

FINAL REPORT

ORGANISATION: Coventry City Council

PROJECT TITLE: Coventry – Demonstrating Tomorrow, Today. Feasibility Study.

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**Technology Strategy Board
Final Report**

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Coventry City Council

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Coventry - Demonstrating
Tomorrow, Today

Feasibility Study



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Section 1: Executive Summary

Background

The Technology Strategy Board (TSB) is looking to invest up to £23.5m in a large scale demonstrator project for Future Cities.

The project will demonstrate at scale, and in use, the additional value that can be created by integrating city systems. The project will enable businesses to test in practice new solutions for connecting and integrating individual city systems, and will allow cities to explore new approaches to delivering a good local economy and excellent quality of life, whilst reducing the environmental footprint and increasing resilience to environmental change. To achieve the scale required to effectively test the value of integrating city systems, TSB intend to fund a single demonstrator project.

Document Purpose

This Feasibility Study:

- Covers key characteristics of Coventry
- Describes the vision for Coventry and the associated challenges and opportunities for the city in transitioning to a successful city future
- Outlines example systems and data within Coventry that may be integrated and the approach for achieving integration
- Highlights key benefits of successful integration of Coventry's systems and barriers to be overcome to deliver the integration project

High Level Process

The Future Cities concept was proposed to a number of trusted public and private sector Council partners and ideas generated through which the concept could be implemented within Coventry. A significant number of responses were received. The partners were then asked to produce a high level project outline describing the key considerations noted by the TSB. A number of ideas were still at the 'conceptual' phase and therefore did not materialise into a project outline that could be taken forward at this stage.

The remaining potential projects were processed through a defined framework to assess their appropriateness against the requirements and values of the Future Cities concept. The collaborative evaluation of all project proposals was performed by the Coventry City Council project team. Each project was assessed against a series of criteria established from the TSB guidance to determine both their appropriateness and achievability.

Conclusion and Recommendation

Coventry has a host of opportunities locked within its existing systems and data. Without the right connections between siloed data sources it is difficult to identify those possibilities. Information based on reliable data is critical for strategic and operational decision-making and for addressing the challenges and opportunities Coventry faces. As a result, at the core of the proposed project is the establishment of a local iterative mechanism, the 'Coventry Knowledge Hub' (CKH), which is capable of using data to generate and link inter-operable projects to address all the city's challenges and opportunities.

Based on the detail contained within this Feasibility Study, the potential of integrating disparate systems and data, and the quality and potential benefits of the project outlines submitted, this report recommends that Coventry City Council submits an application to the TSB for the full £23.5m to fund a large scale demonstrator project that consists of:

The Coventry Knowledge Hub (CKH): to address the overarching problem of un-used data and segregated data systems. The integration of data from various city sources and partner operated initiatives is the first vital step in designing and developing integrated city systems. Data will be collated which clearly represents and impacts on the themes in this study, specifically: Population Growth, Citizen Needs and Reducing Energy Usage. Additionally, dynamic smaller businesses will be able to input to and extract from the Hub to create entirely new market opportunities.

- Two interrelated demonstrations will be used to illustrate, test and embed the CKH with the Knowledge Hub providing the core data to enable the demonstrations:
 - (1) **Vehicle Inductive Charging:** focus on the drive to reduce vehicle tailpipe emissions (CO₂), reduce noise and improve air quality. Picking up on the limitations of electric vehicles in terms of range and cost, the demonstration will provide for a dynamic and static induction charging infrastructure that vehicle manufacturers, operators and users will test and enjoy.
 - (2) **Future City Mobility:** deliver scalable architecture for mobility data collection and service provision covering multi modal transport infrastructure, vehicles and users. It will integrate telecommunications, electronics and information technologies to plan design and operate maintain and manage transport networks.
- **Making it happen:** Essential to the success of the demonstrator is a strand of work that seeks to address the very real hurdles that inhibit action. These are associated with leadership, culture, decision making and strategic finance.

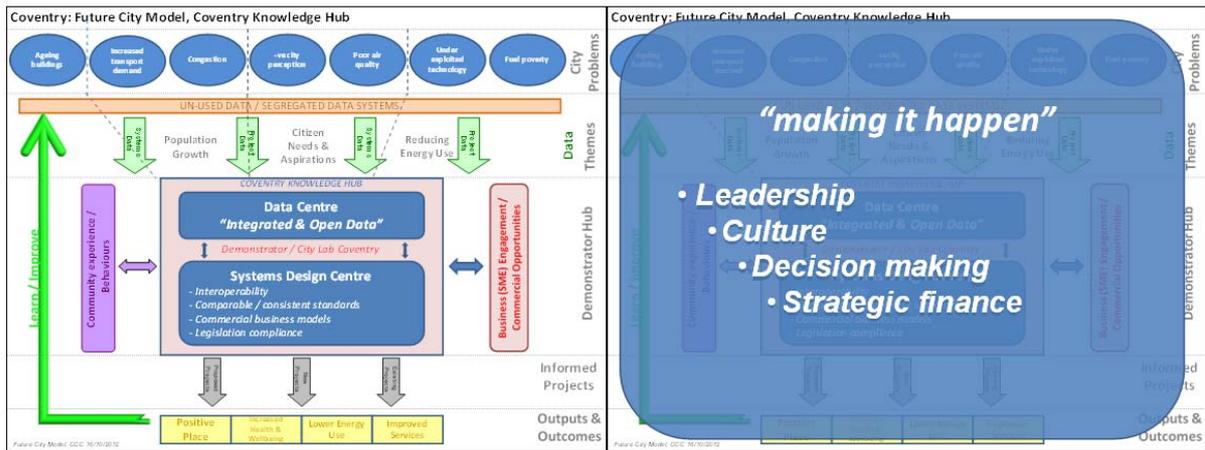
Executive Summary - Supporting Information

The city of Coventry occupies a well defined 9834 hectares (38 square miles) in the middle of England. Coventry City Council is the sole responsible local authority. The city is the UK's 13th largest with a population estimated for 2010 of 316,000. Economically Coventry's GVA of £18,032 per capita is above the West Midlands average but slightly behind that of the UK as a whole: in total the city's economy is valued by total GVA at £5.6 billion annually. Its economic footprint extends to cover the whole of Warwickshire.

Coventry is determined to be a city that works; for jobs and growth, for its young people and for its vulnerable citizens. It intends to maximise the benefit of its reputation for innovation, of its design and engineering skills base and of its knowledge powerhouses to develop as a regional centre that is an attractive place for dynamic investors and innovators. It will use integrated systems and new and robust community engagement technologies, to help make and implement decisions, to become energy and resource efficient, and to meet the needs and aspirations of its people.

In articulating the challenges and opportunities that the Future Cities concept will address, the City Council has focused on Coventry's local needs, business potential, capability to deliver within the timeframe and the creation of a platform for ongoing work.

Under-exploited digital technologies, unused data and disparate systems are seen as both the fundamental challenges and the mechanisms for moving forward. In order to address this crucial challenge, the City and its partners proposes a Coventry Knowledge Hub, an integrated city ecosystem, which incorporates an integrated and open data centre, a systems integration design centre and City Lab Coventry. City Lab focuses on engagement and provides the real life experimentation environment building on past achievements and current initiatives. Overlaying the approach will be a strand of activity that addresses strategic finance, decision making and risk taking.



Benefits associated with the implementation of the project are summarised as:

- Economic prosperity through creation of new jobs and/or inward investment derived directly and indirectly from the CKH itself and through the creation of multiple projects
- The Knowledge Hub will provide a greater understanding of city performance and from this allows an informed evaluation of the true impact of city initiatives and projects
- Benefits accrue from a low carbon transport system which enables greater levels of use of the city by individuals and businesses. Coventry will be recognised as a leading environment supporting the development of leading edge technologies.
- The ability to move people and goods efficiently is the cornerstone of the Coventry economy. It enhances existing trade and is a key enabler for inward investment.
- Quality of life is improved as a direct result of reduced congestion (wellbeing), CO2 and pollution reduction.

The City Council will use tried and trusted project management procedures to implement its ideas, monitor progress against agreed milestones and evaluate outcomes. Measures of success will include the number of data sets examined and utilised, the number of systems integrated, the viability and adaptability of the hub, and the reduction in CO2 emissions. Qualitative impact data gathered from Coventry's businesses and citizens will measure, for example, the degree to which businesses believe they can gain commercial advantage from the proposal and the impact of improved transport arrangement on people and on businesses.

It is planned that the approach and its successes and shortcomings can be presented to a wider national and international audience in such a way as to benefit the key stakeholders and provide a platform for further development. The City Council and its partners are particularly conscious of the ability of its approach to be sustained, adapted and embedded through time using funding from the private sector.

Clearly such innovative methodologies are not without risk. However, in developing the study's proposal the Council and its key knowledge partner, Coventry University, have jointly been at pains to engage with the private sector and secure its support to mitigate risk and optimise leverage.

Section 2: Introduction, Background and Context

2A) Introduction

The Technology Strategy Board (TSB) is looking to invest up to £23.5m in a large scale demonstrator project for Future Cities. As part of the process the TSB has commissioned 30 cities to complete Feasibility Studies to assess the suitability of each to deliver a demonstrator project that meets the TSB criteria.

Coventry was awarded funds to undertake a study based upon ideas submitted to the TSB in June 2012. The original application for which is available in Appendix 1.

Coventry City Council commissioned consultants KPMG to help prepare its feasibility study. KPMG was selected based on its demonstrable expertise in the area and is thanked for its valuable contribution.

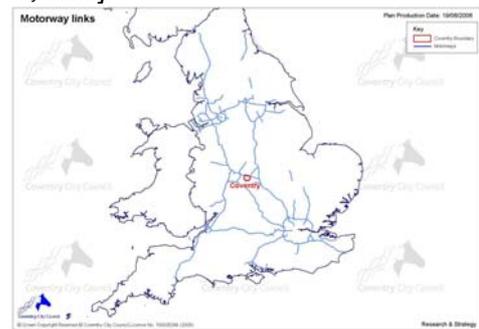
This report details the findings of the Coventry study.

2B) Geography and governance

Coventry is located in the South Eastern most corner of the West Midlands, occupying a well-defined area of 38 square miles in the middle of England. Coventry has grown to be the 11th largest city in England and 13th largest city in the UK.

There has been extensive regeneration in the city centre, with Coventry now part way through an exciting regeneration programme of more than £9 billion that is seeing it grow into one of the country's most desirable locations. The city has many beautifully restored and maintained buildings, as well as 20 Grade I listed buildings resulting in a vibrant city, which is welcoming to both visitors and residents.

Figure 2B.1 - UK Map with Coventry focus [Source: Coventry City Council]



Considered a Metropolitan Borough, Coventry City Council is the body responsible for local governance. Councillor John Mutton leads the City Council, which is made up of 18 wards, with 54 councillors coming together to represent the city as a whole. The council has strong relationships with the governance of surrounding local areas, and thus initiatives like the Coventry and Warwickshire Local Enterprise Partnership help to create opportunities for the city.

2C) Population

Coventry has a population of over 315,000 people, with two thirds of the population being within working age. The average age of a person living in Coventry is 35, much lower than both the West Midlands, and the English average (refer to Appendix 2 Coventry Population Pyramid 2010 (Source Office for National Statistics, 2010 Mid-Year Population Estimates). There are a further 1.14 million people within a 30-minute drive of the city centre, with Coventry's catchment area including Warwick, Leamington Spa, Solihull and the South of Birmingham.

Figure 2C.1 – Coventry population demographic by sex [Source: Office for National Statistics, 2010 Mid-Year Population Estimates]

	Coventry (numbers)	West Midlands (numbers)	GB (numbers)
All people	315,700	5,455,200	60,462,600
Males	157,500	2,684,000	29,758,900
Females	158,200	2,771,200	30,703,700

One of Coventry's greatest assets is its labour force, with over a quarter of the population educated to degree level. In addition to the 35,000 undergraduates in Coventry, over 600,000 undergraduates can be accessed within a 50-mile radius. This is due in part to the strong growth across Coventry's two universities, Coventry University and the University of Warwick.

Coventry has a significantly younger population than Warwickshire, meaning that nearly 64% of the city's population is of working age. The multi cultural and ethnic diversity of Coventry's resident population is a strong characteristic within the city, with circa 26% of a non White-British background (refer to Appendix 3 "Ethnicity Chart" for a detailed breakdown of ethnic representation within Coventry).

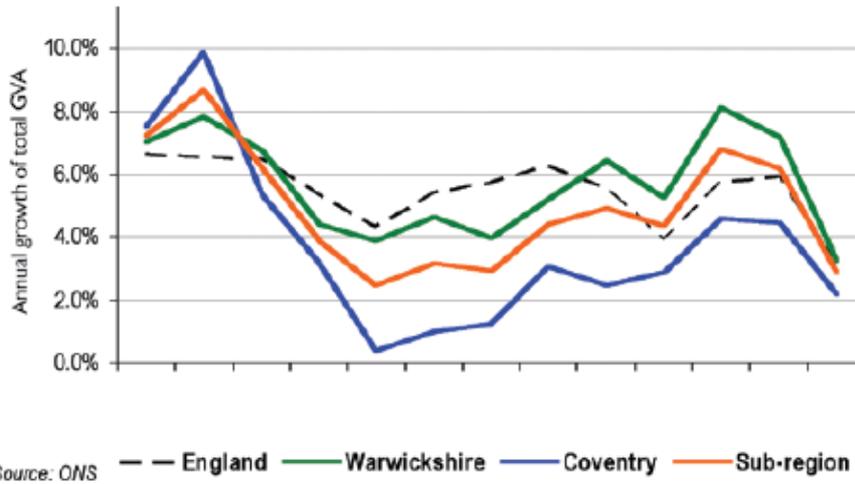
Coventry is a welcoming city where diversity and cohesion is celebrated and valued. Over 100 languages are spoken here, helping the city to reach out to markets across the globe. In the last five to ten years the population of Coventry has been changing with the highest growth rates seen for decades. Whilst population projections are an imprecise science, latest projections estimate that the population will grow to 370,000 by 2033.

2D) Economy

The overall performance of an economy is generally measured through the amount of Gross Value Added (GVA) that is generated within a particular area. In total, the GVA that is generated by the city's economy is valued at £5.6 billion annually. GVA data for the sub-region is only available up to 2008, and so does not yet include the impact of the recession. GVA per head for Coventry in 2008 was just under the £19k mark with a growth of circa 60% (between 1995 – 2008) (Please refer to Appendix 4: CW Local Economic Assessment 2011). The average annual wage of a resident of Coventry in 2009 was £23,506 (10.1% lower than the England average). In February 2010, 15.5% of the working age population in Coventry were classified as workless. This compares to the England average of 12.5%.

Figure 2D.1: Annual GVA growth rates [Source: Coventry City Council: CW Local Economic Assessment 2011]

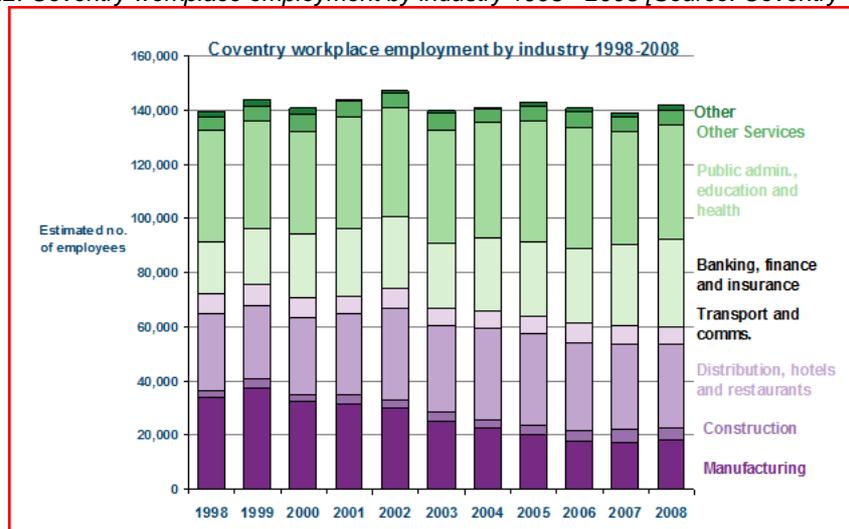
Figure 4: Annual growth rates of total GVA (1996-2008)



Coventry is proud of its economy, and with a quick look over key statistics it is clear why. Diversity in the city’s employers provides residents with a multitude of opportunities, and as a result 37% of people in Coventry are employed in managerial, professional, associate professional and technical roles. Coventry is renowned for its strong engineering heritage across the motorsport, automotive and advanced manufacturing sectors. It has a cluster of 250 companies worth over £5 billion, and employing over 4,300, with companies based here including car-makers Peugeot, Aston Martin, and Jaguar Land Rover, as well as engineering partners such as Brose and Penso (refer to Appendix 5: The Top 15 Employers in Coventry 2011).

The largest broad sector of the Coventry economy is public administration, education and health which employs approximately 45,750 people in Coventry, almost a third (32%) of all employment. Manufacturing has become an increasingly smaller part of the economy in recent years and now makes up about 11% of employment, about 15,000 people. Business services’ (banking, finance and insurance) has employed an increasing number of people in the city since 1998, increasing from 14% to 23% of all employment in 2008 (England 23%). 58% of employees work for SMEs (business with less than 200 employees) compared to an England average of 69% (2008). Between 2008 and 2010 the estimated number of employees at Coventry workplaces fell from about 147,000 to 143,000 with notable falls in business services, manufacturing and ‘other services’ jobs and a notable increase in public administration, education and health jobs.

Figure 2D.2: Coventry workplace employment by industry 1998 - 2008 [Source: Coventry City Council]



Going forward economic development activity is being grounded in the concept of a Future City - the umbrella that describes Coventry's determination to be a competitive, innovative, integrated and resource efficient, low carbon city of the future that meets the needs and aspirations of its people. It focuses on people and technologies to ensure that the city is connected, engaged, robust, smart and resilient; advantageously placed to deal with population growth and resource scarcity.

The Coventry and Warwickshire Local Enterprise Partnership commissioned a study by independent consultants, Breeze Strategy, to better understand the strengths of the local economy from the perspective of inward investors. The research identified Coventry and Warwickshire as global leaders in areas such as low-carbon vehicles, intelligent transport systems and serious gaming. It has one of Europe's fastest-growing ICT and software clusters in Europe, home to the largest concentration of IT companies outside London, and a quickly advancing medical technologies sector. When glancing over the city's top 25 largest employers we can see multinational corporations from across finance, manufacturing, healthcare and education, but also with many other sectors represented.

In the ten years spanning 1998-2008, Coventry experienced a 20% growth in the number of businesses in the city, with business services, retail and education receiving the most growth, all above the national average. In 2008 Coventry City Council set the goal of rebalancing the economy away from the public sector, and in just four years great success in this policy has been achieved through growth in manufacturing and production, and growth of other non-service sectors.

2E) Current state of key infrastructure

Coventry City is particularly noted for its strong transport links. Five major national motorways service the region, and Coventry Railway Station is just a five minute walk from the City centre, allowing easy access to Virgin, London Midland, and Cross Country operated rail services. Coventry is also in close proximity to two international airports (Birmingham International Airport & East Midlands Airport)

The City Council is committed to green travel. The city has two established park and ride services, serving the north and south of the city. The Council is actively promoting the use of cycle paths across the city and is introducing a "Red Routes" initiative, aimed at reducing delays caused by inappropriate parking through improved control of parking and loading restrictions.

Coventry has a proven track record in introducing innovative ideas across its transport infrastructure. Recent examples include:

1. As part of a £7m redevelopment of the city centre ahead of the Olympic Games, Coventry created a number of new , low speed junctions – based on the principles of shared spaces. This work has involved improvements to pedestrian routes – creating wider pavements and narrower roads as well as reducing street clutter and relocating street furniture. The key objective has been to reduce vehicle speeds and make the city centre a more pedestrian friendly experience.



The approach is based on the premise that by creating a greater sense of uncertainty and making it unclear who has right of way, drivers reduce their speed, and everyone reduces their level of risk compensation.

2. The Department for Transport (DFT) has given the go-ahead for an £19.3 million upgrade to the rail link between Nuneaton and Coventry, known as NUCKLE. The DFT has approved a grant of £9.75 million for the project which will increase the frequency of services between Nuneaton and Coventry to every 30 minutes, with new stations developed at Bermuda Park and Coventry Arena, and longer platforms at Bedworth station. Once it is completed, the scheme will give people better access to jobs and open up new possibilities for leisure and services. In the future, the scheme will see even more growth in the corridor between Nuneaton and Coventry, and this scheme will help to reduce traffic congestion and deliver more reliable trains between the two destinations

3. The Sustainable Transport Team is a team dedicated to promoting sustainable travel to schools, businesses and local communities. The Team promote walking, cycling, public transport and using technology to avoid travelling through a number of schemes to support this objective, which include, 'Safer Routes to Schools', 'Safer Routes to Work' and 'Cycle Training for Adults and Children'.

4. Coventry City Council owns a Metropolitan Area Network (MAN) comprising 107 km of ducts and associated fibre optic cable connecting public sector sites across the city. The network ensures the fast, safe and secure transfer of data across all local authority sites including schools and other education facilities. Additionally, the network provides the infrastructure upon which the cities Urban Traffic Management & Control (UTMC) system operates.

5. Coventry City Council has formed a city-wide energy partnership with E.ON, to help improve the energy efficiency in the city, reduce fuel bills and help combat climate change.

6. Coventry continues to build on its automotive heritage and recent initiatives to develop a low carbon vehicle infrastructure highlight these credentials, including:

- The first electric 'park and ride' bus service in the UK. Comprising three electric buses, associated fast charging facilities, three overnight charging bays and six electric car chargers for patrons of the service.
- 18 public, city based, electric charging points installed as part of the Coventry and Birmingham Low Emission Demonstrator (CABLED) project.
- Six electric charging points and one hydrogen refuelling station at Coventry University Techno Centre. The university have committed to installing a further 30 charging points.
- Coventry is also an active participant in the 'Plugged in Midlands' scheme which has a target of at least 100 further charging point installations in Coventry and Warwickshire by 2013.

2F) Relevant History

The area of Coventry and Warwickshire has a long and significant economic history, which continues to shape and influence the current performance of the local economy; and could provide the foundations for its future growth.

Coventry is the birthplace of the British transport industry, and has hosted more than 300 cycle companies, 130 motorcycle manufacturers and 120 car makers. Coventry's fine engineering and manufacturing skills heritage is now fuelling the creation of new industries. The heavy industrial past still remains but focus has shifted to specialised and innovative products, creating new manufacturing models in the process. New industries are emerging and prospering, with Coventry University and the University of Warwick playing a lead role in developing innovative ideas, particularly in digital technologies and environmental engineering. There has also been huge growth in the knowledge industries, such as research and development, and business services. Finance has been making its presence felt, as has logistics, leisure, ICT and specialist software and hardware.

A recent report published in the Guardian undertaken by The Work Foundation which classifies cities and towns by economic criteria has classified Coventry as an Enterprise Engine (growing private sectors and increasing economic performance) alongside such cities as Manchester, Leeds, Bristol and Southampton.

The achievement in knowledge transfer and developing innovation can be attributed to the various science, technology and business parks that have been created across the city. As a result, businesses have been able to successfully retain graduates and better promote future business ideas. The idea of business, science and technology parks has taken hold in Coventry with a number of developments in and around the city providing the perfect environment in which new and existing businesses can cluster and thrive. Coventry has a leading edge on Research & Development excellence, through the enablement of businesses to connect into these University affiliated world-class centres. With these conditions, Coventry is globally competitive, a leading centre for high-tech industries and home to around 1,000 research and development companies.

Section 3: Vision for the City

3A) What is the vision for the future of the city?

Coventry is determined to be a city that works; for jobs and growth, for its young people and for its vulnerable citizens. It intends to maximise the benefit of its reputation for innovation, its design and engineering skills base, and of its knowledge powerhouses to develop as a regional centre that is an attractive place for dynamic investors and innovators. It will use integrated systems and new and robust community engagement technologies, to help make and implement decisions, to become energy and resource efficient and to meet the needs and aspirations of all people.

Coventry City Council has a three year vision for the city which is documented in its 2011 to 2014 Council plan. This Council Plan is the cornerstone of the council's policy framework for the three year period. The plan is underpinned at a strategic level by a four part vision:

1) To be a city that works for jobs and growth

Corporate Plan vision and objectives	Coventry, proud to be a city that works for jobs and growth						
	To create jobs through the growth of business and investment in the city	To help more residents get jobs	To help residents improve their skills	Young people stay in education or find work or training	The provision of housing to meet the needs of residents	To increase Coventry's share of the low carbon industry	To produce a Core Strategy for the future spatial planning of Coventry

2) To be a city that works for a better environment

Corporate Plan vision and objectives	Coventry, proud to be a city that works for better pavements, streets and roads		
	Roads and pavements will be in good condition and be well maintained	Streets will be cleaner and there will be less fly-tipping	Recycling levels will increase and the amount of waste will be reduced

3) To be a city that works to support and celebrate young people

Corporate Plan vision and objectives	Coventry, proud to be a city that works to support and celebrate our young people				
	The impact of poverty on children and their families is reduced	Children and young people's level of achievement improves	Children and young people's health and well-being improves	Families are given the early help and support they need	Children are supported to live safe from harm

4) To be a city that works to protect its most vulnerable residents.

Corporate Plan vision and objectives	Coventry, proud to be a city that works to protect our most vulnerable residents						
	Older people and disabled adults live independently and safely and have more choice and control over their health and social care	Support those in transition from child to adult social care	Health inequality in the city is addressed	Harm caused by crime and anti-social behaviour is reduced	Domestic violence is not tolerated and support and intervention is effective	People are prevented from becoming homeless and supported if they do	People receive the treatment they need to help them recover from drug and alcohol misuse

Please refer to **Appendix 6** for a granular breakdown of Council objectives and associated performance measures.

The Council recognises that to achieve its vision it will need to make changes to the way it leads, adopts and implements new ideas.

3B) City Ambitions

The ambitions for the city are described in the following four sections a) City Economy b) Social Wellbeing c) Health of Citizens and d) Environmental impact of the city. These were the stated ambitions that required consideration as guided by the TSB. We have also referenced the applicable City Vision noted previously for clear linkage.

A) City Economy

Associated City Vision: 1) To be a city that works for jobs and growth

Despite the challenging economic environment there are positives to be taken from the city's economic performance. With just under a third of industry sectors having seen increases in employment, the private sector creating jobs, over 900 business start-ups each year and indications of an increase in the number of city residents with high level qualifications.

It is acknowledged that growth in the manufacturing industry will play a critical role in the overall recovery of the UK's economy. Coventry has been integral to the Country's industry for two centuries and is leading the way in the resurgence of growth across the technological sectors. It is our vision for Coventry to be at the forefront of innovation and the development of new technologies, and the level of economic resurgence to continue apace. Through the development and regeneration of the region, it is hoped that new and existing businesses will thrive, affording employment opportunities to the city's diverse workforce.

The city is becoming a hub of headquarters for national and international organisations, including Severn Trent, the Qualifications & Curriculum Development Agency (QCTA), Barclays, TUI, OCR and E.ON. Coventry has established key priorities and investment plans for business, tourism and equality. The target sectors for growth which underpin the future vision of Coventry are transport technologies, innovative technologies, advanced manufacturing and digital technologies. Business and leisure tourism are also an important sector for the City, currently accounting for over 8500 jobs. A key priority of the City is to encourage growth and deliver a programme of activities to increase the profile of the City. The Council's Equality Strategy aims to make better use of technology and developing alternative methods through which Coventry's citizens can contact the Council, thus addressing social inclusion among excluded communities and social groups.

Economic growth is a major priority in Coventry, through job creation, higher skills and improved wellbeing. The Council is continuing to invest in new 'knowledge' industries and jobs for its people, such as in R&D and business services. To this end, Coventry is leveraging its fine heritage of engineering and manufacturing skills; Coventry University and the University of Warwick are playing a leading role in developing innovative ideas, particularly in medical technologies and environmental engineering. For example, Coventry University Technology Park hosts 70 tech companies, ranging in size from two to 500 employees.

The Coventry and Warwickshire Local Enterprise Partnership (CWLEP) is playing a key role in the region's regeneration. The CWLEP has a broad, long term mission statement:

"To make our area a World Class economy in which to do business; a place to: lead a great life, excel at learning, visit and return to – all supported by exceptional private, public and voluntary services".

This strategy sets out our more focussed plans for the next five years, and is driven by the following vision for the Coventry and Warwickshire economy:

"By 2016, through strong private-public sector collaboration, Coventry and Warwickshire will be regarded as one of the best and easiest places in the country to establish, run and grow strong and successful businesses; generating significant new employment and skills opportunities in the area."

B) Social Wellbeing

Associated City Vision:

- 1) To be a city that works to support and celebrate young people
- 2) To be a city that works to protect its most vulnerable residents

A vibrant city centre, rich cultural heritage, great leisure and shopping facilities, and acres of beautiful countryside are some of the things that Coventry has to offer its residents. This has been achieved and will be further enhanced through the ongoing intensive regeneration programme that is shaping Coventry for the demands of the 21st Century. Coventry is a forward thinking city and has in place a number of strategies that are working to enhance the social wellbeing of its residents. These include:

Crime - The Crime and Disorder Prevention (CDRP) Strategy developed through the Coventry Community Safety Partnership has developed strong working relationships between a range of partners. Coventry was one of the first for crime reduction partnership working, long before it became a statutory responsibility. Coventry has a relatively low level of crime. One of the city's milestones in crime reduction is that Coventry is a pioneer in Hate Crime Reduction, creating a post to increase confidence in reporting of crimes, motivated by prejudice. A Hate Crime Reduction Strategy has been devised to not only reduce hate crime but to increase the massively under-reported offences.

Housing - Coventry aims to work with partners in the city and beyond to create over 11,000 additional homes by 2028, supported by new employment in the city. City centre apartment living has become one of the fastest growing markets in the property world over the past decade, and Coventry has kept pace with homebuyers' demands to live at the heart of the city. Coventry city centre has been transformed recently, becoming the place to live. A range of apartments have been built, including the city's first loft-style apartments.



Infrastructure - Coventry City Council is 'wiring up' the city to help deliver better services, improve educational opportunities and keep people moving around the city. A £10million upgrade of the Council's ICT network, called the wide area network (WAN) has connected all council buildings and schools to meet the increasing demands of delivering services for the city's 300,000 residents and enable local schools to benefit from improved broadband access and faster internet services.

C) Health of Citizens

Associated City Vision: 1) To be a city that works to protect its most vulnerable residents

The City is committed to supporting its most vulnerable citizens. Public services have historically, struggled to share information to enable the more efficient delivery of services to the public. In light of recent welfare reforms and a reduction in the welfare budget, the city is under pressure to achieve better integration across its public services and deliver more effective care pathways.

Coventry has undertaken a Troubled Families Program which seeks to identify the small proportion of families who place a disproportionate level of demand on the city's health and social care service. When identified, this allows the opportunity for early intervention, providing appropriate support, which in the long term, reduces the demand a family will place upon public services. This is an adaptable

process which can be transferred to any number of other public services given the availability of information and a framework through which the necessary evaluation can be performed.

D) Environmental Impact of the City

Associated City Vision: 1) To be a city that works for a better environment

Coventry rose 10 places to seventh in the Forum for the Future sustainability index between 2007 and 2010, and was third for 'Environmental Performance' in 2010. It is our vision that the city is not adversely affected by the demands of its increasing population, be it through increased levels of congestion, reduced air quality or its carbon footprint. This will be achieved through continued and targeted investment in the city's transport infrastructure, innovative green transport alternatives and partnership with the public sector to exploit and implement new markets in sustainable technologies.

Coventry City Council, in collaboration with the Coventry Partnership has produced its Climate Change Strategy (*ref: Climate Change Strategy for Coventry*). This document outlines how the authority aims to tackle climate change as we move towards 2020; to ensure that Coventry is a world leading low carbon and sustainable city, resilient to extreme weather events and to long term climate change. The Council's vision for 2020 is:

1	To reduce carbon dioxide emissions by 27.5 per cent (based on N186 2005 data).
2	To increase the city's GDP by £1.9bn compared to a 2010 baseline, creating 26,000 low carbon jobs.
3	To ensure that every school is an Eco-School and 50% have "Green Flag" status.
4	To improve home energy efficiency and reduce fuel poverty.
5	To implement a climate change community engagement plan to build a sustainable city.
6	To define the necessary requirements to achieve a waste recycling rate of 50 per cent for the city.
7	To develop a procurement code for the city.
8	To increase green space, protect habitats; and encourage locally grown food.
9	To improve the city's resilience and raise awareness of climate change risks; and encourage infrastructure improvements.

We plan to tackle climate change in two ways; firstly by reducing our carbon dioxide emissions to avoid making the problem worse (mitigation) and, secondly by preparing the city for the inevitable changes in the climate (adaptation).

1. Reducing our Carbon Emissions: Using fuel and energy more wisely in our homes, workplaces and schools and in how we travel will reduce carbon emissions and lessen the impact of climate change in the future. For this approach to be effective it requires action on three main fronts:

- 1) modifying our behaviour so we use energy less wastefully
- 2) improving buildings and infrastructure so that energy is used more efficiently
- 3) investigating how we can generate our own energy from renewable sources

Selected key strategies and plans, relevant to this study are:

- **Low Carbon Transport:** A Greener Future – details how emissions from transport will be reduced up to 2022
- **Green Deal:** a 'pay as you save' scheme for householders due to start in 2012
- **Smart Meters:** provide users with real-time energy measurements which will be installed in all households by 2020

- **The Carbon Reduction Commitment Energy Efficiency Scheme:** aims to significantly reduce UK carbon emissions not covered by other pieces of legislation. The primary focus is to reduce emissions in large public and private sector organisations

2. Adapting to a changing climate: We need to adapt to our changing climate and this means planning to avoid the risks associated with these changes before they happen. Every organisation in Coventry needs to understand and manage these risks, to ensure that their assets, services and infrastructure continue to function appropriately and that the city is resilient to unexpected weather events.

Coventry City Council is investing significant time and resources in the development and implementation of an Air Quality Action Plan. Five automatic monitoring sites are in place at strategic locations across the city, where air quality detection equipment has been installed. This is supported by a total of 96 Nitrogen Dioxide diffusion tubes which help assess public exposure to NO₂. A review of air quality statistics within the city area has confirmed that no locations outside of the air quality management area have exceeded government objectives. Generally, the majority of locations have decreased in concentration since 2008, with 84% of sites having a lower concentration of NO₂ since 2008 (Please refer to Appendix 7 which provides a summary of work by Coventry City Council to monitor and manage air quality in the city since 1998).

3C. What are the challenges and opportunities for the city in transitioning to a successful city future?

A SWOT analysis has been performed to identify the strengths, weaknesses, opportunities and threats that exist within Coventry in the context of transitioning to a successful future city. These are detailed in the table that follows.

SWOT Analysis for Coventry transitioning to a successful city future	
<u>STRENGTHS</u>	<u>WEAKNESSES</u>
<p>S1 - Developments & Investment: enviable record of large scale development projects from public and private sector funding.</p> <p>S2 - Positive Attitude to Innovation and Partnerships: strong innovative partnership initiatives such as City Lab - a test bed for business ideas to develop innovative solutions in six key sectors.</p> <p>S3 - Excellent Knowledge Base and Key Major Businesses: World class research institutions of the University of Warwick & Coventry University. Strong working relationships with key major businesses.</p> <p>S4 – Strong Consultation and Strategy Building: placing the citizen at the centre of decision making for the future of the city using modern methods of consultation in the creation of the city’s transformation strategy e.g. CovJam.</p>	<p>W1 - Negative City Perception: Coventry has undergone significant rebranding, regeneration and development; however a lingering negative perception nationally may result in the city’s strengths not being recognised.</p> <p>W2 - Changing Funding Environment: available public sector funding is significantly depleted as a result of the 2010 Government spending review.</p> <p>W3 – GVA Below National Average: Coventry’s GVA of £18,032 per capita is above the West Midlands average but behind that of the UK as a whole.</p> <p>W4 – Disconnected Data Sets: Coventry has a wealth of systems across the city infrastructure and no central mechanism for integration.</p> <p>W5 – Leadership: overcoming the cultural issues that inhibit innovative development</p>
<u>OPPORTUNITIES</u>	<u>THREATS</u>
<p>O1 - Transport and Renewable Energy Growth: real progress in automotive, aerospace and environmental technology sectors.</p> <p>O2 – Digital Technologies Growth: the highly regarded Serious Games Institute and Digital Lab underpin the city’s growing digital capability.</p> <p>O3 - Utilising Vast Skill Base: Coventry has a diverse workforce and two world class Universities producing skilled graduates that can be retained within the city and local area should sufficient employment opportunities be available.</p> <p>O4 – Public and Private Sector Investment: realisable opportunities to attract crucial development and investment funding.</p> <p>O5 – Bid for Ultra Fast Connectivity: Coventry’s Super-Connected City Plan (SCCP) aims to meet the need for a step change in broadband provision.</p>	<p>T1 - Ageing Society: addressing the societal issues of supporting a growing elderly population.</p> <p>T2 - Fuel Poverty: as a result of rising energy costs that are not matched by income levels.</p> <p>T3 - Population Growth and Congestion: An expanding, independently mobile population increases the level of congestion on Coventry city transport infrastructure.</p> <p>T4 - Poor Air Quality: The high levels of CO2 and NO2 across Coventry.</p> <p>T5 – Inactive Young People and Unemployment: The likelihood of increased unemployment as a result of public sector cuts.</p> <p>T6 – Energy Security and Availability: Existing energy infrastructure will fail to meet the future energy demands of Coventry.</p>

Please refer to **Appendix 8** for supporting SWOT information.

Section 4: Which City Systems Need Integration?

Overview

This Feasibility Study has sought to identify opportunities for integrating city wide systems that align to the objectives of a Future City and the vision for Coventry. This includes an understanding of example data sets that could be potentially integrated and also a formalised process for assessing ideas and projects that could be taken through to an application for funding. Whilst there is no single, limited set of city systems that are appropriate for integration, for the context of this study we have provided examples of data sets where integrating data can provide real insight and benefit to Coventry. These example data sets are also linked to the visions for Coventry and the SWOT analysis performed in Section 3.

		Link to Council Vision				Example Data Sets
		1	2	3	4	
Opportunities						
O1	Transport and Renewable Energy Growth	x	x			Fleet Usage Energy Usage Profiles for Public Sector Buildings Carbon Management Projects output Planned transport information Incident information Journey times and roads capacity Transport Network Operators Data Transport infrastructure providers Data
O2	Digital Technologies Growth	x				Business Start Up Information Telecommunication providers Data Mobile data device manufacturers Data University Research Emerging Technology Providers Data
O3	Utilising Vast Skill Base	x		x	x	Employment demographics Unemployment statistics Government led training information
O4	Public and Private Sector Investment	x				Housing Stock Conditions Business Rates Database
O5	Bid for Ultra Fast Connectivity	x				Ultra Fast Connectivity Project Data
Weaknesses						
W1	Negative City Perception		x			Public Perception Survey Data Tourism statistics (spend, visitors, etc...) CCC Parks and leisure systems Citizen Engagement Programmes Outputs from CovJam
W2	Changing Funding Environment	x		x	x	City Council Budgetary Information
W3	GVA Below National Average	x				Population Statistics and Census Data
W4	Disconnected data sets	x	x	x	x	ALL CITY DATASETS
W5	Leadership	x	x	x	x	ALL CITY DATASETS
Threats						
T1	Ageing Society				x	Council Tax Database Hospital Outpatient Activity General Practitioner Information Health Providers and Blue Light Service Data
T2	Fuel Poverty				x	Deprivation Data Adult Social Care Data Fuel poverty statistics
T3	Population Growth and Congestion		x			Census Data Coventry City Council (CCC) Speed cameras CCC Inductive loops CCC Surveillance cameras Planned transport movements Highways Agency Information Parking providers Data Road Maintenance Plans Housing / City Development Information
T4	Poor Air Quality		x			Aerial Thermal Survey Air Quality - Real Time and Monthly Data Contaminated Land Sites Air Quality Assessments Per Capita Emissions Data on regulated industrial sites Greenhouse Gas Emissions Report CCC Weather stations
T5	Inactive Young People and Unemployment			x	x	Childrens Social Care Data Unemployment Statistics

Key – City Vision

1	To be a city that works for jobs and growth
2	To be a city that works for a better environment
3	To be a city that works to support and celebrate young people
4	To be a city that works to protect its most vulnerable residents

The table on the preceding page clearly highlights the fact that Coventry has a host of opportunities locked within its existing information. However, without the right connections between siloed data sources it is difficult to identify those possibilities. Information based on reliable data is critical for strategic and operational decision-making and for addressing the challenges and opportunities the City faces. The use of incomplete, inconsistent or inaccurate data, or data not delivered on time, may give a distorted view of reality. Equally, the table highlights an absolute need to address the leadership challenge going forward.

Data is therefore the key enabler for realising the City's vision. The analysis performed also highlights that the City weakness of 'Disconnected Data Sets' is intrinsically linked to all four objectives for the Council's vision. In order to determine the most appropriate project and therefore the associated systems and data sets, we have been through a formal process that is described in the sections that follow.

Partner Engagement and Idea Generation

The Future Cities concept was proposed to a number of trusted public and private sector Council partners. This included internal departments within the Council and external suppliers who have expressed an interest previously in leading edge technological solutions for the city. A significant number of ideas were generated through the interaction with these partners, many of which are included in the table below.

<p>Coventry: Smart Grid City – A project to turn the entire city in to a smart grid network.</p> <p>Fast and Clean Transportation System (FACTS): an integrated system, including the transport of people, goods, voice and data. A trolley bus transport system and overhead cable infrastructure on major city routes. The project would incorporate congestion charging for non electric vehicles, subsidised park and rides, electric vehicle charging at car parks, roof rack type systems fitted to hybrid delivery vehicles, cycle paths and cycle hire schemes. Data would be communicated by fibre mounted</p> <p>Greening the 'grey' fleets: A project to reduce the grey fleet usage of the City Council, the universities and the city hospital. The project investigated the introduction of electric car clubs, associated infrastructure, booking systems and core usage requirements.</p> <p>Improved access to health through an expanded electric bus fleet: Connecting the sub-region (Nuneaton-Coventry-Leamington area) to Walsgrave via a high quality electric bus service and new interchange facility at Coventry Station, incorporating electric vehicle charging for taxi's and other vehicles.</p> <p>Transport booking system for GP practices and hospital: An integrated appointment booking system at GP practices and hospitals, whereby a patient database is developed and utilised to organise transport arrangements upon booking an appointment.</p> <p>A City Wayfinding Portal: A smart phone driven system providing a GPS fed app detailing bespoke mobility options for moving around the city (to include car, bus, taxi, train, walking and cycling data), customisable parameters would include time, cost, travel method etc.</p> <p>City Wide Air Quality measurement: a real time system dynamically informing traffic controls and monitoring the effects of congestion on the air quality in communities and leisure spaces.</p>	<p>Personal Rapid Transit system: A proposal to create a city based transport network of 'on demand' driverless pods to link key employment sites and out of centre car parks. At off peak times, pods would be used to transport goods and waste.</p> <p>SMART Coventry: A 'BIG Data' proposal for the city. The scheme would join up the different systems of the city council, with external bodies such as the NHS patient transport section, taxi services, local and national Highways Authorities and city security systems. The central hub uses a common data base to collate data from different data sources and data owners and present the information to the user in a common manner. The users would be able to plan vehicle use and travel plans, book journeys to minimise the number of vehicles on the road and journey times.</p> <p>Future City Mobility: provide co-operative system reducing traffic congestion and optimising the use of fleet vehicles such as public transport and goods/freight logistics in the urban environment by providing both in-vehicle and smartphone applications for predictive inbound and outbound multi-modal journey planning and predictive re-routing of critical services including buses and blue light services.</p> <p>Coventry Knowledge Hub: A knowledge hub to address the overarching problem of un-used data and segregated data systems. The integration of data from various city sources and partner operated initiatives is the vital first step in designing and developing integrated city systems.</p> <p>Vehicle Inductive Charging on the City road infrastructure: a project to install inductive charging infrastructure, both static and dynamic, in selected locations in the city. By working in conjunction with a number of vehicle manufacturers and operators, we will demonstrate the benefits that can be realised to vehicle owners, vehicle and transport operators, energy providers, vehicle manufacturers and the City Council through an 'inductively-enabled city'.</p> <p>Smart Communities: Community based energy usage data informing Community energy action projects.</p>
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The TSB has provided guidance on what is expected to form a demonstrator project and as a high number of ideas were still at the ‘conceptual’ phase they therefore have not yet materialised into a project outline that could be taken forward for application consideration at this point in time.

High Level Project Outline Review

Those partners who were able to translate their initial ideas into a workable project outline within the time line provided by the TSB were asked to complete a high level project template describing some of the key considerations noted by the TSB. This specifically includes at a summarised level the following details:

- A high level summary of the initiative
- The city challenges and opportunities to be addressed
- The city systems and data sets to be integrated
- Benefits that are to be achieved through implementation
- Summary of how those highlighted systems will be integrated
- Risks to delivering
- High level resource requirements
- High level costs for the delivery of the initiative and any known ongoing costs

The potential projects were processed through a defined framework to assess their appropriateness against the requirements and values of the Future Cities concept. The collaborative evaluation of all project proposals was performed by the Coventry City Council project team. Each project was assessed against a series of criteria broadly established from the TSB guidance to determine both their appropriateness and achievability.

Example Attractiveness Criteria	Example Achievability Criteria	Template Graph
<ul style="list-style-type: none"> • Scale and quality of benefits to Coventry • Potential for further development and use beyond the initial two years of funding • The extent to which multiple systems will be integrated through the project • The extent to which the project addresses existing problems within the city • The extent to which the project harnesses recent or current investment in the city infrastructure • Level of innovation 	<ul style="list-style-type: none"> • Project Plan available with individual work packages with milestones, deliverables, resources and measures of success • The adequacy of risk assessment and contingency planning • The extent to which detailed costing has been included (eligible and ineligible costs) • Capacity and capability of the Council (or defined third parties) to deliver the project. • Likelihood of benefits realisation 	<p>The graph is a 5x5 matrix with 'Attractiveness' on the vertical axis and 'Achievability' on the horizontal axis, both ranging from 1 to 5. The top-right quadrant (Achievability 3-5, Attractiveness 3-5) is colored green. The rest of the matrix is colored orange or red, with the bottom-left corner (Achievability 1-2, Attractiveness 1-2) being the darkest red.</p>

Note: The key focus at this stage for the purposes of the Feasibility Study was to ensure the projects aligned themselves to the challenges and opportunities the City faces and the concept of Future Cities. As a result the detail required to support ‘Achievability’ was more relevant to the application stage of the process.

Each project outline was scored between 1 (low) and 5 (high) for each relevant criteria to determine which proposal demonstrated the best fit against the Future Cities Concept and therefore could at this stage be taken forward through to the application. The following five projects were assessed as part of this process (supporting information provided within preceding table):

- 1) City Wide Information System (SMART Coventry)
- 2) Coventry Knowledge Hub
- 3) Vehicle Inductive Charging
- 4) Future City Mobility
- 5) FACTS – Fast And Clean Transport System

Project Selection

The integration of city systems acts as an enabler to assist in tackling the City’s challenges especially in the areas of traffic congestion, air quality and fuel poverty where a wealth of data is already available across the public and private sectors.

Based on the detail contained within this Feasibility Study, the potential for integrating disparate systems and data, and the quality and potential benefits of the project outlines submitted, this report recommends that Coventry City Council submits an application to the TSB for the full £23.5m to fund a large scale demonstrator project that consists of:

- **Coventry Knowledge Hub (CKH):** to address the overarching problem of un-used data and segregated data systems. The integration of data from various city sources and partner operated initiatives is the vital first step in designing and developing integrated city systems. Data will be collated which clearly represents and impacts on the themes in this study.
- Two interrelated demonstrations will be used to illustrate, test and embed the CKH:
 - i. **Vehicle Inductive Charging:** focus on the drive to reduce vehicle tailpipe emissions (CO₂), reduce noise and improve air quality. Picking up on the limitations of electric vehicles in terms of range and cost the demonstration will provide for a dynamic and static induction charging infrastructure that vehicle manufacturers, operators and users will test and enjoy.
 - ii. **Future City Mobility:** deliver scalable architecture for mobility data collection and service provision covering multi modal transport infrastructure, vehicles and users. It will integrate telecommunications, electronics and information technologies to plan design and operate maintain and manage transport networks.

The Coventry Knowledge Hub (CKH)

The implementation of a “knowledge hub” or framework within which data can be intelligently amalgamated and analysed presents the opportunity through which an infinite resource of information can be integrated. The CKH acts as the catalyst through which the City learns and improves systems and processes to further address the city’s challenges. The lessons learnt are the initiators for further projects, from which further data is created and so the cycle continues.

The Knowledge Hub concept does not limit the city challenges and issues that can be addressed, but instead provides a living framework that can be adapted to meet the needs of the city as these change over time. The intelligent, intuitive and proactive use of data is a fundamental requirement in the transition to a successful future city. Data residing in public and private sector systems to project derived statistics remains redundant as a result of the disconnected manner in which information is handled. Open access to data, increased cross sector partnership working and the interoperability of city systems will enable the better identification of city issues, performance and opportunities. Information can be gathered and combined intelligently to inform Council decision making, to upscale city projects, to work collaboratively with the public and Coventry SME’s and enable the Council to better address areas of challenge and socially marginalised groups.

This initiative presents a real opportunity to make significant improvements within the City. It also offers the opportunity for Coventry to be the shop window for Future Cities developments as a disseminator of best practice thereby extending the benefits of integration beyond the city. The opportunity exists to create a greater working partnership between all parties and to maximise savings and benefits city wide. The collated data and information will have a value and use which has not been available before.

The main city challenge that will be addressed by the Coventry Knowledge Hub will be the overarching problem of un-used data and segregated data systems. The integration of data from various city sources and partner operated initiatives is the first vital step in designing and developing integrated city systems. Within the opportunities for the city, data will be collated which clearly represents and impacts on the themes in this study.

By targeting systems that directly relate to the city challenges, effective data and systems integration will enable greater understanding of data trends/patterns which directly impact on key services. Detailed data analysis will ultimately lead to intelligent solutions which will improve city services,

reduce energy consumption and make better use of existing infrastructure to manage the effects of population growth and associated mobility and future service demands. Economic impact will be maximised through proactive stakeholder engagement - citizens and businesses (particularly SMEs), and strategic policy changes.

Vehicle Inductive Charging

Key Features	
Potential Systems – Public transport, Transport Network Operators, infrastructure providers , Telecommunication providers (land and mobile), Network equipment providers, Vehicle manufacturers, Health providers	Challenges & Opportunities - Congestion and transportation and lower energy usage

The drive to reduce vehicle tail-pipe emissions to reduce CO2 output is well-known and well documented. Nowhere is this more important than in the urban environment, where reduced noise pollution and improved air quality offer significant benefits. As vehicles are one of the bigger contributors to CO2 emissions, an understanding of traffic flow and how this can be improved or reduced within the urban space is a key enabler in improving air quality.

This project proposes to install inductive charging infrastructure, both static and dynamic, in selected locations in the city. By working in conjunction with a number of vehicle manufacturers and operators, the aim will be to demonstrate the benefits that can be realised to vehicle owners, vehicle and transport operators, energy providers, vehicle manufacturers and the City Council through an 'inductively-enabled city'.

Inductive charging can be either static or dynamic. In static applications the main advantages are convenience and aesthetics; a driver does not have to physically connect the vehicle by cable to a charging station, and the charging equipment is mounted either on or in the road, reducing the proliferation of unsightly charging posts. Dynamic charging allows vehicles to take on board charge whilst travelling on the road infrastructure. This has the advantage of reducing the size of the battery required on the vehicle, saving cost, weight and precious natural resources and, with sufficient in-road infrastructure, could yield almost unlimited urban range.

A better understanding of traffic congestion within the city opens the door to previously unexplored and innovative inductive charging solutions. Areas of traffic congestion offer good opportunities for vehicles to maximise the charge that they are taking from an inductive charging system. Purpose designed vehicles will provide opportunities to reduce vehicle size (and therefore improve vehicle density distribution) and, coupled with other technologies which allow communication between the vehicles and the road infrastructure, provide information for real-time traffic-flow management.

From the perspective of the challenge of lower energy usage, there are at least two significant opportunities offered by inductive charging. Firstly, demand predictability can lead directly to supply management, which potentially has the benefit of reducing unnecessary generation and subsequent energy-shedding. Secondly, the vehicles in an inductively-enabled environment give the power generators the opportunity to use the fleet as energy storage, using that energy to balance back into the grid when needed. All of this results in net lower energy usage in the city. The other challenge to be addressed is environmental pollution, in terms of air quality improvement through reduction in tail-pipe emissions, noise pollution through the replacement of ICE with electric technologies and aesthetic pollution by significantly reducing the proliferation of street furniture, i.e. charging posts, with all of their maintenance and other liabilities.

A key component for this initiative is the data required from various sources such as public transport, transport operators, telecommunication providers and vehicle manufacturers that when integrated

provides the overarching framework for the charging infrastructure to be implemented effectively and efficiently. The Coventry Knowledge Hub will therefore be a key enabler.

Future City Mobility

Key Features	
Potential Systems – Transport, Energy Management, Routes, Health providers	Challenges & Opportunities - Reducing emissions, Reducing congestion, Reducing accidents, Improving wellbeing

Intelligent Mobility is the integration of information and communications technology with multi-modal transport infrastructure, vehicles and users to provide innovative services relating to different modes of transport and traffic management. Users can then be better informed and make safer, more coordinated and ‘smarter’ use of transport networks. Intelligent Mobility integrates telecommunications, electronics and information technologies with multi-modal transport to plan, design, operate, maintain and manage transport systems. It is possible to control and optimise the performance of the overall network for consumers. The project will deliver a scalable architecture for mobility data collection and service provision using a cloud based architecture to minimise the need for unsustainable infrastructure programmes.

The overall objective is to provide a co-operative system reducing traffic congestion and optimising the use of fleet vehicles such as public transport and goods/freight logistics in the urban environment. This will be achieved by providing both in-vehicle and smartphone applications for predictive inbound and outbound multi-modal journey planning and predictive re-routing of critical services including buses and blue light services. The project will require the integration of controlled, predictive and potential random datasets from the general public, service providers, fleet operator and road network operators.

Key challenges and opportunities addressed include:

- Transport is a driver for economic growth - addressing the innovation challenge to deliver ‘More for Less’ from the transport which is a major driver for the economy and society as a whole.
- Reducing emissions - mobility is about moving people and goods in the most efficient way possible which will have significant beneficial impact on the city’s targets for carbon reduction.
- Reducing congestion - the rising cost of congestion will waste an extra £22bn worth of time in England alone by 2025.
- Reducing accidents – the majority of accidents causing serious injuries or deaths in England occur on urban roads. In addition to the direct social costs, there are costs to the economy through the loss of output and potential adverse effects on the reliability of journeys because of the disruption to the network.
- Improving wellbeing - current levels of air pollution are damaging to health both in the short and long term. The effects on our respiratory and cardio-vascular systems are estimated to lead to 12-24,000 premature deaths per annum. There is an increasing level of obesity in society and intelligent mobility is not just about the use of vehicles but the whole transport infrastructure including walking, cycling, etc.

The Coventry Knowledge Hub will again be an enabler for such a project which is data intensive. The CKH would provide the data sets and analysis for effective and efficient transportation within Coventry.

Section 5: Approach to Integration

Overview

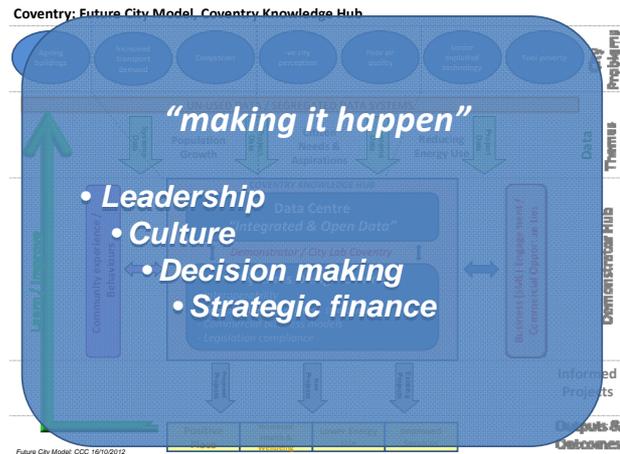
The table set out in section 4 clearly highlights that both Leadership and Data are the key weaknesses that needs to be addressed.

Overview – Leadership

As acknowledged in the SWOT, the leadership issues that inhibit the adoption of innovative solutions to city problems are a key weakness that this approach aims to address. To that end activity will be required to address the very real leadership hurdles that inhibit action. These hurdles include leadership overall, culture, decision making and finance.

In this important area of overall leadership, officers will link to the Council's ABC (A Bolder Coventry) team that is already addressing these crucial issues. This is best viewed as an overlay to the CKH model.

An assessment of the impact of the review into leadership and decision making as it relates to the implementation of new solutions will be made and shared.



Overview – Data

Historically, data has been the domain of information technology and has been customised for specific business and functional parts of organisations. We have seen a significant shift of leading companies to adjust their strategies to treat information as a corporate asset and move beyond an approach that treats data primarily as a critical technology enabler. This shift includes a focus on enterprise governance and business ownership and leadership. The shift also includes an integrated approach to designing data models and related architectures, and critically depends on a commitment to rationalisation and standardisation of information throughout the organisation.

Organisations who are at the forefront of managing information as an asset have invested in the creation of information centres (such as a knowledge hub) to provide the capabilities to ensure they are continually developing and enhancing the information to which they have access. The demands of the city are driven by a mixture of the desire to maintain the status quo and changing requirements from external bodies such as Central Government and resulting economic pressures. Use of a knowledge hub allows the changing demands of the city to be responded to in a timely manner.

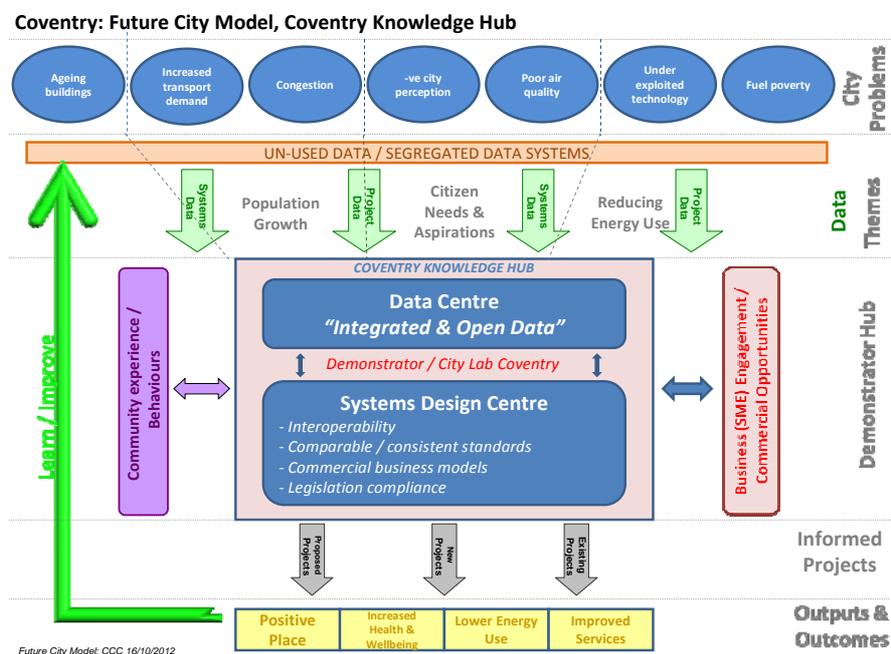
Leadership: Making it Happen

This cross cutting element of the package will look to uncover best practice from other cities in the UK and from around the world to see how Coventry might best adapt its leadership positioning and its decision procedures to realise the full potential of innovative ideas. It is intended that a dedicated officer and Hub staff will work with a small Council team established earlier in 2012 to address wider governance matters including engaging with citizens. It has the very direct support of the Council's Chief Executive who will maximise the benefit of the work through engagement with other institutions examining this complex but crucial set of challenges.

Coventry Knowledge Hub

The concept of the Coventry Knowledge Hub (CKH) is built around legacy systems and data and to view this initiative simply within the context of a single problem is to miss the premise on which the CKH has been conceived. The emphasis is on the ability to learn and improve and with the incorporation of new, expanding and updated data sets, increase the variety of analysis that is performed. Modern day cities evolve and with that so do their challenges and the demands of their citizens. The CKH proposes the implementation of a framework through which, given the availability of relevant data, any issue can be addressed.

The CKH therefore represents the 'Approach to Integration' by providing a central function focused on integrating city wide systems and data sets. The diagrammatic representation below highlights the vision of the key elements of the CKH and the clear linkage to city problems, data themes and ultimately the projects that drive the outputs and outcomes for the benefit of Coventry. (In addition to the model, Appendix 9 details the skills requirement necessary to establish a functioning knowledge hub).



This Coventry Knowledge Hub Initiative is made up of three discrete parts, which will work together to form a leading edge Integrated City Ecosystem.

1) An Integrated and Open Data Centre

Currently there is limited consolidation of data from city services or from various initiatives run by private and public sector partners within the City. The implementation of an integrated and open Data Centre will look to change that and to bring together and validate data from these sources. Open Data is a key driver in terms of European Commission's drive for smart city development.

2) The Systems Integration Design Centre (SIDC)

This will focus on the design of integrated systems along four main areas of activity: Interoperability of systems, standards, business models and human factors / user behaviours. Within these areas, the SIDC will monitor trends and look for the unknown, or the opportunities, for product development and / or process improvement. These are key areas for the development and implementation of integrated city systems.

3) City Lab Coventry

City Lab Coventry is the hub of the Integrated City Ecosystem, as an accredited part of the European Network of Living Labs it also gives access to European best practice in this area. The Lab is the focus of the engagement with SMEs and the citizen. The Lab enables the City Centre to be used as a real-life experimentation environment where users and producers can co-design, co-create, demonstrate and pilot test innovations. The Lab will be the vehicle through which SMEs will have access to the Open Data Centre and the Integration Design Centre to develop products and services.

It will be compulsory for any project that is part of the Future Cities Demonstrator to provide relevant data and systems access to the CKH. Any outputs from the subsequent data analysis and development of new and innovative solutions within the SIDC will be used to justify investment in upgrading and improving relevant city systems (where direct economic and social benefits can be identified). Coventry citizens will be engaged through existing City Council dissemination channels, media and PR activity, together with the execution of specific campaigns (similar to CovJam and Voice Your View), and the user-centred design aspects of City Lab.

The CKH will bring together an appropriate mix of data analytical, IT (technology enabling) and City Challenge specific resources to produce outputs and outcomes that drive clear and concise decision making and ultimately deliver projects that can drive benefits into Coventry.

Project Specific Integration Information

Coventry Knowledge Hub

- The Knowledge Hub will put the tools in place to enable the integration of city systems, including: interoperability between systems, standards of data and business models for the integration of city systems. The Hub is the catalyst for the integration of systems within the city.

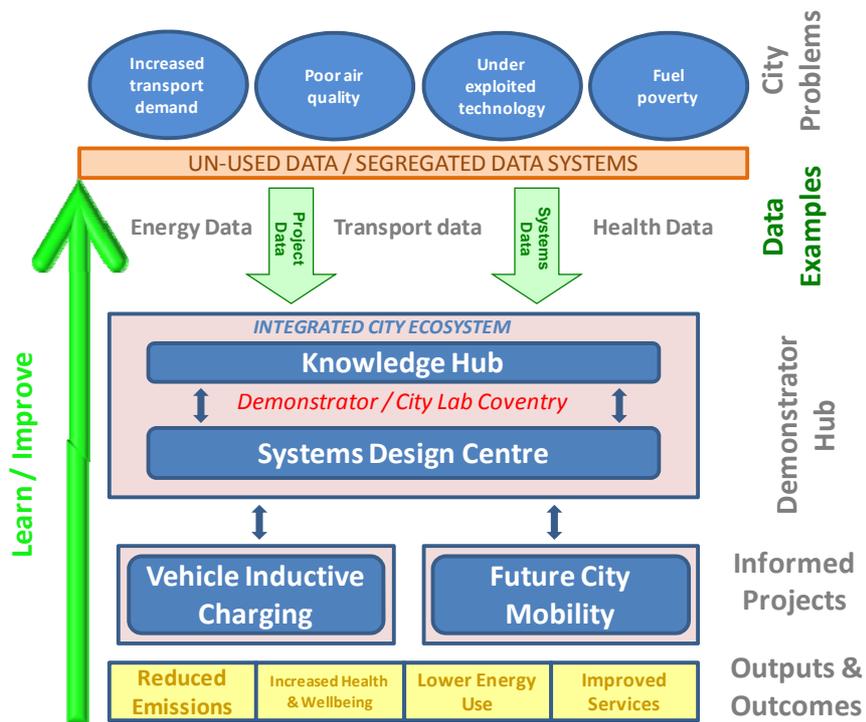
Vehicle Inductive Charging

- The two major systems which would be most closely integrated would be transport and energy management, as previously described. However, the ability of the system to offer a data communication capability also has benefits for way-finding, fleet operation and management, congestion management and others. This might include, for example, data about the location, availability and state of readiness of inductively enabled car share vehicles, public transport, council vehicles, health-care vehicles (ambulances, medical supplies, GPs). In such a way, routing data could be provided, including priority routing for emergency vehicles. With city-scapes often generating wireless and GPS dead-zones, the ability to communicate through a different infrastructure could be very beneficial.
- Whilst the physical inductive infrastructure provides one of the means through which to transfer data, which facilitates integration, the processing of this data to make integration effective should be carried out through an 'integration hub'.

Future City Mobility

- Elements of the protocols for this type of system or systems approach have already been studied using the innovITS Advance facility where the traffic control systems, vehicles, nomadic device, wireless communication systems have been integrated to achieve the overall system architecture.
- Coventry City Council are critical to the partnership and there is a level of understanding within the project of the existing traffic management systems. Core expertise is also included for developing the applications for both nomadic and in vehicle devices. There is also extensive background know how in vehicle telemetry systems including V2V, V2I, V2X architectures and controls.

The proposed integration approach is therefore aligned to utilising the CKH to integrate data in a format and standard that the two projects of Vehicle Inductive Charging and Future City Mobility can utilise respectively for delivery and ongoing maintenance of the proposed project outputs.



Overarching Data Governance and Integration Approaches for a resource such as they Coventry Knowledge Hub are further explored and detailed in Appendix 10.

Section 6: Benefits

We have provided a summary of the benefits associated with integration of City systems in a general context and specific to the project being proposed.

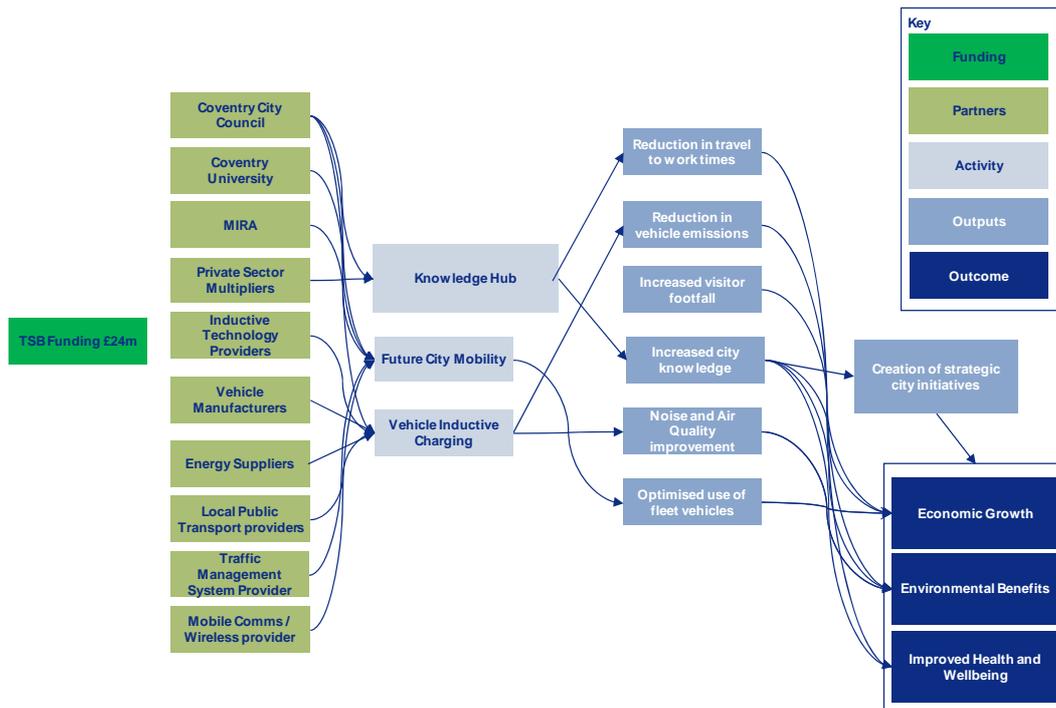
Overall

There are overriding benefits associated with the integration of multiple systems and data sets, this includes and is not restricted to:

- **Effective action planning and management:** The Knowledge and understanding gained from the Coventry Knowledge Hub integration allows the city to perform more effective scenario planning and better informed strategic decision making. The Knowledge Hub is an iterative process that can be adapted to analyse fresh data reflected in the city's changing strengths, opportunities, weaknesses and threats. Accurate, innovative interpretations of city data can then be used to help set city targets and priorities, identify opportunities, access resources, evaluate actions, measure progress, and develop jobs and growth.
- **Innovation** is derived from connectivity, meaning technical integration of the city's legacy systems through open platforms. Real-time interconnected data will help city authorities to undertake better management, make faster decisions, and optimise the effectiveness of decisions made.
- Benefits to be obtained from the **coordinated, intelligent and integrated management** of city data include:
 - **Single version of the truth** – A single data set results in an accurate interpretation of city data that is not contradicted by disconnected islands of data. Accurate data is fundamental as this represents the foundations upon which future city decisions will be made.
 - **Data quality, governance and data trust** – Established data quality and governance practices improve the reliability of city data but also the efficiency and effectiveness with which data is used for the benefit of Coventry.
 - **Extensible model** that can grow with the city – creating a sustainable model that through integration identifies new opportunities through which city challenges can be addressed. As new opportunities are borne, so is further data for incorporation into the model and the ability to manipulate data in new ways to address city issues as they evolve over time.

Project Benefits

Any project requires a clear delivery of outputs and outcomes based on the activities that are being conducted. The representation to follow highlights the conceptual map for the project being proposed. To avoid complication the cross-cutting leadership element has been omitted from the mapping.



The Coventry Knowledge Hub Benefits

Given the innovative and open-ended nature of the Coventry Knowledge Hub proposition, there is no exhaustive or restricted list of benefits that can be achieved. The Knowledge Hub is a tool through which the “Future Cities” vision for Coventry can be achieved. The Knowledge Hub is less geared towards the achievement of direct benefits and more towards the investigation of relevant challenges, from which solutions and ultimately benefits can be derived.

Cities nationally are attempting to leverage the benefits and insight that are locked within their information assets through the time consuming, manual manipulation of data. The knowledge hub revolutionises this process and empowers data owners in the following ways:

- To anticipate case volumes, optimize staffing levels, improve case throughput, monitor finances and prepare reports in one thorough application.
- Develop the ability to rapidly build a number of predefined scorecards, interactive dashboards and ad hoc reports with limited or no IT involvement.
- Reduce redundancy of reporting tools required to be licensed and maintained.
- Enable dynamic reporting at various time dimensions, including daily, weekly, monthly, quarterly and yearly views.
- Enhance ability for measurement definition and reporting cascading from strategic levels to individuals.
- Reduce the backlog of reports requiring IT development by putting capability in hands of end users (power users, super users, etc.).
- The Coventry Knowledge Hub will provide a greater understanding of city performance and from this allows an informed evaluation of the true impact of city initiatives and projects.

The Coventry Knowledge Hub will in many ways provide the glue to reflect the benefits that are accrued to the city (and the UK) through initiatives undertaken within the city. Although each initiative and activity run by the city and its partners accrues their own benefit to the city, this is maximised by their integration and the knowledge gained as part of this process. The Hub acts as the catalyst through which the City learns and improves systems and processes to further address the city’s challenges. Furthermore, The Hub will link systems beyond the city boundaries into national frameworks (possibly for example including the NHS); as the city does not function in isolation.

The benefits to the city economy will be reflected in the work of City Lab Coventry as it engages with the local SME community. Knowledge hub data creates a test bed from which innovative SME's will be able to develop and pilot new products and services.

- The city economy will also benefit from improved service delivery through improved interoperability and business models.
- Benefits accrue from a low carbon transport system which enables greater levels of use of the city by individuals and businesses.
- The cost of operation of a low carbon fleet of council owned vehicles will be reduced. The energy efficiency of the city will be improved.
- The city will be recognised as a leading environment supporting the development of leading edge technologies.

The benefits to the quality of life of the city citizens will also be a key element of the work of City Lab Coventry as it engages the SME community to the Citizen and through the work of the Systems Design Centre as it proposes new initiatives to address the city themes and problems. The integration work of The Hub will influence health and wellbeing of citizens, economic growth and jobs in the City and also be a building block in developing Coventry as a positive place.

The Coventry Knowledge Hub will create a feedback loop between Coventry citizens, their actions and the environment. People moving within a city predominantly base their decisions on information that is static and that does not reflect the actual state of systems and dynamics within their city (for example printed transportation timetables and static opening hours). Companies and local authorities instead increasingly manage their networks in real-time, always aware of the current system state. The generated data is kept segregated, and whilst useful to each individual, contains much more value when put to creative use as made possible by the Coventry Knowledge Hub. Knowledge Hub integration creates the opportunity to provide Coventry residents with access to useful real-time information about their city upon which real- life decisions can be based.

The benefits in reducing environmental impact will come from the improved services and better intelligence about key areas where improvements have positive environmental impact. For example this will initially cover transport use within the city. This will inform further initiative development of city systems and, where necessary, initiatives to address city problems.

Clearly specific performance indicators will need to be established for each new project that is developed from the knowledge hub process, with the key point being the whole purpose of this initiative is to improve economic, social and environmental well-being for residents of Coventry. Overarching indicators that are applicable include:

- Economic prosperity – new jobs and/or inward investment derived directly and indirectly from the Knowledge Hub itself and the creation of multiple projects
- Reduction in “regrettable” events – crime and disorder, alcohol related hospital admissions, new cases of domestic violence, referrals of children ‘at risk’
- Quality of life indicators

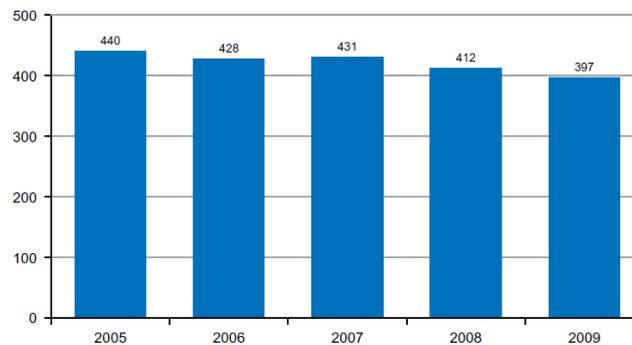
Vehicle Inductive Charging Benefits

Benefits accrue from a low carbon transport system which enables greater levels of use of the city by individuals and businesses. The cost of operation of a low carbon fleet of council owned vehicles will be reduced. The energy efficiency of the city will be improved. The city will be recognised as a leading environment supporting the development of leading edge technologies.

The residents of the city will benefit from easier negotiation of the city, especially in peak times. The city will be a quieter place to be, with improved air quality, with all of the consequential health benefits which accrue from these factors.

Noise and air quality from dramatically reduced tail pipe emissions are the most immediately obvious impacts, together with the more global impact of the reduction of carbon emission in power generation from a better demand-responsive system. The benefits of this will be manifested in more social use of city spaces which will better support fragile eco-systems. Ultimately through the initiatives planned by reducing traffic congestion the key benefit would be to reduce total carbon dioxide emissions from transport for Coventry to a greater extent than demonstrated between 2005 and 2009.

Figure 6.1: Carbon dioxide emissions from transport sources in Coventry excluding air travel and motorways (000s tonnes) [Source: Coventry City Council- Climate Change Strategy]



Benefits Summary		
Example Performance Indicators	Supplementary notes	Benefit Summary
Energy consumption	Per passenger mile within Coventry	Decrease
Total CO2 emissions	Vehicular traffic in Coventry or average CO2 emission of cars registered to Coventry residents	Decrease
Electric vehicles (plus hybrid vehicles)	% of total vehicles registered to (a) Coventry residents and (b) Coventry businesses. OR take-up of Plug-in Car Grants for electric vehicles by Coventry residents	Increase
R&D investment into dynamic charging systems	Investment received from public and private sector organisations (including jobs created)	Increase

Future Mobility Benefits

The ability to move people and goods efficiently is the cornerstone of the city economy. It enhances existing trade and is a key enabler for inward investment. Co-operative systems reduce congestion and optimising the use of fleet vehicles such as public transport and goods/freight logistics through the integration of all forms of transport will make the alternative modes more usable and attractive changing people's perception. By building on existing systems, partnerships and historic investment in transport infrastructure it will provide the maximum impact at minimal cost.

Quality of life is improved as a direct result of reduced congestion (wellbeing), CO2 and pollution reduction. In particular the deliverables will be route and mode planning based on demand detection with user and demand based priorities thus reducing standing traffic, enabling 'green corridors' improving efficiency and promoting modal shift to public services. Key priorities will be addressing hospital prioritisation and 'blue corridors', dynamic routing of public transport, logistics fleets and amenity fleets. All of which address the needs of the ageing society and the needs of deprived communities. Inherent in the strategies will be improved road safety and safety for pedestrians, cyclists and children contributing to the national casualty reduction strategy and optimisation.

Benefits Summary		
Example Performance Indicators	Supplementary notes	Benefit Summary
Number of people living within 30 minutes (or 1 hour)	Travel time to Coventry city centre, Current baseline is 1.14m.	Increase
Footfall of people visiting Coventry	For (a) shopping, (b) tourism and (c) leisure	Increase
Quality of life indicator	Covering health and environment	Increase
Travel times indicator	Average journey time per mile at peak periods on key routes	Decrease
Total CO2 emissions	Vehicular traffic in Coventry or average CO2 emission of cars registered to Coventry residents	Decrease

Section 7: Barriers

As a significant change to local public practice, involving a large number of independent stakeholders and potentially personal identifiable information, there are a number of barriers that require effective mitigation. We have assessed these barriers, across the implementation and operation of the knowledge hub and have grouped them into three broad categories surrounding the risks for people, process and technology and data.

Future City Barriers		
People	Process	Technology & Data
Barriers as a result of the ability and/or availability of key individuals to perform the tasks in hand	Barriers that are in place due to complex, over engineered process models or lack of governance processes and controls	Barriers associated with the stability and integrity of the technical platforms / systems and the quality of the underlying data

People Barriers

Barrier Title	Barrier Summary	High Level Proposed Mitigation
Resistance to change	Citizen indifference or unwillingness to engage / change behaviours. Similar to the risk of being unable to engage the policy makers, this risk would have a significant impact on the level of behavioural change that could take place as an outcome to the Knowledge Hub's work.	This risk would be mitigated both through the human factors / behaviours theme of the SIDC and through the work of City Lab Coventry, which has a focus on user-led design and development.
Advocacy	User buy in is critical to the outcomes of the system, if the users both public and city authorities do not want to use the system, do not trust the information, or regard it as not beneficial to either them personally or the city, then the system has failed to deliver the outcomes regardless if it is actually capable of doing so or not.	Prior to the system design user testing would be essential, publicity and education will be required to ensure users of all types buy in to the system.
Public Perception (Vehicle Inductive Charging)	This project requires selected stretches of the city's road network to be dug up to install the dynamic infrastructure. This could lead to negative comments from road-users and residents. Furthermore, there is likely to be a need to reassure people that the electric cables and inductive loops buried under the road are no more dangerous than the other services (for example gas mains) already existing.	Ensure citizen feedback is captured before, during and after implementation including resources specifically assigned to manage and monitor 'the user experience'.

Process Barriers

Barrier Title	Barrier Summary	High Level Proposed Mitigation
Leadership / Decision Making	Existing processes are often ineffective in allowing the adoption of innovative solutions to city problems. Issues of lengthy / ineffective decision making timescales, decision ownership and risk averse cultures are common place.	The 'Making it Happen' work stream will seek to identify and learn from best practice. The activity will work to improve established practices to better inform and speed up the formal process.
Local policy	Unable to influence public sector policy makers. This would have a significant impact on how much change could take place from the outputs and outcomes of data analysis.	The risk would be mitigated by running The Hub as a partnership initiative with shared responsibility between the Council and the University, including secondments of key staff.
Data Governance	Many organisations do not operate functional and mature data governance practices. These organisations often incur additional costs through: <ol style="list-style-type: none"> Poor data quality, data errors, duplications and omissions in transactions data and master file data Failed system implementations and data migration projects Inefficient business processes and controls 	Develop practices, standards, models and processes in line with applicable industry guidelines. Improved data governance will lead to improved data quality, integrity and availability of data and increased data confidence.
Partner Participation (Vehicle Inductive Charging)	The project requires the participation of inductive technology providers, vehicle providers and users.	The technology providers are keen to engage in a large scale demonstrator project, not just to promote their own businesses, but also to promote the technology generically. Partner management is therefore of upmost importance.

Technology & Data Barriers

Barrier Title	Barrier Summary	High Level Proposed Mitigation
Data Quality	Every organisation has to deal with Data quality issues, but achieve varying degrees of success. Poor data quality can lead to: lower stakeholder satisfaction, failed business process, extra work, loss in system credibility, extra costs, missed opportunities, compliance problems, and inaccurate reporting.	Develop practices, standards, models and processes in line with applicable industry guidelines. Potentially seek dedicated resource within the Coventry Knowledge Hub to find the largest percentage of errors, fix these errors, document why these errors are occurring and create controls to prevent these errors from continuing to be entered. The remaining percentage of errors can be cleaned through the use of an automated engine.
Data Management	Data security / assurance; data robustness / resilience and interoperability. This would impact on the usability of the data and may impact upon the commercial benefits of the projects.	This risk is mitigated by the adherence to data standards and protection laws, which for example protect the individual, whilst the data can be used in aggregate.
Data Security	The ability to access and integrate data from public sector organisations. Public sector organisations may be unwilling to enter into partnership and give access to relevant data and information. Without access to this information, the scope of data sets and ultimately relevant outcomes from subsequent analysis may be limited. There have been many high profile instances of data loss or theft. A combination of increased risk (often underestimated) and increasing regulation and data legislation (often misunderstood), have led to ill-planned, costly and ineffective solutions. The costs of failure can include large fines, loss of confidential and valuable information, and significant damage to the business through customer and other stakeholder dissatisfaction.	Assess information security practices against business objectives and legal / regulatory requirements, aimed at protecting data confidentiality, integrity and availability. Topics include: <ul style="list-style-type: none"> • Security policies and procedures re: passwords, mobile computing, email, internet use, encryption, backup, network and database security, anti-virus, incident management, etc. • Understanding the value of data assets; addressing the risks of loss. • Effective segregation of duties and access controls • Compliance officers trained in providing assurance to various acts such as DPA (Data Protection Act)
New Technologies	Inductive systems have been demonstrated reliably, but at relatively low volume to date. This is particularly so regarding dynamic induction charging systems.	To minimise these risks, it would be the intention to engage with a number of potential providers in each field, which will also enable us to demonstrate interoperability between proprietary systems, which will be necessary if the technology is to be widely deployed. The early establishment of an integration hub will mitigate many of the integration risks.

Whilst this is by no means an exhaustive list of the Barriers in achieving successful integration of city systems and data it does provide an overview of the type and scale of challenges that would need to be mitigated during the delivery and implementation of any given project.

These are in addition to standard project management risks associated with the timely delivery of the project outputs to the quality standards and cost budgets in place. Any project that is delivered would seek to utilise an industry recognised project management methodology and employ experienced and trained practitioners in managerial positions (such as project manager, design lead).