



# Future Cities UK/US Knowledge Exchange Mission

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## Background to the Report

This report has been produced by the Building Research Establishment (BRE) on behalf of the project partners. It captures the key learning outcomes from the high level knowledge exchange mission to Chicago, San Francisco and New York in 2014. It reflects on what UK government, businesses and researchers in the cities space can learn from the US experience and apply to their own projects.

### Project partners:

BRE  
[www.bre.co.uk](http://www.bre.co.uk)

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Innovate UK  
[www.innovateuk.gov.uk](http://www.innovateuk.gov.uk)  
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Technology Strategy Board

The Knowledge Transfer Network  
[www.ktn-uk.co.uk](http://www.ktn-uk.co.uk)



Science & Innovation Network  
<https://www.gov.uk/government/world/organisations/uk-science-and-innovation-network>



**UK Science  
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## Executive Summary

Open Your City Data

Work with your Educational Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable collaboration

Build Trust

Recognise Complexity

Innovation means implementation

Appendix 1  
Background to the Mission

Appendix 2  
Delegates/Organisers

Appendix 3  
Mission Agenda

References

## Executive Summary

Clarity of vision is a strong indicator of success in solving the challenges of cities. That was an important message from a Future Cities UK/US Knowledge Exchange Mission to Chicago, San Francisco and New York.

Other common elements found in US success stories were that they often embraced an open data approach and involved universities in developing solutions for the future.

Among the challenges that the US cities faced were a lack of strategic capability, complex governance holding up decision making, issues of trust and public acceptance and, not least, difficulty in scaling up ideas to full-scale deployment.

However, the group of 14 delegates also noted how larger organisations looked to start-ups and smaller businesses for fresh ideas and innovations.

The mission, from 29 January to 7 February 2014, met representatives of city governments, business and academia groups, looking to learn from their experiences and to share work being carried out in the UK.

It was supported and organised by Innovate UK, the Science and Innovation Network in the US (part of the UK Foreign and Commonwealth Office), the Knowledge Transfer Network and the Building Research Establishment (BRE).

Workshops and visits involved meetings with 26 national and city government agencies and departments, 26 universities and research organisations, and more than 35 businesses. These ranged from large consulting firms and infrastructure companies to developers and digital start-ups.

Each region visited – the East Coast, the Mid West and the West Coast – has a different set of challenges and opportunities, and a different history. Everywhere there was a real enthusiasm to share what is happening in US cities and to learn about activities in the UK.

### Common themes in success stories

There were many success stories, and some common themes.

Being able to communicate clarity of vision was a strong indicator of success. Cities that were able to create that narrative, and convene political structures, citizens and business around it, were more effective in mobilising many different players to make that vision a reality.

The power of an open data approach to widen the range of solutions for urban challenges was very clear. Delegates saw many examples of the value of open data in allowing new ideas to form and to be tested, and to encourage citizens to engage with city management.

In each location, local universities were deeply involved in developing solutions. Not only did this provide expertise for the cities to draw on, but it encouraged the universities to create cross disciplinary programmes, departments and institutions to tackle ‘real life’ research challenges.

The strong start-up culture in the US is a real strength, creating a diverse ecosystem of potential products and services for cities. The larger businesses in city infrastructure and services are looking to this start-up population for ideas they can pull

together to make practical solutions for cities.

This collaboration between large and small should enable innovative solutions to be available much more quickly.

There was an astonishing range of products and services being proposed, prototyped, developed and tested against real city challenges. Cities’ willingness to talk about their challenges and needs, coupled with an environment that supports early trials, is bringing many new potential suppliers into the market for city systems and services.

We heard about a number of regeneration projects of various types. It was clear that components of solutions to make cities more successful, more adaptable and more resilient can be built into major regeneration projects at marginal cost.

### Common difficulties

US cities encountered many difficulties in implementing new solutions, and again, common themes emerged.

A lack of strategic capability was evident in many cities, particularly with respect to digital and information technologies and the overall vision for sustainable cities. Without in-house expertise and capacity to drive through the adoption of solutions, many interesting experiments will remain just that: experiments.

The complexity of governance and regulatory structures was mentioned repeatedly as a barrier to adoption, particularly those that cut across many aspects of city operations. Although decision making in the UK can feel unreasonably slow and complex, many US participants in the discussions

looked enviously at the relative simplicity of UK governance structures and procedures.

Trust and public acceptability was a major and unresolved issue. There was evidence of a backlash to core elements of future city solutions because of public concerns over the ‘surveillance state’. Many solutions proposed by smaller technology companies and academic groups were over-optimistic in assuming a relaxed attitude to use of personal data.

Most of the projects and products were point solutions to specific issues. It highlights the difficulty of treating the city as a system of systems, and part of a system of cities.

Many interesting projects and prototypes had shown benefits but were stuck at the demonstration stage. Financing, capability, and decision making and governance structures all conspire to make it hard to embed new solutions fully into the operations of the city.



## Executive Summary

**Open Your City Data**

Work with your Educational Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable collaboration

Build Trust

Recognise Complexity

Innovation means implementation

Appendix 1  
Background to the MissionAppendix 2  
Delegates/OrganisersAppendix 3  
Mission Agenda

References

## Open Your City Data

### Lessons for the UK

The power of an open data approach to stimulate the development of new solutions to urban challenges was very clear. We saw many examples of the value of open data in allowing new ideas to form and to be tested, and to encourage citizen engagement with city management. All of the cities we met have made a specific commitment to open city data, and have appointed senior officers to drive that commitment through, often recruiting highly skilled individuals from tech companies to do this effectively.

### Observations

#### Open Democracy

The open data and cities movement in the States is strongly influenced by the open democracy movement. The US open government movement began in 2006 by scraping data from government websites and coming up with trends and histories. The influence of lobbyists in the US is a cause of much of the mistrust between cities and their citizens; money spent on political lobbyists was a key driver for opening data. This has since gained traction and has placed the impetus on government at all levels, including cities and their agencies to make their data available openly.

#### Driving Transparency

Opening data can help to legitimise actions that might otherwise be sensitive, such as actions aimed at particular social groups or intensely political decisions such as allocation of budgets between city departments. Solutions such as the Open Cheque Book in San Matteo, where all

procurement of \$5,000 or more is published online, are driven by transparency.

Open data can make the challenges visible and clear and allow specific and targeted interventions at a highly localized level.

#### A Technological AND a Behavioural Challenge

Open data allows cities to facilitate conversations between citizens and the city, enabling citizens a much more active role in the management of their cities. However, if city departments do not share their data with each other the vision of integrated city systems simply cannot be realised. It can be difficult to persuade organisations and individuals within those organisations to share data if information is seen as a source of power.

The mission came across a number of approaches to create a culture where city departments are supported and encouraged to share their data; ranging from an Executive Order in Hartford Connecticut to a champion based approach in San Matteo County. Both are gaining momentum and time will tell whether the opt-in approach or the mandated approach will prove more successful.

#### Key questions for UK cities to consider:

- How can your city open (more) data?
- How could your city benefit from opening data?
- What uses of your city's open data can you imagine?
- What are the risks of not opening data?

### Chicago

Chicago's data science team focus on analytics that can be deployed on a daily basis to help operational teams in the city. Having proved the concept on rodent baiting and food hygiene, a databased analysis of black market cigarettes helped the city recover \$25,000 a month in lost revenue. Data can be used to justify decisions that might be controversial and to target interventions based on facts rather than subjective approaches.<sup>[1]</sup>

### New York

New York's open data platform publishes 3,000 datasets. The issuing of building control warrants in New York spans across the planning, health and fire departments. Each department held a separate data set providing a very fragmented service. Taking a more integrated approach through open data has improved efficiency and dramatically reduced complaints. In doing so, they faced challenges around people and businesses who were concerned about the security and eventual use of their data but have been able to overcome those by delivering a secure place to host the data.<sup>[2]</sup>

### California Report Card

The California Report Card<sup>[3]</sup> from CITRIS enables citizens to use their smart phones to grade the State of California on issues such as healthcare, education etc. This enables city agencies to prioritise service delivery based on citizen opinion and therefore strengthens local democracy and citizen engagement.



Executive Summary

Open Your City Data

**Work with your Educational Establishments**

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable collaboration

Build Trust

Recognise Complexity

Innovation means implementation

Appendix 1  
Background to the MissionAppendix 2  
Delegates/OrganisersAppendix 3  
Mission Agenda

References

## Work with your Educational Establishments

### Lessons for the UK

Clarity of vision and narrative was a strong indicator of success. Cities that were able to create that narrative, and convene political structures, citizens and businesses around it, were more effective in mobilising many different players to make that vision a reality.

Wherever we went, the 'local' universities were deeply involved with the city in developing future solutions. Not only did this provide deep expertise for the cities to draw on, but it encouraged the universities to break down traditional organisational silos and create cross-disciplinary programmes, departments and institutions to tackle the challenges. Both cities and universities are winners by focusing on real life research challenges in the universities' back yards.

### Observations

#### Universities as assets

Universities can play a central role in nurturing culturally, economically and socially attractive cities. For example, Michigan State University has been critical to the development of Medical Mile in Grand Rapids, which has been central to attracting investment, jobs and skilled labour to the city.

#### Universities to build the skill base

The shift to a digital age will be disruptive. What happens to the companies whose business gets disrupted by the physical world becoming better connected? How do we predict what new business opportunities this creates, and prepare people with the skills to respond to this change? There were strong messages, across all of the cities the delegations met, on the key role of universities in developing new industries to replace redundant industrial bases.

#### Good universities need good cities

Local universities depend on the success of the city. During the mission we heard how the Cleveland State University collaborated with the Cleveland City agencies to regenerate the inner city and reduce crime. Universities in cities with reputations for being run down and high crime will struggle to attract the top faculty members and students. Parents won't want their children go to university in a city perceived as dangerous.

#### Key Questions for UK Cities to Consider

- How is your city leveraging its local assets?
- Is your city making best use of its local university?
- How are you using your university to nurture a thriving city?
- Do you have a clear strategy for partnerships around grand challenges?

### Gary Indiana

The city of Gary Indiana is working with Indiana University Northwest to take a data-based approach to managing its economic decline with its associated social and environmental problems.

Gary Indiana was founded in 1906 to service the Gary Steelworks, by 1920 it had over 100,000 residents with its population peaking at 180,000 in the 1960s. The reduced scale of the steel works and associated commercial disinvestment combined with growth of greenfield development has had catastrophic impact on the city.

Today the city has around 80,000 residents, 35% of whom live below the poverty line. The median household income is less than half of the national average and less than 60% of the state average. Property prices are about 1/3 of the national average with a 30-35% vacancy rate on the buildings.

The city is analysing the landscape of the city plot by plot. The analysis identifies vacant plots, vacant buildings and buildings at risk of vacancy to target actions on interventions that will 'concentrate success' such as assembling individual plots to create larger blocks of real estate that could be sold to developers on more attractive terms. The city government is trying to manage a city infrastructure that is designed for 200,000 people on a very limited budget and therefore using data helps the city target resources in a smarter more joined up way such as the practice of selling vacant homes for \$1 on the condition that they are refurbished and maintained.

The experience in Gary provides a strong case for the use of visualisation, mapping and modelling technologies to accurately assess the current state of the city.



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments**Nurture Enterprise**

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

Innovation means  
implementationAppendix 1  
Background to the  
MissionAppendix 2  
Delegates/OrganisersAppendix 3  
Mission Agenda

References

## Nurture Enterprise

### Lessons for the UK

The strong US ecosystem for entrepreneurship enables the creation of a diverse range of potential products and services for cities. The larger business players in city infrastructure and services are looking in population of start-ups for innovative ideas they can pull together to make practical solutions for cities. This collaboration between large and small should enable innovative solutions for cities to emerge quickly.

### Observations

Cities are competing at a national and global level to attract highly mobile talent essential for creating high-tech start-ups. Cities need to make themselves attractive to this key entrepreneurial population, which is essential to drive innovation and require opportunity and investment in quality of life. However cities must also balance this against the needs of existing populations who may feel unable to engage with the new economy.

Many of the cities that the delegation met in the MidWest were suffering from the results of industrial decline. The industrial revolution was the *raison d'être* for many of these cities. Can these cities recreate their past? Or should they even try? Much of the heavy industry, such as steel, that these cities had developed to service has disappeared or moved abroad for cheaper labour. The result for many of these cities has been devastating. As much as half of the population of some of these cities has moved away. Nurturing local enterprise and setting realistic visions would help these cities retain and attract economically active citizens. Cities

need to look hard at their assets and possibilities and construct an exciting and engaging narrative based on those solid foundations.

Technological advances such as the Internet of Things are generating more and more data, and allowing more and more opportunities for decisions to be automated, creating a digital/physical blur<sup>[4]</sup>.

The emerging concept of 'Maker Spaces' are very good examples of how people are being empowered to create new products that link into that Internet of Everything. Maker Spaces in cities are providing the right conditions for small, innovative, high-tech start-ups to start generating wealth at a local level. Such initiatives are reconnecting the city to manufacturing and the advancement of things like 3D printing and other advanced manufacturing techniques brings opportunity. Although this will not onshore previously lost manufacturing jobs, it will provide some jobs.

Inclusivity is a key requirement. Affordability of housing and services was cited as a significant challenge in both New York and San Francisco. Maker spaces and entrepreneurial clusters require relatively low cost space to thrive. For example the rising costs around silicon roundabout in London driving away the very people that made it a hotbed of innovation in the first place. Solutions such as using University owned space to support spin outs could prevent success in nurturing enterprise from choking off innovation. Other solutions include providing city owned space and zoning to prevent the free market raising costs too high as success builds, for example Gary Indiana is creating small scale business parks that would be well connected but cheap.

A big challenge for cities is how technology can be inclusive and benefit all sectors of society. The Google Bus protest was ongoing during the delegation's visit to San Francisco. These protests are based on the perception that employees of technology companies living in the city and commuting to Silicon Valley are pushing up the cost of living in the city, pricing lower paid workers out of the city. An emerging consensus amongst the delegation that solutions that help improve the quality of life for all and provide greater cohesion would help to stimulate further economic growth, improve public safety and reduce

welfare costs within cities. If nurturing enterprise is the lesson then this is one of its shadow sides and cities need to be mindful of it.

### Key questions for UK cities to consider:

- What is your city's enterprise culture?
- Does your city do enough to support start-ups?
- What can you do to address the unintended consequences of structural changes?

### Chicago competing on a global stage

As with any structural change there are winners and losers. Chicago has reinvented itself as a global city, a city with global business headquarters and significant inward investment. Estimates reveal that only one third of the city has been able to benefit from that reinvention and the impact on cities in the surrounding region of this clustering of headquarters has meant that companies have moved their corporate headquarters to Chicago, with a detrimental impact on the cities that have lost out. The economics of aggregation and cluster effects are working here, but if benefits only 1/3 of the city and damages other nearby cities is it sustainable? How should Chicago act in the future? What should the other cities in surrounding cities do to compete?

### Chief Innovation Officer

San Francisco was the first US city to appoint a Chief Innovation Officer and other cities have followed suit. Their success is measured on job creation. They play an active role in start-up communities by having regular meetings, participating in round tables and funding accelerated learning schemes. This is something for UK cities to consider to improve their competitiveness.

### Open City

The Chicago Open City movement has progressed from just 4 people to a devoted community of around 50 attendees at weekly hack events. These have created a wide range of apps, including one that tracks the progress of snow ploughs clearing the streets. This allows citizens to see whether their community is getting a good service. Although there is no clear route to commercialisation of these apps, the initiative has enabled around 800 programmers to find permanent jobs. The opening up of data has enabled many SMEs and start-ups to emerge in an ecosystem traditionally dominated by big players.<sup>[5]</sup>



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

**Cities as  
Innovators**

Think Long Term

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

Innovation means  
implementationAppendix 1  
Background to the  
MissionAppendix 2  
Delegates/OrganisersAppendix 3  
Mission Agenda

References

## Cities as Innovators

### Lessons for the UK

There was an astonishing range of products and services being proposed, prototyped, developed and tested against real city challenges. From responsive parking charges to using social media data to predict crowd behaviour. The willingness of cities to talk about their challenges and needs, coupled with an environment that supports early trials, is clearly bringing many new potential suppliers into the market for city systems and services.

### Observations

The mission highlighted many good examples of solutions from grass roots innovation that have enormous potential. The challenge is embedding them in city operations. The open data and analytics initiatives within many of the US cities had strong political leadership, but little evidence of a business model that would be sustainable beyond the initial funding period.

Having a business model, or indeed an exit strategy following pilot projects, is crucial for any future cities initiative. The UK with its more limited funds would seem to have stronger methodologies for making business cases and planning for pilot projects, through the use of mechanisms such as Local Enterprise Partnerships and Economic Development Companies.

Who should pay for different elements of the project is key. The principle of 'if the benefit accrues to the city then the city should pay and if it accrues to businesses then business should pay' is interesting. In Bristol solar energy

providers pay for the maintenance of the solar map. Quantification methodologies for third party benefits to businesses, citizens and city governments from future cities solutions would enable stronger business cases. New business models will be needed to enable all parties to extract value from new solutions

To fully understand the benefits of future cities solutions we also need to be able to quantify the social benefits. This needs better methodologies and tools than are currently available. Manchester's New Economy model is a good example of how this is being done in practice.

The Glasgow Future Cities Demonstrator is showing how cities can take risks, and, by engaging across all city agencies and local communities, can be extremely successful and innovative.

### Key questions for UK cities to consider:

- What does innovation mean to your city?
- What examples do you have from your city of innovative approaches?
- How is your city funding innovation?

### Solar Maps – Bristol & San Francisco

The importance of having solid business cases and strategies for maintaining and updating the data beyond initial project funding is important. In 2006 San Francisco used Federal grant funding to become one of the first cities to publish a solar map to show households where the most suitable places were for solar power installations.

This proved to be incredibly popular. A 3D model of the city was built to calculate available usable roof space and to date this has resulted in nearly 4,000 PV installations with 22.9 MW capacity. However, the longevity of this project is threatened by a lack of funds. Once the federal funding ran out the city department struggled to run the quarterly update on new installations, and a change to the Google API in 2013 led to the map having to be recoded. The department did not have the budget to do this.

In contrast, Bristol City Council published a solar map that has proved to be the most visited page on the city's website. The council seeing this level of interest, quickly identified that there was business benefit for the solar energy companies in maintaining and updating the map and are investigating ways to enable the solar energy providers to finance the map. The principle is that if there is business benefit from the activity then business should pay, but if the benefit accrues to society then the city should pay.



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

**Think Long Term**

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

Innovation means  
implementationAppendix 1  
Background to the  
MissionAppendix 2  
Delegates/OrganisersAppendix 3  
Mission Agenda

References

## Think Long Term

### Lessons for the UK

We heard of a range of different ways in which cities are building foundations for the long term. It starts with a strategy or action plan and uses this to build the economy and brand that will provide great places for people to live and support. The challenge is what comes first. The signal from cities is important (through strategy and policy), the infrastructure and investment follows.

Cities and national government need the right decision making framework to take the long term view and be able to evaluate the wider socio-economic and environmental benefits.

### Observations

The UK has been very successful in measuring the impacts of certain regeneration approaches. This has to some extent been led by the need to 'make the case' to government for funding, but is also perhaps a cultural difference. This kind of thinking did not appear to be present in many of the US cities the delegation met, perhaps due to the narrow focus put in place by city boundaries rather than metropolitan area boundaries. In the UK the impact analysis of urban design and architecture and modelling of cultural and social interventions, and (large amounts of) economic forecasting and monitoring have enabled many regeneration schemes and defined economic masterplans.

In the Chicago Lakeside development the mission saw how delays in getting the project off the ground led to uncertainty and lack of confidence particularly in the local community. The local community with the city could have adopted a retrofit programme to improve and increase housing provision much more quickly in the existing areas. Building into established neighbourhoods would mean community cohesion is easier, and density for other infrastructure could be more quickly established. Even once the masterplan starts construction, it will take many years for the community to build.

Lessons can be learnt from manufacturing where plants are built with the expectation that they will need to respond to future changes. Manufacturers build their factories with the expectation that the infrastructure will support product lines that change on a much faster cycle than the factories and assembly lines that develop them. Cities could do the same.

#### Key questions for UK cities to consider:

- Does your city administration have plans beyond the local electoral cycle?
- What are the barriers to taking a longer term view?
- What signals do you need to give to build confidence for inward investors?

### Milwaukee

Milwaukee Cities need to find their own USPs. Using an asset-based regeneration approach focuses cities on what their own assets are and how they can differentiate themselves from the competition. Not every city can be the world's most creative or the world's most sustainable city. An excellent example of this is the city of Milwaukee, Michigan which has used its connectivity with water (the name means 'Gathering Place by the Waters') to reinvent itself as a global capital of water science.<sup>[6]</sup>

The city did not seek to be the next New York, it sought to be the best version of itself. Formerly the machine shop of the world, the strategy has ensured that Milwaukee has reversed the industrial decline that began in the 1970s and today has the highest proportion of its workforce employed in manufacturing at 1720% and growing. According to Matt Howard from the City of Milwaukee, "Milwaukee had 'turned its back on the water' redirecting our attention to the water enabled new thinking."

The strategy involved leveraging its natural assets of three rivers and position on the great lake as an asset to attract water technology companies and the water divisions of global companies. This included the creation of a 60 acre stormwater park on the site of a former railway siding one mile from downtown. The site was originally a river basin and therefore part of the natural drainage system. The city resisted the temptation to concrete over the site creating an environmental asset whilst freeing up protected land for businesses who all contribute to its upkeep, making it environmentally and economically sustainable.

### Chicago

Chicago's 2015 Action Plan<sup>[7]</sup>, first published in 2005, also reflects the need for cities to be resilient. Retrofit measures for buildings, innovative infrastructure financing measures, and using foreclosed properties for urban farming all added to the long term resilience of the city.



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

**Take a Systems  
View**Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

Innovation means  
implementationAppendix 1  
Background to the  
MissionAppendix 2  
Delegates/OrganisersAppendix 3  
Mission Agenda

References

## Take a Systems View

### Lessons for the UK

A lack of strategic capability was evident in many cities, particularly with respect to digital and information technologies. This led to difficulties in procuring new solutions and integrating these into city operations. Without in-house expertise and capacity to drive through the adoption of new solutions, many interesting experiments will remain just that; experiments.

### Observations

The delegation was surprised by the levels of fragmentation within cities. Despite high profile use of data and the drive towards open data, there were still very low levels of integration across the city departments. One city government had seven separate email systems all procured and operated independently. Getting the basics right will create the right conditions under which future cities solutions can be effectively implemented. Many UK cities have begun to pull together legacy ICT siloes as the first step towards deeper integration.

The politics of making future cities systems is a major challenge for city capability and governance. In a situation where we are moving towards using data to make better, evidence based decisions, many of the established processes and subjective decisions are being increasingly challenged.

In an environment where cities are struggling to deliver basic services on a day to day basis investing budgets and resource in strategic initiatives can be difficult to justify.

### San Matteo County, California

In San Matteo County in California the newly appointed Chief Information Officer found himself with no data sets. His approach was to task each county department with appointing a data liaison officer. Working together this group looked at what data was available and what could be done with that data. For example, departmental budgets were freely available but how the money was actually spent was not available. By implementing an open cheque book<sup>(9)</sup> San Matteo made full details of all expenditure (over \$5,000) available online. This has led to government expenditure becoming self-policing and the level of transparency has overcome mistrust from citizens.

### Key questions for UK cities to consider:

- Does your city have a joined-up approach?
- Does your city seem fragmented with little cross-over between different agencies and departments?
- Who's the decision-maker in your city?
- Does your city have a joined up approach?
- Does your city seem fragmented with little crossover between different agencies and departments?
- Who's the Decision maker?

### Hartford, Connecticut

In Hartford, Connecticut, the Mayor provided the Chief Data Officer with an executive order which effectively mandates how the different departments need to share and integrate their data.

Time will tell how effective the mandated approach will be.

### New York

New York was able to bounce back relatively quickly from Hurricane Sandy due to a multi-agency approach to the challenges facing the cities. This approach was much more effective because of the collaborations that were put in place in the year before the shock.

What is not clear from the discussions was how this is translating into institutional learning and change.



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

**Provide clarity  
to enable  
collaboration**

Build Trust

Recognise Complexity

Innovation means  
implementationAppendix 1  
Background to the  
MissionAppendix 2  
Delegates/OrganisersAppendix 3  
Mission Agenda

References

## Provide clarity to enable collaboration

### Lessons for the UK

The complexity of governance and regulatory structures was mentioned repeatedly as a barrier to the adoption of new solutions, particularly those that cut across multiple aspects of city operations. Multiple layers of decision-making and overlapping responsibilities brings many benefits to US cities, but clearly slows down decision making, and can lead to negative outcomes when the challenge or solution is outside the framework the governance structures were set up to manage. Although in the UK it often feels like decision making is unreasonably slow and complex, many of the US participants in the discussions looked enviously at the relative simplicity of UK governance structures and procedures.

### Observations

Effective and robust governance structures are fundamental to unlocking the value of future cities. A key message throughout the mission has been that the technology is relatively easy, it's the cultural, political and legislative arena in which the real challenges lie.

The starkest contrast between the US and the UK was the issue of city governance and finance, and the role of politics in managing and changing cities. We expected that greater localism and democratic accountability in US cities would give much more space for cities to take control of their challenges and opportunities than the more centralized UK system. However, in practice US cities had less room for manoeuvre than we had thought.

The US has much higher levels of locally controlled tax revenues, leading to some highly innovative tax financing approaches, such as tax breaks to encourage local philanthropy, tax breaks for local bonds and tax increment financing. This is good for the cities with effective and strong local governance but not for those cities in decline whose tightly constrained resources do not afford the flexibility to offer such incentives.

In the US there are four main levels of governance: Federal, State, County

and City – these were often cited as barriers to the provision of integrated and well functioning cities. This vertical fragmentation combined with horizontal fragmentation between different city functions and agencies makes coherent responses to key urban challenges harder to design and implement. This is also common in the UK where most of the city's services are provided by non-city agencies such as health, policing, education and transport. The role of the city as convenor and facilitator of city services and enablers of others to deliver those services is key to the long term success of the cities.

Many of the cities that the delegation visited and spoke to had sustainability plans but not resilience plans, with the exception of New York City, which published Plan NYC, its vision to ensure New York is not affected by future external events of scale.

#### Key questions for UK cities to consider:

- How is your city's governance structure 'future fit'?
- How is your city collaborating with your neighbours?
- How are you interacting at the local and regional level?



Executive Summary

Open Your City Data

Work with your Educational Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable collaboration

**Build Trust**

Recognise Complexity

Innovation means implementation

Appendix 1 Background to the Mission

Appendix 2 Delegates/Organisers

Appendix 3 Mission Agenda

References

## Build Trust

### Lessons for the UK

Trust and public acceptability was a major and unresolved issue. We saw evidence that key foundation elements of future city solutions were facing a public backlash because of concerns over the surveillance state. This was already causing significant difficulties. We also saw that many solutions proposed by smaller high-tech companies and academic groups assumed a relaxed attitude on the part of citizens to the use of their personal data that seemed optimistic. Informed consent is critical and cannot be taken for granted.

### Observations

Technology has the power to place citizens at the heart of the Future City. It opens up the possibility of getting beyond the concept of citizen as consumer towards citizen as an integral part of the system. Throughout the mission this was recognised as an important opportunity, but it was unclear how to make this happen, or indeed what metrics could be used to measure the social benefits of projects.

### Engaging Citizens

The use of online mechanisms for citizen engagement raises the question of the digital divide. Those who are able and willing to engage digitally and those who are not. It asks many questions, such as how do we ensure that everyone gets heard in the virtual conversation and not just a limited number of digital activists, who may not be representative of the population at

large? How do we balance the smart with the unsmart? How can we balance the hard and soft data to deliver robust decision making tools reflecting the needs of the citizens and delivering real and quantifiable quality of life benefits?

### Data & Trust

Trust in data and trust in who owns the data is a critical factor in the successful delivery of future cities Solutions. The sense from the mission was there is growing recognition that this is an issue, but it is not clear how this will manifest itself, and therefore how to deal with it. There is a significant amount of data held by third parties, from the obvious such as social media, energy companies and city governments through to the less transparent use of data from mobile phones, taxi companies etc.

Throughout the mission there were examples of how high levels of democratic accountability can lead to irrational decision making. For example, the Streetline Inc parking technology, that has been trialled in San Francisco, has the potential to eliminate the need for parking wardens, but what elected official wants to be responsible for cutting jobs and therefore realising the full benefit of the system.

### Key questions for UK cities to consider:

- How can you build greater trust with your citizens? Do citizens actively engage in city decision making?
- What plans do you have to increase citizen engagement?

### Public Art to Build Trust

Both Chicago and San Francisco were exploring opportunities to use sensors as public art within the city, an approach with strong synergies with Bristol's Playable Cities Initiative<sup>[9]</sup>. In Chicago, the Chicago Tech Plan<sup>[10]</sup> is implementing an initiative to roll out city wide sensors and, by making them interactive, playful and approachable, changing the perception of them from surveillance devices to community assets.

### San Francisco Parklets

The San Francisco Parklets programme<sup>[11]</sup> is a response to citizen action to take control and ownership of their public realm. Initiated by artists taking control of two parking spaces and inviting passers-by to feed the meter, it sent a clear message to the city that citizens wanted enhanced public realm rather than more street parking. Instead of removing the installations, the city decided to enable citizens to take control of their public spaces through providing a set of guidelines and processes to deliver effective parklets. This has not only engaged citizens and businesses but created opportunities for experimentation from small design firms within the city.

### Third parties as trusted holders of data

There is a perception that third parties can act as the trusted intermediary to hold personal data. The impression from the Centre for Urban Science and Progress in New York (CUSP)<sup>[12]</sup>, the University of Chicago and the Centre for Information Technology Research (CITRIS)<sup>[13]</sup> in the Interest of Society at UC Berkeley confirmed that universities have access to privileged data over and above that which the cities can access. This is played out in the names of some of the programmes being implemented in these institutions such as the Data Science for Social Good programme funded by Eric Schmidt at the University of Chicago<sup>[14]</sup>, CITRIS' focus on data and democracy and CUSP's focus on data ethics and privacy. CUSP aims to lead a new class of personal data users: nonprofit research and academic institutions that will primarily use this data for educational and research purposes.

In Illinois, the City authority is not allowed to see data and utility information at individual account level. The city can however see anonymised and aggregated information. Universities are perceived as more trusted than politicians as the public are afraid they will be misrepresented and their privacy compromised by politicians.



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

**Recognise  
Complexity**Innovation means  
implementationAppendix 1  
Background to the  
MissionAppendix 2  
Delegates/OrganisersAppendix 3  
Mission Agenda

References

## Recognise Complexity

### Lessons for the UK

Most of the projects and products that we saw were point solutions to specific issues. At this stage in the development of the market this is perhaps to be expected, but it highlights the need to treat the city as a system of systems, and part of a system of cities. The difficulty of treating a city holistically forces people back into their traditional functions and siloes as they attempt to reduce the problem to manageable pieces. City managers need support to be able to embrace complexity.

### Observations

How the cities relate to their wider regional context was seen as an issue.

Power sharing across a functioning economic geography is difficult. Strong leadership models can mitigate against this but two or more mayors need to get along very well, and this is not often the case. Moreover, the sheer number of different elected officials, both vertically (e.g. elected police commissioners, district attorneys etc.) and horizontally (e.g. school board zones) hamper integration and coherent spatial planning. Transport is one of the most visible examples of this.

The State of Connecticut has 3.5 million people, 14 planning organisations and 18 transit agencies, in contrast to London where a single agency Transport for London (TFL) was created in 2000 and is responsible for all transport within the city (although institutional and organisational challenges do still exist for TFL as it interacts with boroughs and other city organisations). The structural inertia in

transportation was all too clear to the delegation who spent time in inordinate levels of congestion, which were viewed as normal. This, if unaddressed, will lead to lower productivity, economic decline and risk to US competitiveness.

### Don't Forget the Suburbs

Perhaps the most surprising visit of the mission was to the National Center for Suburban Studies at Hofstra University. Our tour of the suburbs of Long Island revealed just how stifling multiple institutions and governance structures can be for effectively functioning urban or suburban areas. The principle of Home Rule, whereby cities, municipalities, and/or counties have the ability to pass laws to govern themselves as they see fit, effectively means that decisions are made at the lowest possible level. This has led to decisions being focussed on the needs of the individuals and the elected officials, with layers of bureaucracy crippling the decision making process. This is physically manifested in gated communities and roads that are blocked off due to resident complaints, whilst a nearby road is completely congested. The Center for Suburban Studies shed an interesting light on the urban hinterlands surrounding our cities. As the places upon which the cities depend for workers and economic connectivity, the need to engage them with the future cities debate is critical.

### Key questions for UK cities to consider:

- How is your city working with complexity?
- Does your city act as a facilitator and enabler?
- What role does your city play in the wider context?

### Learning from the Energy Sector

ComEd and S&C Electric in Chicago made the business case for smart grid technology not simply by measuring the cost of outages to the supplier, but also by factoring in the costs to the economy of power outages. The US has significantly more power outages and therefore has a power interruption cost calculator. The case was made by demonstrating the savings associated with reduced impact on businesses and business operations. Ultimately this was what appealed to the state senate as the cost of power outages was an issue they could readily relate to. Crucially this buy-in and demonstration of the wider benefits enabled S&C to make investment decisions based on capital and operational costs.

### Boston Federal Reserve

Research funded by the Federal Reserve Bank in Boston found that only eight out of a peer group of 26 small cities have been able to maintain or recover much of their economic performance after various economic shifts and shocks. Those that had been successful had collaborative leadership, strong anchor institutions, investment in infrastructure and extension of benefits to the community as a whole. Collaborative leadership, the ability to work together across sectors over a sustained period with a comprehensive vision, was seen as most critical. This led to the establishment of the Working Cities Challenge which supports leaders who are reaching out across sectors to ensure that smaller cities in Massachusetts are places of opportunity and prosperity for all their residents.



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

**Innovation means  
implementation**

Appendix 1  
Background to the  
Mission

Appendix 2  
Delegates/Organisers

Appendix 3  
Mission Agenda

References

## Innovation means implementation

### Lessons for the UK

Scaling innovation and new ways of working is a huge challenge. We saw many interesting projects and prototypes that had shown benefits, but were stuck at the demonstration stage. It is clearly difficult to take something from proof of principle to full scale deployment. Financing, capability, decision-making and governance structures all conspire to make it hard to embed these new solutions fully into the operations of the city. Many potential solutions die at this point. More thought needs to be given to what happens after the demonstration phase is over. Observations

The economics of open data and data analytics are still difficult to prove. The ground level initiatives such as hack nights were developing applications which have potential, but where there is no clear route to embed them in city operations. They appear nascent and lacking in longevity. These emergent approaches seem effective for testing the concepts around the release and use of data, but how these will be turned into commercial solutions is unclear.

The view that ‘what works in another city may not be relevant to our city’ is a strong in many city departments, and with elected representatives. For researchers, data from other cities is not a problem, however for city departments there is a clear need for internal evidence and case studies that come from cities that are as similar as possible.

As more cities start investing in data platforms the cost of development is coming down, making the widespread collection and analysis of data more accessible for more cities. However, there is clearly a ‘not invented here’ or ‘not applicable here’ barrier that needs to be overcome. National organisations have a role to play in helping cities understand the relevance and transferability of initiatives developed elsewhere.

### Key questions for UK cities to consider:

- What are your city’s processes for mainstreaming innovation?
- How do you learn from failure?



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

Innovation means  
implementation**Appendix 1  
Background to the  
Mission**Appendix 2  
Delegates/OrganisersAppendix 3  
Mission Agenda

References

## Appendix 1 Background to the Mission

A group of 14 delegates from the UK visited Chicago, San Francisco, and New York, from 29 January – 7 February 2014, for a series of meetings and visits around the theme of future cities. The delegation was comprised of senior representatives from academia, industry, and local government, and the project was co-organised by the US Science & Innovation Network (SIN), Innovate UK, the Knowledge Transfer Network and the Building Research Establishment (BRE).

The mission included visits, workshops and debates with a wide range of future cities stakeholders including universities, businesses and city authorities. The sessions covered a range of topics including urban regeneration, energy and smart grids, intelligent infrastructure, transportation, resilience, citizen engagement, and Big Data.

Throughout the mission the delegates were able to increase their understanding of the future cities initiatives being implemented in the US and the challenges and opportunities being faced by their US counterparts. As the visit progressed the UK delegation gained confidence that in many areas the UK is leading the field with a joined up strategy and innovative project implementation.

Many US participants in the meetings were unaware of the scope of UK initiatives in this area, and were impressed by the innovative approaches being taken, and results being achieved, often at with significantly less capital outlay than for comparable projects in the US. The project was successful in raising the profile of the UK as a global innovator in the eyes of key US stakeholders.

This report represents the key learning outcomes from the mission. The intelligence gathered will be used to inform the Innovate UK's Future Cities strategy and to further strengthen collaboration and knowledge exchange between the UK and US.



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

Innovation means  
implementationAppendix 1  
Background to the  
Mission**Appendix 2  
Delegates/  
Organisers/**Appendix 3  
Mission Agenda

References

## Appendix 2 Delegates/Organisers

### Delegates

Chris Murray, Director, Core Cities Group	Chris took up post as Director of the Core Cities Group in 2006. Core Cities Group is a collaboration between the eight largest cities in England outside London, focused on increasing their economic competitiveness, reforming public services and working with Government to negotiate the devolution of power and resource to drive this agenda.  Member cities work in partnership to enhance economic performance and quality of life for citizens.
Ben Plowden, Transport for London	Ben is currently Director of Surface Strategy and Planning, Surface Transport at TfL, a position he has held since 2011. Ben's responsibilities include providing the overall strategic direction for Surface Transport and delivery of cycling, walking, public realm, road safety, freight, bus priority and Travel Demand Management.
Stephen Hilton, Corporate Consultation and eParticipation Manager, Bristol City Council	Bristol is the 10th largest city in the UK, with a population of approximately 1.1 million. Stephen leads the Connecting Bristol programme, which aims to position the city as a leader in digital innovation.
Colin Birchenall, Glasgow City Council	Glasgow is the largest city in Scotland and the fourth largest in the UK. In January 2013 Glasgow was awarded £24m to host the TSB's Future Cities Demonstrator project.
Stephanie Glendinning, Professor of Civil Engineering, Newcastle University	Stephanie is an expert in environmental geotechnics, and is pioneering the Living Laboratory initiative for technology demonstration and development.
Richard Miller, Head of Sustainability, Innovate UK	As Head of Sustainability, Richard oversees a broad portfolio of Innovate UK projects including those relating to future cities, and is responsible for allocating £25m of the organisation's £300m budget.
Richard Bellingham, Director of Future Cities, University of Strathclyde	Richard is the Director for the new Institute for Future Cities at the University of Strathclyde which will create a focus and strategy to coordinate academic research on urban themes, and partnerships with cities, business, and government.
Judith Sykes, Useful Simple Projects	A Director of Useful Simple Projects, Judith works with major infrastructure and urban development projects to drive innovation and sustainable development.
Simon Cross, BRE	Simon is Director of Building Futures Group at BRE.
Kathryn Vowles, Balfour Beatty	Kathryn is a member of the 20,000 person Support Services division at Balfour Beatty, and is responsible for driving the company's work to find smarter, more innovative solutions for clients.
Tim Stonor, Space Syntax Representing Government Office for Science	Tim is an architect and urban planner who has devoted his career to the analysis and design of human behaviour patterns – the ways in which people move, interact and transact in buildings and urban places.
Lee Woodcock, Atkins Global	Lee Woodcock is the Technology Director for Atkins and has over 20 years experience in highways and transportation in both public and private sectors, providing advisory, design and operational services.
Dan Hill & Scott Cain, Future Cities Catapult	Dan Hill is Executive Director of Futures & Best Practice at the UK's Future Cities Catapult, a world-leading urban innovation centre. Scott Cain is Executive Director of Strategy, Business Development and Communications for the Future Cities Catapult.

### Organisers

Alison Nicholl  
BRE Innovation Network Manager,  
BREChris Knowland  
Head of Science & Innovation,  
British Consulate General San  
FranciscoJack Westwood  
Vice Consul,  
Science & Innovation,  
British Consulate General ChicagoBradley Keelor  
Senior Science & Innovation Policy  
Advisor,  
British Embassy Washington D.C.Rebecca Leshan  
Senior Officer,  
Science & Innovation,  
British Consulate General Boston

Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

Innovation means  
implementation

Appendix 1  
Background to the  
Mission

Appendix 2  
Delegates/Organisers

**Appendix 3  
Mission Agenda**

References

## Appendix 3 Mission Agenda

### Chicago 30 January

Modelling & Data Analytics for City Design Workshop, University of Chicago Computation Institute and Argonne National Laboratory

#### Themes

- Bloomberg Mayor's Challenge
- Data Science for Social Good Programme
- City Instruments for Measurement & Data Capture

#### Participants

- Charlie Catlett, Urban Center for Computation and Data
- Tom Schenk, City of Chicago
- Derek Edr, DataMade
- Rick Stevens, Argonne National Laboratories

Visit to the Chicago Lakeside Development – hosted by McAffery Interests<sup>[16]</sup>

#### Themes

- Sustainable Urban Design

#### Participants

- Her Majesty's Consul General, Stephen Bridges
- Ed Woodbury, President of McCaffery Interests
- Doug Voigt, Skidmore Owings and Merrill

Visit to Chicago Architectural Foundation<sup>[17]</sup>

### Chicago 31 January

Smart Energy Systems Workshop, hosted by S&C Electric and ComEd

#### Themes

- Smart Grid Technologies
- DemandSide Management
- Citizen and consumer behaviour

#### Participants

- John Estey, CEO S&C Electric
- Joe Svachula, Vice President, Smart Grid & Technology, ComEd
- Dr Leah Guzowski, Argonne National Lab
- Scott Bernstein, Centre for Neighbourhood Technologies

<sup>[18][19]</sup>

Urban Regeneration Workshop

#### Themes

- Sustainable Urbanisation
- Post Industrial urban regeneration

#### Participants

- Richard Longworth, Senior Fellow, Chicago Council on Global Affairs
- Michael Berkshire, Sustainable Development Division, City of Chicago
- Matt Howard, Sustainability Director, City of Milwaukee
- Joseph Van Dyck, Director of Redevelopment, City of Gary Indiana
- Prof Ned Hill, Dean, Maxine Goodman Levine College of Urban Affairs, Cleveland State University
- Prof Hal Wolman, Director, The George Washington Institute for Public Policy, George Washington University<sup>[20][21]</sup>



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

Innovation means  
implementation

Appendix 1  
Background to the  
Mission

Appendix 2  
Delegates/Organisers

**Appendix 3  
Mission Agenda**

References

## San Francisco 2 February

Seminar Cities Data & Citizens, PG&E Pacific Energy Centre The Future of Urban Transportation<sup>[15]</sup>

### Themes

- Transport Infrastructure
- Traffic Forecasting
- Active Traffic Management
- Electric Vehicles
- Autonomous Vehicles

### Participants

- Gustavo Collantes, Assistant Director, Policy Institute for Energy, Environment
- Ralph Menzano, Executive Director – Global Transportation Industry, Oracle
- Justin Bean, Sr Marketing Manager, US & EMEA, Streetline Inc.

### Citizen Engagement

#### Themes

- Approaches to Engagement
- Putting findings into practice
- Use of data
- Nontechnical barriers to implementation
- Case studies

#### Participants

- MJ Petroni, Principal, Causeit, Inc.
- Gordon Feller, Director, Urban Innovations, Cisco Systems
- Jonathan Fink, Vice President for Research and Strategic Partnerships, Portland State University

### Energy & Smart Grids

#### Themes

- Smart grids
- Smart meter implementation
- Consumer behaviour
- Electric vehicles and the grid
- The role of Big Data

#### Participants

- Samir Menon, Head, Eco Sustainability Services, Americas, Tata Steel
- Russ Vanos, SVP Strategy & Corporate Development, Itron
- Ulric Kwan, Electric Vehicle Team Lead, Pacific Gas & Electric Corporation

### Urban Data

#### Themes

- Data acquisition
- Smart infrastructure
- Data access and management
- Moving from data to action
- The data/information marketplace

#### Participants

- Chris Allen Vein, Chief Information Officer for Global ICT Development, World Bank
- Ronald C. Cohen, Director, Berkeley Atmospheric Science Center, University of California, Berkeley
- Jon Walton, Chief Information Officer, San Mateo County
- Steven C Tiell, Technology Vision, Accenture Technology Labs



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

Innovation means  
implementation

Appendix 1  
Background to the  
Mission

Appendix 2  
Delegates/Organisers

**Appendix 3  
Mission Agenda**

References

## San Francisco 3 February

Visit to CITRIS – Center for Information Technology Research in the Interest of Science (UC Berkeley)

### Themes

- CITRIS Invention Lab
- The Foundry
- Data & Democracy Initiative
- Healthcare Initiative

### Participants

- Eric Paulos, CoDirector, CITRIS Invention Lab and Professor, Electrical Engineering, Computer Science
- Peter Minor, CoFounder of the Foundry and CITRIS Research and Development Manager
- Camille Crittenden, Deputy Director, CITRIS
- David Lindeman, Director of Healthcare, CITRIS

City Hall Roundtable,  
San Francisco City Hall

### Participants

- Paul Chasan, Urban Planner/Urban Designer, Planning
- Jason Lally, Innovation Fellow, Mayor's Office of Civic Innovation
- Danielle Murray, Renewable Energy Program Manager, Department of

### Environment

- Chris Pangilinan, Associate Engineer, Municipal Transportation Agency
- Shannon Spanhake, Deputy Chief Innovation Officer, Mayor's Office of Civic Innovation

Reception in conjunction with the British American Business Council

### Themes

- The market for integrated urban management
- Barriers to be overcome in order to realise the market
- Critical success factors for market participants

### Participants

- Priya Guha, HM Consul General to San Francisco
- Colin Brown, VP West Coast US
- Gordon Feller, Director, Urban Innovations, Cisco Systems
- Rob Massoudi, Vice President, Business Development and Strategic Partnerships, SpaceTime Insight
- Richard Pope, Development Director, Sonoma Mountain Village



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

Innovation means  
implementation

Appendix 1  
Background to the  
Mission

Appendix 2  
Delegates/Organisers

**Appendix 3  
Mission Agenda**

References

## New York, 5th February 2014

### Remaking Cities, Epstein Baker Green

#### Themes

- What are the significant changes to approach/focus in modern urban planning?
- What is the potential or actual economic impact of regeneration? How is this quantified?
- What sustainability standard are in place?
- How are citizens engaged in remaking process?
- What are the sources of financing? What are the revenue-raising powers of cities?
- What is the extent of integrated management between government, academia and private sector?

#### Participants

- Professor Eugenie Birch, Lawrence C. Nussdorf Chair of Urban Research and Education at the University of Pennsylvania
- Professor Don Carter, David Lewis Director of Urban Design and Regional Engagement of the Remaking Cities Institute at Carnegie Mellon University
- Prabal Chakrabati, Vice President, Community Development, Regional and Community Outreach at the Federal Reserve Bank of Boston
- Professor Nestor Davidson, Director Fordham Urban Law Center
- Peter Miscovich, Managing Director, Corporate Solutions at Jones Lang LaSalle
- Steven Pedigo, Director of Research for the Creative Glass Group

### Information Technology & Data in Integrated City Management

#### Themes

- How is information technology/data unlocking economic benefit? How is this quantified?
- How is government interacting with academia and the private sector in analytics and IT Initiatives?
- How do IT/data initiatives impact citizen quality of life?
- What are examples/case studies of IT/data initiatives/programmes

#### Participants

- Mark Headd, Chief Data Officer, City of Philadelphia
- Heather Hudson, Chief Data Officer, City of Baltimore
- Debra Lam, Chief of Innovation & Performance, City of Pittsburgh
- Sabina Sitaru, Chief Information Officer, City of Hartford, Connecticut
- Seth Wainer, Senior Technology Policy Advisor to the Mayor of Cory Booker, City of Newark, New Jersey
- Chris Tonjes, Chief Technology Officer, City of Baltimore

### Intelligent Transport

#### Themes

- How are transport systems making cities more prosperous?
- Is sustainability a driving force for upgrades?
- What is the impact of/benefit to citizens?
- How is transportation changing with movement of people (living in city centres v. commuting)?
- Where are the research gaps?
- What are the economic arguments for investing in transportation?
- Where is the supply chain? Financing?

#### Participants

- Matthew Burt, Technology Policy Analyst, US Department of Transportation's Volpe Center
- David Giles, Director, Centre for Urban Futures
- Dr Qing He, Stephen Still Assistant Professor, University of Buffalo
- Dr Nicholas Lownes, Castleman Associate Professor, University of Connecticut
- Dr Ali Maher, Director, Center for Advanced Infrastructure and Transportation, Rutgers University
- Dr Martin Pietrucha, Director of the Thomas D Larson Pennsylvania Transportation Institute at Penn State University
- Dr Camille Kamga, Director, University Transportation Research Center, City College of New York



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

Innovation means  
implementation

Appendix 1  
Background to the  
Mission

Appendix 2  
Delegates/Organisers

**Appendix 3  
Mission Agenda**

References

## Regional Showcase, New York Institute of Technology

### Debate Participants

- Dr Richard Miller, Head of Sustainability, Technology Strategy Board
- Robert Prieto, Senior Vice President, Fluor Corporation
- Carter Strickland, Commissioner of the New York City Department of Environmental Protection

### Exhibitors

- Azavea
- Dewberry
- Off Track Planet
- Roadify
- SeeClickFix
- Sefaira
- Volpe
- Seamless Docs

## New York, 6th February 2014

### CUSP – New York University’s Centre for Science & Progress

#### Themes

- Roles of government, academia and private sector
- Identified and potential supply chain and financing sources
- Areas of UK and US expertise

#### Participants

- Dr Mike Holland, Chief of Staff, CUSP
- Dr Aristides Patrinos, Deputy Director of Research, CUSP

### Suburbs, National Center for Suburban Studies, Hofstra University, Hempstead, NY

#### Themes

- What are the disparities in household income between city centers and suburbs? Are these targets for change?
- What are the effects of job sprawl/housing supply?
- How are businesses shaping education/skills agenda?
- What are the revenue raising powers of suburbs and cities?
- Site visits

#### Participants

- Lawrence Levy, Executive Dean, National Center for Suburban Studies, Hofstra University
- Dr Christopher Niedt, Academic Director, National Center for Suburban Studies, Hofstra University
- June Williamson, Associate Professor for Architecture at City College of New York



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

Innovation means  
implementation

Appendix 1  
Background to the  
Mission

Appendix 2  
Delegates/Organisers

**Appendix 3  
Mission Agenda**

References

## Resilience, National Grid Headquarters

### Themes

- What are examples where lack of resilience has led to economic impact?
- How was this quantified?
- What is the level of emergency/disaster awareness among communities?
- How is public awareness/engagement coordinated?
- What is the involvement of the business communities in preparedness/response to disaster?
- How is the opening of finances handled to enable opportunity, change, preparedness?
- What is the supply chain?
- What are the research focuses, where are the research gaps?
- How does resilience enable sustainability?

### Participants

- Thomas Abdallah, Chief Environmental Engineer, Capital Program Management Department, MTA New York City Transit
- Dr David Abramson, Deputy Director and Director of Research, National Center for Disaster Preparedness and Assistant Professor, Sociomedical Sciences, Columbia University
- Gene Buerkle, US Director of Business Resilience and Continuity, National Grid
- Jennifer Cribbs, Lead Sustainability Officer, Region II (New York/New Jersey) US Department of Housing and Urban Development
- Kathleen Fox, Deputy Assistant, National Preparedness for the Federal Emergency Management Agency
- Michael House, Department Manager for Infrastructure Security and Resiliency, URS Group
- Ileana Ivanciu, Vice President for Environmental Services, Dewberry Engineering
- Dr Irwin Redlener, Director, National Center for Disaster Preparedness at the Earth Institute and Professor of Health Policy and Management at Columbia University Medical Center
- Josh Sawislak, Senior Advisor to the Secretary for Infrastructure Resilience, US Department of Housing and Urban Development
- Dr Joseph Trainor, Disaster Recovery Center and Assistant Professor of Public Policy and Administration, University of Delaware
- Rebecca Weiner, Director of Intelligence Analysis, New York Police Department

- Dr Rae Zimmerman, Director, Institute for Civil Infrastructure Systems, Professor of Public Administration at New York University's Robert F Wagner Graduate School of Public Service.
- Rabi Kieber, US Environmental Protection Agency
- Inga Thiessen, NYC Office of Emergency Management



Executive Summary

Open Your City Data

Work with your  
Educational  
Establishments

Nurture Enterprise

Cities as Innovators

Think Long Term

Take a Systems View

Provide clarity to enable  
collaboration

Build Trust

Recognise Complexity

Innovation means  
implementation

Appendix 1  
Background to the  
Mission

Appendix 2  
Delegates/Organisers

Appendix 3  
Mission Agenda

## References

## References

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- [21] City of Gary Redevelopment Department: [www.gary.in.us/redevelopment/default.asp](http://www.gary.in.us/redevelopment/default.asp)

