Maximising Effectiveness of Smart City Policies

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In the future, cities will be able to harness the transformative power of new technologies to revolutionise the way citizens and businesses use their services in the urban environment. This will make cities more sustainable, efficient and desirable places to live. This transformation will be most successful if it relies on:

Collaboration at every level – across departments, between different layers of government and with citizens. Realising the greatest ambitions of the smart city depends upon alignment and co-operation between cities, governments, local companies and citizens.

Adoption of open, standardised technologies. A successful smart city relies upon flexibility and long-term cost minimisation, which are difficult if tied to a proprietary solution.

Innovative service delivery, procurement and funding models. Smart city projects can be used to change models of delivering services to require less initial funding from the city.

Consumer data privacy and cyber security becoming a priority area led by central government. Where local bodies do not have the resources to lead on cyber security issues, these should be led centrally.

1 Introduction

This paper is intended for planners and decision makers in central and local government who are involved in smart city initiatives. It aims to summarise best practice in the planning, funding and implementation of smart city applications so that their benefits can be more widely realised in cities of all sizes. It has been produced by Analysys Mason on behalf of the GSMA.

Each smart city development will have a slightly different set of aims, but at their heart, all are seeking to use technology to make the city better: more productive, more efficient, less polluting, with a higher quality of life for citizens. Combatting climate change and achieving the COP21 targets[1] are an important aspect of this. Almost all smart city services will rely to a greater or lesser extent on communications networks.

1. The central aim was to keep "the increase in global average temperature to well below 2°C above pre-industrial level" For details see http://ec.europa.eu/clima/policies/international/negotiations/paris_en

2 Collaboration must be a priority at all levels

A 2017 report from Black & Vetch, Strategic Directions: Smart city/Smart Utility,[2] highlights the need for collaboration:

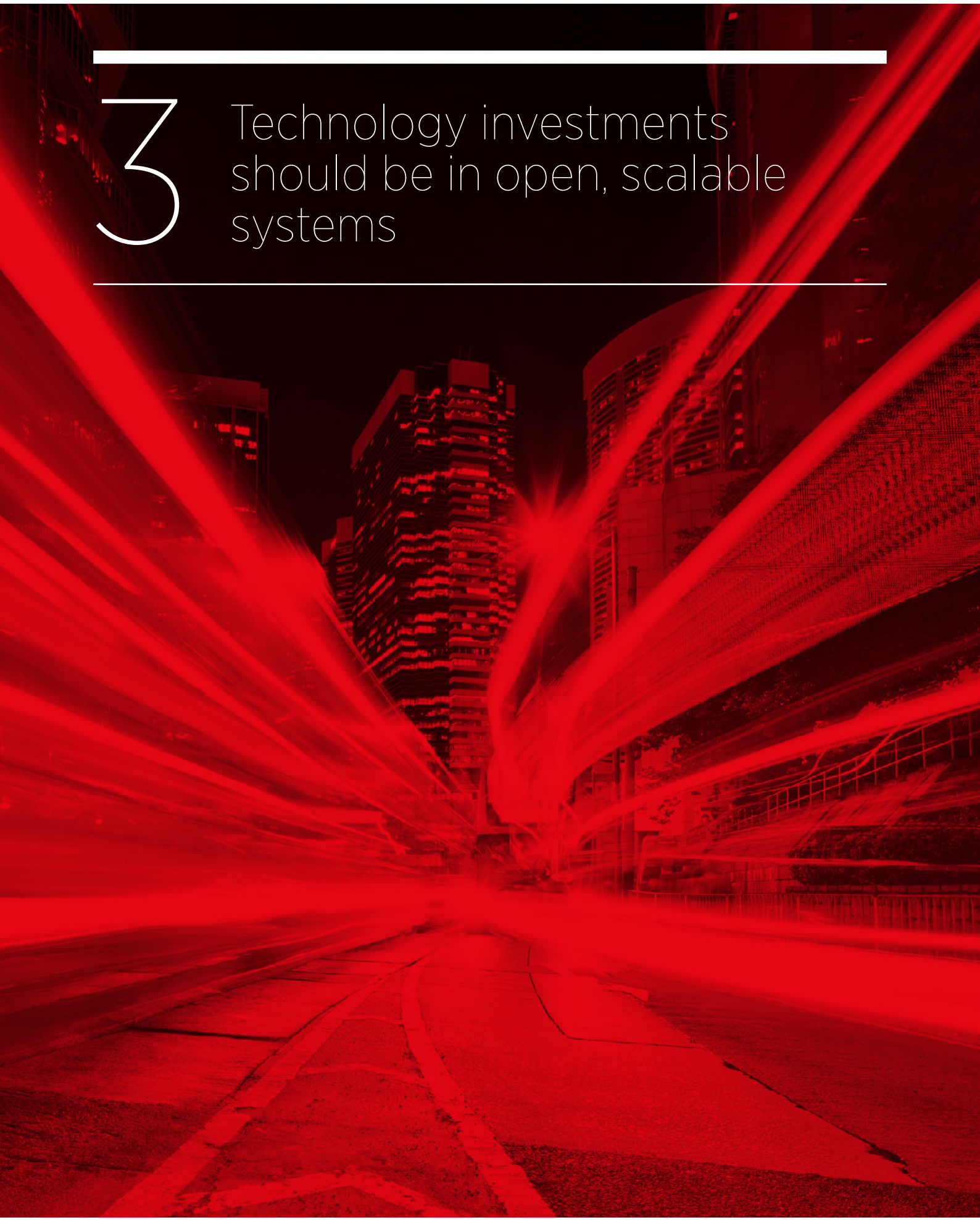
> Much of the smart city discussion centers on how communities exit the "from" state of basic delivery of critical services toward the "to" state in which energy, water, transportation and communications are integrated building blocks operating in harmony

To encourage collaboration governments and cities should:

- **Appoint a smart city CIO or a smart city manager. This role will be to develop a cross-department co-operation strategy and encourage sharing.** Objectives could be defined in terms of the resource savings that a smart city project can achieve. The manager needs the authority to act, and should report directly to the chief executive. Smart cities require co-operation between teams that do not typically work together, such as regulators (e.g. telecoms and energy) or local delivery teams (e.g. street lights, waste management). Similarly, close collaboration between offices, department, government agencies, and ministries is vital to the success of the overall smart city project. As an example, Barcelona Digital City[3] has had a strong focus on cross-working between different parts of local government.
- **Include a plan for communicating with the local community in all projects.** Smart city projects are most likely to be successful if their aims are understood and supported by local stakeholders (e.g. citizens, local companies, utilities, hospitals, schools). The benefits need to be explained, and the challenges (e.g. concerns over collection and usage of data) addressed openly. The Lyon Smart City project is notable for its emphasis on strong co-operation with citizens.[4] The project, dubbed a 'co-smart city' and described as a 'public-private-citizen co-production', is gaining wide involvement, with 550 attendees to its 2016 Smart City Meeting.[5]
- **Only fund projects that include processes for sharing findings.** A purely competitive environment can discourage knowledge sharing. Funding processes should be structured so as to promote sharing of knowledge, as the UK has done with the financing of the Manchester City Verve project.[6]

2. https://www.bv.com/insights/expert-perspectives/data-and-planning-drive-growth-smart-cities-and-utilities
3. http://ajuntament.barcelona.cat/estrategiadigital/en
4. http://www.business.greaterlyon.com/smart-city-lyon-process-47.html
5. http://www.business.greaterlyon.com/fileadmin/user_upload/fichiers/site_eco/20161118_gl_lyon_smart_city_metropole_intelligente_plaquette_en.pdf
6. https://www.gov.uk/government/news/manchester-wins-10m-prize-to-become-world-leader-in-smart-city-technology

3 Technology investments should be in open, scalable systems



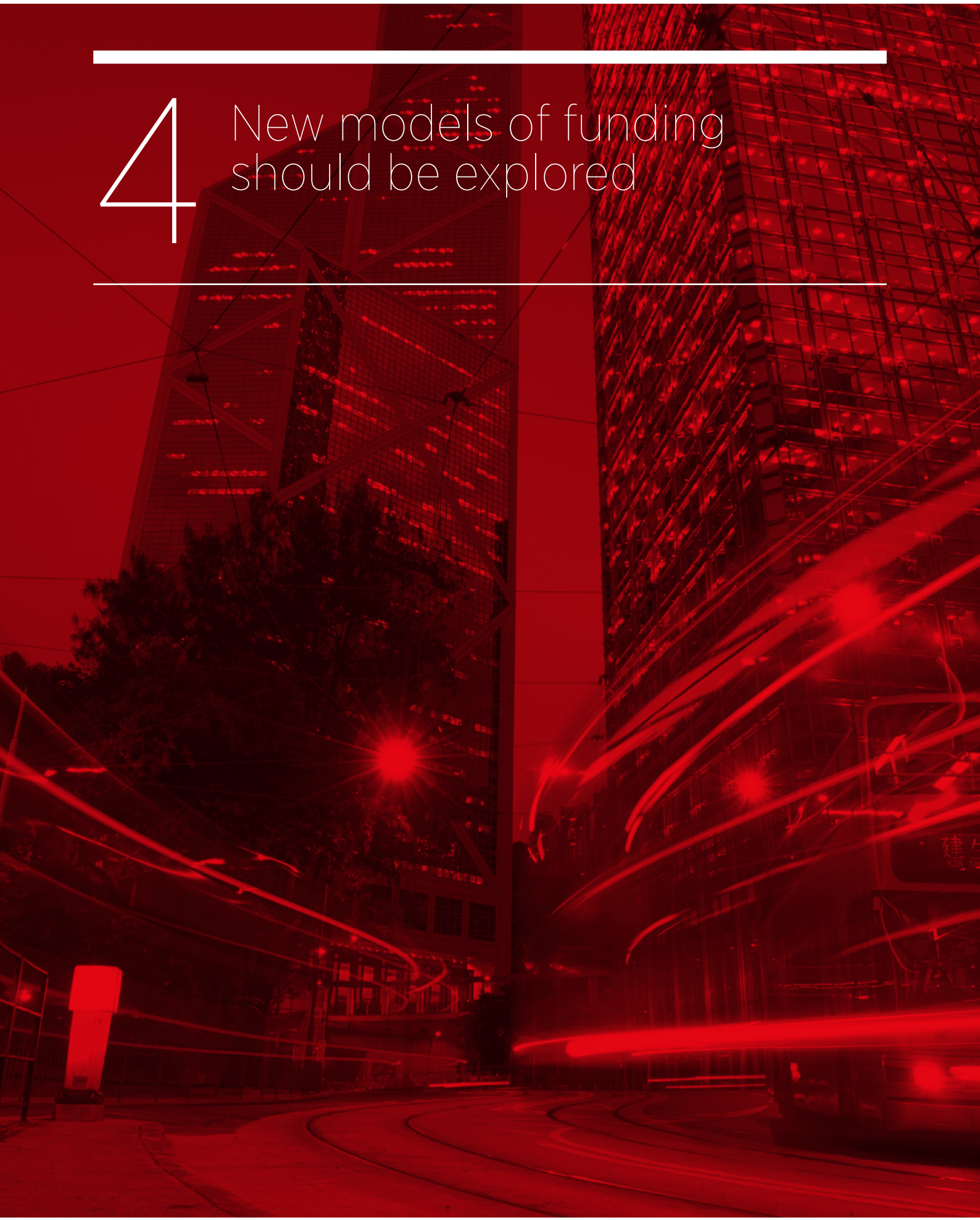
The technology in smart cities will need to last many years (often over a decade); as such they must be delivered cost effectively and should be flexible enough support many services.

Cities should:

- **Favour standards-based technology.** A city should avoid proprietary technologies that ties it to a single provider. Standards-based solutions (such as 3GPP connectivity standards[7] or FIWARE[8] and Hypercat[9] in other layers of the technical stack) provide more flexible options in the longer term, and insulate a city from a key vendor running into financial or technical problems. Competition between different suppliers should also mean that costs are lower in the long term than proprietary solutions.
- **Invest in technology designed to support multiple applications and platforms that are open, interoperable and scalable.** Many components of a smart city solution (e.g. communications networks, cyber security, data analytics tools) can be applied to and shared across a multitude of different services: from smart metering, to traffic management, or smart street lights. This produces economies of scale and scope to reduce costs and improve collaboration. For example, in Brazil, the city of Nova Friburgo, in Rio de Janeiro is using a platform, based on FIWARE, to support multiple aspects of its smart city project (including monitoring, information aggregation, maps/GIS and business process management).
- **Make data openly and easily accessible, while still protecting privacy.** Cities generate a wealth of data. They should look to make this data open so that it can be easily used by citizens and commercial entities. Chicago offers open access to over a 1000 data series,[10] with information ranging from traffic flows to public health. London[11] shares almost 700 data sets on the economy, transport and environment to registered users. Data does not necessarily need to be made available for free. Copenhagen has set up the City Data Exchange[12] for the sale of its data. In providing data openly, cities need to think how to maintain public trust and consider how open data can be managed responsibly and the benefits explained.
- **Look for support from central government on cyber security and privacy issues.** Central governments need to take the lead in these areas and can help by, for example, putting together policy guidelines, technical frameworks, alerts and advisories for local planners.[13] In the USA, the Department of Homeland Security's Industrial Control Systems Cyber Emergency Response Team provides regular reports on how to mitigate potential security threats.[14]

7. For example, GSM, UMTS, LTE, LTE-M, NB-IoT. Most other wide-area connectivity technologies, such as Sigfox, LoRaWAN and RPMA, are not yet recognised standards though some standardisation efforts are ongoing (http://www.telensa.com/2016/06/14/weightless-etsi-partner-lpwan-iot-standards-development/)
8. FIWARE is developing a set of software standards for smart applications for multiple verticals, but with a particular emphasis on smart cities. See more at: https://www.fiware.org/
9. Hypercat is creating data standards for IoT so that information from one system can be more easily used by another.. See more at: http://www.hypercat.io/
10. https://data.cityofchicago.org/
11. https://data.london.gov.uk/
12. https://www.citydataexchange.com/#/home
13. Documents such as those produced by the GSMA (see http://www.gsma.com/connectedliving/future-iot-networks/iot-security-guidelines/) may be useful in this task.
14. For details see https://ics-cert.us-cert.gov/

4 New models of funding should be explored



Almost all smart city projects require significant initial investment. Even if the longer-term financial benefits of an investment are clear, local authorities may struggle to raise the funding necessary for the initial capital expenditure.

To assist on funding, cities should:

- **Explore models that require no significant upfront investment.** Smart city solutions can allow cities to move from capex-intensive asset ownership models to buying services. A number of organisations have promoted the concept of 'smart metering as a service',[15] where the energy company does not own the meter, but pays a third party to operate a smart-metering system. The same model could be applied to street lights and other services. This shift would require a change in mentality for cities. It also may require legal changes from central government when arrangements are not in place for public-private partnership (PPP) models.
- **Look at revenue-generating opportunities.** There is clear potential to generate revenue from data resources, but there are also physical assets that can be better exploited via smart city connectivity. In a pilot project in Los Angeles, each street light pole is turned into a 'smart pole' that contains cellular and Wi-Fi connections. This is operated as a PPP project involving Philips, Ericsson and the City of Los Angeles, and generates USD1200 for the city per annum per pole.[16]
- **Look to green banks and investment funds for financing.** In December 2016, the London Borough of Barking and Dagenham agreed a loan with the Green Investment Bank of GBP6.8 million to fund 14 790 low-energy street lights.[17] Similar funding arrangements are available from institutions such as the Clean Energy Group (Australia), Green Finance Organisation (Japan) and the New York Green Bank (USA). Some local authorities lack the resources to bid for such funding, which itself may require central government backing; even if the skills are available, there is a potential benefit in coordinating and aggregating action at a national level to avoid unnecessary duplication for each city bidding for funding.
- **Collaborate on projects and procurement.** The costs for each city can be reduced through collaboration. For example, Dublin has created Dublinked, a data collaboration project involving the four councils around the city and a local university.[18] Other cities are looking at how to procure smart city solutions jointly, and lower costs by taking advantage of economies of scale.

15. For example see http://www.prnewswire.com/news-releases/verizon-delivers-smart-energy-as-a-service-300120314.html
16. http://www.ptc.com/product-lifecycle-report/cash-strapped-cities-turn-smart-street-lighting-into-profits
17. http://www.greeninvestmentbank.com/news-and-insights/2016/london-borough-aims-to-halve-electricity-used-by-streetlights-with-green-loan/
18. http://dublinked.ie/

5 Proven methodologies are usually more secure, robust and cost-effective

Cities should look to learn from tried and tested technologies and funding models that have already been implemented, rather than create new solutions. Each new implementation contributes to the body of knowledge being built up, and there are now many and varied sources of information on smart cities beyond the documents cited in this paper. Cities can learn from groups and support bodies, such as the EIP-SCC, Smart Cities Council and ICLEI. There is a growing body of high-quality research and reporting that has been published and shared.[19]

19. For example, see:
    - The Connected City Blueprint from the Wireless Broadband Alliance and the Connected City Advisory Board http://www.wballiance.com/wp-content/uploads/2016/12/Connected-City-Blueprint-V1.pdf,
    - Mapping Smart Cities in the EU from the European Parliament, http://www.europarl.europa.eu/RegData/etudes/etudes/join/2014/507480/IPOL-ITRE_ET(2014)507480_EN.pdf
    - Using Partnerships to Power a Smart City: A toolkit for smart cities from the NTIA, https://www.ntia.doc.gov/blog/2016/using-partnerships-power-smart-cities-toolkit-local-communities
    - Analysing the potential for wide scale roll out of integrated Smart Cities and Communities solutions from the European Commission https://ec.europa.eu/energy/sites/ener/files/documents/d2_final_report_v3.0_no_annex_iv.pdf

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