Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together

On January 9, 2017, The National Coordination Office (NCO) for Networking and Information Technology Research and Development (NITRD) requested comments from the public regarding the draft *"Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together"*.

The draft Strategic Plan is posted at: https://www.nitrd.gov/drafts/SCC_StrategicPlan_Draft.pdf.

Request for public comment was posted in Federal Register: 82 FR 3810
Deadline for submission under this RFC was February 28, 2017.

Note: RFC 82 FR 3810 noted that responses might be made public. In accordance with FAR 15.202(3), responses to this notice are not offers and cannot be accepted by the Government to form a binding contract. Responders are solely responsible for all expenses associated with responding to this RFC.

Note: This document is a Summary of Responses to the Request for Public Comment. Responses may have been edited to remove links to commercial sites. Responses that were judged unsuitable for government hosting are not included herein.

The National Coordination Office (NCO) for Networking and Information Technology Research and Development (NITRD) would like to thank all responders to this request for comments.

The submissions will be used to inform the development of the Smart Cities and Communities Federal Strategic Plan.

For further information contact: Ernest Lucier at (703) 292-4873 or SCCTF@NITRD.gov.

This document is a compilation of responses received from the public and may contain links to information created and maintained by third parties.

The National Coordination Office (NCO) for Networking and Information Technology Research and Development (NITRD) is not responsible for material contained at those sites, and does not guarantee the accuracy, relevance, timeliness, or completeness of any third party information.

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February 28, 2017

Attn: Smart Cities and Communities
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Email: SCCTF@nitrd.gov

On behalf of the American Society of Civil Engineers (ASCE), we would like to submit the following comments in addition to those already submitted by ASCE's Committee on Sustainability.

ASCE appreciates the opportunity to comment on the "Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together" and commend the National Science and Technology Council, the Networking and Information Technology Research and Development Subcommittee, and the Smart Cities and Communities Task Force for their work. This plan and its implementation will play a valuable role in focusing and directing efforts to improve people's lives and the nation's economy through the adaption of intelligent infrastructure. We will focus the rest of our comments on the plan's strategic priorities.

We were pleased to see the plan's focus on interoperability and data sharing. As a positive example of collaboration and data sharing, we recommend the plan mention the National Capital Region Geospatial Data Exchange, a system that facilitates the secure, flexible, and standardized sharing of critical mapped information.

We agree with the plan's assertion that "long-term growth and sustainability of smart cities/communities requires evaluating progress [and] demonstrating benefit." Rigorous evaluation of the costs and benefits of new technologies ought to be used to guide cost-effective investment. We encourage the inclusion of additional language that emphasizes the importance of evaluating lifecycle costs, so that the total cost of an infrastructure project from design through retirement is included.

We also note with approval of the plan's inclusion of creating more sustainable communities as an objective and would suggest that using a standardized rating of infrastructure's sustainability would provide important data as to the attainment of this goal. The Institute for Sustainable Infrastructure and its Envision sustainability rating tool would be a good example of this.

Envision, described at https://sustainableinfrastructure.org/envision, usually is used to evaluate the sustainability of infrastructure projects but could be used to assess the effects of master plans or zoning regulations on the sustainability and resilience of cities and communities. Envision awards provide case studies of successful efforts for sustainable communities.

ASCE was founded in 1852 and is the country's oldest national civil engineering organization. It represents more than 150,000 civil engineers in private practice, government, industry and academia who are dedicated to the advancement of the science and profession of civil engineering. If you have any questions, please contact Laura Hale at 202-789-7852 or XXXXX

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February 28, 2017

Smart Cities and Communities Federal Strategic Plan:
Exploring Innovation Together
Email: SCCTF@nitrd.gov

Re: SCC Strategic Plan ASCE Committee on Sustainability

The Committee on Sustainability of the American Society of Civil Engineers thanks the Smart Cities and Communities Task Force for the opportunity to comment on the draft Smart Cities and Communities Federal Strategic Plan. The plan and its implementation will serve a very valuable role in integrating the R&D and programmatic efforts of federal agencies to enhance sustainability and quality of life, improve health and safety, and further economic prosperity. ASCE's Policy 418 Sustainable Development support these same principles - http://www.asce.org/issues-and-advocacy/public-policy/policy-statement-418---the-role-of-the-civil-engineer-in-sustainable-development/ Also, these federal activities can be integrated with those of state and local governments and the private sector.

We note approvingly that the planned research is not limited to networking and information technologies and services. These are important. Also important are R&D improving knowledge of how cities/communities and their infrastructures can enhance sustainability and quality of life, improve health and safety, and further economic prosperity and resilience.

The Institute for Sustainable Infrastructure and its Envision sustainability rating tool may be worthy of citation as important and relevant private sector efforts support smart, sustainable and resilient cities and communities.

The Institute for Sustainable Infrastructure is a joint effort of the American Public Works Association (APWA), American Society of Civil Engineers (ASCE) and the American Council of Engineering Companies. It is described at https://sustainableinfrastructure.org/about-isi/ and could be referred to in Section 3.2.2 of SCC.

Envision is described at https://sustainableinfrastructure.org/envision/. Envision usually is used to evaluate the sustainability of infrastructure projects but could be used to assess the effects of master plans or zoning regulations on the sustainability and resilience of cities and communities. Envision awards provide case studies of successful efforts for sustainable communities. See https://sustainableinfrastructure.org/envision/project-awards/#0/83/-167. The Green Build Project at San Diego Airport and the Expo Line Phase 2 Los Angeles awards seem particularly relevant to SCC.

On page 13, Section 2.1.2 it seems appropriate to add a paragraph on the importance of funding and implementing university research for smart cities and communities.

On page 18, Section 2.3 it seems relevant to cite the National Capital Region Data exchange, see https://octo.dc.gov/page/ncr-gdx

Sincerely;

Michael R. Sanio, F.ASCE, CAE, ENV-SP
Director, Sustainability

Cc:

Doug Sereno, F. ASCE, Chair ASCE Committee on Sustainability
Terry Neimeyer, F.ASCE, Chair ASCE COS Standards Committee

The National Coordination Office (NCO) for Networking and Information Technology Research and Development (NITRD), National Science Foundation

Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together

RESPONSE TO THE FEDERAL REGISTER NOTICE 82 FR 3810 REQUEST FOR PUBLIC COMMENT

February 24, 2017

Submitted by:

Booz Allen Hamilton Inc.
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February 24, 2017

Smart Cities and Communities
National Coordination Office (NCO)
Suite II-405
4201 Wilson Boulevard
Arlington, VA 22230

Subject: Response to: Draft “Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together”

Dear National Coordination Office:

Booz Allen Hamilton Inc. (Booz Allen) is pleased to submit this response to the Request for Public Comment entitled “Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together”.

Booz Allen has built an integrated and multi-functional Internet of Things practice, and is building on our experience in multiple industries such as transportation, energy, and public safety, among others, to develop an integrated Smart City practice. Through our capabilities, service offerings, and industry experience, Booz Allen can fill many roles in the development of a Smart City vision and strategy, and the full design and implementation of that strategy. If you have any questions about our response, please contact me at ~~XXXXXX~~

Sincerely,

Dominie Garcia
Senior Associate

BOOZ ALLEN HAMILTON INC.

Introduction

Booz Allen commends the Networking and Information Technology Research and Development Program (NITRD) on its development of the draft Smart Cities and Communities Federal Strategic Plan. We believe the group has identified the right goals, strategic priorities, and next steps. Through our experience in supporting smart city vision and strategy development within the U.S. and internationally, we agree with the assessment that that no two smart cities or communities are exactly the same. Each locality must engage with citizens and stakeholders to identify their unique challenges and develop tailored smart city solutions to improve livability, workability, and sustainability for citizens, businesses, government, and other organizations. In response to the NITRD's request for comment, we provide some suggestions to strengthen the strategic plan and ensure that cities and communities are provided the necessary support from the Federal Government to assist in developing smart city plans and implementing technologies and systems.

Are the central goals appropriate and/or are there other goals that should be considered?

While we believe that all the goals identified in the report are valid and will help facilitate and accelerate development and deployment of smart cities, a few reflections are included to help strengthen some of the language and details. Goals 1 (Understand Local Needs and Goals) and 2 (Accelerate Innovation and Infrastructure Improvement) would benefit from discussing the need for cities and communities to develop a holistic smart city vision and strategy, including short, medium, and long term plans and goals, with timelines and milestones. In addition, partnership plans linked to the challenges (e.g., social, economic) the city is trying to solve will help cities form coalitions or teams that can focus on solutions aimed at addressing these challenges. Having a plan and roadmap will help the Federal government understand city/community needs and prioritize where to fund investments to accelerate smart city innovation and technology solutions. Strategy development, road mapping, and initial planning will benefit the city/community and its residents by:

- Increasing efficiency during detailed Smart City planning and solution implementation
- Increasing industry engagement through an established, transparent plan with known goals and performance measures
- Encouraging early involvement and buy-in by residents and community stakeholders

Goal 5 (Focus on People-Centered Solutions) could be strengthened by adding more detail about the *meaning* and extensibility of improving quality of life for all residents and enabling inclusive and sustainable smart cities and communities of the future. The Plan accurately describes the ability of new technologies and smart city environments to improve quality of life and services for residents of all races, ages, socioeconomic levels, and to address the needs of people with differing languages, cultures, disabilities, and cognitive abilities. However, we would encourage NITRD to include more explicit discussion and attention to how these technologies and the programs through which they are deployed can increase accessibility for disabled communities, and provide new and expanding economic opportunities to disadvantaged communities. In our smart city planning and community engagements, many municipalities have emphasized accessibility and inclusiveness as prime among their ultimate goals in implementing smart city technologies. New and automated transportation modes, technologies that provide voice-activated prompts and alerts to the visually impaired, opening up of economically depressed areas with additional safety protections and opportunities for access, and a multitude of other examples can provide illustrations of this point. A specific use case with which to demonstrate Federal progress in these areas is the USDOT ITS JPO's Accessible Transportation Technologies Research Initiative.

Booz Allen recommends that NITRD include more explicit discussion throughout the plan that addresses the important role that private/commercial organizations will play in the smart city ecosystem. Municipalities and the federal government are often very resource constrained, as well as limited in the personnel with

specialized technical and cutting-edge skill sets that they employ. Because of these constraints on public agencies, and the advent of brand new opportunities for commercial companies to realize return on investment (ROI) in various infrastructure and technology related projects, we believe there is an increased role for these companies in developing and deployment of smart city technologies.

Developing positive ROI models for commercial companies will go a long way in encouraging investment in areas that have long been thought to be "public goods," thereby taking some of the burden off tax payers and public agencies for investment and operations. One example that illustrates this is the advent and successful deployment of electronic, variable-priced tolling. These solutions have often been deployed and are operated by private companies, in conjunction and with cooperation from public agencies, resulting in both revenue for the companies and significant improvements in a locale's community goals such as reduced congestion, which reduces negative environmental impacts and improves roadway safety. Similar and new to be developed possibilities exist across the smart city spectrum that can be tapped for more integrated public private partnerships that will provide needed investment and result in accomplishing many community goals.

Are the strategic priorities appropriate and/or are there other priorities that should be considered?

Priorities 2.1 (Accelerate Fundamental R&D) and 2.2 (Facilitate Secure and Resilient Infrastructure, Systems, and Services) are both focused on aspects of cybersecurity, privacy, risk management strategies, and the Internet of Things (IoT), which Booz Allen agrees are all fundamental aspects to developing and deploying smart city technologies. We recommend that the approaches outlined in those priority areas should be further discussed within Sub-priority 2.2.2 (Support cities/communities in designing new secure and resilient infrastructure, systems, and services). As the federal government works to instruct and mentor cities and communities around smart city cyber security issues, a focus on training and mentoring around established, best-in-practice risk based approaches to assessing cybersecurity vulnerabilities/threats and developing mitigation strategies should be a central tenet of all security and privacy assessments and controls. One of the key building blocks of IoT and smart city security and privacy is a risk assessment. It is difficult – perhaps impossible – to fully secure every aspect of IoT. There are simply too many paths of attack, and cybersecurity resources are always limited. Cities and communities will need to prioritize their resources based on what is most important. As funding is largely constrained in cities and communities, these leaders will need to balance risk and security controls, along with response capabilities, to develop functional, resilient technology solutions that do not break the bank.

These discussions raise the question of how the cities and communities can invest in and fund the capital and operating costs of implementing complex and expensive smart city solutions. Booz Allen recommends a more explicit discussion of this issue in the strategic plan. The issue of funding is at the forefront of new technology deployment, and deployers should always view the implementation of smart city and IoT solutions in terms of long term wins in addition to short term gains, and look to measure returns and outcomes in more than the traditional financial metrics. Some of these new measures can be cross-industry measures of efficiency, savings, new revenue opportunities, and customer retention, for example. A detailed treatment of revenue and cost-benefit models is an important activity for the city to undertake as it envisions and maps out a strategy and plan for deployment of new technologies. Working with multiple private companies that are actively investing and developing many smart city technologies will yield a rich set of revenue generation and funding models that are likely new to the city and how it has traditionally funded new technological investment. One of the primary goals of a smart city initiative should be to attract commercial and other non-tax-based sources of investment to cover some portion of capital expenditures so that operating expenses and modernization costs are manageable with the city's budget.

New revenue models can be developed as multiple players in a region and across industries work together to develop plans, visions, and technology roadmaps for smart city systems and solutions. Ideal models for advancing these types of investments include various ways of combining public and private resources into Public Private Partnerships (P3s). It is incumbent on the city and its partners to develop models that will attract private investment and still attend to public needs and goals. City and community leadership, especially those leading procurement activities, need to understand P3 principles and risk allocation, while also being knowledgeable about previous successful P3 models and best practices. Further discussion of the need for new and innovative funding mechanisms could be included throughout the plan but should likely be focused within Goal 3 (Facilitate Cross-Sector Collaboration and Bridge Existing Silos) and Priority 2.4 (Enable Evaluation of Progress and Long-term Growth of Smart Cities/Communities).

Are the next steps identified in the draft plan appropriate and/or are there others that should be considered?

The specified next steps are appropriate for the draft plan, as the NCO will not be able to finalize next steps until the goals and strategic priorities are updated based on submitted comments. In the final version of the plan, it would be helpful for cross-sector organizations to understand immediate next (planning and tactical) steps beyond promoting interagency coordination and engaging with city/community leaders. While these are key activities that should continue, they are not unique or new to the organizations active within the smart city solutions development and implementation communities. Increased marketing and messaging of these activities should help to bring less active cities/communities and partners into the discussion. The NCO would likely help to energize efforts and collaboration by including the immediate next steps and direction from the draft roadmap, including any immediate funding and partnership opportunities.

The roadmap will be crucial for cities, communities, industry, academia, etc. to align and complement efforts to further the overall strategic plan goals to eventually advance smart city solutions across the country in a secure, efficient, and sustainable manner. We would recommend requesting public comment on the road map draft to prepare cross-sector organizations for potential research, collaboration, and funding opportunities.

Booz Allen Smart City Experience and Expertise Summary

Booz Allen has a track record of supporting critical technology issues across the public and private sectors. We have spent decades supporting clients in smart city-related industries, such as transportation, health, energy and utilities, public safety, and communications. In addition, our firm is at the forefront in the specialty areas of mobility, communication technologies, sensor development, data analytics, cybersecurity, and the other essential components for safe, secure, and effective smart city technologies. Booz Allen is already invested in this budding industry; working with partners and public agencies to craft visions, concepts, technologies, and systems that will be the foundation of smart cities in the future.

Today we have a dedicated IoT practice that brings together capabilities in data science, cybersecurity, networking, technology strategy, digital services, engineering, and change management to deploy strategies and solutions that we have successfully implemented for Fortune 100 companies and government agencies alike. We have a multiyear, multimillion-dollar investment to develop strategies and solutions with leading industry partners, such as Intel, Microsoft, Amazon Web Services, as well as a range of other companies with niche expertise in various aspects of smart city technology and applications. Booz Allen has deployed these capabilities in our work to date helping cities define their vision, roadmap, and industry partnerships. We have accomplished this in the US with cities such as Kansas City, Missouri, and also internationally in various countries in the Middle East and South East Asia.

BOSTON UNIVERSITY

February 28, 2017

Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together
Response – Request for Comment

Boston University Contributors:
Azer Bestavros – *Boston University Hariri institute for Computing*
Christos Cassandras – *Boston University Center for Information and Systems Engineering*
Andrei Lapets – *Boston University Hariri Institute for Computing*
Conor LeBlanc – *Boston University Initiative on Cities*
Katharine Lusk – *Boston University Initiative on Cities*
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Ioannis Ch. Paschalidis – *Boston University Center for Information and Systems Engineering*
Mayank Varia - *Boston University Hariri Institute for Computing*

Goals

The Boston University (BU) review team, listed above, agrees with the goals presented in the Strategic Plan. In particular, our team believes that "Understanding local needs and local goals," "Accelerating smart city/community innovation and infrastructure development," and "Facilitate cross-sector collaboration and bridge existing silos" are of utmost importance.

The BU team strongly advocates for the value of understanding local needs and goals when pursuing strategies that will impact people in their everyday lives. When considering approaches to supporting smart city/community initiatives, though, Federal agencies should support regional approaches rather than relying only on local tactics. Investments to accelerate smart city/community innovation and infrastructure development are crucial. In particular, Federal agencies should focus on opportunities to enable pilot projects that allow research to be applied and adopted by local and regional governments. Public-private-university partnerships represent an important avenue for building collaboration across sectors while addressing data privacy concerns, another area of interest for the BU team.

Priorities

The BU team was drawn to "advancing secure, privacy-preserving data sharing and interoperability" as a top priority. Data privacy and data sharing is a challenge that BU's Hariri Institute for Computing is deeply familiar with through their work on pay equity with the City of Boston. Through this experience, Boston University researchers learned that insisting on data sharing for its own sake can be problematic. Instead, investments must be made in secure infrastructure and systems that allow data to be shared thoughtfully without compromising confidentiality or privacy of individuals or institutions.

The City of Boston's high-profile initiative to study pay equity, supported by a diverse set of more than 170 employer organizations, was stalled by concerns about the confidentiality of

BOSTON UNIVERSITY

the data to be collected. This data was needed in order to calculate aggregate metrics. The conflict boiled down to the mistaken belief of city officials and corporate executives that data sharing is a prerequisite to knowledge sharing. In large part, this misconception – a belief in the false choice between data utility and data privacy – is the result of an over-emphasis in the research community on the development of infrastructures and platforms for "data sharing" with an expectation of altruism from data owners. Absent such altruism, the community is struggling to develop incentives or proper compensation for data owners to "do the right thing."

We believe in an alternative tack: the development of infrastructures and platforms that allow knowledge extraction from multiple data sets that remain otherwise private. In particular, a key enabling technology that allowed the pay equity initiative to be carried out was a web-based application that the Hariri Institute designed and implemented at Boston University that uses a cryptographic technique called *secure multi-party computation* (MPC). MPC privately splits users' sensitive data across multiple servers in such a way that analytics may be jointly computed and released while ensuring that small subsets of colluding parties cannot learn any user's data. As such, MPC allows mutually suspicious data holders to jointly extract knowledge from their collective data sets, without ever revealing their actual data to each other or to any other parties.

As detailed in an opinion by Bestavros, Lapets, and Varia published in the February 2017 issue of the *Communications of the Association for Computing Machinery*, MPC techniques possess substantial social value: they enable society to benefit from collective data aggregation and analysis in contexts where the raw data are encumbered by legal and corporate policy restrictions on data sharing. However, MPC's social benefits cannot be realized unless participating organizations (i.e., their executives, directors, and legal advisors) are empowered with a clear, confident understanding of exactly how MPC protects their sensitive data and mathematically guarantees compliance with data sharing restrictions. To that end, the design and implementation of the Hariri Institute's own MPC platform was informed by nearly two years' worth of discussions with personnel from key participating organizations (including CIOs, CTOs, HR executives, and lawyers), social scientists, and members of the Boston City Council that commissioned the study.

Accelerating fundamental R&D for smart cities/communities was also an appropriate priority. In particular, the BU team is passionate about investments that improve the ability to translate research into pilot projects and real-world policies. Despite tremendous research already underway or completed, local governments often lack the funding or capacity to implement ideas. Without collaboration from public officials, academic researchers simply do not have the ability to translate their work into large-scale services and tools. These tools, while important, also may not offer promising business models for private sector partners. Therefore, it is important that Federal agencies be willing to support and incentivize translational opportunities that help turn research into implementation.

The importance of transparency and community engagement was a priority missing from the Strategic Plan. One of the things we often hear from community members is a need for a

feedback loop that allows citizens to understand what's being learned and how they can benefit from new initiatives. We believe that smart cities and their partners should communicate findings to members of the public such that they are participating and benefiting from the policies that are being enacted around them. This approach, which considers the community as a true partner rather than a "subject," can help build policies that are inclusive, effective, and well-tailored to a city's needs.

Finally, investments in regional resources, as opposed to investments that are restricted by local boundaries, are important, and we hope to see more of a priority placed on this in future drafts. BU researchers have found that regional collaboration can help bring in additional stakeholders and widen the impact of new technologies. This also allows for easier sharing of best practices. The Massachusetts Green High Performance Computing Center serves as a model for how a regional resource acts as a platform for cities and communities state-wide. This kind of organization is one step removed from the technology solution, but is nevertheless a key factor in the success of smart city/community programs.

Next Steps

The next steps identified in this draft Strategic Plan are appropriate. It will be important for the Task Force to consider the major challenges that city and community stakeholders share during the comment process. Commenters' experiences of failure or frustration may provide the best insights into how to prioritize funding. The BU team also believes there ought to be a willingness to amend and update the roadmap for progress as new lessons emerge.

The Boston University team appreciates the opportunity to submit comments. We would be honored to provide assistance in updating the draft or supporting the Smart Cities and Communities work through more formal partnerships, collaborative initiatives, or convenings.

February 28, 2017
National Coordination Office,
Networking and Information Technology
Research and Development (NITRD)
National Science Foundation
Submitted Via Email: *SCCTF@nitrd.gov*

RE: Smart Cities and Communities Federal Strategic Plan

The Ruckus Wireless Business Unit of Brocade ("Brocade/Ruckus") is pleased to provide input regarding the Smart Cities and Communities Federal Strategic Plan.[1] Brocade/Ruckus supports the objectives of the plan to accelerate the development of smart city solutions through coordination of Federal smart city initiatives with local government, academia, industry, civil society, and other stakeholders. Brocade/Ruckus is the industry leader in service provider and outdoor Wi-Fi and has partnered with numerous cities, communities and public-private partnerships to deploy smart city technologies. As Public Wi-Fi is unique serving as both a use case and an underlying infrastructure for other smart city applications, Brocade/Ruckus looks forward to the opportunity to serve as an industry resource and engage in future discussions with NITRD and other stakeholders. We offer the following input on the framework:

1. Brocade/Ruckus Recommends the Framework Emphasize the Importance of Shared Infrastructure

In its interagency role, NITRD is uniquely situated to advance the importance of shared infrastructure facilitating the integration of IT with traditional city infrastructure. IT (namely Wi-Fi access points and small cells) is increasingly being embedded in a range of infrastructure including street lights, bus stop shelters, kiosks and other types of street furniture. In addition to the obvious aesthetic benefits to deploying edge networking and other tech in this manner, embedding IT also leverages the fact that these assets have power and backhaul, and in many cases displays for advertising that feed the business model for sustainable "free" public Wi-Fi. Traditional infrastructure can be co-deployed together with Wi-Fi, cameras and environmental sensors as we are doing today with our LED street light partners as well as kiosk and street furniture vendors. Similar in concept to "dig once," any infrastructure deployed should examine opportunities to embed IT.

2. Brocade/Ruckus Supports the Global Cities Team Challenge (GCTC)

The GCTC is a critical component to accomplish the goals of the framework: to understand

[1] *See* National Science Foundation, Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together, 82 FR 3810, (Jan. 12, 2017), available at www.federalregister.gov/documents/2017/01/12/2017-00501/smart-cities-and-communities-federal-strategic-plan-exploring-innovation-together.

local needs and goals, accelerate smart city/community innovation and infrastructure, develop best practice blueprints and guidelines, and engage with city/community stakeholders. Brocade/Ruckus is participating significantly as an industry lead with the Public Wi-Fi Super Cluster. As introductory background, we are providing the information below on our smart city technology. Brocade/Ruckus looks forward to continued engagement with NITRD and other stakeholders.

Sincerely,

/s/ Joseph Andersen
Joseph Andersen
Government Affairs
Brocade
XXXXXXXXX

Steve Wimsatt
Smart Cities Business Development
Ruckus Wireless Business Unit, Brocade
XXXXXXXXXX

Smart Wi-Fi for Even Smarter Cities

Smart cities are no longer a dream. Urbanization, demographic shifts, environmental changes, and new technologies are reshaping the way city leaders create and deliver public services –pushing them to use technology more effectively to enrich the quality of life for residents and visitors. The rise of Smart Cities is the response to these challenges.

Smart Wi-Fi: A Basic Building Block for Smart Cities

No single technology is a panacea for every use case and application, however, carrier grade smart Wi-Fi is at the forefront of smart city infrastructure. Given its cost efficiencies, the speed at which it can be deployed and the high bandwidth it delivers, as well as nearly universal support across mobile devices, Smart Wi-Fi is now viewed as a basic building block for enabling the Smart City. Smart Wi-Fi transforms traditional wireless connectivity within unlicensed radio frequencies through the use of advanced capabilities that extend the range, reliability and performance of 802.11 technologies. This allows the network to automatically adapt to environmental changes while optimizing client performance. For Smart Cities, this means strong wireless connectivity even when large trucks block an AP or crowds pack the street. Superior broadband wireless connectivity is critical to deliver a platform for new Smart City applications such as traffic control, parking management, environmental sensors, and IP video surveillance, as well as simply providing a good experience for residents, visitors and staff. Combined with cloud computing, sophisticated analytics software, location-based services, embedded sensors, mobile device applications and new technologies such as Hotspot 2.0, Smart Wi-Fi has become indispensable for helping municipalities achieve smart city status and do many things that were previously impossible or too expensive.

Ruckus Smart Wi-Fi for Smarter Cities

Beyond conventional Wi-Fi technology, originally conceived as a technology of convenience

for consumers, Ruckus Smart Wi-Fi employs a range of new capabilities, not available in traditional Wi-Fi systems, that are essential to the development of smart cities. When coupled with cloud-based applications, analytics engines and the "Internet of Things", Smart Wi-Fi allows a city to more easily and efficiently collect and analyze all kinds of data to make better decisions about urban planning, city property management and budgets. Perhaps the most critical Ruckus differentiator for Smart City deployments is its patented Beamflex antennas. These advanced directional smart antenna arrays enable RF transmissions to be focused and automatically directed over the best signal paths to deliver the highest speeds with the least amount of interference and packet loss. This extends the coverage range of each access point, reducing deployment cost since cities need fewer APs and have more flexibility in where they are mounted. Other key features for Smart Cities include reliable wireless meshing, enabling a single network connection point to serve several APs vs requiring a connection to each AP and highly scalable location services, which help cities to better understand and analyze user behavior and footfall trends, particularly in locations where traditional location services or new beacon technology doesn't always work well or is cost-prohibitive.

Focused Wi-Fi Expertise

Ruckus is purely focused on Wi-Fi. All of our R&D, engineering, development, testing, professional services, channel partners are Wi-Fi oriented, as well as 100% of our revenue. We help customer solve the most challenging, mission critical wireless connectivity challenges and continuously improve our knowledgebase for how to successfully deploy, manage and monetize Wi-Fi networks. For cities, this means expertise in where to target deployments and how to design and plan network installs. Most of the time this means selecting specific areas or zones for Wi-Fi coverage, and conducting site surveys to understand the RF environment and what is needed to ensure strong, pervasive Wi-Fi connectivity.

Scalable Wi-Fi Management

Ruckus has worked with cities and service providers to deploy networks with over 100,000 access points. Strong management is critical to ensure high service quality and minimize ongoing operational costs. The Ruckus SmartZone software platform provides a tremendous level of flexibility: scaling up to 300,000 devices, offering single and multi-tenancy, as well as 'WiFi-as-you-grow' — the capability for your network to expand with and adapt to the changing needs of your business. Ruckus Wi-Fi offers an ideal platform for immediate city services, as well as a robust platform for future opportunities and applications. That is why it is the preferred solution for cities of all sizes around the world.

ARE THE CENTRAL GOALS APPROPRIATE AND/OR ARE THERE OTHER GOALS THAT SHOULD BE CONSIDERED?

NITRD outlines five goals in the Smart Cities and Communities Plan: 1) understand local needs and local goals; 2) accelerate smart city/community innovation and infrastructure development; 3) facilitate cross-sector collaboration and bridge existing silos; 4) boost exports and promote U.S. global leadership; and 5) focus on people-centered solutions that support job growth and economic competitiveness.[1] These are worthy goals to advance the development of smart cities in the United States. However, NITRD should refine its fifth goal ("focus on people-centered solutions that support job growth and economic competitiveness") to focus on productivity rather than job growth. Embracing automation and other data-driven efficiencies in pursuit of greater productivity can result in short-term job disruptions, and NITRD's goals should allow for that since reaping the benefits to productivity is crucial for both job growth and increased economic competitiveness.[2]

NITRD should add a sixth goal of creating a global smart city community. U.S. cities will be significantly more successful in their own transformation to smart cities if they do so in concert with cities abroad as this will allow them to share best practices and benefit from greater scale. By encouraging interoperability and industry-led standards development on a global level, the federal government can also play a valuable role in preventing the balkanization of the Internet of Things, which is the technological backbone of smart cities.[3] NITRD can also develop global best practices and facilitate inter-city data sharing to encourage cities to not only improve performance relative to their internal benchmarks but also relative to their global peers. Finally, by developing a global smart city community, NITRD can lay the groundwork for a network of voices who will support data-friendly regulations and oppose efforts to limit the free flow of data across borders, since data-friendly policies are necessary to maximize the value and usefulness of smart city applications.[4]

[1] "Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together," Networking and Information Technology Research and Development Program, January 2017, https://www.nitrd.gov/drafts/SCC_StrategicPlan_Draft.pdf,
[2] Robert D. Atkinson, "Bring on the Robots, Please!," *Huffington Post*, February 1, 2016, http://www.huffingtonpost.com/robert-d-atkinson-phd/bring-on-the-robots-pleas_b_9130652.html.
[3] Joshua New and Daniel Castro, "Why Countries Need National Strategies for the Internet of Things," Center for Data innovation, December 16, 2015, http://www2.datainnovation.org/2015-national-iot-strategies.pdf.
[4] Ibid; Daniel Castro, "The False Promise of Data Nationalism," Information Technology and Innovation Foundation, December 2013, http://www2.itif.org/2013-false-promise-data-nationalism.pdf.

ARE THE STRATEGIC PRIORITIES APPROPRIATE AND/OR ARE THERE OTHER PRIORITIES THAT SHOULD BE CONSIDERED?

Smart cities will produce a substantial amount of data that will help communities learn how to be more productive, sustainable, and resilient. It is important that smart cities do not only benefit certain types of cities or neighborhoods, but are integrated into a wide array of diverse communities. This will avoid unnecessarily exacerbating digital divides or contributing to the problem of "data poverty."[5] Moreover, including people of varying socioeconomic backgrounds is a way to ensure that projects properly understand a community's goals and needs and helps create more user-centric services.[6] To that end, NITRD should make diversity a strategic priority. For example, it could work with civic leaders in low-income neighborhoods to ensure they fully understand the benefits of smart cities. In addition, it could prioritize proposals that integrate a community's diverse population into the planning and testing stages of a smart city initiative.

ARE THE NEXT STEPS IDENTIFIED IN THE DRAFT PLAN APPROPRIATE AND/OR ARE THERE OTHERS THAT SHOULD BE CONSIDERED?

As NITRD's Smart Cities and Communities Task Force works to execute the strategies detailed in this plan and focuses on its plans to promote interagency coordination, it should be aware and supportive of proposals for the federal government to develop a national strategy to support the Internet of Things.[7] A national strategy for the Internet of Things would have a heavy focus on both accelerating the development of smart cities as well as organizing federal agency efforts to promote the development and adoption of the Internet of Things.[8] Increased federal agency collaboration could substantially advance the goals of the task force, particularly because the federal government already carries

[5] Daniel Castro, "The Rise of Data Poverty in America," Center for Data Innovation, September 10, 2014, http://www2.datainnovation.org/2014-data-poverty.pdf.
[6] See "Play 1" in "Digital Services Playbook," U.S. Digital Services, n.d., https://playbook.cio.gov/#play1.
[7] S.Res 110, 114th Congress. (2015); DIGIT Act, S. 88, 114th Congress. (2017).
[8] Joshua New and Daniel Castro, "Why Countries Need National Strategies for the Internet of Things," Center for Data innovation, December 16, 2015, http://www2.datainnovation.org/2015-national-iot-strategies.pdf.

out a vast array of different initiatives to both use and support the development of the Internet of Things, many of which relate directly to smart cities.[9]

Though it is not the responsibility of the Smart Cities and Communities Task Force to develop a national strategy for the Internet of Things, it should ensure that its work compliments and aids in the development of a national strategy.

Sincerely,

Daniel Castro
Director
Center for Data Innovation

Joshua New
Policy Analyst
Center for Data Innovation

[9] Daniel Castro and Joshua New, "Everything the U.S. Government is Doing to Help the Private Sector Build the Internet of Things," Center for Data Innovation, December 12, 2016, http://www2.datainnovation.org/2016-federal-support-iot.pdf; Daniel Castro, Joshua New, and Alan McQuinn, "How Is the Federal Government Using the Internet of Things?," Center for Data Innovation, July 25, 2016, http://www2.datainnovation.org/2016-federal-iot.pdf.

RESILENT, RELIABLE, ULTRA-LOW COST POWER FOR SMART CONNECTED COMMUNITIES

Rajendra Singh
D. Houser Banks Professor & Director Center for Silicon Nanoelectronics
Holcombe Department of Electrical and Computer Engineering & Department of Automotive Engineering
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The use of fossil fuels and nuclear fuel for power generation in centralized power faculties is a major barrier in building self-contained sustainable smart connected communities. Hardware and software developments have played a vital role in enabling the capability of "personal communication". A self-contained, smart and connected community should use energy resilience, forming the basis of an ultra-low-cost and resilient, local, and direct current power network for electricity infrastructure. The community will comprise smart homes equipped with battery storage and solar panels generating electricity, effectively forming a local power network, and with an extensive Internet of Things (IoT) to supply data needed by an agent-based, networked, power-management system to facilitate real-time energy sharing among the constituent members within the nanogrid (Fig. 1).. The local DC power network based on photovoltaics and batteries will provide resilient, reliable and sustainable power source to everyone leading to "personal power". The combination of "personal communication", "personal power", and IOT is paving the way for the emergence of "precision and personalization" as the driver of emergence of smart and connected communities in the 21st century.

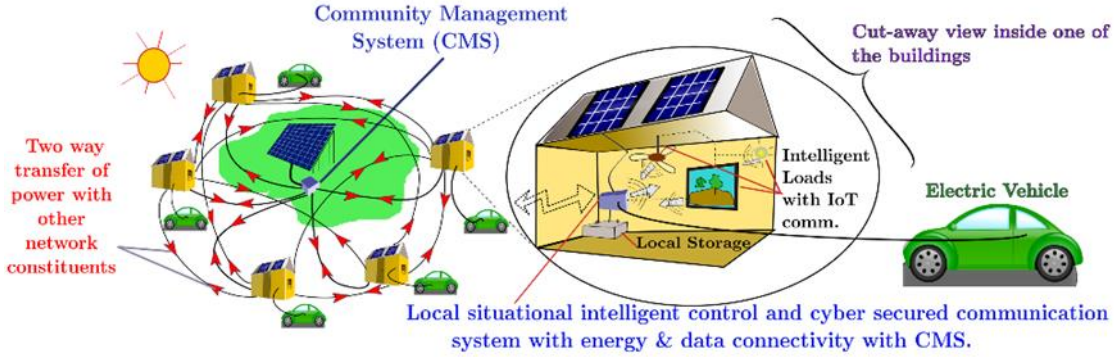

Fig. 1 Resilient power network for smart and connected communities.

Our emphasis on energy resilience at a community level is a timely response to both global trends and national needs, as the traditional centralized energy networks have proven vulnerable to disproportionately large-scale, regional blackouts caused by small-scale, local failures. For instance, in 2003, a tree branch brushing up against a power line (i.e., a local failure) started a domino effect, causing a massive blackout across southeast Canada and eight U.S. states that resulted in 11 deaths and $6 billion in damages [1]. Given that the majority of the power grid exists above ground, severe weather events frequently cause such local failures. The last decade has seen over 680 widespread blackouts caused by severe weather events in the U.S. alone, with an estimated annual cost of $70 billion and with ~90% of these outages affecting 50,000 or more customers [2]. The aging power grids are not only more prone to causing weather-related outages,

but they also lack the automated sensors that instantaneously relay outage information, leading to slower response times by maintenance workers and operators.

What is more, energy resilience is further challenged by system-level inefficiencies that put an increased constraint on supply during times of increased energy demand as well as create a financial burden on the consumer. The high voltage, alternating current (AC) transmission infrastructure cost alone is currently around $5 million per mile [3]. Except for a few inductive loads, virtually all our loads today are direct current (DC); meaning that a 30% cost increase is accrued due to AC infrastructure [4]. Experimental data of Fig. 2 shows that 30 % electrical power is saved when local DC power is used in place of centralized AC power for DC loads. . We have shown that the use of solar energy and batteries leads to a local DC-powered network that can be resilient, reliable, and economical as the cost of solar power has decreased to levels lower than any other electricity-generating source, and the cost of batteries continues to decline at a rapid pace [3]. Recent trade publications have reported that the cost of electrical power, which can be stored in batteries, is lower than the power generated by fossil fuels and nuclear reactors [5, 6]. A study led by the former head of the Harvard Medical School found that fossil fuels cost the U.S. economy $500 billion per year in medical expenses and work hours lost, and are in part responsible for cancer, heart disease, asthma, and early death [7]. Childhood leukemia is also linked to high-voltage lines and is also possible link to testicular cancer [8-9]. In a study of electricity generation and health, the authors found that only solar, wind, and wave power have negligible adverse effects on health [10]

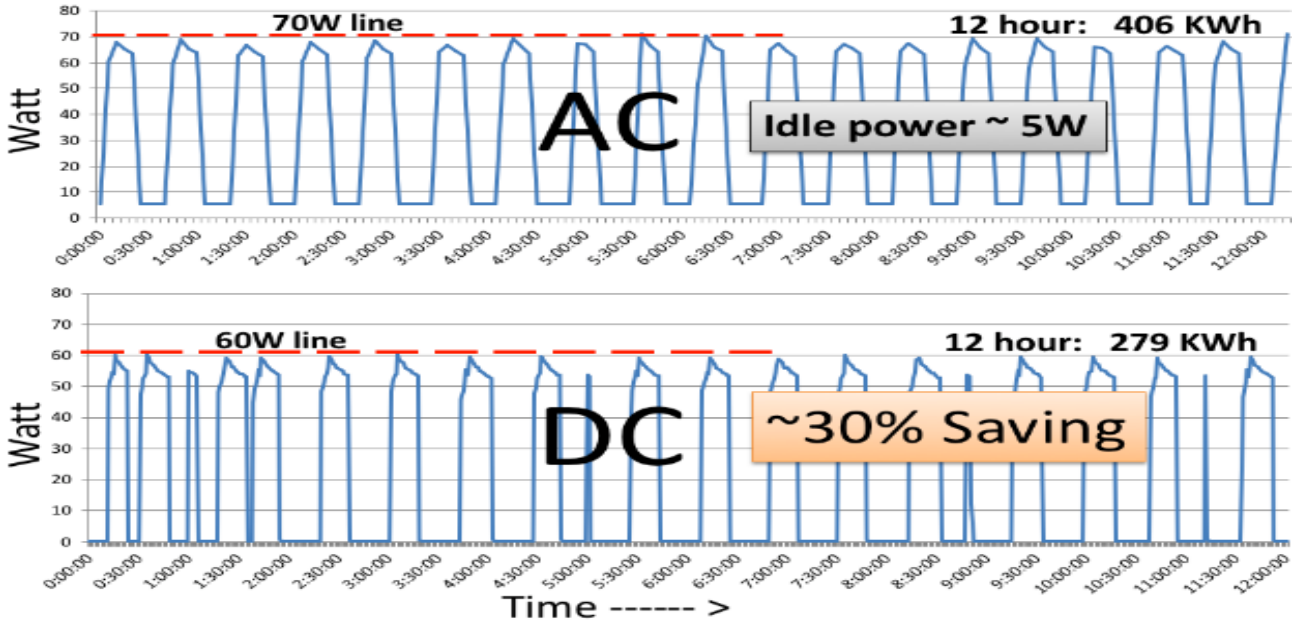

Figure 2. 30 % power saving by local DC Power as compared to Centralized AC Power

Similar to PV, the cost reduction of batteries (Fig. 3) is driving the electrification of transport sector. Driven by advancements in technology and volume manufacturing, the cost of batteries is about $ 200/kWh today and will reach at par or below the hydro storage by 2020.

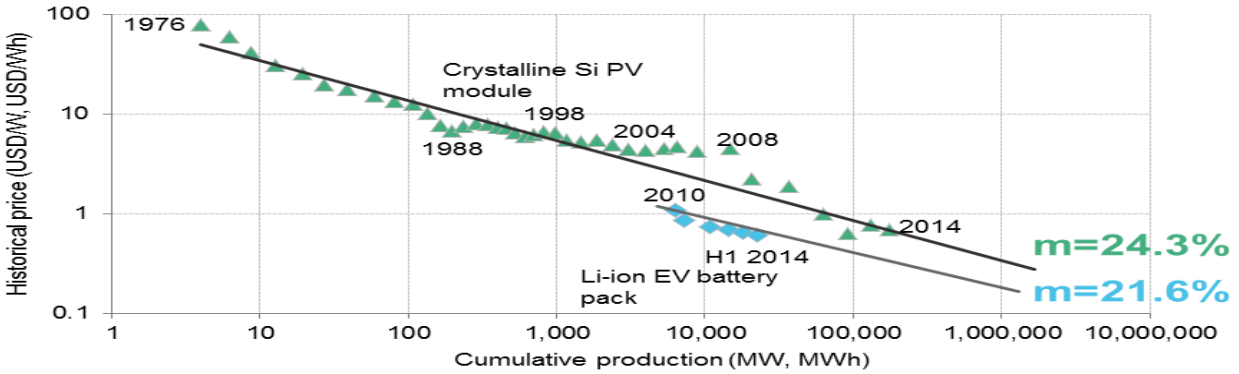

Figure 3. Cost reduction trends of photovoltaic modules and Lithium batteries. [Bloomberg New Energy Finance].

Reminiscent of the original concept of local power generation and utilization envisioned by Edison, this approach offers the potential not only to significantly reduce vulnerability to disproportionate power outages but also to dramatically improve energy efficiency leading to major cost reduction with added societal benefit of access to all. . Further overall cost reduction will be gained from the ability to store energy and share it within the communities. We view energy resilience from the perspective of people within these self-contained communities, providing them with information and giving them the tools to change their environments... Giving community members the power to enact change through data-driven choices will provide a fertile context for exploring their relationships with energy resilience and smart systems.

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COLUMBIA UNIVERSITY

IN THE CITY OF NEW YORK

DATA SCIENCE INSTITUTE

February 25, 2017

Comment on the Draft "Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together" from the National Coordination Office for Networking and Information Technology Research and Development (NITRO), National Science Foundation

Dear Sir or Madam,

As Chair of the Smart Cities Center of Columbia University's Data Science Institute, I read the Draft Federal Strategic Plan with great interest. The document provides an excellent roadmap for coordinated Federal initiatives in Smart Cities and Communities. I believe it identifies many of the central goals and strategic priorities for our research community.

I would like to inject the perspective of the University researcher in the smart cities research landscape. As alluded to in the plan document, Cities are facing highly complex choices regarding the adoption of smart city technologies, which they are right to worry might ultimately provide a poor return on investment due to highly uncertain and rapidly shifting uses and demands. Or, alternatively, those choices may lead to a product decision that becomes obsolete or not widely adopted, making it difficult to upgrade or improve as technology advances. The genesis of many technological solutions considered do not come from an understanding of the most pressing City challenges. The role of Universities in this consideration of choices has tremendous potential. University researchers can provide their independent technical expertise to help guide city agencies' consideration of technologies. In addition to providing technical expertise, Universities can use cities as a test bed for technology and innovation enabling the city and its vendors to more deeply understand the benefits. This can lead to a better informed customer, improved and well vetted technologies, as well as the potential savings of public funds.

Universities, whose primary mission is education, can also lead the way in workforce training which is smart cities context-driven. This can include pilot testing and field deployments done in conjunction with public schools or neighborhoods to engage citizen participation, education and hands on training.

Lastly, in terms of "next steps" to be considered in the document, the most effective mechanisms of funding for smart cities R&D may not be currently in place. Despite the immense technical expertise and talent housed in research universities, there are generally not clear pathways to enable the funding of R&D in the smart cities area which are truly driven by local problems and local needs. As identified in the strategic plan, the undertaking

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of smart cities projects is intrinsically local. Perhaps the establishment of a federal bank to competitively enable research in support of local projects would be an effective mechanism. If a federal agency could be the keeper of grant funding for research it would facilitate contracting more in line with Research Institutions. Proposals could be required to obtain proper city advocacy, and then be vetted and awarded in a contract method consistent with Research contracting policies. Today, cities are well suited to issue procurement and service contracts but have limited mechanisms to contract directly with academia or other research institutions on applied or fundamental research that can directly benefit a city.

Sincerely,

Andrew Smyth

Professor, Dept. of Civil Engineering & Engineering Mechanics
Chair, Smart Cities Center of the Data Science Institute
Director of Research, Robert A.W. Carleton Laboratory

February 28, 2017

Attn: Smart Cities and Communities, NCO

Suite II-405, 4201 Wilson Boulevard, Arlington, VA 22230

The Computing Technology Industry Association "CompTIA" respectively submits our comments on the **National Science Foundation Smart Cities and Communities Federal Strategic Plan**. The Plan emphasizes all of the various elements that constitute a successful smart city/community.

There are a few areas that we would like to highlight.

Workforce

The lifeblood of any successful smart community is a well skilled workforce. The long term sustainability of a smart city relies on a "cradle to grave" approach to education. This starts with the K-12 segment driving interest in the Science, Technology, Education, and Mathematics (STEM) disciplines followed by apprenticeship programs involving secondary education students to retraining the current workforce. The information technology skills that will be needed to realize the 21st century smart community workforce must be emphasized over the course of the entire education life cycle.

Cities as Technology Test Beds

In order for our cities to truly capitalize our nation's technology portfolio, we must emphasize "transitioning research to practice through testing at scale". The city environment is the perfect test bed to scale up a number of technological and cyber solutions. The test bed approach will allow a city to mitigate risk. To compliment the "urban test bed" environment, we strongly support the funding of the National Telecommunications and Information Administration's Institute for Telecommunications Sciences Boulder, Colorado based spectrum testbed. Many of the wireless capabilities that will be deployed in a smart community will need to be able to share spectrum. The best practices/case studies developed by the Institute will need to be replicated nationwide.

Infrastructure

A community can only be as good as its collective parts. For a community to become smart, it is critical for a community to modernize its infrastructure. A 21st century

infrastructure ecosystem includes transportation (roads, bridges and airports), water (public utilities) and energy (electric grid) that is layered by cross-cutting secure smart technology, enabled by ubiquitous broadband connectivity and sensors, covering urban, suburban, and rural populations. We believe that the nation should emphasize technology when modernizing our infrastructure.

Role of Prizes and Challenges

There is a longstanding track record of prizes (whether funded by the federal government or the private sector) spurring innovation and the return on investment can be strong. Some studies find that prizes can generate $16 dollars in investments for new technologies for every dollar spent.

We strongly encourage the continued use of federal challenges to address the smart community marketplace. Building on the success of the Department of Transportation challenge, other agencies should consider creating their own challenges.

Role of Open Data

As federal, state, and local governments have opened up data sets to the general public, the opportunities for innovation have started to emerge. We strongly support the continued evolution of the open data movement. Opening government data increases citizen participation in government, creates opportunities for economic development, and informs decision making in both the private and public sectors.

Respectfully submitted,

David Logsdon

Senior Director, Public Advocacy

CompTIA

February 28, 2017

BY ELECTRONIC SUBMISSION

National Science Foundation
Networking and IT Research and Development
Smart Cities and Communities Task Force
4201 Wilson Blvd., Suite II-405
Arlington, VA 22240

Re: *Smart Cities and Communities Federal Strategic Plan*, *82 Fed. Reg. 3801*

To Whom It May Concern:

CTIA[1] respectfully submits these comments on the National Science Foundation's ("NSF") *Smart Cities and Communities Federal Strategic Plan* (the "Strategic Plan").[2]

We applaud NSF's efforts to ensure U.S. leadership in smart city deployments by establishing the Strategic Plan, which will coordinate federal initiatives and guide local governments. 5G wireless networks will enable applications allowing communities of all sizes to digitize municipal infrastructure. The speed, reliability and capacity of these networks will drive an ecosystem of sensors and analytics. They will bring significant broadband infrastructure investment and increase efficiency. The deployment of wireless smart city innovations requires access to physical

[1] CTIA-The Wireless Association® (www.ctia.org) represents the U.S. wireless communications industry and the companies throughout the mobile ecosystem that enable Americans to live a 21st century connected life. The association's members include wireless carriers, device manufacturers, suppliers as well as apps and content companies. CTIA vigorously advocates at all levels of government for policies that foster continued wireless innovation and investment. The association also coordinates the industry's voluntary best practices, hosts educational events that promote the wireless industry and co-produces the industry's leading wireless tradeshow. CTIA was founded in 1984 and is based in Washington, D.C.

[2] *See 82* Fed. Reg. 3810 (Jan. 12, 2017).

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infrastructure. Cross-industry platforms are necessary to share lessons learned and best practices for these emerging technologies.

A recent report commissioned by Accenture explores how 5G wireless service will benefit urban and rural communities as they connect infrastructure like utilities, public safety and transportation to a network of sensors allowing for monitoring and analysis.[3] 5G will enable more connections, quicker response times and low-power connections for extended sensor battery life.[4] The move to 5G networks will create three million jobs and boost annual GDP by $500M, driven by a projected $275M investment by telecom providers within the next seven years.[5] Deloitte recently analyzed the wireless industry's impact on growth in key industries like energy, health care, public safety and transportation.[6] The implementation of wireless technologies will lead to smart grid adoption reducing energy usage, health system savings via monitoring chronic conditions, lives saved through improved public safety response times, and reduced traffic congestion through evolution to connected and autonomous vehicles.

Fostering smart infrastructure requires efficient siting policies, especially for "small cells" that attach to existing structures like light poles. Network operators need more timely zoning and permitting approvals, reasonable fee structures, and access to rights of way. As local governments plan their smart city strategies, they should collaborate with carriers to ensure a

[3] *See How 5G Can Help Municipalities Become Vibrant Smart Cities*, Accenture, at 3 (Jan. 2017), *available at:* http://www.ctia.org/docs/default-source/default-document-library/how-5g-can-help-municipalities-become-vibrant-smart-cities-accenture.pdf .
[4] *See id.* at 7.
[5] *See id. at 14.*
[6] *See Wireless Connectivity Fuels Industry Growth and Innovation in Energy, Health, Public Safety, and Transportation*, Deloitte (Jan. 2017), *available at:* http://www.ctia.org/docs/default-source/default-document-library/deloitte_20170119.pdf .

robust backbone of sites that can address network demands as they evolve.

We agree with the Strategic Plan's priority on fostering communication and lessons learned through cross-sector platforms addressing security concerns.[7] This is particularly important in smart cities since they incorporate numerous municipal services and their stakeholders. The National Institute of Standards and Technology ("NIST") Cybersecurity Framework established an industry-led approach for information-sharing and assurance centers that are the cornerstones of our members' data security efforts across sectors. These centers allow us to interact with other sectors like utilities and transportation. Federal agencies should continue to encourage industry participation in this framework.[8] Additionally, our participation in the NIST Smart City Working Group allows us to join an analysis of solution attributes and features, advancing interoperability and avoiding vendor lock-in.[9]

The wireless industry will address an overall framework for security in the Internet of Things. CTIA is preparing and assessment of managed and unmanaged network environments against industry best practices and standards. Our Cybersecurity Working Group will analyze a global model for the Internet of Things, while looking to advance cybersecurity for the U.S., and in coordination with other sectors.

The Strategic Plan establishes NSF's vision for communities that deliver services more safely and efficiently through connectivity. CTIA looks forward to opportunities to participate in NSF's efforts to realize that vision.

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[7] *See* Strategic Plan Priority 2.4.4 at 25.
[8] *See id.* at 18.
[9] *See* NIST International Technical Working Group on IoT-Enabled Smart City Framework, *available at:* https://pages.nist.gov/smartcitiesarchitecture/ .

Respectfully submitted,

CTIA

By: */s/ Jackie McCarthy*

Jackie McCarthy
Assistant Vice President, Regulatory Affairs
CTIA
1400 16th Street, NW, Suite 600
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Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together

The #DemandDC Message!

Smart Cities & Communities / Resilient Communities: Imagine sustainable communities that blend the charm of a walkable downtown with the satisfaction of clean local power, water, and artisanal food production. Imagine families and friends thriving and immersed in a high quality self-sustaining lifestyle. Imagine a community connected to itself by the understanding that it is eliminating harm to the earth while promoting national resiliency and even survivability. Imagine sharing a sense of purpose and reconnecting with the excitement that built America. The time is now.

Vision: Holistic self-sustaining communities that provide an attractive mutually supporting mix of urban village, residential, agricultural, and commercial/industrial modules. Designed for resilience and security, can operate independent of external power and water utilities, minimize dependence on supply chains and long distance commerce, and produce more energy, food and other commodities than they require.

Background:

The United States electrical grid is a vast just-in-time machine that requires constant load balancing; it is not designed to sustain significant disruptions. Although one regional subcomponent can cause a region to fail; there are threats to the entire grid itself. Ice storms and hurricanes are well known threats to regional power supplies, but the United States is not prepared for extreme solar flares causing geomagnetic disturbances outside the operating range of the power network, or intentional cyber, electromagnetic pulse, or physical attacks.

"As citizens of the United States, our current way of life is dependent on secure and reliable electrical power. If electric power is not available for weeks, months or even a year, then cascading impacts would degrade multiple critical infrastructures -- water supply, wastewater treatments; telecommunications and the internet; food production and delivery; fuel extraction, refining and distribution; financial systems; transportation and traffic controls; emergency services; hospitals and

healthcare; supply chains; and other critical societal processes. Loss of life could be catastrophic. Life itself would change."

Approach:
Direct Current (dc) power is the foundation for a resilient, reliable and sustainable future for smart cities and communities. DC power, coupled with distributed renewable energy resources (DRER) (PV, wind, etc.) and energy storage, which are inherently dc centric, offers the best solution for the evolution of the digital power infrastructure of the future.

ABOVE INCLUDES EXCEPTS FROM:

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The re-emergence of LVDC/ELVDC

SOURCE: Chris Moller, The Open University, UK and Brian T. Patterson, The EMerge Alliance, USA

The Rationale

Since Edison lost the Current Wars to Westinghouse and Tesla 130 years ago, AC has reigned supreme for the distribution of electricity. With such an installed base of equipment and engineering knowledge, there needs to be a fairly strong argument for changing it. The argument centres on:

- **Renewable energy sources** are largely DC – and they are generally smaller and more widely distributed which makes coupling them into the current "synchronous" system increasingly difficult, more expensive and less reliable.

- **Energy storage** is natively DC – which results in the inherent need to convert the power back and forth between AC and DC, as opposed to much simpler DC to DC conversions (which are required anyway). In addition to these conversions being less efficient, they require additional equipment at a higher cost and lower reliability.

- It is much simpler to **trade electricity** using DC than AC – the prospect of a direct transactional management of power flow in an electrical system, using semiconductor-based power electronics, is greatly simplified if the power flow is direct current and can be actively articulated with solid-state devices. Again, this suggests lower cost, greater reliability and a higher level of power articulation when using direct current power.

- An increasing variety of **small appliances** need relatively low levels of DC power. (Without AC mains, dangerous voltages can be avoided.) – In addition, even though low voltage AC could be considered, this again would require significantly more electronics at the point of use which would raise costs and lower reliability for equivalent function and safety.

- The **transformer** that was the main component for delivering the required voltage has been superseded by the switched-mode power supply, which is smaller, lighter, and no more expensive. In addition – AC coil transformers are increasingly less efficient at the lower voltages and power levels being increasingly used by devices. Furthermore, while transformers deal with the voltage needs, they do not deal with the other requirements of multi-phase, synchronous AC power systems – which include frequency management, power factor correction, harmonic filtering, and phase/line balancing.

In summary, moving in the direction of a non-synchronous power form, namely direct current (dc), greatly mitigates most of the complicating factors of power source generation and coupling, power storage and distribution and load management. The simplicity and lower cost of these solutions helps to justify the deployment of Renewable Energy systems to meet international needs and standards whilst minimizing the environmental impact of an increasingly electricity hungry world. As we move from a 'hunter-gather' mentality regarding energy to a far more sustainable 'farmer-harvester' mentality, we need to adjust the electrical infrastructure to better accommodate this critical transformation.

Comment On Draft of
"Smart Cities and Communities Federal Strategic Plan:
Exploring Innovation Together"

I'm in Maine, a rural state with more than 400 communities, a population of over 1 million people who are highly creative and hard working. We have a superb Legislative Government Oversight Committee (GOC) that works collaboratively with the Office of Program Evaluation and Government Accountability (OPEGA) using modern best procedures to evaluate peformance of legislative programs and agencies. We also have a highly interdisciplinary state and federal Maine Traffic and Safety Committee (MTSC) that is conducting excellent research.

There are many Maine community programs in health and law enforcement, including fire departments, that demonstrate innovative programs.

What we need, and what is not mentioned in the draft is the legal structures and personnel for innovation and development in laws: the fundamental frameworks for accessing justice in international law, intellectual property law, cyberlaw, and antitrust law. I agree with Chander & Uye's claim that "Law Made Silicon Valley", 2014. I also believe that the lack of access to specialist attorneys and structures for facilitating access to law by self-represented litigants is and will continue to be a constraint on innovation, development, and diffusion of development in Maine and other rural states until corrected.

Please accept this comment as a plea, and a statement to include in the final report, for applicants to work with Department of Justice attorneys to develop and to advise on appropriate necessary electronic and personal frameworks for access to law by Mainers and others living in rural areas. Our state courts have been underfunded for some time, Maine Judges are still the lowest paid state judges (National Center for State Courts, 2017) and, although funding is available for moving the state courts to an electronic system, it will take time and will not solve the crucial problems of shortages of experienced attorneys in the federal areas mentioned above.

Please place this comment in the priorities and objectives sections.

Dwight Hines
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February 28, 2017

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COMMENTS OF THE ELECTRONIC PRIVACY INFORMATION CENTER

to the

NATIONAL SCIENCE FOUNDATION

Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together

[Docket No. 2017-00501]

February 28, 2017

By notice published on January 9, 2017 the National Science Foundation ("NSF") requests public comments regarding the Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together ("Smart Cities Plan").[1] Pursuant to this notice, the Electronic Privacy Information Center ("EPIC") submits these comments to urge the NSF to revise the draft document to prioritize cybersecurity in smart city development, address privacy concerns, and minimize data collection.

EPIC is a public interest research center in Washington, D.C. EPIC was established in 1994 to focus public attention on emerging privacy and human rights issues and to protect privacy, the First Amendment, and constitutional values. EPIC has considerable expertise in the Internet of Things and other connected devices and has testified before Congress on connected vehicles and submitted numerous comments to various agencies concerning connected devices.[2] EPIC has also submitted comments on the privacy implications and need for transparency of the development and use of the Smart Grid.[3]

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[1] *Request for Comment on "Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together,"* 82 Fed. Reg. 3810 (Jan. 9, 2017).

[2] EPIC Associate Director Khaliah Barnes, Testimony Before the U.S. House of Representatives, Committee on Oversight and Government Reform, Subcommittees on Information Technology and Transportation and Public Assets, *The Internet of Cars* (Nov. 18, 2015), https://epic.org/privacy/edrs/EPIC-Connected-Cars-Testimony- Nov-18-2015.pdf; EPIC Statement to the House Committee Subcommittee on Communications and technology, Feb. 2, 2017, https://epic.org/testimony/congress/EPIC-Statement-NTIA-02-02-2017.pdf; Comments to the NTIA "On the Benefits, Challenges, and Potential Roles for the Government in Fostering the Advancement of the Internet of Things," June 2, 2016, https://epic.org/apa/comments/EPIC-NTIA-on-IOT.pdf.

[3] EPIC Comments to the California Public Utility Commission, "Proposed Policies and Findings Pertaining to the EISA Standard Regarding Smart grid and Customer Privacy," Mar. 9, 2010, https://epic.org/privacy/smartgrid/EPIC_03_10_CPUC_Comments.pdf

The Smart Cities Plan Should Be Updated to Prioritize Cybersecurity and Privacy

EPIC urges NSF to emphasize cybersecurity and privacy must be in all aspects of smart city planning. The long-term, sustainable goals mentioned in the Smart Cities Plan will be impossible without a secure system.

The need for strong cybersecurity measures in cities is already be evident. Shortly before the 2017 Presidential Inauguration, the Washington Metropolitan Police Department's closed-circuit television cameras were hacked and unable to record for three days.[4] In November, hackers infiltrated San Francisco's public transportation system and threatened to release customer and employee data unless a ransom was paid.[5] Hackers have also targeted police departments across the country by breaching their computer systems, holding files for ransom, and deleting files when they are not paid.[6]

A recent DHS report found that cybersecurity was a top concern in both the public and private sector.[7] The DHS report also noted that most states acknowledge their lack of understanding of cybersecurity practices.[8] The benefits that smart cities could bring cannot be achieved if the systems are insecure and cities are subject to hacks that threaten public safety.

Protecting Individual Privacy

The Smart Cities Plan envisions monitoring roads and first-responder activity so that resources are used efficiently. However, the plan should explain how data from private individuals will be safeguarded. The Plan should also address the potential discriminatory effect of monitoring individual behavior through secretive algorithms. For example, several cities have entered into data sharing agreements with popular traffic apps that rely on self-reporting[9] If these agreements become the norm, cities must protect individual privacy and be transparent with the public about how they use the data they receive and ensure that consumer data is protected.

Additionally, using data points to determine where first responders, especially law enforcement, are most needed could potentially increase police presence in some communities. An

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[4] Clarence Williams, *Hackers Hit D.C. Police Closed-Circuit Camera Network, City Officials Disclose,* Washington Post, Jan. 27, 2017, https://www.washingtonpost.com/local/public-safety/hackers-hit-dc-police-closed-circuit-camera-network-city-officials-disclose/2017/01/27/d285a4a4-e4f5-11e6-ba11-63c4b4fb5a63_story.html?utm_term=.c3df5f646abb

[5] Robert Hackett, *Hackers Threaten to Release 30GB of Stolen Data From San Francisco's Municipal Railway,* Fortune, Nov. 28, 2016, http://fortune.com/2016/11/28/muni-hack-san-francisco/.

[6] Chris Francescani, *Ransomware Hackers Blackmail U.S. Police Departments,* CNBC, Apr. 26, 2016, http://www.cnbc.com/2016/04/26/ransomware-hackers-blackmail-us-police-departments.html.

[7] *National Preparedness Report,* DHS, Mar. 30, 2016, https://www.fema.gov/media-library-data/1476817353589-987d6a58e2eb124ac6b19ef1f7c9a77d/2016NPR_508c_052716_1600_alla.pdf.

[8] *Id.*

[9] Parmy Olson, *Why Google's Waze Is Trading User Data With Local Governments,* Forbes, Jul. 7, 2014, https://www.forbes.com/sites/parmyolson/2014/07/07/why-google-waze-helps-local-governments-track-its-users/#3fba10ed39ba; Nick Stockton, *Boston Is Partnering With Waze To Make Its Roads Less Of A Nightmare,* Wired, Feb. 20, 2015, https://www.wired.com/2015/02/boston-partnering-waze-make-roads-less-nightmare/.

Summary of responses to the RFC on the draft "Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together"

increased police presence could lead to the impression that some communities are being treated differently than others and that some individuals are viewed differently because of where they live and who they know.[10] While attempting to achieve efficient use of resources, the Smart Cities Plan should also consider the potential discriminatory effects and require transparency about how first responders use data they collect and algorithms that they use.[11]

Data Minimization

The collection of personally identifiable information ("PII") will necessarily requires new privacy laws and new privacy safeguards. Innovative solutions that reduce regulatory burdens will be based on Privacy Enhancing Techniques ("PETs") that minimize or eliminate the collection of PII.[12]

If "Smart Cities' fail to minimize data collection and establish strong privacy and security measures to safeguard the data that is collected, they will almost necessarily place their inhabitants at risk from system failure, and cyber attack.

Conclusion

The Smart Cities Plan raises profound privacy and security challenges. It would be foolhardy to proceed down this road without a clear understanding of the risks and an equally clear commitment to establish necessary safeguards.

Marc Rotenberg
Marc Rotenberg
EPIC President

Kim Miller
Kim Miller
EPIC Policy Fellow

[10] Matt Stroud, *The Minority Report: Chicago's New Police Computer Predicts Crimes, But Is It Racist?*, The Verge, Feb. 19, 2014, http://www.theverge.com/2014/2/19/5419854/the-minority-report-this-computer-predicts-crime-but-is-it-racist; John Eligon, Timothy Williams, *Police Program Aims to Pinpoint Those Most Likely To Commit Crimes,* New York Times, Sept. 24, 2015, https://www.nytimes.com/2015/09/25/us/police-program-aims-to-pinpoint-those-most-likely-to-commit-crimes.html?_r=0.

[11] *Algorithmic Transparency: End Secret Profiling*, EPIC, https://epic.org/algorithmic-transparency/.

[12] Marc Rotenberg, *Preserving privacy in the Information Society* (UNESCO 2000), http://www.unesco.org/webworld/infoethics_2/eng/papers/paper_10.htm

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February 28, 2017

Comments from the Future of Privacy Forum to the National Coordination Office for Networking and Information Technology Research and Development (NITRD)

On behalf of the Future of Privacy Forum, we are pleased to submit these comments regarding the Request for Comment on the *Draft Smart Cities and Communities Federal Strategic Plan*, published in the Federal Register on January 9, 2017.

Introduction

Today's cities and communities are already pervaded by growing networks of connected technologies to generate actionable, often real-time data about the city or community and its citizens. Sensor networks and always-on data flows are already supporting new service models and generating analytics that make modern cities and local communities faster and safer, as well as more sustainable, livable, and equitable. At the same time, connected smart city devices raise concerns about individuals' privacy, autonomy, freedom of choice, and potential discrimination by institutions.

We commend NITRD for its forward-looking guidance and the acknowledgement that privacy will play a key role in promoting trust in smart cities and communities. This guidance and its emphasis on privacy is an important first step in building that trust.

The Future of Privacy Forum (FPF) is a DC-based non-profit organization that serves as a catalyst for privacy leadership and scholarship, and advances principled data practices in support of emerging technologies. We run a Smart City Working Group composed of over ninety representatives from local government, technology suppliers, connectivity providers, consumer advocacy organizations, and academia. This group serves as an ongoing collaborative effort to pursue best practices for data in the smart city/community ecosystem.[1]

We strongly agree that the path forward for city/community innovation in both the U.S. and globally lies through data and knowledge-sharing, best practices, and collaboration. Federal support to advance secure, privacy-preserving data sharing is critical to achieving this goal. In our work with smart city and community stakeholders, we have identified several key domains that we believe are ripe for Federal support and should be considered for this group's next steps.

Federal Support to Advance Secure, Privacy-Preserving Data Sharing

De-identification resources, training, and expertise. Many smart cities/communities have committed to making civic data available to partners, vendors, peers, advocates, academics, and citizens around the world via a range of mechanisms, including everything from public open data portals to private, custom data sharing agreements. While these data-sharing efforts serve important scientific and societal goals, city/community leaders must also ensure that individuals' personal data are kept private and secure in the process.

One of the greatest risks of sharing government datasets or opening them to the public is the possibility that individuals may be re-identified or singled out from those datasets, revealing data about them that could be embarrassing, damaging or even life threatening. Recent advances in

[1] The views herein do not necessarily reflect those of our members or our Advisory Board.

smart city data-collection technologies, re-identification science, data marketplaces, and Big Data analytics raise the risk of re-identification. These concerns loom all the larger as open data efforts continue to mature, no longer simply publishing historic data and statistics but increasingly making granular, searchable data about the city's – and its citizens' – activities available to anyone in the world.[2]

De-identification – the process of modifying personal data to ensure that data subjects are no longer identifiable—is one of the primary measures that organizations take to protect and share data in a privacy-preserving manner. Nevertheless, de-identification may be one of the most difficult tools for cities/communities to implement.

Governments and scholars have recently begun to tackle the difficulty question of publishing and de-identifying record-level government data. In 2015, for example, the National Institute of Standards and Technology (NIST) released a level-setting report on *De-Identification of Personal Information*, followed up by a specific guide to *De-Identifying Government Datasets* in 2016.[3] Municipalities are beginning to join in these efforts as well, focusing primarily on de-identification in the context of open data programs. For example, the City of San Francisco published the first iteration of an "*Open Data Release Toolkit*" in 2016.[4] FPF and the City of Seattle are currently developing an "*Open Data Risk Assessment*" in collaboration with a community advisory board and local academics, to be published in July 2017.

Despite these emerging toolkits and guidance documents, municipalities lack easy access to experts and new developments in de-identification science. Federal support for a central repository of resources, training, and experts would support the capacity of city nationwide to incorporate effective de-identification when appropriate for the data they collect, share, and handle. Federal support for continued research into expertise and best practices around de-identification would facilitate municipal decision-making, protect individual privacy, and accelerate smart city/community innovations.

Privacy risk assessment frameworks. When responsible organizations identify new ways to process data, for example, when launching a new program, product, system, or service, they utilize Privacy Impact Assessments (PIA) to conduct a systematic analysis to identify and address privacy issues. Current PIA practice includes detailed frameworks to help privacy professionals understand and quantify privacy risks. However, traditional private sector PIAs do not necessarily account for the unique risks created by smart city/community projects, which may include:

- Ethical, societal, and reputational risks, including concerns about power imbalances, discrimination, and government surveillance of citizens and vulnerable populations,

[2] *See, e.g.*, Lauren FitzPatrick, *CPS Privacy Breach Bared Confidential Student Information*, CHICAGO SUN TIMES (Feb. 25, 2017), http://chicago.suntimes.com/news/cps-privacy-breach-bared-confidential-student-information/; Alex Tockar, *Riding with the Stars: Passenger Privacy in the NYC Taxicab Dataset*, NEUSTAR RESEARCH (Sept. 15, 2014), https://research.neustar.biz/2014/09/15/riding-with-the-stars-passenger-privacy-in-the-nyc-taxicab-dataset/.

[3] *See* NISTIR 8053: DE-IDENTIFICATION OF PERSONAL INFORMATION, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (2015), http://dx.doi.org/10.6028/NIST.IR.8053; DRAFT NIST SP 800-188: DE-IDENTIFYING GOVERNMENT DATASETS, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (2016), http://csrc.nist.gov/publications/drafts/800-188/sp800_188_draft2.pdf.

[4] *See* OPEN DATA RELEASE TOOLKIT, DATASF (2016), https://datasf.org/resources/open-data-release-toolkit/.

- Public-private partnerships with complex data ownership, security, and management arrangements,
- Open data commitments and public records laws which may reveal individual information,
- Public spaces or circumstances in which individual notices or choices are not feasible (e.g., infrastructure upgrades that may incidentally capture personal data, but which would not be effective were citizens allowed to opt-out).

FPF is currently receiving input from our Working Group stakeholders on a PIA for smart city/community projects.

At the same time, accounting for risks is only part of a balanced value equation. Decision-makers must also assess, prioritize, and to the extent possible, quantify a project's benefits in order to understand whether assuming the risk is ethical, fair, legitimate and cost-effective. Municipalities in particular are stewards to the data of numerous, highly diverse populations, and must bear in mind that social and cultural priorities and sensitivities may vary just as widely among their constituent communities. Federally-supported guidance or convenings to help city/community leaders assess the sensitivity of particular data points would further strengthen city/communities' ability to collect, use, share, and dispose of data in a consistent and privacy-preserving manner.

Formation of a network of privacy leaders for smart cities/communities. The most effective way to provide cities and communities with the types of privacy resources and expertise described above would be to establish a privacy-focused network of city innovation and technology leaders. FPF has recently established a School Leaders Privacy Network with funding from the Bill & Melinda Gates Foundation as part of its education and student privacy program, helping educators better communicate and collaboratively address core privacy issues and principles.

Currently, many local governments and officials lack the institutional resources and knowledge to assess and manage the range of privacy risks that might arise from the use of smart city/community technologies and services. The emergence of Chief Innovation Officers (CIOs), Chief Technology Officers (CTOs), Chief Privacy Officers (CPOs), and Chief Data Officers (CDOs) within municipal governments points towards a growing awareness that data privacy and security are a priority. Federal support for a network of city/community privacy leaders and a central repository of common tools, terminology, and training would enable privacy-preserving systems to scale across application areas and geographic boundaries.

Conclusion

This *Draft Smart Cities and Communities Federal Strategic Plan* is a productive first step in establishing a consistent path forward for smart city/community innovation. We thank NITRD for recognizing the importance of privacy and look forward to remaining engaged as the guidance evolves. Please contact FPF Policy Counsel Kelsey Finch, kfinch@fpf.org, with any follow-up or questions.

Sincerely,

Kelsey Finch	Omer Tene	Jules Polonetsky
Policy Counsel	Senior Fellow	CEO

Computing Community Consortium (CCC) Response to NITRD
"Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together"
Elizabeth Mynatt, Dan Lopresti, Klara Nahrstedt, Shwetak Patel,
Jennifer Rexford, Ben Zorn

Computing Community Consortium
Catalyst

This response was prepared by the Computing Community Consortium (CCC). The mission of the CCC is to catalyze the computing research community and enable the pursuit of innovative, high-impact research. Our goal is to call attention to major research opportunities for the computing community. The draft NITRD plan highlights several key research areas, but it misses others that are critical and falls short in laying out an ambitious agenda that will maximize the long-term success and broad impact of major infrastructure investments.

While this plan lays out a comprehensive, multi-agency approach for smart cities and communities, bridging research to implementation to evaluation, this plan does not fully capture the *transformative potential* to reshape our lived environments, ranging from rural communities to dense urban environments. The research community can and should be engaged in articulating grand challenges that raise smart city and community efforts from settling for incremental improvements to reaching for transformative change in economic opportunity and inclusive innovation, civic participation and privacy, and interactive and intelligent systems. Additionally challenges in research infrastructure, authentic evaluation, sustainability and workforce development should not be underestimated. Addressing these barriers will require deep multi-disciplinary research from computer science to public policy and sustained civic-academic-industry partnerships.

Economic Opportunity: Many persistent socio-economic barriers to education, economic well-being, and healthcare and wellness could be challenged through far-reaching, integrative approaches to smart communities and cities. It is unrealistic to expect that these improvements will occur unless these challenges are incorporated from the start in strategic plans for smart cities and communities. The benefits of intelligent infrastructure should be applied in overcoming long-standing structural impediments to broad-based equality in these areas.

Universal Access: Access to city and community services by people with physical and cognitive impairments is problematic. "People-Centered Solutions" should address barriers to access and use; a significant percentage of the population faces such barriers due to injury, disease, and aging. Moreover, any work with small and rural communities needs to address basic barriers to Internet access, especially among older adults.

Security: Security is a foundational challenge in intelligent infrastructure. Key points missing from the draft plan include the difficulty of key management for diverse IoT devices interconnected across differing networks and sectors; security protocols to span smart city

services (transportation, smart grid, water); and long-term approaches to maintaining the security of embedded smart technologies. Physical infrastructure (e.g. bridges, roads) is built for decades, while cyber-infrastructure may need software upgrades every few months.

Privacy: While the draft plan raises privacy considerations, it should also call for new research in privacy-preserving approaches to data collection and use. For example, approaches to Differential Privacy[1] could help manage the tradeoffs between data collection and privacy needs. This issue is particularly important for smart cities and communities where pervasive data collection will span many aspects of daily life.

Computational Materials: The current plan makes no mention of computational materials that extend beyond cyber-physical systems and anticipate the greater integration of computer science and the programming of biological and other physical materials, ranging from self-healing building materials to bio-mechanical-digital environmental sensors and actuators. For example, recent advances in metamaterials have demonstrated the feasibility of this new paradigm.

Learning Systems / AI: Also conspicuous in its absence is a discussion of how intelligent infrastructure should incorporate machine learning and mixed initiative experimentation and control. Developing these capabilities is critically important. Big data analytics is just the first step in providing descriptive, prescriptive, and predictive systems. What is needed are approaches to multiple loops of learning ranging from automation, to decision support, to the eventual production of generalized knowledge. For example, advanced transportation systems could incrementally learn to manage different patterns of traffic, then provide decision support for proactively managing special cases (e.g., disaster response), to supporting planning and prioritization for new road/control modifications, to advancing generalized knowledge that can be applied across different city and transportation capabilities.

Scale: This plan frequently collapses attention to cities and communities as if those needs are interchangeable. In fact, these needs vary tremendously and **we recommend a specific focus on small and rural communities**. Basic access to Internet-based capabilities is critical to delivering on the human-centric needs for smart communities. A recent PCAST report[2] points to the pervasive access needs of aging adults, especially in small and rural communities. Hence, more research will need to be done on mobile platforms, mobile integrated end-to-end systems with easy setup, portable, low-cost, data cyber-infrastructures, edge computing and tele-services that allow for different economic contexts.

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[1] Dwork, Cynthia. "Differential privacy: A survey of results." *International Conference on Theory and Applications of Models of Computation*. Springer Berlin Heidelberg, 2008.

[2] President's Committee of Advisors on Science and Technology, *Report to the President on the Independence, Technology, and Connection in Older Age,* March 2016.

Infrastructure for research and authentic evaluation: We also wish to emphasize the importance of research infrastructure and "authentic evaluation," i.e. evaluating systems in the context of real use. Developing a comprehensive plan for investing in research infrastructure remains an ongoing challenge. Another challenge is that for smart cities and communities, many evaluation metrics are non-traditional. Success may not be measured as to whether a technology is robust, secure, or real-time (traditional CS metrics), but rather whether its deployment increases the number of visitors, new residents, and business activity, or decreases crime, traffic, and waste. Hence, evaluation of smart city/community technologies must bring together teams of computer scientists, engineers, social scientists, urban planners, economists and local leaders.

IT Sustainability: Sustainability is a formidable barrier for the long-term success of intelligent infrastructure investments. Local governments want to see concrete, actionable plans from vendors or groups of researchers who propose deploying smart technologies. These barriers may be especially high in the case of small towns and rural areas where government resources are tight. Another major challenge of IT sustainability is community education. Will citizens be able to understand and use the deployed technologies? Third, a major challenge of IT sustainability is lack of innovative economic models to deploy and upgrade smart cyber-infrastructures. Some gains (e.g., decreasing crime) may not have direct revenue implications while others (e.g., decreasing parking) may reduce city revenue. A fourth major challenge of IT sustainability is the lack of evaluation methods for integrated/interdependent smart technologies.

Education and workforce development: We wish to amplify the importance of educational programs and approaches that integrate key information regarding data analytics, sensing, communication, security, and privacy. We also want to call attention to the need for basic and applied research in workforce tools that will enable people to access and harness these capabilities. For example, research in visual analytics addresses challenges of working with complex data sets, understanding probabilistic and predictive information and supporting collaborative decision making. Likewise, wearable and augmented reality systems offer the ability to "see" and interact with layers of information connected to physical objects.

In conclusion, meeting these challenges requires sustained investment in basic research while proactively integrating these visions into current smart community and city approaches to ensure capacity and interoperability for future gains. While some of these transformative visions may be implied in the NITRD plan, we maintain that audacious visions will drive substantial change and that a focus on human-centric, socio-economic needs and barriers will help ensure that all people benefit from these investments. We should also aspire that these systems reach for transformative capabilities, ranging from managing privacy tradeoffs, programming new materials and learning at many scales.

Georgia Tech Institute for People and Technology Response to NITRD "Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together"

Jennifer Clark, Debra Lam, Carl DiSalvo, Chris Le Dantec and Elizabeth Mynatt

This response was prepared by Georgia Tech's Institute for People and Technology (IPaT). The mission of our Institute is shape the future of human-centered systems, environments and technologies to promote fulfilling, healthy and productive lives. Fostering smart cities and inclusive innovation in one of our four research pillars[1]. Our goal in this response is to call attention to the need for strong multidisciplinary research approaches and partnerships to complement the information technology research and development described in this plan. This holistic approach is needed to reach the potential for smart cities and communities innovation. Technological disruption is inevitable for our cities and communities. The question on how best to manage this societal shift lies in people and its adaption and acceptance of it.

Cities as Democratic Institutions: It is not enough to enable entrepreneurialism and improve efficiencies in governance. Cities are democratic institutions that uphold foundational principles of equity that define our nation. Scholars of cities in fields such as urban and regional studies have documented and analyzed the ways in which many of prominent notions of smart cities are exclusive and in need of new approaches to provide fair potentials for diverse participation.[2] This agenda will require a multi-faceted approach that engages both technology policy and design.[3] Fields such as human-computer interaction, digital civics, economic geography, and urban policy provide the interdisciplinary approaches necessary for analyzing, evaluating, and developing the new models required for smart and connected communities.[4]

The larger picture challenge with respect to smart cities and community engagement is that addressing the challenges of broadening public involvement through data-based civic participation means engaging with the epistemic questions bound up in data as a form of participation. It is not enough to simply address impediments such as access and data literacy, we must also consider the ways different communities relate to the kinds of surveillance and monitoring that smart cities projects implement. Who owns the data? How can it be corrected or contested? There are deep parallels to movements that concern the 'right to the city' that seek to address the exclusion in urban life based on ethnicity, class, and group membership; similarly, inclusive smart cities practices need to attenuate to the consequences both of participation and of intentional non-participation.

Civic Participation: Cities are social-technical systems and though it may seem obvious, it is important to remember that cities are comprised of people. The domains of civic media and digital

[1] www.ipat.gatech.edu

[2] Shelton, Taylor and Jennifer Clark (2016) "*Technocratic Values and Uneven Development in the "Smart City,"* Metropolitics. 10 May 2016. URL: http://www.metropolitiques.eu/Technocratic-Values-and-Uneven.html;
See also Gibbs, David, Rob Krueger, and Gordon MacLeod. "Grappling with smart city politics in an era of market triumphalism." Urban Studies 50, no. 11 (2013): 2151-2157. See also Hollands, Robert G. "Will the real smart city please stand up? Intelligent, progressive or entrepreneurial?." City 12, no. 3 (2008): 303-320. See also Hollands, Robert G. "Critical interventions into the corporate smart city." Cambridge Journal of Regions, Economy and Society 8, no. 1 (2015): 61-77.

[3] Clark, Jennifer (*f* 2017) *Resilient Regions and Open Innovation: The Evolution of Smart Cities and Civic Entrepreneurship*. Tim Vorley and Nick Williams, Eds. Creating resilient economies: entrepreneurship, growth and development in uncertain times. Northampton, MA. Edward Elgar.

[4] Le Dantec, C. A., Appleton, C., Asad, M., Rosenberger, R., & Watkins, K. (2016) Advocating Through Data: Community Visibilities in Crowdsourced Cycling Data. In A. Golub, M. L. Hoffmann, A. E. Lugo, G. F. Sandoval (Eds). Bicycle Justice and Urban Transformation: Biking For All? Routledge.

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civics are vibrant research areas that simultaneously study and foster community engagement, through transdisciplinary approaches that span engineering, design, computing, and the social sciences. This work is crucial for empirically understanding how smart cities technologies and services do and do not engage and serve diverse stakeholders in cities. This work is also crucial for prototyping and testing socio-technical interventions in embedded, real-world, contexts that take seriously the social and cultural dimensions of cities. Important research questions in this area include:

- How do diverse stakeholders develop the technological literacies necessary to be active participants in smart cities?
- How does the design of smart cities technologies and services promote democratic conditions?
- What are the barriers to inclusion in smart cities?
- How do smart cities re-define civics and civic engagement in the 21st century?

The smart city can become a site to more broadly think about the role of community engagement. With the rise of increasingly networked smart cities, boundaries blur across levels of scale, sets of actors, and the digital artifacts that are deployed to connect them. As sociotechnical issues and infrastructures grow more enmeshed—specifically in the context of smart cities—so too must our capacity to think and design for these complexities. This perspective requires expanding our understanding of civic engagement beyond a focus on deliberation and rational decision making as has been the traditional thrust of civic-minded HCI work[5].

Broadening our consideration of civic touch-points will enable us to more fully conceive of the impact and opportunity of smart cities for all residents—from the mundane interactions with city services, to privileged and ritual interactions of democratic participation; from individuals sharing concerns with neighbors, to community associations building local coalitions to advocate for their needs. These touch-points include the kinds of outcomes that knit cities together through the relations of urban life, rather than the transactions of service delivery—communication (with and about data), personal investment (supporting individual and collective self-efficacy), building for all (inclusive practices, and inclusive systems), sustainable action (internal and external to established institutions), and education (capacity building across demographic and socio-economic boundaries). Addressing these moments of civic interaction suggests different categories of digital civic systems that differ from supporting the transactions of deliberation and instead seek to mediate contested and vigorous relations within and across community boundaries.

University-City Partnerships: We strongly agree with the need to 'integrate the role of humans in smart systems'. One of the main ways is through building university- city partnerships. Universities are a natural place for smart city and community innovations as educators of the next generation of

[5] Asad, M., Le Dantec, C. A, Neilsen, B., and Diedrick, K. (2017) Creating a Socio-Technical API: Designing City-Scale Community Engagement. To appear CHI 2017. ACM

Lodato, Thomas James, and Carl DiSalvo. "Issue-oriented hackathons as material participation." new media & society (2016): 1461444816629467.

Gordon, E., and P. Mihailidis. "Civic Media: Technology, Design." Practice. Cambridge, MA: MIT Press (2015).

Olivier, Patrick, and Peter Wright. "Digital civics: taking a local turn." interactions 22, no. 4 (2015): 61-63.

Vlachokyriakos, Vasillis, Clara Crivellaro, Christopher A. Le Dantec, Eric Gordon, Pete Wright, and Patrick Olivier. "Digital civics: Citizen empowerment with and through technology." In Proceedings of the 2016 CHI conference extended abstracts on human factors in computing systems, pp. 1096-1099. ACM, 2016.

Zuckerman, Ethan. "New media, new civics?." Policy & Internet 6, no. 2 (2014): 151-168.

leaders, researchers in advanced technical innovations, and thought leaders in societal transformation. However, there is symbiotic relationship that can be advanced by embedding university R&D into city operations. As cities pursue urban laboratories and smart city demonstration projects, R&D, often done by universities can be rapidly tested and refined, furthering university research and city practice.[6] Universities can help cities develop 'data and knowledge sharing', from building the data architecture and hosting the platforms to incorporating data analytics into city operations. They can also help with cybersecurity, developing privacy standards, and forging wider partnerships with industry, such NYC, CUNY, and IBM Pathways to Technology Early College High School[7], or GT's Center for Education Integrating Science, Mathematics, and Computing (CEISMC)[8]. We urge NITRD to leverage the MetroLab network of university-city partnerships, including as a means for coordinating resources and disseminating best practices.

STEM Education: While there was brief mention of 'integrating the role of humans in smart systems', it was not reflected enough in the solutions. K-12 stem education is important, especially for disadvantaged and underrepresented groups. However, there will need to be larger workforce retraining and education from manufacturing, heavy industries, and other labor-intensive sectors. More programs need to be developed and expanded to account for workforce transition and retraining in the smart cities space. The maker movement has many compelling examples, especially around building entrepreneurship.

Scale and Platforms: As we strive to increase our aspirations for smart cities and communities and broaden the reach and means of civic participation, we must also integrate those perspectives into the design, management and evolution of the socio-technical systems that will be the fabric for smart cities and communities. Notably, we must envision this fabric as a "system of systems" and the integration of these systems must be designed and managed at various levels: privacy, accountability, data interoperability and avenues for coordinated control. Technical visions, such as a city-wide operating system and state-wide data exchange, must be realized alongside needs for community representation, advocacy, inclusion and fairness.

Sustainability: Accelerating R&D funding for smart infrastructure is insufficient. We need to think about long term operations and maintenance for smart cities. Where will that funding come from and how will it be incorporated into existing city systems? This will especially be important as smart technologies rapidly change or become obsolete. There is a gaping need for public policy and city planning research to be integrated into long-term smart city and community approaches.

Global Leadership: US global leadership and competitive advantage does not rest with exporting smart tech. The state of US infrastructure and amount of funding devoted to it undermines US global leadership in exporting smart cities. The American Society of Civil Engineers' latest report card ranked America's infrastructure at a D+, requiring $3.6 trillion in investment.[9] How can cities think about smart infrastructure and R&D when there is such a large gap in existing infrastructure? It is currently difficult to compete with the scale of smart city development in Scandinavia, Israel, Singapore and other parts of the world.

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6 Clark, Jennifer (2014) *Siting "Scientific Spaces" in the US: The Push and Pull of Regional Development Strategies and National Innovation Policies*. Special Issue on Science and the City. Environment and Planning C: Government and Policy. Pp.1-16

7 http://www.ptechnyc.org/

8 https://www.ceismc.gatech.edu/

9 http://www.infrastructurereportcard.org/

PROPOSED ADDITIONAL COMMENT

HAAS Alert would propose a focus on using smart city technologies to reduce the number of first responder traffic incidents to 0.

GOAL

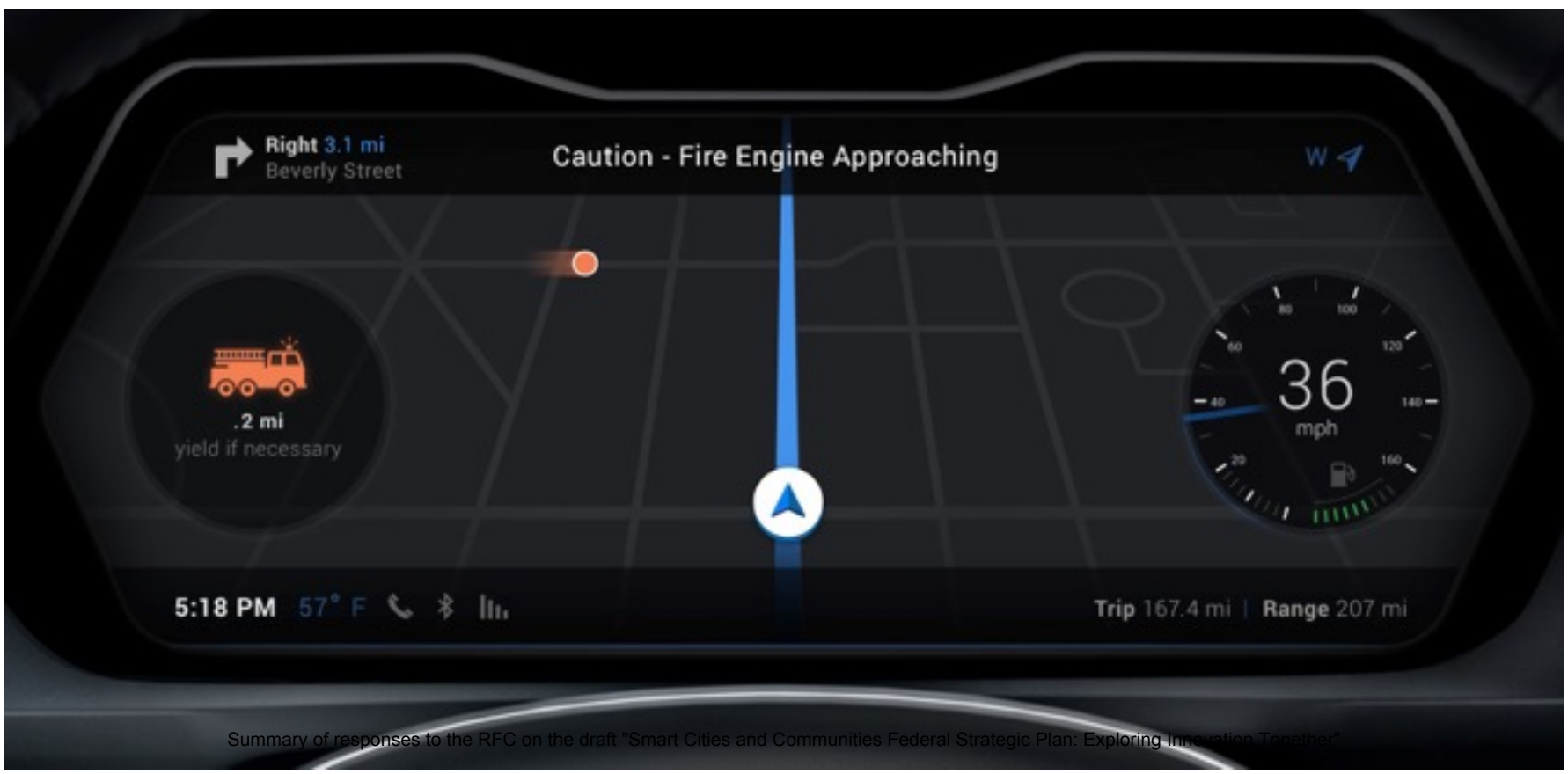
HAAS Alert is changing the way cities move in a big way. Using today's cellular networks the company promotes a "virtuous cycle" of mobility which reduces congestion, which reduces emissions, which creates overall system efficiency, which saves lives…

OUR OVERVIEW AND OUR MISSION

HAAS Alert is the mobile V2V Safety Cloud that delivers preemptive notifications to motorists, informing them of the road ahead. The company is connecting the unconnected by putting oncoming emergency vehicles, utility trucks, municipal fleets, school buses and many more on the grid, today. The real-time datasets are broadcast through the company's mobile and smart sensor products which allow direct integration with vehicles, map data suppliers, traffic data companies, smart city grids and more.

Our mission started 1.5 years ago as a small company in Chicago, learning quickly that capturing data to alert vehicles in real-time is not easy. Most of the data needed for true real-time processing of this type cannot be aggregated, instead it needs to be created – and that's exactly what HAAS Alert does.

The need isn't to only know where an emergency vehicle is driving, but when it's on an emergency run. Not only where a utility truck is parked, but when technicians are actively working in the road. Not only do drivers need to know this information, but so do connected and autonomous vehicles themselves. Vehicles are currently utilizing last second detection technologies to identify roadway situations, and even some rely purely on crowdsourcing. HAAS Alert believes we can do better, identifying situations before they develop using data. Capturing at the source real-time datasets allows for distributing information through our leading Safety Cloud Platform not only to drivers and vehicles, but also back to smart city grids for traffic light preemption, street lights, intelligent traffic solutions and many other connected applications and devices.



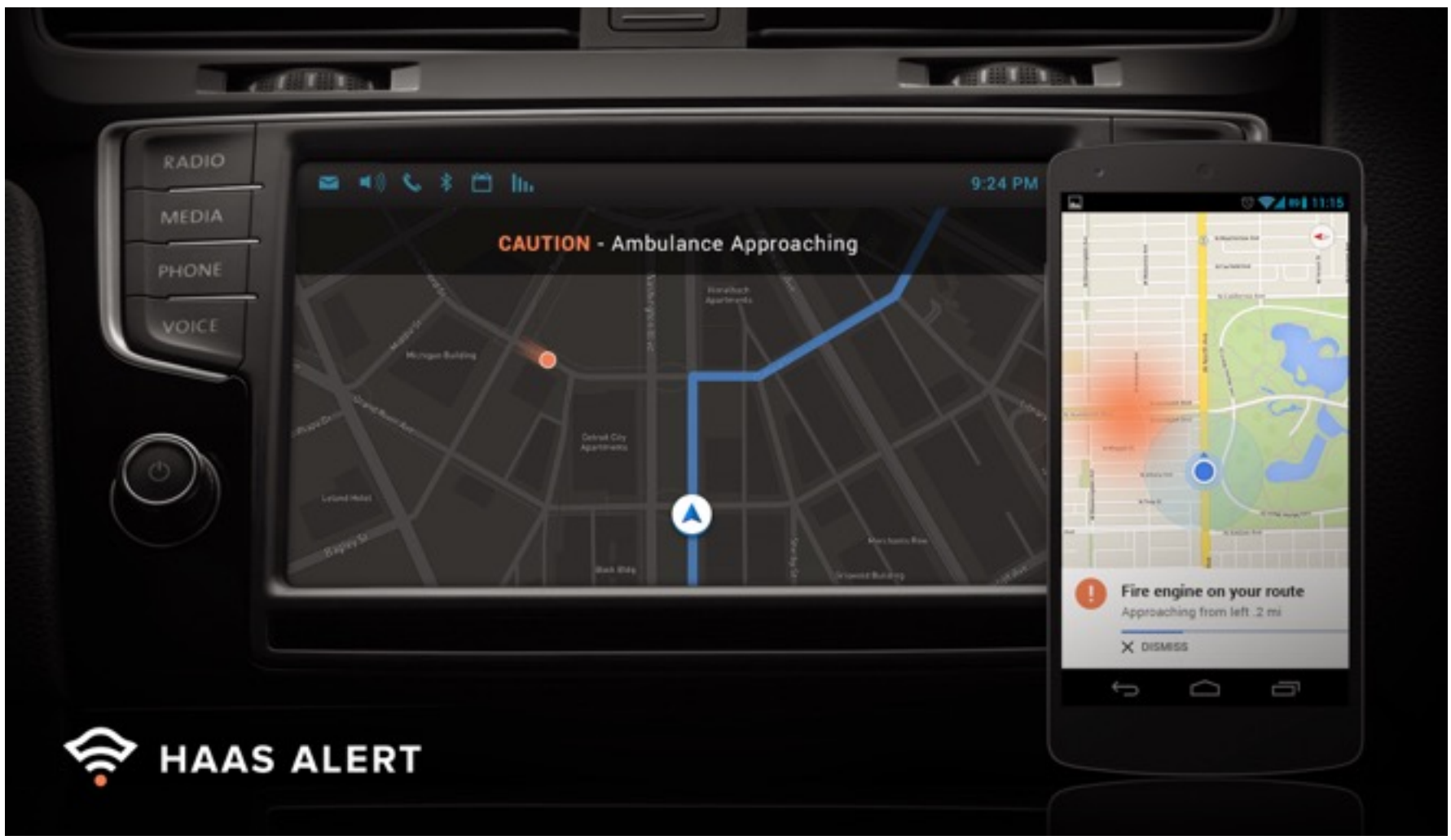
HAAS ALERT

The solution is not a dispatch system, instead, HAAS Alert engineered the leading Safety Cloud with a pure mobile solution. Without the need for complex hardware, vehicle downtime for re-wiring, expensive integration with CAD and dispatch systems, etc. HAAS Alert's solutions require only a few minutes to install and is all mobile based – solutions are 100% passive to first responders and fleet providers. This means that they can continue to focus on their tasks in the field without introducing new steps to their operations. If you've ever ridden with a first responder as we have (750 hours), it quickly becomes obvious why they don't have time to add any extra steps.

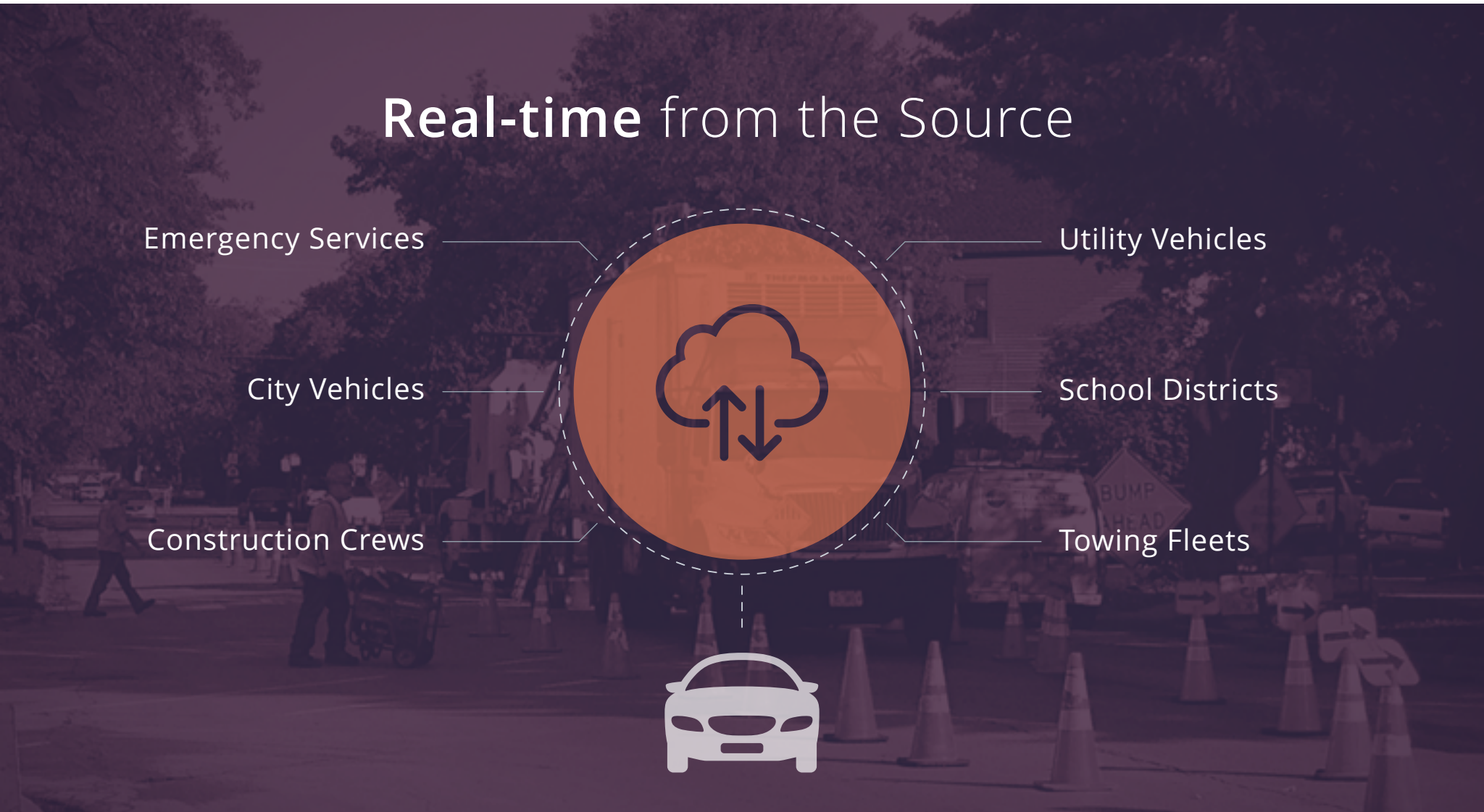
When we look at the problems for a lack of this type of technology, sadly it's easy to find. On average police officers and firefighters have a higher death rate ***driving*** to the scene of an incident than at the scene itself. On the cost side, cities can expect to payout on average $1M each time an injury occurs.

Then there are the effects on the environment due to traffic jams, accident idle times for those stuck in traffic and other in-road situations are tremendous, HAAS Alert helps alleviate those instances. Each year, U.S. vehicles consume more than 6 billion gallons of diesel fuel and gasoline—without even moving, and roughly half of that is wasted by passenger vehicles in traffic.

In our experience, smart city talk usually consists of smart parking or some sort and a discussion around of "what could be" – HAAS Alert allows for immediate integration of a needed use case and can be done within minutes – we can setup an entire battalion for a fire department in under an hour, capture the required data, pull the information into our Safety Cloud Platform, and push out to a designated network. This is the power of working with current infrastructure like mobile networks and platforms.



HAAS ALERT



PARTNER SUPPORT

HAAS Alert works with DOTs, public safety departments, and other public/private entities that affect the roadways to insure that the data collected is delivered to the right distribution networks. Our unique safety cloud allows for distribution to map and navigation apps, automotive manufacturers, smart city grids, and traffic data suppliers. This way, the vehicles that are broadcasting themselves through the HAAS Alert Safety Cloud know that the alerts will go beyond a driver's mobile.

Having a business in mobility means that you have to work and integrate with not only automotive, but with the grid that supports traffic flow, V2X integrations, as well as allowing for the data to be available for other use cases. Vehicles of the future that rely on integrated automotive sensors to communicate are still decades away from reality to function at scale. HAAS Alert uses the exiting mobile infrastructure to pass the alert data from the vehicles broadcasting to the HAAS Alert safety cloud through to our distribution networks.

HAAS Alert is ensuring the safety of our first responders, municipal and city workers, field technicians and the public by **connecting people, vehicles and things**, today.

Submitted on behalf of IEEE Big Data Initiative, IEEE Internet of Things Initiative, and IEEE Smart Cities Initiative

RE: Smart Cities and Communities Federal Strategic Plan

Our planet's human population is expected to grow from the current 7.3 billion to almost 10 billion by 2050, and of that population approximately 70% will live in an urban setting. There is an imperative for cities to be sustainable, environmentally sound, affordable, and to provide citizens a high quality of life, which includes among other aspects habitat, essential services, goods, employment, culture and recreation, and safety. To achieve the highest potential for humanity, Smart Cities bring together government, commerce, society, and technology to enable smart living and community engagement that enhance and support human existence while tending to the vitality and viability of our world. In this setting, smart systems that exploit our knowledge of science, technology, business models, and modern processes play a key role.

IEEE appreciates the opportunity to comment on the Smart Cities and Communities Federal Strategic Plan: "Exploring Innovation Together." The four focus areas that have been identified in the plan are key areas to help with the evolution of a smart city and society. They resonate well with key areas in which IEEE has been working and that IEEE can focus on to make a contribution with impact. IEEE has been assisting municipalities in managing the transition to urbanization in areas such as raising awareness of the benefits and downsides of technology; helping to guide appropriate uses of technology; research and development in practices that address citizen and community governance; the challenges of economic growth; the use of natural resources; creating roadmaps for resilient and secure infrastructure; and the use and exploitation of data to drive growth, engaged living, better business practices, citizen health, and ecological behavior. IEEE has well-established activities to support the Federal Strategic Plan. These include work underway by the IEEE Standards Association (SA), as well as initiatives in Smart Cities (applications), Big Data (analytics), Internet of Things/IoT (technology), 5G (connectivity), and Transportation (mobility). IEEE is also working in areas like smart grid, medical, and consumer application integration for energy efficiency that could support the Federal Strategic Plan as well.

As an example, one of the areas of both greatest promise and challenge for Smart Cities is the management, gathering, processing, and analysis of ever-increasing streams of data. It is in many ways the underpinning of what the "smart" in smart cities is about—reducing the complexity and wealth of information to fact- and knowledge-based effective decision-making and practice. A further challenge is to reduce the interval to value to near-real-time. IEEE has an ongoing effort focused on the aspects of big data that pertain to data analytics, its applications, and applied machine learning. Specific to the technology of Smart Cities is the opportunity to maximize learning from the data obtained from many sources, sensors, cameras, and mobile platforms utilized within a city's infrastructure. The exploitation of such data increases operational efficiencies and reduces cost and use of resource, which in turn leads to an optimal, more appealing, safer, and healthier city environment.

The challenges are, first, to ensure the data is easily accessible when needed, usable, complete, trusted, and reliable. The data also needs to be in a form that can be consistently analyzed and processed, is understandable, provides business intelligence, and results in action, within practical constraints. A second challenge is to ensure the security and integrity of the data, keeping it safe from cyber intruders and attackers. IEEE is well positioned to address these

aspects and would welcome the opportunity to contribute to the Smart Cities and Communications Federal Strategic Plan. In addition, IEEE has a dataset repository web-based application, IEEE DataPort, that can store large datasets and serves as a source for accessing datasets.

IEEE has organized local and regional events in targeted cities with international experts in the specific areas of focus. A fundamental undertaking of the IEEE Smart Cities initiative, the IEEE Core Smart Cities program recognizes and helps cities that are establishing and investing both human and financial capital into smart-city plans. Acceptance into the initiative requires an articulate, pragmatic plan for how the city can become smarter in how it is run, with the goal of improving its citizens' quality of life. Selected cities receive strategic and practical advice from a team of IEEE experts to help conduct activities and further the well-being of their citizens in a sustainable environment.

Current IEEE Core Smart Cities include Casablanca, Morocco; Guadalajara, Mexico; Kansas City, Missouri, USA; Trento, Italy; and Wuxi, China. A dozen additional Affiliated Smart Cities also joined, like Natal and Londrina in Brazil, Pune in India, Sfax and Ariana in Tunisia, Issy-les-Moulineaux in France, and Diamniadio in Senegal. All IEEE Smart Cities are developing action plans based on an integrated local ecosystem originating from the municipality, IEEE local section, universities, and industries. Every city chooses a limited number of key progress areas that focus on items to solve their most important issues, fulfill their most important objectives, and gain the highest leverage effects on value creation.

The evolution of state and local government efficiencies and policy for citizens and civic priorities is moving into a bi-modal construct of traditional government operations and real-time digital democratic methods and approaches. While some cities, states, and countries recognize these core gaps in transformation of society, many governments and civic leaders have a latent need to grasp how to organize and plan for the use of digital technologies and approaches in a pragmatic way with confidence.

Bringing Society and Government to a Common Level of Understanding

Governments' understanding of digital technology to help drive and support civic and regional policies is stalling due to lack of a common taxonomy or language that binds the digital world to the physical world of governance. To that end, IEEE is looking at technology and standards in the following areas that balance an edge-to-enterprise technology reference architecture to help move the digital conversation forward in terms of confidence, budget investment, ROI, and in compliance with legal and privacy policies of state, local, and federal government practices.

A Common Taxonomy/Ontology

A few cities that have taken the time to research the data-domain foundations that run their respective civic responsibilities and citizen engagements. Some cities have discovered that in order to keep the domain conversation to an acceptable and managed set of terms, there are up to 12 data domains that can be used to map out a city or local government's existing legacy government processes and in turn digital data processes. While this mapping is a great start, it is also valuable to map and bind civic issues and progress against these issues with a general metrics and indicator system. This will allow a clear understanding of how elected government is performing in and around the "classic way of working" while allowing for digital efforts and requirements, with an initial goal of seeing how these can improve, enhance, or replace classic government methods.

What Will Address This Issue—A standard around a data-domain taxonomy with suggested metrics and indicators.

Benefits—Helps establish guiding principles around ordering digital information and civic operations.

Governance Education and Board of Advisors

The ethics, privacy, and governance of digital data and information has many consequences. While data can be captured at any time from any location in almost real time, the use of such information has to be vetted and qualified around social responsibility and legal standards. To that end, help and guidance on what standards should be pertinent in the use of digital information and insight to help enhance, protect, or modify civic and local government changes should be reviewed and qualified via a governance framework that reviews operational usage and that captures insights, the moral and ethical benefits of these insights, and the legality of change in city, state, and local government behavior.

What Will Address This Issue—A recommended practice on how to establish a digital governance steering team or board of directors that reviews and approaches the installation, operation, and usage of digital information for civic and citizen value.

Benefits—Monitors the use and pertinent value of information in a balanced and considerate fashion to ensure near- and long-term equity of digital information and citizen privacy and rights.

General Reference Architecture Guidance for Smart Cities and Societies

To deliver against the real-time digital democracy needs and timeline will take an acute understanding of how edge-to-enterprise information flows happen from citizens, sensors, and even critical infrastructure in and around the telecommunications conduits that exist in local and regional environments. To that end, research is needed on how to show city, state, and local governments how to design, enable, and benefit from digital infrastructure, modern telecommunication methods and techniques, and compute, storage, and IO/technologies. This will ensure that any current or future investments are deemed productive, scalable, and demonstrate benefits to citizens, communities, and governing officials.

IEEE P1451-99, *IoT Harmonization*, is a recent IEEE standards project that that is designed to help Smart Cities to be able, for example, to bridge devices using different protocols. It further provides a means for the owners of the devices to protect their personal information and access to their devices. This protects their privacy and confidentiality of information. Many Smart-City use cases today use smart phones and owner information, and the devices are being compromised. This is a major concern that has slowed deployment, and protections against it are needed for Smart-City systems. This new standards effort should be helpful for those developers and researchers, including academia, to provide IoT for Smart Cities.

Most current standardization activities are confined to very specific verticals and represent islands of disjointed and often redundant development. IEEE P2413 will define an architectural framework for IoT, including descriptions of various IoT domains, definitions of IoT domain abstractions, and identification of commonalities between different IoT domains. The architectural framework defined in IEEE P2413 promotes cross-domain interaction, aids system interoperability and functional compatibility, and further fuels the growth of the IoT market. The adoption of a unified approach to the development of IoT systems will reduce industry fragmentation and create a critical mass of multi-stakeholder activities around the world. The IEEE P2413 architectural framework for IoT provides a reference model that defines relationships among various IoT verticals (e.g., transportation, healthcare, etc.) and common architecture elements. It also provides a blueprint for data abstraction and the quality

"quadruple" trust that includes protection, security, privacy, and safety. The reference architecture covers the definition of basic architectural building blocks and their ability to be integrated into multi-tiered systems. The reference architecture also addresses how to document and, if desired, mitigate architecture divergence.

What Will Address This Issue—A standard reference architecture for edge-to-enterprise digital solutions.

Benefits—Creates a roadmap of technology that helps show how to make a digital society real, stable, and consistent.

Submitted on behalf of IEEE Big Data Initiative, IEEE Internet of Things Initiative, and IEEE Smart Cities Initiative

Response to RFC for Smart Cities and Communities: Federal Strategic Plan

Hello,

Please find below my review comments to the draft of the Federal strategic plan: (RFC for Smart Cities and Communities:

1. It is not clear what kind of assumptions and initial conditions are factored in for this initiative. Without a clear statement of assumptions such constraints (other than budgetary)- it is difficult to understand and comment on a proposal such as this. For e.g a broad policy and regulatory framework is critical to the success in enforcement and implementation. It would be good to describe these in the present context of this initiative.

2. Define and include more qualitative goals for smart cities/communities that are uniform and consistent in terms of lifestyle and holistic well-being and improvements for citizens, communities, corporations and the environment esp. the immediate ecosystem that sustains the city e.g. improvement in time saved in transportation, healthcare, education, happiness along with quantitative goals such as co2 emissions, education standards, economic status etc . This could be one way to deal with differences in how various cities define and prioritize "smart" to better serve their own communities. These goals are lightly touched upon (pg nine) as one of the goals. However qualitative goals are arguably the most basic common denominator of measurement for smart cities and communities.

3. There is no discussion whatsoever on the reliance on existing policy framework and the need for new ones. Conceivably, a smart city framework offers renewed opportunities to fix many broken systems and institution such as food, health and education. Furthermore, increased awareness must be made to address behavioral problems related to excessive consumption, poor health habits, drug and alcohol abuse and waste management. Policy reforms are needed mainly in food, transportation and education, co2 emissions etc. E.g the redundant and inefficiency of the use of individual vehicles for single person transport. Emphasize and design for mass transportation, move away and dis-incentivize use of private vehicles over public transportation. Perhaps, Mass transportation must be clearly delineated as a key strategic goal under infrastructure planning.

4. Agriculture in an urban setting must be prioritized as part of infrastructure planning to deal with high population densities. Food growth (vertical farming, urban farming, community co-operatives and incentives for local farmers markets etc.), distribution across all economic strata must be prioritized. This also ties into sustainability factors and goals and in fact a great opportunity to get the design and incentives right at start.

5. Factor in environmental and climate change impact- mitigation and adaptation priorities and infrastructure into all facets if the discussion. This adds large variability and its impact must therefore be included as part of the design and discussion framework of technology, policy etc

6. Prioritize services for special needs and disenfranchised communities- senior citizens, disabled, homeless etc. great opportunity to integrate what has been unfortunately on the outlier side of serviced and priorities. Possibly as part of DHS First Responder's group.

Regards,

Indira Iyer Almeida

Sustainability and Energy professional

Smart Cities and Communities
NCO for NITRD, Suite II-405
4201 Wilson Blvd.
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February 28, 2017

Dr. Sarah Nusser
Vice President for Research
Iowa State University
2610 Beardshear Hall
Ames, IA 50011

Re: Request for Public Comments regarding NSF Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together

Dear Smart Cities and Communities Task Force,

I write to provide comments and underscore particular areas of interest and support related to the Smart Cities and Communities Federal Strategic Plan: Exploring Innovations Together. I appreciate the opportunity to comment on this draft plan.

In the request for public comment, the NSF National Coordination Office (NCO) for Networking and Information Technology Research and Development (NITRD) requests comments on three specific "Questions for Commenters." This response addresses these questions in order.

1. **Are the central goals appropriate and/or are there other goals that should be considered?**

   The goals to "understand local needs and local goals" as well as to "facilitate cross-sector collaboration and bridge existing silos" relate very well to efforts Iowa State University (ISU) has been engaged in. ISU encourages bolstering collaboration across both internal and external stakeholders, in effort to apply to realistic and inclusive scenarios and breakdown silos. As an example, a recent ISU project entitled "Sustainable Cities Decision Making," led by Dr. Ulrike Passe encompasses this collaboration. As a part of ISU's 2016 Presidential Initiative for Interdisciplinary Research, a program launched by ISU President Steven Leath, focused on this understanding of local needs and local goals. A summary of this project example follows:

   "Tackling the environmental, spatial, and human complexities of sustainable cities requires a transdisciplinary, systems-based approach that emphasizes strong stakeholder involvement. Our pilot project develops data-intensive, replicable decision-making support systems that engage ISU researchers in humanities, engineering, design,

computer sciences, social sciences, community stakeholders, and city officials in data collection and decision-making to create sustainable futures. While quantitative environmental data sets for urban areas exists, their vast quantities and multiple formats make it challenging for decision-makers to integrate and use the data effectively as they seek to create more livable, resilient cities. In addition, while quantitative data is abundant, qualitative information about interactions between humans and the built environment is lacking, so systems are frequently designed without attention to the perspectives of those who live in them.

In our 'sustainable cities decision making project' local stakeholders help collect complex and disparate sets of data at multiple scales including spatial data, human/built environment interaction data, and data on needs and perceptions of surroundings to develop integrated system models. These models will provide stakeholders with feedback suggesting how choices can create different outcomes, allowing them to make more informed decisions. By integrating principles of data-driven science with community engagement practices, we advance on environmental and social challenges in ways that make communities full partners in the scientific and development processes. The communities involved are thus not only better informed about sustainability but are empowered as actors in creating new futures."

The second goal, to "accelerate smart cities/communities innovation and infrastructure improvement" supports regional work, bringing together representatives from cities and communities along with innovators from academia and industry. ISU has engaged with many local partners on a diverse set of applications. The example above is one of many relationships we have leveraged, and there are many other research partnerships we could share. These partnerships strengthen the strategic plan. As a university partner, the focus on education brings critical value to the plan.

Goals of "boosting exports and promoting U.S. global leadership," and "focusing on people-centered solutions that support job growth and economic competitiveness," further underscore the role of education and training, in effort of creating measurable benefits and high quality of life for residents. Attracting and retaining talented individuals certainly resonates within this strategic plan.

In addition, it should be acknowledged that while rural communities are mentioned explicitly in the text, there seems to be an underlying assumption that communities are ready to participate in the development of 'smart cities,' their infrastructure, technologies, etc. Readiness to participate in such movements is likely very different in each communities. Many rural communities face challenges that cannot be overcome by scaling or retrofitting recommendations from larger communities. The specific challenges of rural communities may well be unique to this group of stakeholders, and this group needs to be considered carefully with appropriate approaches and solutions explicitly in all goals, strategic priorities, and next steps.

2. Are the strategic priorities appropriate and/or are there other priorities that should be considered?

As a whole, the strategic priorities included appear appropriate. The noted role of social sciences, alongside computing, engineering, ethics, education and policy, and the integration with these priorities is also of importance. Advances in technology should be considered a common theme across these priorities.

Under "2.1.1 Facilitate city/community engagement in an iterative research cycle," it was emphasized that research questions would be based upon challenges unearthed by working closely with cities and communities." This is very appropriate to the strategic plan, and is well-supported. Further, 2.1.2 supports the transition to practice in the communities, which is also of importance.

2.2.2 discusses design and build aspects related to new infrastructure, including systems, services, security and resiliency as key considerations. These aspects are critical, and should be further supported by education and integration of these features. The listed examples are helpful in terms of clarifying the strategic priority.

However, consideration may be given to adding an additional priority addressing how and to what extent these could be implemented or leveraged. This aspect may be of particular relevance for small, rural communities without current capacities to begin to address basic security.

In addition, it may be relevant to address existing infrastructure in a similar thread. In terms of building infrastructure, educating and empowering residents and other experts can help drive smart cities and smart buildings. Integrating smart building technology into new and existing buildings can reap many benefits. The role of design in integrating smart technology with building controls, and operations for water, energy, and resource management should be considered.

Strategic Priority 2.3 addresses fostering smart cities and communities. Perhaps an addition that discusses community empowerment should be included as one of the strategic priorities under this category. Similar to the example noted under #1 above, Dr. Passe's research project is a striking example of how community empowerment underpins a successful project.

2.4.3 may be further supported by emphasizing a coordinated effort of the academic and stakeholder community to develop programs at all levels that support workforce development in the form of degrees and in-service certificates. Leveraging the four regional big data hubs to achieve forward planning, integration, and movement serves as an example of this coordinated effort.

3. **Are the next steps identified in the draft plan appropriate and/or are there others that should be considered?**

   ISU would underscore and support the role of academia in close engagement with federal agencies, cities/communities, industry, and other government entities to come together to understand local needs and enable and mobilize solutions.

   Under the listed Task Force list of actions, #1 names stakeholder organizations to consult with broadly. Other possibly stakeholders that may be considered could include: Association of Public and Land-grant Universities, local/regional councils of government, regional planning agencies, metropolitan planning organizations, American Planning Association, etc.

We look forward to continuing to work toward the many fruitful goals, strategic priorities, next steps, and activities supported within this “Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together” draft. Thank you for the opportunity to submit these comments. Please let me know if you have any questions or concerns.

Comments on "Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together"

Author: David Witkowski, Executive Director – Smart Region Initiative
Joint Venture Silicon Valley – xxxxxx

Metcalf's Law states that the value of a network increases geometrically with the number of connected nodes. The very first fax machine was expensive to make and utterly worthless – it was the second fax machine that gave the first one value. (Shapiro & Varian, 1999) Logically the greatest return on investment for smart cities technology will be when there's alignment between cities on technologies and standards. This is especially true in "megaregions" such as the San Francisco Bay Area, where residents are highly mobile across city borders and scarcely notice when they've moved from one city to another. Many cities are moving forward with smart city deployments based on limited information and a desire to act rooted in politics. The risk, in a world where there are nearly four dozen possible choices just in wireless standards for Internet of Things (Madden, 2016) is that every city could end up isolated. There are real costs to this lack of alignment. A white paper published in May 2016 (Machina Research, 2016) states that "Smart cities could waste $341 billion by 2025 by implementing non-standardized IoT solutions".

Yet convincing dozens of cities in a megaregion (Bay Area Council Economic Institute, 2016) to align on a unified standard would take years, and the result would be sub-optimal. What cities need are curated programs for convening, educational events, shared case-study learning, and encouragement of a regional dialog about smart city strategies and tactics. Joint Venture Silicon Valley (JVSV) has successfully used this model in regional initiatives over the past two decades, has already begun a program aimed at smart cities, and we're encouraged to see efforts such as the NIST/NTIA Global City Teams Challenge use a similar strategy with their "SuperCluster/Cluster" model. Regional organizations like JVSV already understand the local needs and goals defined in the first step of the SCC Strategic Plan draft, because we're actively engaged with our local cities via existing relationships.

In our experience municipal governments lack the technical expertise to make informed decisions about technologies in a rapidly-changing landscape. Larger cities which have Chief Information Officer roles typically do better in this regard, but it's always a struggle. JVSV has defined a strategy we call Education^3 :

- Educate municipal leaders about technologies
- Educate companies about how to work with cities
- Educate residents about the value of new technologies.

Unfortunately we're also dependent on local funding sources; either municipal governments with constrained budgets or donations from corporations that fluctuate from year-to-year and can disappear completely during recessions or market corrections. We encourage the creation of supportive funding for regional non-profits engaged in this type of work.

Our perspective on smart city systems are that they're a combination of enabling technologies, arranged into vertical applications spaces, designed to efficiently solve municipal challenges.

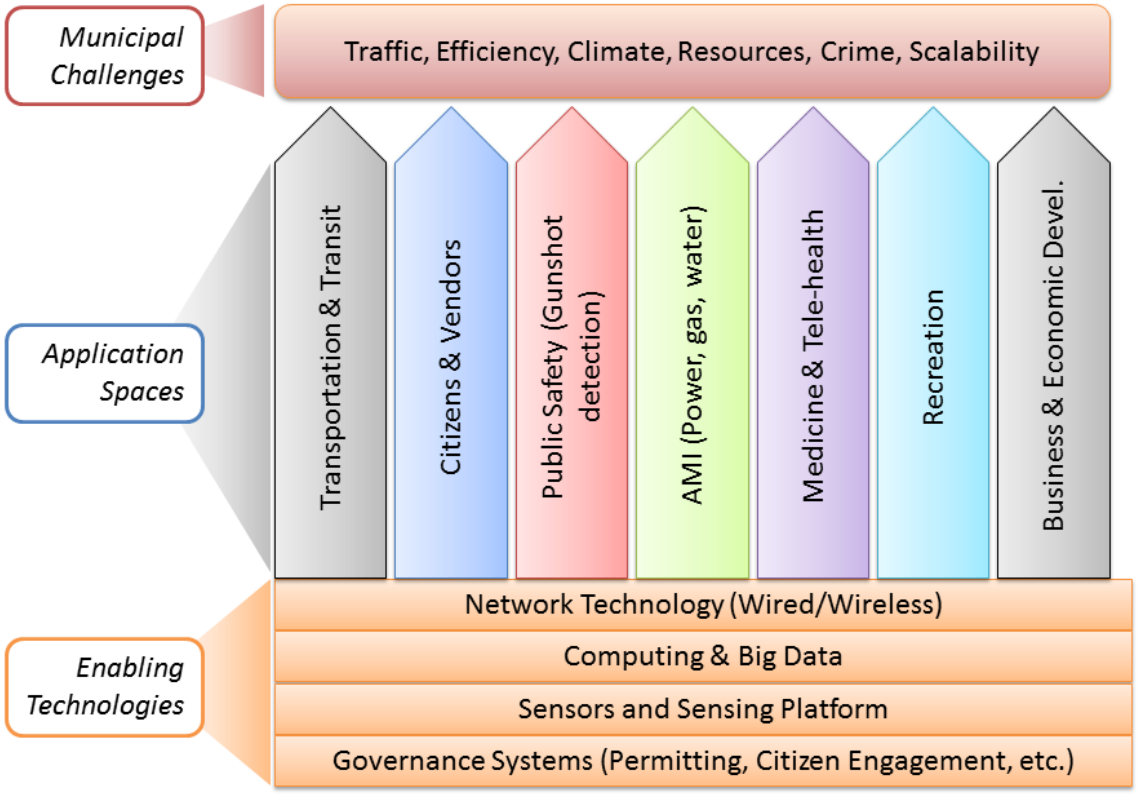

Figure 1 – Smart City Technology Model (Joint Venture Silicon Valley, 2017)

We agree with comments in the SCC-SP which note that every community is different, and there will be cases where each smart city deployment will need to match local needs. Yet systems such as smart transportation, or integrated transit coordination and payment, are clearly suited for regional alignment.

We agree with comments in the SCC-SP that networking and information technology over the last several decades have transformed individuals' lives, and we believe that this has created an expectation that government should be as easy to use as those technologies. For $500 and a monthly fee we have access to everything, almost on demand: Personal transportation, food, services, information, etc. When asked why people are drawn to systems like Uber the common response is, "It just works." Citizens, likewise, want their interaction with government to "just work." User Experience (UX) is a critical component of smart city design, and its value cannot be understated.

We agree with comments in the SCC-SP that smart city projects must provide education and training to residents to help understand the benefits of smart city technologies. Citizens may react adversely to what they perceive as intrusive and unproven technology, or to the costs associated with deployment and maintenance. There is a very real risk that data collected can be

used to intrude on the private lives of citizens. The security of smart city systems has not been fully proven. We must engage with residents, or risk facing populist opposition.

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Margaret Murphy

From: Margaret Murphy
Sent: Friday, January 13, 2017 10:01 PM
To: Lucier, Ernie CTR
Subject: NCO-Smart Cities and Communities

National Coordination Office,

My name is Margaret Murphy, I was accepted as a Special Student to the Emory University-Graduate School of Arts and Sciences to prepare for my research in the field of anthropology. My research is focused in the preservation of endangered language and culture, with core concentration in the establishment of effective language preservation programs. I completed coursework during the summer 2012, semester.

I have developed a theory that I would like to share with the National Coordination Office, in reference to the Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together.

I have been working in the field of literacy, both as an advocate and volunteer, but also as a humanitarian. Language, I believe is fundamental to who we are-and every culture possesses a unique knowledge that is expressed in their language.

When we preserve a language, we acknowledge value, we are evaluating a form of communication, and realizing the value in its uniqueness.

I have also found the importance that financial literacy holds, in the preservation of an endangered language. The teaching of value, can be transcribed to ones own thoughts-and the importance of ones own thoughts.

I have developed a theory in the preservation of endangered language, that incorporates (not the teaching of one language over another) but the inherent understanding of each culture, of financial literacy. In this way, we are not assuming one language is superior over another, but ensuring that all languages hold equal communicative value-and represent themselves equally.

This is the theory that I am hoping to contribute to the Smart Cities/ Communities Federal Strategic Plan: Exploring Innovation Together.

Thank you,

Margaret Murphy

Mihai Zaharia
Sent: Monday, January 16, 2017 1:32 AM
To: Lucier, Ernie CTR
Subject: observation concerning SCC_StrategicPlan_Draft.pdf

Dear Ernest,

here you have enclosed some minimal technical related observations regarding your draft:

intuitive visual interface and block based programming used in handling the smart city infrastructure with graduate access to upper command functions and levels based on citizen clearance in the system --> extensive studies are needed in order to find a common suitable interface (local culture must not be avoided so the tools must be created to be highly customizable at the interface level)

ai based tool to supervise (cyber-cop) these complex infrastructures are needed

using big data instruments may be an asset but these tools are not matured yet

sharing data protocols and standards must not depend on some implementation technology specifics

Introducing an unique digital signature that will represent the citizen both in its private and smart city related access user life

a federative based system approach may be cheap on short term but inefficient on long term so the architecture solution will depend on the city budget (eventually only some clients from the infrastructure from other big city may be used (as paid services))

defining research in this context it's a tricky problem so the support from the informational stakeholder community (plus variants as white hat guys must be involved also) in needed tool development using various types of market specific methods to attract them in doing some particular pieces of software with the respect to a common standard

the accent must be on the intermediate levels of architecture and promoted standards (as open as possible) not to the final app in the first stage

an thorough analysis must be done regarding the security risks of using these tools on mobile devices (see post quantum computing problems and the rest of typical problems)

IoT/IoE is still far from maturity so forcing now the large scale integration without having at least national standards regarding the implementation (at the interface level) of these devices may be an inefficient solution from economic point of view on long term but research grants concerning the problem are required both from gov or private bodies

best regards,

Mike

Before The
National Coordination Office for Networking and Information Technology Research and Development
Arlington, VA 22230

Smart Cities and Communities Federal)
Strategic Plan: Exploring Innovation Together)

Mobilitie LLC appreciates this opportunity to submit comments on the Smart Cities and Communities Federal Strategic Plan. The Plan identifies priorities "to help transform our cities and communities and improve our standards of living." One strategic priority is to "facilitate secure and resilient infrastructure, systems and services for smart cities/communities." Wireless telecommunications networks are a critical part of that infrastructure, because the immense promise new technologies hold for the smart cities of the future requires those networks. Simply put, without a massive increase in the capability of networks to accommodate the exploding growth in broadband and other traffic that the Internet of Things and other technologies will generate, the benefits of those technologies will not be fully achieved.

Mobilitie was built on the vision that the nation needs a huge investment in telecom networks if it is to reap the benefits broadband can deliver. We employ over 2,000 people and are the largest privately-held infrastructure provider in the United States. We fund and install indoor and outdoor WiFi and wireless networks using small cells, microwave spectrum, and fiber. We are working with communities across the nation to deliver available and affordable broadband services to their residents.

Small cell wireless networks are essential to accelerate broadband infrastructure for smart cities. They provide the increased network capacity and speeds smart cities will require. The possibilities are nearly infinite: remote health, education, and entertainment; efficient grid power management; remote house and office systems management; automated highway traffic management; and robust public safety communications simply start the list. This massive investment in a resilient and secure broadband future does not require government funding; it can be readily supported by the ground-breaking technology and competitive marketplace of the wireless industry. Mobilitie and other providers are ready to invest billions of dollars immediately to place millions of small cells throughout the country, most of them in the right of way – simple antennas and small boxes generally the size of a toaster oven or smaller. But that investment requires that unnecessary barriers and regulations be relaxed.

Mobilitie recognizes the processing and operational challenges cities face in supporting this essential infrastructure and offers these comments to facilitate cross-sector collaboration and bridge the existing silos to realize the full promise of broadband from the wireless spectrum. Small cell deployment is the core of wireless expansion and essential to achieve the agency's strategic goal of accelerated infrastructure deployment, which in turn will provide more economic and quality of life opportunities to more people. There can be no more important goal for smart cities

than to expand the affordability and availability of advanced wireless broadband services to benefit all Americans. Many cities are working with industry to realize these goals. The unnecessary tragedy is the cities who cannot see this future clearly enough to forge processes and cost structures that encourage investment in this essential infrastructure.

Many cities are blocking deployment by imposing excessive, unreasonable and discriminatory charges for access to their rights of way and to municipal assets such as light and power poles. Others cannot or will not build any process, much less a timely one, to accept and grant wireless infrastructure deployment applications. Action now to deploy small cell networks is all the more important because the massive demand for 4G already compels vast expansions in capacity, and 5G is just around the corner. New spectrum is also on the calendar and cannot fulfill its promise of broader access without the infrastructure to support it. But if barriers to deployment are not removed, the investment that is required will not happen – and the public will lose.

* * *

Wireless broadband is the essential public service for the 21st Century – just as important as landline telephone networks were in the 20th Century. People increasingly depend on access to wireless broadband to get an education, to apply for a job, to obtain health care, to reach first responders and loved ones, and to learn about services their government provides. It is particularly essential for those citizens who depend on wireless to stay connected, including millions of low-income citizens. New technologies and services, including 5G and the Internet of Things, will enhance the capabilities of fire, rescue and police departments to protect the safety of their communities' residents.

To achieve the promise of broadband, most new networks need to be deployed along local roads and streets. They are by far the best location because every resident and every business is located close to a road. Many of the new wireless broadband technologies will rely on high-band spectrum, which has immense capacity but short signal propagation, again making the use of rights of way essential. Moreover, the network to support many of the new broadband services like connected vehicles and traffic management must be installed along those streets.

We often think of rights of way in the twentieth century traditional model, a resource for utilities like electricity, gas and water -- but historically the purpose of rights of way has been far broader. Centuries ago government began to hold and manage rights of way for the benefit of the public by granting entities a "right" to use the "way." Early uses were for roadways, allowing commercial and personal travel and then with advances in technology urban and national public transportation systems like railroads and subways. Next came the "traditional" utilities, which supplied water, electricity, gas and then telephone service to residents. The development of the community has driven the particular use, but the fundamental purpose of a right of way has consistently been to preserve a physical space for building and operating services that benefit the public.

Congress has recognized that access to state and local rights of way is essential for new communications networks, not just traditional utilities. In amending the Communications Act in 1996, it prohibited barriers that impeded new services. And, it extended access rights well beyond traditional telephone utilities in order to achieve its fundamental goal of promoting new services to benefit all Americans. It balanced local government's traditional authority to manage its roads and streets with ensuring that they would be available for new telecom services at affordable prices that would not deter investment. It thus granted rights of way access to all carriers, such as wireless providers, and companies like Mobilitie, which build and operate the transport networks supporting other carriers. The Federal Communications Commission has carried this policy forward in rulings that enable more efficient deployment of a nationwide wireless system that respects and furthers local interests, growth, and commerce. All three current Commissioners have declared that the agency needs to do more to clear the small cell deployment process of regulatory obstacles and delay.

Mobilitie seeks to expand its successful partnership with many local jurisdictions to build a commonly accepted process that overcomes these obstacles and supports all cities and counties in their transition to smart cities. That process should provide transparent cost recovery for a town's costs of managing its right of way, adopt streamlined administrative permitting procedures that recognize the volume of small cell deployment that is essential, and encourage its low and aesthetically favorable profile in the right of way. A transparent and efficient process will encourage massive private investment in this latest generation infrastructure, which is an essential component of the smart city's resilient and secure technology.

At Mobilitie, we are ready to build and operate the wireless broadband networks needed to support the smart cities of the future that will benefit all Americans, and look forward to working with federal, state and local agencies to achieve that important national objective.

Respectfully submitted,

/s/ D. Kirk Jamieson

_____

D. Kirk Jamieson
Senior Vice President, Government Affairs
MOBILITIE, LLC
2220 University Drive
Newport Beach, CA 92660

From: Nancy Sullivan
Sent: Monday, January 23, 2017 12:19 PM
To: SCCTF
Cc: Lucier, Ernie CTR
Subject: RE: RFC Smart City Strategy

Hello,

Thank you for the opportunity to review and submit comments to this strategy.
My first comment is the awe inspiring scope of progressive "upgrades" to the human experience that are embedded in this initiative.

Moving on to more helpful comments:

Are the central goals appropriate?
NS: I was not sure if they were complete so I looked at several other NSF documents on smart cities so I narrowed down my comment to these.
Complete if Human Services includes : Emergency and disaster response; Environment includes Waste Management; Government operations includes business /commercial services (ie are we making the cities economically competitive): and somewhere in the mix postal service and library servies have been included. (Ancillary comment is that I have long believed that more learnings could have been gleamed from library systems for the conceptual knowledge models)

Are the strategic priorities appropriate and are there others?
NS: again not sure if my concerns are embedded in the topics summarized so I list what I think could be missing are:

- Determining protocols for Information Management such as domain name protocols; master data structures; data models in general and security practices
- Determining governance in standardization practices will it be a congressionally sponsored committee? a league of mayors? If cities are going to get "Smart" about energy, water, transportation there must be shared standards in all cities and agreement will not come without formal and well represented governance

Are the next steps appropriate and are there others?
NS: What I do not see in the next steps in the structure of the program . At the risk of being too brief I will list my concerns in bullets. I would gladly welcome further conversation if explanation is required. The items that are missing in the next steps are could be illustrated as I have attached

- Define the program governance structure (at first program organization governance and then later on there will be a need to define technology governance in regard to what is proprietary and what is public domain)
- Define the long term plan for time/budget/review gates
- Define is the short term activation: eg) who is going to do what in the first six months how will it be funded ; what is the goal fo the first six months
- Complete the missing elements of the activity chart laid out on page 10 and illustrated in the attached.

Recommendation to add additional underpinning activities of Program, Change and Information Management so that leadership is not surprised when the process around activities consumes budget and time.

This is a very interesting topic and I would like to know if there is a way I can be further involved. Please advise.

Good luck!
Nancy Sullivan

Submitted by Nancy Sullivan

RE: Smart Cities and Communities Federal Strategic Plan

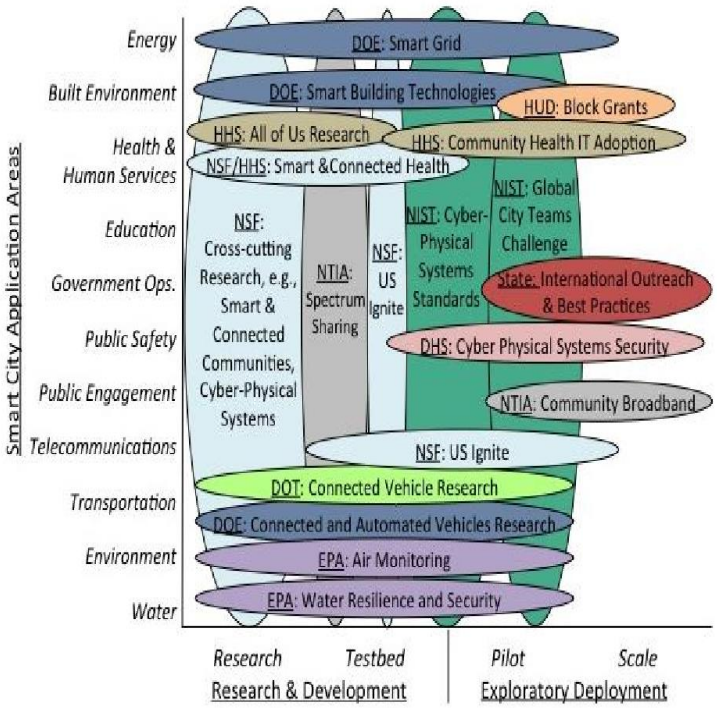

Figure 2: Examples of Federal smart city/community bridging programs. The image depicts examples of smart city/community bridging programs supported by the Federal government by application area (vertical axis) and technology readiness level, from research to exploratory deployment (horizontal axis). Bridging programs are those that cross multiple application areas (vertically-elongated ovals) or span multiple technology readiness levels (horizontally-elongated ovals).

Program Management: Governance and Project Methodology

Change Management: talent& resources& change network; goal setting and KPIs

Information Management: ongoing activity including information security

Recommendation to add additional notes so that leadership is not surprised when the process around activities consumes budget and time. Recognizing – of course_ without the program, change and information management activities there is wasted time and money.

NLC NATIONAL LEAGUE OF CITIES
CITIES STRONG TOGETHER

February 28, 2017

Mr. Ernest Lucier
Smart Cities and Communities, NCO
Suite II-405
4201 Wilson Blvd., Arlington, VA 22230

Re: Docket No. NSF FRDOC 0001, Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together

Dear Mr. Lucier:

The National League of Cities (NLC) submits this letter to provide feedback on the draft Smart Cities and Communities Federal Strategic Plan. As an advocate for the more than 19,000 cities, towns and villages in the United States, we welcome this opportunity to provide input on the ongoing development of our nation's smart cities framework. We commend the Smart Cities and Communities Task Force for its leadership in the development of the draft plan and for its commitment to aligning federal and non-federal stakeholders in a process that supports the needs of residents in all cities and communities. We offer comments on the following aspects of the plan:

Centering of Individual Cities' Needs and Priorities

We thank the Task Force for centering the unique needs and priorities of individual cities. Any federal program that intends to address the future needs of cities of all geographies and sizes must focus on understanding the challenges and desires of those unique communities. The final plan should particularly account for the needs of small and mid-sized cities, which constitute the majority of American communities.

We urge the Task Force to include further engagement with state and national municipal associations, such as the National League of Cities, as conveners and bridges between individual communities and functional silos. We also encourage the Task Force to build local elected officials into the plan as key stakeholders. Local elected officials not only champion the programs that will benefit their residents, they write the local ordinances and authorize the budget allocations that will allow smart city projects to move forward. Local elected officials must be a part of any national smart city planning process.

NLC.org 660 North Capitol St. NW, Suite 450 / Washington, DC 20001 / ph: (202) 626-3000

Summary of responses to the RFC on the draft "Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together"

Facilitation of Data and Standardization

As NLC found in its recent report "Trends in Smart City Development,"[1] access by cities to data and best practices information is crucial for success. Many cities are already leading by example, by creating their own open-data platforms and information sharing initiatives. For smart city investments to scale and for best practices to spread, we agree that data must be portable and technology must be interoperable.

However, we urge federal stakeholders to work towards a standards development process that is not only industry-led. Standards development must be a joint effort led both by industry actors and the communities they serve. Cities are no longer mere clients for firms selling smart city technology – they are active proving grounds for a new way of life.

The Value of Security, Sustainability, and Economic Mobility

Finally, we applaud the Task Force for prioritizing smart city technologies and best practices that support security, community resilience, and economic mobility for all residents. Cities pursue smart technology to improve people's lives. We agree that federally supported funding and programming to build smarter cities should focus on making cities' data more secure, their infrastructure more sustainable, and on building more economic opportunities for all people.

Thank you for the opportunity to submit comments and for considering the perspective of our nation's cities as you further develop the Smart Cities and Communities Federal Strategic Plan. If you have any questions, please do not hesitate to contact Angelina Panettieri at xxxxx. Thank you for your consideration.

Sincerely,

Clarence Anthony
Executive Director and CEO
National League of Cities

[1] National League of Cities. "Trends in Smart City Development." January 5, 2017. http://www.nlc.org/resource/smart-city-development

PNNL SEATTLE
RESEARCH CENTER
1100 Dexter Avenue North
Suite 400
Seattle, WA 98109-3598
www.pnnl.gov

February 27, 2017

Dear Smart Cities and Communities Task Force:

Thank you for the opportunity to review the Smart Cities and Communities Federal Strategic Plan. We find that the document provides a comprehensive approach and, in particular, we appreciate that the section on next steps clearly reflects a clear vision for moving forward.

Attached you will find a few general comments we feel could be considered within the document or in future efforts as it moves forward. In particular, on page 16 we ask that you revise the statement regarding PNNL to more appropriately reflect the program: "Pacific Northwest National Laboratory (PNNL), a U.S. Department of Energy national laboratory, was one of the key performers in the Wide-Area Recovery & Resiliency Program (WARRP), which developed the Denver UASI All-Hazards Regional Recovery Framework. The document was developed through a collaborative effort by the Denver UASI and the State of Colorado in partnership with the U.S. Department of Homeland Security's Science and Technology Directorate and other federal agencies."

Should you have any questions or need further clarification please do not hesitate to contact me at XXXXXX.

Thank you again for the opportunity to comment.

Sincerely,

Ann Lesperance
Director
Northwest Regional Technology Center for Homeland Security
Pacific Northwest National Laboratory

Attachment

Smart Cities and Communities Federal Strategic Plan
Comments

Suggested Revisions:

- Executive Summary
  - It might be helpful to mention the intended audience and how the guidance is meant to be used.
  - It might be worth adding a vision statement. Emerging technologies (e.g., driverless cars) will paint a very different picture of the future. What future do the authors envision (or what future do the authors wish to see come about as a result of the recommendations in this study?). A vision statement can help the authors communicate how they define Smart Cities and resilient cities without going into great detail.
  - Similarly, it might be worth stating any key assumptions, if any, being made. (e.g., Projections about funding mechanisms or assumptions about "threat" projections.

- Strategic Priorities
  - Pg. 16 – Please revise the statement regarding PNNL to more appropriately reflect the program. "Pacific Northwest National Laboratory (PNNL), a U.S. Department of Energy national laboratory, was one of the key performers in the Wide-Area Recovery & Resiliency Program (WARRP), which developed the Denver UASI All-Hazards Regional Recovery Framework. The document was developed through a collaborative effort by the Denver UASI and the State of Colorado in partnership with the U.S. Department of Homeland Security's Science and Technology Directorate and other federal agencies."

General Comments:

- To avoid the appearance that this effort is a classic technology push, it may be helpful to provide background about needs that we want to solve with this avalanche of new technology. The positive aspects of the vision are compelling and even exciting; the potential down sides are enormous if not fully considered. On all sides we are challenged with the advent of new technologies that we have yet to develop appropriate policy to ensure appropriate uses.
- Create a picture of what cities and communities will look like in the future – Where will jobs be? Where will people work? (home vs traveling to office). That will determine impact on infrastructure. Private sector can help with this. For example, what impact will self-navigating cars have on the volume of cars on the roadways?
- Given the vast number of infrastructures it may be best to prioritize the key infrastructures for focus.

Specific Comments on Themes:

- Privacy:
  - Avoid systems that may encroach on privacy or the potential for identity theft.
  - Regarding leveraging Internet of Things, mention the vulnerabilities, threats, privacy associated with Internet of Things.
  - Encourage government research into unintended consequences and policy development to ensure appropriate uses of the capability while providing the privacy and information protections needed for individuals and institutions.

- Infrastructure:
  - Encourage the government to focus on creating and enabling dramatic new advances in bandwidth and communications protocols. In effect we need a capability that is essentially bandwidth unconstrained, low energy, and simple, above-ground infrastructure that will allow upgrades and replacement without capital improvement like tearing up roadways.
  - Encourage advances to focus first on infrastructure improvements in efficiency, reduction of consumable resources, and reduction of costs. For example you might link together data from multiple sources to control traffic lights for a multi-block area to improve traffic flow. Another example might be sensors that balance energy usage from renewable and nonrenewable sources to meet facility power demands at minimum cost and with reduced use of nonrenewable resources.
  - Enable systems to automatically update building or infrastructure layout with any changes so there are always accurate "as builts" and make that available to facility managers and public safety wirelessly.

- Private Sector:
  - Industry will take care of the technology development and insertion but the infrastructure on which it runs should probably be handled via public-private partnerships much like Port Associations to avoid monopoly positions or stifle competition in the marketplace.
  - Create a roadmap on how private sector is leveraged.
  - Understand/Develop a vision with private sector, non-governmental organizations, and communities, and identify who is investing in what, including with that a roadmap of gaps that might be filled by federal government.
  - Emphasize and invest in the development of economic models with the communities and private sector – especially with reference in the report to the creation of jobs. This is a private sector activity.

- Policy:
  - The word "regulation" does not appear in this document. There is a need to consider the regulatory impact of emerging technologies and innovation, particularly when they bump up against privacy concerns. There is significant discussion about the promise of internet of things etc. but no recognition that the

R&D and technology development proposed here will shape, and be shaped by, regulations, existing and new.

- It might be worth adding a section on policy analysis in the document. Granted, the suggestion of public-private partnerships implies policy analysis will be included, a more explicit discussion about how non-governmental organizations, Federally Funded Research and Development Corporations (FFRDCs), etc. can support the recommendations in this strategy with technology-informed policy analysis, to include analysis of pending laws, policies and regulations, can ensure future solutions are cost effective, efficient, sustainable, and resilient.
    - The discussion about datasets on pages 18-19 are a great example of the regulatory implications of technology innovations.
    - The discussion about economic models on page 23 is another related point, but policy analysis involves more than economic analysis.

Comments from SSC Group RE: Summary of Draft Strategy

Reference: Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together
Thank you for the opportunity to respond to your Smart Cities and Communities Federal Strategic Plan strategy paper.

Our group, Securing Smart Cities (http://securingsmartcities.org/) is a not-for-profit global initiative that aims to solve the existing and future cybersecurity problems of smart cities through collaboration between companies, governments, media outlets, other not-for-profit initiatives and individuals across the world. As members of the Securing Smart Cities we suggest that there is not sufficient comment regarding the absolute requirement for inherent system integrity, specifically with regard to Smart City critical infrastructures (CI) such as, existing water purification, traffic control, sewage and any future CI systems development. In addition, the growing threat from inherently in-secure IOT devices currently being deployed and the looming threat from unmanaged airborne drones go unmentioned in the paper. Instead there is an unfortunate bias towards the marketing, business as usual, dreamy new advanced technologies to come; w/o the sobering caveat that this time there is no room for error, no room for inherently insecure advanced technology.

We believe there will be little chance for a successfully meeting any of the Central Goals of the strategy if 'existing/legacy' CI is not secured as a pre-requisite for any new critical infrastructures provisioned with substantive inherent cyber security. Please feel free to reference these three SCC papers at our WEB site:

- Cyber Security Guidelines for Smart City Technology Adoption . The Smart City Department Cyber Security role and implications . Establishing a Safe and Secure Municipal Drone Program

Reactive Bolt-On cyber security solutions are a failed 20th approach. Similarly, the view that what is needed is more cyber warriors to protect CI systems is also a failed perspective. What is needed is acknowledgement by higher learning institutions that the focus from cyber warrior to qualified Product Integrity Engineers (PIE) is the appropriate near-term strategy. These re-tooled cyber warriors will design and build Smart City applications and products with inherent product integrity supporting the Smart Cities and Communities concept. To do otherwise will simply create more risk and open up vast vulnerabilities to enemy nation states, terrorist and criminals who certainly will take advantage of poorly planned future cities, placing the populations of urban areas at greater risk than ever before or imagined.

David Jordan
Securing Smart Cities Board Member

Chief information Security Officer
Department of Technology Services
2100 Clarendon Blvd., Suite 610
Arlington, VA 22201

Steve Sumner

From: Steve Sumner
Sent: Friday, January 13, 2017 3:00 PM
To: SCCTF
Subject: Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together

Comment -

Playing the devil's advocate for a moment, such a system would have to be ubiquitous and, by definition, a necessity for urban life like a utility. I presume the infrastructure would be secured in a location and somehow impervious to invasion.

Having said that, the larger purpose for undertaking this kind of project would seem to be to provide a high standard of living. While commendable, it should not get lost on us that it would essentially be a foundation on which to build a community. The focus is creating a place for people to live their lives. The technology underlying it all is not an end in itself.

Technology generates no disposable income, only people engaged in gainful employment can do that. I guess that's my point...don't lose sight of the end game. We can be wirelessly wonderful out the ying-yang, but if people can't easily afford it then it's useless.

Dr. Caralynn Nowinski Collens, CEO – UI LABS

Response: Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together

We applaud the National Science Foundation Smart Cities and Communities Task Force for publishing the Smart Cities and Communities Federal Strategic Plan: Exploring Innovation Together. The imperative of smart city/community solutions is paramount and timely, requiring government to forge new alliances and cross-department collaborations. By emphasizing a community-based approach and identifying successful strategies in which we can coordinate smart city initiatives, we position American cities for strengthened economic competitiveness. At UI LABS, given our critical approach to investing in research and development funded by a multitude of corporate partners, we welcome federal coordination and facilitation to achieve the big goals of modernizing U.S. cities and communities.

As a first of its kind innovation accelerator, UI LABS' City Digital program uses the City of Chicago as a testbed for technology research and development for integrated data solutions to urban infrastructure challenges. Together with a host of partners from the public and private sectors, our platform identifies programs and pilots that focus on value which can only be unlocked through collaboration and coordination of partners and data to improve the design, creation, use, interactivity and impact of urban infrastructure in cities and communities.

We have found the strategic plan promoting an inclusive vision that will foster R&D and promote the growth of new technologies.

We would like to review the plan from the recommended set of questions.

Are the central goals appropriate and/or are there other goals that should be considered?

To promote scaling, the federal government should actively prioritize R&D on smart city solutions that are regional in nature and require cross-jurisdictional coordination and solutions. This allows for a better relationship with federal agendas on solutions where they have regulatory influence as well—water, energy, and transportation highest value among them.

City Digital is driving an innovation agenda for smart cities that is gaining traction in the U.S. and abroad. The program has become the go-to execution arm for smart city pilot projects in the City of Chicago, and has a unique methodology of sourcing "problem statements" (100+ collected) to solve from city commissioners. To date, City Digital has launched 11 projects, with four completed projects, and built a pipeline of another 27 projects. The program employs the lean start-up approach to reduce project time, and has a tested multi-party legal agreement in place.

City Digital's vision is to digitize the built environment to transform how we live, work, and play in cities today and tomorrow via the intelligent interchange of public and private data. Using Chicago as a primary testbed, City Digital enables experiments at scale to develop real solutions for the marketplace that can be replicated nationally and globally. To that end, City Digital concurs with this Strategic Plan that smart city problems and solution opportunities are inherently local. Yet the federal government can help bridge solutions to scale.

City Digital works with the City of Chicago to develop solutions that build toward comprehensive technological smart city development, with sustained involvement and support from the private sector. Yet generally, cities still tend to emphasize individual pilot or point solutions as part of building a smart city strategy. While these are very important within the local context, they are only meaningful when placed within a context of a new business model, partnership, data sharing relationship, etc. The federal level should emphasize the goals.

The benefits to modernized infrastructure and smart systems enhance economic competitiveness through the creation of new jobs, ease of moving people and goods, and improving the wellbeing of individual lives. The ability to export regional goods and services determines a city's economic success. According to the Brookings Institute, companies that export pay up to 17 percent more in wages than local-serving firms. Within the last decade, we reached a critical milestone with the majority of the world's citizens living in metro areas. Our urban centers must have the infrastructure to ship goods and do so through transforming digital channels. By clearly articulating the opportunity that "smart" cities pose for exports, we can continue to enhance competitiveness.

Our Underground Infrastructure Mapping project, detailed above, exemplifies how infrastructure technology can become a major export. In addition to a dozen U.S. cities, international cities such as London, Doha, and Singapore have contacted our City Digital program about purchase. Each product sale is expected to create a 10x return to pilot team members, sufficient to support private financing.

In addition to interest in City Digital's solutions, global cities are also reaching out to learn our approach to creating new smart city technologies via a consortium of public and private players. By developing and piloting technology in Chicago, other cities are able to import process, testbed requirements, and examples of collaborative innovation to building smart cities.

Are the strategic priorities appropriate and/or are there other priorities that should be considered?

We encourage and welcome the approach of cross-sector collaboration to bridge against silos and provide a uniformed approach to accessing resources to advance the modernization of urban infrastructure needs.

City Digital has been responsible for 11 applied R&D pilots representing commercial markets of over $50B, four of which are completed. First-hand knowledge has informed that there is a critical opportunity to invest in new technology to monitor and manage urban infrastructure.

As an example, our Underground Infrastructure Mapping (UIM) pilot solves a global problem cities face: cities and utilities have limited and often times inaccurate or obsolete data on underground assets, creating inefficiency, delays, unplanned costs, and risk during design and construction. Our pilot created an engineering grade, common, secure data platform that can create, consume, consolidate, organize, and store 3D infrastructure data, as well as a new process and construction scanning tools to create an accurate 3D map of underground utilities of Chicago.

Consolidated and improved data will help utilities better design and coordinate construction in city streets, resulting in fewer accidental damages and reduced construction impacts for city residents. The platform enables virtual mapping and coordination for cataloging underground structures, such as water pipes, gas lines, power and electrical systems, subway structures, and telecommunications cabling. The goal is to overcome inefficiencies and costs created by incomplete, paper-based systems to better coordinate underground permitting and activities, reduce redundant digging operations and accidental interruptions of service, improve accuracy of utility information and optimize the way this information is obtained.

There is an implied linear progression of R&D to solution and scaling. Not all R&D efforts will result in widely successful scaling. To improve commercial success for pilots such as UIM, the federal government should prioritize funding on issues where, from its vantage point, they are able to see commonalities amongst cities grappling with similar issues (coastal flooding, etc.) This helps with peer-to-peer knowledge sharing goals and also helps build markets for private sector solution development. This also helps with the issues stated around economic models for evaluation – giving a quantifiable set of metrics along with funding to cities facing similar issues.

Are the next steps identified in the draft plan appropriate and/or are there others that should be considered?

Efforts to boost long term sustainability for technology and solutions need to prioritize funding for cities to maintain the long-term maintenance of new systems, or support to establish a private or academic partner to provide this role. The way in which we can support human capital correctly derives from successful workforce development and STEM programs that use technology to foster growth and new approaches to learning. We must encourage city governments to embrace on the job training and the adjustment to new systems.

A continued and sustained emphasis on the coordination of federal government is critical to meet the incredible opportunities of modernizing urban infrastructure and the overwhelming moment that all American cities can embrace through the right support and facilitated government channels. We encourage the strategic report to explore coordination in greater depth and with additional emphasis. As a potential benefiting organization of government coordination, we can advise that when the federal government choses to work together cohesively it encourages metro governments to take a similarly welcome approach.

February 24, 2017

Smart Cities and Communities, NCO,
Suite II-405
4201 Wilson Blvd.
Arlington, VA 22230

This letter is in response to the January 9 request for comment on the "Smart Cities and Communities Strategic Plan," listed in the Federal Register 82 FR 3810.

The Sustainable Cities Initiative (SCI) is a multidisciplinary think-tank at the University of Oregon that focuses on the built environment, resiliency and quality of life. Our work spans a wide range of academic disciplines and we are intimately engaged in research and applied work with cities and agencies throughout our state and throughout the country.

Related to the draft strategic plan, SCI's Urbanism Next Research Initiative has focused on the secondary impacts of smart city technologies on city development, urban form and design. To examine these issues, we have developed a national network of thought leaders from the public sector, private sector and academia to examine how changes in technology will impact the design and planning of cities. This national network is interdisciplinary and includes experts from engineering, urban design, planning, real estate and architecture. As identified in Goal 3 in the draft strategic plan, collaboration across domains, organizational sectors and geographic boundaries is important to addressing the challenges posed by smart cities and communities.

While there has been substantial research involving the technological aspects of smart cities technology, there is scant work or rigorous investigation into the secondary effects of how this technology will shape land use, physical city design, urban densification or sprawl, and changes in local vitality and activity. For example, it is widely projected that adoption of AVs – especially via fleets – will drastically reduce the need for parking. This in turn will have dramatic effects on land use, street design, and development densities, which will alter land value, residential, and commercial location preference and ultimately overall development form. It is exactly these types of downstream implications that remain largely uninvestigated despite their enormous impacts on city form and function, the well-being of residents, and regional economic competitiveness.

In the following comments, we respond to the goals, priorities, and the next steps in the draft plan.

1) **Central Goals:**

We are supportive of the five overall goals and particularly Goal 3, which focuses on facilitating cross- sector collaboration and bridging existing silos.

However, we note that the broad goals seem focused on the development, use, and implementation of smart city technologies and do not focus on the secondary impacts on urban development. How will this technology affect development patterns and densities, distribution of land uses, the design of streets and districts,

land valuation and real estate, and the overall metropolitan footprint? How might this vary between urban, suburban, and rural communities? Given the potential impacts of this new technology – and the magnitude of these impacts – it is critical to consider the unintended and currently unforeseen consequences.

We have heard from many public and private stakeholders that they are unclear about these consequences, feel they are unprepared and desperately need research and modeling around the implications of smart technologies and specifically autonomous vehicles on the built environment so they can adjust policy, avoid economically disruptive scenarios, guide project development, direct sound infrastructure investment, and protect quality of life.

The strategic plan's goals seem focused on an optimistic view of how smart technologies can streamline and create efficiencies in cities. While this is absolutely a benefit worthy of investigation, these technologies will potentially be as disruptive to urban systems as the introduction of automobiles was to cities a century ago. If history is any guide, these types of disruptions could result in economic hardship, inefficient or wasteful use of funds, instability, and reduced quality of life. For example, if a new technology like autonomous vehicles allows for riders to have commutes where they can be productive or spend time on leisure activities, then it is conceivable that cities will sprawl even further, consuming valuable farm and forest land, requiring expensive municipal infrastructure, and further segregating society based on who can afford the technology and who cannot. On the other hand, if shared autonomous vehicles becomes the norm, that mode of transportation may complement existing investments in transit, reduce the need for road expansion and associated costs, and free up excess urban land currently used for parking for other redevelopment and productive economic uses. We urge federal agencies to include the investigation of the secondary effects on urban development in their plans.

2) Strategic Priorities:

The strategic priorities focus on fundamental R&D related to technology, infrastructure, knowledge sharing/best practice, and evaluating progress and long-term growth. We encourage federal agencies to include considerations of city form and development within these areas and move beyond strictly technological considerations. While Priority Area 1 highlights understanding the impact on social, behavioral, economic, cultural, legal and ethical drivers, we encourage federal agencies to rely on an interdisciplinary lens using planning, architecture, and real estate. Specifically, we would recommend consideration of the effect of new technology on land use, physical design of streets and districts, pressures to expand urban footprints and increase sprawl and the effects on municipal budgets. As in best practices for technology, cities can also learn from each other about how to respond and plan for changes in city form and development.

3) **Next Steps:**

We are supportive of the federal strategy to accelerate R&D for smart cities and communities. We believe that interagency coordination and engaging with

city/community stakeholders are critical to address the challenges posed by smart cities while embracing the opportunities. We encourage federal agencies to expand the types of activities eligible for funding to consider the secondary impacts of smart technologies on city form and development.

Thank you for the opportunity to provide feedback to this important area of work.
Sincerely,

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