

Oxford: A Smart City in the making

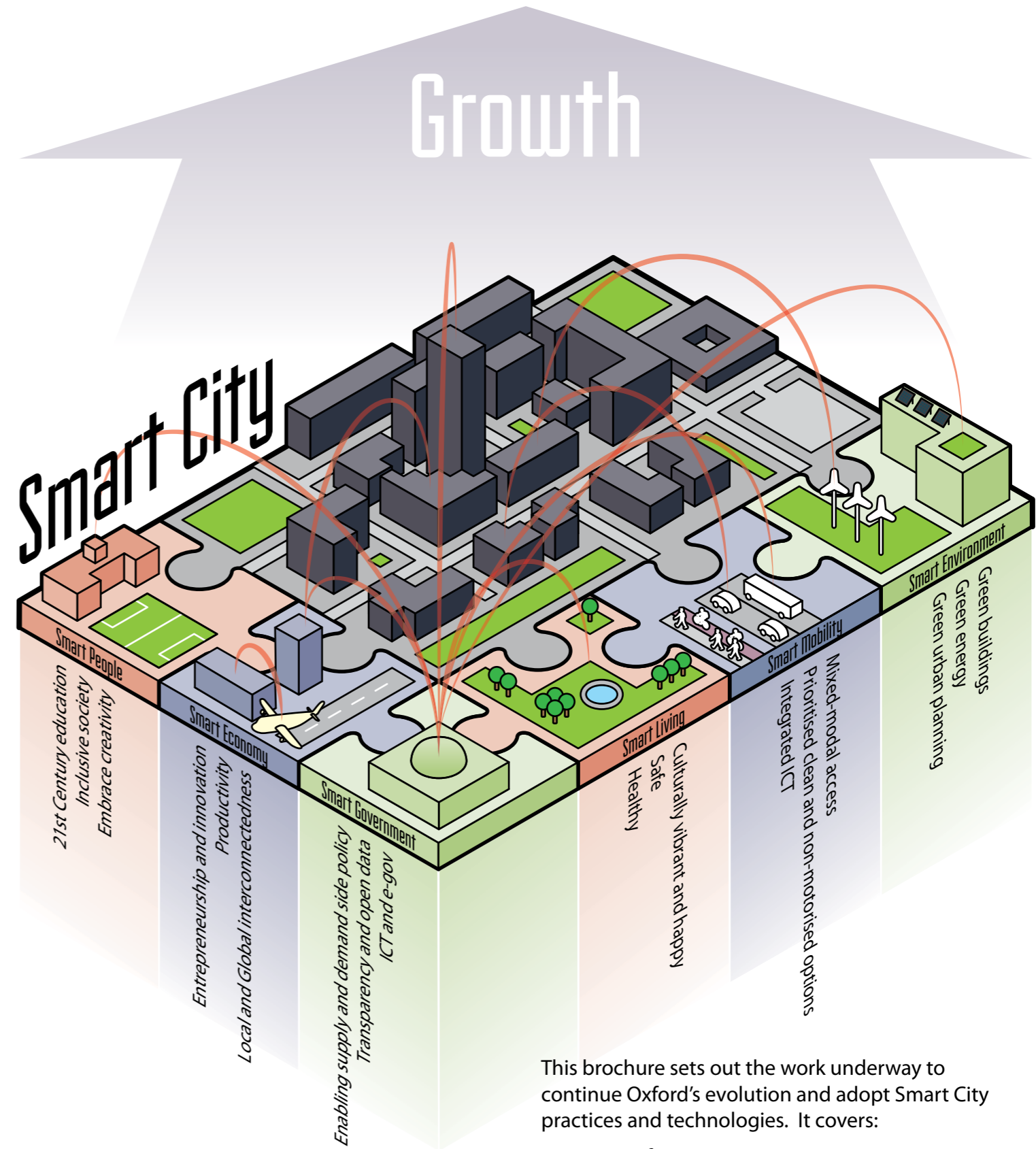
Cities like Oxford evolve constantly. Change here has been dramatic since early settlers first exploited strategic fording points across the river in the 8th Century. Today it is a global centre for learning, research, science, innovation, technology, advanced engineering, and manufacturing. Consequently Oxfordshire is one of the UK's fastest growing and most dynamic areas.

Recent developments in digital sensors and communications technologies are significantly increasing the volume, velocity, and variety of data flowing around the planet. Concentrated in urban areas with good connectivity; these data flows offer unparalleled scope to better understand, rationalise, and influence how the world around us functions.

Smart Cities of the future are expected to combine constantly updating data sets to monitor the pressures everyday life places on currently isolated infrastructure and services.

As well as more deeply inter-connecting the urban services we rely on, emerging Smart City technologies will enable more automated management of a 'whole city system' rather than each service in isolation. This more holistic approach to city management is expected to deliver greater efficiency – reducing costs and resource consumption; while also improving conditions for innovation, economic development, quality of life, and social prosperity.

A smart city is one that engages with the current step-change in digital technologies to enhance performance and wellbeing, reduce costs, increase sustainability, and engage more effectively and actively with its citizens.



This brochure sets out the work underway to continue Oxford's evolution and adopt Smart City practices and technologies. It covers:

- Reasons for investing in Smart City initiatives.
- Implementation challenges and learning points.
- Opportunities for Oxford.
- The Oxford Smart City - vision and objectives.
- Next steps.

Reasons to invest in Smart City initiatives

Drivers

Global energy demand projected to increase by >33% by 2035 - growth will be focused on cities that demand efficiency-optimised supply networks.



Up to 27% of treated UK water is lost through existing water supply networks - Oxfordshire is under serious water stress according to the Environment Agency.



Congestion costs the UK economy £16bn per annum in lost production (approximately 1.6% of GDP) - urban intensification means demand for mobility by both public and private transport options will focus on growing cities like Oxford.



Only 20% of the 600m tonnes of products and materials that enter the UK economy each year are actually recycled.

The ability to better understand and influence how the city functions - exploiting emerging data flows - critically depends on smart city technologies and processes.



European households could save 10% of their annual energy consumption through smart meters - investment in smart grid technologies and commercial building energy management systems offers an estimated 4:1 return.

Managing accelerating change across multiple sectors requires data + analytical insight + powerful ICT & comms. So far the technology exists, but is yet to be assembled so as to fully exploit the data collection and analysis potential needed to effect change.



Opportunities

£250,000,000,000

UK Government values Smart City services at around £250bn a year by 2020.

Automated vehicle trials will take place in the UK from 2015 onwards - ahead of most other EU countries.



Smart Cities will be more inclusive - involving citizens in participatory decision-making.

Smart City approaches will facilitate the use of predictive analytics to optimise the delivery of civic infrastructure and services.



Smart Cities will be more resilient to dynamic events (flooding, traffic, cultural) and respond proactively to long term trends (climate change, rising energy and water demand).

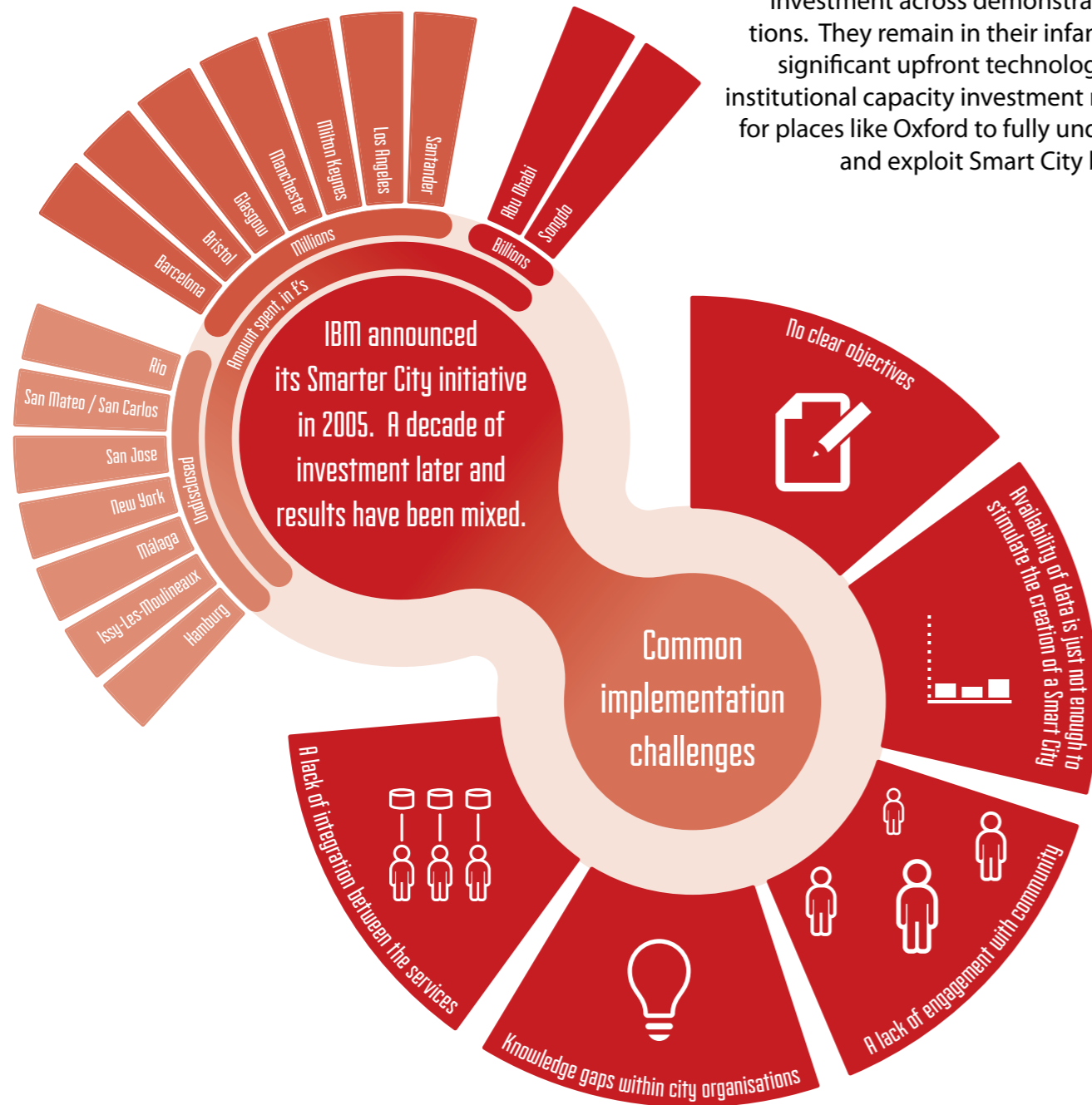
EU (Horizon 2020) and UK Government (Innovate UK & Catapults) are investing heavily in smart transport initiatives to join-up disparate service networks and deliver faster, more sustainable, more reliable, and safer mobility options for local people.



Implementation Challenges and Learning Points

Challenges

Smart City initiatives have been slow to gather momentum over a decade of investment across demonstrator locations. They remain in their infancy, with significant upfront technological and institutional capacity investment required for places like Oxford to fully understand and exploit Smart City benefits.



At the heart of the Smart City challenge sit existing services (e.g. transport, water, retail, energy) that have evolved organically to collect, store, and use their own data sets as the basis for their operation. Only occasionally do third party service providers currently benefit from agreements to share data with limited numbers of collaborators.

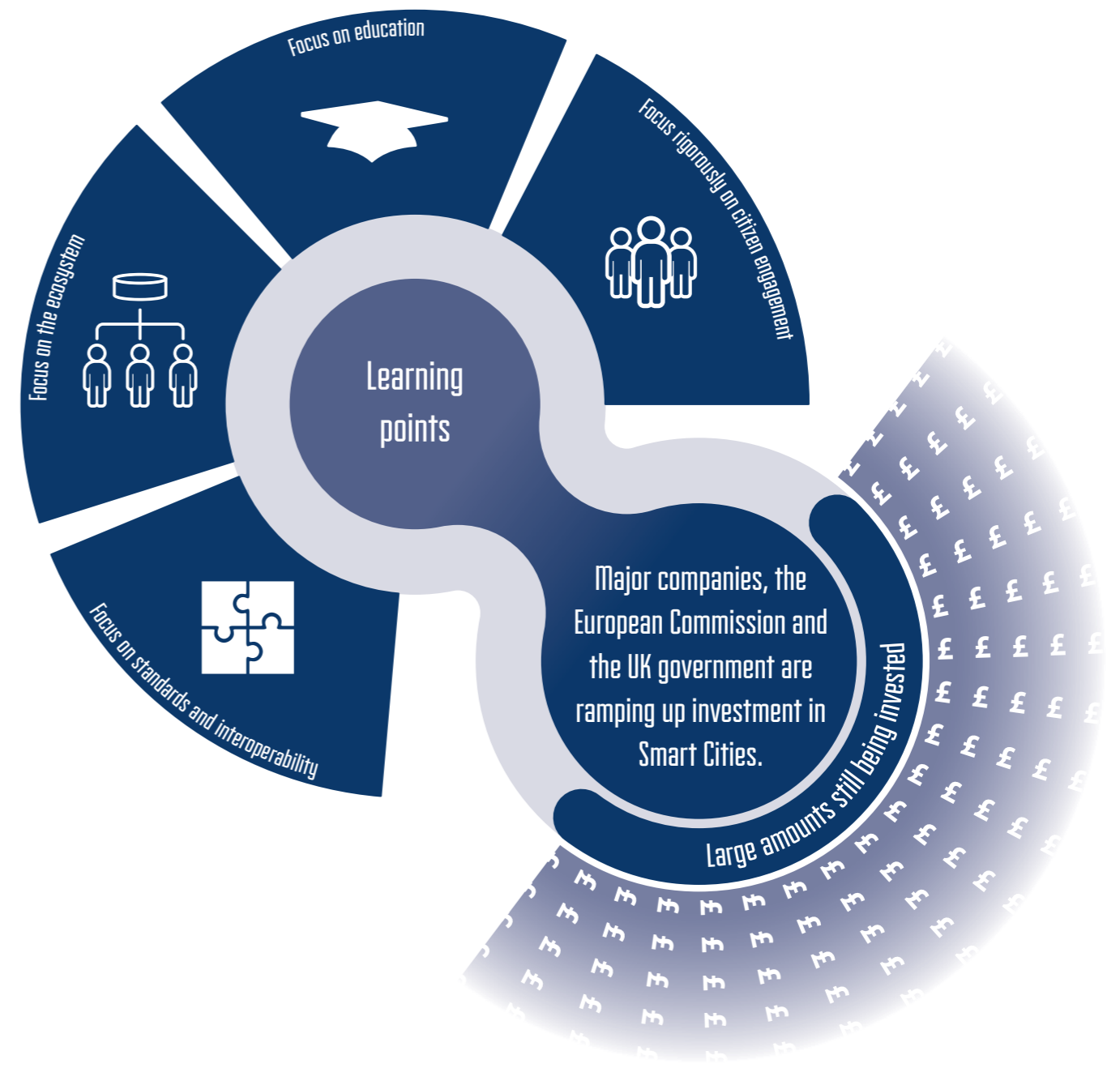
This evolution has firmly established data silos, legacy systems, and processes that prevent open public data sharing and the adoption of new technology and processes. Dismantling these established patterns of operation and re-imagining them into a more holistic and user-centred service represents a conceptual, technological, and co-operational challenge.

Learning Points

Public authorities have a significant, coordinating role to play if the potential of the Smart City vision is to be fully achieved. City, district and county councils are ideally placed to build collaborative partnerships with education and research institutes, private and third sector organisations, as well as community groups. Together, this partnership can share the responsibility for being future-thinking, and take a long-term view on optimum approaches to managing change and delivering a sustainable city.

Cities which take the lead now and invest time in collaborative partnerships with third party city service providers stand the best chance of attracting public and private sector innovation funding for Smart Cities. They also have the greatest opportunity to reap the benefits of early adoption.

Learning from the experience of previous Smart City initiatives points the way towards approaches that are likely to yield success.

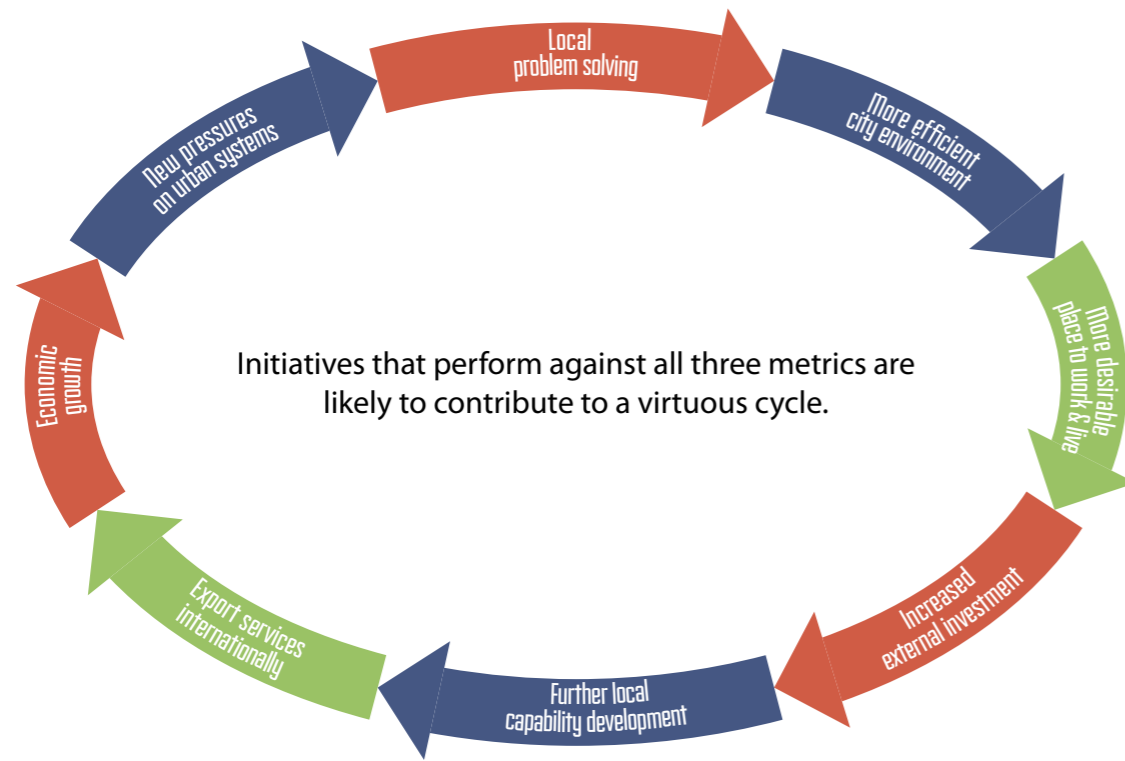


Opportunities for Oxford

Oxford's ambition is to be a city in which all citizens feel happy to live, and experience a high quality of life. Delivering a world-class city for everyone will demand innovative responses to changes in climate, population, and demographics - turning these potential challenges into opportunities for sustainable economic growth and social prosperity.

A large number of projects and initiatives related to Smart City concepts are already underway in and around Oxford, so the city is already on a 'Smart' trajectory'. Effectively evaluating the value of these technologies and processes needs to consider three key measures:

- 1 The extent to which they help Oxford to address foreseeable urban challenges.
- 2 Their ability to unlock UK and international investment.
- 3 The scale of new opportunities created for developing and exporting Oxfordshire's leading intellectual, research, and innovation capabilities.

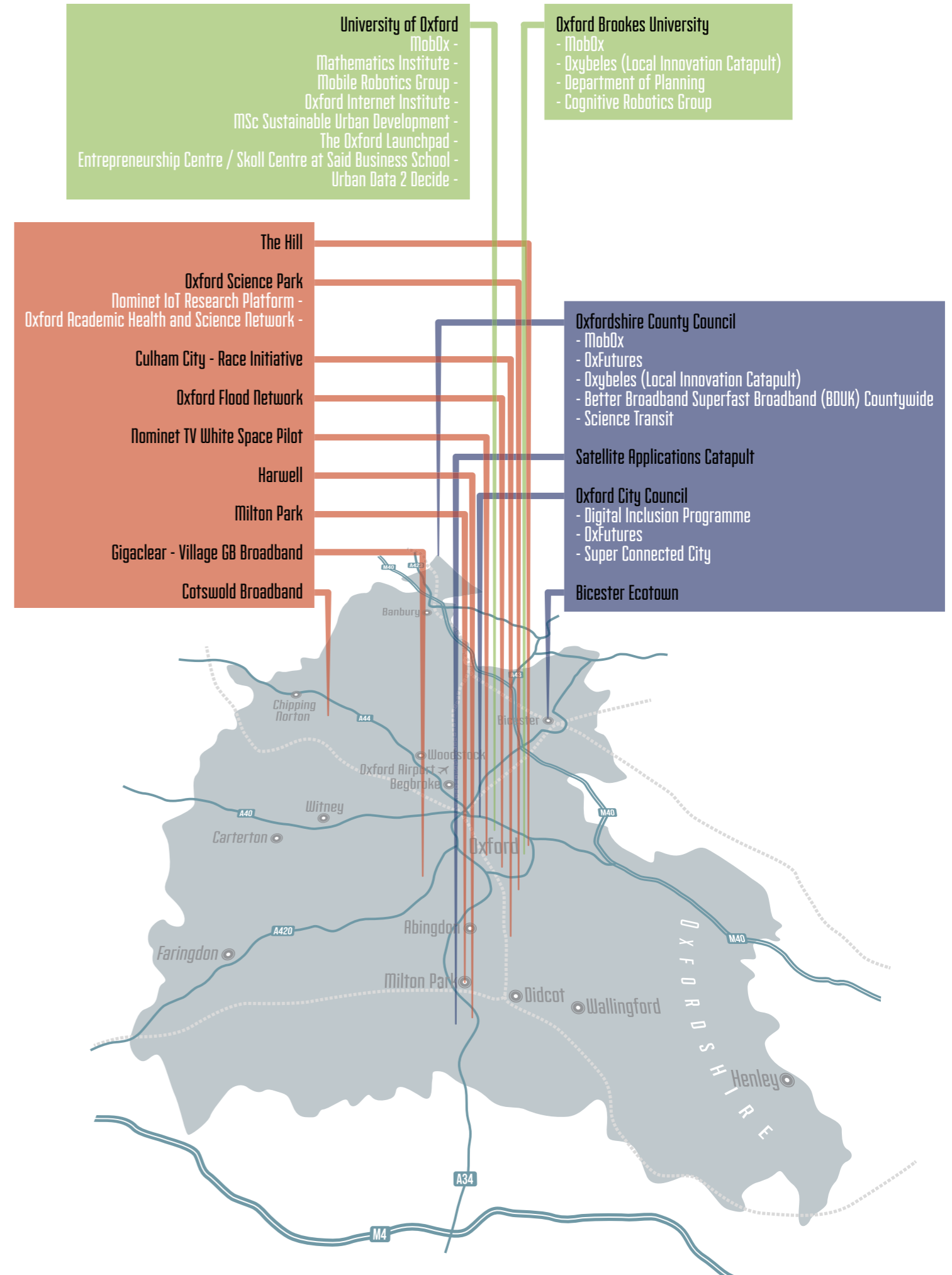


An identified threat to successfully determining existing projects' effectiveness is their relatively disparate nature:

- Truly Smart Cities need integration at a level that transcends all city services/activities.
- This requires a system for a city-wide information infrastructure and data exchange.
- Such an infrastructure must not only support new data-collection initiatives (sensor networks), but must integrate with existing services and groups to enable data sharing across all services and support their Smart evolution.

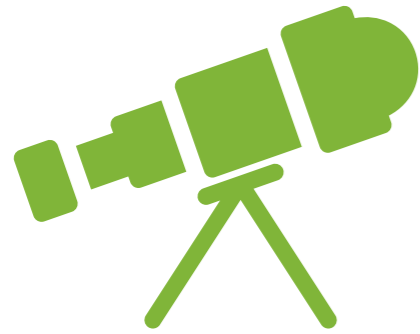
Without engaging existing services at this grass-roots level, Smart City type thinking and behaviour is unlikely to emerge as the city norm, and initiatives are likely to remain patchy or isolated.

Existing projects and partners



The Oxford Smart City

Vision



Our vision for Oxford is of a place where innovative ideas, active citizens, and aligned stakeholders come together and collaborate openly and inclusively:

- We want the city to evolve so it develops, evaluates, and deploys new technologies and processes that enhance understanding of itself.
- We want to accelerate the city's development as a living, breathing, community.
- We want to support continued, sustainable economic growth and social prosperity, while improving resilience to change.

Open and inclusive information infrastructure, and data exchange across the full range of Oxford's services and citizens, will underpin this vision.

Objectives



Three objectives will guide the facilitation and co-ordination of the city's stakeholders to collaboratively scope and exploit the opportunities arising from data-sharing and Smart City technologies:

- 1 Improve the effectiveness and efficiency of public and private service delivery to Oxford's citizens and businesses.
- 2 Bring about sustainable improvements in the quality of life – socially, economically, and environmentally.
- 3 Attract investment and innovation from around the world into the city and region.

Successfully delivering against these objectives will be achieved through a long term strategy being developed by the Smart Oxford Project Board as the next key steps.

Why Oxford?



Rapidly expanding: 155,000 people now – projected at 165,000 by 2023 [1]

Compact: Densely populated city covering 46km² [2]

Demographic diversity: wide-ranging service needs [3]

Global intellectual leader: 2 universities, health and bioscience expertise [4]

Dynamic population turnover: 26% per annum driven by high adult student population (24%) [5]

Housing pressure: Highest UK price to wage ratio and lack of supply [6]

Areas of deprivation: One area in the lowest 10% in England [7]

Transport congestion: 46,000 daily inbound commuters + medieval street pattern [8]

State education: Below national average attainment [9]

Environmental issues: High flood risk + low air quality [10]

Next Steps

Government funding will help to accelerate Oxford's evolution to becoming a Smart City, but can only take us so far in the context of our objectives. Establishing and developing solid partnerships that lay the foundation on which Smart City infrastructure can be built, and from which private sector investment can be secured, is critical to achieving our ambitions.

The next steps, right, set out a pathway to reaching the point at which we can coherently and concertedly demonstrate that Oxford is an ambitious smart city and investment ready to government and the private sector.

