PRESENTED TO

CITY OF PITTSBURGH, OFFICE OF MANAGEMENT & BUDGET

4/10/2017

RESPONSE TO REQUEST FOR INFORMATION

SMART STREETLIGHTS – RFI NO. 2017-0001

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Summary

TEN Connected Solutions (TEN), a Pittsburgh-based company, is pleased to present our response to the **City of Pittsburgh's Request for Information for Smart Streetlights (RFI No. 2017-0001**).

TEN Connected Solutions is a next-generation street lighting and smart city solutions development and integration company that is revolutionizing the way Municipalities across the state and now the country achieve energy efficiency goals and position themselves for a smarter future through the adoption of technology. We combine cutting-edge automated technologies with industry expertise to remove excessive costs and complexities from project development, engineering, finance and installation of the solutions. Our team of leading technology, financial and construction industry professionals provides comprehensive solutions on an accelerated timeline so our City customers can start to reap the benefits sooner than with traditional approaches.

We have actively developed solutions for more than 300,000 street lights across the United States. Most recently, TEN was selected in February, 2017 to convert the City of Portland, Maine's street lighting system to LED complete with a lighting control system and to install public-access Wi-Fi throughout the City in partnership with a local internet service provider (ISP). Our proven approach has helped cities save millions of dollars annually on utility bills while dramatically reducing energy and maintenance costs and creating new revenue streams through the deployment of smart city technologies.

TEN Connected Solutions is a wholly-owned subsidiary of The Efficiency Network, Inc. ("TEN") and is the dedicated team at TEN delivering street lighting and smart city solutions. TEN Connected Solutions is headquartered in Pittsburgh with offices in Philadelphia, Boston, Maine, and Baltimore/Washington DC regions.

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The intent of our response is to highlight our **technology integration expertise** and to show why TEN is the best choice to help the City of Pittsburgh complete their visionary street lighting and smart cities project. TEN shares this vision and is one of the nation's industry-leading companies helping 21st Century cities implement groundbreaking LED street lighting conversions and smart cities' technology integration solutions. TEN's street lighting and smart cities' solutions deliver lower costs, better lights, safer streets, greater public services, and brighter, more beautiful neighborhoods.

As a technology-focused yet neutral company, TEN's approach is to vet all available technologies and present the best and most applicable options to the City of Pittsburgh leadership. In addition to bringing creative ideas, proven technologies, and substantial expertise and experience, TEN's proposal highlights the creation of a "smart ecosystem" to enhance technology infrastructure to prepare Pittsburgh for the future.

TEN will bring several robust technology offerings to the City, including technology giants like Cisco, Hitachi, Comcast, and many others, to address Pittsburgh's desire for better traffic management, public safety, air quality, and shared capacity. [For example, Cisco, a current TEN partner, offers a Connected Digital Platform (CDP) capable of allowing the City to create innovative models to reduce outlay and risk when initiating and expanding smart city projects.]

In this response, TEN will present ideas to address the following capabilities:

• Utilization of the City's Existing Assets	• Inclusion of Smart City Applications	• Deployment of Traffic Management Systems	• Revenue Generation Opportunities
• Public Safety Technology	• Air Quality Sensors	• Shared Capacity	• Smart Street Lighting

TEN has the expertise, experience, and national network of partners in place to deliver a world-class smart street lighting project to Pittsburgh.

Thank you for the opportunity to submit this RFI response and we look forward to an opportunity to work with the City.

Robert G. Campbell, President

A. Project Overview

TEN has been a first mover nationally, helping cities of various sizes upgrade to smart street lighting systems. The team at TEN has done everything from asset inventory auditing, to final street lighting design and installation, including facilitating the purchase of all materials and equipment - ensuring that all ideas are communicated with installation sub-contractors so that our customers receive the absolute best prices in the marketplace. For the City of Pittsburgh, TEN recommends converting the approximately 39,799 streetlights to LED, resulting in energy savings of 60-80% annually and maintenance savings of upwards of 90% annually. Beyond the savings, updated streetlights can offer a ready-made physical communications platform for sensors, controls, and backhaul that power a Smart Pittsburgh and pave the way for many more "Smart City" initiatives over the next decade, transforming Pittsburgh into the exemplar for other initiatives across the country.

TEN has established substantial (and diplomatic) manufacturer and smart city-centric technology company relationships resulting in TEN's ability to analyze and then to deliver to our customers the highest quality of commercialized street lighting and smart city technologies, at the lowest possible cost, and with maximum revenue generation.

Approach

TEN proposes to convert the Pittsburgh street lighting system to LED lighting with wireless controls, and then to strategically leverage available energy and operational savings to invest in other smart cities infrastructure.

Benefits of LED Lighting Upgrade	
Reduced Maintenance	**Save Energy**
• Fewer lights to replace and dispose of due to longer life, lack of parts to replace / significantly reduced maintenance • Consistency of warranties and equipment • Less associated lane closures	• High System Efficacy • Less site wattage • Controllable and dimmable
Improved Optical Control	**Improve Visibility**
• Reduce direct and reflected uplight • Less light trespass with reduced shielding • Reduce wasted light and light pollution	• Better color rendering • More uniform lighting distributions • Eliminate dark areas between poles
Increased Safety	**Increase Environmental Care**
• Reduced fixture outage liability concerns • Broader spectrum lighting	• Reduce hazardous waste • Reduce energy consumption

Phased Approach: Phase I - Guaranteed Energy Savings Performance Contract Under PA GESA

TEN recommends that the City consider a phased approach to install the LED street lighting and smart city technology integration services utilizing the enabling legislation known as the Pennsylvania Guaranteed Energy Savings Act ("GESA", Act 39) which allows for future **guaranteed** energy and maintenance savings to be leveraged to support the installation of street lighting upgrades and the deployment of smart city infrastructure, including revenue generation infrastructure, to benefit the City, and its residents and businesses. The savings can pay for as many upgrades as the savings will allow.

TEN's Partners:

TEN is vendor neutral, and analyzes, designs, and installs technologies in the best interest of each of its city customers. However, for the purposes of this response, TEN spent some time to establish preliminary partnerships with several internationally recognized vendors to support our contention that TEN will deliver the best and most comprehensive solutions to the City. TEN has discussed this initiative, in detail, with the following TEN Partners:

TEN's approach of picking the best vendors and technologies for the individual components and integrating them into an open platform is distinctly better than having vertically integrated solutions from individual vendors who may only have the best technology for a single component (e.g. the LED lighting control) and not the others (e.g. the communication network, or modularity to support other smart city sensors, etc).

Smart LED Street Lighting

TEN appreciates the desire to upgrade street lighting throughout the City to achieve the maximum benefits of LED technology while also maintaining a high level of value using quality products and careful installation. TEN's unique approach to street lighting solutions will aid Pittsburgh in methodically moving through a process culminating in the City determining the best lighting technologies to meet their needs. This is the same process of collaboration TEN has completed for each of its' municipal clients – with extremely successful results.

On a weekly basis, TEN is working with the worlds' leading exterior LED streetlight manufacturers and distributors, and incorporating a variety of LED technologies into our projects. This has put TEN in a unique position allowing TEN to be an early evaluator of these technologies, and to come to conclusions regarding the efficiency, design, light output, quality, characteristics and other functionality and characteristics of the worlds' leading brands.

Simply put, TEN is one of only a handful of companies nationwide that has installed LED streetlights and intelligent wireless controls manufactured by several different technology providers, carefully selected by and for our customers. Because of TEN's turn-key role on numerous projects, including the direct purchase of millions of dollars of street lighting and related lighting materials from the likes of, Eaton/Cooper, GE, Leotek, Holophane, Philips American Electric, and Cree, TEN has established and maintained substantial, and diplomatic, manufacturer relationships resulting in our ability to analyze and deliver to our customers the highest quality LED street lighting and smart city technologies, at the absolute lowest price.

Smart Lighting Controls

Installing advanced wireless controls enables the City of Pittsburgh to have more control over new LED street lights, increased overall luminaire lamp life, dimming capabilities (where applicable) for increased electric energy savings, and significantly reduced operational costs associated with the street lighting system.

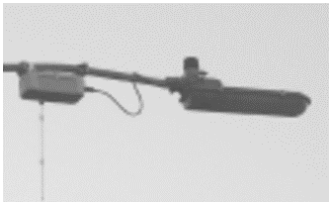
When the full life-cycle of an advanced wireless controls system is considered, the technology (with the 7-pin NEMA connector) has been found to provide more control for the street lighting system, to "future-proof" the streetlight, and to enable additional technologies to be integrated at-a-later date. Any TEN recommended and/or installed control system will have open Application Program Interfaces (APIs) that will allow the city to ensure functionality and expand the system in the future. TEN has significant experience working with all of the major manufacturers – most notably CIMCON, Telensa, Echelon, and CityTouch. TEN has had particularly good success most recently with both Cimcon and Telensa, both having central management systems turning any brand of LED streetlight into an extensible, "future-proofed" platform capable of additional modified functionality and potential for greater energy savings as tariffs change in the future.

TEN's Approach to Creating a Streetlight based Smart City Platform

1. Modular Power Supply: We believe the best approach towards addressing the immediate need of upgrading the LED streetlights, as well as taking into account the longer-term goal of the City to use this opportunity to create an extensible street light centric Smart City platform, is to provide a power extender module (illustrated below) that interfaces in between the LED fixture itself and the controller from one of the above control vendors. This power extender module then will enable the addition of one (or more) smart city devices on the light poles or mast arm, and thereby tap into the 120V (or 240V) power. Ideally,

Continuous Auxilliary Power

this external power consumption of any device plugged into this extender will be measured using a plug level energy meter for billing purposes. This design is future-proof, since it will enable any additional systems to be mounted on the light poles. These individual deployments can be customized to the changing needs of the City or specific neighborhoods. For example, a ShotSpotter system can first be installed in areas with higher crime rate while systems for helping find parking spots can be installed in the downtown area.



2. Networking / Backhaul: A key requirement is to be able to get different kinds of data from the light poles, and onto the public internet (and vice versa). A network is required for the LED streetlights themselves to be controllable remotely, and will be even more essential as new services are added by additional sensors and boxes on top of each light pole throughout the city. While it is feasible for each service (e.g. ShotSpotter, LED light network and central management system) to have its own network, this will likely become untenable and lead to wasted resources. Instead, a better option might be to be able to share network connectivity options between services and boxes. At the very least, we imagine needing a long-range communication protocol like the emerging LoRAWAN standard, that provides connectivity up to several miles, although the data rates offered are in several kilo-bits/sec. For services like lighting control, LoRAWAN will be sufficient. However, for emerging smart city applications like video analytics, streaming sensor data at high rates, or even supporting city scale Wi-Fi, we need to look at different technologies. The two feasible options for creating a city-wide network is to either to partner with a cellular network provider (e.g. AT&T, T-Mobile or Verizon) or with fixed line operators like Comcast or Verizon FiOS. Since providing network connectivity at every light pole is most likely cost prohibitive, we believe a hybrid approach is more feasible. Under this approach, each light pole can be instrumented with directional Wi-Fi antennae to the adjacent poles, forming a mesh network between then. Then, at regular distances, such as every 5th or 10th light pole, we suggest adding a gateway box with either cellular or fixed (cable or fiber) uplinks to the Internet. The cost and the feasibility of each of these options needs to be further evaluated.

3. City Scale Wi-Fi / Small Cell Network: Depending on the availability of bandwidth on each light pole, we can envision the city providing **a city scale public Wi-Fi service** to its residents. The technical challenges in doing so range from authenticating users, tracking their usage, determining a long-term revenue model (e.g. advertisement supported, free, nominally paid?) and managing coverage, availability, and security. Adding public Wi-Fi Access Points to each light pole is not particularly hard given that power will be available (1 above), but the main requirement is to have robust backhaul connectivity to the Internet on each pole (described above) with enough bandwidth to support modern Internet services like video. Public Wi-Fi is promising for underserved and impoverished areas to help citizens who may not otherwise have easy, affordable access to the internet. While building city-scale Wi-Fi networks using mesh network technology has been attempted in the past (Google, Mountain View CA), most of those experiments did not take off due to slow speeds, reliability, and competition from the local ISPs. Even in the case of Pittsburgh, public Wi-Fi would only be feasible if the ISPs providing the network backhaul to the city allow it to happen given that it may affect their revenue directly if citizens use the public Wi-Fi and not purchase internet services from the ISP.

Alternatively, the street lights also provide an opportunity to deploy **a city scale cellular infrastructure** with much higher levels of service than those that we have currently. Femto-cells are a recent technology which allows small cellular base station antenna's to be placed inside buildings and homes, to provide localized cellular connectivity. Usually these femto cells are connected to hard wired, high bandwidth, lines to the Internet and provide coverage for 100s of yards at the most, while regular cellular base stations cover multiple miles. An advantage of femto cells is that they can leverage the same frequency bands since the "cells" don't overlap as much, thus improving overall spectrum usage -- also called "spatial reuse". Under this vision, each light pole or a subset thereof can be fitted with a femto cell increasing the coverage and the network speeds for smartphones, mobile devices and potentially autonomous vehicles in their vicinity. The underlying assumption for this to work is, of course, the availability of high bandwidth backhaul connectivity to the light poles themselves (2 above).

4. Creating a modular Smart City Virtual Appliance: To support new services and systems to each light pole in the future there are essentially two options. The first option is for each vendor to provide their own hardware and mount it on the pole, drawing only power from the city infrastructure (Point 1 above) and potentially leveraging the City's provided network (Point 2 above). Instead, we envision a second option to dramatically lower the barrier to test and add new services. Under this option, on a subset or all of the light poles, we could add a generic weather sealed computational node. This computational node would have a number of Input/Output ports such as USB and Analog-to-Digital interfaces to connect different forms of

physical sensors (e.g. temperature, humidity, sound) and interface a number of common sensors from the start (e.g. a camera, temperature, humidity, light, audio, CO_2 sensors, etc). In addition, this computational node can run standard Linux based software and utilize primitives like Virtualization and Containers that enable resources (compute, network, memory) to be compartmentalized and partitioned between different services. Our overall vision is that the city can then provide "virtual" smart city appliances to potential vendors, who can then either access the data from the sensors already provided or add USB or other analog sensors and run their services directly on a subset or all of the light poles. The city could then charge these vendors for using their light poles, and accessing both power and the network on them, providing an additional revenue source in the future. The advantage to prospective vendors is that they don't need to install hardware on each light pole in the city to showcase their system and provide services to our citizens.

5. Cyber Security: Connected platforms, including streetlights, need to be secure by design from potential attackers. TEN envisions that the data from each light pole always leaves encrypted with multiple layers of security. For example, there should be network level encryption keys that are managed by the network provider so that all data in transit is always encrypted. Furthermore, each service (e.g. the street lighting controls, ShotSpotter, etc.) should have their own encryption keys, using standard cryptographic primitives like symmetric key ciphers (AES 128/256bit keys), Asymmetric key ciphers (RSA) and Public Key Cryptography. Critically, proper authorization protocols (e.g. OAuth), ephemeral sessions keys derived from the master keys, should be used so that even if session keys are compromised the data can only be decrypted for a short time window, if at all. It is also critical that there are protocols for key revocation and updates in case they are compromised as provided. To determine and specify who has access to what operation, role based access control can be used with clearly defined hierarchies and user groups, and primitives to delegate access. For example, the City's Director of Innovation and Performance and CTO could potentially have complete access, who can then delegate access to setting up the schedules for the street lights to a particular list of people, while a different group of people can have access to update the billing systems or update the software on the street lights. Essentially, it is imperative that the City utilize and implement cyber security guidelines for connected infrastructure, and take precautions to make the City's network robust against both inadvertent misconfigurations as well as malicious attackers.

6. Data Privacy: Given a number of sensors installed on the light poles, and the services utilizing them, many of which have privacy implications, it is imperative that the City have a plan on how to address them. Potentially privacy invasive sensors include camera's, microphones, and even network packet traces in case the City plans to deploy a public Wi-Fi network. Most of the privacy threats come from being able to identify individuals and their actions, without their consent, and the long-term storage and usage of the data about those individuals. TEN proposes that the City carefully vet the services that are installed on the City's poles, carefully understanding what sort of sensor data is captured about users, and at what granularity, and establish a privacy framework around the data gathering and its use under what conditions. There has been prior research showing that often private data can be denatured and anonymized while still being useful, for example, blurring the license plate of cars and faces of humans, is still useful for a service that tracks traffic within the City or movement of people. It is likely that some form of notice and choice will also need to be provided to citizens if any of the smart city services capture data specifically about them that can identify them.

7. Open Data Formats, Open Data System, and Documented APIs:
It will be critical to the City's platform that data from all the sensors and smart boxes be methodically organized, named and described, so that they can be connected together and "mashup" services can be created to generate the most amount of value for the City. This careful consideration is necessary for future technology integration and usage, as well as the potential of having a technology integrator manage smart city applications across multiple City departments. So, for example, if vendor 1 installed a box to capture temperature, someone else could use that sensor stream with vendor's permission (or the City's permission). That most likely will require an open data platform, which can ingest all the data and provide connectivity or drivers to different systems. TEN suggests that the City could even mandate that any system that goes up must adhere to their interface and be interoperable.

For this project, TEN has consulted with open data platform expert **Yuvraj Agarwal, a CMU professor and TEN technology consultant** – to devise the best approach possible to prepare the City for the future. Professor Agarwal currently is co-leading the IoT Expedition out of CMU, (www.iotexpedition.org) where Professor Agarwal's team have already created and released an open source platform for managing sensor/actuator data from the Internet of Things. This platform could be adapted for

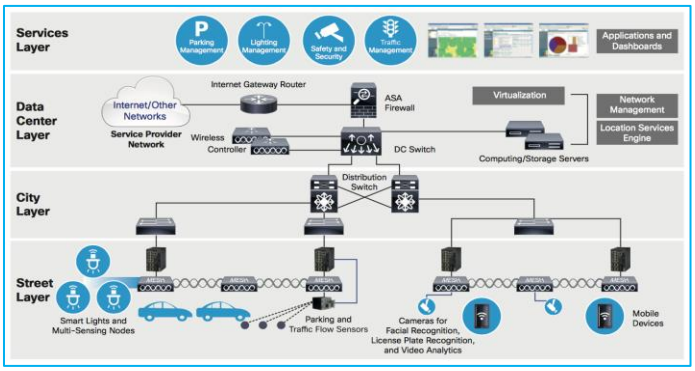
use by the City in collaboration with CMU. Its mission is to be extensible and integrated, security and privacy sensitive, end-user programmable, and widely deployable.

One of TEN's partners, Cisco, also offers a connected digital platform, delivering levels of customized functionality. Here are some of the highlights of the Cisco platform:

Combining Smart City Solutions Over Time, One Possibility

Cisco's Smart+Connected Digital Platform (CDP) solution

CDP offers a pay-as-you-go cloud-hosted service that delivers a set of tools and guidelines for creating a Smart City framework and managing an effective solutions portfolio for Pittsburgh's priorities, requirements, and budget. Cisco's CDP platform can effectively aggregate and analyze incoming data. It can provide correlated data as needed across domains, for example, it can correlate flow density, emissions, and lighting data from cameras and sensors that can be used by traffic and parking agencies and city planners.



With CDP, all technologies across all platforms can work together. CDP enables a marketplace for the development of global applications that can interoperate through secure Application Programming Interfaces (APIs). It also manages and coordinates APIs so that there is no need to change each one, only the CDP Dashboard. Cisco's CDP is more than a dashboard — all solutions within a Smart City have a dashboard. CDP can control and regulate each of them on the glass. In addition, CDP preserves the City's future choices—not locking you into just one vendor.

Digital Platform Dashboard

A typical Cisco DNA solution for cities consists of:

- Core infrastructure—switches, routers, and unified communications platforms
- Wi-Fi infrastructure—wireless access points and controllers
- Network management applications, such as Cisco Prime™ products
- Location services engine to deploy location-based mobile services.

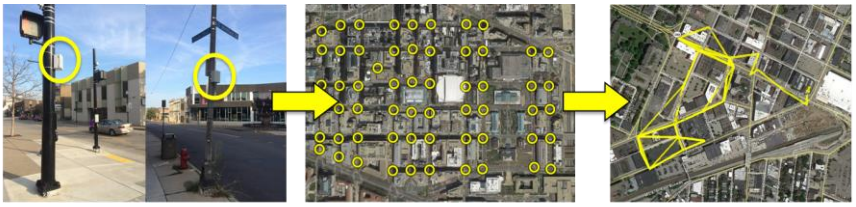
The solution also supports multiple use cases in the area of city infrastructure management, including:

- **Public Wi-Fi:** Citizens can access the Internet over their smartphones, tablets, and other computing devices when they are in public spaces and on the move—for example, to view maps, local business information, or educational content.

B. Suggested Business Model to Get Things Started - Building a Smart City … One Practical Step at a Time

TEN has significant experience completing street lighting and smart cities projects for cities under the energy performance contracting model suggested herein. TEN recommends that the City undertake a performance contract procurement for Street Lighting/Smart Lighting Solutions in accordance with the enabling legislation known as the Pennsylvania Guaranteed Energy Savings Act (the PA "GESA"). This approach allows the City of Pittsburgh to pay for all new LED streetlights (with controls) by leveraging future energy and operational savings. The City could issue a bond or enter into a tax-exempt lease purchase agreement with the best nationally available interest rates and terms, and the energy and operational savings will repay the project resulting in a budget neutral LED street lighting conversion of the City's streetlight system.

This is same business model TEN currently is executing for the City of Portland, Maine, to install smart streetlights, and public Wi-Fi throughout Portland leveraging current city assets and mast arm attachments in partnership with a local ISP. Unique in Portland, TEN is working with the Pittsburgh-based developer of Surtrac, Rapid Flow Technologies, to install the Rapid Flow Phaenon sensor technology to study cruising for parking (illustrated below). In Pittsburgh, if the City decides to expand the Surtrac deployment under the ATCMTD grant, TEN, by leveraging excess savings dollars from the streetlight system – or revenue generation dollars from the smart media system (see below) - can be used to fund solutions targeting the problem domain of Surtrac and similar systems.



Low-cost automatic vehicle identification (AVI) sensors

Dense, ubiquitous sensor network deployments

Reconstructed vehicle routes

With TEN's business model in mind, implementing elements of a smart city initiative will begin driving and fueling local economic growth. Together, these elements could translate into many other areas including attracting more businesses, citizen engagement, and continually expanding the connectedness of people, processes, data, and things in the City. By keeping that momentum moving forward, the City of Pittsburgh can remain a major engine of economic growth on every level.

C. Cost Savings and Revenue Generation Opportunity

In TEN's estimation, the annual savings from the street lighting conversion is expected to be around $2.1 million. The smart LED streetlighting would pay for itself in well under 8 years. Therefore, it is important to point out that if the City were to enter into a program term of 15 years, there would be approximately $16 million in excess cash flow from the program to pay for the integration and deployment of revenue generating (and other) technologies including smart media advertising facilities, city-wide Wi-Fi, and other smart city endeavors desired by the City – including expanding the Surtrac and ShotSpotter deployments, and other smart city infrastructure.

Project Economic Summary for the City of Pittsburgh – Order of Magnitude:

Estimated Project Cost	$15.7 million
Number of Fixtures Replaces:	39,799
Estimated Annual Electric Savings:	24,900,000 kWh
Payback (simple):	7.5 years
Estimated Annual Overbilling Savings:	$210,000 (approximately 7% of current utility spend)
Total Annual Savings:	$2,100,000
Excess Cash Flow:	$15.8 million
Revenue Generation from Smart Media	$8.7 million (for the first 5 years) (City share is 25% with ZERO investment)

Total Estimate of Additional Funds Available for Smart City Technology Deployments in the first 5 years:

$25 million

D. Operational Efficiencies

A Central Management System (CMS) smart node, instead of the traditional photocell on the streetlight, will allow the City to dim the lights for additional savings, troubleshoot for maintenance, and issue repair tickets for outages. These "onboard computers" control each light in a mesh (or star) network, giving the City the ability to remotely turn each light on/off. The controls node also can contain GPS X- and Y-coordinates for mapping and although they come standard with power usage reporting – can also be equipped with utility-grade metering to prepare the City for time of use billing in the future.

E. Public Safety

Visualization Platforms, like the one offered by Hitachi, and one TEN could consider for the City, is a set of distributed and modular services for interconnecting existing systems, modeling real-world physical objects, ingesting data, and performing analytics and workflow. Cities are increasingly using intelligent technology to connect public and private stakeholders with the goal of making cities smarter, safer and more sustainable. Real-time data can be connected and used to take smarter actions, that will play a key role in improving public safety, and making the City of Pittsburgh smarter.

As part of a Visualization Platform, the system aggregates data from isolated disparate systems and provides correlated, intelligent intelligent information in real-time for situational awareness in a single, dynamic, interface for anyone, anywhere at any time using any web-enabled device. One of the main features of some systems is Predictive Analytics and Evidence Management – the City can create and monitor heat maps and predictive policing via analytic modules.

A sample visualization platform (from Hitachi)

F. Digital Citizen Experience – Revenue Generation Opportunity

A smart media grid enables the City of Pittsburgh to become better connected with its residents and visitors. Some platforms use information kiosks to create a better connected community, where citizens can easily discover events, programs, deals and other relevant and important information as they walk down the street. The system also allows public safety and homeland security officials to not only see and assess emergency situations but also to broadcast alerts and provide mobile updates to residents in targeted locations.

Media Platforms also serve as a significant revenue generation opportunity. Advertisers can develop targeted content and pay premium fees to broadcast their individual content. This revenue opportunity can net up to millions of dollars for Pittsburgh to reduce the term of repayment of the streetlighting system conversion itself, or to pay for smart city technology infrastructure improvements, and public services.

TEN (along with its partner Smart City Media) has established preliminary cost estimates to deliver this service to Pittsburgh, and look forward to sharing our vision with the City through this process. Original estimates indicate that **a smart media platform could generate $8.7 million for Pittsburgh in the first 5 years without Pittsburgh having to invest any capital in the smart media project**. In 10 years, the smart media revenue realized is approximately $17 million.

Intellistreets, by Illuminating Concepts (another TEN partner) has the ability to generate revenue and provide public safety and homeland security officials with critical information. The system can also be used to broadcast audio messages to residents, serve as a mechanism to update residents on traffic closures, and use colors and lights to alert individuals to an emergency situation.

Electronic modules (EM) that may be embedded or attached to almost any form of structure or luminaire. The systems use wireless technology – not necessarily Wi-Fi (and therefore potentially less "hackable") – to communicate with individual luminaires. Using wireless eliminates the high construction costs of wiring, cabling, and conduit and allows for integration within virtually any modern architectural control system for synchronization of any feature within and around the system.

Finally, the system can be used for entertainment purposes and allow the City the use of radio broadcast from playlists while a wide range of additional sensors can be utilized for exciting pedestrian user interaction.

A sample media device (from Illuminating Concepts)