they collect
- **Require data deletion standards.** Ensure that companies do not store data for longer than is needed for the reason it was collected.

Forecasting recommendations:

- **Coordinate with communities with insider knowledge.** Coordinate with external communities like the World Economic Forum and the Venture Capital community
- **Balance between experts and private sector.** Recognize that experts are much better at predicting new technologies than business models that will be successful, while the private sector is better at identifying business models
- **Forecast for the largest number of possibilities.** Identify a wide set of probable futures - rather than a single, most probable one - and develop a strategy that will handle the largest number of possibilities (not necessarily the most probable possibility).
- **Use patent trends.** Review patent trends to understand how companies are thinking about the future

Conclusion

Our conversations with experts and our community provided the City with a solid foundation for approaching a framework for emerging technology. This process helped us temperature check how communities feel about emerging technology and where and how people thought the City should leverage new technologies. It also allowed us to check any blind spots we might have, identify what people believed to be major pain points, and clarify areas for further research.

Appendix D: Staff Report - Learning from our Friends

As part of our research phase, City staff analyzed how other cities and jurisdictions are handling the introduction of new technologies. The following report describes our findings from other cities.

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Key Takeaways

Talking to cities about their approach to emerging technology led us to some incredible insights, best practices, and aspirations. We would like to ground our report with these takeaways as they can help guide San Francisco's policy-making efforts:

- **Articulate meaningful city goals to help companies communicate how they can help.** Cities and companies may have different goals, but they are not necessarily in conflict. Cities had an easier time working with companies when they had clear goals they wanted to achieve and they communicated them well. This means defining what it means to "advance equity" or "make technology accessible."

- **Having an easy way to pilot new technologies is crucial.** We heard over and over again about the importance of testing a technology in one's own city before full-scale deployment and creating a nimble mechanism (like demonstration projects) to establish a pilot quickly. Cities described that use-cases of a technology in other cities was a good starting place. However, cities are sufficiently different in culture, demographics, politics, etc., meaning that learning from others cannot replace testing out the technology in one's own backyard. Many cities aspire to be "beta" cities or "testbeds."

- **There will always be cases where cities need to be reactive, but proactive projects have the best results.** This one is obvious, but important. Cities are in different stages of proactive problem solving with technology. However, most describe better control over projects when they are proactive projects, rather than reactive ones. Being forward thinking leads to better collaboration with companies as well.

- **Technology might be use-case specific but the government process is not. Use this to your advantage.** Generally, cities thought that new technologies would have quirks and nuances that would require a different permit or pilot. (In some cases, cities tried to make a permit for one technology broad enough to apply potentially to a similar, even more emerging technology [e.g. dockless bike to electric scooters].) However, while the permit might be different, the process would remain similar. Cities spoke aspirationally about creating a standard or streamlined process to permit emerging technologies.

- **It's about people, not technology.**
A good working relationship, consistent collaboration, and continuous stakeholder engagement (with both the community and the private sector) were cited as some of the most important factors for the success of a project.

Introduction

In the spring of 2018, the Board of Supervisors passed Resolution 102-18. This resolution urged City Administrator Naomi Kelly to create a working group to inform future legislation on emerging technologies.

From July to December 2018, the City Administrator will convene an Open Working Group made up of a variety of perspectives — including members of the public, City stakeholders, academics, industry, community groups, and advocacy organizations — to inform the City's engagement and governance of emerging technologies. The final recommendations will help the city realize its goal of using technological innovation to improve quality of life for the community while mitigating unintended consequences.

As an initial step, City staff conducted research on cities around the country and the world to understand their tactics for addressing the impact of new technologies. This research is fundamental to explore new and emerging technologies as well as learn about effective implementation models and strategies for promoting equity and engaging our community.

The figure below is a visual description of the steps of the Emerging Technology Open Working Group process. The findings from this research will help inform our final recommendations in December.

Figure 1. Project Journey Overview for the Emerging Technology Open Working Group

	RESEARCH PHASE. *Objective:* Staff advisory team begins work with comparative analysis on other city's approaches to emerging technology. Team conducts interviews with experts to get perspective on problems and solutions.
	LISTENING SESSIONS. *Objective:* Gather information from the public on most important issues in order to identify problems for focus of the remainder of the project.
	NEED IDENTIFICATION. *Objective:* Consolidate feedback and provide a list of major values and issue areas we need to address.
	SUBGROUPS. OBJECTIVE: Subgroups are designed by issue area to establish criteria for success and develop specific recommendations.
	SOLUTIONS DEFINITION. *Objective:* Define what solutions must and must not do. Present and receive feedback on initial recommendations.
	FINAL RECOMMENDATIONS. *Objective:* Final working group meeting to review final recommendations and receive feedback.

From the City's perspective, we define emerging technologies as the new technologies, applications of technology, and business models that:

1. are in development and have only been tested at market level on a limited basis;
2. are expected to have a measurable impact economically, socially, or morally in the next five to ten years; and
3. do not fit within existing regulatory categories or schemes within San Francisco.

It is important to note that emerging technologies are separate but related to "smart city" technology. Generally, we view smart city technology as innovations that cities use to improve services. Adopting smart city technologies has led cities to grapple with how to use data better and try new technologies in a variety of new ways and at different scales.

In contrast, emerging technologies are generally led by private actors and the cities main role has been to provide oversight and regulation. And in the past, regulations have often been reactive.

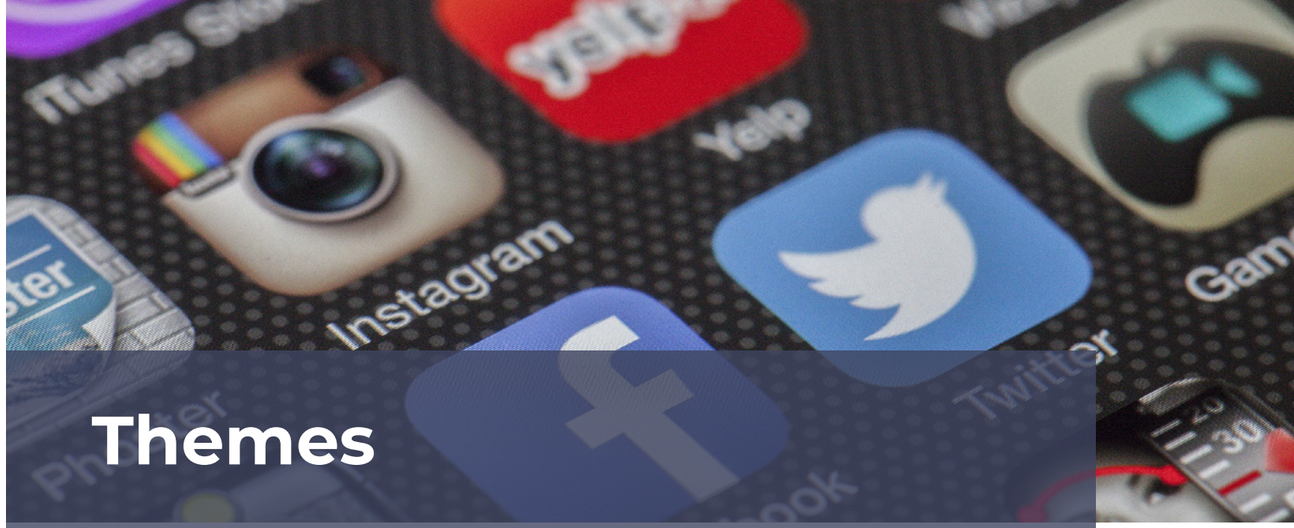
In this report, we look at both emerging and smart city technology because we believe there are lessons that we can learn from "smart city technology" than can inform regulatory approaches. Additionally, we want to highlight the ways in which cities have proactively engaged with smart city technologies to solve problems and innovate since many of the objectives of smart cities overlap with our regulatory goals. In short, there is a lot to learn from smart cities!

This report offers a sampling of technology frameworks and projects from other cities. From our research and conversations with other cities, we identified common issues and priorities, including:

- **Clear vision and goals**
- **Engagement and partnerships**
- **Digital divide and equity**
- **Accessibility**
- **Data sharing**
- **Privacy**
- **Enforcement**
- **Forecasting**

Each section features a brief description of the topic and relies on case studies to illustrate how various cities have approached the issue. The report then highlights some topics (such as cybersecurity) that we think merits more consideration and focus.

We hope this research will serve as part reconnaissance and part inspiration. It was designed to get people thinking about the spectrum of responses to emerging technology and how San Francisco might be able to move from a reactionary position to a more proactive, problem-solving one.



Themes

Clear Vision And Goals

Cities must have a keen understanding of what they hope to achieve through their use of technology as well as a set of goals to measure progress. This is especially true as the market for emerging and smart city technology grows exponentially. To frame this need, the market for sensors and other WiFi enabled Internet-of-Things (IoT) devices will reach between 4 and 11 trillion dollars annually by 2025. Predictably, cities are increasingly inundated with sales pitches and are struggling to figure out what to adopt.

Without a vision, cities risk getting lost. They might make unsound investments or miss out on opportunities for collaboration with the private sector and communities. City departments might all implement technology without talking to and learning from one another. Instead of leading the dialogue, cities risk being reactionary instead.

A clear vision for the future helps to address this problem. It does not mean cities need to have everything figured out, but rather a vision helps create an approach to technology that is tailored to a given city's needs and values. To that end, there is a broad spectrum of goals and approaches cities have taken to plan for the future. Below are examples from Singapore, Kansas City, and Boston, which illustrate the spectrum of how cities are envisioning the future of their cities.

Singapore and autonomous vehicles

In 2016, the World Economic Forum ranked Singapore as the most "technology-ready" city in the world. This was the result of a concerted effort. The government realized new technology was being implemented across agencies without any higher coordination. This meant there was a fair amount of redundancies and lessons learned were not leveraged across agencies.

As a result, Singapore took deliberate steps to create a vision for the future and assign leadership to make it happen. In Singapore, this took form by creating a central innovation office. With their leadership, they split their focus in two directions: promoting **adoption** of new technologies and creating appropriate **regulation.**

With clear leadership, the innovation team began tackling strategic priorities such as improving transportation in Singapore by reducing reliance on private transportation and increasing use of public transportation. The transportation innovation team worked with the transportation departments to think through how technology could be used to solve problems. An increase in travel demand, a labor shortage, and an aging population led Singapore to look to autonomous vehicles (AV).

Looking to the future, Singapore now has created a five-year testbed for AVs. Officials worked to pass the Road Traffic Act which granted broad authority to the Minister of Transport to create new rules regarding the timeline and scope of AV trials, equipment required, and data sharing standards. The government also worked with Nanyang Technological University to establish the Center for Excellence for Testing and Research of AVs, which would create testing and certification standards. Finally, Singapore built a test park for AVs and released a request for information (RFI) to find AV companies seeking to pilot their technology.

Together these actions created a large and nimble regulatory "sandbox" for AVs which has allowed for the slow integration of AVs from the test park to city streets. This flexibility has led to several pilots, including piloting AV trucks with Toyota and Scania, AV public buses with ST Kinetics, and AV cars with A*Star, nuTomony, Delphi, and Smart. Singapore is now looking ahead to integrating their AV pilots with vehicle-to-vehicle and vehicle-to-infrastructure communication technologies. At the end of the five year sandbox regulation period, Singapore will evaluate the pilot to determine if it should either enact more permanent legislation or extend the testing period.

Kansas City and its Comprehensive Smart City Partnership

In June 2018 the City Council of Kansas City, Missouri unanimously authorised the City Administrator to release a request for proposals (RFP) for a Comprehensive Smart City Partnership. In the RFP, Kansas City states their vision of becoming the "first true smart city in the world," by building on past initiatives and partnering with a private sector firm to design and build "a fully integrated suite of sensors, networks, and data and analytics platforms."

Kansas City began their smart city initiatives in 2016 after Google Fiber chose the City to be the first metropolitan area to get high speed Internet access. The City underwent a major revitalization project with the creation of a new, free streetcar through downtown Kansas City and took the opportunity to make the area more connected through a partnership with Cisco. Initiatives include free WiFI (provided by Cisco and Sprint), smart kiosks that provide way-finding and hyperlocal advertising, and smart streetlights that dim and brighten as needed.

The 2018 RFP builds on this progress and is the first of its kind in duration and scope. The partnership will begin after the City's five year contract with Cisco ends and last between 10 and 30 years. The new partner will be responsible for maintenance of the Cisco system and in exchange for public right of way access and data, the partner will provide capital and build data analysis platforms. Proposals are due on July 31, 2018. Atlanta, Georgia and Columbus, Ohio recently have followed suit and issued similar RFPs.

Boston and its Smart City Playbook

In 2017 Boston, Massachusetts released its Smart City Playbook, a webpage that acknowledges the City is not yet sure what the smart city trend means for Boston, especially in the long-term. The purpose of the playbook is to provide advice to technology companies, researchers, journalists, and activists who want to work with the City as it develops a long-term vision.

Boston's goal is to create a strategy for sensor-technology that is "people-centered, problem-driven, and responsible." The City's core advice to companies is to help Boston grapple with the details and implications of the smart city:

- **Stop sending sales people.** Boston wants to talk to people who know about cities, who have examples of successes and failures in other cities, and who address concerns raised in the playbook.
- **Solve real problems for for real people.** Boston is looking to improve quality of life for its residents. Companies should talk to residents of and advocacy organizations centered in Boston about issues people are facing in the City. Companies must be able to evidence the problem and how their technology helps solve the problem.
- **Don't worship efficiency.** While important, efficiency implies that government knows what it ought to focus on and simply needs to make processes cheaper. Boston wants companies to engage with them not only on cost and efficiency but on what and how to problem solve.

- **Make better decisions, not (just) better data.** A lot of the technologies that are pitched to Boston talk about long-term cost savings from data insights. However, these savings frequently are dependent on behavior or policy change as well, which is difficult to guarantee. The City wants more than potential improvements based on data; it wants partners who have thought about these challenges, concretely and in the context of Boston, and who can help make decision-making easy.
- **Platforms make them go ¯_(☺)_/¯ .** Boston is trying out new technologies on a case by case basis to see what they can learn. The City is not ready for platforms because they do not know what sensors will be used, how they will be networked, where they will be located, or what technical standards will be applied to them.
- **Towards a public privacy policy.** Boston is concerned about the amount of personal identifiable information (PII) that will be collected as the city starts to deploy more sensors and is looking to build an infrastructure that will collect as little data as possible. The City is interested in learning how companies are handling PII, including what they are collecting and what methods are used to anonymize data, as well as general data management and sharing practices.

Engagement And Partnerships

Community engagement is a critical component of local government for shared decision making and collective problem solving. As emerging technologies are deployed across cities in new and novel ways, cities are grappling with how to educate the public on the specifics of various technologies and installation plans, how to solicit feedback on the project, how to identify problems and solutions as a community, and how to be accountable and share lessons learned.

In addition, high costs, civil liberties concerns, and the technical knowledge required to evaluate technology often necessitates that cities engage outside partners to help with a project, from the private sector to academia to community organizations.

Below are two examples — from New York and Chicago — of how cities are engaging communities and relying on partnerships when deploying emerging technologies.

New York City and the NYCx Co Lab Brownsville Project

In 2017 the Mayor's Office of Technology and Innovation in New York, New York launched the Neighborhood Innovation Lab also known as the NYCx Co-Lab. The intent of the lab is to solve local problems using technology in collaboration with local residents, technology companies, community organizations, and other stakeholders.

The first collaboration was in Brownsville, a small neighborhood in Brooklyn with high poverty and public housing and a history of low investment from the City. Osborne plaza was chosen to be the anchor site for the project, and the team decided to install smart furniture for residents of Brownsville to test out. They installed:

- BigBelly solar trash and recycling containers that alert the sanitation department when full,
- Soofa park benches that can charge residents' cell phones using solar power and collect data on when and how frequently the plaza is used, and
- LinkNYC kiosks that provide WiFi and information on city services.

Technology workshops and trainings for community members of all ages also take place in Osborne plaza, as part of this effort.

In addition to the above pilot, the Co-Lab also hosted brainstorm sessions and community forums over the course of several months to identify need. Out of this collaborative needs assessment came two priorities: one to enhance and encourage residents to use public spaces at night and another to reduce waste and increase recycling rates. These needs became the subject of two NYCx Co Lab challenges titled "Safe and Thriving Night Corridors" and "Zero Waste in Shared Space." These challenges called for technology solutions to each of the problems, and selected winners would each receive $20,000 to pilot their solution in Brownsville.

Chicago and the Array of Things

In 2016, Chicago announced a partnership with the University of Chicago and Argonne National Laboratory to install environmental sensor nodes around the city. Together, the nodes create a network of sensors (mounted on light posts) that collects a host of real-time data on Chicago's environmental surrounding and urban activity. The nodes can hold up to 15 sensors and also include a computer, two cameras, a microphone, and a cooling fan. In addition, the software, hardware, specifications etc., are open source. The project is known as Array of Things and is thought of as a "fitness tracker" for the city.

Since the Array of Things involves multiple, networked cameras and sensors, a key part of Chicago's community engagement was related to privacy. The City engaged subject matter experts, including the Electronic Frontier Foundation and the American Civil Liberties Union, to write a draft policy. This was then released for public comments using Madison, a platform that allows residents to leave comments and annotations on legislation as well as see what other residents have commented on. From here, the City incorporated feedback and the policy was then approved by an oversight council (which was advised by a technical privacy and security working group) and again made public.

Smart Chicago Collaborative, a civic organization funded by the MacArthur foundation, the Chicago Community Trust, and the City of Chicago, began educational outreach soon after the program was announced. Initially Chicago sought input on policies and where nodes should be located. However, the City soon realized it first needed an educational component that described the technology (including what it could and could not do) to a lay audience as well as the broader goals for the technology.

Chicago also launched its first effort at youth education and engagement with Array of Things, called "Lane of Things." Lane of Things is an 8-week course taught to Lane Tech High School

students. The course covers computer science topics and teaches about the sensors deployed around the city as well as uses for the data. Chicago hopes to expand this program to other schools in the coming years.

Digital Divide And Equity

Many cities have begun to attempt to correct for the systemic racism and injustices that guided policymaking for decades. Some cities are attempting proactively to promote inclusion, offer tailored services, and provide opportunities for economic growth to underserved neighborhoods, people of color, those with disabilities, and other communities that face discrimination. [1]

The implementation and distribution of technology in a city can further marginalize communities, offer solutions that improve the safety and quality of life for these communities, or a mixture of both. By making equity an explicit focus for emerging technologies, cities can help to ensure they grapple with how technology might disproportionately impact underserved communities and/or make proactive policy that seeks to improve quality of life.

Below are two examples of how Portland and Seattle think of equity and emerging technology.

Portland and it's Smart City PDX Framework

In June 2018, Portland City Council in Oregon adopted the Smart City PDX Priorities Framework, the result of a collaboration between 14 departments and all five City Commissioners' offices. Portland's framework established guiding principles for evaluating proposals and choosing data and technology investments throughout the City, with a stated focus on "addressing the problems of and reducing disparities for communities of color and people with disabilities." These principles, which must be adhered to in order to receive PDX funding, include:

- The community should lead identification of needs, priorities, and solutions. The community should also be involved in designing projects and making decisions.
- Evidence-based interventions and success metrics decided with community input
- Commit to ongoing refinement and evaluation of projects
- Make data freely available and accessible so that the public can evaluate decisions and create their own solutions
- Be effective partners with outside groups including academia, non-profit organizations and national consortiums, other agencies, and private sector companies

Portland identified the following focus areas for its framework:

- Economic Prosperity
- Public Safety
- Human Health
- Environmental Health
- Transportation/Mobility
- Education
- Housing
- Resiliency

[1] Note: the section titled Accessibility will seek to explore equity with regards to those who are differently abled.

The City will use its Smart City Steering Committee to implement the framework and share, manage, and evaluate smart city policies and projects, funding opportunities, and potential partnerships. The Committee is led by the Bureau of Planning and Sustainability (BPS), Mayor's Office, Portland Bureau of Transportation (PBOT), Office for Community Technology (OCT), and the Bureau of Technology Services (BTS).

Seattle and dockless bikes

Seattle, Washington was an early adopter of dockless bicycles. The City began a pilot in early 2017 after ending their municipal docked bikeshare program due to financial problems. To participate in the pilot, companies needed to apply for a permit and meet requirements across several criteria including safety, parking, insurance, data, and equity.

To encourage hiring and other opportunities for underserved communities, Seattle has identified a tier of neighborhoods throughout Seattle that are economically distressed and should be prioritized. The tier is based on three indicators:

1. rate of people living 200% under the poverty level,
2. unemployment rate
3. and the number of people over 25 without a college degree.

For the dockless bike permit, the City required that companies include neighborhoods in this tier in 20 percent of their service area.

Unfortunately this requirement did not act as intended. Companies simply designated their service area as "Seattle" rather than noting specific neighborhoods. The companies argued that because they are dockless, it is hard to say where the bicycles will end up.

Initial data suggests some diversity in ridership and good coverage in those tier one neighborhoods (riders skew white, young, and male). For the next phase of the permit, the City is looking into creating more specific requirements for promoting an equitable distribution of bikes throughout the city and encouraging companies to service areas in the far north and south areas of the City.

Accessibility

As cities becomes places where residents increasingly rely on technology for services and navigating the city, cities need to ensure that the technology used is accessible to everyone. This includes those with disabilities as well as older populations.

Cities should challenge themselves to ensure each product they install is accessible. Cities should also work to mitigate any harmful consequences that piloting or installing new technology might have on differently-abled residents (e.g. ensure scooters are not in the public right of way). Finally, cities should be responsive to feedback and look at how technology can be used specifically to solve problems for this demographic (e.g. accessible pedestrian signals).

Below are examples from Detroit, New York City, and the California Legislature, which is currently debating an accessibility bill with regard to transportation network companies.

Detroit and adaptable cycling program

Detroit launched its bikeshare program, called MoGo, in May 2017. After a successful first year with over 120,000 rides, the City decided to create a pilot program that provided cycling options to those who cannot ride a traditional bike.

The pilot program is provided via a partnership with the City, a local bike shop called Wheelhouse Detroit, and a nonprofit called Programs to Educate All Cyclists (PEAC). The six month pilot provides 13 different types of cycles, including tricycles, hand tricycles, incumbents, tandem bikes, and cargo bikes.

Rather than the traditional bikeshare program where bikes are docked at stations around the city and ready to go at any time, the adaptive bikes must be reserved ahead of time and all are stored at one Wheelhouse Detroit location. Staff at Wheelhouse is trained to help riders find the appropriate bike and get set up and if the cyclist had a companion rider, the companion rides for free.

MoGo and PEAC are working on outreach to inform residents about the program. The City is also conducting surveys and focus groups to determine what works about the program and where there is room for improvement. After the pilot ends in October 2018, the City plans to evaluate the program and make necessary changes.

New York City and LinkNYC

In 2014, Mayor De Blasio issued a request for proposals (RFP) to reinvent New York City's payphones. The RFP asked for plans that would provide free WiFi and phone calls as part of a digital equity campaign.

The Mayor's Office for People with Disabilities got involved in the writing of the RFP to ensure it included accessibility standards. These standards were developed by looking to the Americans with Disabilities Act, web accessibility standards (WCAG 2.0), and a digital toolkit prepared by G3ict, a global initiative for inclusive information and communication technologies. Some standards include an appropriate height range, using braille on any buttons, and selecting a tablet that has built-in accessibility features. In addition to engaging early and getting accessibility language in the RFP, the Office for People with Disabilities also acted as one of the judges for the RFP.

A Google-funded company called CityBridge won with their LinkNYC kiosk. The 9.5 foot tall kiosks are equipped with device charging capabilities and a tablet that could browse maps, city services, and the internet. LinkNYC chose to use an Android tablet, which had accessibility features like screen reading, magnification capability, and the option to invert colors. However, CityBridge did not initially turn on these functions and the company was eventually sued by the National Federation of the Blind. The lawsuit was settled after CityBridge agreed to turn on these functionalities as well as create a dedicated shortcut key to request assistance with a Link, accessibility training for staff at CityBridge, and the appointment of an accessibility coordinator to ensure the changes were made. The Office for People with Disabilities has continued to work with CityBridge on improving accessibility and adding additional features.

California and SB 1276, transportation network companies (TNCs) and accessibility for persons with disabilities

California Senator Jerry Hill introduced bill SB 1276 into the Senate in early 2018. The bill would require California Public Utilities Commission to develop regulations for transportation network companies (TNC) like Uber and Lyft regarding accessibility accommodations, including those who need a wheelchair accessible vehicle. The bill passed the Senate and is currently making its way through the Assembly.

If the bill is enacted, Public Utilities Commission would be required (by 2020) to conduct workshops with cities, counties, advocacy organizations, etc., to develop programs for on-demand services, service alternatives, and partnerships. The bill would also require each TNC to be accessible and would impose a fee on TNCs until they comply. This fee would then be applied to fund on-demand accessible transportation services for persons with disabilities. Any party that is funded would need to provide detailed reports regarding number of rides and geographic availability. Importantly, this bill would also alter TNCs liability and protect them from lawsuits from the disabled community.

Data Sharing

Data is what makes a smart city "smart." By generating new and traditionally hard to come by data, ensors and other emerging technology can create new insights about how residents engage with their city and how the city can adjust its services or design to improve quality of life.

There is no shortage of examples from the private sector about the level of insights that can be made from a wealth of data. However, cities can have a hard time acquiring meaningful data from companies. Owning all or some of the data is also a challenge because more data means more security vulnerability.

Cities have taken different approaches to data sharing, from asserting ownership over the data to trying to collect as little as possible. Below are some examples from Boston and Seattle.

Boston and autonomous vehicles

In 2016 Boston Mayor Marty Walsh signed an Executive Order to begin testing of autonomous vehicles with the goal of making transportation more reliable, safe, and accessible. Mayor Walsh granted oversight to the Transportation Commissioner who would lead oversight and development of policies along with the Department of Transportation and the Mayor's Office of New Urban Mechanics.

Generally, the City's approach to data is to own as little as possible while setting out requirements to ensure companies are collecting data to evaluate the pilot. In the autonomous vehicle pilot, companies working with the city (like nuTonomy and Optimus Ride) must collect and provide upon request data necessary for evaluating the cars. The City also reserves a right to demand specific data (regarding unexpected occurrences, safety issues, etc.) if needed.

In addition to this policy, Boston requires companies to release data publicly, especially when devices are in the public right of way, as a transparency measure. For example, autonomous vehicle companies are required to create and make public quarterly usage reports. These reports must include information on crashes, miles and locations driven, conditions driven in, and failures and disruptions while in autonomous mode. Finally, companies must also host at least two public meetings to share their research agenda as well as thoughts on infrastructure needed, feedback on policy, data collection, and partnerships.

Seattle and dockless bikes

As mentioned in the section "Promoting equity," Seattle's dockless bicycle pilot began in 2017. A challenge Seattle faced in getting data is that multiple companies were participating in the pilot. Since Seattle, like many other cities, has broad open data and request for data protocols companies were afraid any proprietary data collected might be made public and reveal business strategies to competitors.

To get around this issue, Seattle partnered with the University of Washington via the Transportation Data Collective. The University collected and analyzed the data and then rolled it up into reports that the City received. This collaboration was not perfect. For instance, because one of the companies was very small, one could identify them in the aggregated data. However, the partnership was a creative one that allowed for interesting insights and lessons learned.

For example, Seattle designed a mandatory survey that the companies had to administer to their riders via company apps. The University of Washington was able to tie the survey responses to rider identification numbers, which allowed the University to see connections between responses and how the respondent uses the service. The City also had to manage difficult situations such as how to handle companies who did not comply with administering the survey, who only somewhat complied by administering it to a few riders, or who changed the questions in the survey.

Seattle and traffic sensors

In 2016 Seattle began using adaptive signal control, a Siemens technology that automatically adjusts in real time the timing plan of traffic signals based on prevailing conditions and traffic demands. Simply put, the city set up sensors, transponders, and a data platform that allows for longer green lights and/or shorter reds along high traffic corridors when pedestrian traffic and cross-route traffic was low and adjust in real time as traffic patterns change.

The current program in Seattle is a pilot known as Mercer SCOOT for its location along Mercer street and an acronym for the system (split cycle offset optimization technique). Early data seems to indicate that the system reduces traffic time by a small margin but traffic reliability by a large one, meaning that while there is still traffic along the commute, it is more predictable (e.g. you know you'll be in 20 minutes of traffic everyday rather than 20 minutes one day and 45 the next).

Seattle determines the best data ownership and sharing policy for each specific project. For the traffic sensor program, the City owns all of the data. The data goes directly to City servers and only goes to Siemens if there is a specific issue or need. The City owns the data partly because of the nature of the project using real-time information, and partly because the City did not want this data to be sold by companies. While the City owns the data, it does not own the software and thus is not responsible for key software updates and modifications, such as modifying the application programming interface (API). One lesson learned for the City was that establishing these policies required very knowledgeable attorneys on the topic of data sharing.

Privacy

Recent high-profile hacks and internal data misuse at private companies, nonprofits, and political organizations have put the public on notice about the safety of their personal information. This type of information is referred to as personally identifiable information (PII) and includes names, social security numbers, addresses, financial information, and any other data that could be used to identify individuals.

In light of concerns over data privacy, public institutions around the world have reacted in ways that will drastically impact how emerging technology can be used in cities. Most important is the European Union's recent enactment of the General Data Protection Regulation (GDPR), which creates stringent data privacy rules. Since this regulation is already shaping privacy practices globally, we include GDPR as a case study below along with privacy policies implemented in Oakland and Seattle.

European Union and the General Data Protection Regulation

The General Data Protection Regulation (GDPR) is in effect for any government inside the European Union (EU) as well as any private organization that collects information about citizens within the EU.[2] The GDPR establishes many regulations for handling PII, including requiring data protection by design and by default, data anonymization, clear public/customer notice of data practices, and the right of public/customer access to their personal data. These regulations were recently implemented and cities are currently grappling with how the regulation impacts emerging and smart city technology.

GDPR requires organizations to justify the legal basis for collection of PII, meaning cities and companies will have to use one of the following in order to justify collecting personal data:

1. **Consent:** "the data subject has given consent to the processing of his/her personal data for one or more specific purposes." Ex: A customer buys a product online. At checkout, the company offers a check-box to "sign up for weekly newsletter," which includes information about data use as well as the right to opt out.

2. **Contracts:** "processing is necessary for the performance of a contract to which the data subject is party to or in order to take steps at the request of the data subject prior to entering into a contract." Ex: To use a free trial, customers may need to share personal information like credit card or contact information.

3. **Legal Obligation:** "processing is necessary for compliance with a legal obligation to which the controller is subject." Ex: A criminal investigation requires processing PII.

4. **Vital Interests:** "processing is necessary to protect the vital interests of the data subject or another natural person." Ex: An individual is admitted to the hospital with life-threatening injuries. The disclosure to the hospital of the individual's medical history is necessary in order to protect her vital interests.

[2] There are some important exemptions for governments re national security, law enforcement, protection of national interests, etc. Countries within the EU can also apply for country-specific exemptions. There are also some nongovernmental exemptions for journalists, religious organizations, etc.

5. **Public Interest:** "processing is necessary for the performance of a task carried out in the public interest or in the exercise of official authority vested in the controller." Ex: The tax authority's collection and processing of an individual's tax return

6. **Legitimate Interests:** "processing is necessary for the purposes of the legitimate interests pursued by the controller or by a third party, except where such interests are overridden by the interests or fundamental rights and freedoms of the data subject." Ex: A company is seeking to provide its customers with more personalized services so it hires a consulting agency and shares market research which includes PII.

Oakland and its Privacy Advisory Commission

In 2013 Oakland attempted to expand to the entire city a monitoring system the city used to surveil its port, called Domain Awareness Center (DAC). This system would have combined data from cameras, microphones, and other monitoring devices throughout the city to create a system the Electronic Frontier Foundation called a "city-wide surveillance apparatus." A coalition of local activists and civil liberties organizations successfully blocked the expansion of DAC.

Oakland City Council responded to the DAC controversy by passing an ordinance that created a privacy advisory commission. The commission includes a mayoral appointee as well as select members from city council. The commission is charged with providing "advice to the City of Oakland on best practices to protect Oaklanders' privacy rights in connection with the City's purchase and use of surveillance equipment and other technology that collects or stores our data." Note the policy only applies to data collected from technology and is focused mostly on the narrow issue of surveillance technology.

Under the guidance of its privacy commission, the City recently passed one of the most stringent data privacy laws, called the Surveillance and Community Safety Ordinance. This law requires public notice for the proposal of a new surveillance technology by holding a public meeting of the privacy commission. The law also requires that "meaningful public input" is sought for all decisions regarding surveillance and that public opinion is significantly weighted.

Seattle and its privacy program

In 2013 Seattle was scrutinized after the discovery that the Seattle Police Department acquired two drones with facial recognition software via a grant from the Department of Homeland Security without informing the public, the Mayor, or City Council. Civil rights organizations like the American Civil Liberties Union and community members argued that the drones were a breach of civil liberties and privacy rights because they had the capacity to recognize and track individuals. Mayor Mike McGinn promptly cancelled the program.
Under the direction of the Chief Technology Officer and Chief Privacy Officer, Seattle created two committees that would develop privacy policies for the City. The first was an internal group of representatives from 15 city departments and the second was an external privacy advisory committee of academics, local companies, activist groups, and private legal organizations. These committees disbanded after the writing of the privacy policies but a Community Technology Advisory Board still meets regularly to make recommendations to the Mayor and City Council.

Seattle's data guidelines also include:

- providing clear public notice re collection and use of PII during time of collection and on .gov website
- collecting only the data necessary for the city to achieve its stated goals
- being accountable by appropriately securing data and ensuring no unauthorized access
- sharing information carefully and requiring outside vendors to agree to the city's privacy policy
- creating a data retention schedule. This schedule provides a timeline for disposing of personal information or de-identifying data and making public.

Enforcement

As cities build frameworks for emerging technology and increasingly test out new technologies with pilot programs and permits, one key challenge is enforcing the rules and regulations. Cities might want a technology to be accessible to vulnerable populations or might require that the technology be placed in a safe location that does not disrupt the use of the public right of way. However, enforcing those rules in a systematic way can be tricky and cities might not have sufficient staffing and budgetary capacity to appropriately inspect and enforce the rules .

Below are examples from Santa Monica and New York City that illustrate the challenge of enforcement.

Santa Monica and electric scooters

Electric Scooters (beginning with the Santa Monica based company, Bird) made their debut in Santa Monica in late 2017. After many complaints regarding safety, Santa Monica's City Council adopted an emergency ordinance establishing an impound fee for scooters parked in the right of way. Eventually this led to a lawsuit between the City and Bird for unpaid impound fees, which Bird settled for $300,000. As part of the agreement, the company also agreed to run a weeklong safety advertising campaign on public buses.

The emergency ordinance is in place until September 2018, when a 16-month pilot will begin with up to three companies being granted permits. The pilot may require scooters to have "lock-to" technology, or some mechanism that allows a user to lock the scooter to a bike rack or other piece of street furniture. This requirement would be unpopular with Scooter companies because very few scooters come equipped with this technology currently. However, lock-to technology would help the city ensure that the right of way be kept clear.

The pilot also allows the city to experiment with "geo-fencing" technology, which would allow the City to create digital perimeters around real locations in Santa Monica. These geo-fenced locations could specify valid parking locations to scooter users. Companies might then be required to move any scooters parked outside of the designated areas, and would be given a certain number of hours to do so. This system would need to be built, and whether or not Santa Monica would be able to determine systematically if companies were requiring with the rules would still need to be determined.

Both lock-to and geo-fencing offer Santa Monica potential solutions to enforcement that do not rely solely on resident complaints or hiring enforcement officers to issue citations however the solutions each come with trade offs.

Forecasting

Technology forecasting attempts to predict upcoming technologies and the anticipated impact they may have on society. Forecasting may also be used to help cities determine which technologies they should invest in for the long-term. This is an important topic as many cities are considering large-scale technology infrastructure projects that will shape the type of services they can offer in the future.

One feature of new technologies is especially important: connectivity to one another. By connecting traffic sensors to smart cars to parking sensors, your car can guide you on the quickest route to where you are going and find, as you approach your destination, available parking spaces within a specified distance to where you're going, taking into account parking restrictions. However, these insights require interoperability of various devices, fast WiFi, and ubiquitous deployment. This gets complicated if a city is developing its system of networked devices over time, as is the case with almost all cities. What if first generation sensors are not equipped to speak to 10th generation devices? What if you invested in a new technology that became obsolete rather than the industry standard?

Below is a case study from our friends at the Federal level on how to create space and bring experts together to forecast on technology and policy.

President Obama and the President's Council of Advisors on Science and Technology

Initially began by President George W. Bush, President Barack Obama rechartered the President's Council of Advisors on Science and Technology (PCAST) with an Executive Order early in his first term. The Council was made up of 21 Presidential appointees who were not in federal government and had distinguished careers in science, technology, and/or innovation.

The Council brought together scientists, engineers, health professionals, etc., to provide a "diversity of experience and views to advise national strategy to nurture and sustain a culture of scientific innovation." The Council engaged scientists in the work of public policy, often by asking them to forecast and make recommendations to plan for the future of various industries including health, energy, education, networking and information technology, advanced manufacturing, and nanotechnology, among others.

For example, PCAST produced a report regarding the future of the United States' health information systems. The report urged the government to adopt a universal exchange language, which allows medical records to be transferred more easily while updating privacy and security measures applied to health records. PCAST argued this system would better enable the country to improve patient care (lowering future costs) and create new healthcare markets.

For Further Discussion

Emerging technology is amorphous by its definition. Smart Cities' nascency means that there are several issue areas that are challenging or currently left unanswered. This section lists some of the areas we feel need to be discussed further when it comes to emerging technology in cities:

- **Economic sustainability.** How can cities ensure the long-term economic sustainability of a permitted project that relies on private companies for service (many of which are new)? Is procurement more economically sustainable? What are the tradeoffs? What are the economic implications of long-term contracts? How can cities determine the best economic model for a project?
- **Future proofing.** How can cities ensure today's devices will be compatible with tomorrow's technology? How can cities asses technology for longevity and interoperability? How can cities ensure their practices are environmentally sustainable and minimize e-waste?
- **Data and decision-making.** How can cities ensure more data leads to better decisions? What practices can cities follow to make data easy to analyze and combine with other data sets?
- **Security.** How can cities ensure the physical safety of devices? What about cybersecurity concerns? How have cyber threats changed over time? What are best practices regarding risk management for cybersecurity? How can cities deal with changing cybersecurity standards over time? How can city staff at all departments be more familiar with cybersecurity protocols?
- **The changing privacy landscape.** How will the GDPR impact smart city development in the EU? What can other regions learn from the EU in case similar policies are passed? How are companies thinking about privacy in light of the shift towards government ensured privacy?

Conclusion

We hope this report offers a glimpse into how cities are approaching and regulating emerging technologies. There is no one-size-fits-all model for responsible and smart implementation of new technology. However, we believe this collection of case studies demonstrates the spectrum of responses cities have taken and what they have learned in their approach. We hope more research and discussion will continue around the eight issue areas we focused on as well as the items listed in our 'for further discussion' section.

We are grateful to all of the cities who spoke candidly about their process, wins, and lessons learned. The insights we gained will continue to be invaluable as we develop a framework around emerging technology in San Francisco.

Appendix:
Other Case Studies

Below is a collection of additional case studies that illustrate other ways cities are testing and using emerging technology. Many of them could be bucketed into the themes above, but we wanted to keep those sections targeted and readable. The case studies below illustrate the spectrum of what is possible.

San Jose and autonomous vehicles

Part of the "Smart City Vision" in San Jose, California is to become a "demonstration city" and reimagine the City as a laboratory for transformative technologies. This includes creating pathways for start-ups to access opportunities to pilot products via the City's Demonstration Partnerships policy that City Council passed in 2008 and amended in 2011. This policy allows the city to enter pilots or testing projects[3] — which often includes offering staff time, city resources, and/or policy exemptions — with companies if the project will accomplish one of the following goals:

- create new markets and new jobs or/and support existing local innovators
- improve quality and efficiency of City services and operations
- advance the City's Green Vision and Economic Development Strategy
- educate the public about innovative solutions.

San Jose identified as a strategic goal to increase mass transit ridership and was interested in testing autonomous vehicles. To achieve this, the Mayor's Innovation Office hosted two roundtables in 2017 with industry stakeholders to discuss city resources and goals as well as case studies from other cities. The City then released a detailed RFI (including a single point of contact, current infrastructure and resources, details on pilot locations, intended goals of the pilots, etc.) asking companies to submit AV project ideas. The City received 31 responses, 21 more than they expected to receive, and ultimately chose to interview 5. San Jose is currently working out data sharing agreements with a few companies before the pilot begins.

[3] San Jose refers to "pilots" as a service, product, etc. that is already in the marketplace and that the city is interested in trying out. "Testing" projects refers to a service, product, etc. that a company approaches the city with in order to evaluate efficacy.

New York City and Soofa smart benches

After nearly 40 years and over $60 million in restoration, New York City reopened Highbridge Park, which links Manhattan to the Bronx. The Parks Department wanted data on park use but the traditional method -- sending employees to monitor park entrances -- was onerous and limited in utility. Instead, the City deployed smart benches made by the company Soofa as part of its "Smarter Parks" initiative.

Soofa smart benches look like traditional park benches but with big box in the middle that is outfitted with a solar panel. Using this power source, the bench can charge park visitors' cell phones and other devices. Most important, however, is a WiFi scanner that counts the number of WiFi connections that pass by (within 75 feet), meaning that each person carrying a smartphone or device will register (anonymously). This will help give staff an accurate picture of park volume at different times as well as the duration of stays in the park and, because of strategic placement of the benches, a sense of each visitor trajectory. The City says this data will help the park to justify capital improvements, guide investments, and schedule maintenance.

New York City and BigBelly trash and recycling bins

In 2017 Mayor De Blasio of New York City announced his office's latest battleground: rats. The strategy was multi-pronged including limiting for apartment buildings the number of hours that trash could be on the street for pickup, replacing dirt floors in the basements of public housing with concrete ones, increasing fines for illegal dumping, and investing in new smart trash bins called BigBelly.

BigBelly garbage and recycling bins have trash compactors inside that allow them to hold eight times the level of garbage as a traditional garbage can. They are powered by solar and are also online, allowing the cans to communicate to the Department of Sanitation when they are almost full. Most importantly for rats, they are completely enclosed and therefore "rat-proof."

New York City first piloted BigBelly in Times Square in 2013. The goal for that pilot was to both increase the recycling rate and make trash collection more efficient. The installation of the smart bins increased the recycling rate from 15 percent to 40 percent and reduced by 50 percent in time spent collecting trash.

The 2017 project will cost $32 million in total, which includes a few million for 336 BigBelly bins (they cost $7,000 per bin). The City is targeting the most infested areas: the Lower East Side and Chinatown in Manhattan, Bushwick and Bed-stuy in Brooklyn, and Grand Concourse in the Bronx. The goal is to decrease the rat population by 70 percent. While there are no current updates from the City, residents have been complaining that many of the BigBelly bins have been overflowing with trash because garbage pick up is too infrequent or because the opening of the garbage is too small for some objects. Maintenance costs have also been an issue for the City, which are expensive.

Austin and dockless bikes and electric scooters

Austin, Texas has a successful docked bicycle share program that is three years old and run by a nonprofit called Austin B-Cycle. In January 2017, the City approved another five-year contract funded mostly through a federal grant.

Later that year, however, dockless bikes begin appearing on city streets with prices that are several times lower than Austin B-Cycle. In February 2018, Austin City Council met to discuss a resolution and get public input regarding a dockless bike share permit pilot program. Companies hoped to share plans for their electric scooters as well but were not allowed. Bird released scooters on to the streets without permission days later and Lime followed.

Following the deployment of scooters, City Council voted to add dockless bikes and electric scooters to an existing ordinance prohibiting abandoned vehicles from blocking the public right of way. City Council also released the permit application, which applied to both bikes and scooters. Both Bird and Lime pulled their bikes and scooters from operating as they applied for licenses.

Soon after putting out the permit, the City put out emergency rules with the most important being the requirement that by August 1 all vehicles have "lock-to" technology. However, after discussing this more with companies in July 2018, the City decided not to enforce this component for the time being. The emergency rules will expire in September and will be replaced by updated final rules.

Washington, D.C. and dockless bikes

Washington, D.C. has the second largest docked bike sharing program in the country with about 3,700 bikes (the largest is New York City's). The docked system, which is owned publicly and operated privately by Motivate, has been very popular. However, as dockless bike companies began deploying around cities throughout the U.S., D.C. decided to create a pilot to test dockless bikes.

In the fall of 2017, the District's Department of Transportation (DDOT) granted seven companies (Jump, Spin, ofo, Mobike, Limebike, Waybots, and Bird) permits that allowed up to 400 bikes each. In addition to standard rules requiring parking out of the public right of way and providing insurance, bike companies were also required to provide a monthly (anonymized) data report on bike usage, routes taken, number of bikes parked illegally, etc. These reports allowed DDOT to compare use to the docked program (however DDOT had a very hard time getting these reports from companies). Early data indicates that for the docked program each bike was used on average 5-6 times, compared to an average of 2-4 for dockless.

During the pilot, companies began complaining that 400 bikes was insufficient for economic sustainability over the pilot period, which they believed was too long. One company, Ofo, pulled out of the pilot and removed all bikes from the District. D.C. eventually expanded the pilot through the summer as it tries to decide how many dockless bikes to allow and what operating fees and regulations to apply in the post-pilot period.

Kansas City and smart kiosks

In 2016 Kansas City, Missouri opened its new free streetcar through downtown. The City decided to test a number of IoT devices along the 2.2 mile route as part of its effort to make Kansas City a "living lab." One of these devices was a smart kiosk.

Kansas City worked with Smart City Media to install 25 "City Posts," giant tablet-like kiosks with touch screens and a number of apps that the company designed with the City. The goal of the kiosks are to provide hyperlocal information to users. This can include the history of the location you are nearest to, bikshare information, and neighborhood events and stores as well as streetcar times, city services, and way-finding. All 25 kiosks cost the City around $1 million however due to revenue generated through advertising on the kiosk, Kansas City expects for the costs to be paid off in about five years.

Because of the broad authority given to the streetcar project, the kiosks did not go through a pilot process but instead were given a 'fast track' permit. In the first year the city made $170,000 in cash back to the city and the kiosks were used nearly 300,000 times. The City also found that the kiosks were especially helpful in spreading emergency information, such as tornado warnings. The City is expanding its use of kiosks by adding 12 to the airport, 10 at the University of Missouri- Kansas City, and 68 along a new rapid bus transit line.

Barcelona and smart parking

In 1992 Barcelona, Spain hosted the Olympics and invested in something that would position it as an early smart city adopter: a network of fiber optic cables. This connectivity has allowed for deployment of sensors for irrigation, controlling street lights, monitoring environmental conditions, and parking (among others).

Barcelona first piloted a parking system with a company called Worldsensing. Through a city program created to foster economic development using technology in the 22@Barcelona District, Barcelona provided office space and permits to Worldsensing to test their product. The City installed 100 sensors in the asphalt in the 22@Barcelona district. These sensors can tell when a car is parked in a given spot and transmit the information to an app.

After the pilot in 2014, Barcelona's software team ultimately chose to develop its own mobile smart parking system called L'apparkB. This system also allows drivers to pay for parking on the application. A year after adoption, the City issues about 4,000 parking permits every day.

Los Angeles and smart street lights

Los Angeles, California is in the early phases of testing out sensors installed on street lights, with a goal of full deployment of smart poles by the 2028 Olympics. The City is currently testing Philips' Smart Poles and one ENE-HUB pole, and is in discussion with vendors to have a larger scale pilot. The capabilities Los Angeles is discussing for their smart poles includes WiFi, gunshot detecting, lighting controls, electric vehicle charging, traffic control, cameras, and USB charging stations.

The City plans to fund this initiative with revenue made by allowing companies to provide 4G (or potentially 5G) LTE and charging them for this right. The City is also testing solar panels on the tops of street poles to generate electricity.

The potential of smart street lights to impact several departments across the city led to new levels of interdepartmental coordination and collaboration. Departments first met for a workshop to discuss priorities and system requirements and later formed a Smart City Coordinating Group that meets regularly.

San Diego and smart street lights

San Diego, California first looked to LED lights as a cost-saving measure during a fiscal crisis. Shifting 35,000 street lights from sodium vapor lights to more efficient LEDs led to less maintenance and saved the city $2.2 million a year. However, the City wanted to be able to tell when LEDs started to degrade so they worked with GE to connect the devices through a wireless network. This allowed the City to tell how much energy a streetlight was using as well as dim and brighten the lights as needed.

The City experimented with more street light technology with its pilot of 50 sensing lights designed by Current, a subsidiary of GE. The cost-savings potential of the street lights as well as the potential for new data to help solve problems led San Diego to expand this program to 3,200 sensing lights at a cost of about $30 million (financed with GE Capital). The City expects the cost-savings to pay for the investment in about 13 years.

The current capabilities of the smart lights focuses on communicating to drivers open parking spaces. The City is exploring what additional items it will add on, including Shotspotter (a gunshot detector), sensing car crashed and alerting the proper authorities, and understanding more about dangerous intersections by looking at close calls as well as crashes.

The City is also making data publicly available and hosting, along with GE, hackathons to encourage software developers and entrepreneurs to create apps that help residents. Some that have already sprung up are an app that helps people find the quietest route to their destination, an app that uses the data to help the visually impaired cross the street, and an app that helps food trucks find an open space that is close to big crowds.

San Diego and autonomous drone delivery

In May 2018, the U.S. Department of Transportation announced that San Diego was selected (along with 10 others) to participate in an experimental commercial drone program. The goal of the program is to both test, in a real setting, using drones for commercial delivery and work with the Federal Aviation Administration to develop rules and regulations around commercial drone use.

The City has various partners for this pilot, including 20 regional partners like Chula Vista, company partners like Uber, and other organizations like the University of California, San Diego (UCSD). Each of these partners has a different interest in drones:

- Chula Vista is interested in drone usage for firefighters or police in emergency situations
- Uber is interested in food delivery via drones, and
- UCSD is interested in flying specimens to other locations for expedited review

Other partners include AT&T, Intel, GE Venture, Port of San Diego, and the San Diego Regional Economic Development Corporation, each of whom will provide connectivity, airspace monitoring, or other needs. San Diego is in the process of applying for expedited waivers and approvals for all of its regional partners in order to start testing.

Appendix E: Staff Report - Innovation & Emerging Technology in San Francisco

San Francisco is the world's leading center of innovation with a significant impact on world economic activity and culture creation. As home to the top technology and creative workforce in the world, San Francisco sees an increasingly talented workforce being drawn to Bay Area companies. This is shown by the unmatched access to investment capital where the Bay Area received a record 50% of U.S. venture investment per the Venture Capital Journal in the first quarter of 2014![4] Combined, these assets have created a strong cluster of tech titans and entrepreneurial startups who are interconnected by strong cultural, professional and social networks.

Innovation in San Francisco does not end with the private sector, however. The City government is always looking for ways to be nimble, improve processes, and bolster engagement with residents in order to make life in San Francisco easy, engaging, and delightful.

As a foundational value, San Francisco is committed to responsible innovation so that all residents benefit. Specific to emerging technologies, the City has taken several steps to ensure innovation is strategic, collaborative, safe, and prioritizes residents' quality of life. To this end, the City has:

- **set a clear vision and goals to guide the City,**
- **developed partnership models to problem-solve with companies, and**
- **deepened community engagement by providing streamlined opportunities for involvement**

This short paper will preview some of the ways the City of San Francisco already is leading the charge around innovation inside the walls of local government.

[4] Venture Capital Journal; www.fenwick.com/FenwickDocuments/Silicon_Valley_grabs_record_share_of_venture_capital_activity__VCJ_News_Analysis_Private_Markets.pdf; 2014

CLEAR VISION AND GOALS

San Francisco envisions a future for the City that is safe, innovative, livable, and diverse, with streamlined city services that are focused on making life easier and more delightful for residents, visitors, and City employees. The City sees data and technology as playing a major role in achieving this vision and it has developed several strategies that will guide the City into the future.

Throughout the Emerging Technology Open Working Group, however, residents and other stakeholders commented that they were unsure how technology fits into the City's vision and goals. To help address this concern, the highlighted reports below discuss in detail how technology can help advance the City's mission. These reports include Vision Zero, the Emerging Mobility Evaluation Report issued by the County Transportation Administration Authority, and the City's five-year Information and Communication Technology (ICT) Plan.

Vision Zero

In 2014, The City and County of San Francisco adopted Vision Zero as a commitment to build better and safer streets and adopt policy changes that save lives. Previous data analysis has revealed that 70 percent of severe and fatal traffic injuries occur on just 12 percent of City streets, and disproportionately occur in low-income neighborhoods. By adopting a citywide strategy, the City hopes to make safer, more livable streets with the ultimate goal of eliminating traffic fatalities by 2024.

Vision Zero outlines several action items to achieve strategic objectives, including many that rely on emerging technology. For example, one action item includes working with the Department of Motor Vehicles to advance autonomous vehicles with appropriate safety components that prioritize passengers and pedestrians. Another action item encourages transportation network companies (TNCs) like Lyft and Uber to use driver performance tools or processes to measure safety and improve driver and/or company accountability.

Link: **https://visionzerosf.org/**

Emerging Mobility Evaluation Report

In July 2018, San Francisco County Transportation Authority released its Emerging Mobility Evaluation Report and adopted by the San Francisco Transportation Commission on July 24, 2018. The report measures emerging mobility services and technologies by how well each align with the City's adopted 10 Guiding Principles for Emerging Mobility Services and Technologies.

The Transportation Authority, the SFMTA, community stakeholders and Emerging Mobility service companies collaboratively identified 10 principles that inform the City's approach to emerging mobility services and technologies. These include:

1. Safety	6. Congestion
2. Supports public transport	7. Accountability
3. Equitable access	8. Labor
4. Disabled access	9. Financial impact
5. Sustainability	10. Collaboration

These principles articulate the City's values in public streets, and also serve as evaluation criteria for new and existing services and technologies seeking to deploy in San Francisco.

The Emerging Mobility Evaluation Report examines a variety of emerging mobility service and technology companies and their products or service models including transportation network companies, microstransit companies, bike sharing, and courier network services companies, among others. Using the established criteria, the City has found many benefits and issues present in emerging mobility services. Looking forward, the Emerging Mobility Report makes several recommendations, emphasizing the need for better data sharing between companies and the City as well as more pilots, partnerships, and regulations that protect residents and cover City costs. In addition to the Emerging Mobility Guiding Principles, these recommendations will serve as a guide to how San Francisco approaches emerging mobility services.

Link: **www.sfcta.org/emerging-mobility/evaluation**

Information and Communication Technology Plan

The Information and Communication Technology (ICT) Plan is a financial and strategic document that anticipates the future of City technology for the next five years. The most recent plan (for years 2018-2022) presents a vision of improved City services through the enabled use of technology so that San Francisco can continue to build a community that is safe, diverse, and welcoming to all.

The ICT plan identifies three strategic goals governing City technology to help guide City investments. The goals are to:

1. Support, Maintain, and Secure Critical Infrastructure
2. Improve Efficiency & Effectiveness of City Operations
3. Increase Access & Transparency to Local Government

Ultimately, how the City uses technology today shapes how and to what extent we can leverage new technologies in the future. In the years to come, San Francisco looks to use new and emerging technologies to better improve life for residents in San Francisco.

Link: **https://sfcoit.org/strategy**

PILOTS AND PUBLIC-PRIVATE PARTNERSHIPS

San Francisco engages regularly with technology companies in order to evaluate potential impacts and ensure smooth implementation of emerging technologies throughout the City and within City government itself. As was frequently discussed in the Emerging Technology Open Working Group, collaboration with technology companies and startups is a critical step towards anticipating new technologies.

The City has several means for engaging, from traditional collaboration models including pilots and permits to more novel and creative processes. The latter include Civic Bridge and Startup in Residence (STIR), which were created by the Mayor's Office of Civic Innovation.

Pilot and permit process

One way the City engages with emerging technology companies is through the pilot and permitting process. The particulars of the process -- including what departments are involved and the application materials required -- is determined by the technology's planned operations and how the company and/or its product will engage with the City's public space. For example, factors like if the product interacts with space on the sidewalk, curb, roadway or some combination will impact which Departments must issue permits.

Departments have different processes for handling pilots and permits. Generally, when a new technology comes to San Francisco, the permitting process begins with the department issuing a time-limited permit (i.e. pilot). Legislation is also frequently created to to establish guidelines and the application process. Once the product is reviewed and undergoes a public hearing, a decision is made about what companies can operate in the City. At this point, a pilot can launch.

A recent example of a company going through this process with the San Francisco Municipal Transportation agency is Scoot, an electric moped and scooter share company. Scoot had internal policies that prioritized City collaboration. The company reached out to the City prior to starting service to get legislation passed and receive the correct permit. They also provided a point of contact to the city agencies, which increased accountability and helped lead to a successful moped pilot. Recently, Scoot was also granted a permit to participate in the City's electric scooter pilot.

Link: **www.sfpublicworks.org/services/permits**

Civic Bridge

Inside local government, the City also has several collaborative partnership models to help make government more collaborative, responsive, and inventive. Civic Bridge is a four-year old program housed within San Francisco's Office of Civic Innovation. Civic Bridge is a cohort-based program that recruits private sector professionals to volunteer their time to work on critical City issues.

Recent examples of successful Civic Bridge collaboration include a partnership between the Mayor's Office of Housing and Community Development (MOHCD) and Google with a goal to make it easier to search and apply for affordable housing. A team of four volunteer employees from Google worked alongside MOHCD for sixteen weeks to prototype and scope a project for a new digital public service that would let users search and apply for city-funded housing programs online. The result of the collaboration is the award winning DAHLIA San Francisco Housing Portal, which won a Good Government award from the San Francisco Bay Area Planning and Urban Research Association (SPUR). By collaborating with local partners, the City was able to kickstart the creation of a simpler, easy-to-use product with transformative potential.

Link: **https://www.innovation.sfgov.org/civic-bridge**

Startup in Residence

Startup in Residence (STIR), another initiative led by the Office of Civic Innovation, supports City Departments by fostering partnerships with early stage technology companies to solve civic problems. For 16 weeks, startups volunteer their time to work with government partners to get to the root of civic challenges through user-testing, skills-sharing, data analysis, and prototyping a technology product or service.

STIR connected the Family and Children's Services team at San Francisco's Human Services Agency (HSA) with a new startup called Binti. The team at HSA was seeking a mobile friendly, cloud-based software solution for individuals interested in becoming foster parents in San Francisco's foster care system. In addition to digitizing the current paper-based review, assessment and placement process, they wanted to improve their pipeline for potential foster parent candidates beginning with their initial interest through final certification. Finally, staff hoped this new software system would reduce the time social workers spent managing their caseloads and completing tasks required to approve new foster families.

Binti was a new software startup that worked mostly with adoption agencies. After being accepted into the STIR program and shadowing HSA employees for several weeks, Binti created a Turbotax-like software program that made it easy for people to apply to become foster care providers. They also built a public website for HSA and created an internal database for the social workers at HSA to use. This suite of upgrades has increased foster care provider applications by 300 percent, decreased the application approval period by 50 percent, and has saved social workers' time by 20 to 40 percent.

Link: **https://www.innovation.sfgov.org/startup-in-residence-stir**

COMMUNITY ENGAGEMENT AND PERMITTING INNOVATIONS

San Francisco always is looking for new ways to work with the community and create more joyful community spaces. In order to efficiently do so, San Francisco has experimented with different ways to streamline the permitting process so that it is more accessible to the community. The lessons learned from these innovations can be used to improve the traditional permit process and quicken time to deployment for emerging technologies. Examples of permitting innovations include Groundplay SF and the business information portal.

Groundplay

Groundplay is a multi-agency City program that combines various public space initiatives, including the Pavement to Parks and Living Innovation Zones initiatives. Pavement to Parks represents a partnership between the Department of Public Works, the Municipal Transportation Agency, and the Planning Department. The program, which launched in 2010, aims to satisfy the desire for wider sidewalks for people to sit, relax, and enjoy the city around them. The program achieves this by turning one or several metered spaces into miniature parks, called parklets, which can include seating, planting, bicycle parking, and art.

Members of the community -- business owners, local organizations, and nonprofit institutions -- are eligible to apply for a parklet permit. Initially, six parklets were installed in various

neighborhoods, including the Mission, Noe Valley, the Western Addition, and North Beach. The parklets were an immediate success, and the City released two more requests for proposals for parklet permits. As of November 2018, 54 parklets have been approved and another eight are under review.

Groundplay projects have now expanded beyond parklets to include public activation projects that use temporary installations on Market Street, the City's cultural, civic and economic spine. The spirit behind the program is to allow for the creativity of partners outside City government to develop new and insightful ways of addressing community needs and aspirations.

The application process for both of these projects is simple and entirely online. The Grounplay website hosts the application -- one form that requires items like sponsoring organizations, project descriptions, site plans, and initial design concepts. In addition, the City created an infographic to help applicants understand the project journey from initial proposal to design and permitting to installation. The Groundplay website also features past and current parklets and other projects for inspiration.

Link: **https://groundplaysf.org/resources/**

Business Information Portal

San Francisco is also engaging with the local business community to help make the business permit process simpler and smoother. The San Francisco Business Portal provides an interactive journey map to help guide new businesses through the 10 steps of forming a business in the City.

When a new business owner is ready to apply for permits and licenses, he/she can use the "starter kits" on the portal. These kits are organized by business type and allow people to understand easily what they need. For example, the food truck starter kit includes a two page guide that lists all 'to do' items before launching (e.g. make an appointment with a business counselor, register your business with the City, obtain a Manager's Food Safety Certification, etc.). The kit also includes all of the relevant forms a new business owner must fill out to complete these to do's as well as some other potentially relevant information and background materials.

In its next iteration, the Business Portal will offer the ability to apply for permits online. Demonstrated through the City's new Cannabis service, permit applications will be consolidated, and business owners will be able to complete and submit their application without needing to navigate the City's departments.

Link: **https://businessportal.sfgov.org/start/permits-licenses**

CONCLUSION

The City has taken stock of its leadership and innovation around emerging technology and innovation as it prepares to present new recommendations to the Board of Supervisors. These recommendations build on the work of different City departments to set a clear vision and goals, collaborate with the private sector to solve challenges, and streamline city services to better engage with the community. These three items are at the foundation of many of the recommendations the City is pursuing.

Appendix F: Prototyping Evaluation Criteria for Emerging Technologies

Before launching a product to all of San Francisco, emerging technology products must comply with a series of minimum requirements to operate in public spaces. New products with unforeseen impacts should be also closely evaluated and tested on a variety of issues, most notably on ther impact on public spaces, equity, accessibility, data ethics, and security, and privacy among others.

The following describes some of the regulatory requirements all products must satisfy to operate in public spaces, followed by some proposed checklists to evaluate emerging technologies.

San Francisco Regulatory Minimum Requirements:

1. An applicant may be required to comply with various regulations, including:
    a. Americans with Disabilities Act (ADA), Title II (28 CFR part 35) and Title III (28 CFR part 36).
    b. ADA Accessibility Standards for Accessible Design (ADAS); 2004 ADA Accessibility Guidelines plus above federal regulations.
    c. California Civil Code, commencing with section 51; The Unruh Civil Rights Act.
    d. California Government Code, commencing with section 4450.
    e. California Building Code (CBC); CCR Title 24, Part 2.
    f. California Vehicle Code (CVC).
    g. California Streets and Highways Code (CSHC).
    h. San Francisco Better Streets Plan.
    i. San Francisco Privacy First Charter Amendment and subsequent legislative requirements.
2. In testing situations where food or other goods are being delivered, additional approval may be required from other stakeholder agencies, including but not limited to the Department of Public Health, SFMTA, etc.
3. All user controls and operating mechanisms shall be accessible in accordance with CBC Section 11B-309 and the ADAS Section 309.
4. If there is interaction for users (both operator and end user), accessible reach ranges to all controls and operating mechanisms shall be provided in accordance with as described in the 2010 ADAS Section 308 and CBC Section 11B-308.
5. The Permittee shall comply with the current Fire Code and guidelines including providing and maintaining minimum distances required for building access, exit egress, and access to SFFD protection services.
6. The new technology shall satisfy all federal, state and local laws and regulations.
7. The new technology shall meet minimum vertical clearance requirements as required by local codes

Minimum Accessibility Requirements on sidewalks:

1. The new technology shall provide a minimum clear path of travel meet the minimum ADA clearances requirements 6’ clear path of travel in commercial corridors and 4’ clear path of travel in residential corridors.
2. A minimum two (2) foot clearance is required along the curbside when operating adjacent to existing on-street parking.
3. Emerging Tech Shall not block or obstruct an accessible route (typically the pedestrian throughway zone as defined in the SF Better Streets Plan, plus facility entrances, public and private transit stops, passenger loading zones and accessible on-street parking spaces). Emerging Tech shall move out of an accessible route when a pedestrian is present and shall allow the unencumbered passage of pedestrians within the public right of way.
4. Placement on the sidewalk must not in any way interfere with curb ramps, access to the building, driveways or access to any fire escape.

5. No element of the proposed Emerging Tech may interfere with access to or egress from any building or facility.
6. No element of the proposed occupancy may be below a fire escape, obstruct access to a Fire Department Connection (FDC) , or fire hydrant.
7. Shall not impede street furniture
8. Shall not be allowed over a manhole, public utility valve or other at-grade access point in the street or sidewalk and may not be bolted to the roadway.

General Operating Requirements:

1. Submit a copy of the S.F. Business License Certificate
2. Bonding Requirement (if applicable)
3. Public Notification (if applicable)
4. The permittee shall be responsible for any damage to any facilities of the City, including but not limited to, San Francisco Public Works, the San Francisco Public Utilities Commission, and public utility companies due to this occupancy.
5. Permittee agrees on its behalf and that of any successor or assign to hold harmless, defend, and indemnify the City and County of San Francisco, including, without limitation, each of its commissions, departments, officers, agents and employees (hereinafter collectively referred to as the "City") from and against any and all losses, liabilities, expenses, claims, demands, injuries, damages, fines, penalties, costs or judgments including, without limitation, attorneys' fees and costs (collectively, "claims") of any kind allegedly arising directly or indirectly from (i) any act by, omission by, or negligence of, Permittee or its subcontractors, or the officers, agents, or employees of either, while engaged in the performance of the work authorized by this Permit, or while in or about the property subject to this Permit for any reason connected in any way whatsoever with the performance of the work authorized by this Permit, or allegedly resulting directly or indirectly from the maintenance or installation of any equipment, facilities or structures authorized under this Permit, (ii) any accident or injury to any contractor or subcontractor, or any officer, agent, or employee of either of them, while engaged in the performance of the work authorized by this Permit, or while in or about the property, for any reason connected with the performance of the work authorized by this Permit, or arising from liens or claims for services rendered or labor or materials furnished in or for the performance of the work authorized by this Permit, (iii) injuries or damages to real or personal property, good will, and persons in, upon or in any way allegedly connected with the work authorized by this Permit from any cause or claims arising at any time, and (iv) any release or discharge, or threatened release or discharge, of any hazardous material caused or allowed by Permittee in, under, on or about the property subject to this Permit or into the environment. As used herein, "hazardous material" means any substance, waste or material which, because of its quantity, concentration of physical or chemical characteristics is deemed by any federal, state, or local governmental authority to pose a present or potential hazard to human health or safety or to the environment.

6. Permittee must hold harmless, indemnify and defend the City regardless of the alleged negligence of the City or any other party, except only for claims resulting directly from the sole negligence or willful misconduct of the City. Permittee specifically acknowledges and agrees that it has an immediate and independent obligation to defend the City from any claim which actually or potentially falls within this indemnity provision, even if the allegations are or may be groundless, false or fraudulent, which obligation arises at the time such claim is tendered to Permittee by the City and continues at all times thereafter. Permittee agrees that the indemnification obligations assumed under this Permit shall survive expiration of the Permit or completion of work.

7. Permittee shall obtain and maintain through the terms of this Permit general liability, automobile liability or workers' compensation insurance as the City deems necessary to protect the City against claims for damages for personal injury, accidental death and property damage allegedly arising from any work done under this Permit. Such insurance shall in no way limit Permitee's indemnity hereunder. Certificates of insurance, in form and with insurers satisfactory to the City, evidencing all coverages above shall be furnished to the City before commencing any operations under this Permit, with complete copies of policies furnished promptly upon City request.

In addition, the Emerging Technology Open Working Group drafted criteria the City could use to evaluate issues specific to new technology. Some of these issues are still evolving and thus current regulation does not capture them. The following checklists may be helpful to develop evaluation criteria that are being tested in San Francisco public spaces.

Equity Checklist

1. Who will have access to the product? Who won't?
2. Does your product directly address an identified inequity?If yes, which one(s) and how?
3. How might your product improve equity indicators? For which communities?
4. How might your product worsen inequity? What are your mitigation strategies?
5. Does the product rely on algorithm that rely on historical data that may contain biases? What mitigation techniques are in place?
6. Have you consulted with underserved communities on your product's design or strategy?
7. Describe how your plan for evaluating your product's impact on equity after launch.

Additional Accessibility Checklist

1. Is the product intended to be used in the public right-of-way?
2. On the basis of safety and access, how will the following communities be impacted by the deployment of the product in public spaces?
   - ❑ Blind or low vision
   - ❑ Chronic health (e.g. autoimmune, neurological)
   - ❑ Cognitive (e.g. intellectual disabilities, learning disabilities, autism spectrum)
   - ❑ Deaf or hard of hearing
   - ❑ Mental health or psychological disability
   - ❑ Mobility disabilities (e.g. wheelchair, walker, cane)
3. When others are using the product, how will people with sensory disabilities detect the product?
4. What accountability mechanisms are in place when issues may occur?
5. Has the product been tested to be physically accessible (504 compliance)?
6. Has the web based interface been tested to be 508 compliant?
7. Has any voluntary product analysis testing been conducted?
8. How may disabled communities benefit from the availability of this product?
9. What mechanisms are in place for disabled communities to provide feedback on design on an ongoing basis?

Data Ethics Checklist

1. Is the terms of service in plain language?In multiple languages?
2. Does the company explain to users in plain language the type of data collected, collection methods, and how data will be used?
3. Do users have the ability to see what information the company has on them?
4. Are surveillance technologies used in the product and are the implications made clear to users?
5. Is there an option to use the service but “opt out” of providing personal information?
6. Will personal information be sold as a commodity?
7. Does the product use an algorithm that is based on historical datasets with potential biases?

Security & Privacy Checklist

1. What kind of data will be stored, process, or accessed?
2. What is the data retention policy for each type of data collected?
3. Will sensitive data be stored, process or accessed by a third party?
4. What is the location of the data center where data is stored?
5. What is done with data collected that is not directly related to the business?
6. Does the company follow any industry security standards? Which one?
7. Can independent verification be provided to show security standards are in practice?
8. Will the product be connected to City infrastructure?(e.g. network, streetlights, power grid)
9. Does the company have an incident response plan?
10. What is the contingency plan for a data breach?
11. What happens to data if the company is bought, sold, or shut down?

Notes:











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