A. Profile of the Initiative

Geographic Region
Western Europe and Others
United Kingdom
Milton Keynes
Milton Keynes Council

Name of Country/Territory
United Kingdom

Name of City/Local Authority
Milton Keynes

Organization
Milton Keynes Council

Title, name and position of person(s) submitting

Basic City Data
Population Size: 270,000
Population Growth Rate(%) : 1.60
Surface Area (km²): 65.2
Population Density (people/km²): 4,141
GDP Per Capita (U.S.$): 1
GINI Index: 0.335
URL/Webpage of Your City:
URL/Webpage of the Initiative: https://vivacitylabs.com/
Main source of prosperity (e.g. industry, trade, tourism, creative industry, etc.) : Service Industry, Hi-Tech Business

B. Title and Abstract

For a large integrated initiative, please consider submitting up to three initiatives under the same title. For example, you may wish to submit under “Low-Carbon Urban Development for My City” an initiative on public transport, an initiative on energy efficiency in buildings, and an initiative on use of renewable energy.

Title or Tagline of the Initiative
'Citireps' Real Time data support transport operations in Milton Keynes

Sub-title

Start date of the initiative
2017-04-03

Tentative End Date of the Initiative (if not yet completed)
2018-03-31

Thematic Areas
Social Economic
Environmental
Governance/Management
Technology Others:

Abstract/Short description of the innovative initiative being submitted for Award.(150 words max)
Every day, millions of us take to the road to drive or cycle to work, to walk to school, or just to go about our business. We take the transport networks for granted, and assume cities will deal with everything. But, how do cities understand the transport network? How do cities know where to invest millions upgrading the roads? How can they make roads less congested, safer, and more sustainable for everyone?

The ‘Citireps’ project (MKC and Vivacity Labs initiative) was implemented in Milton Keynes in 2018 and is helping Milton Keynes by providing live and historic data on the types of vehicles and activities on its networks. The system consisting of 2500 sensors covers all major junctions, city car parking, bus networks and pedestrian areas. This provides visibility travel patterns and real time city busyness. This has been achieved by deploying low cost, highly capable sensors at scale across the city. The sensors equipped with on-board cameras and processors, (after discarding images so within data protection regulations) provide movement data in real time. This data when fed into a reporting system, gives cost effective, accurate, live information on activity. Additionally, with machine learning (AI) capabilities the system can accurately predict future levels of congestion, identify routing choices for traffic, Parking availability, busyness of buses and the impacts incidents. City planners are now deploying the information to traffic control systems so that the city continues to operate efficiently for all its citizens, answering the questions set in the opening paragraph.

C. Background Information

Describe the legislative or policy framework under which the initiative is taking place, for example, a public policy document at the central or local government level, a policy statement, a covenant, a compact or internationally recognized agreement including, for example, the Sustainable Development Goals, and/or the New Urban Agenda

MKC adopted its new Mobility strategy in 2018 (Local Transport Plan). This strategy places the introduction of technology at the forefront in assisting with the delivery of improved sustainable mobility for all citizens, visitors and businesses. The policy aligns with national UK strategy objectives, and the project was supported by UK government funding to deploy city-scale sensor technology providing real time data. The project is held up as part of the UKs grand challenge to deliver future of mobility.

D. Summary of the Origins of the Initiative

Describe what sparked the initiative and how the initiative came about and what challenges or issues of sustainable development it is meant to address using the following lead questions as your guide (350 words max)
1. Describe briefly the reason(s) for undertaking the initiative including social, economic, political or cultural challenge(s) or issues confronting the city/region/community. Include where relevant number of people, enterprises or institutions affected.

Milton Keynes is one of the fastest growing areas in the UK. Current plans will see the city double in size over the next 20 years to a population approaching 500,000. Whilst the city currently enjoys low levels of congestion, much of its mobility is currently met by private vehicles and this trend is likely to continue in the short to medium term. Without the resources to double the size of the transport network to meet the forecast doubling of travel demand the city needs to explore how it can sustainable increase its growth without suffering from increases in congestion, worsening air quality and reducing economic outputs, leading to an overall degradation of service to citizens. Taking forward cost-effective technological solutions was a key condition for supporting growth, and the council in developing its futures strategy tested this strategy with key stakeholders and citizens and found that the population fully supported the development of a **Smart Shared Sustainable Mobility** initiative which look to apply relevant technology-based solutions for addressing mobility challenges. Importantly the remit was also to ensure that mobility improvements needed to be inclusive for all citizens and helped address mobility equality along with ensuring sustainable economic growth.

2. Describe the goals of the initiative in terms of desired change or outcome and timeframe for achieving the change or outcome (for example, change in policy, strategy, business model, technology, means of implementation, financing arrangements, human development and empowerment, measuring and evaluating progress and impact, etc.).

The goal of the initiative is to provide real time accessible information around travel options to all residents and visitors to the city. The information, provided as live real time snap shops can provide stimuli for travel behaviour change potentially away from unsustainable modes, or negative impacts of travel. By providing a ‘busyness’ indicator of all travel options, informed choice can be made around the options that best meet the needs of the traveller. (practical application of Mobility as a Service) Potentially the choice can be influenced by intervention either by the transport authority or service provider which align to wider objectives. This could take the form of dynamic pricing of services such as parking, or bus transit, to lower or raise prices to influence demand that best meets the agreed objectives. The system has a unique capability around Artificial intelligence, so can forecast impact based on machine learning, meaning it can prevent negative impacts by taking advanced decisions on how and when information is given.

3. Describe whether the innovation involves any partnership (public-public, public-private, public-community, etc.) and if yes, who is or was the leading partner(s), the role they each played and whether other parties have benefited or are benefiting from your innovation and how?
The delivery of the project was undertaken through a partnership between the technology suppliers Vivacity Labs and Milton Keynes Council. Milton Keynes Council outlined the challenges cities face, particularly medium sized cities tackling the challenge of increasing demand on city resources and the negative impacts this was creating. MKC made senior experts available to discuss issues faced and how typically these were approached. It was quickly recognised that traditional approaches of increase travel supply could not meet forecast demand particularly for individual car travel options. However, it was established that most travel demand could be met if demand was spread between all available modes, and a barrier to achieving this was the availability of relevant up to date information. Knowing what options were available for transport users that was reliable and accurate was seen as key. Working in partnership the first stage was to develop initial capability of sensor technology to capture information. Small pilot trial was successfully concluded in 2015/16. The challenge was then to deploy this capability at scale that was economically and technically viable. Vivacity Labs clearly had the technical capability to develop the system, so following the development of a full business case the proposal was presented to UK Government as a first of a kind initiative. UK Government supported the application and provided partial funding to launch a city scale initiative which deployed 2500 sensors across MK transport network. The initiative was developed to demonstrate large scale deployment and the tech delivered the defined outputs in the business case (ie it worked) The potential therefore realise in a real city. The benefits now accruing are that through a practical demonstration that the system can be fitted in a city in a short period of time and can output valuable data. this has led to the initiative being rolled out in other cities including Oxford, Cambridge, Nottingham and on the entire UK canal network. in each of the following locations the system has been tailored to meet particular challenges, eg Nottingham to report on Air quality, in Oxford Parking in remote areas and for the canals a permit monitoring capability.

4. Describe the resources used for implementing the initiative, including funding/financing strategy or arrangements and any significant contributions that are not in cash, for example, in human, technical or managerial resources.

As described above the project recieve expert input from senior professional officers from the city. This was also supported by input from academic experts (Cambridge University) and business advisors providing advice from a commercial angle. This was achieved through a specially created advisory board that assisted in developing the initial business case to be put to the Government funding body (innovate UK).

Professional planners, highway engineers and transport planner also supported the installation process and worked with Vivacity Labs to develop the back office reporting systems. This partnership approach to delivery instigated by MKC was designed to ensure the system met the needs of both MKC and through this potentially all other transport authorities (cities) in the UK and beyond. In terms of financial resources, the project secured approximately £1.7m investment form UK government, matched by approximately £1.3m from private investors. the council supported via free advice and technical support for installations
E. Summary of the Innovative Aspect(s) of the Initiative

Describe the innovation for the initiative using the following lead questions as a guide. (350 words max)

1. Describe whether the initiative should be considered evolutionary or revolutionary. Evolutionary would imply that innovation evolved over time based on lessons learned from experience and that the changes or outcomes are cumulative. Revolutionary would imply something quite new or something that has been borrowed from elsewhere but never been tried before in the sector or context in question and therefore bears a certain degree of risk. If it’s borrowed from elsewhere, describe what the linkage with the other preceding experiences is.

The innovation is revolutionary in its application. The project is a first of a kind application deployed at scale in a city that links to a back office reporting system specifically designed in collaboration with the end user (Milton Keynes Council). It has the capability to detect both moving and stationary objects through visual technology (cameras) and process this information within the sensor to then transmit as processed data. With capability to collect and process data continually over a complete network, specifically developed algorithms can be applied to deliver AI capabilities that enable highway and transport network managers to respond to developing incidents or pressures, and through urban traffic control system will be able to activate responses automatically to deal with current and developing pressures. The potential is to create self managing system that can be set to deliver for example an equilibrium state where traveller are supported to achieve their travel objectives at a generalised cost for the city area that meets its requirements. The generalised cost can be set dynamically to respond to changing objectives that may develop overtime, ensuring the system is responsive and has a long lifespan.

2. Describe where the innovation is being applied, for example, in policy or strategy; planning, design and implementation; business model or financing arrangement; tools and technology; governance and administration; etc.

The sensor technology is now operational covering 14,000 car parking spaces in Central Milton Keynes, it is located on all 140 major highway junctions in the city, city centre pedestrian areas and on a number of key bus routes. The innovation is therefore being applied in theatre as part of enabling the delivery of Milton Keynes Council’s transport strategy to support Shared Smart Sustainabe transport. To illustrate this by examples, the outputs are now informing the planning and design of service design for transport operations such as parking provision, bus services and highway improvements. For parking this means understanding availability of spaces, directing traffic to these and developing information of price sensitivity and future parking space requirements.
Directing to under utilised parking areas could save the council over £100m in not having to oversupply spaces to ensure adequate supply (which is currently model). For buses providing space forecasts can ensure passenger enjoy a quality journey on a vehicle that has seats and has real time network location detected, and for highway improvement, these can be designed on the basis of very accurate traffic data, again ensuring the council manages its asset provision within available resources. The system is also generating additional business capability. Recently the main retail business partnership within MK has secured (funded) data from the parking sensors to provide directly to business so they can get a live forecast of where there are spaces for their employees and customers. The is supplemented by forecast generated from the machine learning so can advise on available at specific future time points. This taking significant frustration from drivers searching for spaces and reducing local congestion and air quality issues in busy parking lots centre is applying the d

3. Describe whether there was or are any obstacles or resistance to the innovation and if so, how were/are they being overcome.

There has not been any significant obstacles in deploying the system. Careful planning of the installations, using expert council installation teams reduced the impact of the installation on live highways, most work being undertaken over night. The use of low resolution camera without facial or vehicle registration plate recognition capabilities has removed issues of capturing and storing personal data, and a carefully constructed communications plan has ensured that the system is understood and value recognised by citizens. MKC received three enquiries from residents that were dealt with to the satisfaction of the respondent.

One major issue has been determining the value of the data captured and its application. The 'potential' value is very significant when each of the component costs of current data collection and use is considered. This is part of ongoing discussions between Vivacity and MKC, with the resolution looking towards creating an open data platform for the council to use for its non commercial planning and service design obligations/requirements and Vivacity creating a further market opportunities for providing the data to commercial organisations such as developers, transport operators and businesses.

F. Summary of the Desired Change or Outcome and how it is being Measured

Describe how the initiative, and in particular the innovation, is or will be making a qualitative and/or quantitative change and how that change or outcome is being measured. (350 words max)
1. What change(s) or outcome(s) have you already achieved or hope to achieve? Please describe the nature of the change(s) or outcome(s) in, for example, improved quality of life; new levels of social, economic or environmental sustainability, including new attitudes and behavior; improved efficiency, effectiveness, accountability or transparency, etc. Please describe the scale of the change, for example, primarily local, regional, national or global and where possible, please quantify the change(s) or outcome(s) being achieved.

The system became live in Milton Keynes in April 2018. The stage we are at at present is ensuring data accuracy and reliability. These tests are nearing completion with the system meeting its specified accuracy of 95% or better.

Positive outcomes include developing an initiative with the business community to report on parking availability, by the creation of a live forecasting capability to direct drivers to spaces. Monitoring of this is via satisfaction survey of our parking service and increased usage (income).

A further development in the pipeline is the creation of a 'motion map' app for resident to see live data about the busyness of all transport services therefore providing a real example of mobility as a service.

The sensors are also being linked to a network of air quality monitors so that live feeds can be developed to look at emerging issues.

The system has enabled further investment be brought into the city to develop an integrated Urban Traffic Management control (UTMC) system. Funded by Government this will create a control centre and capability to fully exploit the system to manage transport operation.

In summary the scale of change is primarily local at present, but with a clear pathway developed to realise the potential benefits outlined earlier in this application. Ultimately the system can be ground breaking and evolutionary. By way of an example, is the system is being integrated into the autonomous POD operation being deployed in MK at present (see UK Autodrive). The sensors with improved communication latency and when linked to a series of improved visual sensors will enable a control centre be created to support remote supervision of fleets of AVs scheduled for deployment in MK in 2019.

The project has almost universal support in Milton Keynes, as the benefits are understood and welcomed. The system supports all transport users, so does not suffer from a two speed approach that is often the case when developing independent / stand alone improvement for individual transport modes.

2. What indicators or metrics are you using to assess the change? Describe who is doing the measuring, and who is using the measurements and how.
The system is essentially self monitoring by the fact it captures all movement data and can report in real time changes. With AI/ machine learning capabilities it can look at changes in operation and forecast the longer term impact as trends continue or evolve.

The system will be integrated into a wider city UTMC capability, and the council will provide the monitoring and evaluation of the innovation and can direct investment on future initiatives based on reliable and complete sets of data.

Reporting is undertaken via an established monitoring function with MKC and working with partners such as the Transport Systems catapult (UK national body for transport based in Milton Keynes) the system can be maintained to a high degree of currency and capability.

3. Describe any specific tools or methods that were developed or applied to improve the chances to attain the desired outcome or change, for example, new working methods, new data and information, new incentives or disincentives, new means of communication and knowledge, new technology, etc.

Citireps in collaboration with MKC has developed its bespoke reporting functionality. An example of the output is included in the annexes to this submission. This product / tool allows the user to interrogate and respond to information and activity on the transport networks. The system was developed as a collaboration between MKC and Vivacity as a product that benefited from early user input into the design and capability. Included developing greater capability through combining with additional data sets such as blue tooth detection that enable journey time data to be combined into the overall functionality.

The system in now supporting consideration of how the traffic management function is undertaken within the authority. It is very likely that a specific control centre is not needed in the future, with the system using AI machine learning to self managing within pre determined tolerances and any issues outside these tolerance need only be alerted as and when they happen to a nominated controller with responsibility for specific aspect such as Passenger Transport, incident management, pedestrian surges etc. This will support greater efficiency in service provision and widen the skill set of existing staff.

4. How does the initiative and its intended changes or outcomes contribute to a new image or reputation for your city or community?

Milton Keynes was highlighted as the #1 smart city in the 2018 Huawei index for smart cities in the transport innovation category. Citireps as a key initiative along with a suite of related transport innovations (including deployment of CAVS, expanding electric vehicle parc and autonomous freight services) has helped in positioning MK as leading innovation hotbed. The exploration and creation of city scale initiatives are very much linked to enabling the city to develop as a vibrant economic and social hub in the UK. It has also helped cement MK as part of the UKs recent industrial strategy to concentrate innovation and growth along the MK, Oxford - Cambridge corridor. The system has attracted national and international attention with numerous fact finding missions hosted. It has also helped
increased investment in the city linked to automotive industries, with significant business such as VW, BMW, Red Bull, chargemaster, Honda, intertek and Network rail increasing investment and activity within the city

**G. Describe what you think other cities can learn from our initiative and what your city/community is prepared to do to further that learning.**

Other cities perhaps can benefit from understanding the approach MK has developed to initiate innovation within the city. To achieve this the council has set out a clear vision and strategy for its development over the next 20 year and set out that it expects creativity and innovation to be a cornerstone for delivery of this. It has opened the door to business innovators to work in the city, to work alongside the council to achieve shared outcomes (growth and business development). The innovative approach has clear support from senior leaders meaning the city can provide an urban laboratory (testbed) for the technology to be deployed. The council has a dedicated function area to explore and manage this activity and provides 'consultancy' (free) to other cities/communities on how they may benefit from lessons learned in MK. Attending events and conferences in a disseminating capacity is always looked on favourably with time made available to staff to undertake these activities. The city host visitors giving freely, honestly and openly time, information and advice.

**H. Relevance of the Initiative to the 2030 Agenda for Sustainable Development, Commonly Referred to as the “Sustainable Development Goals” and to the New Urban Agenda.**

Please tick the most appropriate boxes and provide a brief description of the relevance of your initiative in relation to the relevant goal(s). Please also refer to the complete text of the Sustainable Development Goals at: www.un.org/sustainabledevelopment/sustainable-development-goals./Regarding the New Urban Agenda please refer to the Action Framework for Implementing the New Urban Agenda at: www.unhabitat.org and http://nua.unhabitat.org/AFINUA19thApr.pdf

- Goal 1: End poverty in all of its forms
- Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3: Ensure healthy lives and promote well-being for all ages
- Goal 4: Ensure inclusive and equitable education and promote life-long learning opportunities for
all ☑ Goal 5: Achieve gender equality and empower all women and girls ☐ Goal 6: Ensure availability and sustainable management of water and sanitation for all ☑ Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all ☑ Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all ☐ Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation ☐ Goal 10: Reduce inequality within and among countries ☑ Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable

The relevant targets in the case of Goal 11:
- ☐ Target 1: Access for all to adequate, safe and affordable housing and basic services and upgrade slums
- ☑ Target 2: Access to safe, affordable, accessible and sustainable transport systems for all
- ☐ Target 3: Participatory, integrated and sustainable human settlement planning and management
- ☐ Target 4: Safeguard cultural and natural heritage
- ☐ Target 5: Reduce deaths and number of people affected by disasters with particular focus on the poor and people in vulnerable situations
- ☑ Target 6: Improve air quality and manage municipal and other wastes
- ☑ Target 7: Universal access to safe, inclusive and accessible green and public spaces, in particular of women, children older persons and persons with disabilities
- ☐ Target 8: Support positive economic, social and environmental links between urban, peri-urban and rural areas
- ☐ Target 9: Improving resource efficiency, mitigation and adaptation to climate change, resilience to disasters and implement holistic disaster risk management
- ☐ Target 10: Support least developed countries in building sustainable and resilient buildings utilizing local materials
- ☑ Goal 12: Ensure sustainable consumption and production patterns
- ☑ Goal 13: Take urgent action to combat climate change and its impacts
- ☐ Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- ☐ Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- ☐ Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions for all
- ☐ Goal 17: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

I. Descriptive Materials in Annex to the Document

These are materials destined to allow members of the Technical Committee and the Jury to have a better understanding of the context of your initiative which is a very important consideration. Please do not exceed the specifications below; anything that exceeds these specifications may not be availed to the Technical Committee or the Jury. Please provide, where possible and relevant, the following:
◆ Up to 5 press clippings or copies of covers and tables of content of reports published on the initiative.

◆ Up to 5 photos (with titles) that best illustrate the initiative (.jpeg at 300 dpi, 2000 x 2000 px max).

◆ Up to 5 graphics that best illustrate the initiative (300 dpi). These graphics could illustrate for example, trends, ratios or percentages; tools or technologies; etc.

◆ 1 map that best illustrates the physical context of the initiative (300 dpi)

◆ 1 chart that best illustrates the initiative (300 dpi)

◆ 1 technical drawing (300 dpi)

J. Additional material

Any additional material such as videos should be submitted on a DVD/CD or by email to the Secretariat at info@guangzhouaward.org.

Note: Any additional material should be submitted to the Secretariat via email or mailing.

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