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Smart Cities Don’t Need to Wait

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The tools to help battle natural disasters are already here.

It's fitting to call the 2015 New England winter a "100-year white flood." That's because, unfortunately, the storms of 2015 remind us that cities are still using yesterday's solutions to deal with severe climate conditions.

Even as one of the United States' most technologically advanced regions, New England where I live, remains tethered to legacy approaches for helping its citizens contend with extremely challenging weather and the myriad problems it creates. The problem is the same – or worse – in other parts of the country.

More than 28 years ago, I invented the technology now known as the cable modem, a technological centerpiece of the broadband data networks that now serve a majority of our nation's population. I provided the intellectual property that underpins this technology for free, without license fees, to help extend the power of this 21st -century toolbox to everyone. Now, I believe it is critically important to further leverage the capabilities of the network to help communities improve the quality of life.

Elected officials everywhere should consider what happened in New England this winter and think about how they might take better advantage of technology that's available here and now. Across the region, cities missed out on opportunities to better serve citizens by taking full advantage of the possibilities of a digital, networked, real-time environment coupled with the pervasive reach of today's communications and information devices.

2015 – or 1915? In the winter of 2015, when New England experienced record snowfall,

- There was no up-to-date information about which roads were plowed, which walkways were safe to pass, which restaurants were open, when the next bus would arrive or where to safely wait for a bus – the bus stations were full of ice and snow.
- Transportation systems shut down because cities could react only to storms and snow piles.
- Critical information such as which health care resources were available was poorly dispersed.
- Retailers were unable to accommodate demand for food and provisions.
- Motorists were stranded or could not find parking.

None of this needed to happen. With support from government and a united effort among both public- and private-sector entities, New England could have set a new global standard of excellence for dealing with nature's challenges.

Opportunities for Network-Based Services

Here are just a few examples of how cities can use broadband networks in emergencies:

A comprehensive, centralized, mobile-based information resource: Combining real-time data inputs, crowd-sourced intelligence, dynamic mapping and Big Data analytics, a one-stop resource could offer current, accurate visual depictions of critical intelligence pertaining to:

- Which streets are plowed and accessible in real time. Intelligent sensors built into snowplow machinery can provide updates much faster than manually transcribed sources.
- Where parking is available. Live images from on-street cameras can accurately convey exact parking conditions at any moment.
- The locations of broken or fallen tree branches overhanging power lines. These hazards can be trimmed before the limbs fall and create massive power outages.
- Where dangerous potholes or road hazards exist (data could be collected in part from automobile sensor devices).
- Where food, pharmacy and other critical retail stores are located and when they are open.
- The best routes and available parking spaces for hospitals and health care facilities.
- Information about nearby, accessible open spaces for exercising and relieving pets.

Transportation 2.0: Making better use of available information systems and data contribution possibilities would allow cities to avoid having to react after the fact to storm-caused transportation upheaval. Some examples:

- Sensor devices mounted on public transit vehicles could provide real-time visual and sensory intelligence about track and path conditions.
- Trains outfitted with powerful climate control systems that heat and melt accumulated snow and ice in real time as they pass over tracks would avoid the need to play a constant game of catch-up with clogged tracks.
- Drainage systems outfitted with meters that sense the accumulation of ice packs can trigger heating response technology in advance.
- Crowd-sourced, real-time intelligence about the locations and conditions of dangerous walkways, icicles that pose physical threats and other vital intelligence could help citizens make better decisions about routes.
- Notification about the locations of garbage collection vehicles and their anticipated arrival time could allow people to avoid having garbage buried under snow because they brought it to the curb too soon.
- Sensors in parking meters [?] could inform people where parking is available, and a crowdsourced database [?] could provide the locations of potholes in streets.

Intelligence Distribution System: Data-infused techniques can improving the way cities transport and supply critical energy and weather-recovery supplies and tools. Examples include the following:

- Weather sensing and analytics data could better prepare retailers for inventory management of snow shovels, heating systems, clothing and other vital goods.
- Improved sharing and unified access to information systems across state boundaries and state agencies would better align our intelligence with actual storm patterns and geography.

- Intelligent mechanics and dynamic route mapping can speed delivery of heating oil through real-time analysis of the best routes and available parking and shipping destinations, similar to the manner in which the FAA manages air traffic. Cities should not be relying solely on the 19-century method of delivering heating oil via river transport!

Empowering Digital Citizens: Rather than insisting that citizens self-discover and monitor hundreds of separate information sources during massive environmental crises, cities could develop smart applications that consolidate and manage multiple data inputs The data might include:

- The exact level of snow and direction of winds at any specific location.
- Which roads are drivable and which parking is usable.
- Available nearby resources for snow removal, roof cleaning and essential home maintenance.
- Food delivery and volunteer relief organizations for the elderly and impaired, including an interactive system enabling each to discover the other.

RX for Climate Crisis: Information systems that speed and simplify access to critical health care resources and offer real-time intelligence about their conditions could save lives. Examples:

- Health condition monitoring at home through medical devices, with images and information sent to physicians – rather than sending physicians and patients to offices.
- Improved sharing of information regarding survival skills for severe weather conditions.
- Real-time intelligence about traffic and road conditions to help emergency technicians and patients travel during storms.

Labeling epic storms “100-year” events and surrendering to some notion of inevitability is irresponsible in an era in which we have access to tools that can sharply reduce strains caused by these events.

All these services would relieve the massive strain on the legacy 911 emergency services infrastructure. Using smart devices, employing automated sensors to capture information and drawing on the availability of experts and the public to supply information are critical components of the 21st-century digital toolbox.

My vision is to build and sustain, through public-private partnerships, mechanisms such as intelligent grid systems and applications that will enable cities to better deal with natural disasters. The public partners would identify the services necessary to its citizens during environmental disaster, and the private partners would help solve the problem and then scale that solution to a global market as a business. I propose three stages for this work:

- In the short term, today's technology and software experts could create smart, useful applications as the frontline for proactive communication and integrated services that make a difference to people’s lives in real time when they face environmental disaster.

- In the mid term, networks of digital sensors and networks of devices could be joined into a network of networksor “managed Internet of Things.” This phase will help create real-time, big-data analyses of events that may be used to save lives and prevent damage to property.
- In the long term, replacing aging transportation systems,
  particularly trains and subways, with state-of-the-art technology will be necessary, as will investing in industrial snow melters, which are now used at some major airports, and adding intelligence to power grids and other infrastructure. These measures, along with short term and mid-term solutions, form the Smart Cities of tomorrow in a step-by-step process.

These phased efforts would be accomplished smartly, working with real data delivered by sensor devices; dynamically, using Big Data as part of the instant analysis; and with the efficiency and effectiveness enabled by factual data that can be used to sort real issues from false alarms.

Mother Nature delivered a profound statement this winter about the need to better prepare and deal with climatic crises. We all need to heed this call and work together to bring the resources I’ve described to life. The next time a “100-year” storm arrives, cities should greet it with the tools of the current century, not the one that preceded it.

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