THE one BRIEF

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RISK & INNOVATION

What Can The Fire Of London Teach Us About Resilient Cities?

OVERVIEW

On Sunday September 2, 1666, a fire that began in a bakery on Pudding Lane, burnt much of London – what was then the largest city in the western world – to the ground. Out of the ashes rose a brand new city.

But the rebuilt London was only a fragment of the original plan outlined by Sir Christopher Wren (still one of the UK's most renowned architects). His full vision was an entirely redesigned city of wide boulevards and civic amenities, based on the gardens of Versailles in France intended to usher in a new era of municipal luxury and productivity. The broad roads that would replace the City of London's chaotic medieval street pattern would help prevent fires and disease spreading, while improving the flow of traffic and making the city run more efficiently.

Although Wren's full plan never came to fruition and disputes over land ownership meant London had to make do with the old street patterns, arguably the 1666 Great Fire of London pushed London to become more fire-resilient – with stone and brick buildings replacing older wooden ones.

Throughout history, catastrophes have acted as catalysts for various improvements, like the more recent Rebuild by Design programme, which emerged in the U.S. after Hurricane Sandy. It is focused on rebuilding the Northeast region of the country with an emphasis on technological and organisational resilience. No doubt, disasters bring great suffering, but they can also bring the opportunity to rebuild – to make something stronger and more adaptable – than before.

Today, London – along with many other older cities around the world – is in in some ways just as due for an update as it was 350 years ago. Population growth has put new pressures on infrastructure and amenities, aging infrastructure needs to be replaced, and new digital industries calls for improved power supply and communications systems. Many cities need a new Wren to help them become better, smarter, more able to meet the needs of their inhabitants – and more resilient to potential disasters.

IN DEPTH

Resilience, risk and urban planning have gone together since cities have been in existence. The first official fire departments – or fire brigades – were formed in London by insurance companies as a direct result of the Great Fire, and their recommendations were involved in the establishment of the first standardised building codes. Understanding the links between risk and resilience lets town planners improve the efficiency of a city and its inhabitants' quality of life, safety, and wellbeing at the same time.

"Cities are perfect examples of how we should plan for resiliency," says Greg Lowe, Global Head of Resilience and Sustainability, Aon. "By their very nature, they pose significant risk because they hold huge concentrations of people and expensive assets." When disasters strike, this concentration means that they can create ripple effects throughout the city and its economy. Traffic can be disrupted, utility supplies affected – water and electricity can be cut off to large areas, affecting thousands of people and businesses, with significant impact to the community's wellbeing.

To improve a city's resilience is one thing, but to improve community resilience, it is necessary to look to the big picture. Jacquie Yannacci, Director, Community Mobilization and Partnerships at the American Red Cross believes a resilient community is "one that possesses the physical, psychological, social and economic capacity to withstand, quickly adapt, and successfully recover from a disaster." When disaster strikes, some may be tempted to try to reconstruct a replica of what was there before, to carry on with life just as it was and forget the disruption caused by the catastrophe.

But a smarter approach is to think like Sir Christopher Wren after the Great Fire of London and consider how to rebuild to make that community more resilient to future disasters – and to future needs.

Building The Cities Of The Future, Today

Whether building or rebuilding, "sophisticated analytics such as catastrophe models and data visualization tools can help city planners and businesses better understand their risk exposure and how they can develop smarter," says Lowe. We are entering the age of the "smart city."

In the 17th century, London was just beginning to experience a population boom that would see it grow to become the world's largest city, growing from a population of 200,000 in 1600 to 6.5 million by 1900. Today, the world's urban centers are experiencing a similar boom in population. By anticipating those needs – and the strains they may put on urban infrastructure –planners can help make tomorrow's communities more resilient to day to day pressures as well as to potential disasters, says Tariq Taherbhai, Senior Director, Aon Infrastructure Solutions.

If a city is going to be functional, it needs to be resilient. And if it's going to be resilient, it needs to be smart.

With sensors under its streets letting waste services know when bins are ready for collection, Barcelona is one of the smartest cities in the world. These sensors also integrate with apps to let drivers know where available parking spaces are, or whether there are traffic issues ahead that they need to be aware of. Barcelonans can even access the city's traffic cameras via smartphone apps to get even more detailed traffic information.

Singapore's Virtual Singapore system, meanwhile, has deployed sensors that let the municipal government know if people are dumping trash, or smoking in illegal areas, via a comprehensive, real time 3-D map of the city. Streetlights in Kansas City are fitted with sensors that capture volumetric data on human movements – data which can then be used by urban developers to optimise the placement of housing, retail units and public amenities.

And then there's Seoul, possibly the world's "smartest city." Electric cables run underneath its streets, automatically charging its electric bus fleet. Commuters waiting on train platforms can shop for groceries via interactive, QR-code equipped digital terminals. And of course there is the requisite trove of sensors, which can monitor the quality of the air and let authorities know when at-risk citizens, like the disabled or those suffering illnesses like Alzheimer's, are moving into area where they may be unsafe.

Rebuilding For Resilience

"To maximize the potential of this 'smart city' approach requires considerable investment – often the rebuilding of existing infrastructure and the introduction of new technologies," says Taherbhai. It also requires investing in the right knowledge, skills and tools to make the most of that data. For instance, says Lowe, "all too often developers or planners look at simple flood maps without fully understanding probabilistic risk."

What's more, to carry out such work can lead to considerable disruption to day-to-day life, which can be a disincentive. But in the aftermath of a disaster, when rebuilding is taking place anyway, "there is a great opportunity to introduce new approaches throughout the rebuilding process. At the same time, there is incentive in rebuilding for long-term resilience," says Taherbhai.

In the event of disasters like earthquakes, fires, floods, or terrorist attacks, cities which can control and optimise municipal functions independently of the human beings that run them – who themselves may be directly at risk in such events – could mean the difference between life and death for thousands of their citizens. For instance, automated warning systems in Japan stopped all trains as soon as the first tremors were felt preceding the 2011 Tohoku tsunami. Sensor technology can help detect contamination in water supplies (an incident like the water poisoning in Flint Michigan could have been averted if lead sensors had been installed in pipelines), or help identify where leaks are occurring in pipes following an earthquake, helping to reduce repair times.

Overcoming The Obstacles To Smarter Cities

The biggest challenge to becoming a "smart city" is existing technological infrastructure. "Smart services need massive amounts of data, and that data needs a digital backbone," says Taherbhai, "and this means that hugely powerful networking infrastructure, like wide-gauge fibre-optic cables, is required for lots of these connected technologies to work." Part of the reason Barcelona has become a world leader in the sector is because it enjoyed a city-wide fibre-optic upgrade in the run-up to hosting the 1992 Olympic games, giving it a two-decade head-start on developing a key underlying part of a modern broadband internet system.

But smart technology is only one side of the resilient cities coin. Communities must be able to adapt to disruption and drive redevelopment. Learning from mistakes is natural, as is the desire to improve on what's gone before, as Wren attempted to do with his London redesigns – to build a greater, more resilient city than before.

"When it comes to designing for resilience, we should embrace flexibility and elegant failure," says Lowe. "While we won't have all of the answers at the onset, we can design so that if something needs refinement, whether due to a natural disaster or socioeconomic change, we can retrofit in the future."

TALKING POINTS

"All the systems government use are silos. They are not connected together. For a smart city to work you need an integrated, independent system. It has to be an open IT infrastructure and there must be great connections – you can't have a smart city without connections" – Joe So, CTO Industry Solutions, Huawei

"Growth of population in urban settlements is posing many challenges. It has placed additional loads on the infrastructure in every city. Our thinking is that cities of tomorrow require technology–driven inputs to make life of our citizens easier and safer," – Vasundhara Raje, Chief Minister Of Rajasthan

FURTHER READING

- Smart Cities 2.0 – Alternet, August 25th, 2016
- Will Smart Cities Need AI To Truly Flourish? – ReadWrite, August 26th, 2016
- Big Data And The Future Of Smart Cities – Forbes, August 15th, 2016
- Are Smart City Transport Systems Vulnerable To Hackers? – BBC, 5th August, 2016
- The Four Key Features Of Successful Smart Cities – TelecomsTech, 12th August 2016
- 100 Resilient Cities Initiative – Rockefeller Foundation
- Lloyd's City Risk Index – Lloyd's and The University Of Cambridge
- The Urban Land Institute

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