



# Technology and the Future of Cities

President's Council of Advisors on Science and Technology

January 15, 2016

# Key PCAST Members and Domain Experts

## PCAST Members

- Rosina Bierbaum
- Christine Cassel
- S. James Gates, Jr.
- Mark Gorenberg\*
- Susan Graham
- Michael McQuade
- Craig Mundie\*
- Ed Penhoet
- William Press
- Maxine Savitz
- Eric Schmidt \*
- Dan Schrag

\* Co-Chairs

## Staff

- Marjory Blumenthal, PCAST (Exec. Director)
- Diana Pankevich, PCAST
- Seasonal Interns, PCAST

## Invited Experts

- Adrian Aoun, [Start-up; former Google]
- Luis Bettencourt, Santa Fe Institute
- Charlie Catlett, U. Chicago and Argonne National Laboratory
- Ryan Chin, MIT Media Lab
- Daniel Doctoroff, Sidewalk Labs
- Steve Koonin, NYU CUSP
- Hans Larsen, Former City of San Jose
- Richard Luthy, Stanford University
- Peter Marx , City of Los Angeles
- Joseph Stagner, Stanford University
- Nancy Sutley, LA Dept of Water / Power

# Experts Consulted (Partial Listing)

Corinna Zarek  
 Sebastian Thrun  
 Jon Levin\* (Stanford econ)  
 Andrew Right (DOT)  
 Geoffrey West  
 Kerry Duggan (OVP)  
 JB Straubel  
 Kent Hiteshew (DOT)  
 Ed Glaeser  
 Vinod Khosla  
 Shiva Shivakumar\*  
 Bob Pepper  
 Balaji Prabhakar\*  
 Levi Thillemann\* (DOE)  
 Maggie Hsu\* (Downtown Project)  
 Nicholas Chim\* (Flux)  
 Jim Gebhardt (EPA)  
 Jonathan Levy (DOE)  
 Mark Johnson (DOE)  
 John MacWilliams (DOE)  
 Katy Sartorius (DOE)

Elizabeth Cocke\* (HUD)  
 Dan Zarilli\* (PlaNYC)  
 Stacey Gillett\* (Bloomberg)  
 Sophia Tu\* (IBM)  
 Danielle Arigoni\* (HUD)  
 Marc Kodack\* (Army-NetZeroWater)  
 Aymeric Rousseau (Argonne)  
 Michael Holland\* (CUSP)  
 Ari Patrinos\* (CUSP)  
 Paul Romer \*NYU)  
 James Sanders\* (Architect/Columbia)  
 Kent Larson  
 Ben Levine\* (Treasury)  
 Peter Chipman\* (OSTP/DOT)  
 Janette Sadik-Khan\* (Bloomberg)  
 Rohit Aggarwala\* (Bloomberg)  
 Vishaan Chakrabarti\* (SHoP Architects)  
 Jose Baptista\* (Rockefeller 100 Resilient Cities)  
 Elizabeth Yee \* (Rockefeller 100 Resilient Cities)

Alan Wilson (UK)  
 Mike Flowers  
 Ankur Datta (DOT)  
 Rob Sampson (Boston area Research Initiative)  
 Kevin Dopart (DOT)  
 Robert Sheehan (DOT)  
 Seleta Reynolds (LA DOT)  
 Maggie Goodrich (LAPD/ LAFD CIO Public Safety)  
 Lucy Jones (Special advisor to Mayor LA)  
 Andrew Abrams (OMB)  
 Michelle Enger (OMB)  
 Joseph Coughlin (MIT AgeLab)  
 Erwin Gianchandani (NSF)  
 Tara McGuinness (PMB)  
 Daniel Correa (OSTP)  
 Nate Loewentheil (NEC)  
 Dan Morgan (DOT)  
 Marcia Pincus  
 Janye Marrow  
 Jed Herrmann

Salin Geevarghese  
 Cliff Kellogg (OMB)  
 Matt McKenna (USDA)  
 Tarak Shah (DOE)  
 Eran Ben-Joseph (MIT)  
 Kevin Bush (HUD)  
 Kevin Dowd  
 Mark Dowd (DOT)  
 Linda Doyle (DOT)  
 Richard Gunn (ProjectFrog)  
 Carlos Monje (DOT)  
 Egon Smith (DOT)  
 Calvin Johnson (HUD)  
 Courtney Jones (HUD)  
 Katherine O'Regan (HUD)  
 Harriet Tregoning (HUD)  
 Constantine Kontokosta (CUSP)  
 David Yeh (OMB/NEC)  
 Robert Greenblum (HUD)  
 Rohan Patel (WHO)  
 Don Graves (OVP)  
 Matt Dalbey EPA

(\* = Staff Only)

# Mission Statement



How can the Federal government best support science and technology opportunities that can improve America's cities – in terms of quality of life, social services, infrastructure and sustainability – for all their residents?

How can we foster a breadth of collective knowledge?

How can we motivate a depth of experimentation?

What is needed to compete internationally?

# Observations

US Cities are Entering a New Era of Change

## Many new infrastructure technologies

- Sensors and Data
- Transportation
- Energy
- Buildings and Housing
- Water
- Agriculture
- Manufacturing

## Changing norms of behavior

- Digital and mobile Technologies
- Sharing economy
- New designs for housing / commercial buildings
- More walking / biking

## Large Cities are using Data and Analytics to Improve Services

- Environment
- Health
- Transportation
- Public Safety
- Economic Development
- Sustainability and Maintenance

## Many stakeholders

- Private sector
- Local, State, Federal governments
- City residents of all kinds
- Universities pioneering Urban Science

# Federal Government is Involved Today

Agency	Initiative
<b>Department of Commerce</b>	<ul style="list-style-type: none"> <li>• Smart Cities – Smart Growth Business Development Mission to China</li> <li>• Digital Economy program</li> <li>• NIST – Global City Teams Challenge</li> <li>• EDA – Strong Cities, Strong Communities Economic Visioning Challenge</li> <li>• EDA – Regional Innovation Strategies Program</li> <li>• Census – CitySDK (Software Development Kit)</li> </ul>
<b>Department of Transportation</b>	<ul style="list-style-type: none"> <li>• Smart City Challenge</li> <li>• Ladders of Opportunity Initiative</li> <li>• Transportation Investment Generating Economic Recovery (TIGER) grants</li> <li>• Transportation Infrastructure Finance Investment Act (TIFIA) loans</li> <li>• Partnership for Sustainable Communities</li> </ul>
<b>Department of Housing and Urban Development</b>	<ul style="list-style-type: none"> <li>• Connect Home</li> <li>• Sustainable Communities Initiative Resource Library</li> <li>• National Disaster Resilience Competition</li> <li>• Renew 300 (along with DOE and EPA)</li> <li>• Promise Zones Initiative</li> <li>• Public housing programs</li> <li>• Partnership for Sustainable Communities</li> </ul>
<b>Department of Energy</b>	<ul style="list-style-type: none"> <li>• Better Buildings Solution Center</li> <li>• Cities Leading through Energy Analysis and Planning (Cities-LEAP)</li> </ul>
<b>Environmental Protection Agency</b>	<ul style="list-style-type: none"> <li>• Partnership for Sustainable Communities</li> </ul>
<b>White House in conjunction with other Federal agencies</b>	<ul style="list-style-type: none"> <li>• Smart Cities Initiative</li> <li>• US Ignite</li> <li>• MetroLab Network (MLN)</li> <li>• Networking and Information Technology Research and Development Program (NITRD), including Smart and Connected Communities framework</li> </ul>

# What is Needed?

US Cities are Entering a New Era of Change

## Urban Development Districts: Experimentation

- Small enough to experiment, big enough to matter
- Context of being part of larger metropolitan area
- Energy Efficient / Green
- Convenient / Mobile
- Connected / Inclusive

## City Web: Breadth of Knowledge

- Multi-Stakeholder
- Shared data and APIs
- Usage-based Privacy
- Metrics and analytics
- Applications
- Results, Models, Best Practices
- Convening

## Integrated Approach

- Innovation challenges, demographic groups thriving together
- Cross Discipline Technological Implementations and Research
- Standards and interoperability
- Funding and regulation reform

## Workforce to Implement Change

- Education and training
- Credentials and Accreditations

# Federal Government – What is Needed?

## For Tomorrow

- Cross-Agency Pilot Coordination Programs
- Workforce of Tomorrow
- More Federal Funding
- Platform for City-to-City Collaboration
- International Collaboration
- Coordinated R&D across government agencies

## Recommendations for Federal Government

**RECOMMENDATION 1.** The Secretary of Commerce, working with the Secretaries of Housing and Urban Development, Transportation, and Energy, should establish an interagency initiative, the Cities Innovation Technology Investment Initiative (CITII), that will encourage, coordinate, and support efforts to pioneer new models for technology-enhanced cities that will incorporate measurable goals for inclusion and equity.

**(1a)** Under the leadership of the Department of Commerce, CITII should create and develop, by December 31, 2016, an initial blueprint for how U.S. agencies can foster systemic innovation across many dimensions of cities.



## Recommendation 1

**(1b) In advance of developing that blueprint, CITII should, through the use of competitions following the model of the Department of Transportation's (DOT) Smart Cities Challenge, undertake activities to accelerate adoption of new technology. It should fund five districts with funding in the range of \$30-40M each, from existing sources in its constituent agencies, with at least two of the districts in low-income communities.**

**(1c) CITII, working in concert with the Department of Housing and Urban Development (HUD) and the Department of Labor, should design training programs, including certificate programs, that can connect urban technology innovation to jobs development.**



## Recommendation 1

**(1d) CITII should work with Federal agencies that have campuses that could be Federal “districts of experimentation,” such as DOD with military bases, to create living trial/test-bed and demonstration areas that can serve as model districts. These collaborations would recognize and encourage innovation in natural/self-defined districts composed of single-owner campuses owned and/or operated by the Federal Government.**



# Recommendation 1

- **(1e) Under the guidance of CITII, the National Institute of Standards and Technology (NIST) and the National Science Foundation (NSF) should initiate a convening process to establish the prospects and parameters for an independent, community-driven body to define, implement, and evolve the City Web (a City Web Consortium), similar to the World Wide Web Consortium (W3C) and the Internet Engineering Task Force (IETF), which emphasize standardization based on broad adoption of common and proven approaches. The Federal Networking and Information Technology Research and Development (NITRD) program should work with CITII to coordinate existing activities to share data, models, and software tools among cities and stakeholders.**

## Recommendation 1

**(1f) The U.S. Chief Data Scientist (CDS) should work with Federal agencies in CITII to identify types of data useful in the design and implementation of projects that improve public safety, public health, citizen mobility, and so on. The CDS should help the agencies promote new ways by which various stakeholders can develop and share best practices and data, attending to privacy and security. CITII should also develop a framework of incentives to motivate all stakeholders to share their data with others. This should include a common use-based model for ensuring privacy and ethical data use.**



## Recommendation 2

**RECOMMENDATION 2.** Because PCAST believes technology will play a crucial role in revitalizing low-income communities in cities across the United States, the Department of Housing and Urban Development (HUD) should embrace technological innovation as a key strategy for accomplishing its mission.

With its history in urban development, HUD should become an originator of new models for making cities more nimble and more adaptable to technological change. The Department will require the staff capacity and the funds on the scale necessary to support advances in urban technology and innovation. HUD should immediately appoint a Chief Technology Officer or Chief Innovation Officer. The Department should adjust future budget requests to establish programs such as innovation laboratories and other data and technology resources common to other agencies.

## Recommendation 3

**RECOMMENDATION 3.** The Administration should seek legislation enabling two financing programs that will support cities and municipalities to develop Urban Development Districts (UDDs) and to introduce significant new technology in their communities.

**(3a)** The Administration should continue to seek approval by Congress of an innovative new Qualified Public Infrastructure Bonds (QPIBs), which, as previously proposed by the Administration in January 2015 and which, if approved by Congress, would provide an incentive for more private investment in technology-based innovation in cities. QPIBs extend benefits of municipal bonds to public-private partnerships.

## Recommendation 3

**(3b) The Department of the Treasury should create an Advanced Technology Infrastructure Incubator (ATII) Program. ATII would facilitate loan funding of technology-based innovation in Urban Development Districts at levels that allow for meaningful change and impact and particularly impact low income districts. This would be scored, based on risk, by the Office of Management and Budget at a small fraction of the value loaned.**



## Recommendation 4

- **RECOMMENDATION 4.** The National Science and Technology Council (NSTC) should create the Urban Science Technology Initiative (USTI) subcommittee to coordinate Federally funded research and development (R&D). Building on more limited coordination efforts such as those revolving around smart cities, USTI would connect different kinds of infrastructural and other physical technology R&D with data- and ICT-oriented R&D. USTI should begin its work by creating an inventory of relevant R&D projects and grant programs across all agencies. PCAST also recommends that the research work of USTI be informed by the implementation work of CITII, and vice versa, a process likely to be in place in the beginning through the participation of the same agencies in both interagency activities.



# Thank You!

For More Information about PCAST: [www.whitehouse.gov/ostp/pcast](http://www.whitehouse.gov/ostp/pcast)